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FCC RADIO TEST REPORT

Applicant's company	**Hewlett-Packard Company**
Applicant Address	8000 Foothills Blvd. Roseville, CA 95747
FCC ID	**RTPMRLBB1403**
Manufacturer's company	**Joy Technology (ShenZhen) Corporation**
Manufacturer Address	Building A,B,C,D, HengKeng Ind., Shangpai, Shangwu,Aiqun Rd., Shiyan Town,Shenzhen 518135 China

Product Name	802.11ac WLAN Radio
Brand Name	HP
Model No.	MRLBB-1403
Product No.	5066-3786
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5250 ~ 5350MHz / 5470 ~ 5725MHz
Received Date	May 28, 2014
Final Test Date	Aug. 17, 2015
Submission Type	Class II Change
Operating Mode	Master

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 C63.10-2009**, **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
FR410910-05	Rev. 01	Initial issue of report	Aug. 20, 2015

1. VERIFICATION OF COMPLIANCE

Product Name	:	802.11ac WLAN Radio
Brand Name	:	HP
Model No.	:	MRLBB-1403
Product No	:	5066-3786
Applicant	:	Hewlett-Packard Company
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 May 28, 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	13.42 dB
4.2	15.407(a)	26dB Spectrum Bandwidth and 99% Occupied Bandwidth	Complies	-
4.3	15.407(a)	Maximum Conducted Output Power	Complies	0.19 dB
4.4	15.407(a)	Power Spectral Density	Complies	0.01 dB
4.5	15.407(b)	Radiated Emissions	Complies	6.31 dB
4.6	15.407(b)	Band Edge Emissions	Complies	0.02 dB
4.7	15.407(g)	Frequency Stability	Complies	-
4.8	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n/ac

Items	Description
Product Type	WLAN (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From host system
Modulation	see the below table for IEEE 802.11n/ac
Data Modulation	For 802.11n: OFDM (BPSK / QPSK / 16QAM / 64QAM) For 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Data Rate (Mbps)	see the below table for IEEE 802.11n/ac
Frequency Range	5250 ~ 5350MHz / 5470 ~ 5725MHz
Channel Number	15 for 20MHz bandwidth ; 7 for 40MHz bandwidth 3 for 80MHz bandwidth
Channel Band Width (99%)	Band 2: 802.11ac MCS0/Nss1 (VHT20): 18.56 MHz ; 802.11ac MCS0/Nss1 (VHT40): 37.12 MHz ; 802.11ac MCS0/Nss1 (VHT80): 74.88 MHz Band 3: 802.11ac MCS0/Nss1 (VHT20): 18.40 MHz ; 802.11ac MCS0/Nss1 (VHT40): 36.80 MHz ; 802.11ac MCS0/Nss1 (VHT80): 76.40 MHz
Maximum Conducted Output Power	Band 2: 802.11ac MCS0/Nss1 (VHT20): 20.21 dBm ; 802.11ac MCS0/Nss1 (VHT40): 22.99 dBm ; 802.11ac MCS0/Nss1 (VHT80): 14.61 dBm Band 3: 802.11ac MCS0/Nss1 (VHT20): 20.33 dBm ; 802.11ac MCS0/Nss1 (VHT40): 22.89 dBm ; 802.11ac MCS0/Nss1 (VHT80): 23.31 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

IEEE 802.11a

Items	Description
Product Type	WLAN (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From host system
Modulation	OFDM for IEEE 802.11a
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	OFDM (6/9/12/18/24/36/48/54)
Frequency Range	5250 ~ 5350MHz / 5470 ~ 5725MHz
Channel Number	15
Channel Band Width (99%)	Bnad 2: 17.12 MHz ; Bnad 3: 17.12 MHz
Maximum Conducted Output Power	Band 2: 20.11 dBm ; Band 3: 19.80 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
TPC Function	☒ With TPC	☐ Without TPC
Weather Band (5600~5650MHz)	☒ With 5600~5650MHz	☐ Without 5600~5650MHz
Beamforming Function	☐ With beamforming	☒ Without beamforming

Antenna and Band width

Antenna	Three (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)	3	MCS 0-23
802.11n (HT40)	3	MCS 0-23
802.11ac (VHT20)	3	MCS 0-9/Nss1-3
802.11ac (VHT40)	3	MCS 0-9/Nss1-3
802.11ac (VHT80)	3	MCS 0-9/Nss1-3

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

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

N/A

3.3. Table for Filed Antenna

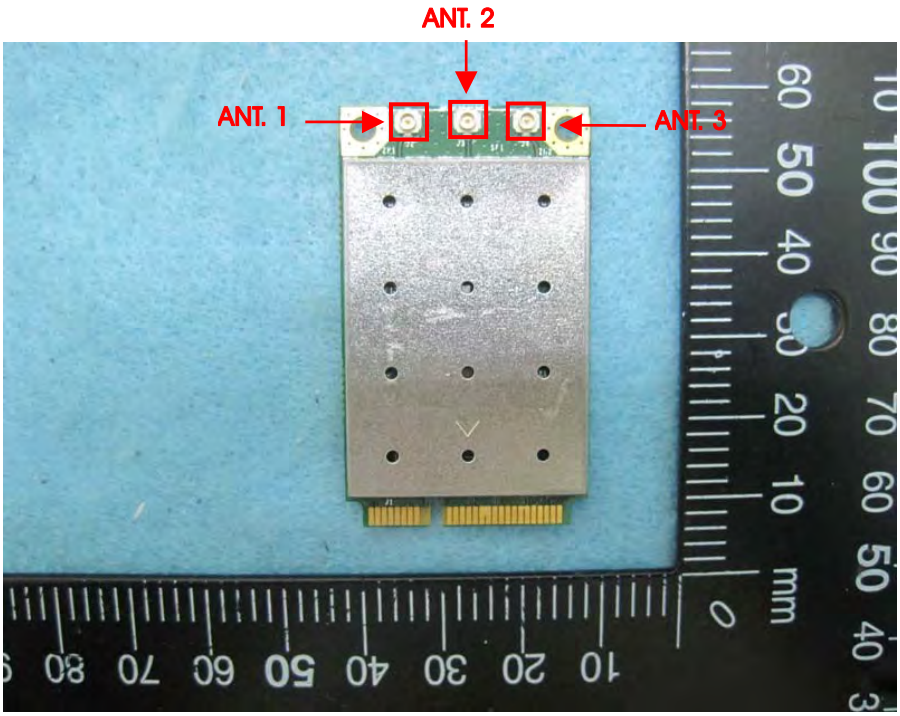
Ant.	Brand	Part No.	Antenna Type	Connector	Gain (dBi)
1	M.gear	120300000095A	PCB Antenna	I-PEX	5.6
2	M.gear	120300000095A	PCB Antenna	I-PEX	5.5
3	M.gear	120300000095A	PCB Antenna	I-PEX	6.5

Note: The EUT has three Antennas.

For IEEE 802.11a/n/ac mode (3TX/3RX):

Ant. 1, Ant. 2 and Ant. 3 can be used as transmitting/receiving antennas.

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



3.4. Table for Carrier Frequencies

There are three bandwidth systems.

For 20MHz bandwidth systems, use Channel 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128,132, 136, 140.

For 40MHz bandwidth systems, use Channel 54, 62, 102, 110, 118, 126, 134.

For 80MHz bandwidth systems, use Channel 58, 106 122.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5250~5350 MHz Band 2	52	5260 MHz	60	5300 MHz
	54	5270 MHz	62	5310 MHz
	56	5280 MHz	64	5320 MHz
	58	5290 MHz	-	-
5470~5725 MHz Band 3	100	5500 MHz	120	5600 MHz
	102	5510 MHz	122	5610 MHz
	104	5520 MHz	124	5620 MHz
	106	5530 MHz	126	5630 MHz
	108	5540 MHz	128	5640 MHz
	110	5550 MHz	132	5660 MHz
	112	5560 MHz	134	5670 MHz
	116	5580 MHz	136	5680 MHz
	118	5590 MHz	140	5700 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	Antenna
AC Power Conducted Emission	CTX		-	-	-
Max. Conducted Output Power	11ac VHT20	Band 2-3	MCS0/Nss1	52/60/64/100/116/140	1+2+3
	11ac VHT40	Band 2-3	MCS0/Nss1	54/62/102/110/134	1+2+3
	11ac VHT80	Band 2-3	MCS0/Nss1	58/106/122	1+2+3
	11a/BPSK	Band 2-3	6Mbps	52/60/64/100/116/140	1+2+3
Power Spectral Density	11ac VHT20	Band 2-3	MCS0/Nss1	52/60/64/100/116/140	1+2+3
	11ac VHT40	Band 2-3	MCS0/Nss1	54/62/102/110/134	1+2+3
	11ac VHT80	Band 2-3	MCS0/Nss1	58/106/122	1+2+3
	11a/BPSK	Band 2-3	6Mbps	52/60/64/100/116/140	1+2+3
26dB Spectrum Bandwidth 99% Occupied Bandwidth Measurement	11ac VHT20	Band 2-3	MCS0/Nss1	52/60/64/100/116/140	1+2+3
	11ac VHT40	Band 2-3	MCS0/Nss1	54/62/102/110/134	1+2+3
	11ac VHT80	Band 2-3	MCS0/Nss1	58/106/122	1+2+3
	11a/BPSK	Band 2-3	6Mbps	52/60/64/100/116/140	1+2+3
Radiated Emission Below 1GHz	CTX		-	-	-
Radiated Emission Above 1GHz	11ac VHT20	Band 2-3	MCS0/Nss1	52/60/64/100/116/140	1+2+3
	11ac VHT40	Band 2-3	MCS0/Nss1	54/62/102/110/134	1+2+3
	11ac VHT80	Band 2-3	MCS0/Nss1	58/106/122	1+2+3
	11a/BPSK	Band 2-3	6Mbps	52/60/64/100/116/140	1+2+3

Band Edge Emission	11ac VHT20	Band 2-3	MCS0/Nss1	52/60/64/100/116/140	1+2+3
	11ac VHT40	Band 2-3	MCS0/Nss1	54/62/102/110/134	1+2+3
	11ac VHT80	Band 2-3	MCS0/Nss1	58/106/122	1+2+3
	11a/BPSK	Band 2-3	6Mbps	52/60/64/100/116/140	1+2+3
Frequency Stability	Un-modulation		-	60/100	1+2+3

Note: 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.

3.6. 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 Class II Change

This product is an extension of original one reported under Sporton project number: FR410910-01
Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Adding Band 2 and Band 3 (5250~5350 MHz, 5470~5725 MHz) for this device. 2. Change Applicant address to "8000 Foothills Blvd. Roseville, CA 95747" from "3000 Hanover Street Palo Alto, California 94304 U.S.A." 3. Change FCC ID to "RTPMRLBB1403" from "B94MRLBB1403"	1. AC Power Line Conducted Emissions 2. 26dB Spectrum Bandwidth and 99% Occupied Bandwidth 3. Maximum Conducted Output Power 4. Power Spectral Density 5. Radiated Emissions<Above 1GHz> 6. Band Edge Emissions 7. Frequency Stability

Note: Radiated Emissions (below 1GHz) was based on the original report: FR410910-01

3.8. Table for Supporting Units

For Test Site No: 03CH01-CB (for Other Frequency)

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC
Test Fixture	ACCTON	AC46074246	N/A

For Test Site No: 03CH01-CB (for 5610MHz)

Support Unit	Brand	Model	FCC ID
NB	DELL	M1330	DoC
Test Fixture	ACCTON	AC46074246	N/A

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E6430	DoC
Test Fixture	ACCTON	AC46074246	N/A

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E6430	DoC
Test Fixture	ACCTON	AC46074246	N/A

3.9. 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.

Power Parameters of IEEE 802.11ac MCS0/Nss1 VHT20

Test Software Version	DOS					
Frequency	5260 MHz	5300 MHz	5320 MHz	5500 MHz	5580 MHz	5700 MHz
MCS0/Nss1 VHT20	15.5	15.5	15.5	14.5	14.5	15

Power Parameters of IEEE 802.11ac MCS0/Nss1 VHT40

Test Software Version	DOS				
Frequency	5270 MHz	5310 MHz	5510 MHz	5550 MHz	5670 MHz
MCS0/Nss1 VHT40	19	16	15.5	18.5	14.5

Power Parameters of IEEE 802.11ac MCS0/Nss1 VHT80

Test Software Version	DOS		
Frequency	5290 MHz	5530 MHz	5610 MHz
MCS0/Nss1 VHT80	11	10.5	18

Power Parameters of IEEE 802.11a

Test Software Version	DOS					
Frequency	5260 MHz	5300 MHz	5320 MHz	5500 MHz	5580 MHz	5700 MHz
802.11a	15	15.5	15	14	14	14.5

3.10. EUT Operation during Test

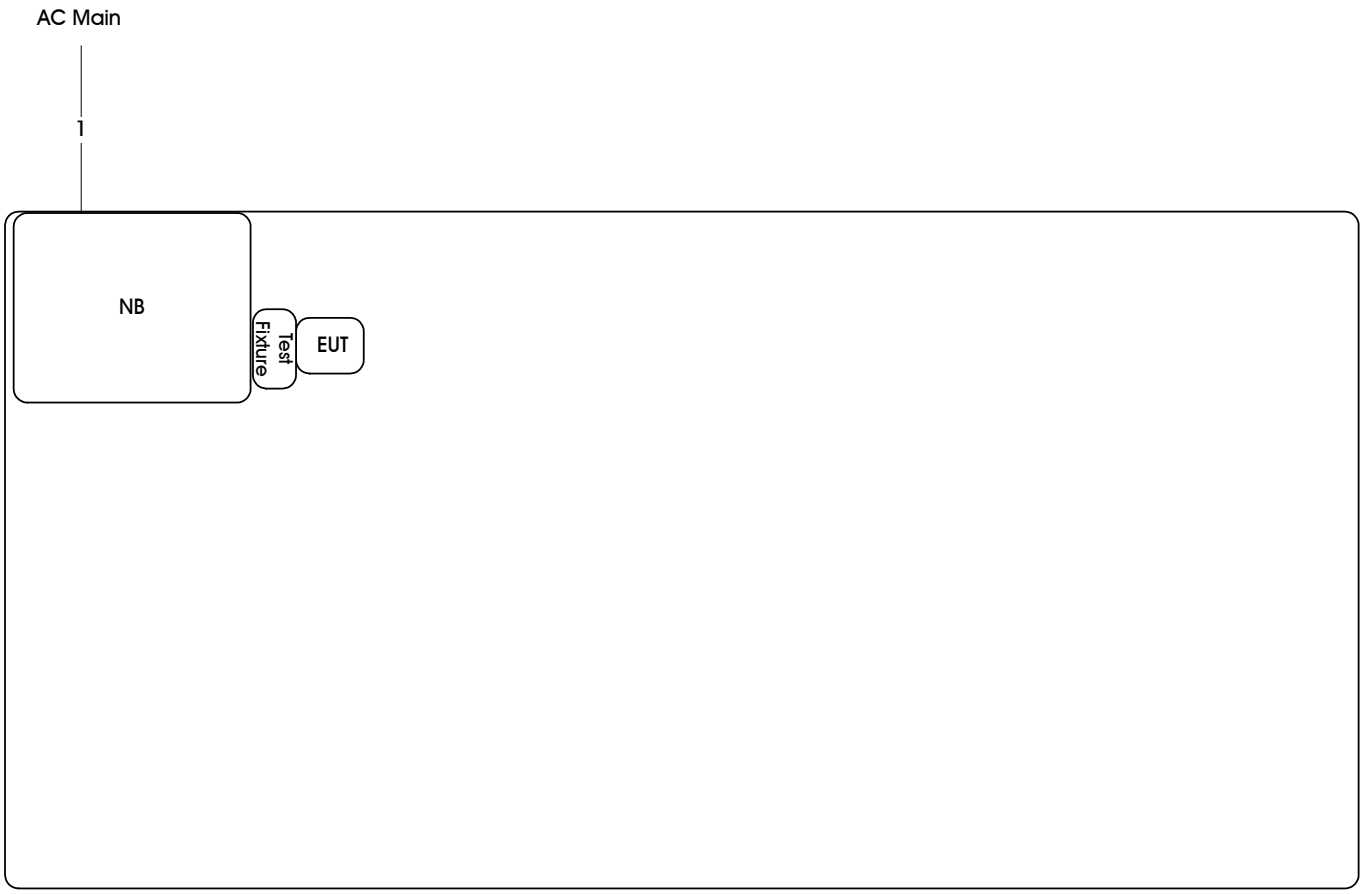
The EUT was programmed to be in continuously transmitting mode.

3.11. Duty Cycle

Mode	On Time(ms)	On+Off Time(ms)	Duty Cycle(%)	1/T Minimum VBW (kHz)
802.11ac MCS0/Nss1 VHT20	2.020	2.060	98.06%	0.01
802.11ac MCS0/Nss1 VHT40	1.880	1.940	96.91%	0.53
802.11ac MCS0/Nss1 VHT80	0.924	0.984	93.90%	1.08
802.11a	0.456	0.504	90.48%	2.19

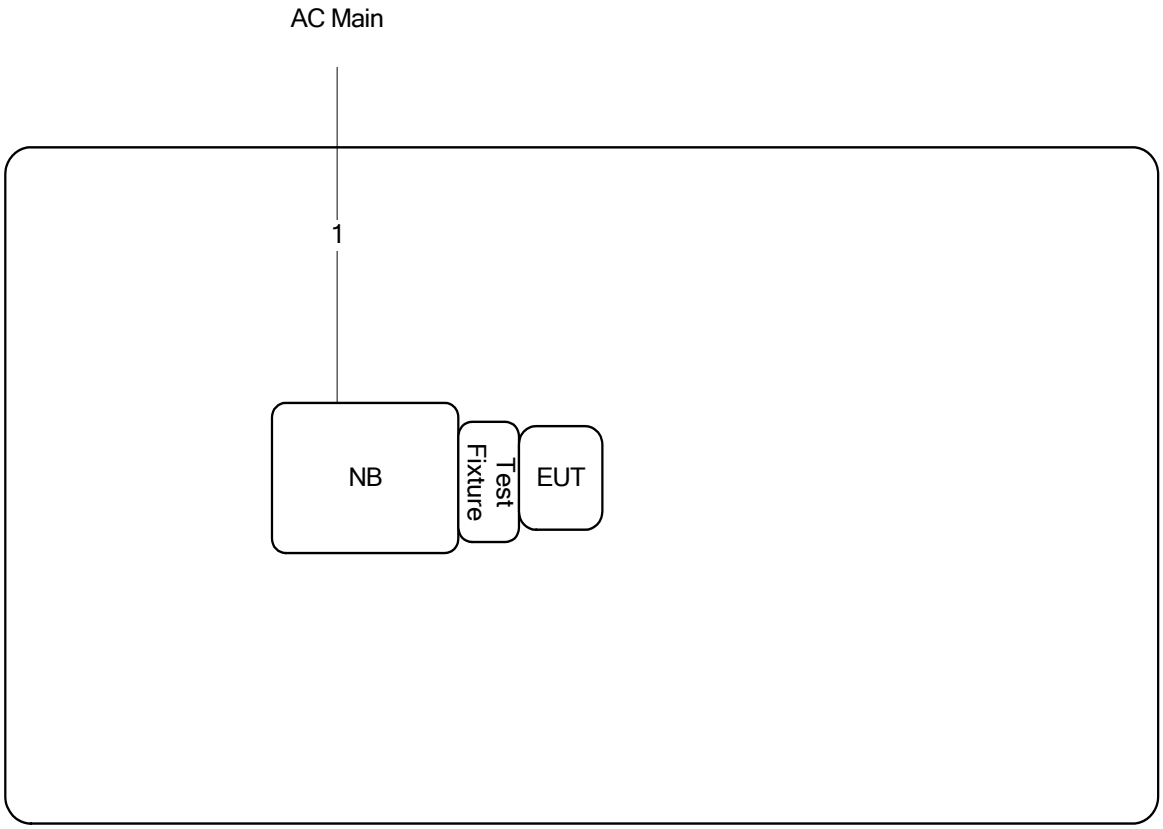
3.12.Test Configurations

3.12.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shield	Length
1	Power cable	No	2.6m

3.12.2. Radiation Emissions Test Configuration



Item	Connection	Shielded	Length(m)
1	Power cable	No	2.6m

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

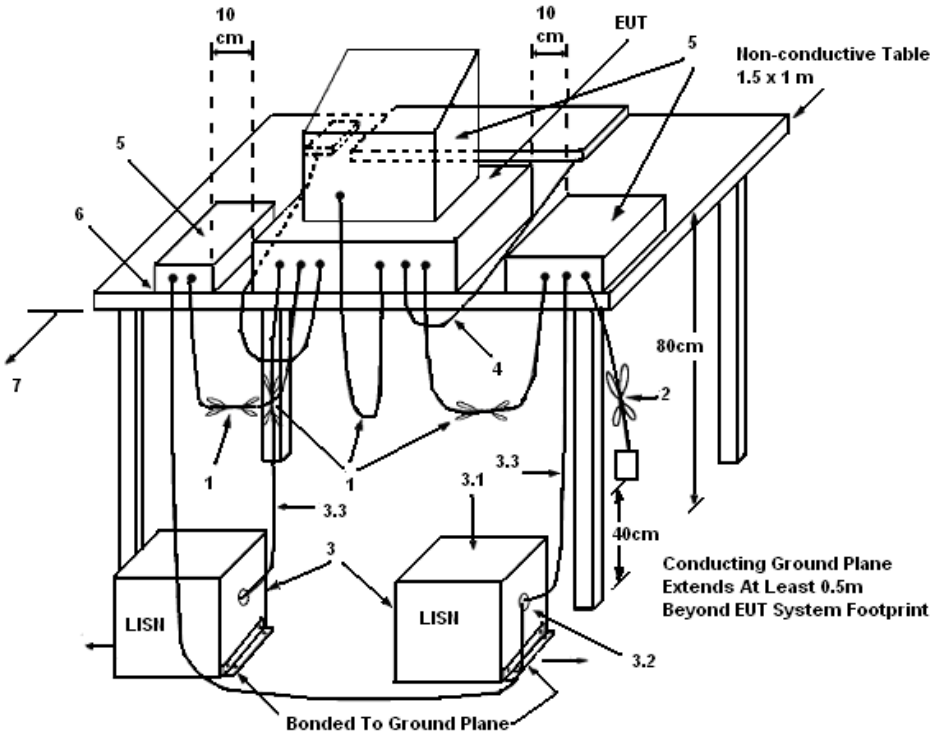
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

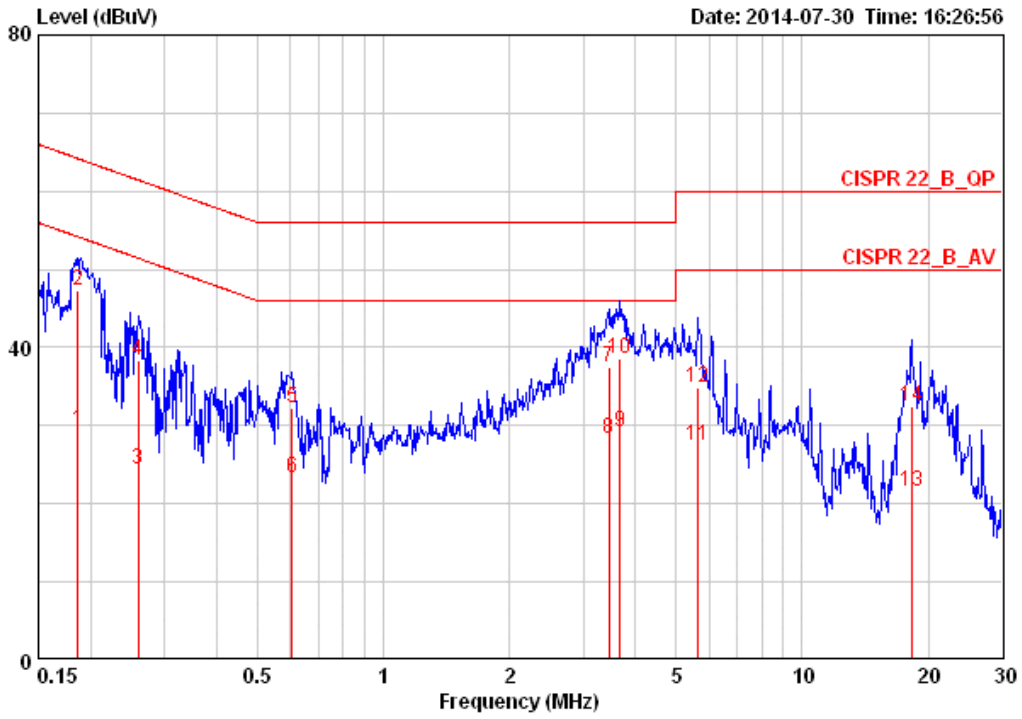
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

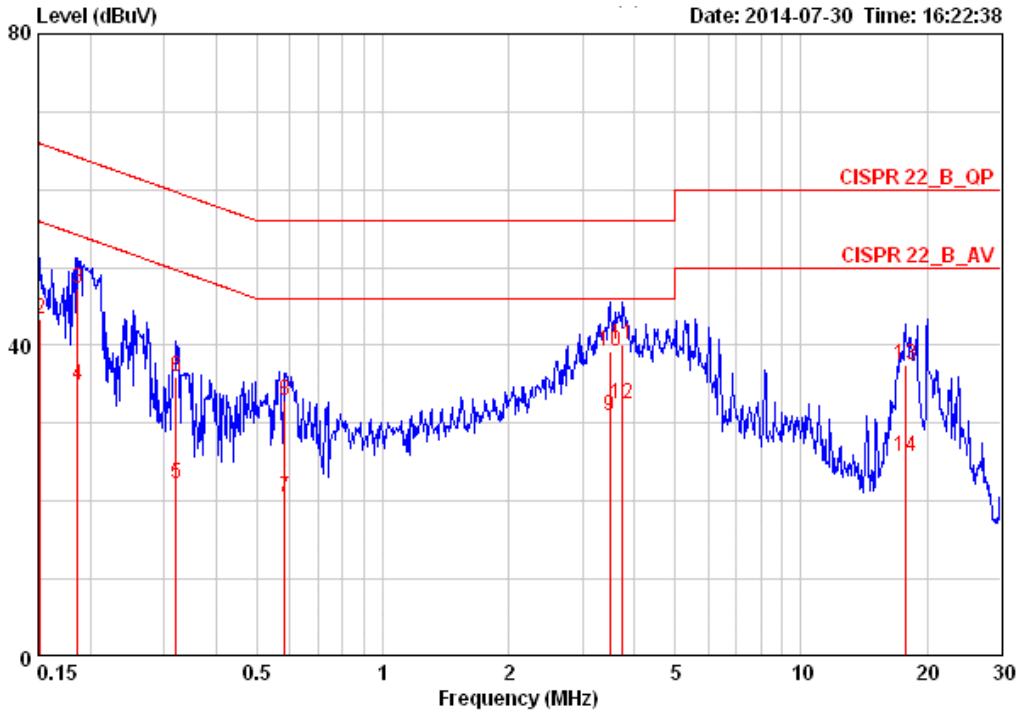
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	25°C	Humidity	52%
Test Engineer	Parody Lin	Phase	Line
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	LISN Factor	Read Level	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dB	dBuV	dB		
1	0.18640	29.32	-24.87	54.20	0.10	29.06	0.16	LINE	AVERAGE
2	0.18640	47.29	-16.90	64.20	0.10	47.03	0.16	LINE	QP
3	0.26026	24.39	-27.03	51.42	0.10	24.12	0.17	LINE	AVERAGE
4	0.26026	38.33	-23.09	61.42	0.10	38.06	0.17	LINE	QP
5	0.60431	32.22	-23.78	56.00	0.11	31.92	0.19	LINE	QP
6	0.60431	23.24	-22.76	46.00	0.11	22.94	0.19	LINE	AVERAGE
7	3.454	37.59	-18.41	56.00	0.20	37.10	0.29	LINE	QP
8	3.454	28.24	-17.76	46.00	0.20	27.75	0.29	LINE	AVERAGE
9 @	3.681	29.31	-16.69	46.00	0.20	28.81	0.29	LINE	AVERAGE
10	3.681	38.56	-17.44	56.00	0.20	38.06	0.29	LINE	QP
11	5.623	27.48	-22.52	50.00	0.26	26.89	0.33	LINE	AVERAGE
12	5.623	34.84	-25.16	60.00	0.26	34.25	0.33	LINE	QP
13	18.232	21.51	-28.49	50.00	0.46	20.56	0.49	LINE	AVERAGE
14	18.232	32.51	-27.49	60.00	0.46	31.56	0.49	LINE	QP

Temperature	25°C	Humidity	52%
Test Engineer	Parody Lin	Phase	Neutral
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	LISN Factor	Read Level	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dB	dBuV	dB		
1	0.15160	31.12	-24.79	55.91	0.09	30.87	0.16	NEUTRAL	AVERAGE
2	0.15160	43.36	-22.55	65.91	0.09	43.11	0.16	NEUTRAL	QP
3	0.18640	47.28	-16.91	64.20	0.09	47.03	0.16	NEUTRAL	QP
4	0.18640	34.92	-19.27	54.20	0.09	34.67	0.16	NEUTRAL	AVERAGE
5	0.31999	22.19	-27.52	49.71	0.09	21.92	0.18	NEUTRAL	AVERAGE
6	0.31999	36.02	-23.69	59.71	0.09	35.75	0.18	NEUTRAL	QP
7	0.58231	20.42	-25.58	46.00	0.10	20.13	0.19	NEUTRAL	AVERAGE
8	0.58231	33.01	-22.99	56.00	0.10	32.72	0.19	NEUTRAL	QP
9 @	3.491	30.96	-15.04	46.00	0.18	30.49	0.29	NEUTRAL	AVERAGE
10	3.491	39.28	-16.72	56.00	0.18	38.81	0.29	NEUTRAL	QP
11 @	3.740	40.14	-15.86	56.00	0.18	39.66	0.29	NEUTRAL	QP
12 @	3.740	32.58	-13.42	46.00	0.18	32.10	0.29	NEUTRAL	AVERAGE
13	17.755	37.39	-22.61	60.00	0.42	36.49	0.48	NEUTRAL	QP
14	17.755	25.70	-24.30	50.00	0.42	24.80	0.48	NEUTRAL	AVERAGE

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	21°C	Humidity	62%
Test Engineer	Jim Huang / Andy Tsai	Configurations	IEEE 802.11ac

Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
52	5260 MHz	24.16	18.56
60	5300 MHz	24.00	18.56
64	5320 MHz	24.80	18.56
100	5500 MHz	24.16	18.40
116	5580 MHz	24.16	18.08
140	5700 MHz	24.16	17.92

Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
54	5270 MHz	45.76	37.12
62	5310 MHz	45.12	36.80
102	5510 MHz	43.20	36.16
110	5550 MHz	48.96	36.80
134	5670 MHz	44.16	36.16

Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. 1 + Ant. 2 + Ant. 3

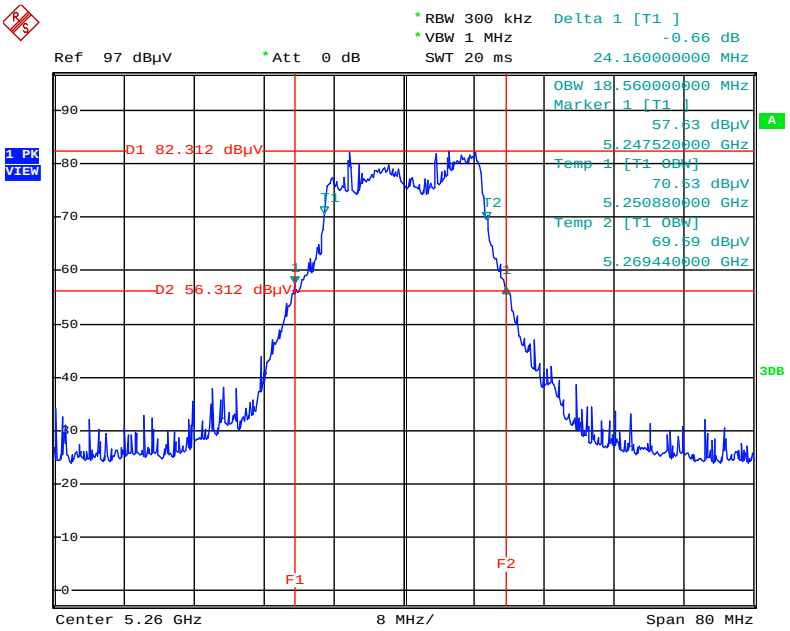
Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
58	5290 MHz	92.80	74.88
106	5530 MHz	99.84	74.88
122	5610 MHz	94.40	76.40

Temperature	21℃	Humidity	62%
Test Engineer	Jim Huang	Configurations	IEEE 802.11a

Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3

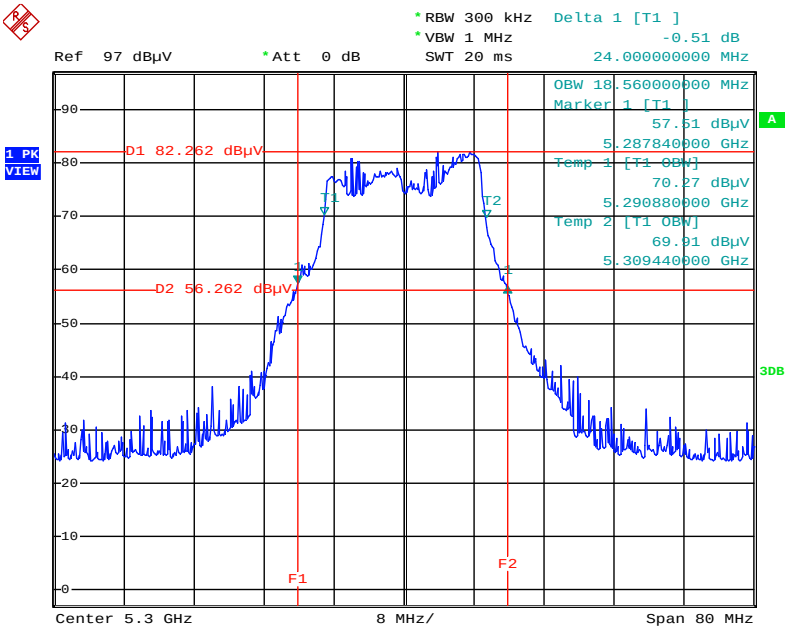
Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
52	5260 MHz	22.56	17.12
60	5300 MHz	22.88	17.12
64	5320 MHz	22.56	16.96
100	5500 MHz	22.88	17.12
116	5580 MHz	21.76	17.12
140	5700 MHz	22.40	17.12

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 / 5260 MHz



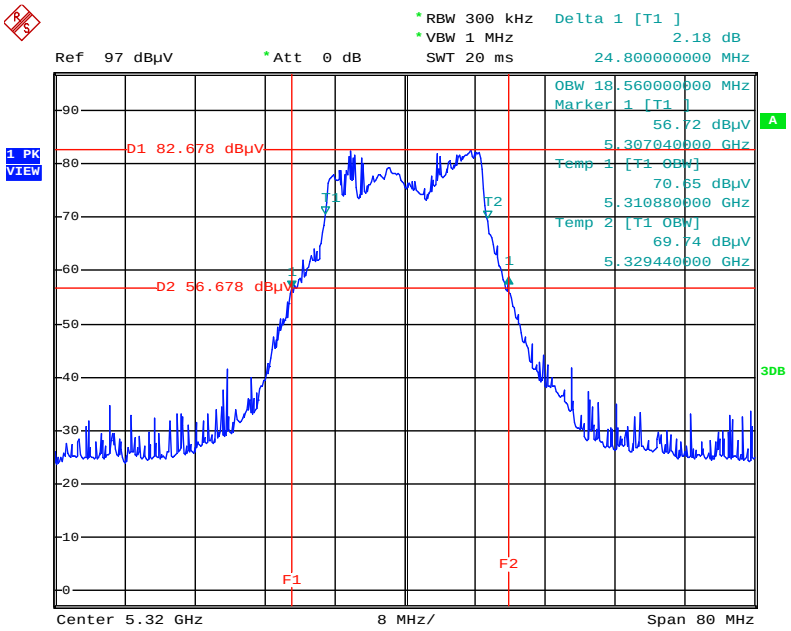
Date: 1.AUG.2014 17:30:35

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 / 5300 MHz



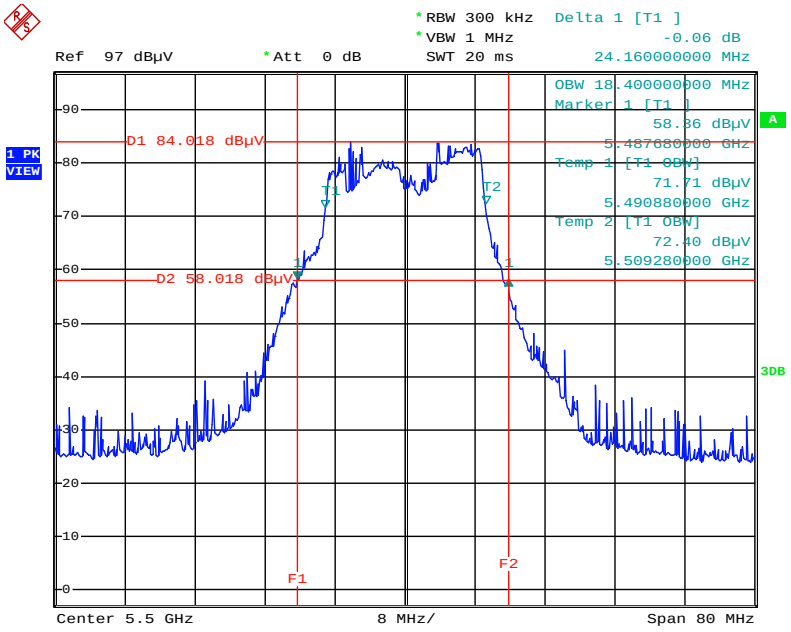
Date: 1.AUG.2014 17:31:17

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 / 5320 MHz



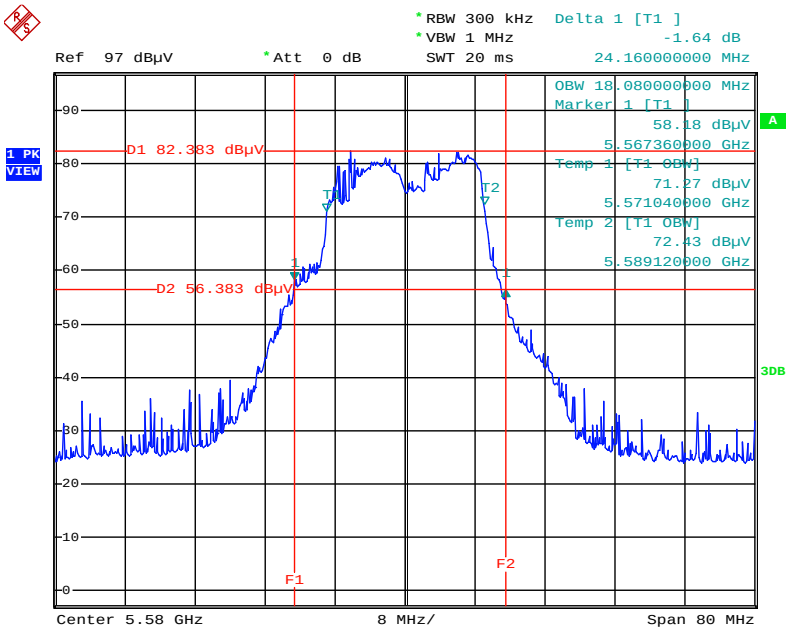
Date: 1.AUG.2014 17:32:55

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 / 5500 MHz



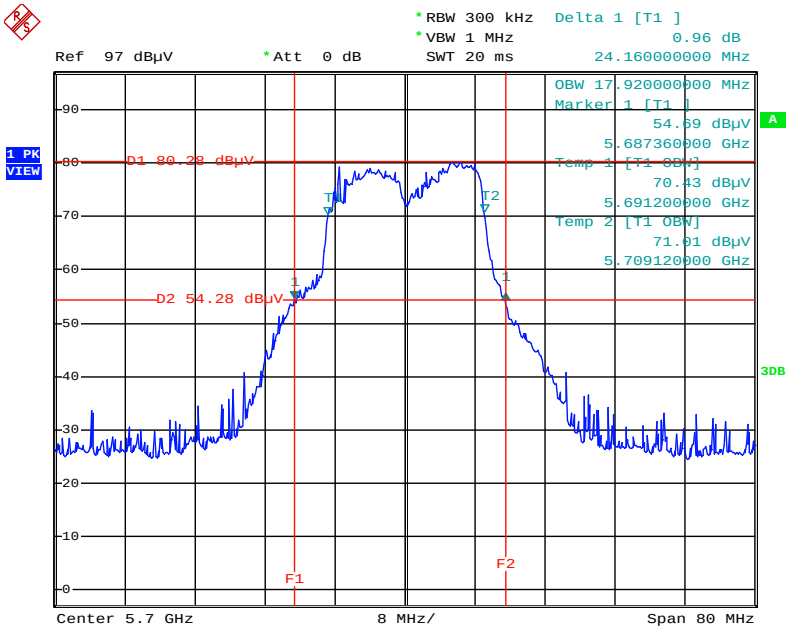
Date: 1.AUG.2014 17:33:48

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 / 5580 MHz



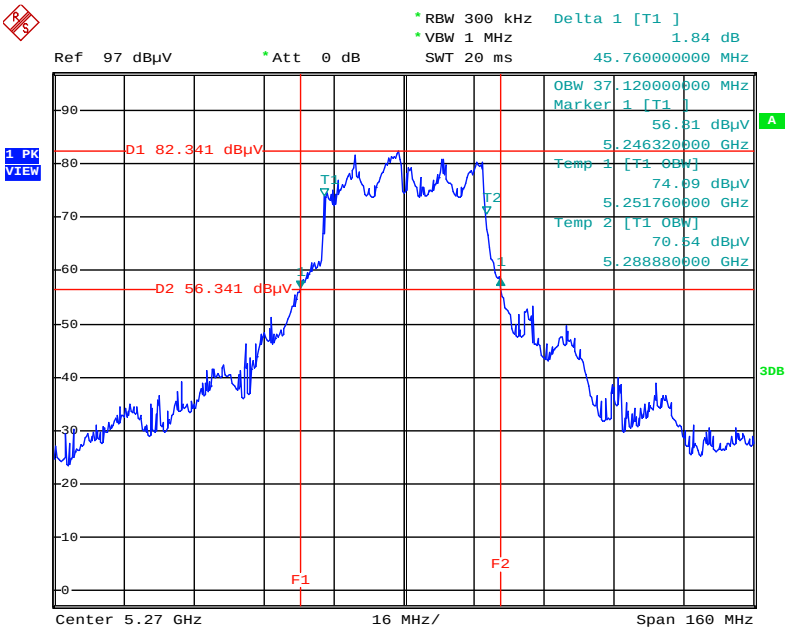
Date: 1.AUG.2014 17:34:51

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 / 5700 MHz



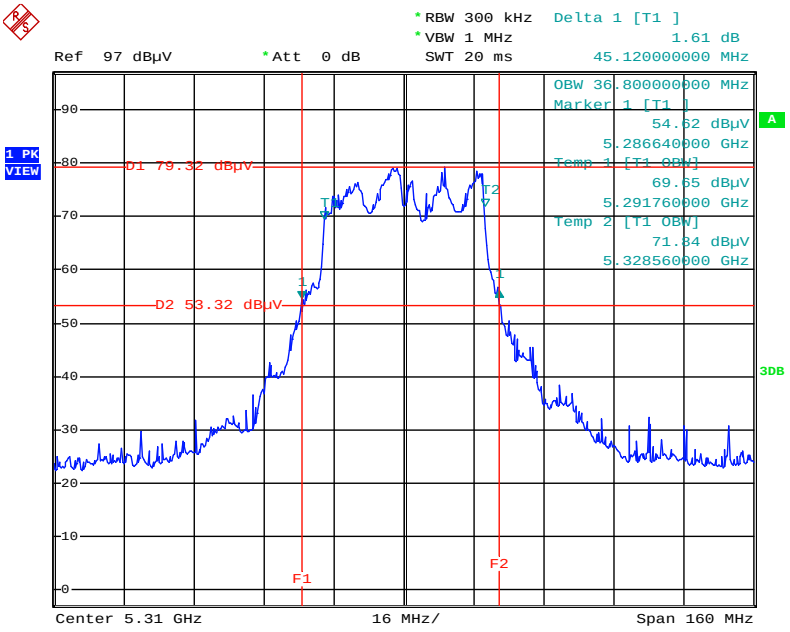
Date: 1.AUG.2014 17:36:21

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 / 5270 MHz



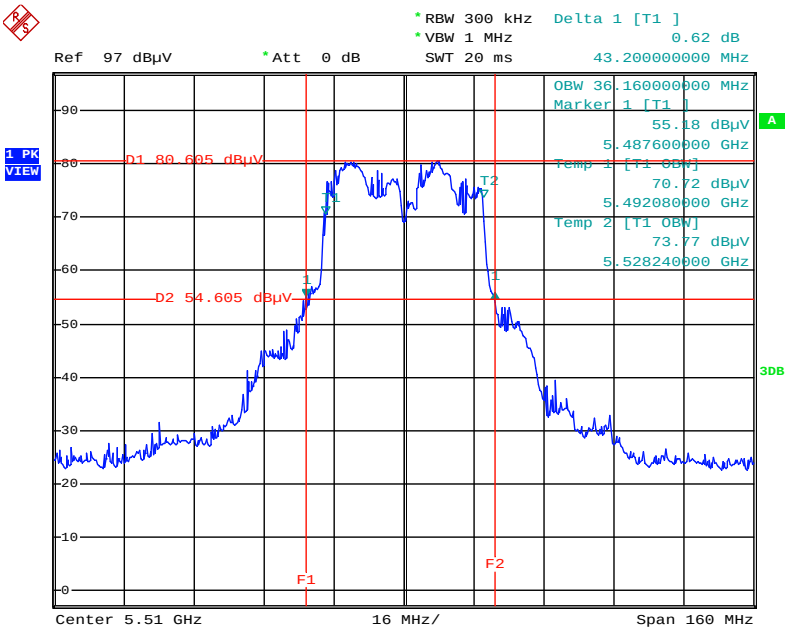
Date: 1.AUG.2014 17:37:43

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 / 5310 MHz



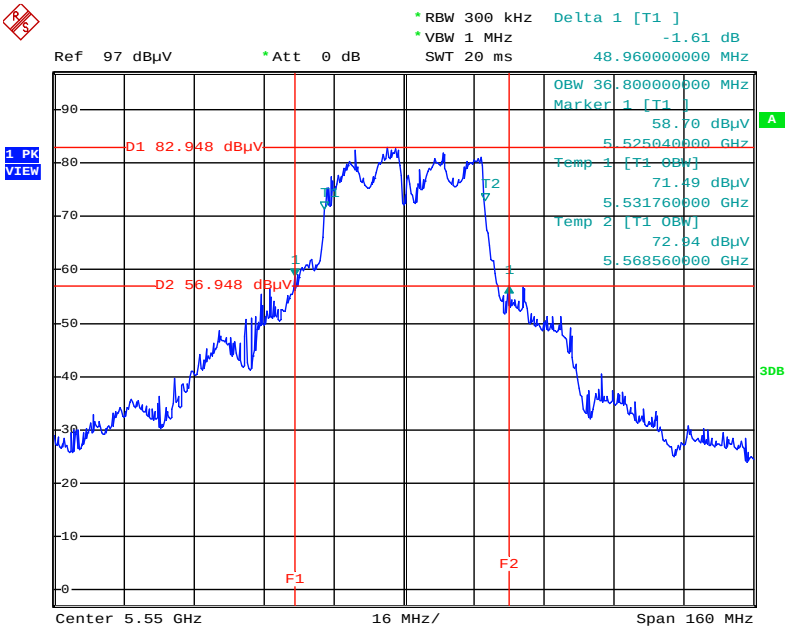
Date: 1.AUG.2014 17:38:46

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 / 5510 MHz



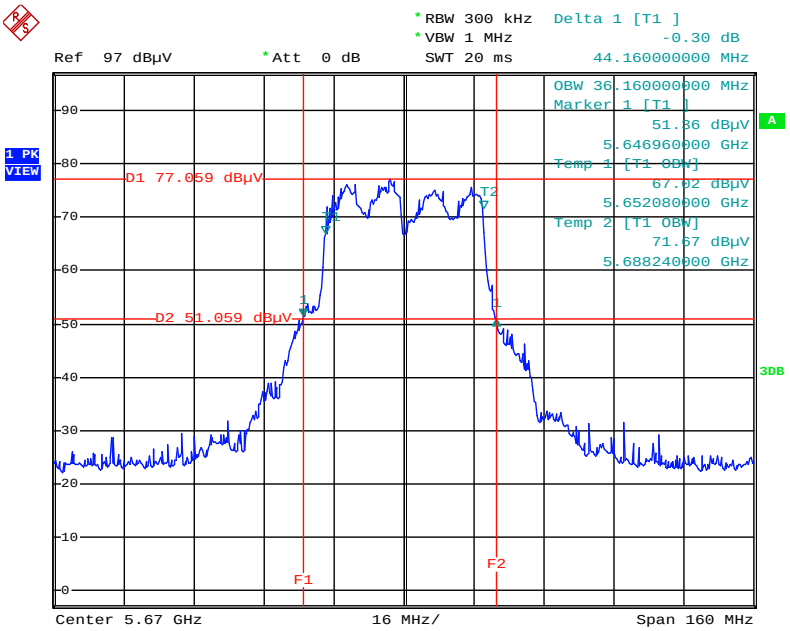
Date: 1.AUG.2014 17:39:52

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 / 5550 MHz



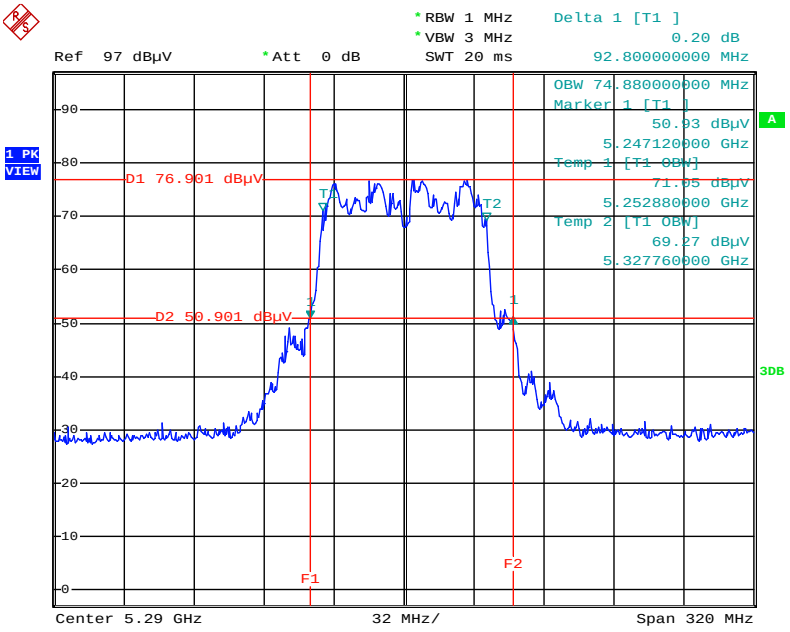
Date: 1.AUG.2014 17:40:35

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 / 5670 MHz



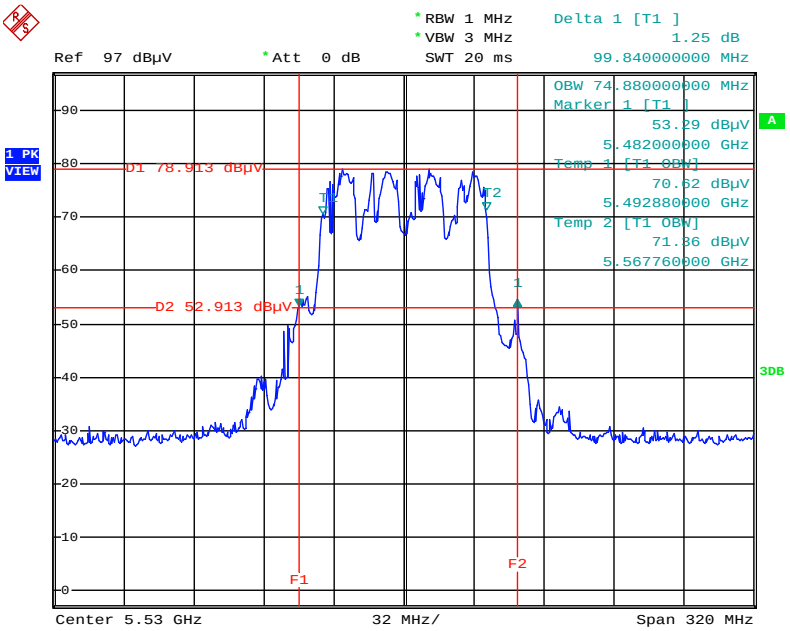
Date: 1.AUG.2014 17:41:20

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. 1 + Ant. 2 + Ant. 3 / 5290 MHz



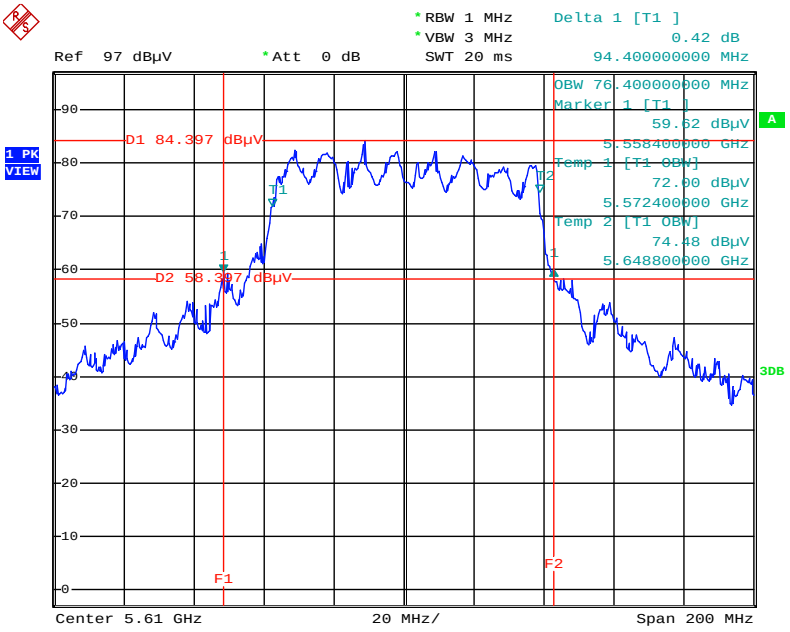
Date: 1.AUG.2014 17:43:24

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. 1 + Ant. 2 + Ant. 3 / 5530 MHz



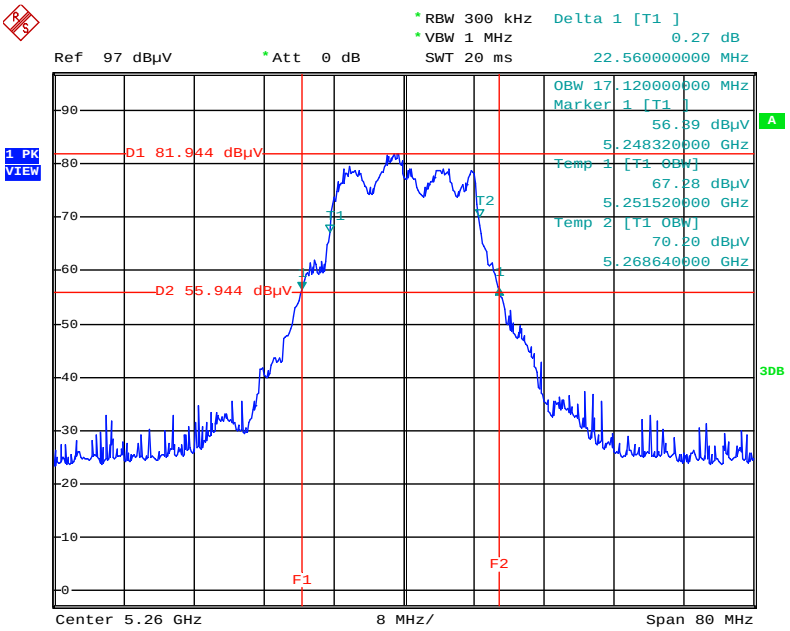
Date: 1.AUG.2014 17:48:36

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. 1 + Ant. 2 + Ant. 3 / 5610 MHz



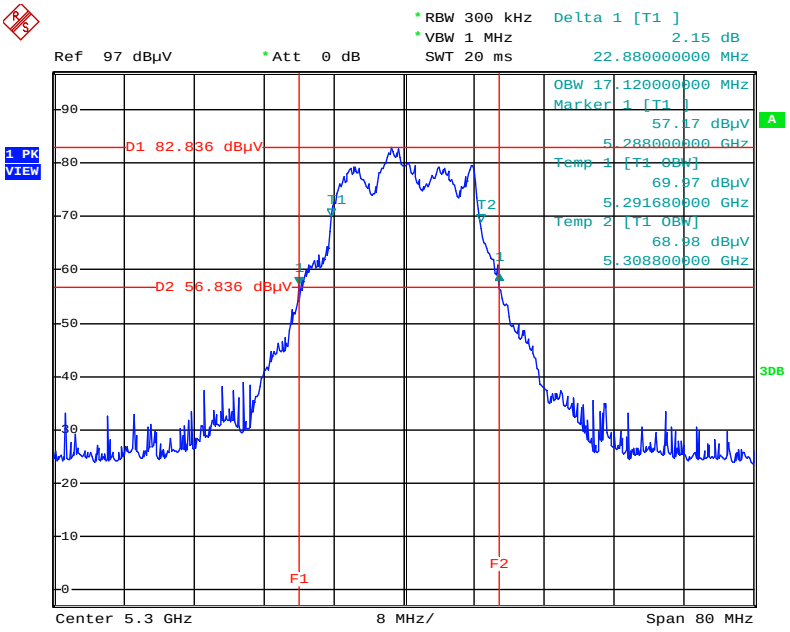
Date: 17.AUG.2015 22:49:08

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 / 5260 MHz



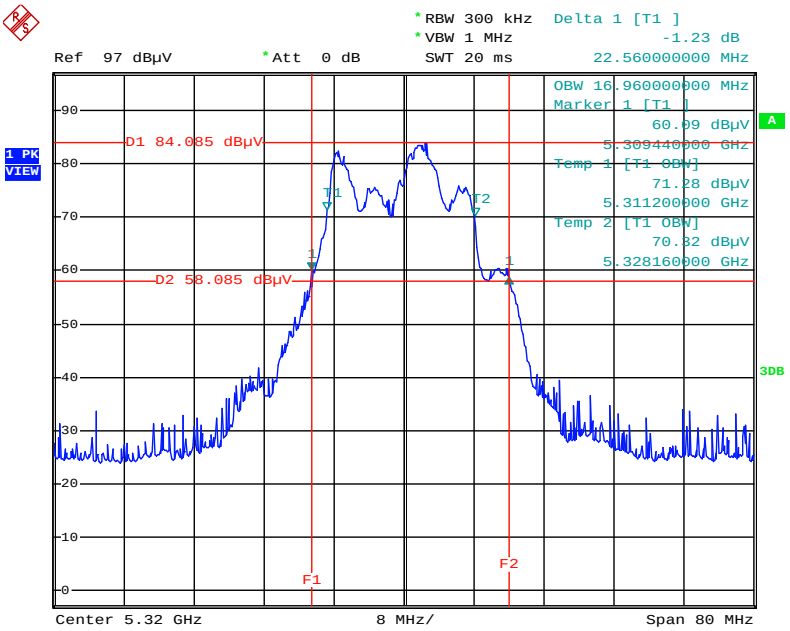
Date: 1.AUG.2014 17:20:43

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 / 5300 MHz



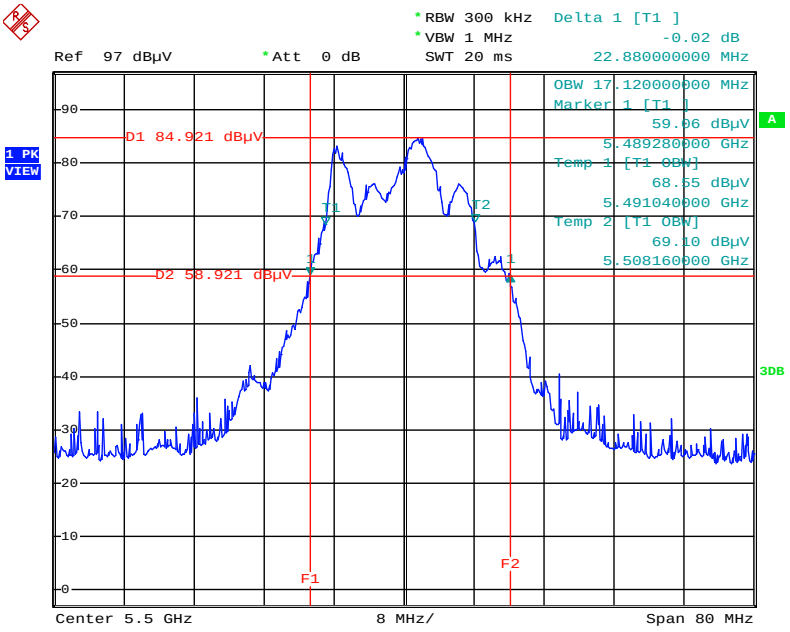
Date: 1.AUG.2014 17:21:36

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 / 5320 MHz



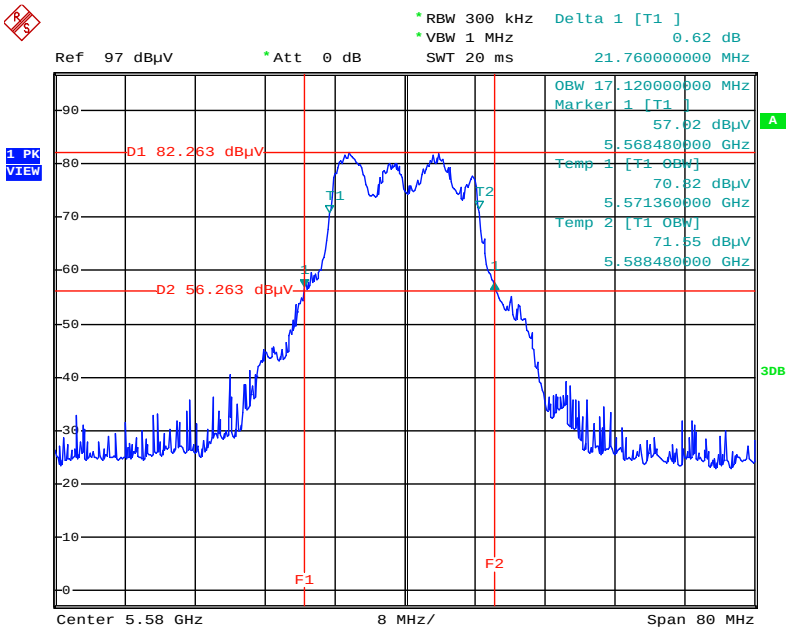
Date: 1.AUG.2014 17:23:24

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 / 5500 MHz



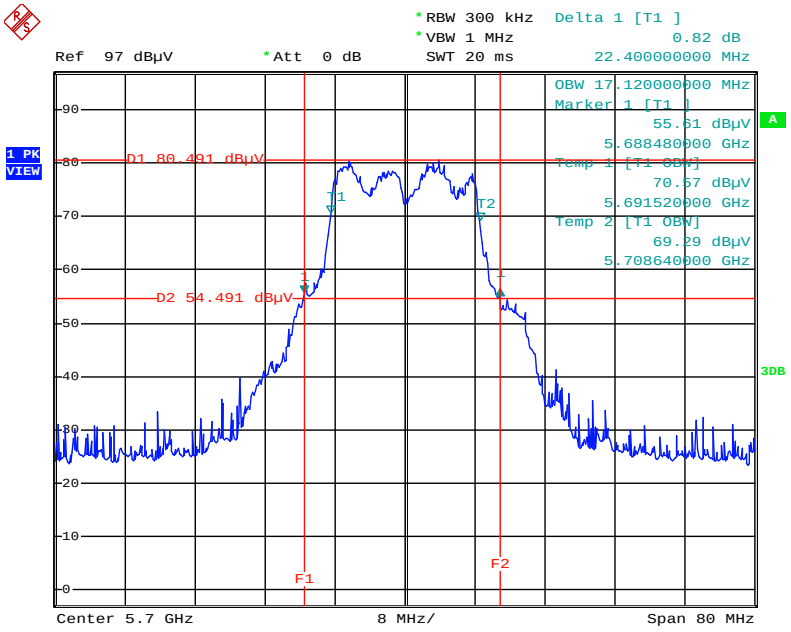
Date: 1.AUG.2014 17:27:11

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 / 5580 MHz



Date: 1.AUG.2014 17:27:43

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 / 5700 MHz



Date: 1.AUG.2014 17:29:02

4.3. Maximum Conducted Output Power Measurement

4.3.1. Limit

For the 5.25-5.35 GHz and 5.470-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW (24dBm) or 11 dBm + 10log B, where B is the 26-dB emission bandwidth in MHz. 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

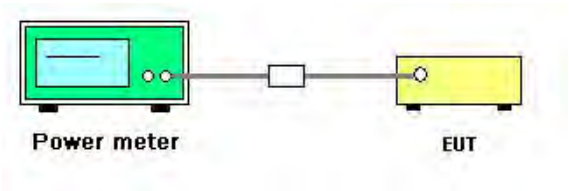
Please refer to section 5 of equipments list in this report The following table is the setting of the power meter.

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	21℃	Humidity	62%
Test Engineer	Jim Huang / Andy Tsai	Configurations	IEEE 802.11ac
Test Date	Aug. 01, 2014 / Aug. 14, 2015~Aug. 17, 2015		

Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Ant. 1	Ant. 2	Ant. 3	Total		
52	5260 MHz	15.75	16.04	14.36	20.21	23.50	Complies
60	5300 MHz	15.85	15.82	14.45	20.19	23.50	Complies
64	5320 MHz	15.93	15.43	14.46	20.09	23.50	Complies
100	5500 MHz	15.60	15.52	14.57	20.03	23.50	Complies
116	5580 MHz	15.83	15.52	13.82	19.91	23.50	Complies
140	5700 MHz	15.72	16.32	14.43	20.33	23.50	Complies

Note : Max Ant. Gain=6.5dBi > 6dBi , so power limit=24-(6.5-6)=23.5dBm

Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Ant. 1	Ant. 2	Ant. 3	Total		
54	5270 MHz	18.26	18.62	17.72	22.99	23.50	Complies
62	5310 MHz	15.61	15.46	14.16	19.89	23.50	Complies
102	5510 MHz	16.04	15.96	14.96	20.45	23.50	Complies
110	5550 MHz	18.36	18.35	17.62	22.89	23.50	Complies
134	5670 MHz	14.74	14.85	13.65	19.22	23.50	Complies

Note : Max Ant. Gain=6.5dBi > 6dBi , so power limit=24-(6.5-6)=23.5dBm

Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. 1 + Ant. 2 + Ant. 3

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Ant. 1	Ant. 2	Ant. 3	Total		
58	5290 MHz	10.37	10.16	8.84	14.61	23.50	Complies
106	5530 MHz	10.42	10.54	9.23	14.87	23.50	Complies
122	5610 MHz	17.97	19.58	17.83	23.31	23.50	Complies

Note : Max Ant. Gain=6.5dBi > 6dBi , so power limit=24-(6.5-6)=23.5dBm

Temperature	21°C	Humidity	62%
Test Engineer	Jim Huang	Configurations	IEEE 802.11a
Test Date	Aug. 01, 2014		

Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Ant. 1	Ant. 2	Ant. 3	Total		
52	5260 MHz	15.02	15.46	13.96	19.63	23.50	Complies
60	5300 MHz	15.87	15.64	14.36	20.11	23.50	Complies
64	5320 MHz	15.47	14.85	14.01	19.59	23.50	Complies
100	5500 MHz	15.41	14.86	13.94	19.55	23.50	Complies
116	5580 MHz	15.53	15.09	13.50	19.56	23.50	Complies
140	5700 MHz	14.95	15.79	14.21	19.80	23.50	Complies

Note : Max Ant. Gain=6.5dBi > 6dBi , so power limit=24-(6.5-6)=23.5dBm

4.4. Power Spectral Density Measurement

4.4.1. Limit

The power spectral density is defined as the highest level of power in dBm per MHz generated by the transmitter within the power envelope. The following table is power spectral density limits and decrease power density limit rule refer to section 4.3.1.

Frequency Range	Power Spectral Density limit (dBm/MHz)
5.25-5.35 GHz	11
5.47-5.725 GHz	11

4.4.2. Measuring Instruments and Setting

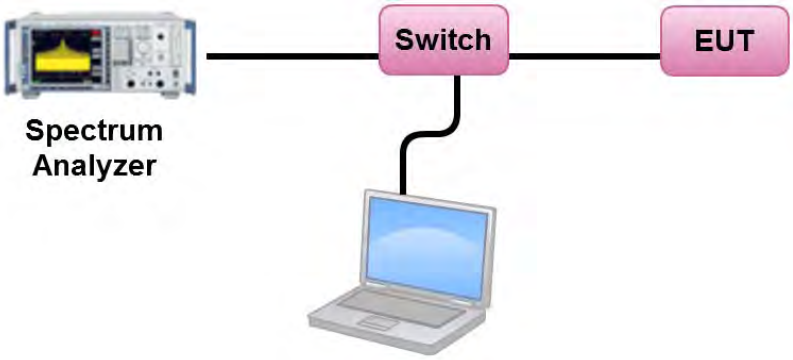
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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) Peak power spectral density (PPSD).
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	21°C	Humidity	62%
Test Engineer	Jim Huang / Andy Tsai	Configurations	IEEE 802.11ac
Test Date	Aug. 01, 2014 / Aug. 14, 2015~Aug. 17, 2015		

Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3

Channel	Frequency	Total Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
52	5260 MHz	6.03	6.34	Complies
60	5300 MHz	6.07	6.34	Complies
64	5320 MHz	6.15	6.34	Complies
100	5500 MHz	6.33	6.34	Complies
116	5580 MHz	5.99	6.34	Complies
140	5700 MHz	6.24	6.34	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =10.66dBi >6dBi,So Limit =11-(10.66-6)=6.34dBm/MHz

Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3

Channel	Frequency	Total Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
54	5270 MHz	6.14	6.34	Complies
62	5310 MHz	3.41	6.34	Complies
102	5510 MHz	4.42	6.34	Complies
110	5550 MHz	6.26	6.34	Complies
134	5670 MHz	2.15	6.34	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =10.66dBi >6dBi,So Limit =11-(10.66-6)=6.34dBm/MHz

Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. 1 + Ant. 2 + Ant. 3

Channel	Frequency	Total Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
58	5290 MHz	-5.89	6.34	Complies
106	5530 MHz	-4.20	6.34	Complies
122	5610 MHz	4.24	6.34	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =10.66dBi >6dBi,So Limit =11-(10.66-6)=6.34dBm/MHz

Temperature	21°C	Humidity	62%
Test Engineer	Jim Huang	Configurations	IEEE 802.11a
Test Date	Aug. 01, 2014		

Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3

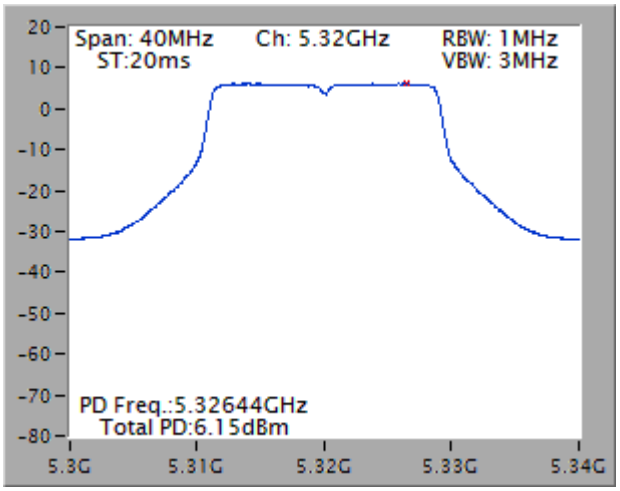
Channel	Frequency	Total Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
52	5260 MHz	6.03	6.34	Complies
60	5300 MHz	6.05	6.34	Complies
64	5320 MHz	5.91	6.34	Complies
100	5500 MHz	6.17	6.34	Complies
116	5580 MHz	6.22	6.34	Complies
140	5700 MHz	6.30	6.34	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =10.66dBi >6dBi,So Limit =11-(10.66-6)=6.34dBm/MHz

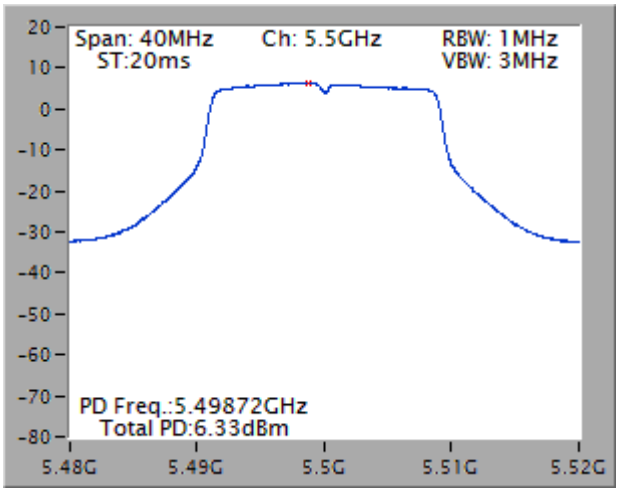
Note: All the test values were listed in the report.

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

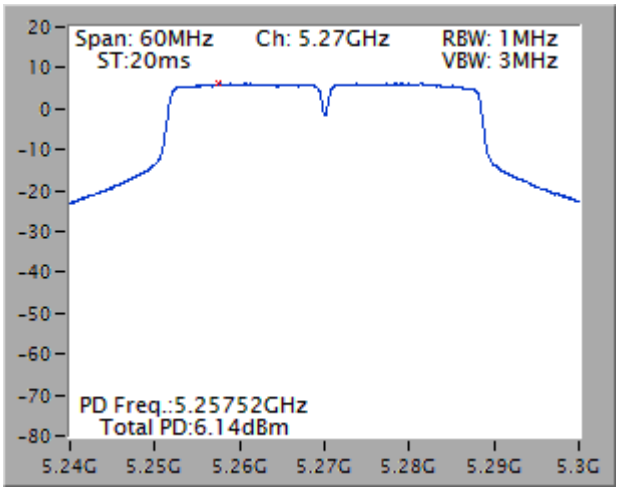
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 / 5320 MHz



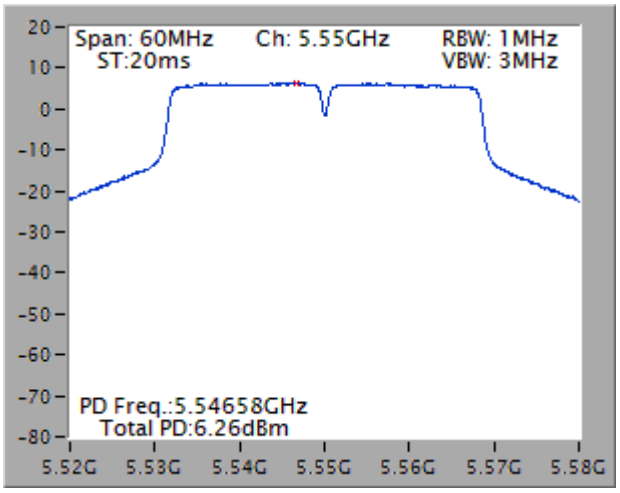
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 / 5500 MHz



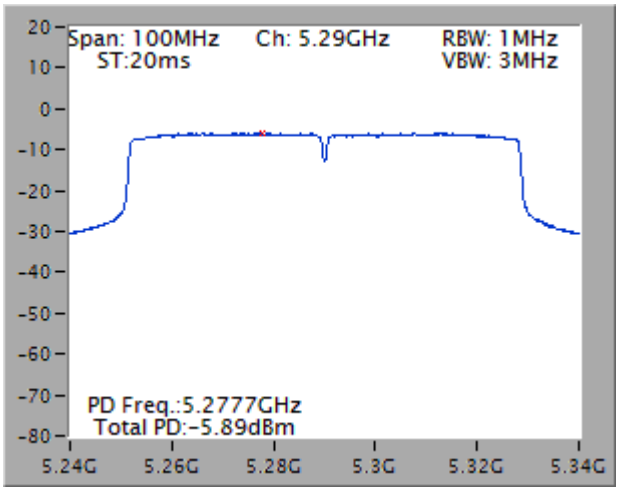
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 / 5270 MHz



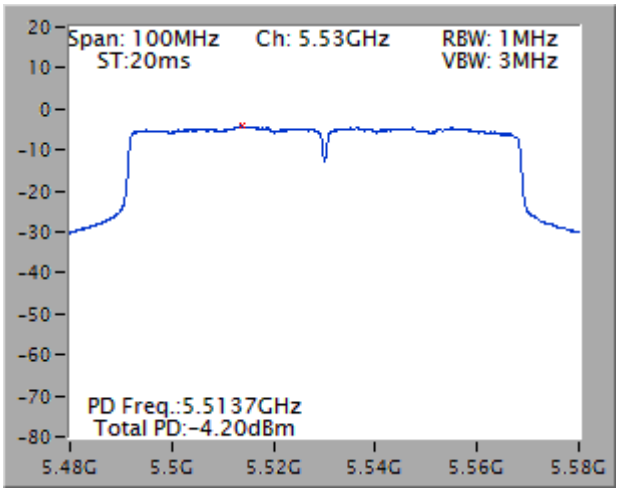
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 / 5550 MHz



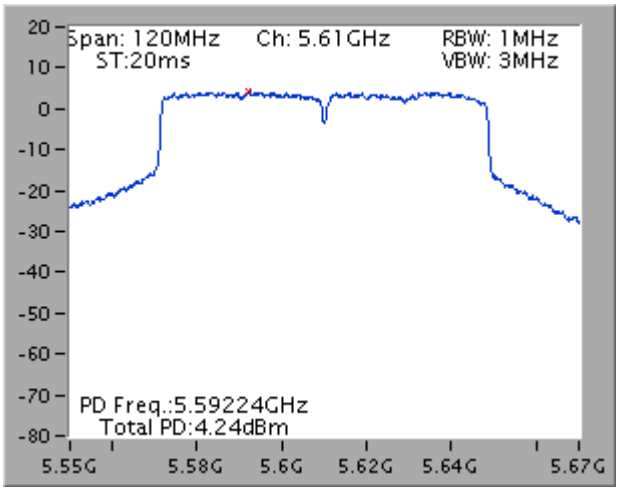
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. A + Ant. B / 5290 MHz



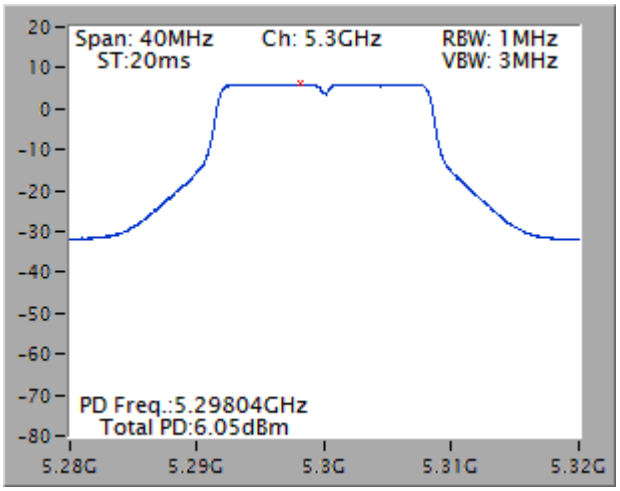
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. 1 + Ant. 2 + Ant. 3 / 5530 MHz



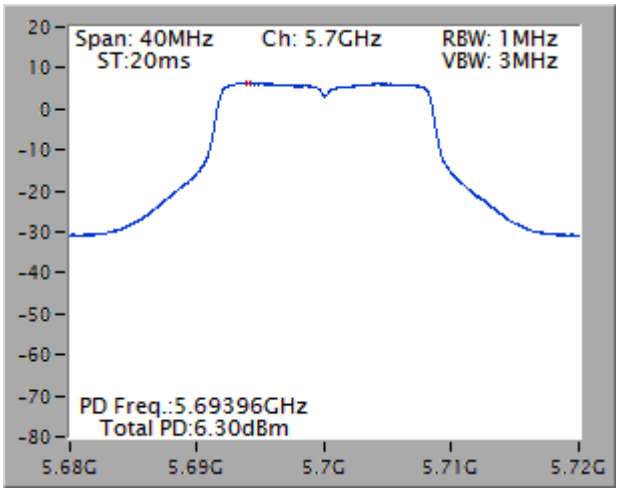
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. 1 + Ant. 2 + Ant. 3 / 5610 MHz



Power Density Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 / 5300 MHz



Power Density Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 / 5700 MHz



4.5. Radiated Emissions Measurement

4.5.1. Limit

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed a -27dBm peak limit or average 54dBuV/m and peak 74dBuV/m limits. For transmitters operating in the 5.470-5.725 GHz band: all emissions outside of the 5.470-5.725 GHz band shall not exceed a -27dBm peak limit or average 54dBuV/m and peak 74dBuV/m limits. 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

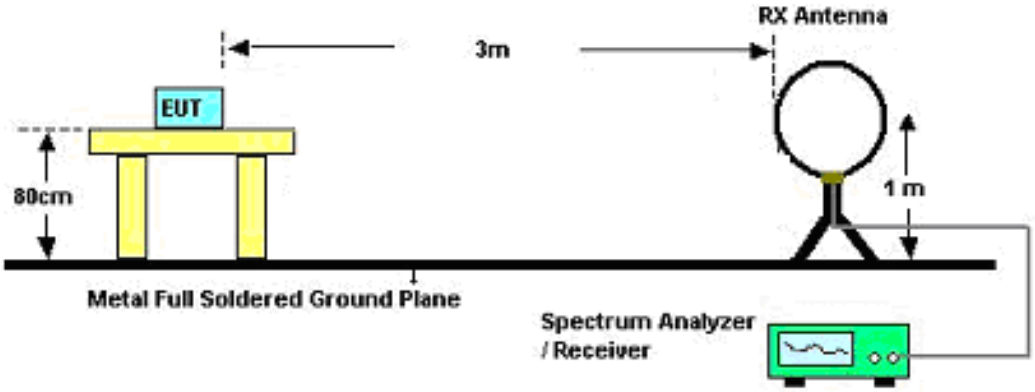
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.5.3. Test Procedures

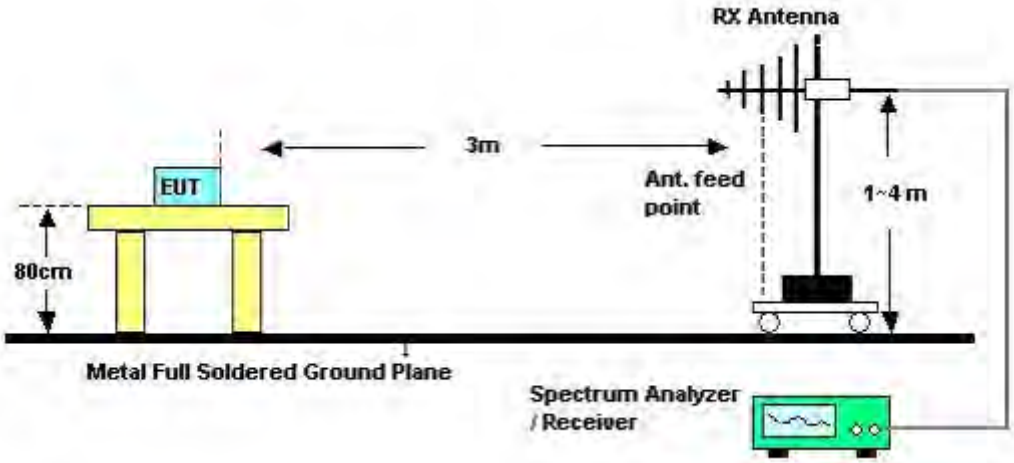
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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.

4.5.4. Test Setup Layout

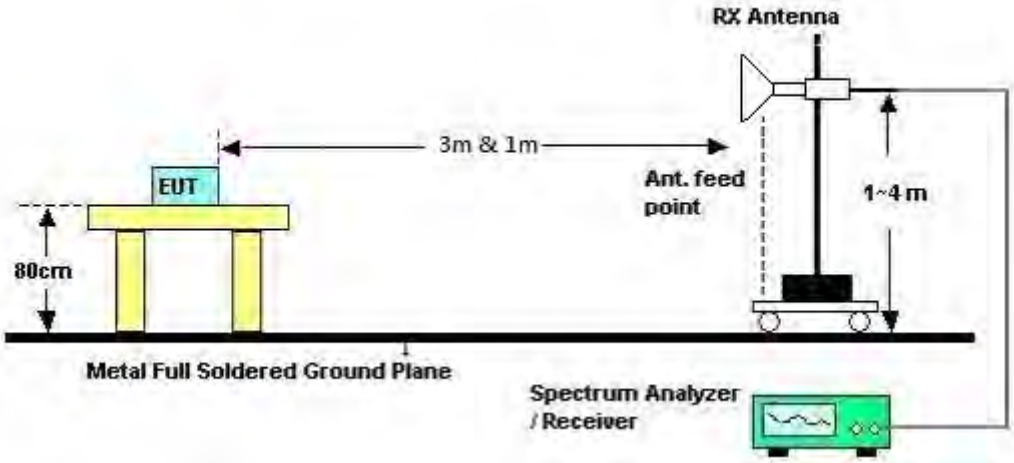
For Radiated Emissions: 9kHz ~30MHz



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

The EUT was programmed to be in continuously transmitting mode.

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

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	CTX
Test Date	Jul. 29, 2014		

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.

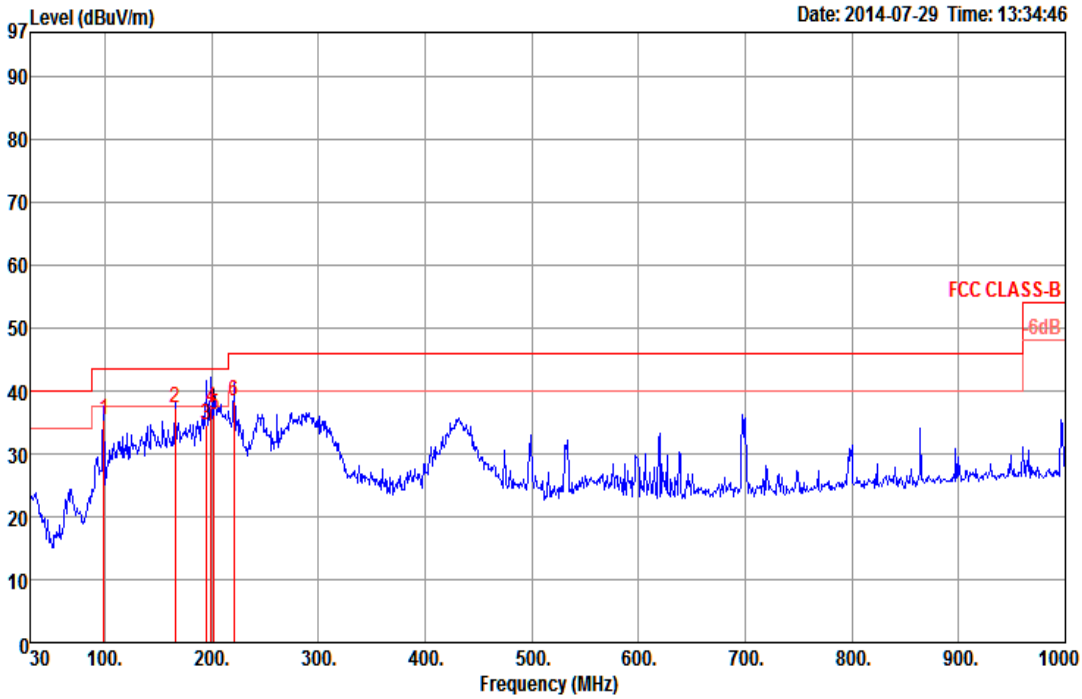
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

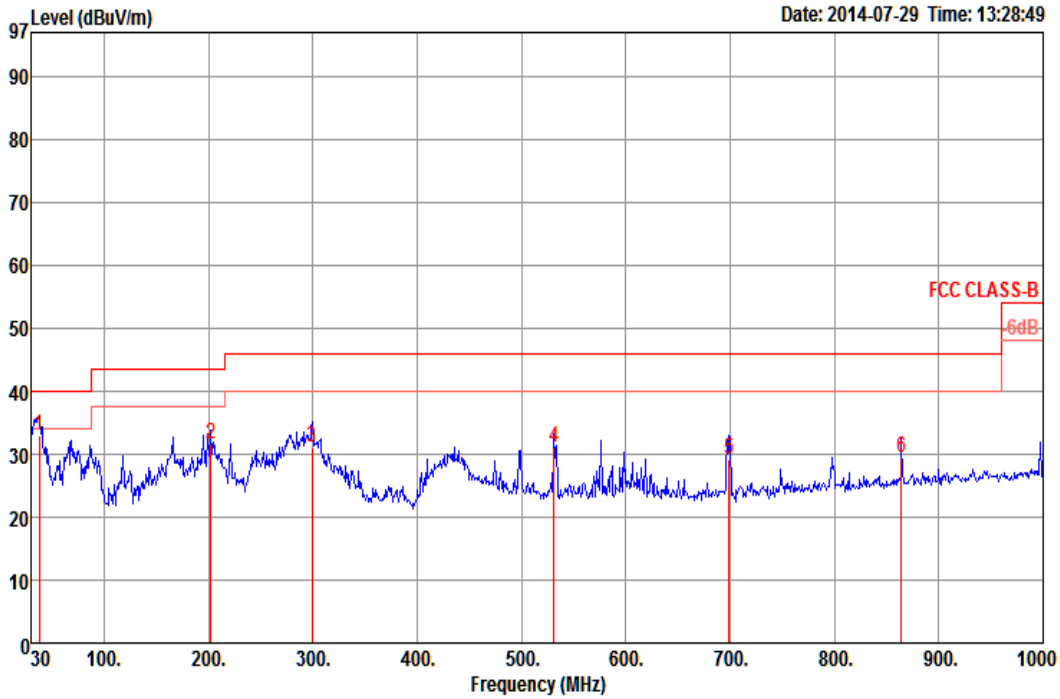
Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	CTX

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	98.87	35.47	43.50	-8.03	51.27	0.82	11.20	27.82	HORIZONTAL	100	134	QP
2	165.80	37.19	43.50	-6.31	52.94	1.14	10.52	27.41	HORIZONTAL	157	211	QP
3	194.90	34.69	43.50	-8.81	50.51	1.26	10.20	27.28	HORIZONTAL	214	167	QP
4	199.75	37.16	43.50	-6.34	52.74	1.27	10.40	27.25	HORIZONTAL	100	310	QP
5	202.66	36.20	43.50	-7.30	51.72	1.28	10.43	27.23	HORIZONTAL	189	284	QP
6	221.09	38.27	46.00	-7.73	53.06	1.32	10.99	27.10	HORIZONTAL	157	95	QP

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	37.76	33.06	40.00	-6.94	45.58	0.47	15.00	27.99	VERTICAL	100	248	QP
2	202.66	31.71	43.50	-11.79	47.23	1.28	10.43	27.23	VERTICAL	164	68	QP
3	299.66	31.06	46.00	-14.94	42.39	1.60	13.90	26.83	VERTICAL	100	89	QP
4	531.49	31.15	46.00	-14.85	38.32	2.18	18.55	27.90	VERTICAL	100	186	QP
5	699.30	29.08	46.00	-16.92	33.69	2.58	19.90	27.09	VERTICAL	154	276	QP
6	864.20	29.45	46.00	-16.55	31.77	2.87	21.69	26.88	VERTICAL	100	328	QP

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	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 52 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15763.14	56.63	74.00	-17.37	45.13	7.93	38.49	34.92	HORIZONTAL	100	164	Peak
2	15779.06	44.39	54.00	-9.61	32.92	7.93	38.48	34.94	HORIZONTAL	100	164	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15777.76	44.61	54.00	-9.39	33.14	7.93	38.48	34.94	VERTICAL	100	341	Average
2	15778.05	56.74	74.00	-17.26	45.27	7.93	38.48	34.94	VERTICAL	100	341	Peak

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 60 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10582.05	52.76	74.00	-21.24	42.77	6.61	38.38	35.00	HORIZONTAL	100	156	Peak
2	10599.06	41.26	54.00	-12.74	31.28	6.60	38.38	35.00	HORIZONTAL	100	156	Average
3	15905.50	43.77	54.00	-10.23	32.47	7.98	38.37	35.05	HORIZONTAL	115	257	Average
4	15905.57	56.67	74.00	-17.33	45.37	7.98	38.37	35.05	HORIZONTAL	115	257	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10604.20	53.81	74.00	-20.19	43.82	6.60	38.38	34.99	VERTICAL	100	207	Peak
2	10605.43	42.69	54.00	-11.31	32.70	6.60	38.38	34.99	VERTICAL	100	207	Average
3	15905.72	59.13	74.00	-14.87	47.83	7.98	38.37	35.05	VERTICAL	146	0	Peak
4	15906.29	47.10	54.00	-6.90	35.80	7.98	38.37	35.05	VERTICAL	146	0	Average

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 64 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10616.05	53.52	74.00	-20.48	43.53	6.60	38.38	34.99	HORIZONTAL	100	96	Peak
2	10636.53	39.83	54.00	-14.17	29.84	6.59	38.37	34.97	HORIZONTAL	100	96	Average
3	15977.08	42.63	54.00	-11.37	31.42	8.00	38.31	35.10	HORIZONTAL	100	222	Average
4	15979.61	55.73	74.00	-18.27	44.52	8.00	38.31	35.10	HORIZONTAL	100	222	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10615.47	40.44	54.00	-13.56	30.45	6.60	38.38	34.99	VERTICAL	100	244	Average
2	10626.40	52.89	74.00	-21.11	42.88	6.60	38.38	34.97	VERTICAL	100	244	Peak
3	15958.34	55.68	74.00	-18.32	44.45	8.00	38.33	35.10	VERTICAL	100	117	Peak
4	15965.79	43.24	54.00	-10.76	32.01	8.00	38.33	35.10	VERTICAL	100	117	Average

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 100 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11018.45	40.06	54.00	-13.94	30.00	6.47	38.30	34.71	HORIZONTAL	100	60	Average
2	11020.70	52.97	74.00	-21.03	42.91	6.47	38.30	34.71	HORIZONTAL	100	60	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11008.25	40.10	54.00	-13.90	30.04	6.47	38.30	34.71	VERTICAL	100	202	Average
2	11018.16	52.59	74.00	-21.41	42.53	6.47	38.30	34.71	VERTICAL	100	202	Peak

Temperature	23℃	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 116 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11158.19	41.52	54.00	-12.48	31.35	6.56	38.30	34.69	HORIZONTAL	100	239	Average
2	11160.22	54.16	74.00	-19.84	43.99	6.56	38.30	34.69	HORIZONTAL	100	239	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11162.61	55.48	74.00	-18.52	45.31	6.56	38.30	34.69	VERTICAL	100	0	Peak
2	11162.97	43.63	54.00	-10.37	33.46	6.56	38.30	34.69	VERTICAL	100	0	Average

Temperature	23℃	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 140 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11400.51	40.42	54.00	-13.58	30.10	6.69	38.30	34.67	HORIZONTAL	100	268	Average
2	11403.11	53.36	74.00	-20.64	43.04	6.69	38.30	34.67	HORIZONTAL	100	268	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11407.16	53.07	74.00	-20.93	42.75	6.69	38.30	34.67	VERTICAL	100	186	Peak
2	11412.52	40.53	54.00	-13.47	30.20	6.70	38.30	34.67	VERTICAL	100	186	Average

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 54 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15867.57	56.57	74.00	-17.43	45.21	7.97	38.40	35.01	HORIZONTAL	100	119	Peak
2	15906.06	43.35	54.00	-10.65	32.05	7.98	38.37	35.05	HORIZONTAL	100	119	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15896.37	57.00	74.00	-17.00	45.68	7.97	38.38	35.03	VERTICAL	100	264	Peak
2	15898.54	43.64	54.00	-10.36	32.32	7.97	38.38	35.03	VERTICAL	100	264	Average

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 62 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10616.17	52.96	74.00	-21.04	42.97	6.60	38.38	34.99	HORIZONTAL	100	320	Peak
2	10619.49	40.45	54.00	-13.55	30.46	6.60	38.38	34.99	HORIZONTAL	100	320	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10614.93	53.40	74.00	-20.60	43.41	6.60	38.38	34.99	VERTICAL	100	236	Peak
2	10626.01	40.04	54.00	-13.96	30.05	6.60	38.38	34.99	VERTICAL	100	236	Average

Temperature	23℃	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 102 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11018.77	40.21	54.00	-13.79	30.15	6.47	38.30	34.71	HORIZONTAL	100	36	Average
2	11037.29	52.69	74.00	-21.31	42.61	6.48	38.30	34.70	HORIZONTAL	100	36	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11027.82	53.28	74.00	-20.72	43.21	6.48	38.30	34.71	VERTICAL	100	117	Peak
2	11043.16	40.29	54.00	-13.71	30.20	6.49	38.30	34.70	VERTICAL	100	117	Average

Temperature	23℃	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 110 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11088.28	40.74	54.00	-13.26	30.63	6.51	38.30	34.70	HORIZONTAL	100	191	Average
2	11124.17	53.40	74.00	-20.60	43.26	6.54	38.30	34.70	HORIZONTAL	100	191	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11088.21	53.44	74.00	-20.56	43.33	6.51	38.30	34.70	VERTICAL	100	71	Peak
2	11118.74	40.64	54.00	-13.36	30.51	6.53	38.30	34.70	VERTICAL	100	71	Average

Temperature	23℃	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 134 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11328.71	53.25	74.00	-20.75	42.98	6.65	38.30	34.68	HORIZONTAL	100	296	Peak
2	11337.47	39.51	54.00	-14.49	29.24	6.65	38.30	34.68	HORIZONTAL	100	296	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11324.51	40.44	54.00	-13.56	30.18	6.64	38.30	34.68	VERTICAL	100	156	Average
2	11361.92	53.36	74.00	-20.64	43.06	6.67	38.30	34.67	VERTICAL	100	156	Peak

Temperature	23℃	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 58 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10564.73	40.84	54.00	-13.16	30.85	6.62	38.39	35.02	HORIZONTAL	100	141	Average
2	10565.60	53.14	74.00	-20.86	43.15	6.62	38.39	35.02	HORIZONTAL	100	141	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10565.53	40.63	54.00	-13.37	30.64	6.62	38.39	35.02	VERTICAL	100	259	Average
2	10590.71	53.95	74.00	-20.05	43.96	6.61	38.38	35.00	VERTICAL	100	259	Peak

Temperature	23℃	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 106 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11076.93	53.33	74.00	-20.67	43.22	6.51	38.30	34.70	HORIZONTAL	100	110	Peak
2	11081.27	40.37	54.00	-13.63	30.26	6.51	38.30	34.70	HORIZONTAL	100	110	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11041.77	52.95	74.00	-21.05	42.86	6.49	38.30	34.70	VERTICAL	100	206	Peak
2	11057.54	39.69	54.00	-14.31	29.59	6.50	38.30	34.70	VERTICAL	100	206	Average

Temperature	24°C	Humidity	55%
Test Engineer	Stim Sung	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 122 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Aug. 13, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11220.97	42.66	54.00	-11.34	28.99	8.57	39.26	34.16	160	225	HORIZONTAL	Average
2	11221.06	55.29	74.00	-18.71	41.62	8.57	39.26	34.16	160	225	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11217.83	42.51	54.00	-11.49	28.84	8.57	39.26	34.16	160	66	VERTICAL	Average
2	11221.40	55.62	74.00	-18.38	41.96	8.57	39.25	34.16	160	66	VERTICAL	Peak

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.

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a CH 52 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 19, 2014		

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	10518.72	54.30	74.00	-19.70	45.69	5.01	38.90	35.30	Peak	100	267	HORIZONTAL
2	10522.88	39.40	54.00	-14.60	30.79	5.01	38.90	35.30	Average	100	267	HORIZONTAL
3	15771.52	52.31	74.00	-21.69	43.29	6.14	38.11	35.23	Peak	100	267	HORIZONTAL
4	15775.04	39.36	54.00	-14.64	30.34	6.14	38.11	35.23	Average	100	267	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	10522.88	51.65	74.00	-22.35	43.04	5.01	38.90	35.30	Peak	100	218	VERTICAL
2	10523.04	40.28	54.00	-13.72	31.67	5.01	38.90	35.30	Average	100	218	VERTICAL
3	15773.84	40.74	54.00	-13.26	31.72	6.14	38.11	35.23	Average	100	143	VERTICAL
4	15778.12	52.73	74.00	-21.27	43.72	6.14	38.11	35.24	Peak	100	143	VERTICAL

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a CH 60 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 19, 2014		

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	10598.84	39.79	54.00	-14.21	31.11	5.01	38.92	35.25	Average	100	144	HORIZONTAL
2	10603.12	49.94	74.00	-24.06	41.24	5.01	38.92	35.23	Peak	100	144	HORIZONTAL
3	15901.84	53.36	74.00	-20.64	44.55	6.15	37.92	35.26	Peak	100	107	HORIZONTAL
4	15902.32	40.39	54.00	-13.61	31.58	6.15	37.92	35.26	Average	100	107	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	10601.28	51.84	74.00	-22.16	43.14	5.01	38.92	35.23	Peak	100	221	VERTICAL
2	10602.60	41.61	54.00	-12.39	32.91	5.01	38.92	35.23	Average	100	221	VERTICAL
3	15897.32	40.46	54.00	-13.54	31.63	6.15	37.94	35.26	Average	100	267	VERTICAL
4	15904.00	53.73	74.00	-20.27	44.92	6.15	37.92	35.26	Peak	100	267	VERTICAL

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a CH 64 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 19, 2014		

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	10630.64	50.20	74.00	-23.80	41.48	5.01	38.93	35.22	Peak	100	323	HORIZONTAL
2	10638.00	37.37	54.00	-16.63	28.65	5.01	38.93	35.22	Average	100	323	HORIZONTAL
3	15957.92	54.50	74.00	-19.50	45.78	6.15	37.85	35.28	Peak	100	300	HORIZONTAL
4	15966.28	40.45	54.00	-13.55	31.73	6.15	37.85	35.28	Average	100	300	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	10642.40	52.60	74.00	-21.40	43.88	5.01	38.93	35.22	Peak	100	214	VERTICAL
2	10642.88	38.95	54.00	-15.05	30.23	5.01	38.93	35.22	Average	100	214	VERTICAL
3	15957.40	53.31	74.00	-20.69	44.59	6.15	37.85	35.28	Peak	100	245	VERTICAL
4	15966.60	40.58	54.00	-13.42	31.86	6.15	37.85	35.28	Average	100	245	VERTICAL

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a CH 100 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 19, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10980.25	40.06	54.00	-13.94	30.02	6.47	38.30	34.73	HORIZONTAL	100	164	Average
2	10989.15	52.59	74.00	-21.41	42.54	6.46	38.30	34.71	HORIZONTAL	100	164	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10983.50	52.55	74.00	-21.45	42.49	6.47	38.30	34.71	VERTICAL	100	35	Peak
2	11006.01	40.09	54.00	-13.91	30.03	6.47	38.30	34.71	VERTICAL	100	35	Average

Temperature	23℃	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a CH 116 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 19, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11140.61	53.53	74.00	-20.47	43.37	6.55	38.30	34.69	HORIZONTAL	100	36	Peak
2	11157.76	40.42	54.00	-13.58	30.25	6.56	38.30	34.69	HORIZONTAL	100	36	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11160.36	55.12	74.00	-18.88	44.95	6.56	38.30	34.69	VERTICAL	100	356	Peak
2	11161.88	43.20	54.00	-10.80	33.03	6.56	38.30	34.69	VERTICAL	100	356	Average

Temperature	23℃	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a CH 140 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 19, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11388.28	52.68	74.00	-21.32	42.37	6.68	38.30	34.67	HORIZONTAL	100	117	Peak
2	11414.25	40.14	54.00	-13.86	29.81	6.70	38.30	34.67	HORIZONTAL	100	117	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11388.21	53.20	74.00	-20.80	42.89	6.68	38.30	34.67	VERTICAL	100	34	Peak
2	11410.93	40.13	54.00	-13.87	29.81	6.69	38.30	34.67	VERTICAL	100	34	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 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed a -27dBm peak limit or average 54dBuV/m and peak 74dBuV/m limits. For transmitters operating in the 5.470-5.725 GHz band: all emissions outside of the 5.470-5.725 GHz band shall not exceed a -27dBm peak limit or average 54dBuV/m and peak 74dBuV/m limits. 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, Please refer to section 3.11 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, only the frequency range investigated is limited to 100MHz around bandedges.

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

The EUT was programmed to be in continuously transmitting mode.

4.6.7. Test Result of Band Edge and Fundamental Emissions

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 52, 60, 64 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Channel 52

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5142.04	58.48	74.00	-15.52	55.53	4.34	33.14	34.53	HORIZONTAL	134	91	Peak
2	5150.00	44.43	54.00	-9.57	41.48	4.34	33.14	34.53	HORIZONTAL	134	91	Average
3	5254.93	117.09			113.92	4.40	33.30	34.53	HORIZONTAL	134	91	Peak
4	5267.96	104.67			101.45	4.42	33.33	34.53	HORIZONTAL	134	91	Average
5	5351.45	44.92	54.00	-9.08	41.52	4.47	33.46	34.53	HORIZONTAL	135	91	Average
6	5362.30	62.73	74.00	-11.27	59.29	4.48	33.49	34.53	HORIZONTAL	134	91	Peak

Item 3, 4 are the fundamental frequency at 5260 MHz.

Channel 60

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5292.19	108.75			105.50	4.43	33.35	34.53	VERTICAL	100	351	Average
2	5292.62	118.96			115.67	4.44	33.38	34.53	VERTICAL	100	351	Peak
3	5350.00	52.23	54.00	-1.77	48.83	4.47	33.46	34.53	VERTICAL	100	351	Average
4	5359.55	67.56	74.00	-6.44	64.16	4.47	33.46	34.53	VERTICAL	100	351	Peak

Item 1, 2 are the fundamental frequency at 5300 MHz.

Channel 64

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5312.62	105.77			102.44	4.45	33.41	34.53	VERTICAL	100	28	Average
2	5315.51	116.36			113.03	4.45	33.41	34.53	VERTICAL	100	28	Peak
3	5350.00	53.38	54.00	-0.62	49.98	4.47	33.46	34.53	VERTICAL	100	28	Average
4	5352.60	70.19	74.00	-3.81	66.79	4.47	33.46	34.53	VERTICAL	100	28	Peak

Item 1, 2 are the fundamental frequency at 5320 MHz.

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 100, 116, 140 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Channel 100

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5460.00	70.35	74.00	-3.65	66.72	4.54	33.62	34.53	VERTICAL	103	177	Peak
2	5460.00	48.73	54.00	-5.27	45.10	4.54	33.62	34.53	VERTICAL	103	177	Average
3	5468.55	72.65	74.00	-1.35	68.98	4.55	33.65	34.53	VERTICAL	103	177	Peak
4	5470.00	53.51	54.00	-0.49	49.84	4.55	33.65	34.53	VERTICAL	103	177	Average
5	5493.05	118.63			114.93	4.56	33.67	34.53	VERTICAL	103	177	Peak
6	5493.34	108.69			104.99	4.56	33.67	34.53	VERTICAL	103	177	Average

Item 5, 6 are the fundamental frequency at 5500 MHz.

Channel 116

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5460.00	45.27	54.00	-8.73	41.64	4.54	33.62	34.53	VERTICAL	131	121	Average
2	5465.79	58.86	74.00	-15.14	55.19	4.55	33.65	34.53	VERTICAL	131	121	Peak
3	5573.49	105.96			101.97	4.62	33.91	34.54	VERTICAL	131	121	Average
4	5574.21	116.67			112.68	4.62	33.91	34.54	VERTICAL	131	121	Peak

Item 3, 4 are the fundamental frequency at 5580 MHz.

Channel 140

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5703.76	118.49			114.03	4.71	34.32	34.57	VERTICAL	100	170	Peak
2	5706.08	108.29			103.84	4.71	34.32	34.58	VERTICAL	100	170	Average
3	5725.00	53.25	54.00	-0.75	48.74	4.72	34.37	34.58	VERTICAL	100	170	Average
4	5729.05	73.80	74.00	-0.20	69.29	4.72	34.37	34.58	VERTICAL	100	170	Peak

Item 1, 2 are the fundamental frequency at 5700 MHz.

Temperature	23℃	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 54, 62 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Channel 54

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5144.36	61.78	74.00	-12.22	58.83	4.34	33.14	34.53	VERTICAL	100	359	Peak
2	5150.00	47.25	54.00	-6.75	44.30	4.34	33.14	34.53	VERTICAL	100	359	Average
3	5275.21	106.11			102.89	4.42	33.33	34.53	VERTICAL	100	359	Average
4	5276.08	116.08			112.83	4.43	33.35	34.53	VERTICAL	100	359	Peak
5	5354.34	67.56	74.00	-6.44	64.16	4.47	33.46	34.53	VERTICAL	100	359	Peak
6	5354.78	53.73	54.00	-0.27	50.33	4.47	33.46	34.53	VERTICAL	100	359	Average

Item 3, 4 are the fundamental frequency at 5270 MHz.

Channel 62

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5312.03	110.84			107.51	4.45	33.41	34.53	VERTICAL	100	29	Peak
2	5312.32	101.25			97.92	4.45	33.41	34.53	VERTICAL	100	29	Average
3	5350.29	52.68	54.00	-1.32	49.28	4.47	33.46	34.53	VERTICAL	100	29	Average
4	5350.87	66.18	74.00	-7.82	62.78	4.47	33.46	34.53	VERTICAL	100	29	Peak

Item 1, 2 are the fundamental frequency at 5310 MHz.

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 102, 110, 134 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Channel 102

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5455.08	66.18	74.00	-7.82	62.55	4.54	33.62	34.53	VERTICAL	111	42	Peak
2	5460.00	49.46	54.00	-4.54	45.83	4.54	33.62	34.53	VERTICAL	111	42	Average
3	5468.26	71.42	74.00	-2.58	67.75	4.55	33.65	34.53	VERTICAL	111	42	Peak
4	5469.71	53.43	54.00	-0.57	49.76	4.55	33.65	34.53	VERTICAL	111	42	Average
5	5498.13	114.15			110.41	4.57	33.70	34.53	VERTICAL	111	42	Peak
6	5498.42	104.15			100.41	4.57	33.70	34.53	VERTICAL	111	42	Average

Item 5, 6 are the fundamental frequency at 5510 MHz.

Channel 110

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5452.19	49.68	54.00	-4.32	46.05	4.54	33.62	34.53	VERTICAL	113	175	Average
2	5455.67	67.75	74.00	-6.25	64.12	4.54	33.62	34.53	VERTICAL	113	175	Peak
3	5468.26	67.87	68.20	-0.33	64.20	4.55	33.65	34.53	VERTICAL	113	175	Peak
4	5546.53	118.91			115.06	4.59	33.80	34.54	VERTICAL	113	175	Peak
5	5547.40	107.81			103.96	4.59	33.80	34.54	VERTICAL	113	175	Average

Item 4, 5 are the fundamental frequency at 5550 MHz.

Channel 134

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5665.95	114.30			110.02	4.67	34.17	34.56	VERTICAL	100	178	Peak
2	5685.34	103.41			99.01	4.70	34.27	34.57	VERTICAL	100	178	Average
3	5730.50	68.18	68.20	-0.02	63.67	4.72	34.37	34.58	VERTICAL	100	178	Peak

Item 1, 2 are the fundamental frequency at 5670 MHz.

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai / Stim Sung	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 58, 106, 122 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014 / Aug. 12, 2015		

Channel 58

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5270.03	93.92			90.70	4.42	33.33	34.53	VERTICAL	100	344	Average
2	5279.15	103.40			100.15	4.43	33.35	34.53	VERTICAL	100	344	Peak
3	5350.00	53.42	54.00	-0.58	50.02	4.47	33.46	34.53	VERTICAL	100	344	Average
4	5350.43	66.60	74.00	-7.40	63.20	4.47	33.46	34.53	VERTICAL	100	344	Peak

Item 1, 2 are the fundamental frequency at 5290 MHz.

Channel 106

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5441.19	63.42	74.00	-10.58	59.83	4.53	33.59	34.53	VERTICAL	103	172	Peak
2	5441.19	46.25	54.00	-7.75	42.66	4.53	33.59	34.53	VERTICAL	103	172	Average
3	5469.28	68.14	68.20	-0.06	64.47	4.55	33.65	34.53	VERTICAL	103	172	Peak
4	5512.63	95.98			92.24	4.57	33.70	34.53	VERTICAL	103	172	Average
5	5513.36	106.03			102.29	4.57	33.70	34.53	VERTICAL	103	172	Peak

Item 4, 5 are the fundamental frequency at 5530 MHz.

Channel 122

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5450.00	52.38	54.00	-1.62	47.35	5.63	33.72	34.32	100	126	VERTICAL	Average
2	5459.00	67.20	74.00	-6.80	62.16	5.63	33.72	34.31	100	126	VERTICAL	Peak
3	5470.00	53.80	54.00	-0.20	48.72	5.64	33.75	34.31	100	126	VERTICAL	Average
4	5470.00	67.43	74.00	-6.57	62.35	5.64	33.75	34.31	100	126	VERTICAL	Peak
5	5594.00	112.98			107.49	5.72	34.10	34.33	100	126	VERTICAL	Peak
6	5598.00	97.91			92.40	5.74	34.10	34.33	100	126	VERTICAL	Average
7	5738.00	68.13	74.00	-5.87	62.12	5.87	34.50	34.36	100	126	VERTICAL	Peak
8	5739.00	53.58	54.00	-0.42	47.52	5.87	34.55	34.36	100	126	VERTICAL	Average

Item 5, 6 are the fundamental frequency at 5610MHz.

Note:

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

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

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a CH 52, 60, 64 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Channel 52

	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	5145.80	57.51	74.00	-16.49	54.88	3.43	34.11	34.91	Peak	102	254	VERTICAL
2	5150.00	44.64	54.00	-9.36	42.01	3.43	34.11	34.91	Average	102	254	VERTICAL
3	5263.60	108.69			105.87	3.46	34.27	34.91	Average	102	254	VERTICAL
4	5264.20	118.64			115.82	3.46	34.27	34.91	Peak	102	254	VERTICAL
5	5350.00	46.87	54.00	-7.13	43.90	3.49	34.39	34.91	Average	102	254	VERTICAL
6	5352.40	63.61	74.00	-10.39	60.64	3.49	34.39	34.91	Peak	102	254	VERTICAL

Item 3, 4 are the fundamental frequency at 5260 MHz.

Channel 60

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5295.37	119.82			116.53	4.44	33.38	34.53	VERTICAL	100	359	Peak
2	5304.92	110.03			106.74	4.44	33.38	34.53	VERTICAL	100	359	Average
3	5350.00	70.53	74.00	-3.47	67.13	4.47	33.46	34.53	VERTICAL	100	359	Peak
4	5350.58	52.87	54.00	-1.13	49.47	4.47	33.46	34.53	VERTICAL	100	359	Average

Item 1, 2 are the fundamental frequency at 5300 MHz.

Channel 64

	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	5319.20	105.99			103.08	3.48	34.34	34.91	Average	100	245	VERTICAL
2	5319.40	118.25			115.34	3.48	34.34	34.91	Peak	100	245	VERTICAL
3	5350.00	53.50	54.00	-0.50	50.53	3.49	34.39	34.91	Average	100	245	VERTICAL
4	5350.00	71.52	74.00	-2.48	68.55	3.49	34.39	34.91	Peak	100	245	VERTICAL

Item 1, 2 are the fundamental frequency at 5320 MHz.

Temperature	23℃	Humidity	61%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a CH 100, 116, 140 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jul. 21, 2014		

Channel 100

	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	5459.60	70.12	74.00	-3.88	66.99	3.52	34.53	34.92	Peak	112	351	VERTICAL
2	5460.00	49.13	54.00	-4.87	46.00	3.52	34.53	34.92	Average	112	351	VERTICAL
3	5467.00	53.89	54.00	-0.11	50.74	3.52	34.55	34.92	Average	112	351	VERTICAL
4	5468.80	72.49	74.00	-1.51	69.34	3.52	34.55	34.92	Peak	112	351	VERTICAL
5	5495.40	118.89			115.70	3.53	34.58	34.92	Peak	112	351	VERTICAL
6	5506.20	108.57			105.35	3.54	34.60	34.92	Average	112	351	VERTICAL

Item 5, 6 are the fundamental frequency at 5500 MHz.

Channel 116

	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	5460.00	45.93	54.00	-8.07	42.80	3.52	34.53	34.92	Average	100	131	VERTICAL
2	5460.00	57.56	74.00	-16.44	54.43	3.52	34.53	34.92	Peak	100	131	VERTICAL
3	5470.00	46.16	54.00	-7.84	43.01	3.52	34.55	34.92	Average	100	131	VERTICAL
4	5470.00	58.39	74.00	-15.61	55.24	3.52	34.55	34.92	Peak	100	131	VERTICAL
5	5577.60	108.53			105.27	3.56	34.63	34.93	Average	100	131	VERTICAL
6	5577.60	118.90			115.64	3.56	34.63	34.93	Peak	100	131	VERTICAL
7	5725.00	45.84	54.00	-8.16	42.49	3.60	34.69	34.94	Average	100	131	VERTICAL
8	5725.00	56.76	74.00	-17.24	53.41	3.60	34.69	34.94	Peak	100	131	VERTICAL

Item 5, 6 are the fundamental frequency at 5580 MHz.

Channel 140

	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	5704.40	104.23			100.90	3.59	34.68	34.94	Average	100	280	VERTICAL
2	5704.60	116.77			113.44	3.59	34.68	34.94	Peak	100	280	VERTICAL
3	5726.60	70.34	74.00	-3.66	66.99	3.60	34.69	34.94	Peak	100	280	VERTICAL
4	5729.20	53.70	54.00	-0.30	50.35	3.60	34.69	34.94	Average	100	280	VERTICAL

Item 1, 2 are the fundamental frequency at 5700 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

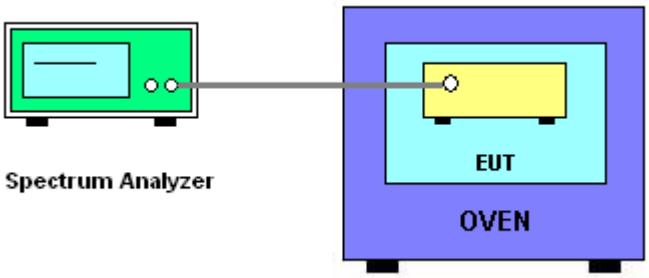
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is 5°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	21°C	Humidity	62%
Test Engineer	Jim Huang	Test Date	Aug. 01, 2014

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5300 MHz	5500 MHz
126.50	5299.9984	5499.9978
110.00	5299.9988	5499.9980
93.50	5299.9992	5499.9986
Max. Deviation (MHz)	0.001600	0.002200
Max. Deviation (ppm)	0.30	0.40

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5300 MHz	5500 MHz
5	5299.9968	5499.9972
20	5299.9970	5499.9980
30	5299.9978	5499.9988
40	5299.9982	5499.9992
Max. Deviation (MHz)	0.003200	0.002800
Max. Deviation (ppm)	0.60	0.51

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	9 kHz ~ 2.75 GHz	Apr. 23, 2014	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150 kHz ~ 100 MHz	Nov. 23, 2013	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Nov. 11, 2013	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150 kHz ~ 30 MHz	Dec. 04, 2013	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112B	2928	30MHz ~ 2GHz	Dec. 27, 2013	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Nov. 05, 2012*	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 01, 2013	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 28, 2014	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Dec. 17, 2013	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	Nov. 12, 2013	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Dec. 16, 2013	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Feb. 24, 2015	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Oct. 23, 2013	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Nov. 25, 2014	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100019	9kHz~40GHz	Dec. 02, 2013	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 06, 2014	Radiation (03CH01-CB)
EMI Test Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8GHz	Dec. 12, 2013	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R.	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	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. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-1	N/A	1 GHz ~ 40 GHz	Nov. 15, 2014	Radiation (03CH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-2	N/A	1 GHz ~ 40 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9kHz~40GHz	Nov. 29, 2013	Conducted (TH01-CB)
Spectrum analyzer	R&S	FSP40	100979	9kHz~40GHz	Dec. 12, 2014	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 03, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	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. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	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. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Sep. 18, 2013	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Sep. 18, 2013	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 03, 2014	Conducted (TH01-CB)

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

"*" Calibration Interval of instruments listed above is two years.

NCR 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%