FCC RADIO TEST REPORT

Applicant's company	**PEGATRON CORPORATION**
Applicant Address	5F., NO. 76, LIGONG ST., BEITOU DISTRICT, TAIPEI CITY 112, Taiwan
FCC ID	**VUI-APS1**
Manufacturer's company	**Maintek Computer (Suzhou) Co., Ltd**
Manufacturer Address	Bldg. 6 NB, 233 Jin Feng Rd, Suzhou District Jiangsu China

Product Name	Advanced power supply with WiFi and MoCA
Brand Name	CISCO
Model No.	APS1, CA010AAB, MWA1221
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250 MHz / 5725 ~ 5850 MHz
Received Date	Dec. 16, 2014
Final Test Date	Feb. 03, 2015
Submission Type	Original Equipment

Statement

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

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

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

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

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

Testing Laboratory
1190

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4D1514AB	Rev. 01	Initial issue of report	Feb. 13, 2015

1. VERIFICATION OF COMPLIANCE

Product Name	:	Advanced power supply with WiFi and MoCA
Brand Name	:	CISCO
Model No.	:	APS1, CA010AAB, MWA1221
Applicant	:	PEGATRON CORPORATION
Test Rule Part(s)	:	47 CFR FCC Part 15 Subpart E § 15.407

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Dec. 16, 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	22.36 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	0.25 dB
4.5	15.407(a)	Power Spectral Density	Complies	0.02 dB
4.6	15.407(b)	Radiated Emissions	Complies	0.69 dB
4.7	15.407(b)	Band Edge Emissions	Complies	0.04 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 internal power supply
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: 35.17 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 38.29 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 39.07 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 75.83 MHz Band 4: IEEE 802.11a: 20.58 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 22.32 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 40.23 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 75.83 MHz
Maximum Conducted Output Power	Band 1: IEEE 802.11a: 23.42 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 23.75 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 19.77 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 12.29 dBm Band 4: IEEE 802.11a: 22.21 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 21.98 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 21.60 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 15.78 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

Description
Power cable*1: Non-shielded, 1.5m

3.3. Table for Filed Antenna

Set	Ant.	Brand	Model No.	P/N	Type	Connector	Gain (dBi)	
							2.4GHz	5GHz
1	1	Hong Lin	APS1	290-30233	PCB	I-PEX	1.60	-
	2	Hong Lin	APS1	290-30247	PCB	I-PEX	2.54	-
	3	Hong Lin	APS1	290-30232	PCB	I-PEX	-	4.22
	4	Hong Lin	APS1	290-30248	PCB	I-PEX	-	4.88
2	1	Airgain	N2420S5	-	PCB	I-PEX	1.50	-
	2	Airgain	N2420SLOP	-	PCB	I-PEX	2.20	-
	3	Airgain	N5X20BLO	-	PCB	I-PEX	-	4.10
	4	Airgain	N5X20SC	-	PCB	I-PEX	-	4.60

Note: 1. The EUT has two sets of antenna, and each set contains four antennas.

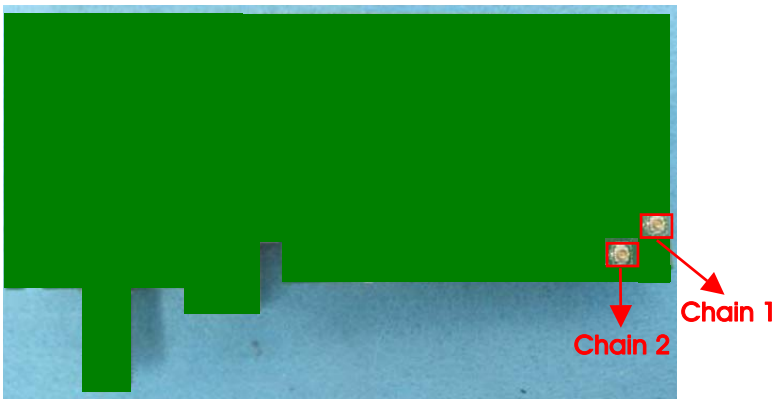
2. Because all antennas are the same type antennas, only the higher gain antennas "set 1" was tested and recorded in the report.

3. Chain 1: Connect to Ant. 1, Chain 2: Connect to Ant. 2, Chain 3: Connect to Ant. 3, Chain 4: Connect to Ant. 4

For 2.4GHz WLAN function (2TX, 2RX):

Chain 1 and Chain 2 could transmit/receive simultaneously.

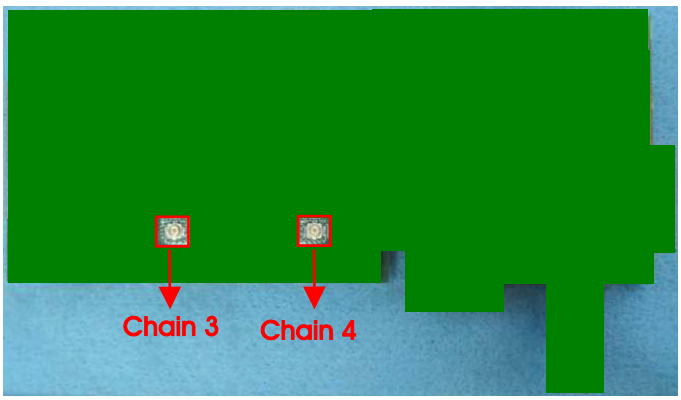
EUT rear view:



For 5GHz WLAN function (2TX, 2RX):

Chain 3 and Chain 4 could transmit/receive simultaneously.

EUT front view:



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	CTX		-	-	-
Max. Conducted Output Power	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	3+4
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	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	36/40/48/149/157/165	3+4
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	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	36/40/48/149/157/165	3+4
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	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	CTX		-	-	-
Radiated Emission Above 1GHz	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	3+4
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	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	36/40/48/149/157/165	3+4
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	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.

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 B) and Radiated Emission Co-location (please refer to Appendix C) 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 Multiple Listing

The model numbers in the following table are all refer to the identical product.

Model No.	Description
APS1	All the models are identical, the difference model for difference model number as marketing strategy.
CA010AAB	
MWA1221	

From the above models, model: MWA1221 was selected as representative model for the test and its data was recorded in this report.

3.8. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
NB	TOSHIBA	Saellite P50-B	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.

Test Software Version	DOS					
Mode	Test Frequency (MHz)					
	NCB: 20MHz					
	5180 MHz	5200 MHz	5240 MHz	5745 MHz	5785 MHz	5825 MHz
802.11a	19.5	23.5	20	17	26	26
802.11ac MCS0/Nss1 VHT20	19.5	24	20	17	26	26
Mode	NCB: 40MHz					
802.11ac MCS0/Nss1 VHT40	5190 MHz		5230 MHz	5755 MHz		5795 MHz
	15		20	14.5		26
Mode	NCB: 80MHz					
802.11ac MCS0/Nss1 VHT80	5210 MHz			5775 MHz		
	13			14		

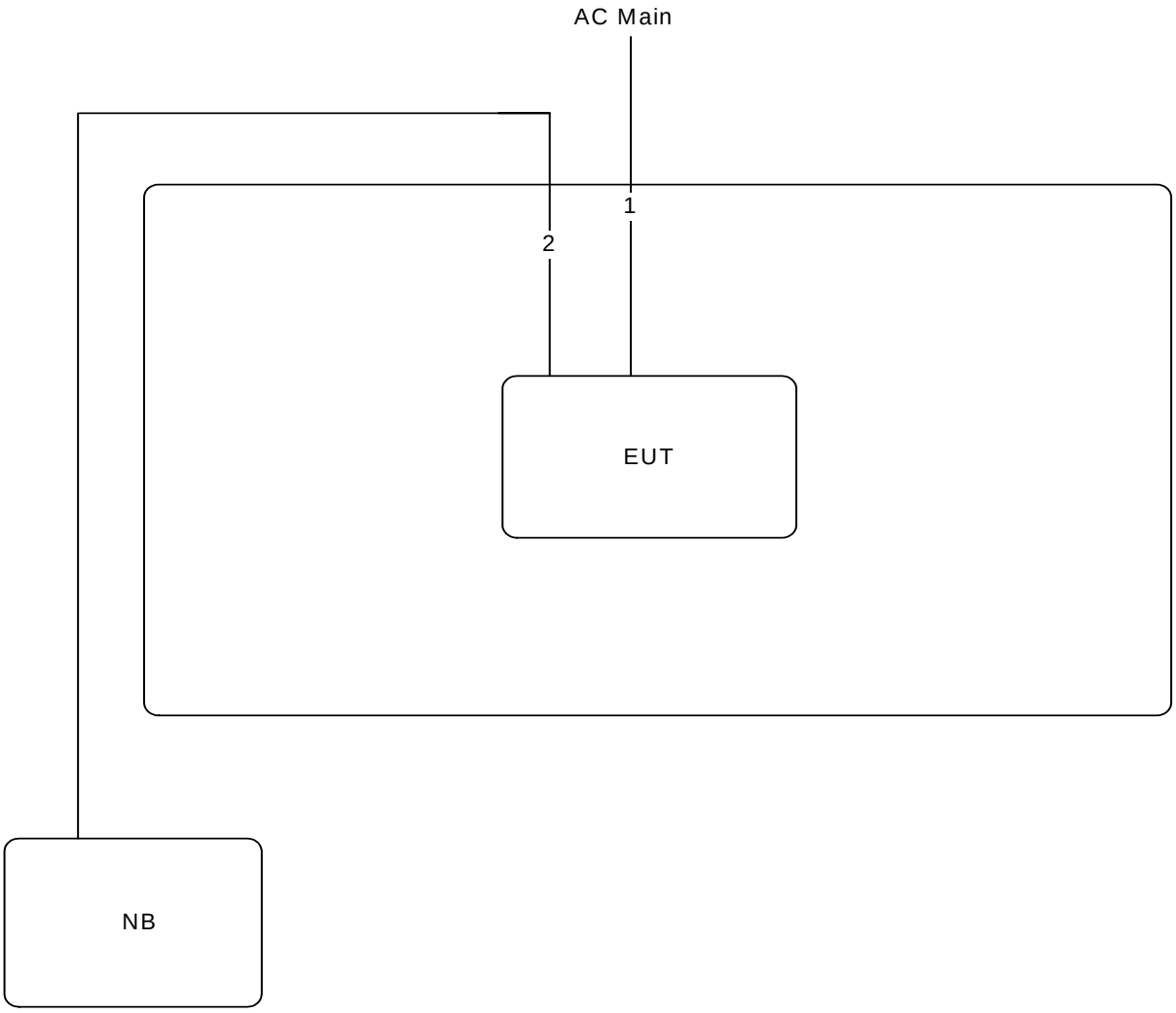
3.10. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.11. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	2.029	2.094	96.89%	0.14	0.49
802.11ac MCS0/Nss1 VHT20	1.899	1.964	96.68	0.15	0.53
802.11ac MCS0/Nss1 VHT40	0.906	1.000	90.58	0.43	1.10
802.11ac MCS0/Nss1 VHT80	0.441	0.519	84.92	0.71	2.27

3.12. Test Configurations



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

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product that is designed to connect to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

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

4.1.2. Measuring Instruments and Setting

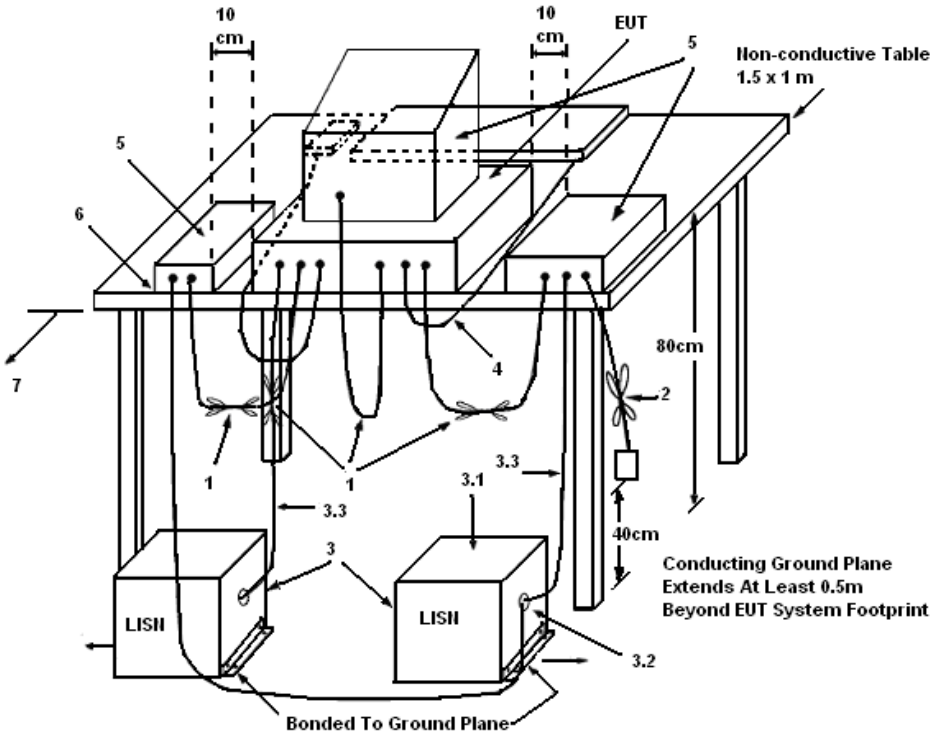
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

4.1.3. Test Procedures

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

4.1.4. Test Setup Layout



LEGEND:

(1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

(2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

(3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.

(3.1) All other equipment powered from additional LISN(s).

(3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

(3.3) LISN at least 80 cm from nearest part of EUT chassis.

(4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

(5) Non-EUT components of EUT system being tested.

(6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

(7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

4.1.5. Test Deviation

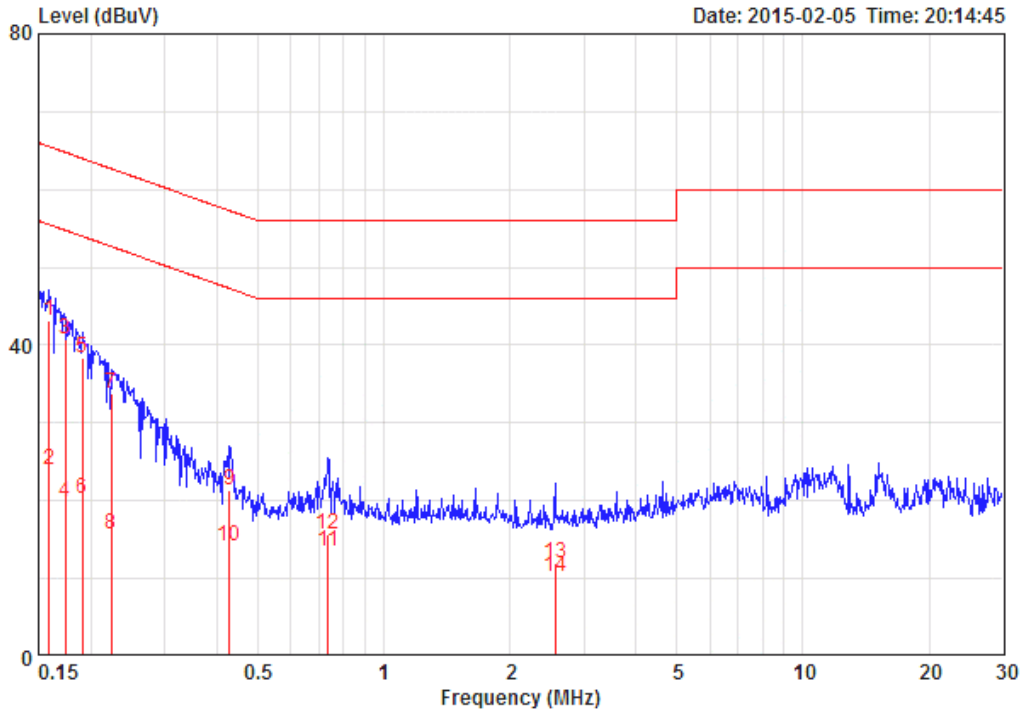
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

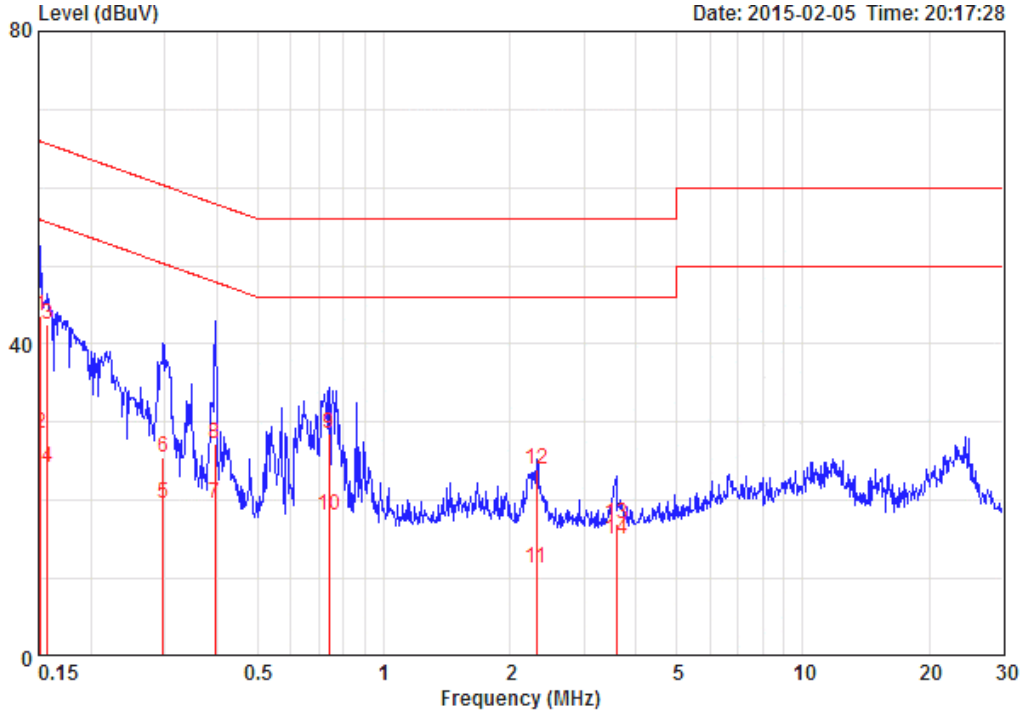
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	25°C	Humidity	52%
Test Engineer	Ryo Fan	Phase	Line
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.15900	43.14	-22.38	65.52	32.95	10.03	0.16	QP	LINE
2	0.15900	24.07	-31.45	55.52	13.88	10.03	0.16	AVERAGE	LINE
3	0.17399	40.82	-23.95	64.77	30.63	10.03	0.16	QP	LINE
4	0.17399	19.76	-35.01	54.77	9.57	10.03	0.16	AVERAGE	LINE
5	0.19039	38.43	-25.59	64.02	28.24	10.03	0.16	QP	LINE
6	0.19039	20.37	-33.65	54.02	10.18	10.03	0.16	AVERAGE	LINE
7	0.22319	33.86	-28.84	62.70	23.66	10.03	0.17	QP	LINE
8	0.22319	15.74	-36.96	52.70	5.54	10.03	0.17	AVERAGE	LINE
9	0.42825	21.34	-35.95	57.29	11.13	10.03	0.18	QP	LINE
10	0.42825	14.07	-33.22	47.29	3.86	10.03	0.18	AVERAGE	LINE
11	0.73519	13.45	-32.55	46.00	3.24	10.02	0.19	AVERAGE	LINE
12	0.73519	15.63	-40.37	56.00	5.42	10.02	0.19	QP	LINE
13	2.567	11.93	-44.07	56.00	1.63	10.03	0.27	QP	LINE
14	2.567	10.27	-35.73	46.00	-0.03	10.03	0.27	AVERAGE	LINE

Temperature	25°C	Humidity	52%
Test Engineer	Ryo Fan	Phase	Neutral
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1 @	0.15160	43.55	-22.36	65.91	33.45	9.94	0.16	QP	NEUTRAL
2	0.15160	28.57	-27.34	55.91	18.47	9.94	0.16	AVERAGE	NEUTRAL
3	0.15733	42.49	-23.12	65.60	32.38	9.95	0.16	QP	NEUTRAL
4	0.15733	24.28	-31.33	55.60	14.17	9.95	0.16	AVERAGE	NEUTRAL
5	0.29712	19.66	-30.67	50.32	9.56	9.92	0.17	AVERAGE	NEUTRAL
6	0.29712	25.41	-34.92	60.32	15.31	9.92	0.17	QP	NEUTRAL
7	0.39553	19.53	-28.41	47.95	9.47	9.88	0.18	AVERAGE	NEUTRAL
8	0.39553	27.35	-30.59	57.95	17.29	9.88	0.18	QP	NEUTRAL
9	0.73910	28.59	-27.41	56.00	18.52	9.88	0.19	QP	NEUTRAL
10	0.73910	18.06	-27.94	46.00	7.99	9.88	0.19	AVERAGE	NEUTRAL
11	2.309	11.33	-34.67	46.00	1.18	9.89	0.26	AVERAGE	NEUTRAL
12	2.309	23.96	-32.04	56.00	13.81	9.89	0.26	QP	NEUTRAL
13	3.584	16.99	-39.01	56.00	6.81	9.89	0.29	QP	NEUTRAL
14	3.584	15.06	-30.94	46.00	4.88	9.89	0.29	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	≥ 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 4.6.4.

4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

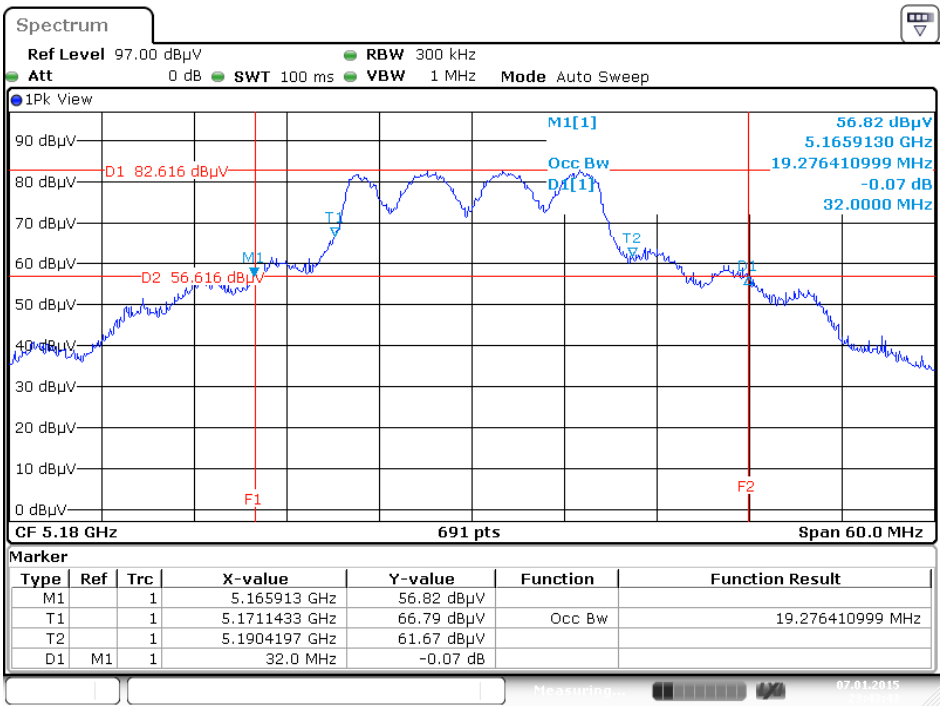
The EUT was programmed to be in continuously transmitting mode.

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

Temperature	26°C	Humidity	63%
Test Engineer	Kenneth Huang		

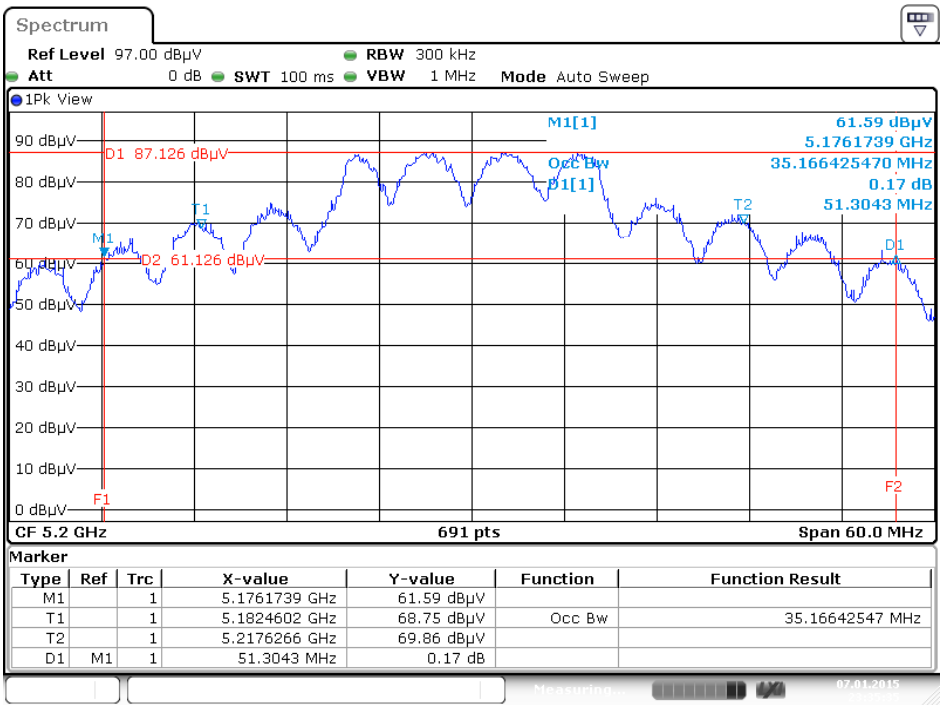
Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5180 MHz	32.00	19.28
	5200 MHz	51.30	35.17
	5240 MHz	31.39	18.32
	5745 MHz	31.39	17.71
	5785 MHz	36.70	20.58
	5825 MHz	32.09	18.93
802.11ac MCS0/Nss1 VHT20	5180 MHz	35.65	17.97
	5200 MHz	48.09	38.29
	5240 MHz	27.74	19.02
	5745 MHz	29.04	17.97
	5785 MHz	33.74	22.32
	5825 MHz	29.91	18.23
802.11ac MCS0/Nss1 VHT40	5190 MHz	46.96	37.77
	5230 MHz	70.44	39.07
	5755 MHz	46.09	36.76
	5795 MHz	76.96	40.23
802.11ac MCS0/Nss1 VHT80	5210 MHz	88.70	75.83
	5775 MHz	98.55	75.83

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



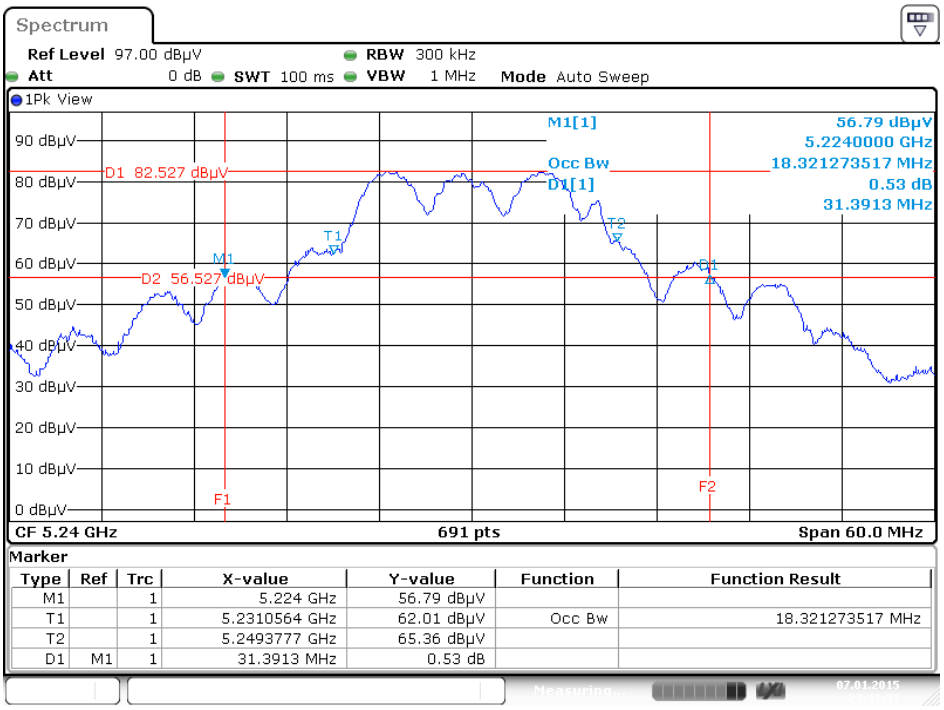
Date: 7.JAN.2015 23:43:42

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



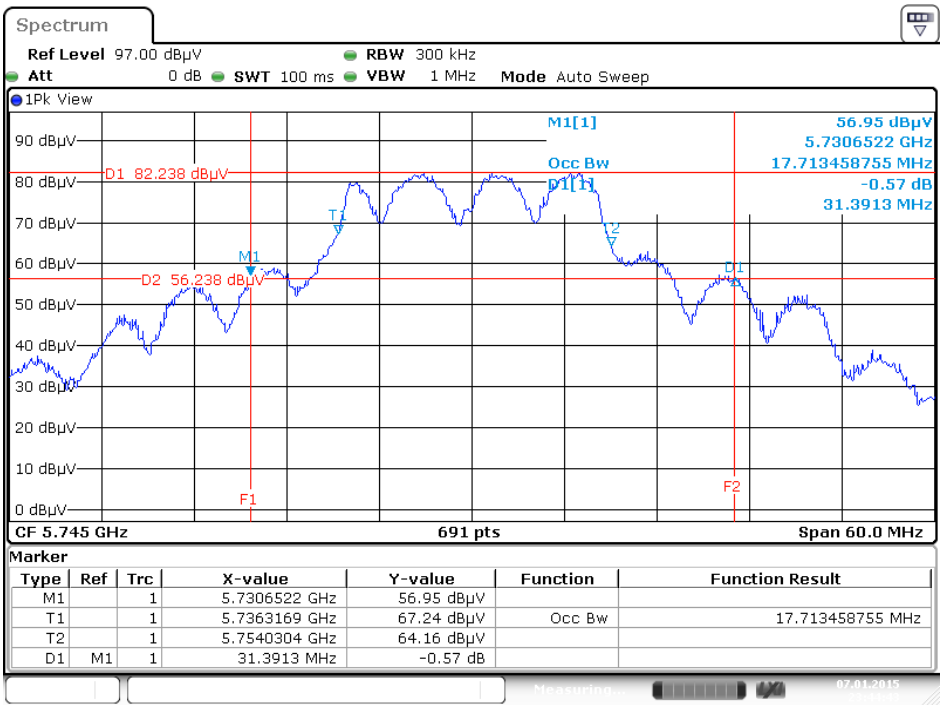
Date: 7.JAN.2015 23:35:35

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



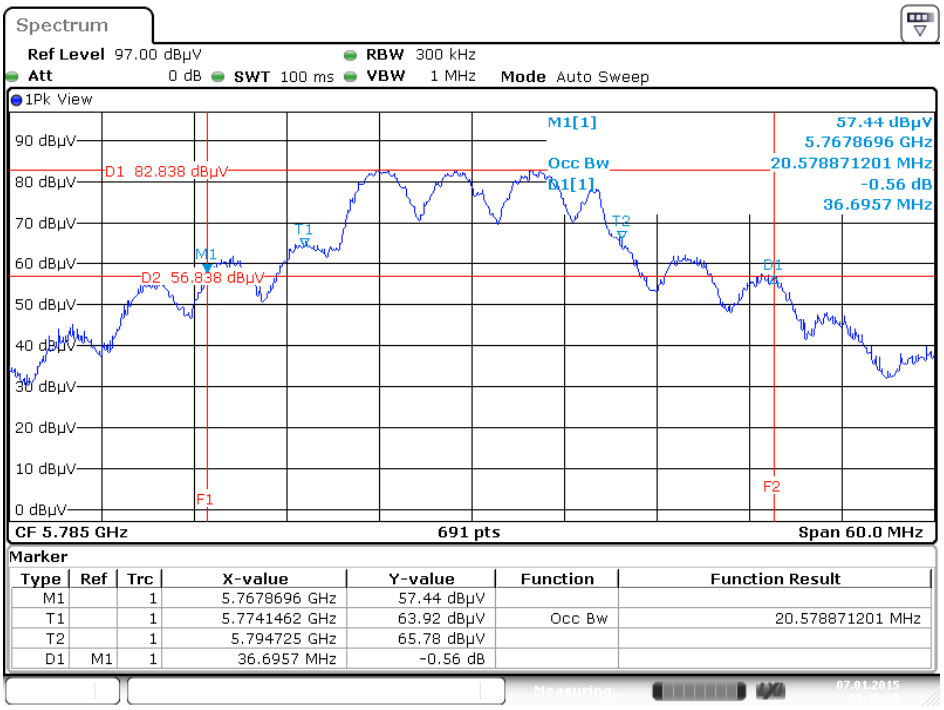
Date: 7.JAN.2015 23:41:53

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



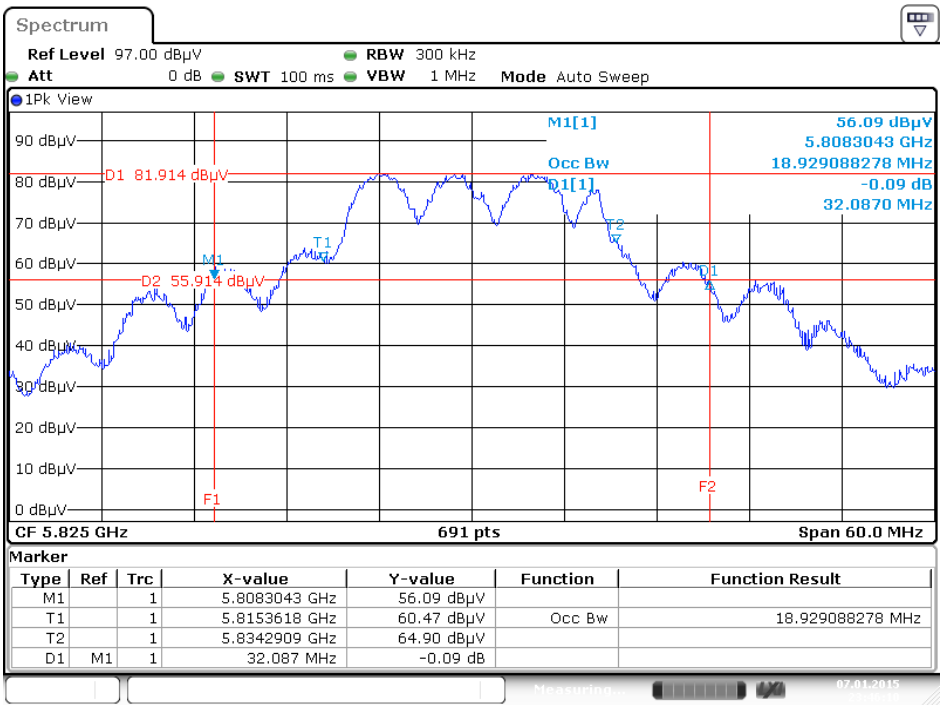
Date: 7.JAN.2015 23:44:43

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



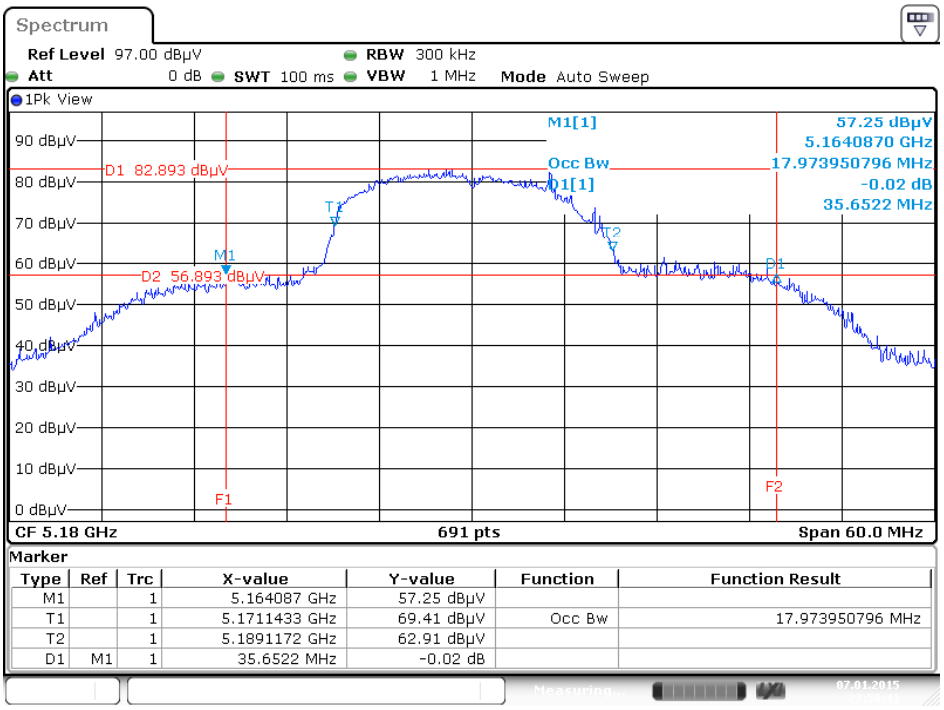
Date: 7.JAN.2015 23:45:25

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



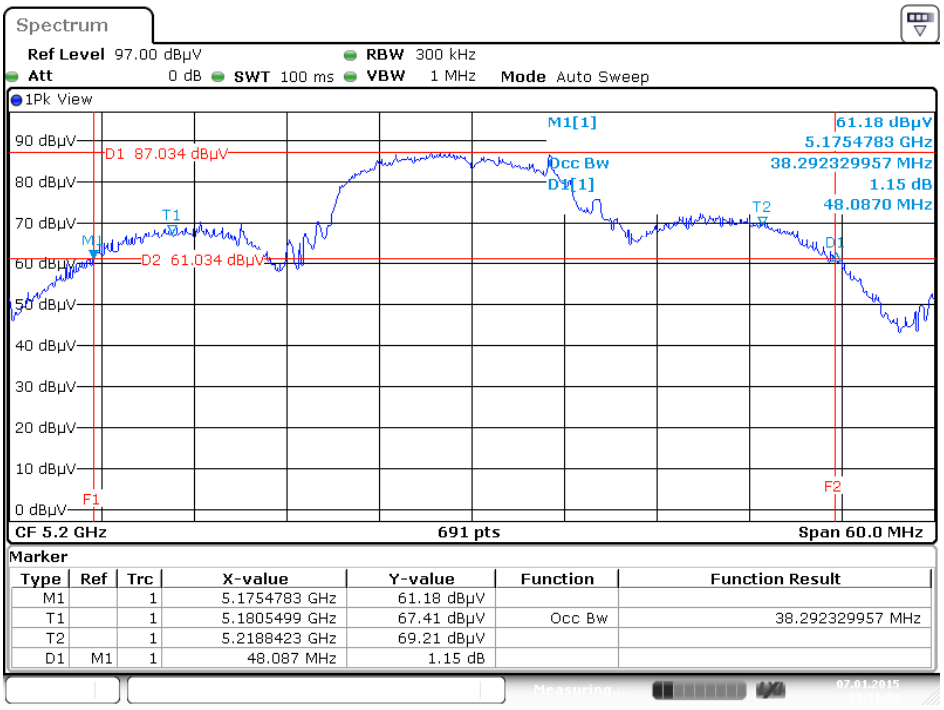
Date: 7.JAN.2015 23:46:09

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



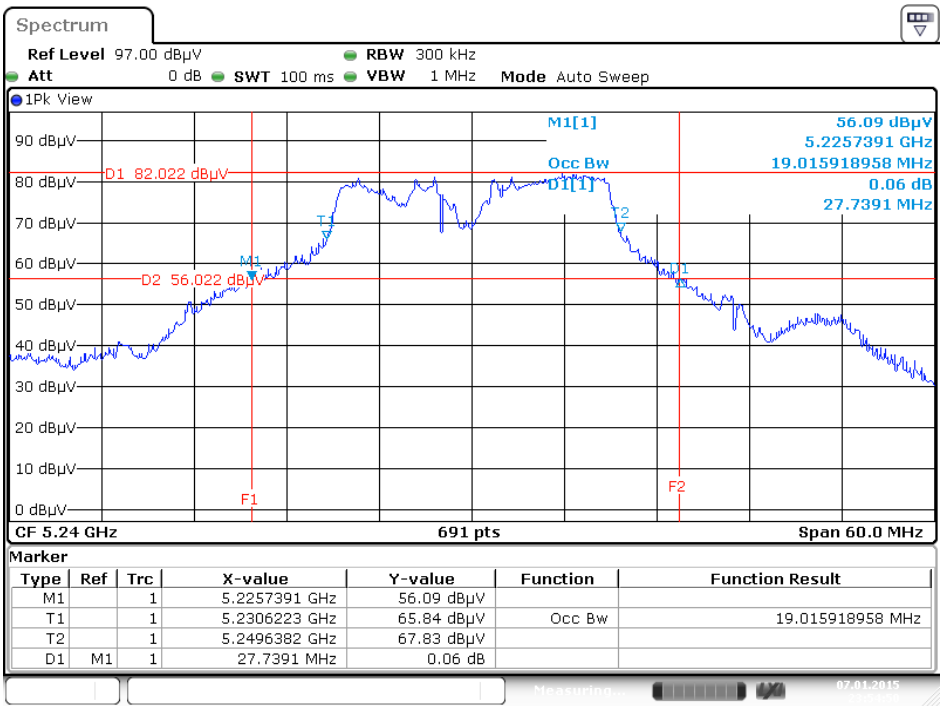
Date: 7.JAN.2015 23:50:41

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



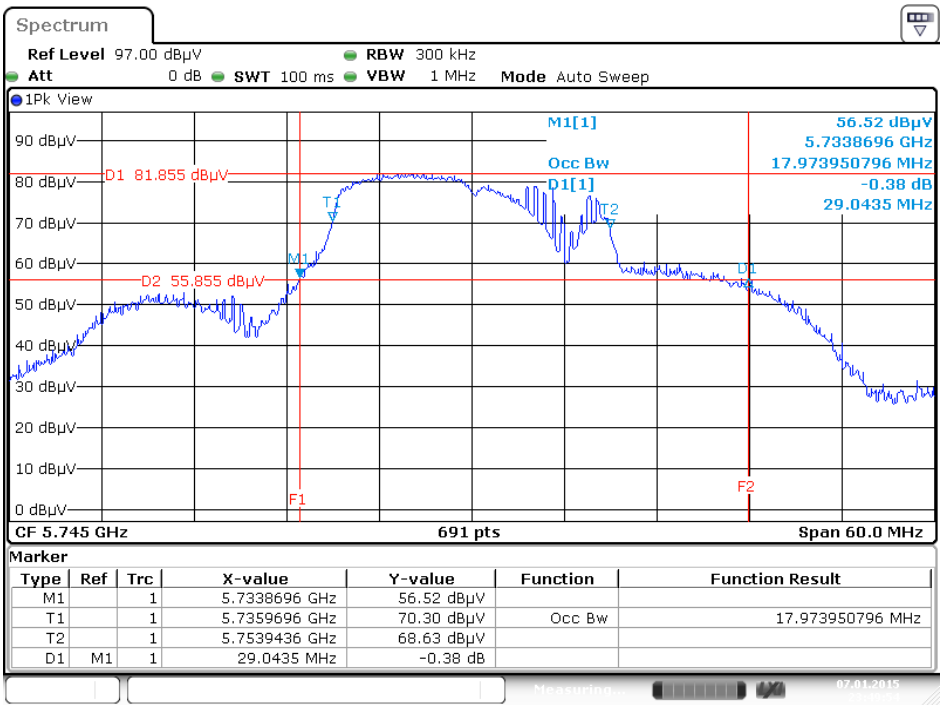
Date: 7.JAN.2015 23:51:24

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



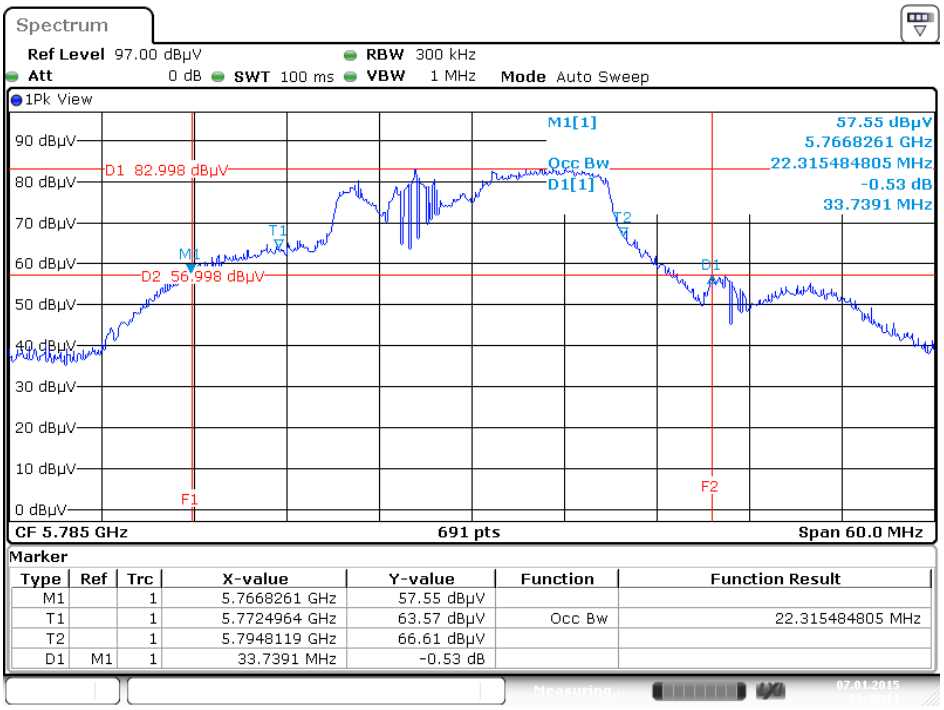
Date: 7.JAN.2015 23:54:49

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



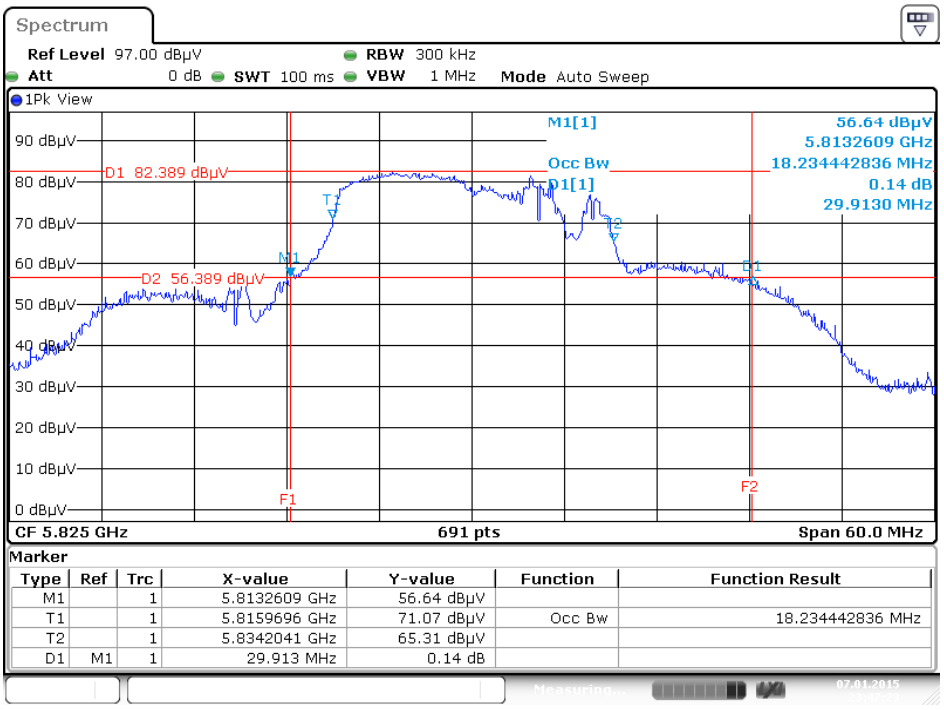
Date: 7.JAN.2015 23:49:54

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



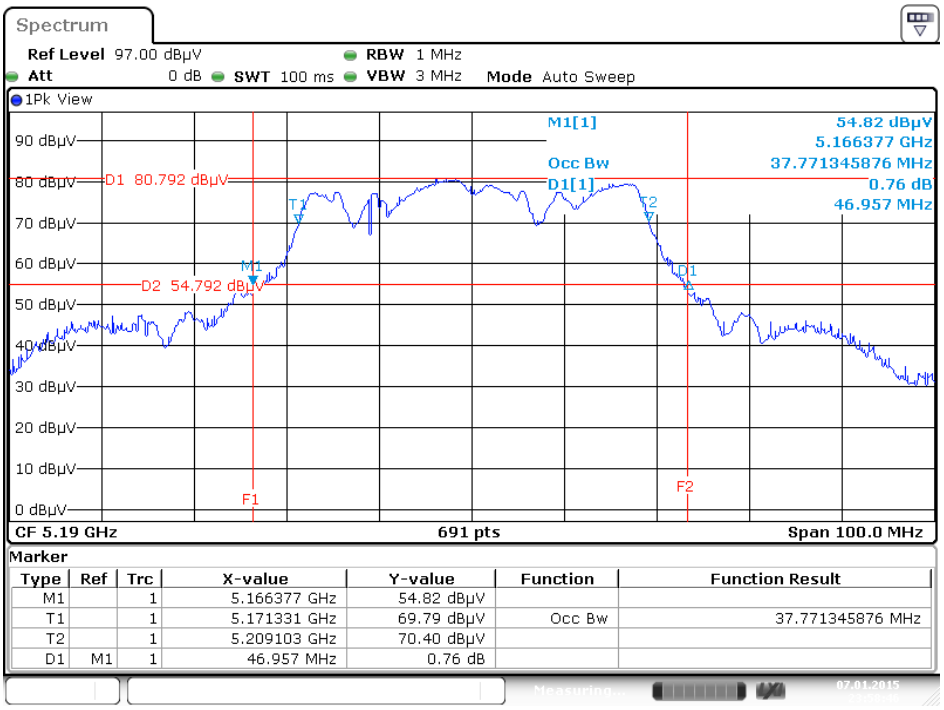
Date: 7.JAN.2015 23:49:11

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



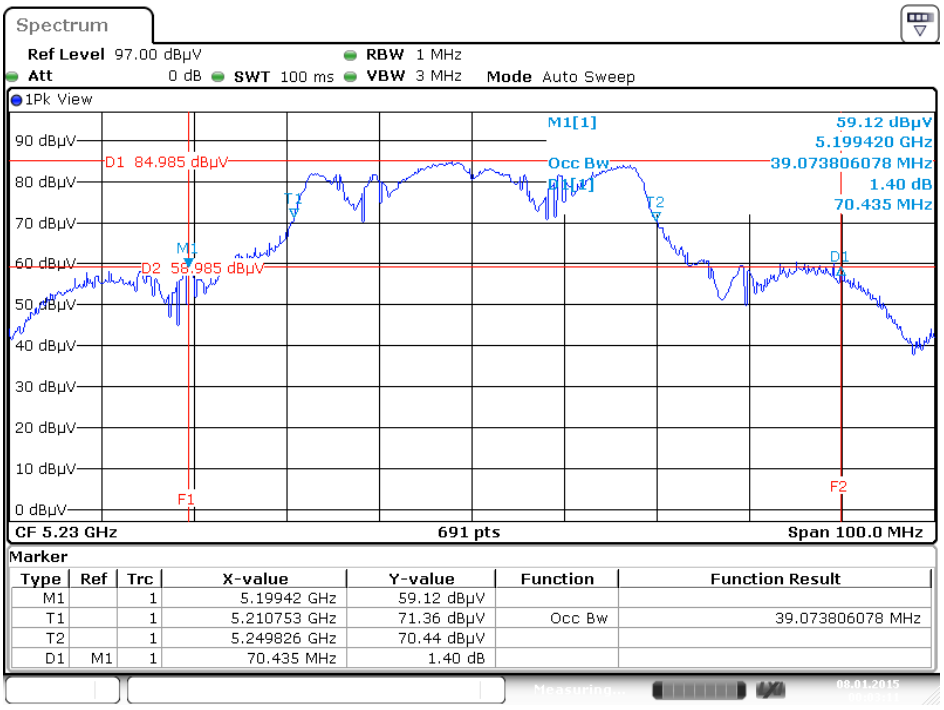
Date: 7.JAN.2015 23:47:23

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



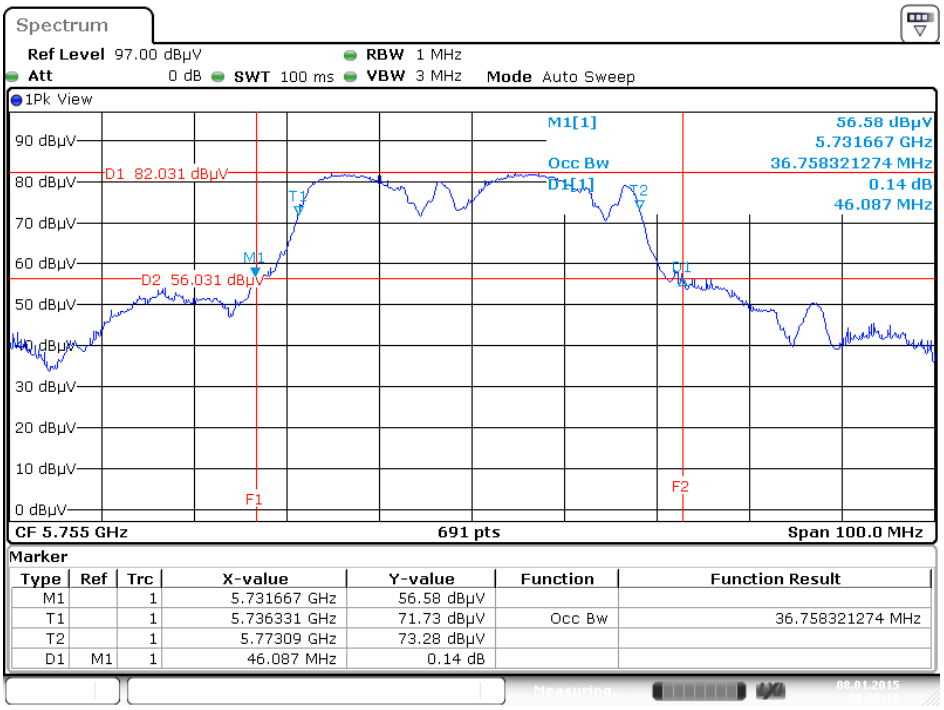
Date: 7.JAN.2015 23:58:46

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



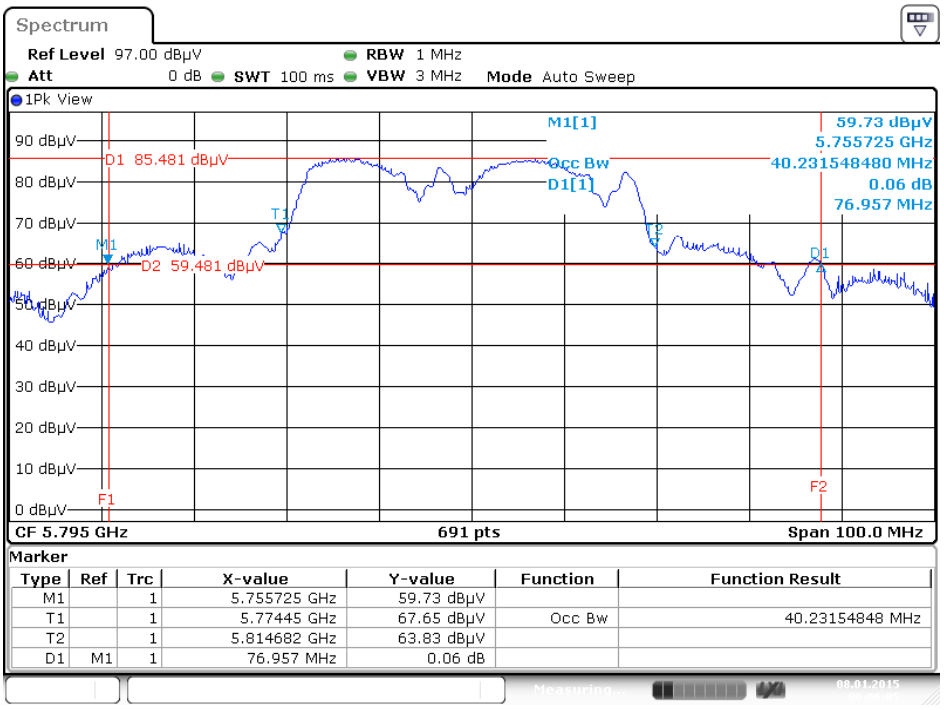
Date: 8.JAN.2015 00:03:11

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



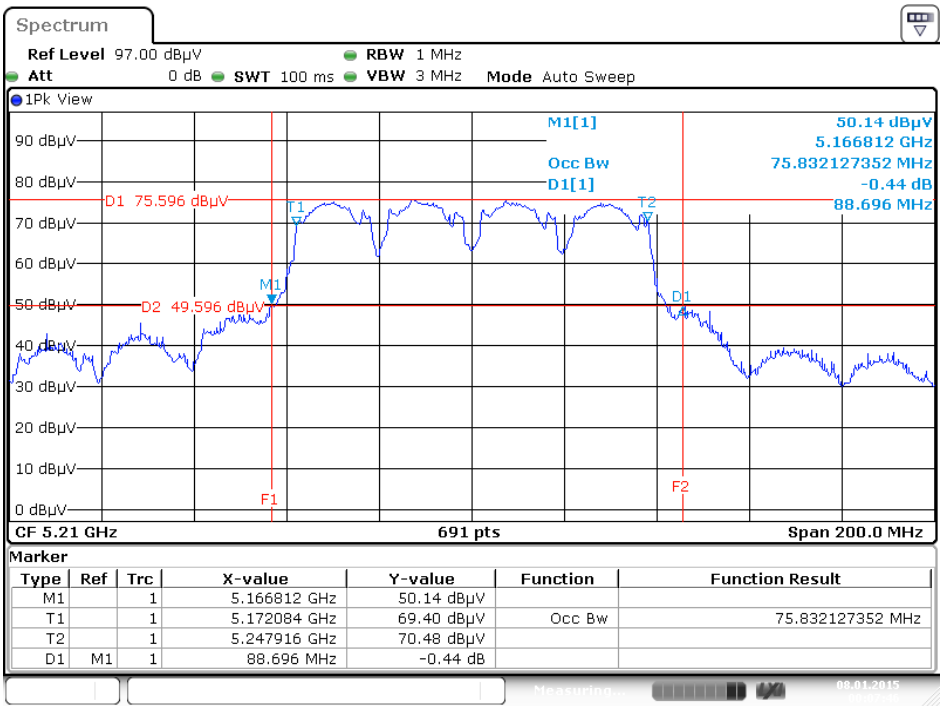
Date: 8.JAN.2015 00:05:18

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



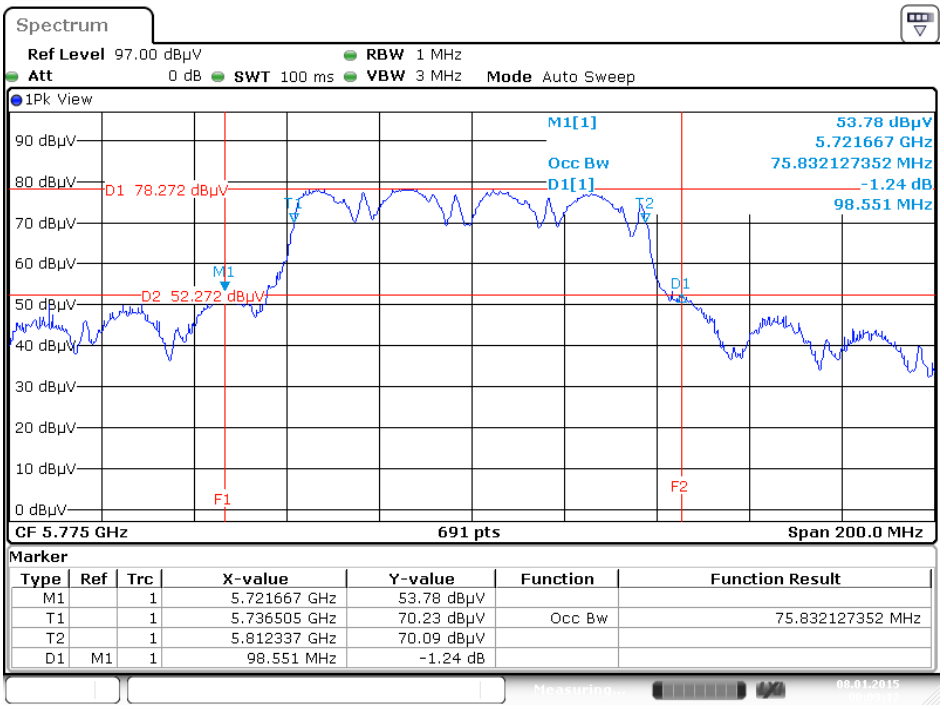
Date: 8.JAN.2015 00:06:05

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



Date: 8.JAN.2015 00:07:47

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



Date: 8.JAN.2015 00:09:12

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

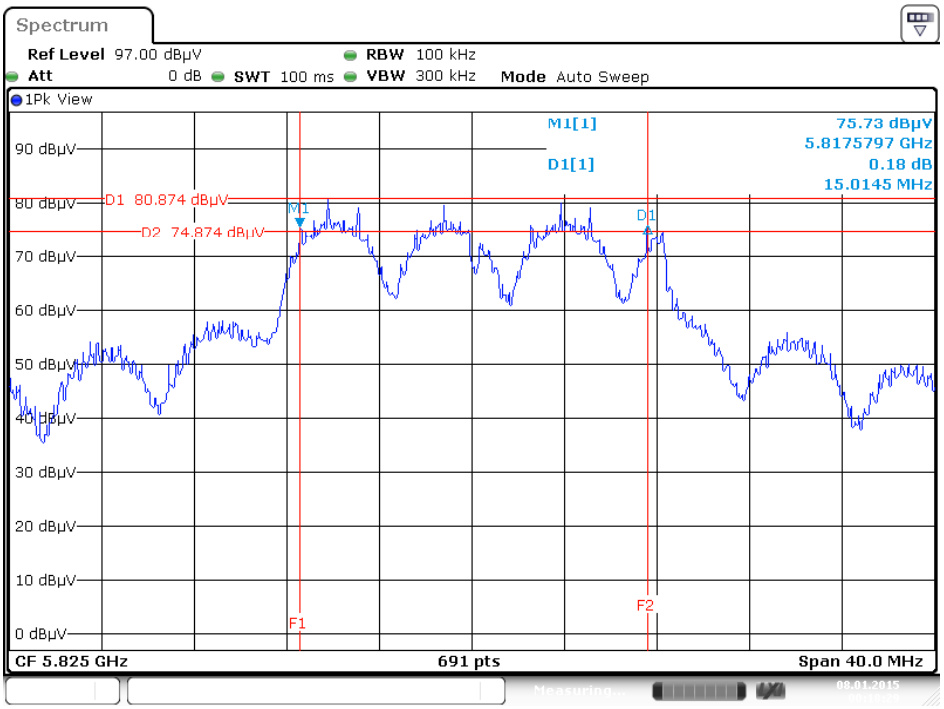
Temperature	26°C	Humidity	63%
Test Engineer	Kenneth Huang		

Mode	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11a	5745 MHz	16.12	500	Complies
	5785 MHz	15.71	500	Complies
	5825 MHz	15.01	500	Complies
802.11ac MCS0/Nss1 VHT20	5745 MHz	12.87	500	Complies
	5785 MHz	16.23	500	Complies
	5825 MHz	16.06	500	Complies
802.11ac MCS0/Nss1 VHT40	5755 MHz	35.36	500	Complies
	5795 MHz	35.71	500	Complies
802.11ac MCS0/Nss1 VHT80	5775 MHz	68.99	500	Complies

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

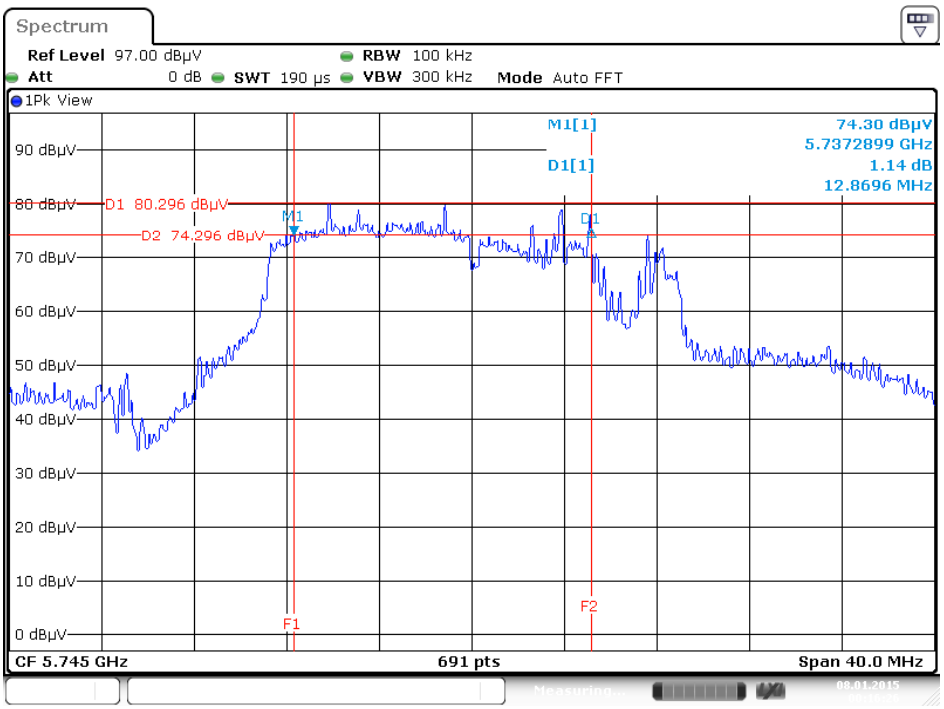
For plots, only the channel with worse result was shown.

6 dB Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5825 MHz



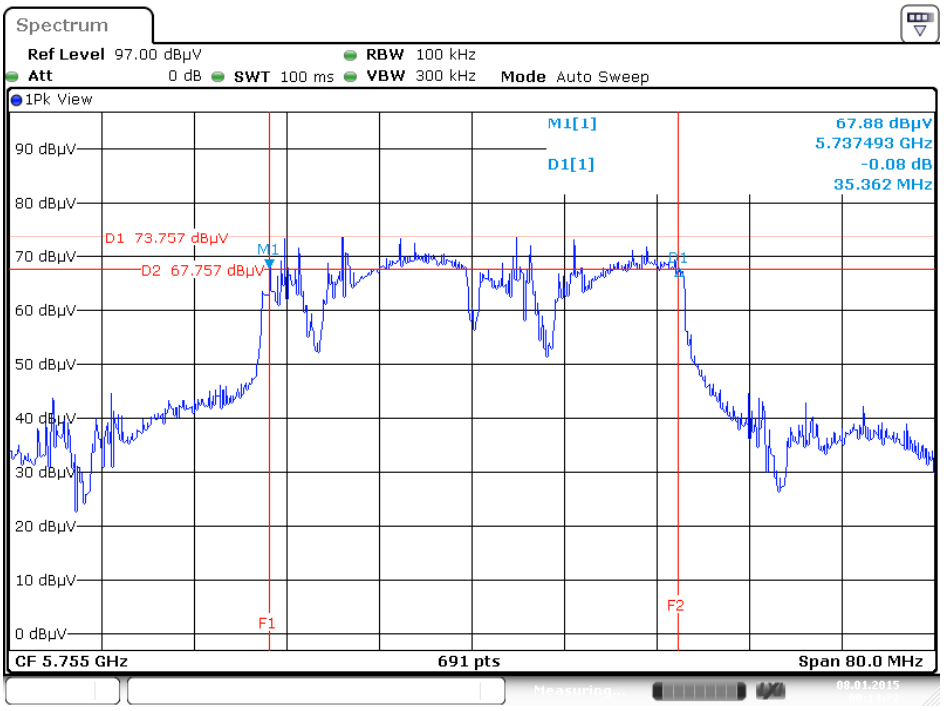
Date:8.JAN.2015 00:18:29

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



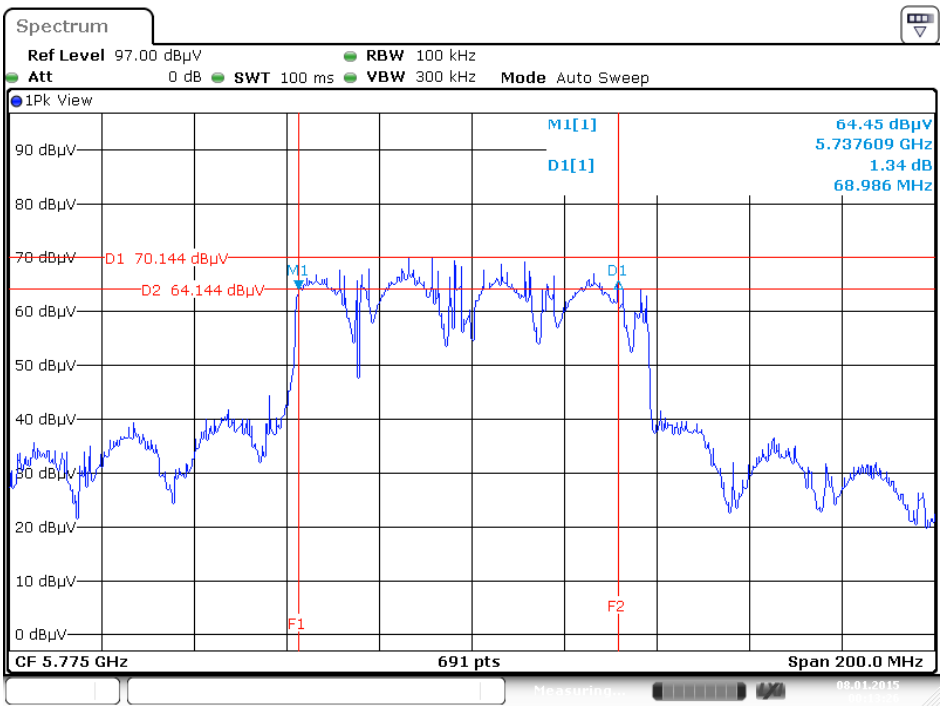
Date:8.JAN.2015 00:16:26

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



Date:8.JAN.2015 00:14:22

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



Date:8.JAN.2015 00:13:27

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.

4.4.2. Measuring Instruments and Setting

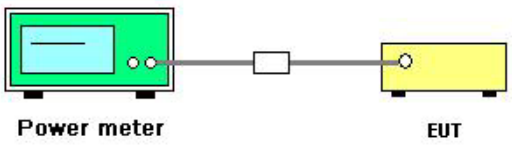
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

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	Kenneth Huang	Test Date	Jan. 07, 2015

Mode	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Chain 3	Chain 4	Total		
802.11a	5180 MHz	15.03	16.16	18.64	24.00	Complies
	5200 MHz	20.36	20.45	23.42	24.00	Complies
	5240 MHz	16.87	17.53	20.22	24.00	Complies
	5745 MHz	16.41	16.66	19.55	30.00	Complies
	5785 MHz	19.06	19.33	22.21	30.00	Complies
	5825 MHz	18.07	18.34	21.22	30.00	Complies
802.11ac MCS0/Nss1 VHT20	5180 MHz	16.22	15.45	18.86	24.00	Complies
	5200 MHz	20.66	20.82	23.75	24.00	Complies
	5240 MHz	16.83	17.31	20.09	24.00	Complies
	5745 MHz	16.22	16.33	19.29	30.00	Complies
	5785 MHz	18.89	19.04	21.98	30.00	Complies
	5825 MHz	18.17	18.13	21.16	30.00	Complies
802.11ac MCS0/Nss1 VHT40	5190 MHz	11.62	11.64	14.64	24.00	Complies
	5230 MHz	16.92	16.59	19.77	24.00	Complies
	5755 MHz	13.32	14.64	17.04	30.00	Complies
	5795 MHz	18.45	18.72	21.60	30.00	Complies
802.11ac MCS0/Nss1 VHT80	5210 MHz	8.38	10.03	12.29	24.00	Complies
	5775 MHz	12.23	13.25	15.78	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 ≥ 1/T
VBW	VBW ≥ 3 RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto couple
Note: If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.	

4.5.3. Test Procedures

For 5.15~5.25 GHz

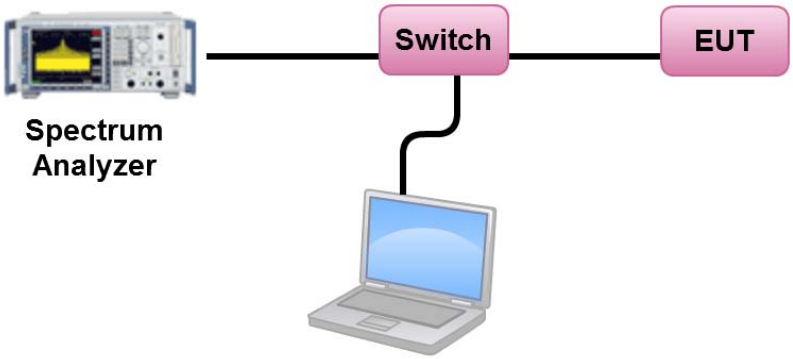
1. The transmitter output (antenna port) was connected RF switch to the spectrum analyzer.
2. Test was performed in accordance with KDB789033 D02 v01 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (F) Maximum Power Spectral Density (PSD).
3. Multiple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

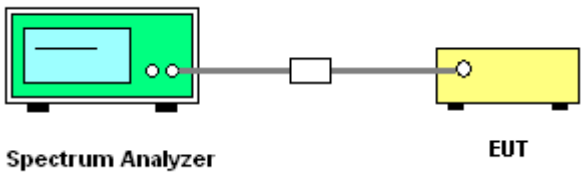
1. Test procedures refer KDB662911 D01 v02r01 section In-Band Power Spectral Density (PSD) Measurements option (b) Measure and sum spectral maximal across the outputs.
2. Use this procedure when the maximum conducted output power in the fundamental emission is used to demonstrate compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
3. Ensure that the number of measurement points in the sweep ≥ 2 x 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 10log(500kHz/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	Kenneth Huang	Test Date	Jan. 07, 2015

Configuration IEEE 802.11a / Chain 3 + Chain 4

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	4.75	9.43	Complies
40	5200 MHz	9.41	9.43	Complies
48	5240 MHz	6.73	9.43	Complies

Note: Directional gain= $10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$ =7.57dBi>6dBi, so limit=11 – (7.57 – 6)=9.43dBm/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	5.64	-3.01	2.63	28.43	Complies
157	5785 MHz	8.54	-3.01	5.53	28.43	Complies
165	5825 MHz	7.73	-3.01	4.72	28.43	Complies

Note: Directional gain= $10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$ =7.57dBi>6dBi, so limit=30 – (7.57 – 6)=28.43dBm/MHz.

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	4.99	9.43	Complies
40	5200 MHz	9.03	9.43	Complies
48	5240 MHz	6.39	9.43	Complies

Note: Directional gain= $10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$ =7.57dBi>6dBi, so limit=11 – (7.57 – 6)=9.43dBm/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	5.76	-3.01	2.75	28.43	Complies
157	5785 MHz	8.06	-3.01	5.05	28.43	Complies
165	5825 MHz	7.37	-3.01	4.36	28.43	Complies

Note: Directional gain= $10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$ =7.57dBi>6dBi, so limit=30 – (7.57 – 6)=28.43dBm/MHz.

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	-1.92	9.43	Complies
46	5230 MHz	3.16	9.43	Complies

Note: Directional gain= $10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$ =7.57dBi>6dBi, so limit=11 – (7.57 – 6)=9.43dBm/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	1.00	-3.01	-2.01	28.43	Complies
159	5795 MHz	4.86	-3.01	1.85	28.43	Complies

Note: Directional gain= $10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$ =7.57dBi>6dBi, so limit=30 – (7.57 – 6)=28.43dBm/MHz.

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	-7.45	9.43	Complies

Note: Directional gain= $10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$ =7.57dBi>6dBi, so limit=11 – (7.57 – 6)=9.43dBm/MHz.

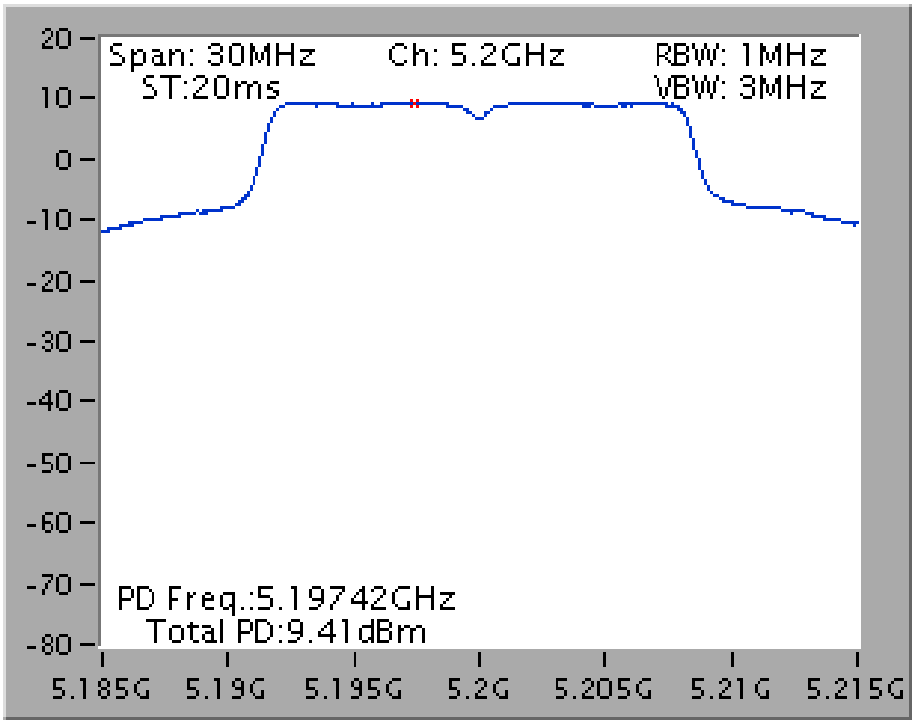
Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
155	5775 MHz	-3.46	-3.01	-6.47	28.43	Complies

Note: Directional gain= $10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$ =7.57dBi>6dBi, so limit=30 – (7.57 – 6)=28.43dBm/MHz.

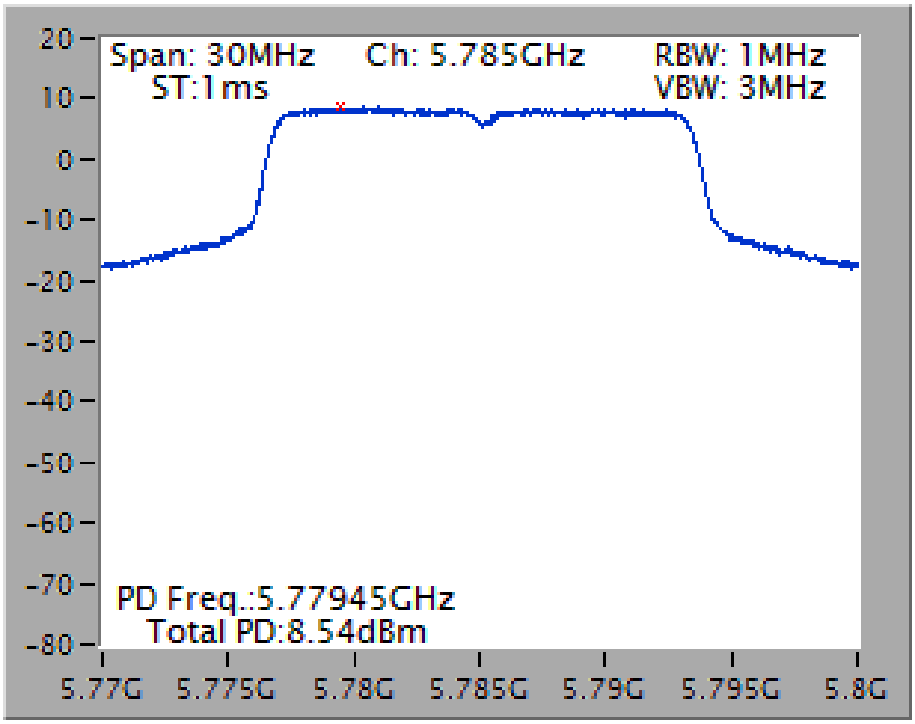
Note: All the test values were listed in the report.

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

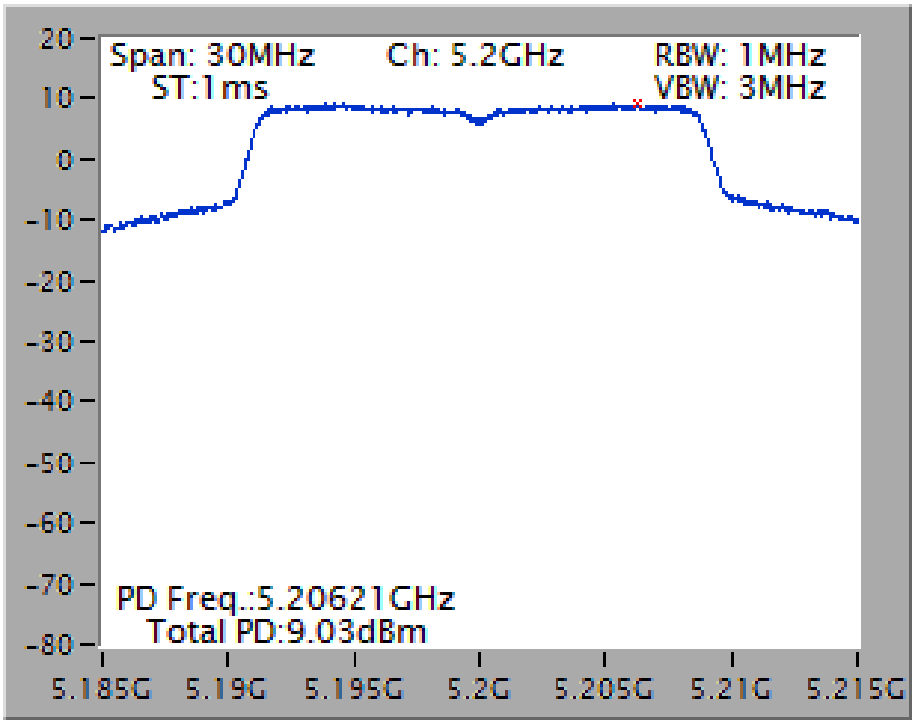
Power Density Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5200 MHz



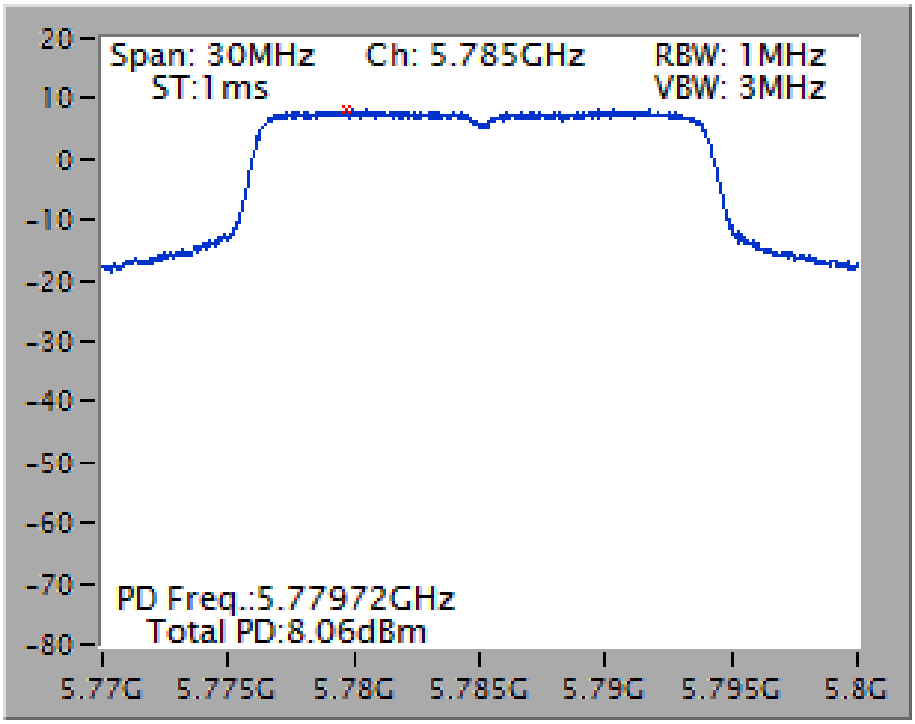
Power Density Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5785 MHz



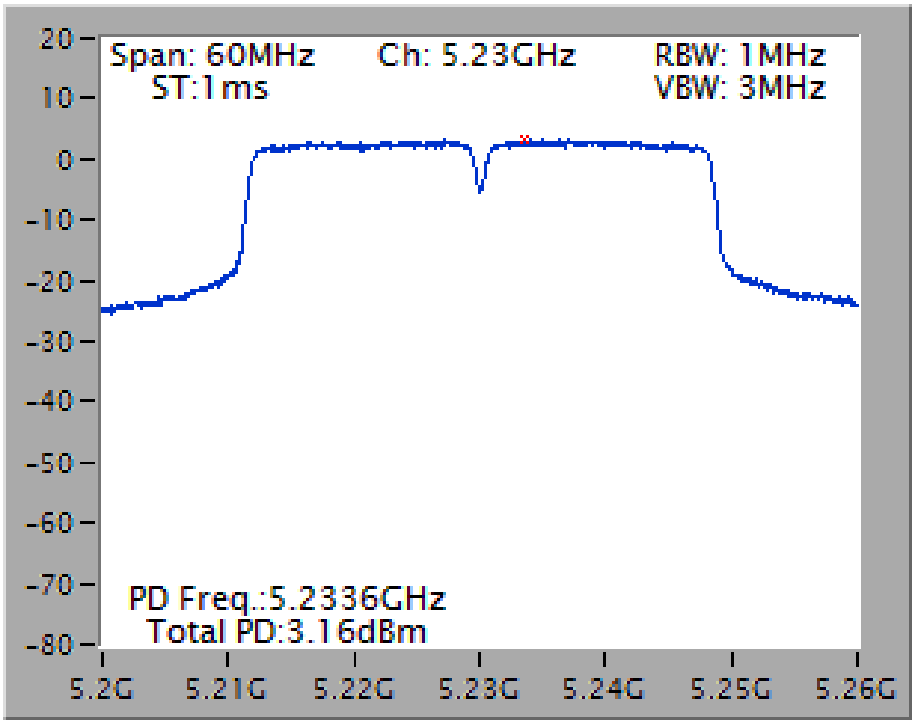
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5200 MHz



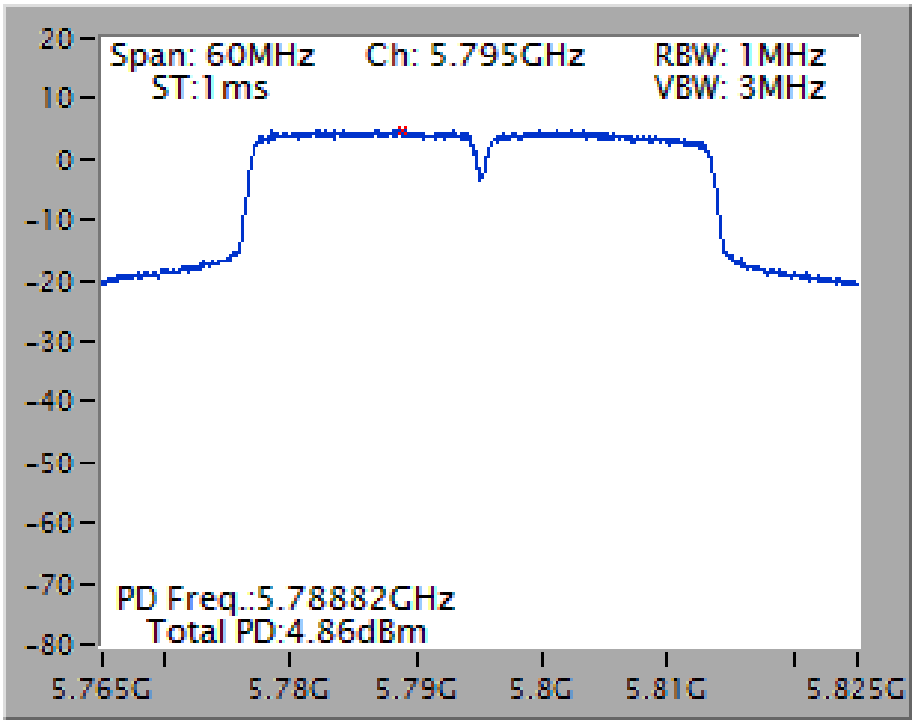
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5785 MHz



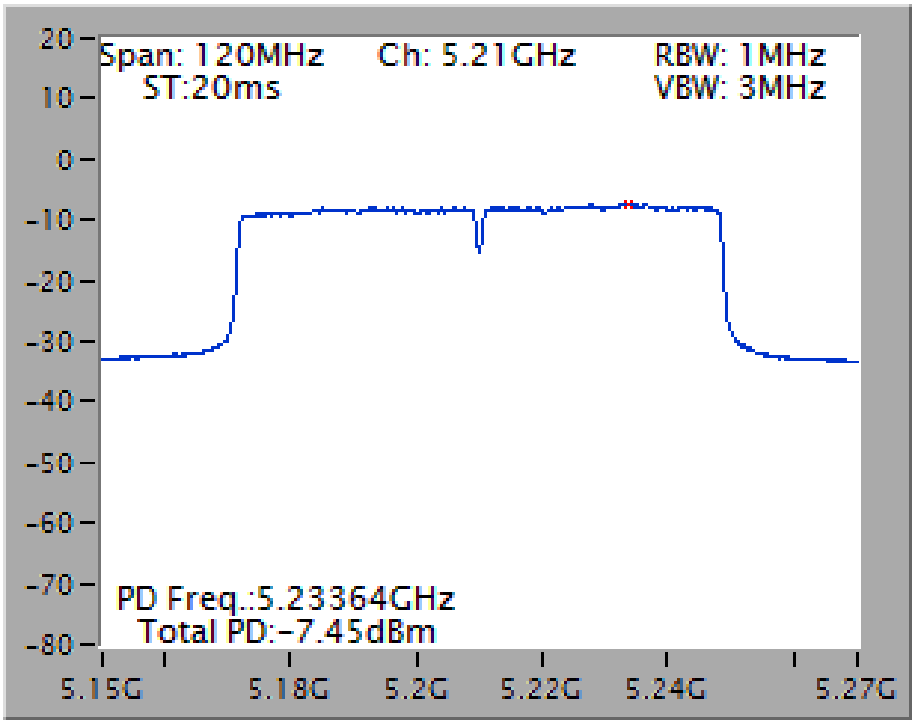
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 / 5230 MHz



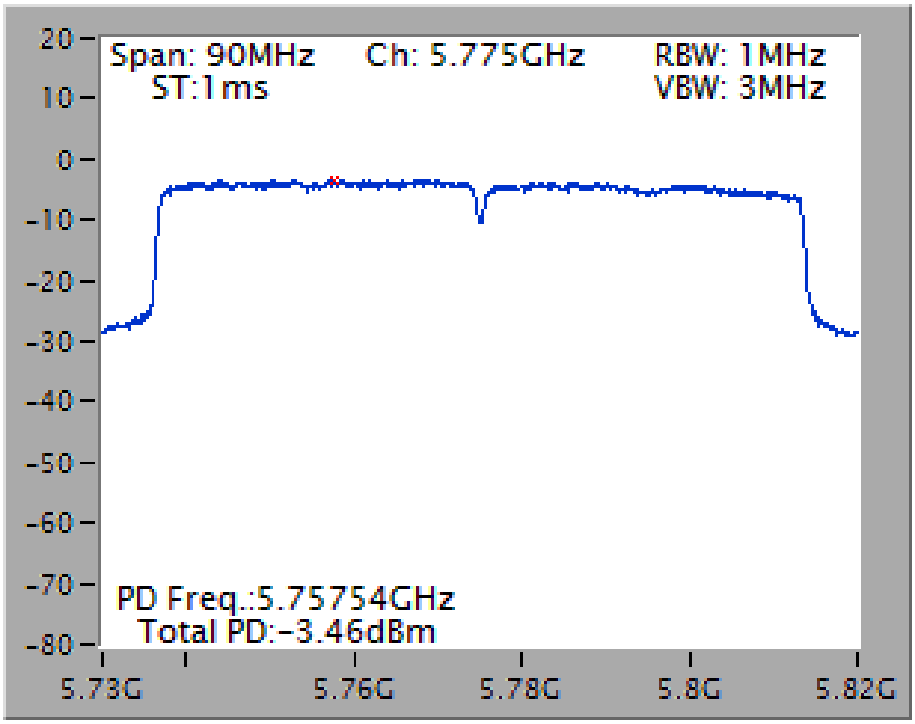
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 / 5795 MHz



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

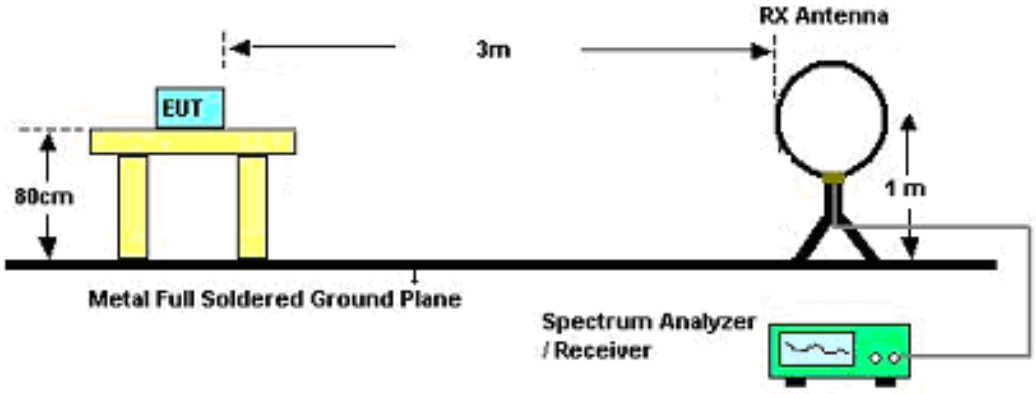
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.6.3. Test Procedures

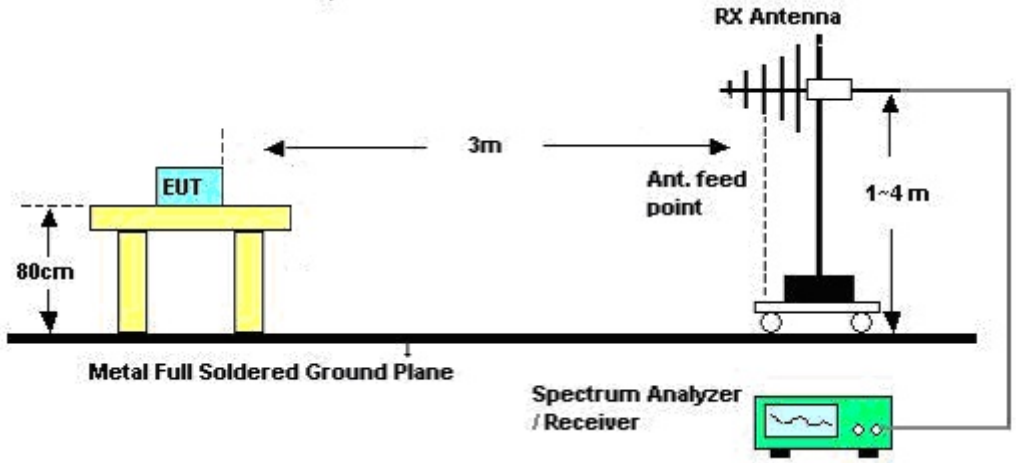
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

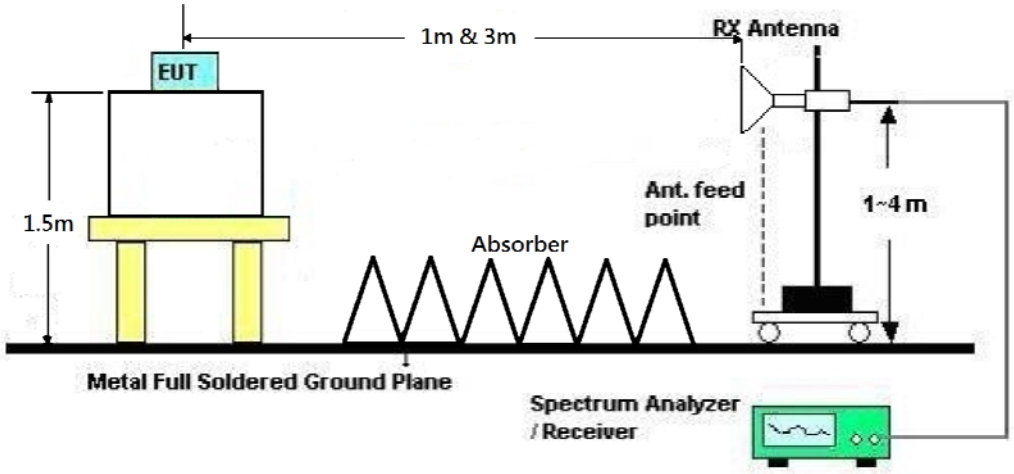
For Radiated Emissions: 9kHz ~30MHz



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	Eddie Weng	Configurations	CTX
Test Date	Jan. 29, 2015		

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.

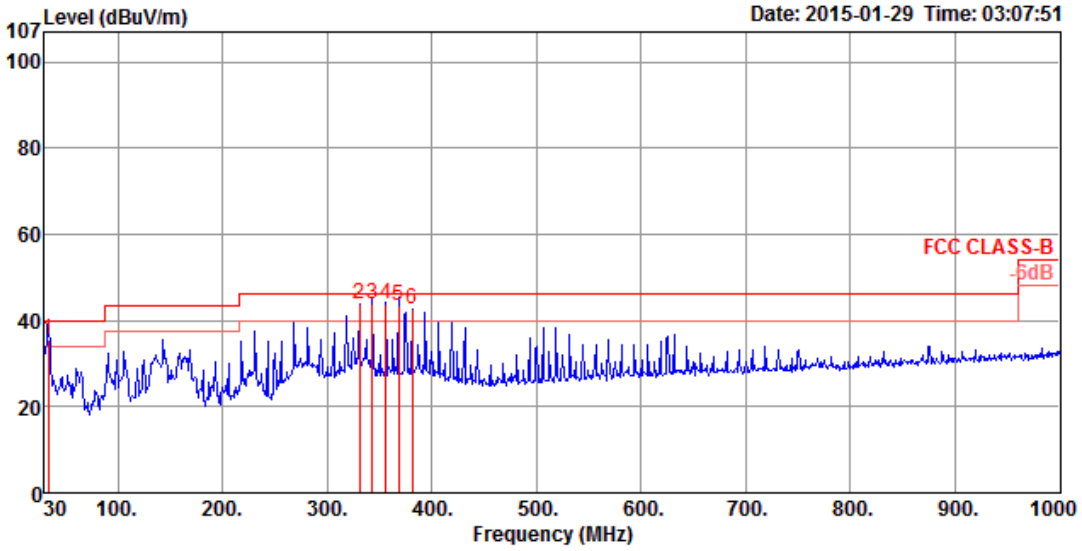
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

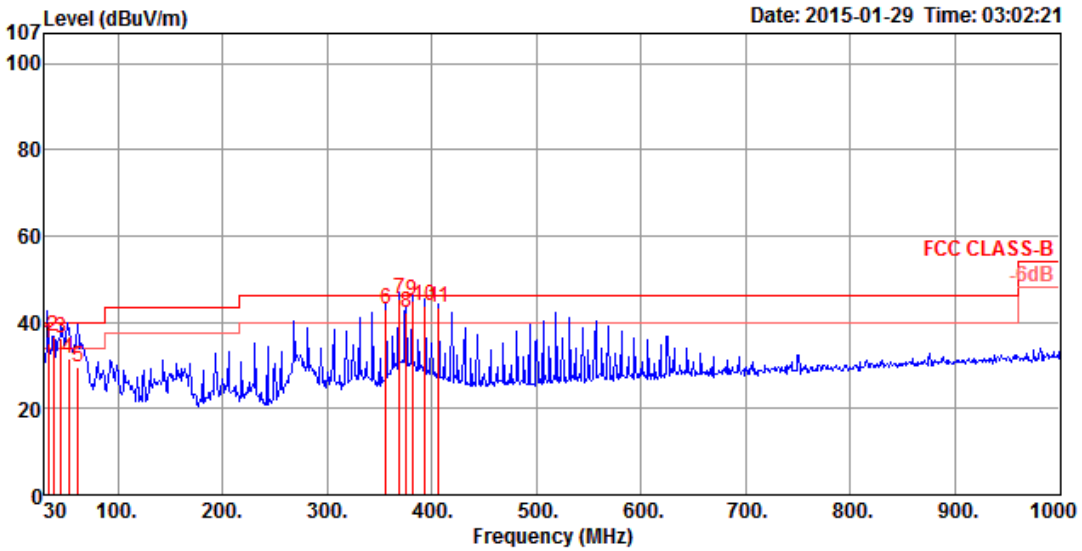
Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	CTX

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	33.72	35.45	40.00	-4.55	49.71	0.42	32.41	17.73	HORIZONTAL	31	400	QP
2	330.70	43.84	46.00	-2.16	60.04	1.30	32.28	14.78	HORIZONTAL	236	100	QP
3	343.31	43.69	46.00	-2.31	59.61	1.32	32.36	15.12	HORIZONTAL	226	100	QP
4	355.92	43.90	46.00	-2.10	59.47	1.35	32.37	15.45	HORIZONTAL	252	125	QP
5	368.53	43.48	46.00	-2.52	58.73	1.37	32.38	15.76	HORIZONTAL	247	125	QP
6	381.14	42.77	46.00	-3.23	57.57	1.39	32.26	16.07	HORIZONTAL	209	100	Peak

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	33.43	35.33	40.00	-4.67	49.73	0.42	32.42	17.60	VERTICAL	232	100	QP
2	38.73	36.61	40.00	-3.39	53.97	0.44	32.48	14.68	VERTICAL	293	100	Peak
3	45.52	36.51	40.00	-3.49	57.62	0.49	32.43	10.83	VERTICAL	218	100	QP
4	52.75	31.73	40.00	-8.27	55.17	0.51	32.51	8.56	VERTICAL	13	125	QP
5	62.01	29.69	40.00	-10.31	54.83	0.57	32.51	6.80	VERTICAL	44	125	QP
6	355.92	43.05	46.00	-2.95	58.63	1.35	32.37	15.44	VERTICAL	231	125	QP
7	368.74	45.31	46.00	-0.69	60.57	1.37	32.38	15.75	VERTICAL	240	125	QP
8	375.32	42.43	46.00	-3.57	57.46	1.38	32.32	15.91	VERTICAL	243	100	QP
9	381.14	44.84	46.00	-1.16	59.66	1.39	32.26	16.05	VERTICAL	257	150	QP
10	393.75	43.96	46.00	-2.04	58.43	1.41	32.24	16.36	VERTICAL	266	150	QP
11	406.36	43.38	46.00	-2.62	57.67	1.43	32.30	16.58	VERTICAL	190	125	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.

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

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11a CH 36 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	15531.55	57.36	74.00	-16.64	44.03	10.77	38.15	35.59	Peak	160	113	HORIZONTAL
2	15538.09	43.38	54.00	-10.62	30.08	10.77	38.12	35.59	Average	160	113	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	15534.18	43.52	54.00	-10.48	30.19	10.77	38.15	35.59	Average	160	347	VERTICAL
2	15534.76	56.56	74.00	-17.44	43.23	10.77	38.15	35.59	Peak	160	347	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11a CH 40 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	15590.16	56.58	74.00	-17.42	43.34	10.78	38.04	35.58	Peak	170	29	HORIZONTAL
2	15599.39	43.30	54.00	-10.70	30.06	10.78	38.04	35.58	Average	170	29	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	15590.04	56.16	74.00	-17.84	42.92	10.78	38.04	35.58	Peak	170	342	VERTICAL
2	15594.47	43.23	54.00	-10.77	29.99	10.78	38.04	35.58	Average	170	342	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11a CH 48 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	15724.51	43.79	54.00	-10.21	30.71	10.79	37.85	35.56	Average	160	11	HORIZONTAL
2	15728.19	56.56	74.00	-17.44	43.50	10.79	37.83	35.56	Peak	160	11	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	15720.49	43.74	54.00	-10.26	30.66	10.79	37.85	35.56	Average	170	347	VERTICAL
2	15722.03	56.44	74.00	-17.56	43.36	10.79	37.85	35.56	Peak	170	347	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11a CH 149 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	11482.16	54.69	74.00	-19.31	41.03	9.24	39.50	35.08	Peak	160	127	HORIZONTAL
2	11488.75	42.77	54.00	-11.23	29.11	9.24	39.50	35.08	Average	160	127	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	11482.27	55.01	74.00	-18.99	41.35	9.24	39.50	35.08	Peak	160	346	VERTICAL
2	11494.34	41.69	54.00	-12.31	28.03	9.24	39.50	35.08	Average	160	346	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11a CH 157 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	11568.38	59.23	74.00	-14.77	45.59	9.26	39.47	35.09	Peak	200	302	HORIZONTAL
2	11569.22	46.47	54.00	-7.53	32.83	9.26	39.47	35.09	Average	200	302	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	11568.58	57.43	74.00	-16.57	43.79	9.26	39.47	35.09	Peak	160	28	VERTICAL
2	11569.39	45.34	54.00	-8.66	31.70	9.26	39.47	35.09	Average	160	28	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11a CH 165 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	11649.16	45.69	54.00	-8.31	32.04	9.28	39.44	35.07	Average	164	258	HORIZONTAL
2	11649.80	58.68	74.00	-15.32	45.03	9.28	39.44	35.07	Peak	164	258	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	11649.71	45.46	54.00	-8.54	31.81	9.28	39.44	35.07	Average	160	191	VERTICAL
2	11655.09	57.83	74.00	-16.17	44.18	9.28	39.44	35.07	Peak	160	191	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	15536.63	43.26	54.00	-10.74	29.93	10.77	38.15	35.59	Average	164	335	HORIZONTAL
2	15538.13	56.14	74.00	-17.86	42.84	10.77	38.12	35.59	Peak	164	335	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	15540.04	56.14	74.00	-17.86	42.84	10.77	38.12	35.59	Peak	164	38	VERTICAL
2	15541.62	43.16	54.00	-10.84	29.86	10.77	38.12	35.59	Average	164	38	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 40 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	15599.35	56.16	74.00	-17.84	42.92	10.78	38.04	35.58	Peak	160	69	HORIZONTAL
2	15600.98	43.34	54.00	-10.66	30.10	10.78	38.04	35.58	Average	160	69	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	15600.58	43.25	54.00	-10.75	30.01	10.78	38.04	35.58	Average	160	28	VERTICAL
2	15601.20	56.22	74.00	-17.78	42.98	10.78	38.04	35.58	Peak	160	28	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 48 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	15715.85	43.69	54.00	-10.31	30.61	10.79	37.85	35.56	Average	160	220	HORIZONTAL
2	15720.20	56.52	74.00	-17.48	43.44	10.79	37.85	35.56	Peak	160	220	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	15715.51	56.43	74.00	-17.57	43.35	10.79	37.85	35.56	Peak	160	16	VERTICAL
2	15722.97	43.64	54.00	-10.36	30.56	10.79	37.85	35.56	Average	160	16	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	11486.01	42.40	54.00	-11.60	28.74	9.24	39.50	35.08	Average	160	353	HORIZONTAL
2	11498.80	55.32	74.00	-18.68	41.67	9.25	39.50	35.10	Peak	160	353	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	11487.39	54.17	74.00	-19.83	40.51	9.24	39.50	35.08	Peak	160	12	VERTICAL
2	11488.64	41.71	54.00	-12.29	28.05	9.24	39.50	35.08	Average	160	12	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 157 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	11570.00	46.61	54.00	-7.39	32.97	9.26	39.47	35.09	Average	160	200	HORIZONTAL
2	11570.00	59.00	74.00	-15.00	45.36	9.26	39.47	35.09	Peak	160	200	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	11570.00	46.29	54.00	-7.71	32.65	9.26	39.47	35.09	Average	160	57	VERTICAL
2	11570.00	59.40	74.00	-14.60	45.76	9.26	39.47	35.09	Peak	160	57	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 165 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	11642.10	58.84	74.00	-15.16	45.19	9.28	39.44	35.07	Peak	176	258	HORIZONTAL
2	11648.32	45.84	54.00	-8.16	32.19	9.28	39.44	35.07	Average	176	258	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	11650.12	46.34	54.00	-7.66	32.69	9.28	39.44	35.07	Average	160	191	VERTICAL
2	11650.35	59.64	74.00	-14.36	45.99	9.28	39.44	35.07	Peak	160	191	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	15561.63	43.75	54.00	-10.25	30.46	10.78	38.09	35.58	Average	160	326	HORIZONTAL
2	15570.81	57.82	74.00	-16.18	44.53	10.78	38.09	35.58	Peak	160	326	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	15564.30	43.78	54.00	-10.22	30.49	10.78	38.09	35.58	Average	160	28	VERTICAL
2	15567.31	56.61	74.00	-17.39	43.32	10.78	38.09	35.58	Peak	160	28	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 46 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	15691.88	57.71	74.00	-16.29	44.60	10.79	37.88	35.56	Peak	160	334	HORIZONTAL
2	15698.39	44.04	54.00	-9.96	30.93	10.79	37.88	35.56	Average	160	334	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	15697.61	57.81	74.00	-16.19	44.70	10.79	37.88	35.56	Peak	160	49	VERTICAL
2	15699.90	44.17	54.00	-9.83	31.06	10.79	37.88	35.56	Average	160	49	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	11500.48	41.97	54.00	-12.03	28.32	9.25	39.50	35.10	Average	160	246	HORIZONTAL
2	11502.85	55.50	74.00	-18.50	41.85	9.25	39.50	35.10	Peak	160	246	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	11507.16	42.05	54.00	-11.95	28.40	9.25	39.50	35.10	Average	160	19	VERTICAL
2	11510.06	55.30	74.00	-18.70	41.65	9.25	39.50	35.10	Peak	160	19	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 159 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	11587.22	44.49	54.00	-9.51	30.83	9.27	39.47	35.08	Average	160	326	HORIZONTAL
2	11596.86	56.89	74.00	-17.11	43.23	9.27	39.47	35.08	Peak	160	326	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	11587.28	56.84	74.00	-17.16	43.18	9.27	39.47	35.08	Peak	160	3	VERTICAL
2	11588.73	44.46	54.00	-9.54	30.80	9.27	39.47	35.08	Average	160	3	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	15625.46	56.80	74.00	-17.20	43.60	10.78	37.99	35.57	Peak	160	21	HORIZONTAL
2	15635.41	43.75	54.00	-10.25	30.55	10.78	37.99	35.57	Average	160	21	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	15625.77	57.65	74.00	-16.35	44.45	10.78	37.99	35.57	Peak	160	112	VERTICAL
2	15632.87	43.79	54.00	-10.21	30.59	10.78	37.99	35.57	Average	160	112	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 155 / Chain 3 + Chain 4
Test Date	Dec. 28, 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	11541.20	56.47	74.00	-17.53	42.81	9.26	39.49	35.09	Peak	160	2	HORIZONTAL
2	11557.70	43.61	54.00	-10.39	29.96	9.26	39.48	35.09	Average	160	2	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	11542.74	56.66	74.00	-17.34	43.00	9.26	39.49	35.09	Peak	160	295	VERTICAL
2	11549.45	43.69	54.00	-10.31	30.03	9.26	39.49	35.09	Average	160	295	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)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	1MHz / 3MHz for Peak

4.7.3. Test Procedures

1. 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	Eddie Weng	Configurations	IEEE 802.11a CH 36, 40, 48 / Chain 3 + Chain 4
Test Date	Dec. 28, 2014		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5145.95	68.04	74.00	-5.96	63.10	6.13	34.01	35.20	Peak	186	359	VERTICAL
2	5150.00	53.62	54.00	-0.38	48.68	6.13	34.01	35.20	Average	186	359	VERTICAL
3	5186.08	100.80			95.77	6.15	34.08	35.20	Average	186	359	VERTICAL
4	5186.08	109.99			104.96	6.15	34.08	35.20	Peak	186	359	VERTICAL

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

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5149.13	53.96	54.00	-0.04	49.02	6.13	34.01	35.20	Average	202	334	VERTICAL
2	5149.71	69.89	74.00	-4.11	64.95	6.13	34.01	35.20	Peak	202	334	VERTICAL
3	5194.21	105.54			100.50	6.16	34.08	35.20	Average	202	334	VERTICAL
4	5204.05	116.36			111.29	6.16	34.11	35.20	Peak	202	334	VERTICAL

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

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5147.40	60.22	74.00	-13.78	55.28	6.13	34.01	35.20	Peak	201	333	VERTICAL
2	5148.70	45.84	54.00	-8.16	40.90	6.13	34.01	35.20	Average	201	333	VERTICAL
3	5233.92	106.92			101.76	6.18	34.18	35.20	Average	201	333	VERTICAL
4	5234.79	117.01			111.85	6.18	34.18	35.20	Peak	201	333	VERTICAL
5	5350.43	44.41	54.00	-9.59	38.93	6.26	34.42	35.20	Average	201	333	VERTICAL
6	5357.38	57.39	74.00	-16.61	51.91	6.26	34.42	35.20	Peak	201	333	VERTICAL

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

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11a CH 149, 157, 165 / Chain 3 + Chain 4
Test Date	Dec. 28, 2014		

Channel 149

	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	5713.84	63.24	68.20	-4.96	57.13	6.44	34.87	35.20	Peak	105	24	VERTICAL
2	5724.71	78.00	78.20	-0.20	71.86	6.45	34.89	35.20	Peak	105	24	VERTICAL
3	5749.63	98.07			91.92	6.45	34.90	35.20	Average	105	24	VERTICAL
4	5749.92	107.85			101.70	6.45	34.90	35.20	Peak	105	24	VERTICAL

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

Channel 157

	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	5705.45	57.60	68.20	-10.60	51.50	6.44	34.86	35.20	Peak	214	17	VERTICAL
2	5724.71	57.70	78.20	-20.50	51.56	6.45	34.89	35.20	Peak	214	17	VERTICAL
3	5780.08	100.01			93.82	6.46	34.93	35.20	Average	214	17	VERTICAL
4	5780.08	110.00			103.81	6.46	34.93	35.20	Peak	214	17	VERTICAL
5	5851.45	56.96	78.20	-21.24	50.69	6.49	34.98	35.20	Peak	214	17	VERTICAL
6	5860.58	57.81	68.20	-10.39	51.52	6.50	34.99	35.20	Peak	214	17	VERTICAL

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

Channel 165

	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	5819.79	99.25			93.02	6.48	34.95	35.20	Average	217	19	VERTICAL
2	5820.08	108.58			102.35	6.48	34.95	35.20	Peak	217	19	VERTICAL
3	5851.16	71.95	78.20	-6.25	65.68	6.49	34.98	35.20	Peak	217	19	VERTICAL
4	5860.87	62.43	68.20	-5.77	56.14	6.50	34.99	35.20	Peak	217	19	VERTICAL

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

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36, 40, 48 / Chain 3 + Chain 4
Test Date	Dec. 28, 2014		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5148.26	67.73	74.00	-6.27	62.79	6.13	34.01	35.20	Peak	162	355	VERTICAL
2	5150.00	53.68	54.00	-0.32	48.74	6.13	34.01	35.20	Average	162	355	VERTICAL
3	5174.21	98.70			93.71	6.15	34.04	35.20	Average	162	355	VERTICAL
4	5184.92	108.11			103.08	6.15	34.08	35.20	Peak	162	355	VERTICAL

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

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5149.42	69.43	74.00	-4.57	64.49	6.13	34.01	35.20	Peak	100	7	VERTICAL
2	5150.00	53.83	54.00	-0.17	48.89	6.13	34.01	35.20	Average	100	7	VERTICAL
3	5206.37	113.91			108.84	6.16	34.11	35.20	Peak	100	7	VERTICAL
4	5207.53	103.15			98.07	6.17	34.11	35.20	Average	100	7	VERTICAL

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

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5143.92	61.19	74.00	-12.81	56.25	6.13	34.01	35.20	Peak	169	280	HORIZONTAL
2	5146.53	45.76	54.00	-8.24	40.82	6.13	34.01	35.20	Average	169	280	HORIZONTAL
3	5245.64	103.54			98.32	6.20	34.22	35.20	Average	169	280	HORIZONTAL
4	5247.81	113.88			108.66	6.20	34.22	35.20	Peak	169	280	HORIZONTAL
5	5350.00	44.76	54.00	-9.24	39.28	6.26	34.42	35.20	Average	169	280	HORIZONTAL
6	5355.64	56.85	74.00	-17.15	51.37	6.26	34.42	35.20	Peak	169	280	HORIZONTAL

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

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149, 157, 165 / Chain 3 + Chain 4
Test Date	Dec. 28, 2014		

Channel 149

	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	5712.11	63.68	68.20	-4.52	57.57	6.44	34.87	35.20	Peak	100	40	VERTICAL
2	5724.42	77.75	78.20	-0.45	71.61	6.45	34.89	35.20	Peak	100	40	VERTICAL
3	5739.21	96.50			90.36	6.45	34.89	35.20	Average	100	40	VERTICAL
4	5739.50	107.31			101.17	6.45	34.89	35.20	Peak	100	40	VERTICAL

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

Channel 157

	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	5712.40	57.35	68.20	-10.85	51.24	6.44	34.87	35.20	Peak	167	287	HORIZONTAL
2	5720.37	57.86	78.20	-20.34	51.74	6.45	34.87	35.20	Peak	167	287	HORIZONTAL
3	5779.79	97.57			91.38	6.46	34.93	35.20	Average	167	287	HORIZONTAL
4	5780.08	108.12			101.93	6.46	34.93	35.20	Peak	167	287	HORIZONTAL
5	5856.08	57.63	78.20	-20.57	51.35	6.50	34.98	35.20	Peak	167	287	HORIZONTAL
6	5869.26	58.29	68.20	-9.91	52.00	6.50	34.99	35.20	Peak	167	287	HORIZONTAL

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

Channel 165

	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	5817.76	96.84			90.61	6.48	34.95	35.20	Average	218	19	VERTICAL
2	5819.50	107.25			101.02	6.48	34.95	35.20	Peak	218	19	VERTICAL
3	5850.00	74.20	78.20	-4.00	67.93	6.49	34.98	35.20	Peak	218	19	VERTICAL
4	5860.00	62.37	68.20	-5.83	56.08	6.50	34.99	35.20	Peak	218	19	VERTICAL

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

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38, 46 / Chain 3 + Chain 4
Test Date	Dec. 28, 2014		

Channel 38

	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	5147.11	66.65	74.00	-7.35	61.71	6.13	34.01	35.20	Peak	250	358	VERTICAL
2	5150.00	53.75	54.00	-0.25	48.81	6.13	34.01	35.20	Average	250	358	VERTICAL
3	5186.53	101.17			96.14	6.15	34.08	35.20	Peak	250	358	VERTICAL
4	5187.68	91.53			86.50	6.15	34.08	35.20	Average	250	358	VERTICAL

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

Channel 46

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5146.09	52.46	54.00	-1.54	47.52	6.13	34.01	35.20	Average	209	318	VERTICAL
2	5148.70	65.73	74.00	-8.27	60.79	6.13	34.01	35.20	Peak	209	318	VERTICAL
3	5228.26	101.60			96.47	6.18	34.15	35.20	Average	209	318	VERTICAL
4	5228.26	111.02			105.89	6.18	34.15	35.20	Peak	209	318	VERTICAL
5	5351.74	46.79	54.00	-7.21	41.31	6.26	34.42	35.20	Average	209	318	VERTICAL
6	5356.51	60.03	74.00	-13.97	54.55	6.26	34.42	35.20	Peak	209	318	VERTICAL

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

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151, 159 / Chain 3 + Chain 4
Test Date	Dec. 28, 2014		

Channel 151

	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	5715.00	67.83	68.20	-0.37	61.72	6.44	34.87	35.20	Peak	105	31	VERTICAL
2	5724.13	71.63	78.20	-6.57	65.49	6.45	34.89	35.20	Peak	105	31	VERTICAL
3	5750.66	92.21			86.06	6.45	34.90	35.20	Average	105	31	VERTICAL
4	5751.53	102.89			96.73	6.46	34.90	35.20	Peak	105	31	VERTICAL

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

Channel 159

	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	5712.11	62.57	68.20	-5.63	56.46	6.44	34.87	35.20	Peak	100	30	VERTICAL
2	5719.21	64.73	78.20	-13.47	58.61	6.45	34.87	35.20	Peak	100	30	VERTICAL
3	5792.40	96.26			90.05	6.47	34.94	35.20	Average	100	30	VERTICAL
4	5793.55	107.37			101.16	6.47	34.94	35.20	Peak	100	30	VERTICAL
5	5853.76	67.36	78.20	-10.84	61.08	6.50	34.98	35.20	Peak	100	30	VERTICAL
6	5860.87	66.18	68.20	-2.02	59.89	6.50	34.99	35.20	Peak	100	30	VERTICAL

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

Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42, 155 / Chain 3 + Chain 4
Test Date	Dec. 28, 2014		

Channel 42

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5144.21	65.47	74.00	-8.53	60.53	6.13	34.01	35.20	Peak	200	330	VERTICAL
2	5146.38	53.92	54.00	-0.08	48.98	6.13	34.01	35.20	Average	200	330	VERTICAL
3	5219.41	98.82			93.70	6.17	34.15	35.20	Peak	200	330	VERTICAL
4	5247.63	88.64			83.42	6.20	34.22	35.20	Average	200	330	VERTICAL
5	5350.72	47.04	54.00	-6.96	41.56	6.26	34.42	35.20	Average	200	330	VERTICAL
6	5362.30	58.41	74.00	-15.59	52.92	6.27	34.42	35.20	Peak	200	330	VERTICAL

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

Channel 155

	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	5705.59	67.96	68.20	-0.24	61.86	6.44	34.86	35.20	Peak	208	23	VERTICAL
2	5722.11	73.12	78.20	-5.08	67.00	6.45	34.87	35.20	Peak	208	23	VERTICAL
3	5743.89	99.04			92.89	6.45	34.90	35.20	Peak	208	23	VERTICAL
4	5746.78	89.46			83.31	6.45	34.90	35.20	Average	208	23	VERTICAL
5	5852.89	63.35	78.20	-14.85	57.08	6.49	34.98	35.20	Peak	208	23	VERTICAL
6	5862.17	63.34	68.20	-4.86	57.05	6.50	34.99	35.20	Peak	208	23	VERTICAL

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

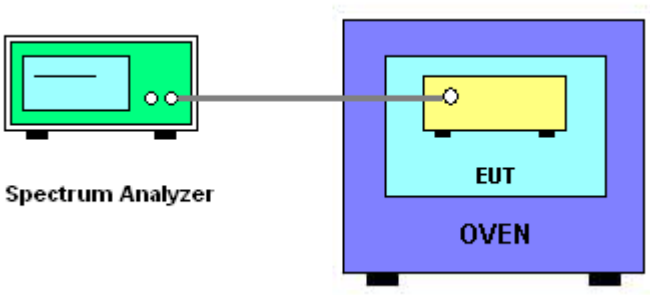
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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. 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 0°C~40°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	Kenneth Huang	Test Date	Jan. 07, 2015

Mode: 20 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5200 MHz	5785 MHz
126.50	5200.0339	5785.0412
110.00	5200.0391	5785.0460
93.50	5200.0465	5785.0512
Max. Deviation (MHz)	0.0464	0.0512
Max. Deviation (ppm)	8.93	8.86

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5200 MHz	5785 MHz
0	5200.0347	5785.0421
10	5200.0356	5785.0439
20	5200.0391	5785.0460
30	5200.0447	5785.0491
40	5200.0456	5785.0504
Max. Deviation (MHz)	0.0456	0.0504
Max. Deviation (ppm)	8.77	8.71

Mode: 40 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5190 MHz	5755 MHz
126.50	5190.0373	5755.0430
110.00	5190.0447	5755.0499
93.50	5190.0573	5755.0560
Max. Deviation (MHz)	0.0573	0.0560
Max. Deviation (ppm)	11.04	9.73

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5190 MHz	5755 MHz
0	5190.0564	5755.0551
10	5190.0547	5755.0534
20	5190.0447	5755.0499
30	5190.0395	5755.0465
40	5190.0378	5755.0443
Max. Deviation (MHz)	0.0564	0.0551
Max. Deviation (ppm)	10.87	9.58

Mode: 80 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5210 MHz	5775 MHz
126.50	5210.0439	5775.0217
110.00	5210.0478	5775.0517
93.50	5210.0561	5775.0699
Max. Deviation (MHz)	0.0561	0.0699
Max. Deviation (ppm)	10.76	12.10

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5210 MHz	5775 MHz
0	5210.0569	5775.0708
10	5210.0539	5775.0677
20	5210.0478	5775.0517
30	5210.0448	5775.0265
40	5210.0430	5775.0226
Max. Deviation (MHz)	0.0569	0.0708
Max. Deviation (ppm)	10.93	12.25

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	8317A	MY39501305	1GHz ~ 26.5GHz	Jan. 13, 2014	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)
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. 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)
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%

Appendix B. Maximum Permissible Exposure

1. Maximum Permissible Exposure

1.1. Applicable Standard

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|², |H|² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|², |H|² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

1.2. MPE Calculation Method

E (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

E = Electric field (V/m)

P = Average RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

Pd = $\frac{30 \times P \times G}{377 \times d^2}$

From the EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

1.3. Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

For 5GHz Band:

Antenna Type : PCB Antenna

Conducted Power for IEEE 802.11ac MCS0/Nss1 VHT20: 23.75 dBm

Distance (m)	Antenna Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)	Test Result
			(dBm)	(mW)			
0.2	4.88	3.0761	23.7510	237.1940	0.145229	1	Complies

For 2.4GHz Band:

Antenna Type : PCB Antenna

Conducted Power for IEEE 802.11g: 24.16 dBm

Distance (m)	Antenna Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)	Test Result
			(dBm)	(mW)			
0.2	2.54	1.7947	24.1575	260.4649	0.093046	1	Complies

Conclusion:

Both of the WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously, the formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ...etc. < 1

CPD = Calculation power density

LPD = Limit of power density

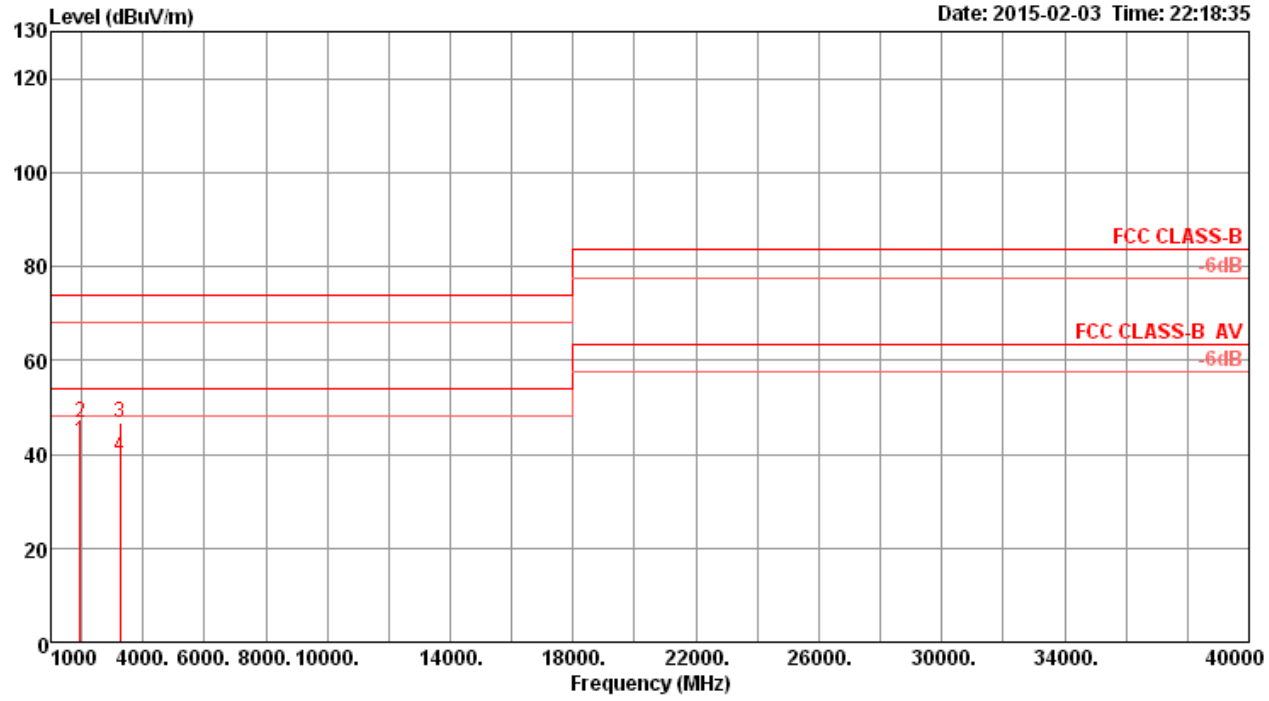
Therefore, the worst-case situation is 0.093046 / 1 + 0.145229 / 1 = 0.238275, which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.

Appendix C. Radiated Emission Co-location Report

1. Results of Radiated Emissions for Co-located

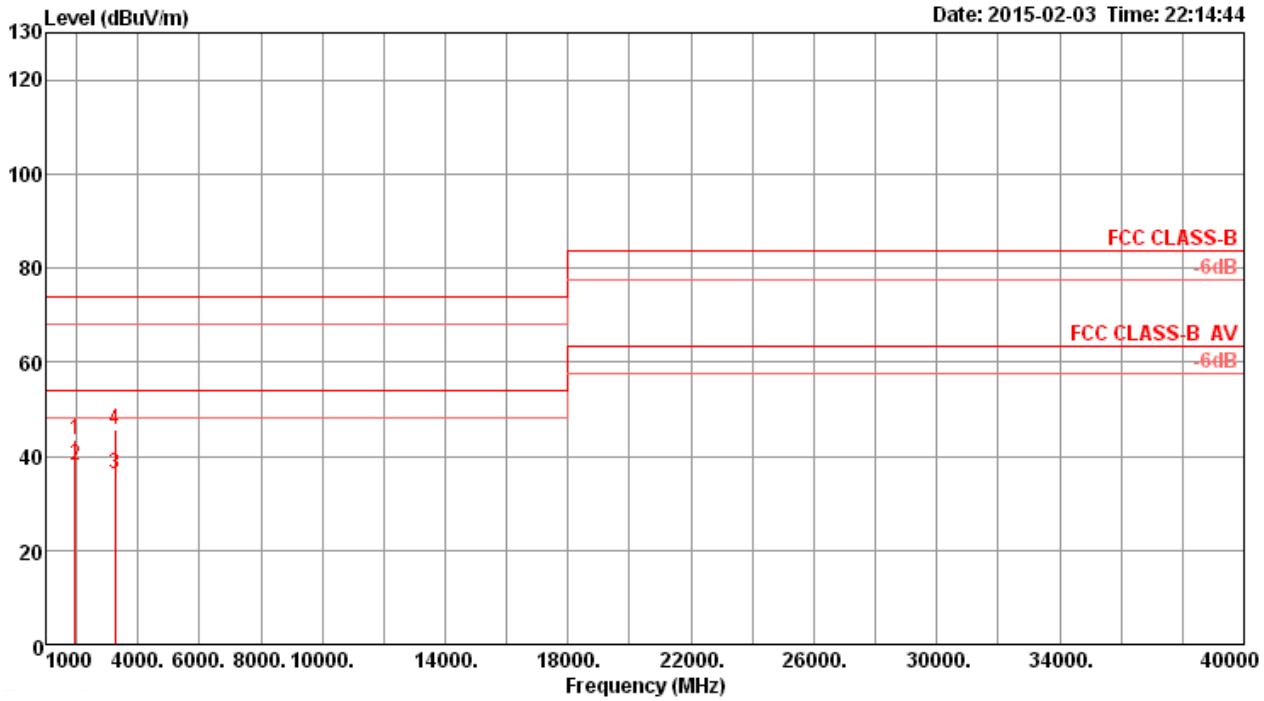
Temperature	25°C	Humidity	40%
Test Engineer	Eddie Weang	Configurations	2.4G + 5G

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	1950.00	42.86	54.00	-11.14	47.08	3.74	26.94	34.90	Average	102	30	HORIZONTAL
2	1950.00	46.80	74.00	-27.20	51.02	3.74	26.94	34.90	Peak	102	30	HORIZONTAL
3	3249.86	46.80	74.00	-27.20	46.75	4.87	30.38	35.20	Peak	100	153	HORIZONTAL
4	3249.96	39.61	54.00	-14.39	39.56	4.87	30.38	35.20	Average	100	153	HORIZONTAL

Vertial



	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	1950.03	43.55	74.00	-30.45	47.77	3.74	26.94	34.90	Peak	100	138	VERTICAL
2	1950.03	37.88	54.00	-16.12	42.10	3.74	26.94	34.90	Average	100	138	VERTICAL
3	3250.03	36.35	54.00	-17.65	36.30	4.87	30.38	35.20	Average	158	196	VERTICAL
4	3250.32	45.64	74.00	-28.36	45.59	4.87	30.38	35.20	Peak	158	196	VERTICAL