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FCC RADIO TEST REPORT

Applicant's company	**Extreme Networks, Inc.**
Applicant Address	9 Northeastern Blvd. Salem, NH 03079 USA
FCC ID	**QXO-4411OU**
Manufacturer's company	**Senao Networks**
Manufacturer Address	3F, No. 529, Chung Cheng Rd., Hsintien, Taipei, Taiwan

Product Name	WS-AP3965i-FCC
Brand Name	Extreme Networks
Model No.	31016
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5250 ~ 5350MHz / 5470 ~ 5725MHz
Received Date	Nov. 17, 2015
Final Test Date	Dec. 21, 2015
Submission Type	Class II Change

Statement

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

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

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

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.10-2013**, **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.

Table of Contents

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR653001AB	Rev. 01	Initial issue of report	Jun. 08, 2016

1. VERIFICATION OF COMPLIANCE

Product Name	:	**WS-AP3965i-FCC**
Brand Name	:	**Extreme Networks**
Model No.	:	**31016**
Applicant	:	**Extreme Networks, 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 Nov. 17, 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.

Reviewed by:

Kevin Liang / Assistant Manager

Testing Laboratory
1190

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	15.407(a)	26dB Spectrum Bandwidth and 99% Occupied Bandwidth	Complies	-
4.2	15.407(e)	6dB Spectrum Bandwidth	Complies	-
4.3	15.407(a)	Maximum Conducted Output Power	Complies	0.01 dB
4.4	15.407(a)	Power Spectral Density	Complies	0.11 dB
4.5	15.407(b)	Radiated Emissions	Complies	4.23 dB
4.6	15.407(b)	Band Edge Emissions	Complies	1.34 dB
4.7	15.407(g)	Frequency Stability	Complies	-
4.8	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	WLAN (4TX, 4RX)
Radio Type	Intentional Transceiver
Power Type	From PoE
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	5250 ~ 5350MHz / 5470 ~ 5725MHz
Channel Number	16 for 20MHz bandwidth ; 8 for 40MHz bandwidth 4 for 80MHz bandwidth
Channel Band Width (99%)	Band 2: IEEE 802.11ac MCS0/Nss1 (VHT20): 17.97 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 37.19 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 76.41 MHz Band 3: IEEE 802.11ac MCS0/Nss1 (VHT20): 17.97 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 37.19 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 76.41 MHz
Maximum Conducted Output Power	Band 2: IEEE 802.11ac MCS0/Nss1 (VHT20): 17.61 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 17.82 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 17.46 dBm Band 3: IEEE 802.11ac MCS0/Nss1 (VHT20): 17.90 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 17.87 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 17.73 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
TPC Function	☒ With TPC	☐ Without TPC
Weather Band (5600~5650MHz)	☒ With 5600~5650MHz	☐ Without 5600~5650MHz
Operating Mode	☒ Outdoor access point	
	☐ Indoor access point	
	☒ Fixed point-to-point access points	
	☐ Mobile and portable client devices	

Note 1: The product has beamforming function for 802.11n/ac in 2.4G/5G.

Note 2: Test results of non-beamforming are recorded in test report: FR541521-02AA. Test results of beamforming are recorded in this test report.

Antenna and Band width

Antenna	Four (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)	4	MCS 0-31
802.11n (HT40)	4	MCS 0-31
802.11ac (VHT20)	4	MCS 0-9/Nss1-4
802.11ac (VHT40)	4	MCS 0-9/Nss1-4
802.11ac (VHT80)	4	MCS 0-9/Nss1-4

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 in 5GHz.

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

3.2. Accessories

Antenna cable, Non-Shielded, 1.5m

3.3. Table for Filed Antenna

Set.	Brand Holder	Model Number (Part No.)	Extreme Part No. (Short Description)	Antenna Type	Connector	Polarized Antenna	Gain (dBi)	
							2.4GHz	5GHz
1	Senao Networks, Inc.	AP3965i	-	PIFA Antenna	MMCX	X	Note 1	

Note 1:

Set.	Antenna Gain (dBi)							
	2.4GHz				5GHz			
	Chain 1	Chain 2	Chain 3	Chain 4	Chain 1	Chain 2	Chain 3	Chain 4
1	6.25	5.77	6.45	5.60	5.96	5.97	6.25	6.08

<For 2.4GHz Function>

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

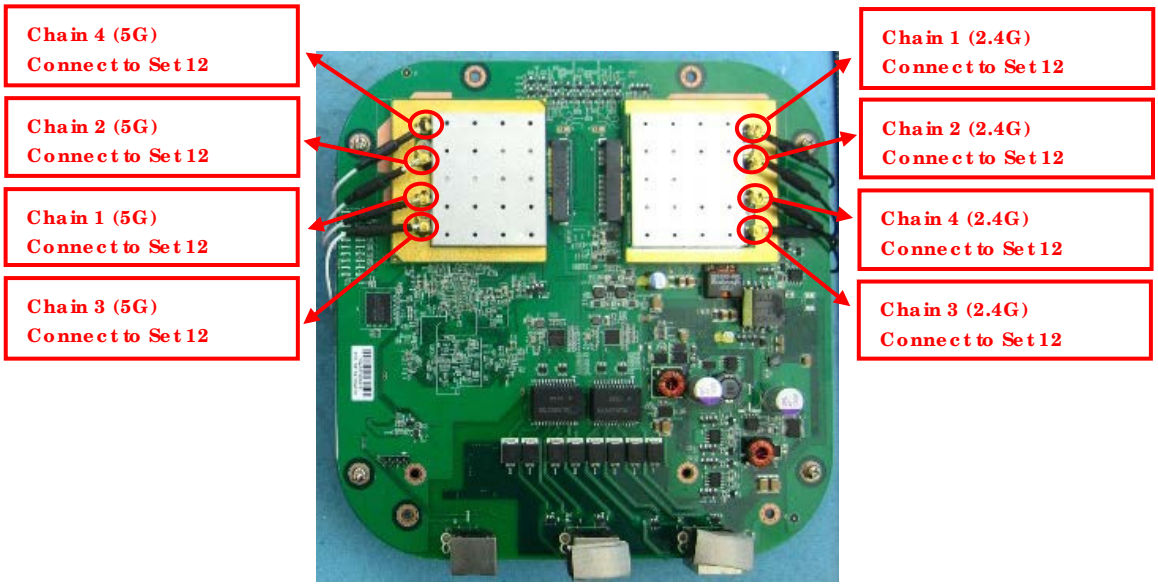
Chain 1, Chain 2, Chain 3 and Chain 4 could transmit/receive simultaneously.

<For 5GHz Function>

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

Chain 1, Chain 2, Chain 3 and Chain 4 could transmit/receive simultaneously.

For EUT2:



3.4. Table for Carrier Frequencies

There are three bandwidth systems.

For 20MHz bandwidth systems, use Channel 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 144.

For 40MHz bandwidth systems, use Channel 54, 62, 102, 110, 118, 126, 134, 142.

For 80MHz bandwidth systems, use Channel 58, 106, 122, 138.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5250~5350 MHz Band 2	52	5260 MHz	60	5300 MHz
	54	5270 MHz	62	5310 MHz
	56	5280 MHz	64	5320 MHz
	58	5290 MHz	-	-
5470~5725 MHz Band 3	100	5500 MHz	124	5620 MHz
	102	5510 MHz	126	5630 MHz
	104	5520 MHz	128	5640 MHz
	106	5530 MHz	132	5660 MHz
	108	5540 MHz	134	5670 MHz
	110	5550 MHz	136	5680 MHz
	112	5560 MHz	138	5690 MHz
	116	5580 MHz	140	5700 MHz
	118	5590 MHz	142	5710 MHz
	120	5600 MHz	144	5720 MHz
	122	5610 MHz	-	-

3.5. Table for Test Modes

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

Test Items	Mode		Data Rate	Channel	Chain
Max. Conducted Output Power	11ac VHT20	Band 2-3	MCS0/Nss1	52/60/64/100 / 116/140/144	1+2+3+4
	11ac VHT40	Band 2-3	MCS0/Nss1	54/62/102/110/134/142	1+2+3+4
	11ac VHT80	Band 2-3	MCS0/Nss1	58/106/122/138	1+2+3+4
Power Spectral Density	11ac VHT20	Band 2-3	MCS0/Nss1	52/60/64/100 / 116/140/144	1+2+3+4
	11ac VHT40	Band 2-3	MCS0/Nss1	54/62/102/110/134/142	1+2+3+4
	11ac VHT80	Band 2-3	MCS0/Nss1	58/106/122/138	1+2+3+4
26dB Spectrum Bandwidth 99% Occupied Bandwidth Measurement	11ac VHT20	Band 2-3	MCS0/Nss1	52/60/64/100 / 116/140/144	1+2+3+4
	11ac VHT40	Band 2-3	MCS0/Nss1	54/62/102/110/134/142	1+2+3+4
	11ac VHT80	Band 2-3	MCS0/Nss1	58/106/122/138	1+2+3+4
6dB Spectrum Bandwidth Measurement	11ac VHT20	Band 4	MCS0/Nss1	144	1+2+3+4
	11ac VHT40	Band 4	MCS0/Nss1	142	1+2+3+4
	11ac VHT80	Band 4	MCS0/Nss1	138	1+2+3+4
Radiated Emission Above 1GHz	11ac VHT20	Band 2-3	MCS0/Nss1	52/60/64/100 / 116/140/144	1+2+3+4
	11ac VHT40	Band 2-3	MCS0/Nss1	54/62/102/110/134/142	1+2+3+4
	11ac VHT80	Band 2-3	MCS0/Nss1	58/106/122/138	1+2+3+4

Band Edge Emission	11ac VHT20	Band 2-3	MCS0/Nss1	52/60/64/100 / 116/140/144	1+2+3+4
	11ac VHT40	Band 2-3	MCS0/Nss1	54/62/102/110/134/142	1+2+3+4
	11ac VHT80	Band 2-3	MCS0/Nss1	58/106/122/138	1+2+3+4
Frequency Stability	20 MHz	Band 2-3	-	60/116	3, 4
	40 MHz	Band 2-3	-	62/110	3, 4
	80 MHz	Band 2-3	-	58/106	3, 4

Note 1: VHT20/VHT40 covers HT20/HT40, due to same modulation. The power setting for 802.11n HT20 and HT40 are the same or lower than 802.11ac VHT20 and VHT40.

Note 2:

The PoE is for measurement only, would not be marketed.

The PoE information as below:

Power	Brand	Model
PoE	Microsemi	PD-9001GR

Note 3: All the specification of test configurations and test modes were based on customer's request.

Note 4: The console port can not be used by end user. It is generally used for updating FW by professional installer.

The following test modes were performed for all tests:

For Radiated Emission Above 1GHz test:

The EUT1 was performed at Y axis and Z axis position. Z axis has been evaluated to be the worst case, thus measurement will follow this same test mode.

The EUT2 was performed at Y axis and Z axis position. Y axis has been evaluated to be the worst case, thus measurement will follow this same test mode.

Mode 1. Place EUT in Y axis

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	-
TH01-CB	OVEN Room	Hsin Chu	-	-	-

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

3.7. Table for Multiple Listing and Class II Change

This product is an extension of original one reported under Sporton project number: FR541521-01AD

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
Add Band 2 and Band 3 (5250~5350 MHz, 5470~5725 MHz)	1. 26dB Bandwidth and 99% Occupied Bandwidth Measurement 2. 6dB Spectrum Bandwidth Measurement 3. Maximum Conducted Output Power Measurement 4. Power Spectral Density Measurement 5. Radiated Emissions Above 1GHz 6. Band Edge Emissions Measurement 7. Frequency Stability Measurement

3.8. Table for Supporting Units

For Test Site No: 03CH01-CB

Support Unit	Brand	Model	FCC ID
NB*2	DELL	E4300	DoC
Device	Extreme Networks	31018	QXO-4411AC
PoE	Microsemi	PD-9001GR	N/A

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC
PoE	Microsemi	PD-9001GR	N/A

3.9. Table for Parameters of Test Software Setting

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

Test Software Version	QCA VER3.0.144.0						
Mode	Test Frequency (MHz)						
	NCB: 20MHz						
	5260 MHz	5300 MHz	5320 MHz	5500 MHz	5580 MHz	5700 MHz	5720 MHz
802.11ac MCS0/Nss1 VHT20	11.5	11.5	11.5	12	12	12	11.5
Mode	NCB: 40MHz						
802.11ac MCS0/Nss1 VHT40	5270 MHz	5310 MHz	5510 MHz	5550 MHz	5670 MHz	5710 MHz	
	11	11	11	11	11	12	
Mode	NCB: 80MHz						
802.11ac MCS0/Nss1 VHT80	5290 MHz	5530 MHz	5610 MHz	5690 MHz			
	11.5	10	11.5	12			

3.10. EUT Operation during Test

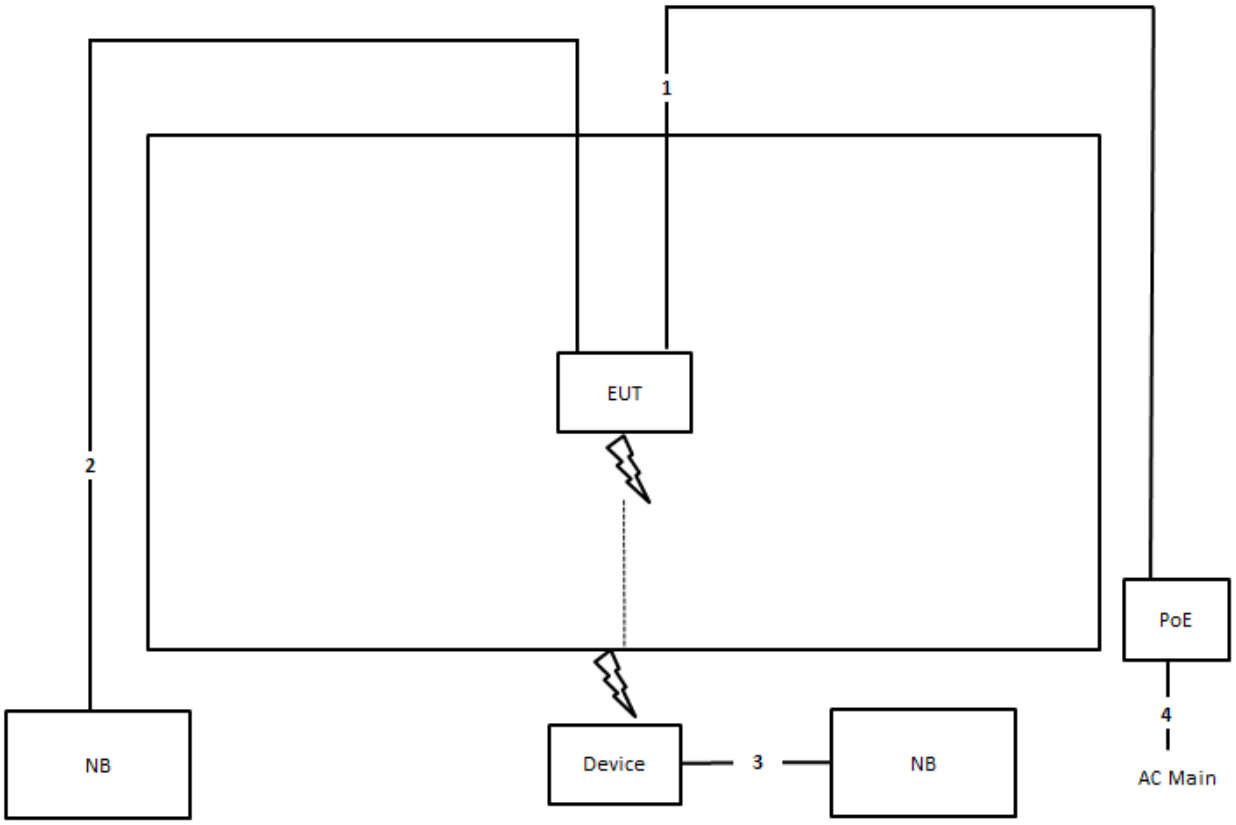
For Conducted Mode:
The EUT was programmed to be in continuously transmitting mode.
For Radiated Mode:
During the test, the following programs under WIN 7 were executed.
The program was executed as follows:
1. During the test, the EUT operation to normal function.
2. Executed command fixed test channel under DOS.
3. Executed "Lantest.exe " to link with the remote workstation to receive and transmit packet by Device and transmit duty cycle no less 98%

3.11. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11ac MCS0/Nss1 VHT20	1.747	1.914	91.30	0.40	0.57
802.11ac MCS0/Nss1 VHT40	1.656	1.848	89.61	0.48	0.60
802.11ac MCS0/Nss1 VHT80	1.897	2.086	90.93	0.41	0.53

3.12. Test Configurations

3.12.1. Radiation Emissions Test Configuration



Item	Connection	Shielded	Length(m)
1	RJ-45 cable	No	10m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	1.5m
4	Power cable	No	4.6m

4. TEST RESULT

4.1. 26dB Bandwidth and 99% Occupied Bandwidth Measurement

4.1.1. Limit

No restriction limits.

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 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

4.1.3. 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%.

4.1.4. Test Setup Layout

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

This test setup layout is the same as that shown in section 4.5.4.

4.1.5. Test Deviation

There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

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

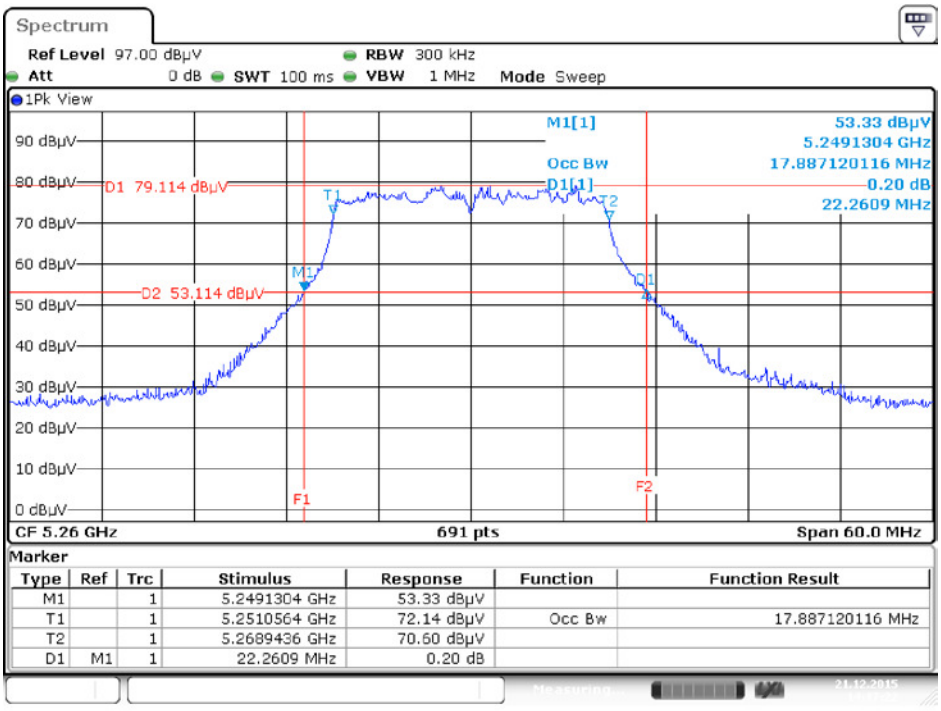
Temperature	25℃	Humidity	45%
Test Engineer	Eddie Weng & Lucas Huang		

Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11ac MCS0/Nss1 VHT20	5260 MHz	22.26	17.89
	5300 MHz	22.43	17.89
	5320 MHz	22.09	17.97
	5500 MHz	22.43	17.89
	5580 MHz	22.09	17.97
	5700 MHz	22.00	17.89
802.11ac MCS0/Nss1 VHT40	5270 MHz	45.07	37.05
	5310 MHz	45.07	37.19
	5510 MHz	45.80	37.19
	5550 MHz	44.64	36.90
	5670 MHz	45.65	37.19
802.11ac MCS0/Nss1 VHT80	5290 MHz	86.38	76.41
	5530 MHz	86.38	76.12
	5610 MHz	87.54	76.41

Straddle Channel

Mode	Frequency	26dB BW (MHz)	99% OBW (MHz)	26dB BW F1 (MHz)	99% OBW T1 (MHz)	UNII 2C 26dB BW (MHz)	UNII 3 26dB BW (MHz)	UNII 2C 99% BW (MHz)	UNII 3 99% BW (MHz)
802.11ac MCS0/Nss1 VHT20	5720 MHz	22.35	17.89	5709.04	5711.06	15.96	6.39	13.94	3.94
802.11ac MCS0/Nss1 VHT40	5710 MHz	45.36	37.05	5687.83	5691.62	37.17	8.19	33.38	3.67
802.11ac MCS0/Nss1 VHT80	5690 MHz	88.12	76.41	5645.65	5651.80	79.35	8.77	73.20	3.21

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5260 MHz



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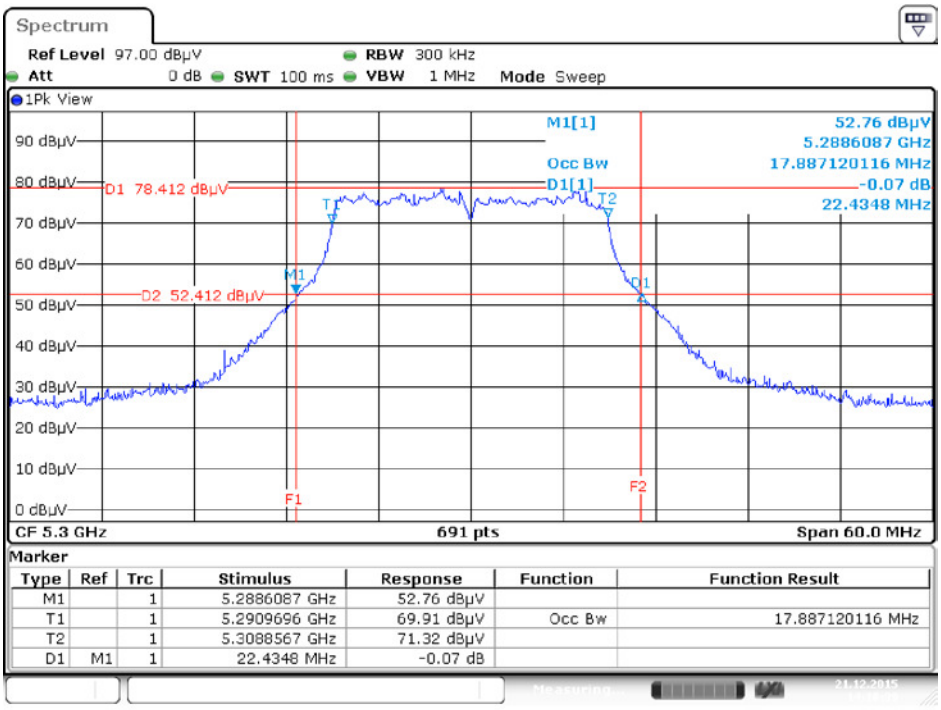
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5300 MHz



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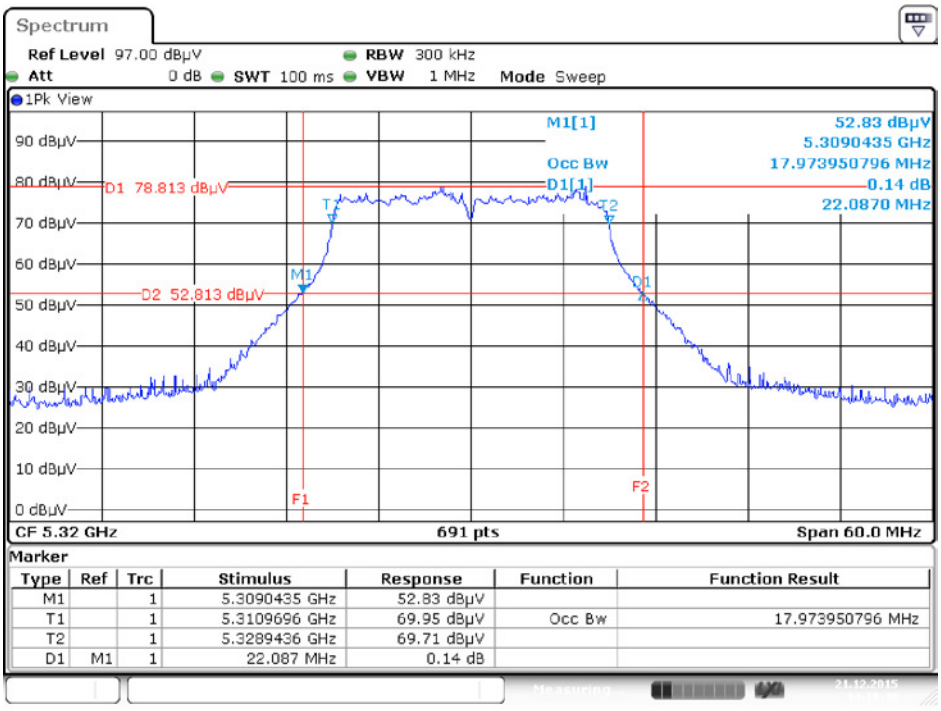
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5320 MHz



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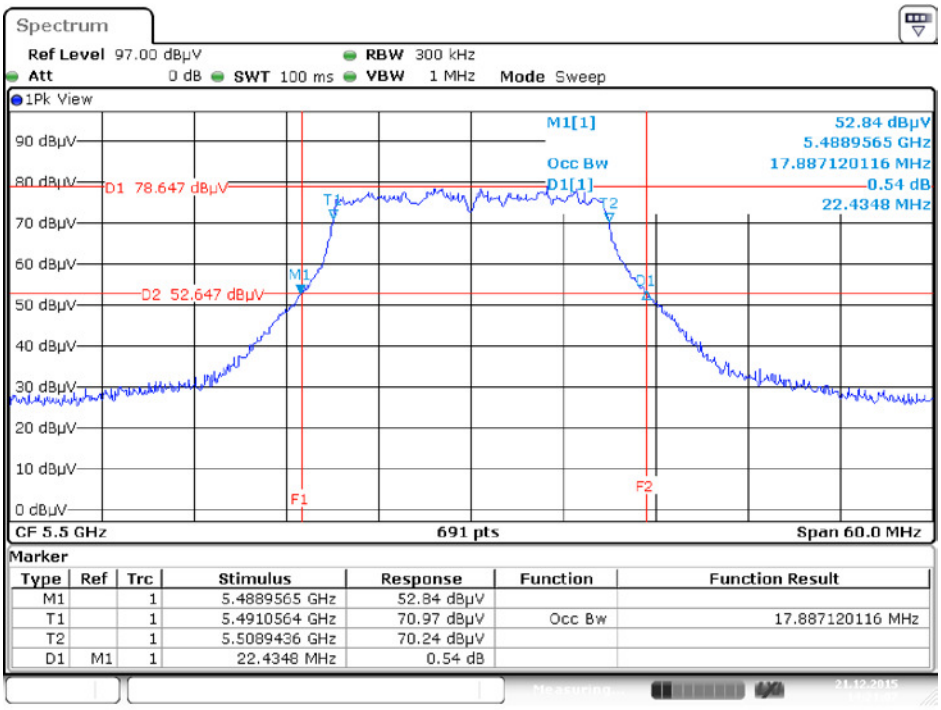
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5500 MHz



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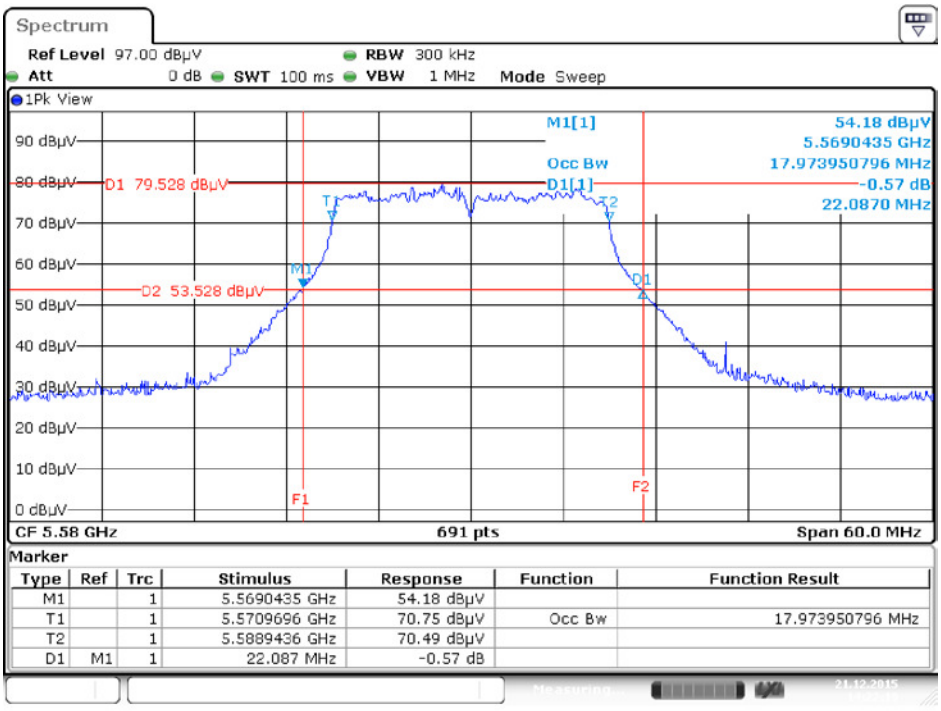
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5580 MHz



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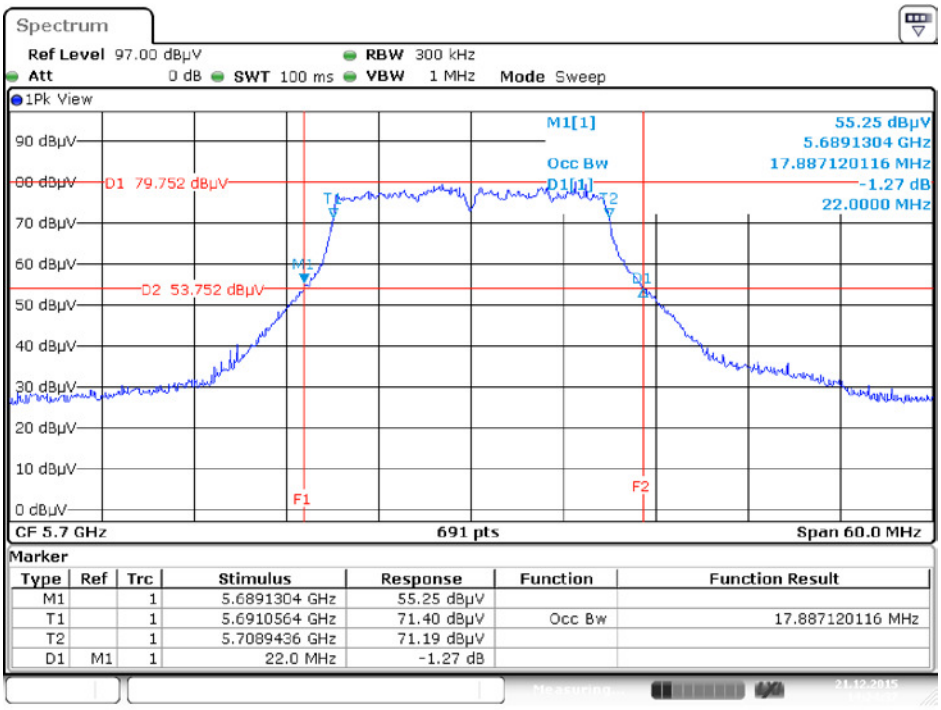
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5700 MHz



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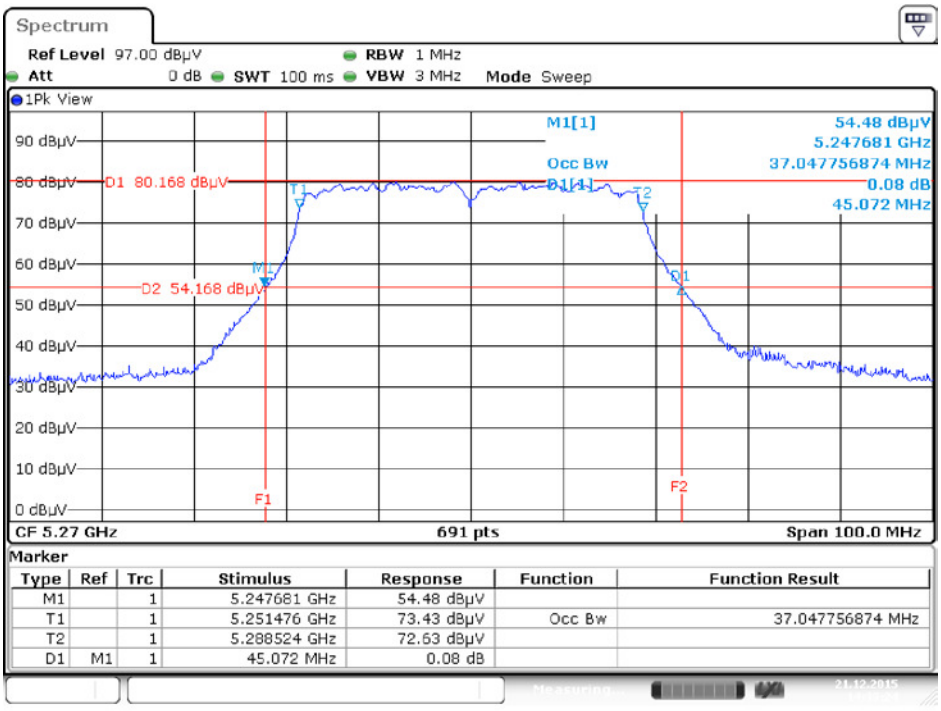
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5270 MHz



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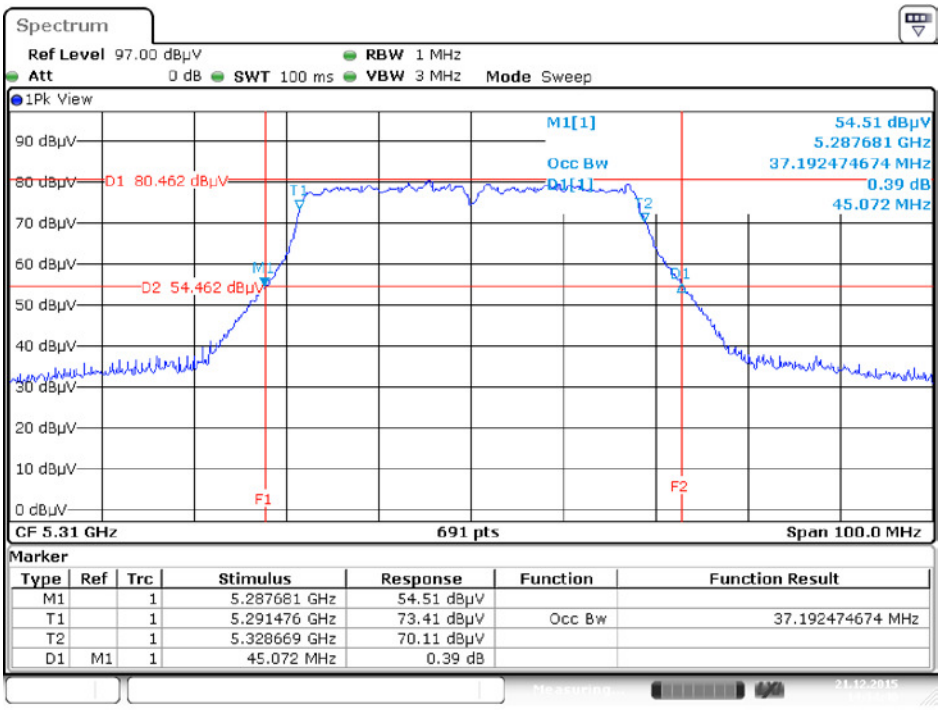
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5310 MHz



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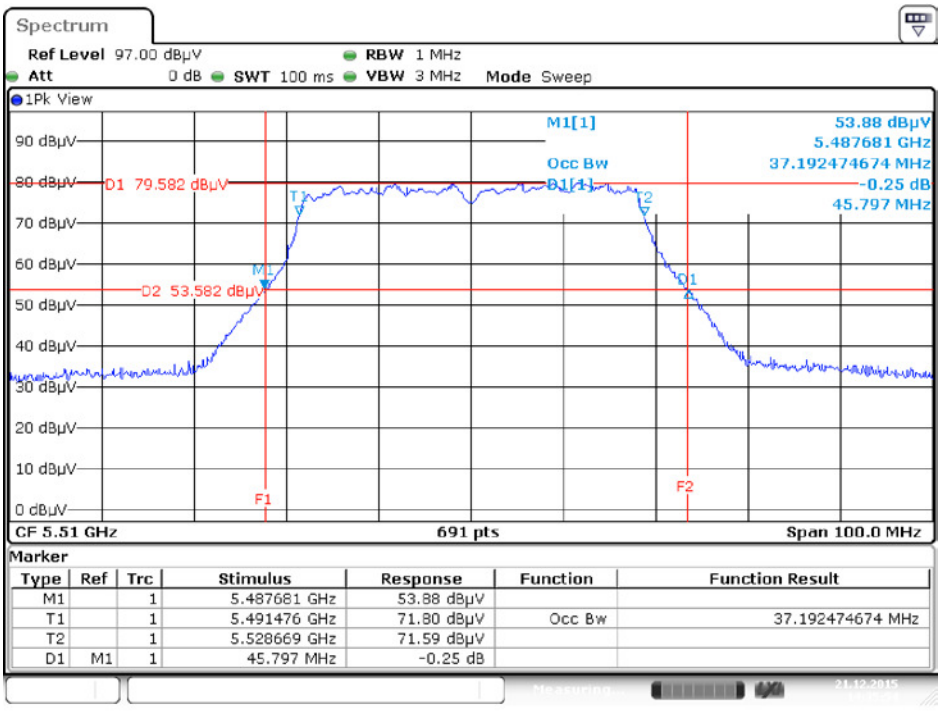
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5510 MHz



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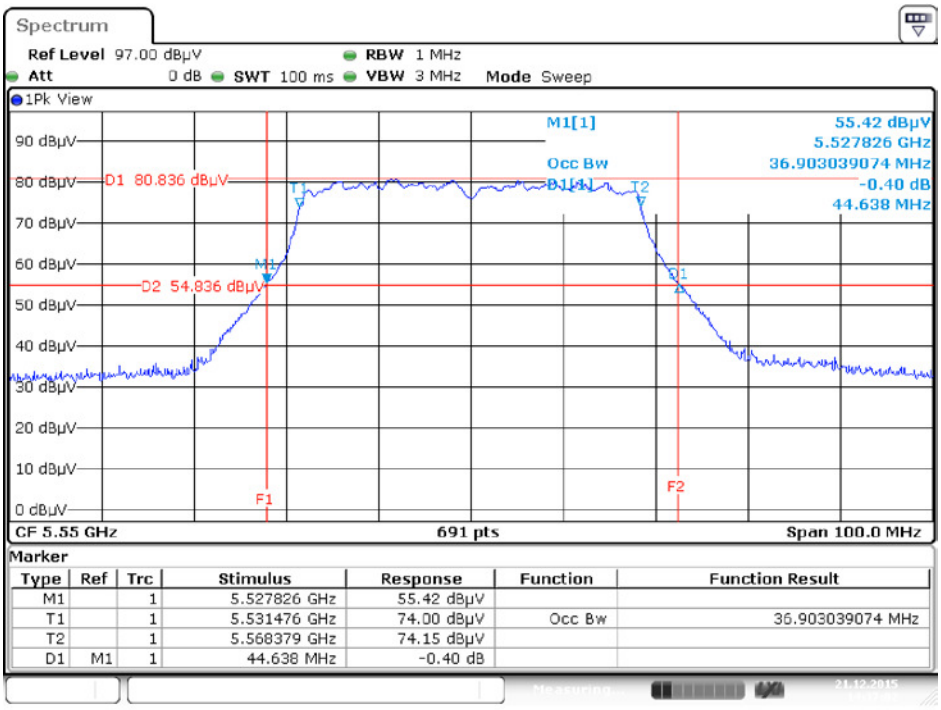
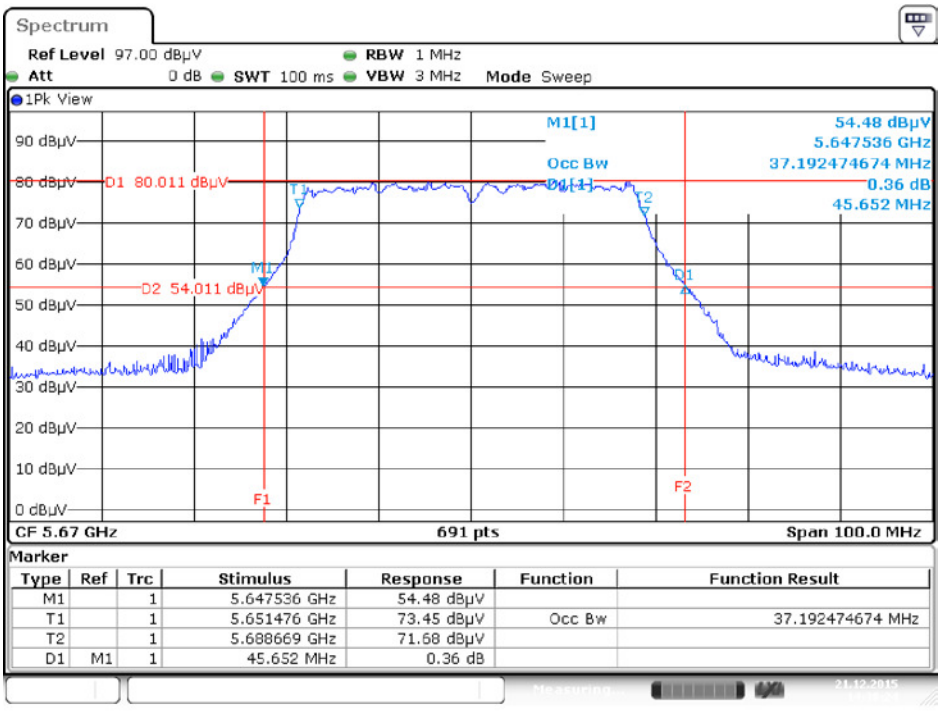
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5550 MHz



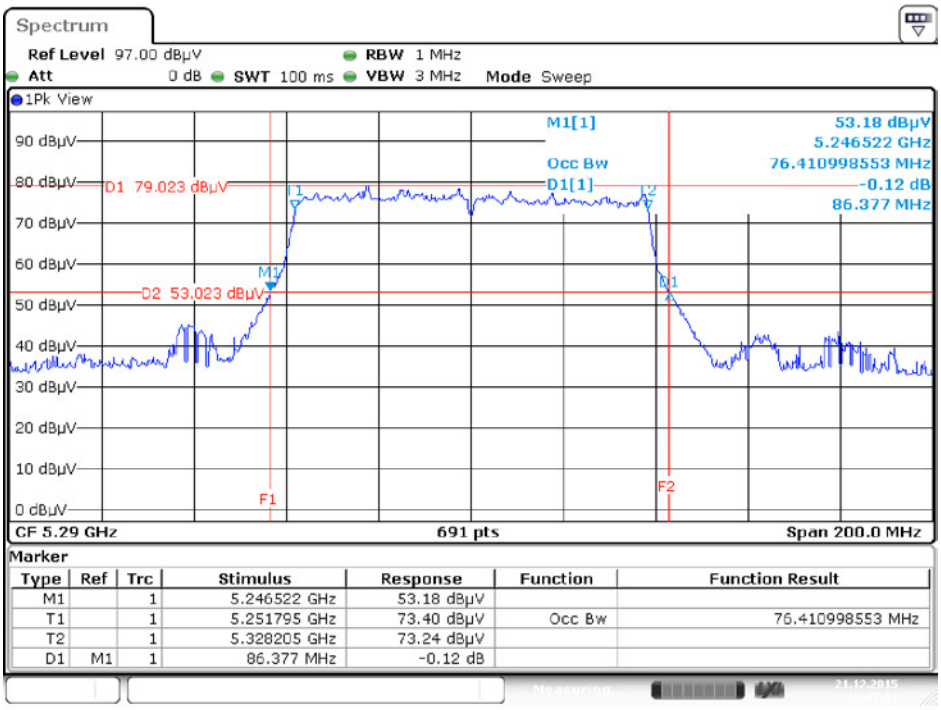
Date: 21.DEC.2015 14:37:02

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5670 MHz



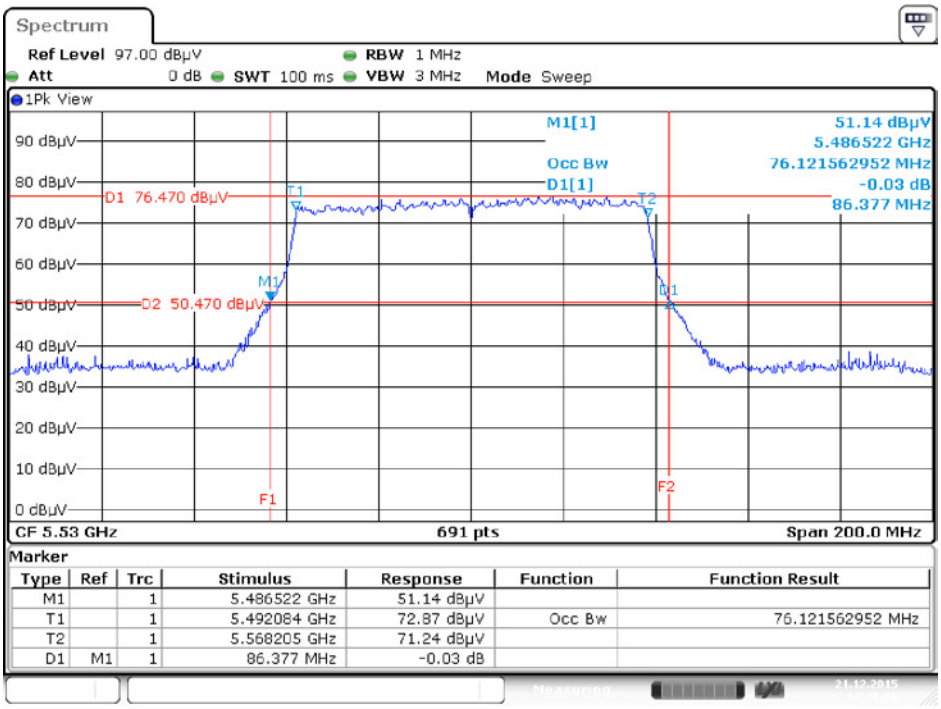
Date: 21.DEC.2015 14:38:24

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5290 MHz



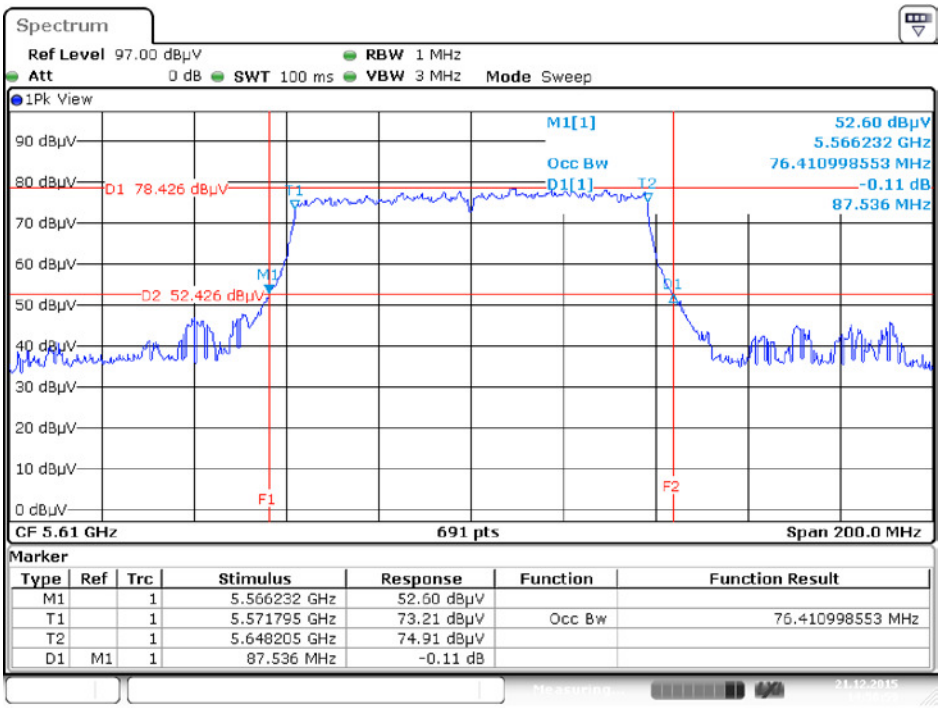
Date: 21.DEC.2015 14:47:11

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5530 MHz



Date: 21.DEC.2015 14:48:37

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5610 MHz

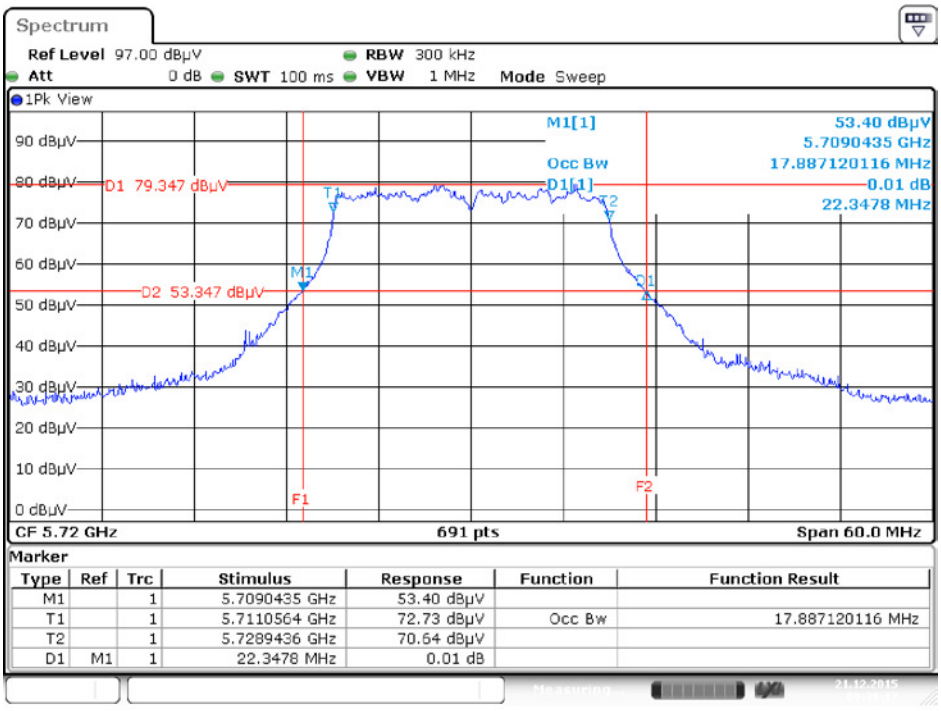


Date: 21.DEC.2015 14:50:59

Straddle Channel

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1

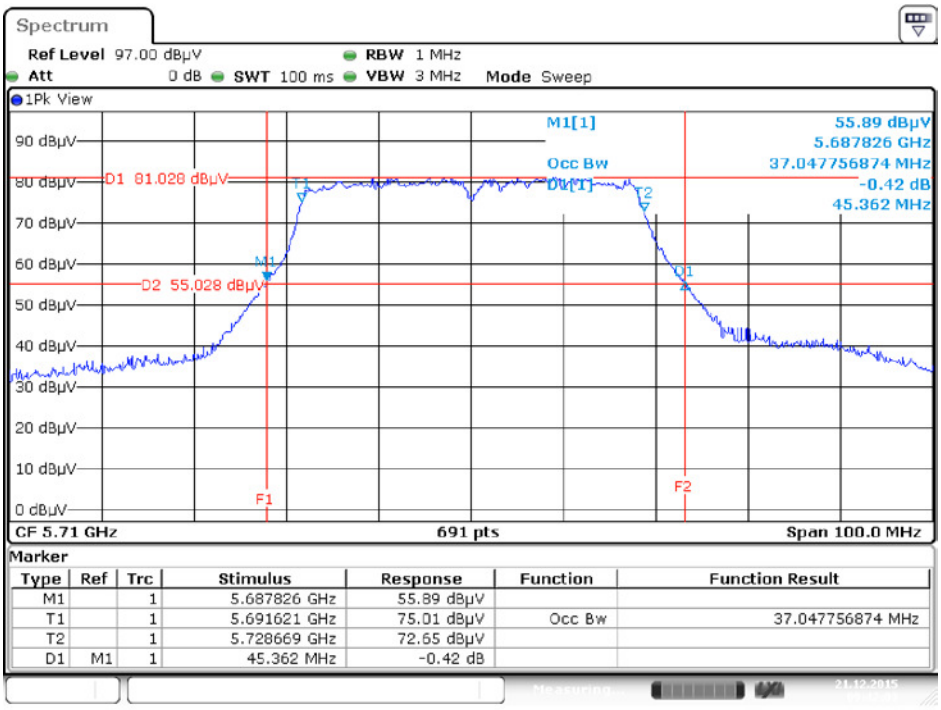
VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5720 MHz



Date: 21.DEC.2015 09:38:16

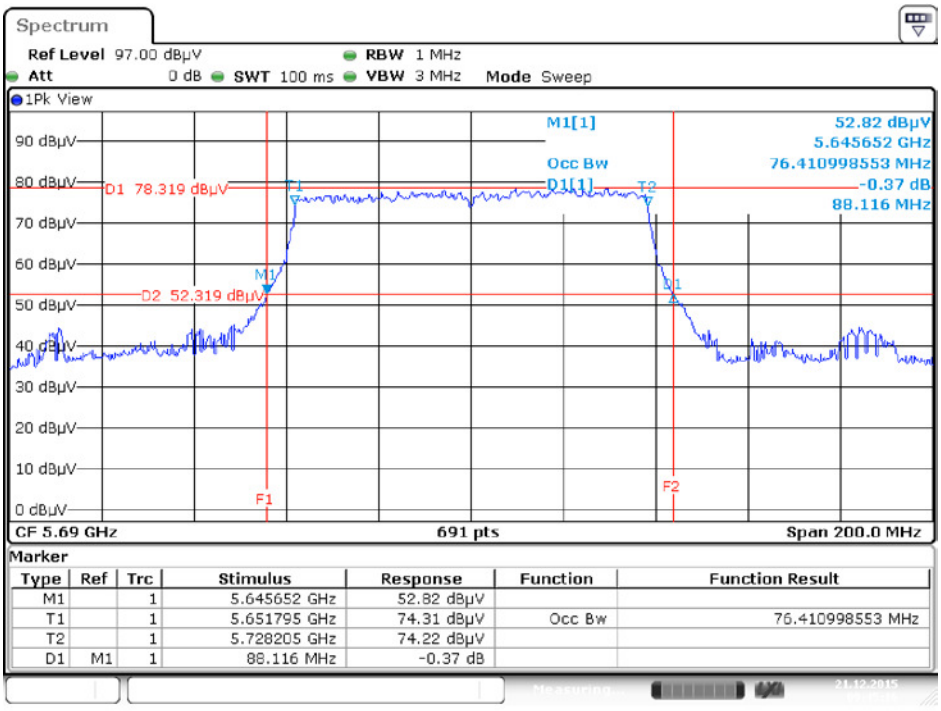
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1

VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5710 MHz



Date: 21.DEC.2015 09:42:03

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5690 MHz



Date: 21.DEC.2015 09:45:15

4.2. 6dB Spectrum Bandwidth Measurement

4.2.1. Limit

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

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 spectrum analyzer.

6dB Spectrum Bandwidth	
Spectrum Parameters	**Setting**
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RBW	100kHz
VBW	≥ 3 x RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.2.3. 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.

4.2.4. Test Setup Layout

For Radiated 6dB Bandwidth Measurement:

This test setup layout is the same as that shown in section 4.5.4.

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 6dB Spectrum Bandwidth

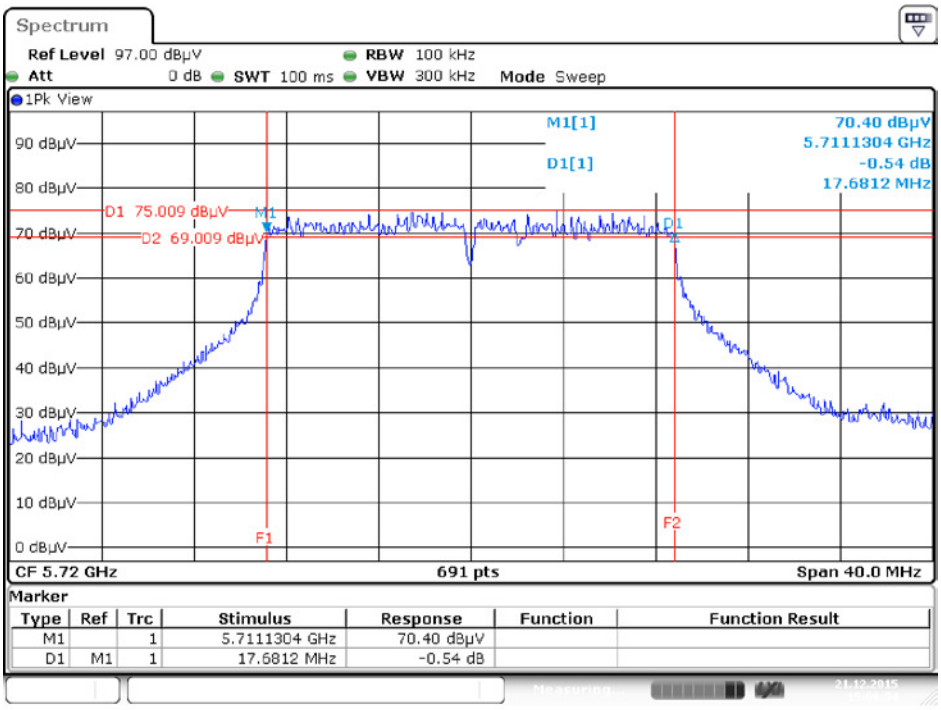
Temperature	25℃	Humidity	45%
Test Engineer	Roki Liu		

Straddle Channel

Mode	Frequency	6dB BW (MHz)	6dB BW M1 (MHz)	UNII 3 BW (MHz)	Min. Limit (kHz)	Test Result
802.11ac MCS0/Nss1 VHT20	5720 MHz	17.68	5711.13	3.81	500	**Complies**
802.11ac MCS0/Nss1 VHT40	5710 MHz	36.41	5691.80	3.20	500	**Complies**
802.11ac MCS0/Nss1 VHT80	5690 MHz	76.52	5651.74	3.26	500	**Complies**

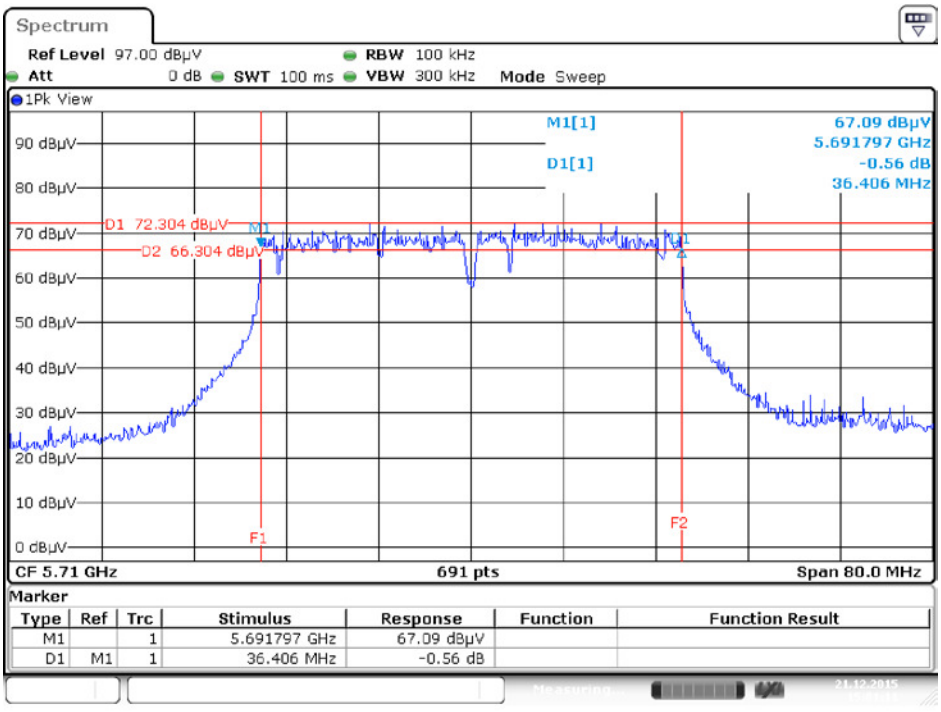
Straddle Channel

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5720 MHz



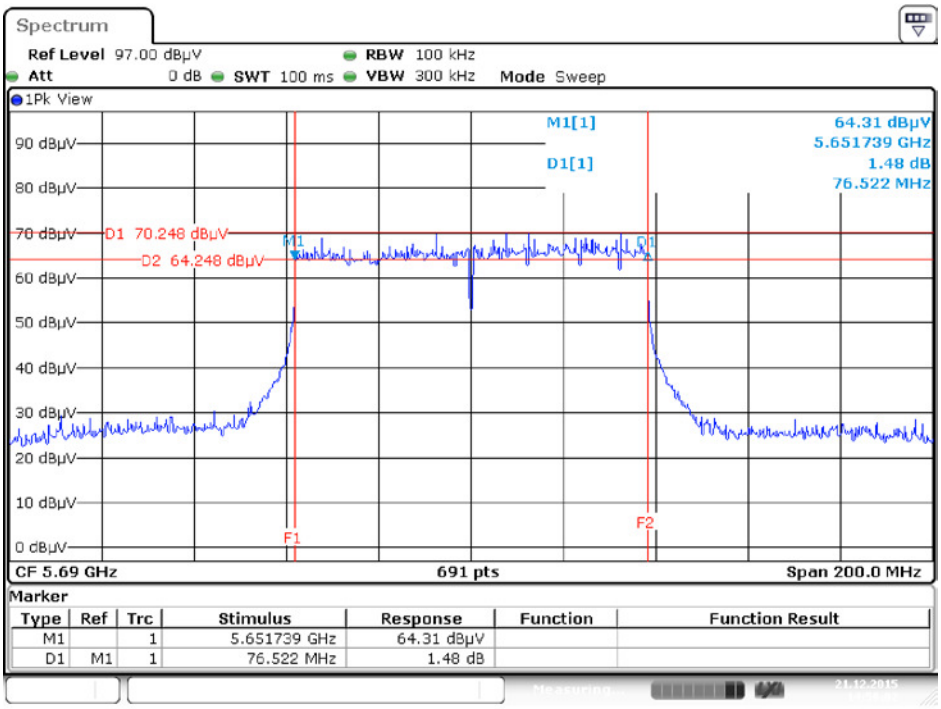
Date: 21.DEC.2015 15:09:54

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5710 MHz



Date: 21.DEC.2015 15:01:11

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5690 MHz



4.3. Maximum Conducted Output Power Measurement

4.3.1. Limit

Frequency Band		Limit
☒	5.25-5.35 GHz	The maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW (24dBm) or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz. 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.
☒	5.470-5.725 GHz	

4.3.2. Measuring Instruments and Setting

For other channel:

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

For straddle channel:

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 count 100
Sweep Time	Auto

4.3.3. Test Procedures

For other channel:

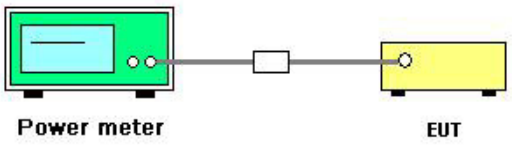
1. The transmitter output (antenna port) was connected to the power meter.
2. Test was performed in accordance with KDB789033 D02 v01 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (E) Maximum conducted output power =>3. Measurement using a Power Meter (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.

For straddle channel:

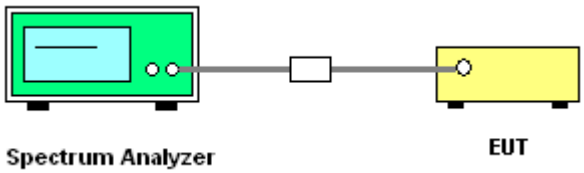
1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Test was performed in accordance with FCC Public Notice DA 02-2138, August 30, 2002.

4.3.4. Test Setup Layout

For other channel:



For straddle channel:



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 Maximum Conducted Output Power

Temperature	25℃	Humidity	45%
Test Engineer	Roki Liu	Test Date	Dec. 21, 2015

P to M

Mode	Frequency	Conducted Power (dBm)					Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
802.11ac MCS0/Nss1 VHT20	5260 MHz	11.12	11.21	11.41	12.28	17.55	17.91	Complies
	5300 MHz	11.16	11.15	11.63	12.12	17.55	17.91	Complies
	5320 MHz	11.22	11.21	11.82	12.05	17.61	17.91	Complies
	5500 MHz	11.79	11.67	11.82	12.22	17.90	17.91	Complies
	5580 MHz	11.68	11.68	11.93	11.21	17.65	17.91	Complies
	5700 MHz	11.35	11.56	11.95	12.51	17.89	17.91	Complies
802.11ac MCS0/Nss1 VHT40	5270 MHz	11.79	11.41	12.35	11.58	17.82	17.91	Complies
	5310 MHz	11.76	11.34	12.46	11.47	17.80	17.91	Complies
	5510 MHz	11.39	11.16	12.52	11.25	17.64	17.91	Complies
	5550 MHz	11.34	11.19	12.87	11.54	17.81	17.91	Complies
	5670 MHz	11.47	11.05	12.85	11.81	17.87	17.91	Complies
802.11ac MCS0/Nss1 VHT80	5290 MHz	11.16	11.43	11.75	11.38	17.46	17.91	Complies
	5530 MHz	10.64	10.55	10.61	11.11	16.75	17.91	Complies
	5610 MHz	11.45	11.24	11.68	12.37	17.73	17.91	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =12.09dBi > 6dBi, So Limit =24-(12.09-6)=17.91dBm.

Straddle Channel

Mode	Frequency	Conducted Power(dBm)					Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
802.11ac MCS0/Nss1 VHT20	5720 MHz (UNII 2C)	11.58	10.51	11.01	10.17	16.87	16.94	Complies
	5720 MHz (UNII 3)	4.79	4.28	4.60	4.25	10.51	23.91	Complies
802.11ac MCS0/Nss1 VHT40	5710 MHz (UNII 2C)	12.81	11.26	11.38	11.70	17.85	17.91	Complies
	5710 MHz (UNII 3)	1.94	0.18	0.28	0.44	6.79	23.91	Complies
802.11ac MCS0/Nss1 VHT80	5690 MHz (UNII 2C)	12.50	11.04	10.74	11.51	17.52	17.91	Complies
	5690 MHz (UNII 3)	-0.34	-2.20	-2.31	-2.11	4.36	23.91	Complies

(UNII 2C)

Note 1:

For 802.11ac VHT20

5720 MHz power limit=11+10log(B);11+10log(15.96)-(12.09-6)=16.94dBm<24dBm, so limit=16.94dBm.

Note 2: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =12.09dBi > 6dBi, So Limit =24-(12.09-6)=17.91dBm.

(UNII 3)

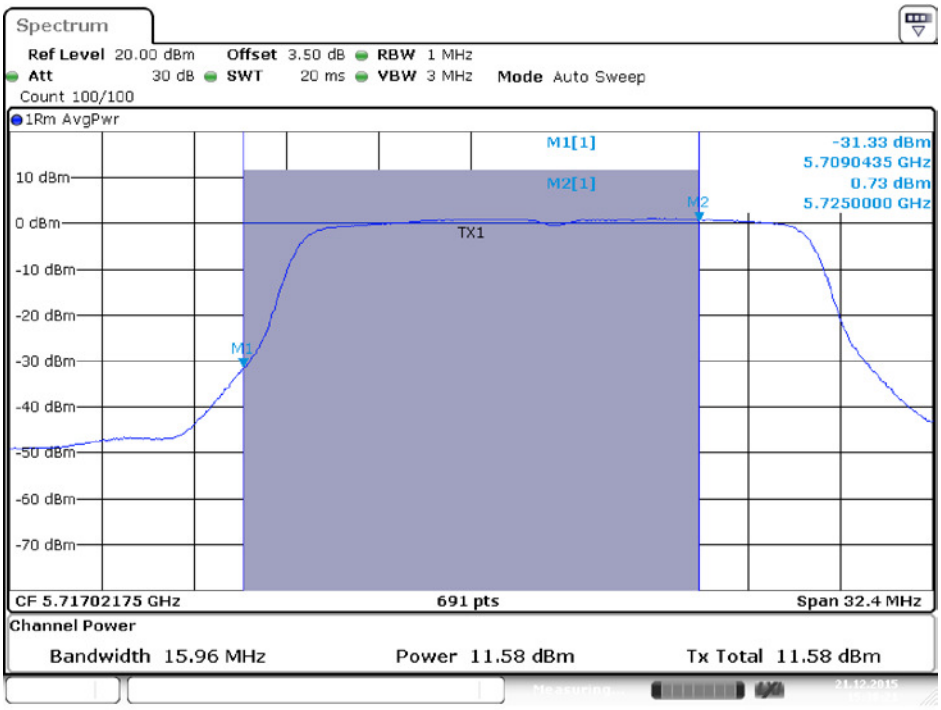
Note 1: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =12.09dBi > 6dBi, So Limit =30-(12.09-6)=23.91dBm.

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

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

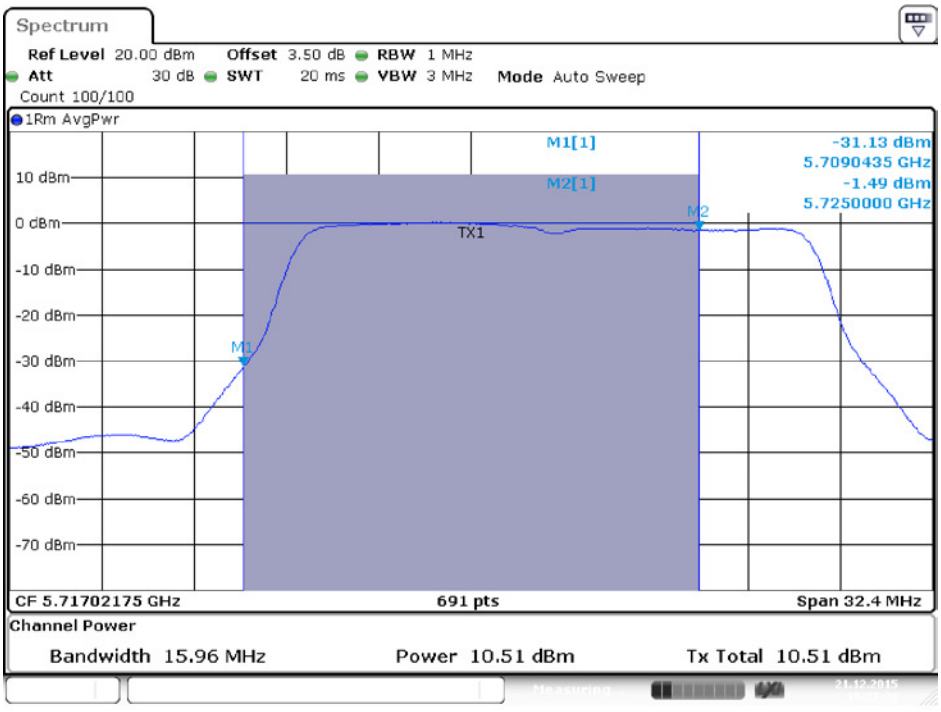
Straddle Channel

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 / 5720 MHz (UNII 2C)



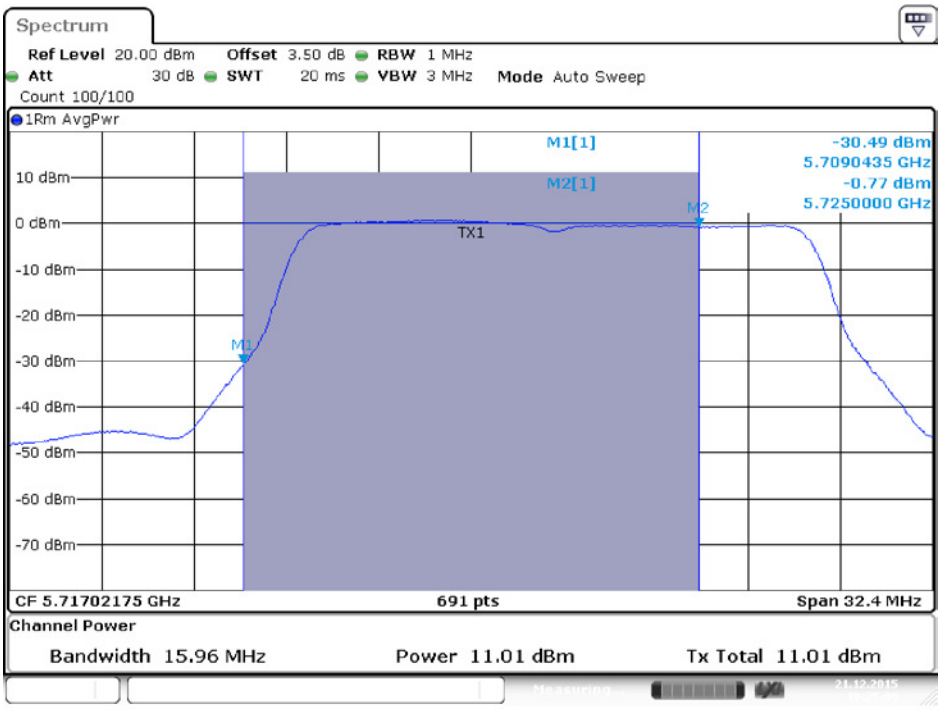
Date: 21.DEC.2015 15:38:20

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 2 / 5720 MHz (UNII 2C)



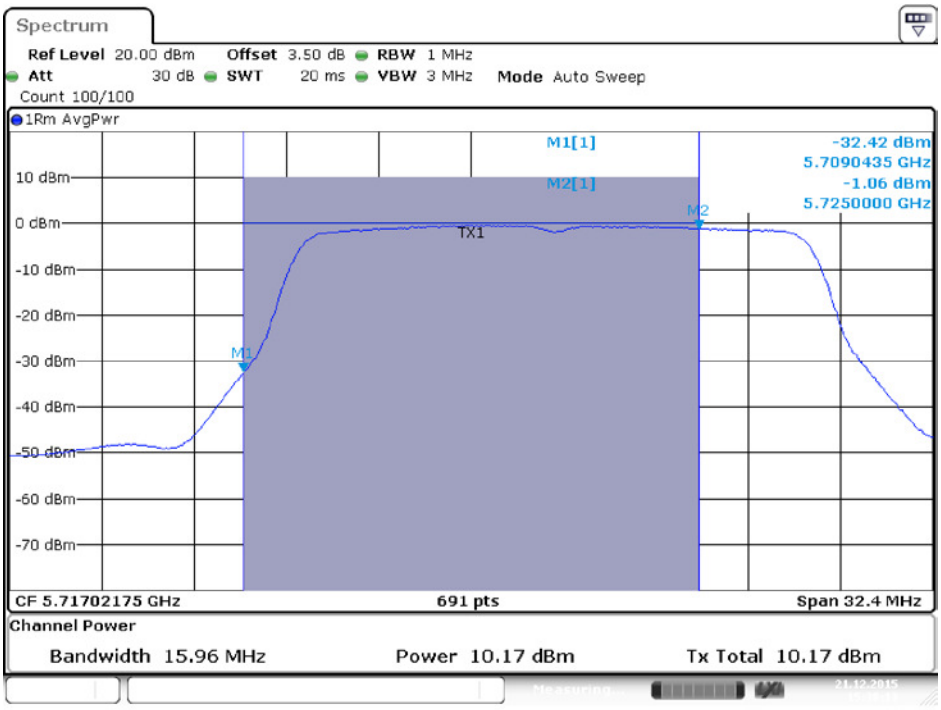
Date: 21.DEC.2015 15:27:28

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 / 5720 MHz (UNII 2C)



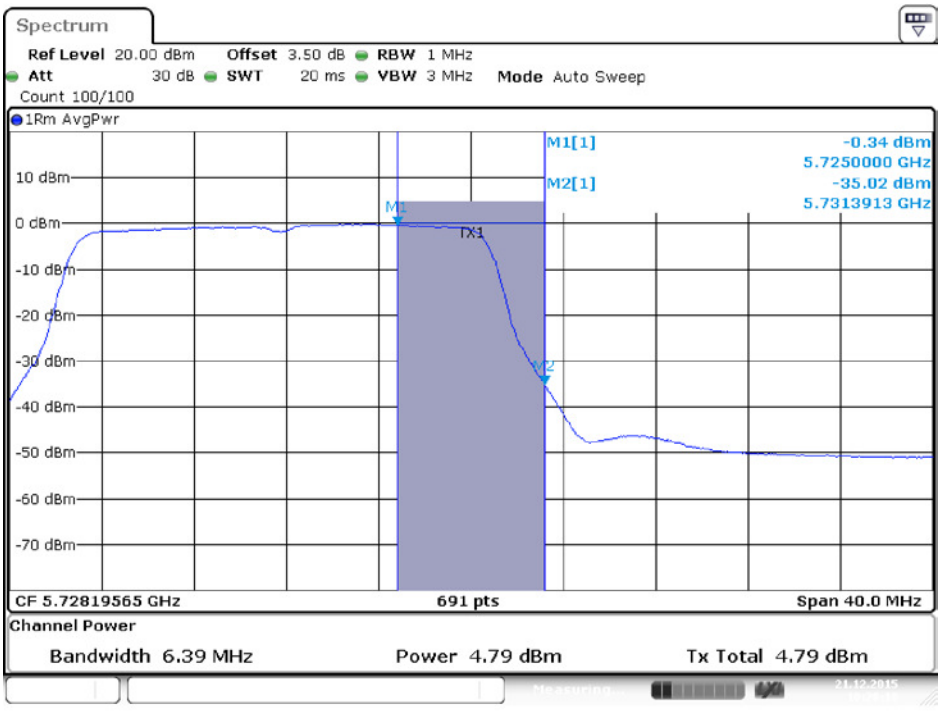
Date: 21.DEC.2015 10:25:09

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 4 / 5720 MHz (UNII 2C)



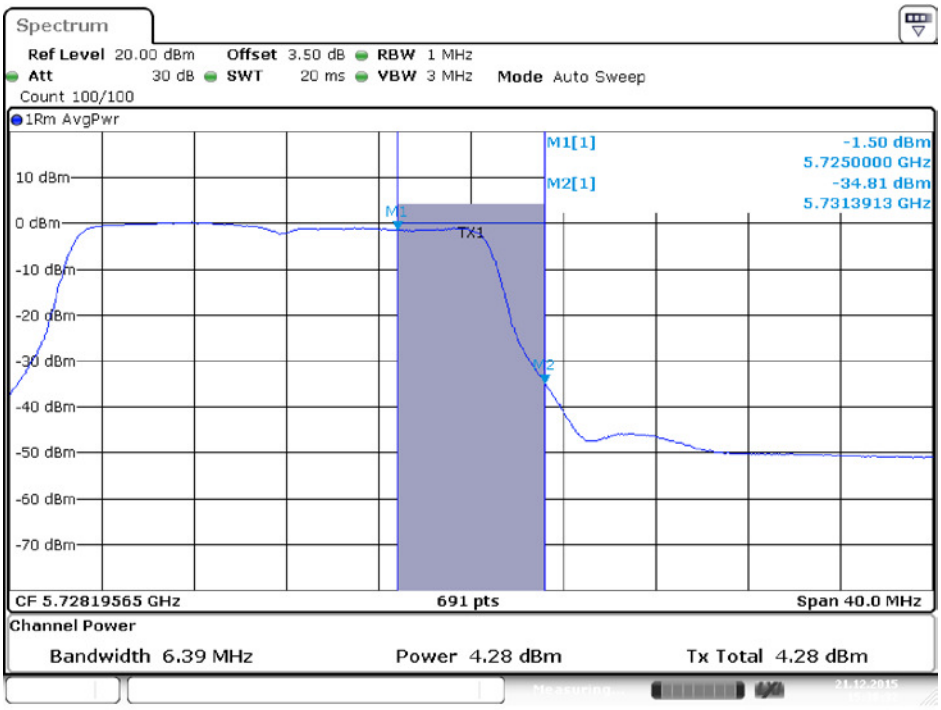
Date: 21.DEC.2015 15:38:13

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 / 5720 MHz (UNII 3)



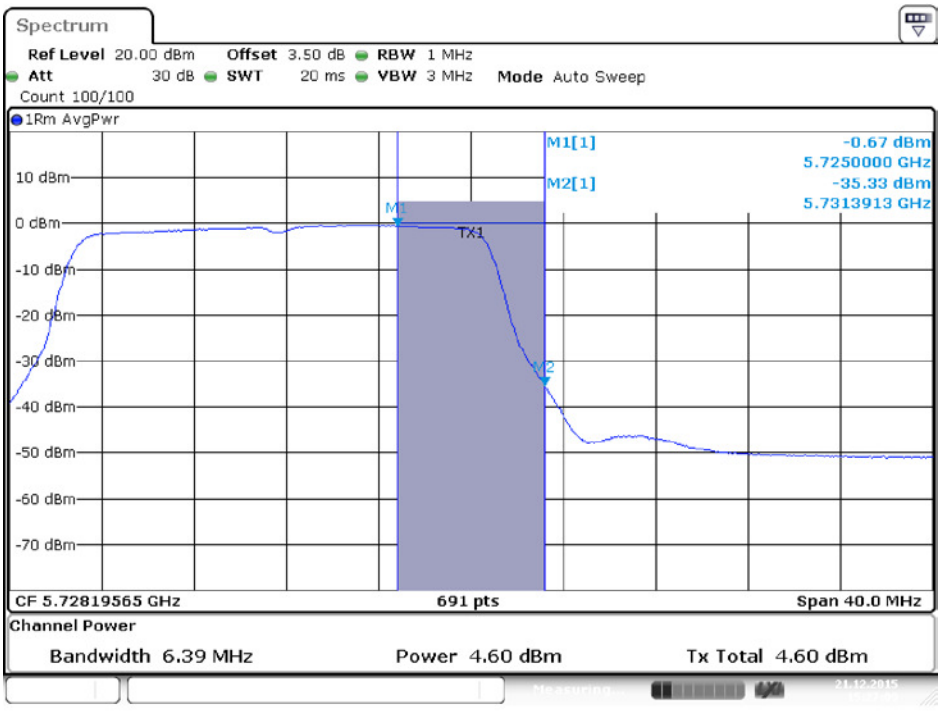
Date: 21.DEC.2015 10:28:17

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 2 / 5720 MHz (UNII 3)



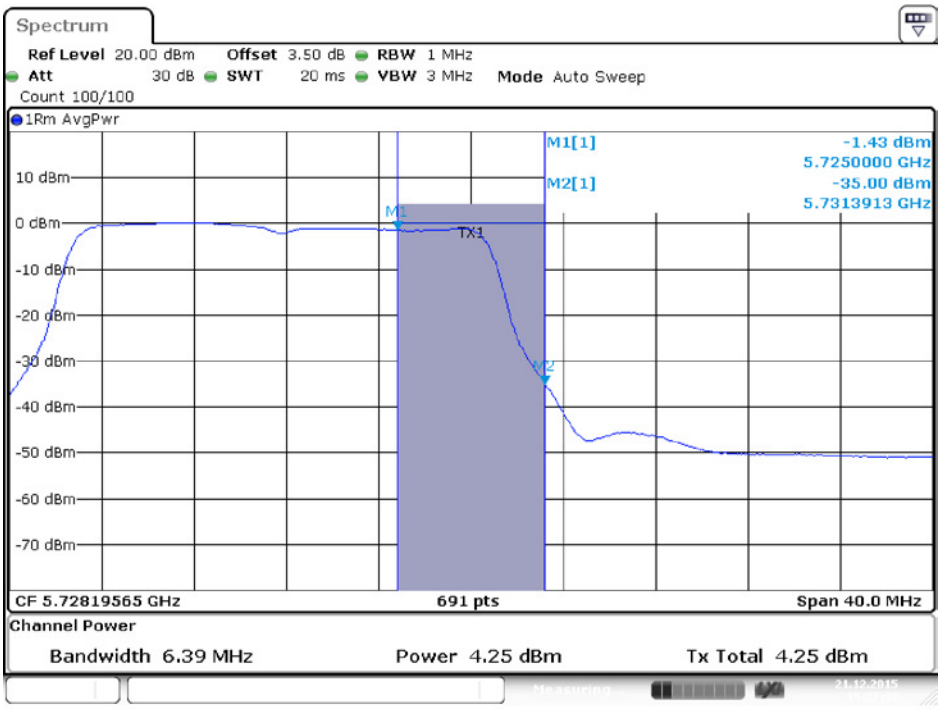
Date: 21.DEC.2015 15:38:31

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 / 5720 MHz (UNII 3)



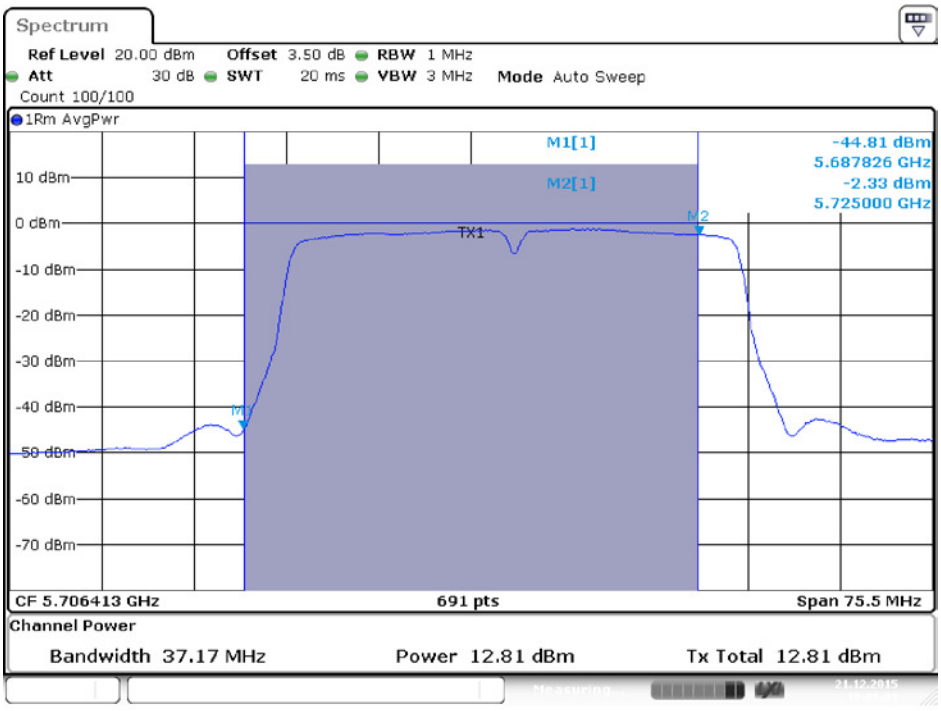
Date: 21.DEC.2015 15:27:09

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 4 / 5720 MHz (UNII 3)



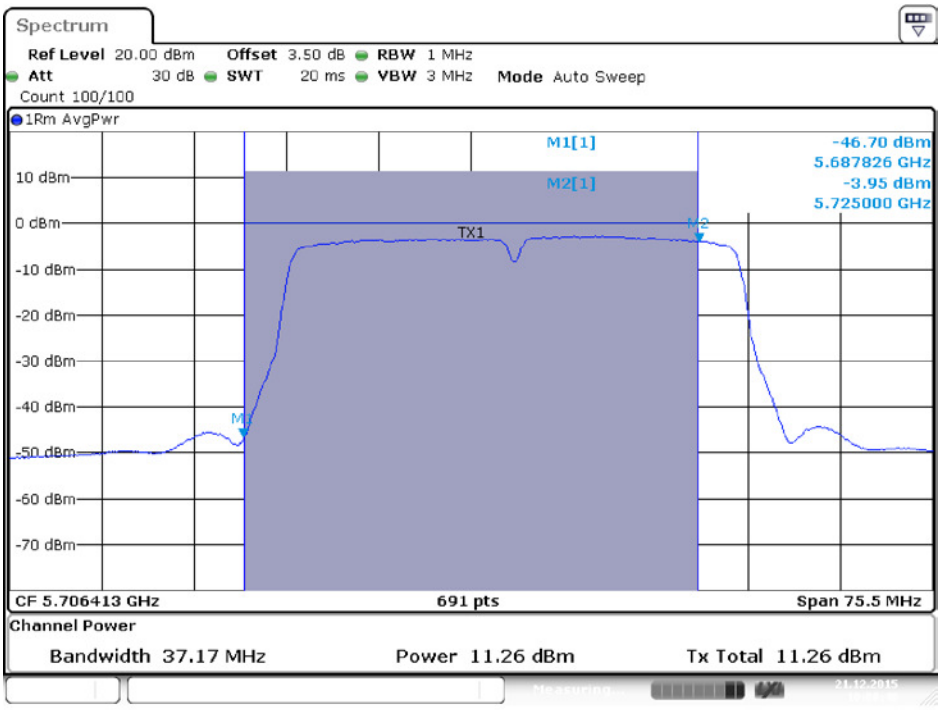
Date: 21.DEC.2015 15:27:32

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 / 5710 MHz (UNII 2C)



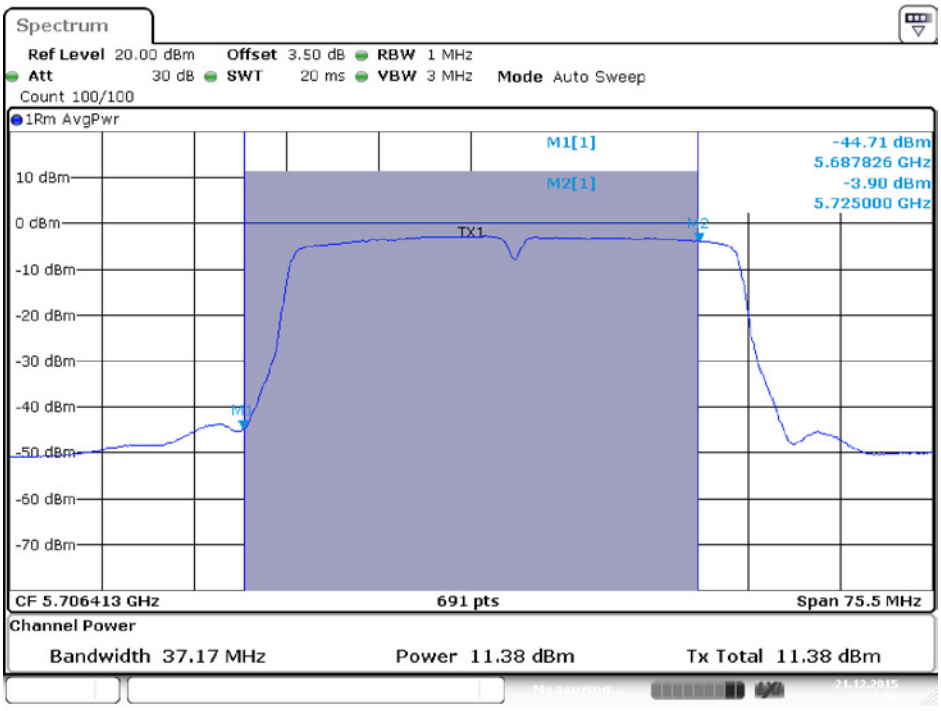
Date: 21.DEC.2015 10:09:03

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 2 / 5710 MHz (UNII 2C)



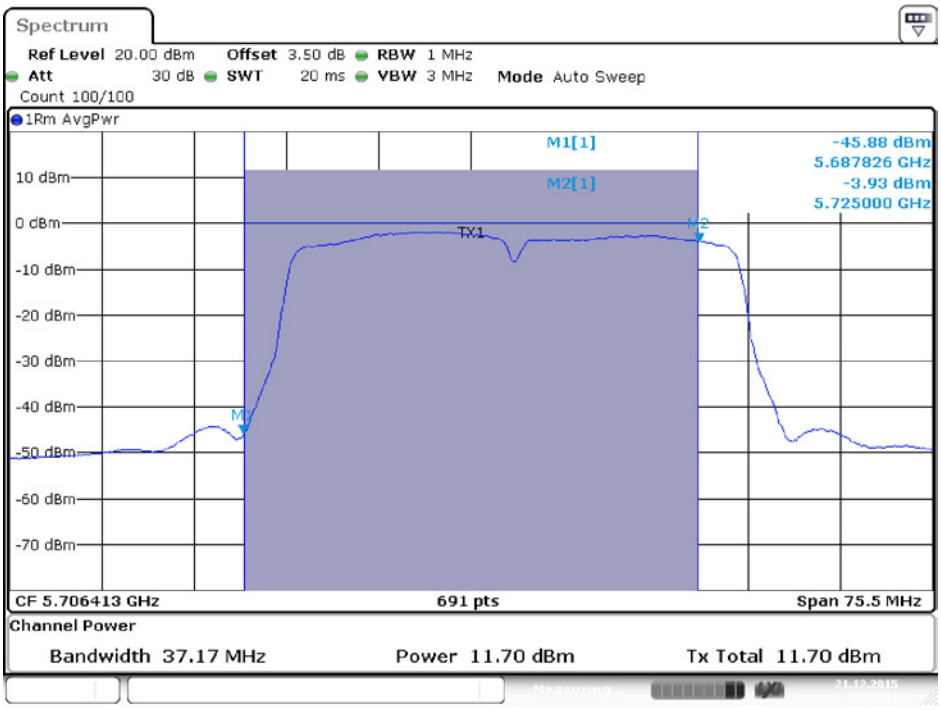
Date: 21.DEC.2015 10:08:48

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 / 5710 MHz (UNII 2C)



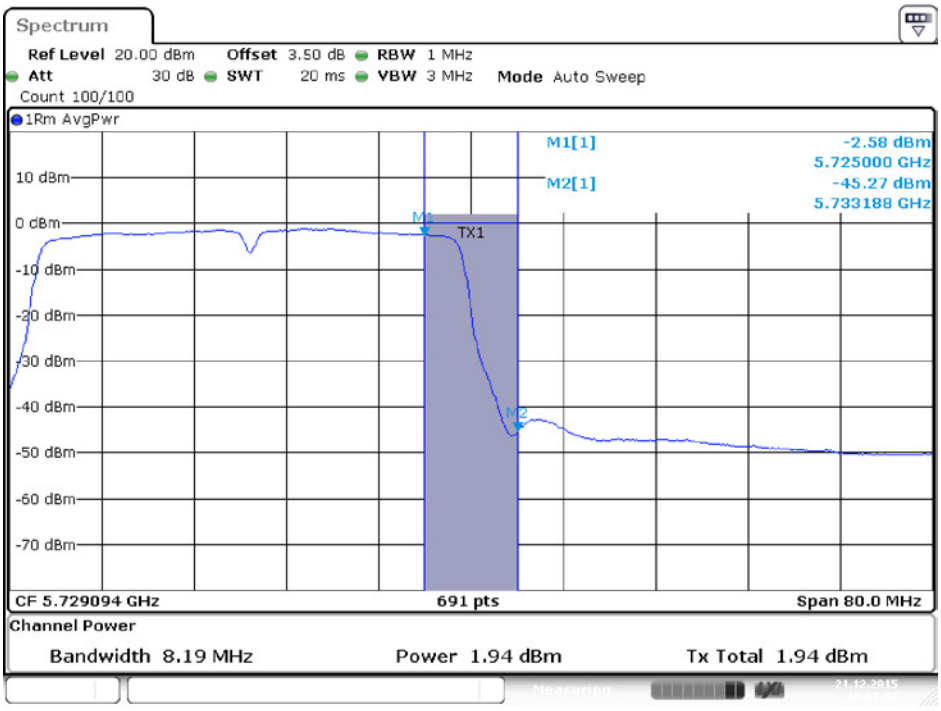
Date: 21.DEC.2015 10:08:55

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 4 / 5710 MHz (UNII 2C)



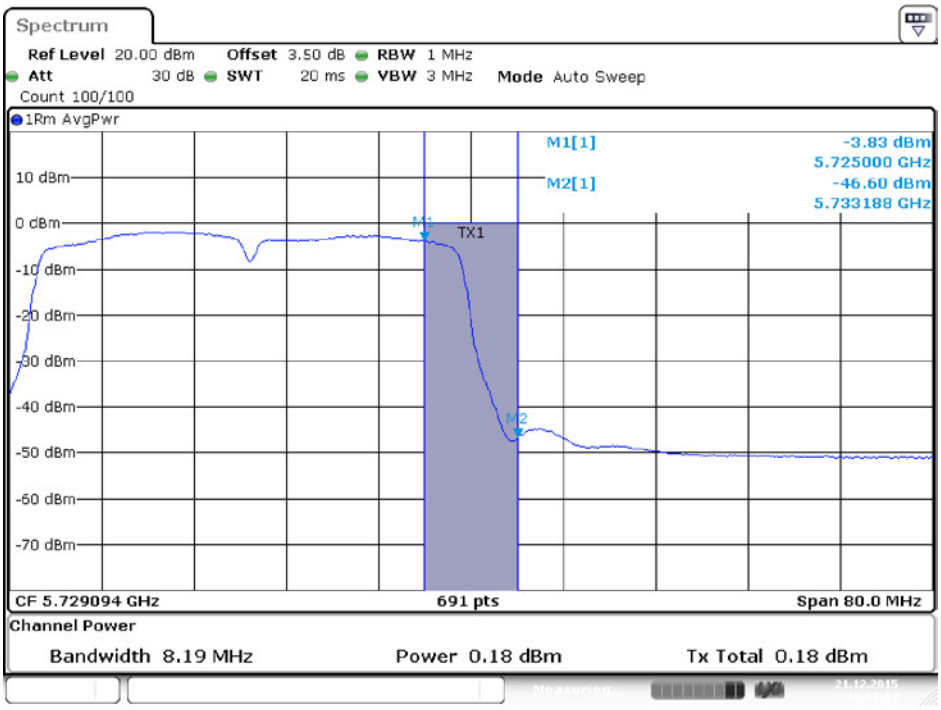
Date: 21.DEC.2015 10:09:11

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 / 5710 MHz (UNII 3)



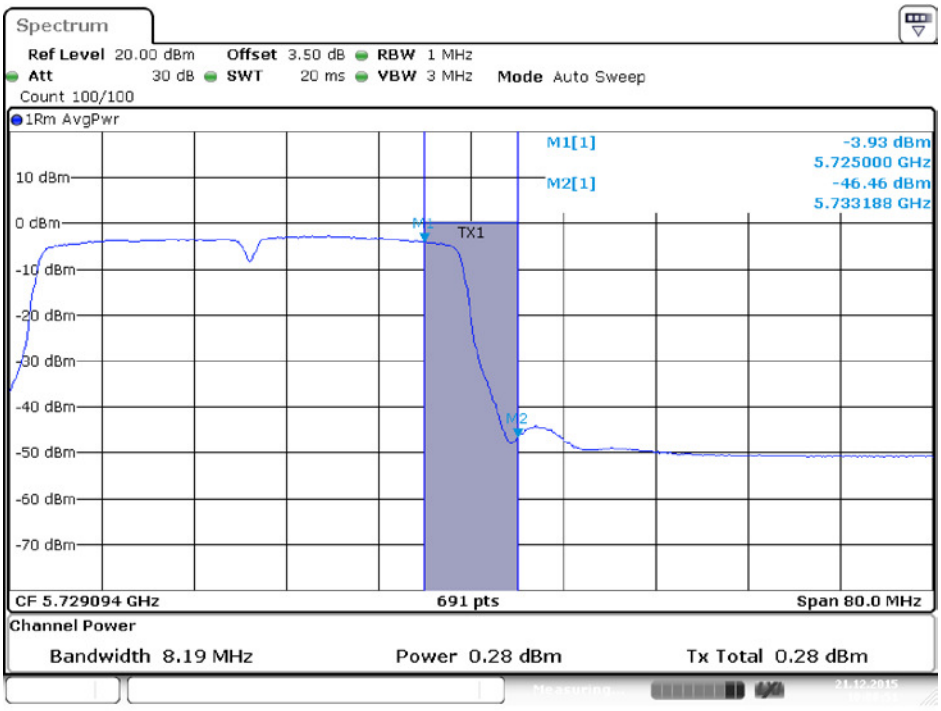
Date: 21.DEC.2015 10:09:06

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 2 / 5710 MHz (UNII 3)



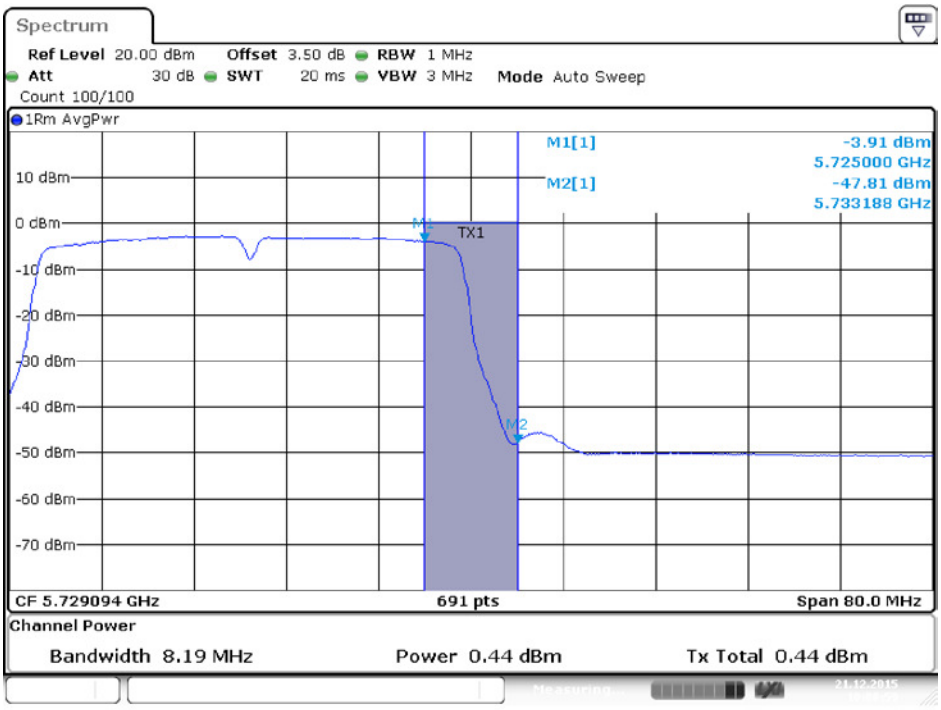
Date: 21.DEC.2015 10:09:14

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 / 5710 MHz (UNII 3)



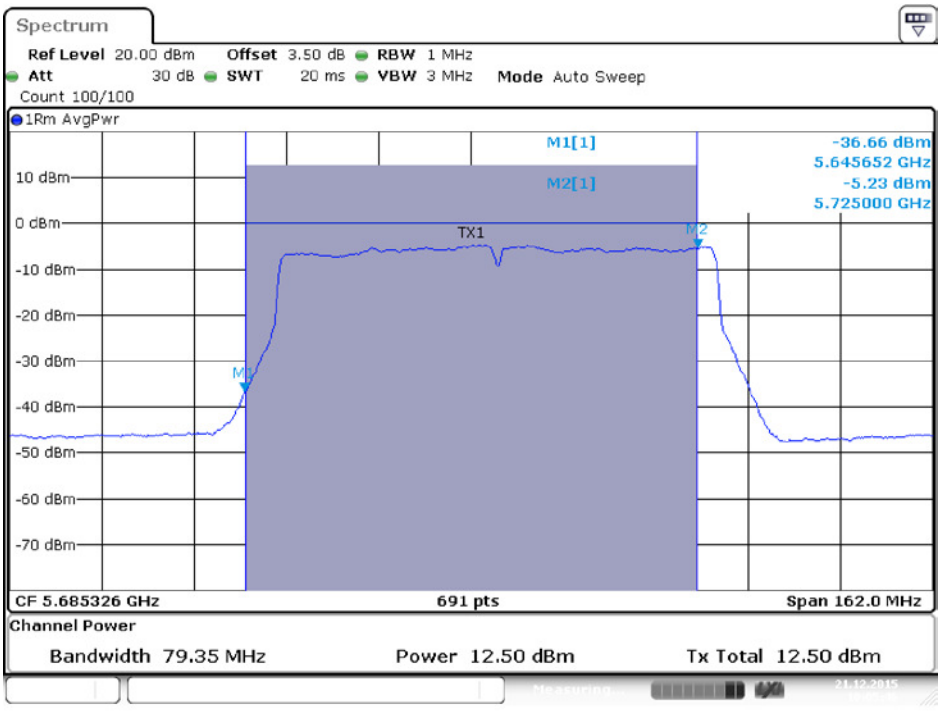
Date: 21.DEC.2015 10:08:51

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 4 / 5710 MHz (UNII 3)



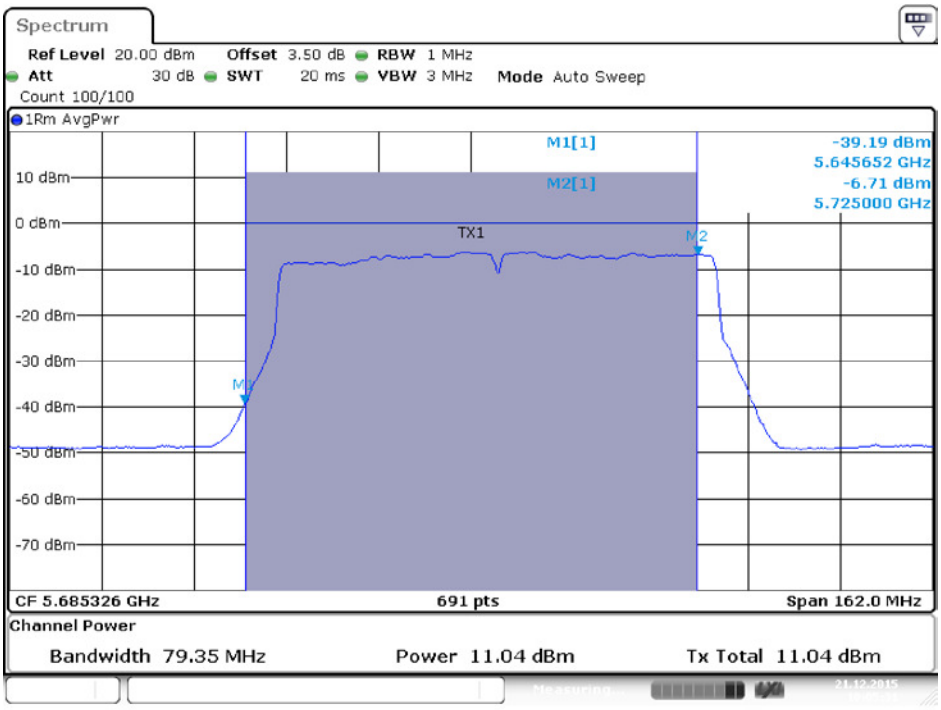
Date: 21.DEC.2015 10:08:59

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 / 5690 MHz (UNII 2C)



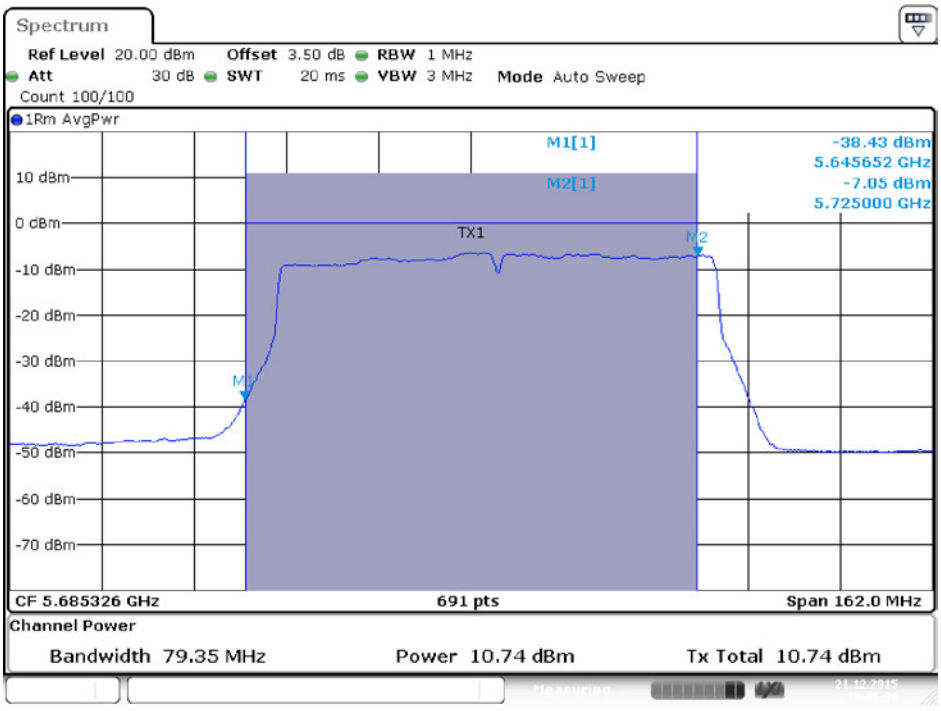
Date: 21.DEC.2015 10:05:46

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 2 / 5690 MHz (UNII 2C)



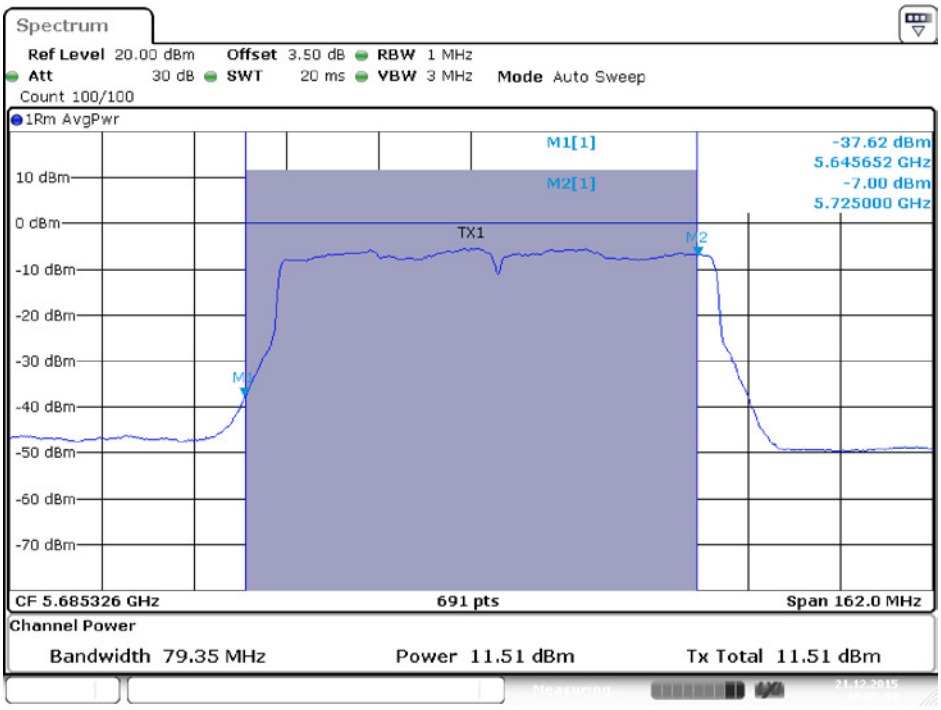
Date: 21.DEC.2015 10:05:31

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 / 5690 MHz (UNII 2C)



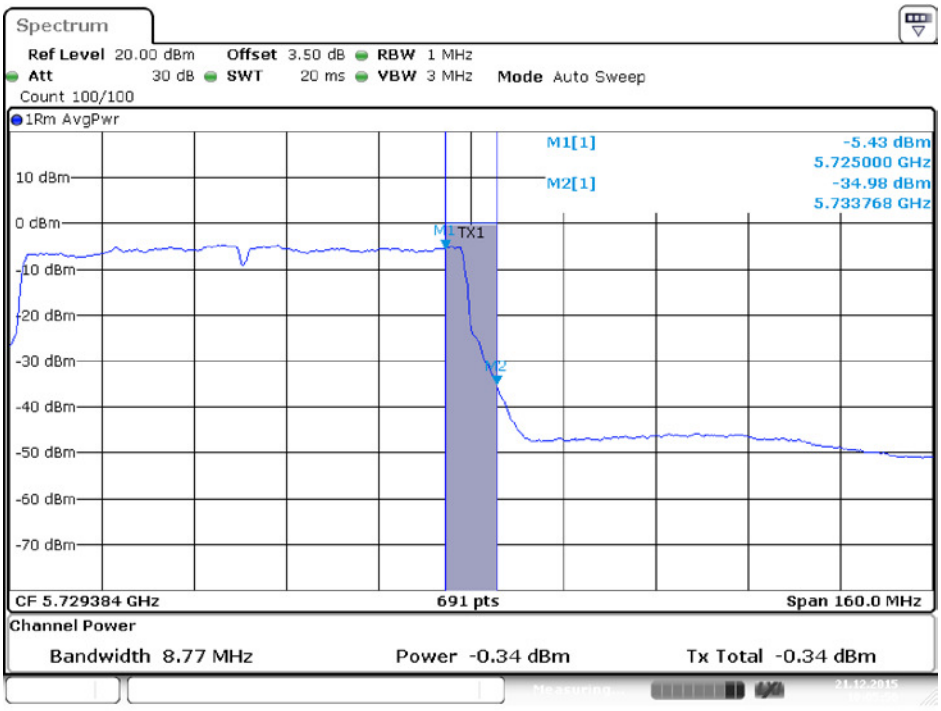
Date: 21.DEC.2015 10:05:38

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 4 / 5690 MHz (UNII 2C)



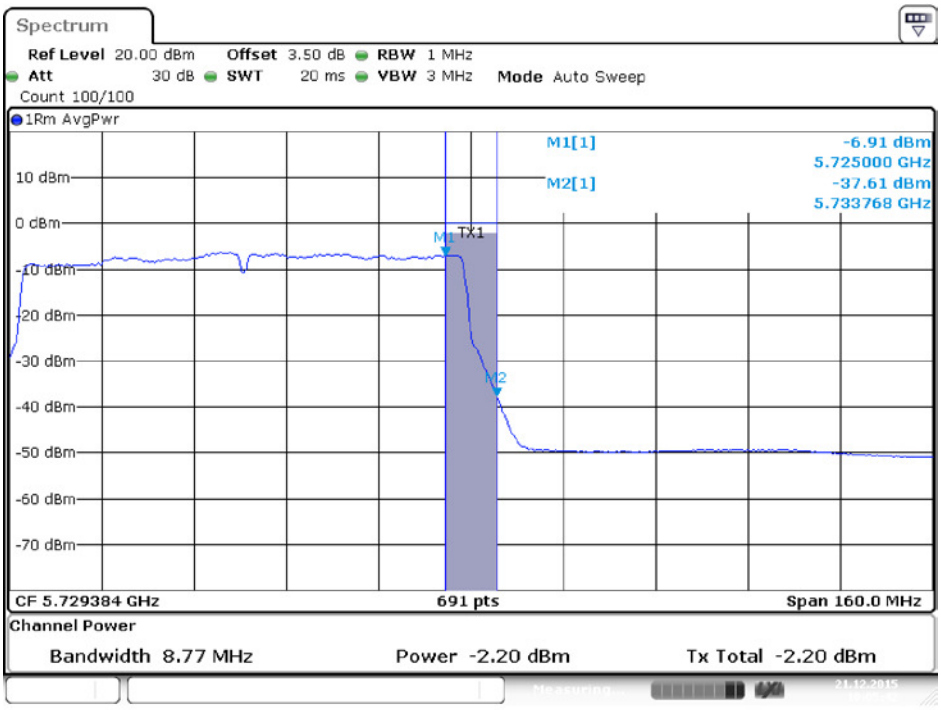
Date: 21.DEC.2015 10:05:54

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 / 5690 MHz (UNII 3)



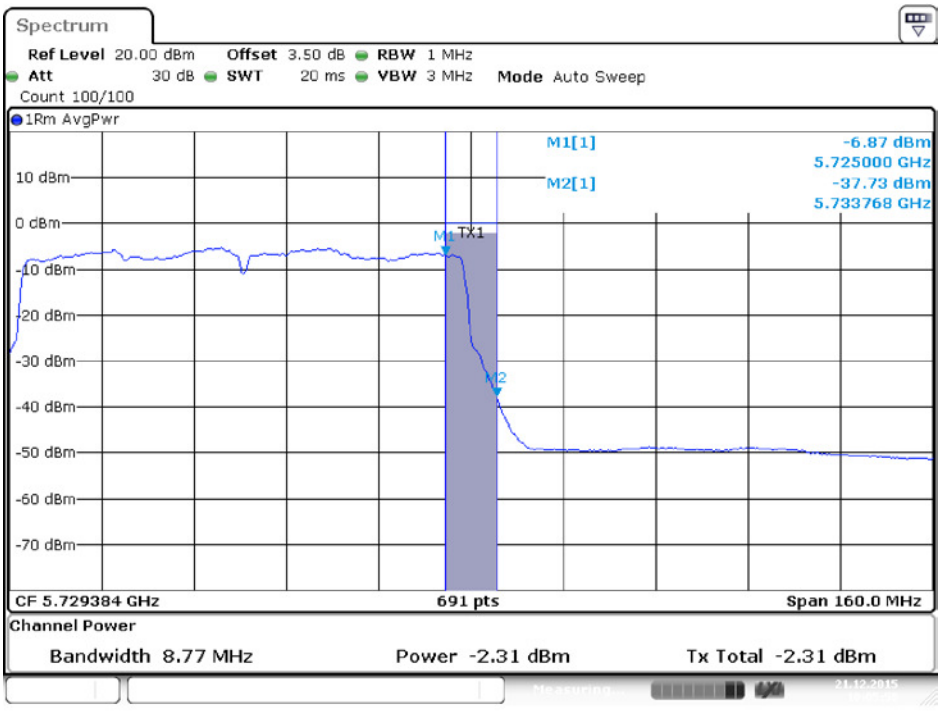
Date: 21.DEC.2015 10:05:50

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 2 / 5690 MHz (UNII 3)



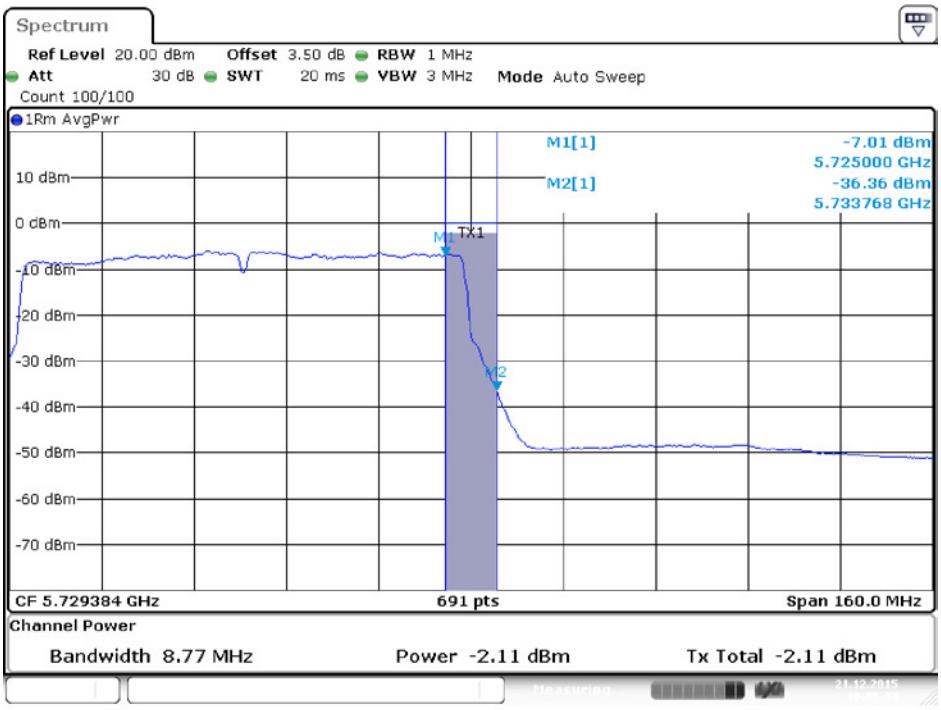
Date: 21.DEC.2015 10:05:42

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 / 5690 MHz (UNII 3)



Date: 21.DEC.2015 10:05:57

Conducted Output Power Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 4 / 5690 MHz (UNII 3)



Date: 21.DEC.2015 10:05:34

4.4. Power Spectral Density Measurement

4.4.1. Limit

The following table is power spectral density limits and decrease power density limit rule refer to section 4.3.1.

Frequency Band		Limit
☒	5.25-5.35 GHz	11 dBm/MHz
☒	5.470-5.725 GHz	11 dBm/MHz

4.4.2. Measuring Instruments and Setting

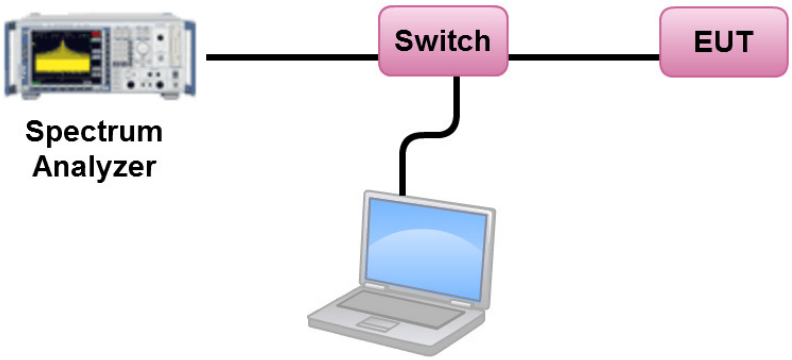
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

4.4.3. 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.

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 Power Spectral Density

Temperature	25℃	Humidity	45%
Test Engineer	Eddie Weng & Lucas Huang		

P to M

Mode	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
802.11ac MCS0/Nss1 VHT20	5260 MHz	4.73	4.91	Complies
	5300 MHz	4.78	4.91	Complies
	5320 MHz	4.71	4.91	Complies
	5500 MHz	4.73	4.91	Complies
	5580 MHz	4.80	4.91	Complies
	5700 MHz	4.62	4.91	Complies
802.11ac MCS0/Nss1 VHT40	5270 MHz	1.68	4.91	Complies
	5310 MHz	1.67	4.91	Complies
	5510 MHz	1.51	4.91	Complies
	5550 MHz	1.70	4.91	Complies
	5670 MHz	1.77	4.91	Complies
802.11ac MCS0/Nss1 VHT80	5290 MHz	-1.71	4.91	Complies
	5530 MHz	-2.75	4.91	Complies
	5610 MHz	-1.37	4.91	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =12.09dBi>6dBi, so the limit 11-(12.09-6)=4.91dBm/MHz.

Straddle Channel

Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
144	5720 MHz (UNII 2C)	4.48	4.91	Complies

Note: $DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$ =12.09dBi>6dBi, so the limit 11-(12.09-6)=4.91dBm/MHz.

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor(dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
144	5720 MHz (UNII 3)	3.63	-3.01	0.62	23.91	Complies

Note: $DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$ =12.09dBi>6dBi, so the limit 30-(12.09-6)=23.91dBm/500kHz.

Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
142	5710 MHz (UNII 2C)	2.18	4.91	Complies

Note: $DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$ =12.09dBi>6dBi, so the limit 11-(12.09-6)=4.91dBm/MHz.

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor(dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
142	5710 MHz (UNII 3)	1.11	-3.01	-1.90	23.91	Complies

Note: $DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$ =12.09dBi>6dBi, so the limit 30-(12.09-6)=23.91dBm/500kHz.

Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 + Chain 2 + Chain 3 + Chain 4

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
138	5690 MHz (UNII 2C)	-1.12	4.91	**Complies**

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =12.09dBi>6dBi, so the limit 11-(12.09-6)=4.91dBm/MHz.

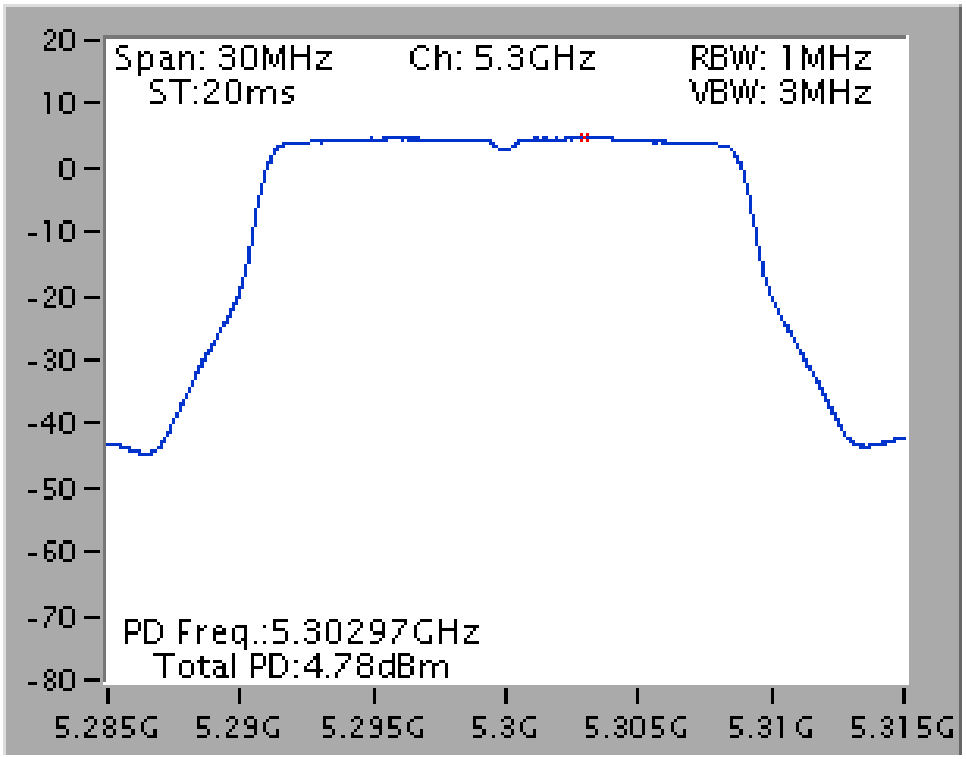
Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
138	5690 MHz (UNII 3)	-1.65	-3.01	-4.66	23.91	**Complies**

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =12.09dBi>6dBi, so the limit 30-(12.09-6)=23.91dBm/500kHz.

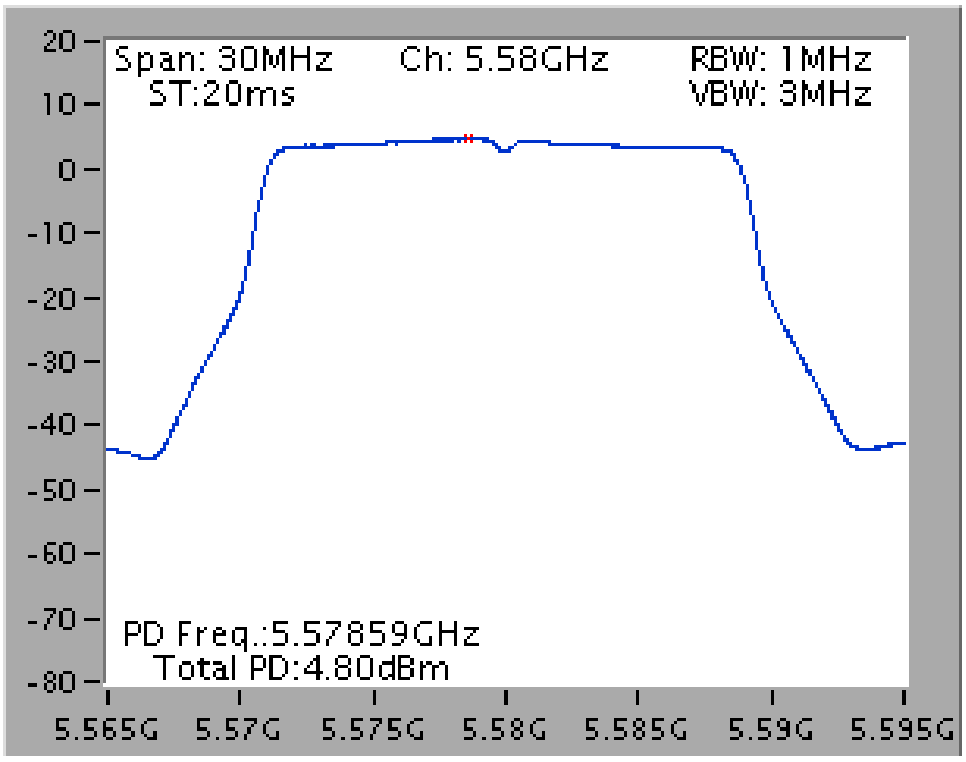
Note: All the test values were listed in the report.

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

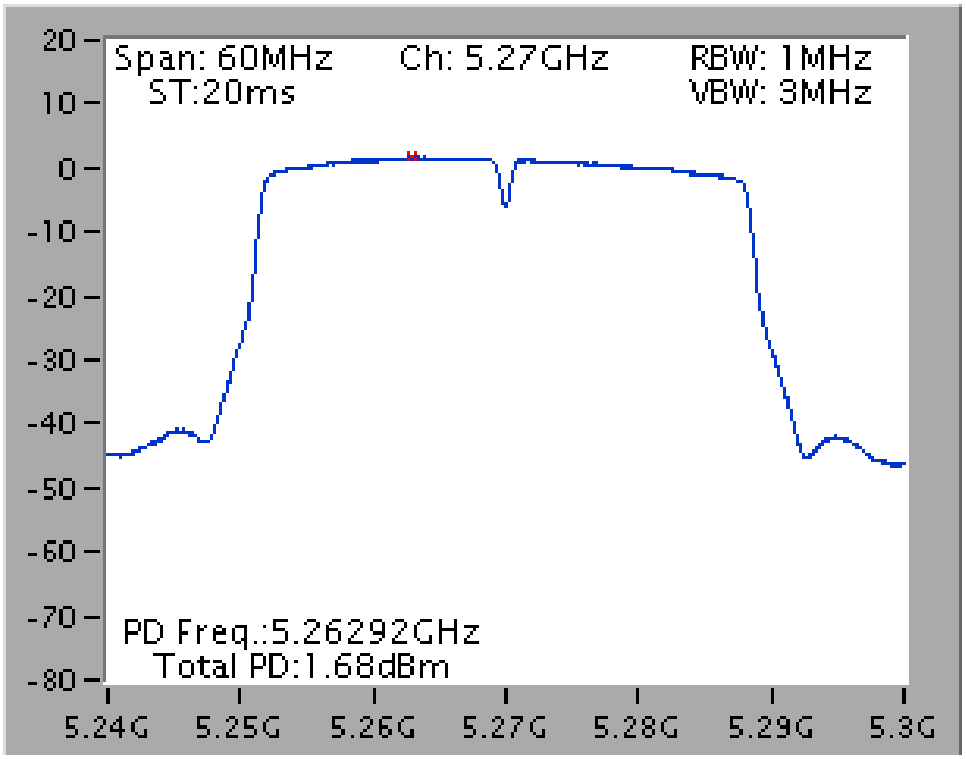
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5300 MHz



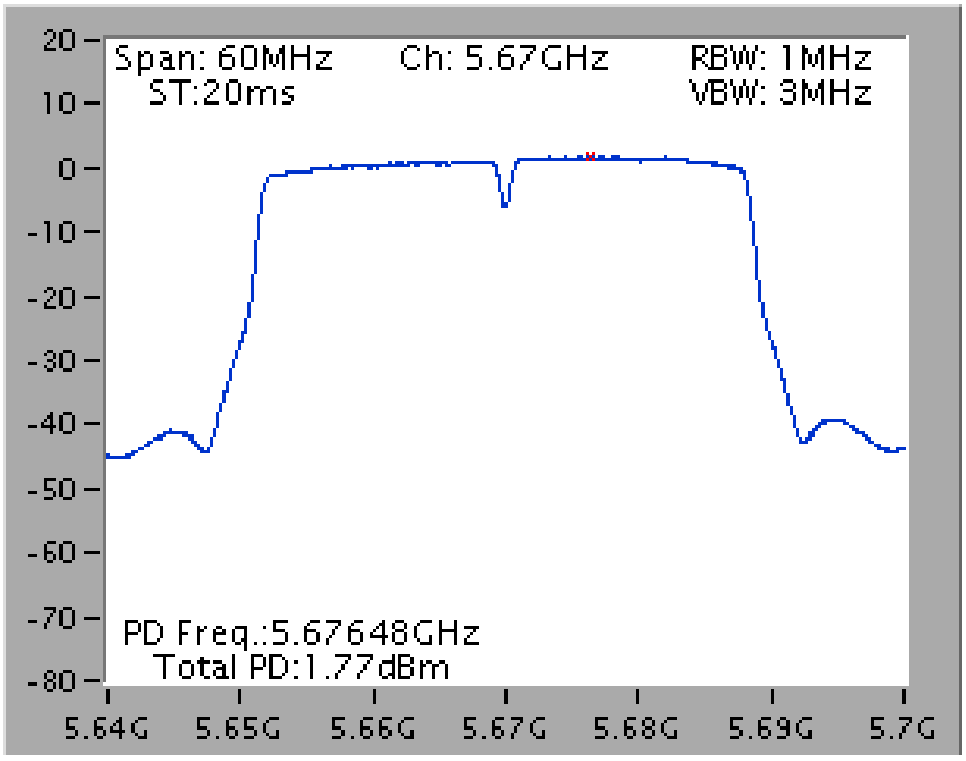
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5580 MHz



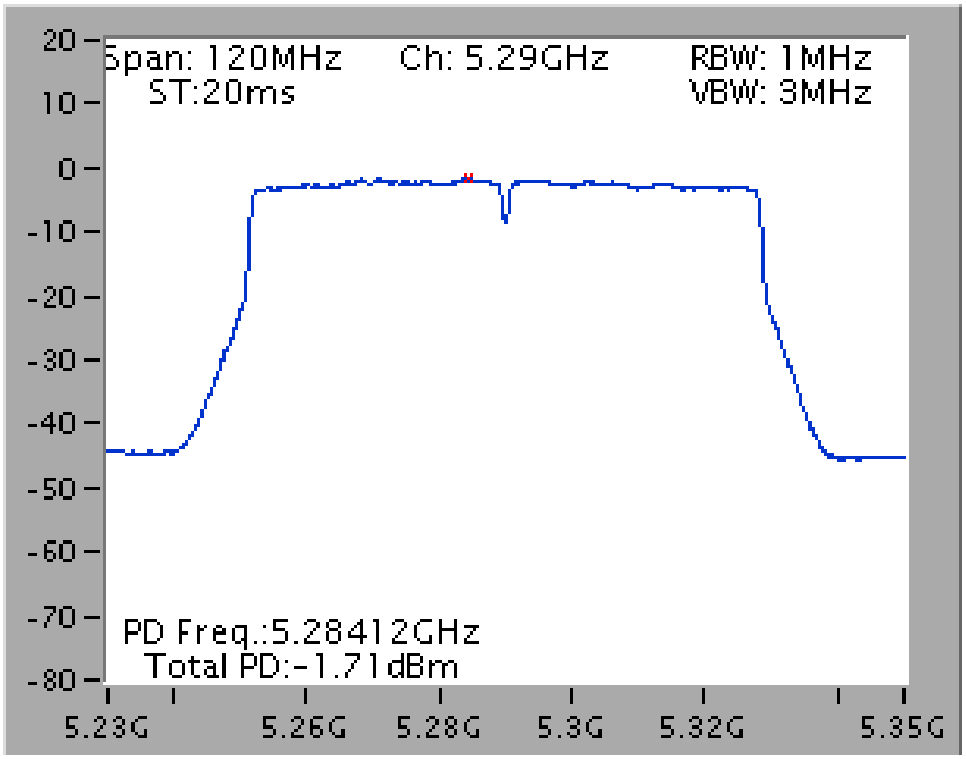
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5270 MHz



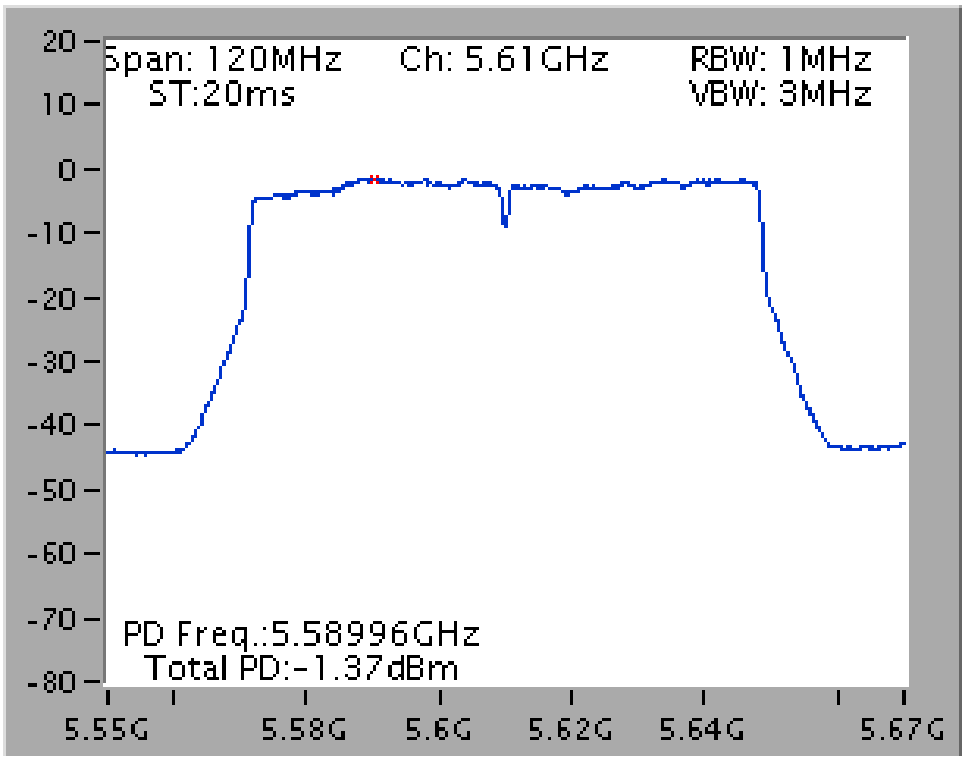
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5670 MHz



Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5290 MHz

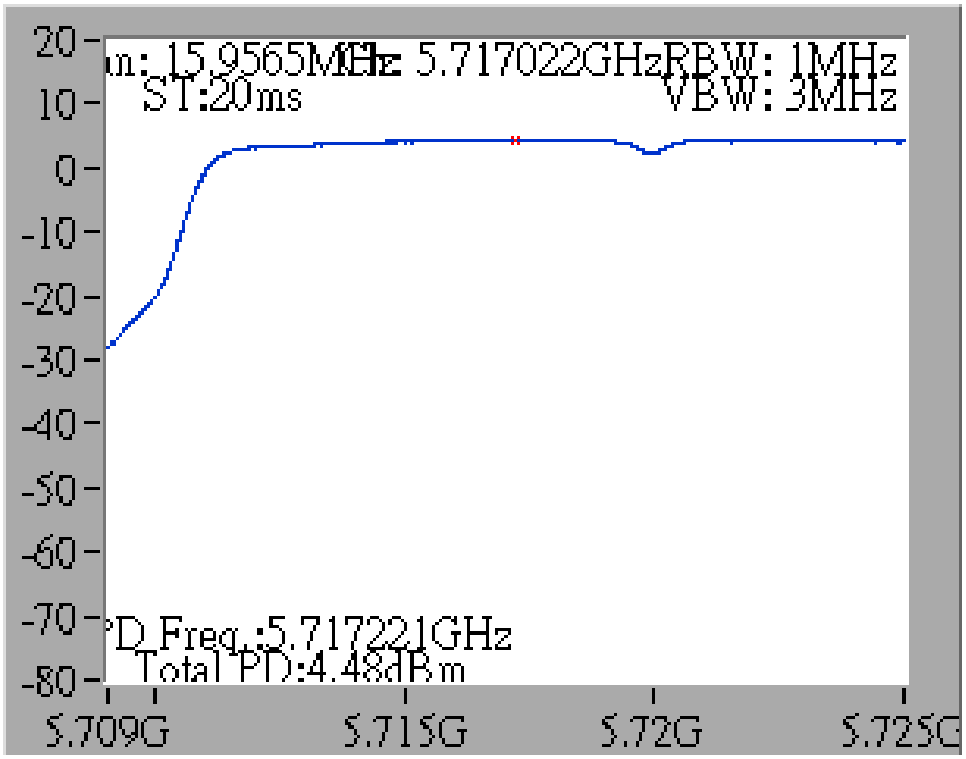


Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5610 MHz

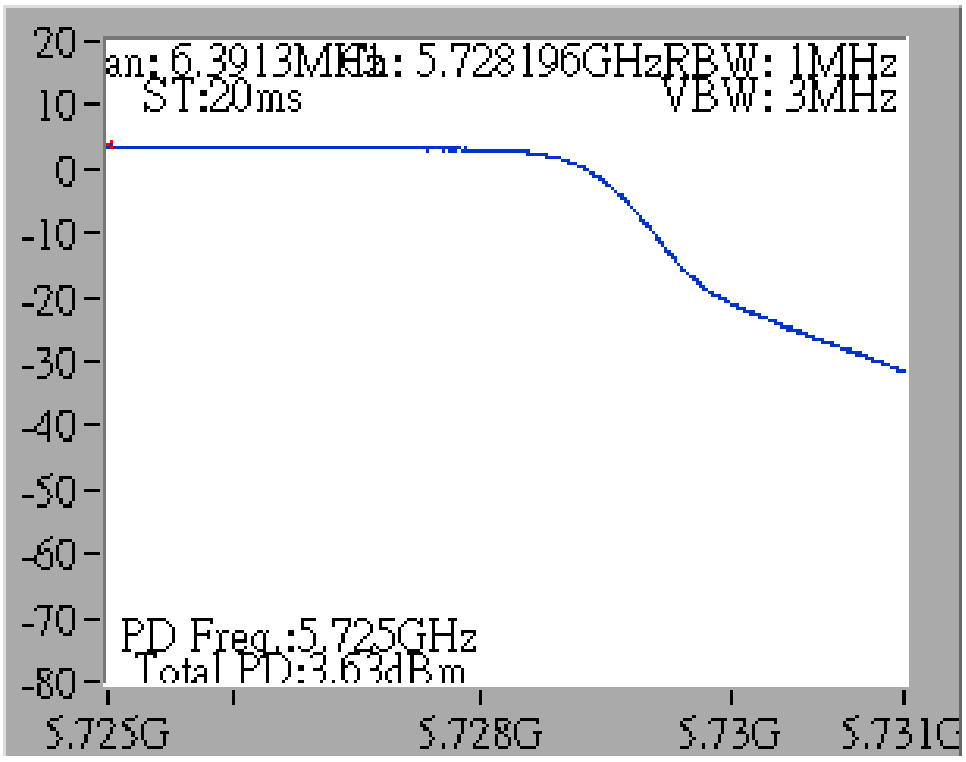


Straddle Channel

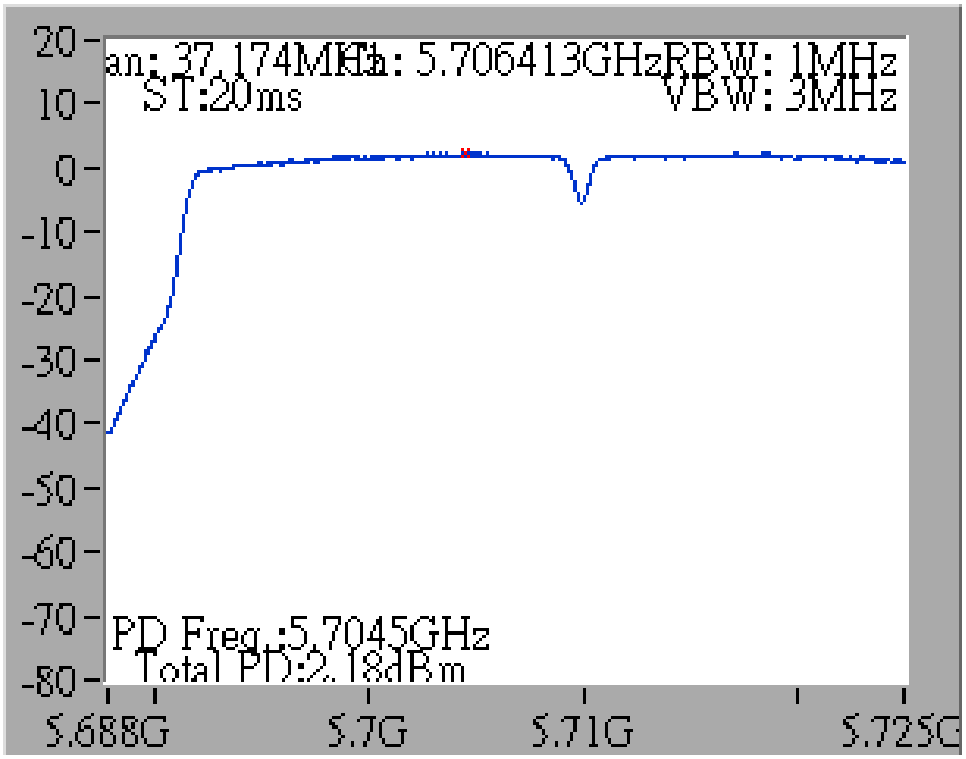
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5720 MHz (UNII 2C)



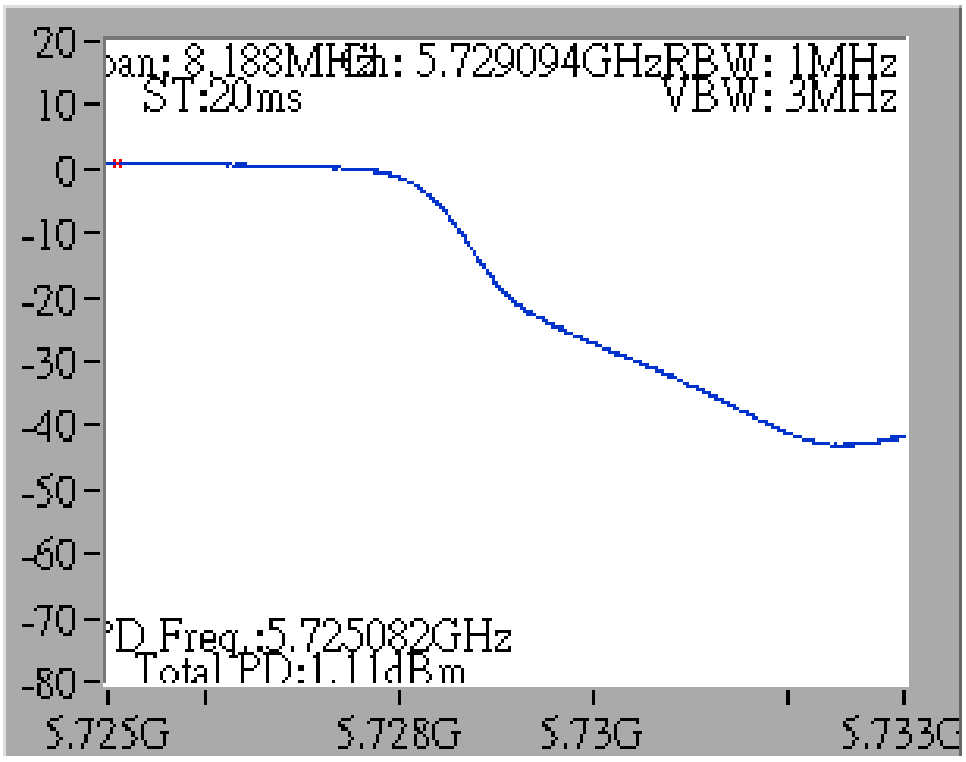
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5720 MHz (UNII 3)



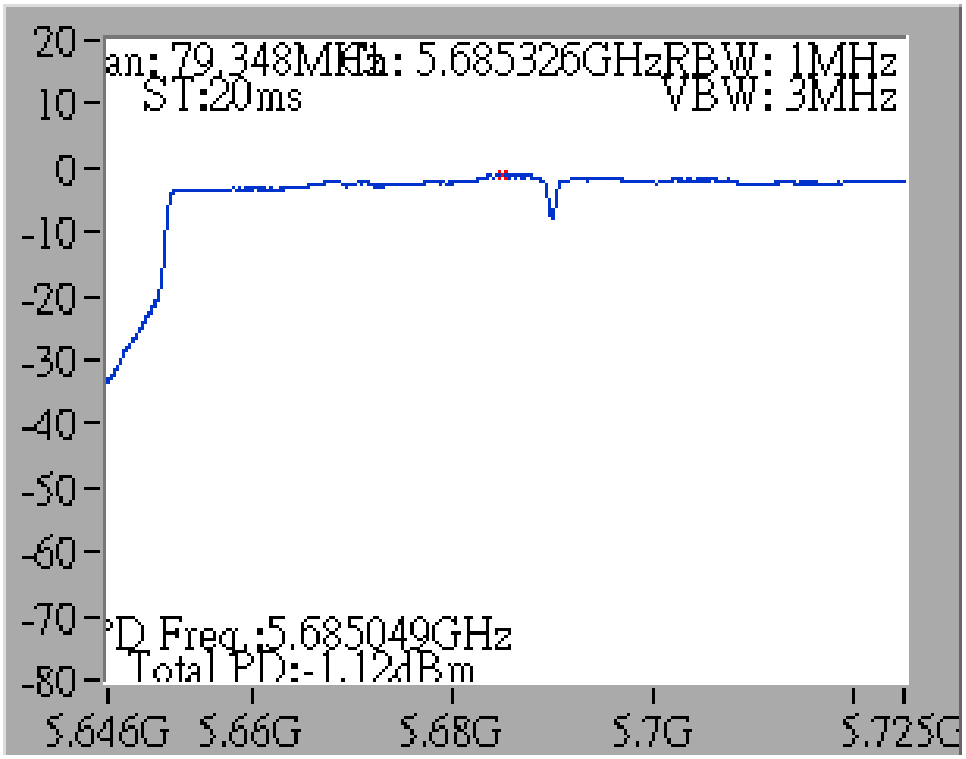
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5710 MHz (UNII 2C)



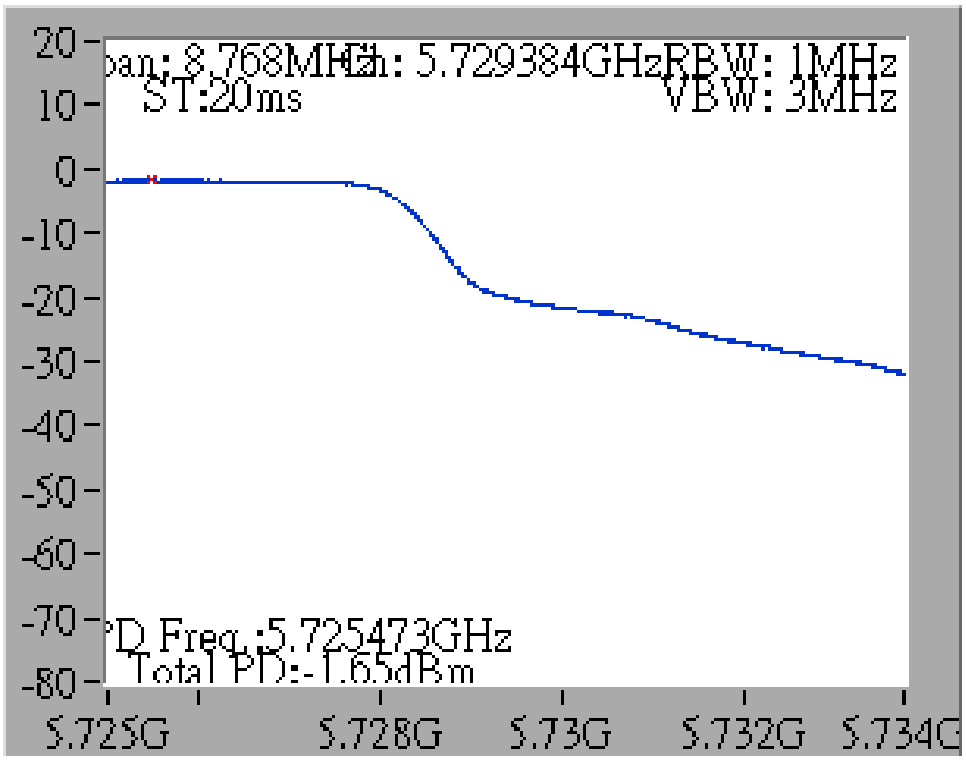
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5710 MHz (UNII 3)



Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5690 MHz (UNII 2C)



Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5690 MHz (UNII 3)



4.5. Radiated Emissions Measurement

4.5.1. Limit

For transmitters operating in the 5.25-5.35 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 5.470-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band 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 (microvolts/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

4.5.2. 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

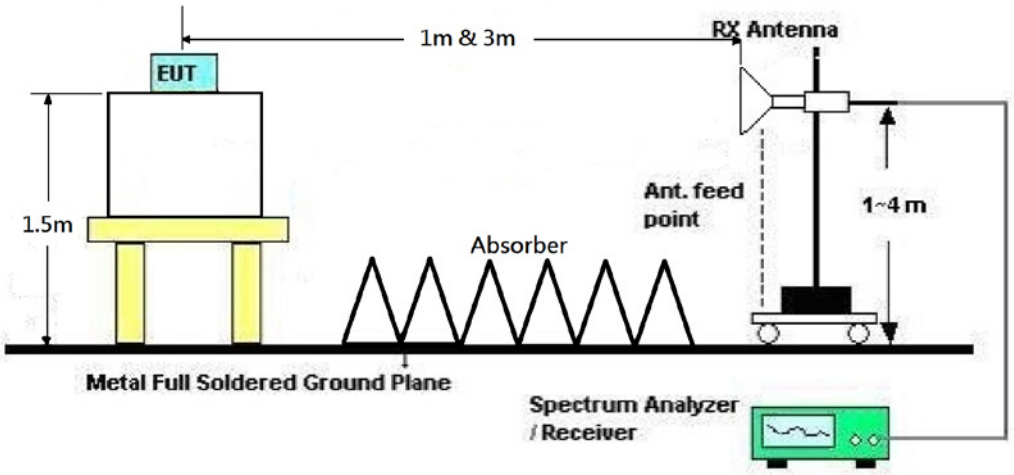
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.5.3. 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/TVBW 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.

4.5.4. Test Setup Layout

For Radiated Emissions: Above 1GHz



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

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 52 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	15775.08	61.86	74.00	-12.14	41.55	16.51	37.76	33.96	212	65	Peak	HORIZONTAL
2	15779.54	48.59	54.00	-5.41	28.28	16.51	37.76	33.96	212	65	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	15780.23	61.83	74.00	-12.17	41.52	16.51	37.76	33.96	192	84	Peak	VERTICAL
2	15781.81	47.50	54.00	-6.50	27.19	16.51	37.76	33.96	192	84	Average	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 60 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	10600.33	57.99	74.00	-16.01	40.48	12.75	38.40	33.64	252	99	Peak	HORIZONTAL
2	10604.84	45.67	54.00	-8.33	28.14	12.75	38.40	33.62	252	99	Average	HORIZONTAL
3	15897.54	61.08	74.00	-12.92	40.99	16.60	37.55	34.06	226	122	Peak	HORIZONTAL
4	15905.07	49.25	54.00	-4.75	29.16	16.60	37.55	34.06	226	122	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	10600.93	45.23	54.00	-8.77	27.72	12.75	38.40	33.64	220	141	Average	VERTICAL
2	10603.47	58.68	74.00	-15.32	41.17	12.75	38.40	33.64	220	141	Peak	VERTICAL
3	15902.29	49.18	54.00	-4.82	29.09	16.60	37.55	34.06	231	126	Average	VERTICAL
4	15903.98	61.77	74.00	-12.23	41.68	16.60	37.55	34.06	231	126	Peak	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 64 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	10641.56	45.35	54.00	-8.65	27.74	12.80	38.40	33.59	206	170	Average	HORIZONTAL
2	10643.87	58.54	74.00	-15.46	40.93	12.80	38.40	33.59	206	170	Peak	HORIZONTAL
3	15959.16	61.26	74.00	-12.74	41.26	16.63	37.47	34.10	231	143	Peak	HORIZONTAL
4	15961.01	48.37	54.00	-5.63	28.37	16.63	37.47	34.10	231	143	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	10639.66	44.34	54.00	-9.66	26.73	12.80	38.40	33.59	203	104	Average	VERTICAL
2	10644.82	57.81	74.00	-16.19	40.20	12.80	38.40	33.59	203	104	Peak	VERTICAL
3	15954.74	61.87	74.00	-12.13	41.87	16.63	37.47	34.10	196	98	Peak	VERTICAL
4	15954.74	48.95	54.00	-5.05	28.95	16.63	37.47	34.10	196	98	Average	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 100 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	10999.37	59.01	74.00	-14.99	40.55	13.44	38.40	33.38	198	155	Peak	HORIZONTAL
2	11004.27	45.96	54.00	-8.04	27.50	13.44	38.40	33.38	198	155	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	10995.06	58.72	74.00	-15.28	40.31	13.39	38.40	33.38	231	136	Peak	VERTICAL
2	11001.37	45.85	54.00	-8.15	27.39	13.44	38.40	33.38	231	136	Average	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 116 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	11155.81	58.88	74.00	-15.12	40.00	13.65	38.61	33.38	212	139	Peak	HORIZONTAL
2	11157.75	45.48	54.00	-8.52	26.48	13.71	38.67	33.38	212	139	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	11155.20	59.48	74.00	-14.52	40.60	13.65	38.61	33.38	218	130	Peak	VERTICAL
2	11158.51	46.83	54.00	-7.17	27.83	13.71	38.67	33.38	218	130	Average	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 140 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	11395.56	44.62	54.00	-9.38	24.87	14.08	39.04	33.37	203	130	Average	HORIZONTAL
2	11396.82	58.23	74.00	-15.77	38.48	14.08	39.04	33.37	203	130	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	11394.91	45.09	54.00	-8.91	25.34	14.08	39.04	33.37	195	124	Average	VERTICAL
2	11395.83	58.14	74.00	-15.86	38.39	14.08	39.04	33.37	195	124	Peak	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 54 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	15804.84	61.32	74.00	-12.68	41.05	16.54	37.69	33.96	200	94	Peak	HORIZONTAL
2	15813.24	48.94	54.00	-5.06	28.67	16.54	37.69	33.96	200	94	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	15810.69	61.53	74.00	-12.47	41.26	16.54	37.69	33.96	204	73	Peak	VERTICAL
2	15812.90	49.01	54.00	-4.99	28.74	16.54	37.69	33.96	204	73	Average	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 62 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	10614.78	44.73	54.00	-9.27	27.20	12.75	38.40	33.62	209	101	Average	HORIZONTAL
2	10615.39	58.03	74.00	-15.97	40.50	12.75	38.40	33.62	209	101	Peak	HORIZONTAL
3	15924.99	62.59	74.00	-11.41	42.59	16.63	37.47	34.10	217	105	Peak	HORIZONTAL
4	15927.96	49.77	54.00	-4.23	29.77	16.63	37.47	34.10	217	105	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	10620.99	45.68	54.00	-8.32	28.15	12.75	38.40	33.62	195	115	Average	VERTICAL
2	10623.07	58.08	74.00	-15.92	40.50	12.80	38.40	33.62	195	115	Peak	VERTICAL
3	15925.06	62.51	74.00	-11.49	42.51	16.63	37.47	34.10	202	108	Peak	VERTICAL
4	15929.77	48.41	54.00	-5.59	28.41	16.63	37.47	34.10	202	108	Average	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 102 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	11018.53	46.09	54.00	-7.91	27.63	13.44	38.40	33.38	200	134	Average	HORIZONTAL
2	11019.68	58.82	74.00	-15.18	40.36	13.44	38.40	33.38	200	134	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	11018.25	46.20	54.00	-7.80	27.74	13.44	38.40	33.38	212	136	Average	VERTICAL
2	11023.35	58.35	74.00	-15.65	39.89	13.44	38.40	33.38	212	136	Peak	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 110 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	11095.52	45.17	54.00	-8.83	26.39	13.60	38.56	33.38	212	148	Average	HORIZONTAL
2	11097.45	59.81	74.00	-14.19	41.03	13.60	38.56	33.38	212	148	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	11096.25	45.57	54.00	-8.43	26.79	13.60	38.56	33.38	222	152	Average	VERTICAL
2	11101.51	59.34	74.00	-14.66	40.56	13.60	38.56	33.38	222	152	Peak	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 134 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	11335.16	44.65	54.00	-9.35	25.12	13.97	38.93	33.37	223	134	Average	HORIZONTAL
2	11343.16	58.39	74.00	-15.61	38.86	13.97	38.93	33.37	223	134	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	11340.53	59.29	74.00	-14.71	39.76	13.97	38.93	33.37	236	142	Peak	VERTICAL
2	11343.62	45.65	54.00	-8.35	26.12	13.97	38.93	33.37	236	142	Average	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 58 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	15865.83	62.22	74.00	-11.78	42.04	16.57	37.62	34.01	193	192	Peak	HORIZONTAL
2	15870.93	47.83	54.00	-6.17	27.70	16.57	37.62	34.06	193	192	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	15865.52	61.21	74.00	-12.79	41.03	16.57	37.62	34.01	209	212	Peak	VERTICAL
2	15871.20	49.12	54.00	-4.88	28.99	16.57	37.62	34.06	209	212	Average	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 106 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	11057.64	58.51	74.00	-15.49	39.95	13.49	38.45	33.38	199	204	Peak	HORIZONTAL
2	11064.19	45.52	54.00	-8.48	26.84	13.55	38.51	33.38	199	204	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	11061.75	46.09	54.00	-7.91	27.41	13.55	38.51	33.38	204	208	Average	VERTICAL
2	11062.67	59.45	74.00	-14.55	40.77	13.55	38.51	33.38	204	208	Peak	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 122 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	11215.27	59.31	74.00	-14.69	40.21	13.76	38.72	33.38	208	213	Peak	HORIZONTAL
2	11223.05	46.85	54.00	-7.15	27.65	13.81	38.77	33.38	208	213	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	11221.28	59.88	74.00	-14.12	40.68	13.81	38.77	33.38	234	206	Peak	VERTICAL
2	11223.66	46.81	54.00	-7.19	27.61	13.81	38.77	33.38	234	206	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.

Straddle Channel

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 144 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	11437.56	44.90	54.00	-9.10	25.05	14.13	39.09	33.37	196	107	Average	HORIZONTAL
2	11439.22	59.01	74.00	-14.99	39.16	14.13	39.09	33.37	196	107	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	11435.92	44.85	54.00	-9.15	25.00	14.13	39.09	33.37	185	111	Average	VERTICAL
2	11437.20	58.21	74.00	-15.79	38.36	14.13	39.09	33.37	185	111	Peak	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 142 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	11415.81	58.21	74.00	-15.79	38.46	14.08	39.04	33.37	213	144	Peak	HORIZONTAL
2	11421.33	45.88	54.00	-8.12	26.03	14.13	39.09	33.37	213	144	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	11415.88	58.86	74.00	-15.14	39.11	14.08	39.04	33.37	207	147	Peak	VERTICAL
2	11417.73	45.06	54.00	-8.94	25.21	14.13	39.09	33.37	207	147	Average	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 138 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 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	11380.46	44.78	54.00	-9.22	25.13	14.03	38.99	33.37	222	198	Average	HORIZONTAL
2	11385.11	53.93	74.00	-20.07	34.18	14.08	39.04	33.37	222	198	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	11381.79	58.08	74.00	-15.92	38.43	14.03	38.99	33.37	230	202	Peak	VERTICAL
2	11381.83	45.75	54.00	-8.25	26.10	14.03	38.99	33.37	230	202	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.

4.6. Band Edge Emissions Measurement

4.6.1. Limit

For transmitters operating in the 5.25-5.35 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 5.470-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band 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 (microvolts/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 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

4.6.3. Test Procedures

1. The test procedure is the same as section 4.5.3.

4.6.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.5.4.

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.

Test Result of Band Edge and Fundamental Emissions

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 52, 60, 64 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 2015		

Channel 52

	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	5135.80	47.43	54.00	-6.57	38.67	8.09	33.72	33.05	255	331	Average	HORIZONTAL
2	5149.00	60.17	74.00	-13.83	51.33	8.15	33.74	33.05	255	331	Peak	HORIZONTAL
3	5263.00	107.17			98.03	8.26	33.94	33.06	255	331	Average	HORIZONTAL
4	5263.60	118.14			109.00	8.26	33.94	33.06	255	331	Peak	HORIZONTAL
5	5370.40	48.67	54.00	-5.33	39.44	8.18	34.11	33.06	255	331	Average	HORIZONTAL
6	5396.80	61.65	74.00	-12.35	52.41	8.17	34.13	33.06	255	331	Peak	HORIZONTAL

Item 3, 4 are the fundamental frequency at 5260 MHz.

Channel 60

	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	5298.80	116.40			107.24	8.24	33.98	33.06	275	345	Peak	HORIZONTAL
2	5299.20	105.25			96.09	8.24	33.98	33.06	275	345	Average	HORIZONTAL
3	5353.20	49.13	54.00	-4.87	39.93	8.20	34.06	33.06	275	345	Average	HORIZONTAL
4	5356.00	61.70	74.00	-12.30	52.49	8.19	34.08	33.06	275	345	Peak	HORIZONTAL

Item 1, 2 are the fundamental frequency at 5300 MHz.

Channel 64

	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	5312.20	107.48			98.30	8.23	34.01	33.06	283	332	Average	HORIZONTAL
2	5312.40	117.55			108.37	8.23	34.01	33.06	283	332	Peak	HORIZONTAL
3	5351.20	68.77	74.00	-5.23	59.57	8.20	34.06	33.06	283	332	Peak	HORIZONTAL
4	5351.60	50.08	54.00	-3.92	40.88	8.20	34.06	33.06	283	332	Average	HORIZONTAL

Item 1, 2 are the fundamental frequency at 5320 MHz.

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 100, 116, 140 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 2015		

Channel 100

	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	5455.40	63.09	74.00	-10.91	53.56	8.36	34.23	33.06	297	355	Peak	HORIZONTAL
2	5459.00	50.50	54.00	-3.50	40.97	8.36	34.23	33.06	297	355	Average	HORIZONTAL
3	5466.40	52.58	54.00	-1.42	42.98	8.41	34.25	33.06	297	355	Average	HORIZONTAL
4	5468.20	67.02	74.00	-6.98	57.42	8.41	34.25	33.06	297	355	Peak	HORIZONTAL
5	5495.80	107.45			97.70	8.51	34.30	33.06	297	355	Average	HORIZONTAL
6	5498.60	119.42			109.67	8.51	34.30	33.06	297	355	Peak	HORIZONTAL

Item 5, 6 are the fundamental frequency at 5500 MHz.

Channel 116

	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	5417.60	61.03	74.00	-12.97	51.64	8.27	34.18	33.06	300	355	Peak	HORIZONTAL
2	5424.00	48.84	54.00	-5.16	39.45	8.27	34.18	33.06	300	355	Average	HORIZONTAL
3	5466.80	62.91	74.00	-11.09	53.31	8.41	34.25	33.06	300	355	Peak	HORIZONTAL
4	5466.80	48.78	54.00	-5.22	39.18	8.41	34.25	33.06	300	355	Average	HORIZONTAL
5	5582.40	105.03			95.02	8.75	34.35	33.09	300	355	Average	HORIZONTAL
6	5584.00	119.22			109.21	8.75	34.35	33.09	300	355	Peak	HORIZONTAL
7	5725.00	48.21	54.00	-5.79	38.43	8.47	34.44	33.13	300	355	Average	HORIZONTAL
8	5747.20	60.82	74.00	-13.18	51.08	8.43	34.45	33.14	300	355	Peak	HORIZONTAL

Item 5, 6 are the fundamental frequency at 5580 MHz.

Channel 140

	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	5705.00	105.43			95.58	8.56	34.42	33.13	299	351	Average	HORIZONTAL
2	5705.20	117.55			107.70	8.56	34.42	33.13	299	351	Peak	HORIZONTAL
3	5725.20	67.14	74.00	-6.86	57.36	8.47	34.44	33.13	299	351	Peak	HORIZONTAL
4	5725.20	52.66	54.00	-1.34	42.88	8.47	34.44	33.13	299	351	Average	HORIZONTAL

Item 1, 2 are the fundamental frequency at 5700 MHz.

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 54, 62 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 2015		

Channel 54

	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	5265.20	115.98			106.84	8.26	33.94	33.06	229	330	Peak	HORIZONTAL
2	5265.20	104.09			94.95	8.26	33.94	33.06	229	330	Average	HORIZONTAL
3	5358.20	49.14	54.00	-4.86	39.93	8.19	34.08	33.06	229	330	Average	HORIZONTAL
4	5359.40	61.07	74.00	-12.93	51.86	8.19	34.08	33.06	229	330	Peak	HORIZONTAL

Item 1, 2 are the fundamental frequency at 5270 MHz.

Channel 62

	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	5306.40	111.03			101.87	8.24	33.98	33.06	284	344	Peak	HORIZONTAL
2	5308.40	100.84			91.66	8.23	34.01	33.06	284	344	Average	HORIZONTAL
3	5350.40	52.10	54.00	-1.90	42.90	8.20	34.06	33.06	284	344	Average	HORIZONTAL
4	5350.80	63.18	74.00	-10.82	53.98	8.20	34.06	33.06	284	344	Peak	HORIZONTAL

Item 1, 2 are the fundamental frequency at 5310 MHz.

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 102, 110, 134 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 2015		

Channel 102

	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	5430.00	62.16	74.00	-11.84	52.77	8.27	34.18	33.06	297	353	Peak	HORIZONTAL
2	5458.80	50.03	54.00	-3.97	40.50	8.36	34.23	33.06	297	353	Average	HORIZONTAL
3	5470.00	65.39	74.00	-8.61	55.79	8.41	34.25	33.06	297	353	Peak	HORIZONTAL
4	5470.00	52.52	54.00	-1.48	42.92	8.41	34.25	33.06	297	353	Average	HORIZONTAL
5	5497.20	112.87			103.12	8.51	34.30	33.06	297	353	Peak	HORIZONTAL
6	5498.40	101.75			92.00	8.51	34.30	33.06	297	353	Average	HORIZONTAL

Item 5, 6 are the fundamental frequency at 5510 MHz.

Channel 110

	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	5458.20	49.66	54.00	-4.34	40.13	8.36	34.23	33.06	300	358	Average	HORIZONTAL
2	5458.80	61.40	74.00	-12.60	51.87	8.36	34.23	33.06	300	358	Peak	HORIZONTAL
3	5464.20	50.44	54.00	-3.56	40.84	8.41	34.25	33.06	300	358	Average	HORIZONTAL
4	5467.20	64.92	74.00	-9.08	55.32	8.41	34.25	33.06	300	358	Peak	HORIZONTAL
5	5555.40	114.59			104.69	8.65	34.33	33.08	300	358	Peak	HORIZONTAL
6	5557.80	103.19			93.29	8.65	34.33	33.08	300	358	Average	HORIZONTAL

Item 5, 6 are the fundamental frequency at 5550 MHz.

Channel 134

	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	5658.80	113.38			103.45	8.64	34.40	33.11	300	352	Peak	HORIZONTAL
2	5659.20	102.06			92.13	8.64	34.40	33.11	300	352	Average	HORIZONTAL
3	5725.00	51.90	54.00	-2.10	42.12	8.47	34.44	33.13	300	352	Average	HORIZONTAL
4	5726.00	66.53	74.00	-7.47	56.75	8.47	34.44	33.13	300	352	Peak	HORIZONTAL

Item 1, 2 are the fundamental frequency at 5670 MHz.

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 58, 106, 122 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 28, 2015		

Channel 58

	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	5118.00	59.66	74.00	-14.34	50.99	8.03	33.69	33.05	299	342	Peak	HORIZONTAL
2	5131.00	47.58	54.00	-6.42	38.82	8.09	33.72	33.05	299	342	Average	HORIZONTAL
3	5308.00	98.67			89.49	8.23	34.01	33.06	299	342	Average	HORIZONTAL
4	5310.00	108.48			99.30	8.23	34.01	33.06	299	342	Peak	HORIZONTAL
5	5357.00	65.89	74.00	-8.11	56.68	8.19	34.08	33.06	299	342	Peak	HORIZONTAL
6	5374.00	52.21	54.00	-1.79	42.98	8.18	34.11	33.06	299	342	Average	HORIZONTAL

Item 3, 4 are the fundamental frequency at 5290 MHz.

Channel 106

	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	5457.00	64.13	74.00	-9.87	54.60	8.36	34.23	33.06	291	354	Peak	HORIZONTAL
2	5460.00	52.13	54.00	-1.87	42.60	8.36	34.23	33.06	291	354	Average	HORIZONTAL
3	5469.00	67.19	74.00	-6.81	57.59	8.41	34.25	33.06	291	354	Peak	HORIZONTAL
4	5469.00	52.95	54.00	-1.05	43.35	8.41	34.25	33.06	291	354	Average	HORIZONTAL
5	5539.00	94.36			84.50	8.61	34.32	33.07	291	354	Average	HORIZONTAL
6	5545.00	106.33			96.43	8.65	34.33	33.08	291	354	Peak	HORIZONTAL
7	5725.00	62.52	74.00	-11.48	52.74	8.47	34.44	33.13	291	354	Peak	HORIZONTAL
8	5725.00	48.31	54.00	-5.69	38.53	8.47	34.44	33.13	291	354	Average	HORIZONTAL

Item 5, 6 are the fundamental frequency at 5530 MHz.

Channel 122

	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	5454.00	49.94	54.00	-4.06	40.41	8.36	34.23	33.06	298	355	Average	HORIZONTAL
2	5460.00	64.34	74.00	-9.66	54.81	8.36	34.23	33.06	298	355	Peak	HORIZONTAL
3	5464.00	64.88	74.00	-9.12	55.28	8.41	34.25	33.06	298	355	Peak	HORIZONTAL
4	5469.00	50.66	54.00	-3.34	41.06	8.41	34.25	33.06	298	355	Average	HORIZONTAL
5	5595.00	111.67			101.60	8.80	34.36	33.09	298	355	Peak	HORIZONTAL
6	5614.00	100.72			90.69	8.76	34.37	33.10	298	355	Average	HORIZONTAL
7	5728.00	52.61	54.00	-1.39	42.84	8.47	34.44	33.14	298	355	Average	HORIZONTAL
8	5748.00	67.11	74.00	-6.89	57.37	8.43	34.45	33.14	298	355	Peak	HORIZONTAL

Item 5, 6 are the fundamental frequency at 5610 MHz.

Note:

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

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

Straddle Channel

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 144 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 2015		

Channel 144

	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	5712.80	104.10			94.29	8.51	34.43	33.13	299	355	Average	HORIZONTAL
2	5716.00	115.73			105.92	8.51	34.43	33.13	299	355	Peak	HORIZONTAL
3	5857.60	63.58	74.00	-10.42	53.59	8.64	34.52	33.17	299	355	Peak	HORIZONTAL
4	5867.20	49.29	54.00	-4.71	39.31	8.64	34.52	33.18	299	355	Average	HORIZONTAL

Item 1, 2 are the fundamental frequency at 5720 MHz.

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 142 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 27, 2015		

Channel 142

	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	5719.60	99.73			89.92	8.51	34.43	33.13	300	315	Average	VERTICAL
2	5720.40	112.25			102.44	8.51	34.43	33.13	300	315	Peak	VERTICAL
3	5865.20	63.99	74.00	-10.01	54.01	8.64	34.52	33.18	300	315	Peak	VERTICAL
4	5880.40	49.36	54.00	-4.64	39.29	8.72	34.53	33.18	300	315	Average	VERTICAL

Item 1, 2 are the fundamental frequency at 5710 MHz.

Temperature	25℃	Humidity	58%
Test Engineer	Peter Wu & Owen Hsu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 138 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Nov. 28, 2015		

Channel 138

	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	5717.00	108.03			98.22	8.51	34.43	33.13	300	324	Peak	HORIZONTAL
2	5718.00	96.46			86.65	8.51	34.43	33.13	300	324	Average	HORIZONTAL
3	5900.00	49.81	54.00	-4.19	39.66	8.80	34.54	33.19	300	324	Average	HORIZONTAL
4	5907.00	64.18	74.00	-9.82	53.94	8.88	34.55	33.19	300	324	Peak	HORIZONTAL

Item 1, 2 are the fundamental frequency at 5690 MHz.

4.7. Frequency Stability Measurement

4.7.1. 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).

4.7.2. Measuring Instruments and Setting

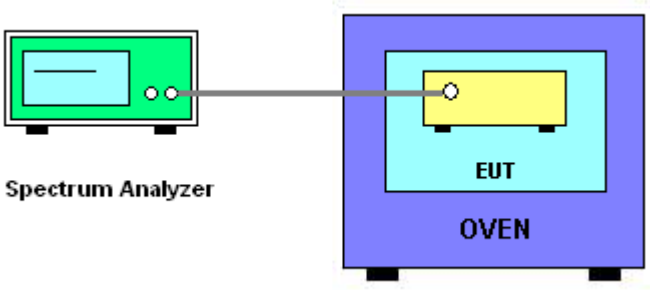
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

4.7.3. 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 802.11n specification).
6. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
7. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
8. Extreme temperature is -40°C~70°C.

4.7.4. Test Setup Layout



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 un-modulation transmitting mode.

4.7.7. Test Result of Frequency Stability

Temperature	25℃	Humidity	45%
Test Engineer	Roki Liu	Test Date	Dec. 07, 2015

Mode: 20 MHz / Chain 4

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5300 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5299.9429	5299.9415	5299.9397	5299.9376
110.00	5299.9417	5299.9404	5299.9388	5299.9369
93.50	5299.9403	5299.9392	5299.9380	5299.9358
Max. Deviation (MHz)	0.0597	0.0608	0.0620	0.0642
Max. Deviation (ppm)	11.26	11.47	11.70	12.11
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(℃)	5300 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
-40	5299.9518	5299.9496	5299.9488	5299.9497
-30	5299.9516	5299.9494	5299.9475	5299.9466
-20	5299.9497	5299.9484	5299.9467	5299.9443
-10	5299.9482	5299.9470	5299.9454	5299.9435
0	5299.9468	5299.9456	5299.9437	5299.9415
10	5299.9455	5299.9442	5299.9427	5299.9409
20	5299.9443	5299.9430	5299.9414	5299.9395
30	5299.9429	5299.9418	5299.9404	5299.9388
40	5299.9413	5299.9398	5299.9382	5299.9362
50	5299.9396	5299.9384	5299.9369	5299.9342
60	5299.9383	5299.9378	5299.9362	5299.9340
70	5299.9379	5299.9371	5299.9357	5299.9336
Max. Deviation (MHz)	0.0621	0.0629	0.0643	0.0664
Max. Deviation (ppm)	11.72	11.87	12.13	12.53
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5580 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5579.9465	5579.9451	5579.9433	5579.9412
110.00	5579.9453	5579.9440	5579.9424	5579.9405
93.50	5579.9439	5579.9428	5579.9416	5579.9394
Max. Deviation (MHz)	0.0561	0.0572	0.0584	0.0606
Max. Deviation (ppm)	10.05	10.25	10.47	10.86
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5580 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
-40	5579.9513	5579.9516	5579.9490	5579.9471
-30	5579.9510	5579.9503	5579.9474	5579.9468
-20	5579.9498	5579.9485	5579.9468	5579.9444
-10	5579.9483	5579.9471	5579.9455	5579.9436
0	5579.9469	5579.9457	5579.9438	5579.9416
10	5579.9456	5579.9443	5579.9428	5579.9410
20	5579.9444	5579.9431	5579.9415	5579.9396
30	5579.9430	5579.9419	5579.9405	5579.9389
40	5579.9414	5579.9399	5579.9383	5579.9363
50	5579.9397	5579.9385	5579.9370	5579.9343
60	5579.9388	5579.9381	5579.9365	5579.9345
70	5579.9379	5579.9374	5579.9352	5579.9339
Max. Deviation (MHz)	0.0621	0.0626	0.0648	0.0661
Max. Deviation (ppm)	11.13	11.22	11.61	11.85
Result	Complies			

Mode: 40 MHz / Chain 4

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5310 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5309.9454	5309.9440	5309.9422	5309.9401
110.00	5309.9442	5309.9429	5309.9413	5309.9394
93.50	5309.9428	5309.9417	5309.9405	5309.9383
Max. Deviation (MHz)	0.0572	0.0583	0.0595	0.0617
Max. Deviation (ppm)	10.77	10.98	11.21	11.62
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5310 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
-40	5309.9516	5309.9492	5309.9472	5309.9458
-30	5309.9489	5309.9484	5309.9468	5309.9444
-20	5309.9484	5309.9471	5309.9454	5309.9430
-10	5309.9469	5309.9457	5309.9441	5309.9422
0	5309.9455	5309.9443	5309.9424	5309.9402
10	5309.9442	5309.9429	5309.9414	5309.9396
20	5309.9430	5309.9417	5309.9401	5309.9382
30	5309.9416	5309.9405	5309.9391	5309.9375
40	5309.9400	5309.9385	5309.9369	5309.9349
50	5309.9383	5309.9371	5309.9356	5309.9329
60	5309.9850	5309.9365	5309.9349	5309.9317
70	5309.9383	5309.9362	5309.9353	5309.9310
Max. Deviation (MHz)	0.0617	0.0638	0.0647	0.0690
Max. Deviation (ppm)	11.62	12.02	12.18	12.99
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5550 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5549.9388	5549.9374	5549.9356	5549.9335
110.00	5549.9376	5549.9363	5549.9347	5549.9328
93.50	5549.9362	5549.9351	5549.9339	5549.9317
Max. Deviation (MHz)	0.0638	0.0649	0.0661	0.0683
Max. Deviation (ppm)	11.50	11.69	11.91	12.31
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5550 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
-40	5549.9446	5549.9448	5549.9436	5549.9385
-30	5549.9433	5549.9435	5549.9425	5549.9381
-20	5549.9425	5549.9412	5549.9395	5549.9371
-10	5549.9410	5549.9398	5549.9382	5549.9363
0	5549.9396	5549.9384	5549.9365	5549.9343
10	5549.9383	5549.9370	5549.9355	5549.9337
20	5549.9371	5549.9358	5549.9342	5549.9323
30	5549.9357	5549.9346	5549.9332	5549.9316
40	5549.9341	5549.9326	5549.9310	5549.9290
50	5549.9324	5549.9312	5549.9297	5549.9270
60	5549.9317	5549.9310	5549.9292	5549.9285
70	5549.9300	5549.9288	5549.9288	5549.9272
Max. Deviation (MHz)	0.0700	0.0712	0.0712	0.0728
Max. Deviation (ppm)	12.61	12.83	12.83	13.12
Result	Complies			

Mode: 80 MHz / Chain 4

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5290 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5289.9653	5289.9639	5289.9621	5289.9600
110.00	5289.9641	5289.9628	5289.9612	5289.9593
93.50	5289.9627	5289.9616	5289.9604	5289.9582
Max. Deviation (MHz)	0.0373	0.0384	0.0396	0.0418
Max. Deviation (ppm)	7.05	7.26	7.49	7.90
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5290 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
-40	5289.9742	5289.9731	5289.9749	5289.9692
-30	5289.9736	5289.9728	5289.9733	5289.9679
-20	5289.9726	5289.9713	5289.9696	5289.9672
-10	5289.9711	5289.9699	5289.9683	5289.9664
0	5289.9697	5289.9685	5289.9666	5289.9644
10	5289.9684	5289.9671	5289.9656	5289.9638
20	5289.9672	5289.9659	5289.9643	5289.9624
30	5289.9658	5289.9647	5289.9633	5289.9617
40	5289.9642	5289.9627	5289.9611	5289.9591
50	5289.9625	5289.9613	5289.9598	5289.9571
60	5289.9620	5289.9602	5289.9591	5289.9569
70	5289.9591	5289.9602	5289.9581	5289.9565
Max. Deviation (MHz)	0.0409	0.0398	0.0419	0.0435
Max. Deviation (ppm)	7.73	7.52	7.92	8.22
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5530 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5529.9612	5529.9598	5529.9580	5529.9559
110.00	5529.9600	5529.9587	5529.9571	5529.9552
93.50	5529.9586	5529.9575	5529.9563	5529.9541
Max. Deviation (MHz)	0.0414	0.0425	0.0437	0.0459
Max. Deviation (ppm)	7.49	7.69	7.90	8.30
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5530 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
-40	5529.9658	5529.9628	5529.9625	5529.9592
-30	5529.9632	5529.9602	5529.9594	5529.9587
-20	5529.9604	5529.9591	5529.9574	5529.9550
-10	5529.9589	5529.9577	5529.9561	5529.9542
0	5529.9575	5529.9563	5529.9544	5529.9522
10	5529.9562	5529.9549	5529.9534	5529.9516
20	5529.9550	5529.9537	5529.9521	5529.9502
30	5529.9536	5529.9525	5529.9511	5529.9495
40	5529.9520	5529.9505	5529.9489	5529.9469
50	5529.9503	5529.9491	5529.9476	5529.9449
60	5529.9481	5529.9482	5529.9469	5529.9444
70	5529.9476	5529.9475	5529.9456	5529.9436
Max. Deviation (MHz)	0.0524	0.0525	0.0544	0.0564
Max. Deviation (ppm)	9.48	9.49	9.84	10.20
Result	Complies			

4.8. Antenna Requirements

4.8.1. 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.

4.8.2. 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 Last Cal.	Calibration Due Date
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 22, 2015	Oct. 21, 2016
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 21, 2015	Jul. 20, 2016
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 12, 2015	Jan. 11, 2016
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Feb.10, 2015	Feb.09, 2016
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Oct. 27, 2015	Oct. 26, 2016
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Nov. 01, 2016
RF Cable-high	Woken	High Cable-17	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Nov. 01, 2016
RF Cable-high	Woken	High Cable-40G-1	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Nov. 01, 2016
RF Cable-high	Woken	High Cable-40G-2	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Nov. 01, 2016
Test Software	Audix	E3	6.2009-10-7	N/A	N/A	N/A
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 12, 2014	Dec. 11, 2015
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 09, 2015	Dec. 08, 2016
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 02, 2015	Jun. 01, 2016
RF Cable-high	Woken	RG402	High Cable-7	1 GHz – 26.5 GHz	Nov. 02, 2015	Nov. 01, 2016
RF Cable-high	Woken	RG402	High Cable-8	1 GHz – 26.5 GHz	Nov. 02, 2015	Nov. 01, 2016
RF Cable-high	Woken	RG402	High Cable-9	1 GHz – 26.5 GHz	Nov. 02, 2015	Nov. 01, 2016
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 26.5 GHz	Nov. 02, 2015	Nov. 01, 2016
RF Cable-high	Woken	RG402	High Cable-6	1 GHz – 26.5 GHz	Nov. 02, 2015	Nov. 01, 2016
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 02, 2015	Nov. 01, 2016

6. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
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%