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FCC RADIO TEST REPORT

Applicant's company	**PEGATRON CORPORATION**
Applicant Address	5F., NO. 76, LIGONG ST., BEITOU DISTRICT, TAIPEI CITY 112, Taiwan
FCC ID	**VUI-APS1**
Manufacturer's company	**Maintek Computer (Suzhou) Co., Ltd**
Manufacturer Address	233 Jin Feng Rd, Suzhou District Jiangsu China

Product Name	Advanced power supply with WiFi and MoCA
Brand Name	CISCO
Model No.	APS1;APS1v1-C;CA010AAB;MWA1221;XW1;XW1-C
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5250 ~ 5350MHz / 5470 ~ 5725MHz
Received Date	Dec. 16, 2014
Final Test Date	Jul. 23, 2016
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 v01r03, KDB662911 D01 v02r01, KDB644545 D03 v01.**

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

Testing Laboratory
1190

Table of Contents

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4D1514-02	Rev. 01	Initial issue of report	Nov. 14, 2016

1. VERIFICATION OF COMPLIANCE

Product Name	:	Advanced power supply with WiFi and MoCA
Brand Name	:	CISCO
Model No.	:	APS1;APS1v1-C;CA010AAB;MWA1221;XW1;XW1-C
Applicant	:	PEGATRON CORPORATION
Test Rule Part(s)	:	47 CFR FCC Part 15 Subpart E § 15.407

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Dec. 16, 2014 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

Sam Chen

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart E			
Part	**Rule Section**	**Description of Test**	**Result**
4.1	15.407(a)	26dB Spectrum Bandwidth and 99% Occupied Bandwidth	Complies
4.2	15.407(a)	Maximum Conducted Output Power	Complies
4.3	15.407(a)	Power Spectral Density	Complies
4.4	15.407(b)	Radiated Emissions	Complies
4.5	15.407(b)	Band Edge Emissions	Complies
4.6	15.407(g)	Frequency Stability	Complies
4.7	15.203	Antenna Requirements	Complies

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	WLAN (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From internal power supply
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	15 for 20MHz bandwidth ; 7 for 40MHz bandwidth 3 for 80MHz bandwidth
Channel Bandwidth (99%)	Band 2: IEEE 802.11a: 23.10 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 22.40 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 37.63 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 75.54 MHz Band 3: IEEE 802.11a: 29.44 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 23.79 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 53.26 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 76.99 MHz
Maximum Conducted Output Power	Band 2: IEEE 802.11a: 22.36 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 22.24 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 22.24 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 13.25 dBm Band 3: IEEE 802.11a: 22.17 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 22.05 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 22.21 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 20.48 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
Beamforming Function	☐ With beamforming	☒ Without beamforming
Operate Condition	☒ Indoor	☐ Outdoor

Antenna and Bandwidth

Antenna	Two (TX)		
Bandwidth 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)	2	MCS 0-15
802.11n (HT40)	2	MCS 0-15
802.11ac (VHT20)	2	MCS 0-9/Nss1-2
802.11ac (VHT40)	2	MCS 0-9/Nss1-2
802.11ac (VHT80)	2	MCS 0-9/Nss1-2

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

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

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

3.2. Accessories

Description
Power cable*1: Non-shielded, 1.5m

3.3. Table for Filed Antenna

Set	Ant.	Brand	Model No.	P/N	Type	Connector	Gain (dBi)	
							2.4GHz	5GHz
1	1	Hong Lin	APS1	290-30233	PCB	I-PEX	1.60	-
	2	Hong Lin	APS1	290-30247	PCB	I-PEX	2.54	-
	3	Hong Lin	APS1	290-30232	PCB	I-PEX	-	4.22
	4	Hong Lin	APS1	290-30248	PCB	I-PEX	-	4.88
2	1	Airgain	N2420S5	-	PCB	I-PEX	1.50	-
	2	Airgain	N2420SLOP	-	PCB	I-PEX	2.20	-
	3	Airgain	N5X20BLO	-	PCB	I-PEX	-	4.10
	4	Airgain	N5X20SC	-	PCB	I-PEX	-	4.60

Note: 1. The EUT has two sets of antenna, and each set contains four antennas.

2. Because all antennas are the same type antennas, only the higher gain antennas "set 1" was tested and recorded in the report.

3. Chain 1: Connect to Ant. 1, Chain 2: Connect to Ant. 2, Chain 3: Connect to Ant. 3, Chain 4: Connect to Ant. 4

For 2.4GHz WLAN function (2TX, 2RX):

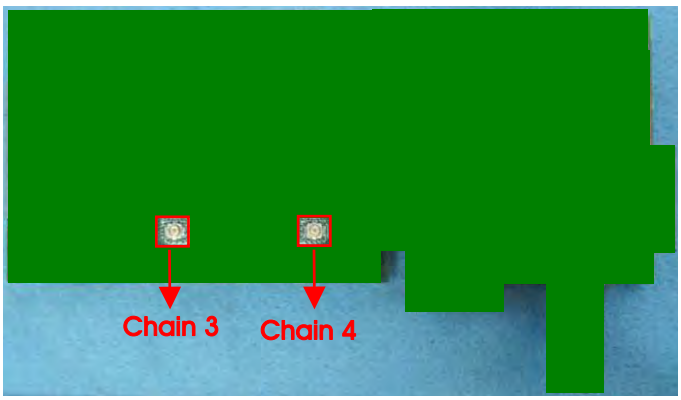
Chain 1 and Chain 2 could transmit/receive simultaneously.

EUT rear view:

For 5GHz WLAN function (2TX, 2RX):

Chain 3 and Chain 4 could transmit/receive simultaneously.

EUT front view:



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.

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

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

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	120	5600 MHz
	102	5510 MHz	122	5610 MHz
	104	5520 MHz	124	5620 MHz
	106	5530 MHz	126	5630 MHz
	108	5540 MHz	128	5640 MHz
	110	5550 MHz	132	5660 MHz
	112	5560 MHz	134	5670 MHz
	116	5580 MHz	136	5680 MHz
	118	5590 MHz	140	5700 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	11a/BPSK	Band 2-3	6Mbps	52/60/64/100/116/140	3+4
	11ac VHT20	Band 2-3	MCS0/Nss1	52/60/64/100/116/140	3+4
	11ac VHT40	Band 2-3	MCS0/Nss1	54/62/102/110/134	3+4
	11ac VHT80	Band 2-3	MCS0/Nss1	58/106/122	3+4
Power Spectral Density	11a/BPSK	Band 2-3	6Mbps	52/60/64/100/116/140	3+4
	11ac VHT20	Band 2-3	MCS0/Nss1	52/60/64/100/116/140	3+4
	11ac VHT40	Band 2-3	MCS0/Nss1	54/62/102/110/134	3+4
	11ac VHT80	Band 2-3	MCS0/Nss1	58/106/122	3+4
26dB Spectrum Bandwidth 99% Occupied Bandwidth Measurement	11a/BPSK	Band 2-3	6Mbps	52/60/64/100/116/140	3+4
	11ac VHT20	Band 2-3	MCS0/Nss1	52/60/64/100/116/140	3+4
	11ac VHT40	Band 2-3	MCS0/Nss1	54/62/102/110/134	3+4
	11ac VHT80	Band 2-3	MCS0/Nss1	58/106/122	3+4
Radiated Emission Above 1GHz	11a/BPSK	Band 2-3	6Mbps	52/60/64/100/116/140	3+4
	11ac VHT20	Band 2-3	MCS0/Nss1	52/60/64/100/116/140	3+4
	11ac VHT40	Band 2-3	MCS0/Nss1	54/62/102/110/134	3+4
	11ac VHT80	Band 2-3	MCS0/Nss1	58/106/122	3+4

Band Edge Emission	11a/BPSK	Band 2-3	6Mbps	52/60/64/100/116/140	3+4
	11ac VHT20	Band 2-3	MCS0/Nss1	52/60/64/100/116/140	3+4
	11ac VHT40	Band 2-3	MCS0/Nss1	54/62/102/110/134	3+4
	11ac VHT80	Band 2-3	MCS0/Nss1	58/106/122	3+4
Frequency Stability	20 MHz	Band 2-3	-	60/116	3
	40 MHz	Band 2-3	-	62/110	3
	80 MHz	Band 2-3	-	58/106	3

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

Note 2: The EUT can only be used at Y-axis.

The following test modes were performed for all tests:

For Radiated Emission test:

Test Mode : CTX

For Co-location MPE Test:

The EUT could be applied with 2.4GHz WLAN function and 5GHz WLAN function; therefore Co-location Maximum Permissible Exposure (Please refer to FA4D1514-02) test is added for simultaneously transmit between 2.4GHz WLAN function and 5GHz WLAN function.

3.6. Table for Testing Locations

Test Site Location					
Address:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.				
TEL:	886-3-656-9065				
FAX:	886-3-656-9085				
Test Site No.	**Site Category**	**Location**	**FCC Designation No.**	**IC File No.**	**VCCI Reg. No**
03CH01-CB	SAC	Hsin Chu	TW0006	IC 4086D	-
TH01-CB	OVEN Room	Hsin Chu	-	-	-

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

3.7. Table for Multiple Listing

The model numbers in the following table are all refer to the identical product.

Model No.	Description
APS1	All the models are identical, the difference model for difference model number as marketing strategy.
APS1v1-C	
CA010AAB	
MWA1221	
XW1	
XW1-C	

From the above models, model: APS1v1-C was selected as representative model for the test and its data was recorded in this report.

3.8. Table for Class II Change

This product is an extension of original one reported under Sporton project number: FR4D1514AB

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

Description	Performance Checking
1. Changing the Casing of the EUT. 2. Changing the Manufacturer's Address to "233 Jin Feng Rd, Suzhou District Jiangsu China" from "Bldg. 6 NB, 233 Jin Feng Rd, Suzhou District Jiangsu China". 3. Adding Model Names. (APS1v1-C, XW1, XW1-C)	No influence on the test results.
4. Adding 5 GHz Band 2 and Band 3 (5250~5350 MHz, 5470~5725 MHz) for this device.	1. 26dB Spectrum Bandwidth and 99% Occupied Bandwidth 2. Maximum Conducted Output Power 3. Power Spectral Density 4. Radiated Emissions (Above 1GHz) 5. Band Edge Emissions 6. Frequency Stability Measurement

3.9. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Notebook	Toshiba	Satellite P50-B	DoC

3.10. Table for Parameters of Test Software Setting

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

Test Software Version	Telnet					
Mode	Test Frequency (MHz)					
	NCB: 20MHz					
	5260 MHz	5300 MHz	5320 MHz	5500 MHz	5580 MHz	5700 MHz
802.11a	21	21.5	21.5	17	21	16.5
802.11ac MCS0/Nss1 VHT20	20.5	21.5	20.5	17	21.5	14.5
Mode	NCB: 40MHz					
802.11ac MCS0/Nss1 VHT40	5270 MHz	5310 MHz	5510 MHz	5550 MHz	5670 MHz	
	21.5	12.5	12	22	19	
Mode	NCB: 80MHz					
802.11ac MCS0/Nss1 VHT80	5290 MHz		5530 MHz		5610 MHz	
	12		10		19.5	

3.11. EUT Operation during Test

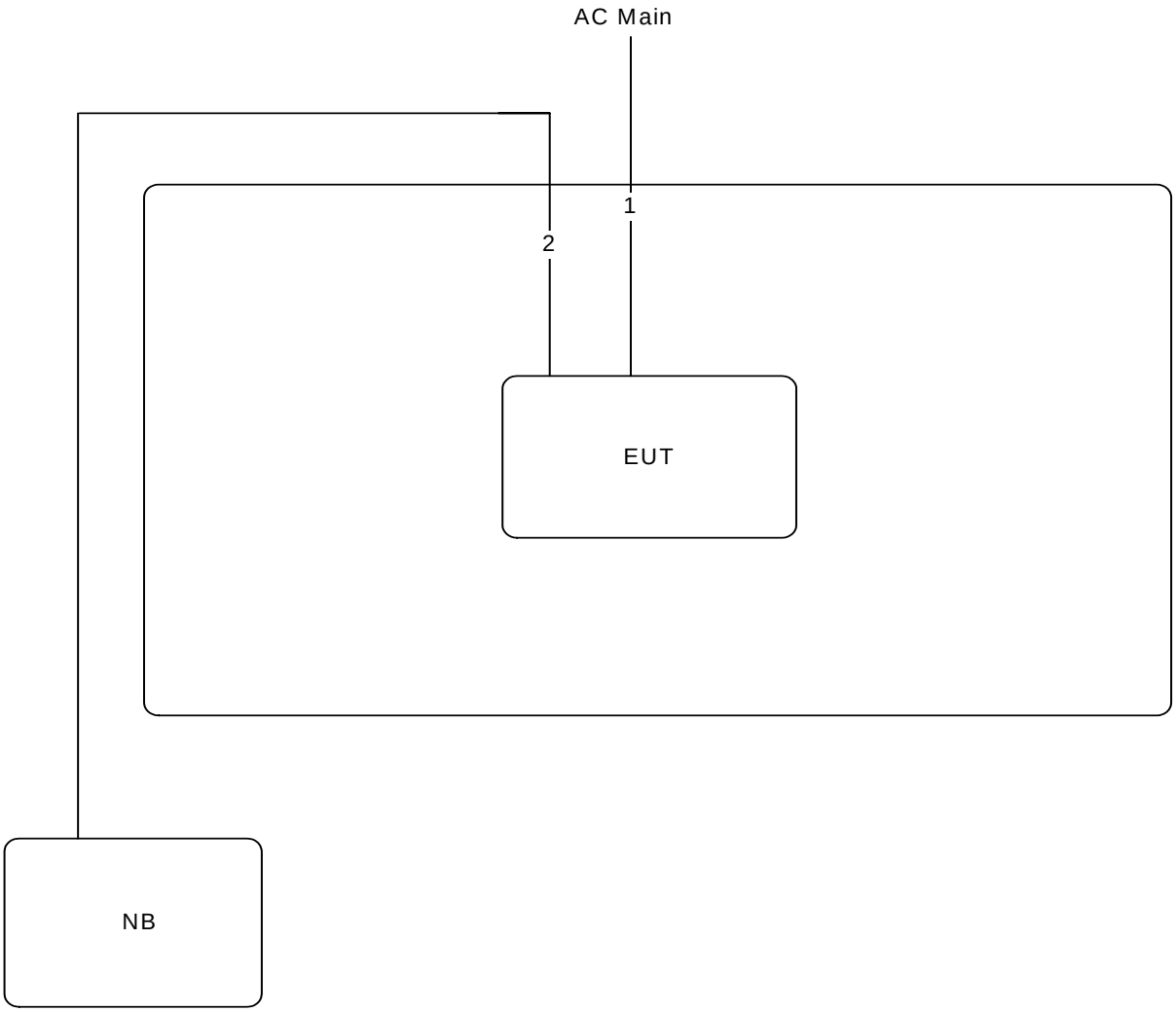
The EUT was programmed to be in continuously transmitting mode.

3.12. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	2.030	2.100	96.67	0.15	0.49
802.11ac MCS0/Nss1 VHT20	1.890	1.960	96.43	0.16	0.53
802.11ac MCS0/Nss1 VHT40	0.910	1.000	91.00	0.41	1.10
802.11ac MCS0/Nss1 VHT80	0.424	0.524	80.92	0.92	2.36

3.13. Test Configurations

3.13.1. Radiation Emissions Test Configuration



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

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 4.4.4.

4.1.5. Test Deviation

There is no deviation with the original standard.

4.1.6. EUT Operation during Test

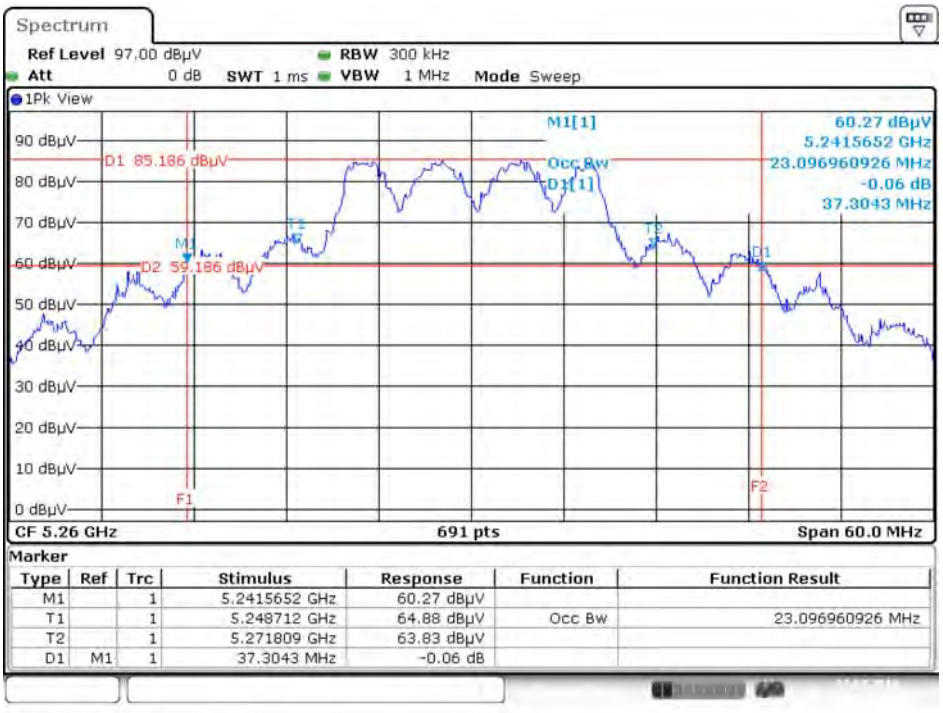
The EUT was programmed to be in continuously transmitting mode.

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

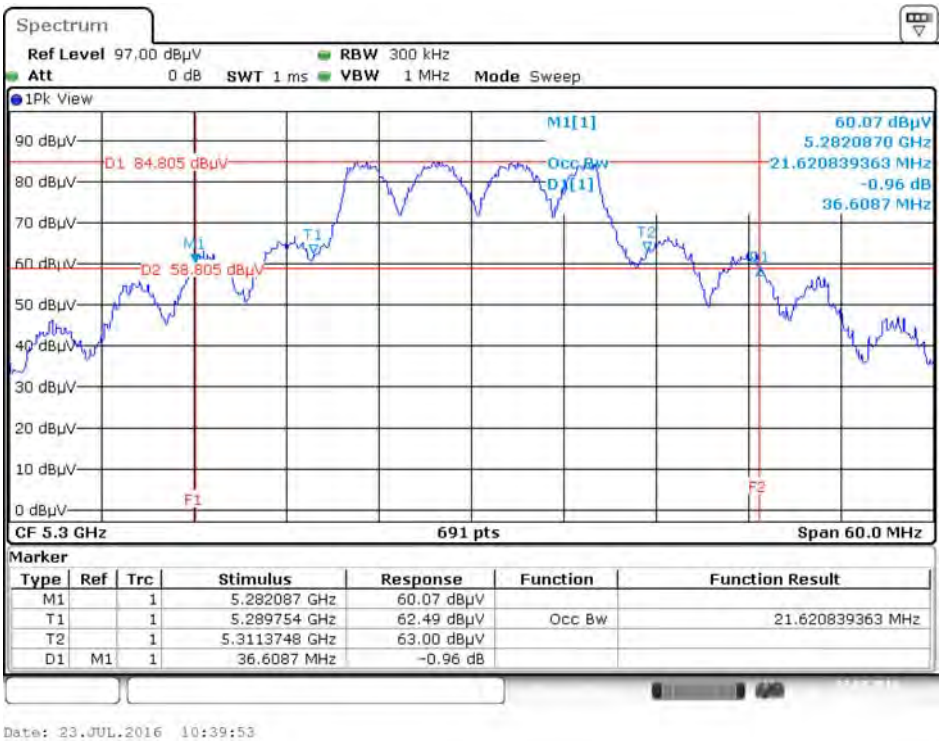
Temperature	22°C	Humidity	48%
Test Engineer	Eddie Weng		

Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5260 MHz	37.30	23.10
	5300 MHz	36.61	21.62
	5320 MHz	35.48	20.49
	5500 MHz	27.30	17.54
	5580 MHz	41.30	29.44
	5700 MHz	26.52	17.37
802.11ac MCS0/Nss1 VHT20	5260 MHz	33.39	22.40
	5300 MHz	38.52	17.11
	5320 MHz	29.57	19.62
	5500 MHz	20.26	16.59
	5580 MHz	42.09	23.79
	5700 MHz	25.74	18.41
802.11ac MCS0/Nss1 VHT40	5270 MHz	72.75	37.63
	5310 MHz	45.36	36.32
	5510 MHz	46.23	36.61
	5550 MHz	76.38	53.26
	5670 MHz	75.80	39.80
802.11ac MCS0/Nss1 VHT80	5290 MHz	90.73	75.54
	5530 MHz	89.28	76.12
	5610 MHz	143.48	76.99

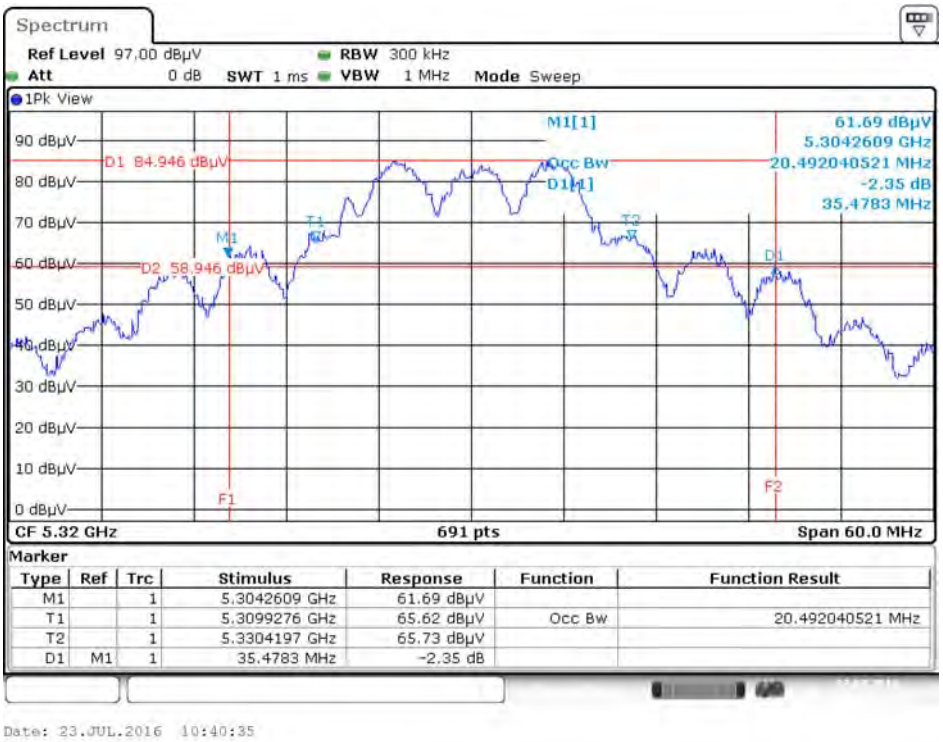
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5260 MHz



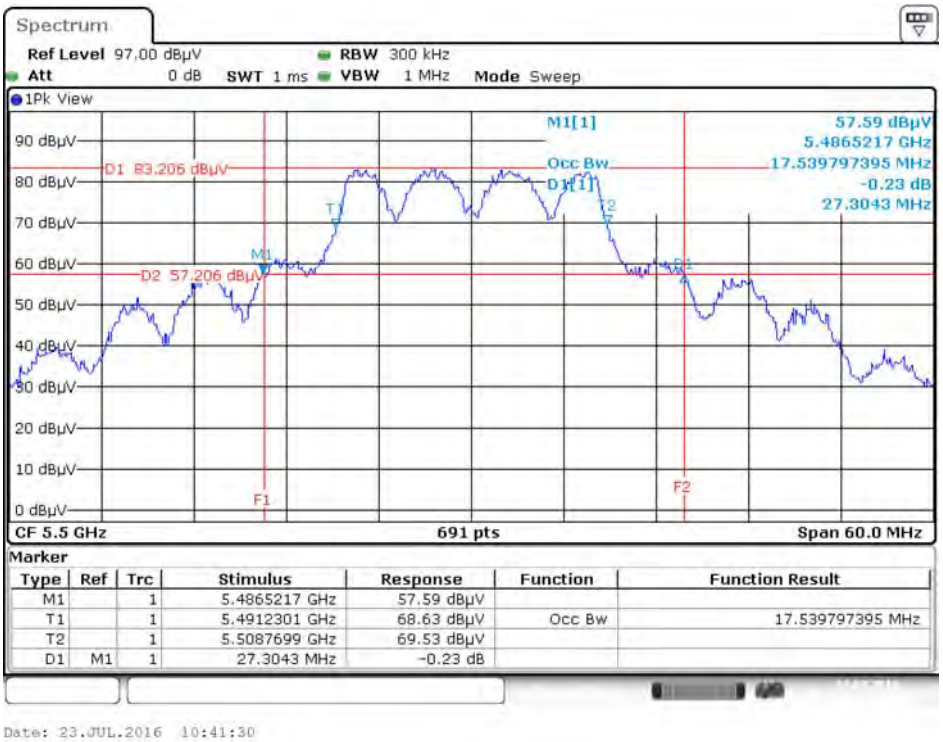
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5300 MHz



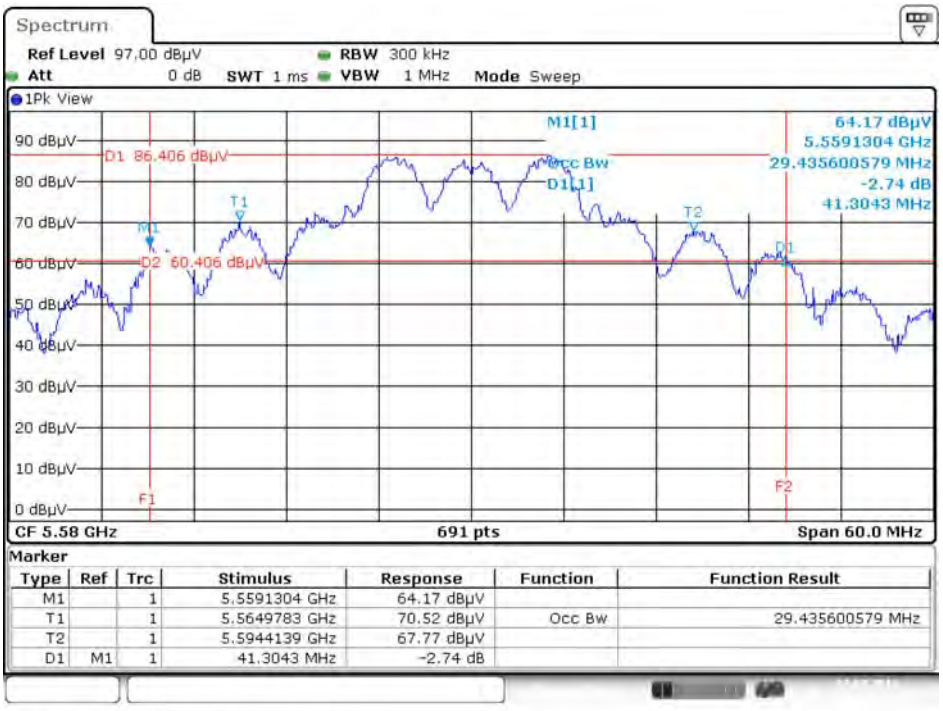
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5320 MHz



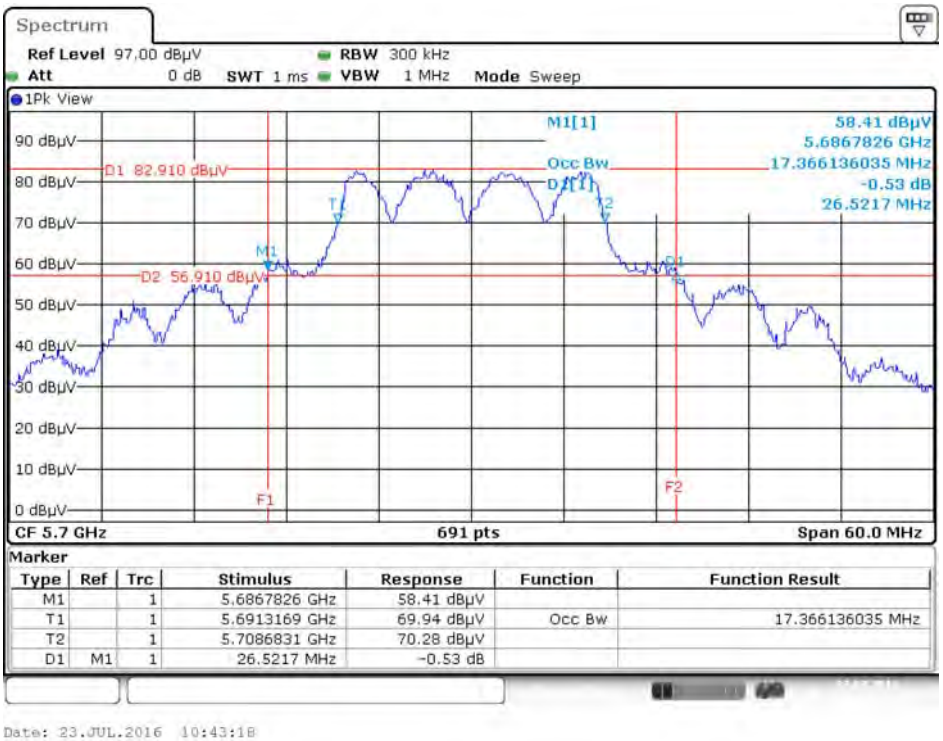
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5500 MHz



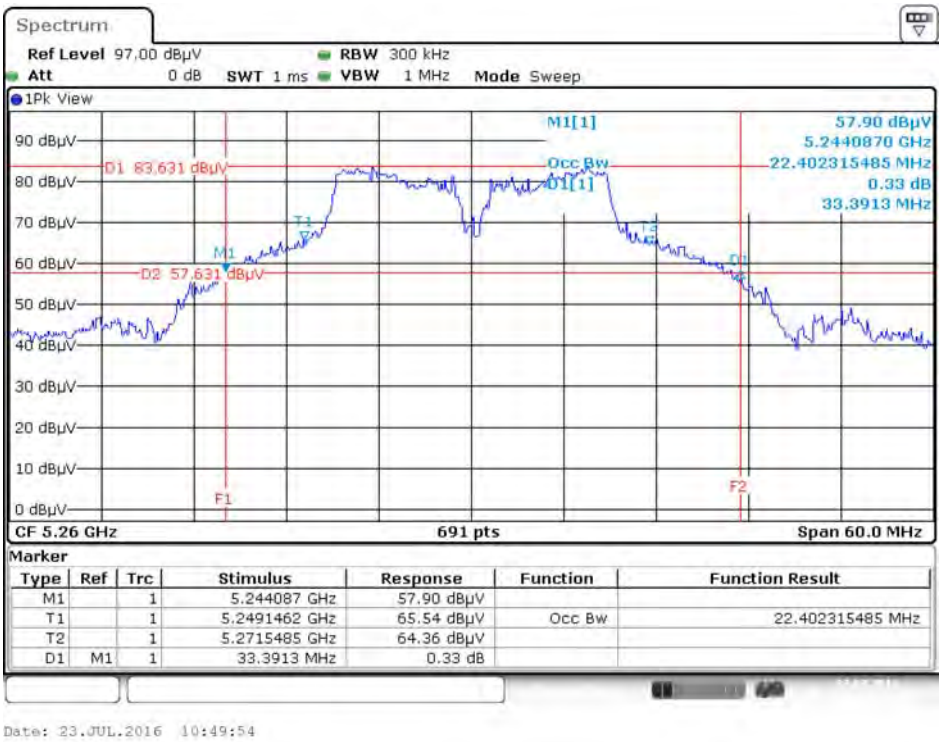
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5580 MHz



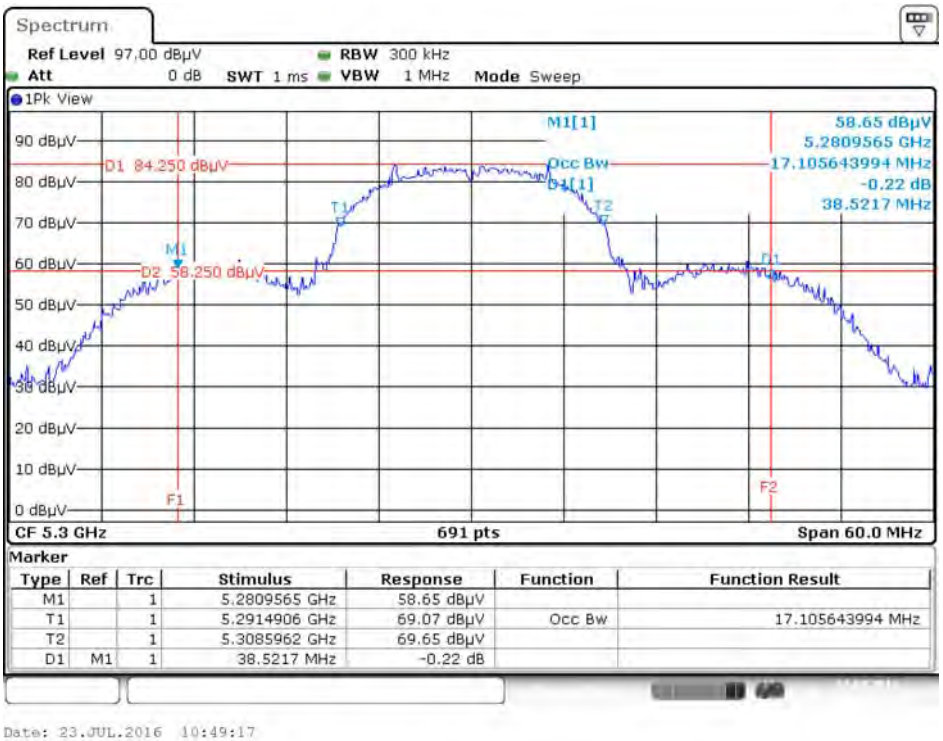
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5700 MHz



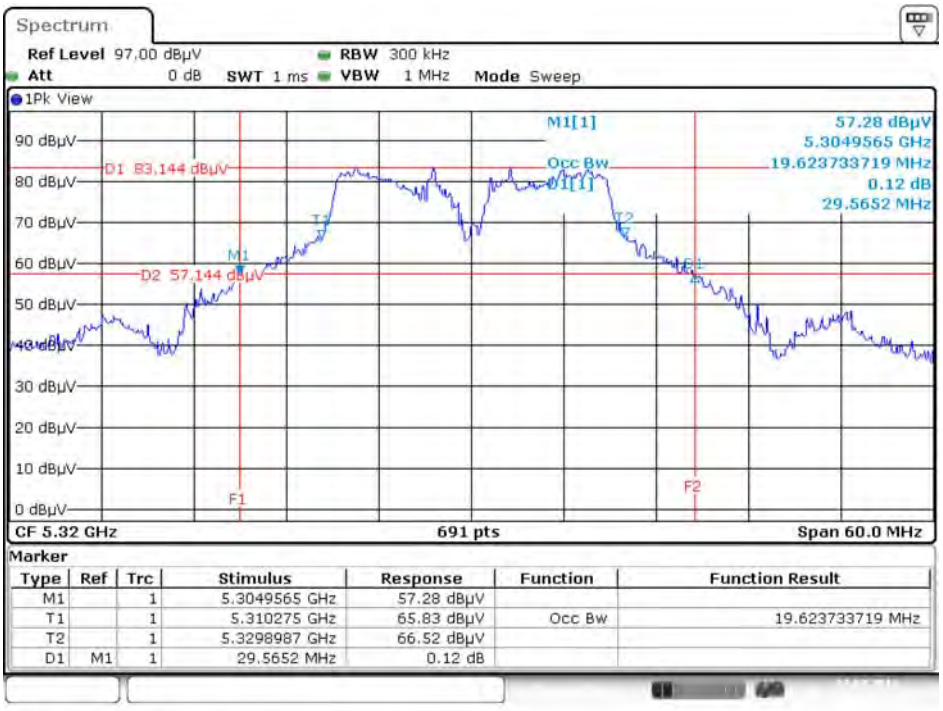
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5260 MHz



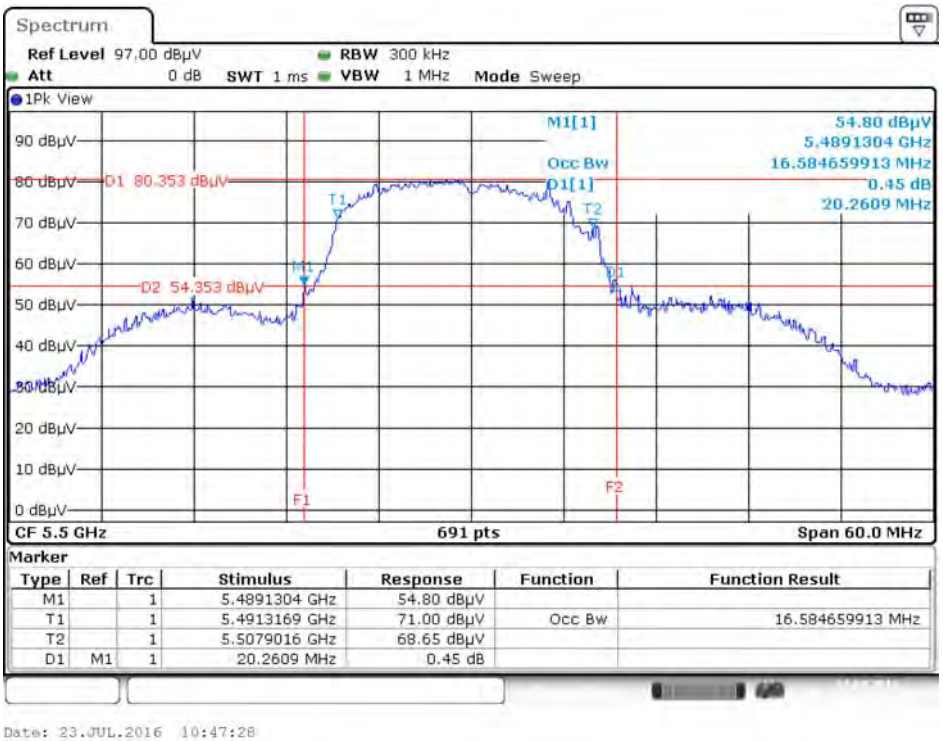
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5300 MHz



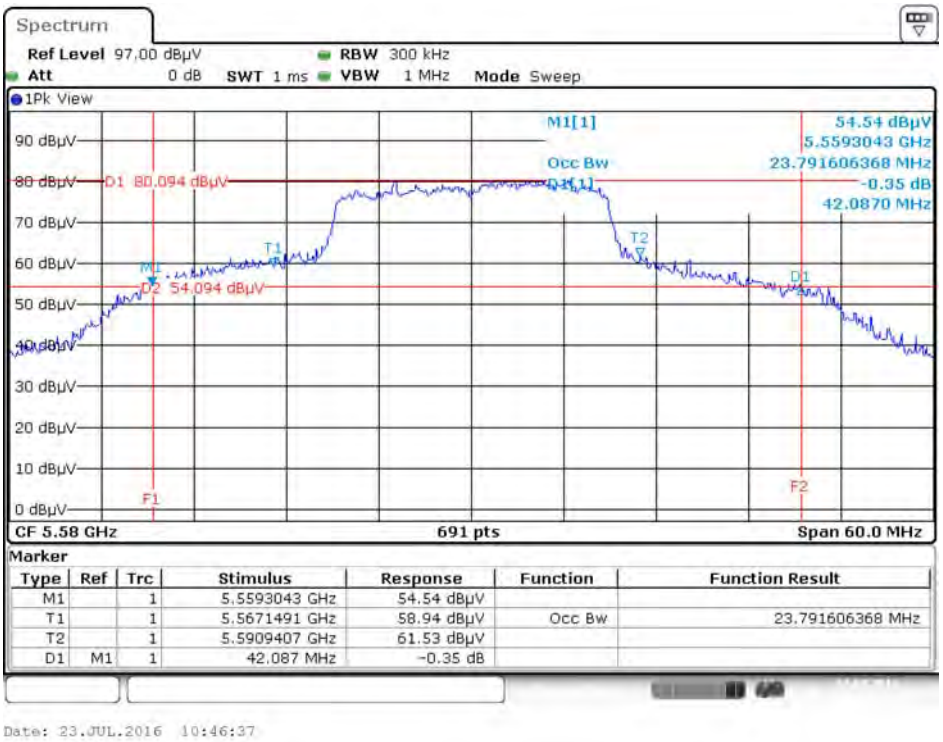
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5320 MHz



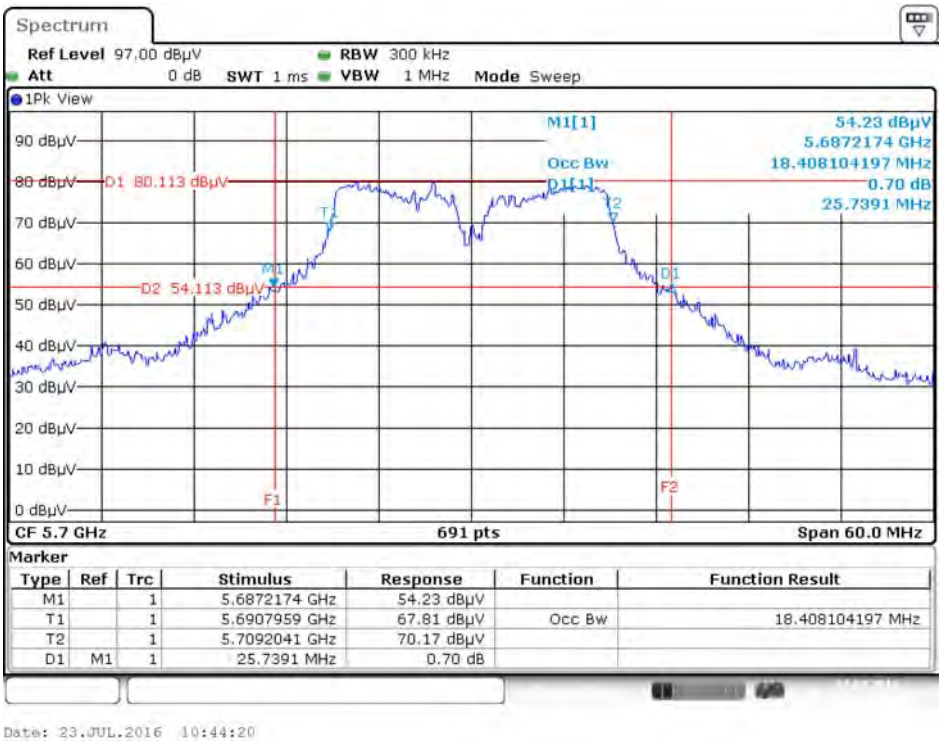
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5500 MHz



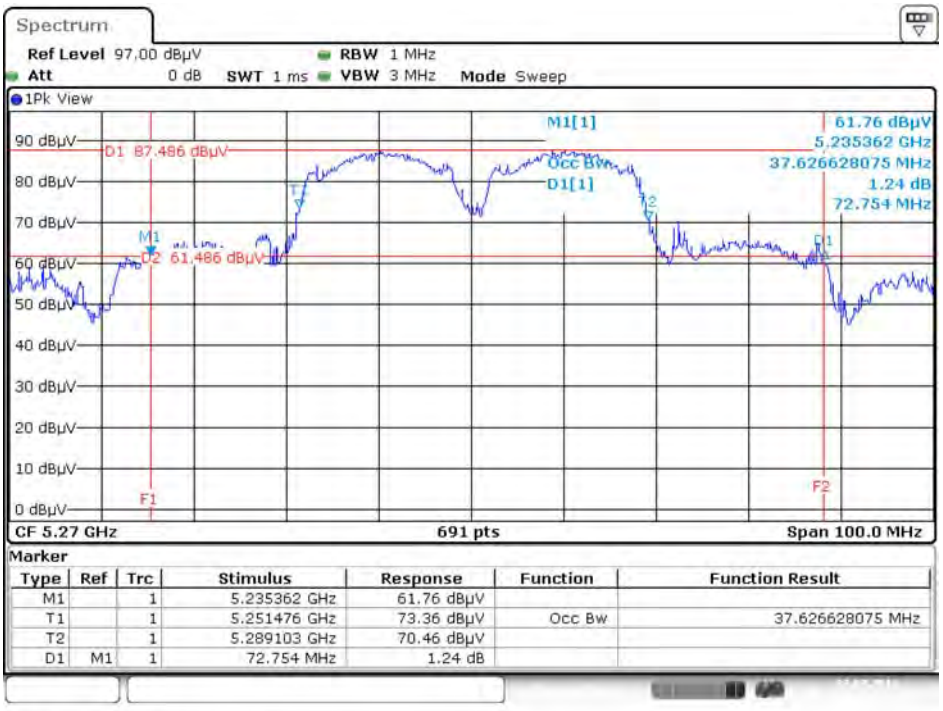
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5580 MHz



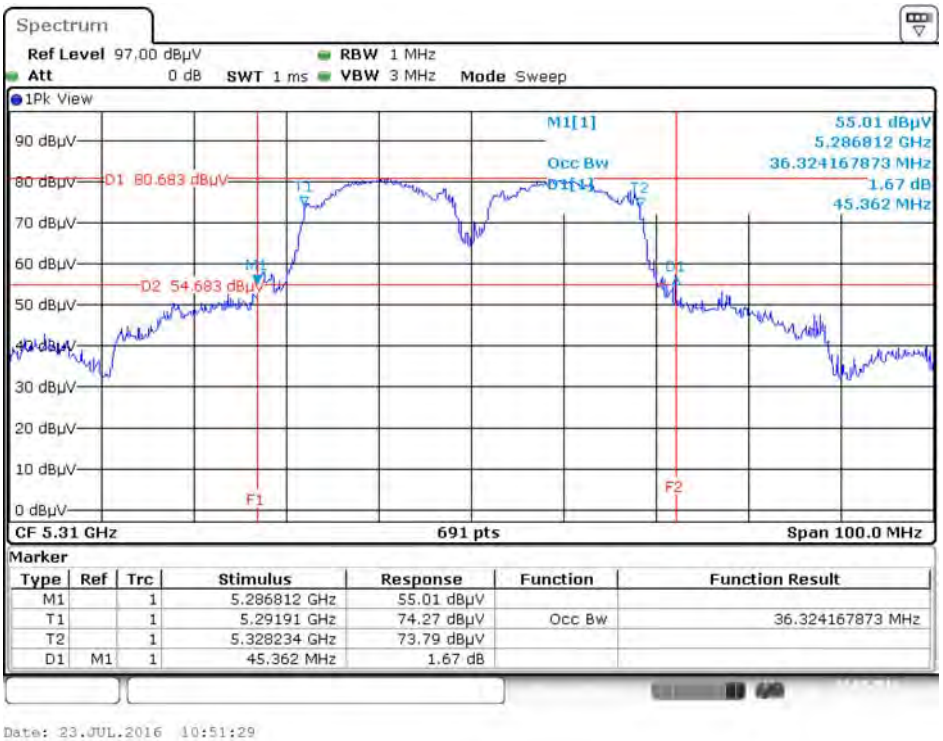
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5700 MHz



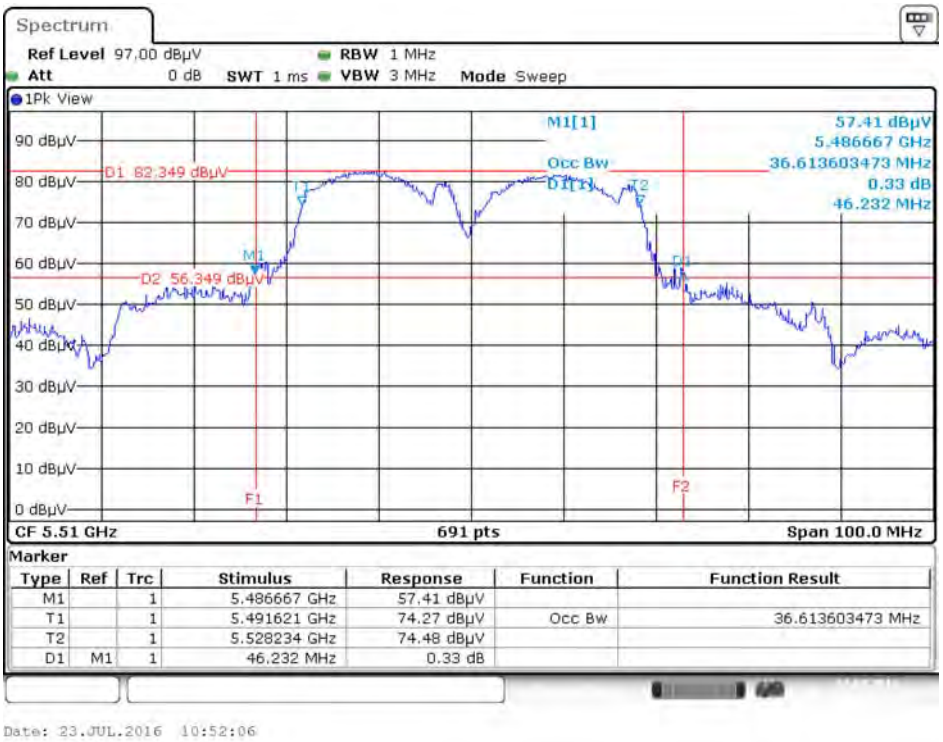
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 / 5270 MHz



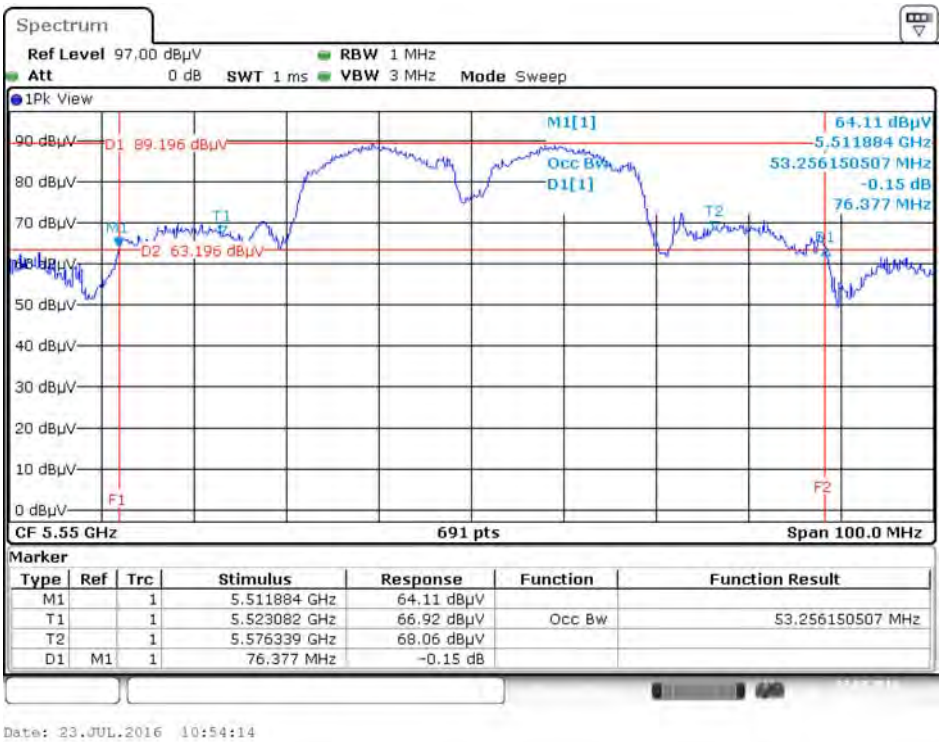
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 / 5310 MHz



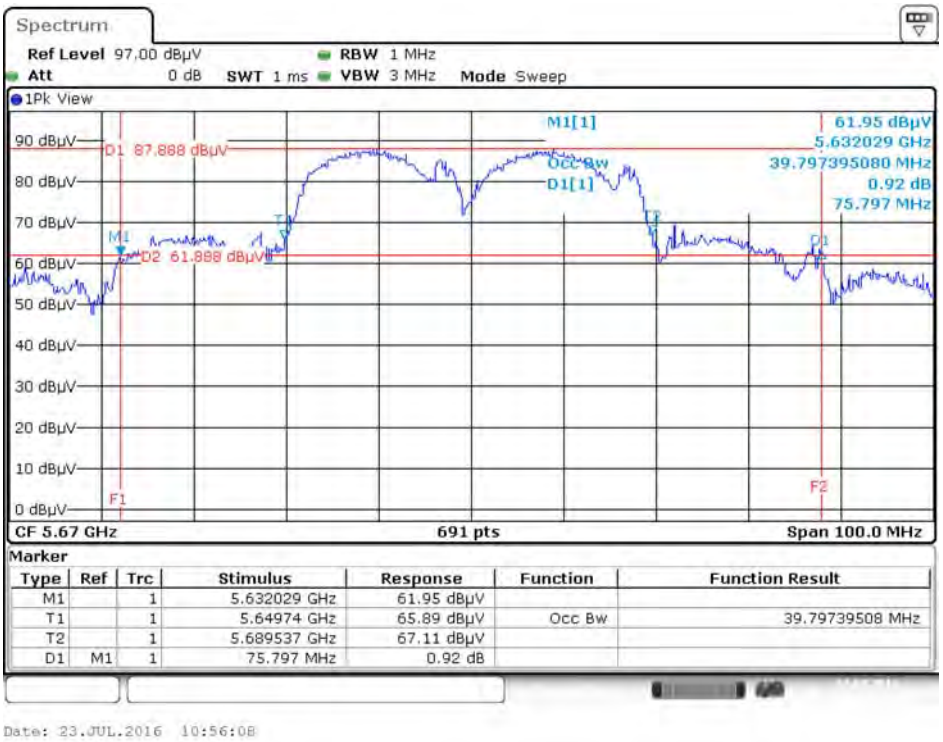
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 / 5510 MHz



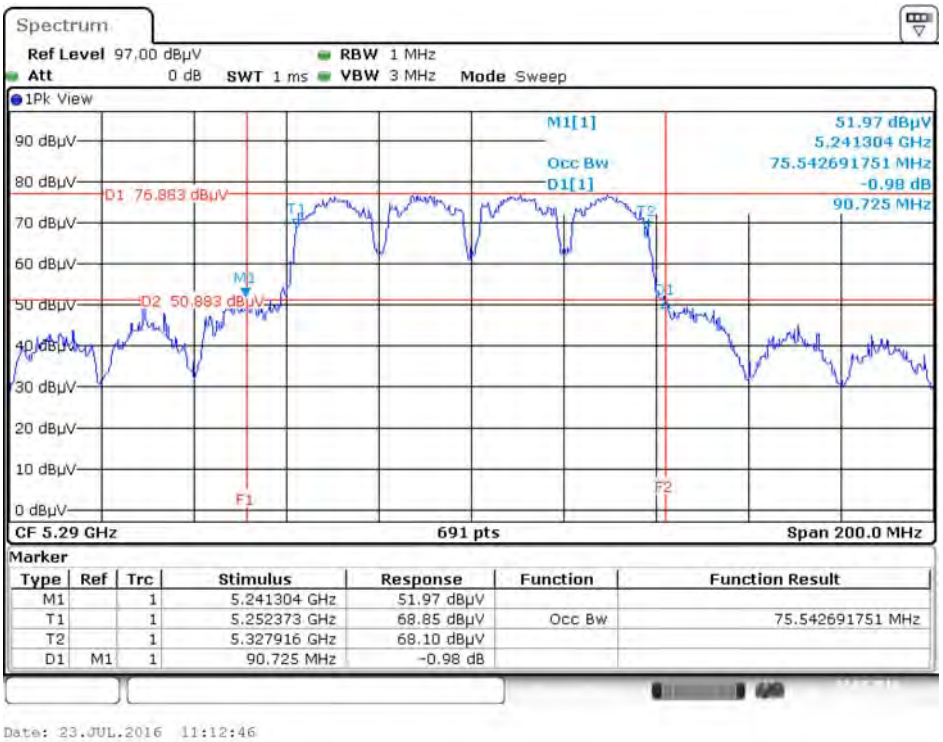
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 / 5550 MHz



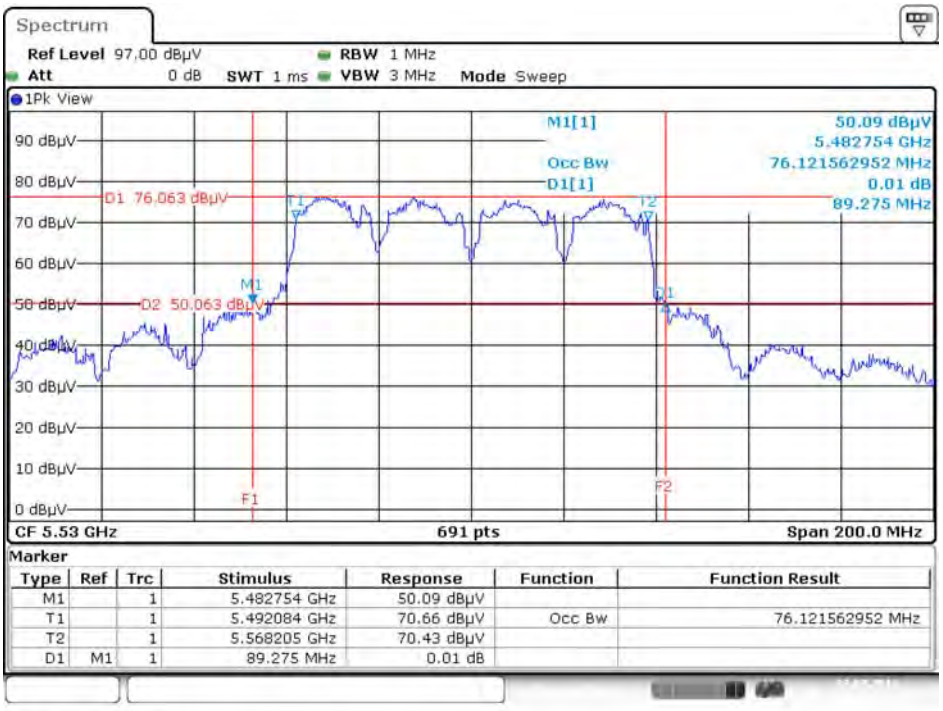
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 / 5670 MHz



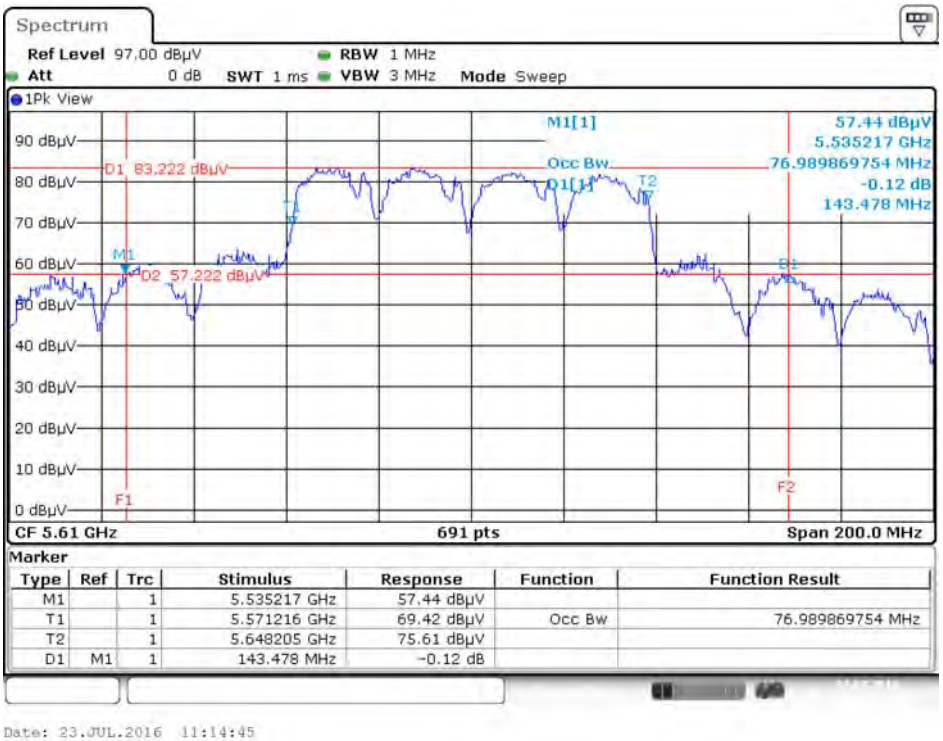
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 + Chain 4 / 5290 MHz



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



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



4.2. Maximum Conducted Output Power Measurement

4.2.1. 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	

4.2.2. Measuring Instruments and Setting

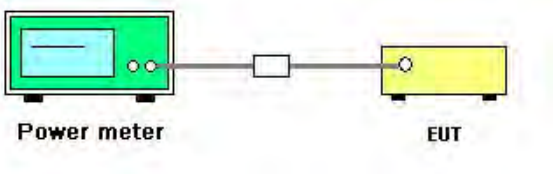
Please refer to section 5 of equipments list in this report The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	AVERAGE

4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the power meter.
2. Test was performed in accordance with KDB789033 D02 v01r03 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (E) Maximum conducted output power =>3. Measurement using a Power Meter (PM) =>b) Method PM-G (Measurement using a gated RF average power meter).
3. Multiple antenna systems was performed in accordance with KDB662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
4. When measuring maximum conducted output power with multiple antenna systems,add every result of the values by mathematic formula.

4.2.4. Test Setup Layout



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 Maximum Conducted Output Power

Temperature	22°C	Humidity	48%
Test Engineer	Eddie Weng	Test Date	Jun. 11, 2016~Jul. 23, 2016

Mode	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Chain 3	Chain 4	Total		
802.11a	5260 MHz	19.33	19.35	22.35	23.98	Complies
	5300 MHz	18.89	19.76	22.36	23.98	Complies
	5320 MHz	18.77	19.34	22.07	23.98	Complies
	5500 MHz	16.21	17.55	19.94	23.98	Complies
	5580 MHz	18.33	19.85	22.17	23.98	Complies
	5700 MHz	16.60	16.78	19.70	23.98	Complies
802.11ac MCS0/Nss1 VHT20	5260 MHz	18.66	19.73	22.24	23.98	Complies
	5300 MHz	18.55	19.69	22.17	23.98	Complies
	5320 MHz	17.40	17.77	20.60	23.98	Complies
	5500 MHz	16.25	17.38	19.86	23.98	Complies
	5580 MHz	18.17	19.77	22.05	23.98	Complies
	5700 MHz	14.11	15.08	17.63	23.98	Complies
802.11ac MCS0/Nss1 VHT40	5270 MHz	18.71	19.70	22.24	23.98	Complies
	5310 MHz	10.18	10.97	13.60	23.98	Complies
	5510 MHz	10.44	12.49	14.60	23.98	Complies
	5550 MHz	18.23	19.99	22.21	23.98	Complies
	5670 MHz	16.72	17.99	20.41	23.98	Complies
802.11ac MCS0/Nss1 VHT80	5290 MHz	9.68	10.73	13.25	23.98	Complies
	5530 MHz	9.87	7.94	12.02	23.98	Complies
	5610 MHz	16.86	18.01	20.48	23.98	Complies

4.3. Power Spectral Density Measurement

4.3.1. Limit

The following table is power spectral density limits and decrease power density limit rule refer to section 4.2.1.

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

4.3.2. Measuring Instruments and Setting

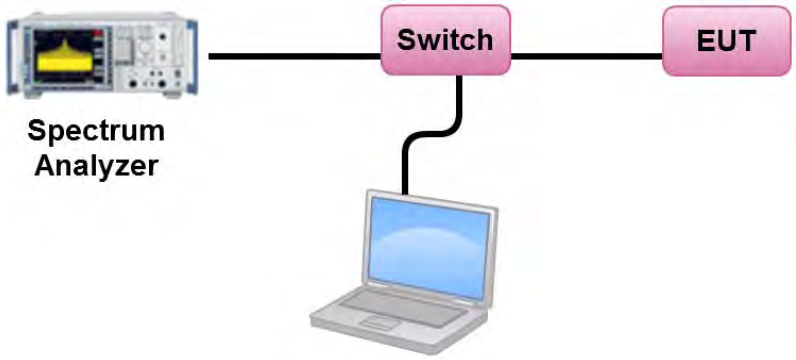
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

4.3.3. 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 v01r03 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 and sum the spectra across the outputs.

4.3.4. Test Setup Layout



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 Power Spectral Density

Temperature	22°C	Humidity	48%
Test Engineer	Eddie Weng		

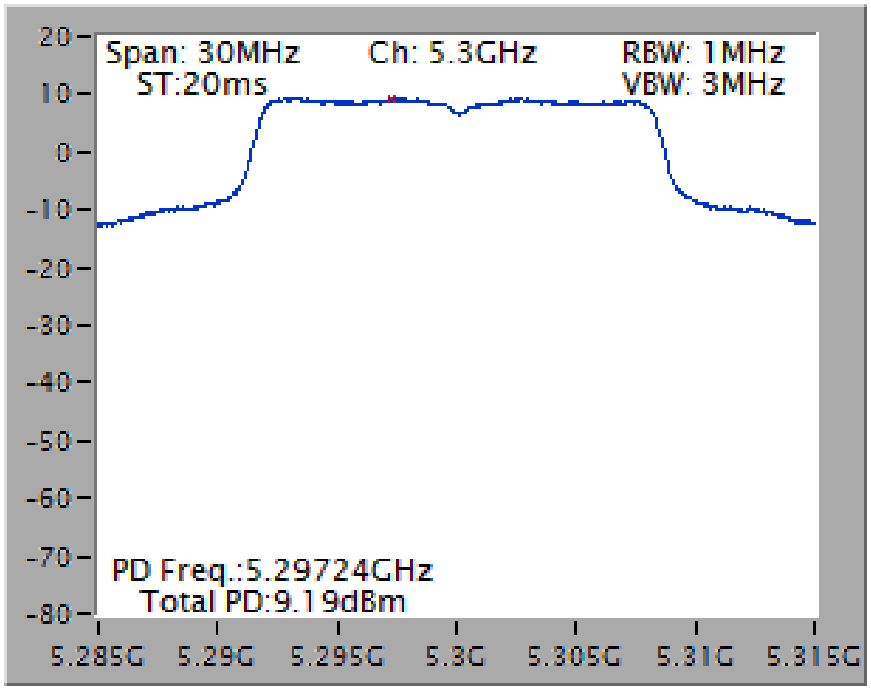
Mode	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
802.11a	5260 MHz	9.12	9.43	Complies
	5300 MHz	9.19	9.43	Complies
	5320 MHz	8.84	9.43	Complies
	5500 MHz	6.67	9.43	Complies
	5580 MHz	9.08	9.43	Complies
	5700 MHz	6.41	9.43	Complies
802.11ac MCS0/Nss1 VHT20	5260 MHz	9.00	9.43	Complies
	5300 MHz	8.93	9.43	Complies
	5320 MHz	7.29	9.43	Complies
	5500 MHz	6.65	9.43	Complies
	5580 MHz	9.00	9.43	Complies
	5700 MHz	4.31	9.43	Complies
802.11ac MCS0/Nss1 VHT40	5270 MHz	6.00	9.43	Complies
	5310 MHz	-2.72	9.43	Complies
	5510 MHz	-1.70	9.43	Complies
	5550 MHz	5.92	9.43	Complies
	5670 MHz	4.14	9.43	Complies
802.11ac MCS0/Nss1 VHT80	5290 MHz	-6.02	9.43	Complies
	5530 MHz	-7.11	9.43	Complies
	5610 MHz	1.21	9.43	Complies

Note: $Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =7.57dBi >6dBi, so Limit=11-(7.57-6)=9.43dBm/MHz.

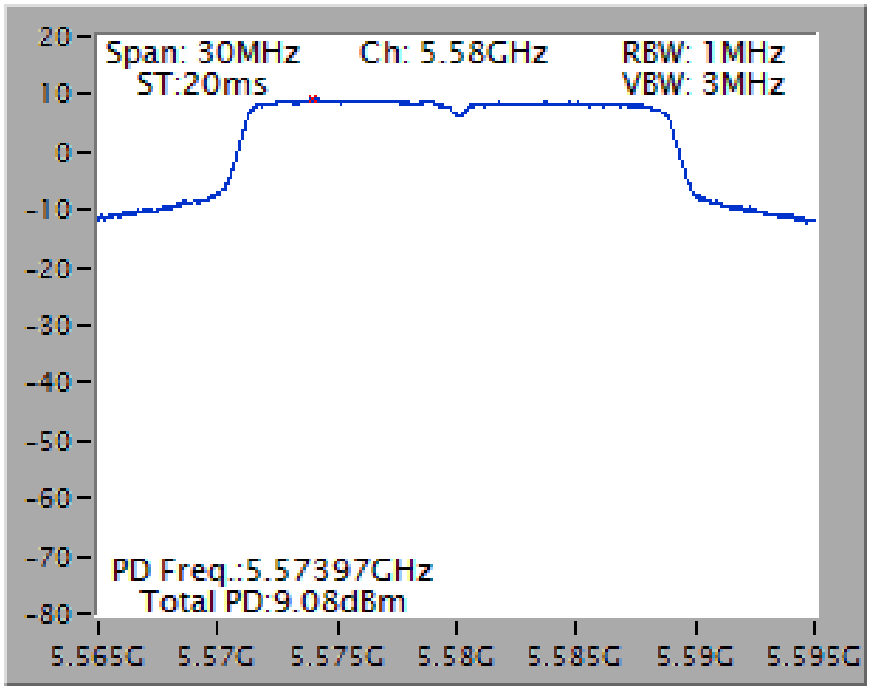
Note: All the test values were listed in the report.

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

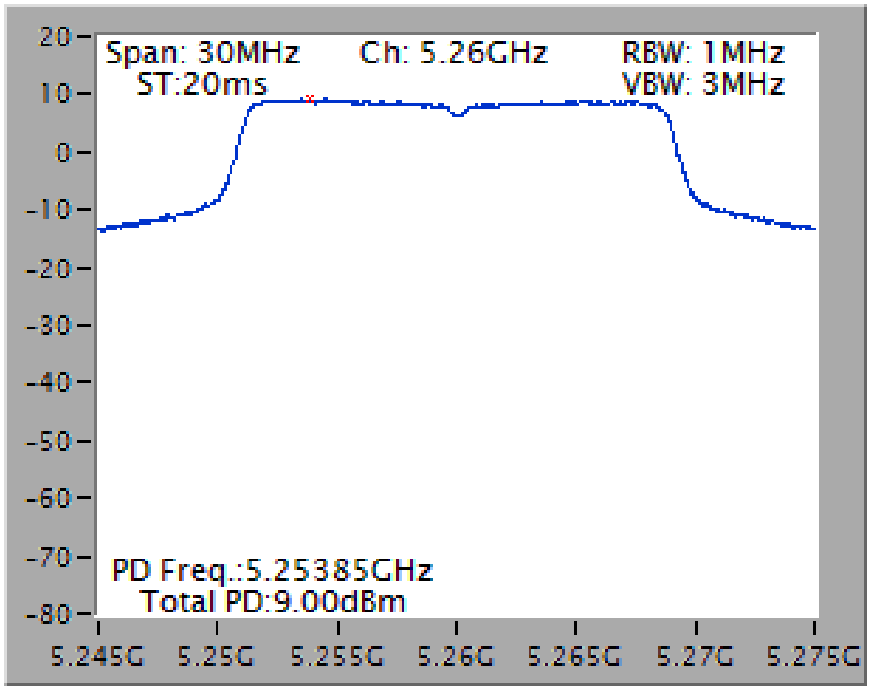
Power Density Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5300 MHz



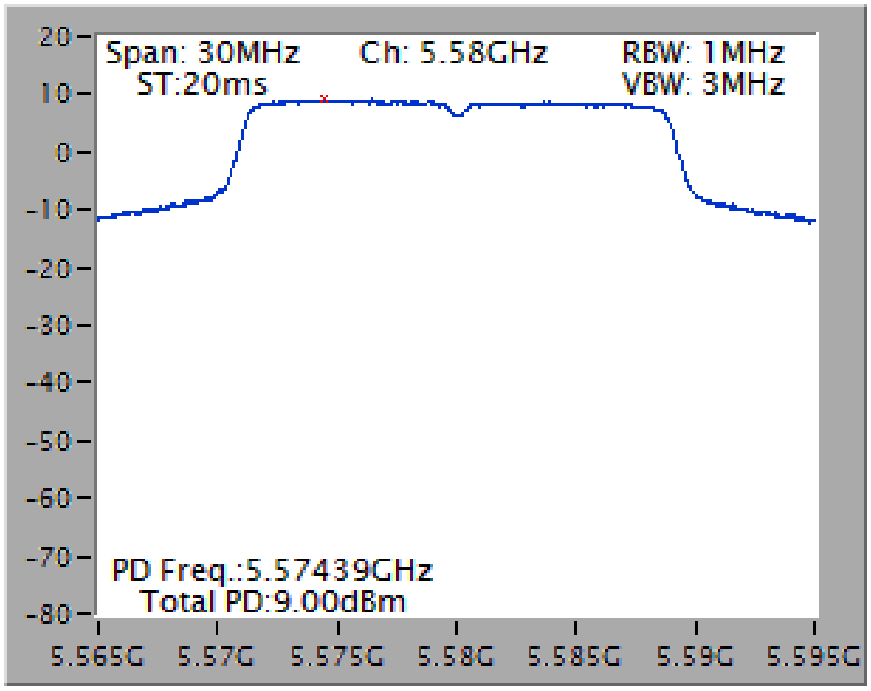
Power Density Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5580 MHz



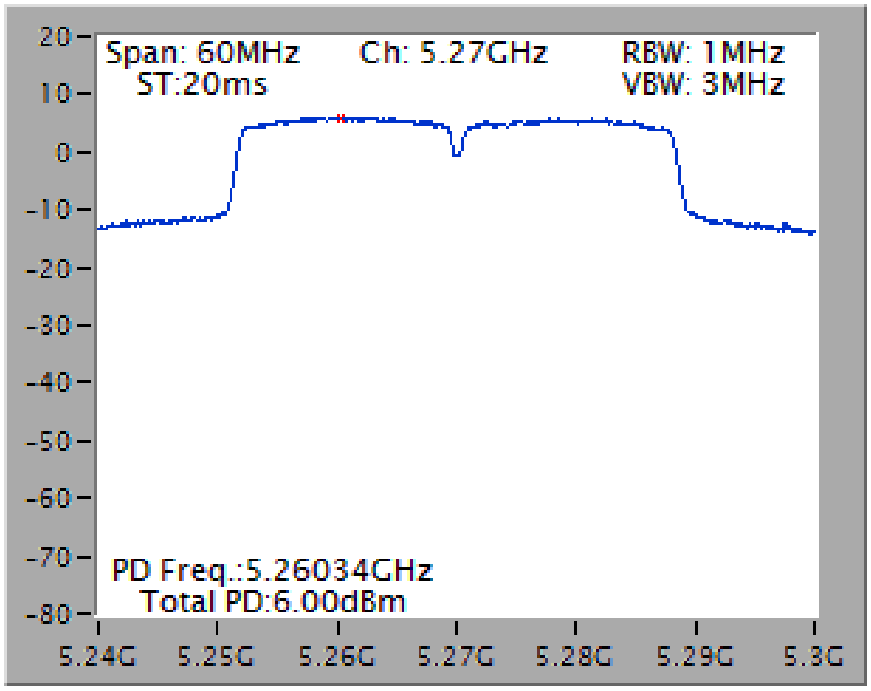
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5260 MHz



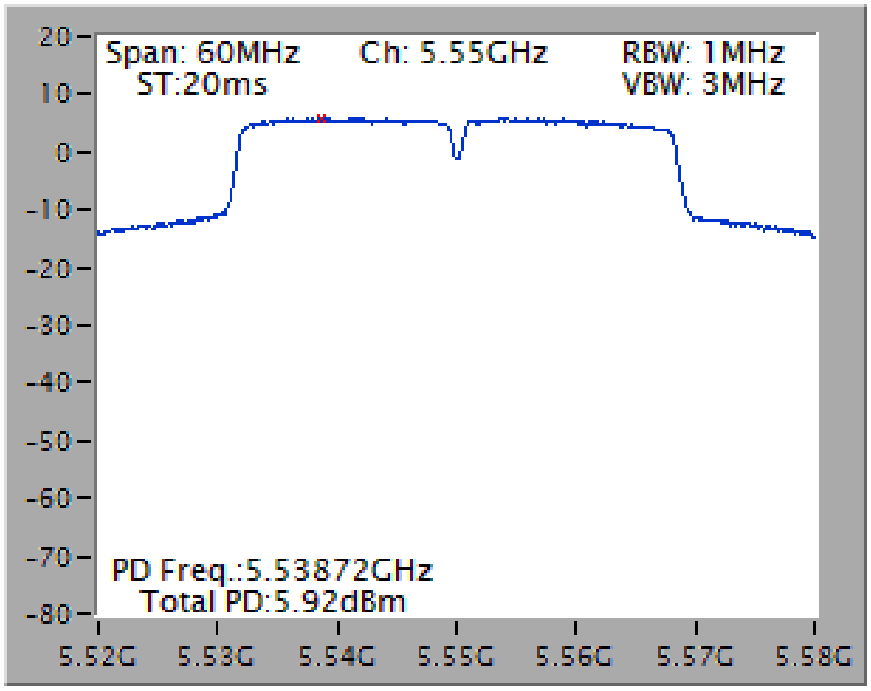
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5580 MHz



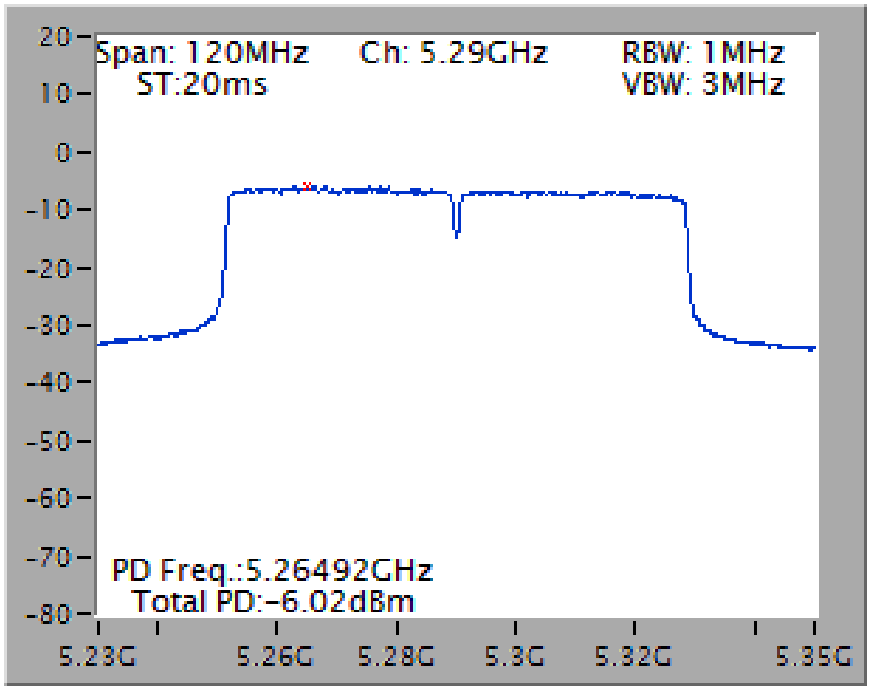
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 / 5270 MHz



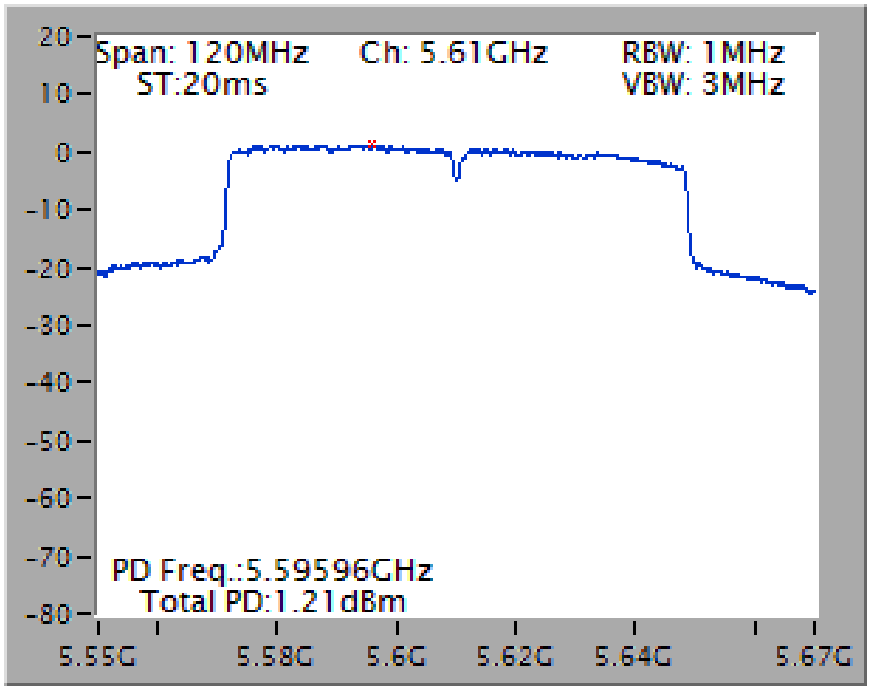
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 / 5550 MHz



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



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



4.4. Radiated Emissions Measurement

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

4.4.2. 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.

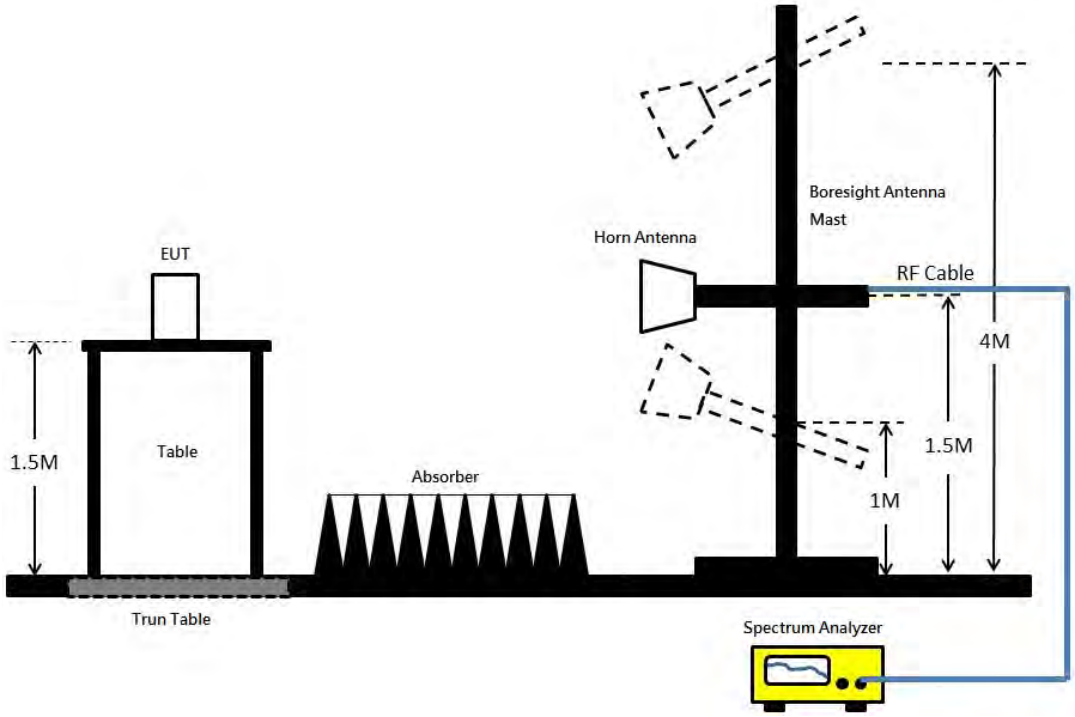
Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	40 GHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	1MHz / 3MHz for peak

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

4.4.3. Test Procedures

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

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

Temperature	22°C	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11a CH 52 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	15779.53	46.57	54.00	-7.43	30.45	13.63	38.35	35.86	150	230	Average	HORIZONTAL
2	15780.19	59.44	74.00	-14.56	43.32	13.63	38.35	35.86	150	230	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	15779.67	59.76	74.00	-14.24	43.64	13.63	38.35	35.86	128	241	Peak	VERTICAL
2	15779.69	47.26	54.00	-6.74	31.14	13.63	38.35	35.86	128	241	Average	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11a CH 60 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	10600.28	51.80	74.00	-22.20	36.82	11.94	38.98	35.94	136	61	Peak	HORIZONTAL
2	10600.48	39.06	54.00	-14.94	24.08	11.94	38.98	35.94	136	61	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	10600.41	39.03	54.00	-14.97	24.05	11.94	38.98	35.94	140	156	Average	VERTICAL
2	10600.86	51.64	74.00	-22.36	36.66	11.94	38.98	35.94	140	156	Peak	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11a CH 64 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	10639.68	39.20	54.00	-14.80	24.20	11.95	39.00	35.95	132	158	Average	HORIZONTAL
2	10640.20	51.91	74.00	-22.09	36.91	11.95	39.00	35.95	132	158	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	10639.62	51.83	74.00	-22.17	36.83	11.95	39.00	35.95	118	224	Peak	VERTICAL
2	10639.65	39.40	54.00	-14.60	24.40	11.95	39.00	35.95	118	224	Average	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11a CH 100 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	11000.27	54.72	74.00	-19.28	39.27	12.12	39.30	35.97	133	172	Peak	HORIZONTAL
2	11000.47	42.82	54.00	-11.18	27.37	12.12	39.30	35.97	133	172	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	11000.09	55.78	74.00	-18.22	40.33	12.12	39.30	35.97	161	222	Peak	VERTICAL
2	11000.46	42.87	54.00	-11.13	27.42	12.12	39.30	35.97	161	222	Average	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11a CH 116 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	11157.50	48.10	54.00	-5.90	32.60	12.19	39.27	35.96	171	309	Average	HORIZONTAL
2	11158.20	60.01	74.00	-13.99	44.51	12.19	39.27	35.96	171	309	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	11159.76	43.75	54.00	-10.25	28.25	12.19	39.27	35.96	134	286	Average	VERTICAL
2	11160.15	55.82	74.00	-18.18	40.32	12.19	39.27	35.96	134	286	Peak	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11a CH 140 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	11399.00	63.21	74.00	-10.79	47.63	12.29	39.22	35.93	191	1	Peak	HORIZONTAL
2	11399.40	50.20	54.00	-3.80	34.62	12.29	39.22	35.93	191	1	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	11398.40	45.33	54.00	-8.67	29.75	12.29	39.22	35.93	136	182	Average	VERTICAL
2	11399.20	58.83	74.00	-15.17	43.25	12.29	39.22	35.93	136	182	Peak	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 52 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	15779.68	58.33	74.00	-15.67	42.21	13.63	38.35	35.86	100	245	Peak	HORIZONTAL
2	15779.73	46.19	54.00	-7.81	30.07	13.63	38.35	35.86	100	245	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	15779.55	59.19	74.00	-14.81	43.07	13.63	38.35	35.86	100	160	Peak	VERTICAL
2	15779.69	45.76	54.00	-8.24	29.64	13.63	38.35	35.86	100	160	Average	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 60 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	10600.03	39.03	54.00	-14.97	24.05	11.94	38.98	35.94	120	282	Average	HORIZONTAL
2	10600.05	51.32	74.00	-22.68	36.34	11.94	38.98	35.94	120	282	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	10600.45	39.57	54.00	-14.43	24.59	11.94	38.98	35.94	151	184	Average	VERTICAL
2	10600.67	52.44	74.00	-21.56	37.46	11.94	38.98	35.94	151	184	Peak	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 64 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	10639.66	39.72	54.00	-14.28	24.72	11.95	39.00	35.95	123	146	Average	HORIZONTAL
2	10639.81	51.68	74.00	-22.32	36.68	11.95	39.00	35.95	123	146	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	10639.67	39.57	54.00	-14.43	24.57	11.95	39.00	35.95	136	206	Average	VERTICAL
2	10639.72	51.49	74.00	-22.51	36.49	11.95	39.00	35.95	136	206	Peak	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 100 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	10999.50	43.43	54.00	-10.57	27.98	12.12	39.30	35.97	159	26	Average	HORIZONTAL
2	10999.56	55.90	74.00	-18.10	40.45	12.12	39.30	35.97	159	26	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	10999.50	43.49	54.00	-10.51	28.04	12.12	39.30	35.97	110	202	Average	VERTICAL
2	11000.25	56.02	74.00	-17.98	40.57	12.12	39.30	35.97	110	202	Peak	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 116 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	11151.50	59.67	74.00	-14.33	44.18	12.18	39.27	35.96	180	310	Peak	HORIZONTAL
2	11153.50	47.04	54.00	-6.96	31.55	12.18	39.27	35.96	180	310	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	11159.76	43.80	54.00	-10.20	28.30	12.19	39.27	35.96	137	119	Average	VERTICAL
2	11160.47	56.49	74.00	-17.51	40.99	12.19	39.27	35.96	137	119	Peak	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 140 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	11393.60	60.78	74.00	-13.22	45.21	12.29	39.22	35.94	190	1	Peak	HORIZONTAL
2	11397.80	48.75	54.00	-5.25	33.17	12.29	39.22	35.93	190	1	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	11399.74	44.42	54.00	-9.58	28.84	12.29	39.22	35.93	137	316	Average	VERTICAL
2	11400.11	57.03	74.00	-16.97	41.45	12.29	39.22	35.93	137	316	Peak	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 54 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	15810.01	57.76	74.00	-16.24	41.64	13.64	38.34	35.86	100	270	Peak	HORIZONTAL
2	15810.47	45.78	54.00	-8.22	29.66	13.64	38.34	35.86	100	270	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	15809.89	45.33	54.00	-8.67	29.21	13.64	38.34	35.86	100	185	Average	VERTICAL
2	15810.49	58.28	74.00	-15.72	42.16	13.64	38.34	35.86	100	185	Peak	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 62 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	10620.60	51.79	74.00	-22.21	36.81	11.94	38.98	35.94	110	163	Peak	HORIZONTAL
2	10621.20	39.27	54.00	-14.73	24.29	11.94	38.98	35.94	110	163	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	10619.71	52.26	74.00	-21.74	37.28	11.94	38.98	35.94	116	129	Peak	VERTICAL
2	10619.72	39.54	54.00	-14.46	24.56	11.94	38.98	35.94	116	129	Average	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 102 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	11020.28	55.61	74.00	-18.39	40.16	12.12	39.30	35.97	133	271	Peak	HORIZONTAL
2	11020.43	43.92	54.00	-10.08	28.47	12.12	39.30	35.97	133	271	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	11020.26	56.38	74.00	-17.62	40.93	12.12	39.30	35.97	123	172	Peak	VERTICAL
2	11020.44	43.38	54.00	-10.62	27.93	12.12	39.30	35.97	123	172	Average	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 110 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	11100.25	43.66	54.00	-10.34	28.18	12.16	39.28	35.96	100	260	Average	HORIZONTAL
2	11100.37	55.90	74.00	-18.10	40.42	12.16	39.28	35.96	100	260	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	11099.87	55.55	74.00	-18.45	40.07	12.16	39.28	35.96	122	167	Peak	VERTICAL
2	11100.49	43.29	54.00	-10.71	27.81	12.16	39.28	35.96	122	167	Average	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 134 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	11354.60	48.83	54.00	-5.17	33.27	12.27	39.23	35.94	189	355	Average	HORIZONTAL
2	11354.60	60.82	74.00	-13.18	45.26	12.27	39.23	35.94	189	355	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	11339.84	56.46	74.00	-17.54	40.91	12.26	39.23	35.94	130	220	Peak	VERTICAL
2	11340.27	44.80	54.00	-9.20	29.25	12.26	39.23	35.94	130	220	Average	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 58 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	15869.59	58.43	74.00	-15.57	42.30	13.66	38.33	35.86	111	283	Peak	HORIZONTAL
2	15869.61	45.80	54.00	-8.20	29.67	13.66	38.33	35.86	111	283	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	15869.67	58.74	74.00	-15.26	42.61	13.66	38.33	35.86	104	208	Peak	VERTICAL
2	15869.74	45.52	54.00	-8.48	29.39	13.66	38.33	35.86	104	208	Average	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 106 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	11060.18	44.54	54.00	-9.46	29.07	12.15	39.29	35.97	109	231	Average	HORIZONTAL
2	11060.24	57.60	74.00	-16.40	42.13	12.15	39.29	35.97	109	231	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	11060.41	43.58	54.00	-10.42	28.11	12.15	39.29	35.97	100	191	Average	VERTICAL
2	11060.45	56.00	74.00	-18.00	40.53	12.15	39.29	35.97	100	191	Peak	VERTICAL

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 122 / Chain 3 + Chain 4
Test Date	Jun. 09, 2016		

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	11220.09	56.46	74.00	-17.54	40.95	12.20	39.26	35.95	156	320	Peak	HORIZONTAL
2	11220.31	44.11	54.00	-9.89	28.60	12.20	39.26	35.95	156	320	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	11219.73	43.02	54.00	-10.98	27.51	12.20	39.26	35.95	117	227	Average	VERTICAL
2	11219.83	55.56	74.00	-18.44	40.05	12.20	39.26	35.95	117	227	Peak	VERTICAL

Note:

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

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

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

4.5. Band Edge 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 (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.5.2. Measuring Instruments and Setting

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

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	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

4.5.3. Test Procedures

The test procedure is the same as section 4.4.3.

4.5.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.4.4.

4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.5.7. Test Result of Band Edge and Fundamental Emissions

Temperature	22°C	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11a CH 52, 60, 64 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	5096.00	59.61	74.00	-14.39	53.66	9.40	33.06	36.51	100	24	Peak	VERTICAL
2	5150.00	47.64	54.00	-6.36	41.47	9.50	33.17	36.50	100	24	Average	VERTICAL
3	5253.60	105.54			99.02	9.64	33.36	36.48	100	24	Average	VERTICAL
4	5259.20	116.04			109.52	9.64	33.36	36.48	100	24	Peak	VERTICAL
5	5381.60	60.37	74.00	-13.63	53.48	9.76	33.58	36.45	100	24	Peak	VERTICAL
6	5437.60	47.95	54.00	-6.05	40.93	9.77	33.69	36.44	100	24	Average	VERTICAL

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	5292.80	101.63			94.97	9.68	33.45	36.47	183	322	Average	HORIZONTAL
2	5292.80	111.96			105.30	9.68	33.45	36.47	183	322	Peak	HORIZONTAL
3	5351.60	53.57	54.00	-0.43	46.77	9.73	33.53	36.46	183	322	Average	HORIZONTAL
4	5353.60	69.76	74.00	-4.24	62.96	9.73	33.53	36.46	183	322	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	5315.80	101.24			94.54	9.70	33.47	36.47	108	17	Average	VERTICAL
2	5315.80	111.97			105.27	9.70	33.47	36.47	108	17	Peak	VERTICAL
3	5350.00	71.55	74.00	-2.45	64.75	9.73	33.53	36.46	108	17	Peak	VERTICAL
4	5350.40	53.76	54.00	-0.24	46.96	9.73	33.53	36.46	108	17	Average	VERTICAL

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

Temperature	22°C	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11a CH 100, 116, 140 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	5460.00	48.99	54.00	-5.01	41.93	9.78	33.72	36.44	290	294	Average	VERTICAL
2	5460.00	61.62	74.00	-12.38	54.56	9.78	33.72	36.44	290	294	Peak	VERTICAL
3	5470.00	53.38	54.00	-0.62	46.28	9.78	33.75	36.43	290	294	Average	VERTICAL
4	5470.00	68.25	74.00	-5.75	61.15	9.78	33.75	36.43	290	294	Peak	VERTICAL
5	5496.00	101.68			94.53	9.78	33.80	36.43	290	294	Average	VERTICAL
6	5502.00	112.56			105.41	9.78	33.80	36.43	290	294	Peak	VERTICAL

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	5457.00	47.45	54.00	-6.55	40.39	9.78	33.72	36.44	281	249	Average	VERTICAL
2	5460.00	59.36	74.00	-14.64	52.30	9.78	33.72	36.44	281	249	Peak	VERTICAL
3	5470.00	47.21	54.00	-6.79	40.11	9.78	33.75	36.43	281	249	Average	VERTICAL
4	5470.00	58.04	74.00	-15.96	50.94	9.78	33.75	36.43	281	249	Peak	VERTICAL
5	5572.80	104.17			96.80	9.79	33.99	36.41	281	249	Average	VERTICAL
6	5582.40	114.65			107.24	9.79	34.03	36.41	281	249	Peak	VERTICAL

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	5694.60	100.96			93.09	9.89	34.36	36.38	271	247	Average	VERTICAL
2	5695.00	111.21			103.34	9.89	34.36	36.38	271	247	Peak	VERTICAL
3	5725.00	53.61	54.00	-0.39	45.61	9.92	34.45	36.37	271	247	Average	VERTICAL
4	5725.00	70.31	74.00	-3.69	62.31	9.92	34.45	36.37	271	247	Peak	VERTICAL

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

Temperature	22°C	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 52, 60, 64 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	5066.40	46.59	54.00	-7.41	40.75	9.34	33.01	36.51	179	329	Average	HORIZONTAL
2	5127.20	59.08	74.00	-14.92	52.95	9.48	33.15	36.50	179	329	Peak	HORIZONTAL
3	5262.40	101.30			94.74	9.65	33.39	36.48	179	329	Average	HORIZONTAL
4	5262.40	111.92			105.36	9.65	33.39	36.48	179	329	Peak	HORIZONTAL
5	5355.20	61.73	74.00	-12.27	54.90	9.74	33.55	36.46	179	329	Peak	HORIZONTAL
6	5433.60	47.91	54.00	-6.09	40.90	9.77	33.69	36.45	179	329	Average	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	5302.80	113.42			106.76	9.68	33.45	36.47	100	25	Peak	VERTICAL
2	5304.40	103.03			96.37	9.68	33.45	36.47	100	25	Average	VERTICAL
3	5359.20	50.14	54.00	-3.86	43.31	9.74	33.55	36.46	100	25	Average	VERTICAL
4	5362.40	67.12	74.00	-6.88	60.29	9.74	33.55	36.46	100	25	Peak	VERTICAL

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	5312.40	98.12			91.42	9.70	33.47	36.47	174	330	Average	HORIZONTAL
2	5312.40	108.09			101.39	9.70	33.47	36.47	174	330	Peak	HORIZONTAL
3	5350.00	53.82	54.00	-0.18	47.02	9.73	33.53	36.46	174	330	Average	HORIZONTAL
4	5350.80	69.06	74.00	-4.94	62.26	9.73	33.53	36.46	174	330	Peak	HORIZONTAL

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

Temperature	22°C	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 100, 116, 140 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	5453.60	62.32	74.00	-11.68	55.26	9.78	33.72	36.44	321	292	Peak	VERTICAL
2	5456.40	49.17	54.00	-4.83	42.11	9.78	33.72	36.44	321	292	Average	VERTICAL
3	5470.00	53.31	54.00	-0.69	46.21	9.78	33.75	36.43	321	292	Average	VERTICAL
4	5470.00	67.94	74.00	-6.06	60.84	9.78	33.75	36.43	321	292	Peak	VERTICAL
5	5494.40	111.82			4.70	9.78	33.77	36.43	321	292	Peak	VERTICAL
6	5496.40	101.78			4.63	9.78	33.80	36.43	321	292	Average	VERTICAL

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	5393.00	59.24	74.00	-14.76	52.31	9.77	33.61	36.45	343	89	Peak	HORIZONTAL
2	5446.00	47.52	54.00	-6.48	40.50	9.77	33.69	36.44	343	89	Average	HORIZONTAL
3	5465.00	47.67	54.00	-6.33	40.58	9.78	33.75	36.44	343	89	Average	HORIZONTAL
4	5469.00	59.42	74.00	-14.58	52.33	9.78	33.75	36.44	343	89	Peak	HORIZONTAL
5	5579.00	113.56			106.15	9.79	34.03	36.41	343	89	Peak	HORIZONTAL
6	5582.00	103.11			95.70	9.79	34.03	36.41	343	89	Average	HORIZONTAL
7	5779.00	60.97	74.00	-13.03	52.77	9.97	34.59	36.36	343	89	Peak	HORIZONTAL
8	5792.00	49.05	54.00	-4.95	40.77	9.99	34.64	36.35	343	89	Average	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	5706.80	97.69			89.75	9.91	34.41	36.38	261	252	Average	VERTICAL
2	5707.60	107.05			99.11	9.91	34.41	36.38	261	252	Peak	VERTICAL
3	5725.00	53.26	54.00	-0.74	45.26	9.92	34.45	36.37	261	252	Average	VERTICAL
4	5725.00	67.22	74.00	-6.78	59.22	9.92	34.45	36.37	261	252	Peak	VERTICAL

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

Temperature	22℃	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 54, 62 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	5254.80	110.49			103.97	9.64	33.36	36.48	100	18	Peak	VERTICAL
2	5255.60	100.26			93.74	9.64	33.36	36.48	100	18	Average	VERTICAL
3	5350.00	66.39	74.00	-7.61	59.59	9.73	33.53	36.46	100	18	Peak	VERTICAL
4	5351.60	53.77	54.00	-0.23	46.97	9.73	33.53	36.46	100	18	Average	VERTICAL

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	5312.40	92.27			85.57	9.70	33.47	36.47	108	18	Average	VERTICAL
2	5312.80	101.61			94.91	9.70	33.47	36.47	108	18	Peak	VERTICAL
3	5350.80	53.70	54.00	-0.30	46.90	9.73	33.53	36.46	108	18	Average	VERTICAL
4	5351.20	66.92	74.00	-7.08	60.12	9.73	33.53	36.46	108	18	Peak	VERTICAL

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

Temperature	22°C	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 102, 110, 134 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	5458.40	63.28	74.00	-10.72	56.22	9.78	33.72	36.44	306	292	Peak	VERTICAL
2	5460.00	50.23	54.00	-3.77	43.17	9.78	33.72	36.44	306	292	Average	VERTICAL
3	5467.20	68.13	68.20	-0.07	61.04	9.78	33.75	36.44	306	292	Peak	VERTICAL
4	5504.00	93.94			86.79	9.78	33.80	36.43	306	292	Average	VERTICAL
5	5504.00	104.25			97.10	9.78	33.80	36.43	306	292	Peak	VERTICAL

Item 4, 5 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	5457.00	67.38	74.00	-6.62	60.32	9.78	33.72	36.44	221	31	Peak	VERTICAL
2	5460.00	53.25	54.00	-0.75	46.19	9.78	33.72	36.44	221	31	Average	VERTICAL
3	5470.00	68.08	68.20	-0.12	60.98	9.78	33.75	36.43	221	31	Peak	VERTICAL
4	5539.00	98.36			91.11	9.78	33.89	36.42	221	31	Average	VERTICAL
5	5542.00	107.90			100.65	9.78	33.89	36.42	221	31	Peak	VERTICAL

Item 4, 5 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	5668.40	99.08			91.34	9.86	34.27	36.39	275	248	Average	VERTICAL
2	5668.40	108.37			100.63	9.86	34.27	36.39	275	248	Peak	VERTICAL
3	5726.00	67.87	68.20	-0.33	59.87	9.92	34.45	36.37	275	248	Peak	VERTICAL

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

Temperature	22°C	Humidity	53%
Test Engineer	Paul Chen	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 58, 106, 122 / Chain 3 + Chain 4
Test Date	Jun. 08, 2016		

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	5048.00	47.39	54.00	-6.61	41.60	9.32	32.98	36.51	193	27	Average	HORIZONTAL
2	5089.00	59.90	74.00	-14.10	53.95	9.40	33.06	36.51	193	27	Peak	HORIZONTAL
3	5268.00	87.13			80.57	9.65	33.39	36.48	193	27	Average	HORIZONTAL
4	5279.00	97.65			91.03	9.67	33.42	36.47	193	27	Peak	HORIZONTAL
5	5350.00	53.78	54.00	-0.22	46.98	9.73	33.53	36.46	193	27	Average	HORIZONTAL
6	5350.00	63.95	74.00	-10.05	57.15	9.73	33.53	36.46	193	27	Peak	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	5452.00	53.74	54.00	-0.26	46.68	9.78	33.72	36.44	242	18	Average	HORIZONTAL
2	5452.00	67.86	74.00	-6.14	60.80	9.78	33.72	36.44	242	18	Peak	HORIZONTAL
3	5470.00	67.14	68.20	-1.06	60.04	9.78	33.75	36.43	242	18	Peak	HORIZONTAL
4	5509.00	86.49			79.33	9.78	33.80	36.42	242	18	Average	HORIZONTAL
5	5519.00	98.38			91.17	9.78	33.85	36.42	242	18	Peak	HORIZONTAL
6	5733.00	61.13	68.20	-7.07	53.13	9.92	34.45	36.37	242	18	Peak	HORIZONTAL

Item 4, 5 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	5459.00	53.89	54.00	-0.11	46.83	9.78	33.72	36.44	318	35	Average	VERTICAL
2	5460.00	66.64	74.00	-7.36	59.58	9.78	33.72	36.44	318	35	Peak	VERTICAL
3	5462.00	67.93	68.20	-0.27	60.87	9.78	33.72	36.44	318	35	Peak	VERTICAL
4	5582.00	93.10			85.69	9.79	34.03	36.41	318	35	Average	VERTICAL
5	5597.00	103.18			95.71	9.79	34.08	36.40	318	35	Peak	VERTICAL
6	5739.00	64.55	68.20	-3.65	56.48	9.94	34.50	36.37	318	35	Peak	VERTICAL

Item 4, 5 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

4.6. Frequency Stability Measurement

4.6.1. 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).

4.6.2. Measuring Instruments and Setting

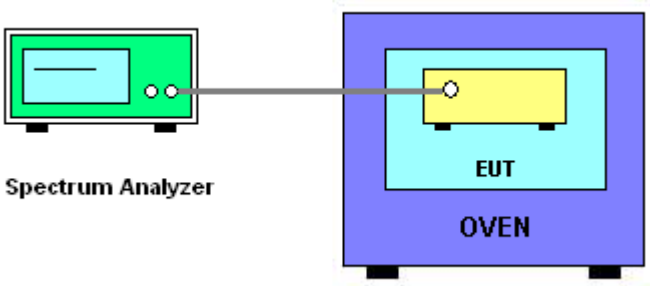
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

4.6.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 10^6 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
6. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
7. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
8. Extreme temperature is 0°C~40°C.

4.6.4. Test Setup Layout



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 un-modulation transmitting mode.

4.6.7. Test Result of Frequency Stability

Temperature	22°C	Humidity	48%
Test Engineer	Eddie Weng	Test Date	Jun. 11, 2016~Jul. 23, 2016

Mode: 20 MHz / Chain 3

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5300 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5299.9936	5299.9927	5299.9918	5299.9911
110.00	5299.9926	5299.9916	5299.9912	5299.9904
93.50	5299.9921	5299.9920	5299.9912	5299.9909
Max. Deviation (MHz)	0.0079	0.0084	0.0088	0.0096
Max. Deviation (ppm)	1.49	1.58	1.66	1.81
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5300 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5299.9906	5299.9902	5299.9894	5299.9884
10	5299.9917	5299.9912	5299.9910	5299.9900
20	5299.9926	5299.9918	5299.9908	5299.9903
30	5299.9974	5299.9969	5299.9960	5299.9953
40	5299.9990	5299.9989	5299.9981	5299.9975
Max. Deviation (MHz)	0.0132	0.0140	0.0144	0.0150
Max. Deviation (ppm)	2.49	2.64	2.71	2.83
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5580 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5579.9933	5579.9926	5579.9918	5579.9911
110.00	5579.9926	5579.9922	5579.9918	5579.9916
93.50	5579.9922	5579.9920	5579.9918	5579.9913
Max. Deviation (MHz)	0.0078	0.0080	0.0082	0.0089
Max. Deviation (ppm)	1.39	1.43	1.47	1.59
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5580 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5579.9913	5579.9912	5579.9909	5579.9905
10	5579.9922	5579.9919	5579.9916	5579.9914
20	5579.9926	5579.9916	5579.9912	5579.9904
30	5579.9974	5579.9965	5579.9958	5579.9948
40	5579.9986	5579.9982	5579.9974	5579.9968
Max. Deviation (MHz)	0.0118	0.0128	0.0129	0.0135
Max. Deviation (ppm)	2.11	2.29	2.31	2.42
Result	Complies			

Mode: 40 MHz / Chain 3

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5310 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5309.9933	5309.9932	5309.9924	5309.9914
110.00	5309.9926	5309.9920	5309.9915	5309.9908
93.50	5309.9921	5309.9918	5309.9915	5309.9907
Max. Deviation (MHz)	0.0079	0.0082	0.0085	0.0093
Max. Deviation (ppm)	1.48	1.54	1.60	1.75
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5310 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5309.9915	5309.9913	5309.9907	5309.9903
10	5309.9916	5309.9909	5309.9903	5309.9902
20	5309.9926	5309.9922	5309.9919	5309.9915
30	5309.9974	5309.9972	5309.9968	5309.9958
40	5309.9992	5309.9990	5309.9982	5309.9977
Max. Deviation (MHz)	0.0108	0.0109	0.0113	0.0123
Max. Deviation (ppm)	2.03	2.05	2.12	2.31
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5550 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5549.9936	5549.9933	5549.9928	5549.9924
110.00	5549.9926	5549.9924	5549.9917	5549.9912
93.50	5549.9922	5549.9916	5549.9912	5549.9909
Max. Deviation (MHz)	0.0078	0.0084	0.0088	0.0091
Max. Deviation (ppm)	1.40	1.51	1.58	1.64
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5550 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5549.9889	5549.9881	5549.9873	5549.9865
10	5549.9908	5549.9900	5549.9895	5549.9891
20	5549.9926	5549.9917	5549.9911	5549.9908
30	5549.9974	5549.9964	5549.9954	5549.9953
40	5549.9985	5549.9983	5549.9981	5549.9971
Max. Deviation (MHz)	0.0161	0.0169	0.0172	0.0176
Max. Deviation (ppm)	2.90	3.04	3.10	3.17
Result	Complies			

Mode: 80 MHz / Chain 3

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5290 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5289.9927	5289.9919	5289.9916	5289.9906
110.00	5289.9926	5289.9923	5289.9920	5289.9914
93.50	5289.9918	5289.9908	5289.9907	5289.9900
Max. Deviation (MHz)	0.0082	0.0092	0.0093	0.0100
Max. Deviation (ppm)	1.55	1.74	1.75	1.89
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5290 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5289.9907	5289.9905	5289.9895	5289.9890
10	5289.9921	5289.9913	5289.9908	5289.9899
20	5289.9926	5289.9923	5289.9921	5289.9916
30	5289.9974	5289.9965	5289.9962	5289.9954
40	5289.9990	5289.9981	5289.9979	5289.9974
Max. Deviation (MHz)	0.0114	0.0116	0.0126	0.0133
Max. Deviation (ppm)	2.15	2.19	2.38	2.51
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5530 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5529.9933	5529.9925	5529.9917	5529.9907
110.00	5529.9926	5529.9917	5529.9909	5529.9906
93.50	5529.9916	5529.9915	5529.9909	5529.9905
Max. Deviation (MHz)	0.0084	0.0085	0.0091	0.0095
Max. Deviation (ppm)	1.52	1.53	1.64	1.71
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5530 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5529.9890	5529.9888	5529.9878	5529.9873
10	5529.9907	5529.9899	5529.9897	5529.9888
20	5529.9926	5529.9917	5529.9907	5529.9901
30	5529.9974	5529.9965	5529.9964	5529.9958
40	5529.9976	5529.9975	5529.9965	5529.9959
Max. Deviation (MHz)	0.0150	0.0152	0.0162	0.0167
Max. Deviation (ppm)	2.71	2.75	2.93	3.02
Result	Complies			

4.7. Antenna Requirements

4.7.1. 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.

4.7.2. Antenna Connector Construction

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

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 22, 2015	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 21, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 18, 2016	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Nov. 13, 2015	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Oct. 27, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-17	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-1	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-2	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
Test Software	Audix	E3	6.2009-I0-7	N/A	N/A	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 09, 2015	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 03, 2016	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-6	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-7	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 02, 2015	Conducted (TH01-CB)

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

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%