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FCC RADIO TEST REPORT

Applicant's company	**D-Link Corporation**
Applicant Address	No.289, Sinhu 3rd Rd., Neihu District, Taipei City 114, Taiwan, R.O.C.
FCC ID	**KA2IR879A1**

Product Name	AC1900 Wi-Fi Router
Brand Name	D-Link
Model No.	DIR-879
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250 MHz / 5725 ~ 5850 MHz
Received Date	Nov. 03, 2015
Final Test Date	Dec. 02, 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.

TAF
Testing Laboratory
1190

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR5O2909AB	Rev. 01	Initial issue of report	Dec. 04, 2015
FR5O2909AB	Rev. 02	Updating the information of the adapter	Dec. 07, 2015

1. VERIFICATION OF COMPLIANCE

Product Name	:	AC1900 Wi-Fi Router
Brand Name	:	D-Link
Model No.	:	DIR-879
Applicant	:	D-Link 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 Nov. 03, 2015 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

Sam Chen

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart E				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.1	15.207	AC Power Line Conducted Emissions	Complies	7.11 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	0.05dB
4.5	15.407(a)	Power Spectral Density	Complies	0.03 dB
4.6	15.407(b)	Radiated Emissions	Complies	6.46 dB
4.7	15.407(b)	Band Edge Emissions	Complies	0.02 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, 4RX)
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: <For Non-Beamforming Mode> IEEE 802.11a: 17.19 MHz <For Beamforming Mode> IEEE 802.11ac MCS0/Nss1 (VHT20): 17.89 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 36.90 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 74.67 MHz Band 4: <For Non-Beamforming Mode> IEEE 802.11a: 18.76 MHz <For Beamforming Mode> IEEE 802.11ac MCS0/Nss1 (VHT20): 17.89 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 36.90 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 74.96 MHz

Maximum Conducted Output Power	Band 1: **<For Non-Beamforming Mode>** IEEE 802.11a: 28.45 dBm **<For Beamforming Mode>** IEEE 802.11ac MCS0/Nss1 (VHT20): 28.18 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 28.02 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 22.90 dBm Band 4: **<For Non-Beamforming Mode>** IEEE 802.11a: 29.43 dBm **<For Beamforming Mode>** IEEE 802.11ac MCS0/Nss1 (VHT20): 28.11 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 28.18 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 24.74 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 for 802.11n/ac in 2.4GHz and 5GHz.	☐ 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 supports HT20 and HT40.

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

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

3.2. Accessories

Power	Brand	Model	Rating
Adapter	LEI	MU24-Y120200-A1	Input:100-240V~50/60Hz, 0.7A Output:12V, 2A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)		TX/RX Function	
					2.4GHz	5GHz	2.4GHz	5GHz
1	Nienyi	NYS1754	PCB Antenna	I-PEX	3	3	TX/RX	RX
2	Nienyi	NYS1751	PCB Antenna	I-PEX	3	3	TX/RX	TX/RX
3	Nienyi	NYS1752	PCB Antenna	I-PEX	3	3	RX	TX/RX
4	Nienyi	NYS1753	PCB Antenna	I-PEX	3	3	TX/RX	TX/RX

Note: The EUT has four Antennas.

For 2.4GHz function:

For IEEE 802.11b/g/n/ac mode (3TX/4RX):

Ant. 1, Ant. 2 and Ant. 4 can be used as transmitting antennas and can transmit simultaneously.

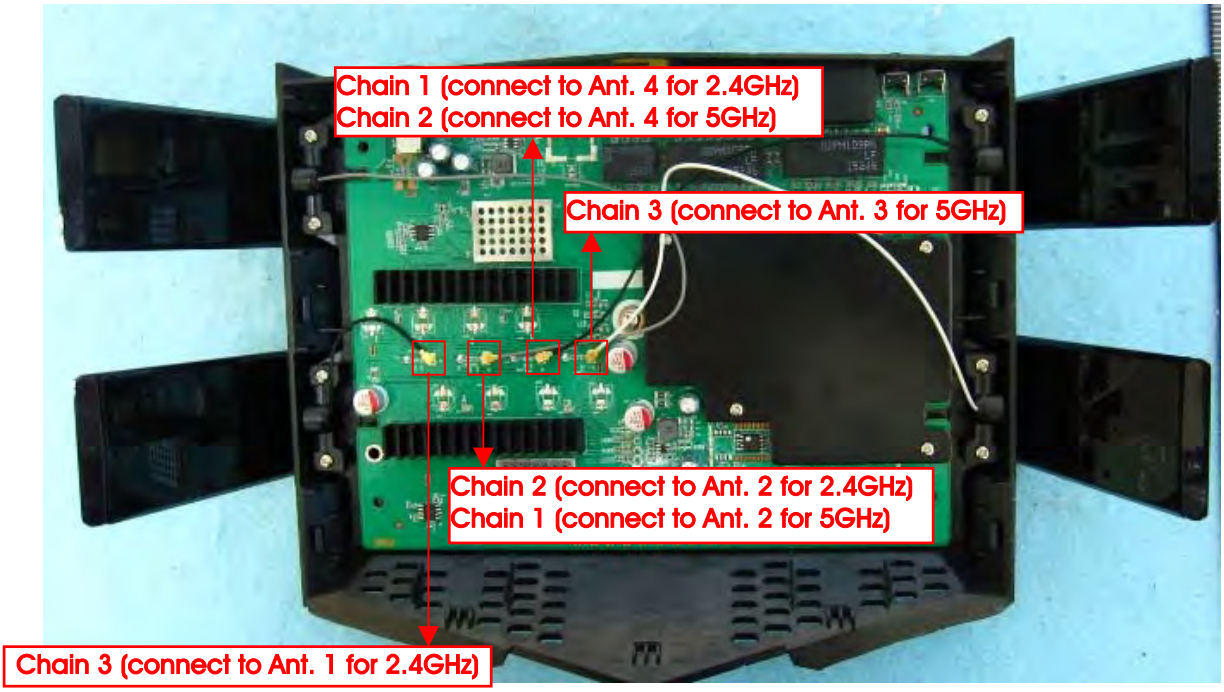
Ant. 1, Ant. 2, Ant. 3 and Ant. 4 can be used as receiving antennas and can receive simultaneously.

For 5GHz function:

For IEEE 802.11a/n/ac mode (3TX/4RX):

Ant. 2, Ant. 3 and Ant. 4 can be used as transmitting antennas and can transmit simultaneously.

Ant. 1, Ant. 2, Ant. 3 and Ant. 4 can be used as receiving antennas and can receive simultaneously.



3.4. Table for Carrier Frequencies

There are three bandwidth systems.

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

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

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

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

3.5. Table for Test Modes

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

Test Items	Mode		Data Rate	Channel	Chain
AC Power Conducted Emission	Normal Link		-	-	-
Max. Conducted Output Power	<For Non-Beamforming Mode>				
	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1+2+3
	<For Beamforming Mode>				
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	1+2+3
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	1+2+3
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	1+2+3
Power Spectral Density	<For Non-Beamforming Mode>				
	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1+2+3
	<For Beamforming Mode>				
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	1+2+3
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	1+2+3
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	1+2+3
26dB Spectrum Bandwidth & 99% Occupied Bandwidth Measurement	<For Non-Beamforming Mode>				
	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1+2+3
	<For Beamforming Mode>				
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	1+2+3
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	1+2+3
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	1+2+3

6dB Spectrum Bandwidth Measurement	<For Non-Beamforming Mode>				
	11a/BPSK	Band 4	6Mbps	149/157/165	1+2+3
	<For Beamforming Mode>				
	11ac VHT20	Band 4	MCS0/Nss1	149/157/165	1+2+3
	11ac VHT40	Band 4	MCS0/Nss1	151/159	1+2+3
	11ac VHT80	Band 4	MCS0/Nss1	155	1+2+3
Radiated Emission Below 1GHz	Normal Link		-	-	-
Radiated Emission Above 1GHz	<For Non-Beamforming Mode>				
	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1+2+3
	<For Beamforming Mode>				
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	1+2+3
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	1+2+3
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	1+2+3
Band Edge Emission	<For Non-Beamforming Mode>				
	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1+2+3
	<For Beamforming Mode>				
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	1+2+3
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	1+2+3
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	1+2+3
Frequency Stability	20 MHz	Band 1&4	-	40/157	1
	40 MHz	Band 1&4	-	38/151	1
	80 MHz	Band 1&4	-	42/155	1

Note: 1. All the specification of test configurations and test modes were based on customer's request.

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

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

The following test modes were performed for all tests:

For Conducted Emission test:

Test Mode 1: EUT Normal Link - AP Mode

For Radiated Emission test (Below 1GHz):

Test Mode 1: EUT Normal Link Z axis - AP Mode

For Radiated Emission test (Above 1GHz):

Test Mode 1: EUT CTX Z axis - 5GHz WLAN function

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 FA5O2909) and Radiated Emission Co-location (please refer to Appendix B) tests are added for simultaneously transmit between 2.4GHz WLAN function and 5GHz WLAN function.

3.6. Table for Testing Locations

Test Site Location					
Address:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.				
TEL:	886-3-656-9065				
FAX:	886-3-656-9085				
Test Site No.	**Site Category**	**Location**	**FCC Reg. No.**	**IC File No.**	**VCCI Reg. No**
03CH01-CB	SAC	Hsin Chu	262045	IC 4086D	-
CO01-CB	Conduction	Hsin Chu	262045	IC 4086D	-
TH01-CB	OVEN Room	Hsin Chu	-	-	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC).

3.7. Table for Supporting Units

For Test Site No: 03CH01-CB (Below 1GHz)

Support Unit	Brand	Model	FCC ID
NB*2	DELL	E4300	DoC
NB*2	Apple	Mac Book	DoC

For Test Site No: 03CH01-CB (Above 1GHz)

<For Non-Beamforming Mode>

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC

<For Beamforming Mode>

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC
WLAN ac Dongle	Broadcom	Bcm4366	DoC

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
NB*4	DELL	E6430	DoC

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC

3.8. Table for Parameters of Test Software Setting

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

<For Non-Beamforming Mode>

Test Software Version	RTL819x 3.3					
Mode	Test Frequency (MHz)					
	NCB: 20MHz					
	5180 MHz	5200 MHz	5240 MHz	5745 MHz	5785 MHz	5825 MHz
802.11a	**30/30/30**	**33/34/33**	**33/35/34**	**46/39/41**	**49/41/45**	**46/37/45**

<For Beamforming Mode>

Test Software Version	RTL819x 3.3					
Mode	Test Frequency (MHz)					
	NCB: 20MHz					
	5180 MHz	5200 MHz	5240 MHz	5745 MHz	5785 MHz	5825 MHz
802.11ac MCS0/Nss1 VHT20	29/27//29	30/29/30	30/29/31	37/29/32	46/37/43	45/35/42
Mode	NCB: 40MHz					
802.11ac MCS0/Nss1 VHT40	5190 MHz		5230 MHz	5755 MHz		5795 MHz
	22/23/24		32/31/34	35/29/31		48/42/44
Mode	NCB: 80MHz					
802.11ac MCS0/Nss1 VHT80	5210 MHz			5775 MHz		
	21/27/22			41/32/37		

3.9. EUT Operation during Test

<For Non-Beamforming Mode>

The EUT was programmed to be in continuously transmitting mode.

<For Beamforming Mode>

For Conducted Mode:

The EUT was programmed to be in continuously transmitting mode.

For Radiated Mode:

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

The program was executed as follows:

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

3.10. Duty Cycle

<For Non-Beamforming Mode>

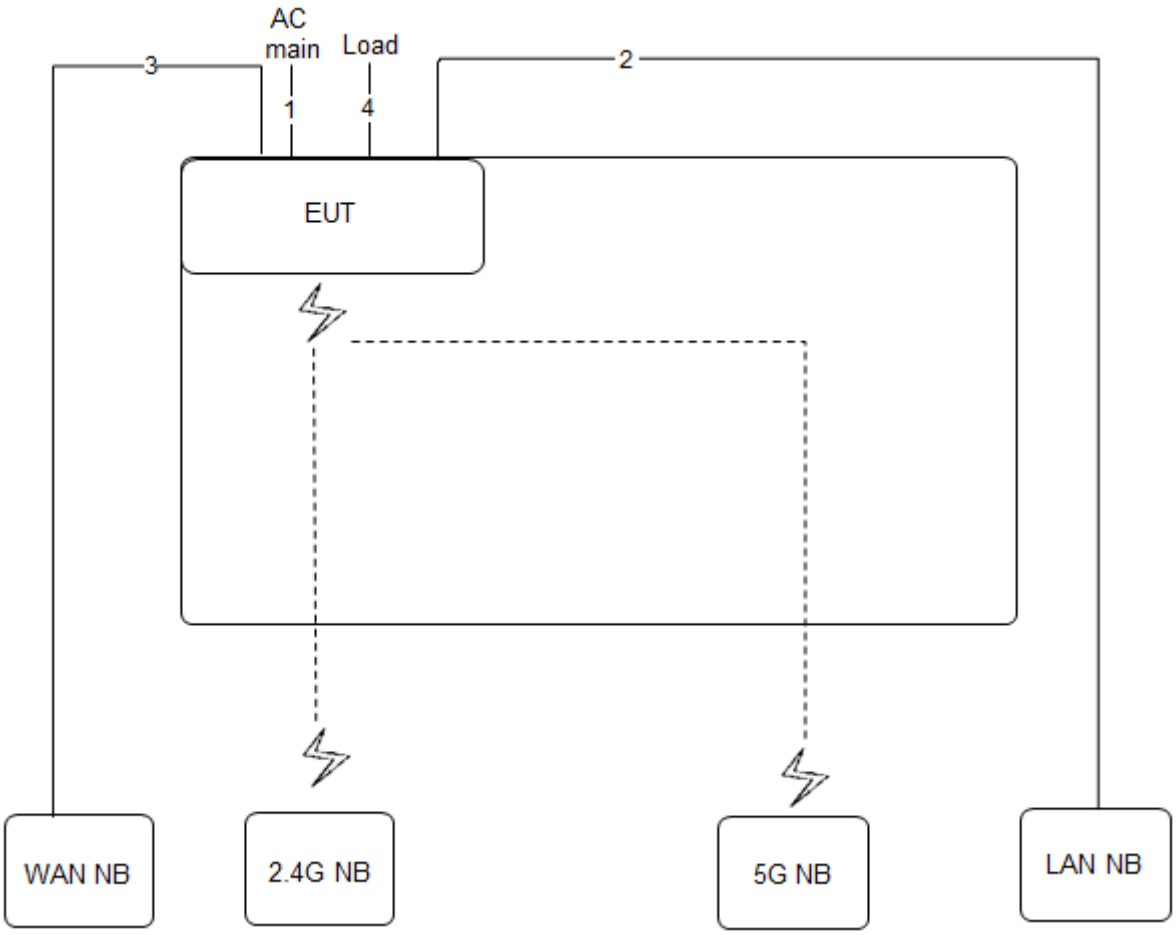
Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	1.000	1.000	100.00%	0.00	0.01

<For Beamforming Mode>

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11ac MCS0/Nss1 VHT20	1.740	1.860	93.55%	0.29	0.57
802.11ac MCS0/Nss1 VHT40	1.664	1.888	88.14%	0.55	0.60
802.11ac MCS0/Nss1 VHT80	1.900	2.040	93.14%	0.31	0.53

3.11. Test Configurations

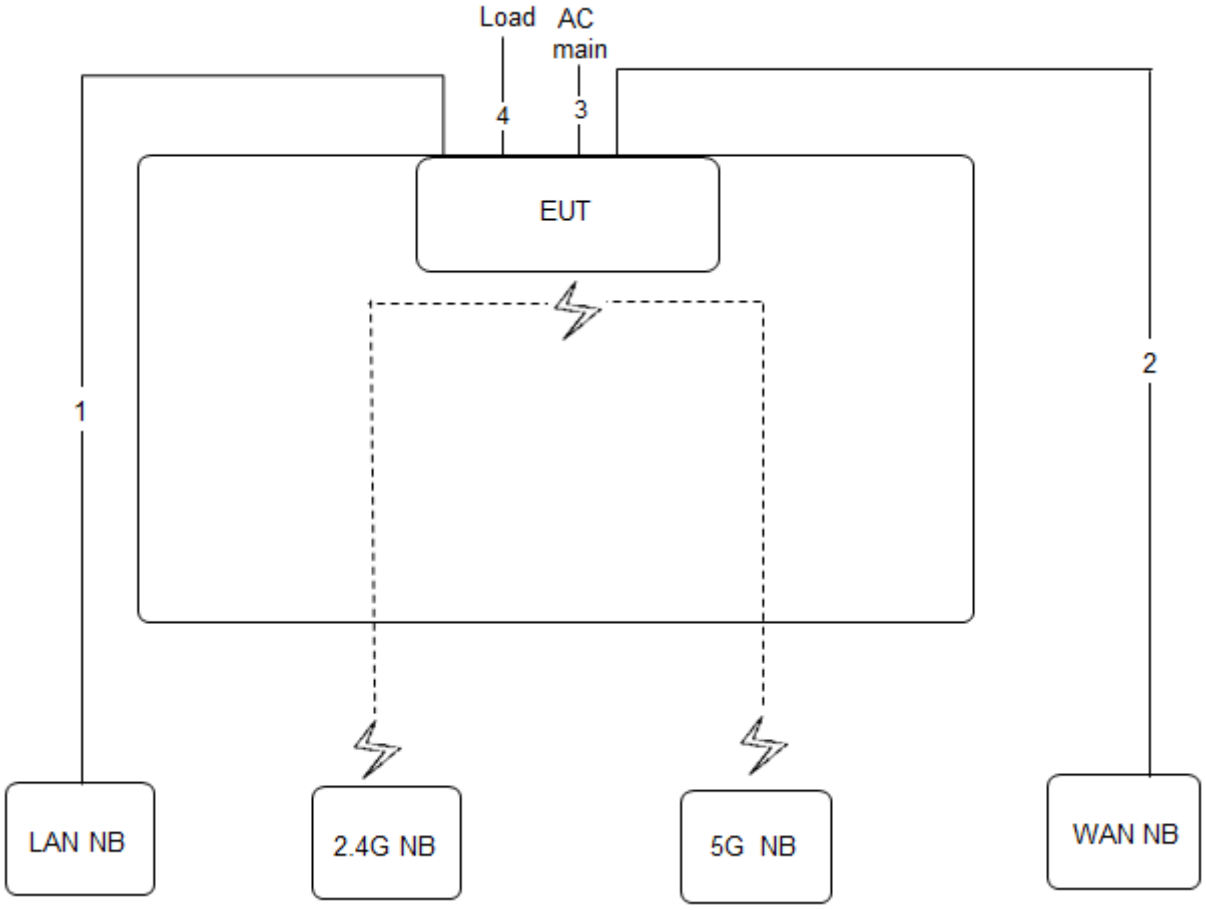
3.11.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shield	Length
1	Power cable	No	1.2m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	10m
4	RJ-45 cable*3	No	3m

3.11.2. Radiation Emissions Test Configuration

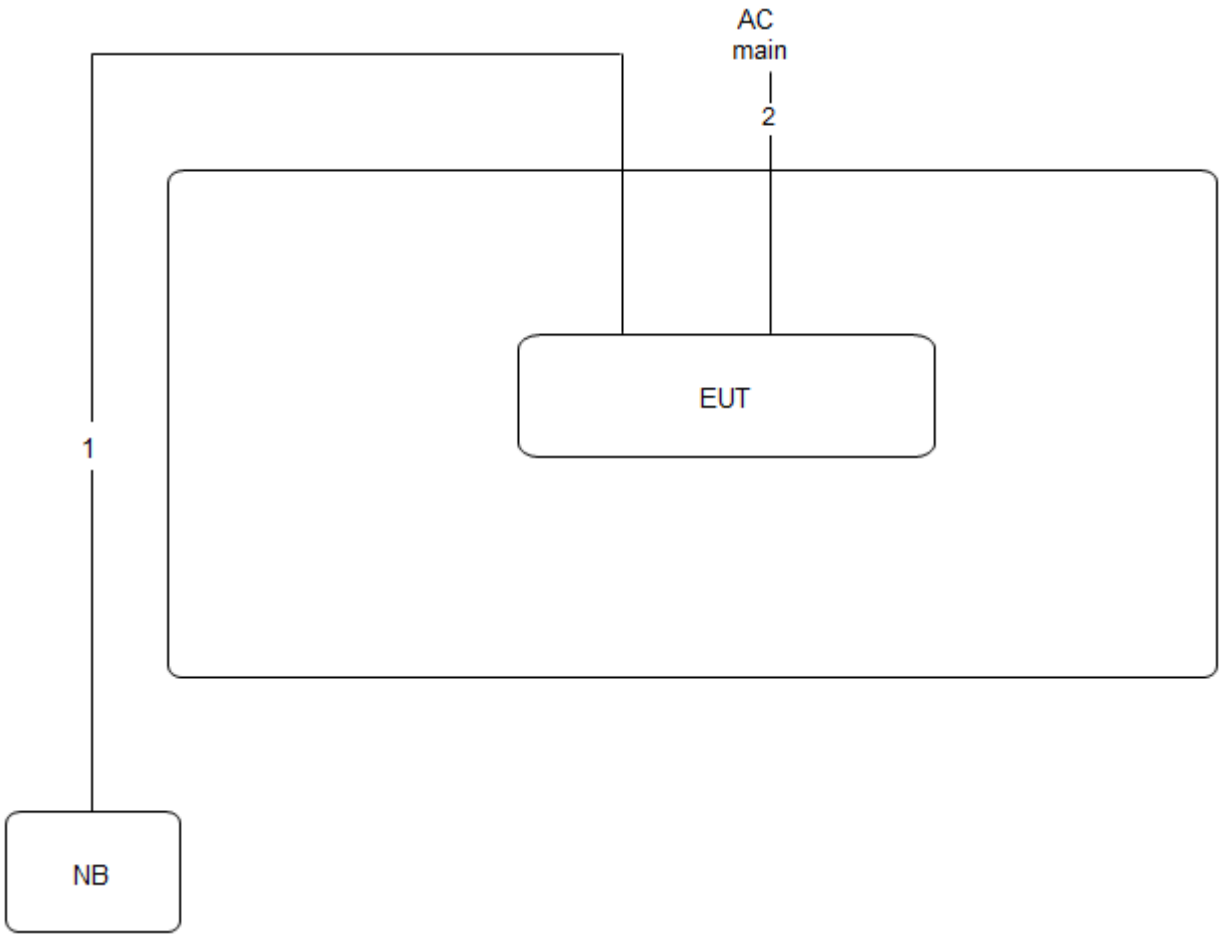
Test Configuration: 30MHz ~1GHz



Item	Connection	Shielded	Length
1	RJ-45 cable	No	10m
2	RJ-45 cable	No	10m
3	Power cable	No	1.2m
4	RJ-45 cable *3	No	1.5m

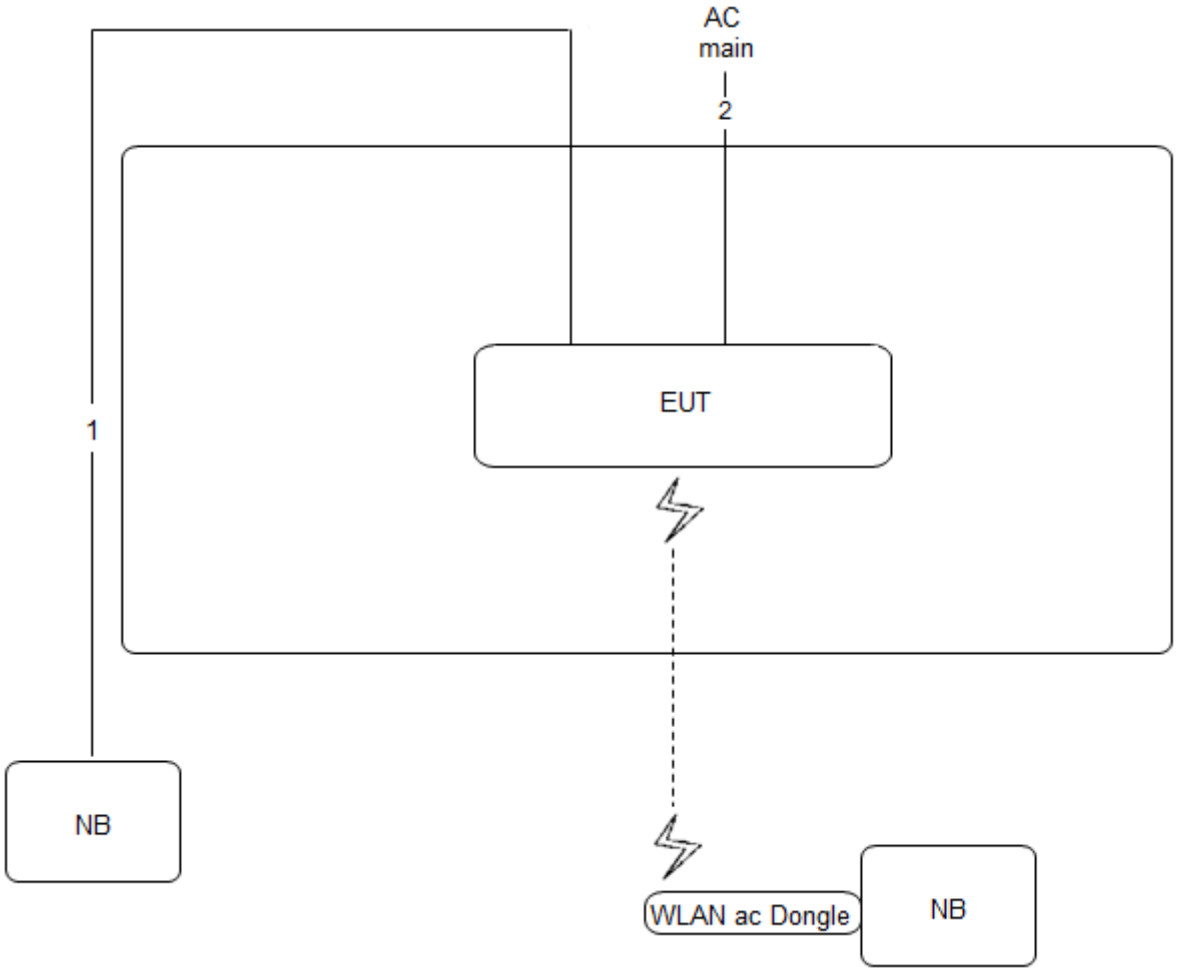
Test Configuration: above 1GHz

<For Non-Beamforming Mode>



Item	Connection	Shielded	Length
1	RJ-45 cable	No	10m
2	Power cable	No	1.2m

<For Beamforming Mode>



Item	Connection	Shielded	Length
1	RJ-45 cable	No	10m
2	Power cable	No	1.2m

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

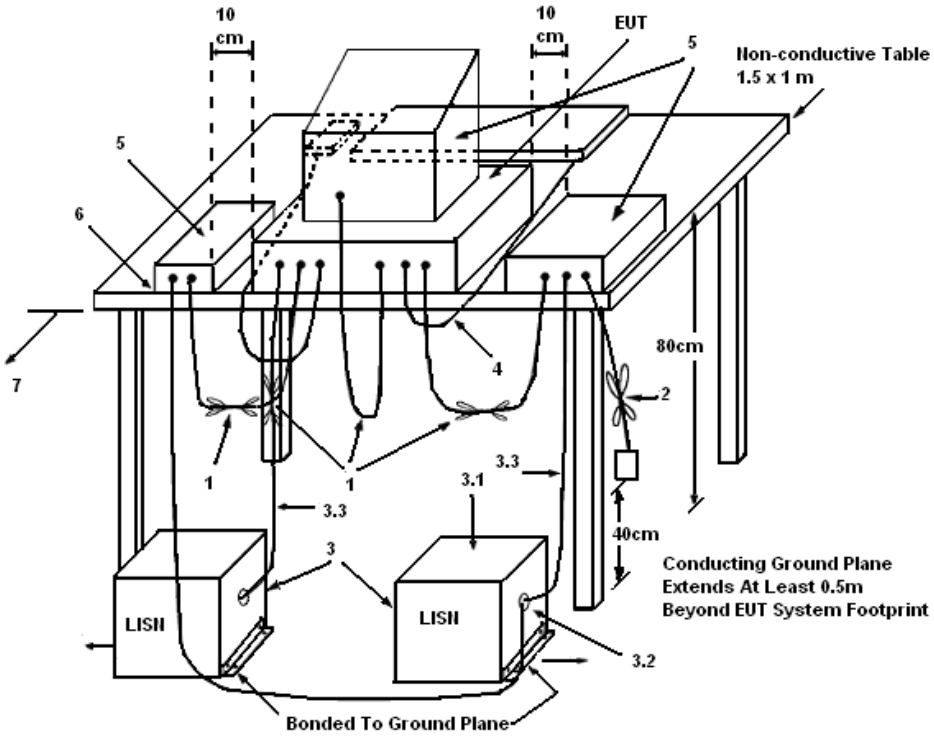
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

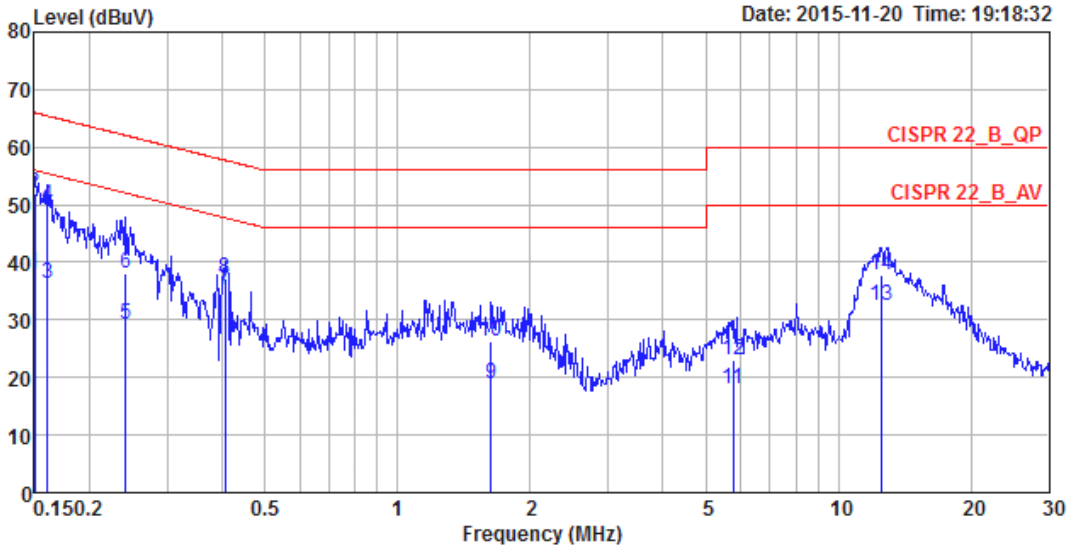
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

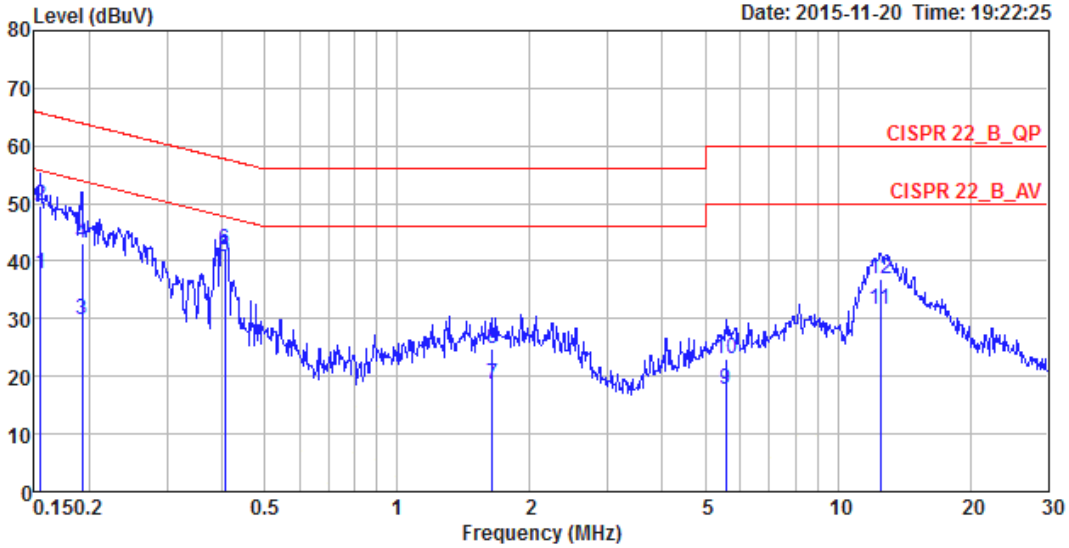
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	25°C	Humidity	58%
Test Engineer	Parody Lin	Phase	Line
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1500	38.03	-17.97	56.00	28.08	9.93	0.02	LINE	Average
2	0.1500	51.81	-14.19	66.00	41.86	9.93	0.02	LINE	QP
3	0.1607	36.23	-19.20	55.43	26.28	9.93	0.02	LINE	Average
4	0.1607	49.87	-15.56	65.43	39.92	9.93	0.02	LINE	QP
5	0.2416	29.18	-22.86	52.04	19.22	9.93	0.03	LINE	Average
6	0.2416	38.02	-24.02	62.04	28.06	9.93	0.03	LINE	QP
7	0.4061	34.99	-12.74	47.73	25.02	9.93	0.04	LINE	Average
8	0.4061	37.07	-20.66	57.73	27.10	9.93	0.04	LINE	QP
9	1.6276	19.04	-26.96	46.00	9.00	9.98	0.06	LINE	Average
10	1.6276	26.32	-29.68	56.00	16.28	9.98	0.06	LINE	QP
11	5.7743	18.11	-31.89	50.00	7.91	10.08	0.12	LINE	Average
12	5.7743	22.94	-37.06	60.00	12.74	10.08	0.12	LINE	QP
13	12.5156	32.60	-17.40	50.00	22.09	10.26	0.25	LINE	Average
14	12.5156	37.77	-22.23	60.00	27.26	10.26	0.25	LINE	QP

Temperature	25°C	Humidity	58%
Test Engineer	Parody Lin	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1548	37.69	-18.05	55.74	27.89	9.78	0.02	NEUTRAL	Average
2	0.1548	49.74	-16.00	65.74	39.94	9.78	0.02	NEUTRAL	QP
3	0.1924	29.83	-24.10	53.93	20.02	9.79	0.02	NEUTRAL	Average
4	0.1924	43.21	-20.72	63.93	33.40	9.79	0.02	NEUTRAL	QP
5	0.4061	40.62	-7.11	47.73	30.79	9.79	0.04	NEUTRAL	Average
6	0.4061	41.92	-15.81	57.73	32.09	9.79	0.04	NEUTRAL	QP
7	1.6450	18.52	-27.48	46.00	8.63	9.83	0.06	NEUTRAL	Average
8	1.6450	24.79	-31.21	56.00	14.90	9.83	0.06	NEUTRAL	QP
9	5.5641	17.72	-32.28	50.00	7.69	9.92	0.11	NEUTRAL	Average
10	5.5641	23.06	-36.94	60.00	13.03	9.92	0.11	NEUTRAL	QP
11	12.5156	31.67	-18.33	50.00	21.36	10.06	0.25	NEUTRAL	Average
12	12.5156	37.03	-22.97	60.00	26.72	10.06	0.25	NEUTRAL	QP

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. 26dB Bandwidth and 99% Occupied Bandwidth Measurement

4.2.1. Limit

No restriction limits.

4.2.2. Measuring Instruments and Setting

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

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

4.2.3. Test Procedures

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

1. The transmitter was radiated to the spectrum analyzer in peak hold mode.
2. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

4.2.4. Test Setup Layout

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

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

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	24°C	Humidity	60%
Test Engineer	Clemens Fang		

<For Non-Beamforming Mode>

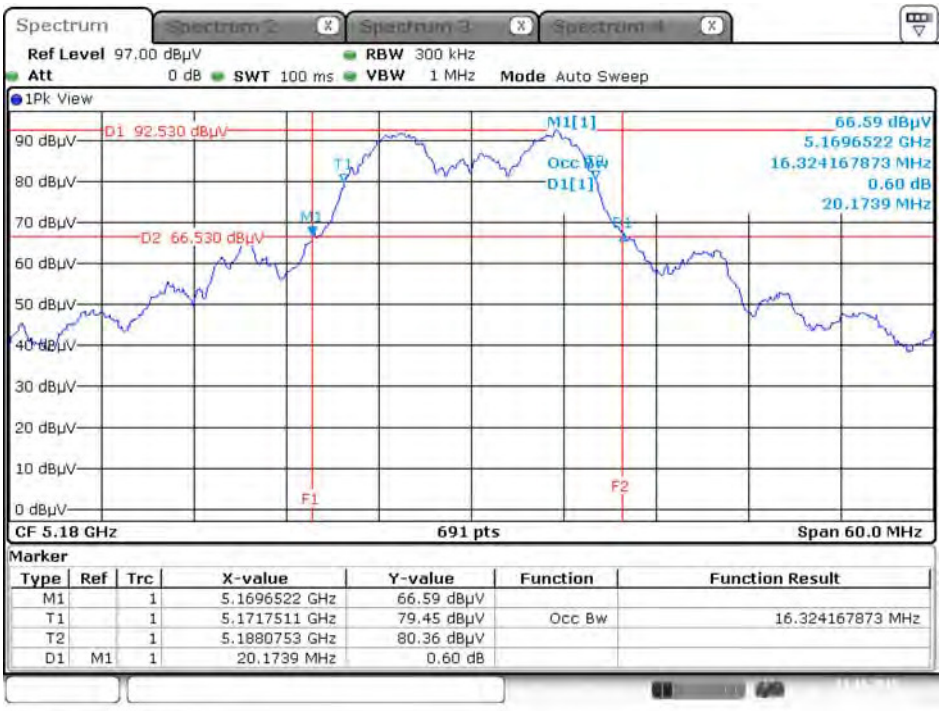
Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5180 MHz	20.17	16.32
	5200 MHz	20.17	16.41
	5240 MHz	23.39	17.19
	5745 MHz	19.39	16.06
	5785 MHz	23.65	18.76
	5825 MHz	23.30	18.06

<For Beamforming Mode>

Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11ac MCS0/Nss1 VHT20	5180 MHz	21.91	17.89
	5200 MHz	21.48	17.89
	5240 MHz	21.57	17.89
	5745 MHz	21.48	17.80
	5785 MHz	21.57	17.89
	5825 MHz	21.48	17.80
802.11ac MCS0/Nss1 VHT40	5190 MHz	44.06	36.90
	5230 MHz	43.77	36.61
	5755 MHz	43.62	36.90
	5795 MHz	43.62	36.90
802.11ac MCS0/Nss1 VHT80	5210 MHz	81.45	74.67
	5775 MHz	81.16	74.96

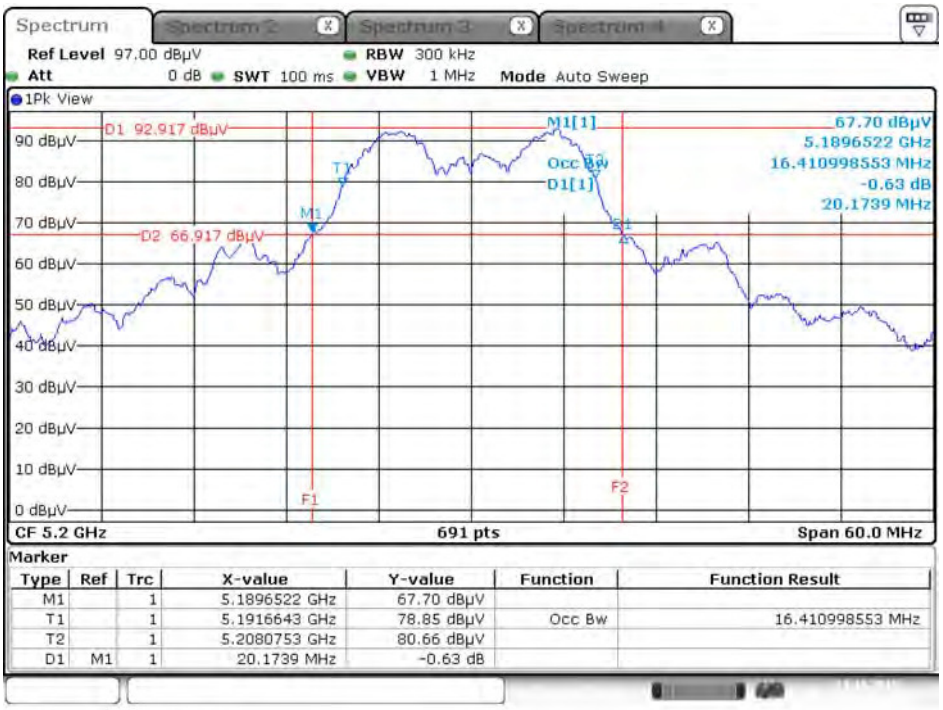
<For Non-Beamforming Mode>

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



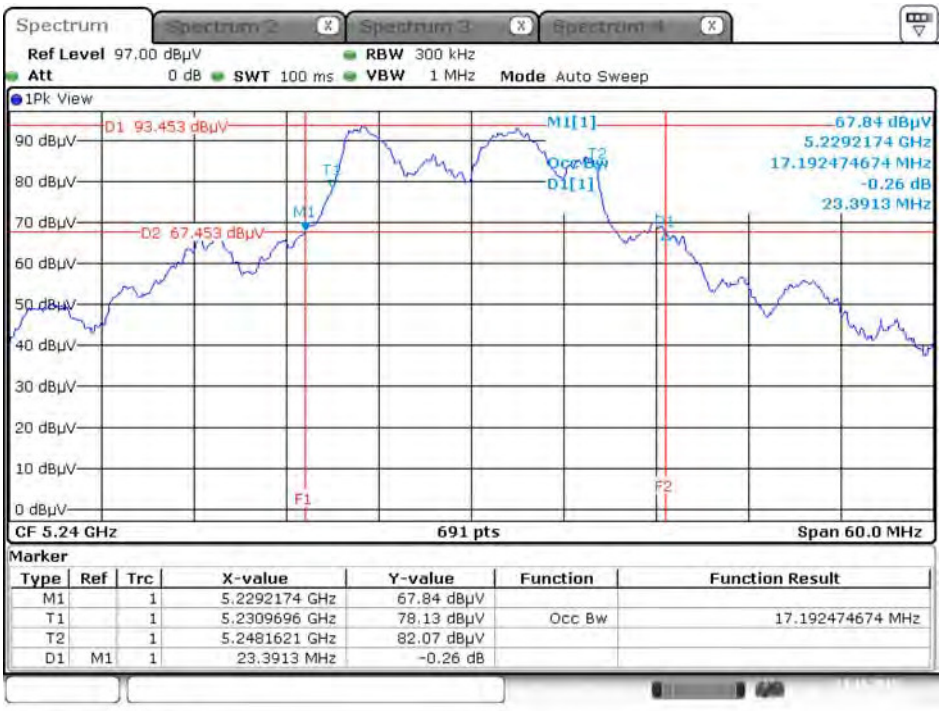
Date: 13.NOV.2015 21:31:10

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



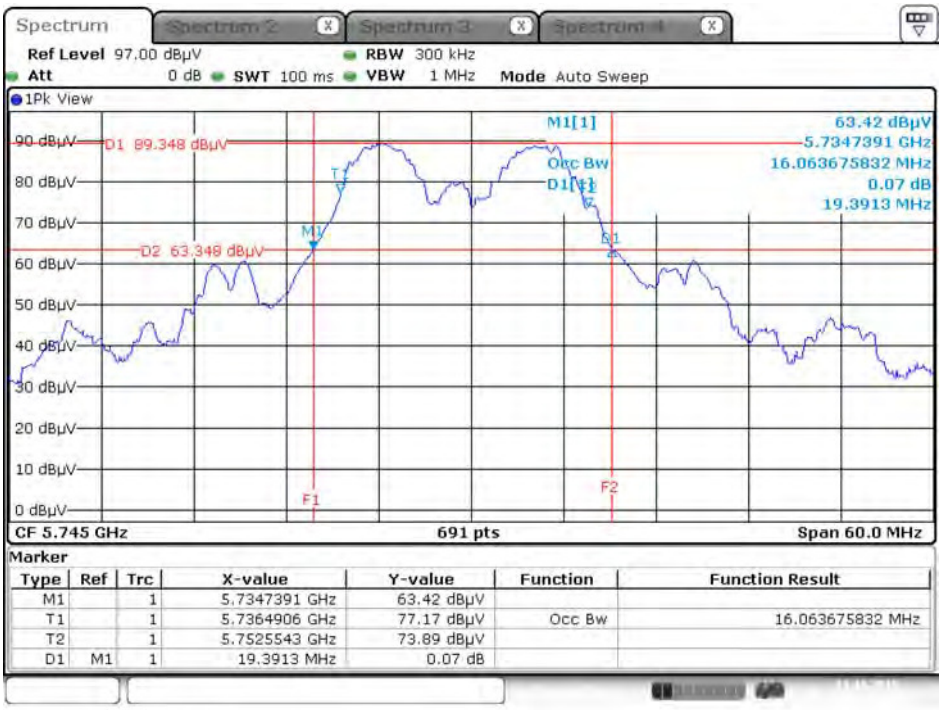
Date: 13.NOV.2015 21:32:34

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



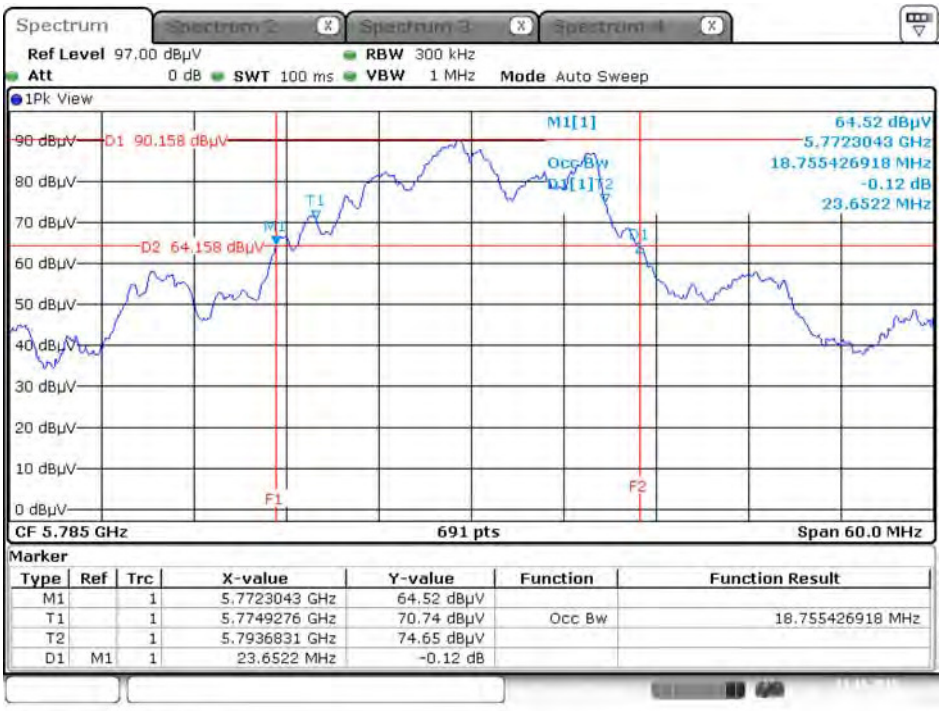
Date: 13.NOV.2015 21:33:47

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



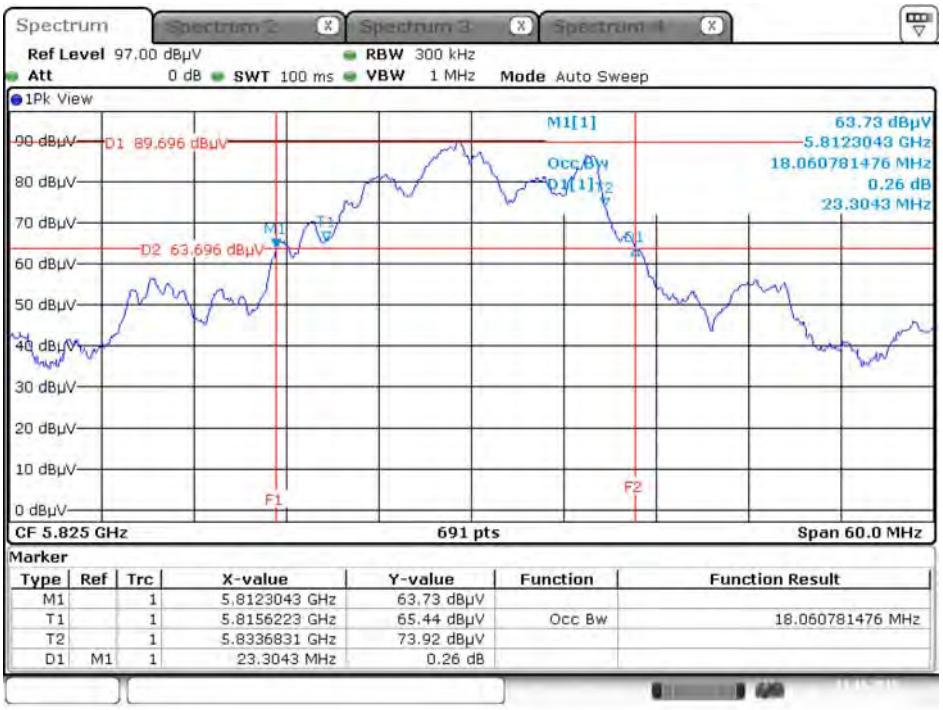
Date: 13.NOV.2015 21:35:46

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



Date: 13.NOV.2015 21:37:00

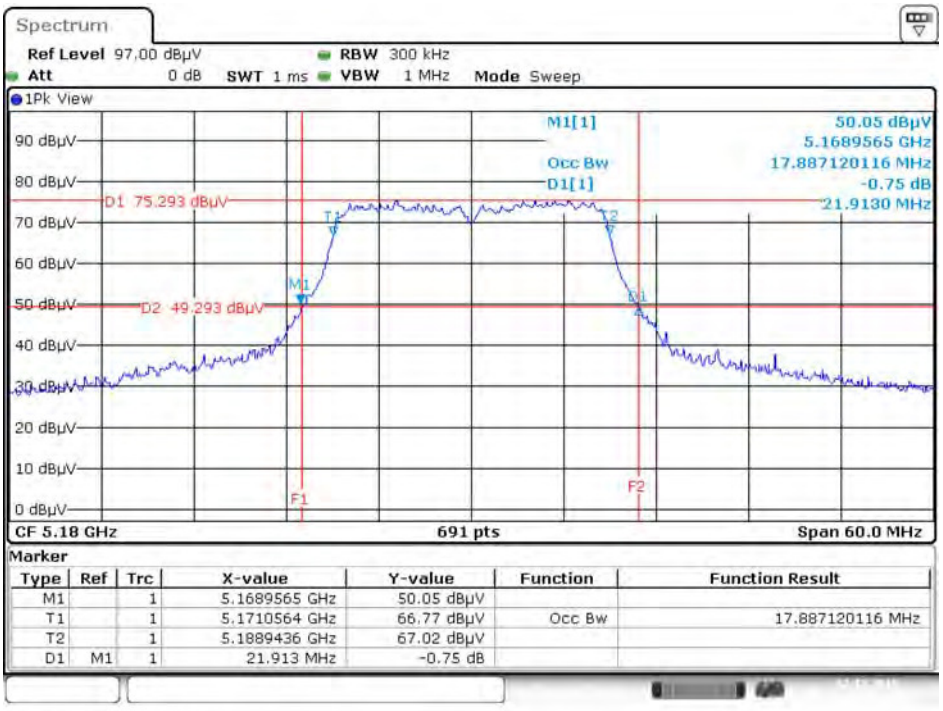
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3 / 5825 MHz



Date: 13.NOV.2015 21:38:54

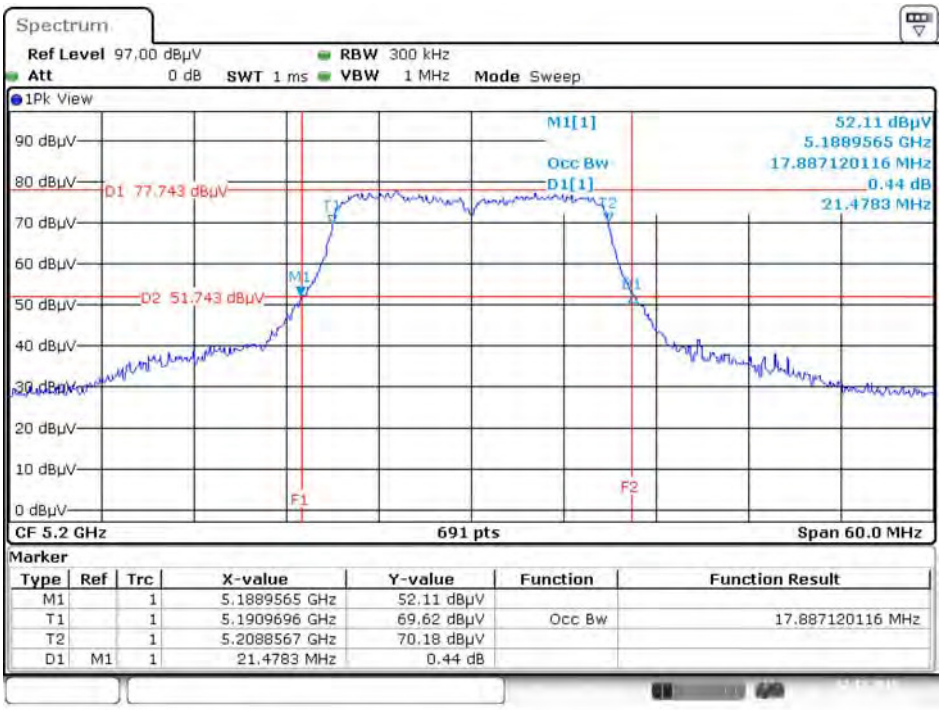
<For Beamforming Mode>

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



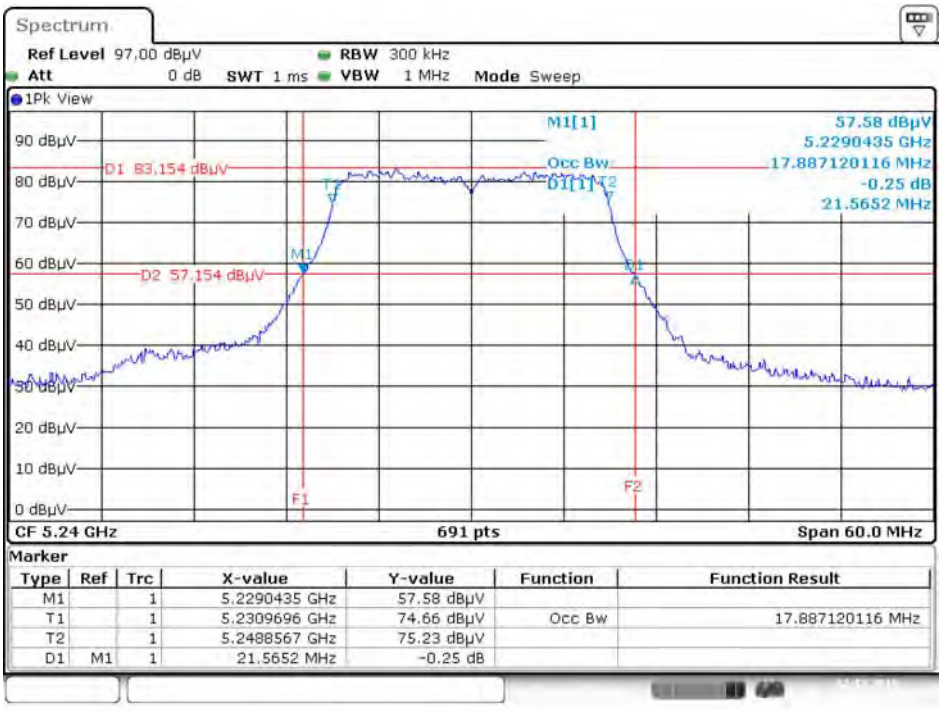
Date: 2.DEC.2015 20:21:25

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



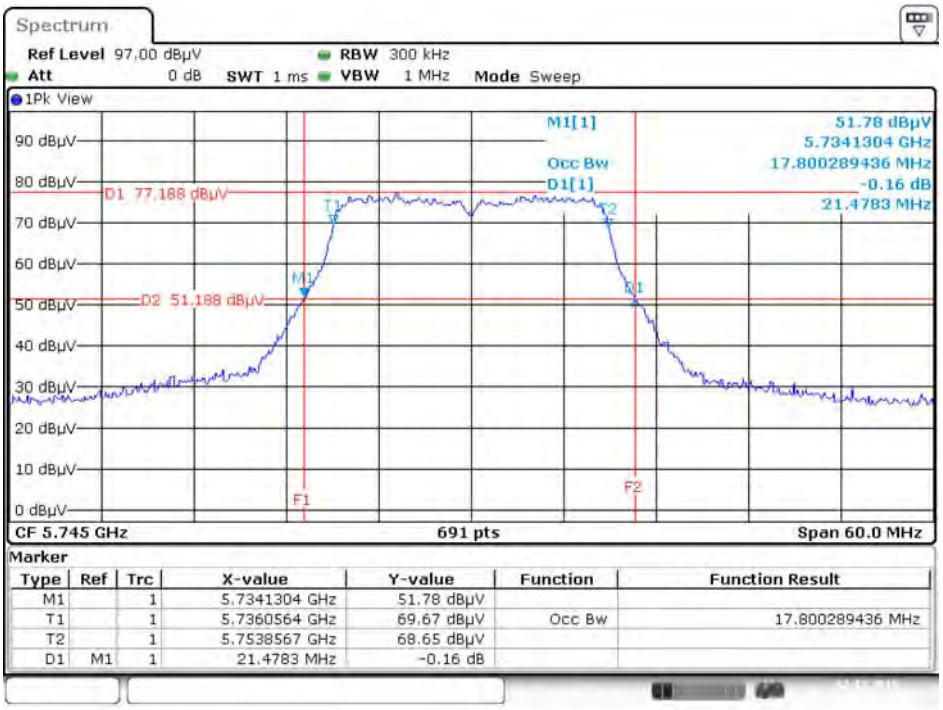
Date: 2.DEC.2015 20:22:11

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



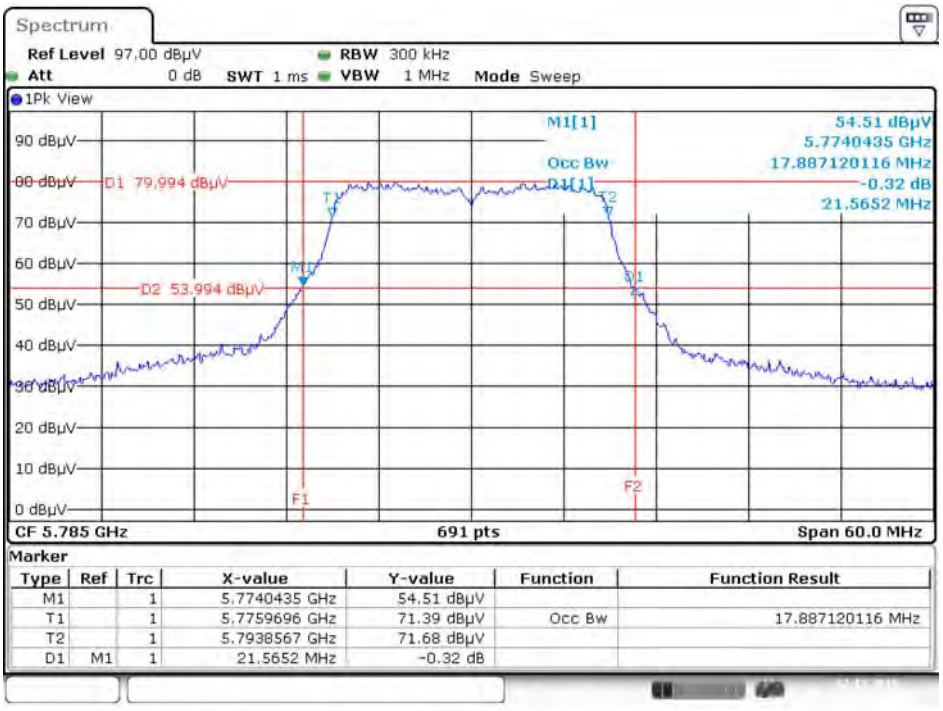
Date: 2.DEC.2015 20:22:56

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



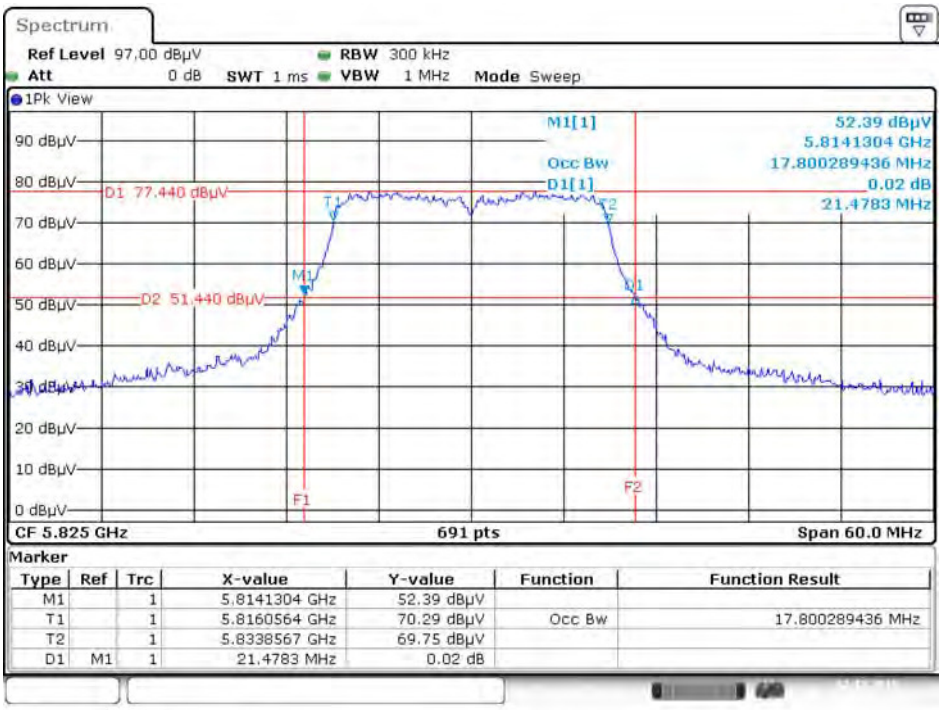
Date: 2.DEC.2015 20:13:17

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



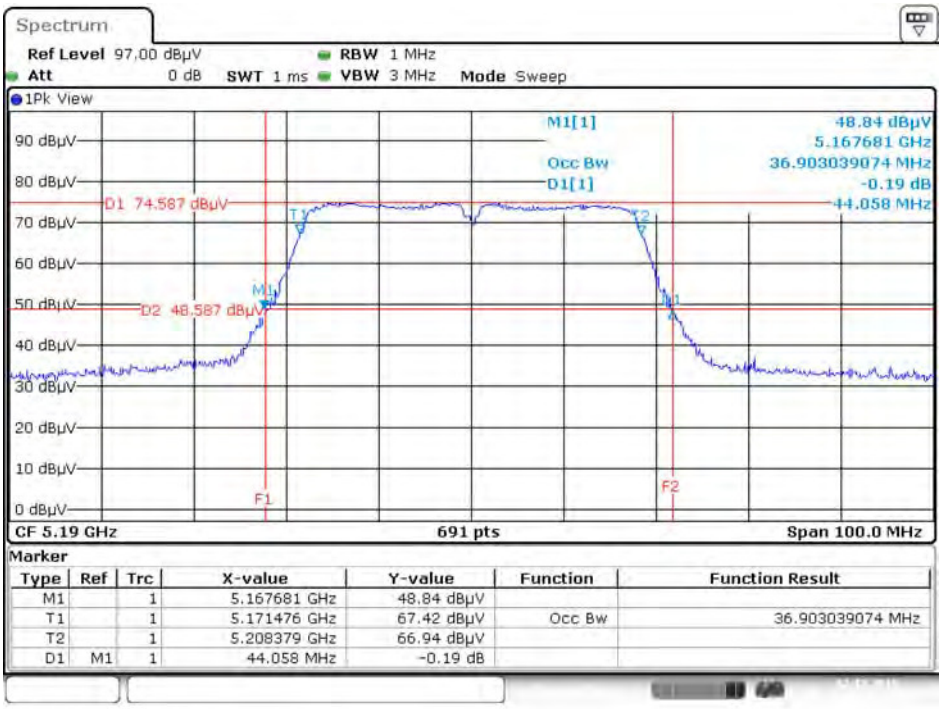
Date: 2.DEC.2015 20:15:08

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



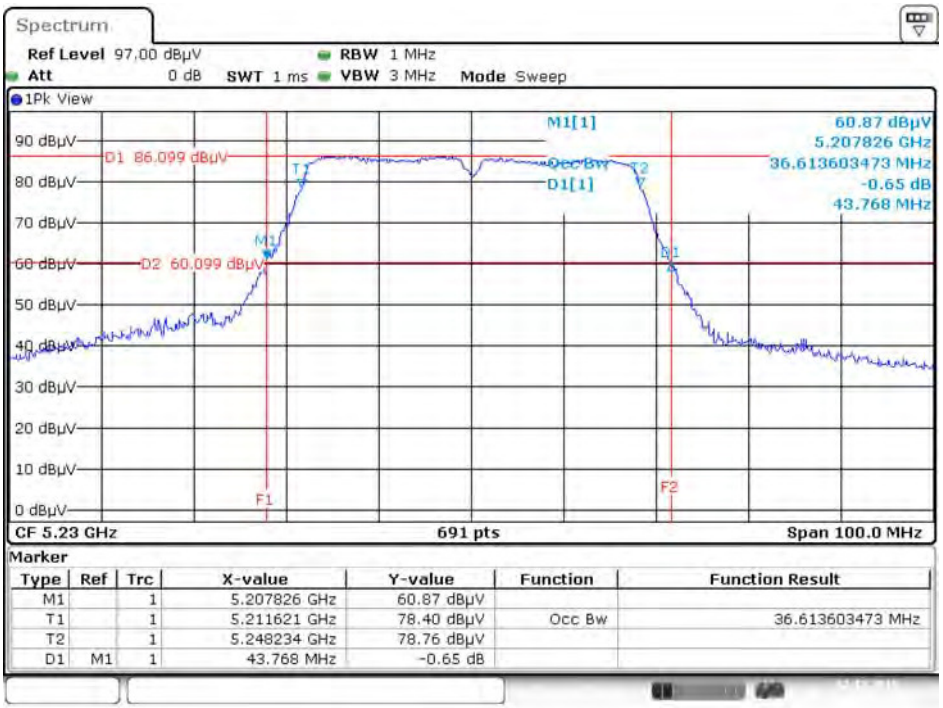
Date: 2.DEC.2015 20:17:04

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



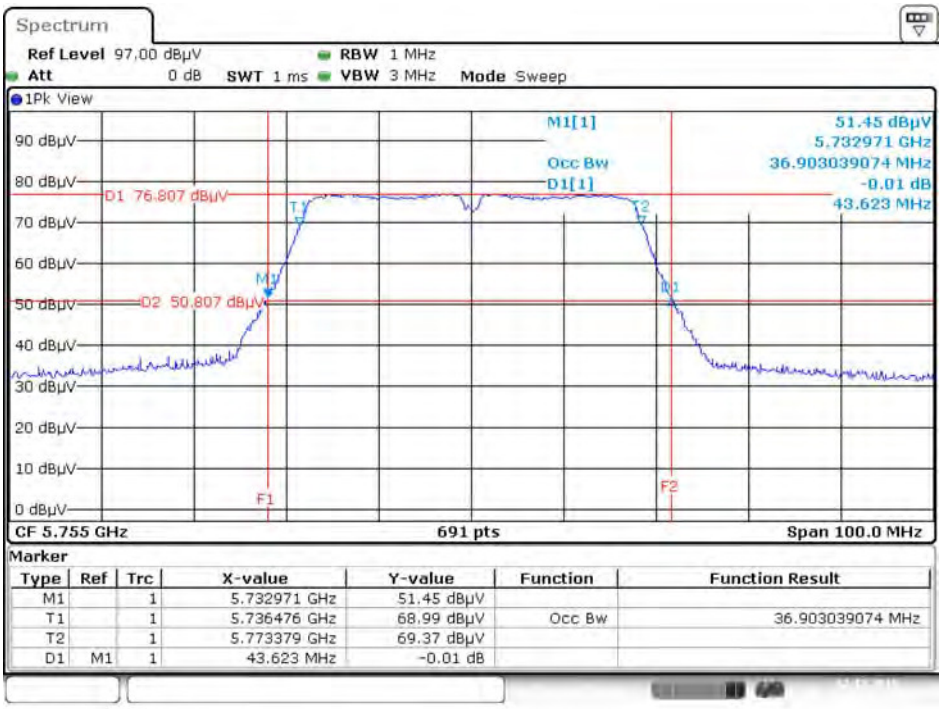
Date: 2.DEC.2015 20:08:55

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



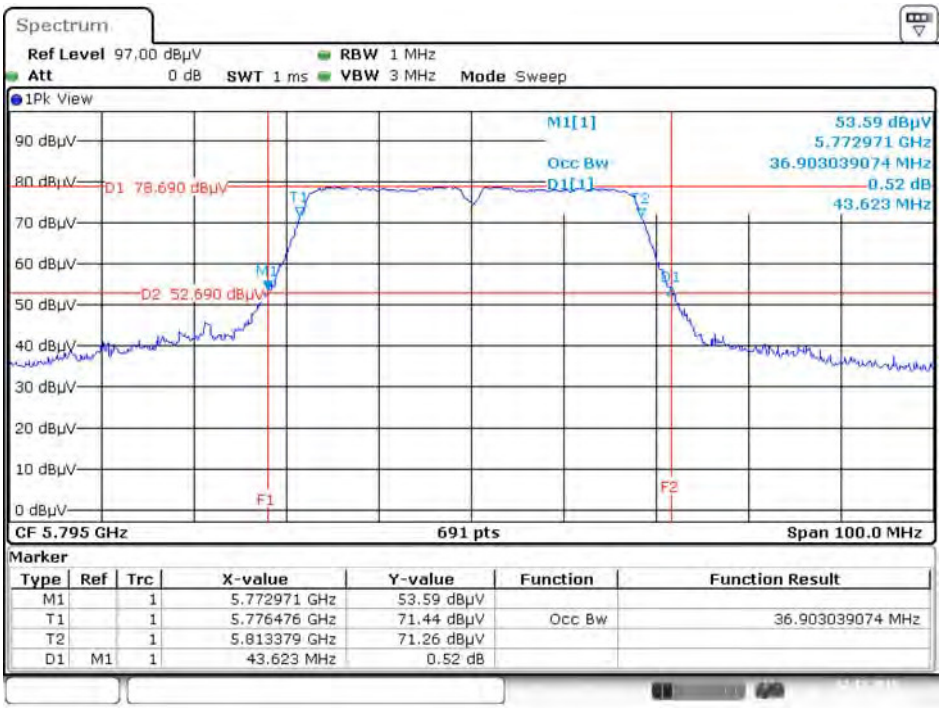
Date: 2.DEC.2015 20:09:37

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



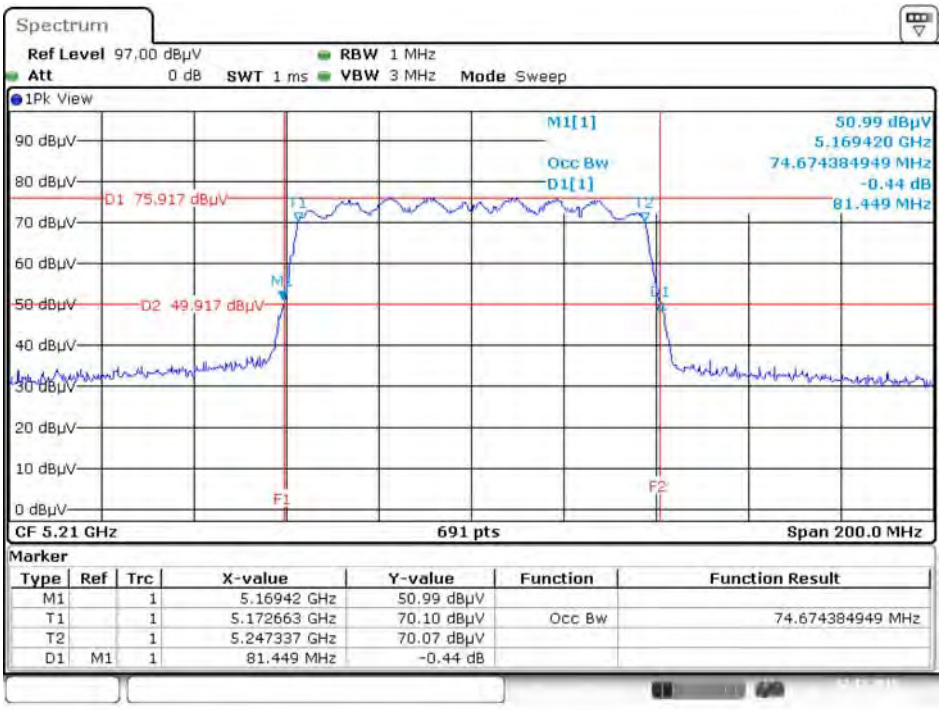
Date: 2.DEC.2015 20:11:02

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



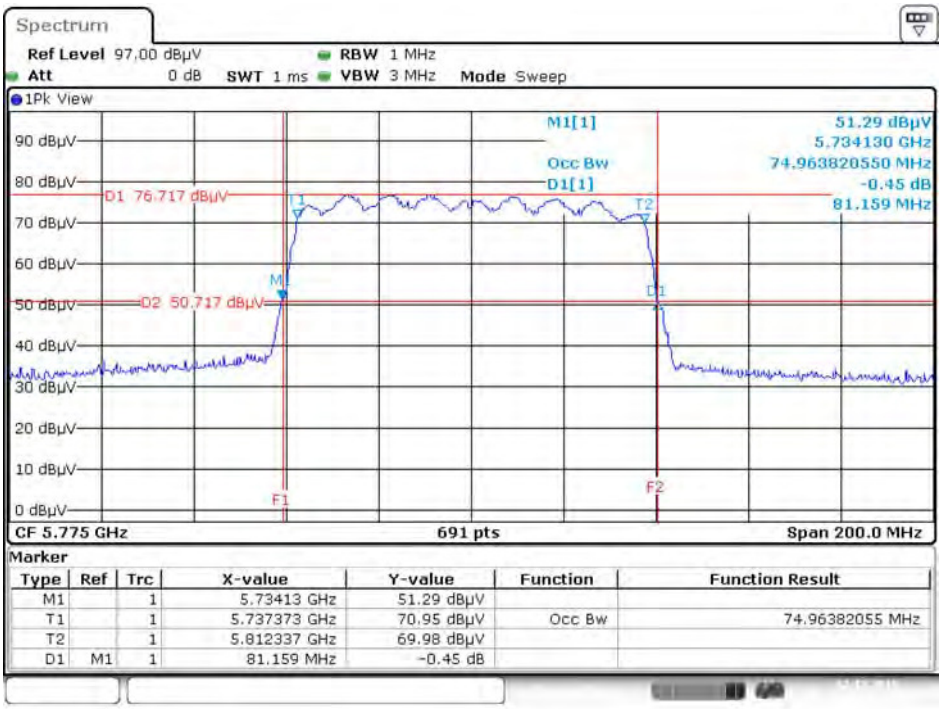
Date: 2.DEC.2015 20:12:01

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



Date: 2.DEC.2015 20:07:38

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



Date: 2.DEC.2015 20:06:49

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	100kHz
VBW	≥ 3 x 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	24°C	Humidity	60%
Test Engineer	Clemens Fang		

<For Non-Beamforming Mode>

Mode	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11a	5745 MHz	16.17	500	Complies
	5785 MHz	16.17	500	Complies
	5825 MHz	11.13	500	Complies

<For Beamforming Mode>

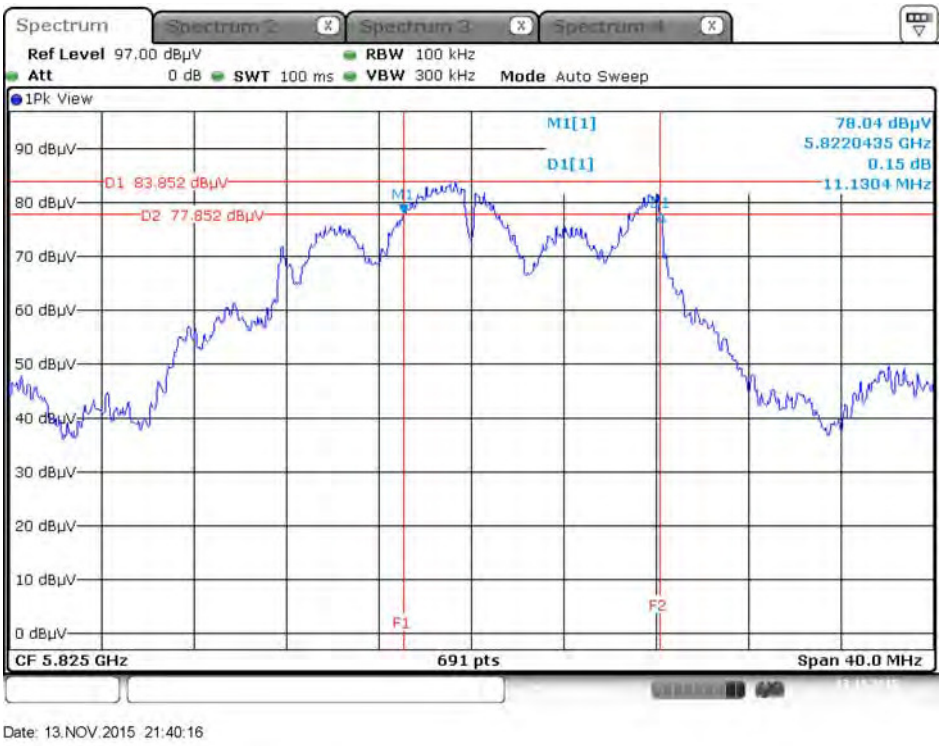
Mode	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11ac MCS0/Nss1 VHT20	5745 MHz	17.62	500	Complies
	5785 MHz	17.74	500	Complies
	5825 MHz	17.62	500	Complies
802.11ac MCS0/Nss1 VHT40	5755 MHz	36.52	500	Complies
	5795 MHz	36.52	500	Complies
802.11ac MCS0/Nss1 VHT80	5775 MHz	74.49	500	Complies

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

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

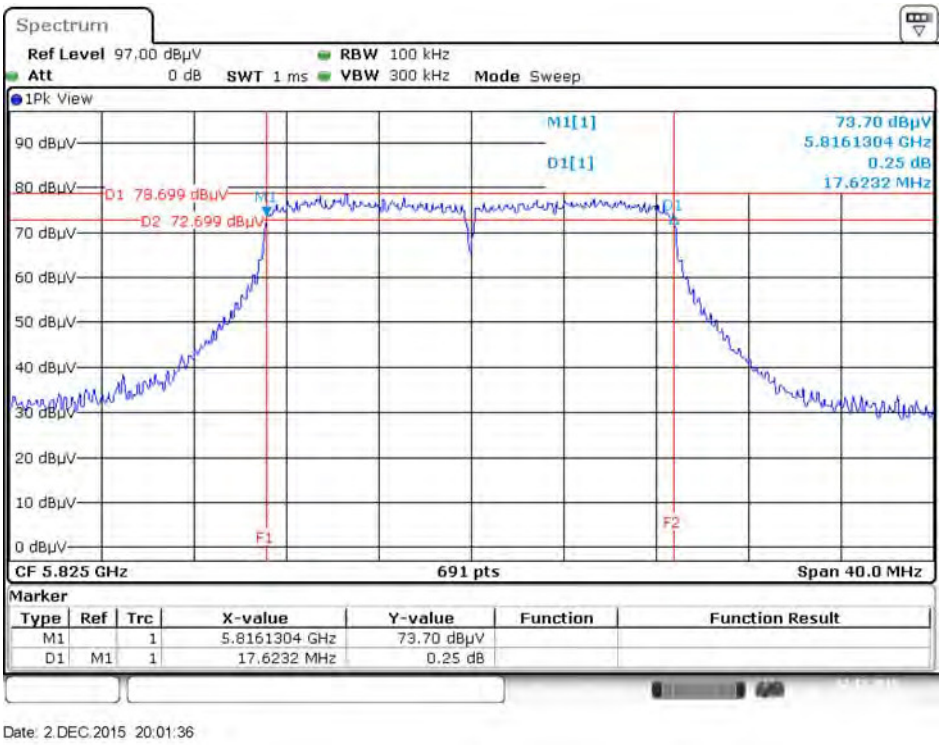
<For Non-Beamforming Mode>

6 dB Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3 / 5825 MHz



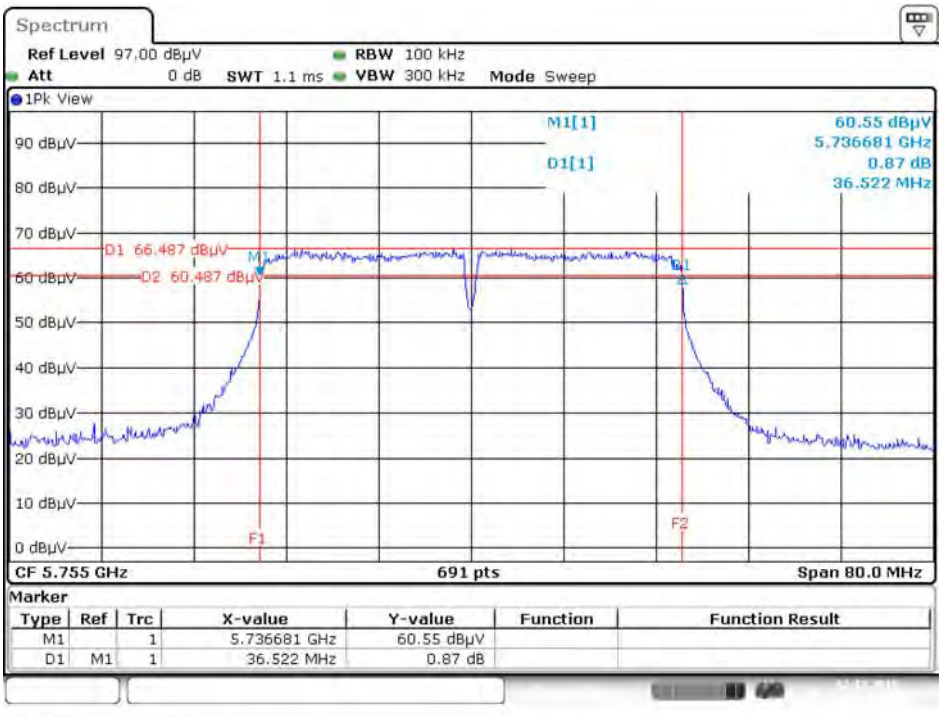
<For Beamforming Mode>

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



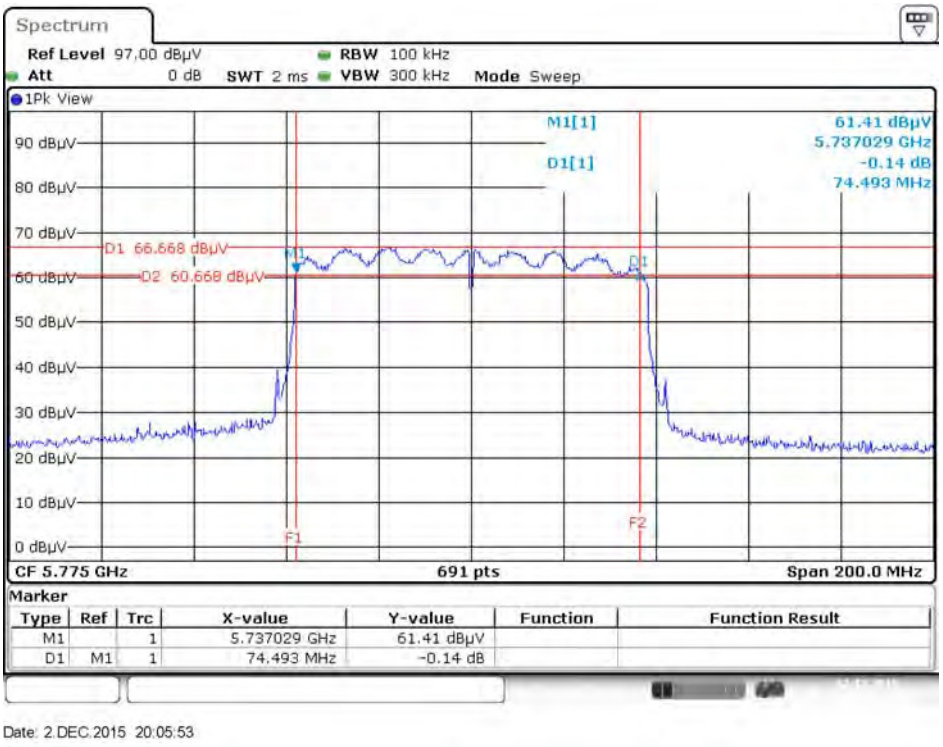
Date: 2.DEC.2015 20:01:36

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 / 5755MHz



Date: 2.DEC.2015 20:03:00

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



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

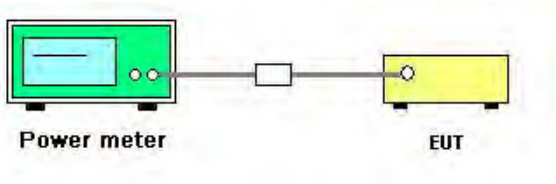
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

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	24°C	Humidity	60%
Test Engineer	Clemens Fang	Test Date	Nov. 13, 2015 ~ Dec. 02, 2015

<For Non-Beamforming Mode>

Mode	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
802.11a	5180 MHz	23.76	23.64	23.65	28.45	30.00	Complies
	5200 MHz	23.65	23.68	23.48	28.38	30.00	Complies
	5240 MHz	23.46	23.76	23.69	28.41	30.00	Complies
	5745 MHz	23.66	23.71	23.78	28.49	30.00	Complies
	5785 MHz	24.57	24.62	24.77	29.43	30.00	Complies
	5825 MHz	23.01	22.74	23.04	27.70	30.00	Complies

<For Beamforming Mode>

Mode	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
802.11ac MCS0/Nss1 VHT20	5180 MHz	23.32	23.13	23.06	27.94	28.23	Complies
	5200 MHz	23.18	23.22	23.32	28.01	28.23	Complies
	5240 MHz	23.58	23.26	23.37	28.18	28.23	Complies
	5745 MHz	18.96	18.95	18.56	23.60	28.23	Complies
	5785 MHz	23.52	23.03	23.46	28.11	28.23	Complies
	5825 MHz	22.86	22.91	22.67	27.59	28.23	Complies
802.11ac MCS0/Nss1 VHT40	5190 MHz	19.12	19.03	19.58	24.02	28.23	Complies
	5230 MHz	23.25	22.89	23.58	28.02	28.23	Complies
	5755 MHz	17.13	17.53	17.29	22.09	28.23	Complies
	5795 MHz	23.22	23.77	23.21	28.18	28.23	Complies
802.11ac MCS0/Nss1 VHT80	5210 MHz	18.08	18.12	18.20	22.90	28.23	Complies
	5775 MHz	20.06	19.97	19.87	24.74	28.23	Complies

Note: $DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$ =7.7dBi, so limit = 30-(7.77-6)=28.23 dBm.

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

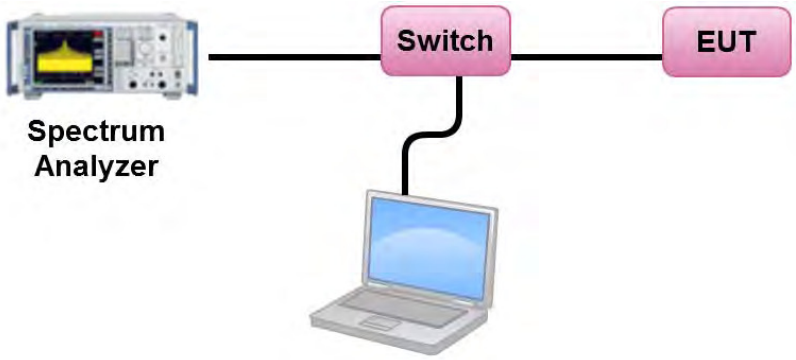
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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
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

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.
5. For 5.725~5.85 GHz, the measured result of PSD level must add 10log(500kHz/RBW) and the final result should ≤ 30 dBm.

4.5.4. Test Setup Layout



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	24°C	Humidity	60%
Test Engineer	Clemens Fang		

<For Non-Beamforming Mode>

Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	15.20	15.23	Complies
40	5200 MHz	15.15	15.23	Complies
48	5240 MHz	15.13	15.23	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =7.7dBi, so limit =17-(7.77-6)= 15.23 dBm/MHz.

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
149	5745 MHz	15.19	-3.01	12.18	28.23	Complies
157	5785 MHz	16.17	-3.01	13.16	28.23	Complies
165	5825 MHz	14.53	-3.01	11.52	28.23	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =7.7dBi, so limit =30-(7.77-6)= 28.23 dBm/500kHz.

<For Beamforming Mode>

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

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	14.64	15.23	Complies
40	5200 MHz	15.00	15.23	Complies
48	5240 MHz	15.07	15.23	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =7.7dBi, so limit =17-(7.77-6)= 15.23 dBm/MHz.

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
149	5745 MHz	10.54	-3.01	7.53	28.23	Complies
157	5785 MHz	14.92	-3.01	11.91	28.23	Complies
165	5825 MHz	14.38	-3.01	11.37	28.23	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =7.7dBi, so limit =30-(7.77-6)= 28.23 dBm/500kHz.

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

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
38	5190 MHz	7.88	15.23	Complies
46	5230 MHz	12.02	15.23	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =7.7dBi, so limit =17-(7.77-6)= 15.23 dBm/MHz.

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
151	5755 MHz	5.84	-3.01	2.83	28.23	Complies
159	5795 MHz	11.91	-3.01	8.90	28.23	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =7.7dBi, so limit =30-(7.77-6)= 28.23 dBm/500kHz.

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

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
42	5210 MHz	3.73	15.23	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =7.7dBi, so limit =17-(7.77-6)= 15.23 dBm/MHz.

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
155	5775 MHz	5.64	-3.01	2.63	28.23	Complies

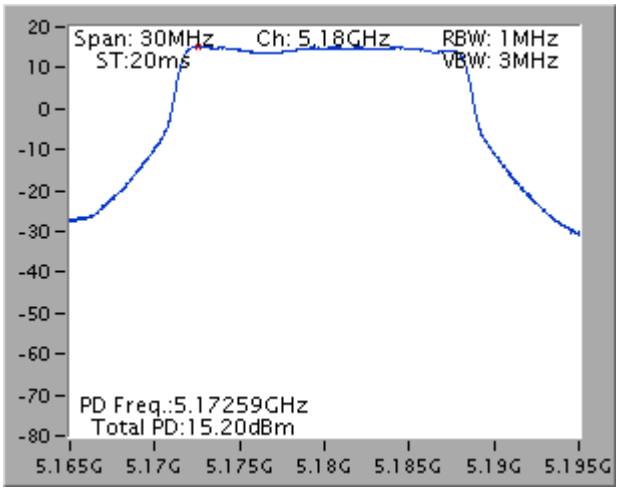
Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =7.7dBi, so limit =30-(7.77-6)= 28.23 dBm/500kHz.

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

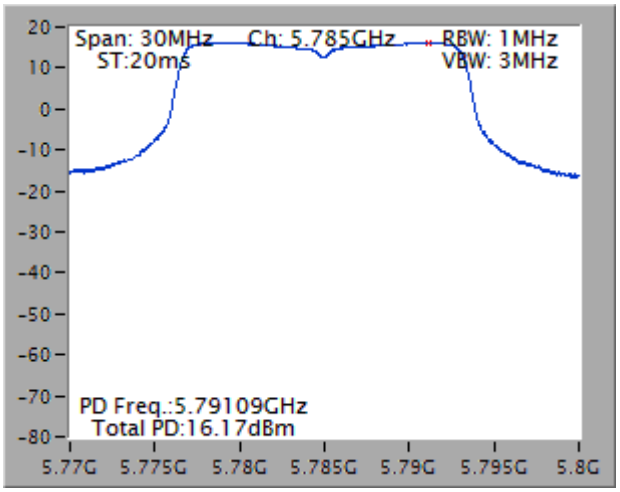
For plots, only the channel with worse result was shown.

<For Non-Beamforming Mode>

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

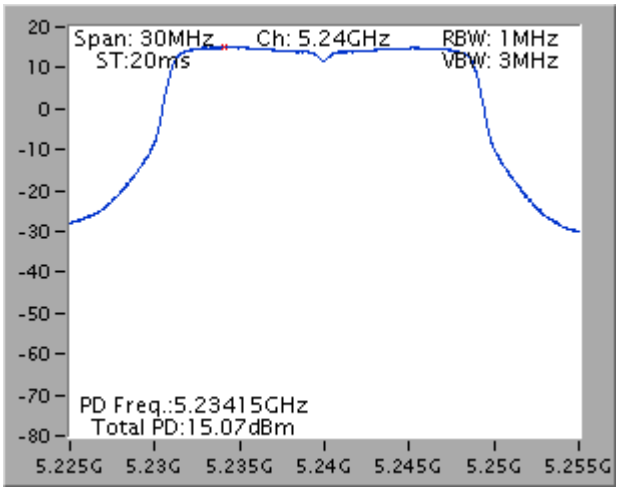


Power Density Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3 / 5785 MHz

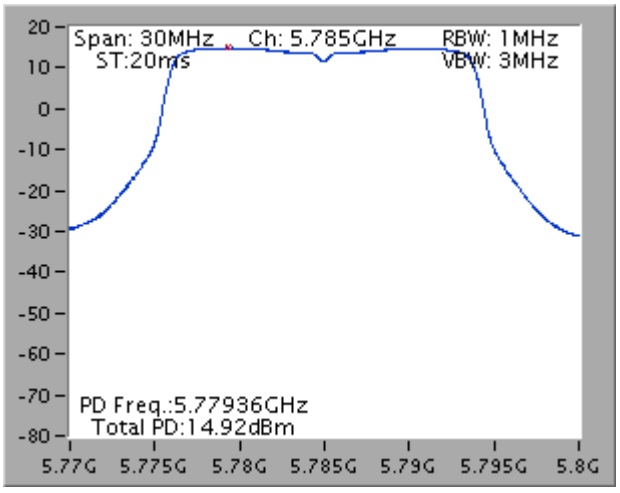


<For Beamforming Mode>

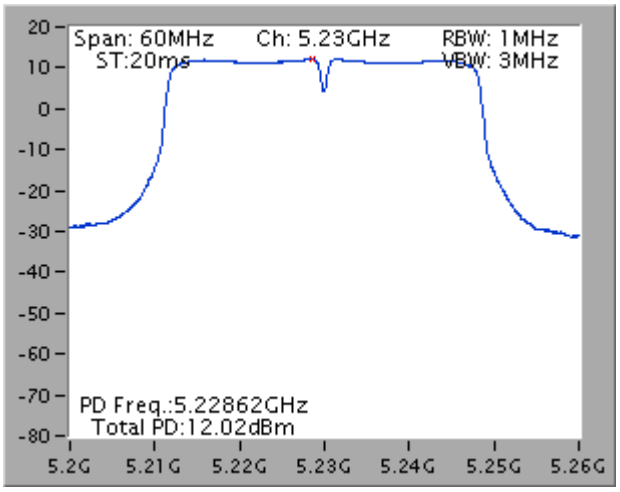
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 / 5240 MHz



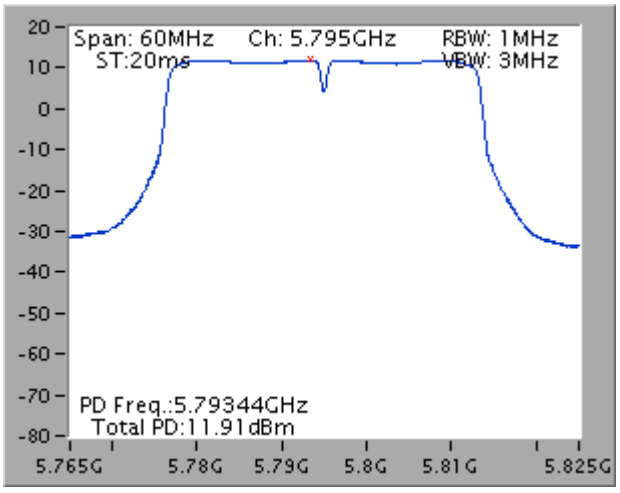
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 / 5785 MHz



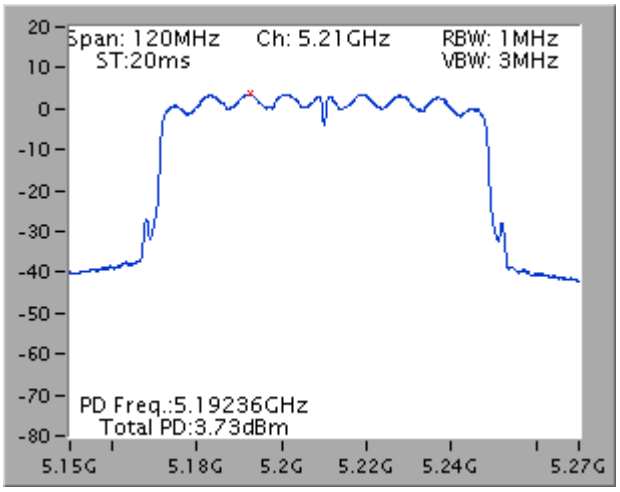
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 / 5230 MHz



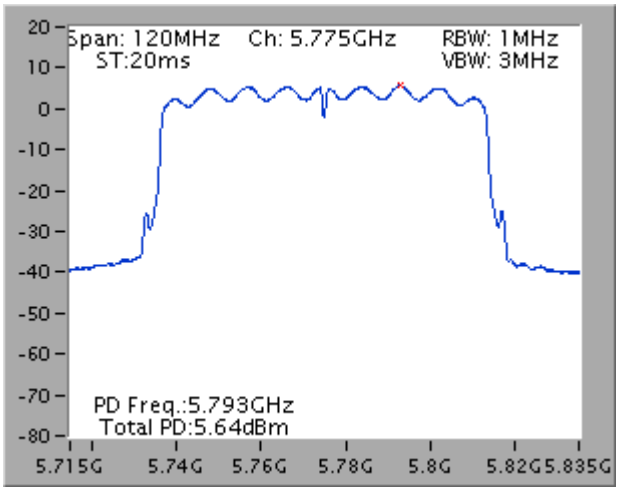
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 / 5795 MHz



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



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

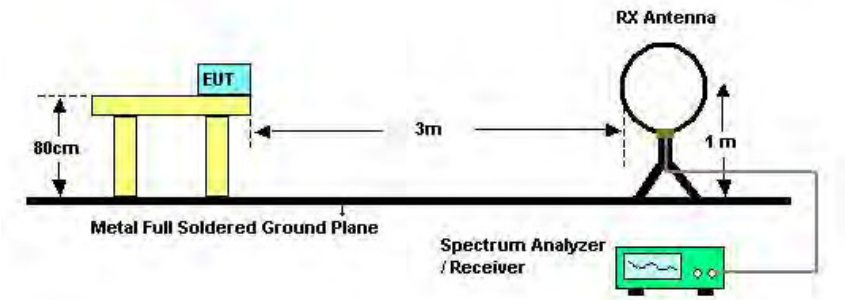
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.6.3. Test Procedures

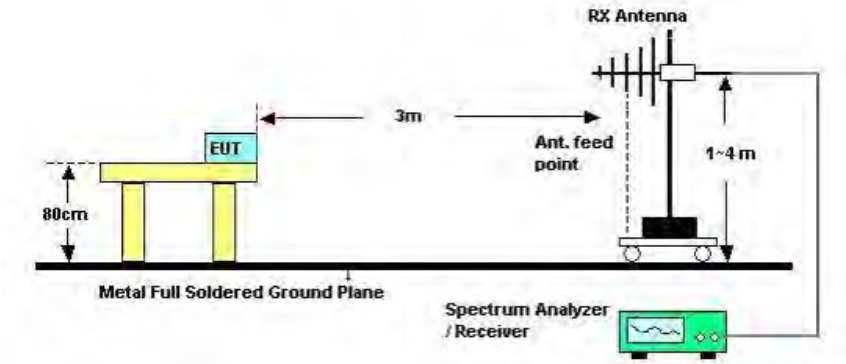
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 1/T VBW for average reading in spectrum analyzer.
7. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
8. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
9. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.6.4. Test Setup Layout

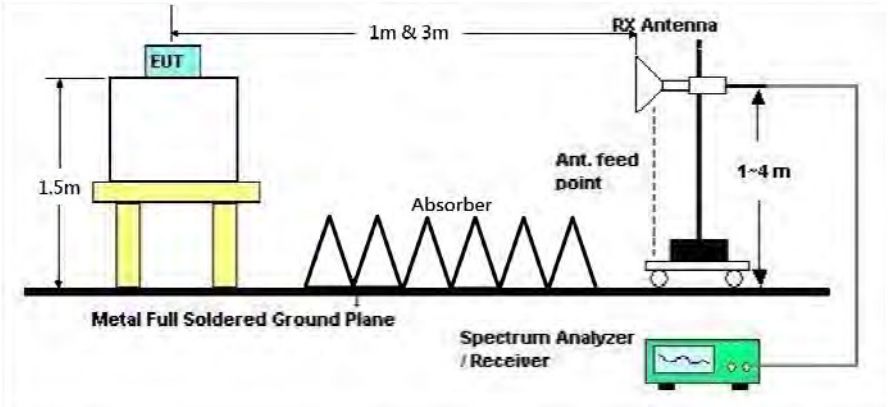
For Radiated Emissions: 9kHz ~30MHz



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

<For Non-Beamforming Mode>

The EUT was programmed to be in continuously transmitting mode.

<For Beamforming Mode>

The EUT was programmed to be in beamforming transmitting mode.

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

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	Normal Link
Test Date	Sep. 18, 2015 ~ Sep. 19, 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.

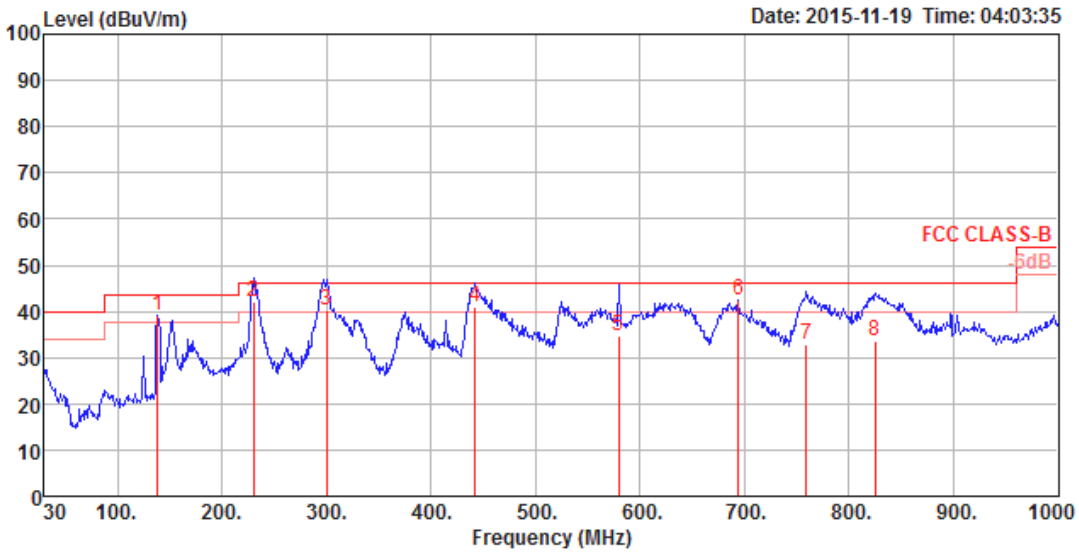
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

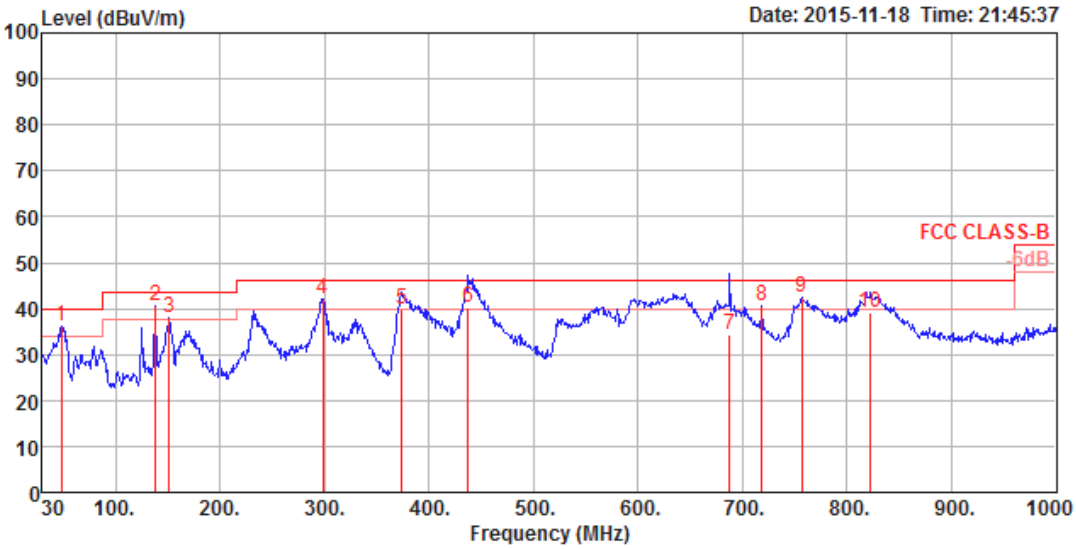
Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	Normal Link

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	138.64	39.28	43.50	-4.22	58.47	1.01	12.16	32.36	125	151	Peak	HORIZONTAL
2	229.82	42.07	46.00	-3.93	61.78	1.30	11.30	32.31	150	158	QP	HORIZONTAL
3	299.66	40.05	46.00	-5.95	56.97	1.48	13.88	32.28	175	239	QP	HORIZONTAL
4	442.25	41.05	46.00	-4.95	54.36	1.82	17.21	32.34	100	4	QP	HORIZONTAL
5	579.99	34.58	46.00	-11.42	45.84	2.09	19.05	32.40	175	164	QP	HORIZONTAL
6	694.45	42.51	46.00	-3.49	52.83	2.26	19.78	32.36	175	221	Peak	HORIZONTAL
7	759.44	32.78	46.00	-13.22	42.19	2.39	20.49	32.29	125	221	QP	HORIZONTAL
8	825.40	33.44	46.00	-12.56	42.02	2.49	21.05	32.12	125	218	QP	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	48.43	36.15	40.00	-3.85	58.19	0.61	9.76	32.41	125	246	Peak	VERTICAL
2	138.64	40.48	43.50	-3.02	59.67	1.01	12.16	32.36	125	83	Peak	VERTICAL
3	151.25	38.16	43.50	-5.34	58.22	1.05	11.24	32.35	100	71	Peak	VERTICAL
4	298.69	42.15	46.00	-3.85	59.10	1.47	13.86	32.28	175	156	Peak	VERTICAL
5	374.35	39.97	46.00	-6.03	54.62	1.67	16.00	32.32	175	204	QP	VERTICAL
6	437.40	40.19	46.00	-5.81	53.57	1.81	17.15	32.34	125	187	QP	VERTICAL
7	687.66	34.47	46.00	-11.53	44.84	2.25	19.75	32.37	150	321	QP	VERTICAL
8	718.70	40.49	46.00	-5.51	50.48	2.31	20.04	32.34	150	80	Peak	VERTICAL
9	756.53	42.44	46.00	-3.56	51.91	2.38	20.44	32.29	125	335	Peak	VERTICAL
10	822.49	39.03	46.00	-6.97	47.64	2.49	21.02	32.12	125	335	QP	VERTICAL

Note:

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

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

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

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

<For Non-Beamforming Mode>

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11a CH 36 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 07, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15539.75	45.60	54.00	-8.40	28.71	13.84	38.25	35.20	Average	150	12	HORIZONTAL
2	15542.46	57.26	74.00	-16.74	40.37	13.84	38.25	35.20	Peak	150	12	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	15537.58	57.44	74.00	-16.56	40.55	13.84	38.25	35.20	Peak	150	173	VERTICAL
2	15539.72	46.75	54.00	-7.25	29.86	13.84	38.25	35.20	Average	150	173	VERTICAL

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11a CH 40 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 07, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15598.03	54.41	74.00	-19.59	37.64	13.83	38.16	35.22	Peak	150	31	HORIZONTAL
2	15601.27	45.74	54.00	-8.26	28.99	13.83	38.16	35.24	Average	150	31	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	15597.75	59.70	74.00	-14.30	42.93	13.83	38.16	35.22	Peak	150	186	VERTICAL
2	15600.83	46.51	54.00	-7.49	29.76	13.83	38.16	35.24	Average	150	186	VERTICAL

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11a CH 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 07, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15719.67	44.91	54.00	-9.09	28.38	13.82	37.99	35.28	Average	150	42	HORIZONTAL
2	15719.93	51.24	74.00	-22.76	34.71	13.82	37.99	35.28	Peak	150	42	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	15719.50	46.05	54.00	-7.95	29.52	13.82	37.99	35.28	Average	150	187	VERTICAL
2	15719.73	57.26	74.00	-16.74	40.73	13.82	37.99	35.28	Peak	150	187	VERTICAL

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11a CH 149 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 07, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11487.66	40.82	54.00	-13.18	26.28	10.26	39.08	34.80	Average	150	19	HORIZONTAL
2	11490.03	53.49	74.00	-20.51	38.95	10.26	39.08	34.80	Peak	150	19	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	11488.40	54.73	74.00	-19.27	40.19	10.26	39.08	34.80	Peak	150	201	VERTICAL
2	11490.91	42.25	54.00	-11.75	27.71	10.26	39.08	34.80	Average	150	201	VERTICAL

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11a CH 157 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 07, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11568.81	52.57	74.00	-21.43	37.95	10.29	39.14	34.81	Peak	150	63	HORIZONTAL
2	11569.96	41.28	54.00	-12.72	26.67	10.29	39.14	34.82	Average	150	63	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	11570.08	54.77	74.00	-19.23	40.16	10.29	39.14	34.82	Peak	150	211	VERTICAL
2	11570.57	42.31	54.00	-11.69	27.70	10.29	39.14	34.82	Average	150	211	VERTICAL

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11a CH 165 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 07, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11648.63	41.14	54.00	-12.86	26.47	10.33	39.18	34.84	Average	150	163	HORIZONTAL
2	11650.83	54.58	74.00	-19.42	39.90	10.33	39.19	34.84	Peak	150	163	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11648.10	52.85	74.00	-21.15	38.18	10.33	39.18	34.84	Peak	150	163	VERTICAL
2	11651.29	42.15	54.00	-11.85	27.47	10.33	39.19	34.84	Average	150	163	VERTICAL

<For Beamforming Mode>

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 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	15541.14	63.01	74.00	-10.99	46.92	13.19	35.35	38.25	HORIZONTAL	33	150	Peak
2	15542.15	49.11	54.00	-4.89	33.02	13.19	35.35	38.25	HORIZONTAL	33	150	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	15538.35	62.41	74.00	-11.59	46.32	13.19	35.35	38.25	VERTICAL	18	150	Peak
2	15540.87	49.12	54.00	-4.88	33.03	13.19	35.35	38.25	VERTICAL	18	150	Average

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 40 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	PreampFactor	AntennaFactor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	15599.16	62.33	74.00	-11.67	46.29	13.21	35.36	38.19	HORIZONTAL	70	150	Peak
2	15600.60	49.06	54.00	-4.94	33.05	13.23	35.36	38.14	HORIZONTAL	70	150	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	PreampFactor	AntennaFactor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	15598.12	62.52	74.00	-11.48	46.48	13.21	35.36	38.19	VERTICAL	55	150	Peak
2	15600.45	49.14	54.00	-4.86	33.13	13.23	35.36	38.14	VERTICAL	55	150	Average

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 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	15718.34	61.65	74.00	-12.35	45.74	13.26	35.38	38.03	HORIZONTAL	85	150	Peak
2	15719.64	48.71	54.00	-5.29	32.80	13.26	35.38	38.03	HORIZONTAL	85	150	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	15719.62	48.73	54.00	-5.27	32.82	13.26	35.38	38.03	VERTICAL	78	150	Average
2	15720.04	62.08	74.00	-11.92	46.17	13.26	35.38	38.03	VERTICAL	78	150	Peak

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 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	11489.29	47.40	54.00	-6.60	30.91	11.72	35.23	40.00	HORIZONTAL	109	150	Average
2	11489.97	60.80	74.00	-13.20	44.31	11.72	35.23	40.00	HORIZONTAL	109	150	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	11489.29	47.54	54.00	-6.46	31.05	11.72	35.23	40.00	VERTICAL	93	150	Average
2	11489.34	60.33	74.00	-13.67	43.84	11.72	35.23	40.00	VERTICAL	93	150	Peak

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 157 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 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	11569.77	60.45	74.00	-13.55	44.06	11.75	35.23	39.87	HORIZONTAL	125	150	Peak
2	11572.33	47.05	54.00	-6.95	30.66	11.75	35.23	39.87	HORIZONTAL	125	150	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	11567.62	47.14	54.00	-6.86	30.75	11.75	35.23	39.87	VERTICAL	115	150	Average
2	11567.74	60.35	74.00	-13.65	43.96	11.75	35.23	39.87	VERTICAL	115	150	Peak

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 165 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 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	11649.84	60.77	74.00	-13.23	44.48	11.78	35.22	39.73	HORIZONTAL	141	150	Peak
2	11650.26	47.23	54.00	-6.77	30.94	11.78	35.22	39.73	HORIZONTAL	141	150	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	11647.89	60.56	74.00	-13.44	44.27	11.78	35.22	39.73	VERTICAL	134	150	Peak
2	11651.16	47.02	54.00	-6.98	30.77	11.80	35.22	39.67	VERTICAL	134	150	Average

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 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	15570.31	62.66	74.00	-11.34	46.62	13.21	35.36	38.19	HORIZONTAL	156	150	Peak
2	15571.10	49.36	54.00	-4.64	33.32	13.21	35.36	38.19	HORIZONTAL	156	150	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	15568.25	49.28	54.00	-4.72	33.24	13.21	35.36	38.19	VERTICAL	147	150	Average
2	15570.64	62.89	74.00	-11.11	46.85	13.21	35.36	38.19	VERTICAL	147	150	Peak

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 46 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 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	15688.07	62.06	74.00	-11.94	46.10	13.25	35.37	38.08	HORIZONTAL	173	150	Peak
2	15691.21	48.91	54.00	-5.09	32.99	13.26	35.37	38.03	HORIZONTAL	173	150	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	15689.74	48.99	54.00	-5.01	33.03	13.25	35.37	38.08	VERTICAL	164	150	Average
2	15690.49	62.64	74.00	-11.36	46.68	13.25	35.37	38.08	VERTICAL	164	150	Peak

Temperature	26℃	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	PreampFactor	AntennaFactor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	11509.14	60.69	74.00	-13.31	44.20	11.72	35.23	40.00	HORIZONTAL	192	150	Peak
2	11509.49	47.42	54.00	-6.58	30.93	11.72	35.23	40.00	HORIZONTAL	192	150	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	PreampFactor	AntennaFactor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	11508.40	61.21	74.00	-12.79	44.72	11.72	35.23	40.00	VERTICAL	184	150	Peak
2	11509.10	47.39	54.00	-6.61	30.90	11.72	35.23	40.00	VERTICAL	184	150	Average

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 159 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 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	11587.85	47.20	54.00	-6.80	30.85	11.77	35.22	39.80	HORIZONTAL	215	150	Average
2	11591.87	60.50	74.00	-13.50	44.15	11.77	35.22	39.80	HORIZONTAL	215	150	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	11589.43	47.19	54.00	-6.81	30.84	11.77	35.22	39.80	VERTICAL	206	150	Average
2	11590.94	60.42	74.00	-13.58	44.07	11.77	35.22	39.80	VERTICAL	206	150	Peak

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 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	15627.61	62.18	74.00	-11.82	46.17	13.23	35.36	38.14	HORIZONTAL	234	150	Peak
2	15629.77	49.29	54.00	-4.71	33.28	13.23	35.36	38.14	HORIZONTAL	234	150	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	15630.16	49.30	54.00	-4.70	33.29	13.23	35.36	38.14	VERTICAL	228	150	Average
2	15632.28	62.81	74.00	-11.19	46.80	13.23	35.36	38.14	VERTICAL	228	150	Peak

Temperature	26℃	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 155 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 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	11548.61	60.73	74.00	-13.27	44.29	11.74	35.23	39.93	HORIZONTAL	308	150	Peak
2	11549.85	47.48	54.00	-6.52	31.04	11.74	35.23	39.93	HORIZONTAL	308	150	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	11549.38	47.55	54.00	-6.45	31.11	11.74	35.23	39.93	VERTICAL	284	150	Average
2	11551.85	61.20	74.00	-12.80	44.81	11.75	35.23	39.87	VERTICAL	284	150	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.

4.7. 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.

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

<For Non-Beamforming Mode>

The EUT was programmed to be in continuously transmitting mode.

<For Beamforming Mode>

The EUT was programmed to be in beamforming transmitting mode.

4.7.7. Test Result of Band Edge and Fundamental Emissions

<For Non-Beamforming Mode>

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11a CH 36, 40, 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 07, 2015		

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	5146.80	69.22	74.00	-4.78	63.54	6.64	34.04	35.00	Peak	235	333	VERTICAL
2	5150.00	53.84	54.00	-0.16	48.16	6.64	34.04	35.00	Average	235	333	VERTICAL
3	5182.00	109.45			103.69	6.67	34.09	35.00	Average	235	333	VERTICAL
4	5182.40	119.03			113.27	6.67	34.09	35.00	Peak	235	333	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	5147.60	70.46	74.00	-3.54	64.78	6.64	34.04	35.00	Peak	223	336	VERTICAL
2	5148.80	53.97	54.00	-0.03	48.29	6.64	34.04	35.00	Average	223	336	VERTICAL
3	5194.00	113.17			107.36	6.69	34.12	35.00	Average	223	336	VERTICAL
4	5204.00	122.65			116.84	6.69	34.12	35.00	Peak	223	336	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	5120.00	47.67	54.00	-6.33	42.07	6.61	33.99	35.00	Average	229	335	VERTICAL
2	5147.60	60.36	74.00	-13.64	54.68	6.64	34.04	35.00	Peak	229	335	VERTICAL
3	5236.40	113.33			107.44	6.72	34.17	35.00	Average	229	335	VERTICAL
4	5237.00	123.73			117.84	6.72	34.17	35.00	Peak	229	335	VERTICAL
5	5350.00	46.88	54.00	-7.12	40.69	6.83	34.36	35.00	Average	229	335	VERTICAL
6	5388.20	60.00	74.00	-14.00	53.72	6.86	34.41	34.99	Peak	229	335	VERTICAL

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

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11a CH 149, 157, 165 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 07, 2015		

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	5707.40	68.08	68.20	-0.12	61.42	7.05	34.64	35.03	Peak	206	291	VERTICAL
2	5725.00	76.66	78.20	-1.54	70.04	7.01	34.64	35.03	Peak	206	291	VERTICAL
3	5738.20	108.48			101.90	6.97	34.65	35.04	Average	206	291	VERTICAL
4	5738.20	118.45			111.87	6.97	34.65	35.04	Peak	206	291	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	5696.20	61.29	68.20	-6.91	54.63	7.05	34.64	35.03	Peak	191	274	VERTICAL
2	5723.80	62.19	78.20	-16.01	55.57	7.01	34.64	35.03	Peak	191	274	VERTICAL
3	5785.60	108.89			102.42	6.86	34.66	35.05	Average	191	274	VERTICAL
4	5785.60	118.42			111.95	6.86	34.66	35.05	Peak	191	274	VERTICAL
5	5854.60	62.15	78.20	-16.05	55.69	6.85	34.67	35.06	Peak	191	274	VERTICAL
6	5924.20	60.47	68.20	-7.73	54.02	6.84	34.69	35.08	Peak	191	274	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	5818.40	107.98			101.52	6.86	34.66	35.06	Average	210	292	VERTICAL
2	5818.40	117.76			111.30	6.86	34.66	35.06	Peak	210	292	VERTICAL
3	5850.00	73.40	78.20	-4.80	66.94	6.85	34.67	35.06	Peak	210	292	VERTICAL
4	5860.00	68.18	68.20	-0.02	61.73	6.85	34.67	35.07	Peak	210	292	VERTICAL

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

<For Beamforming Mode>

Temperature	26℃	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36, 40, 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 30, 2015		

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	5149.60	71.04	74.00	-2.96	64.68	7.78	32.94	31.52	VERTICAL	119	191	Peak
2	5150.00	53.76	54.00	-0.24	47.40	7.78	32.94	31.52	VERTICAL	119	191	Average
3	5184.80	118.85			112.46	7.78	32.94	31.55	VERTICAL	119	191	Peak
4	5186.80	106.76			100.36	7.78	32.94	31.56	VERTICAL	119	191	Average

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

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	5149.60	70.42	74.00	-3.58	64.06	7.78	32.94	31.52	VERTICAL	68	144	Peak
2	5150.00	53.70	54.00	-0.30	47.34	7.78	32.94	31.52	VERTICAL	68	144	Average
3	5196.40	120.50			114.10	7.78	32.94	31.56	VERTICAL	68	144	Peak
4	5204.80	109.38			102.97	7.78	32.94	31.57	VERTICAL	68	144	Average

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	5146.40	59.08	74.00	-14.92	52.72	7.78	32.94	31.52	VERTICAL	114	172	Peak
2	5150.00	47.15	54.00	-6.85	40.79	7.78	32.94	31.52	VERTICAL	114	172	Average
3	5245.40	107.80			101.36	7.78	32.93	31.59	VERTICAL	114	172	Average
4	5245.40	119.34			112.90	7.78	32.93	31.59	VERTICAL	114	172	Peak
5	5350.00	45.85	54.00	-8.15	39.33	7.77	32.93	31.68	VERTICAL	114	172	Average
6	5350.00	58.08	74.00	-15.92	51.56	7.77	32.93	31.68	VERTICAL	114	172	Peak

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

Temperature	26℃	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149, 157, 165 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 2015		

Channel 149

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	PreampFactor	AntennaFactor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	5714.00	67.67	68.20	-0.53	60.59	8.02	33.00	32.06	VERTICAL	300	203	Peak
2	5724.40	77.81	78.20	-0.39	70.69	8.04	33.00	32.08	VERTICAL	300	203	Peak
3	5750.20	114.98			107.84	8.06	33.02	32.10	VERTICAL	300	203	Peak
4	5750.80	103.10			95.96	8.06	33.02	32.10	VERTICAL	300	203	Average

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

Channel 157

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	PreampFactor	AntennaFactor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	5714.60	63.06	68.20	-5.14	55.98	8.02	33.00	32.06	VERTICAL	300	176	Peak
2	5723.40	62.17	78.20	-16.03	55.05	8.04	33.00	32.08	VERTICAL	300	176	Peak
3	5779.00	106.70			99.49	8.10	33.03	32.14	VERTICAL	300	176	Average
4	5789.80	118.53			111.28	8.12	33.03	32.16	VERTICAL	300	176	Peak
5	5853.40	63.32	78.20	-14.88	55.97	8.18	33.05	32.22	VERTICAL	300	176	Peak
6	5865.40	61.89	68.20	-6.31	54.52	8.19	33.06	32.24	VERTICAL	300	176	Peak

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

Channel 165

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	PreampFactor	AntennaFactor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	5829.80	118.49			111.18	8.16	33.05	32.20	VERTICAL	299	208	Peak
2	5831.60	106.26			98.95	8.16	33.05	32.20	VERTICAL	299	208	Average
3	5850.20	77.81	78.20	-0.39	70.46	8.18	33.05	32.22	VERTICAL	299	208	Peak
4	5860.00	52.38	54.00	-1.62	45.01	8.19	33.06	32.24	VERTICAL	299	208	Average
5	5862.80	70.98	74.00	-3.02	63.61	8.19	33.06	32.24	VERTICAL	299	208	Peak

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

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38, 46 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 2015		

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	5149.60	69.09	74.00	-4.91	62.73	7.78	32.94	31.52	VERTICAL	186	241	Peak
2	5150.00	53.95	54.00	-0.05	47.59	7.78	32.94	31.52	VERTICAL	186	241	Average
3	5176.00	99.71			93.32	7.78	32.94	31.55	VERTICAL	186	241	Average
4	5176.00	111.89			105.50	7.78	32.94	31.55	VERTICAL	186	241	Peak

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

Channel 46

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	5144.80	69.65	74.00	-4.35	63.29	7.78	32.94	31.52	VERTICAL	287	222	Peak
2	5150.00	53.71	54.00	-0.29	47.35	7.78	32.94	31.52	VERTICAL	287	222	Average
3	5215.00	104.40			97.99	7.78	32.94	31.57	VERTICAL	287	222	Average
4	5215.60	116.16			109.75	7.78	32.94	31.57	VERTICAL	287	222	Peak

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

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151, 159 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 2015		

Channel 151

	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	5714.60	68.37	74.00	-5.63	61.29	8.02	33.00	32.06	VERTICAL	190	226	Peak
2	5715.00	53.69	54.00	-0.31	46.61	8.02	33.00	32.06	VERTICAL	190	226	Average
3	5725.00	72.12	78.20	-6.08	65.00	8.04	33.00	32.08	VERTICAL	190	226	Peak
4	5740.20	98.80			91.65	8.06	33.01	32.10	VERTICAL	190	226	Average
5	5744.20	112.46			105.31	8.06	33.01	32.10	VERTICAL	190	226	Peak

Item 4, 5 are the fundamental frequency at 5755 MHz.

Channel 159

	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	5714.00	67.06	74.00	-6.94	59.98	8.02	33.00	32.06	VERTICAL	189	309	Peak
2	5715.00	49.93	54.00	-4.07	42.85	8.02	33.00	32.06	VERTICAL	189	309	Average
3	5721.80	71.06	78.20	-7.14	63.98	8.02	33.00	32.06	VERTICAL	189	309	Peak
4	5778.20	117.75			110.54	8.10	33.03	32.14	VERTICAL	189	309	Peak
5	5780.60	103.74			96.53	8.10	33.03	32.14	VERTICAL	189	309	Average
6	5854.40	73.26	78.20	-4.94	65.91	8.18	33.05	32.22	VERTICAL	189	309	Peak
7	5860.00	53.76	54.00	-0.24	46.39	8.19	33.06	32.24	VERTICAL	189	309	Average
8	5867.60	68.12	74.00	-5.88	60.75	8.19	33.06	32.24	VERTICAL	189	309	Peak

Item 4, 5 are the fundamental frequency at 5795 MHz.

Temperature	26°C	Humidity	56%
Test Engineer	Steven Liang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42, 155 / Chain 1 + Chain 2 + Chain 3
Test Date	Dec. 01, 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	5147.00	66.65	74.00	-7.35	60.29	7.78	32.94	31.52	VERTICAL	97	100	Peak
2	5149.00	53.96	54.00	-0.04	47.60	7.78	32.94	31.52	VERTICAL	97	100	Average
3	5183.00	96.72			90.33	7.78	32.94	31.55	VERTICAL	97	100	Average
4	5183.00	108.35			101.96	7.78	32.94	31.55	VERTICAL	97	100	Peak
5	5420.00	46.60	54.00	-7.40	39.99	7.79	32.92	31.74	VERTICAL	97	100	Average
6	5420.00	60.52	74.00	-13.48	53.91	7.79	32.92	31.74	VERTICAL	97	100	Peak

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

Channel 155

	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	5711.00	68.04	68.20	-0.16	60.96	8.02	33.00	32.06	VERTICAL	98	184	Peak
2	5724.00	71.35	78.20	-6.85	64.23	8.04	33.00	32.08	VERTICAL	98	184	Peak
3	5766.00	96.51			89.34	8.08	33.03	32.12	VERTICAL	98	184	Average
4	5786.00	108.83			101.62	8.10	33.03	32.14	VERTICAL	98	184	Peak
5	5855.00	64.70	78.20	-13.50	57.35	8.18	33.05	32.22	VERTICAL	98	184	Peak
6	5863.00	62.69	68.20	-5.51	55.32	8.19	33.06	32.24	VERTICAL	98	184	Peak

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

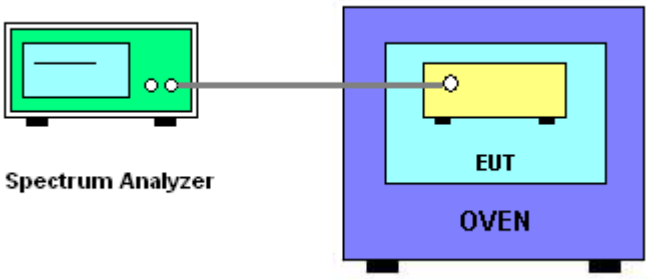
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
7. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
8. Extreme temperature is 0°C~40°C.

4.8.4. 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	24°C	Humidity	60%
Test Engineer	Clemens Fang	Test Date	Nov. 13, 2015 ~ Dec. 02, 2015

Mode: 20 MHz / Chain 1

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5200 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5199.9444	5199.9435	5199.9406	5199.9397
110.00	5199.9428	5199.9435	5199.9406	5199.9398
93.50	5199.9428	5199.9428	5199.9406	5199.9402
Max. Deviation (MHz)	**0.0572**	**0.0572**	**0.0594**	**0.0603**
Max. Deviation (ppm)	**11.00**	**11.00**	**11.42**	**11.60**
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5200 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5199.9426	5199.9420	5199.9398	5199.9406
10	5199.9426	5199.9418	5199.9398	5199.9406
20	5199.9422	5199.9406	5199.9392	5199.9410
30	5199.9420	5199.9406	5199.9392	5199.9410
40	5199.9420	5199.9406	5199.9420	5199.9402
Max. Deviation (MHz)	**0.0580**	**0.0594**	**0.0608**	**0.0598**
Max. Deviation (ppm)	**11.15**	**11.42**	**11.69**	**11.50**
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5785 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5785.0022	5784.9979	5784.9974	5784.9968
110.00	5785.0000	5784.9976	5784.9970	5784.9964
93.50	5784.9886	5784.9966	5784.9958	5784.9955
Max. Deviation (MHz)	**0.0114**	**0.0034**	**0.0042**	**0.0045**
Max. Deviation (ppm)	**1.97**	**0.59**	**0.73**	**0.78**
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5785 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5784.9854	5784.9882	5784.9854	5784.9882
10	5784.9989	5784.9886	5784.9826	5784.9882
20	5784.9579	5784.9577	5784.9562	5784.9854
30	5784.9588	5784.9587	5784.9504	5784.9882
40	5784.9514	5784.9514	5784.9432	5784.9882
Max. Deviation (MHz)	**0.0486**	**0.0486**	**0.0568**	**0.0146**
Max. Deviation (ppm)	**8.41**	**8.41**	**9.82**	**2.52**
Result	Complies			

Mode: 40 MHz / Chain 1

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5190 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5189.9422	5189.9408	5189.9390	5189.9369
110.00	5189.9410	5189.9397	5189.9381	5189.9362
93.50	5189.9396	5189.9385	5189.9373	5189.9351
Max. Deviation (MHz)	**0.0604**	**0.0615**	**0.0627**	**0.0649**
Max. Deviation (ppm)	**11.65**	**11.86**	**12.09**	**12.51**
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5190 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5189.9435	5189.9423	5189.9404	5189.9382
10	5189.9422	5189.9409	5189.9394	5189.9376
20	5189.9410	5189.9397	5189.9381	5189.9362
30	5189.9396	5189.9385	5189.9371	5189.9355
40	5189.9380	5189.9365	5189.9349	5189.9329
Max. Deviation (MHz)	**0.0637**	**0.0649**	**0.0664**	**0.0691**
Max. Deviation (ppm)	**12.28**	**12.51**	**12.80**	**13.32**
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5755 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5754.9352	5754.9338	5754.9320	5754.9299
110.00	5754.9340	5754.9327	5754.9311	5754.9292
93.50	5754.9326	5754.9315	5754.9303	5754.9281
Max. Deviation (MHz)	**0.0674**	**0.0685**	**0.0697**	**0.0719**
Max. Deviation (ppm)	**11.71**	**11.90**	**12.11**	**12.49**
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5755 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5754.9365	5754.9353	5754.9334	5754.9312
10	5754.9352	5754.9339	5754.9324	5754.9306
20	5754.9340	5754.9327	5754.9311	5754.9292
30	5754.9326	5754.9315	5754.9301	5754.9285
40	5754.9310	5754.9295	5754.9279	5754.9259
Max. Deviation (MHz)	**0.0707**	**0.0719**	**0.0734**	**0.0761**
Max. Deviation (ppm)	**12.28**	**12.49**	**12.75**	**13.22**
Result	Complies			

Mode: 80 MHz / Chain 1

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5210 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5209.9413	5209.9399	5209.9381	5209.9360
110.00	5209.9401	5209.9388	5209.9372	5209.9353
93.50	5209.9387	5209.9376	5209.9364	5209.9342
Max. Deviation (MHz)	**0.0613**	**0.0624**	**0.0636**	**0.0658**
Max. Deviation (ppm)	**11.77**	**11.98**	**12.21**	**12.63**
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5210 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5209.9426	5209.9414	5209.9395	5209.9373
10	5209.9413	5209.9400	5209.9385	5209.9367
20	5209.9401	5209.9388	5209.9372	5209.9353
30	5209.9387	5209.9376	5209.9362	5209.9346
40	5209.9371	5209.9356	5209.9340	5209.9320
Max. Deviation (MHz)	**0.0646**	**0.0658**	**0.0673**	**0.0700**
Max. Deviation (ppm)	**12.40**	**12.63**	**12.92**	**13.44**
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5775 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5774.9352	5774.9338	5774.9320	5774.9299
110.00	5774.9340	5774.9327	5774.9311	5774.9292
93.50	5774.9326	5774.9315	5774.9303	5774.9281
Max. Deviation (MHz)	**0.0674**	**0.0685**	**0.0697**	**0.0719**
Max. Deviation (ppm)	**11.67**	**11.86**	**12.07**	**12.45**
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5775 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5774.9365	5774.9353	5774.9334	5774.9312
10	5774.9352	5774.9339	5774.9324	5774.9306
20	5774.9340	5774.9327	5774.9311	5774.9292
30	5774.9326	5774.9315	5774.9301	5774.9285
40	5774.9310	5774.9295	5774.9279	5774.9259
Max. Deviation (MHz)	**0.0707**	**0.0719**	**0.0734**	**0.0761**
Max. Deviation (ppm)	**12.24**	**12.45**	**12.71**	**13.18**
Result	Complies			

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. 22, 2015	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 02, 2014	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 02, 2014	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	Dec. 03, 2014	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	37880	20MHz ~ 2GHz	Sep 03, 2015	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 12, 2015*	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 22, 2015	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 21, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Feb. 24, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 12, 2015	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Feb.10, 2015	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Oct. 27, 2015	Radiation (03CH01-CB)
EMI Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8.4GHz	Jan. 21, 2015	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz ~ 1 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-17	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-1	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-2	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
Spectrum 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. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-7	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-6	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 02, 2015	Conducted (TH01-CB)

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

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

N.C.R means Non-Calibration required.

6. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.7 dB	Confidence levels of 95%