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FCC RADIO TEST REPORT

Applicant's company	**Xirrus, Inc.**
Applicant Address	2101 Corporate Center Drive, Thousand Oaks, CA 91320 USA
FCC ID	**SK6-XDR130**
Manufacturer's company	**Lite-On Network Communication (Dongguan) Limited**
Manufacturer Address	30#Keji Rd.,Yin Hu Industrial Area,Qingxi Town,DongGuan City,Guangdong,China

Product Name	Wireless Access Point Radio module
Brand Name	XIRRUS
Model No.	XDR130
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250 MHz / 5725 ~ 5850 MHz
Received Date	Apr. 10, 2015
Final Test Date	May 15, 2015
Submission Type	Original Equipment
Operating Mode	Master / Bridge (Client without radar detection)

Statement

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

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

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

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

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

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

Testing Laboratory
1190

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR541029AB	Rev. 01	Initial issue of report	May 27, 2015

1. VERIFICATION OF COMPLIANCE

Product Name	:	Wireless Access Point Radio module
Brand Name	:	XIRRUS
Model No.	:	XDR130
Applicant	:	Xirrus, 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 Apr. 10, 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	11.17 dB
4.2	15.407(a)	26dB Spectrum Bandwidth and 99% Occupied Bandwidth	Complies	-
4.3	15.407(e)	6dB Spectrum Bandwidth	Complies	-
4.4	15.407(a)	Maximum Conducted Output Power	Complies	2.36 dB
4.5	15.407(a)	Power Spectral Density	Complies	0.08 dB
4.6	15.407(b)	Radiated Emissions	Complies	0.47 dB
4.7	15.407(b)	Band Edge Emissions	Complies	0.03 dB
4.8	15.407(g)	Frequency Stability	Complies	-
4.9	15.203	Antenna Requirements	Complies	-

Note: 1. The EUT is a limited module which only limited to the Wireless Access Point (brand: XIRRUS / model: XD4130).

2. The EUT was installed to the Wireless Access Point (brand: XIRRUS / model: XD4130) to perform all the tests.

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	WLAN (3TX, 3RX)
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: 19.02 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 19.19 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 37.77 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 75.83 MHz Band 4: IEEE 802.11a: 33.26 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 38.55 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 59.77 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 74.96 MHz
Maximum Conducted Output Power	Band 1: IEEE 802.11a: 21.41 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 21.30 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 21.71 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 17.95 dBm Band 4: IEEE 802.11a: 21.30 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 23.14 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 22.07 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 17.17 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

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

Antenna and Band width

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

IEEE 11n/ac Spec.

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

Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT 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
1	Walsin	RFMTA241700NNLB004	Directional	I-PEX	2.3	10.5
2	Walsin	RFMTA241700NNLB004	Directional	I-PEX	2.3	10.5
3	Walsin	RFMTA241700NNLB004	Directional	I-PEX	2.3	10.5

Note: 1. The EUT has three antennas.

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

3. Chain 1, Chain 2 and Chain 3 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.

For RF transceiver sources (QCA9890):

Test Items	Mode		Data Rate	Channel	Chain
AC Power Conducted Emission	CTX		-	-	-
Max. Conducted Output Power	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1+2+3
	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	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1+2+3
	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	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1+2+3
	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	11a/BPSK	Band 4	6Mbps	149/157/165	1+2+3
	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	CTX		-	-	-
Radiated Emission Above 1GHz	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1+2+3
	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	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1+2+3
	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+2+3
	40 MHz	Band 1&4	-	38/151	1+2+3
	80 MHz	Band 1&4	-	42/155	1+2+3

For RF transceiver sources (QCA9880):

Test Items	Mode		Data Rate	Channel	Chain
Radiated Emission Above 1GHz	11ac VHT20	Band 4	MCS0/Nss1	157	1+2+3
Band Edge Emission	11ac VHT20	Band 4	MCS0/Nss1	157	1+2+3

Note: 1. VHT20/VHT40 covers HT20/HT40, due to same modulation.

2. The PoE is for measurement only, would not be marketed, its information as below:

Power	Brand	Model No.	FCC ID
PoE 1	PowerDsine	PD-3501G/AC	DoC
PoE 2	PowerDsine	PwerDsine7001G	DoC

The following test modes were performed for all tests:

For Radiated Emissions Above 1GHz and Radiated Emission Co-location test:

Mode 1. Place EUT in X axis (Panel upward)

Mode 2. Place EUT in X axis (Panel down)

Mode 3. Place EUT in Y axis (LAN port down)

Mode 3 has been evaluated to be the worst case after evaluating. Consequently, measurement will follow this same test mode.

For Radiated Emissions Below 1GHz test:

Place EUT in Y axis (LAN port down) generated the worst test result for Radiated emission Above 1GHz test, thus the measurement for Radiated emission Below 1GHz test will follow this same test configuration.

Mode 1. Place EUT in Y axis (LAN port down) - 2.4GHz WLAN function

Mode 2. Place EUT in Y axis (LAN port down) - 5GHz WLAN function

Mode 1 generated the worst test result, so it was recorded in this report.

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 Sporton test report: FA541029.) 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.

Note: The Wireless Access Point (brand: XIRRUS / model: XD4130) will install four radio modules (brand: XIRRUS / model: XDR130 / FCC ID: SK6-XDR130). These four radio modules will be operated in different bands. If they are used in the same band, the output power of each radio module will be reduced to make sure that total power is equal to max output power of single radio module.

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. Multiple Listing

There are two RF transceiver sources (QCA9890 & QCA 9880). They are pin to pin compatible. These two RF chipset are electrically identical.

The deviation is F/W and communications protocol so just selects QCA9890 as worse case and recorded in the report.

The QCA9880 was verified spurious emission above 1G, band-edge for 802.11ac VHT20 CH157 and recorded in the report.

3.8. Table for Supporting Units

For Test Site No: TH01-CB and 03CH01-CB

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6430	DoC
Wireless Access Point	XIRRUS	XD4130	SK6-XDR130
PoE 2	PowerDsine	PwerDsine7001G	N/A

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC
Wireless Access Point	XIRRUS	XD4130	SK6-XDR130
PoE 1	PowerDsine	PD-3501G/AC	DoC

3.9. Table for Parameters of Test Software Setting

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

Test Software Version	ART-xircon V1.0.2.25					
Mode	Test Frequency (MHz)					
	NCB: 20MHz					
	5180 MHz	5200 MHz	5240 MHz	5745 MHz	5785 MHz	5825 MHz
802.11a	15	15	14.5	15.5	18	18.5
802.11ac MCS0/Nss1 VHT20	16	15	14.5	14.5	24	18
Mode	NCB: 40MHz					
802.11ac MCS0/Nss1 VHT40	5190 MHz		5230 MHz	5755 MHz		5795 MHz
	14.5		17	14		19
Mode	NCB: 80MHz					
802.11ac MCS0/Nss1 VHT80	5210 MHz			5775 MHz		
	14			12.5		

3.10. EUT Operation during Test

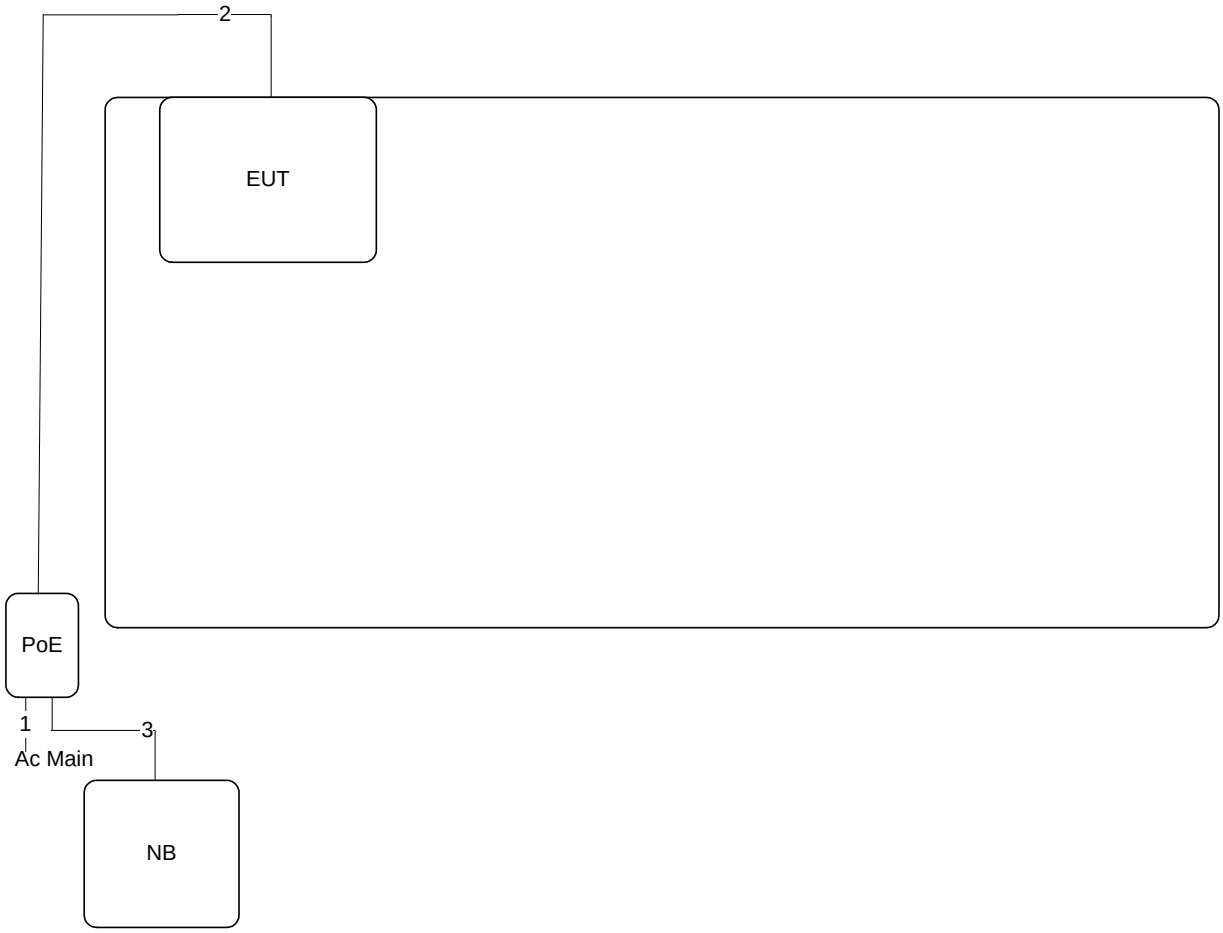
The EUT was programmed to be in continuously transmitting mode.

3.11. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	1.000	1.000	100.00	0.00	0.01
802.11ac MCS0/Nss1 VHT20	1.000	1.000	100.00	0.00	0.01
802.11ac MCS0/Nss1 VHT40	1.000	1.000	100.00	0.00	0.01
802.11ac MCS0/Nss1 VHT80	1.000	1.000	100.00	0.00	0.01

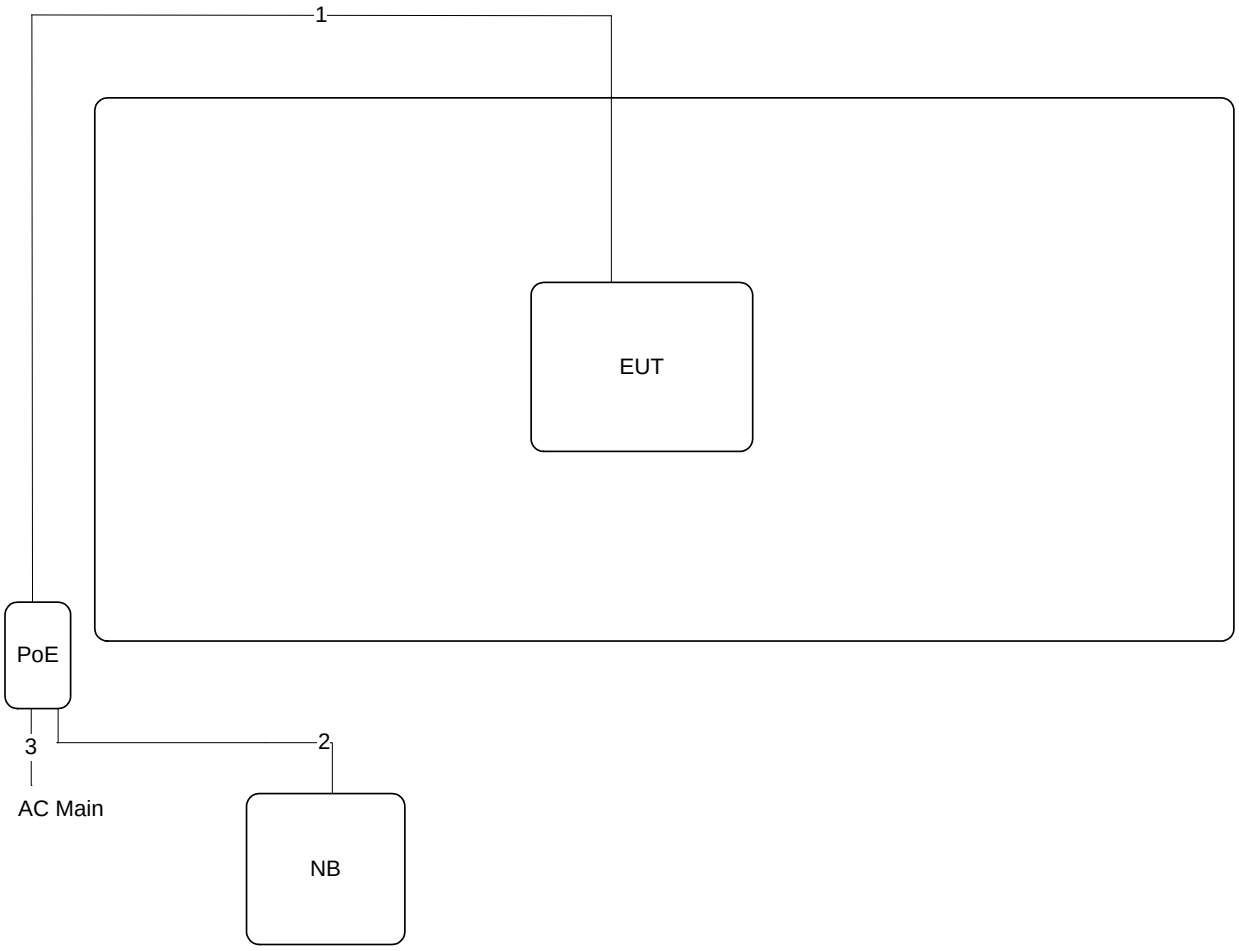
3.12. Test Configurations

3.12.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	1.8m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	1.5m

3.12.2. Radiation Emissions Test Configuration



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

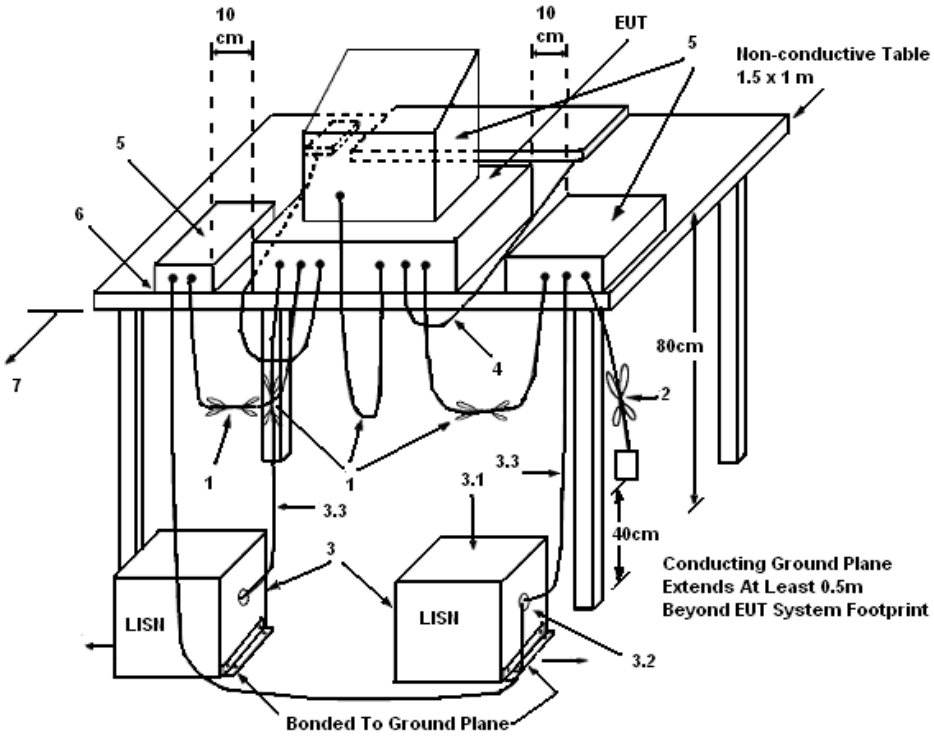
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

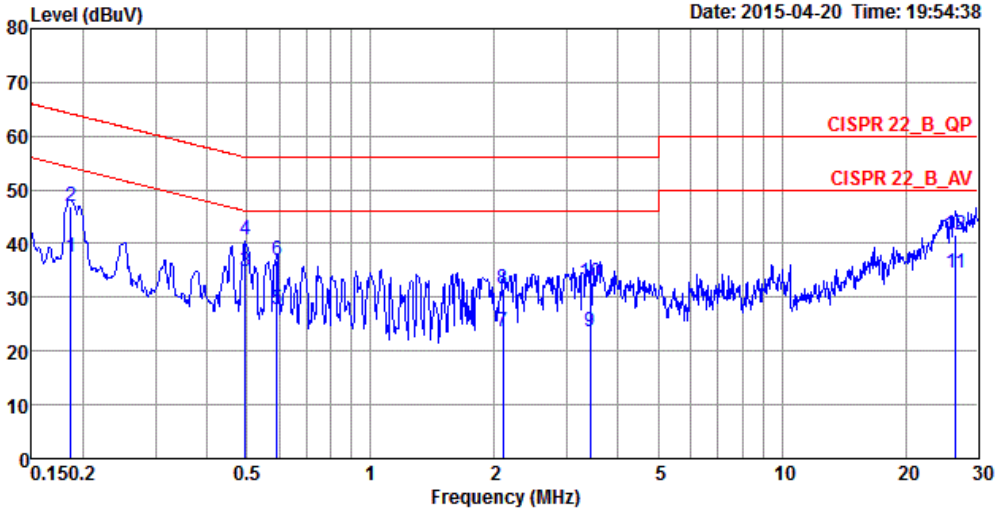
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

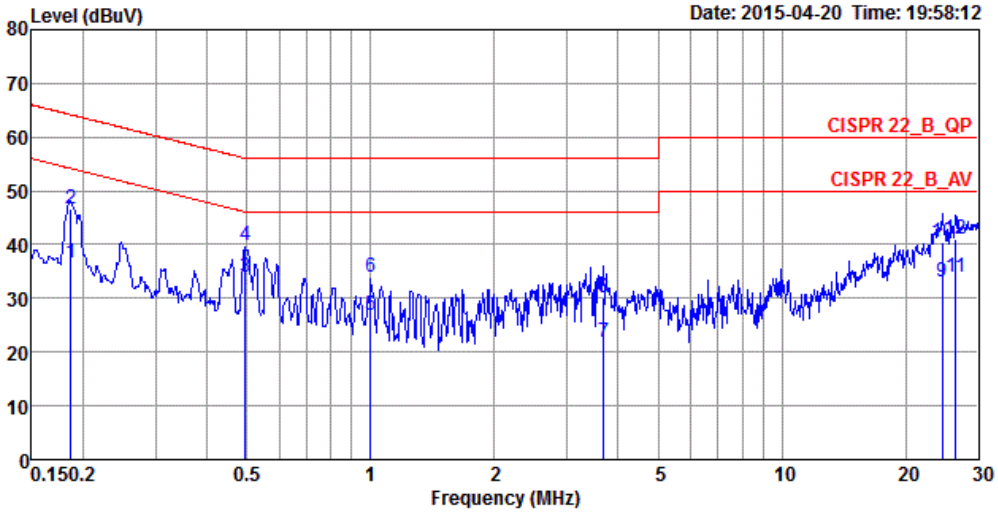
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	24°C	Humidity	56%
Test Engineer	Hank Yang	Phase	Line
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.19	37.42	-16.78	54.20	27.37	10.03	0.02	LINE	Average
2	0.19	47.08	-17.12	64.20	37.03	10.03	0.02	LINE	QP
3	0.50	34.88	-11.17	46.05	24.81	10.03	0.04	LINE	Average
4	0.50	40.80	-15.25	56.05	30.73	10.03	0.04	LINE	QP
5	0.59	27.86	-18.14	46.00	17.80	10.02	0.04	LINE	Average
6	0.59	36.99	-19.01	56.00	26.93	10.02	0.04	LINE	QP
7	2.10	23.66	-22.34	46.00	13.57	10.03	0.06	LINE	Average
8	2.10	31.70	-24.30	56.00	21.61	10.03	0.06	LINE	QP
9	3.42	23.56	-22.44	46.00	13.47	10.03	0.06	LINE	Average
10	3.42	32.66	-23.34	56.00	22.57	10.03	0.06	LINE	QP
11	26.42	34.58	-15.42	50.00	23.79	10.51	0.28	LINE	Average
12	26.42	41.58	-18.42	60.00	30.79	10.51	0.28	LINE	QP

Temperature	24°C	Humidity	56%
Test Engineer	Hank Yang	Phase	Neutral
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.19	36.49	-17.71	54.20	26.50	9.97	0.02	NEUTRAL	Average
2	0.19	46.68	-17.52	64.20	36.69	9.97	0.02	NEUTRAL	QP
3	0.50	33.82	-12.23	46.05	23.90	9.88	0.04	NEUTRAL	Average
4	0.50	39.98	-16.07	56.05	30.06	9.88	0.04	NEUTRAL	QP
5	1.00	26.92	-19.08	46.00	16.98	9.89	0.05	NEUTRAL	Average
6	1.00	33.91	-22.09	56.00	23.97	9.89	0.05	NEUTRAL	QP
7	3.68	21.87	-24.13	46.00	11.92	9.89	0.06	NEUTRAL	Average
8	3.68	30.24	-25.76	56.00	20.29	9.89	0.06	NEUTRAL	QP
9	24.53	32.94	-17.06	50.00	22.48	10.18	0.28	NEUTRAL	Average
10	24.53	40.34	-19.66	60.00	29.88	10.18	0.28	NEUTRAL	QP
11	26.42	33.92	-16.08	50.00	23.41	10.23	0.28	NEUTRAL	Average
12	26.42	41.12	-18.88	60.00	30.61	10.23	0.28	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

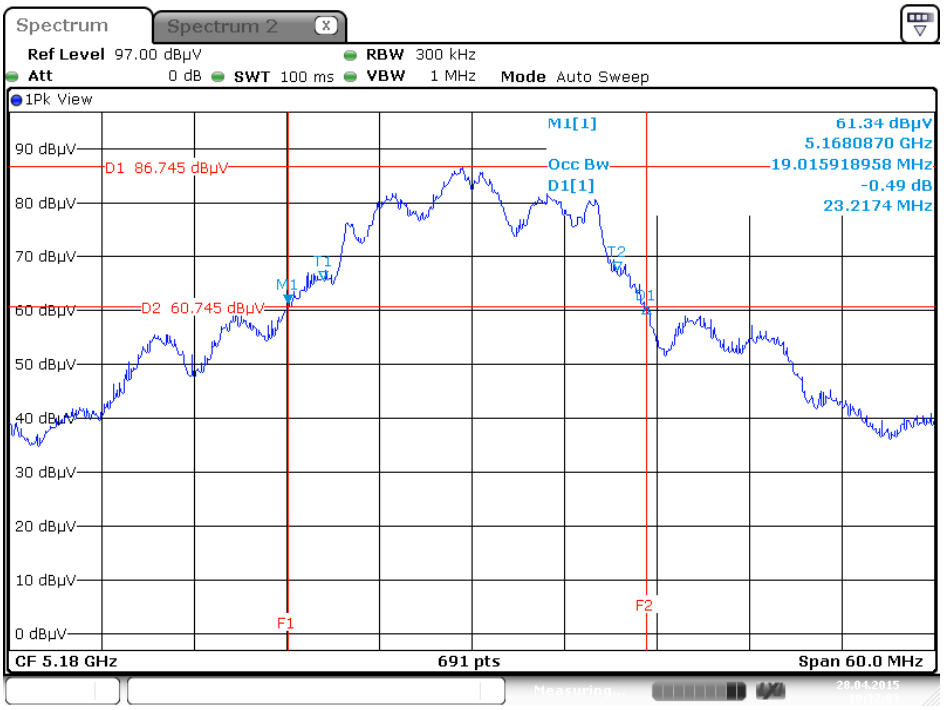
The EUT was programmed to be in continuously transmitting mode.

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

Temperature	26°C	Humidity	63%
Test Engineer	Lucas Huang		

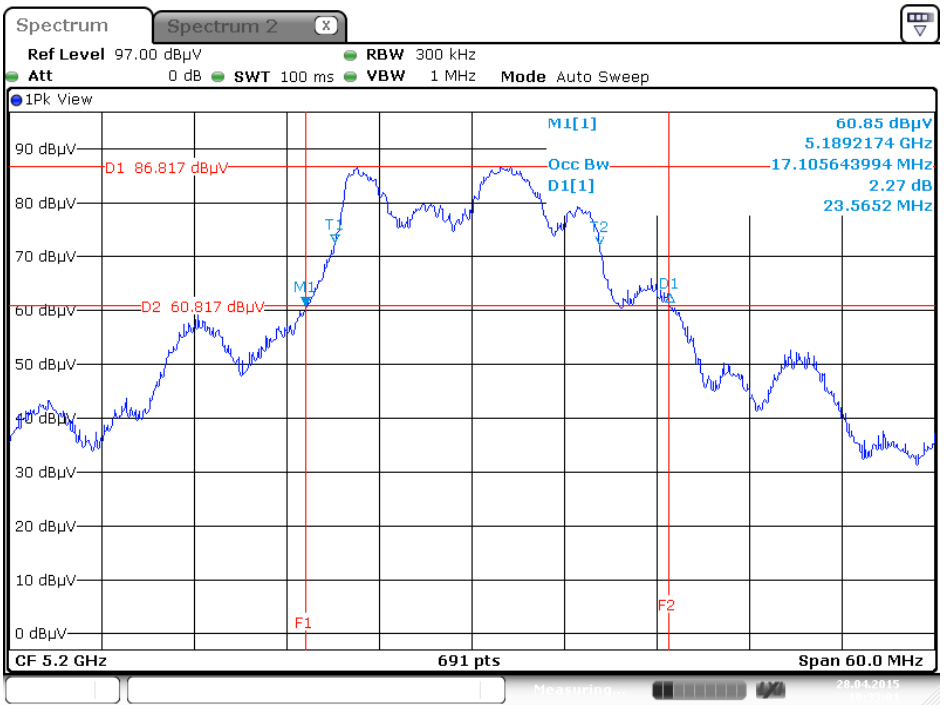
Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5180 MHz	23.22	19.02
	5200 MHz	23.56	17.10
	5240 MHz	26.35	17.19
	5745 MHz	22.26	16.75
	5785 MHz	52.00	33.26
	5825 MHz	33.39	24.49
802.11ac MCS0/Nss1 VHT20	5180 MHz	25.83	17.80
	5200 MHz	25.22	19.19
	5240 MHz	29.57	18.23
	5745 MHz	25.48	19.19
	5785 MHz	53.04	38.55
	5825 MHz	29.30	23.44
802.11ac MCS0/Nss1 VHT40	5190 MHz	40.58	35.60
	5230 MHz	71.30	37.77
	5755 MHz	45.65	37.63
	5795 MHz	86.23	59.77
802.11ac MCS0/Nss1 VHT80	5210 MHz	89.57	75.83
	5775 MHz	87.25	74.96

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



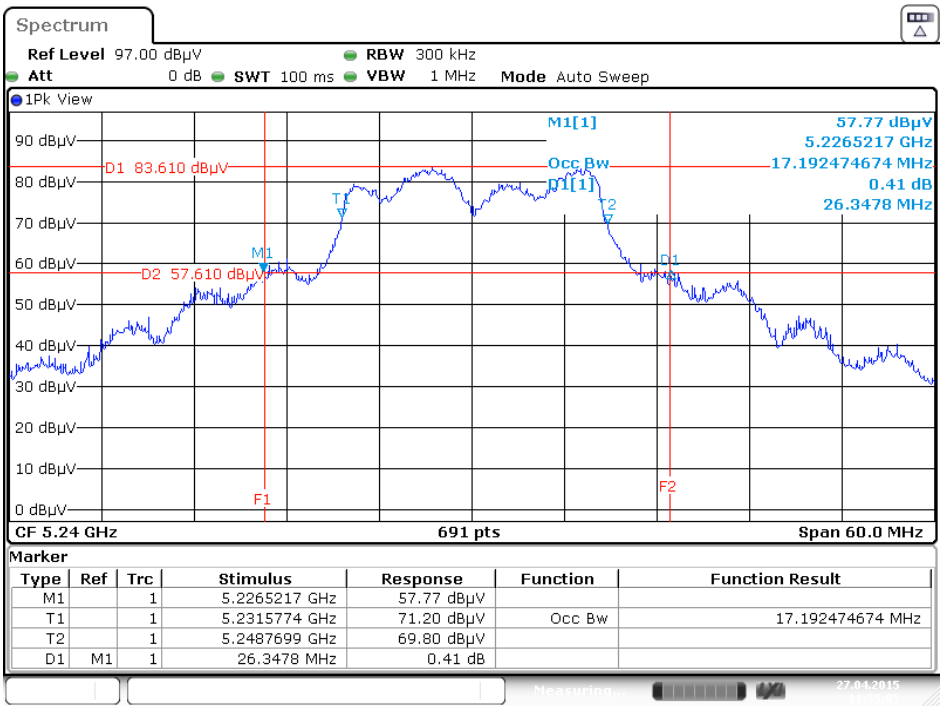
Date: 28.APR.2015 10:32:03

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



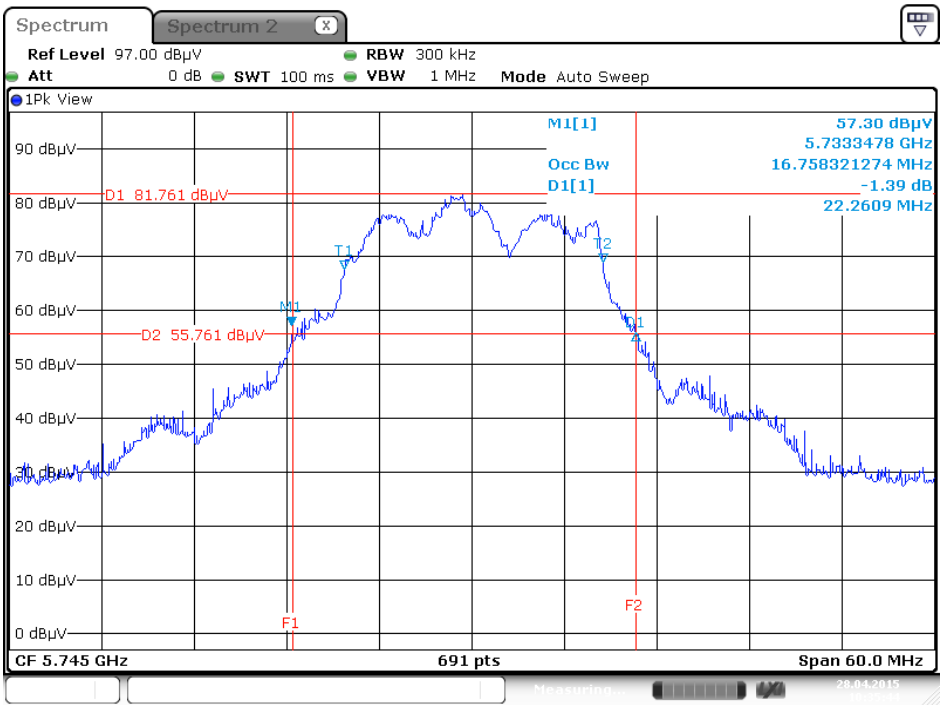
Date: 28.APR.2015 10:33:01

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



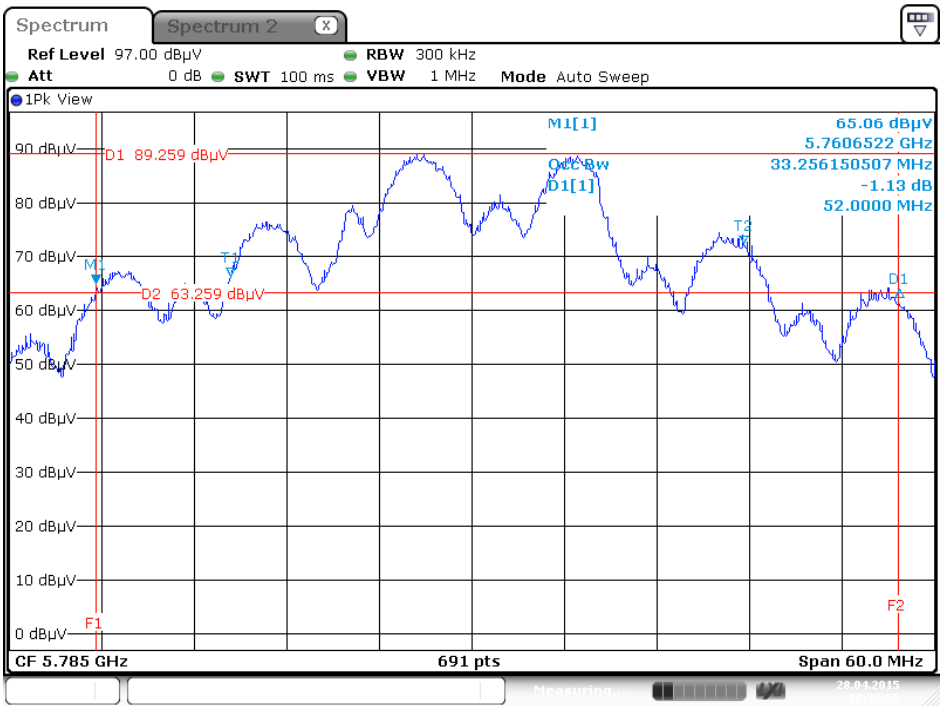
Date: 27.APR.2015 11:35:05

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



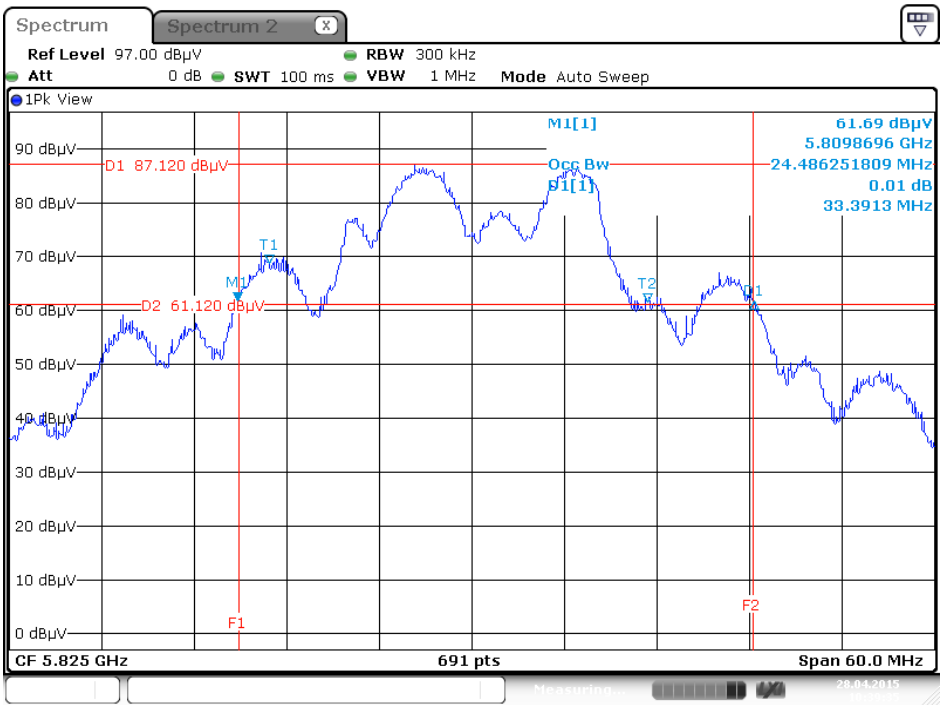
Date: 28.APR.2015 10:35:44

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



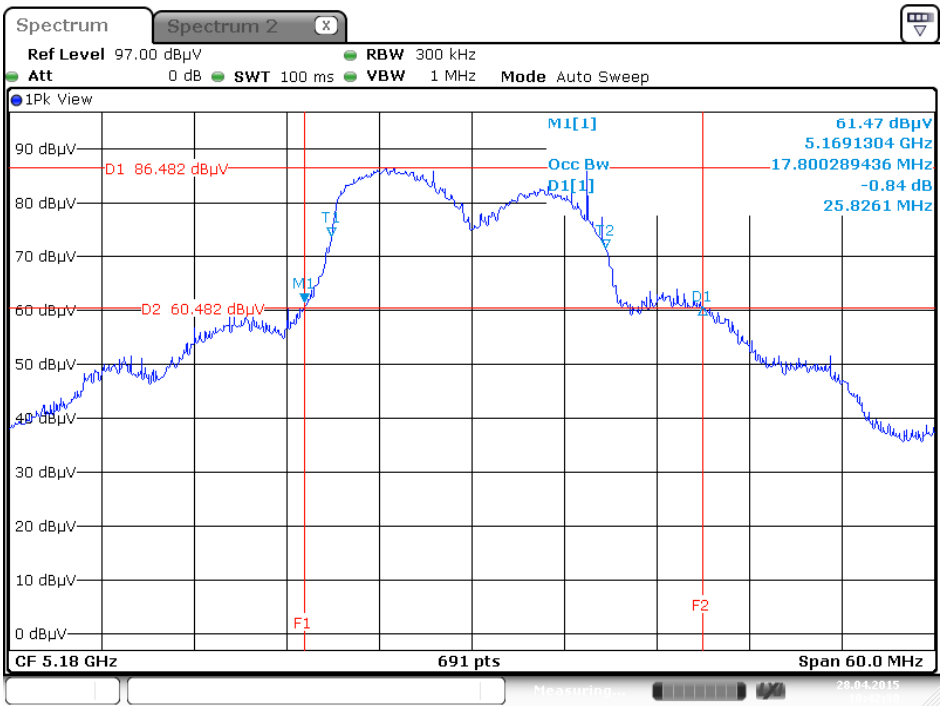
Date: 28.APR.2015 10:37:55

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



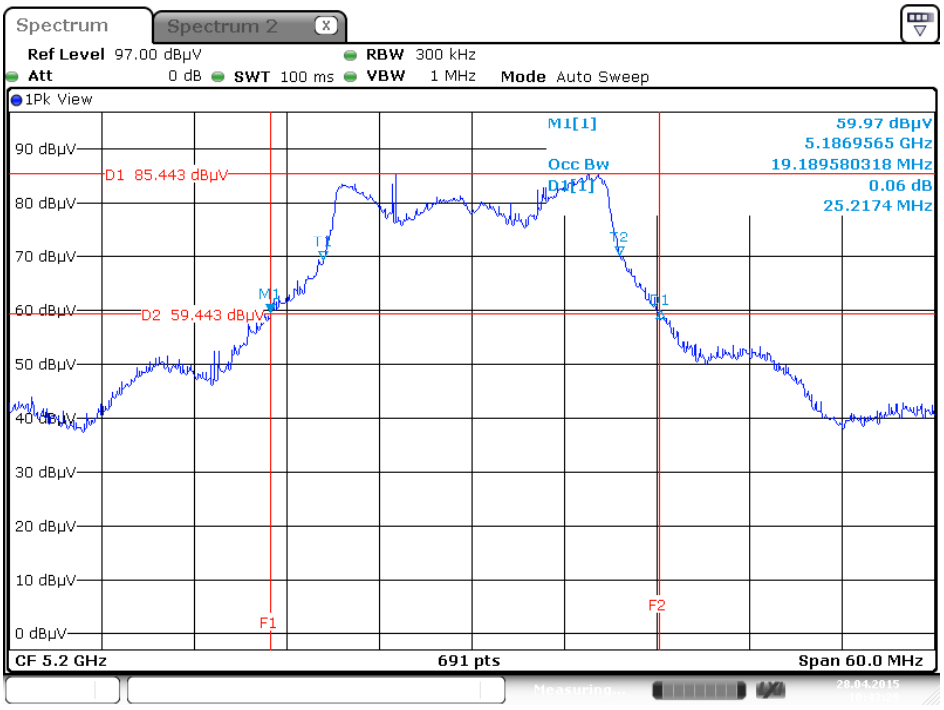
Date: 28.APR.2015 10:39:36

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



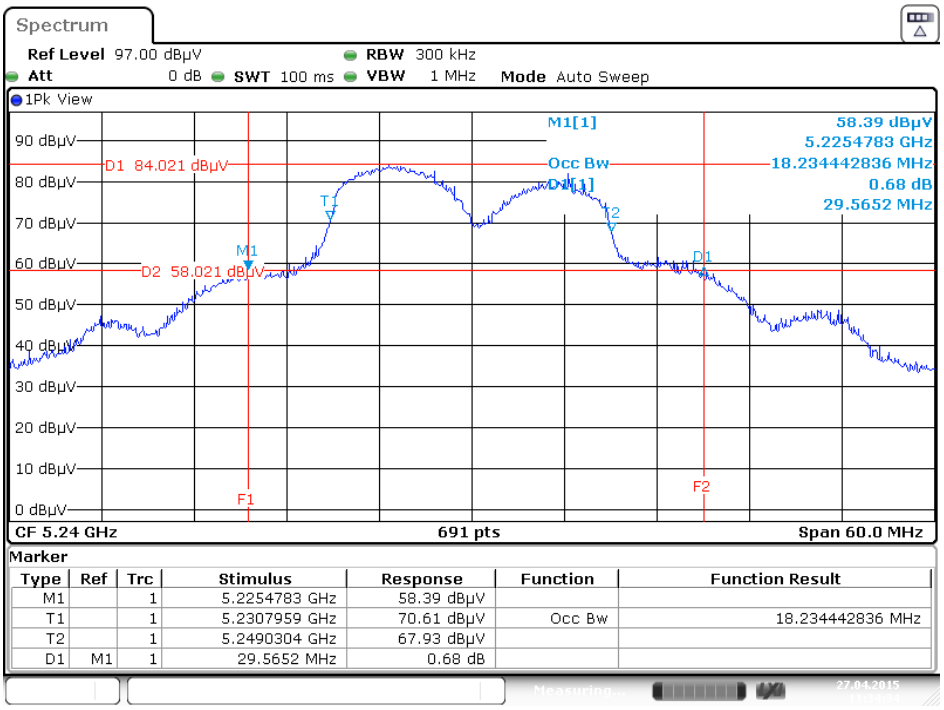
Date: 28.APR.2015 10:42:29

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



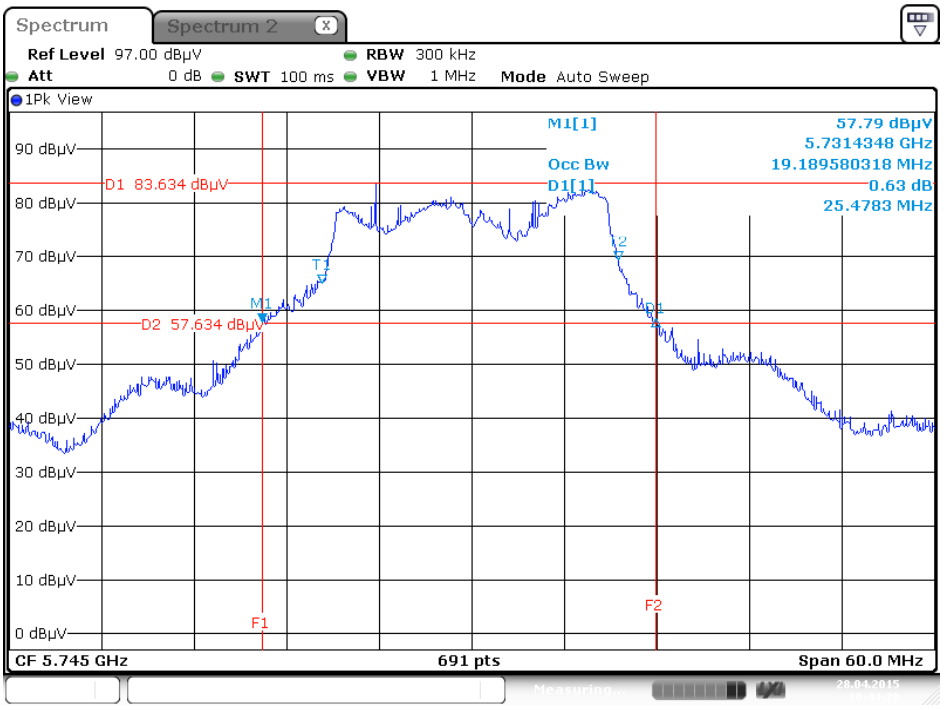
Date: 28.APR.2015 10:43:30

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



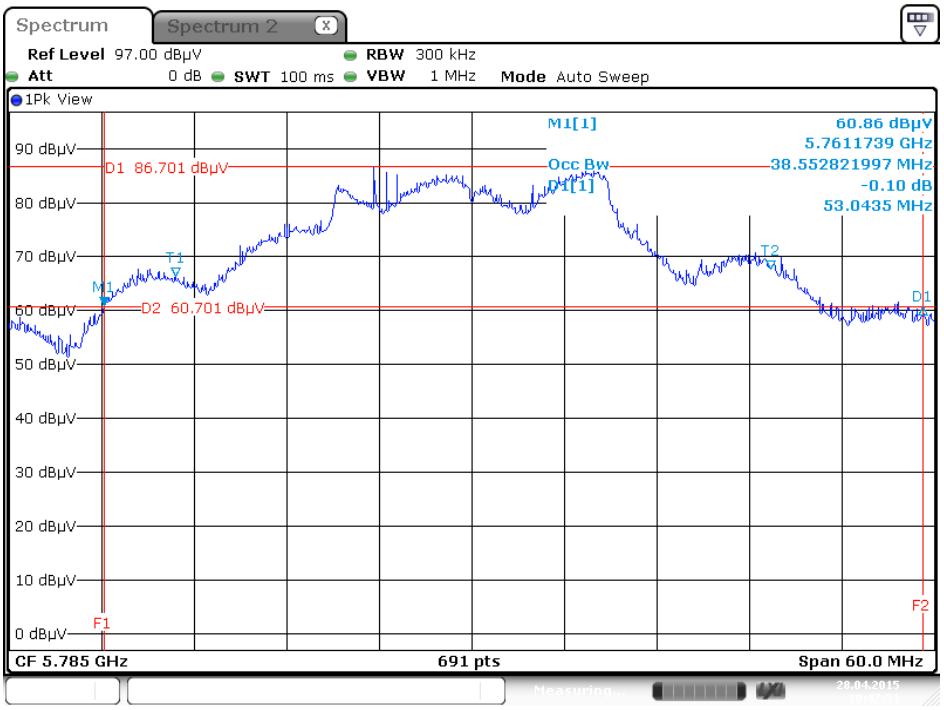
Date: 27.APR.2015 11:34:34

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



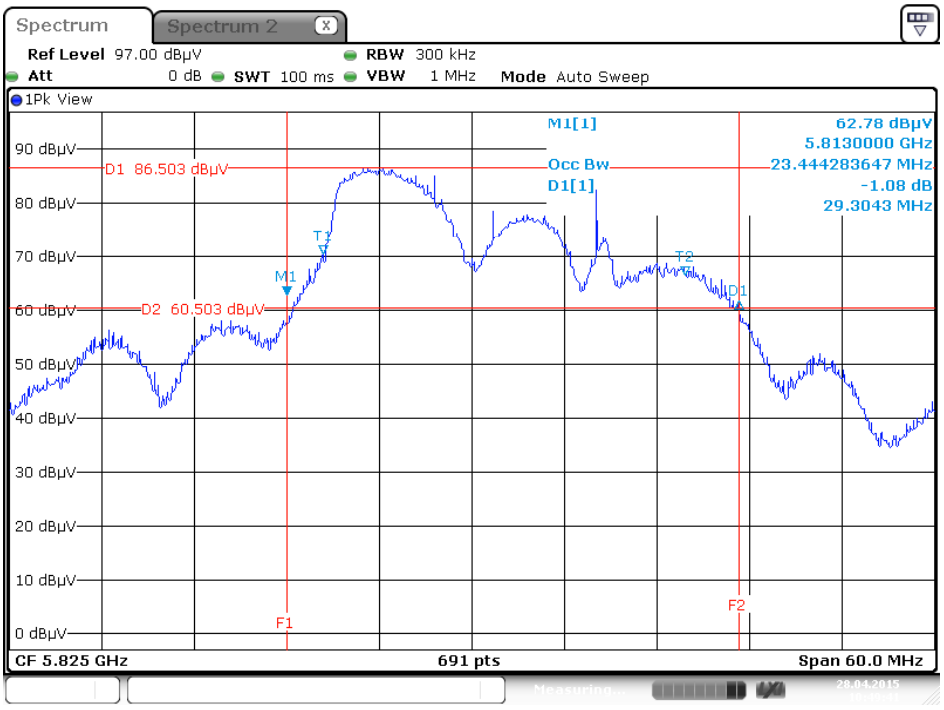
Date: 28.APR.2015 10:44:29

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



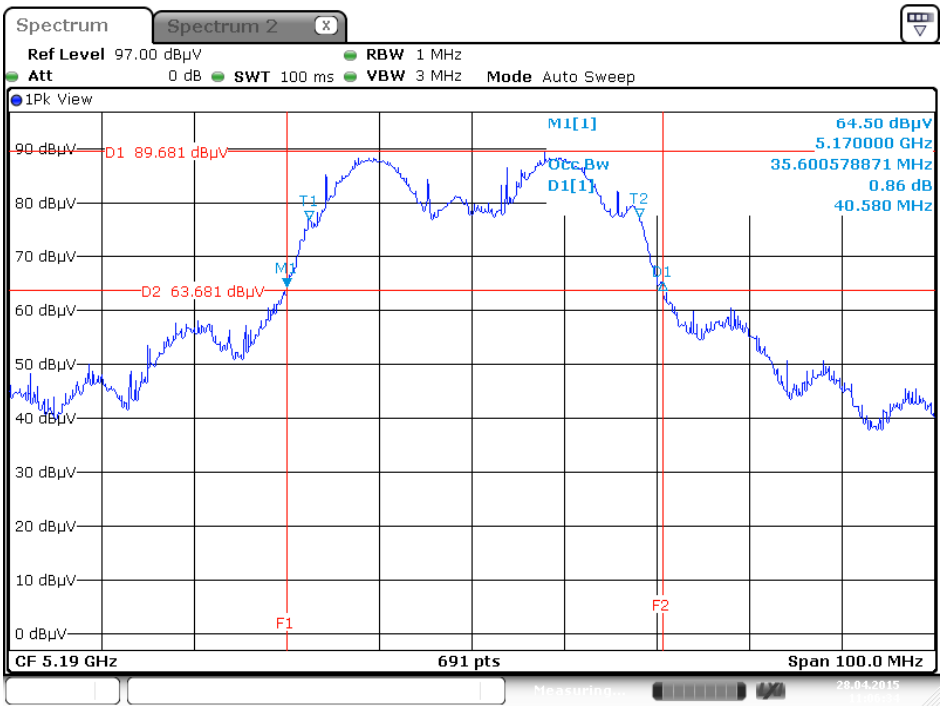
Date: 28.APR.2015 10:47:52

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



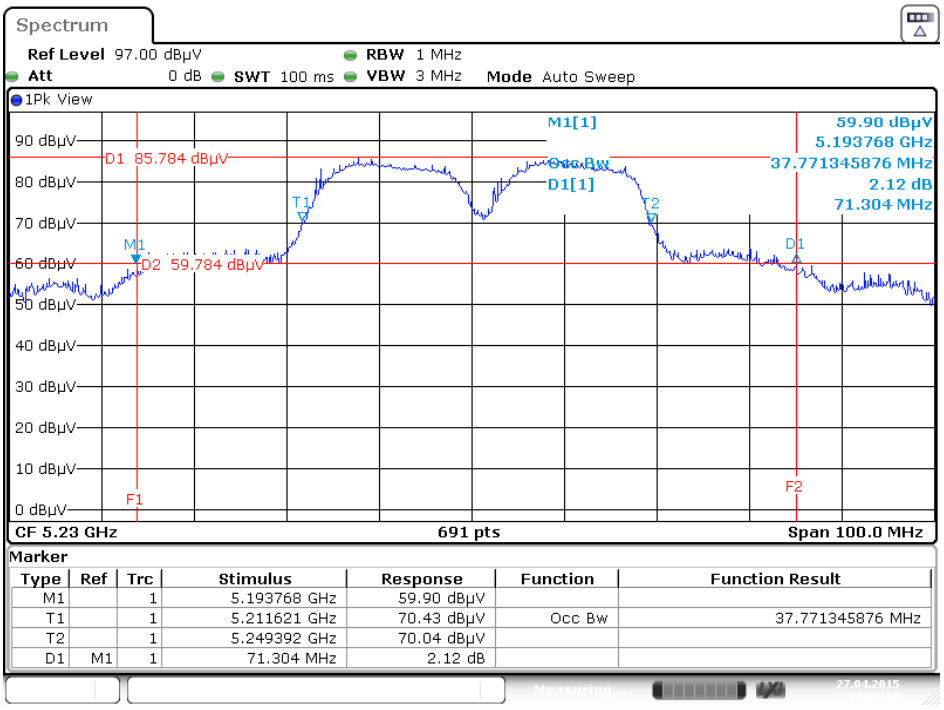
Date: 28.APR.2015 10:49:41

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



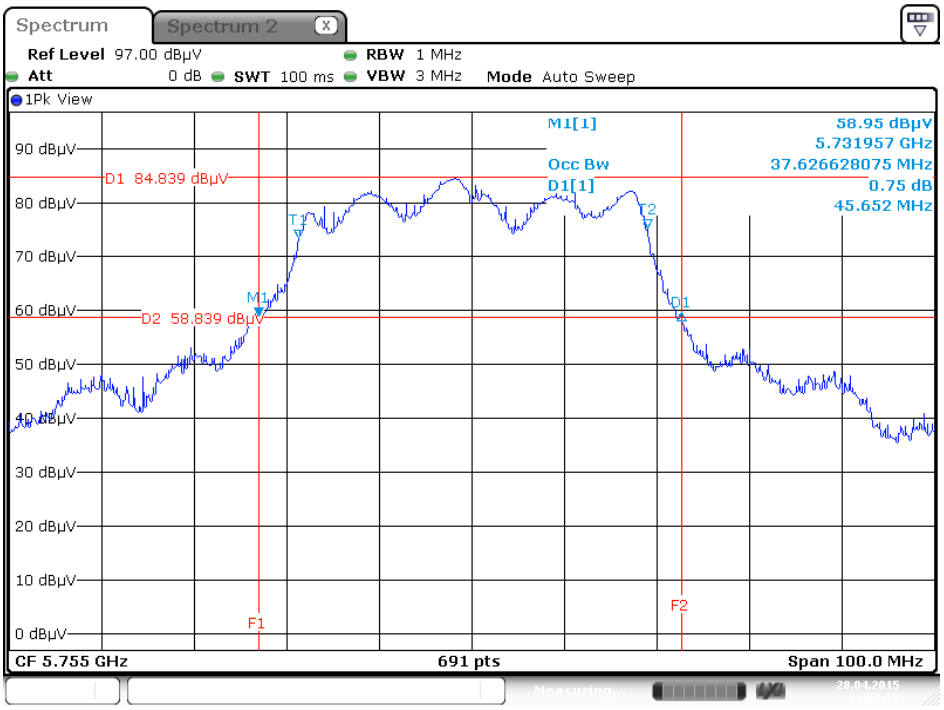
Date: 28.APR.2015 11:06:34

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



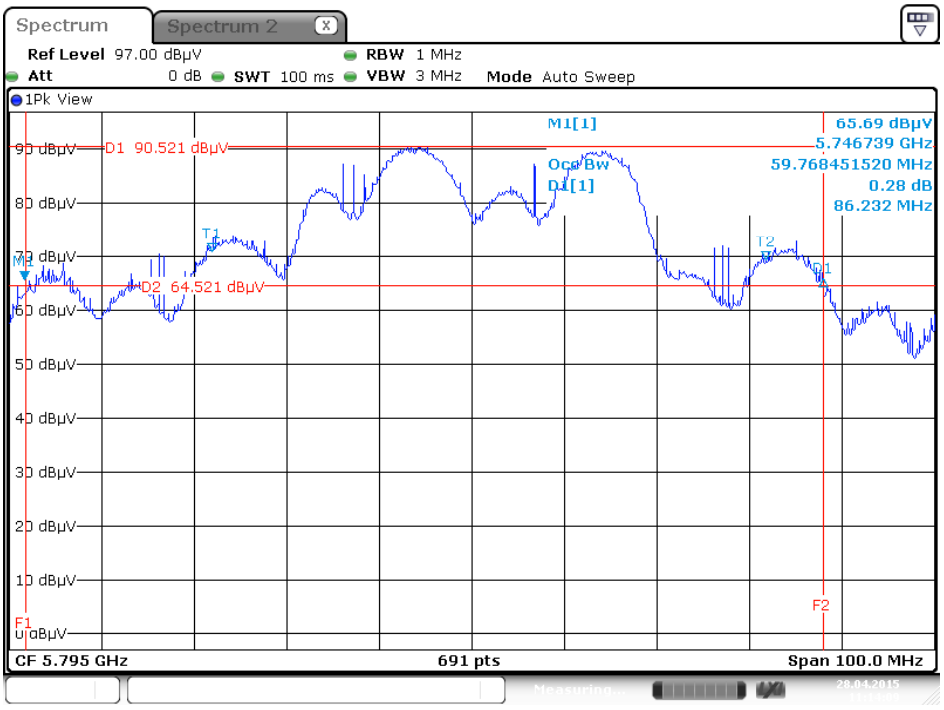
Date: 27.APR.2015 11:25:08

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



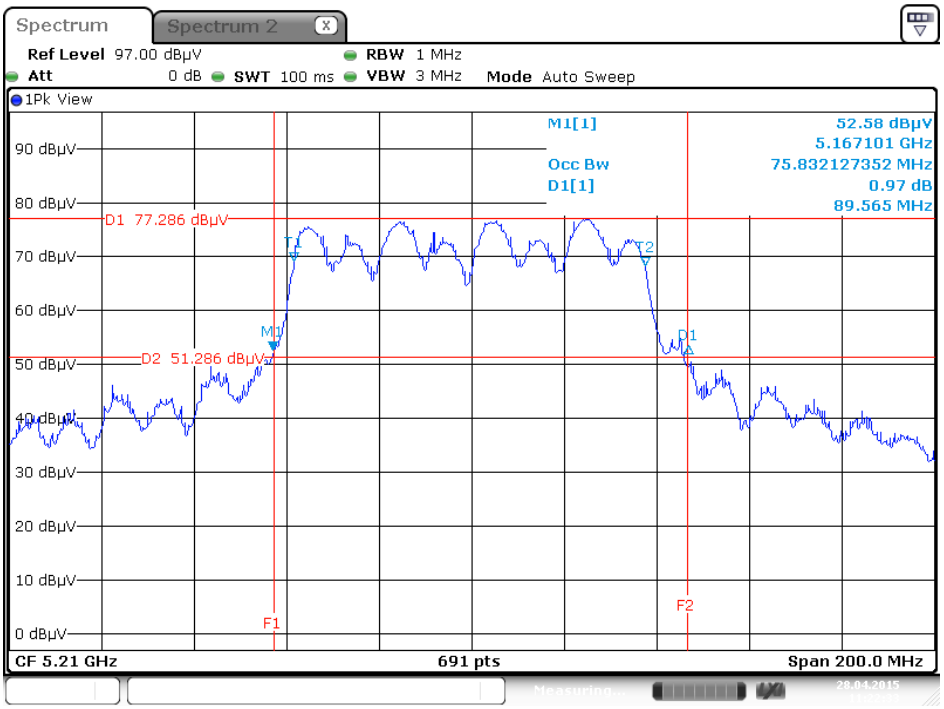
Date: 28.APR.2015 11:09:12

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



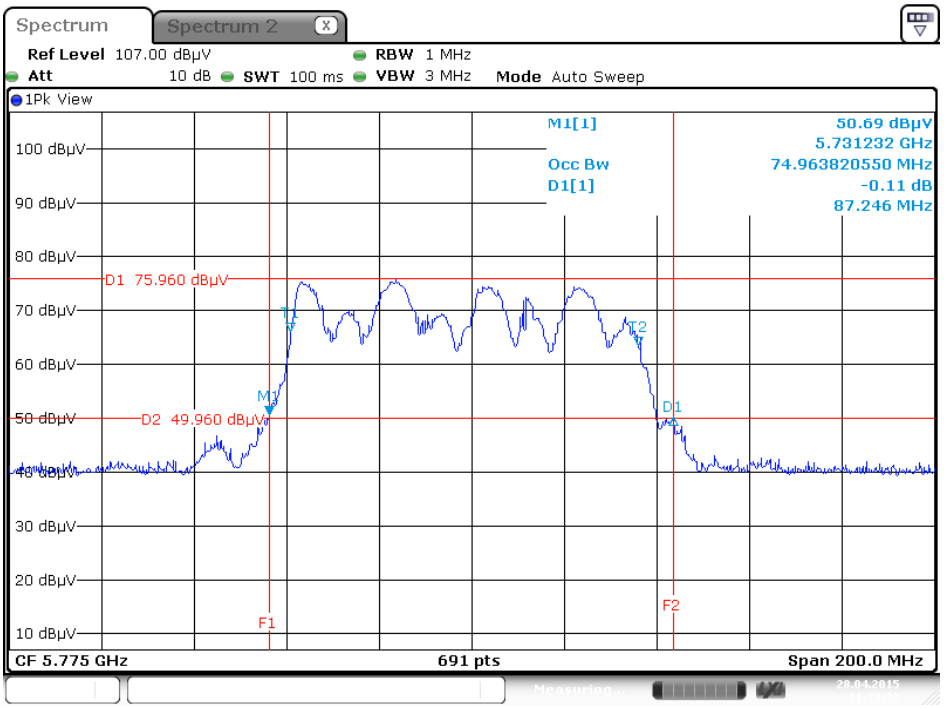
Date: 28.APR.2015 11:14:09

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



Date: 28.APR.2015 11:22:33

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



Date: 28.APR.2015 11:23:32

4.3. 6dB Spectrum Bandwidth Measurement

4.3.1. Limit

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

4.3.2. Measuring Instruments and Setting

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

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

4.3.3. Test Procedures

For Radiated 6dB Bandwidth Measurement:

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

4.3.4. Test Setup Layout

For Radiated 6dB Bandwidth Measurement:

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

4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of 6dB Spectrum Bandwidth

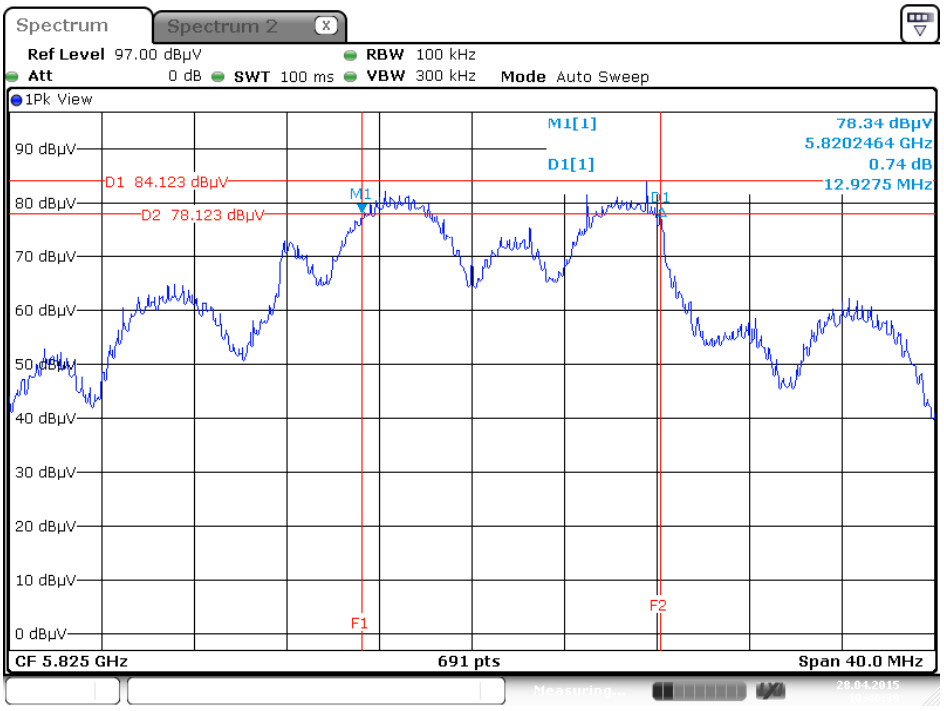
Temperature	26°C	Humidity	63%
Test Engineer	Lucas Huang		

Mode	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11a	5745 MHz	14.49	500	Complies
	5785 MHz	13.21	500	Complies
	5825 MHz	12.93	500	Complies
802.11ac MCS0/Nss1 VHT20	5745 MHz	15.19	500	Complies
	5785 MHz	17.68	500	Complies
	5825 MHz	16.35	500	Complies
802.11ac MCS0/Nss1 VHT40	5755 MHz	36.52	500	Complies
	5795 MHz	31.88	500	Complies
802.11ac MCS0/Nss1 VHT80	5775 MHz	65.22	500	Complies

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

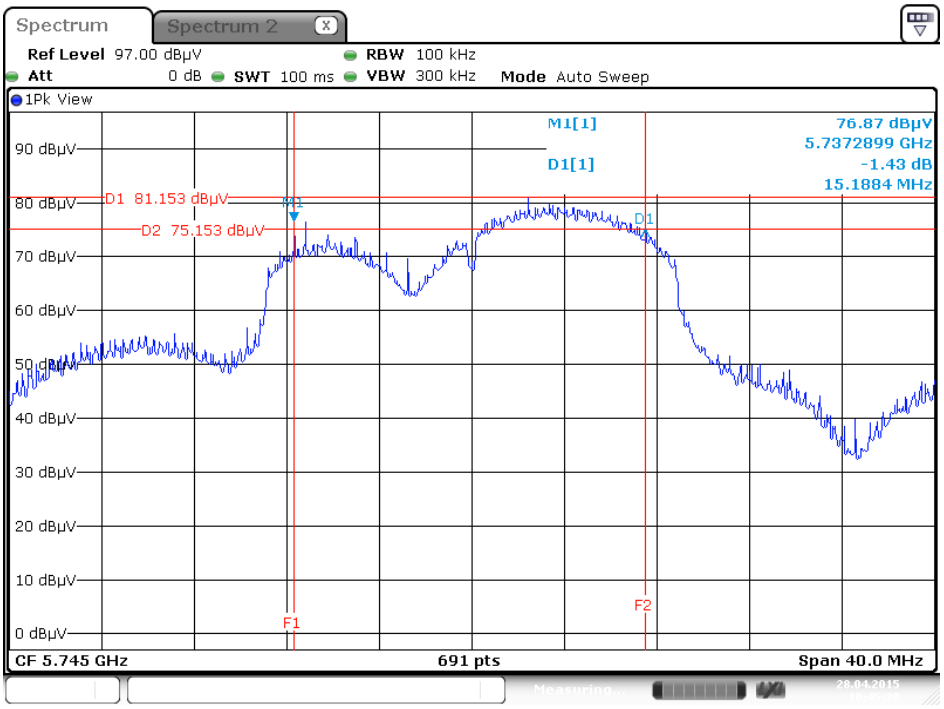
For plots, only the channel with worse result was shown.

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



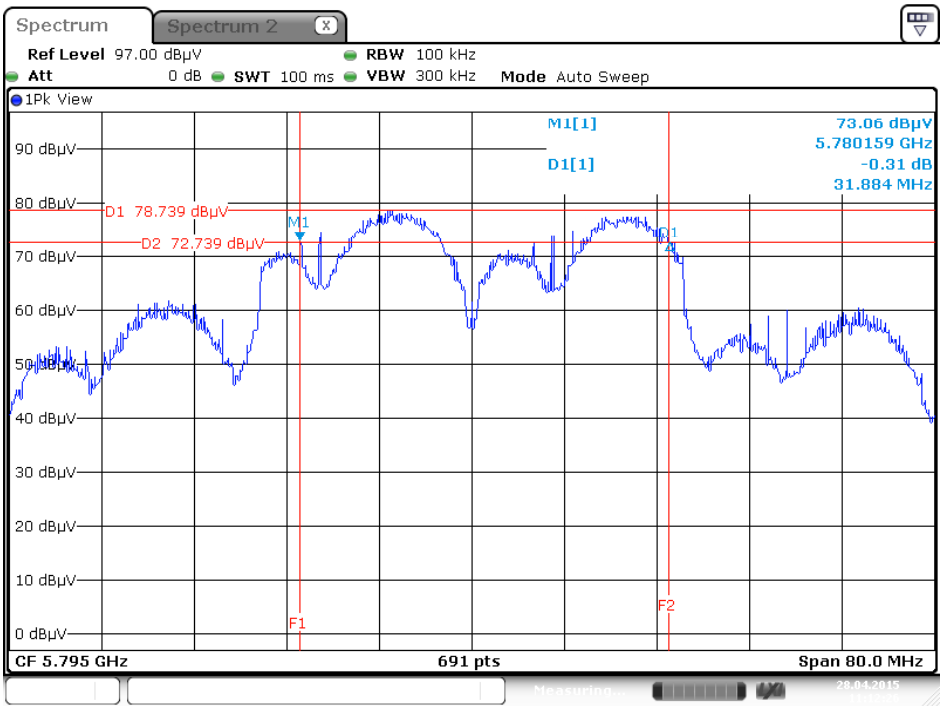
Date: 28.APR.2015 10:40:40

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 / 5745 MHz



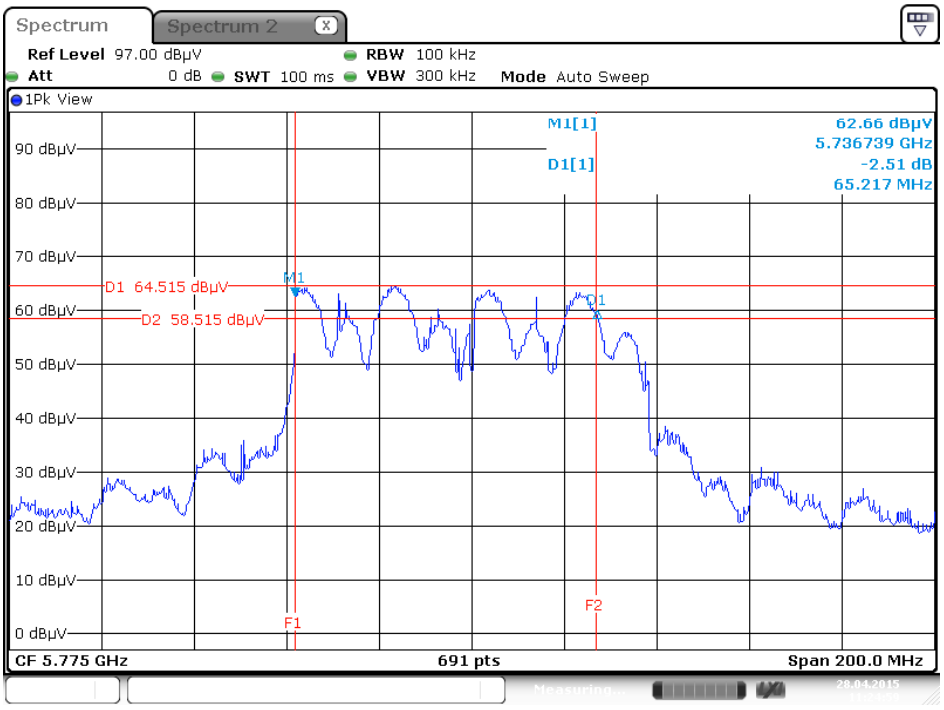
Date: 28.APR.2015 10:45:21

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



Date: 28.APR.2015 11:12:27

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



Date: 28.APR.2015 11:24:59

4.4. Maximum Conducted Output Power Measurement

4.4.1. Limit

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

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

4.4.2. Measuring Instruments and Setting

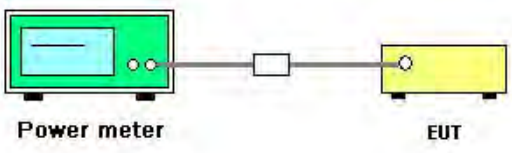
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	AVERAGE

4.4.3. Test Procedures

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

4.4.4. Test Setup Layout



4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7. Test Result of Maximum Conducted Output Power

Temperature	26°C	Humidity	63%
Test Engineer	Lucas Huang	Test Date	Apr. 28, 2015

Mode	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
802.11a	5180 MHz	16.55	16.80	16.18	21.29	25.50	Complies
	5200 MHz	16.87	16.77	16.24	21.41	25.50	Complies
	5240 MHz	16.44	16.55	16.77	21.36	25.50	Complies
	5745 MHz	15.69	15.40	14.82	20.09	25.50	Complies
	5785 MHz	16.08	16.56	15.66	20.89	25.50	Complies
	5825 MHz	16.96	16.24	16.36	21.30	25.50	Complies
802.11ac MCS0/Nss1 VHT20	5180 MHz	14.71	15.68	17.43	20.86	25.50	Complies
	5200 MHz	16.57	16.77	16.23	21.30	25.50	Complies
	5240 MHz	16.38	16.37	16.34	21.13	25.50	Complies
	5745 MHz	14.16	14.17	14.35	19.00	25.50	Complies
	5785 MHz	18.76	18.4	17.89	23.14	25.50	Complies
	5825 MHz	16.69	16.41	16.13	21.19	25.50	Complies
802.11ac MCS0/Nss1 VHT40	5190 MHz	13.24	13.92	14.38	18.64	25.50	Complies
	5230 MHz	16.69	17.12	16.99	21.71	25.50	Complies
	5755 MHz	13.56	13.03	14.15	18.38	25.50	Complies
	5795 MHz	17.74	17.26	16.85	22.07	25.50	Complies
802.11ac MCS0/Nss1 VHT80	5210 MHz	12.52	13.31	13.62	17.95	25.50	Complies
	5775 MHz	12.20	12.40	12.60	17.17	25.50	Complies

Note: Antenna gain=10.50dBi >6dBi, so power limit=30 – (10.50 – 6)=25.50dBm.

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

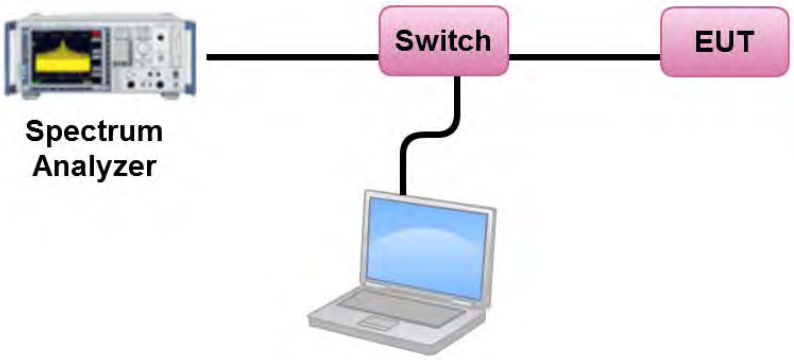
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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	26°C	Humidity	63%
Test Engineer	Lucas Huang	Test Date	Apr. 28, 2015

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

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	7.52	7.73	Complies
40	5200 MHz	7.33	7.73	Complies
48	5240 MHz	7.54	7.73	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =15.27dBi >6dBi, so limit=17 – (15.27 – 6)=7.73dBm/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	7.48	-3.01	4.47	20.73	Complies
157	5785 MHz	8.13	-3.01	5.12	20.73	Complies
165	5825 MHz	9.05	-3.01	6.04	20.73	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =15.27dBi >6dBi, so limit=30 – (15.27 – 6)=20.73dBm/500kHz.

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	7.41	7.73	Complies
40	5200 MHz	7.60	7.73	Complies
48	5240 MHz	7.65	7.73	Complies

Note: $Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =15.27dBi >6dBi, so limit=17 – (15.27 – 6)=7.73dBm/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	6.61	-3.01	3.60	20.73	Complies
157	5785 MHz	9.74	-3.01	6.73	20.73	Complies
165	5825 MHz	7.99	-3.01	4.98	20.73	Complies

Note: $Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =15.27dBi >6dBi, so limit=30 – (15.27 – 6)=20.73dBm/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	4.38	7.73	Complies
46	5230 MHz	6.26	7.73	Complies

Note: $Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =15.27dBi >6dBi, so limit=17 – (15.27 – 6)=7.73dBm/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	2.16	-3.01	-0.85	20.73	Complies
159	5795 MHz	5.77	-3.01	2.76	20.73	Complies

Note: $Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =15.27dBi >6dBi, so limit=30 – (15.27 – 6)=20.73dBm/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	-0.17	7.73	Complies

Note: $Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =15.27dBi >6dBi, so limit=17 – (15.27 – 6)=7.73dBm/MHz.

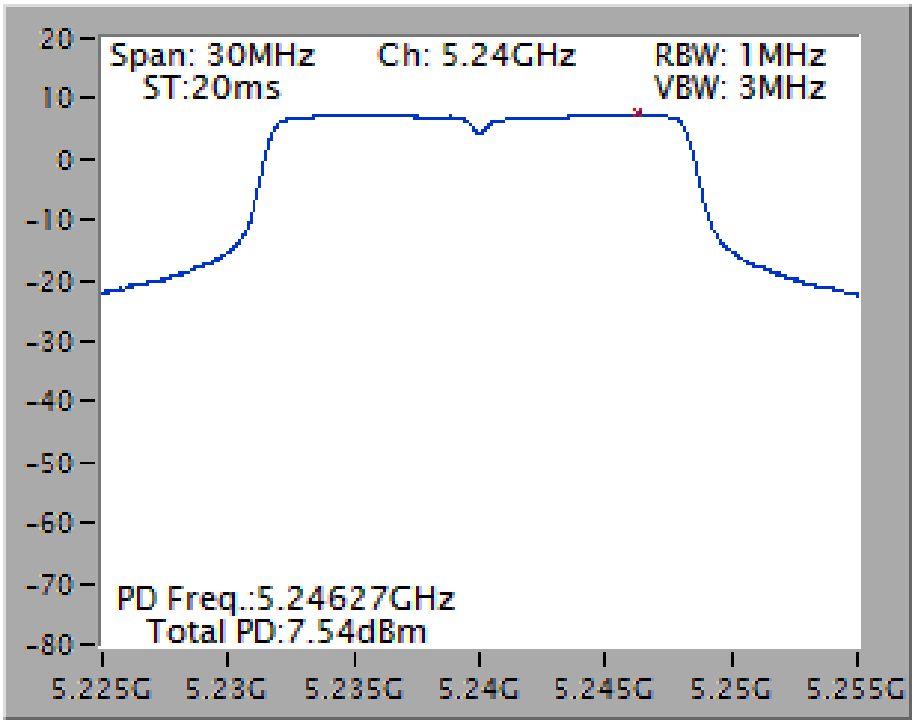
Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
155	5775 MHz	-1.09	-3.01	-4.10	20.73	Complies

Note: $Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =15.27dBi >6dBi, so limit=30 – (15.27 – 6)=20.73dBm/500kHz.

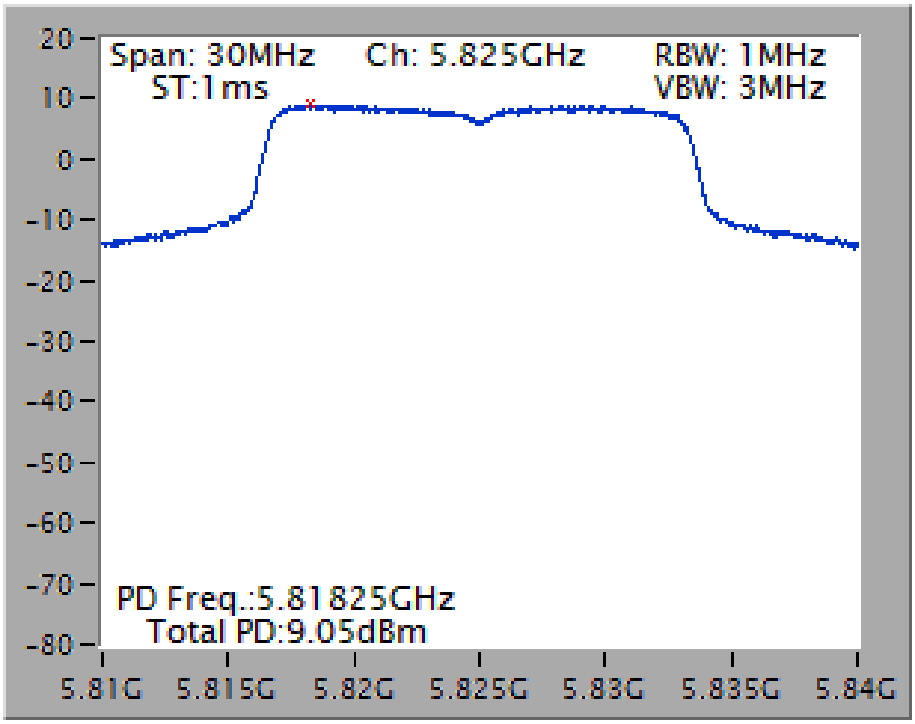
Note: All the test values were listed in the report.

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

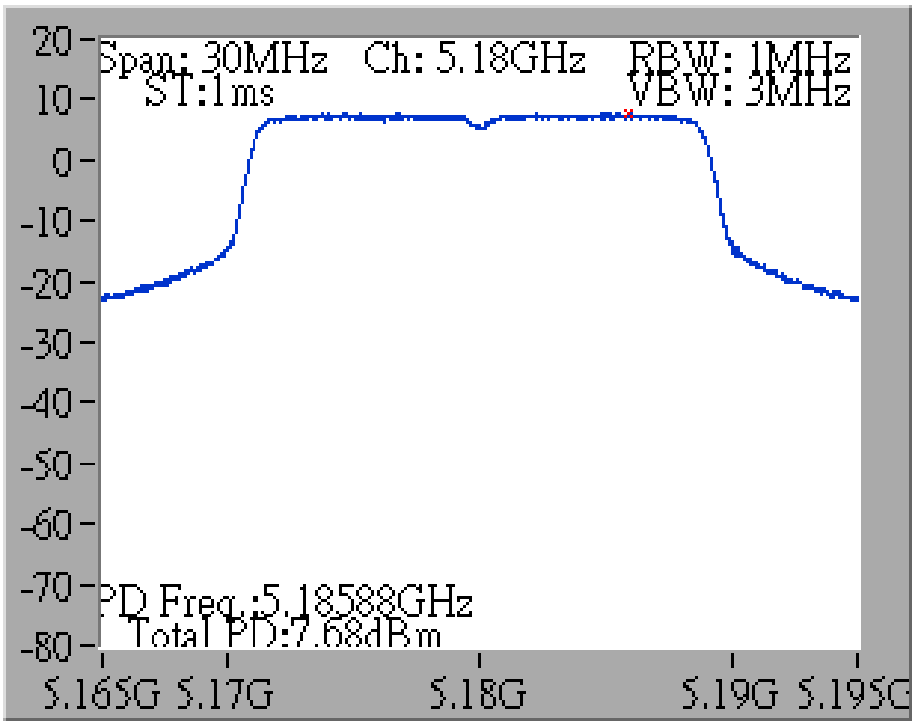
Power Density Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3 / 5240 MHz



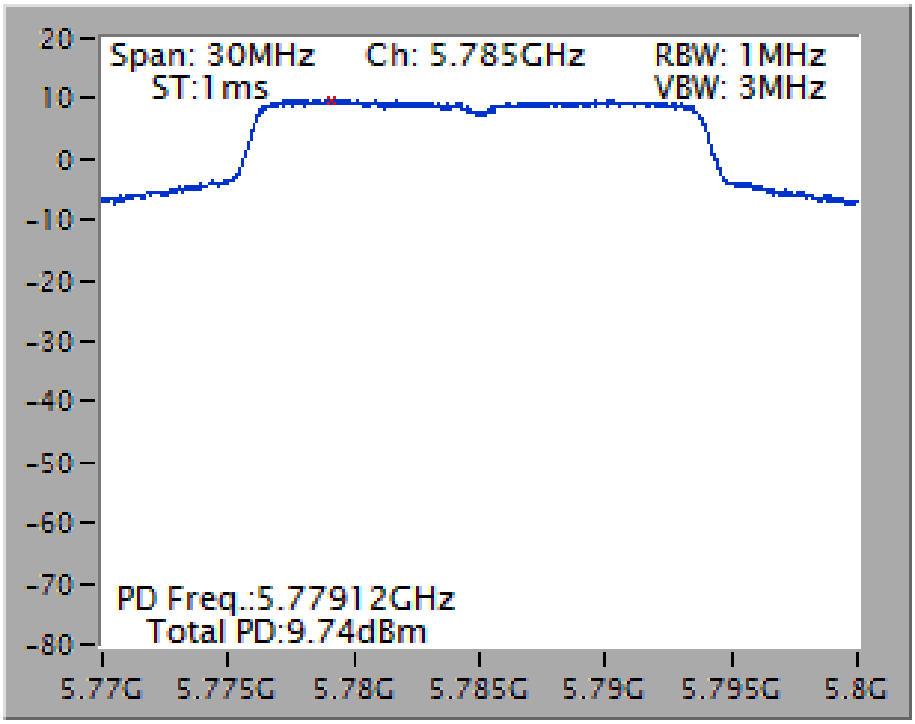
Power Density Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3 / 5825 MHz



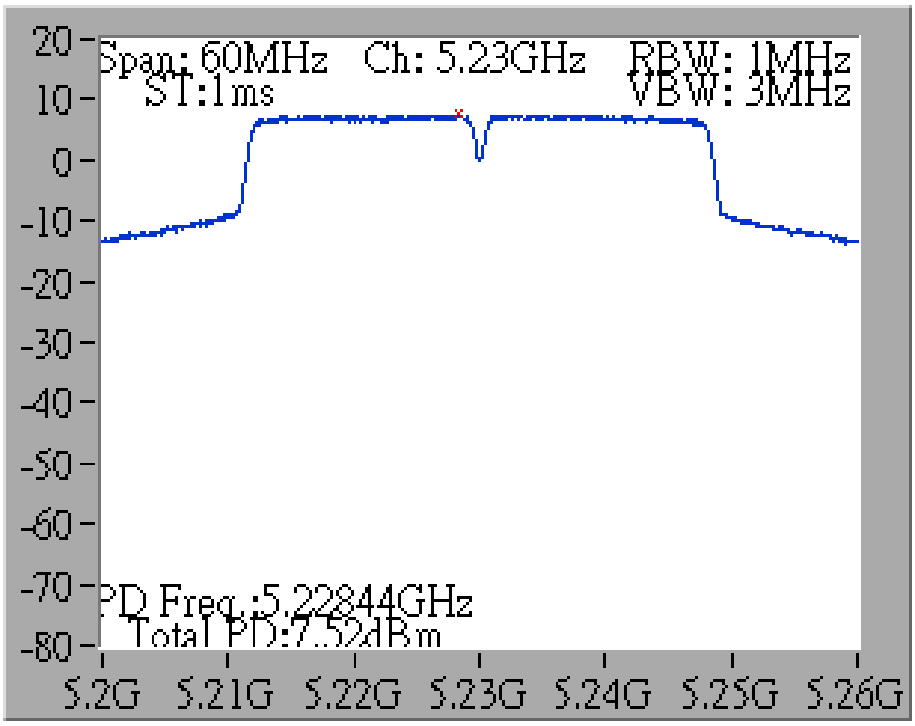
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 / 5180 MHz



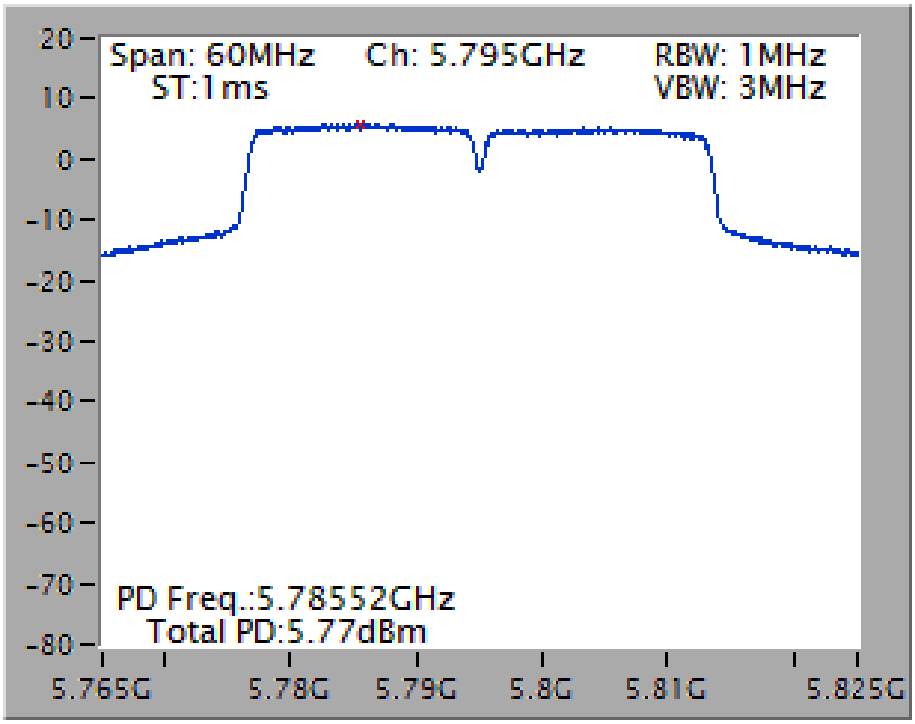
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 / 5785 MHz



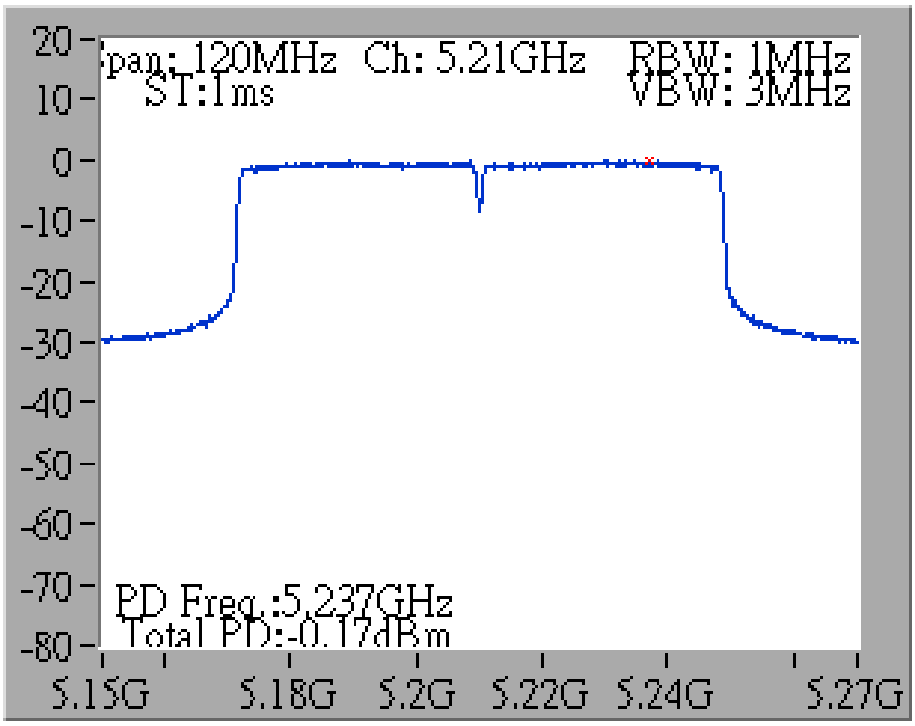
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 / 5230 MHz



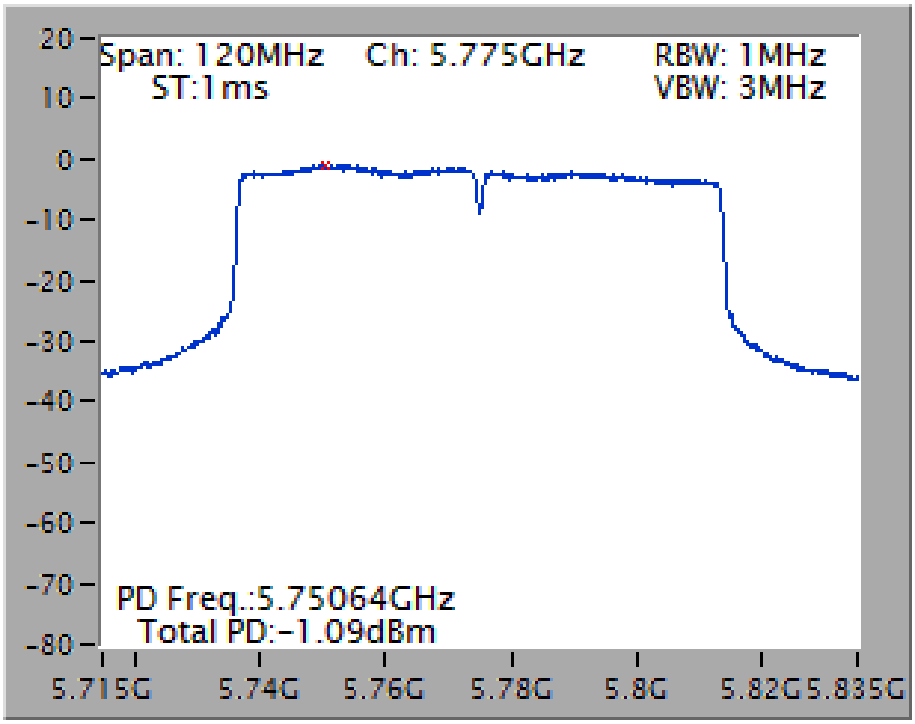
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 / 5795 MHz



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

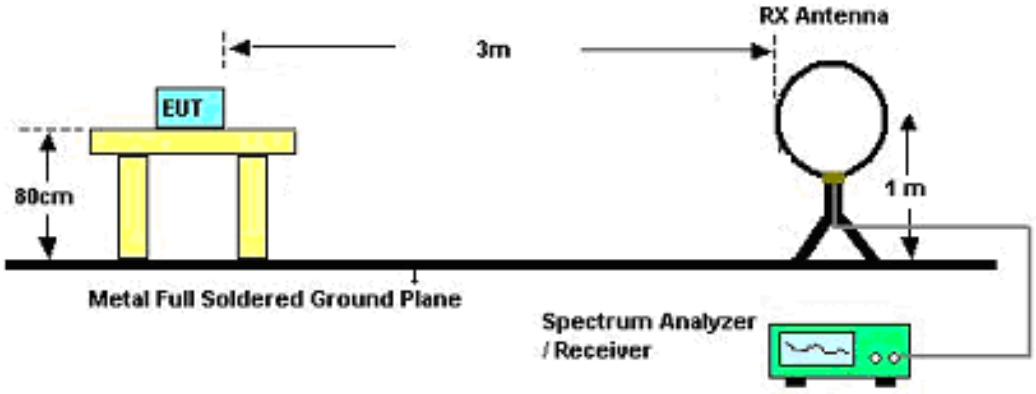
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.6.3. Test Procedures

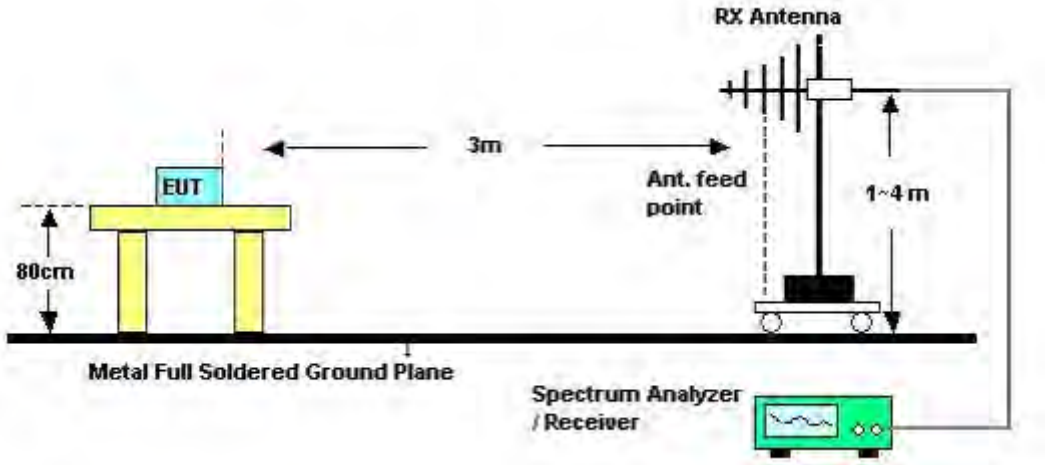
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting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

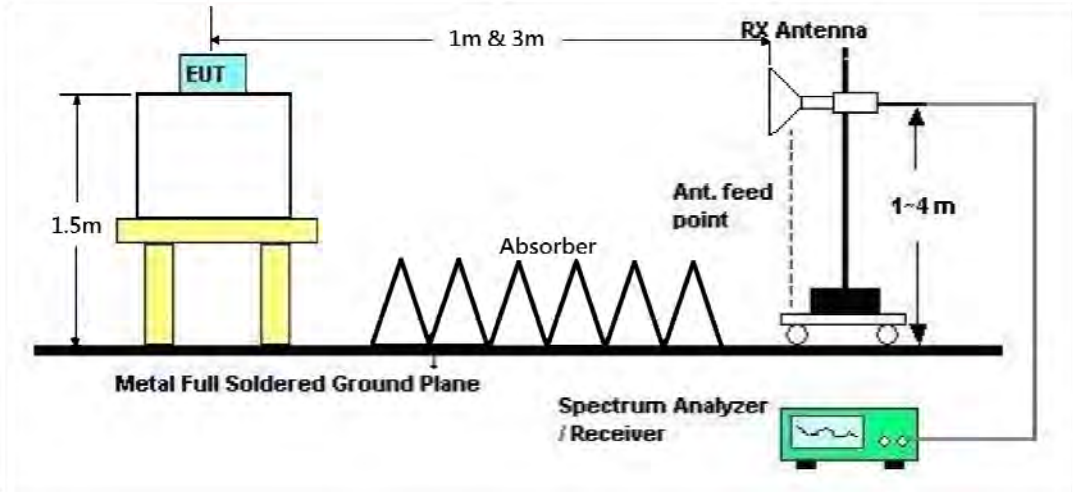
For Radiated Emissions: 9kHz ~30MHz



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

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	Gino Huang	Configurations	CTX
Test Date	May 04, 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.

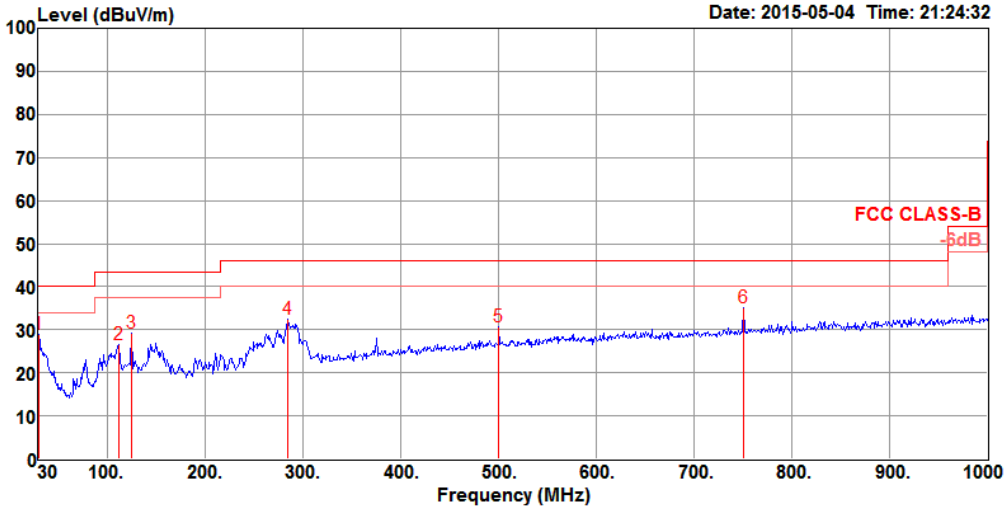
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

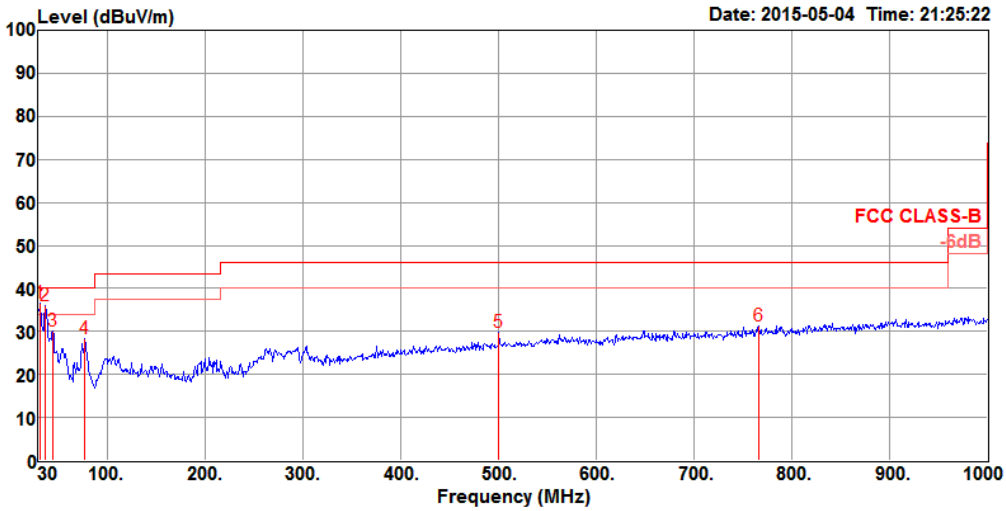
Temperature	26°C	Humidity	68%
Test Engineer	Gino Huang	Configurations	CTX
Test Mode	Mode 1		

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	30.00	28.80	40.00	-11.20	40.30	0.64	20.10	32.24	300	342	Peak	HORIZONTAL
2	111.48	26.43	43.50	-17.07	45.32	0.99	12.39	32.27	300	64	Peak	HORIZONTAL
3	125.06	29.21	43.50	-14.29	47.68	1.04	12.75	32.26	300	99	Peak	HORIZONTAL
4	284.14	32.33	46.00	-13.67	49.43	1.46	13.58	32.14	100	113	Peak	HORIZONTAL
5	500.45	30.57	46.00	-15.43	43.02	1.90	17.80	32.15	150	233	Peak	HORIZONTAL
6	750.71	35.02	46.00	-10.98	44.46	2.22	20.41	32.07	100	214	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	31.94	36.65	40.00	-3.35	49.37	0.64	18.88	32.24	125	260	Peak	VERTICAL
2	36.79	35.97	40.00	-4.03	51.60	0.65	15.98	32.26	100	143	Peak	VERTICAL
3	44.55	30.05	40.00	-9.95	50.07	0.68	11.54	32.24	200	152	Peak	VERTICAL
4	77.53	28.23	40.00	-11.77	52.15	0.84	7.41	32.17	125	163	Peak	VERTICAL
5	500.45	29.75	46.00	-16.25	42.19	1.90	17.81	32.15	100	188	Peak	VERTICAL
6	766.23	31.37	46.00	-14.63	40.68	2.25	20.53	32.09	150	295	Peak	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 RF transceiver sources (QCA9890):

Temperature	26°C	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11a CH 36 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15547.53	55.26	83.54	-28.28	43.76	7.56	38.66	34.72	213	146	Peak	HORIZONTAL
2	15584.72	42.96	63.54	-20.58	31.53	7.57	38.63	34.77	213	146	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15549.41	55.85	83.54	-27.69	44.37	7.56	38.66	34.74	213	146	Peak	VERTICAL
2	15580.09	42.82	63.54	-20.72	31.39	7.57	38.63	34.77	213	146	Average	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11a CH 40 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15596.06	42.33	63.54	-21.21	30.90	7.58	38.62	34.77	155	133	Average	HORIZONTAL
2	15597.92	54.98	83.54	-28.56	43.55	7.58	38.62	34.77	155	133	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15617.25	54.97	83.54	-28.57	43.57	7.59	38.60	34.79	210	138	Peak	VERTICAL
2	15618.29	42.15	63.54	-21.39	30.75	7.59	38.60	34.79	210	138	Average	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11a CH 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15725.79	43.61	63.54	-19.93	32.35	7.62	38.52	34.88	125	163	Average	HORIZONTAL
2	15725.90	56.29	83.54	-27.25	45.03	7.62	38.52	34.88	125	163	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15722.78	55.26	83.54	-28.28	44.00	7.62	38.52	34.88	210	200	Peak	VERTICAL
2	15723.13	42.24	63.54	-21.30	30.98	7.62	38.52	34.88	210	200	Average	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11a CH 149 / Chain 1 + Chain 2 + Chain 3
Test Date	May 15, 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	11484.93	68.63	83.54	-14.91	53.86	9.24	40.28	34.75	Peak	148	350	HORIZONTAL
2	11486.09	55.61	63.54	-7.93	40.84	9.24	40.28	34.75	Average	148	350	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	11490.51	54.41	63.54	-9.13	39.64	9.24	40.28	34.75	Average	158	14	VERTICAL
2	11495.43	66.90	83.54	-16.64	52.13	9.24	40.28	34.75	Peak	158	14	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11a CH 157 / Chain 1 + Chain 2 + Chain 3
Test Date	May 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11574.89	58.43	63.54	-5.11	45.37	8.90	39.01	34.85	191	352	HORIZONTAL	Average
2	11575.29	73.40	83.54	-10.14	60.34	8.90	39.01	34.85	191	352	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11574.97	63.07	63.54	-0.47	50.01	8.90	39.01	34.85	155	340	VERTICAL	Average
2	11574.97	77.59	83.54	-5.95	64.53	8.90	39.01	34.85	155	340	VERTICAL	Peak

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11a CH 165 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11644.56	57.08	63.54	-6.46	46.87	6.56	38.36	34.71	59	168	Average	HORIZONTAL
2	11654.88	69.22	83.54	-14.32	59.02	6.56	38.36	34.72	59	168	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11649.60	68.63	83.54	-14.91	58.43	6.56	38.36	34.72	14	184	Peak	VERTICAL
2	11650.72	56.04	63.54	-7.50	45.84	6.56	38.36	34.72	14	184	Average	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36 / Chain 1 + Chain 2 + Chain 3
Test Date	May 15, 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	15534.65	65.99	83.54	-17.55	51.02	10.77	39.31	35.11	Peak	165	0	HORIZONTAL
2	15534.93	52.31	63.54	-11.23	37.34	10.77	39.31	35.11	Average	165	0	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	15544.63	48.70	63.54	-14.84	33.71	10.78	39.32	35.11	Average	150	100	VERTICAL
2	15546.95	60.84	83.54	-22.70	45.85	10.78	39.32	35.11	Peak	150	100	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 40 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10403.52	52.41	83.54	-31.13	43.07	6.14	38.34	35.14	254	145	Peak	HORIZONTAL
2	10406.96	40.13	63.54	-23.41	30.79	6.14	38.34	35.14	254	145	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10397.36	40.50	63.54	-23.04	31.16	6.14	38.34	35.14	173	132	Average	VERTICAL
2	10409.52	52.83	83.54	-30.71	43.48	6.14	38.35	35.14	173	132	Peak	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15709.28	56.67	83.54	-26.87	45.40	7.62	38.53	34.88	214	134	Peak	HORIZONTAL
2	15715.84	43.93	63.54	-19.61	32.67	7.62	38.52	34.88	214	134	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15726.72	56.79	83.54	-26.75	45.55	7.62	38.52	34.90	135	123	Peak	VERTICAL
2	15738.32	43.82	63.54	-19.72	32.58	7.63	38.51	34.90	135	123	Average	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149 / Chain 1 + Chain 2 + Chain 3
Test Date	May 15, 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	11483.49	66.84	83.54	-16.70	52.07	9.24	40.28	34.75	Peak	150	354	HORIZONTAL
2	11483.56	53.19	63.54	-10.35	38.42	9.24	40.28	34.75	Average	150	354	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	11483.56	52.54	63.54	-11.00	37.77	9.24	40.28	34.75	Average	186	8	VERTICAL
2	11484.21	67.44	83.54	-16.10	52.67	9.24	40.28	34.75	Peak	186	8	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 157 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11560.72	69.16	83.54	-14.38	58.97	6.55	38.32	34.68	55	170	Peak	HORIZONTAL
2	11560.72	55.22	63.54	-8.32	45.03	6.55	38.32	34.68	55	170	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11570.48	66.82	83.54	-16.72	56.63	6.55	38.33	34.69	10	169	Peak	VERTICAL
2	11571.76	54.34	63.54	-9.20	44.15	6.55	38.33	34.69	10	169	Average	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 165 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11650.00	67.83	83.54	-15.71	57.63	6.56	38.36	34.72	59	170	Peak	HORIZONTAL
2	11650.48	55.53	63.54	-8.01	45.33	6.56	38.36	34.72	59	170	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11650.80	55.71	63.54	-7.83	45.51	6.56	38.36	34.72	12	170	Average	VERTICAL
2	11651.36	68.50	83.54	-15.04	58.30	6.56	38.36	34.72	12	170	Peak	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38 / Chain 1 + Chain 2 + Chain 3
Test Date	May 15, 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	15552.78	59.57	83.54	-23.97	44.59	10.78	39.32	35.12	Peak	155	351	HORIZONTAL
2	15560.01	46.26	63.54	-17.28	31.28	10.78	39.32	35.12	Average	155	351	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	15550.17	58.65	83.54	-24.89	43.67	10.78	39.32	35.12	Peak	138	340	VERTICAL
2	15567.76	46.05	63.54	-17.49	31.06	10.78	39.33	35.12	Average	138	340	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 46 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15680.96	45.07	63.54	-18.47	33.76	7.61	38.55	34.85	66	153	Average	HORIZONTAL
2	15703.36	56.22	83.54	-27.32	44.95	7.62	38.53	34.88	66	153	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15681.84	44.10	63.54	-19.44	32.79	7.61	38.55	34.85	94	138	Average	VERTICAL
2	15704.16	57.14	83.54	-26.40	45.87	7.62	38.53	34.88	94	138	Peak	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11500.00	61.20	83.54	-22.34	51.02	6.54	38.30	34.66	54	168	Peak	HORIZONTAL
2	11501.52	48.74	63.54	-14.80	38.56	6.54	38.30	34.66	54	168	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11501.28	43.73	63.54	-19.81	33.55	6.54	38.30	34.66	337	168	Average	VERTICAL
2	11501.36	55.44	83.54	-28.10	45.26	6.54	38.30	34.66	337	168	Peak	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 159 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11591.28	51.91	63.54	-11.63	41.72	6.55	38.33	34.69	61	170	Average	HORIZONTAL
2	11592.48	64.25	83.54	-19.29	54.06	6.55	38.33	34.69	61	170	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11590.88	51.69	63.54	-11.85	41.50	6.55	38.33	34.69	10	167	Average	VERTICAL
2	11592.08	63.71	83.54	-19.83	53.52	6.55	38.33	34.69	10	167	Peak	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Chain 1 + Chain 2 + Chain 3
Test Date	May 15, 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	15606.12	60.10	83.54	-23.44	45.13	10.78	39.34	35.15	Peak	150	205	HORIZONTAL
2	15652.00	46.28	63.54	-17.26	31.30	10.79	39.36	35.17	Average	150	205	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	15619.07	53.65	83.54	-29.89	38.67	10.78	39.35	35.15	Peak	160	227	VERTICAL
2	15652.07	46.07	63.54	-17.47	31.09	10.79	39.36	35.17	Average	160	227	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 155 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11538.13	39.47	63.54	-24.07	29.29	6.54	38.31	34.67	321	123	Average	HORIZONTAL
2	11552.49	52.77	83.54	-30.77	42.58	6.55	38.32	34.68	321	123	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11540.28	40.52	63.54	-23.02	30.34	6.54	38.31	34.67	202	124	Average	VERTICAL
2	11566.67	53.08	83.54	-30.46	42.88	6.55	38.33	34.68	202	124	Peak	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.

For RF transceiver sources (QCA9880):

Temperature	26°C	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 157 / Chain 1 + Chain 2 + Chain 3
Test Date	May 15, 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	11578.83	62.37	63.54	-1.17	47.62	9.26	40.26	34.77	Average	159	338	HORIZONTAL
2	11580.42	75.77	83.54	-7.77	61.02	9.26	40.26	34.77	Peak	159	338	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	11577.60	76.97	83.54	-6.57	62.22	9.26	40.26	34.77	Peak	138	353	VERTICAL
2	11577.74	62.83	63.54	-0.71	48.08	9.26	40.26	34.77	Average	138	353	VERTICAL

Note:

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

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

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

4.7. Band Edge Emissions Measurement

4.7.1. Limit

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

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

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

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

4.7.2. Measuring Instruments and Setting

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

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

4.7.3. Test Procedures

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

For RF transceiver sources (QCA9890):

Temperature	26°C	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11a CH 36, 40, 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 23, 2015		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5148.59	73.49	83.50	-10.01	33.17	6.21	34.11	0.00	64	123	Peak	HORIZONTAL
2	5150.00	59.27	63.50	-4.23	18.95	6.21	34.11	0.00	64	123	Average	HORIZONTAL
3	5183.21	114.91			74.51	6.24	34.16	0.00	64	123	Peak	HORIZONTAL
4	5183.53	104.87			64.47	6.24	34.16	0.00	64	123	Average	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	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5128.85	67.14	83.50	-16.36	26.88	6.17	34.09	0.00	325	154	Peak	HORIZONTAL
2	5144.23	55.90	63.50	-7.60	15.58	6.21	34.11	0.00	325	154	Average	HORIZONTAL
3	5205.45	106.16			65.71	6.27	34.18	0.00	325	154	Average	HORIZONTAL
4	5206.09	115.37			74.92	6.27	34.18	0.00	325	154	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	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5142.89	67.15	83.50	-16.35	26.87	6.17	34.11	0.00	56	128	Peak	VERTICAL
2	5145.29	55.89	63.50	-7.61	15.57	6.21	34.11	0.00	56	128	Average	VERTICAL
3	5235.19	107.81			67.28	6.30	34.23	0.00	56	128	Average	VERTICAL
4	5235.67	117.14			76.61	6.30	34.23	0.00	56	128	Peak	VERTICAL
5	5361.64	56.84	63.50	-6.66	15.96	6.47	34.41	0.00	56	128	Average	VERTICAL
6	5366.92	68.30	83.50	-15.20	27.42	6.47	34.41	0.00	56	128	Peak	VERTICAL

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

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11a CH 149, 157, 165 / Chain 1 + Chain 2 + Chain 3
Test Date	CH 149, 157: May 14, 2015 / CH 165: Apr. 23, 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	5709.79	77.59	77.74	-0.15	37.16	6.44	33.99	0.00	Peak	129	77	HORIZONTAL
2	5724.71	87.04	87.74	-0.70	46.58	6.45	34.01	0.00	Peak	129	77	HORIZONTAL
3	5738.05	112.47			71.98	6.45	34.04	0.00	Average	129	77	HORIZONTAL
4	5738.63	122.78			82.29	6.45	34.04	0.00	Peak	129	77	HORIZONTAL

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

Channel 157

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5668.17	71.89	77.74	-5.85	31.98	5.81	34.10	0.00	139	70	HORIZONTAL	Peak
2	5724.52	71.62	87.74	-16.12	31.59	5.85	34.18	0.00	139	70	HORIZONTAL	Peak
3	5778.75	115.53			75.30	5.90	34.33	0.00	139	70	HORIZONTAL	Average
4	5788.85	126.19			85.89	5.90	34.40	0.00	139	70	HORIZONTAL	Peak
5	5850.48	70.25	87.74	-17.49	29.68	5.97	34.60	0.00	139	70	HORIZONTAL	Peak
6	5866.73	70.65	77.74	-7.09	30.01	5.97	34.67	0.00	139	70	HORIZONTAL	Peak

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

Channel 165

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5831.25	111.68			70.03	6.92	34.73	0.00	61	160	Average	HORIZONTAL
2	5831.25	121.57			79.92	6.92	34.73	0.00	61	160	Peak	HORIZONTAL
3	5851.44	84.14	87.74	-3.60	42.45	6.95	34.74	0.00	61	160	Peak	HORIZONTAL
4	5860.00	77.65	77.74	-0.09	35.94	6.97	34.74	0.00	61	160	Peak	HORIZONTAL

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

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36, 40, 48 / Chain 1 + Chain 2 + Chain 3
Test Date	CH 36: May 15, 2015 / CH 40, 48: Apr. 23, 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	5147.11	78.06	83.54	-5.48	38.58	6.13	33.35	0.00	Peak	127	90	HORIZONTAL
2	5150.00	62.93	63.54	-0.61	23.45	6.13	33.35	0.00	Average	127	90	HORIZONTAL
3	5185.50	121.29			81.76	6.15	33.38	0.00	Peak	127	90	HORIZONTAL
4	5187.24	111.18			71.65	6.15	33.38	0.00	Average	127	90	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	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5148.72	67.49	83.50	-16.01	27.17	6.21	34.11	0.00	328	157	Peak	HORIZONTAL
2	5149.68	56.18	63.50	-7.32	15.86	6.21	34.11	0.00	328	157	Average	HORIZONTAL
3	5206.41	105.75			65.30	6.27	34.18	0.00	328	157	Average	HORIZONTAL
4	5207.69	115.39			74.92	6.27	34.20	0.00	328	157	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	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5109.23	67.04	83.50	-16.46	26.84	6.14	34.06	0.00	62	169	Peak	HORIZONTAL
2	5150.00	55.66	63.50	-7.84	15.34	6.21	34.11	0.00	62	169	Average	HORIZONTAL
3	5234.71	108.31			67.78	6.30	34.23	0.00	62	169	Average	HORIZONTAL
4	5236.15	118.18			77.65	6.30	34.23	0.00	62	169	Peak	HORIZONTAL
5	5350.00	56.97	63.50	-6.53	16.11	6.47	34.39	0.00	62	169	Average	HORIZONTAL
6	5360.67	68.62	83.50	-14.88	27.74	6.47	34.41	0.00	62	169	Peak	HORIZONTAL

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

Temperature	26°C	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149, 157, 165 / Chain 1 + Chain 2 + Chain 3
Test Date	CH 149: May 15, 2015 / CH 157, 165: Apr. 23, 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	5712.68	75.90	77.74	-1.84	35.47	6.44	33.99	0.00	Peak	129	74	HORIZONTAL
2	5724.42	87.27	87.74	-0.47	46.81	6.45	34.01	0.00	Peak	129	74	HORIZONTAL
3	5741.82	120.98			80.49	6.45	34.04	0.00	Peak	129	74	HORIZONTAL
4	5742.11	111.08			70.59	6.45	34.04	0.00	Average	129	74	HORIZONTAL

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	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5713.37	77.59	77.74	-0.15	36.08	6.83	34.68	0.00	65	164	Peak	HORIZONTAL
2	5716.25	78.78	87.74	-8.96	37.27	6.83	34.68	0.00	65	164	Peak	HORIZONTAL
3	5777.31	112.67			71.08	6.88	34.71	0.00	65	164	Average	HORIZONTAL
4	5777.31	122.97			81.38	6.88	34.71	0.00	65	164	Peak	HORIZONTAL
5	5856.64	77.54	87.74	-10.20	35.85	6.95	34.74	0.00	65	164	Peak	HORIZONTAL
6	5860.96	73.93	77.74	-3.81	32.22	6.97	34.74	0.00	65	164	Peak	HORIZONTAL

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

Channel 165

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5817.31	110.25			68.61	6.92	34.72	0.00	56	158	Average	HORIZONTAL
2	5820.19	120.30			78.65	6.92	34.73	0.00	56	158	Peak	HORIZONTAL
3	5850.00	83.88	87.74	-3.86	42.19	6.95	34.74	0.00	56	158	Peak	HORIZONTAL
4	5860.00	77.54	77.74	-0.20	35.83	6.97	34.74	0.00	56	158	Peak	HORIZONTAL

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

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38, 46 / Chain 1 + Chain 2 + Chain 3
Test Date	CH 38: May 15, 2015 / CH 46: Apr. 24, 2015		

Channel 38

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5148.55	76.45	83.54	-7.09	36.97	6.13	33.35	0.00	Peak	131	91	HORIZONTAL
2	5150.00	63.27	63.54	-0.27	23.79	6.13	33.35	0.00	Average	131	91	HORIZONTAL
3	5187.68	105.59			66.06	6.15	33.38	0.00	Average	131	91	HORIZONTAL
4	5188.55	115.15			75.62	6.15	33.38	0.00	Peak	131	91	HORIZONTAL

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

Channel 46

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5150.00	62.83	63.50	-0.67	22.51	6.21	34.11	0.00	51	104	Average	HORIZONTAL
2	5150.00	74.77	83.50	-8.73	34.45	6.21	34.11	0.00	51	104	Peak	HORIZONTAL
3	5233.21	105.82			65.29	6.30	34.23	0.00	51	104	Average	HORIZONTAL
4	5235.13	115.85			75.32	6.30	34.23	0.00	51	104	Peak	HORIZONTAL

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

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151, 159 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 24, 2015		

Channel 151

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5715.00	77.32	77.74	-0.42	35.81	6.83	34.68	0.00	60	164	Peak	HORIZONTAL
2	5725.00	82.70	87.74	-5.04	41.18	6.83	34.69	0.00	60	164	Peak	HORIZONTAL
3	5737.69	105.15			63.59	6.86	34.70	0.00	60	164	Average	HORIZONTAL
4	5737.69	114.72			73.16	6.86	34.70	0.00	60	164	Peak	HORIZONTAL

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

Channel 159

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5715.00	75.30	77.74	-2.44	33.79	6.83	34.68	0.00	64	118	Peak	HORIZONTAL
2	5717.44	78.53	87.74	-9.21	37.02	6.83	34.68	0.00	64	118	Peak	HORIZONTAL
3	5793.08	117.19			75.57	6.90	34.72	0.00	64	118	Peak	HORIZONTAL
4	5797.56	107.41			65.79	6.90	34.72	0.00	64	118	Average	HORIZONTAL
5	5854.62	79.65	87.74	-8.09	37.96	6.95	34.74	0.00	64	118	Peak	HORIZONTAL
6	5860.00	77.38	77.74	-0.36	35.67	6.97	34.74	0.00	64	118	Peak	HORIZONTAL

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

Temperature	26℃	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42, 155 / Chain 1 + Chain 2 + Chain 3
Test Date	CH 42: May 15, 2015 / CH 155: Apr. 17, 2015		

Channel 42

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5148.70	63.51	63.54	-0.03	24.03	6.13	33.35	0.00	Average	128	89	HORIZONTAL
2	5150.00	76.90	83.54	-6.64	37.42	6.13	33.35	0.00	Peak	128	89	HORIZONTAL
3	5227.37	113.34			73.73	6.18	33.43	0.00	Peak	128	89	HORIZONTAL
4	5228.23	102.79			63.18	6.18	33.43	0.00	Average	128	89	HORIZONTAL

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

Channel 155

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5715.00	76.88	77.74	-0.86	38.07	4.49	34.32	0.00	83	135	Peak	HORIZONTAL
2	5725.00	80.46	87.74	-7.28	41.59	4.50	34.37	0.00	83	135	Peak	HORIZONTAL
3	5755.46	112.76			73.77	4.51	34.48	0.00	83	135	Peak	HORIZONTAL
4	5756.91	103.90			64.91	4.51	34.48	0.00	83	135	Average	HORIZONTAL
5	5852.17	74.38	87.74	-13.36	35.11	4.54	34.73	0.00	83	135	Peak	HORIZONTAL
6	5860.00	74.24	77.74	-3.50	34.90	4.55	34.79	0.00	83	135	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

For RF transceiver sources (QCA9880):

Temperature	26°C	Humidity	68%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 157 / Chain 1 + Chain 2 + Chain 3
Test Date	May 15, 2015		

Channel 157

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5705.88	75.43	77.74	-2.31	35.00	6.44	33.99	0.00	Peak	130	71	HORIZONTAL
2	5725.00	80.61	87.74	-7.13	40.15	6.45	34.01	0.00	Peak	130	71	HORIZONTAL
3	5780.66	126.35			85.80	6.46	34.09	0.00	Peak	130	71	HORIZONTAL
4	5781.09	116.21			75.66	6.46	34.09	0.00	Average	130	71	HORIZONTAL
5	5851.30	75.69	87.74	-12.05	35.02	6.49	34.18	0.00	Peak	130	71	HORIZONTAL
6	5861.30	75.35	77.74	-2.39	34.64	6.50	34.21	0.00	Peak	130	71	HORIZONTAL

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

Note:

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

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

4.8. Frequency Stability Measurement

4.8.1. Limit

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

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

4.8.2. Measuring Instruments and Setting

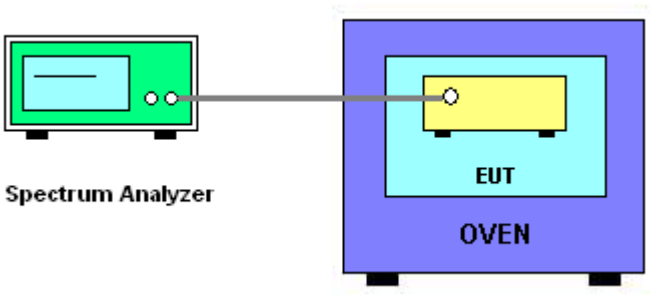
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

4.8.3. Test Procedures

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

4.8.4. Test Setup Layout



4.8.5. Test Deviation

There is no deviation with the original standard.

4.8.6. EUT Operation during Test

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

4.8.7. Test Result of Frequency Stability

Temperature	26°C	Humidity	63%
Test Engineer	Lucas Huang	Test Date	Apr. 28, 2015

Mode: 20 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5200 MHz	5785 MHz
126.50	5199.9873	5784.9780
110.00	5199.9834	5784.9845
93.50	5199.9864	5784.9450
Max. Deviation (MHz)	0.0166	0.0550
Max. Deviation (ppm)	3.19	9.51

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5200 MHz	5785 MHz
-20	5199.9856	5784.9875
-10	5199.9873	5784.9783
0	5199.9767	5784.9834
10	5199.9786	5784.9888
20	5199.9856	5784.9766
30	5199.9785	5784.9957
40	5199.9783	5784.9967
50	5199.9833	5784.9960
Max. Deviation (MHz)	0.0233	0.0234
Max. Deviation (ppm)	4.49	4.04

Mode: 40 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5190 MHz	5755 MHz
126.50	5189.9875	5754.9786
110.00	5189.9879	5754.9874
93.50	5189.9776	5754.9786
Max. Deviation (MHz)	0.0225	0.0214
Max. Deviation (ppm)	4.33	3.73

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5190 MHz	5755 MHz
-20	5189.9875	5754.9885
-10	5189.9783	5754.9986
0	5189.9746	5754.9983
10	5189.9786	5754.9985
20	5189.9786	5754.9876
30	5189.9854	5754.9786
40	5189.9786	5754.9787
50	5189.9833	5754.9783
Max. Deviation (MHz)	0.0254	0.0217
Max. Deviation (ppm)	4.90	3.77

Mode: 80 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5210 MHz	5775 MHz
126.50	5209.9878	5774.9883
110.00	5209.9787	5774.9886
93.50	5209.9786	5774.9888
Max. Deviation (MHz)	0.0214	0.0117
Max. Deviation (ppm)	4.11	2.02

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5210 MHz	5775 MHz
-20	5209.9875	5774.9960
-10	5209.9900	5774.9986
0	5209.9855	5774.9786
10	5209.9777	5774.9665
20	5209.9856	5774.9800
30	5209.9856	5774.9885
40	5209.9666	5774.9888
50	5209.9966	5774.9678
Max. Deviation (MHz)	0.0334	0.0335
Max. Deviation (ppm)	6.41	5.80

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)
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	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	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)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-17	N/A	1 GHz ~ 18 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-1	N/A	1 GHz ~ 40 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-2	N/A	1 GHz ~ 40 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
Thermometer	HTC-1	HTC-1	TP-1	-50℃~70℃	Mar. 11, 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. 03, 2014	Conducted (TH01-CB)
RF Power Divider	Woken	2 Way	TH01-DV-02	1GHz ~ 6GHz	Jan. 10, 2015	Conducted (TH01-CB)
RF Power Divider	Woken	4 Way	TH01-DV-01	1GHz ~ 6GHz	Jan. 10, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-7	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-6	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 03, 2014	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Thermometer	HTC-1	HTC-1	TP-8	-50℃～70℃	Mar. 05, 2015	Conducted (TH01-CB)

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

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

6. MEASUREMENT UNCERTAINTY

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