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FCC RADIO TEST REPORT

Applicant's company	Abocom Systems, Inc.
Applicant Address	No.77, Yu-Yih Rd., Chu-Nan, Miao-Lih County 35059, Taiwan R.O.C.
FCC ID	MQ4AM7221
Manufacturer's company	Abocom Systems, Inc.
Manufacturer Address	No.77, Yu-Yih Rd., Chu-Nan, Miao-Lih County 35059, Taiwan R.O.C.

Product Name	2T2R 802.11b/g/n/ac Module
Brand Name	AboCom
Model No.	AM7221
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250 MHz / 5725 ~ 5850 MHz
Received Date	Feb. 04, 2015
Final Test Date	Mar. 10, 2015
Submission Type	Original Equipment

Statement

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

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

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

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



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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR520229AB	Rev. 01	Initial issue of report.	Mar. 17, 2015
FR520229AB	Rev. 02	Revising the close-up view of test photo.	Mar. 18, 2015

1. VERIFICATION OF COMPLIANCE

Product Name : 2T2R 802.11b/g/n/ac Module
Brand Name : AboCom
Model No. : AM7221
Applicant : Abocom Systems, Inc.
Test Rule Part(s) : 47 CFR FCC Part 15 Subpart E § 15.407

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Feb. 04, 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	14.99 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	1.88 dB
4.5	15.407(a)	Power Spectral Density	Complies	0.75 dB
4.6	15.407(b)	Radiated Emissions	Complies	3.97 dB
4.7	15.407(b)	Band Edge Emissions	Complies	0.04 dB
4.8	15.407(g)	Frequency Stability	Complies	-
4.9	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	IEEE 802.11a: WLAN (1TX, 1RX) IEEE 802.11n: WLAN (2TX, 2RX) IEEE 802.11ac: WLAN (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From host system
Modulation	IEEE 802.11a: OFDM IEEE 802.11n/ac: see the below table
Data Modulation	IEEE 802.11a/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) IEEE 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Data Rate (Mbps)	IEEE 802.11a: OFDM (6/9/12/18/24/36/48/54) IEEE 802.11n/ac: see the below table
Frequency Range	5150 ~ 5250 MHz / 5725 ~ 5850 MHz
Channel Number	9 for 20MHz bandwidth ; 4 for 40MHz bandwidth 2 for 80MHz bandwidth
Channel Band Width (99%)	Band 1: IEEE 802.11a: 24.48 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 26.88 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 52.20 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 75.20 MHz Band 4: IEEE 802.11a: 28.08 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 30.00 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 42.00 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 74.80 MHz

Maximum Conducted Output Power	Band 1: IEEE 802.11a: 20.28 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 22.11 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 22.12 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 16.20 dBm Band 4: IEEE 802.11a: 20.61 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 21.94 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 20.03 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 16.42 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Items	Description	
Communication Mode	☒ IP Based (Load Based)	☐ Frame Based
Beamforming Function	☐ With beamforming	☒ Without beamforming
Operating Mode	☐ Outdoor access point	
	☐ Indoor access point	
	☐ Fixed point-to-point access points	
	☒ Mobile and portable client devices	

Antenna and Band width

Antenna	Single (TX)			Two (TX)		
Band width Mode	20 MHz	40 MHz	80 MHz	20 MHz	40 MHz	80 MHz
IEEE 802.11a	V	X	X	X	X	X
IEEE 802.11n	X	X	X	V	V	X
IEEE 802.11ac	X	X	X	V	V	V

IEEE 11n/ac Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	2	MCS 0-15
802.11n (HT40)	2	MCS 0-15
802.11ac (VHT20)	2	MCS 0-9/Nss1-2
802.11ac (VHT40)	2	MCS 0-9/Nss1-2
802.11ac (VHT80)	2	MCS 0-9/Nss1-2

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

Then EUT 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

N/A

3.3. Table for Filed Antenna

Ant.	Brand	Model No.	Type	Connector	Gain (dBi)		
					2.4GHz	5GHz Band 1	5GHz Band 4
1	-	-	PCB	N/A	3.00	1.03	2.03
2	-	-	PCB	N/A	2.42	1.66	1.08

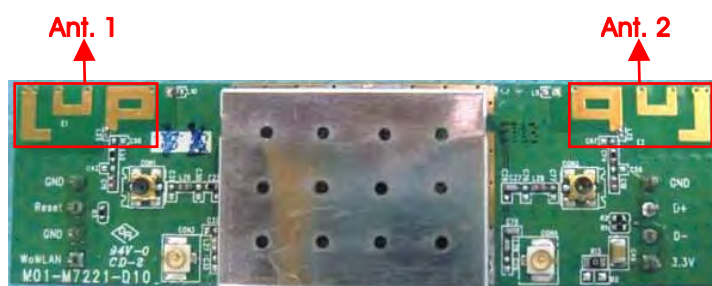
Note: The EUT has two antennas.

For IEEE 802.11a/b/g (1TX, 1RX):

Only Ant. 1 could transmit/receive simultaneously.

For IEEE 802.11n/ac (2TX, 2RX):

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



3.4. Table for Carrier Frequencies

There are three bandwidth systems.

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

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

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

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

3.5. Table for Test Modes

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

Test Items	Mode		Data Rate	Channel	Ant.
AC Power Conducted Emission	CTX		-	-	-
Max. Conducted Output Power	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	1+2
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	1+2
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	1+2
Power Spectral Density	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	1+2
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	1+2
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	1+2
26dB Spectrum Bandwidth & 99% Occupied Bandwidth Measurement	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	1+2
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	1+2
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	1+2
6dB Spectrum Bandwidth Measurement	11a/BPSK	Band 4	6Mbps	149/157/165	1
	11ac VHT20	Band 4	MCS0/Nss1	149/157/165	1+2
	11ac VHT40	Band 4	MCS0/Nss1	151/159	1+2
	11ac VHT80	Band 4	MCS0/Nss1	155	1+2
Radiated Emission Below 1GHz	CTX		-	-	-
Radiated Emission Above 1GHz	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157/165	1+2
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	1+2
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	1+2

Band Edge Emission	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/ 157/165	1
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/ 157/165	1+2
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	1+2
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	1+2
Frequency Stability	20 MHz	Band 1&4	-	40/157	1
	40 MHz	Band 1&4	-	38/151	1+2
	80 MHz	Band 1&4	-	42/155	1+2

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

The following test modes were performed for all tests:

For AC Power Line Conducted Emissions test:

Mode 1. EUT (5GHz WLAN function)

For Radiated Emission above 1GHz test:

Mode 1. Place EUT in X axis

Mode 2. Place EUT in Y axis

Mode 3. Place EUT in Z axis

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

For Radiated Emission below 1GHz test:

The EUT was performed at X axis, Y axis and Z axis position for Radiated emission above 1GHz test, and the worst case was found at X axis. So the measurement will follow this same test configuration.

Mode 1. Place EUT in X axis (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

Support Unit	Brand	Model	FCC ID
NB	DELL	E6400	DoC
Test fixture	AboCom	AM7221T-X10	N/A

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC
Test fixture	AboCom	AM7221T-X10	N/A

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E6220	DoC
Test fixture	AboCom	AM7221T-X10	N/A

3.8. Table for Parameters of Test Software Setting

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

Test Software Version	MT7662 QA V1.0.3.12					
Mode	Test Frequency (MHz)					
	NCB: 20MHz					
	5180 MHz	5200 MHz	5240 MHz	5745 MHz	5785 MHz	5825 MHz
802.11a	2C	2F	2F	1E	2F	27
802.11ac MCS0/Nss1 VHT20	2D/2D	2F/2F	2F/2F	1C/21	2F/2F	20/25
Mode	NCB: 40MHz					
802.11ac MCS0/Nss1 VHT40	5190 MHz		5230 MHz		5755 MHz	
	1E/1D		2F/2F		17/1C	
802.11ac MCS0/Nss1 VHT40	24/29					
	Mode	NCB: 80MHz				
802.11ac MCS0/Nss1 VHT80	5210 MHz			5775 MHz		
	18/18			1B/1B		

3.9. EUT Operation during Test

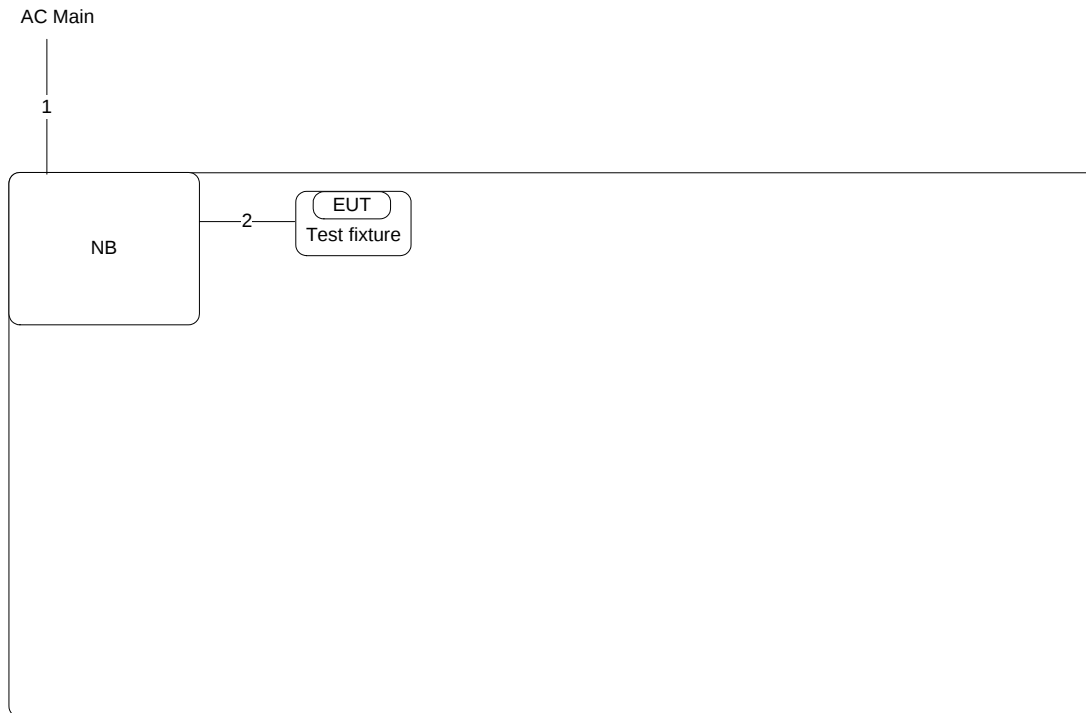
The EUT was programmed to be in continuously transmitting mode.

3.10. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	1.427	1.442	98.96	0.05	0.01
802.11ac MCS0/Nss1 VHT20	1.350	1.388	97.26	0.12	0.74
802.11ac MCS0/Nss1 VHT40	0.643	0.695	92.52	0.34	1.56
802.11ac MCS0/Nss1 VHT80	0.304	0.357	85.15	0.70	3.29

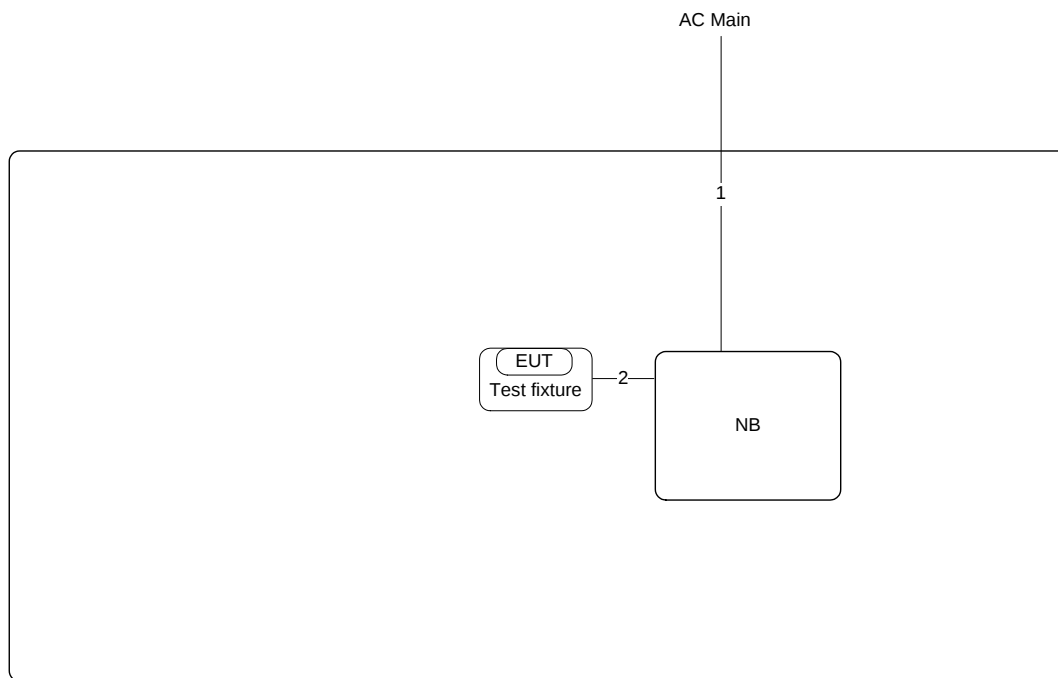
3.11. Test Configurations

3.11.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	USB cable	Yes	1.5m

3.11.2. Radiation Emissions Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	USB cable	Yes	1.5m

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

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

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

4.1.2. Measuring Instruments and Setting

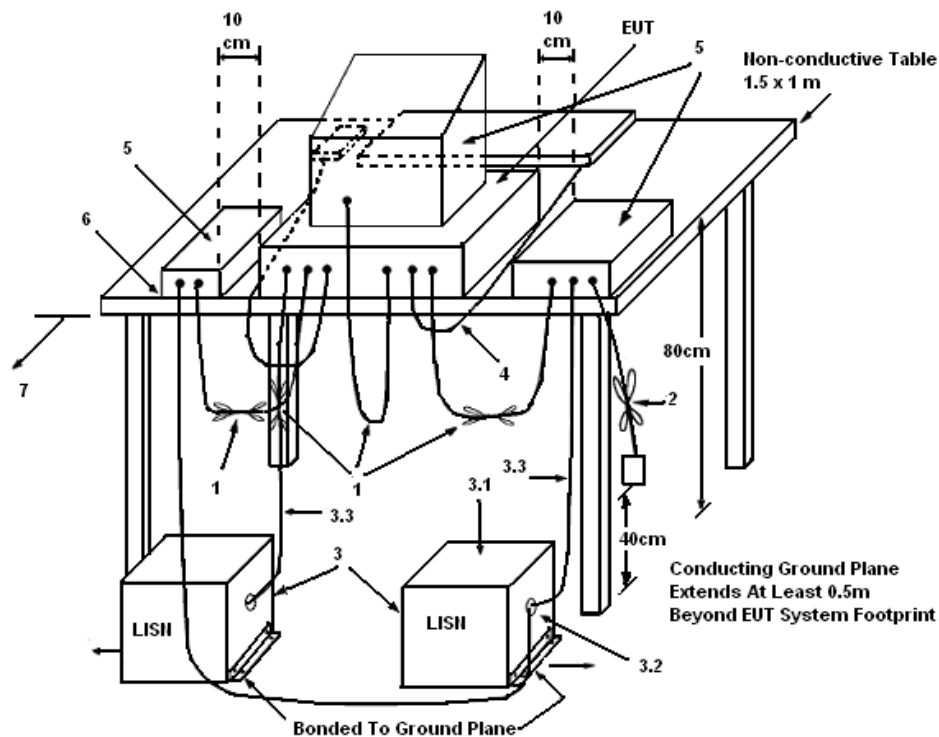
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

4.1.3. Test Procedures

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

4.1.4. Test Setup Layout



LEGEND:

- (1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- (2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- (3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω . LISN can be placed on top of, or immediately beneath, reference ground plane.
- (3.1) All other equipment powered from additional LISN(s).
- (3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
- (3.3) LISN at least 80 cm from nearest part of EUT chassis.
- (4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.
- (5) Non-EUT components of EUT system being tested.
- (6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.
- (7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

4.1.5. Test Deviation

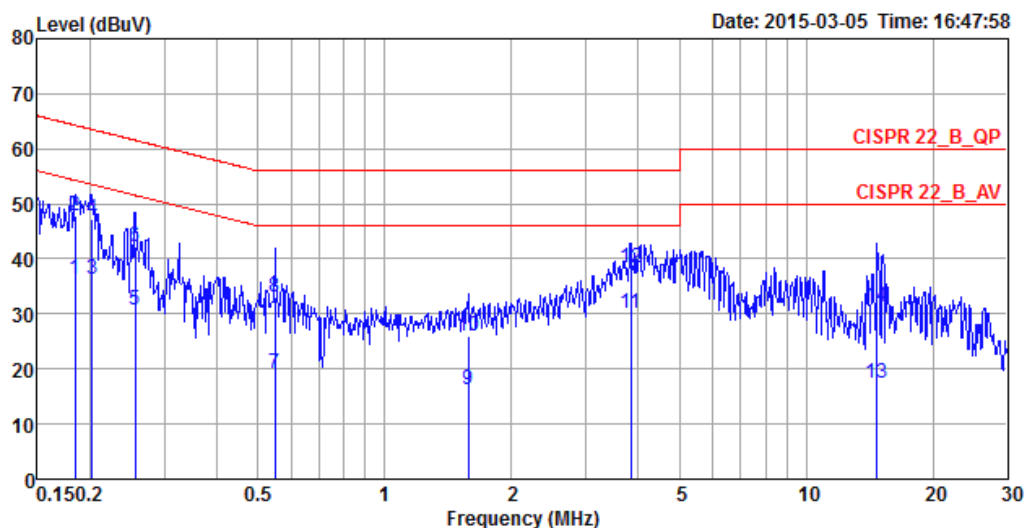
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

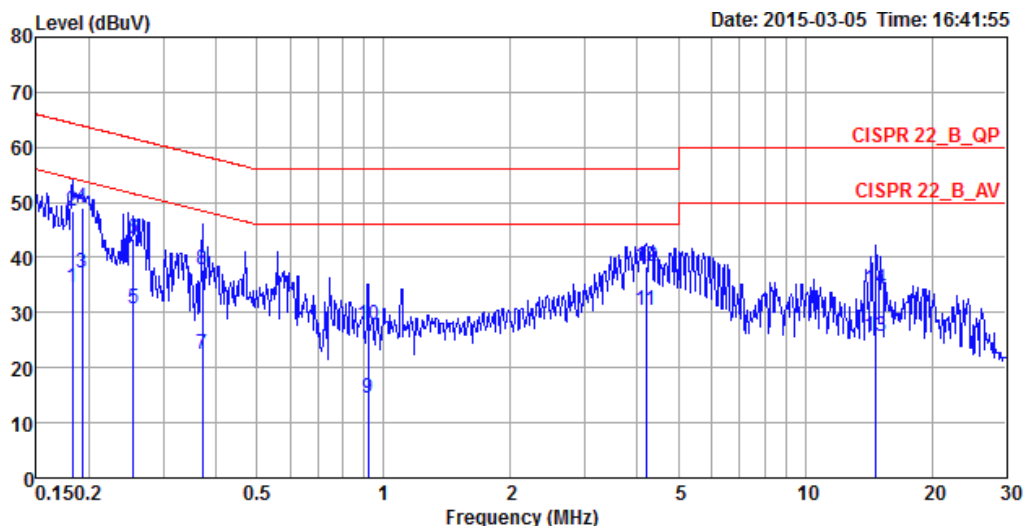
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	24°C	Humidity	56%
Test Engineer	Parody Lin	Phase	Line
Configuration	CTX	Test Mode	Mode 1



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.18	36.22	-18.06	54.28	25.95	10.03	0.24	LINE	Average
2	0.18	47.74	-16.54	64.28	37.47	10.03	0.24	LINE	QP
3	0.20	36.27	-17.27	53.54	25.99	10.03	0.25	LINE	Average
4 qp	0.20	47.26	-16.28	63.54	36.98	10.03	0.25	LINE	QP
5	0.26	30.60	-20.96	51.56	20.30	10.03	0.27	LINE	Average
6	0.26	42.32	-19.24	61.56	32.02	10.03	0.27	LINE	QP
7	0.55	19.29	-26.71	46.00	8.95	10.03	0.31	LINE	Average
8	0.55	32.99	-23.01	56.00	22.65	10.03	0.31	LINE	QP
9	1.58	16.12	-29.88	46.00	5.75	10.03	0.34	LINE	Average
10	1.58	26.11	-29.89	56.00	15.74	10.03	0.34	LINE	QP
11 pp	3.84	30.16	-15.84	46.00	19.76	10.03	0.37	LINE	Average
12	3.84	38.43	-17.57	56.00	28.03	10.03	0.37	LINE	QP
13	14.75	17.32	-32.68	50.00	6.76	10.13	0.43	LINE	Average
14	14.75	31.17	-28.83	60.00	20.61	10.13	0.43	LINE	QP

Temperature	24°C	Humidity	56%
Test Engineer	Parody Lin	Phase	Neutral
Configuration	CTX	Test Mode	Mode 1



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.18	34.42	-19.95	54.37	24.22	9.97	0.23	NEUTRAL	Average
2	0.18	48.33	-16.04	64.37	38.13	9.97	0.23	NEUTRAL	QP
3	0.19	37.06	-16.87	53.93	26.84	9.98	0.24	NEUTRAL	Average
4 pp	0.19	48.94	-14.99	63.93	38.72	9.98	0.24	NEUTRAL	QP
5	0.25	30.56	-21.04	51.60	20.34	9.95	0.27	NEUTRAL	Average
6	0.25	43.52	-18.08	61.60	33.30	9.95	0.27	NEUTRAL	QP
7	0.37	22.56	-25.91	48.47	12.38	9.89	0.29	NEUTRAL	Average
8	0.37	37.65	-20.82	58.47	27.47	9.89	0.29	NEUTRAL	QP
9	0.92	14.39	-31.61	46.00	4.17	9.89	0.33	NEUTRAL	Average
10	0.92	27.63	-28.37	56.00	17.41	9.89	0.33	NEUTRAL	QP
11 av	4.20	30.50	-15.50	46.00	20.24	9.89	0.37	NEUTRAL	Average
12	4.20	38.40	-17.60	56.00	28.14	9.89	0.37	NEUTRAL	QP
13	14.75	25.82	-24.18	50.00	15.41	9.98	0.43	NEUTRAL	Average
14	14.75	34.32	-25.68	60.00	23.91	9.98	0.43	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	$\geq 3 \times \text{RBW}$
Detector	Peak
Trace	Max Hold

4.2.3. Test Procedures

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

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

4.2.4. Test Setup Layout

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

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

4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

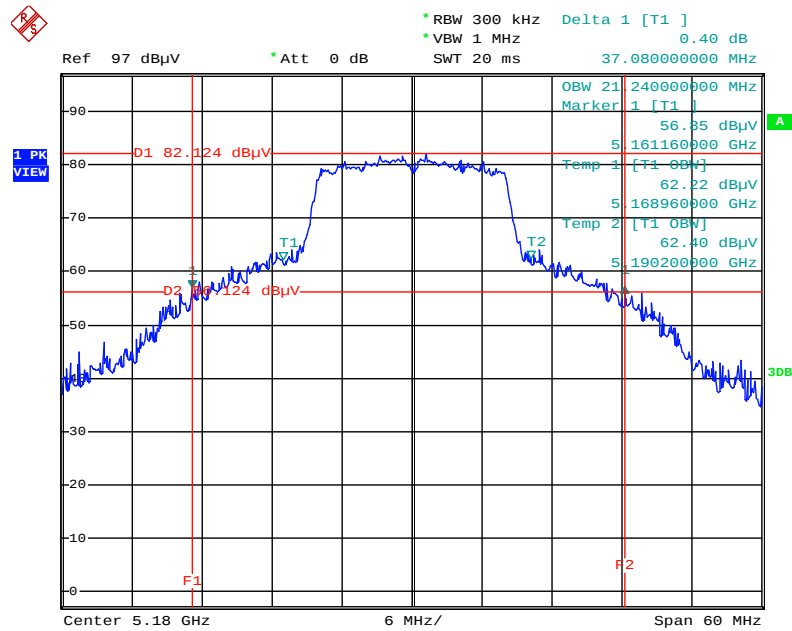
The EUT was programmed to be in continuously transmitting mode.

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

Temperature	20°C	Humidity	58%
Test Engineer	Clemens Fang		

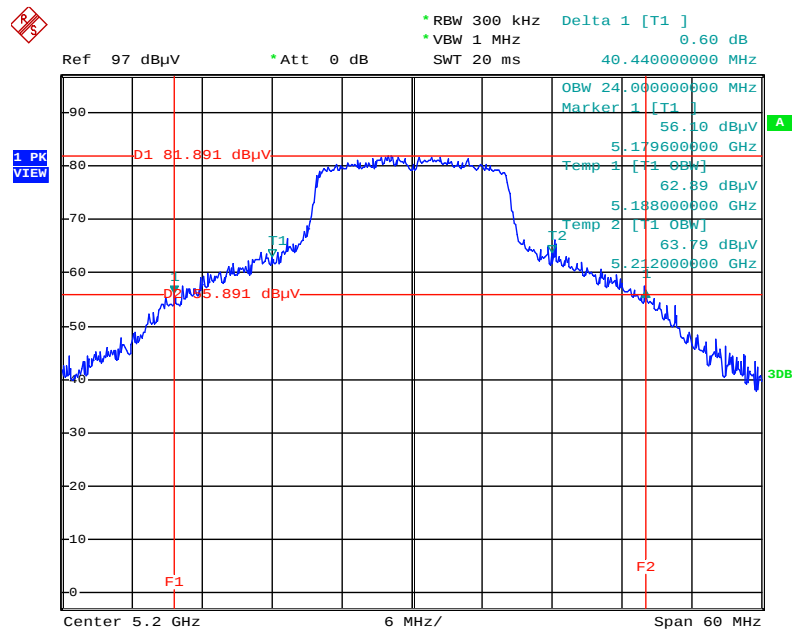
Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5180 MHz	37.08	21.24
	5200 MHz	40.44	24.00
	5240 MHz	40.56	24.48
	5745 MHz	19.92	16.92
	5785 MHz	42.96	28.08
	5825 MHz	35.52	19.08
802.11ac MCS0/Nss1 VHT20	5180 MHz	39.60	23.76
	5200 MHz	43.32	25.80
	5240 MHz	45.00	26.88
	5745 MHz	20.88	17.88
	5785 MHz	46.08	30.00
	5825 MHz	28.92	18.24
802.11ac MCS0/Nss1 VHT40	5190 MHz	42.00	36.60
	5230 MHz	92.60	52.20
	5755 MHz	42.00	36.80
	5795 MHz	85.40	42.00
802.11ac MCS0/Nss1 VHT80	5210 MHz	80.40	75.20
	5775 MHz	80.80	74.80

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



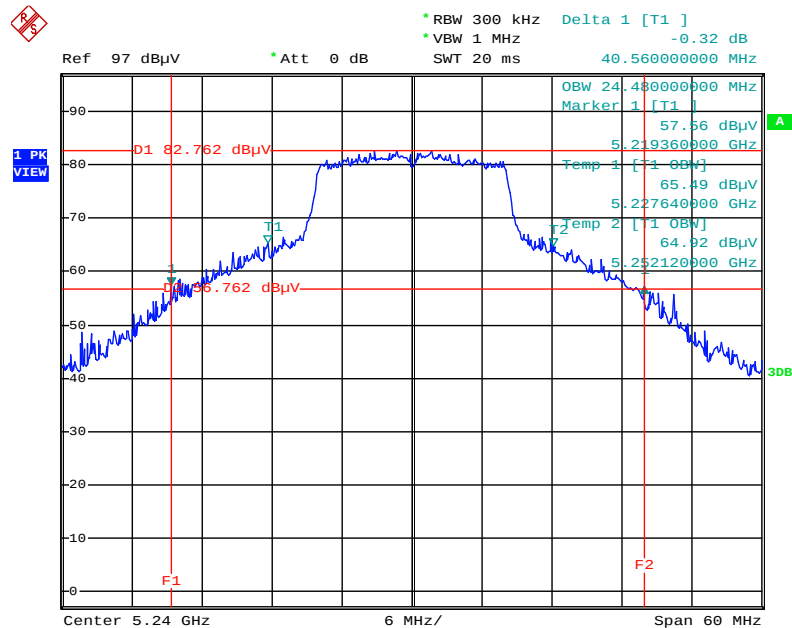
Date: 28.FEB.2015 00:46:05

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



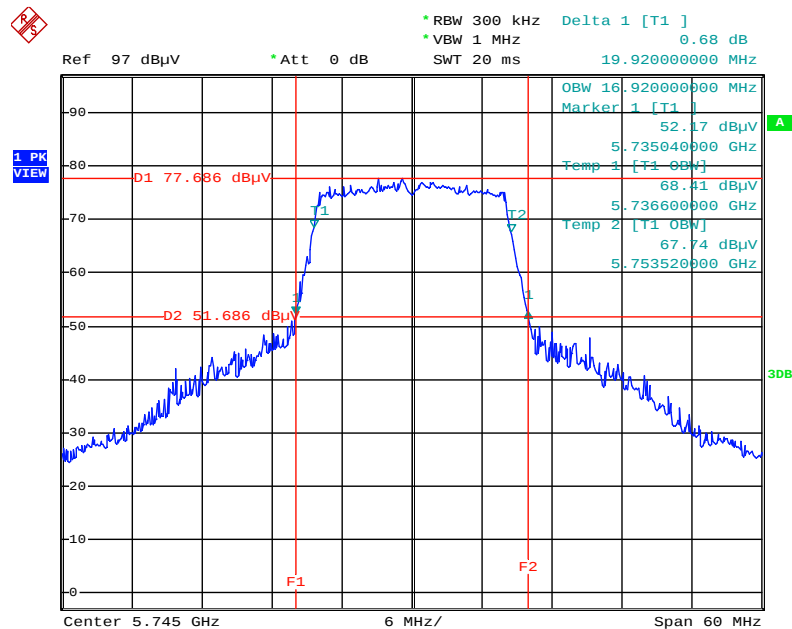
Date: 28.FEB.2015 00:47:06

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



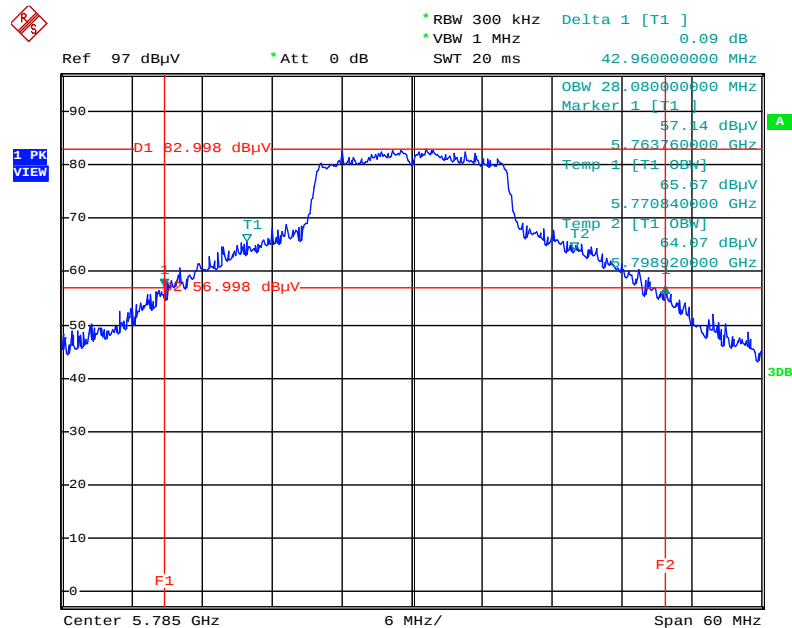
Date: 28.FEB.2015 00:47:51

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



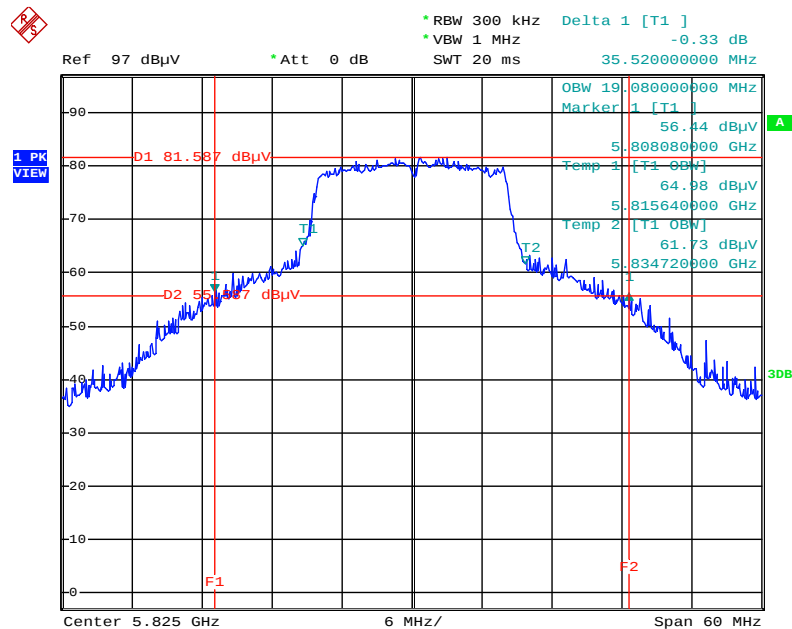
Date: 28.FEB.2015 00:50:55

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



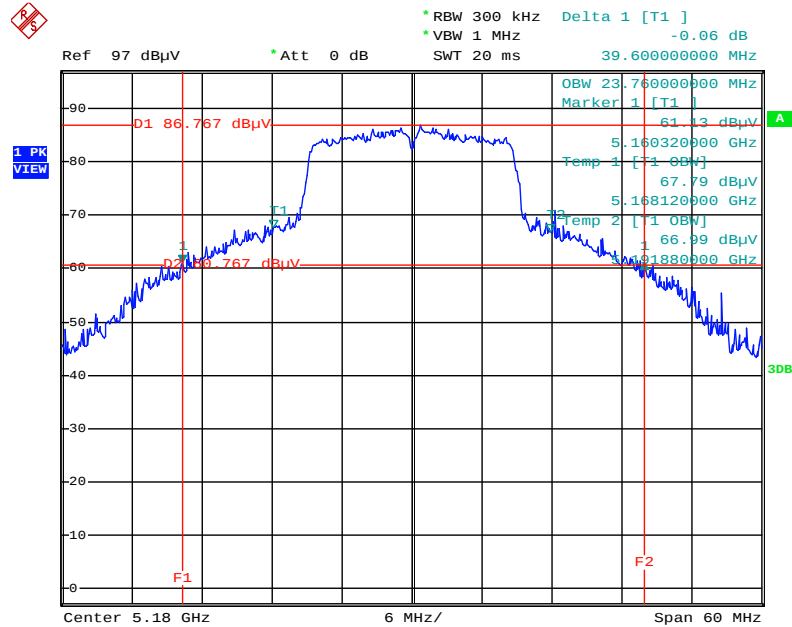
Date: 28.FEB.2015 00:51:42

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



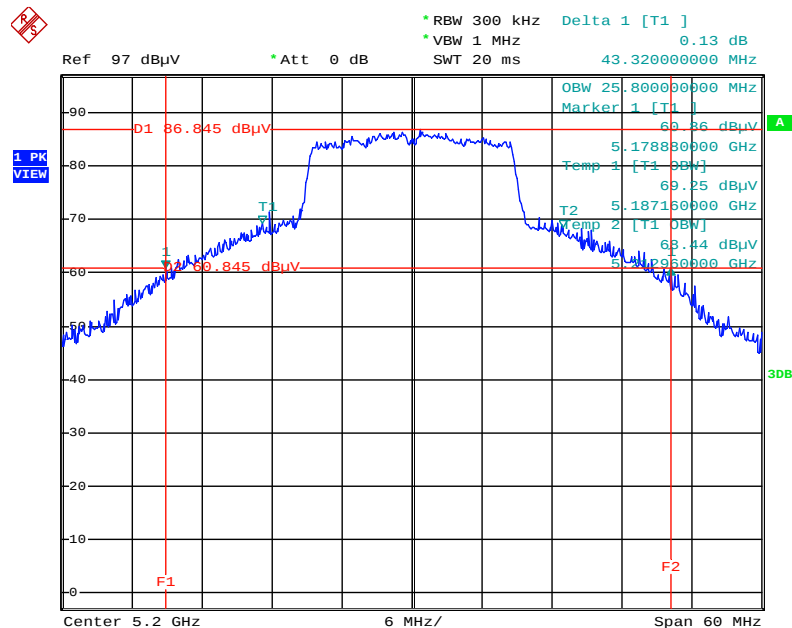
Date: 28.FEB.2015 00:52:39

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



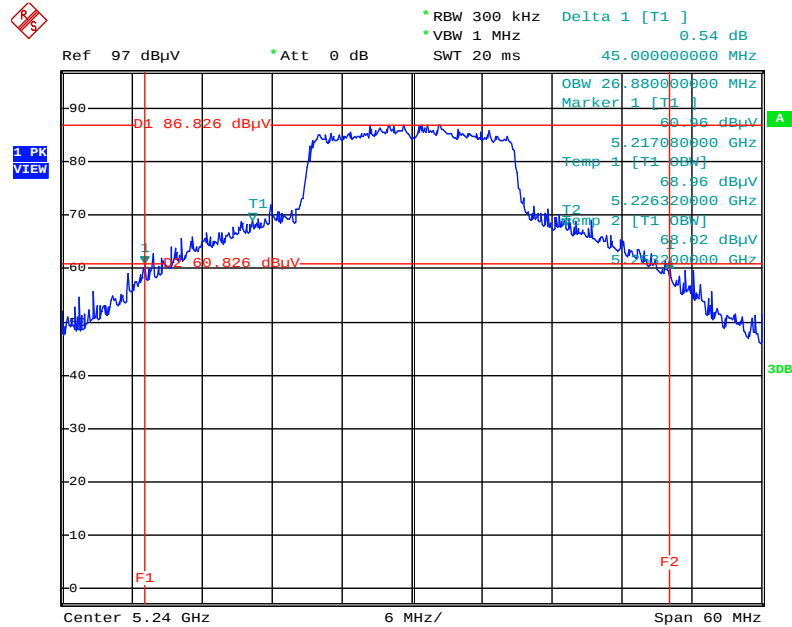
Date: 28.FEB.2015 00:58:47

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



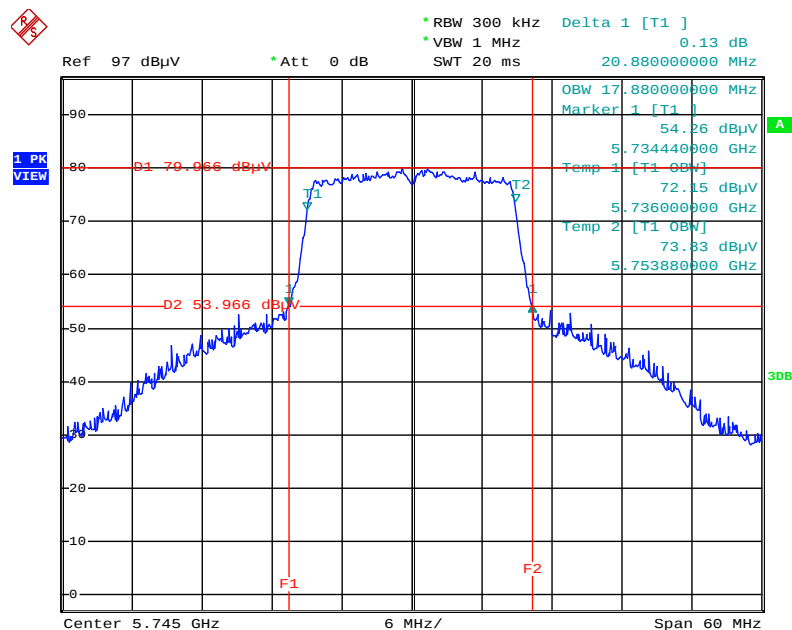
Date: 28.FEB.2015 01:00:03

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



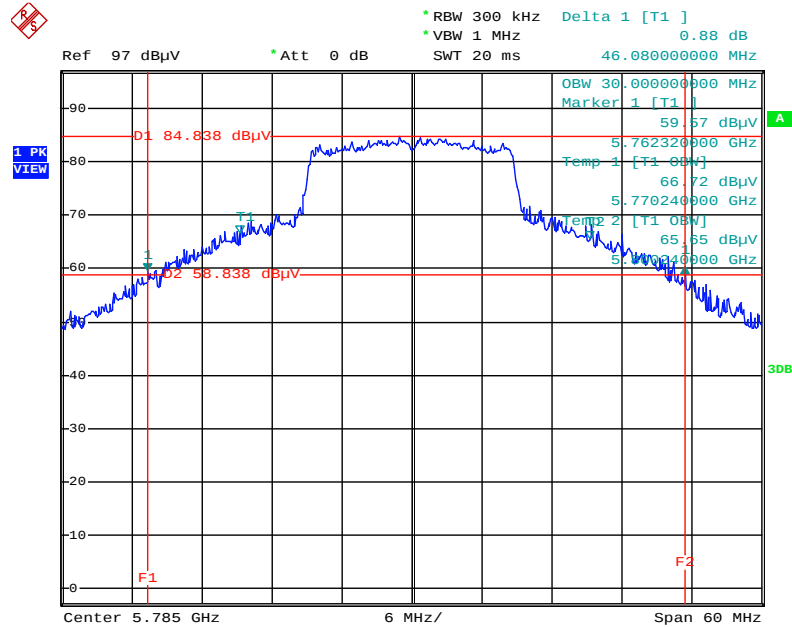
Date: 28.FEB.2015 01:01:06

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



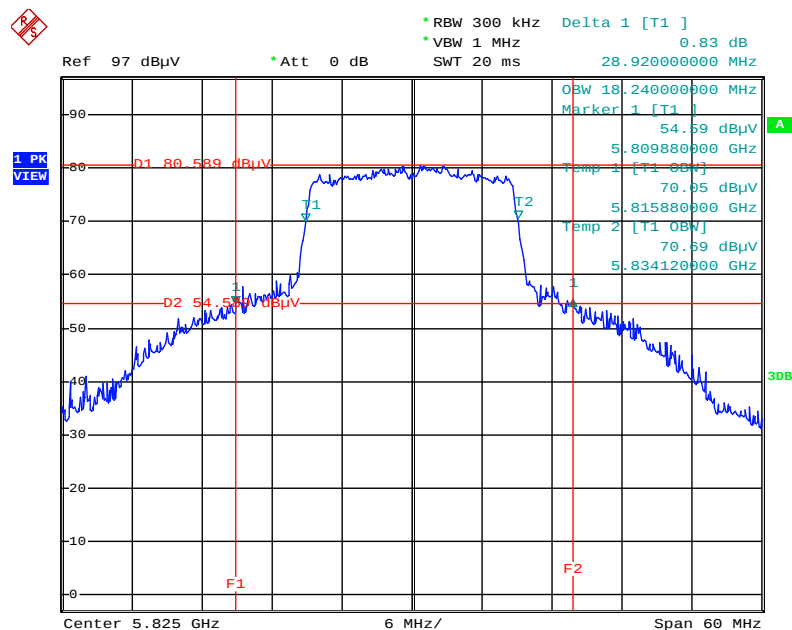
Date: 28.FEB.2015 01:04:08

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



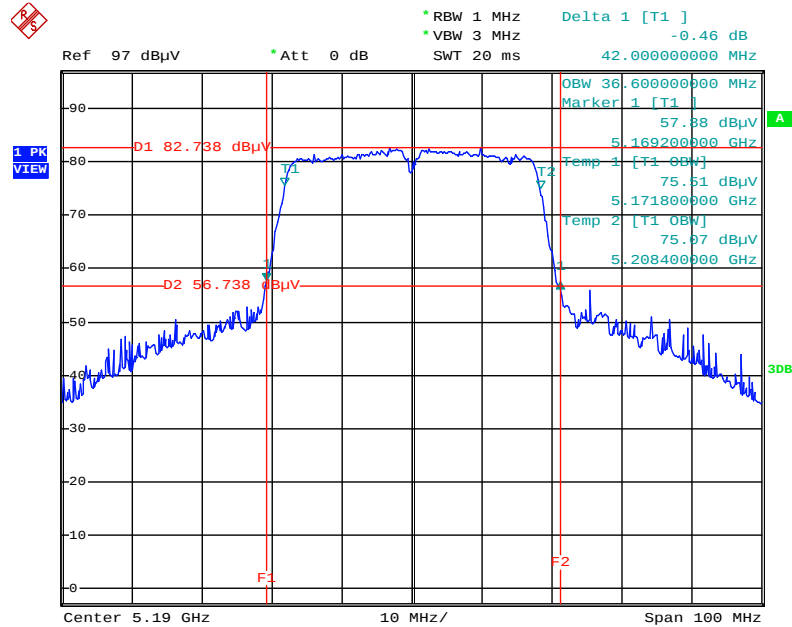
Date: 28.FEB.2015 01:05:40

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



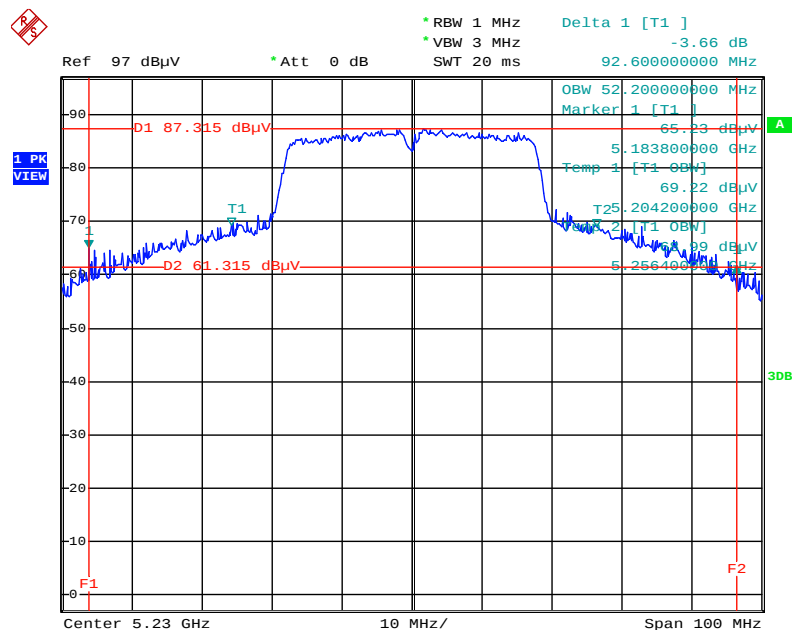
Date: 28.FEB.2015 01:06:43

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



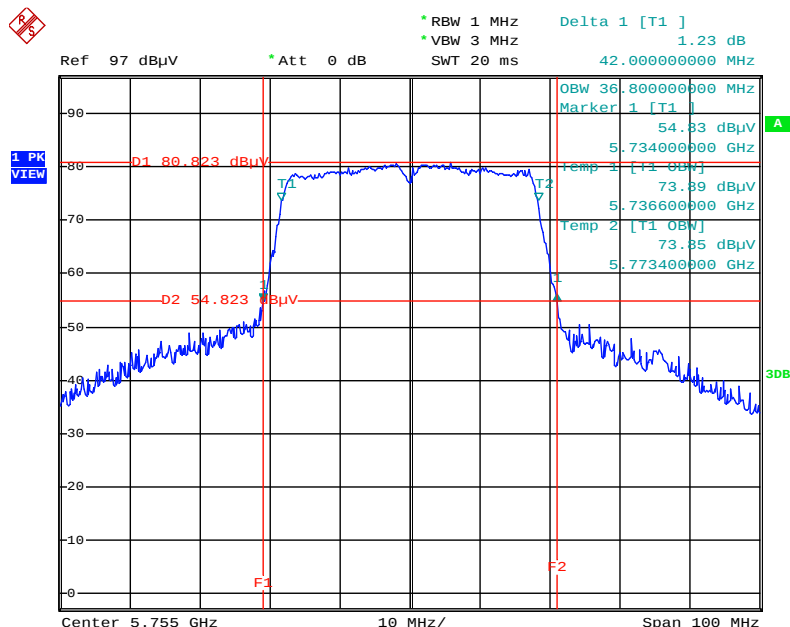
Date: 28.FEB.2015 01:08:26

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



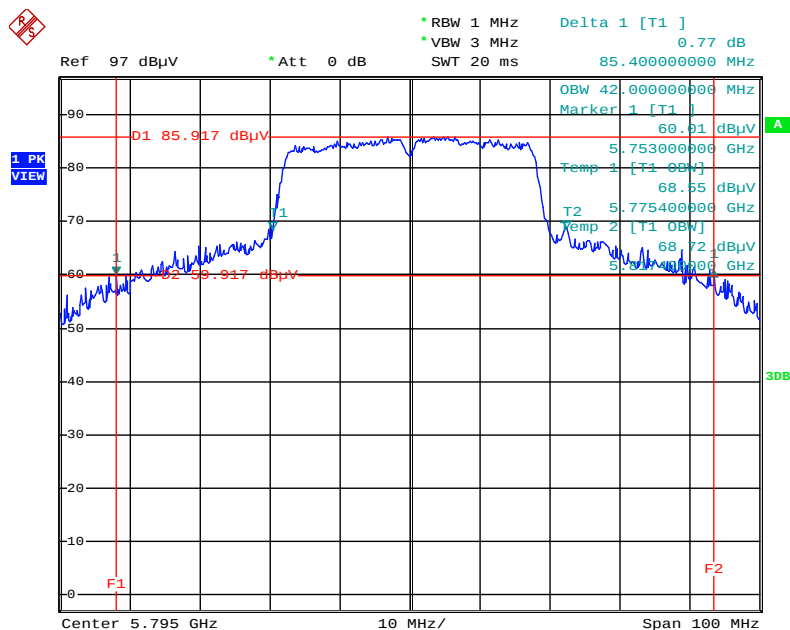
Date: 28.FEB.2015 01:10:02

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



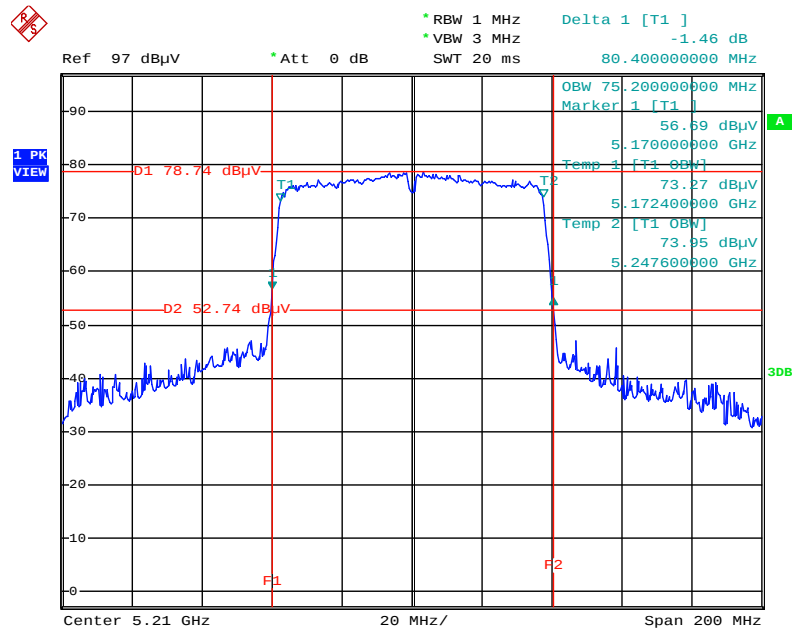
Date: 28.FEB.2015 01:11:32

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



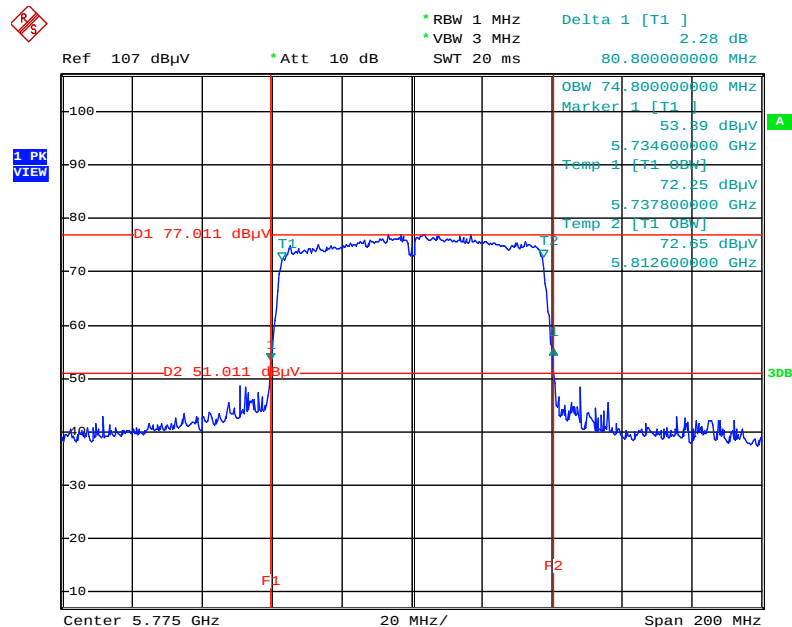
Date: 28.FEB.2015 01:12:23

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



Date: 28.FEB.2015 01:13:27

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



Date: 28.FEB.2015 01:14:25

4.3. 6dB Spectrum Bandwidth Measurement

4.3.1. Limit

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

4.3.2. Measuring Instruments and Setting

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

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

4.3.3. Test Procedures

For Radiated 6dB Bandwidth Measurement:

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

4.3.4. Test Setup Layout

For Radiated 6dB Bandwidth Measurement:

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

4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of 6dB Spectrum Bandwidth

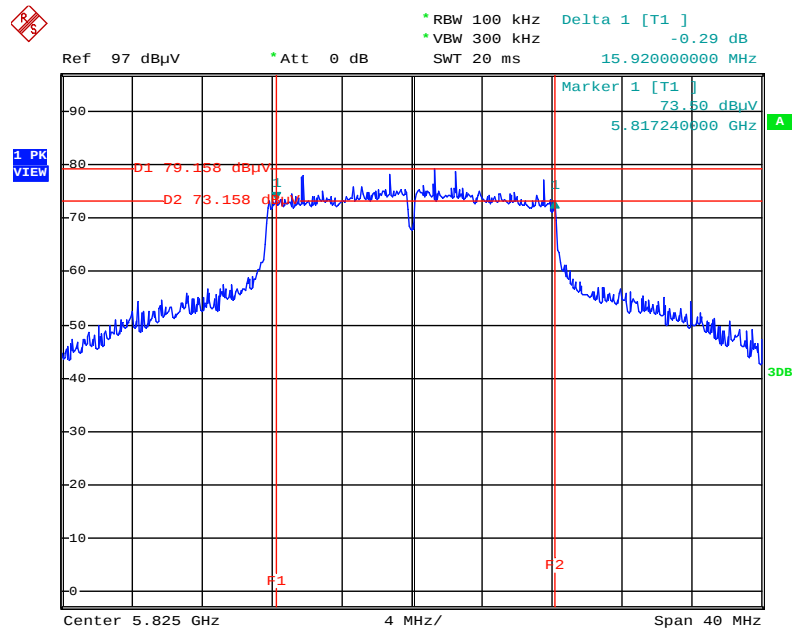
Temperature	20°C	Humidity	58%
Test Engineer	Clemens Fang		

Mode	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11a	5745 MHz	16.32	500	Complies
	5785 MHz	16.32	500	Complies
	5825 MHz	15.92	500	Complies
802.11ac MCS0/Nss1 VHT20	5745 MHz	16.96	500	Complies
	5785 MHz	17.60	500	Complies
	5825 MHz	16.96	500	Complies
802.11ac MCS0/Nss1 VHT40	5755 MHz	35.36	500	Complies
	5795 MHz	34.24	500	Complies
802.11ac MCS0/Nss1 VHT80	5775 MHz	75.20	500	Complies

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

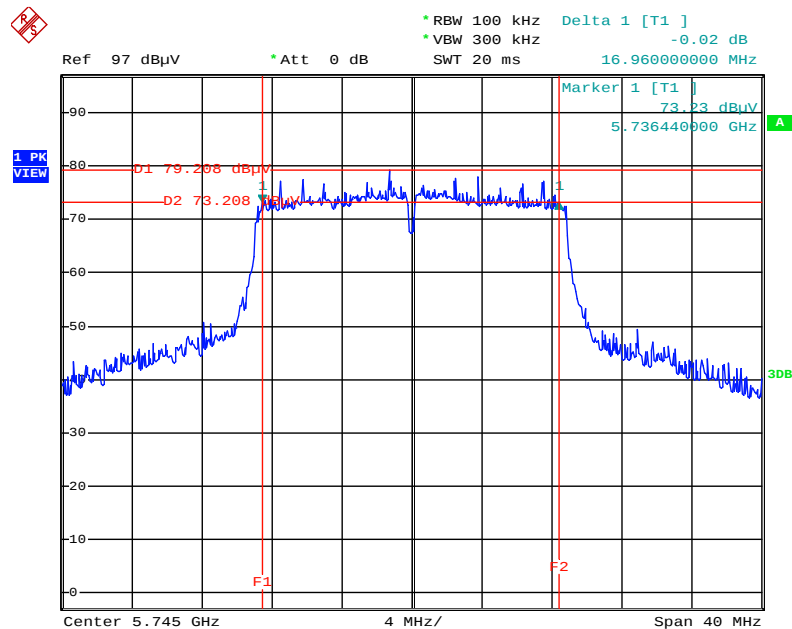
For plots, only the channel with worse result was shown.

6 dB Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 / 5825 MHz



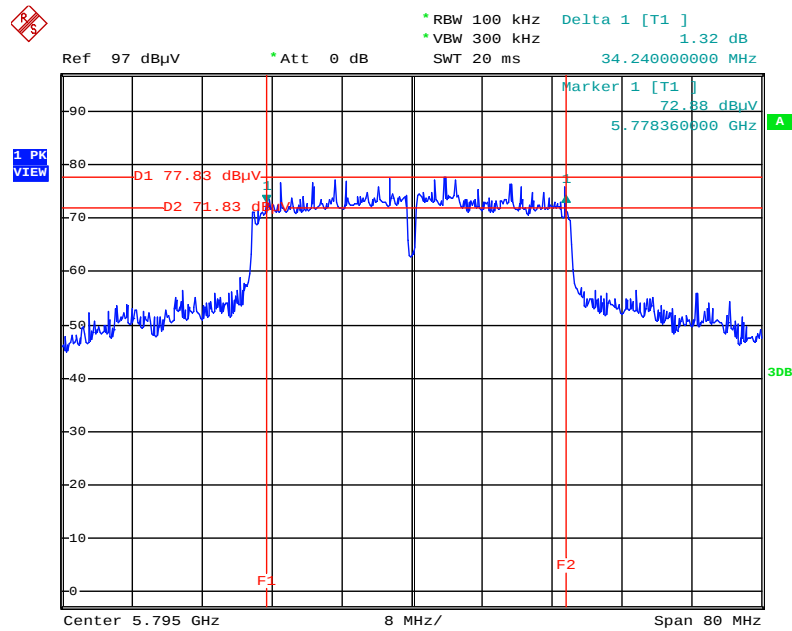
Date: 27.FEB.2015 23:31:22

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 / 5745 MHz



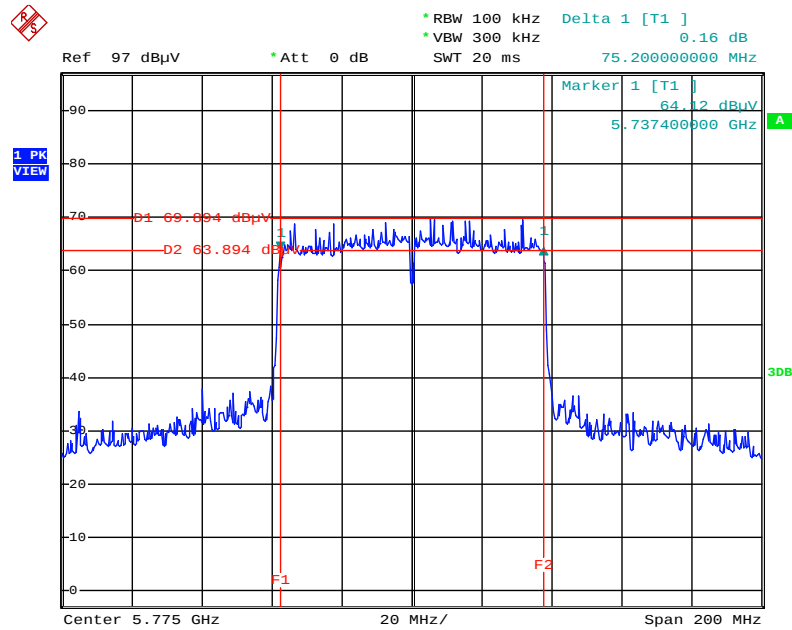
Date: 27.FEB.2015 23:34:17

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



Date: 27.FEB.2015 23:36:16

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



Date: 27.FEB.2015 23:37:15

4.4. Maximum Conducted Output Power Measurement

4.4.1. Limit

Frequency Band		Limit
☒	5.15~5.25 GHz	
	Operating Mode	
	☐ Outdoor access point	The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
	☐ Indoor access point	The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
	☐ Fixed point-to-point access points	The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm). Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.
	☒ Mobile and portable client devices	The maximum conducted output power over the frequency band of operation shall not exceed 250 mW (24dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

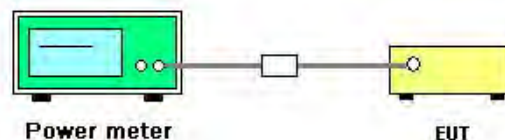
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	AVERAGE

4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the power meter.
2. Test was performed in accordance with KDB789033 D02 v01 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (E) Maximum conducted output power =>3. Measurement using a Power Meter (PM) =>b) Method PM-G (Measurement using a gated RF average power meter).
3. Multiple antenna systems was performed in accordance with KDB662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
4. When measuring maximum conducted output power with multiple antenna systems, add every result of the values by mathematic formula.

4.4.4. Test Setup Layout



4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7. Test Result of Maximum Conducted Output Power

Temperature	20°C	Humidity	58%
Test Engineer	Clemens Fang	Test Date	Feb. 28, 2015

Mode	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
		Ant. 1		
802.11a	5180 MHz	19.22	24.00	Complies
	5200 MHz	20.28	24.00	Complies
	5240 MHz	20.22	24.00	Complies
	5745 MHz	16.66	30.00	Complies
	5785 MHz	20.61	30.00	Complies
	5825 MHz	19.49	30.00	Complies

Mode	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Ant. 1	Ant. 2	Total		
802.11ac MCS0/Nss1 VHT20	5180 MHz	18.05	18.04	21.06	24.00	Complies
	5200 MHz	18.97	19.17	22.08	24.00	Complies
	5240 MHz	19.11	19.09	22.11	24.00	Complies
	5745 MHz	14.66	14.22	17.46	30.00	Complies
	5785 MHz	19.45	18.33	21.94	30.00	Complies
	5825 MHz	15.74	15.87	18.82	30.00	Complies
802.11ac MCS0/Nss1 VHT40	5190 MHz	13.99	13.34	16.69	24.00	Complies
	5230 MHz	18.95	19.26	22.12	24.00	Complies
	5755 MHz	12.22	13.20	15.75	30.00	Complies
	5795 MHz	17.26	16.77	20.03	30.00	Complies
802.11ac MCS0/Nss1 VHT80	5210 MHz	13.60	12.73	16.20	24.00	Complies
	5775 MHz	13.26	13.55	16.42	30.00	Complies

4.5. Power Spectral Density Measurement

4.5.1. Limit

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

Frequency Band		Limit
☒	5.15~5.25 GHz	
	Operating Mode	
☐	Outdoor access point	17 dBm/MHz
☐	Indoor access point	17 dBm/MHz
☐	Fixed point-to-point access points	17 dBm/MHz
☒	Mobile and portable client devices	11 dBm/MHz
☒	5.725~5.85 GHz	30 dBm/500kHz

4.5.2. Measuring Instruments and Setting

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

For 5.15~5.25 GHz

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RBW	1000 kHz
VBW	3000 kHz
Detector	RMS
Trace	AVERAGE
Sweep Time	Auto
Trace Average	100 times

For 5.725~5.85 GHz

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

4.5.3. Test Procedures

For 5.15~5.25 GHz

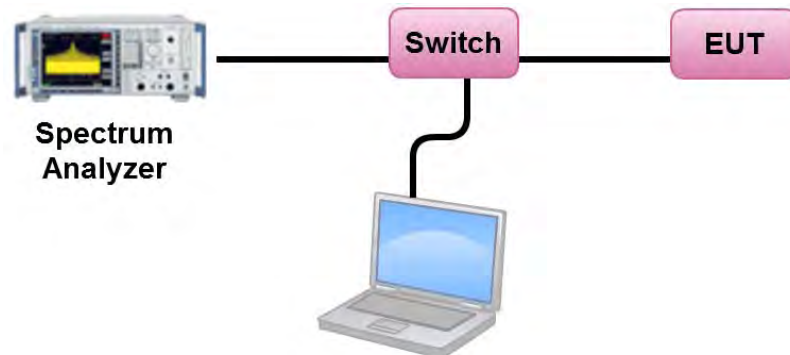
1. The transmitter output (antenna port) was connected RF switch to the spectrum analyzer.
2. Test was performed in accordance with KDB789033 D02 v01 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (F) Maximum Power Spectral Density (PSD).
3. Multiple antenna systems was performed in accordance KDB662911 D01 v02r01 in-Band Power Spectral Density (PSD) Measurements (a) Measure and sum the spectra across the outputs.
4. When measuring first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3 and so on up to the Nth output to obtain the value for the first frequency bin of the summed spectrum. The summed spectrum value for each of the other frequency bins is computed in the same way.

For 5.725~5.85 GHz

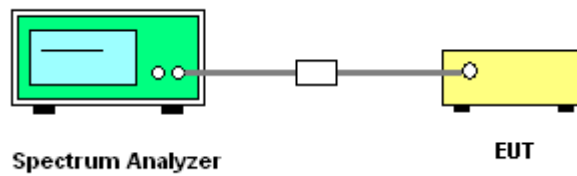
1. Test procedures refer KDB662911 D01 v02r01 section In-Band Power Spectral Density (PSD) Measurements option (b) Measure and sum spectral maximal across the outputs.
2. Use this procedure when the maximum conducted output power in the fundamental emission is used to demonstrate compliance. The EUT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

4.5.4. Test Setup Layout

For 5.15~5.25 GHz



For 5.725~5.85 GHz



4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.5.7. Test Result of Power Spectral Density

Temperature	20°C	Humidity	58%
Test Engineer	Clemens Fang	Test Date	Feb. 28, 2015

Configuration IEEE 802.11a / Ant. 1

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	6.25	11.00	Complies
40	5200 MHz	7.10	11.00	Complies
48	5240 MHz	7.48	11.00	Complies

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
149	5745 MHz	3.09	-3.01	0.08	30.00	Complies
157	5785 MHz	7.46	-3.01	4.45	30.00	Complies
165	5825 MHz	6.36	-3.01	3.35	30.00	Complies

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

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	9.75	11.00	Complies
40	5200 MHz	10.25	11.00	Complies
48	5240 MHz	10.08	11.00	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{K=1}^{N_{ANT}}g_{j,k}\right\}^2}{N_{ANT}}\right] = 4.37\text{dBi} < 6\text{dBi}$, so the limit doesn't reduce.

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
149	5745 MHz	5.17	-3.01	2.16	30.00	Complies
157	5785 MHz	9.20	-3.01	6.19	30.00	Complies
165	5825 MHz	6.93	-3.01	3.92	30.00	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{K=1}^{N_{ANT}}g_{j,k}\right\}^2}{N_{ANT}}\right] = 4.59\text{dBi} < 6\text{dBi}$, so the limit doesn't reduce.

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

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
38	5190 MHz	1.18	11.00	Complies
46	5230 MHz	6.95	11.00	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{K=1}^{N_{ANT}}g_{j,k}\right\}^2}{N_{ANT}}\right] = 4.37\text{dBi} < 6\text{dBi}$, so the limit doesn't reduce.

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
151	5755 MHz	0.09	-3.01	-2.92	30.00	Complies
159	5795 MHz	4.43	-3.01	1.42	30.00	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{K=1}^{N_{ANT}}g_{j,k}\right\}^2}{N_{ANT}}\right] = 4.59\text{dBi} < 6\text{dBi}$, so the limit doesn't reduce.

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

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
42	5210 MHz	-2.85	11.00	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{K=1}^{N_{ANT}}g_{j,k}\right\}^2}{N_{ANT}}\right] = 4.37\text{dBi} < 6\text{dBi}$, so the limit doesn't reduce.

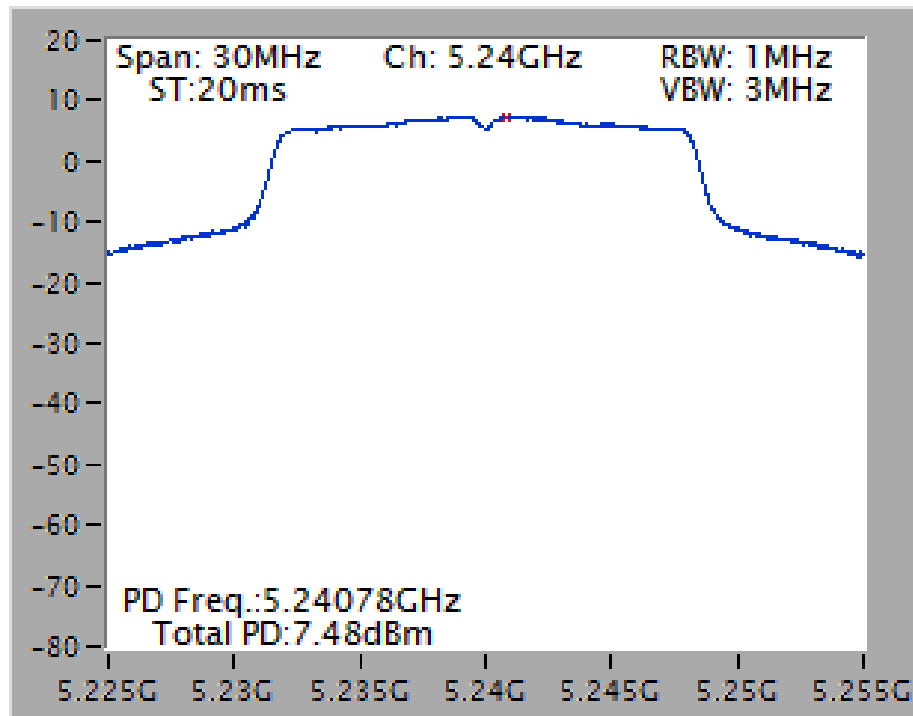
Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
155	5775 MHz	-3.04	-3.01	-6.05	30.00	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{K=1}^{N_{ANT}}g_{j,k}\right\}^2}{N_{ANT}}\right] = 4.59\text{dBi} < 6\text{dBi}$, so the limit doesn't reduce.

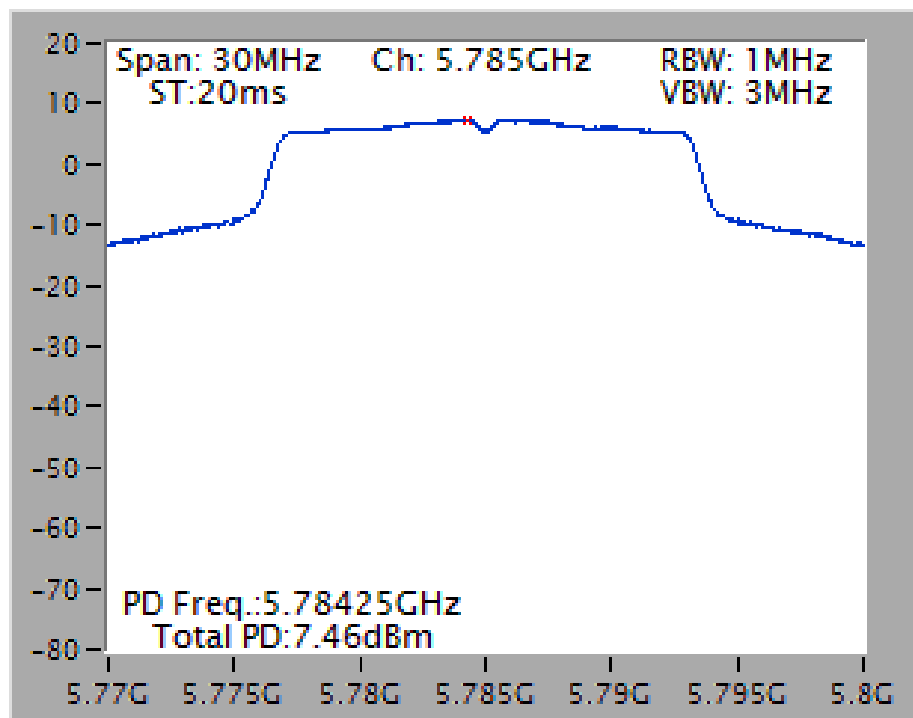
Note: All the test values were listed in the report.

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

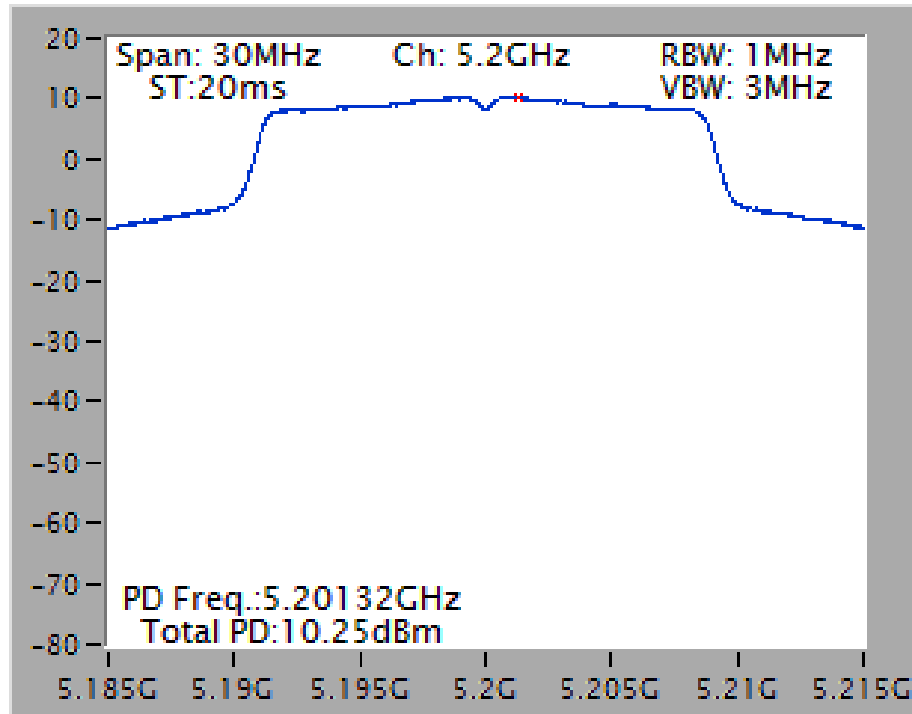
Power Density Plot on Configuration IEEE 802.11a / Ant. 1 / 5240 MHz



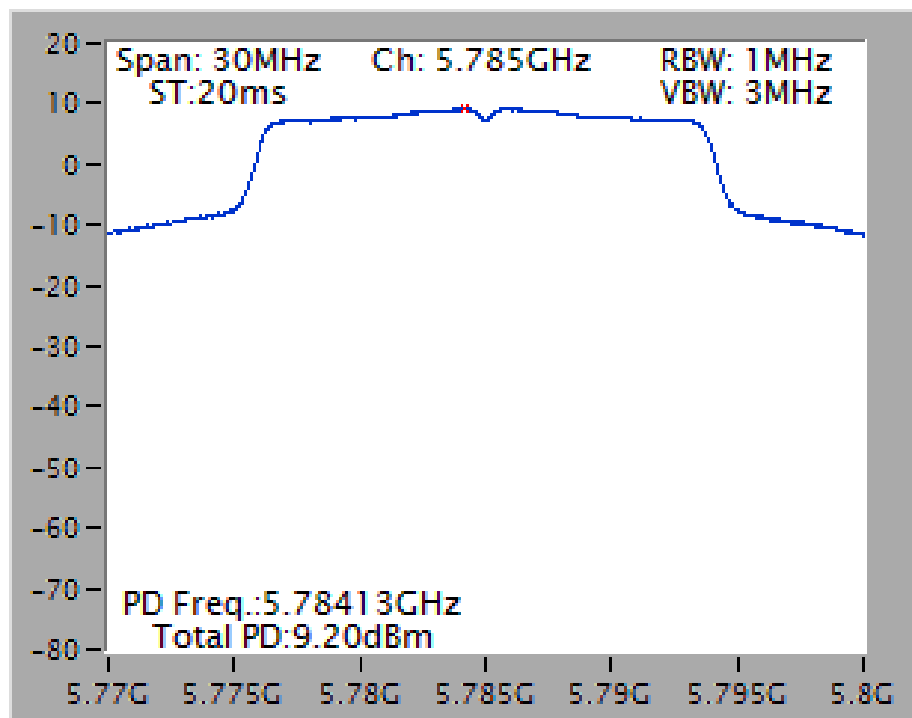
Power Density Plot on Configuration IEEE 802.11a / Ant. 1 / 5785 MHz



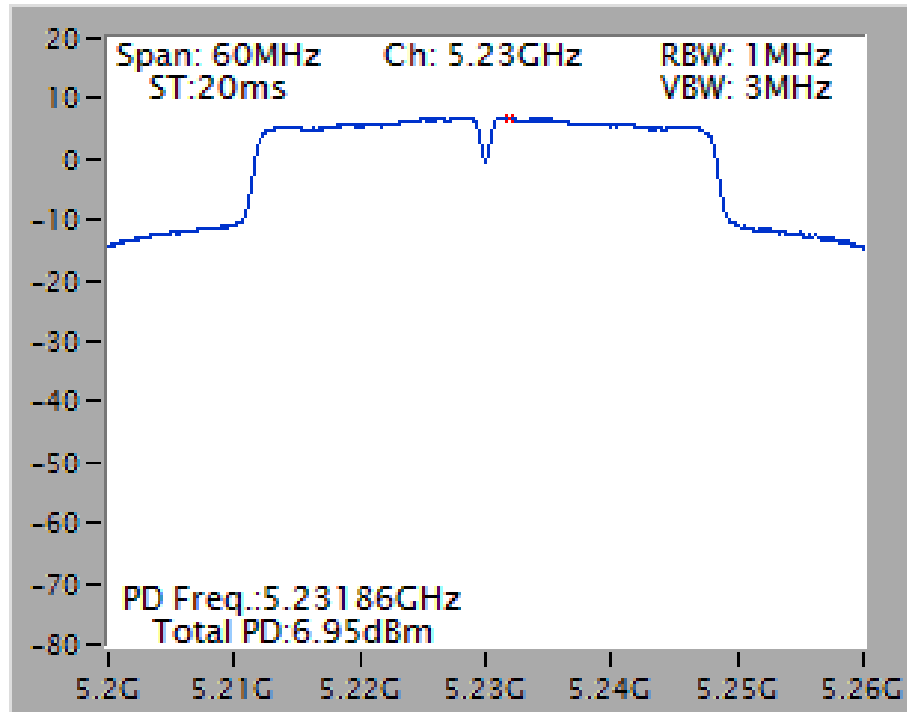
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 / 5200 MHz



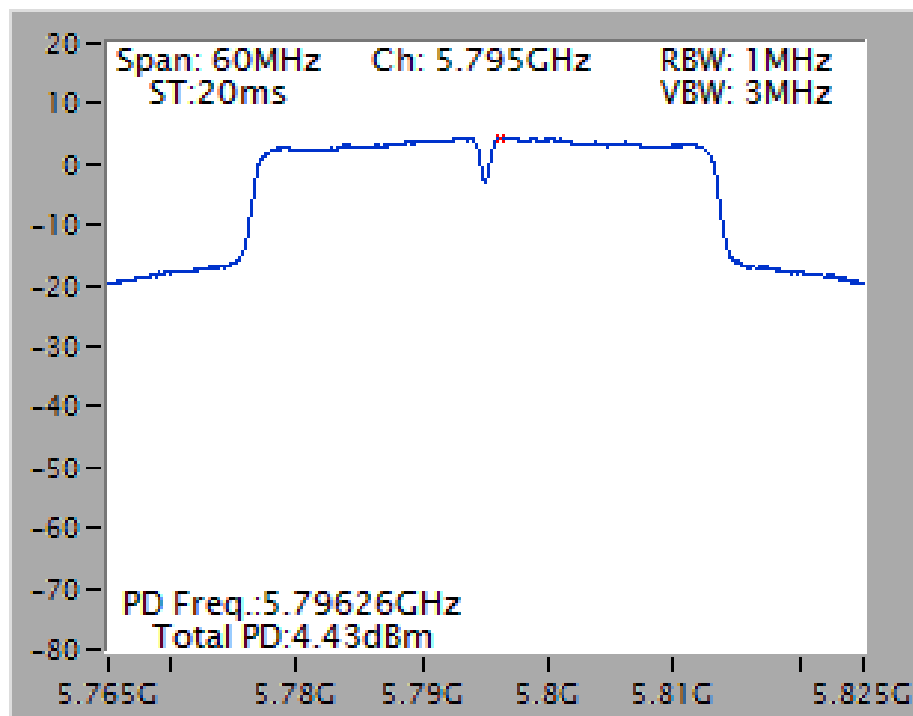
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 / 5785 MHz



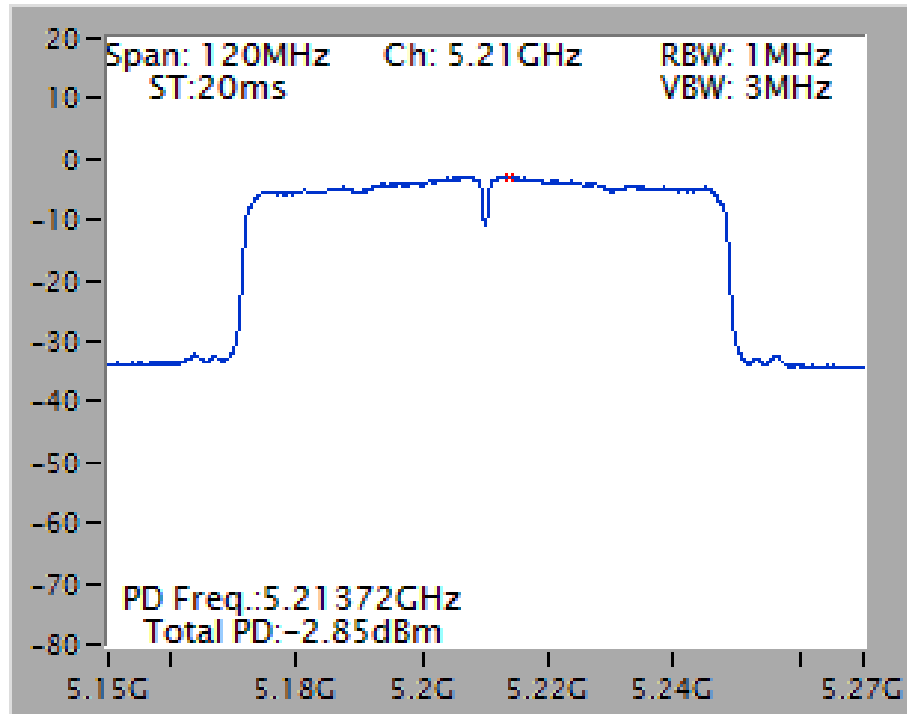
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 / 5230 MHz



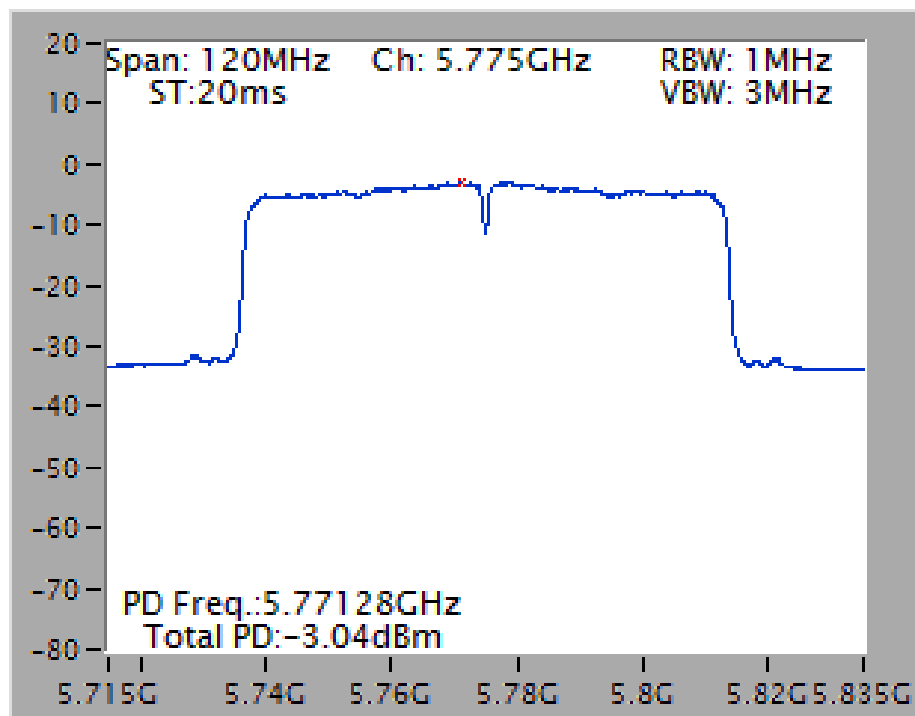
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 / 5795 MHz



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



Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. 1 + Ant. 2 / 5775 MHz



4.6. Radiated Emissions Measurement

4.6.1. Limit

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.6.2. Measuring Instruments and Setting

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

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	40 GHz
RBW / VBW (Emission in restricted band)	1 MHz / 3MHz for Peak, 1 MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	1 MHz / 3MHz for peak

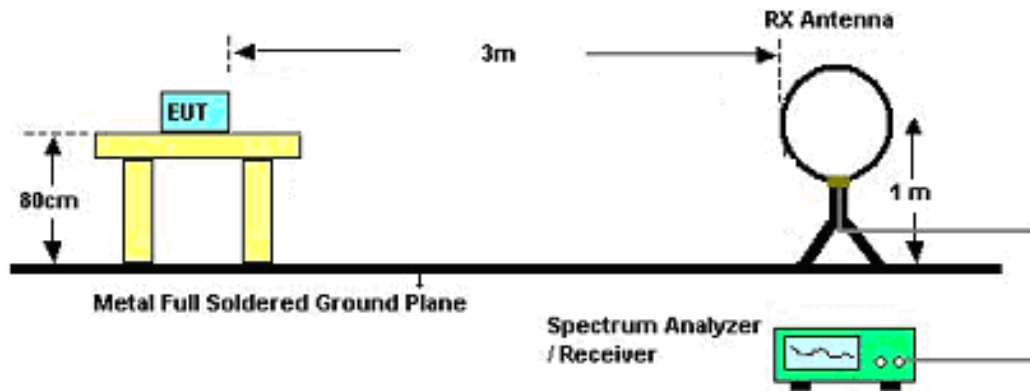
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.6.3. Test Procedures

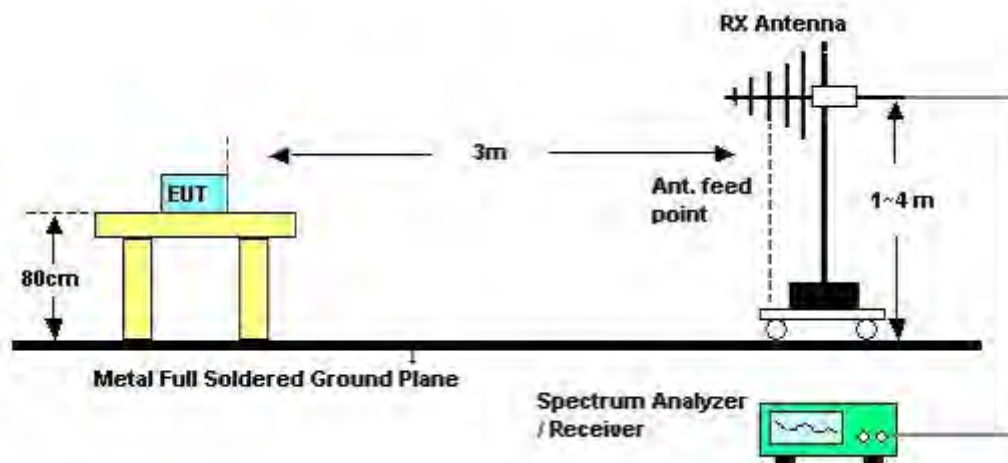
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

4.6.4. Test Setup Layout

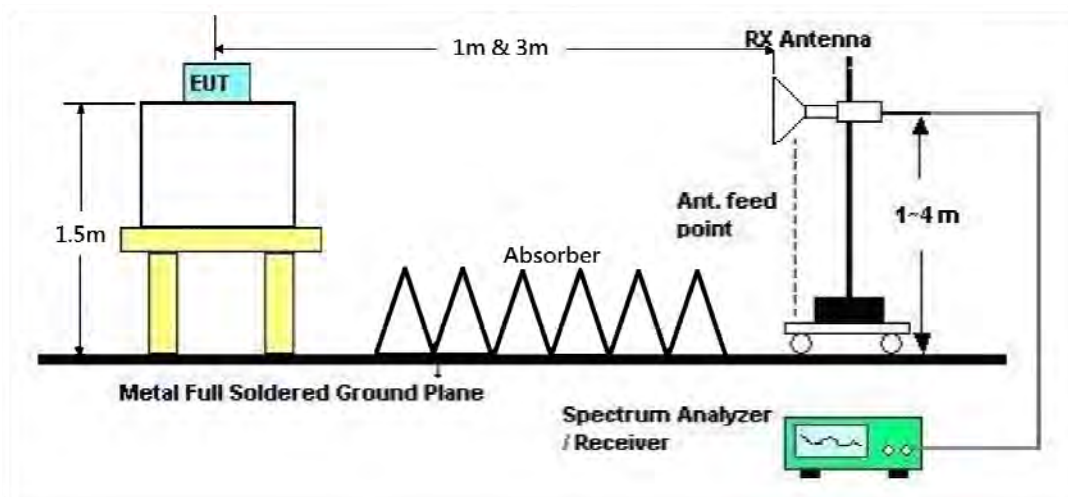
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

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

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	CTX
Test Date	Feb. 09, 2015	Test Mode	Mode 1

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.

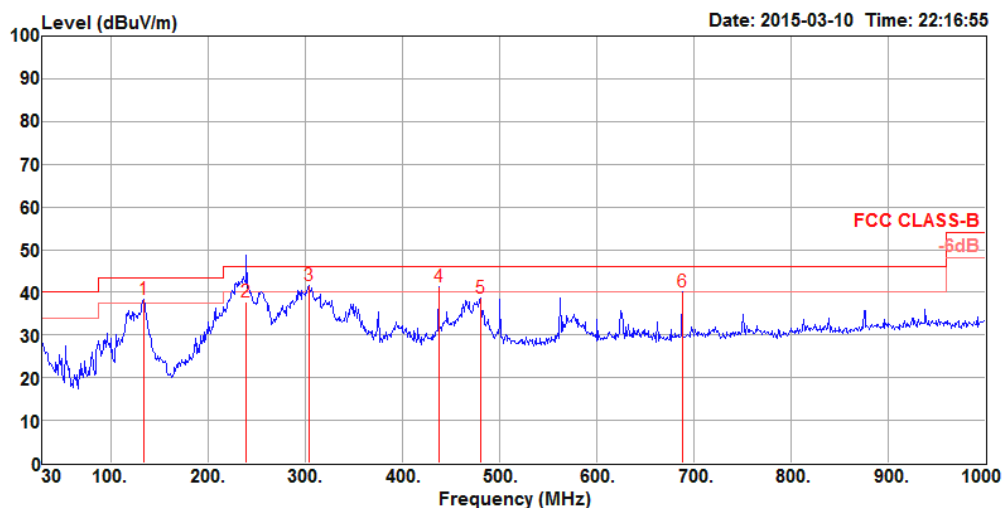
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

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

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

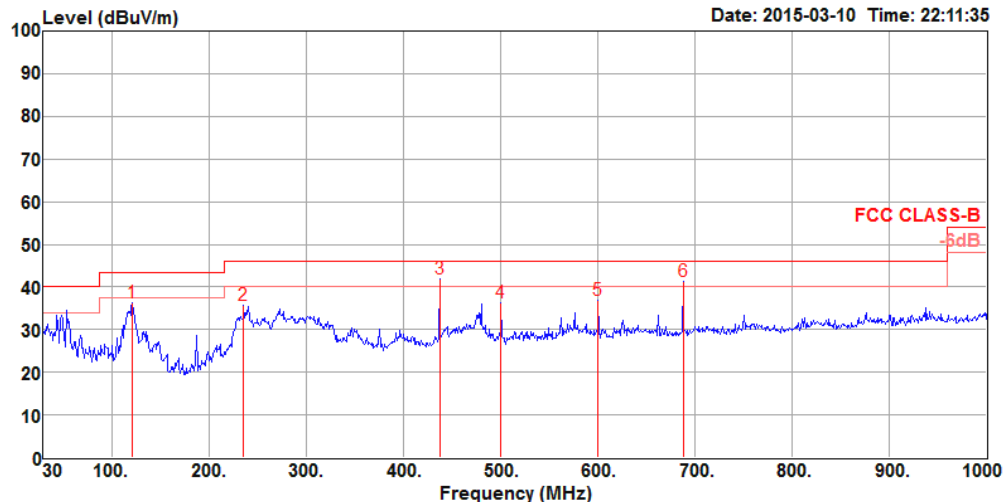
Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	CTX
Test Mode	Mode 1		

Horizontal



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	133.79	38.22	43.50	-5.28	56.95	1.01	12.46	32.20	300	148	Peak
2	239.52	37.87	46.00	-8.13	56.48	1.35	12.20	32.16	132	14	QP
3	303.54	41.73	46.00	-4.27	58.25	1.50	14.01	32.03	100	140	Peak
4	437.40	41.40	46.00	-4.60	54.72	1.83	16.95	32.10	100	186	Peak
5	480.08	38.75	46.00	-7.25	51.32	1.92	17.52	32.01	100	186	Peak
6	687.66	40.10	46.00	-5.90	50.33	2.28	19.68	32.19	100	112	Peak

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	121.18	36.27	43.50	-7.23	54.81	0.96	12.79	32.29	125	249 Peak	VERTICAL
2	235.64	35.72	46.00	-10.28	54.68	1.34	11.81	32.11	125	85 Peak	VERTICAL
3	437.40	42.03	46.00	-3.97	55.34	1.83	16.96	32.10	100	119 Peak	VERTICAL
4	500.45	36.37	46.00	-9.63	48.75	1.96	17.81	32.15	100	199 Peak	VERTICAL
5	600.36	36.99	46.00	-9.01	48.10	2.14	19.10	32.35	100	35 Peak	VERTICAL
6	687.66	41.38	46.00	-4.62	51.61	2.28	19.68	32.19	100	352 Peak	VERTICAL

Note:

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

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

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

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

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11a CH 36 / Ant. 1
Test Date	Feb. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15537.57	59.38	74.00	-14.62	44.08	12.04	38.14	34.88	150	197	Peak	HORIZONTAL
2	15540.32	45.79	60.00	-14.21	30.49	12.04	38.14	34.88	150	197	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15531.84	45.62	60.00	-14.38	30.30	12.04	38.15	34.87	150	272	Average	VERTICAL
2	15544.57	58.40	74.00	-15.60	43.11	12.04	38.13	34.88	150	272	Peak	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11a CH 40 / Ant. 1
Test Date	Feb. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15604.04	58.45	74.00	-15.55	43.26	12.07	38.03	34.91	150	256	Peak	HORIZONTAL
2	15604.28	45.11	60.00	-14.89	29.92	12.07	38.03	34.91	150	256	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15603.49	45.35	60.00	-14.65	30.16	12.07	38.03	34.91	150	206	Average	VERTICAL
2	15604.25	59.35	74.00	-14.65	44.16	12.07	38.03	34.91	150	206	Peak	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11a CH 48 / Ant. 1
Test Date	Feb. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15715.07	44.93	60.00	-15.07	29.94	12.11	37.84	34.96	150	346	Average	HORIZONTAL
2	15717.53	58.08	74.00	-15.92	43.09	12.11	37.84	34.96	150	346	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15716.66	58.16	74.00	-15.84	43.16	12.11	37.85	34.96	150	265	Peak	VERTICAL
2	15717.58	45.39	60.00	-14.61	30.39	12.11	37.85	34.96	150	265	Average	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11a CH 149 / Ant. 1
Test Date	Feb. 17, 2015		

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	11485.96	42.26	54.00	-11.74	27.75	10.50	40.21	36.20	150	215	Average	HORIZONTAL
2	11494.63	56.08	74.00	-17.92	41.57	10.50	40.21	36.20	150	215	Peak	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	11486.61	57.22	74.00	-16.78	42.71	10.50	40.21	36.20	150	277	Peak	VERTICAL
2	11491.79	42.66	54.00	-11.34	28.16	10.50	40.20	36.20	150	277	Average	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11a CH 157 / Ant. 1
Test Date	Feb. 17, 2015		

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	11571.25	43.30	54.00	-10.70	28.89	10.54	40.03	36.16	150	336	Average	HORIZONTAL
2	11571.45	58.04	74.00	-15.96	43.63	10.54	40.03	36.16	150	336	Peak	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	11571.52	56.93	74.00	-17.07	42.52	10.54	40.03	36.16	150	311	Peak	VERTICAL
2	11573.53	43.78	54.00	-10.22	29.38	10.54	40.02	36.16	150	311	Average	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11a CH 165 / Ant. 1
Test Date	Feb. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	11645.44	57.52	74.00	-16.48	43.21	10.57	39.87	36.13	150	285	Peak	HORIZONTAL
2	11647.18	43.87	54.00	-10.13	29.56	10.57	39.87	36.13	150	285	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	11647.95	57.48	74.00	-16.52	43.20	10.57	39.84	36.13	150	231	Peak	VERTICAL
2	11649.19	44.02	54.00	-9.98	29.74	10.57	39.84	36.13	150	231	Average	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15535.31	44.96	60.00	-15.04	29.66	12.04	38.14	34.88	150	263	Average	HORIZONTAL
2	15536.14	58.82	74.00	-15.18	43.52	12.04	38.14	34.88	150	263	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15535.79	58.43	74.00	-15.57	43.13	12.04	38.14	34.88	150	199	Peak	VERTICAL
2	15538.16	45.10	60.00	-14.90	29.80	12.04	38.14	34.88	150	199	Average	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 40 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15604.04	58.57	74.00	-15.43	43.38	12.07	38.03	34.91	150	321	Peak	HORIZONTAL
2	15604.43	44.82	60.00	-15.18	29.63	12.07	38.03	34.91	150	321	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15595.46	45.22	60.00	-14.78	30.02	12.06	38.05	34.91	150	293	Average	VERTICAL
2	15600.32	58.25	74.00	-15.75	43.06	12.06	38.04	34.91	150	293	Peak	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 48 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	15716.70	58.06	74.00	-15.94	43.07	12.11	37.84	34.96	150	275	Peak	HORIZONTAL
2	15723.66	44.62	60.00	-15.38	29.64	12.11	37.84	34.97	150	275	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	15717.66	58.31	74.00	-15.69	43.31	12.11	37.85	34.96	150	338	Peak	VERTICAL
2	15723.66	45.02	60.00	-14.98	30.04	12.11	37.84	34.97	150	338	Average	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	11487.41	42.05	54.00	-11.95	27.54	10.50	40.21	36.20	150	214	Average	HORIZONTAL
2	11493.59	55.71	74.00	-18.29	41.20	10.50	40.21	36.20	150	214	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	11491.43	55.07	74.00	-18.93	40.57	10.50	40.20	36.20	150	296	Peak	VERTICAL
2	11492.89	42.15	54.00	-11.85	27.65	10.50	40.20	36.20	150	296	Average	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 157 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

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	11572.10	57.05	74.00	-16.95	42.64	10.54	40.03	36.16	150	325	Peak	HORIZONTAL
2	11574.64	43.02	54.00	-10.98	28.61	10.54	40.03	36.16	150	325	Average	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	11568.00	43.32	54.00	-10.68	28.92	10.54	40.03	36.17	150	309	Average	VERTICAL
2	11574.10	56.78	74.00	-17.22	42.38	10.54	40.02	36.16	150	309	Peak	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 165 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

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	11652.91	57.42	74.00	-16.58	43.15	10.57	39.83	36.13	150	214	Peak	HORIZONTAL
2	11653.46	43.38	54.00	-10.62	29.11	10.57	39.83	36.13	150	214	Average	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	11648.97	43.67	54.00	-10.33	29.39	10.57	39.84	36.13	150	190	Average	VERTICAL
2	11651.49	57.48	74.00	-16.52	43.21	10.57	39.83	36.13	150	190	Peak	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15570.33	44.90	60.00	-15.10	29.65	12.05	38.09	34.89	150	219	Average	HORIZONTAL
2	15574.63	59.04	74.00	-14.96	43.80	12.05	38.09	34.90	150	219	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15570.67	45.27	60.00	-14.73	30.02	12.05	38.09	34.89	150	188	Average	VERTICAL
2	15574.51	58.27	74.00	-15.73	43.04	12.05	38.08	34.90	150	188	Peak	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 46 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

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	15687.31	44.82	60.00	-15.18	29.77	12.10	37.90	34.95	150	332	Average	HORIZONTAL
2	15694.69	57.93	74.00	-16.07	42.88	12.10	37.90	34.95	150	332	Peak	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	15687.24	58.49	74.00	-15.51	43.44	12.10	37.90	34.95	150	236	Peak	VERTICAL
2	15690.58	45.14	60.00	-14.86	30.10	12.10	37.89	34.95	150	236	Average	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	11508.22	55.44	74.00	-18.56	40.92	10.51	40.20	36.19	150	282	Peak	HORIZONTAL
2	11511.17	42.22	54.00	-11.78	27.70	10.51	40.20	36.19	150	282	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	11506.04	55.95	74.00	-18.05	41.44	10.51	40.19	36.19	150	207	Peak	VERTICAL
2	11514.60	42.44	54.00	-11.56	27.96	10.51	40.16	36.19	150	207	Average	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 159 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	11591.43	56.82	74.00	-17.18	42.44	10.55	39.99	36.16	150	266	Peak	HORIZONTAL
2	11593.33	43.44	54.00	-10.56	29.05	10.55	39.99	36.15	150	266	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	11592.74	56.90	74.00	-17.10	42.53	10.55	39.97	36.15	150	221	Peak	VERTICAL
2	11593.04	43.38	54.00	-10.62	29.01	10.55	39.97	36.15	150	221	Average	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15625.64	58.32	74.00	-15.68	43.16	12.07	38.01	34.92	150	333	Peak	HORIZONTAL
2	15626.27	45.01	60.00	-14.99	29.85	12.07	38.01	34.92	150	333	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15633.69	58.52	74.00	-15.48	43.38	12.08	37.98	34.92	150	306	Peak	VERTICAL
2	15634.57	45.08	60.00	-14.92	29.94	12.08	37.98	34.92	150	306	Average	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 155 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11545.62	42.76	54.00	-11.24	28.29	10.53	40.12	36.18	150	294	Average	HORIZONTAL
2	11549.23	56.38	74.00	-17.62	41.94	10.53	40.08	36.17	150	294	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11545.21	55.96	74.00	-18.04	41.52	10.53	40.09	36.18	150	193	Peak	VERTICAL
2	11554.43	43.01	54.00	-10.99	28.58	10.53	40.07	36.17	150	193	Average	VERTICAL

Note:

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

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

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

4.7. Band Edge Emissions Measurement

4.7.1. Limit

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.7.2. Measuring Instruments and Setting

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

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RBW / VBW (Emission in restricted band)	1 MHz / 3MHz for Peak, 1 MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	1 MHz / 3MHz for Peak

4.7.3. Test Procedures

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

4.7.4. Test Setup Layout

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

4.7.5. Test Deviation

There is no deviation with the original standard.

4.7.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.7.7. Test Result of Band Edge and Fundamental Emissions

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11a CH 36, 40, 48 / Ant. 1
Test Date	Feb. 17, 2015		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5149.57	73.77	74.00	-0.23	68.59	6.64	31.52	32.98	150	188	Peak	HORIZONTAL
2	5150.00	50.84	54.00	-3.16	45.66	6.64	31.52	32.98	150	188	Average	HORIZONTAL
3 0	5180.58	98.73			93.49	6.66	31.55	32.97	150	188	Average	HORIZONTAL
4 0	5182.03	111.04			105.80	6.66	31.55	32.97	150	188	Peak	HORIZONTAL

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

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5146.82	68.18	74.00	-5.82	63.00	6.64	31.52	32.98	150	186	Peak	HORIZONTAL
2	5150.00	46.54	54.00	-7.46	41.36	6.64	31.52	32.98	150	186	Average	HORIZONTAL
3 0	5199.13	99.87			94.60	6.68	31.56	32.97	150	186	Average	HORIZONTAL
4 0	5199.13	111.66			106.39	6.68	31.56	32.97	150	186	Peak	HORIZONTAL

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

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5128.73	56.79	74.00	-17.21	51.64	6.62	31.51	32.98	150	185	Peak	HORIZONTAL
2	5150.00	43.01	54.00	-10.99	37.83	6.64	31.52	32.98	150	185	Average	HORIZONTAL
3 0	5236.96	110.93			105.59	6.71	31.59	32.96	150	185	Peak	HORIZONTAL
4 0	5240.87	99.28			93.94	6.71	31.59	32.96	150	185	Average	HORIZONTAL
5	5350.00	43.05	54.00	-10.95	37.51	6.80	31.68	32.94	150	185	Average	HORIZONTAL
6	5350.00	56.68	74.00	-17.32	51.14	6.80	31.68	32.94	150	185	Peak	HORIZONTAL

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

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11a CH 149, 157, 165 / Ant. 1
Test Date	Feb. 17, 2015		

Channel 149

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5714.86	62.03	68.20	-6.17	55.74	7.11	32.05	32.87	150	230	Peak	HORIZONTAL
2	5724.71	73.65	78.20	-4.55	67.33	7.12	32.07	32.87	150	230	Peak	HORIZONTAL
3 0	5744.42	93.57			87.21	7.14	32.09	32.87	150	230	Average	HORIZONTAL
4 0	5746.74	105.38			99.01	7.14	32.09	32.86	150	230	Peak	HORIZONTAL

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

Channel 157

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5715.00	61.43	68.20	-6.77	55.14	7.11	32.05	32.87	150	230	Peak	HORIZONTAL
2	5724.13	63.04	78.20	-15.16	56.72	7.12	32.07	32.87	150	230	Peak	HORIZONTAL
3 0	5785.87	98.13			91.66	7.18	32.15	32.86	150	230	Average	HORIZONTAL
4 0	5787.32	110.24			103.77	7.18	32.15	32.86	150	230	Peak	HORIZONTAL
5	5854.05	65.39	78.20	-12.81	58.77	7.24	32.23	32.85	150	230	Peak	HORIZONTAL
6	5867.24	60.75	68.20	-7.45	54.11	7.25	32.23	32.84	150	230	Peak	HORIZONTAL

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

Channel 165

		Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase	
		MHz	dBuV/m	dBuV/m		dB	dB/m	dB	cm	deg			
1 0		5824.13	96.29			89.74	7.21	32.19	32.85	150	241	Average	HORIZONTAL
2 0		5827.60	108.05			101.50	7.21	32.19	32.85	150	241	Peak	HORIZONTAL
3		5851.74	77.87	78.20	-0.33	71.28	7.23	32.21	32.85	150	241	Peak	HORIZONTAL
4		5860.43	65.32	68.20	-2.88	58.69	7.24	32.23	32.84	150	241	Peak	HORIZONTAL

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

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36, 40, 48 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamplifier Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5149.86	73.23	74.00	-0.77	68.05	6.64	31.52	32.98	120	198	Peak	HORIZONTAL
2	5150.00	53.79	54.00	-0.21	48.61	6.64	31.52	32.98	120	198	Average	HORIZONTAL
3 0	5178.70	112.66			107.42	6.66	31.55	32.97	120	198	Peak	HORIZONTAL
4 0	5179.13	102.24			97.00	6.66	31.55	32.97	120	198	Average	HORIZONTAL

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

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamplifier Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5147.68	64.08	74.00	-9.92	58.90	6.64	31.52	32.98	128	198	Peak	HORIZONTAL
2	5150.00	46.67	54.00	-7.33	41.49	6.64	31.52	32.98	128	198	Average	HORIZONTAL
3 0	5198.84	112.56			107.29	6.68	31.56	32.97	128	198	Peak	HORIZONTAL
4 0	5201.16	102.55			97.28	6.68	31.56	32.97	128	198	Average	HORIZONTAL

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

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamplifier Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5148.70	57.30	74.00	-16.70	52.12	6.64	31.52	32.98	112	202	Peak	HORIZONTAL
2	5150.00	44.76	54.00	-9.24	39.58	6.64	31.52	32.98	112	202	Average	HORIZONTAL
3 0	5240.87	102.57			97.23	6.71	31.59	32.96	112	202	Average	HORIZONTAL
4 0	5241.30	112.29			106.95	6.71	31.59	32.96	112	202	Peak	HORIZONTAL
5	5350.00	44.86	54.00	-9.14	39.32	6.80	31.68	32.94	112	202	Average	HORIZONTAL
6	5352.60	57.97	74.00	-16.03	52.43	6.80	31.68	32.94	112	202	Peak	HORIZONTAL

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

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149, 157, 165 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

Channel 149

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	5712.97	63.67	68.20	-4.53	57.38	7.11	32.05	32.87	132	200	Peak	HORIZONTAL
2	5724.57	77.63	78.20	-0.57	71.31	7.12	32.07	32.87	132	200	Peak	HORIZONTAL
3 0	5745.29	108.33			101.97	7.14	32.09	32.87	132	200	Peak	HORIZONTAL
4 0	5746.30	97.58			91.22	7.14	32.09	32.87	132	200	Average	HORIZONTAL

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

Channel 157

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	5715.00	59.73	68.20	-8.47	53.44	7.11	32.05	32.87	101	247	Peak	HORIZONTAL
2	5724.13	63.71	78.20	-14.49	57.39	7.12	32.07	32.87	101	247	Peak	HORIZONTAL
3 0	5786.45	102.49			96.02	7.18	32.15	32.86	101	247	Average	HORIZONTAL
4 0	5786.45	113.55			107.08	7.18	32.15	32.86	101	247	Peak	HORIZONTAL
5	5850.00	61.16	78.20	-17.04	54.57	7.23	32.21	32.85	101	247	Peak	HORIZONTAL
6	5860.00	62.01	68.20	-6.19	55.38	7.24	32.23	32.84	101	247	Peak	HORIZONTAL

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

Channel 165

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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 0	5826.01	100.06			93.51	7.21	32.19	32.85	117	249	Average	HORIZONTAL
2 0	5828.18	110.35			103.80	7.21	32.19	32.85	117	249	Peak	HORIZONTAL
3	5850.00	76.16	78.20	-2.04	69.57	7.23	32.21	32.85	117	249	Peak	HORIZONTAL
4	5860.43	68.16	68.20	-0.04	61.53	7.24	32.23	32.84	117	249	Peak	HORIZONTAL

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

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38, 46 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

Channel 38

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	5149.71	69.06	74.00	-4.94	63.88	6.64	31.52	32.98	128	177 Peak	HORIZONTAL
2	5150.00	53.69	54.00	-0.31	48.51	6.64	31.52	32.98	128	177 Average	HORIZONTAL
3 0	5186.53	106.25			101.00	6.67	31.55	32.97	128	177 Peak	HORIZONTAL
4 0	5187.97	96.28			91.03	6.67	31.55	32.97	128	177 Average	HORIZONTAL

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

Channel 46

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	5149.42	69.77	74.00	-4.23	64.59	6.64	31.52	32.98	125	200 Peak	HORIZONTAL
2	5150.00	53.63	54.00	-0.37	48.45	6.64	31.52	32.98	125	200 Average	HORIZONTAL
3 0	5225.95	110.40			105.07	6.70	31.59	32.96	125	200 Peak	HORIZONTAL
4 0	5231.74	101.44			96.11	6.70	31.59	32.96	125	200 Average	HORIZONTAL

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

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151, 159 / Ant. 1 + Ant. 2
Test Date	Feb. 18, 2015		

Channel 151

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamplifier Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5714.13	67.54	68.20	-0.66	61.25	7.11	32.05	32.87	108	244	Peak	HORIZONTAL
2	5724.42	74.37	78.20	-3.83	68.05	7.12	32.07	32.87	108	244	Peak	HORIZONTAL
3 0	5750.66	104.72			98.35	7.14	32.09	32.86	108	244	Peak	HORIZONTAL
4 0	5753.26	94.16			87.76	7.15	32.11	32.86	108	244	Average	HORIZONTAL

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

Channel 159

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamplifier Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5707.19	60.06	68.20	-8.14	53.77	7.11	32.05	32.87	109	245	Peak	HORIZONTAL
2	5724.42	62.05	78.20	-16.15	55.73	7.12	32.07	32.87	109	245	Peak	HORIZONTAL
3 0	5792.11	110.15			103.68	7.18	32.15	32.86	109	245	Peak	HORIZONTAL
4 0	5793.26	98.98			92.51	7.18	32.15	32.86	109	245	Average	HORIZONTAL
5	5850.58	69.42	78.20	-8.78	62.83	7.23	32.21	32.85	109	245	Peak	HORIZONTAL
6	5860.87	64.10	68.20	-4.10	57.47	7.24	32.23	32.84	109	245	Peak	HORIZONTAL

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

Temperature	26°C	Humidity	68%
Test Engineer	Alex Fan	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42, 155 / Ant. 1 + Ant. 2
Test Date	Feb. 17, 2015		

Channel 42

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	5146.38	66.81	74.00	-7.19	61.63	6.64	31.52	32.98	115	200 Peak	HORIZONTAL
2	5150.00	53.92	54.00	-0.08	48.74	6.64	31.52	32.98	115	200 Average	HORIZONTAL
3 0	5203.49	101.41			96.14	6.68	31.56	32.97	115	200 Peak	HORIZONTAL
4 0	5205.66	91.82			86.55	6.68	31.56	32.97	115	200 Average	HORIZONTAL
5	5350.00	49.16	54.00	-4.84	43.62	6.80	31.68	32.94	115	200 Average	HORIZONTAL
6	5352.89	61.38	74.00	-12.62	55.84	6.80	31.68	32.94	115	200 Peak	HORIZONTAL

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

Channel 155

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	5711.38	67.99	68.20	-0.21	61.70	7.11	32.05	32.87	131	196 Peak	HORIZONTAL
2	5722.83	69.77	78.20	-8.43	63.45	7.12	32.07	32.87	131	196 Peak	HORIZONTAL
3 0	5768.49	101.20			94.79	7.16	32.11	32.86	131	196 Peak	HORIZONTAL
4 0	5777.89	90.18			83.74	7.17	32.13	32.86	131	196 Average	HORIZONTAL
5	5857.24	66.22	78.20	-11.98	59.60	7.24	32.23	32.85	131	196 Peak	HORIZONTAL
6	5864.34	66.36	68.20	-1.84	59.73	7.24	32.23	32.84	131	196 Peak	HORIZONTAL

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

Note:

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

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

4.8. Frequency Stability Measurement

4.8.1. Limit

In-band emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

4.8.2. Measuring Instruments and Setting

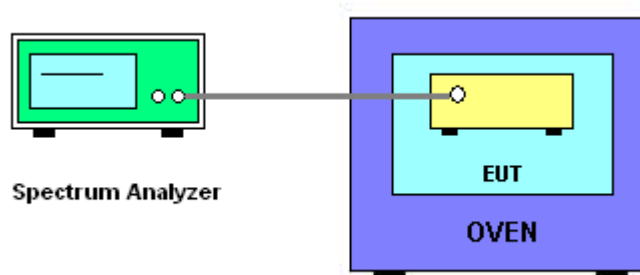
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

4.8.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f_c \times 10^6$ ppm and the limit is less than ± 20 ppm (IEEE 802.11n specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is $0^\circ\text{C} \sim 50^\circ\text{C}$.

4.8.4. Test Setup Layout



4.8.5. Test Deviation

There is no deviation with the original standard.

4.8.6. EUT Operation during Test

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

4.8.7. Test Result of Frequency Stability

Temperature	20°C	Humidity	58%
Test Engineer	Clemens Fang	Test Date	Feb. 28, 2015

Mode: 20 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5200 MHz	5785 MHz
126.50	5200.0021	5785.0021
110.00	5199.9934	5784.9928
93.50	5199.9912	5784.9912
Max. Deviation (MHz)	0.0088	0.0088
Max. Deviation (ppm)	1.69	1.52

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5200 MHz	5785 MHz
0	5200.0004	5785.0004
10	5199.9968	5784.9968
20	5199.9926	5784.9928
30	5199.9914	5784.9914
40	5199.9896	5784.9896
50	5199.9884	5784.9884
Max. Deviation (MHz)	0.0116	0.0116
Max. Deviation (ppm)	2.23	2.01

Mode: 40 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5190 MHz	5755 MHz
126.50	5189.9978	5754.9982
110.00	5189.9952	5754.9942
93.50	5189.9926	5754.9924
Max. Deviation (MHz)	0.0074	0.0076
Max. Deviation (ppm)	1.43	1.32

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5190 MHz	5755 MHz
0	5190.0004	5755.0004
10	5189.9968	5754.9968
20	5189.9938	5754.9950
30	5189.9914	5754.9914
40	5189.9896	5754.9896
50	5189.9884	5754.9884
Max. Deviation (MHz)	0.0116	0.0116
Max. Deviation (ppm)	2.24	2.02

Mode: 80 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5210 MHz	5775 MHz
126.50	5209.9984	5774.9942
110.00	5209.9942	5774.9928
93.50	5209.9912	5774.9908
Max. Deviation (MHz)	0.0088	0.0092
Max. Deviation (ppm)	1.69	1.59

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5210 MHz	5775 MHz
0	5210.0004	5775.0004
10	5209.9968	5774.9968
20	5209.9950	5774.9932
30	5209.9914	5774.9914
40	5209.9896	5774.9896
50	5209.9884	5774.9884
Max. Deviation (MHz)	0.0116	0.0116
Max. Deviation (ppm)	2.23	2.01

4.9. Antenna Requirements

4.9.1. Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

4.9.2. Antenna Connector Construction

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Test Receiver	R&S	ESCS 30	100355	9kHz ~ 2.75GHz	Apr. 23, 2014	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 02, 2014	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 02, 2014	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	Dec. 03, 2014	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	N.C.R.	Conduction (CO01-CB)
Signal analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec.12, 2014	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 03, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	1126203	300MHz~40GHz	Oct. 06, 2014	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1210004	300MHz~40GHz	Oct. 06, 2014	Conducted (TH01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	May 26, 2014	Radiation (03CH01-CB)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Jul. 28, 2014	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Oct. 28, 2014	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 22, 2014	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 15, 2014	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 12, 2015	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Nov. 25, 2014	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 06, 2014	Radiation (03CH01-CB)
EMI Test Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8GHz	Jan. 21, 2015	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R.	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO 2000	N/A	1 m - 4 m	N.C.R.	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 15, 2014	Radiation (03CH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Cable-high	Woken	High Cable-1	N/A	1 GHz – 26.5 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 15, 2014	Radiation (03CH01-CB)

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

N.C.R. means Non-Calibration required.

6. MEASUREMENT UNCERTAINTY

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