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

FCC RADIO TEST REPORT

Applicant's company	**Hitron Technologies**
Applicant Address	No.1-8, Lising 1st Rd. Hsinchu Science Park, Hsinchu 300, Taiwan
FCC ID	**U4P-CGNM**
Manufacturer's company	**Hitron Technologies**
Manufacturer Address	No.1-8, Lising 1st Rd. Hsinchu Science Park, Hsinchu 300, Taiwan

Product Name	D3 WiFi MoCA Gateway
Brand Name	Hitron
Model No.	CGNMXXXXXXXX (The "X" in model name can be 0 to 9, A to Z or blank, for marketing purpose.)
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250 MHz / 5725 ~ 5850 MHz
Received Date	Feb. 26, 2014
Final Test Date	Jan. 21, 2015
Submission Type	Class II Change

Statement

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

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

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

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.10 2009**, **47 CFR FCC Part 15 Subpart E, KDB789033 D02 v01, KDB662911 D01 v02r01, KDB644545 D03 v01.**

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

Note: Using 1.5m table as an alternative was permitted by the FCC per TCBC conference call of Dec. 2, 2014.

Testing Laboratory
1190

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR431033-04	Rev. 01	Initial issue of report	May 21, 2015

1. VERIFICATION OF COMPLIANCE

Product Name	:	D3 WiFi MoCA Gateway
Brand Name	:	Hitron
Model No.	:	CGNMXXXXXXXX
Applicant	:	Hitron Technologies
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 Feb. 26, 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	7.54 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	2.01 dB
4.5	15.407(a)	Power Spectral Density	Complies	0.80 dB
4.6	15.407(b)	Radiated Emissions	Complies	1.32 dB
4.7	15.407(b)	Band Edge Emissions	Complies	0.06 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 (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From power adapter
Modulation	IEEE 802.11a: OFDM IEEE 802.11n/ac: see the below table
Data Modulation	IEEE 802.11a/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) IEEE 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Data Rate (Mbps)	IEEE 802.11a: OFDM (6/9/12/18/24/36/48/54) IEEE 802.11n/ac: see the below table
Frequency Range	5150 ~ 5250 MHz / 5725 ~ 5850 MHz
Channel Number	9 for 20MHz bandwidth ; 4 for 40MHz bandwidth 2 for 80MHz bandwidth
Channel Band Width (99%)	Band 1: IEEE 802.11a: 18.58 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 21.27 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 38.93 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 76.12 MHz Band 4: IEEE 802.11a: 19.71 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 19.88 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 37.48 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 75.25 MHz
Maximum Conducted Output Power	Band 1: IEEE 802.11a: 27.99 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 27.93 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 27.38 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 17.62 dBm Band 4: IEEE 802.11a: 27.43 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 27.37 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 26.64 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 18.57 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	Three (TX)		
Band width Mode	20 MHz	40 MHz	80 MHz
IEEE 802.11a	V	X	X
IEEE 802.11n	V	V	X
IEEE 802.11ac	V	V	V

IEEE 11n/ac Spec.

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

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

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

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

3.2. Accessories

Power	Brand	Model No.	Rating
Adapter	AtechOEM	ADS0363-W 120250	Input: 100-240Vac~ 50-60Hz 1.0A Output: 12Vdc, 2.5A
Other			
Pedestal*1			

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)		
					2.4GHz	5GHz B1	5GHz B4
1	Airgain	N2420SS-T-G220U	PIFA Antenna	I-PEX	3.1	-	-
2	Airgain	N2420SS-T-G150U	PIFA Antenna	I-PEX	3.4	-	-
3	-	-	PCB Antenna	I-PEX	4.48	-	-
4	Airgain	N5X20BW-T-G150U	PIFA Antenna	I-PEX	-	3.1	3.9
5	Airgain	N5X20BW-T-G150U	PIFA Antenna	I-PEX	-	2.8	5.2
6	Airgain	N5X20BW-T-G100U	PIFA Antenna	I-PEX	-	2.4	5.6

Note: The EUT has six antennas.

<For 2.4GHz>

For IEEE 802.11b/g/n mode (3TX/3RX)

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

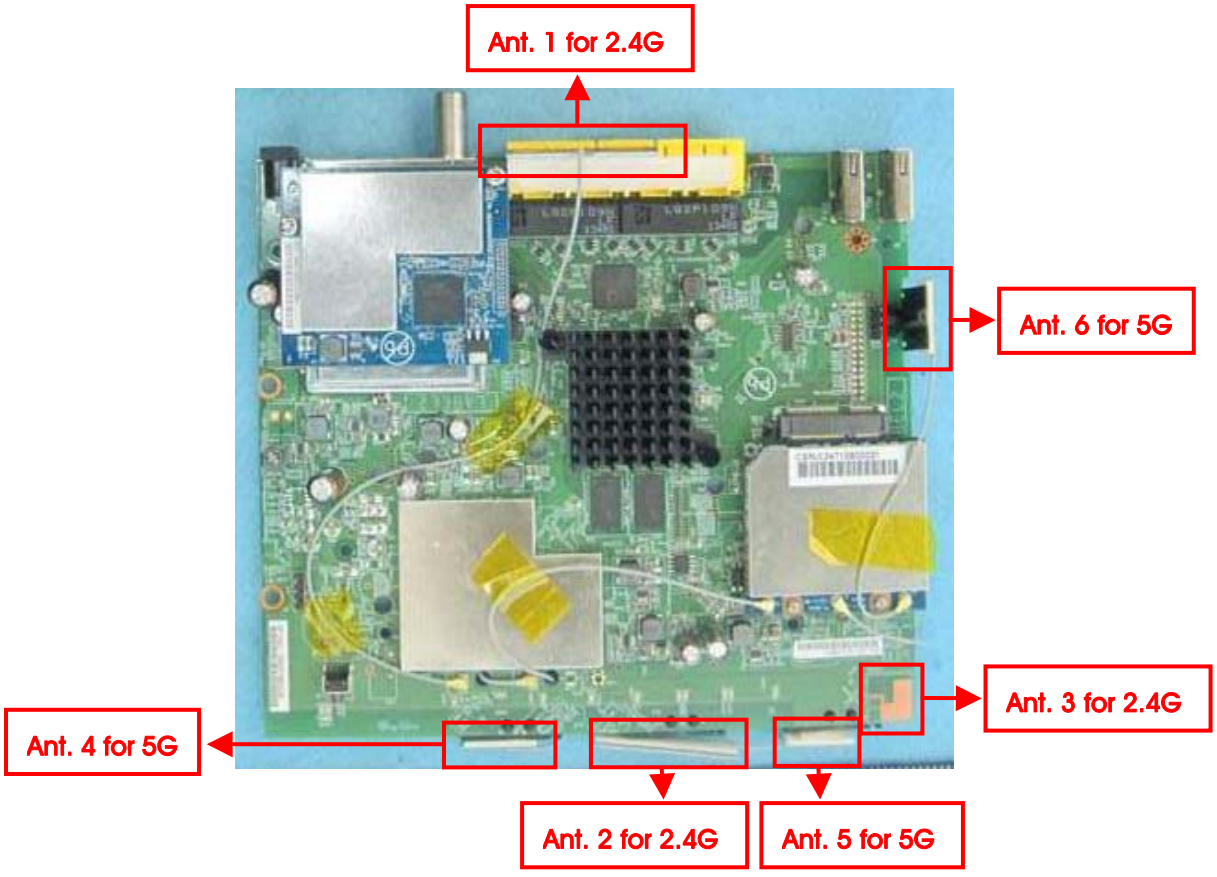
Ant. 1, Ant. 2 and Ant. 3 could transmit/receive simultaneously.

<For 5GHz>

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

Ant. 4, Ant. 5 and Ant. 6 can be used as transmitting/receiving antenna.

Ant. 4, Ant. 5 and Ant. 6 could transmit/receive simultaneously.



3.4. Table for Carrier Frequencies

There are three bandwidth systems.

For 20MHz bandwidth systems, use Channel 36, 40, 44, 48, 149, 153, 157, 161, 165.

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

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

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5150~5250 MHz Band 1	36	5180 MHz	44	5220 MHz
	38	5190 MHz	46	5230 MHz
	40	5200 MHz	48	5240 MHz
	42	5210 MHz	-	-
5725~5850 MHz Band 4	149	5745 MHz	157	5785 MHz
	151	5755 MHz	159	5795 MHz
	153	5765 MHz	161	5805 MHz
	155	5775 MHz	165	5825 MHz

3.5. Table for Test Modes

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

Test Items	Mode		Data Rate	Channel	Ant.
AC Power Conducted Emission	CTX		-	-	-
Max. Conducted Output Power	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	4+5+6
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	4+5+6
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	4+5+6
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	4+5+6
Power Spectral Density	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	4+5+6
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	4+5+6
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	4+5+6
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	4+5+6
26dB Spectrum Bandwidth & 99% Occupied Bandwidth Measurement	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	4+5+6
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	4+5+6
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	4+5+6
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	4+5+6
6dB Spectrum Bandwidth Measurement	11a/BPSK	Band 4	6Mbps	149/157/165	4+5+6
	11ac VHT20	Band 4	MCS0/Nss1	149/157/165	4+5+6
	11ac VHT40	Band 4	MCS0/Nss1	151/159	4+5+6
	11ac VHT80	Band 4	MCS0/Nss1	155	4+5+6
Radiated Emission Below 1GHz	CTX		-	-	-
Radiated Emission Above 1GHz	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	4+5+6
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	4+5+6
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	4+5+6
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	4+5+6

Band Edge Emission	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	4+5+6
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	4+5+6
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	4+5+6
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	4+5+6
Frequency Stability	Un-modulation		-	38/40/42/151/155/157	4+5+6

Note: VHT20/VHT40/VHT 80covers HT20/HT40/HT80, due to same modulation.

The following test modes were performed for all tests:

For Conducted Emission test:

Mode 1. EUT Standing-CTX

For Radiated Emission Below 1GHz test:

Mode 1. EUT Standing-CTX

For Radiated Emission Above 1GHz test:

Mode 1. EUT Standing-CTX

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 List

The model number detail information for the following table:

Model No.	Description
CGNMXXXXXXXX	The "X" in model name can be 0 to 9, A to Z or blank, for marketing purpose.

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

3.8. Table for Class II Change

This product is an extension of original one reported under Sporton project number: FR431033
Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
Update 5GHz Band 1 and Band 4 from "Old Rules" to "New Rules".	1. AC Power Line Conducted Emissions 2. 26dB Spectrum Bandwidth and 99% Occupied Bandwidth 3. Maximum Conducted Output Power 4. 6dB Spectrum Bandwidth 5. Power Spectral Density 6. Radiated Emissions 7. Band Edge Emissions 8. Frequency Stability 9. MPE

3.9. Table for Supporting Units

For Test Site No: 03CH01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	M1330	E2K4965AGNM

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E6430	DoC

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	D420	E2KWM3945ABG

3.10. 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	Atheros Radio Test 2 (ART2-GUI)					
Mode	Test Frequency (MHz)					
	NCB: 20MHz					
	5180 MHz	5200 MHz	5240 MHz	5745 MHz	5785 MHz	5825 MHz
802.11a	23	23	23	21.5	23	21.5
802.11ac MCS0/Nss1 VHT20	19	23	23	19.5	23	21
Mode	NCB: 40MHz					
802.11ac MCS0/Nss1 VHT40	5190 MHz		5230 MHz	5755 MHz	5795 MHz	
	15.5		23	17	22.5	
Mode	NCB: 80MHz					
802.11ac MCS0/Nss1 VHT80	5210 MHz			5775 MHz		
	13			14.5		

3.11. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.12. Duty Cycle

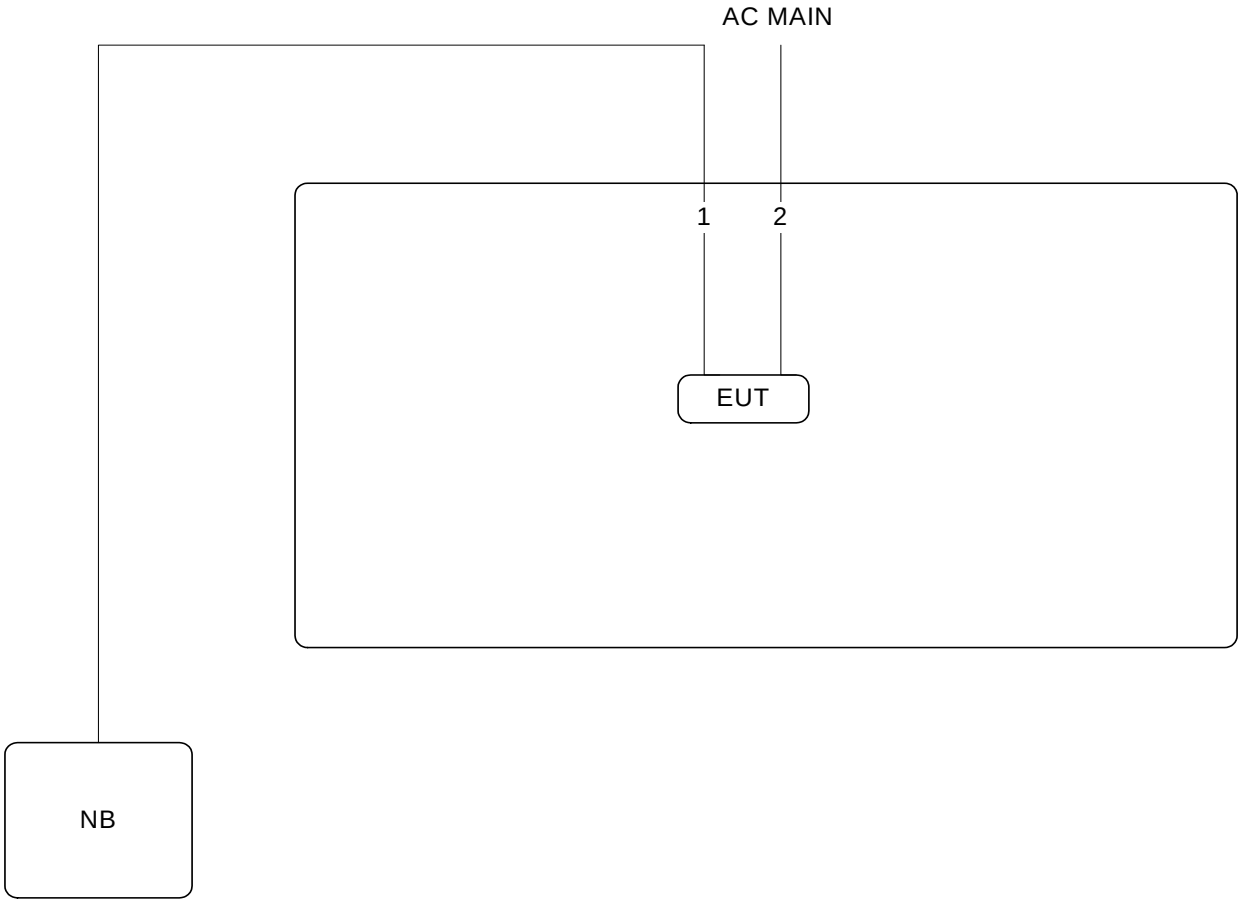
Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	2.034	2.076	97.98%	0.09	0.49
802.11ac MCS0/Nss1 VHT20	1.900	2.015	94.29%	0.26	0.53
802.11ac MCS0/Nss1 VHT40	0.935	0.9938	94.08%	0.26	1.07
802.11ac MCS0/Nss1 VHT80	0.316	0.37506	84.21%	0.75	3.17

3.13. Test Configurations

3.13.1. AC Power Line Conduction Emissions Test Configuration

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

3.13.2. Radiation Emissions Test Configuration



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

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

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

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

4.1.2. Measuring Instruments and Setting

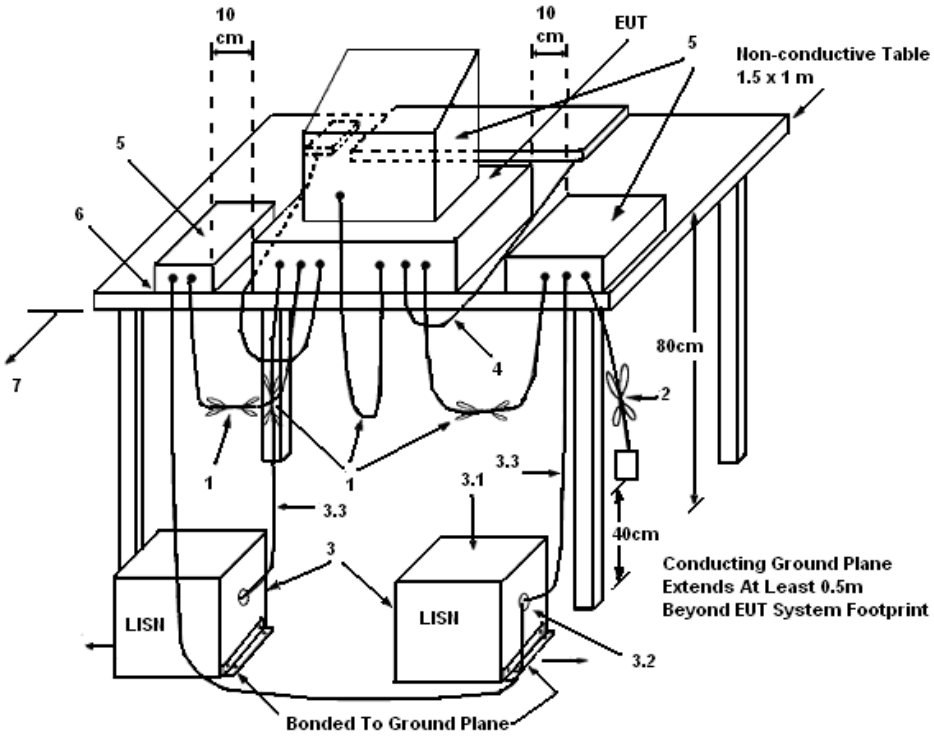
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

4.1.3. Test Procedures

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

4.1.4. Test Setup Layout



LEGEND:

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

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

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

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

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

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

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

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

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

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

4.1.5. Test Deviation

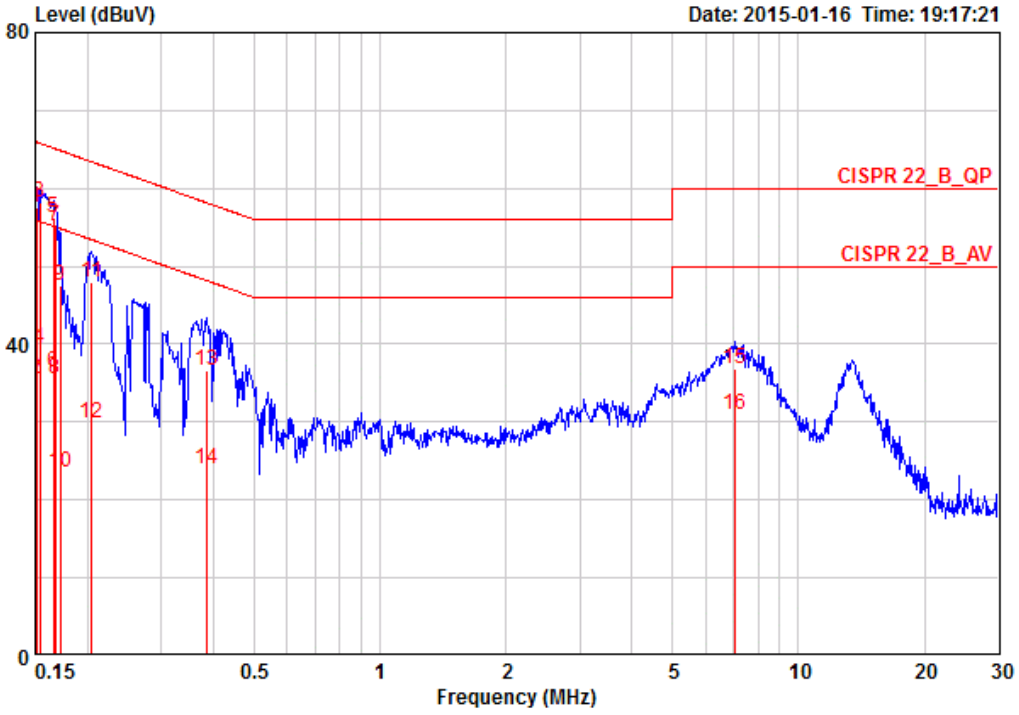
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

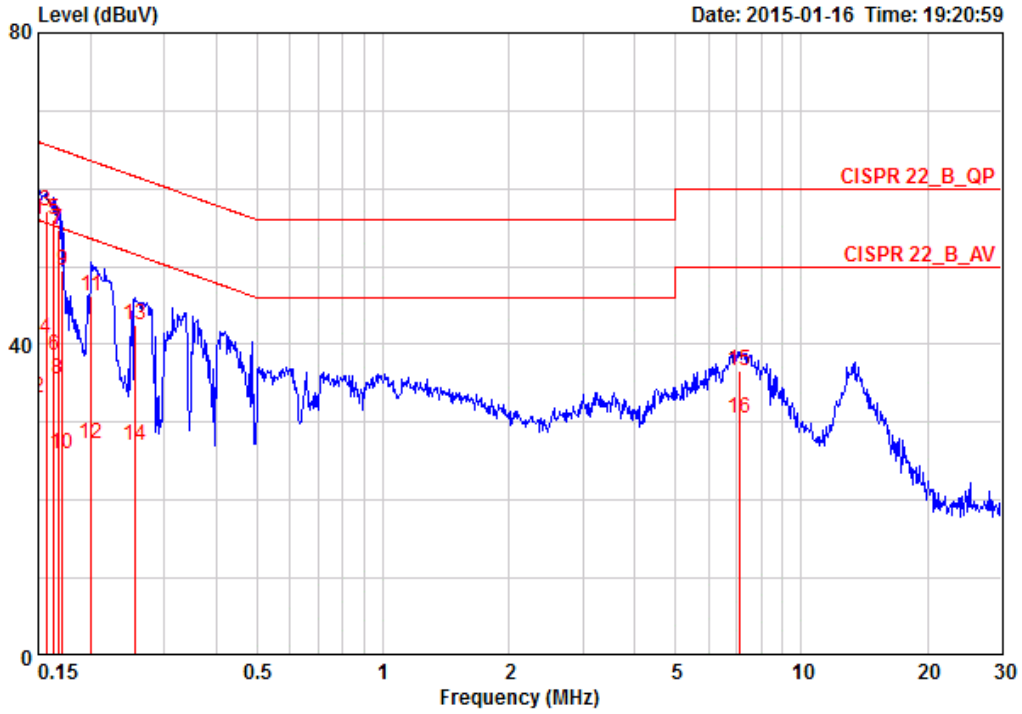
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	24°C	Humidity	47%
Test Engineer	Deven Huang	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 @	0.15080	57.55	-8.41	65.96	47.58	9.77	0.20	QP	LINE
2	0.15080	35.50	-20.46	55.96	25.53	9.77	0.20	AVERAGE	LINE
3 @	0.15403	58.24	-7.54	65.78	48.26	9.77	0.20	QP	LINE
4	0.15403	39.45	-16.33	55.78	29.47	9.77	0.20	AVERAGE	LINE
5	0.16589	56.27	-8.89	65.16	46.28	9.77	0.22	QP	LINE
6	0.16589	36.37	-18.79	55.16	26.38	9.77	0.22	AVERAGE	LINE
7	0.16765	55.11	-9.96	65.08	45.12	9.77	0.22	QP	LINE
8	0.16765	35.52	-19.55	55.08	25.53	9.77	0.22	AVERAGE	LINE
9	0.17215	47.42	-17.44	64.86	37.42	9.77	0.22	QP	LINE
10	0.17215	23.55	-31.31	54.86	13.55	9.77	0.22	AVERAGE	LINE
11	0.20505	48.05	-15.35	63.40	38.02	9.78	0.25	QP	LINE
12	0.20505	29.94	-23.46	53.40	19.91	9.78	0.25	AVERAGE	LINE
13	0.38724	36.71	-21.41	58.12	26.64	9.77	0.30	QP	LINE
14	0.38724	23.96	-24.16	48.12	13.89	9.77	0.30	AVERAGE	LINE
15	7.025	36.94	-23.06	60.00	26.90	9.64	0.39	QP	LINE
16	7.025	31.02	-18.98	50.00	20.98	9.64	0.39	AVERAGE	LINE

Temperature	24°C	Humidity	47%
Test Engineer	Deven Huang	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	0.15000	55.92	-10.08	66.00	45.80	9.92	0.20	QP	NEUTRAL
2	0.15000	33.03	-22.97	56.00	22.91	9.92	0.20	AVERAGE	NEUTRAL
3 @	0.15650	57.19	-8.46	65.65	47.06	9.92	0.21	QP	NEUTRAL
4	0.15650	40.74	-14.91	55.65	30.61	9.92	0.21	AVERAGE	NEUTRAL
5	0.16327	56.11	-9.18	65.30	45.98	9.92	0.21	QP	NEUTRAL
6	0.16327	38.56	-16.73	55.30	28.43	9.92	0.21	AVERAGE	NEUTRAL
7	0.16765	54.64	-10.44	65.08	44.50	9.92	0.22	QP	NEUTRAL
8	0.16765	35.43	-19.65	55.08	25.29	9.92	0.22	AVERAGE	NEUTRAL
9	0.17125	49.58	-15.32	64.90	39.44	9.92	0.22	QP	NEUTRAL
10	0.17125	25.92	-28.98	54.90	15.78	9.92	0.22	AVERAGE	NEUTRAL
11	0.20075	46.13	-17.45	63.58	35.96	9.92	0.25	QP	NEUTRAL
12	0.20075	27.30	-26.28	53.58	17.13	9.92	0.25	AVERAGE	NEUTRAL
13	0.25480	42.56	-19.04	61.60	32.38	9.92	0.27	QP	NEUTRAL
14	0.25480	27.07	-24.53	51.60	16.89	9.92	0.27	AVERAGE	NEUTRAL
15	7.137	36.62	-23.38	60.00	26.42	9.80	0.40	QP	NEUTRAL
16	7.137	30.45	-19.55	50.00	20.25	9.80	0.40	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

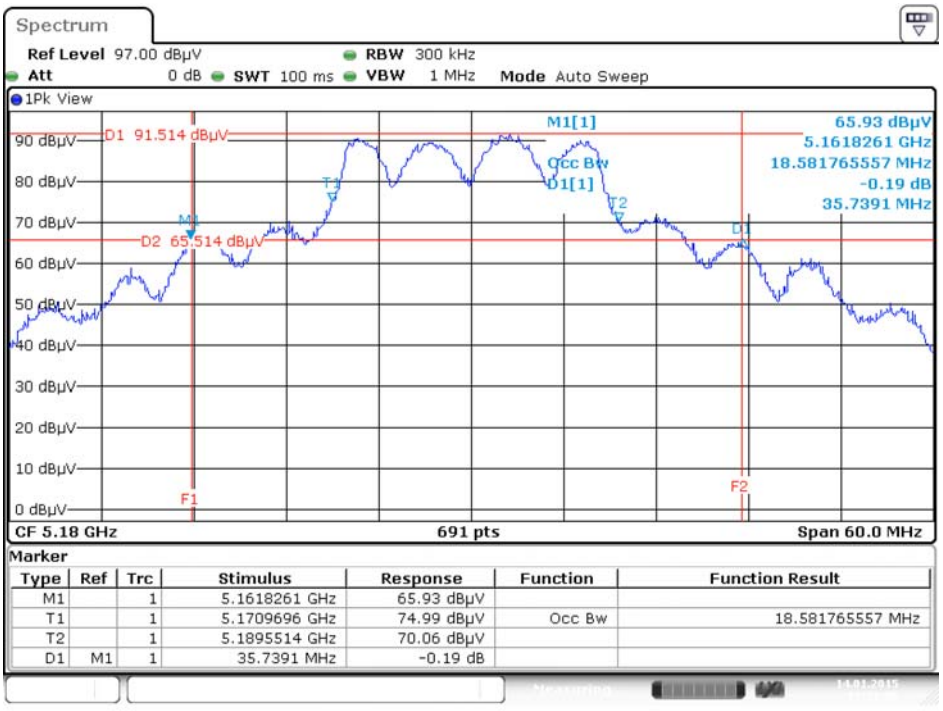
The EUT was programmed to be in continuously transmitting mode.

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

Temperature	26℃	Humidity	63%
Test Engineer	Mars Lin		

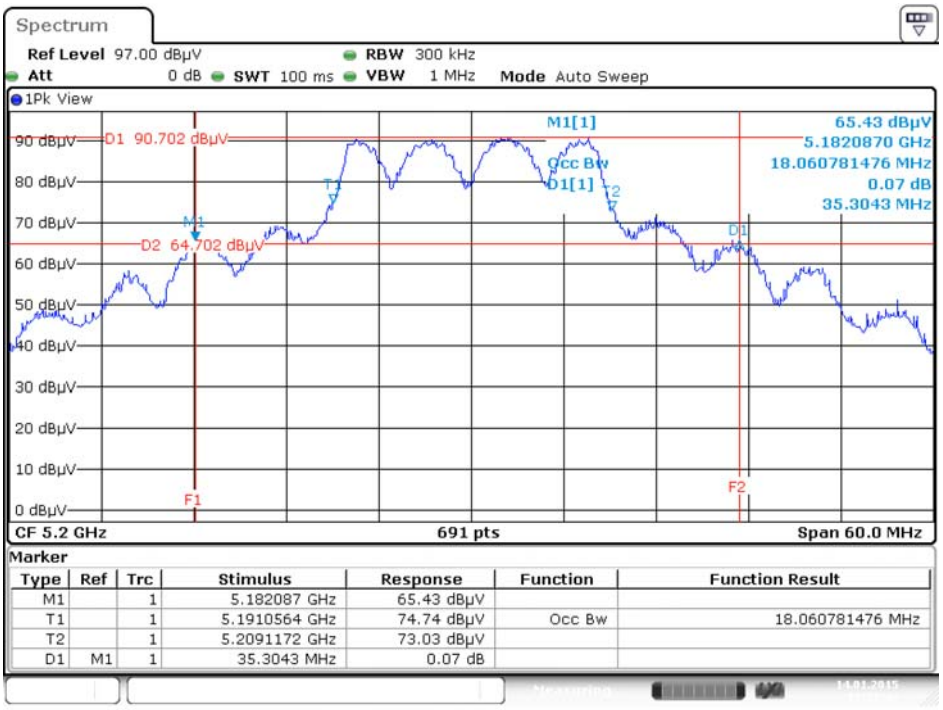
Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5180 MHz	35.74	18.58
	5200 MHz	35.30	18.06
	5240 MHz	35.13	18.06
	5745 MHz	35.65	18.84
	5785 MHz	35.91	19.71
	5825 MHz	30.96	17.19
802.11ac MCS0/Nss1 VHT20	5180 MHz	29.57	21.27
	5200 MHz	29.48	20.58
	5240 MHz	29.74	20.32
	5745 MHz	22.78	17.89
	5785 MHz	39.91	19.88
	5825 MHz	24.70	17.97
802.11ac MCS0/Nss1 VHT40	5190 MHz	46.23	38.06
	5230 MHz	60.29	38.93
	5755 MHz	42.17	36.32
	5795 MHz	62.90	37.48
802.11ac MCS0/Nss1 VHT80	5210 MHz	83.48	76.12
	5775 MHz	82.89	75.25

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



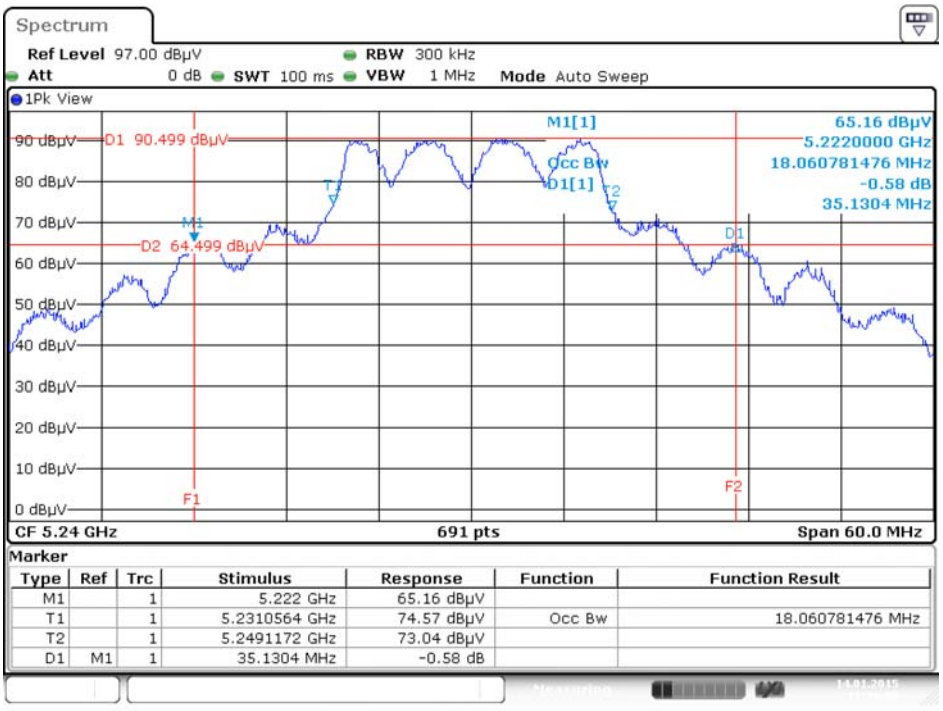
Date: 14.JAN.2015 17:21:56

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



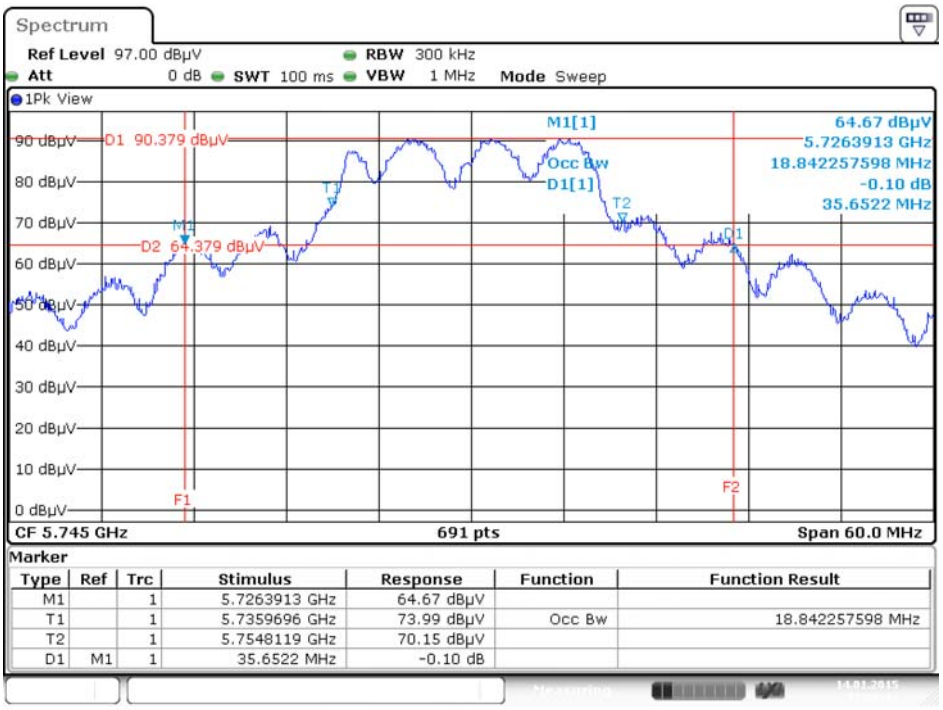
Date: 14.JAN.2015 17:27:43

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



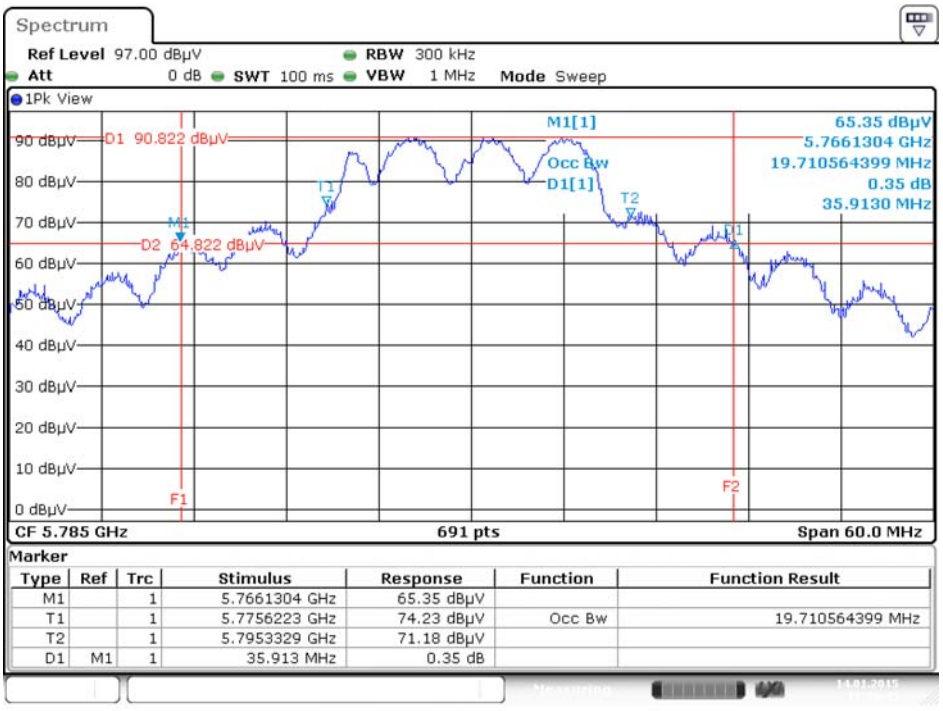
Date: 14.JAN.2015 17:29:59

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 / 5745 MHz



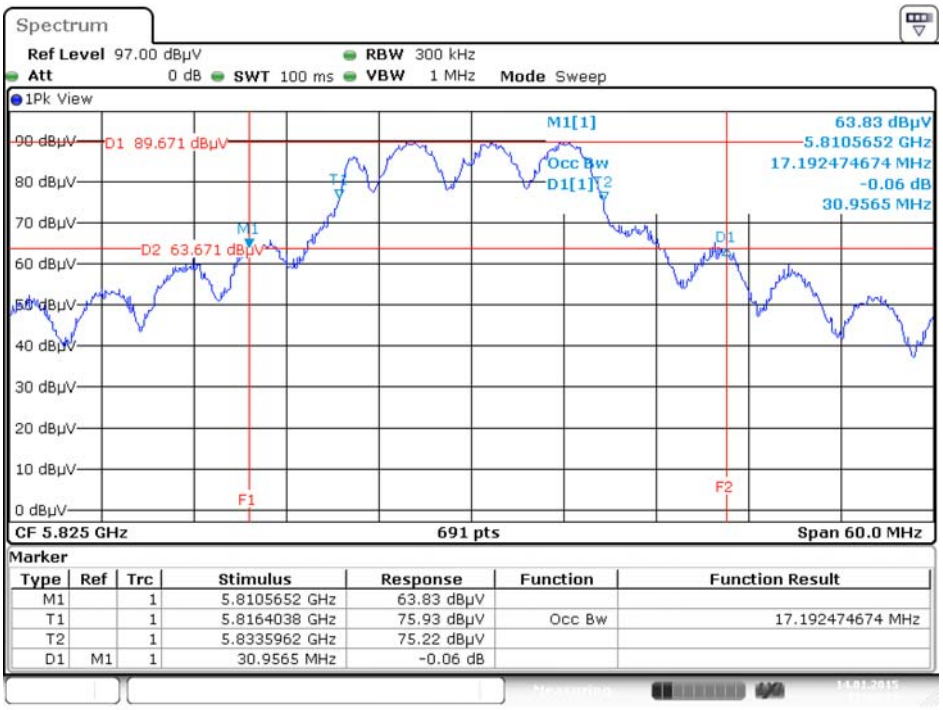
Date: 14.JAN.2015 17:36:41

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 / 5785 MHz



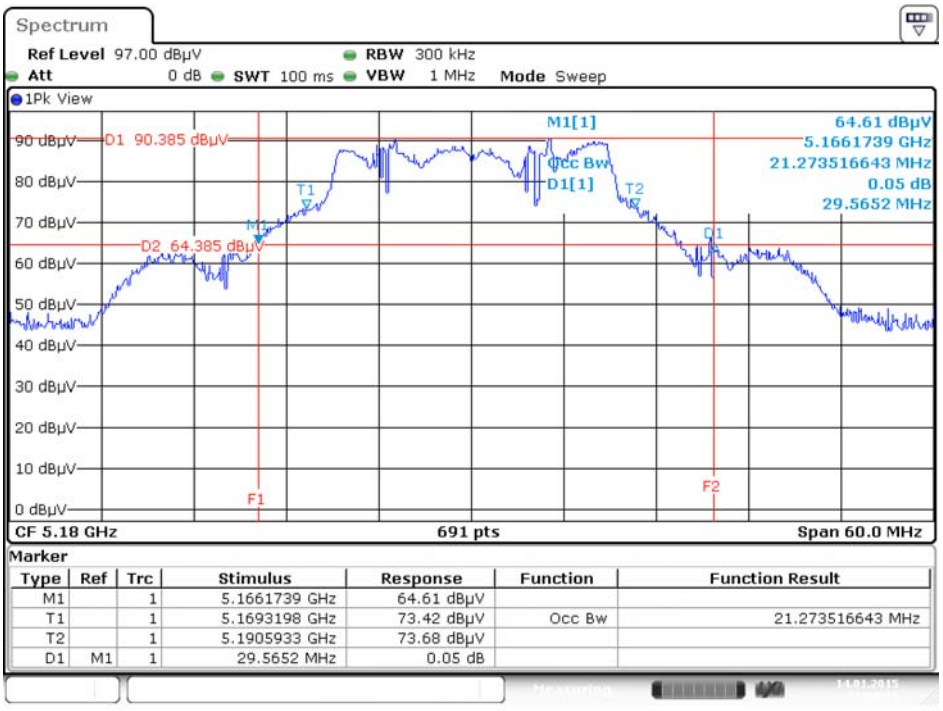
Date: 14.JAN.2015 17:39:46

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 / 5825 MHz



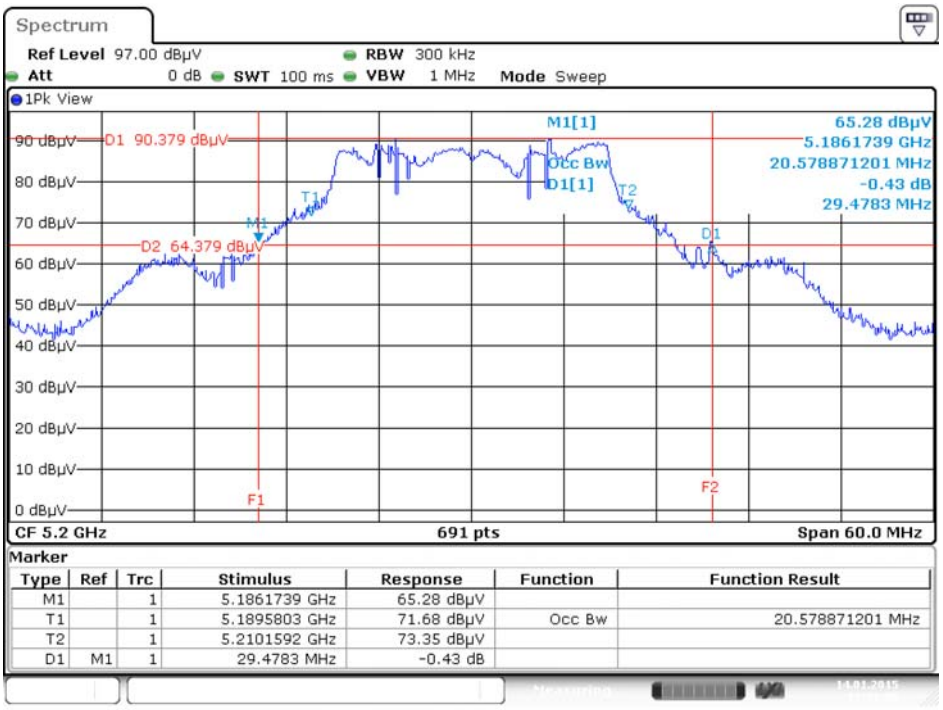
Date: 14.JAN.2015 17:43:40

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



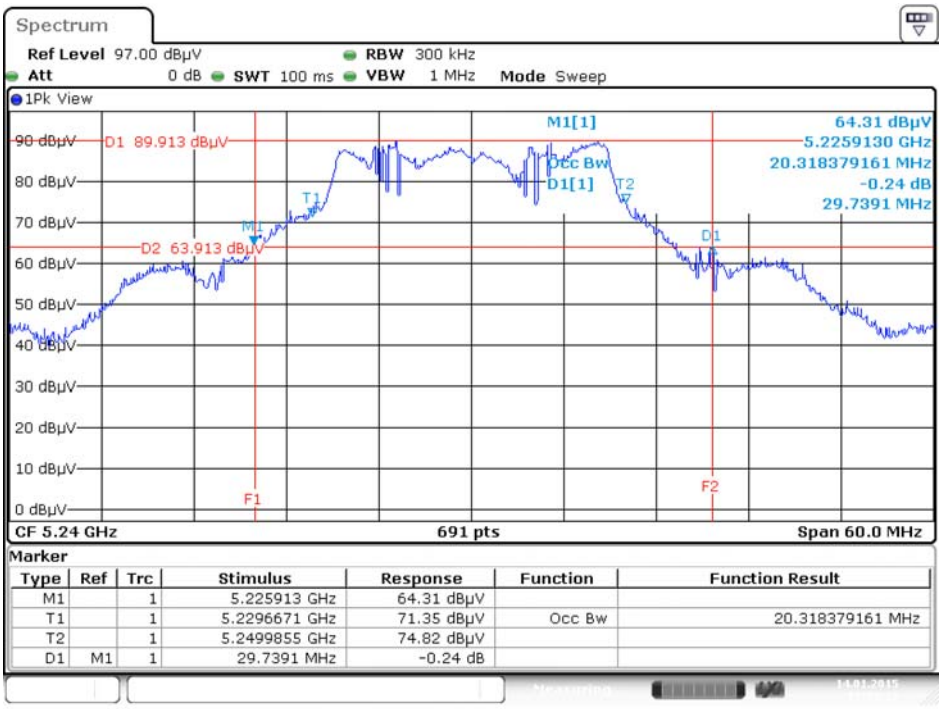
Date: 14.JAN.2015 17:50:32

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



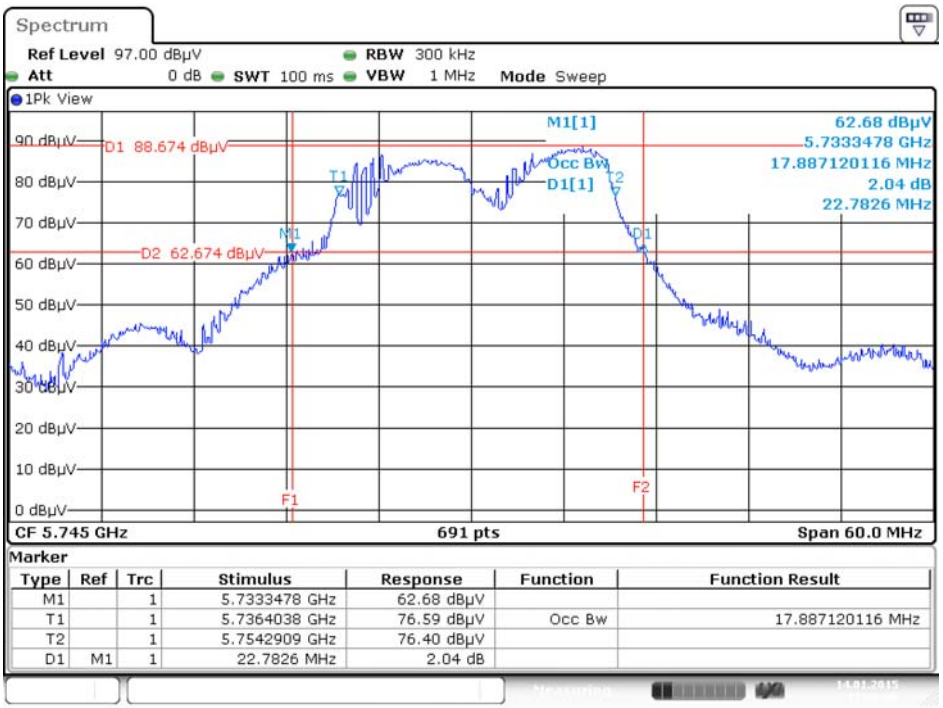
Date: 14.JAN.2015 17:51:56

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



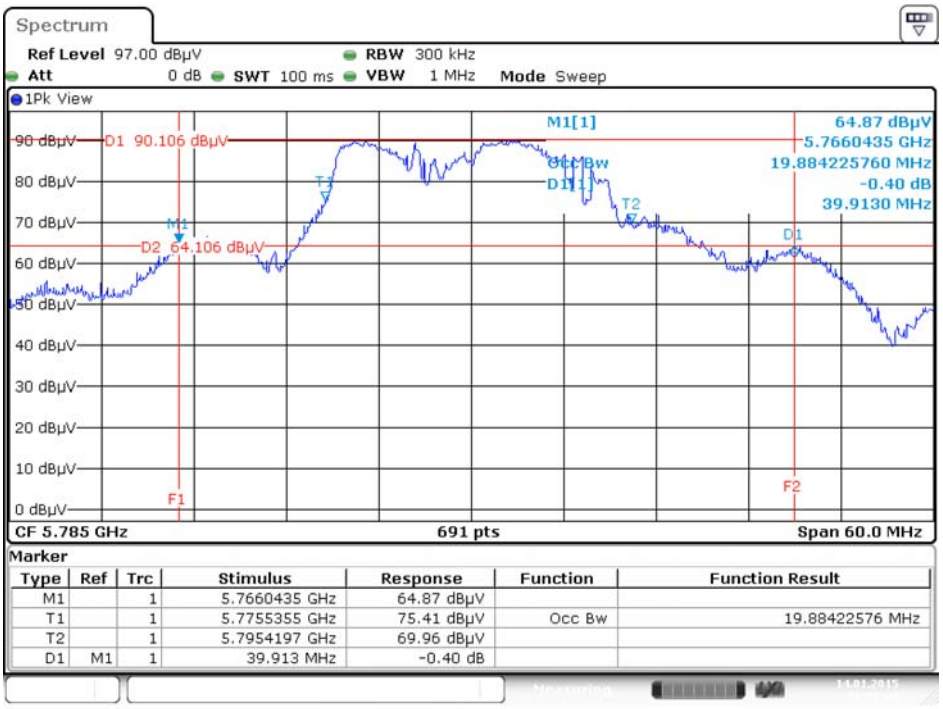
Date: 14.JAN.2015 17:53:38

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 / 5745 MHz



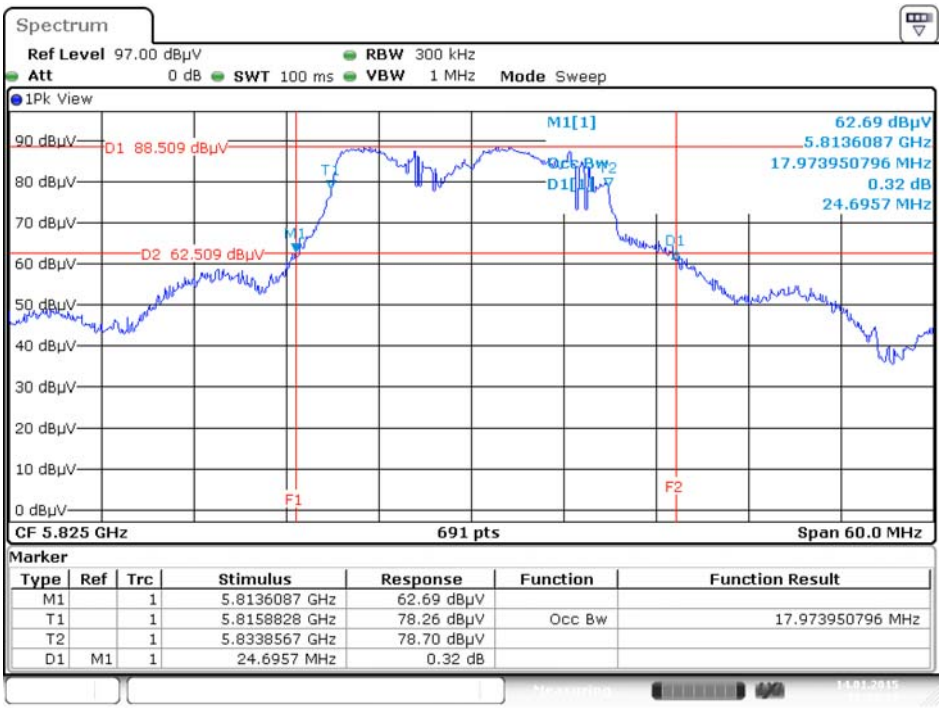
Date: 14.JAN.2015 17:56:46

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 / 5785 MHz



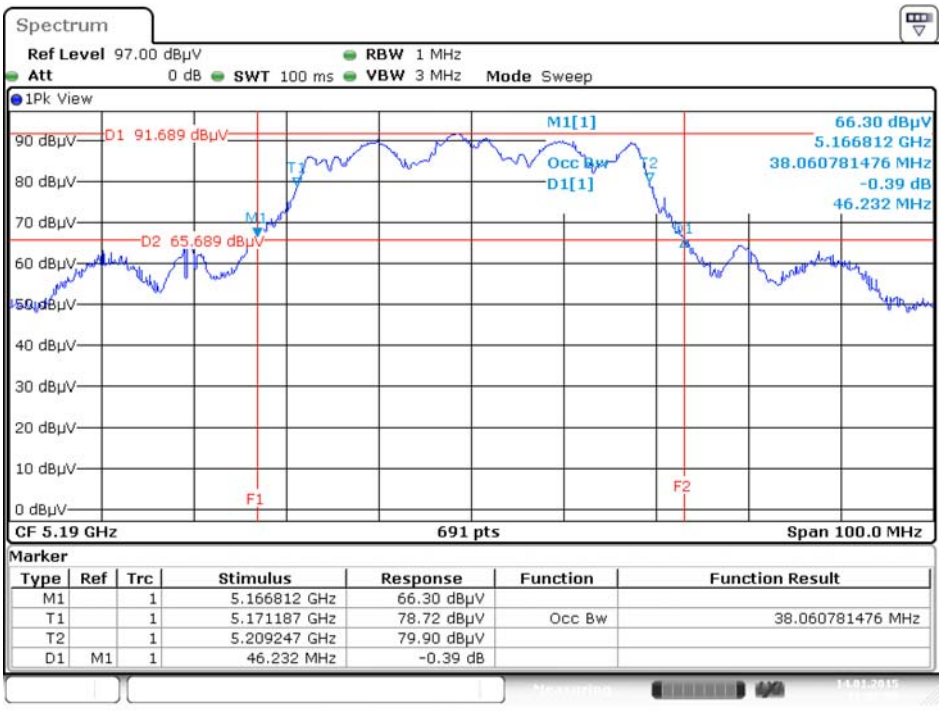
Date: 14.JAN.2015 18:01:34

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 / 5825 MHz



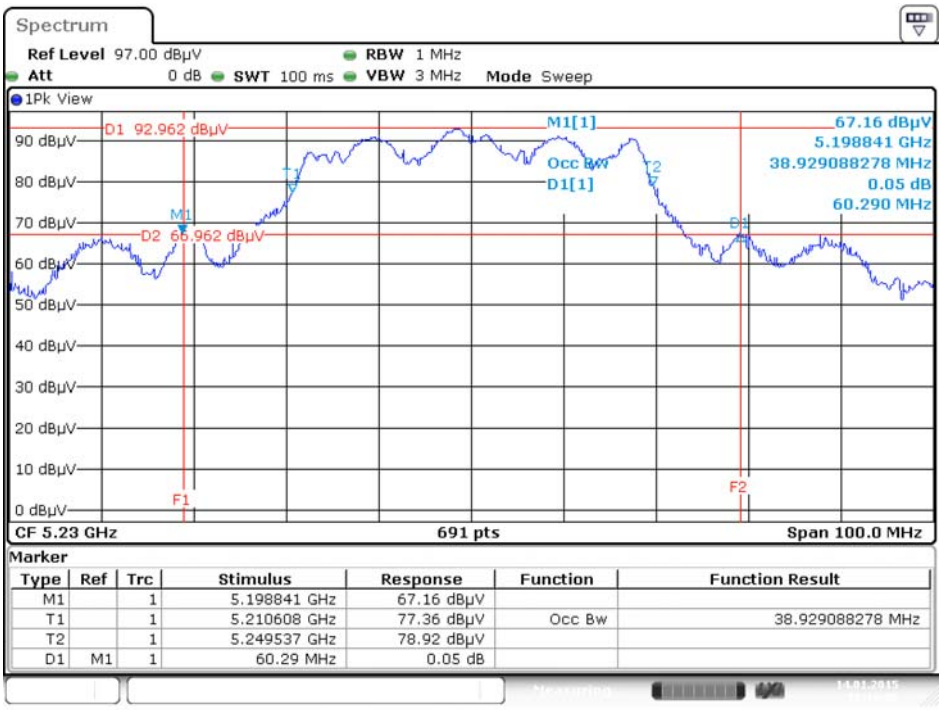
Date: 14.JAN.2015 18:03:18

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



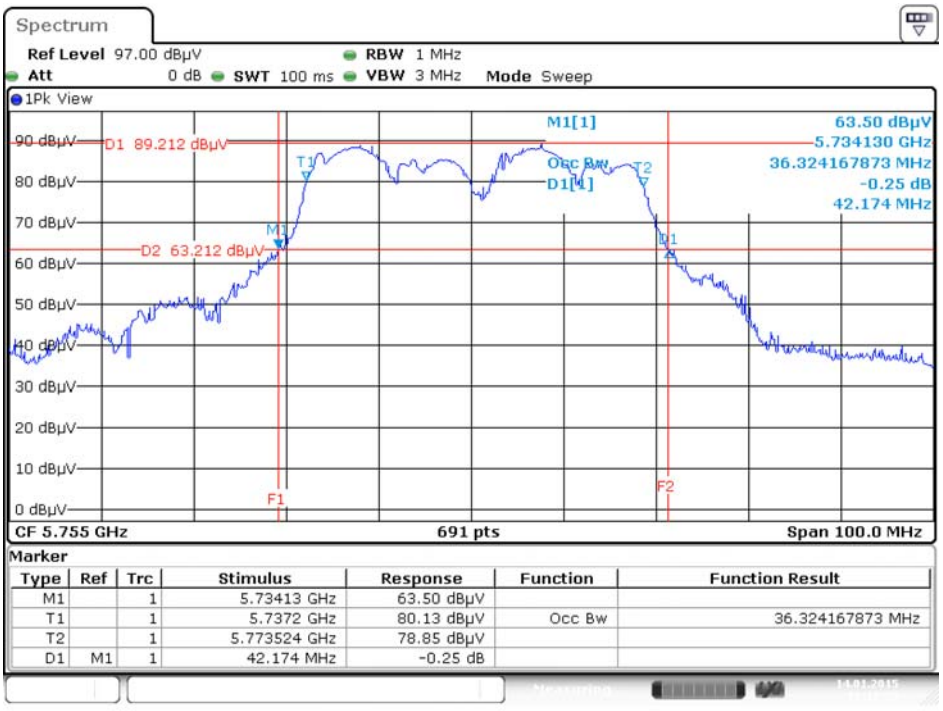
Date: 14.JAN.2015 18:07:59

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



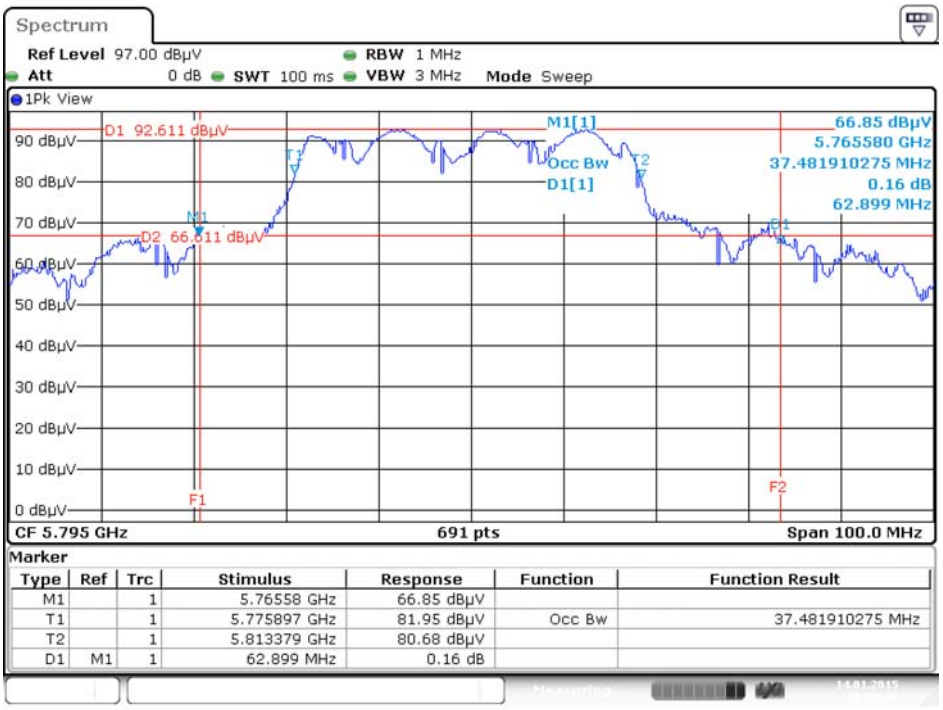
Date: 14.JAN.2015 18:14:37

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 / 5755 MHz



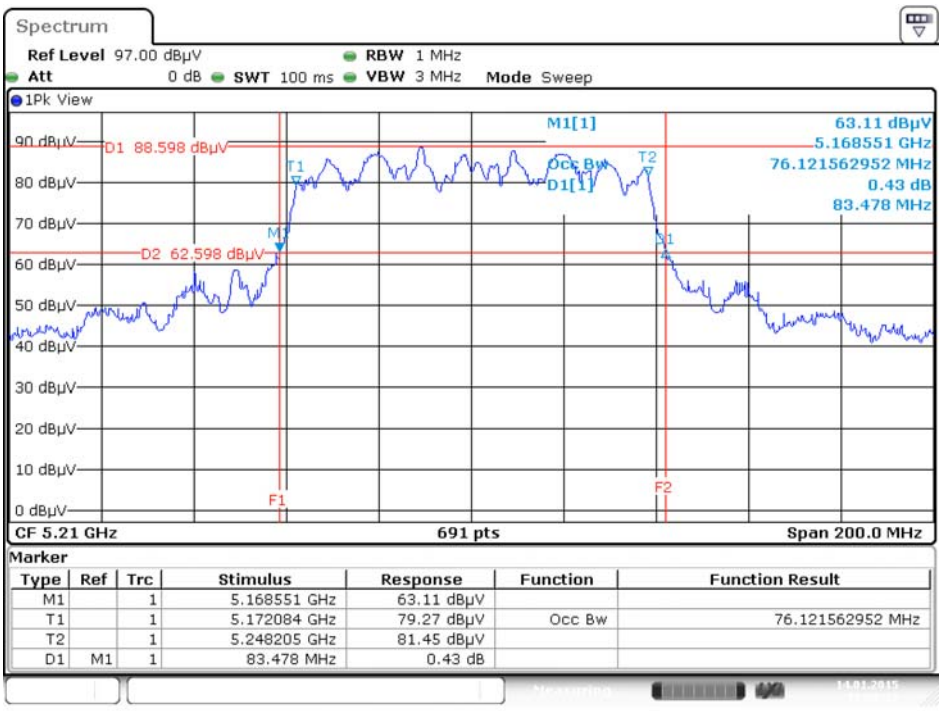
Date: 14.JAN.2015 18:17:24

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 / 5795 MHz



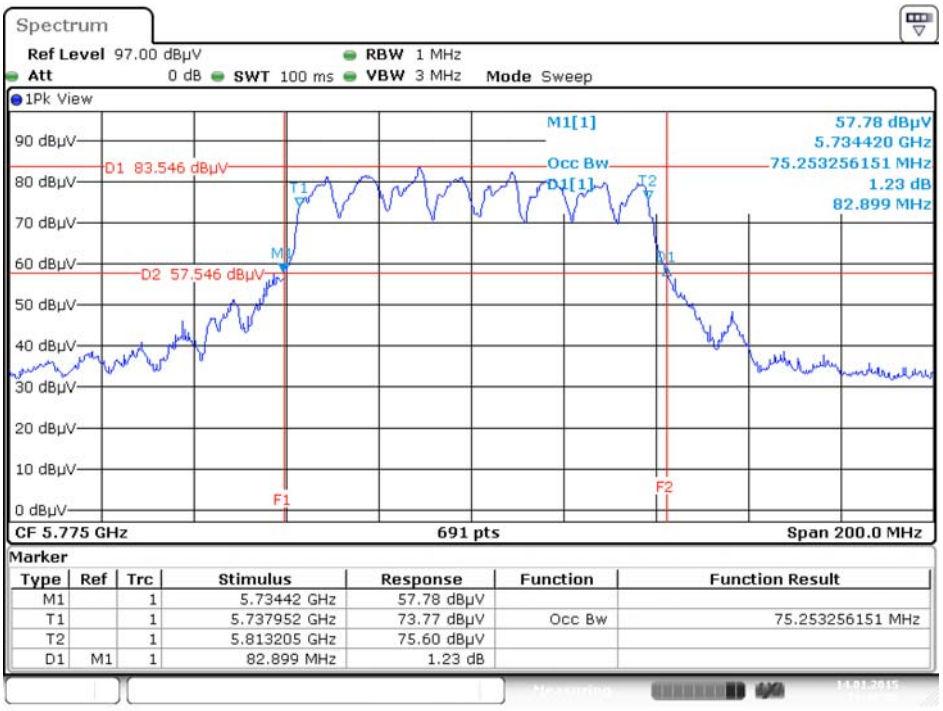
Date: 14.JAN.2015 18:23:47

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



Date: 14.JAN.2015 18:28:33

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. 1 + Ant. 2 + Ant. 3 / 5775 MHz



Date: 14.JAN.2015 19:47:36

4.3. 6dB Spectrum Bandwidth Measurement

4.3.1. Limit

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

4.3.2. Measuring Instruments and Setting

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

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

4.3.3. Test Procedures

For Radiated 6dB Bandwidth Measurement:

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

4.3.4. Test Setup Layout

For Radiated 6dB Bandwidth Measurement:

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

4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of 6dB Spectrum Bandwidth

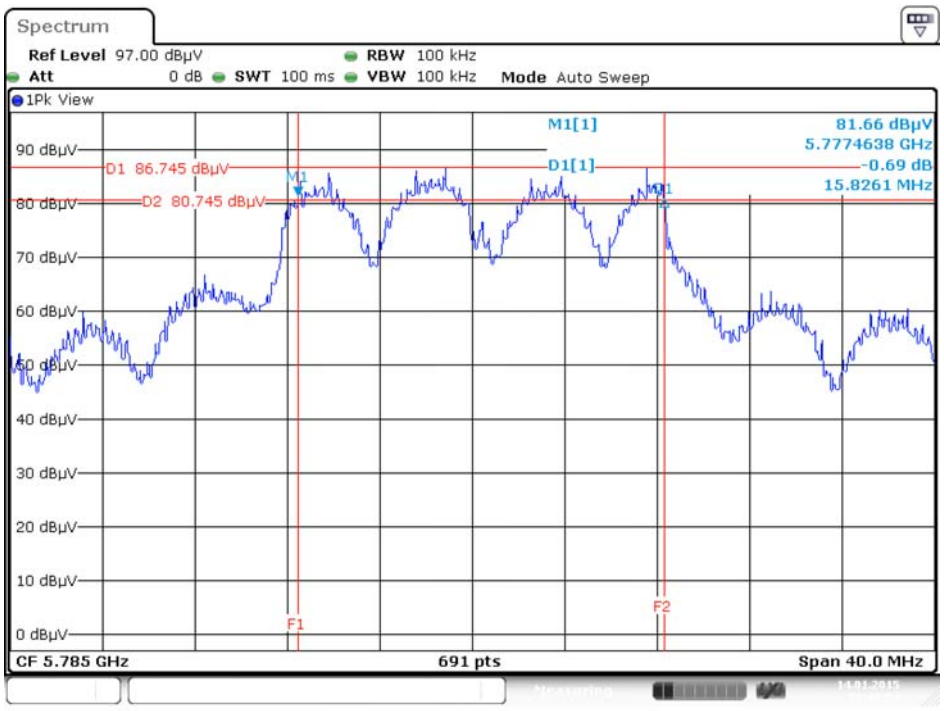
Temperature	26°C	Humidity	63%
Test Engineer	Mars Lin		

Mode	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11a	5745 MHz	16.06	500	Complies
	5785 MHz	15.83	500	Complies
	5825 MHz	16.06	500	Complies
802.11ac MCS0/Nss1 VHT20	5745 MHz	16.35	500	Complies
	5785 MHz	16.29	500	Complies
	5825 MHz	15.19	500	Complies
802.11ac MCS0/Nss1 VHT40	5755 MHz	34.55	500	Complies
	5795 MHz	34.20	500	Complies
802.11ac MCS0/Nss1 VHT80	5775 MHz	74.49	500	Complies

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

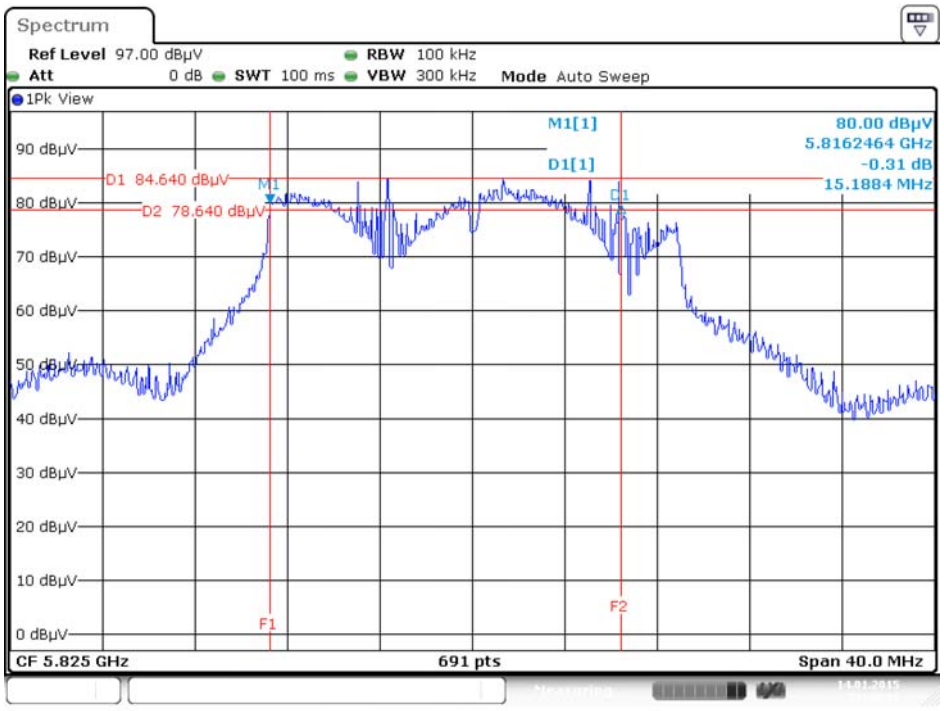
For plots, only the channel with worse result was shown.

6 dB Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 / 5785 MHz



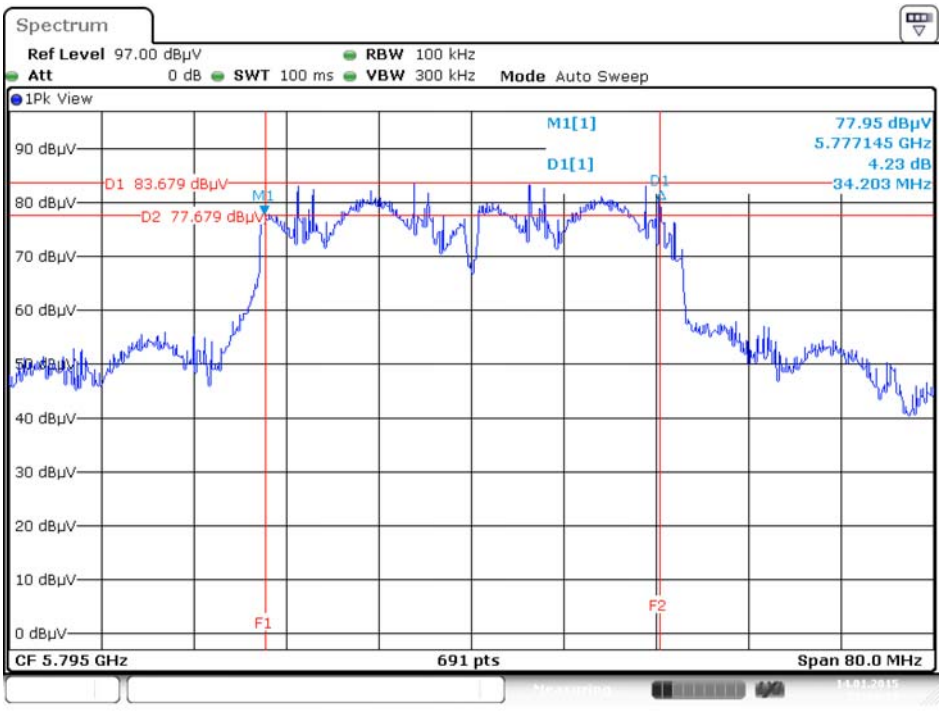
Date: 14.JAN.2015 21:42:55

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 / 5825 MHz



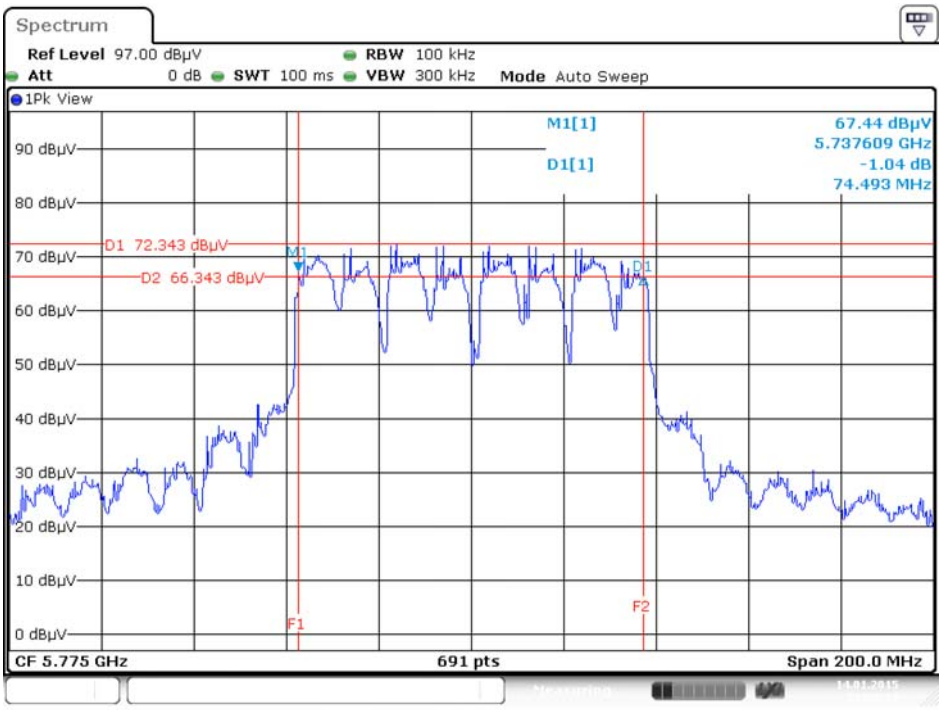
Date: 14.JAN.2015 21:40:12

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 / 5795MHz



Date: 14.JAN.2015 21:34:11

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. 1 + Ant. 2 + Ant. 3 / 5775 MHz



Date: 14.JAN.2015 21:30:11

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

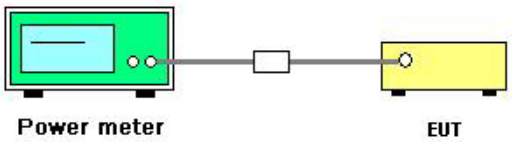
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

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	Mars Lin	Test Date	Jan. 14, 2015 ~ Jan. 21, 2015

Mode	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Ant. 1	Ant. 2	Ant. 3	Total		
802.11a	5180 MHz	22.83	23.35	23.46	27.99	30.00	Complies
	5200 MHz	22.74	23.22	23.47	27.93	30.00	Complies
	5240 MHz	22.82	23.17	23.48	27.94	30.00	Complies
	5745 MHz	21.01	22.78	21.68	26.66	30.00	Complies
	5785 MHz	22.41	22.93	22.61	27.43	30.00	Complies
	5825 MHz	21.13	21.62	21.06	26.05	30.00	Complies
802.11ac MCS0/Nss1 VHT20	5180 MHz	20.25	20.57	19.92	25.03	30.00	Complies
	5200 MHz	22.56	23.43	23.44	27.93	30.00	Complies
	5240 MHz	22.65	23.31	23.47	27.93	30.00	Complies
	5745 MHz	19.98	19.95	19.42	24.56	30.00	Complies
	5785 MHz	22.31	22.96	22.49	27.37	30.00	Complies
	5825 MHz	20.53	21.05	20.66	25.52	30.00	Complies
802.11ac MCS0/Nss1 VHT40	5190 MHz	15.96	16.39	15.57	20.76	30.00	Complies
	5230 MHz	22.25	22.37	23.14	27.38	30.00	Complies
	5755 MHz	16.83	17.12	16.45	21.58	30.00	Complies
	5795 MHz	21.57	22.14	21.88	26.64	30.00	Complies
802.11ac MCS0/Nss1 VHT80	5210 MHz	12.42	13.48	12.57	17.62	30.00	Complies
	5775 MHz	13.82	14.12	13.43	18.57	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

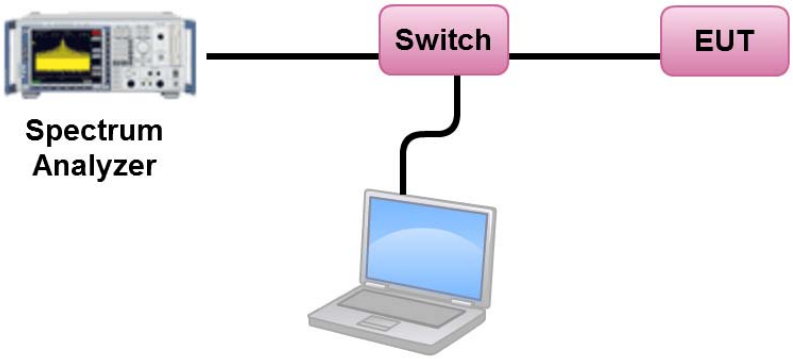
1. The transmitter output (antenna port) was connected RF switch to the spectrum analyzer.
2. Test was performed in accordance with KDB789033 D02 v01 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (F) Maximum Power Spectral Density (PSD).
3. Multiple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

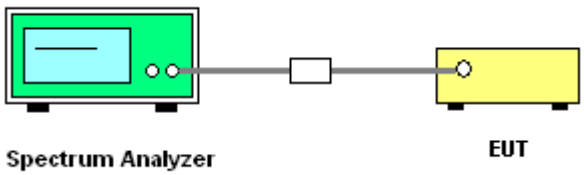
1. Test procedures refer KDB662911 D01 v02r01 section In-Band Power Spectral Density (PSD) Measurements option (b) Measure and sum spectral maximal across the outputs.
2. Use this procedure when the maximum conducted output power in the fundamental emission is used to demonstrate compliance. The EUT 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	Mars Lin	Test Date	Jan. 14, 2015 ~ Jan. 21, 2015

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

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	14.58	15.45	Complies
40	5200 MHz	14.47	15.45	Complies
48	5240 MHz	14.54	15.45	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ = 7.55dBi, so limit = 17-(7.55-6)=15.45dBm/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	13.45	-3.01	10.44	26.27	Complies
157	5785 MHz	14.15	-3.01	11.14	26.27	Complies
165	5825 MHz	12.85	-3.01	9.84	26.27	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ = 9.73dBi, so limit = 30-(9.73-6)=26.27dBm/500kHz

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

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	12.75	15.45	Complies
40	5200 MHz	14.49	15.45	Complies
48	5240 MHz	14.45	15.45	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ = 7.55dBi, so limit = 17-(7.55-6)=15.45dBm/MHz

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
149	5745 MHz	11.34	-3.01	8.33	26.27	Complies
157	5785 MHz	14.11	-3.01	11.10	26.27	Complies
165	5825 MHz	12.23	-3.01	9.22	26.27	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ = 9.73dBi, so limit = 30-(9.73-6)=26.27dBm/500kHz

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

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
38	5190 MHz	4.20	15.45	Complies
46	5230 MHz	11.01	15.45	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ = 7.55dBi, so limit = 17-(7.55-6)=15.45dBm/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	5.26	-3.01	2.25	26.27	Complies
159	5795 MHz	10.69	-3.01	7.68	26.27	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ = 9.73dBi, so limit = 30-(9.73-6)=26.27dBm/500kHz

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

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
42	5210 MHz	-1.23	15.45	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ = 7.55dBi, so limit = 17-(7.55-6)=15.45dBm/MHz

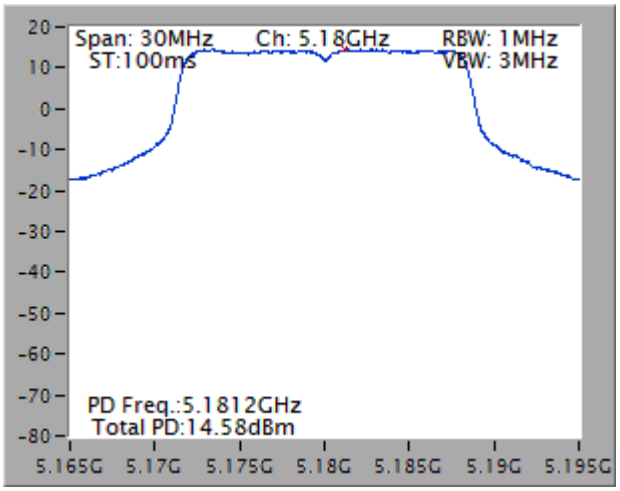
Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
155	5775 MHz	-0.63	-3.01	-3.64	26.27	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ = 9.73dBi, so limit = 30-(9.73-6)=26.27dBm/500kHz

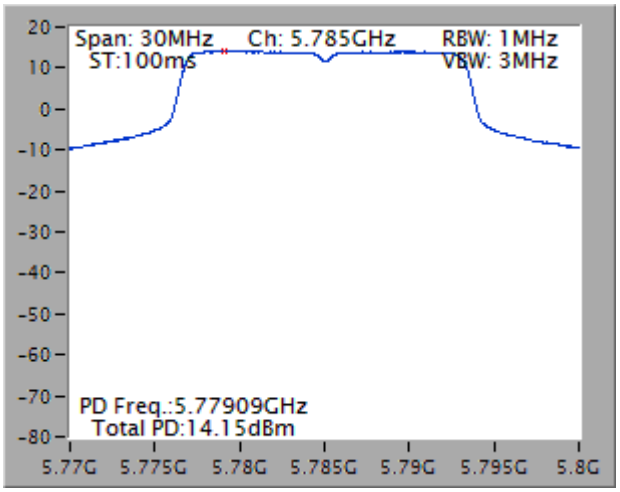
Note: All the test values were listed in the report.

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

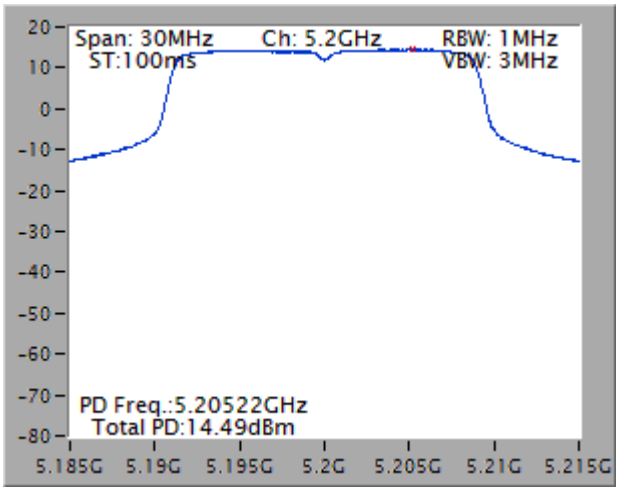
Power Density Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 / 5180 MHz



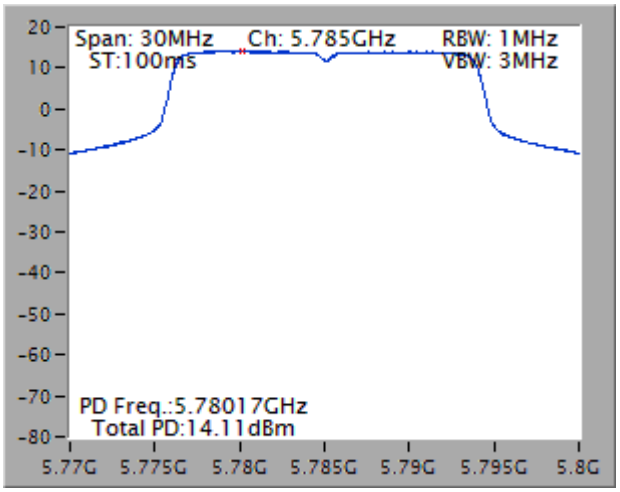
Power Density Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 / 5785 MHz



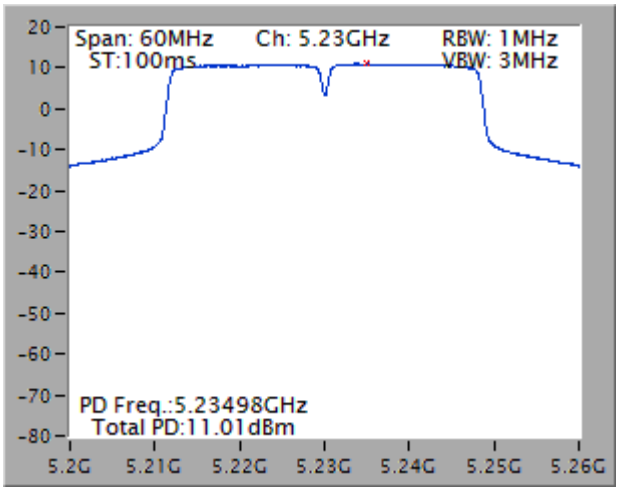
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 / 5200 MHz



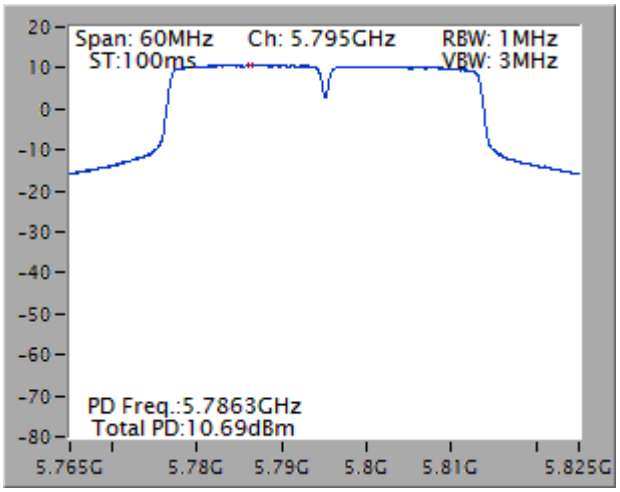
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 / 5785 MHz



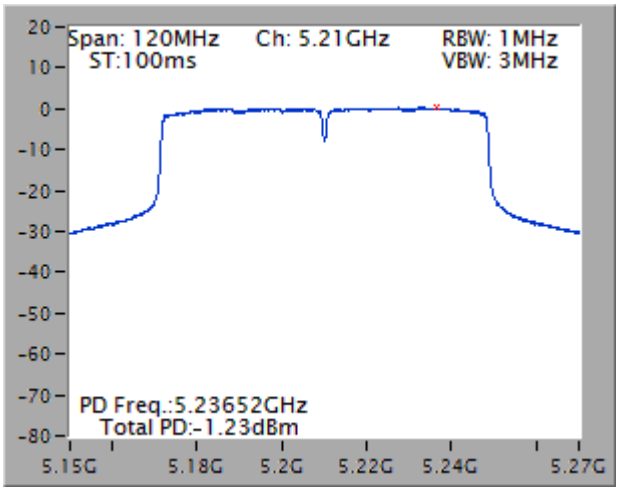
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 / 5230 MHz



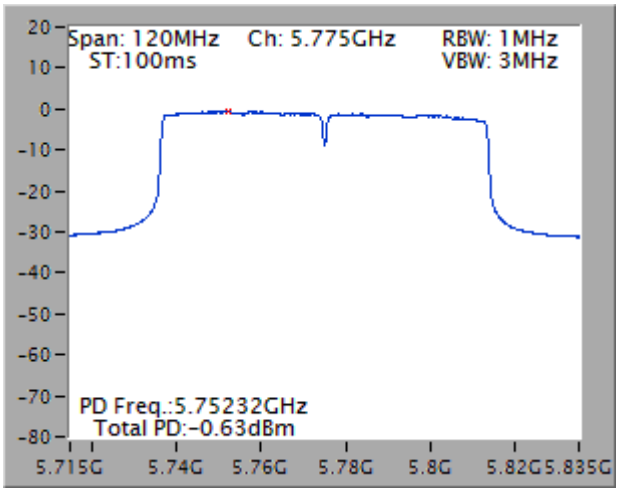
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 / 5795 MHz



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



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

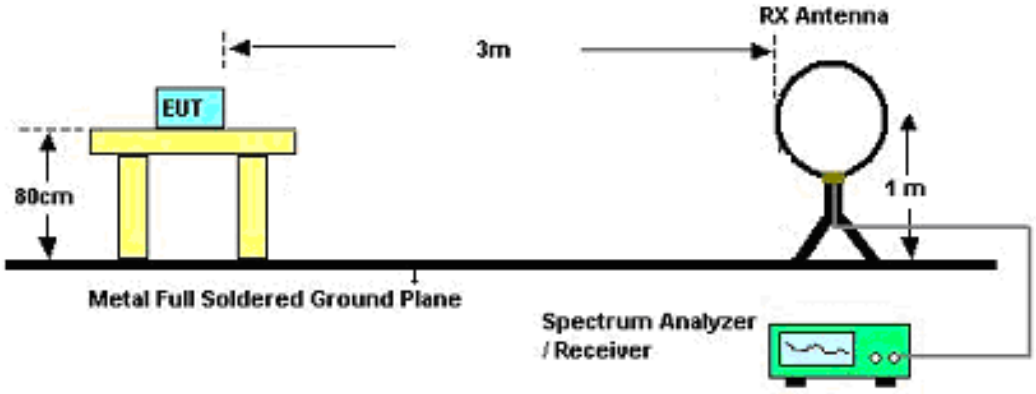
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.6.3. Test Procedures

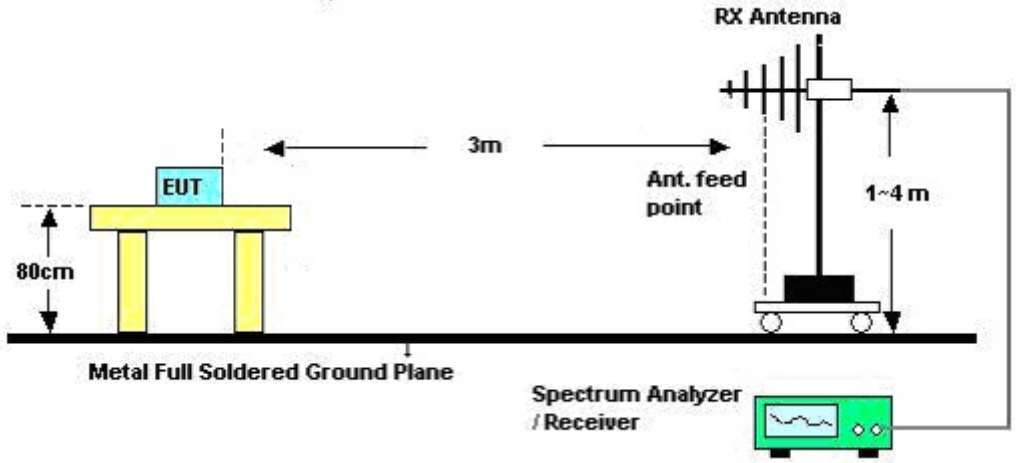
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

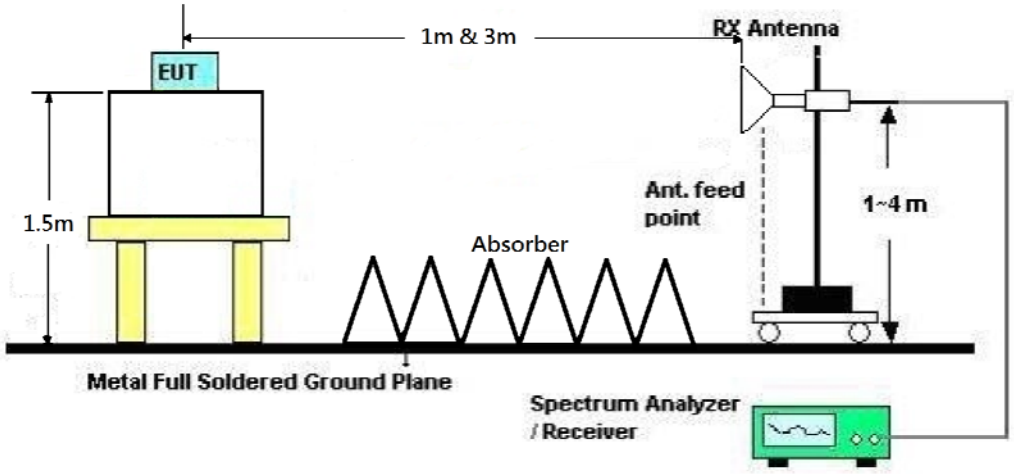
For Radiated Emissions: 9kHz ~30MHz



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	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	CTX
Test Date	Jan. 16, 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.

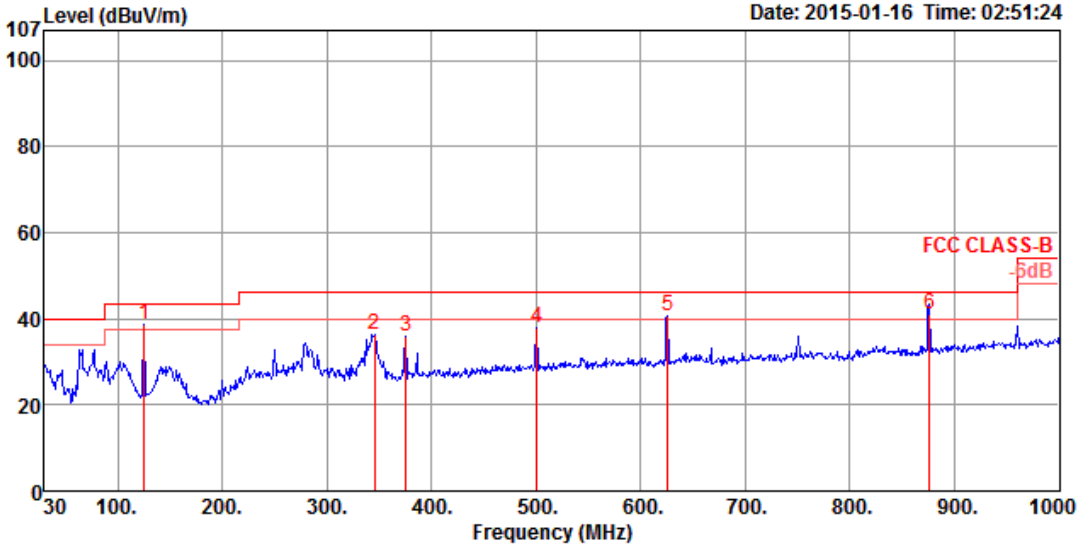
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

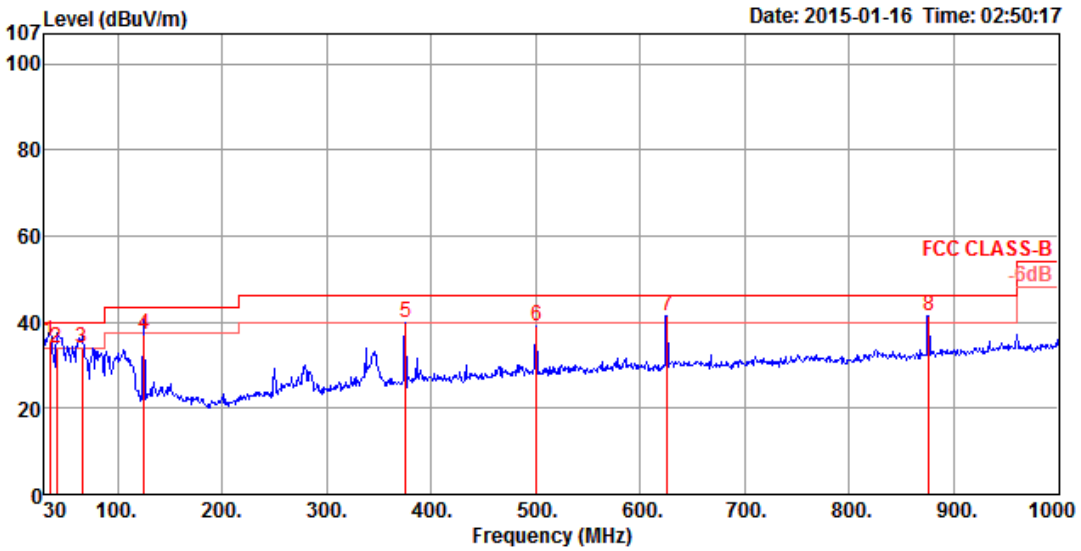
Temperature	25°C	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	CTX

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	125.06	38.68	43.50	-4.82	57.65	0.80	32.42	12.65	HORIZONTAL	191	200	Peak
2	345.25	36.40	46.00	-9.60	52.25	1.33	32.36	15.18	HORIZONTAL	205	125	Peak
3	375.32	36.08	46.00	-9.92	51.09	1.38	32.32	15.93	HORIZONTAL	237	150	Peak
4	500.45	38.08	46.00	-7.92	51.08	1.60	32.41	17.81	HORIZONTAL	222	100	Peak
5	625.58	40.58	46.00	-5.42	52.04	1.81	32.53	19.26	HORIZONTAL	211	125	Peak
6	875.84	41.14	46.00	-4.86	49.70	2.13	32.05	21.36	HORIZONTAL	192	100	QP

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	34.85	35.51	40.00	-4.49	50.50	0.42	32.41	17.00	VERTICAL	260	125	QP
2	41.64	34.02	40.00	-5.98	53.09	0.46	32.47	12.94	VERTICAL	283	100	QP
3	65.89	33.97	40.00	-6.03	59.10	0.59	32.52	6.80	VERTICAL	204	150	QP
4	125.06	37.13	43.50	-6.37	56.10	0.80	32.42	12.65	VERTICAL	269	100	QP
5	375.32	40.02	46.00	-5.98	55.05	1.38	32.32	15.91	VERTICAL	209	125	Peak
6	500.45	39.19	46.00	-6.81	52.20	1.60	32.41	17.80	VERTICAL	62	100	Peak
7	625.58	41.51	46.00	-4.49	52.98	1.81	32.53	19.25	VERTICAL	297	100	Peak
8	875.84	41.60	46.00	-4.40	50.16	2.13	32.05	21.36	VERTICAL	75	125	Peak

Note:

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

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

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

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

Temperature	25°C	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11a CH 36 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jan. 20, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15533.56	67.67	74.00	-6.33	53.03	10.37	38.78	34.51	184	252	HORIZONTAL	Peak
2	15543.85	52.58	54.00	-1.42	37.95	10.37	38.78	34.52	184	252	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15533.66	65.29	74.00	-8.71	50.65	10.37	38.78	34.51	204	227	VERTICAL	Peak
2	15543.80	50.75	54.00	-3.25	36.12	10.37	38.78	34.52	204	227	VERTICAL	Average

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11a CH 40 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jan. 20, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15594.06	66.81	74.00	-7.19	52.26	10.36	38.77	34.58	184	252	HORIZONTAL	Peak
2	15603.75	52.19	54.00	-1.81	37.67	10.36	38.75	34.59	184	252	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15598.45	64.19	74.00	-9.81	49.65	10.36	38.77	34.59	150	246	VERTICAL	Peak
2	15599.35	49.95	54.00	-4.05	35.41	10.36	38.77	34.59	150	246	VERTICAL	Average

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11a CH 48 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 22, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15718.60	64.94	74.00	-9.06	50.60	10.36	38.72	34.74	183	248	HORIZONTAL	Peak
2	15719.30	50.69	54.00	-3.31	36.35	10.36	38.72	34.74	183	248	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15719.15	49.94	54.00	-4.06	35.60	10.36	38.72	34.74	176	227	VERTICAL	Average
2	15728.49	63.98	74.00	-10.02	49.65	10.36	38.72	34.75	176	227	VERTICAL	Peak

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11a CH 149 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jan. 20, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11490.50	59.14	74.00	-14.86	45.80	9.09	39.10	34.85	143	278	HORIZONTAL	Peak
2	11490.55	45.82	54.00	-8.18	32.48	9.09	39.10	34.85	143	278	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11491.35	44.74	54.00	-9.26	31.40	9.09	39.10	34.85	171	78	VERTICAL	Average
2	11492.25	58.48	74.00	-15.52	45.14	9.09	39.10	34.85	171	78	VERTICAL	Peak

Temperature	25°C	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11a CH 157 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jan. 20, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11573.00	45.42	54.00	-8.58	32.15	9.11	39.01	34.85	253	237	HORIZONTAL	Average
2	11574.25	59.04	74.00	-14.96	45.77	9.11	39.01	34.85	253	237	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11569.35	59.53	74.00	-14.47	46.26	9.11	39.01	34.85	101	210	VERTICAL	Peak
2	11569.90	45.99	54.00	-8.01	32.72	9.11	39.01	34.85	101	210	VERTICAL	Average

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11a CH 165 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jan. 20, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11653.25	59.50	74.00	-14.50	46.35	9.11	38.89	34.85	253	276	HORIZONTAL	Peak
2	11653.45	45.80	54.00	-8.20	32.65	9.11	38.89	34.85	253	276	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11652.25	45.94	54.00	-8.06	32.79	9.11	38.89	34.85	127	204	VERTICAL	Average
2	11652.30	59.58	74.00	-14.42	46.43	9.11	38.89	34.85	127	204	VERTICAL	Peak

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 29, 2014~Jan. 21, 2015		

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	15541.23	45.29	54.00	-8.71	30.96	10.72	34.73	38.34	HORIZONTAL	249	174	Average
2	15542.56	60.02	74.00	-13.98	45.69	10.72	34.73	38.34	HORIZONTAL	249	174	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	15537.41	45.74	54.00	-8.26	31.40	10.72	34.72	38.34	VERTICAL	258	155	Average
2	15541.21	58.80	74.00	-15.20	44.47	10.72	34.73	38.34	VERTICAL	258	155	Peak

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 40 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 29, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15597.20	47.86	54.00	-6.14	31.67	12.58	38.36	34.75	100	100	Average	HORIZONTAL
2	15599.20	59.94	74.00	-14.06	43.75	12.58	38.36	34.75	100	100	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15596.20	48.10	54.00	-5.90	31.91	12.58	38.36	34.75	25	100	Average	VERTICAL
2	15601.60	60.48	74.00	-13.52	44.29	12.58	38.36	34.75	25	100	Peak	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 48 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 29, 2014~Jan. 21, 2015		

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	15722.60	66.81	74.00	-7.19	52.72	10.80	34.80	38.09	HORIZONTAL	340	145	Peak
2	15724.96	52.44	54.00	-1.56	38.36	10.80	34.80	38.08	HORIZONTAL	340	196	Average

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	15726.93	52.68	54.00	-1.32	38.60	10.80	34.80	38.08	VERTICAL	225	145	Average
2	15727.27	67.42	74.00	-6.58	53.34	10.80	34.80	38.08	VERTICAL	225	145	Peak

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 29, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11489.72	55.67	74.00	-18.33	40.60	10.71	39.39	35.03	275	100	Peak	HORIZONTAL
2	11490.20	43.04	54.00	-10.96	27.97	10.71	39.39	35.03	275	100	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11489.74	54.96	74.00	-19.04	39.89	10.71	39.39	35.03	310	100	Peak	VERTICAL
2	11490.06	42.35	54.00	-11.65	27.28	10.71	39.39	35.03	310	100	Average	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 157 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 29, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11569.78	43.67	54.00	-10.33	28.50	10.76	39.44	35.03	288	100	Average	HORIZONTAL
2	11569.80	57.24	74.00	-16.76	42.07	10.76	39.44	35.03	288	100	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11569.70	44.00	54.00	-10.00	28.84	10.75	39.44	35.03	328	100	Average	VERTICAL
2	11569.84	57.28	74.00	-16.72	42.11	10.76	39.44	35.03	328	100	Peak	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 165 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 29, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11650.04	44.28	54.00	-9.72	29.03	10.81	39.48	35.04	268	100	Average	HORIZONTAL
2	11650.14	57.83	74.00	-16.17	42.58	10.81	39.48	35.04	268	100	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11649.66	44.83	54.00	-9.17	29.58	10.81	39.48	35.04	295	100	Average	VERTICAL
2	11649.98	57.19	74.00	-16.81	41.94	10.81	39.48	35.04	295	100	Peak	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 22, 2014~Jan. 21, 2015		

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	15566.18	58.33	74.00	-15.67	44.04	10.72	34.74	38.31	HORIZONTAL	203	172	Peak
2	15577.47	44.98	54.00	-9.02	30.71	10.72	34.74	38.29	HORIZONTAL	203	172	Average

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	15565.11	45.12	54.00	-8.88	30.86	10.72	34.73	38.27	VERTICAL	106	142	Average
2	15576.27	58.47	74.00	-15.53	44.22	10.72	34.74	38.27	VERTICAL	106	142	Peak

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 46 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 22, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15689.94	59.97	74.00	-14.03	43.95	12.58	38.23	34.79	248	100	Peak	HORIZONTAL
2	15690.06	46.65	54.00	-7.35	30.63	12.58	38.23	34.79	248	100	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15689.98	46.67	54.00	-7.33	30.65	12.58	38.23	34.79	356	100	Average	VERTICAL
2	15690.04	59.46	74.00	-14.54	43.44	12.58	38.23	34.79	356	100	Peak	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 29, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11509.20	43.07	54.00	-10.93	27.98	10.72	39.40	35.03	307	100	Average	HORIZONTAL
2	11510.40	55.47	74.00	-18.53	40.38	10.72	39.40	35.03	307	100	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11509.76	43.16	54.00	-10.84	28.07	10.72	39.40	35.03	347	100	Average	VERTICAL
2	11510.08	55.71	74.00	-18.29	40.62	10.72	39.40	35.03	347	100	Peak	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 159 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 22, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11589.84	58.97	74.00	-15.03	43.79	10.76	39.45	35.03	252	100	Peak	HORIZONTAL
2	11590.16	44.75	54.00	-9.25	29.57	10.76	39.45	35.03	252	100	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11590.08	44.72	54.00	-9.28	29.54	10.76	39.45	35.03	313	100	Average	VERTICAL
2	11590.08	57.95	74.00	-16.05	42.77	10.76	39.45	35.03	313	100	Peak	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 29, 2014~Jan. 21, 2015		

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	15627.57	44.96	54.00	-9.04	30.74	10.76	34.76	38.22	HORIZONTAL	160	156	Average
2	15629.31	58.02	74.00	-15.98	43.80	10.76	34.76	38.22	HORIZONTAL	160	156	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	15627.58	58.70	74.00	-15.30	44.49	10.76	34.76	38.21	VERTICAL	299	151	Peak
2	15628.62	44.99	54.00	-9.01	30.78	10.76	34.76	38.21	VERTICAL	299	151	Average

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 155 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Jan. 08, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	11580.56	57.24	74.00	-16.76	40.66	39.01	12.42	34.85	100	166	HORIZONTAL	Peak
2	11588.40	44.86	54.00	-9.14	28.32	38.97	12.42	34.85	100	166	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	11582.96	57.32	74.00	-16.68	40.74	39.01	12.42	34.85	100	216	VERTICAL	Peak
2	11589.68	44.98	54.00	-9.02	28.44	38.97	12.42	34.85	100	216	VERTICAL	Average

Note:

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

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

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

4.7. 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	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11a CH 36, 40, 48 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 22, 2014		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5145.80	69.35	74.00	-4.65	65.75	5.99	33.02	35.41	168	310	VERTICAL	Peak
2	5147.00	53.24	54.00	-0.76	49.64	5.99	33.02	35.41	168	310	VERTICAL	Average
3	5178.00	113.32			109.69	6.01	33.04	35.42	168	310	VERTICAL	Peak
4	5178.60	101.14			97.51	6.01	33.04	35.42	168	310	VERTICAL	Average

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	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5144.81	44.43	54.00	-9.57	40.83	5.99	33.02	35.41	136	45	VERTICAL	Average
2	5145.00	59.51	74.00	-14.49	55.91	5.99	33.02	35.41	136	45	VERTICAL	Peak
3	5206.99	111.94			108.28	6.03	33.06	35.43	136	45	VERTICAL	Peak
4	5207.19	101.43			97.77	6.03	33.06	35.43	136	45	VERTICAL	Average

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	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5133.82	54.15	74.00	-19.85	50.57	5.98	33.01	35.41	168	271	HORIZONTAL	Peak
2	5150.00	40.96	54.00	-13.04	37.36	5.99	33.02	35.41	168	271	HORIZONTAL	Average
3	5244.50	100.53			96.84	6.05	33.09	35.45	168	271	HORIZONTAL	Average
4	5244.80	110.29			106.60	6.05	33.09	35.45	168	271	HORIZONTAL	Peak
5	5350.00	41.81	54.00	-12.19	37.79	6.11	33.40	35.49	168	271	HORIZONTAL	Average
6	5354.50	55.27	74.00	-18.73	51.19	6.12	33.45	35.49	168	271	HORIZONTAL	Peak

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

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11a CH 149, 157, 165 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 22, 2014		

Channel 149

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5714.10	66.26	68.20	-1.94	61.11	6.34	34.16	35.35	140	275	HORIZONTAL	Peak
2	5724.70	72.32	78.20	-5.88	67.13	6.35	34.18	35.34	140	275	HORIZONTAL	Peak
3	5750.69	97.77			92.52	6.37	34.20	35.32	140	275	HORIZONTAL	Average
4	5750.99	107.97			102.72	6.37	34.20	35.32	140	275	HORIZONTAL	Peak

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	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5715.00	56.82	68.20	-11.38	51.66	6.35	34.16	35.35	210	52	VERTICAL	Peak
2	5725.00	61.89	78.20	-16.31	56.70	6.35	34.18	35.34	210	52	VERTICAL	Peak
3	5784.70	113.55			108.12	6.39	34.33	35.29	210	52	VERTICAL	Peak
4	5785.90	103.00			97.57	6.39	34.33	35.29	210	52	VERTICAL	Average
5	5856.29	58.35	78.20	-19.85	52.47	6.44	34.67	35.23	210	52	VERTICAL	Peak
6	5865.39	57.55	68.20	-10.65	51.66	6.44	34.67	35.22	210	52	VERTICAL	Peak

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	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5822.30	100.55			94.86	6.42	34.53	35.26	100	314	VERTICAL	Average
2	5822.60	111.99			106.30	6.42	34.53	35.26	100	314	VERTICAL	Peak
3	5852.10	75.22	78.20	-2.98	69.41	6.44	34.60	35.23	100	314	VERTICAL	Peak
4	5863.00	68.10	68.20	-0.10	62.21	6.44	34.67	35.22	100	314	VERTICAL	Peak

Item 3, 4 are the fundamental frequency at 5825 MHz.

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36, 40, 48 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 22, 2014		

Channel 36

	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	5147.80	68.00	74.00	-6.00	64.14	5.92	33.58	31.52	VERTICAL	53	158	Peak
2	5149.20	53.91	54.00	-0.09	50.05	5.92	33.58	31.52	VERTICAL	53	158	Average
3	5187.79	106.06			102.10	5.97	33.57	31.56	VERTICAL	53	158	Average
4	5187.79	115.86			111.90	5.97	33.57	31.56	VERTICAL	53	158	Peak

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

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB/m	cm	deg		
1	5149.80	60.54	74.00	-13.46	56.94	33.02	176	49	Peak	VERTICAL
2	5150.00	46.56	54.00	-7.44	42.96	33.02	176	49	Average	VERTICAL
3	5196.00	101.23			97.59	33.05	176	49	Average	VERTICAL
4	5196.40	111.49			107.85	33.05	176	49	Peak	VERTICAL

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

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	5149.70	64.51	74.00	-9.49	60.65	5.92	33.58	31.52	VERTICAL	62	158	Peak
2	5150.00	51.00	54.00	-3.00	47.14	5.92	33.58	31.52	VERTICAL	62	158	Average
3	5247.49	110.59			106.53	5.99	33.54	31.61	VERTICAL	62	158	Average
4	5247.79	120.44			116.38	5.99	33.54	31.61	VERTICAL	62	158	Peak
5	5350.00	51.57	54.00	-2.43	47.34	6.06	33.51	31.68	VERTICAL	62	158	Average
6	5353.30	63.77	74.00	-10.23	59.54	6.06	33.51	31.68	VERTICAL	62	158	Peak

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

Temperature	25℃	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149, 157, 165 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 22, 2014		

Channel 149

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	5714.00	67.92	68.20	-0.28	59.08	34.16	10.03	35.35	199	29	VERTICAL	Peak
2	5725.00	78.04	78.20	-0.16	69.15	34.18	10.05	35.34	199	29	VERTICAL	Peak
3	5743.80	105.52			96.59	34.20	10.06	35.33	199	29	VERTICAL	Average
4	5743.80	115.38			106.45	34.20	10.06	35.33	199	29	VERTICAL	Peak

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	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5712.80	59.26	68.20	-8.94	54.11	6.34	34.16	35.35	238	341	VERTICAL	Peak
2	5722.00	58.85	78.20	-19.35	53.68	6.35	34.16	35.34	238	341	VERTICAL	Peak
3	5788.40	112.80			107.37	6.39	34.33	35.29	238	341	VERTICAL	Peak
4	5789.60	102.29			96.79	6.39	34.40	35.29	238	341	VERTICAL	Average
5	5850.20	60.11	78.20	-18.09	54.31	6.43	34.60	35.23	238	341	VERTICAL	Peak
6	5860.60	58.74	68.20	-9.46	52.85	6.44	34.67	35.22	238	341	VERTICAL	Peak

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	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5822.20	110.14			104.51	6.42	34.47	35.26	100	337	VERTICAL	Peak
2	5823.60	99.23			93.54	6.42	34.53	35.26	100	337	VERTICAL	Average
3	5856.79	69.72	78.20	-8.48	63.84	6.44	34.67	35.23	100	337	VERTICAL	Peak
4	5861.60	67.90	68.20	-0.30	62.01	6.44	34.67	35.22	100	337	VERTICAL	Peak

Item 3, 4 are the fundamental frequency at 5825 MHz.

Temperature	25°C	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38, 46 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 22, 2014		

Channel 38

	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	5147.30	67.22	74.00	-6.78	63.36	5.92	33.58	31.52	VERTICAL	70	159	Peak
2	5150.00	53.85	54.00	-0.15	49.99	5.92	33.58	31.52	VERTICAL	70	159	Average
3	5183.11	98.73			94.80	5.95	33.57	31.55	VERTICAL	70	159	Average
4	5197.49	109.47			105.50	5.97	33.56	31.56	VERTICAL	70	159	Peak

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

Channel 46

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB/m	cm	deg		
1	5140.71	46.31	54.00	-7.69	42.72	33.01	168	312	Average	VERTICAL
2	5141.61	59.51	74.00	-14.49	55.92	33.01	168	312	Peak	VERTICAL
3	5242.29	108.37			104.68	33.09	168	312	Peak	VERTICAL
4	5242.59	97.58			93.89	33.09	168	312	Average	VERTICAL

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

Temperature	25°C	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151, 159 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 22, 2014		

Channel 151

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	5714.60	68.10	68.20	-0.10	59.26	34.16	10.03	35.35	214	354	VERTICAL	Peak
2	5723.80	73.26	78.20	-4.94	64.38	34.18	10.04	35.34	214	354	VERTICAL	Peak
3	5745.00	108.61			99.66	34.20	10.07	35.32	214	354	VERTICAL	Peak
4	5764.60	98.57			89.52	34.27	10.09	35.31	214	354	VERTICAL	Average

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	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5710.80	60.58	68.20	-7.62	55.43	6.34	34.16	35.35	138	332	VERTICAL	Peak
2	5725.00	66.57	78.20	-11.63	61.38	6.35	34.18	35.34	138	332	VERTICAL	Peak
3	5787.21	108.39			102.96	6.39	34.33	35.29	138	332	VERTICAL	Peak
4	5806.69	97.68			92.07	6.41	34.47	35.27	138	332	VERTICAL	Average
5	5850.90	70.63	78.20	-7.57	64.83	6.43	34.60	35.23	138	332	VERTICAL	Peak
6	5866.59	67.82	68.20	-0.38	61.93	6.44	34.67	35.22	138	332	VERTICAL	Peak

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

Temperature	25°C	Humidity	58%
Test Engineer	Gary Chu / Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42, 155 / Ant. 1 + Ant. 2 + Ant. 3
Test Date	Dec. 22, 2014~Jan. 15, 2015		

Channel 42

	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	5148.80	65.94	74.00	-8.06	62.08	5.92	33.58	31.52	VERTICAL	74	166	Peak
2	5150.00	53.94	54.00	-0.06	50.08	5.92	33.58	31.52	VERTICAL	74	166	Average
3	5199.21	104.17			100.20	5.97	33.56	31.56	VERTICAL	74	166	Peak
4	5238.77	93.93			89.90	5.99	33.55	31.59	VERTICAL	74	166	Average
5	5350.00	52.12	54.00	-1.88	47.89	6.06	33.51	31.68	VERTICAL	74	166	Average
6	5359.99	64.51	74.00	-9.49	60.24	6.08	33.50	31.69	VERTICAL	74	166	Peak

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	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5705.41	67.98	68.20	-0.22	62.86	6.34	34.14	35.36	314	100	Peak	VERTICAL
2	5725.00	72.64	78.20	-5.56	67.45	6.35	34.18	35.34	314	100	Peak	VERTICAL
3	5743.80	91.21			85.98	6.36	34.20	35.33	314	100	Average	VERTICAL
4	5777.80	102.92			97.50	6.39	34.33	35.30	314	100	Peak	VERTICAL
5	5855.19	60.85	78.20	-17.35	55.04	6.44	34.60	35.23	314	100	Peak	VERTICAL
6	5860.00	60.15	68.20	-8.05	54.26	6.44	34.67	35.22	314	100	Peak	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

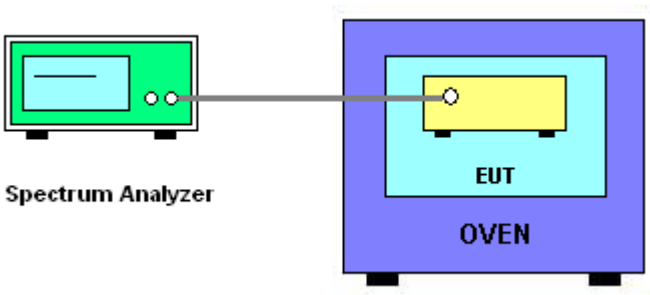
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 -30°C~50°C.

4.8.4. Test Setup Layout



4.8.5. Test Deviation

There is no deviation with the original standard.

4.8.6. EUT Operation during Test

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

4.8.7. Test Result of Frequency Stability

Temperature	26°C	Humidity	63%
Test Engineer	Mars Lin	Test Date	Jan. 14, 2015
Configurations	IEEE 802.11a		

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5200 MHz	5785 MHz
126.50	5200.0196	5785.0208
110.00	5200.0188	5785.0203
93.50	5200.0182	5785.0200
Max. Deviation (MHz)	0.019600	0.020800
Max. Deviation (ppm)	3.77	3.60

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5200 MHz	5785 MHz
-30	5200.0206	5785.0221
-20	5200.0202	5785.0218
-10	5200.0198	5785.0214
0	5200.0195	5785.0210
10	5200.0192	5785.0206
20	5200.0188	5785.0203
30	5200.0186	5785.0200
40	5200.0182	5785.0195
50	5200.0180	5785.0192
Max. Deviation (MHz)	0.020600	0.022100
Max. Deviation (ppm)	3.96	3.82

Temperature	26°C	Humidity	63%
Test Engineer	Mars Lin	Test Date	Jan. 14, 2015
Configurations	IEEE 802.11ac MCS0/Nss1 VHT40		

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5190 MHz	5755 MHz
126.50	5190.0208	5755.0240
110.00	5190.0203	5755.0232
93.50	5190.0198	5755.0228
Max. Deviation (MHz)	0.020800	0.024000
Max. Deviation (ppm)	4.01	4.17

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5190 MHz	5755 MHz
-30	5190.0223	5755.0250
-20	5190.0217	5755.0246
-10	5190.0213	5755.0242
0	5190.0208	5755.0240
10	5190.0204	5755.0236
20	5190.0203	5755.0232
30	5190.0200	5755.0228
40	5190.0196	5755.0224
50	5190.0192	5755.0220
Max. Deviation (MHz)	0.022300	0.025000
Max. Deviation (ppm)	4.30	4.34

Temperature	26°C	Humidity	63%
Test Engineer	Mars Lin	Test Date	Jan. 14, 2015
Configurations	IEEE 802.11ac MCS0/Nss1 VHT80		

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5210 MHz	5775 MHz
126.50	5210.0207	5775.0121
110.00	5210.0203	5775.0217
93.50	5210.0198	5775.0212
Max. Deviation (MHz)	0.020700	0.021700
Max. Deviation (ppm)	3.97	3.76

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5210 MHz	5775 MHz
-30	5210.0215	5775.0236
-20	5210.0213	5775.0232
-10	5210.0211	5775.0228
0	5210.0209	5775.0224
10	5210.0205	5775.0219
20	5210.0203	5775.0217
30	5210.0202	5775.0213
40	5210.0199	5775.0209
50	5210.0194	5775.0203
Max. Deviation (MHz)	0.021500	0.023600
Max. Deviation (ppm)	4.13	4.09

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	Schwarzbeck	NSLK 8127	8127650	9kHz ~ 30MHz	Nov. 17, 2014	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Nov. 17, 2014	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	Dec. 04, 2014	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	May 26, 2014	Radiation (03CH01-CB)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Jul. 28, 2014	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Oct. 28, 2014	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 22, 2014	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 15, 2014	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02009	1GHz ~ 26.5GHz	Dec. 17, 2014	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Nov. 25, 2014	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100080	9kHz ~ 40GHz	Oct. 15, 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-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)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
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.

NCR means Non-Calibration required.

6. MEASUREMENT UNCERTAINTY

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