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FCC RADIO TEST REPORT

Applicant's company	**NETGEAR, Inc.**
Applicant Address	350 East Plumeria Drive, San Jose, California 95134, USA
FCC ID	**PY313200231**

Product Name	WiFi Range Extender
Brand Name	NETGEAR
Model No.	EX6100, EX6000
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250 MHz / 5725 ~ 5850 MHz
Received Date	Oct. 14, 2013
Final Test Date	Sep. 24, 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, KDB644545 D03 v01.**

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

TAF
Testing Laboratory
1190

Table of Contents

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR3O1622-07	Rev. 01	Initial issue of report	Oct. 05, 2015

1. VERIFICATION OF COMPLIANCE

Product Name	:	WiFi Range Extender
Brand Name	:	NETGEAR
Model No.	:	EX6100, EX6000
Applicant	:	NETGEAR, 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 Oct. 14, 2013 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

Sam Chen

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart E				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.1	15.407(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	1.44 dB
4.4	15.407(a)	Power Spectral Density	Complies	2.07 dB
4.5	15.407(b)	Radiated Emissions	Complies	2.75 dB
4.6	15.407(b)	Band Edge Emissions	Complies	0.02 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 (1TX, 1RX)
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	5150 ~ 5250 MHz / 5725 ~ 5850 MHz
Channel Number	9 for 20MHz bandwidth ; 4 for 40MHz bandwidth 2 for 80MHz bandwidth
Channel Band Width (99%)	Band 1: IEEE 802.11a: 29.52 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 32.40 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 44.07 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 76.00 MHz Band 4: IEEE 802.11a: 28.68 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 29.16 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 37.00 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 76.00 MHz
Maximum Conducted Output Power	Band 1: IEEE 802.11a: 27.98 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 28.15 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 25.57 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 20.11 dBm Band 4: IEEE 802.11a: 28.56 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 28.21 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 24.62 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 20.05 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

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

Antenna and Band width

Antenna	Single (TX)		
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)	1	MCS 0-7
802.11n (HT40)	1	MCS 0-7
802.11ac (VHT20)	1	MCS 0-9/Nss1
802.11ac (VHT40)	1	MCS 0-9/Nss1
802.11ac (VHT80)	1	MCS 0-9/Nss1

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

Others
RJ-45 Cable, Non-shielded, 1.5m

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)		Remark
					2.4GHz	5GHz	
1	Master Wave	X6100-98242	Dipole Antenna	I-PEX	3.31	-	External
2	Foxconn	FX01H74-0G-EF	PCB Antenna	I-PEX	3.66	-	Internal
3	Master Wave	X6100-98242	Dipole Antenna	I-PEX	-	5	External

Note: There are three antennas provided to this EUT and all of them can be used as transmitting and receiving antenna

<For 2.4GHz Band>

For IEEE 802.11b/g mode (2TX/2RX):

Chain 1 and Chain 2 can be used as transmitting/receiving antennas.

Chain 1 and Chain 2 could transmit/receive simultaneously.

For IEEE 802.11n mode (2TX/2RX):

Chain 1 and Chain 2 can be used as transmitting/receiving antennas.

Chain 1 and Chain 2 could transmit/receive simultaneously.

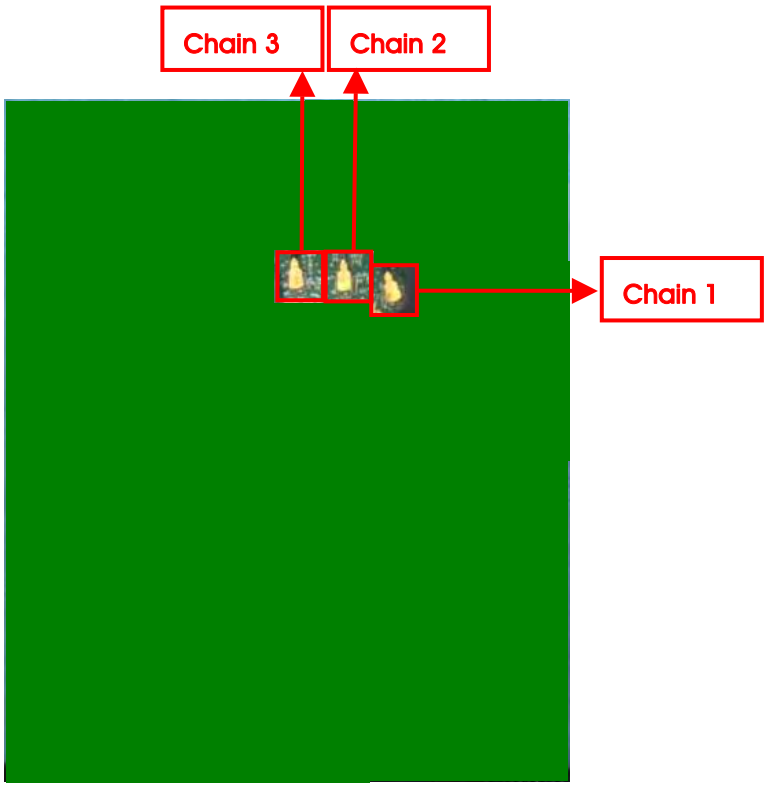
<For 5GHz Band>

For IEEE 802.11a mode (1TX/1RX):

Only Chain 3 can be used as transmitting/receiving antenna.

For IEEE 802.11n/ac mode (1TX/1RX):

Only Chain 3 can be used as transmitting/receiving antenna.



3.4. Table for Carrier Frequencies

There are three bandwidth systems.

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

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

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

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

3.5. Table for Test Modes

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

Test Items	Mode		Data Rate	Channel	Chain
Max. Conducted Output Power	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157 /165	3
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157 /165	3
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	3
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	3
Power Spectral Density	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157 /165	3
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157 /165	3
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	3
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	3
26dB Spectrum Bandwidth & 99% Occupied Bandwidth Measurement	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157 /165	3
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157 /165	3
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	3
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	3
6dB Spectrum Bandwidth Measurement	11a/BPSK	Band 4	6Mbps	149/157/165	3
	11ac VHT20	Band 4	MCS0/Nss1	149/157/165	3
	11ac VHT40	Band 4	MCS0/Nss1	151/159	3
	11ac VHT80	Band 4	MCS0/Nss1	155	3
Radiated Emission Above 1GHz	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157 /165	3
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157 /165	3
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	3
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	3

Band Edge Emission	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157 /165	3
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/157 /165	3
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	3
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	3
Frequency Stability	20 MHz	Band 1&4	-	40/157	3
	40 MHz	Band 1&4	-	38/151	3
	80 MHz	Band 1&4	-	42/155	3

Note: 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.

The following test modes were performed for all tests:

For Radiated Emissions Test above 1GHz:

The EUT was performed at 3-axis and the worst-case was found at Y axis.

So the measurement will follow this same mode

Mode 1. Place EUT in Y axis

For Co-location MPE:

The EUT could be applied with 2.4GHz WLAN function and 5GHz WLAN function; therefore Co-location Maximum Permissible Exposure (Please refer to FA3O1622-07).

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: FR3O1622-06

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

Modifications	Performance Checking
Updating 5GHz Band 1 and Band 4 to "new rules" from "old rules"	1. 26dB Bandwidth and 99% Occupied Bandwidth 2. 6dB Spectrum Bandwidth 3. Maximum Conducted Output Power 4. Power Spectral Density 5. Radiated Emissions (1GHz~40GHz) 6. Frequency Stability

The EUT has two model names which are identical to each other in all aspects except for the following Table:

Equipment Name	Model No.	Description
WiFi Range Extender	EX6100	1. All the models are identical, the different model names served as marketing strategy. 2. EX6000 would be identical as EX6100 except housing overlay color changed and product name changed in GUI. No WiFi driver update.
	EX6000	

Note: The above difference does not affect the test result of RF tests, so only model No.: EX6100 was tested and recorded in this report.

3.8. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E4300	DoC

3.9. Table for Parameters of Test Software Setting

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

Test Software Version	MT76xxE QA V2.0.5.0					
Mode	Test Frequency (MHz)					
	NCB: 20MHz					
	5180 MHz	5200 MHz	5240 MHz	5745 MHz	5785 MHz	5825 MHz
802.11a	1D	28	22	1E	2A	20
802.11ac MCS0/Nss1 VHT20	1E	2A	22	1E	2A	1F
Mode	NCB: 40MHz					
802.11ac MCS0/Nss1 VHT40	5190 MHz		5230 MHz	5755 MHz		5795 MHz
	19		23	19		21
Mode	NCB: 80MHz					
802.11ac MCS0/Nss1 VHT80	5210 MHz			5775 MHz		
	15			18		

3.10. EUT Operation during Test

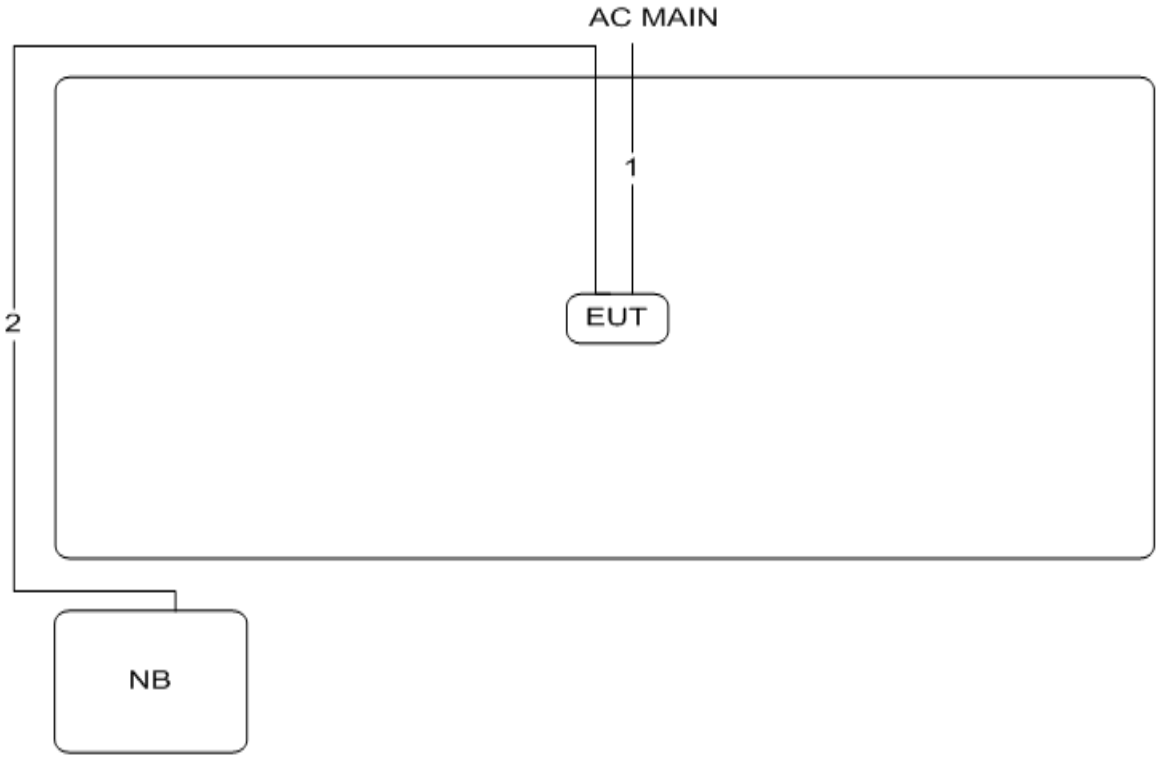
The EUT was programmed to be in continuously transmitting mode.

3.11. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	1.000	1.000	100	0.00	0.01
802.11ac MCS0/Nss1 VHT20	1.000	1.000	100	0.00	0.01
802.11ac MCS0/Nss1 VHT40	1.000	1.000	100	0.00	0.01
802.11ac MCS0/Nss1 VHT80	1.000	1.000	100	0.00	0.01

3.12. Test Configurations

3.12.1. Radiation Emissions Test Configuration



Item	Connection	Shielded	Length(m)
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 4.5.4.

4.1.5. Test Deviation

There is no deviation with the original standard.

4.1.6. EUT Operation during Test

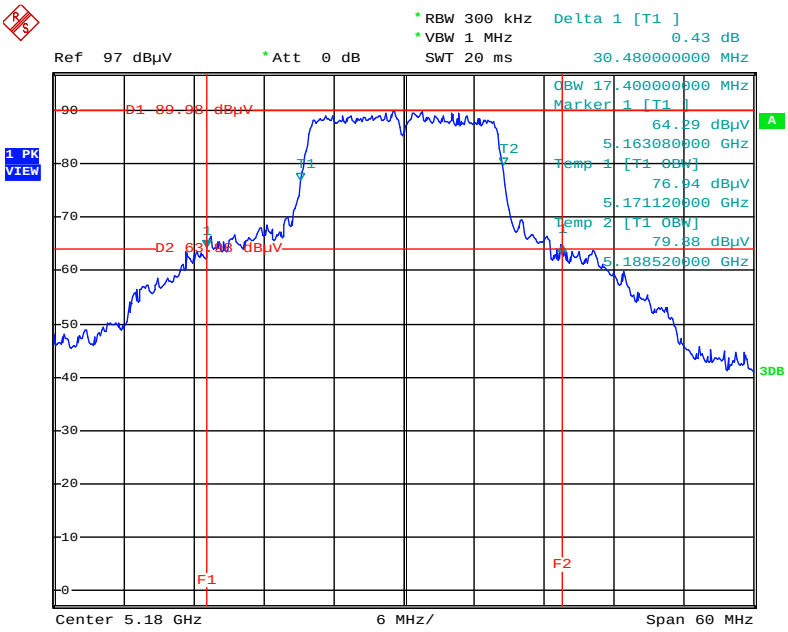
The EUT was programmed to be in continuously transmitting mode.

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

Temperature	25℃	Humidity	45%
Test Engineer	Eddie Weng		

Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5180 MHz	30.48	17.40
	5200 MHz	42.48	29.52
	5240 MHz	36.35	20.87
	5745 MHz	24.72	16.92
	5785 MHz	41.28	28.68
	5825 MHz	27.84	17.16
802.11ac MCS0/Nss1 VHT20	5180 MHz	33.72	18.12
	5200 MHz	47.88	32.40
	5240 MHz	42.50	21.35
	5745 MHz	20.88	17.64
	5785 MHz	45.12	29.16
	5825 MHz	22.56	17.76
802.11ac MCS0/Nss1 VHT40	5190 MHz	49.40	36.80
	5230 MHz	92.63	44.07
	5755 MHz	41.80	36.60
	5795 MHz	58.20	37.00
802.11ac MCS0/Nss1 VHT80	5210 MHz	82.40	76.00
	5775 MHz	82.40	76.00

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



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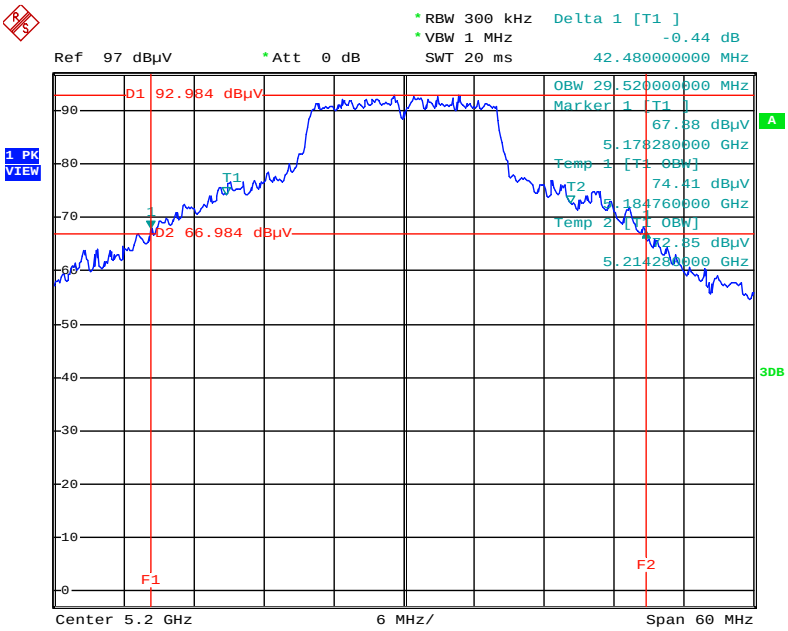
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 / 5200 MHz



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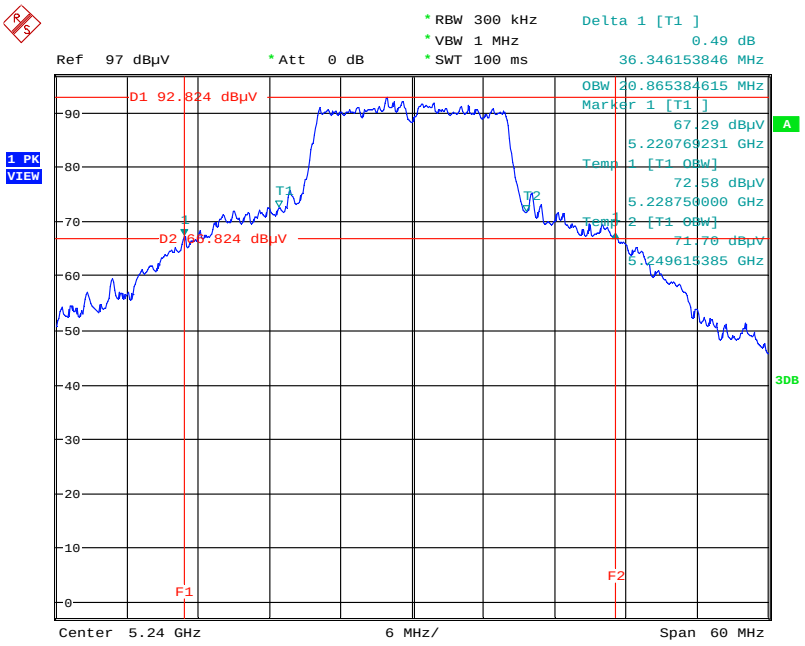
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 / 5240 MHz



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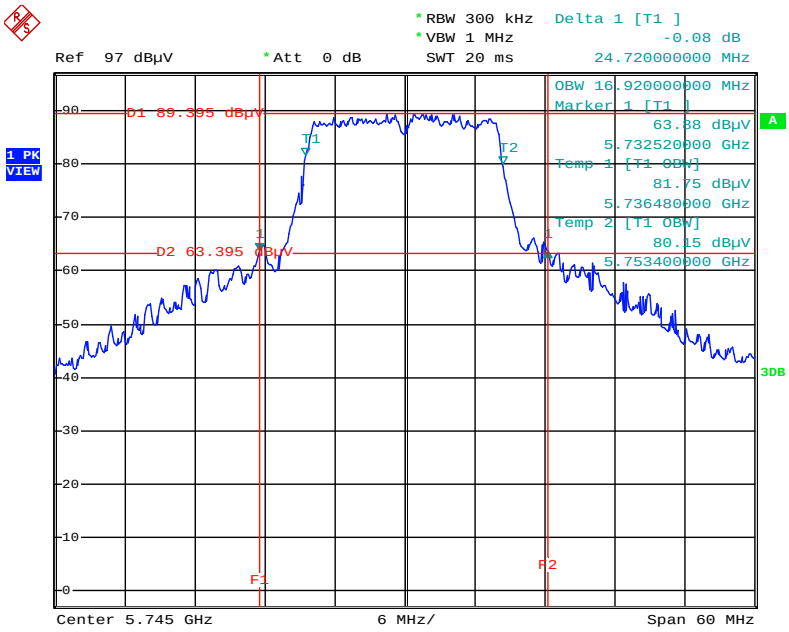
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 / 5745 MHz



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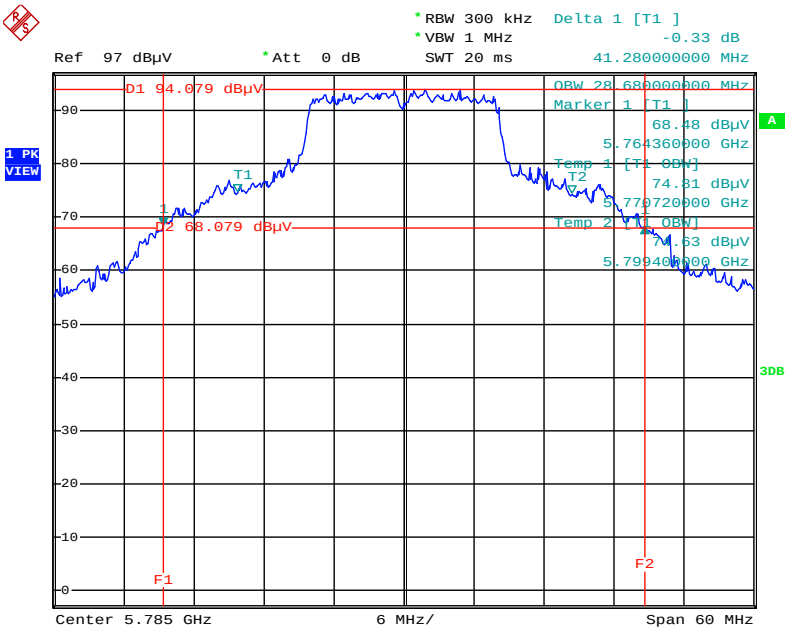
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 / 5785 MHz



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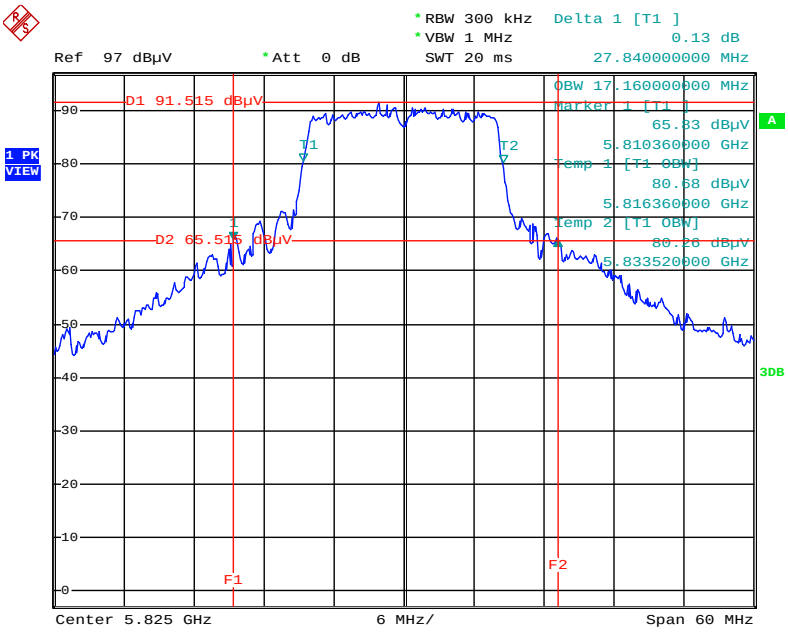
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 / 5825 MHz



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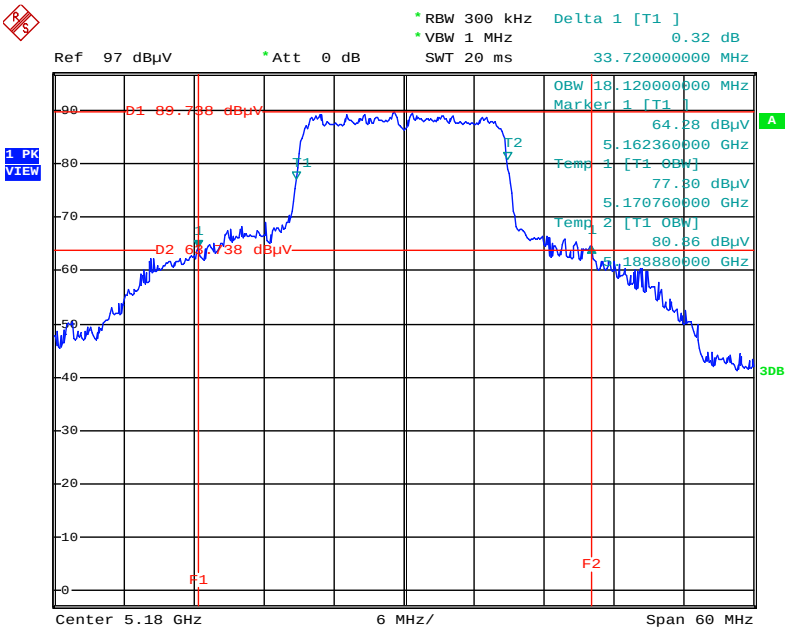
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 / 5180 MHz



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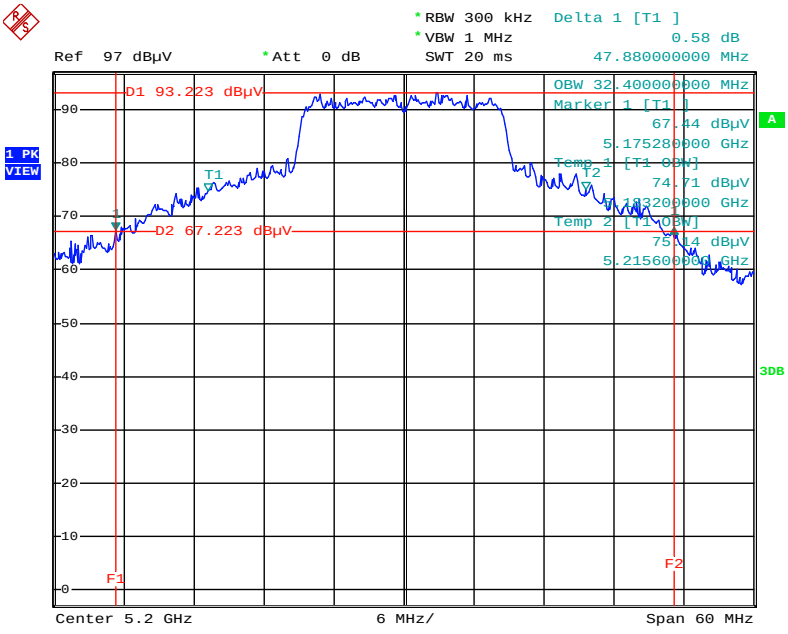
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 / 5200 MHz



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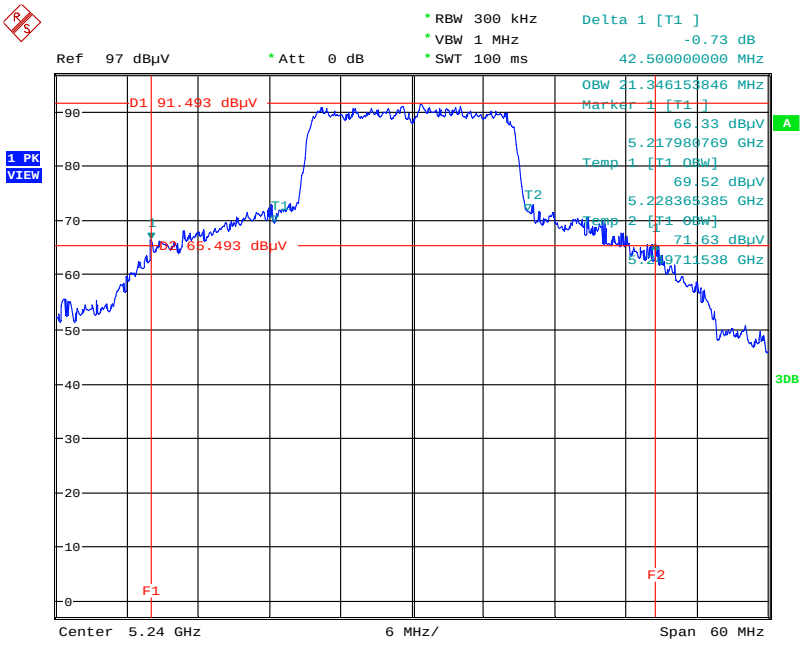
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 / 5240 MHz



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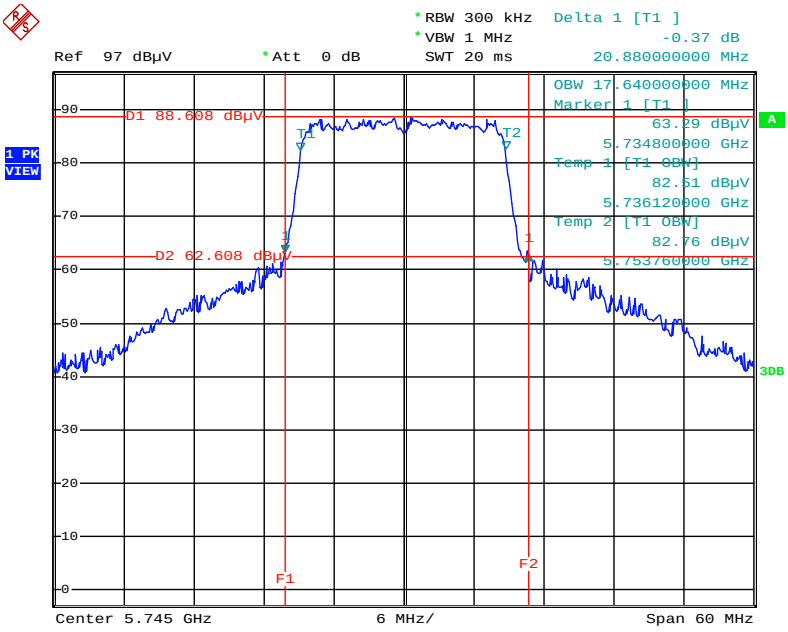
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 / 5745 MHz



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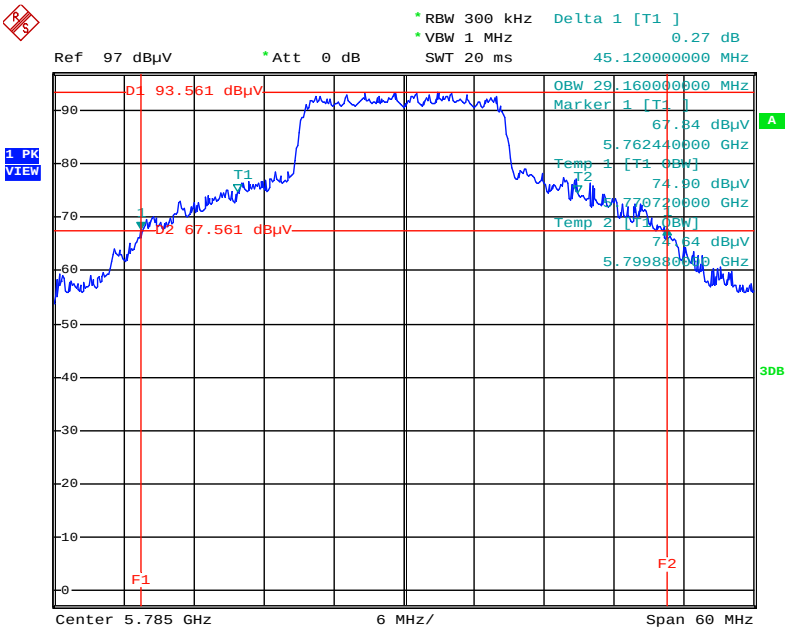
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 / 5785 MHz



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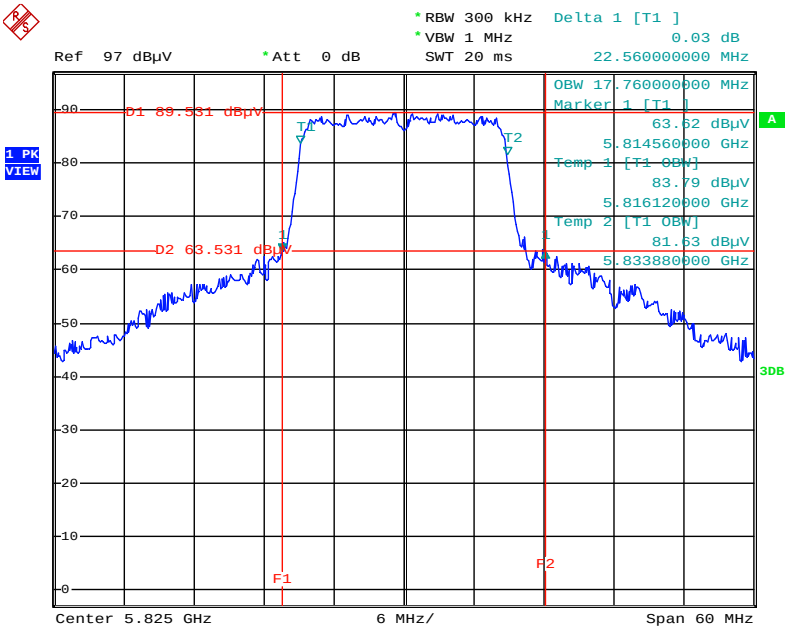
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 / 5825 MHz



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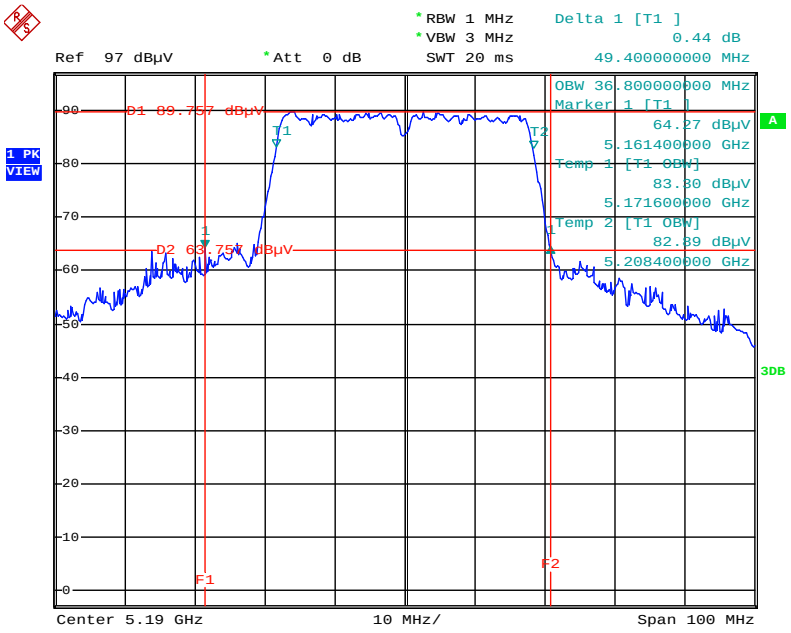
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 / 5190 MHz



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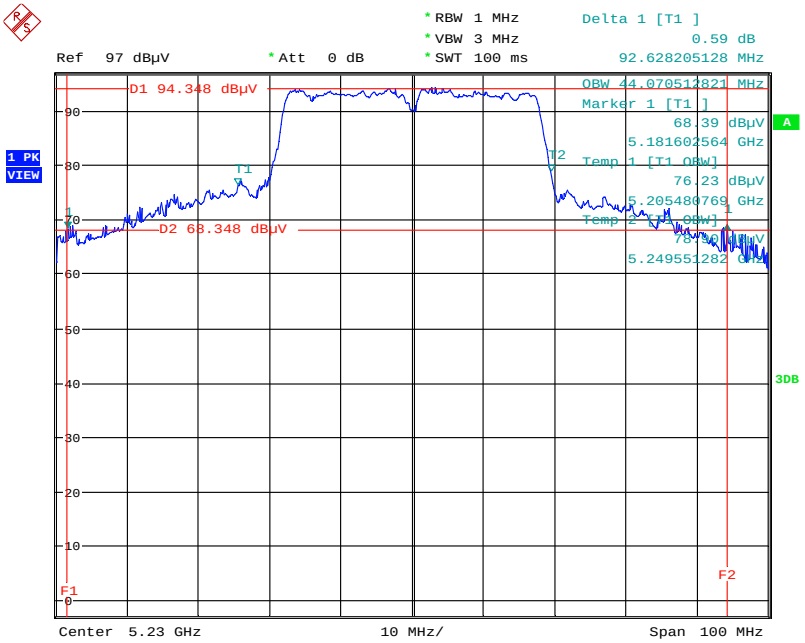
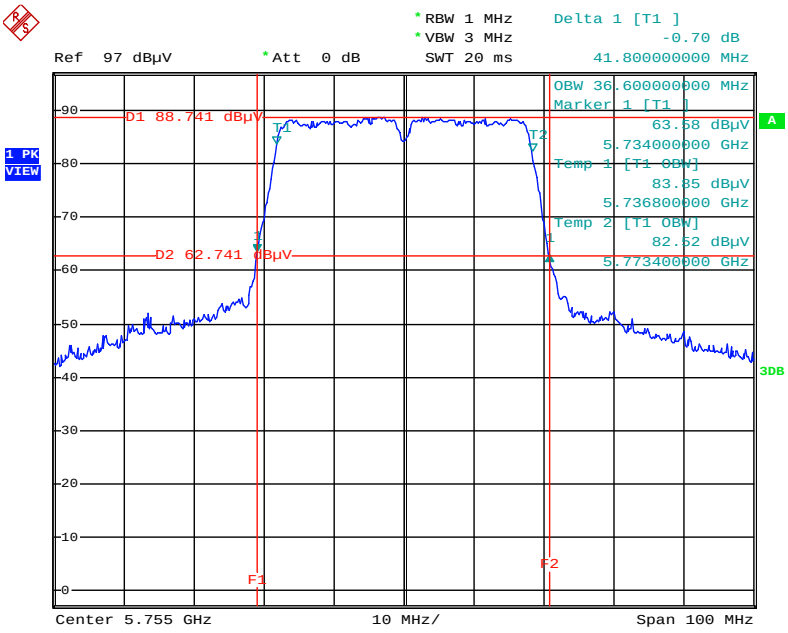
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 / 5230 MHz



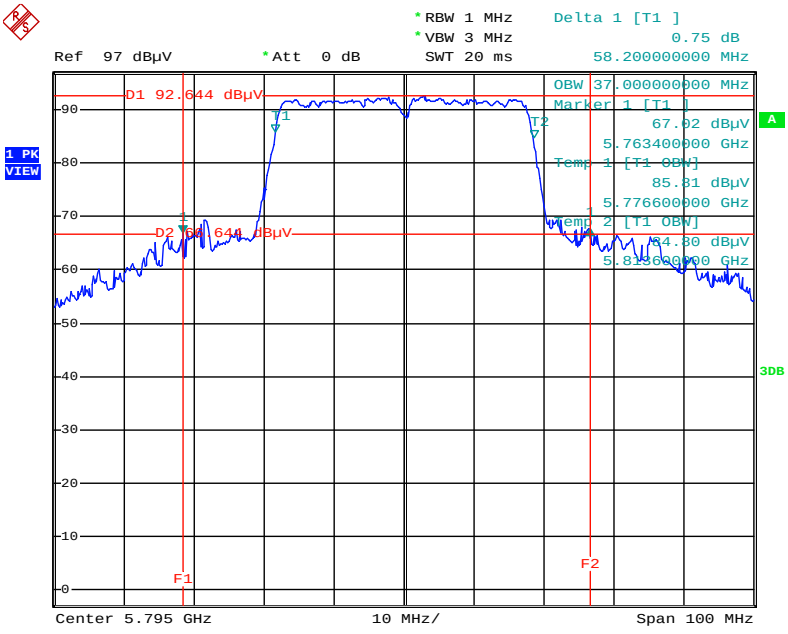
Date: 24.SEP.2015 00:34:18

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



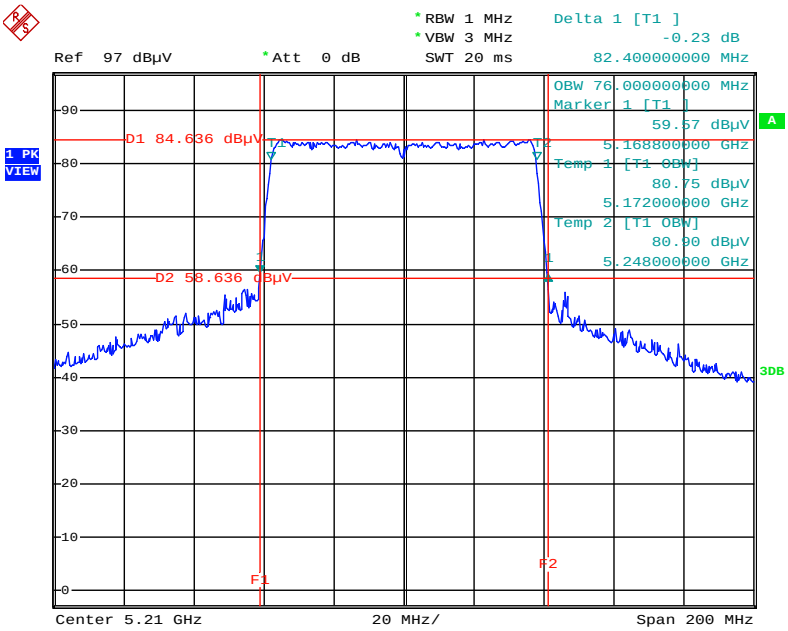
Date: 18.SEP.2015 14:22:23

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



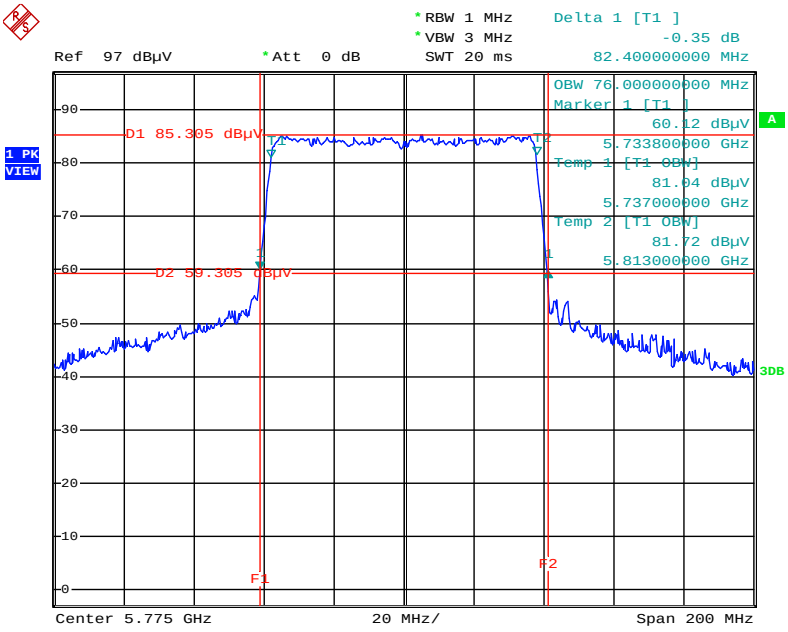
Date: 18.SEP.2015 14:23:05

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



Date: 18.SEP.2015 14:25:19

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



Date: 18.SEP.2015 14:26:15

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. 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

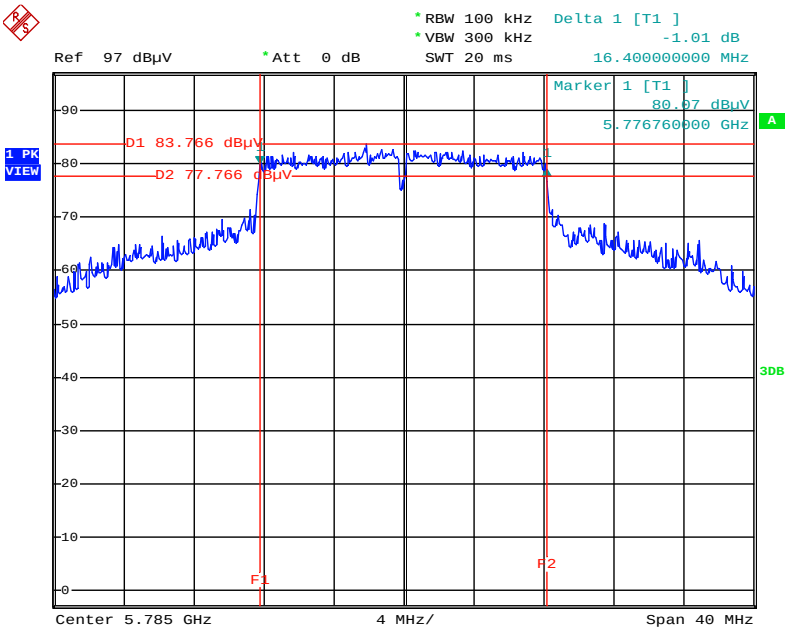
Temperature	25°C	Humidity	45%
Test Engineer	Eddie Weng		

Mode	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11a	5745 MHz	16.48	500	Complies
	5785 MHz	16.40	500	Complies
	5825 MHz	16.48	500	Complies
802.11ac MCS0/Nss1 VHT20	5745 MHz	17.68	500	Complies
	5785 MHz	17.68	500	Complies
	5825 MHz	17.60	500	Complies
802.11ac MCS0/Nss1 VHT40	5755 MHz	36.48	500	Complies
	5795 MHz	36.48	500	Complies
802.11ac MCS0/Nss1 VHT80	5775 MHz	76.80	500	Complies

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

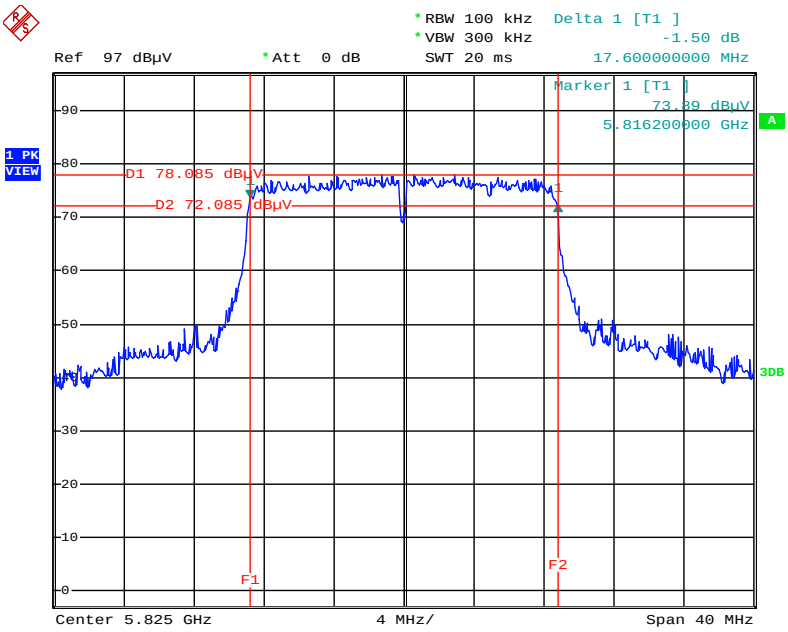
For plots, only the channel with worse result was shown.

6 dB Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 / 5785 MHz



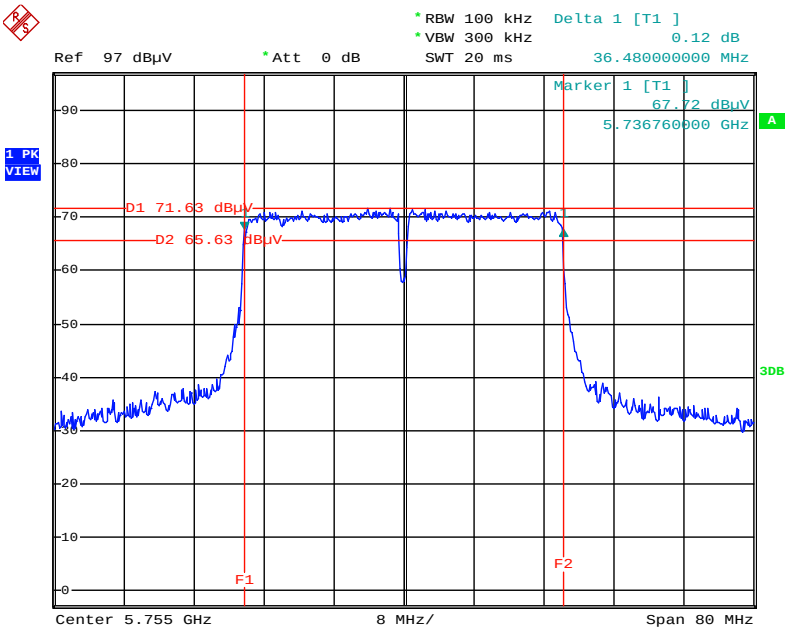
Date: 18.SEP.2015 14:32:53

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



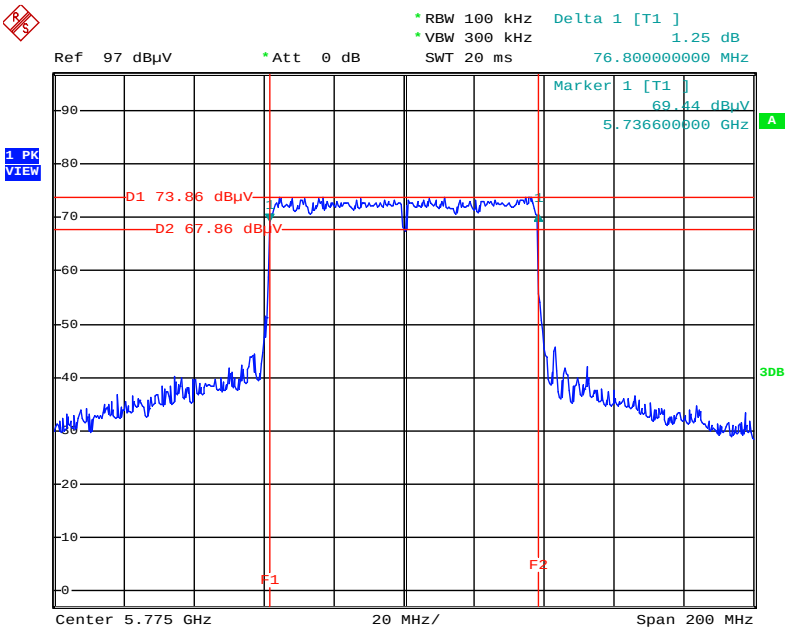
Date: 18.SEP.2015 14:36:11

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



Date: 18.SEP.2015 14:37:14

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



Date: 18.SEP.2015 14:28:40

4.3. Maximum Conducted Output Power Measurement

4.3.1. Limit

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

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

4.3.2. Measuring Instruments and Setting

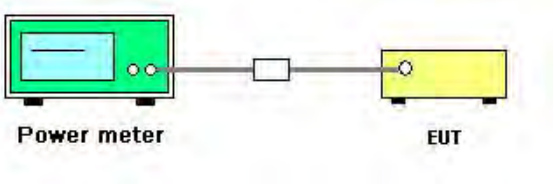
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	AVERAGE

4.3.3. Test Procedures

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

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 Maximum Conducted Output Power

Temperature	25°C	Humidity	45%
Test Engineer	Eddie Weng	Test Date	Sep. 18, 2015

Mode	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 3		
802.11a	5180 MHz	24.78	30.00	Complies
	5200 MHz	27.98	30.00	Complies
	5240 MHz	25.61	30.00	Complies
	5745 MHz	24.15	30.00	Complies
	5785 MHz	28.56	30.00	Complies
	5825 MHz	24.92	30.00	Complies
802.11ac MCS0/Nss1 VHT20	5180 MHz	24.78	30.00	Complies
	5200 MHz	28.15	30.00	Complies
	5240 MHz	25.24	30.00	Complies
	5745 MHz	23.61	30.00	Complies
	5785 MHz	28.21	30.00	Complies
	5825 MHz	23.94	30.00	Complies
802.11ac MCS0/Nss1 VHT40	5190 MHz	22.43	30.00	Complies
	5230 MHz	25.57	30.00	Complies
	5755 MHz	20.62	30.00	Complies
	5795 MHz	24.62	30.00	Complies
802.11ac MCS0/Nss1 VHT80	5210 MHz	20.11	30.00	Complies
	5775 MHz	20.05	30.00	Complies

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

4.4.2. Measuring Instruments and Setting

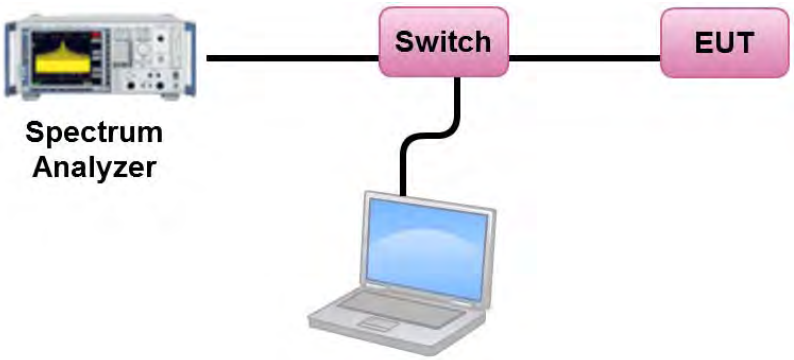
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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
Note: If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.	

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

4.4.4. 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°C	Humidity	45%
Test Engineer	Eddie Weng	Test Date	Sep. 18, 2015

Configuration IEEE 802.11a / Chain 3

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	11.70	17.00	Complies
40	5200 MHz	14.91	17.00	Complies
48	5240 MHz	12.51	17.00	Complies

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
149	5745 MHz	10.84	-3.01	7.83	30.00	Complies
157	5785 MHz	15.40	-3.01	12.39	30.00	Complies
165	5825 MHz	12.65	-3.01	9.64	30.00	Complies

Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	11.67	17.00	Complies
40	5200 MHz	14.93	17.00	Complies
48	5240 MHz	12.14	17.00	Complies

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
149	5745 MHz	10.46	-3.01	7.45	30.00	Complies
157	5785 MHz	15.01	-3.01	12.00	30.00	Complies
165	5825 MHz	10.89	-3.01	7.88	30.00	Complies

Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
38	5190 MHz	6.18	17.00	Complies
46	5230 MHz	9.36	17.00	Complies

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
151	5755 MHz	4.36	-3.01	1.35	30.00	Complies
159	5795 MHz	8.47	-3.01	5.46	30.00	Complies

Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3

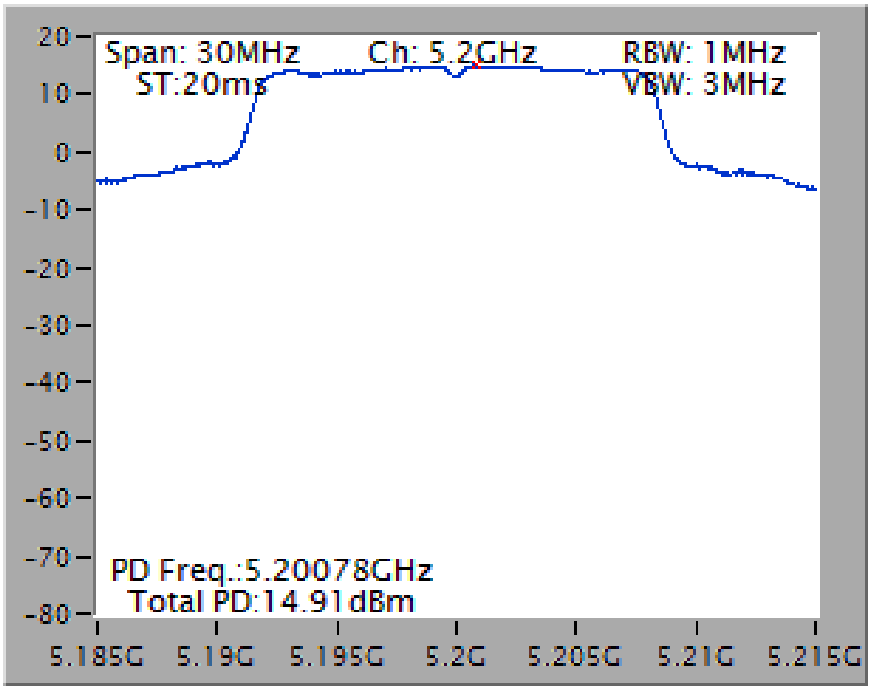
Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
42	5210 MHz	1.11	17.00	Complies

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
155	5775 MHz	1.03	-3.01	-1.98	30.00	Complies

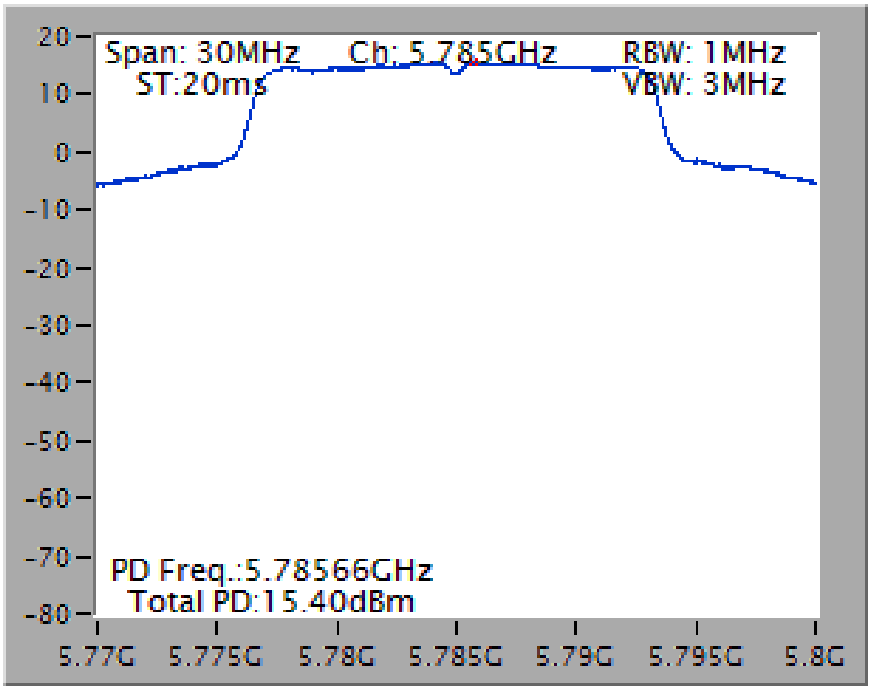
Note: All the test values were listed in the report.

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

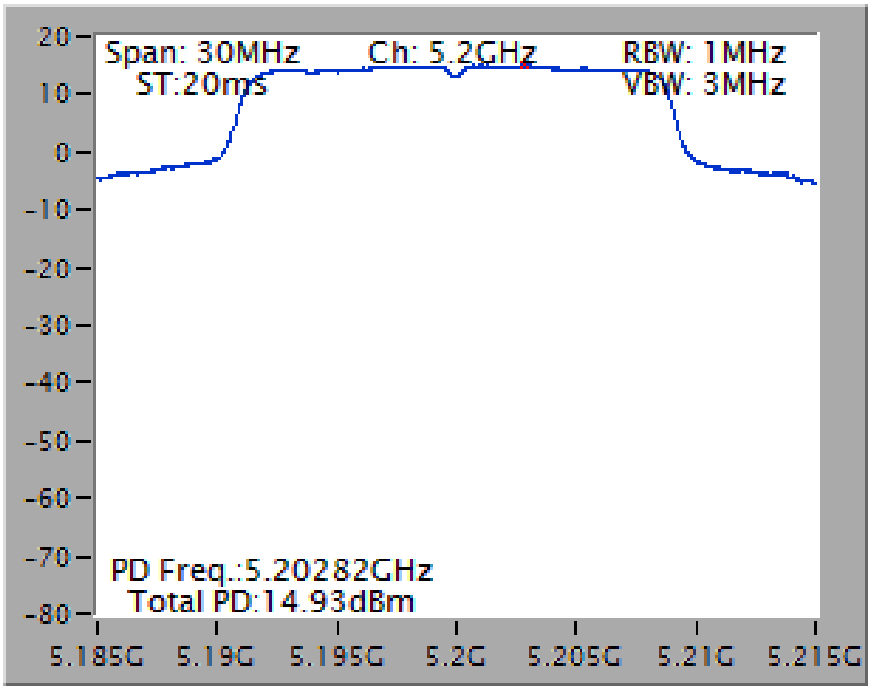
Power Density Plot on Configuration IEEE 802.11a / Chain 3 / 5200 MHz



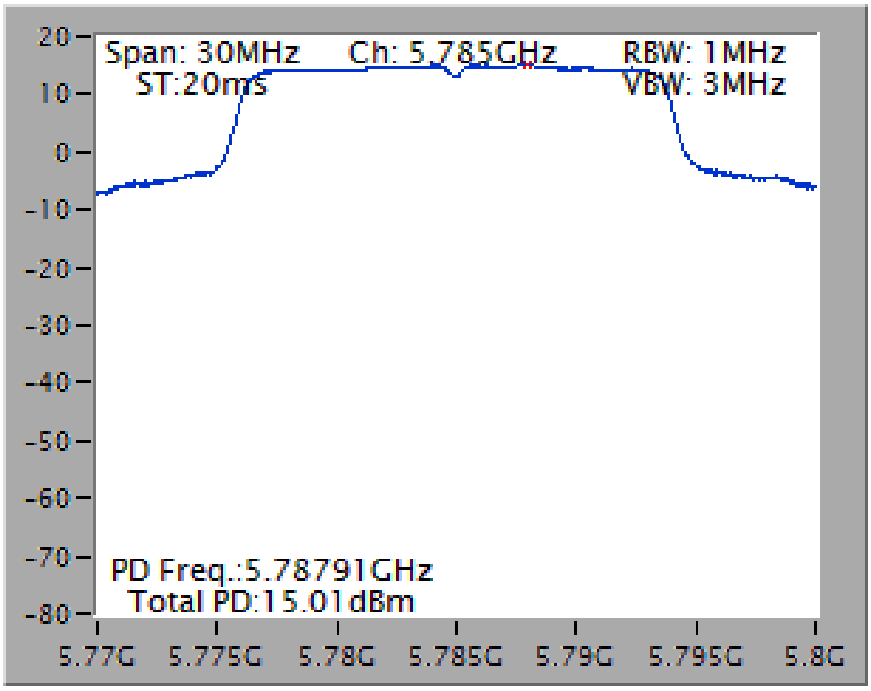
Power Density Plot on Configuration IEEE 802.11a / Chain 3 / 5785 MHz



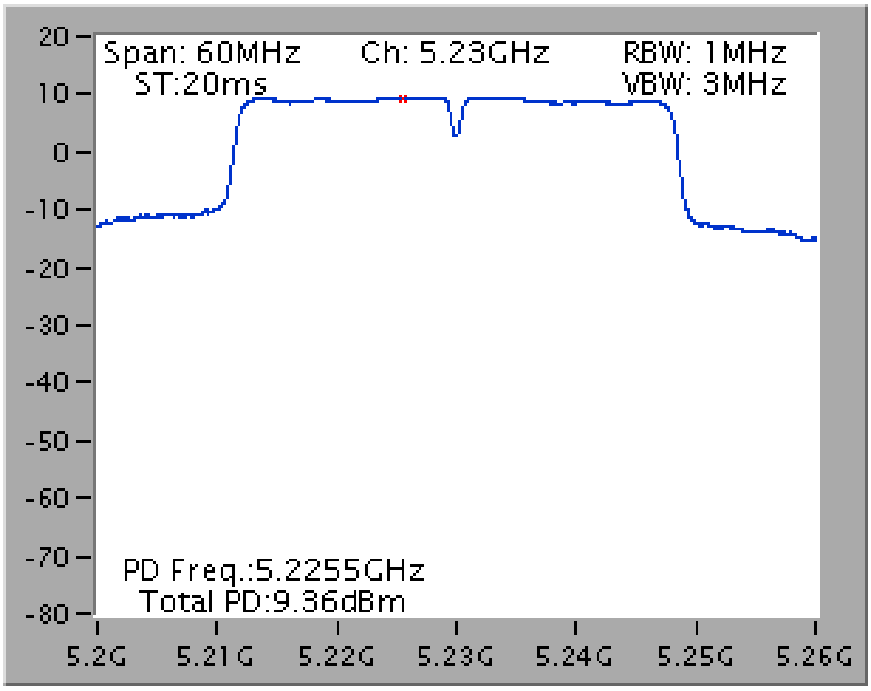
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 / 5200 MHz



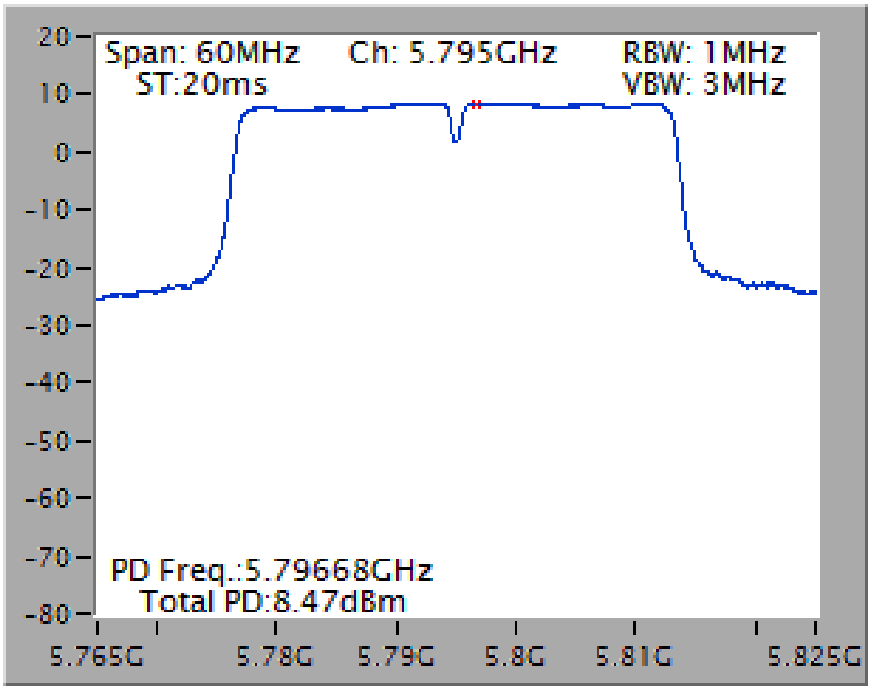
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 / 5785 MHz



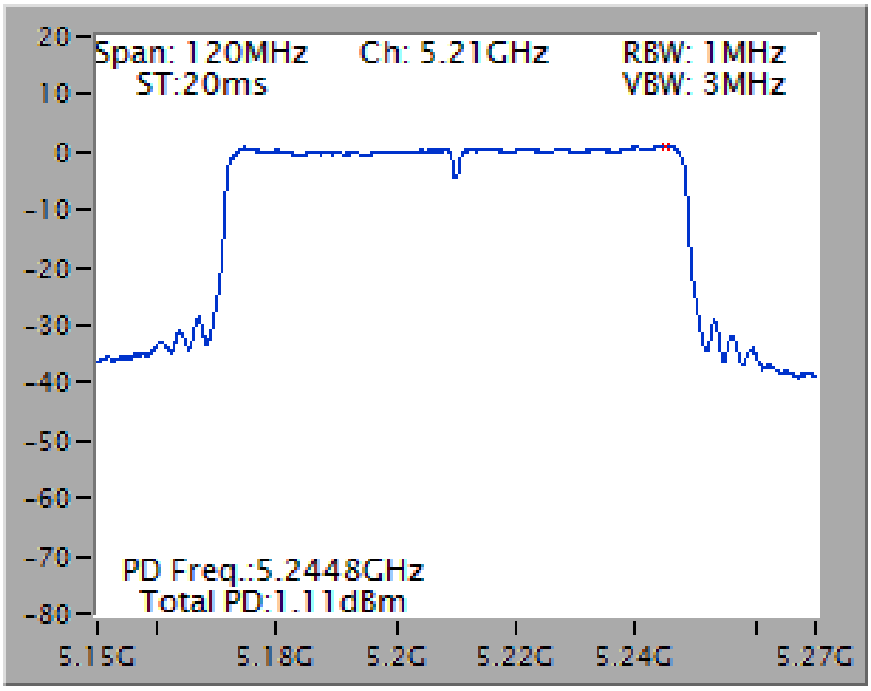
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 / 5230 MHz



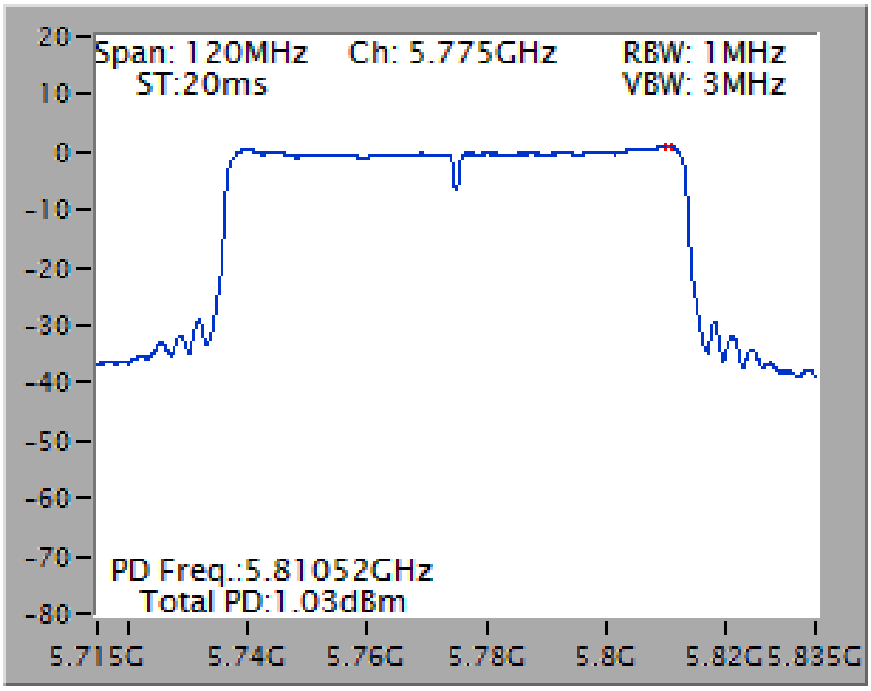
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 / 5795 MHz



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



Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 / 5775 MHz



4.5. Radiated Emissions Measurement

4.5.1. Limit

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

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

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

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

4.5.2. 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.

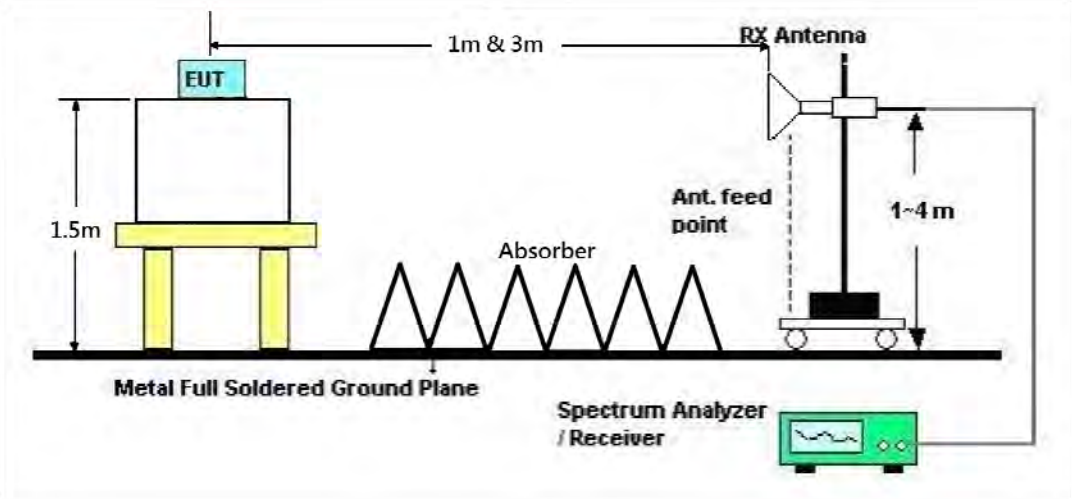
Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	40 GHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	1MHz / 3MHz for peak

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/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.

4.5.4. Test Setup Layout



4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

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

Temperature	25°C	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11a CH 36 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15541.20	44.86	54.00	-9.14	31.04	10.77	38.25	35.20	Average	168	357	HORIZONTAL
2	15545.60	57.20	74.00	-16.80	43.39	10.78	38.23	35.20	Peak	168	357	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15536.00	57.78	74.00	-16.22	43.96	10.77	38.25	35.20	Peak	175	48	VERTICAL
2	15548.80	44.60	54.00	-9.40	30.80	10.78	38.23	35.21	Average	175	48	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11a CH 40 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15599.32	46.88	54.00	-7.12	33.18	10.78	38.16	35.24	Average	169	215	HORIZONTAL
2	15601.67	60.45	74.00	-13.55	46.75	10.78	38.16	35.24	Peak	169	215	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15599.28	48.16	54.00	-5.84	34.46	10.78	38.16	35.24	Average	172	241	VERTICAL
2	15601.39	62.30	74.00	-11.70	48.60	10.78	38.16	35.24	Peak	172	241	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11a CH 48 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15719.88	48.48	54.00	-5.52	34.98	10.79	37.99	35.28	Average	166	228	HORIZONTAL
2	15720.28	62.21	74.00	-11.79	48.71	10.79	37.99	35.28	Peak	166	228	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15720.18	65.68	74.00	-8.32	52.18	10.79	37.99	35.28	Peak	171	240	VERTICAL
2	15720.42	51.25	54.00	-2.75	37.75	10.79	37.99	35.28	Average	171	240	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11a CH 149 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11490.07	41.76	54.00	-12.24	28.24	9.24	39.08	34.80	Average	168	300	HORIZONTAL
2	11491.02	55.44	74.00	-18.56	41.92	9.24	39.08	34.80	Peak	168	300	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11490.13	42.92	54.00	-11.08	29.40	9.24	39.08	34.80	Average	179	257	VERTICAL
2	11491.47	55.88	74.00	-18.12	42.36	9.24	39.08	34.80	Peak	179	257	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11a CH 157 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11570.16	43.73	54.00	-10.27	30.15	9.26	39.14	34.82	Average	166	304	HORIZONTAL
2	11571.66	56.98	74.00	-17.02	43.40	9.26	39.14	34.82	Peak	166	304	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11571.99	58.74	74.00	-15.26	45.16	9.26	39.14	34.82	Peak	159	258	VERTICAL
2	11572.02	45.70	54.00	-8.30	32.12	9.26	39.14	34.82	Average	159	258	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11a CH 165 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11647.97	41.94	54.00	-12.06	28.32	9.28	39.18	34.84	Average	184	309	HORIZONTAL
2	11651.52	55.81	74.00	-18.19	42.18	9.28	39.19	34.84	Peak	184	309	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11650.08	44.17	54.00	-9.83	30.55	9.28	39.18	34.84	Average	184	255	VERTICAL
2	11651.42	56.90	74.00	-17.10	43.27	9.28	39.19	34.84	Peak	184	255	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15539.82	42.55	54.00	-11.45	28.73	10.77	38.25	35.20	Average	180	332	HORIZONTAL
2	15540.92	55.90	74.00	-18.10	42.08	10.77	38.25	35.20	Peak	180	332	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15540.66	56.43	74.00	-17.57	42.61	10.77	38.25	35.20	Peak	175	243	VERTICAL
2	15540.96	42.79	54.00	-11.21	28.97	10.77	38.25	35.20	Average	175	243	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 40 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15600.72	43.04	54.00	-10.96	29.34	10.78	38.16	35.24	Average	174	308	HORIZONTAL
2	15602.05	55.89	74.00	-18.11	42.19	10.78	38.16	35.24	Peak	174	308	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15598.08	62.13	74.00	-11.87	48.41	10.78	38.16	35.22	Peak	174	240	VERTICAL
2	15598.13	47.66	54.00	-6.34	33.94	10.78	38.16	35.22	Average	174	240	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 48 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15718.71	46.48	54.00	-7.52	32.98	10.79	37.99	35.28	Average	172	274	HORIZONTAL
2	15720.63	59.92	74.00	-14.08	46.42	10.79	37.99	35.28	Peak	172	274	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15720.38	50.04	54.00	-3.96	36.54	10.79	37.99	35.28	Average	172	239	VERTICAL
2	15721.03	64.14	74.00	-9.86	50.64	10.79	37.99	35.28	Peak	172	239	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11489.75	53.62	74.00	-20.38	40.10	9.24	39.08	34.80	Peak	178	275	HORIZONTAL
2	11489.78	40.95	54.00	-13.05	27.43	9.24	39.08	34.80	Average	178	275	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11489.98	40.71	54.00	-13.29	27.19	9.24	39.08	34.80	Average	172	221	VERTICAL
2	11490.38	53.07	74.00	-20.93	39.55	9.24	39.08	34.80	Peak	172	221	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 157 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11568.92	43.67	54.00	-10.33	30.08	9.26	39.14	34.81	Average	163	300	HORIZONTAL
2	11570.87	56.56	74.00	-17.44	42.98	9.26	39.14	34.82	Peak	163	300	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11569.20	59.10	74.00	-14.90	45.51	9.26	39.14	34.81	Peak	162	258	VERTICAL
2	11569.76	45.25	54.00	-8.75	31.67	9.26	39.14	34.82	Average	162	258	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 165 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11649.32	41.48	54.00	-12.52	27.86	9.28	39.18	34.84	Average	186	310	HORIZONTAL
2	11650.53	54.70	74.00	-19.30	41.07	9.28	39.19	34.84	Peak	186	310	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11649.18	56.76	74.00	-17.24	43.14	9.28	39.18	34.84	Peak	156	264	VERTICAL
2	11649.64	43.38	54.00	-10.62	29.76	9.28	39.18	34.84	Average	156	264	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15568.18	39.02	54.00	-14.98	25.25	10.78	38.20	35.21	Average	174	320	HORIZONTAL
2	15570.56	52.67	74.00	-21.33	38.90	10.78	38.20	35.21	Peak	174	320	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15569.61	39.01	54.00	-14.99	25.24	10.78	38.20	35.21	Average	172	200	VERTICAL
2	15572.27	52.24	74.00	-21.76	38.47	10.78	38.20	35.21	Peak	172	200	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 46 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15609.81	39.46	54.00	-14.54	25.76	10.78	38.16	35.24	Average	173	218	HORIZONTAL
2	15611.78	52.63	74.00	-21.37	38.96	10.78	38.13	35.24	Peak	173	218	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15611.08	52.41	74.00	-21.59	38.71	10.78	38.16	35.24	Peak	171	210	VERTICAL
2	15612.49	39.58	54.00	-14.42	25.91	10.78	38.13	35.24	Average	171	210	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11512.13	29.53	54.00	-24.47	15.98	9.25	39.10	34.80	Average	177	232	HORIZONTAL
2	11512.30	42.72	74.00	-31.28	29.17	9.25	39.10	34.80	Peak	177	232	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11507.80	29.54	54.00	-24.46	15.99	9.25	39.10	34.80	Average	175	230	VERTICAL
2	11508.10	42.25	74.00	-31.75	28.70	9.25	39.10	34.80	Peak	175	230	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 159 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11587.86	42.55	74.00	-31.45	28.95	9.27	39.15	34.82	Peak	180	242	HORIZONTAL
2	11590.17	29.51	54.00	-24.49	15.91	9.27	39.15	34.82	Average	180	242	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11588.98	42.31	74.00	-31.69	28.71	9.27	39.15	34.82	Peak	178	237	VERTICAL
2	11592.23	29.57	54.00	-24.43	15.97	9.27	39.15	34.82	Average	178	237	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15632.16	39.79	54.00	-14.21	26.15	10.78	38.11	35.25	Average	185	267	HORIZONTAL
2	15632.41	52.80	74.00	-21.20	39.16	10.78	38.11	35.25	Peak	185	267	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15629.75	39.73	54.00	-14.27	26.09	10.78	38.11	35.25	Average	182	258	VERTICAL
2	15630.24	52.58	74.00	-21.42	38.94	10.78	38.11	35.25	Peak	182	258	VERTICAL

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 155 / Chain 3
Test Date	Jul. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11509.65	29.49	54.00	-24.51	15.94	9.25	39.10	34.80	Average	181	260	HORIZONTAL
2	11510.18	42.20	74.00	-31.80	28.65	9.25	39.10	34.80	Peak	181	260	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11509.38	42.64	74.00	-31.36	29.09	9.25	39.10	34.80	Peak	179	245	VERTICAL
2	11511.62	29.55	54.00	-24.45	16.00	9.25	39.10	34.80	Average	179	245	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 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

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

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

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

4.6.2. Measuring Instruments and Setting

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

4.6.7. Test Result of Band Edge and Fundamental Emissions

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11a CH 36, 40, 48 / Chain 3
Test Date	Jul. 15, 2015		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5148.60	69.38	74.00	-4.62	64.21	6.13	34.04	35.00	Peak	164	289	VERTICAL
2	5150.00	53.73	54.00	-0.27	48.56	6.13	34.04	35.00	Average	164	289	VERTICAL
3	5182.20	111.59			106.35	6.15	34.09	35.00	Peak	164	289	VERTICAL
4	5182.40	102.06			96.82	6.15	34.09	35.00	Average	164	289	VERTICAL

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

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5149.20	53.84	54.00	-0.16	48.67	6.13	34.04	35.00	Average	166	278	VERTICAL
2	5150.00	68.86	74.00	-5.14	63.69	6.13	34.04	35.00	Peak	166	278	VERTICAL
3	5201.20	105.12			99.84	6.16	34.12	35.00	Average	166	278	VERTICAL
4	5202.40	114.66			109.38	6.16	34.12	35.00	Peak	166	278	VERTICAL

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

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5136.80	46.84	54.00	-7.16	41.71	6.12	34.01	35.00	Average	161	278	VERTICAL
2	5144.00	60.10	74.00	-13.90	54.93	6.13	34.04	35.00	Peak	161	278	VERTICAL
3	5238.20	114.69			109.34	6.18	34.17	35.00	Peak	161	278	VERTICAL
4	5239.40	105.03			99.68	6.18	34.17	35.00	Average	161	278	VERTICAL
5	5379.80	47.06	54.00	-6.94	41.36	6.28	34.41	34.99	Average	161	278	VERTICAL
6	5381.60	60.10	74.00	-13.90	54.40	6.28	34.41	34.99	Peak	161	278	VERTICAL

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

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11a CH 149, 157, 165 / Chain 3
Test Date	Jul. 15, 2015		

Channel 149

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5714.80	67.84	68.20	-0.36	61.79	6.44	34.64	35.03	Peak	174	283	VERTICAL
2	5724.20	78.05	78.20	-0.15	71.99	6.45	34.64	35.03	Peak	174	283	VERTICAL
3	5748.40	113.16			107.10	6.45	34.65	35.04	Peak	174	283	VERTICAL
4	5749.00	103.18			97.12	6.45	34.65	35.04	Average	174	283	VERTICAL

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

Channel 157

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5710.60	62.80	68.20	-5.40	56.75	6.44	34.64	35.03	Peak	178	273	VERTICAL
2	5722.00	66.00	78.20	-12.20	59.94	6.45	34.64	35.03	Peak	178	273	VERTICAL
3	5783.20	117.06			110.99	6.46	34.66	35.05	Peak	178	273	VERTICAL
4	5784.40	107.08			101.01	6.46	34.66	35.05	Average	178	273	VERTICAL
5	5850.40	67.21	78.20	-10.99	61.11	6.49	34.67	35.06	Peak	178	273	VERTICAL
6	5860.00	64.97	68.20	-3.23	58.87	6.50	34.67	35.07	Peak	178	273	VERTICAL

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

Channel 165

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5826.20	103.84			97.75	6.48	34.67	35.06	Average	174	272	VERTICAL
2	5827.40	113.25			107.16	6.48	34.67	35.06	Peak	174	272	VERTICAL
3	5850.60	74.45	78.20	-3.75	68.35	6.49	34.67	35.06	Peak	174	272	VERTICAL
4	5863.00	68.17	68.20	-0.03	62.07	6.50	34.67	35.07	Peak	174	272	VERTICAL

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

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36, 40, 48 / Chain 3
Test Date	Jul. 16, 2015		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5149.40	70.43	74.00	-3.57	65.26	6.13	34.04	35.00	Peak	162	292	VERTICAL
2	5150.00	53.89	54.00	-0.11	48.72	6.13	34.04	35.00	Average	162	292	VERTICAL
3	5181.80	111.71			106.47	6.15	34.09	35.00	Peak	162	292	VERTICAL
4	5182.80	101.67			96.43	6.15	34.09	35.00	Average	162	292	VERTICAL

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

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5148.80	70.35	74.00	-3.65	65.18	6.13	34.04	35.00	Peak	198	273	VERTICAL
2	5150.00	53.79	54.00	-0.21	48.62	6.13	34.04	35.00	Average	198	273	VERTICAL
3	5202.40	114.29			109.01	6.16	34.12	35.00	Peak	198	273	VERTICAL
4	5202.80	104.06			98.78	6.16	34.12	35.00	Average	198	273	VERTICAL

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

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5120.60	59.78	74.00	-14.22	54.68	6.11	33.99	35.00	Peak	187	314	HORIZONTAL
2	5150.00	46.02	54.00	-7.98	40.85	6.13	34.04	35.00	Average	187	314	HORIZONTAL
3	5236.40	112.87			107.52	6.18	34.17	35.00	Peak	187	314	HORIZONTAL
4	5237.00	102.99			97.64	6.18	34.17	35.00	Average	187	314	HORIZONTAL
5	5355.20	47.43	54.00	-6.57	41.81	6.26	34.36	35.00	Average	187	314	HORIZONTAL
6	5363.60	60.80	74.00	-13.20	55.14	6.27	34.39	35.00	Peak	187	314	HORIZONTAL

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

Temperature	25℃	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149, 157, 165 / Chain 3
Test Date	Jul. 16, 2015		

Channel 149

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5714.60	68.11	68.20	-0.09	62.06	6.44	34.64	35.03	Peak	174	284	VERTICAL
2	5722.40	77.65	78.20	-0.55	71.59	6.45	34.64	35.03	Peak	174	284	VERTICAL
3	5748.20	103.14			97.08	6.45	34.65	35.04	Average	174	284	VERTICAL
4	5748.20	112.68			106.62	6.45	34.65	35.04	Peak	174	284	VERTICAL

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

Channel 157

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5712.40	65.27	68.20	-2.93	59.22	6.44	34.64	35.03	Peak	180	274	VERTICAL
2	5724.40	66.29	78.20	-11.91	60.23	6.45	34.64	35.03	Peak	180	274	VERTICAL
3	5783.80	116.79			110.72	6.46	34.66	35.05	Peak	180	274	VERTICAL
4	5785.60	106.84			100.76	6.47	34.66	35.05	Average	180	274	VERTICAL
5	5856.40	67.78	78.20	-10.42	61.67	6.50	34.67	35.06	Peak	180	274	VERTICAL
6	5867.20	64.11	68.20	-4.09	58.01	6.50	34.67	35.07	Peak	180	274	VERTICAL

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

Channel 165

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5826.80	113.23			107.14	6.48	34.67	35.06	Peak	174	274	VERTICAL
2	5828.00	103.70			97.61	6.48	34.67	35.06	Average	174	274	VERTICAL
3	5850.00	74.90	78.20	-3.30	68.80	6.49	34.67	35.06	Peak	174	274	VERTICAL
4	5862.60	67.73	68.20	-0.47	61.63	6.50	34.67	35.07	Peak	174	274	VERTICAL

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

Temperature	25°C	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38, 46 / Chain 3
Test Date	Jul. 16, 2015		

Channel 38

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5146.80	71.82	74.00	-2.18	66.65	6.13	34.04	35.00	Peak	153	281	VERTICAL
2	5150.00	53.95	54.00	-0.05	48.78	6.13	34.04	35.00	Average	153	281	VERTICAL
3	5173.20	95.60			90.39	6.14	34.07	35.00	Average	153	281	VERTICAL
4	5173.20	105.30			100.09	6.14	34.07	35.00	Peak	153	281	VERTICAL

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

Channel 46

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5149.60	67.80	74.00	-6.20	62.63	6.13	34.04	35.00	Peak	164	279	VERTICAL
2	5150.00	53.81	54.00	-0.19	48.64	6.13	34.04	35.00	Average	164	279	VERTICAL
3	5228.20	100.71			95.36	6.18	34.17	35.00	Average	164	279	VERTICAL
4	5228.20	110.70			105.35	6.18	34.17	35.00	Peak	164	279	VERTICAL

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

Temperature	25°C	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151, 159 / Chain 3
Test Date	Jul. 16, 2015		

Channel 151

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5714.60	67.77	68.20	-0.43	61.72	6.44	34.64	35.03	Peak	174	284	VERTICAL
2	5722.20	71.98	78.20	-6.22	65.92	6.45	34.64	35.03	Peak	174	284	VERTICAL
3	5749.40	98.19			92.13	6.45	34.65	35.04	Average	174	284	VERTICAL
4	5753.00	107.55			101.48	6.46	34.65	35.04	Peak	174	284	VERTICAL

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

Channel 159

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5714.60	63.12	68.20	-5.08	57.07	6.44	34.64	35.03	Peak	178	288	VERTICAL
2	5725.00	65.35	78.20	-12.85	59.29	6.45	34.64	35.03	Peak	178	288	VERTICAL
3	5805.20	110.87			104.78	6.48	34.66	35.05	Peak	178	288	VERTICAL
4	5811.80	101.13			95.05	6.48	34.66	35.06	Average	178	288	VERTICAL
5	5850.00	71.12	78.20	-7.08	65.02	6.49	34.67	35.06	Peak	178	288	VERTICAL
6	5863.40	68.15	68.20	-0.05	62.05	6.50	34.67	35.07	Peak	178	288	VERTICAL

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

Temperature	25°C	Humidity	45%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42, 155 / Chain 3
Test Date	Jul. 16, 2015		

Channel 42

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5149.20	67.75	74.00	-6.25	62.58	6.13	34.04	35.00	Peak	188	292	VERTICAL
2	5150.00	53.73	54.00	-0.27	48.56	6.13	34.04	35.00	Average	188	292	VERTICAL
3	5174.80	91.63			86.39	6.15	34.09	35.00	Average	188	292	VERTICAL
4	5176.40	100.96			95.72	6.15	34.09	35.00	Peak	188	292	VERTICAL
5	5350.00	45.36	54.00	-8.64	39.74	6.26	34.36	35.00	Average	188	292	VERTICAL
6	5370.00	58.69	74.00	-15.31	53.03	6.27	34.39	35.00	Peak	188	292	VERTICAL

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

Channel 155

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5713.40	68.18	68.20	-0.02	62.13	6.44	34.64	35.03	Peak	158	282	VERTICAL
2	5725.00	71.66	78.20	-6.54	65.60	6.45	34.64	35.03	Peak	158	282	VERTICAL
3	5808.60	103.60			97.52	6.48	34.66	35.06	Peak	158	282	VERTICAL
4	5810.20	94.36			88.28	6.48	34.66	35.06	Average	158	282	VERTICAL
5	5854.20	65.90	78.20	-12.30	59.79	6.50	34.67	35.06	Peak	158	282	VERTICAL
6	5860.60	65.02	68.20	-3.18	58.92	6.50	34.67	35.07	Peak	158	282	VERTICAL

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

Note:

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

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

4.7. 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

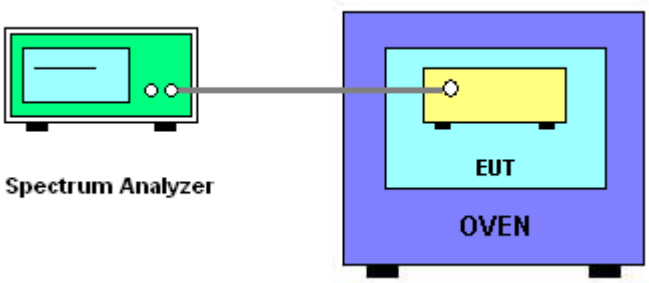
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

2. The transmitter output (antenna port) was connected to the spectrum analyzer.
3. EUT have transmitted absence of modulation signal and fixed channelize.
4. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
5. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
6. 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).
7. 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.
8. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
9. Extreme temperature is 0°C~40°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°C	Humidity	45%
Test Engineer	Eddie Weng	Test Date	Sep. 18, 2015

Mode: 20 MHz / Chain 3

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5200 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5199.9693	5199.9689	5199.9688	5199.9688
110.00	5199.9694	5199.9690	5199.9691	5199.9689
93.50	5199.9684	5199.9680	5199.9680	5199.9681
Max. Deviation (MHz)	0.0316	0.0320	0.0320	0.0319
Max. Deviation (ppm)	6.08	6.15	6.15	6.13
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5200 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5199.9719	5199.9706	5199.9690	5199.9671
10	5199.9706	5199.9693	5199.9677	5199.9658
20	5199.9694	5199.9681	5199.9665	5199.9646
30	5199.9679	5199.9666	5199.9650	5199.9631
40	5199.9664	5199.9651	5199.9635	5199.9616
Max. Deviation (MHz)	0.0336	0.0349	0.0365	0.0384
Max. Deviation (ppm)	6.46	6.71	7.02	7.38
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5785 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5784.9602	5784.9602	5784.9601	5784.9600
110.00	5784.9610	5784.9600	5784.9603	5784.9601
93.50	5784.9590	5784.9592	5784.9593	5784.9592
Max. Deviation (MHz)	0.0410	0.0408	0.0407	0.0408
Max. Deviation (ppm)	7.09	7.05	7.04	7.05
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5785 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5784.9635	5784.9622	5784.9606	5784.9587
10	5784.9622	5784.9609	5784.9593	5784.9574
20	5784.9610	5784.9597	5784.9581	5784.9562
30	5784.9595	5784.9582	5784.9566	5784.9547
40	5784.9580	5784.9567	5784.9551	5784.9532
Max. Deviation (MHz)	0.0420	0.0433	0.0449	0.0468
Max. Deviation (ppm)	7.26	7.48	7.76	8.09
Result	Complies			

Mode: 40 MHz / Chain 3

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5190 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5189.9646	5189.9633	5189.9617	5189.9598
110.00	5189.9634	5189.9621	5189.9605	5189.9586
93.50	5189.9620	5189.9607	5189.9591	5189.9572
Max. Deviation (MHz)	0.0380	0.0393	0.0409	0.0428
Max. Deviation (ppm)	7.32	7.57	7.88	8.25
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5190 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5189.9659	5189.9646	5189.9630	5189.9611
10	5189.9646	5189.9633	5189.9617	5189.9598
20	5189.9634	5189.9621	5189.9605	5189.9586
30	5189.9619	5189.9606	5189.9590	5189.9571
40	5189.9604	5189.9591	5189.9575	5189.9556
Max. Deviation (MHz)	0.0396	0.0409	0.0425	0.0444
Max. Deviation (ppm)	7.63	7.88	8.19	8.55
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5755 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5754.9574	5754.9561	5754.9545	5754.9526
110.00	5754.9562	5754.9549	5754.9533	5754.9514
93.50	5754.9548	5754.9535	5754.9519	5754.9500
Max. Deviation (MHz)	0.0452	0.0465	0.0481	0.0500
Max. Deviation (ppm)	7.85	8.08	8.36	8.69
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5755 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5754.9587	5754.9574	5754.9558	5754.9539
10	5754.9574	5754.9561	5754.9545	5754.9526
20	5754.9562	5754.9549	5754.9533	5754.9514
30	5754.9547	5754.9534	5754.9518	5754.9499
40	5754.9532	5754.9519	5754.9503	5754.9484
Max. Deviation (MHz)	0.0468	0.0481	0.0497	0.0516
Max. Deviation (ppm)	8.13	8.36	8.64	8.97
Result	Complies			

Mode: 80 MHz / Chain 3

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5210 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5209.9628	5209.9615	5209.9599	5209.9580
110.00	5209.9616	5209.9603	5209.9587	5209.9568
93.50	5209.9602	5209.9589	5209.9573	5209.9554
Max. Deviation (MHz)	0.0398	0.0411	0.0427	0.0446
Max. Deviation (ppm)	7.64	7.89	8.20	8.56
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5210 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5209.9641	5209.9628	5209.9612	5209.9593
10	5209.9628	5209.9615	5209.9599	5209.9580
20	5209.9616	5209.9603	5209.9587	5209.9568
30	5209.9601	5209.9588	5209.9572	5209.9553
40	5209.9586	5209.9573	5209.9557	5209.9538
Max. Deviation (MHz)	0.0414	0.0427	0.0443	0.0462
Max. Deviation (ppm)	7.95	8.20	8.50	8.87
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5775 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5774.9598	5774.9585	5774.9569	5774.9550
110.00	5774.9586	5774.9573	5774.9557	5774.9538
93.50	5774.9572	5774.9559	5774.9543	5774.9524
Max. Deviation (MHz)	0.0428	0.0441	0.0457	0.0476
Max. Deviation (ppm)	7.41	7.64	7.91	8.24
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5775 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5774.9611	5774.9598	5774.9582	5774.9563
10	5774.9598	5774.9585	5774.9569	5774.9550
20	5774.9586	5774.9573	5774.9557	5774.9538
30	5774.9571	5774.9558	5774.9542	5774.9523
40	5774.9556	5774.9543	5774.9527	5774.9508
Max. Deviation (MHz)	0.0444	0.0457	0.0473	0.0492
Max. Deviation (ppm)	7.69	7.91	8.19	8.52
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 Date	Remark
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 28, 2014	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 22, 2014	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 12, 2015	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Nov. 25, 2014	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 06, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-1	N/A	1 GHz ~ 40 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-2	N/A	1 GHz ~ 40 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100979	9kHz~40GHz	Dec. 12, 2014	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-7	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-6	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 03, 2014	Conducted (TH01-CB)

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%