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FCC RADIO TEST REPORT

Applicant's company	**PEGATRON CORPORATION**
Applicant Address	5F., NO. 76, LIGONG ST., BEITOU DISTRICT, TAIPEI CITY 11259 Taiwan
FCC ID	**VUIUPWL6031C**
Manufacturer's company	**PEGATRON CORPORATION**
Manufacturer Address	5F., NO. 76, LIGONG ST., BEITOU DISTRICT, TAIPEI CITY 11259 Taiwan

Product Name	Wireless module
Brand Name	PEGATRON
Model No.	UPWL6031C
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250 MHz / 5725 ~ 5850 MHz
Received Date	Feb. 08, 2013
Final Test Date	May 20, 2016
Submission Type	Class II Change

Statement

Test result included is for the IEEE 802.11n and IEEE 802.11a 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 v01r02, KDB662911 D01 v02r01, ET Docket No. 13–49; FCC 16–24.**

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

TAF
Testing Laboratory
1190

Table of Contents

1. VERIFICATION OF COMPLIANCE 1
2. SUMMARY OF THE TEST RESULT 2
3. GENERAL INFORMATION 3
3.1. Product Details 3
3.2. Table for Filed Antenna 5
3.3. Table for Carrier Frequencies 7
3.4. Table for Test Modes 8
3.5. Table for Testing Locations 9
3.6. Table for Class II Change 10
3.7. Table for Supporting Units 10
3.8. Table for Parameters of Test Software Setting 11
3.9. EUT Operation during Test 11
3.10. Duty Cycle 11
3.11. Test Configurations 12
4. TEST RESULT 13
4.1. 26dB Bandwidth and 99% Occupied Bandwidth Measurement 13
4.2. 6dB Spectrum Bandwidth Measurement 23
4.3. Maximum Conducted Output Power Measurement 28
4.4. Power Spectral Density Measurement 31
4.5. Radiated Emissions Measurement 39
4.6. Band Edge Emissions Measurement 58
4.7. Frequency Stability Measurement 66
4.8. Antenna Requirements 71
5. LIST OF MEASURING EQUIPMENTS 72
6. MEASUREMENT UNCERTAINTY 73
APPENDIX A. TEST PHOTOS ..... A1 ~ A3

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR651717AB	Rev. 01	Initial issue of report	Jun. 01, 2016

1. VERIFICATION OF COMPLIANCE

Product Name	:	Wireless module
Brand Name	:	PEGATRON
Model No.	:	UPWL6031C
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 Feb. 08, 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**
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
4.4	15.407(a)	Power Spectral Density	Complies
4.5	15.407(b)	Radiated Emissions	Complies
4.6	15.407(b)	Band Edge Emissions	Complies
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	IEEE 802.11a: WLAN (1TX, 3RX) IEEE 802.11n: WLAN (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From host system
Modulation	IEEE 802.11a: OFDM IEEE 802.11n: see the below table
Data Modulation	IEEE 802.11a/n: OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	IEEE 802.11a: OFDM (6/9/12/18/24/36/48/54) IEEE 802.11n: see the below table
Frequency Range	5150 ~ 5250 MHz / 5725 ~ 5850 MHz
Channel Number	9 for 20MHz bandwidth ; 4 for 40MHz bandwidth
Channel Band Width (99%)	Band 1: IEEE 802.11a: 28.83 MHz IEEE 802.11n MCS0 (HT20): 18.58 MHz IEEE 802.11n MCS0 (HT40): 37.19 MHz Band 4: IEEE 802.11a: 31.95 MHz IEEE 802.11n MCS0 (HT20): 18.06 MHz IEEE 802.11n MCS0 (HT40): 36.47 MHz
Maximum Conducted Output Power	Band 1: IEEE 802.11a: 21.11 dBm IEEE 802.11n MCS0 (HT20): 21.22 dBm IEEE 802.11n MCS0 (HT40): 21.93 dBm Band 4: IEEE 802.11a: 21.58 dBm IEEE 802.11n MCS0 (HT20): 19.48 dBm IEEE 802.11n MCS0 (HT40): 19.09 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3
Accessories	N/A

Items	Description	
Communication Mode	☒ IP Based (Load Based)	☐ Frame Based
Beamforming Function	☐ With beamforming	☒ Without beamforming
Operate Condition	☒ Indoor	☐ Outdoor

Antenna and Band width

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

IEEE 11n Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	3	MCS0-23
802.11n (HT40)	3	MCS0-23
Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT supports HT20 and HT40. Note 2: Modulation modes consist of below configuration: HT20/HT40: IEEE 802.11n		

3.2. Table for Filed Antenna

Ant.	Brand Holder	Model Name	Antenna Type	Connector	Gain (dBi)	
					2.4GHz	5GHz
1	HL Technology	260-26021	PCB Antenna	I-PEX	-	2.70
2	HL Technology	260-26022	PCB Antenna	I-PEX	2.32	2.52
3	HL Technology	260-26023	PCB Antenna	I-PEX	4.64	2.73
4	HL Technology	260-26027	PCB Antenna	I-PEX	3.57	-
5	HL Technology	260-26028	PCB Antenna	I-PEX	1.97	-
6	HL Technology	260-26029	PCB Antenna	I-PEX	2.7	-
7	HL Technology	260-26030	PCB Antenna	I-PEX	1.97	2.29
8	HL Technology	260-26031	PCB Antenna	I-PEX	1.97	2.29
9	HL Technology	260-26032	PCB Antenna	I-PEX	3.65	2.56
10	HL Technology	260-26033	PCB Antenna	I-PEX	3.34	-
11	HL Technology	260-26034	PCB Antenna	I-PEX	2.65	-
12	HL Technology	260-26035	PCB Antenna	I-PEX	4.22	-
13	HL Technology	260-26038	PCB Antenna	I-PEX	2.2	2.65
14	HL Technology	260-26039	PCB Antenna	I-PEX	1.92	2.49
15	Wanshih Electronic Co., Ltd.	UC3WFI0095	PCB Antenna	I-PEX	4.45	2.72
16	Wanshih Electronic Co., Ltd.	UC3WFI0063	PCB Antenna	I-PEX	2.04	2.68
17	Wanshih Electronic Co., Ltd.	UC3WFI0064	PCB Antenna	I-PEX	3.9	2.73

Note 1:

For 2.4GHz Function:

Ant. 2~17 are the same antenna type in the antenna list; antenna 3 is the highest gain antenna.

It was selected to perform the test and recorded in this report.

For 5GHz Function:

Ant. 1~3, 7~9 and 13~17 are the same antenna type in the antenna list; antenna 3 is the highest gain antenna.

It was selected to perform the test and recorded in this report.

Note 2:

For IEEE 802.11a/b/g mode (1TX/3RX):

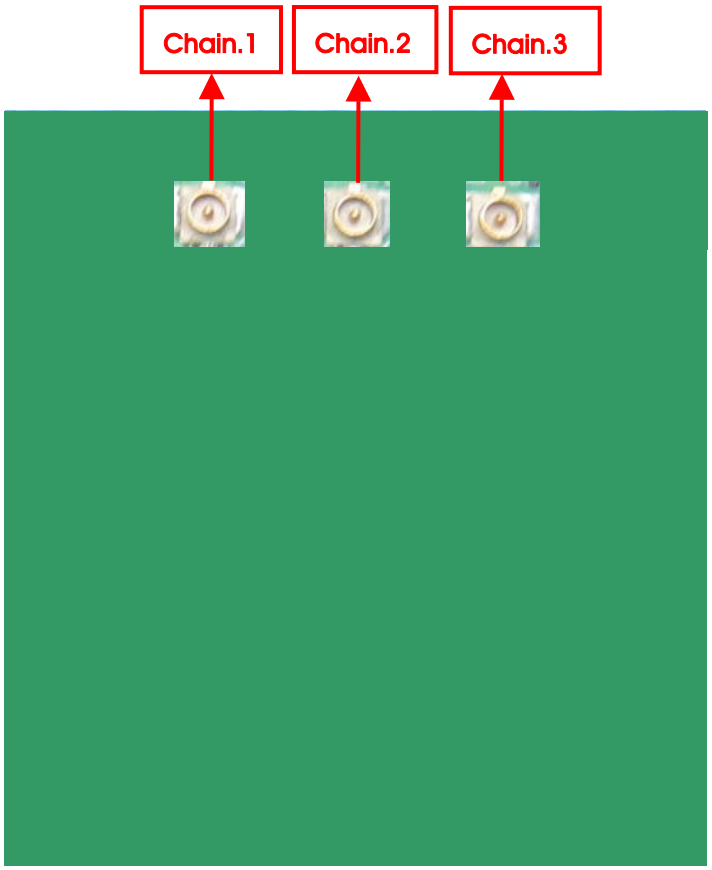
Only Chain 1 can be use as transmit antenna.

Chain 1, Chain 2 and Chain 3 could both receive simultaneously.

For IEEE 802.11n mode (3TX/3RX):

Chain 1, Chain 2 and Chain 3 can be used as transmitting/receiving antenna.

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



3.3. Table for Carrier Frequencies

The EUT has two bandwidth system.

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.

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
5725~5850 MHz Band 4	149	5745 MHz	159	5795 MHz
	151	5755 MHz	161	5805 MHz
	153	5765 MHz	165	5825 MHz
	157	5785 MHz	-	-

3.4. 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	1
	11n HT20	Band 1&4	MCS0	36/40/48/ 149/157/165	1+2+3
	11n HT40	Band 1&4	MCS0	38/46/ 151/159	1+2+3
Power Spectral Density	11a/BPSK	Band 1&4	6Mbps	36/40/48/ 149/157/165	1
	11n HT20	Band 1&4	MCS0	36/40/48/ 149/157/165	1+2+3
	11n HT40	Band 1&4	MCS0	38/46/ 151/159	1+2+3
26dB Spectrum Bandwidth & 99% Occupied Bandwidth Measurement	11a/BPSK	Band 1&4	6Mbps	36/40/48/ 149/157/165	1
	11n HT20	Band 1&4	MCS0	36/40/48/ 149/157/165	1+2+3
	11n HT40	Band 1&4	MCS0	38/46/151/159	1+2+3
6dB Spectrum Bandwidth Measurement	11a/BPSK	Band 4	6Mbps	149/157/165	1
	11n HT20	Band 4	MCS0	149/157/165	1+2+3
	11n HT40	Band 4	MCS0	151/159	1+2+3
Radiated Emission Above 1GHz	11a/BPSK	Band 1&4	6Mbps	36/40/48/ 149/157/165	1
	11n HT20	Band 1&4	MCS0	36/40/48/ 149/157/165	1+2+3
	11n HT40	Band 1&4	MCS0	38/46/151/159	1+2+3
Band Edge Emission	11a/BPSK	Band 1&4	6Mbps	36/40/48/ 149/157/165	1
	11n HT20	Band 1&4	MCS0	36/40/48/ 149/157/165	1+2+3
	11n HT40	Band 1&4	MCS0	38/46/151/159	1+2+3
Frequency Stability	20 MHz	Band 1&4	-	40/157	1
	40 MHz	Band 1&4	-	38/151	1

The following test modes were performed for all tests:

For Radiated Emission test:

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

3.5. 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).

3.6. Table for Class II Change

This product is an extension of original one reported under Sporton project number: FR320831AA and AB

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

Modifications	Performance Checking
Updating 5GHz Band 1 to "New Rules" from "Old Rules".	26dB Spectrum Bandwidth and 99% Occupied Bandwidth. Maximum Conducted Output Power. Power Spectral Density. Radiated Emissions Above 1GHz. Band Edge Emissions. Frequency Stability.
Updating test rule of 5GHz band 4 to "15.407 (b)(4)(i) of New Rules (ET Docket No. 13–49; FCC 16–24)" from "Old Rules".	26dB Spectrum Bandwidth and 99% Occupied Bandwidth. 6dB Spectrum Bandwidth. Maximum Conducted Output Power. Power Spectral Density. Radiated Emissions Above 1GHz. Band Edge Emissions Frequency Stability.
1. Changing the gain of Ant. 5, Ant. 7, Ant. 8 and Ant. 15 is lower than original antennas. 2. Disable band 2 and band 3	Do not effect the test results.

3.7. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E4300	DoC
Fixture	PEGATRON	PEGATRON	N/A

3.8. Table for Parameters of Test Software Setting

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

Test Software Version	Mtool 1.0.0.9									
Mode	Test Frequency (MHz)									
	5180 MHz	5200 MHz	5240 MHz	5745 MHz	5785 MHz	5825 MHz	5190 MHz	5230 MHz	5755 MHz	5795 MHz
802.11a	78	88	72	100	100	100	-	-	-	-
802.11n MCS0 HT20	60	68	69	61	53	56	-	-	-	-
802.11n MCS0 HT40	-	-	-	-	-	-	44	71	58	52

3.9. EUT Operation during Test

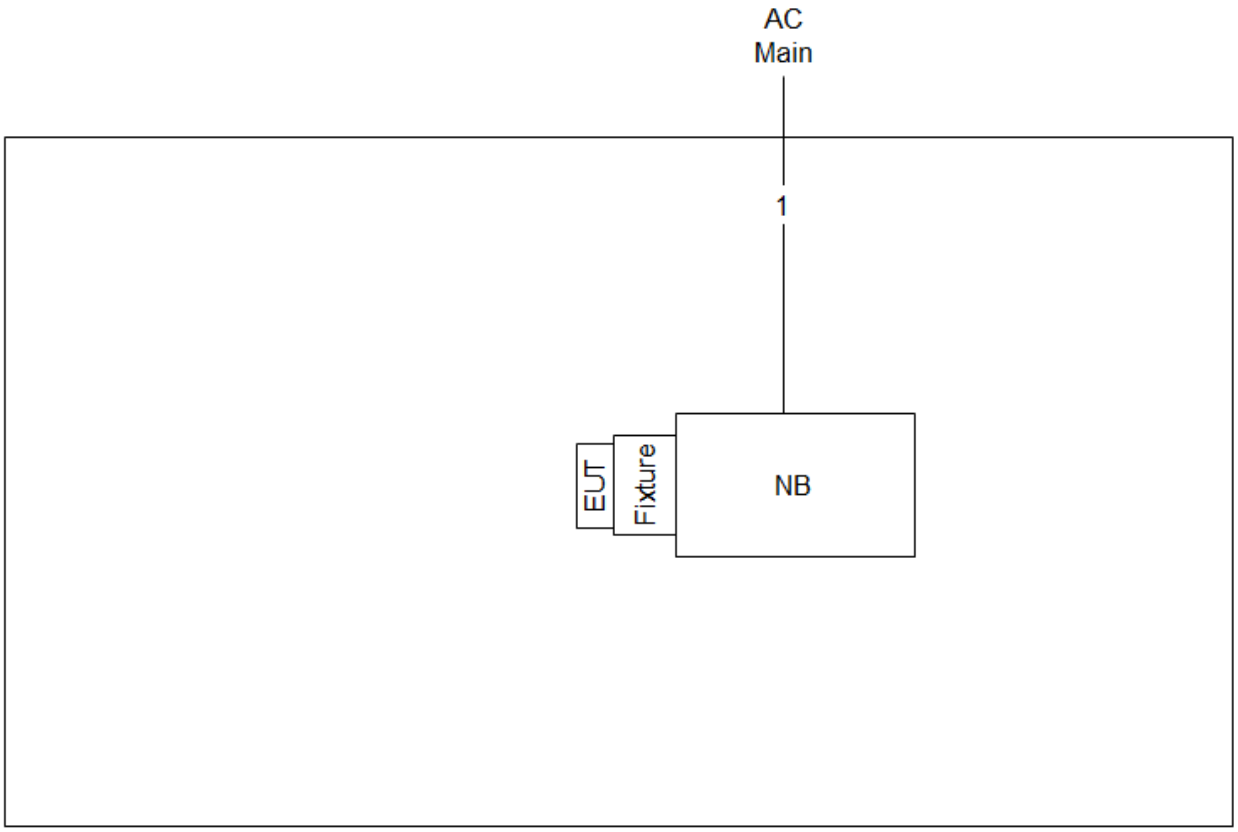
The EUT was programmed to be in continuously transmitting mode.

3.10. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	2.070	2.090	99.04%	0.04	0.01
802.11n MCS0 HT20	1.900	1.930	98.45%	0.07	0.01
802.11n MCS0 HT40	0.932	0.964	96.68%	0.15	1.07

3.11. Test Configurations

3.11.1. Radiation Emissions Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	2.6m

4. TEST RESULT

4.1. 26dB Bandwidth and 99% Occupied Bandwidth Measurement

4.1.1. Limit

No restriction limits.

4.1.2. Measuring Instruments and Setting

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

26dB Bandwidth	
Spectrum Parameters	**Setting**
Attenuation	Auto
Span Frequency	> 26dB Bandwidth
RBW	Approximately 1% of the emission bandwidth
VBW	VBW > RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto
99% Occupied Bandwidth	
Spectrum Parameters	**Setting**
Span	1.5 times to 5.0 times the OBW
RBW	1 % to 5 % of the OBW
VBW	≥ 3 x RBW
Detector	Peak
Trace	Max Hold

4.1.3. Test Procedures

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

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

4.1.4. Test Setup Layout

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

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

4.1.5. Test Deviation

There is no deviation with the original standard.

4.1.6. EUT Operation during Test

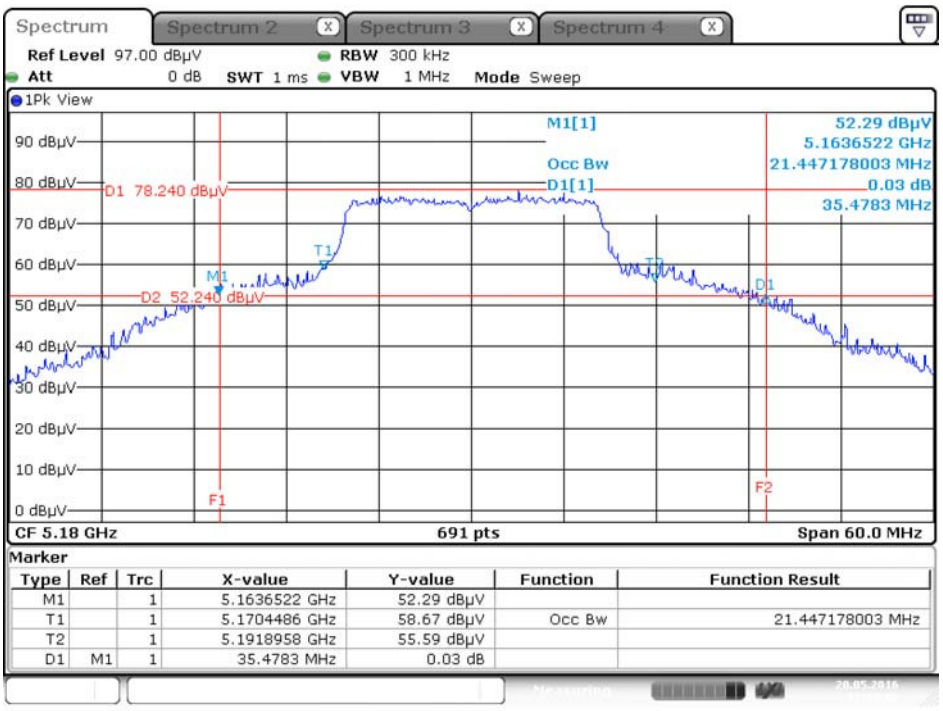
The EUT was programmed to be in continuously transmitting mode.

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

Temperature	25°C	Humidity	65%
Test Engineer	Andy Tsai		

Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5180 MHz	35.48	21.45
	5200 MHz	42.70	28.83
	5240 MHz	30.44	17.80
	5745 MHz	45.57	31.61
	5785 MHz	45.13	31.17
	5825 MHz	46.52	31.95
802.11n MCS0 HT20	5180 MHz	24.70	17.63
	5200 MHz	30.87	18.06
	5240 MHz	30.78	18.58
	5745 MHz	30.00	18.06
	5785 MHz	20.44	17.97
	5825 MHz	20.26	17.97
802.11n MCS0 HT40	5190 MHz	39.86	35.60
	5230 MHz	69.86	37.19
	5755 MHz	41.45	36.47
	5795 MHz	40.00	36.32

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



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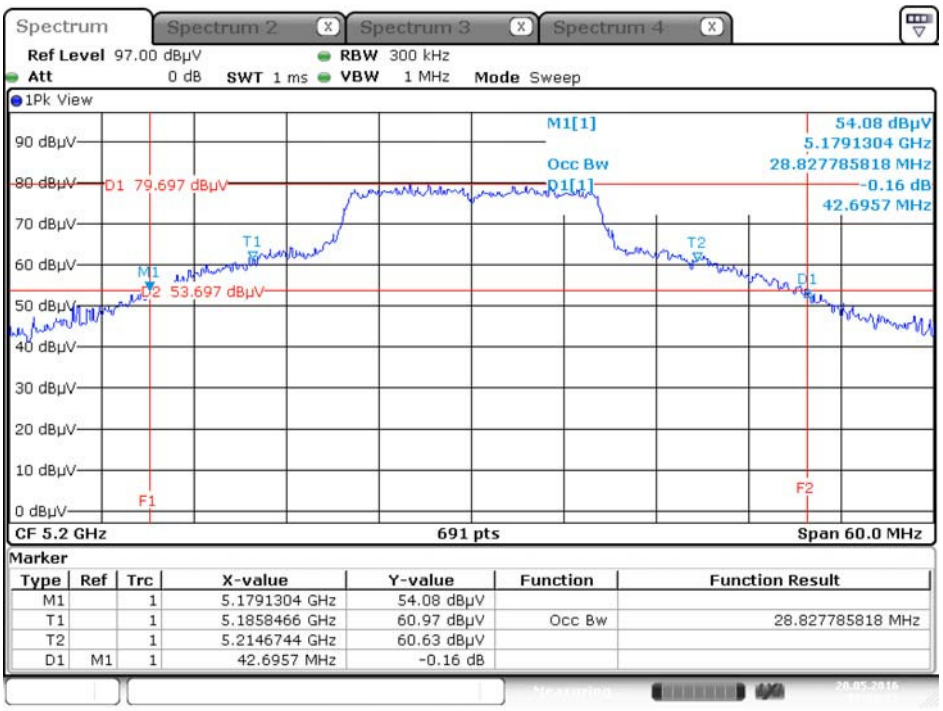
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 / 5200 MHz



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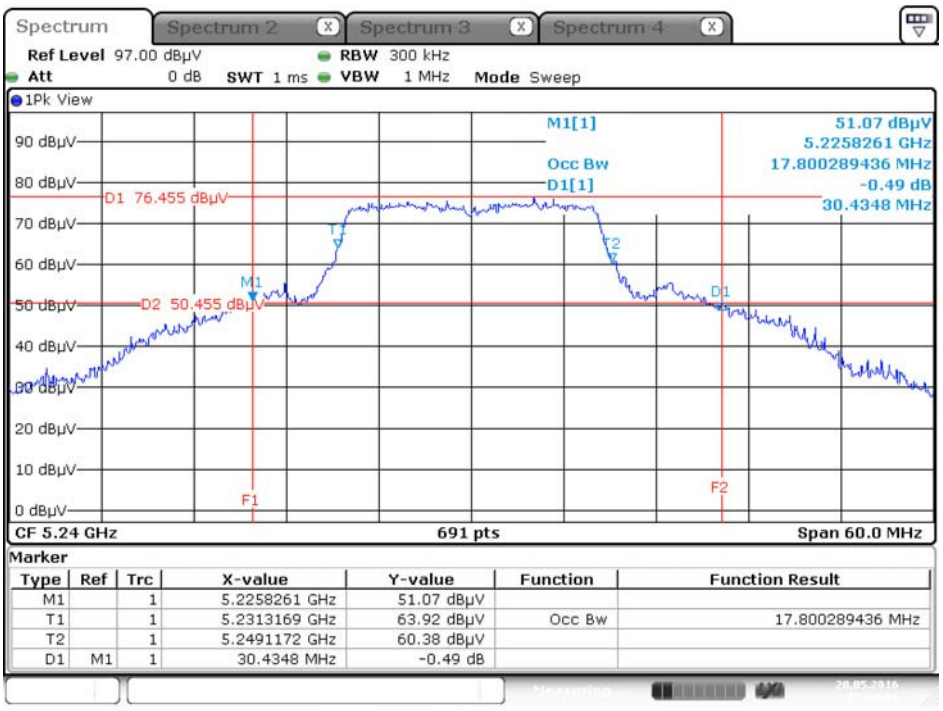
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1/ 5240 MHz



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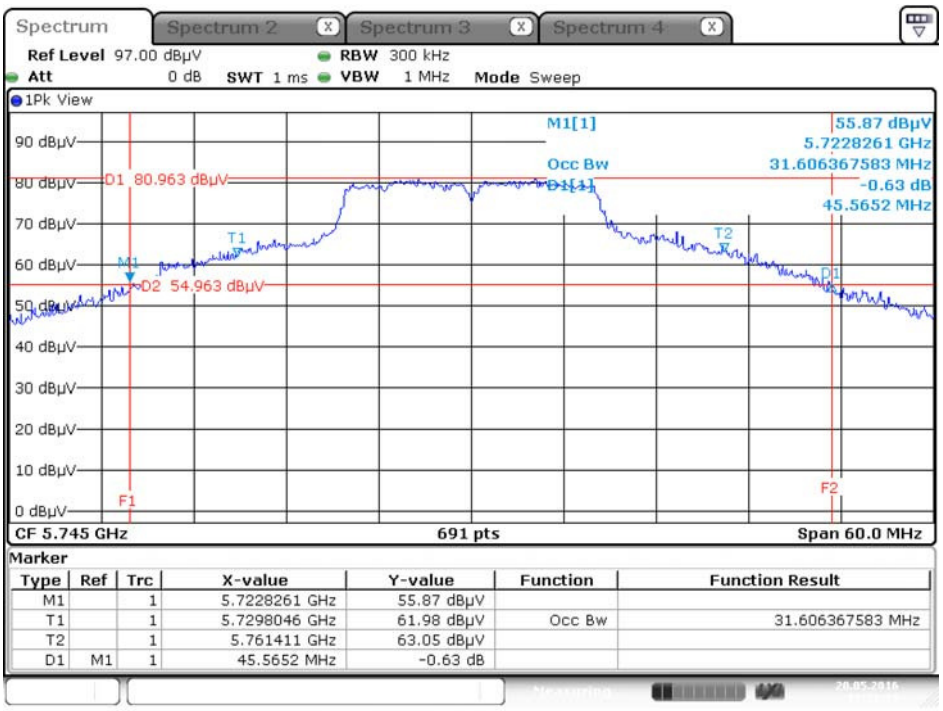
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 / 5745 MHz



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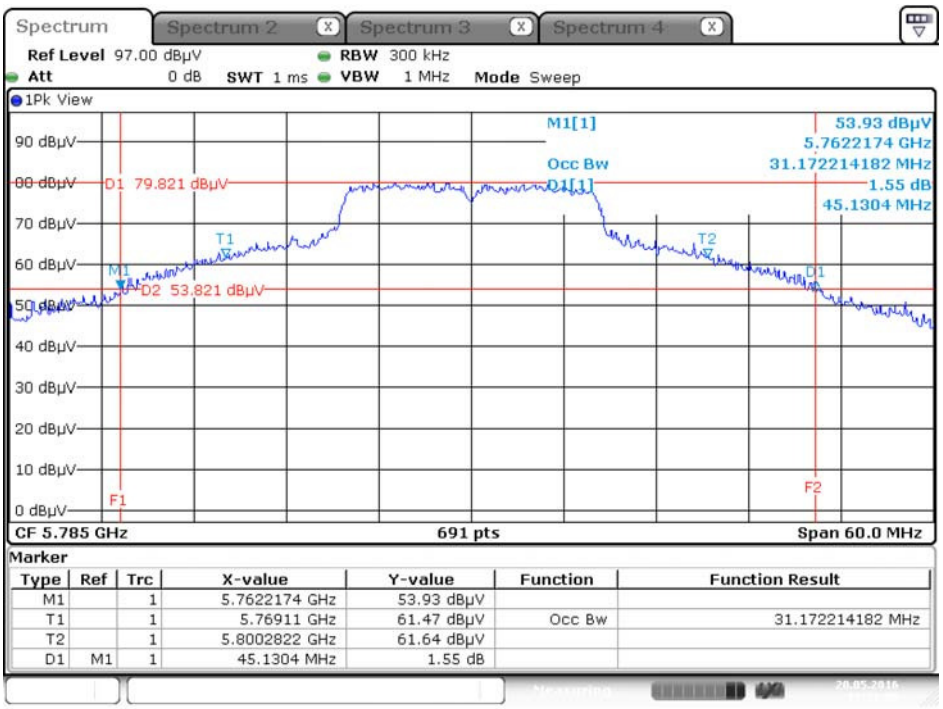
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 / 5785 MHz



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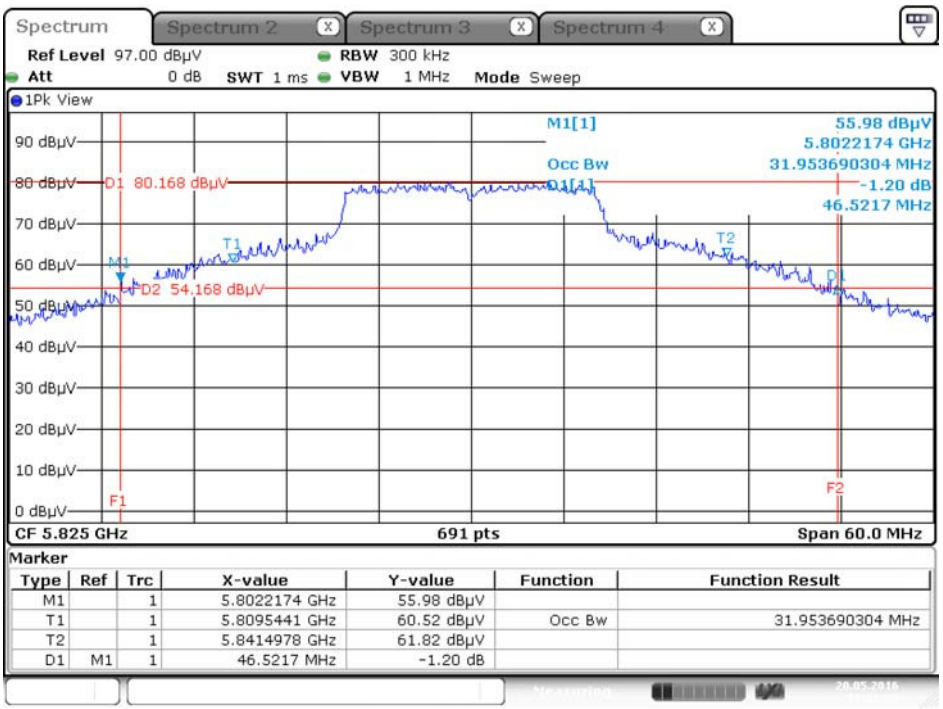
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 / 5825 MHz



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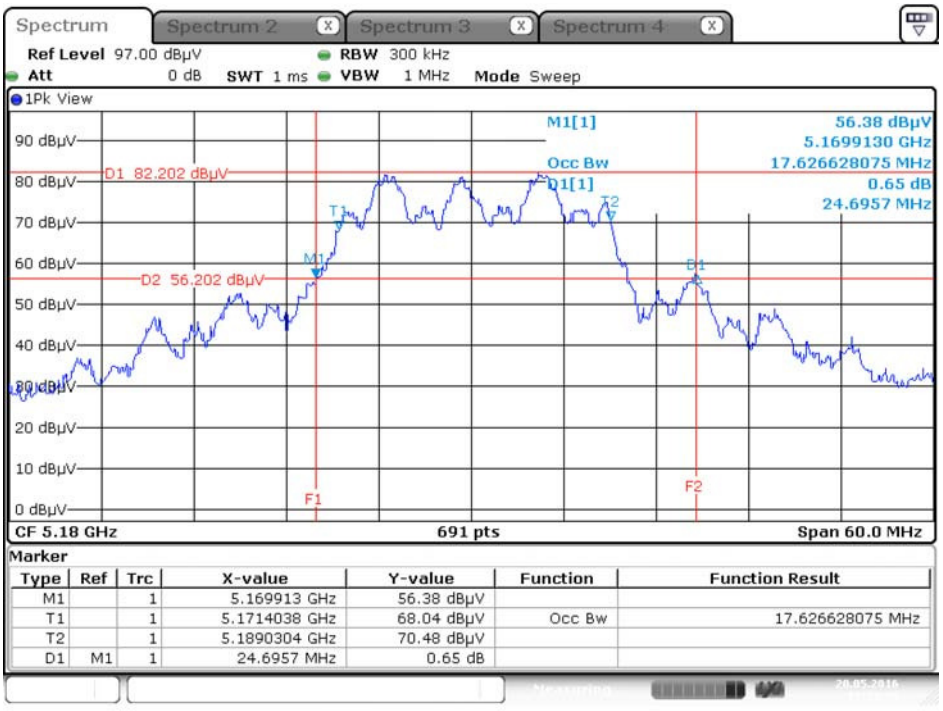
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 + Chain 3 / 5180 MHz



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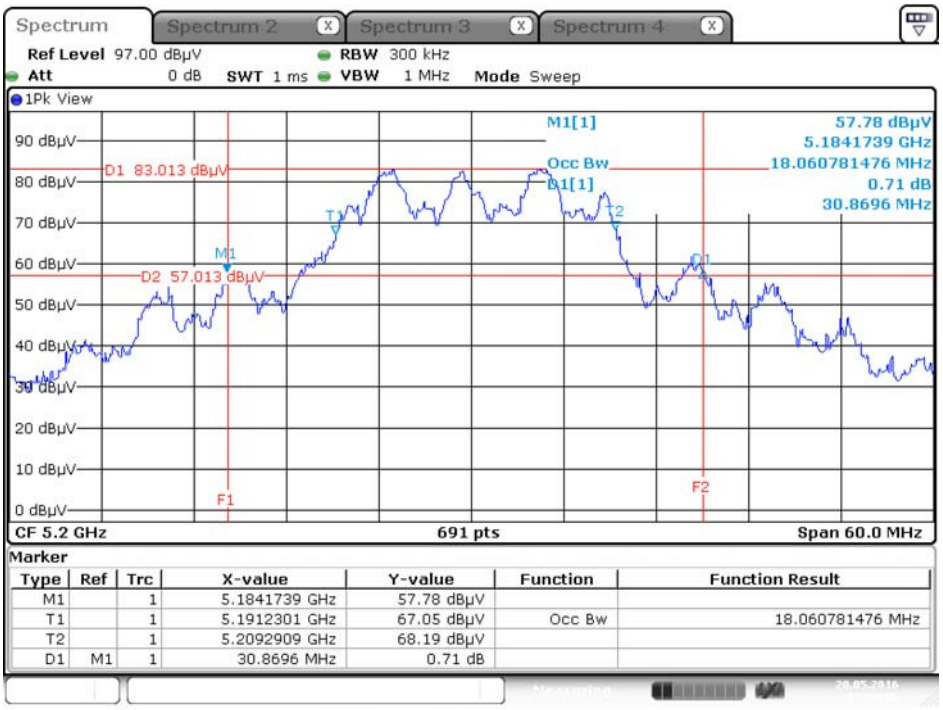
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 + Chain 3 / 5200 MHz



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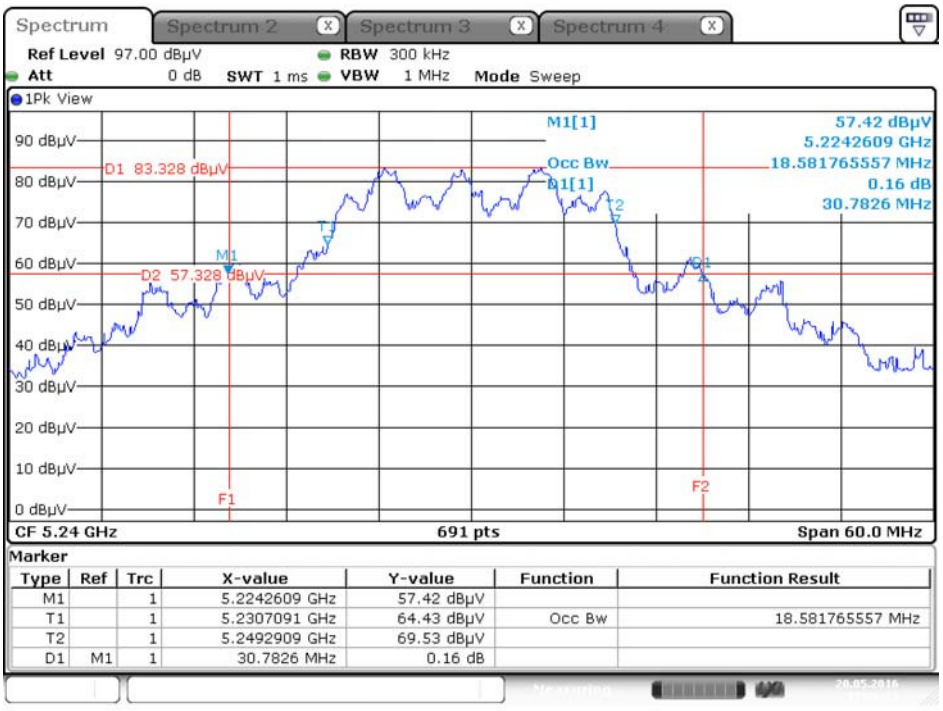
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 + Chain 3 / 5240 MHz



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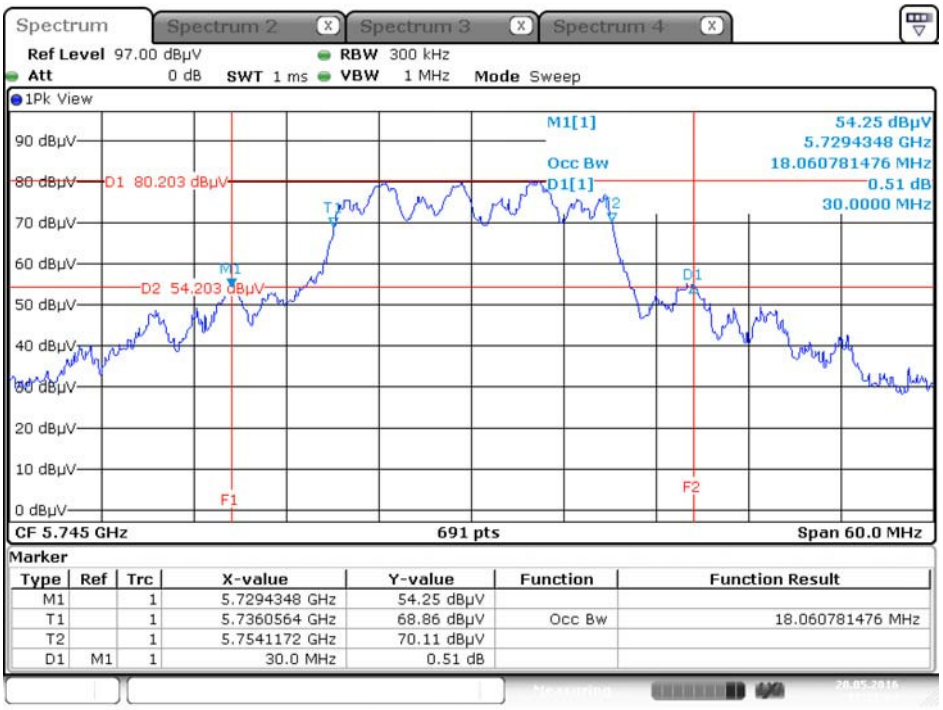
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 + Chain 3 / 5745 MHz



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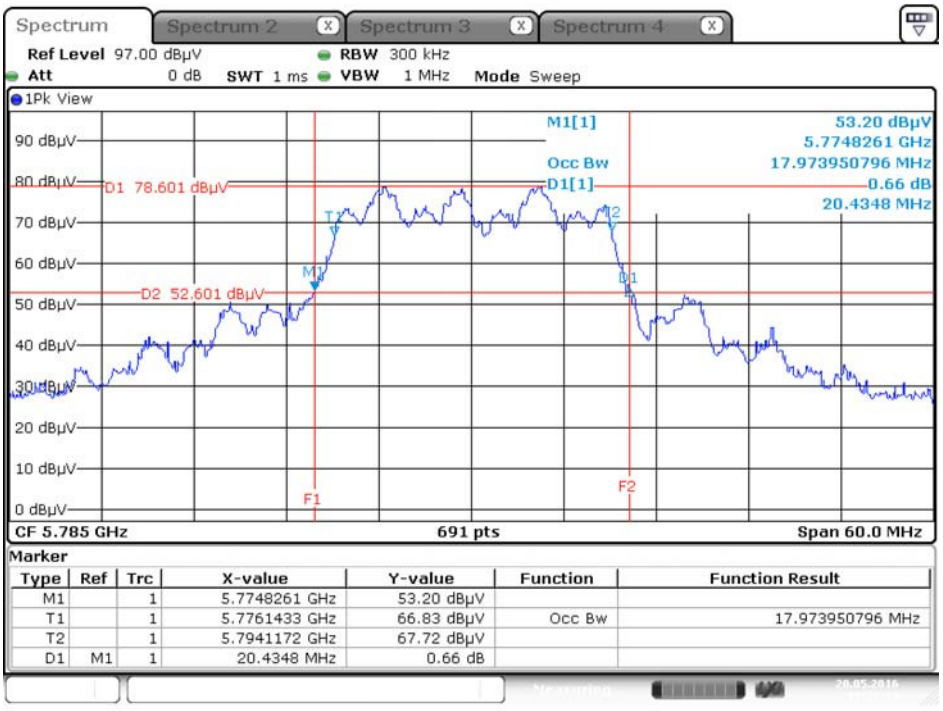
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 + Chain 3 / 5785 MHz



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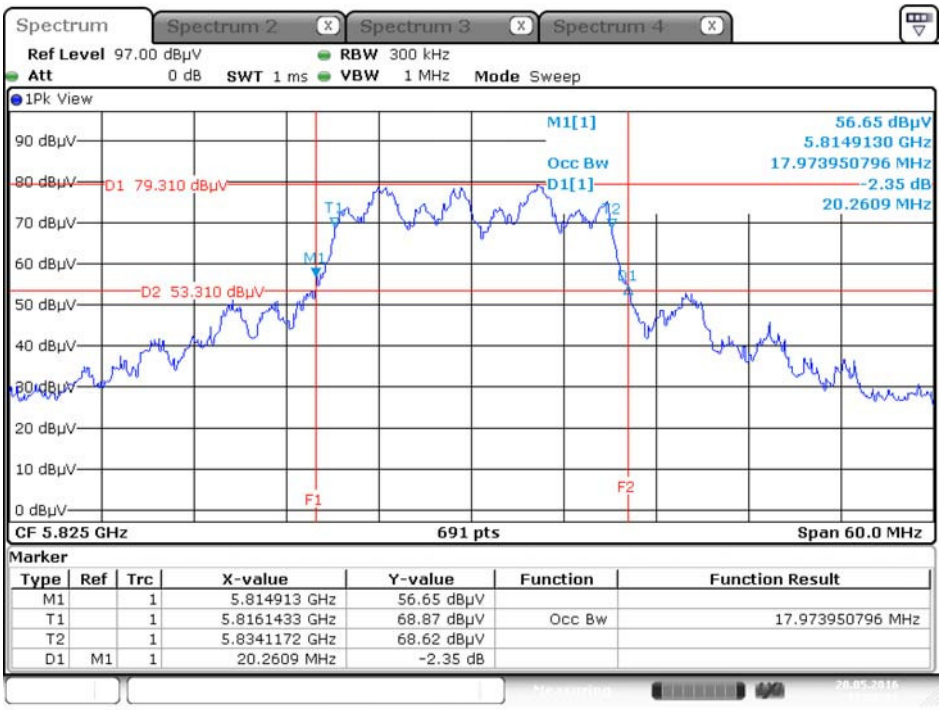
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 + Chain 3 / 5825 MHz



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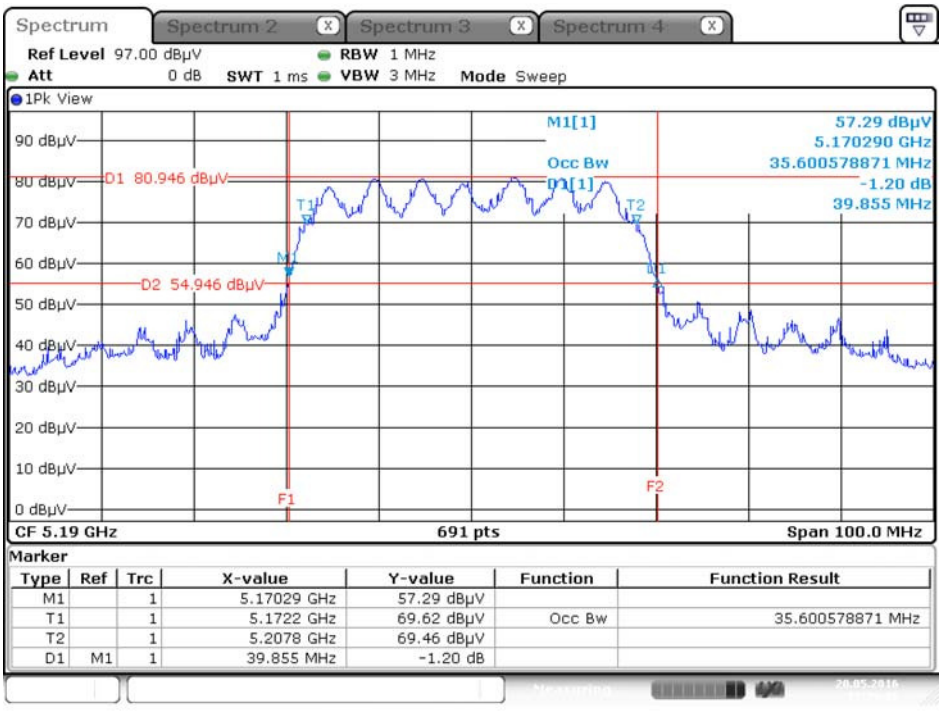
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 1 + Chain 2 + Chain 3 / 5190 MHz



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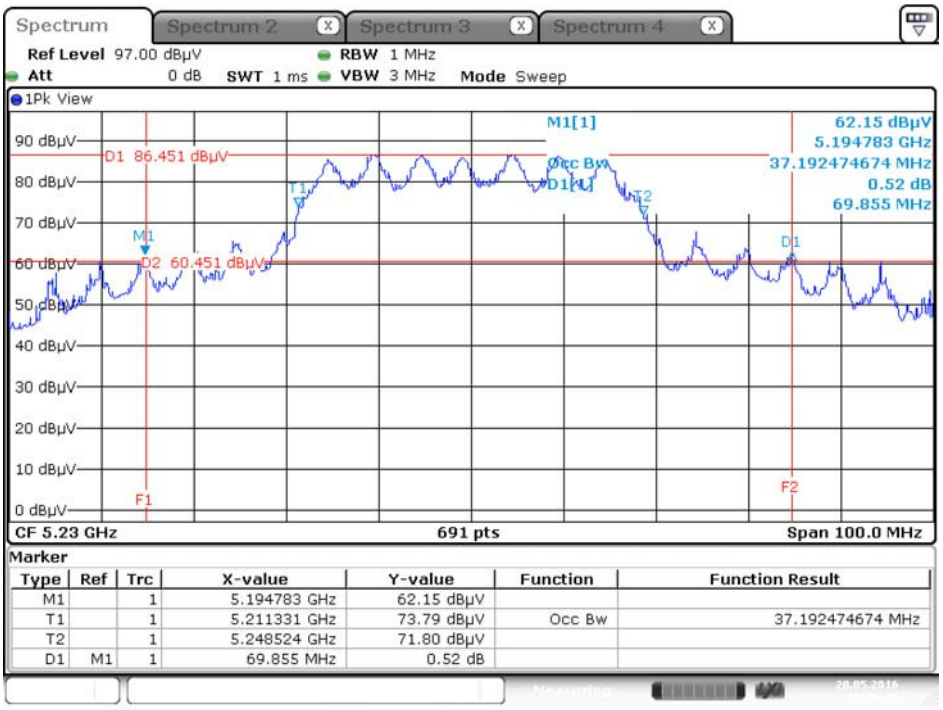
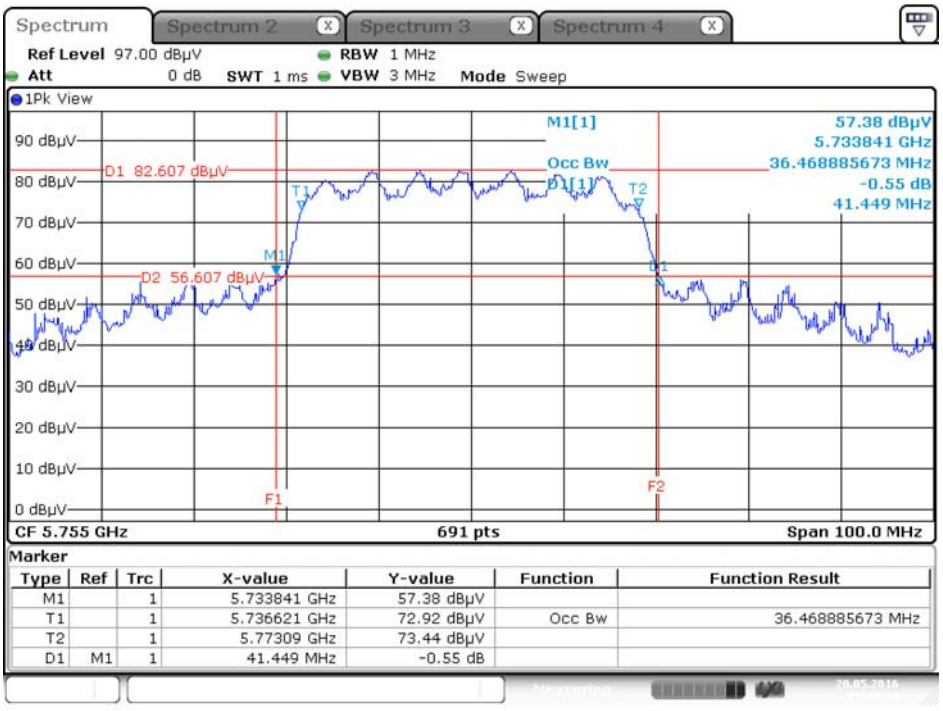
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 1 + Chain 2 + Chain 3 / 5230 MHz



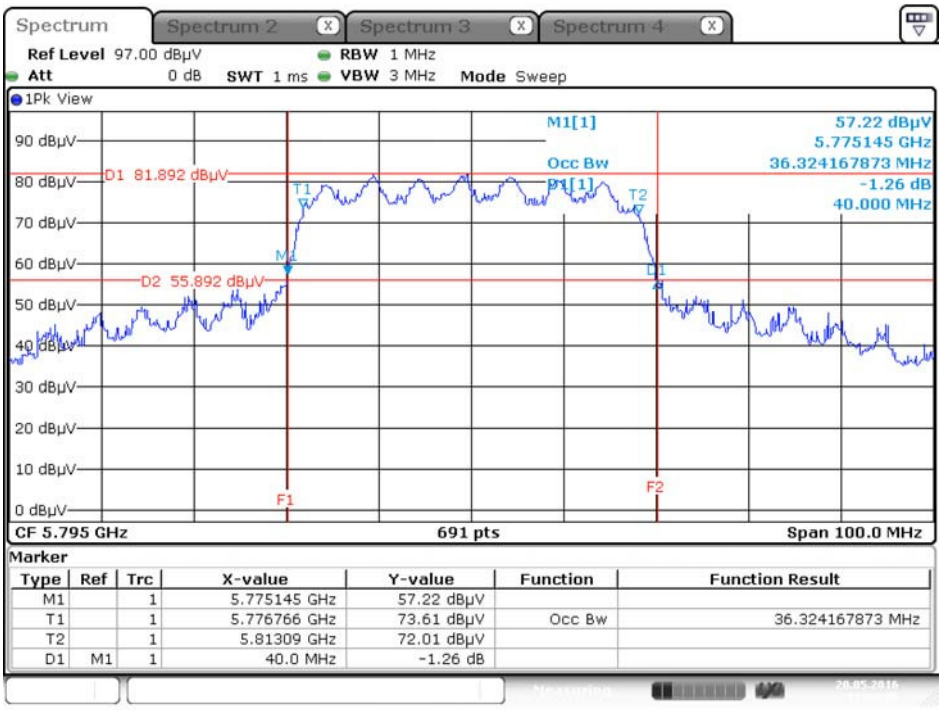
Date: 20.MAY.2016 17:29:45

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 1 + Chain 2 + Chain 3 / 5755 MHz



Date: 20.MAY.2016 17:30:23

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 1 + Chain 2 + Chain 3 / 5795 MHz



Date: 20.MAY.2016 17:30:56

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 v01r02 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (C) Emission Bandwidth.
3. Multiple antenna system was performed in accordance with KDB662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
4. Measured the spectrum width with power higher than 6dB below carrier.

4.2.4. Test Setup Layout

For Radiated 6dB Bandwidth Measurement:

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

4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of 6dB Spectrum Bandwidth

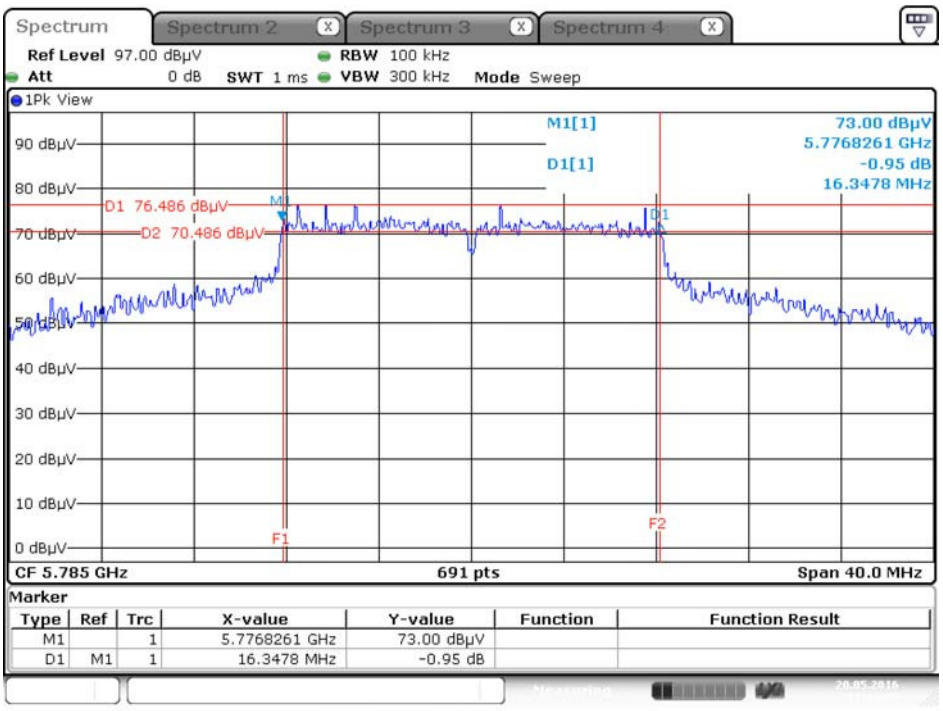
Temperature	25°C	Humidity	65%
Test Engineer	Andy Tsai		

Mode	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11a	5745 MHz	16.41	500	Complies
	5785 MHz	16.35	500	Complies
	5825 MHz	16.35	500	Complies
802.11n MCS0 HT20	5745 MHz	17.22	500	Complies
	5785 MHz	15.48	500	Complies
	5825 MHz	15.19	500	Complies
802.11n MCS0 HT40	5755 MHz	31.30	500	Complies
	5795 MHz	31.30	500	Complies

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

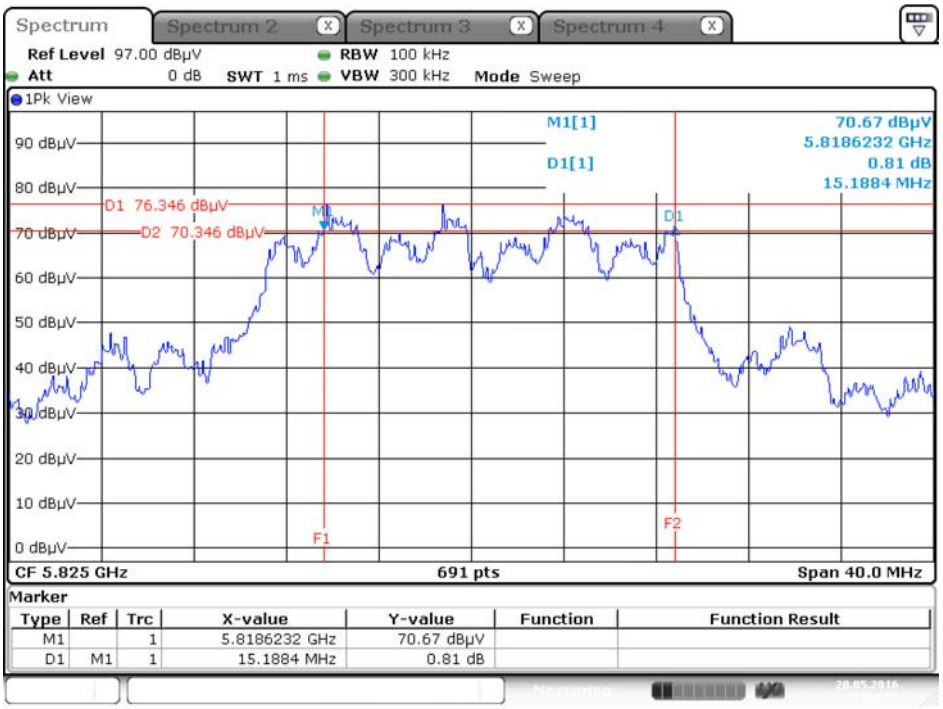
For plots, only the channel with worse result was shown.

6 dB Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 / 5785 MHz



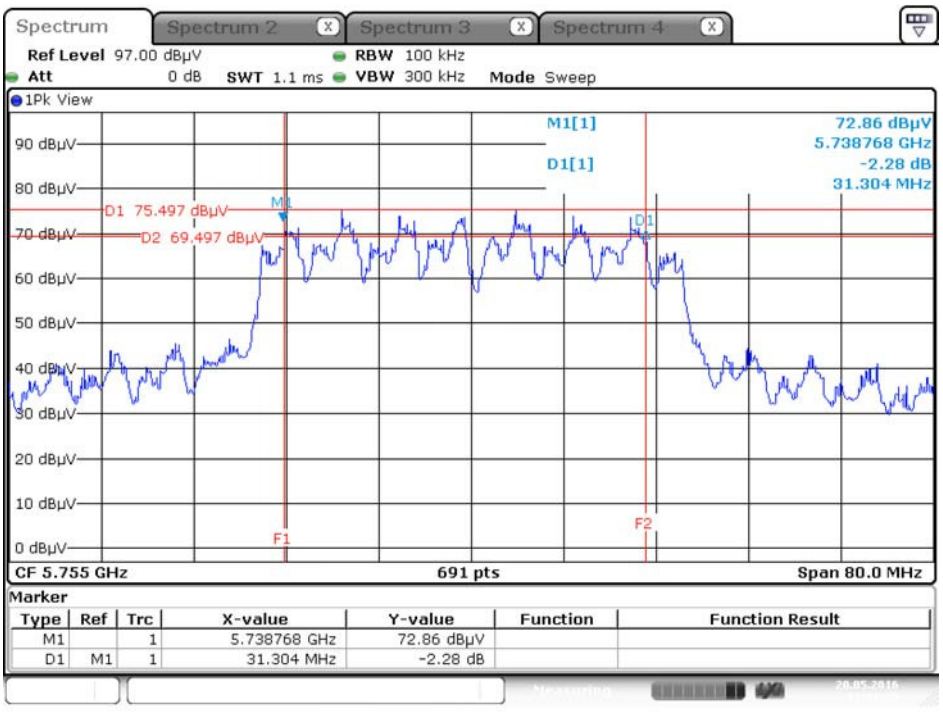
Date: 20.MAY.2016 17:34:54

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 + Chain 3 / 5825 MHz



Date: 20.MAY.2016 17:33:53

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 1 + Chain 2 + Chain 3 / 5755MHz



Date: 20.MAY.2016 17:32:23

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.
	☐	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

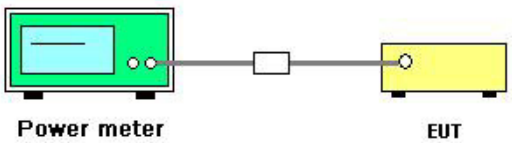
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Bandwidth	50MHz bandwidth is greater than the EUT emission bandwidth
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 v01r02 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.

4.3.4. 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	65%
Test Engineer	Andy Tsai	Test Date	May 20, 2016

Mode	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
802.11a	5180 MHz	18.78	30.00	Complies
	5200 MHz	21.11	30.00	Complies
	5240 MHz	17.18	30.00	Complies
	5745 MHz	21.58	30.00	Complies
	5785 MHz	21.37	30.00	Complies
	5825 MHz	21.43	30.00	Complies

Mode	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
802.11n MCS0 HT20	5180 MHz	14.41	15.36	14.32	19.49	30.00	Complies
	5200 MHz	16.15	16.85	16.19	21.18	30.00	Complies
	5240 MHz	16.23	16.95	16.11	21.22	30.00	Complies
	5745 MHz	14.76	14.81	14.56	19.48	30.00	Complies
	5785 MHz	13.45	13.04	12.53	17.79	30.00	Complies
	5825 MHz	13.43	13.31	13.28	18.11	30.00	Complies
802.11n MCS0 HT40	5190 MHz	11.55	11.94	11.48	16.43	30.00	Complies
	5230 MHz	17.26	17.23	16.97	21.93	30.00	Complies
	5755 MHz	14.29	14.24	14.41	19.09	30.00	Complies
	5795 MHz	13.03	13.09	13.37	17.94	30.00	Complies

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

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

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
	☐	Client devices	11 dBm/MHz
☒	5.725~5.85 GHz		30 dBm/500kHz

4.4.2. Measuring Instruments and Setting

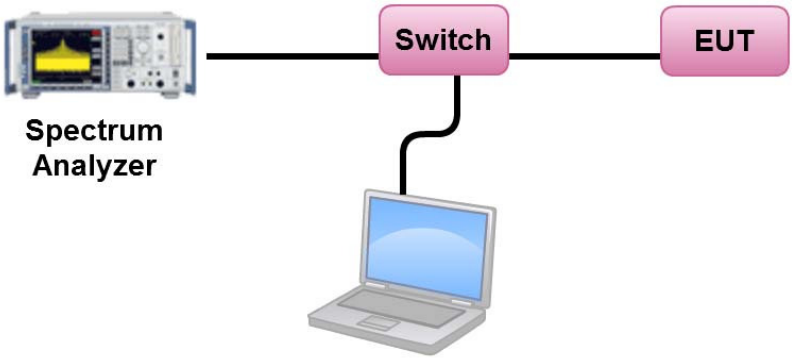
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 v01r02 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. 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	65%
Test Engineer	Andy Tsai		

Configuration IEEE 802.11a / Chain 1

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	5.43	17.00	Complies
40	5200 MHz	7.94	17.00	Complies
48	5240 MHz	3.95	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	8.25	-3.01	5.24	30.00	Complies
157	5785 MHz	8.21	-3.01	5.20	30.00	Complies
165	5825 MHz	8.08	-3.01	5.07	30.00	Complies

Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 + Chain 3

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	6.14	15.50	Complies
40	5200 MHz	7.80	15.50	Complies
48	5240 MHz	7.94	15.50	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =7.50dBi, so limit=17-(7.50-6)=15.50 dBm/MHz.

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
149	5745 MHz	6.17	-3.01	3.16	28.50	Complies
157	5785 MHz	4.35	-3.01	1.34	28.50	Complies
165	5825 MHz	4.82	-3.01	1.81	28.50	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =7.50dBi, so limit=30-(7.50-6)=28.50 dBm/MHz.

Configuration IEEE 802.11n MCS0 HT40 / Chain 1 + Chain 2 + Chain 3

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
38	5190 MHz	0.08	15.50	Complies
46	5230 MHz	5.42	15.50	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =7.50dBi, so limit=17-(7.50-6)=15.50 dBm/MHz.

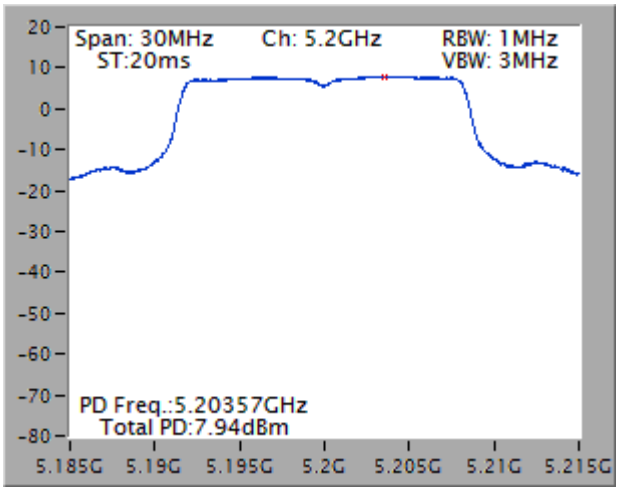
Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
151	5755 MHz	2.67	-3.01	-0.34	28.50	Complies
159	5795 MHz	1.67	-3.01	-1.34	28.50	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =7.50dBi, so limit=30-(7.50-6)=28.50 dBm/MHz.

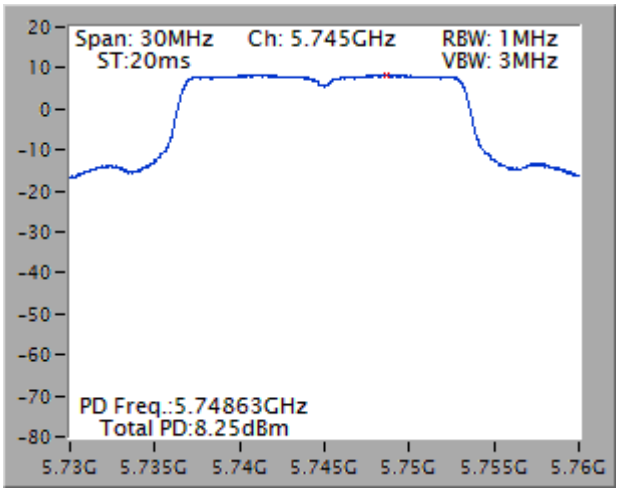
Note: All the test values were listed in the report.

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

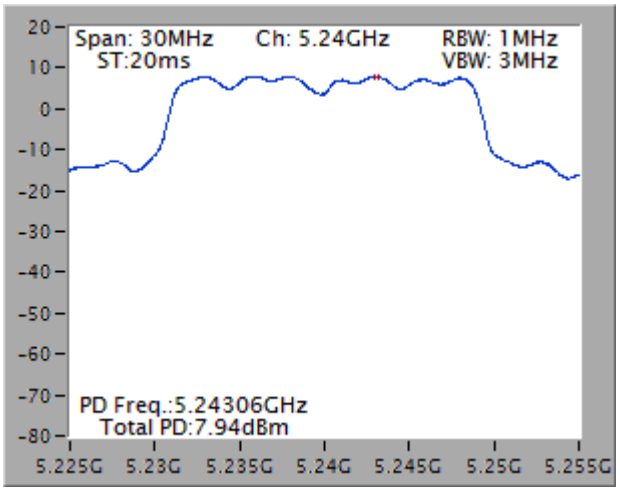
Power Density Plot on Configuration IEEE 802.11a / Chain 1 / 5200 MHz



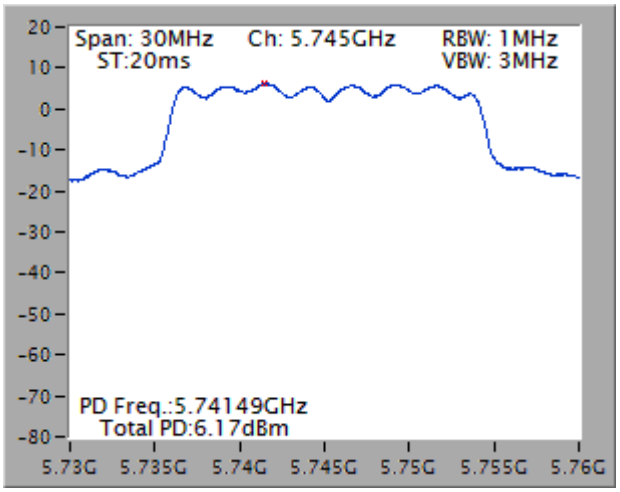
Power Density Plot on Configuration IEEE 802.11a / Chain 1 / 5745 MHz



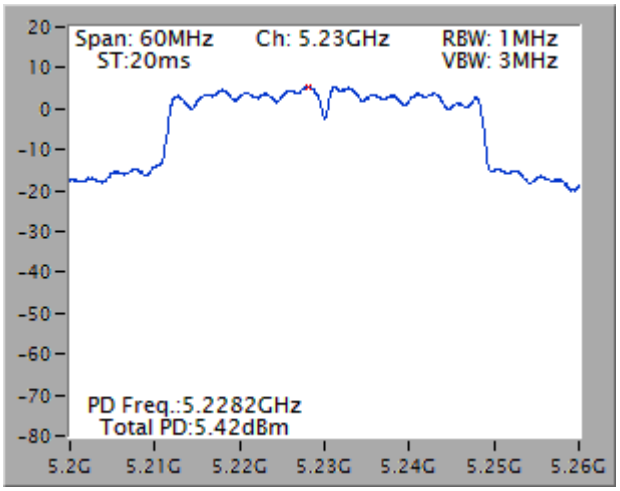
Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 + Chain 3 / 5240 MHz



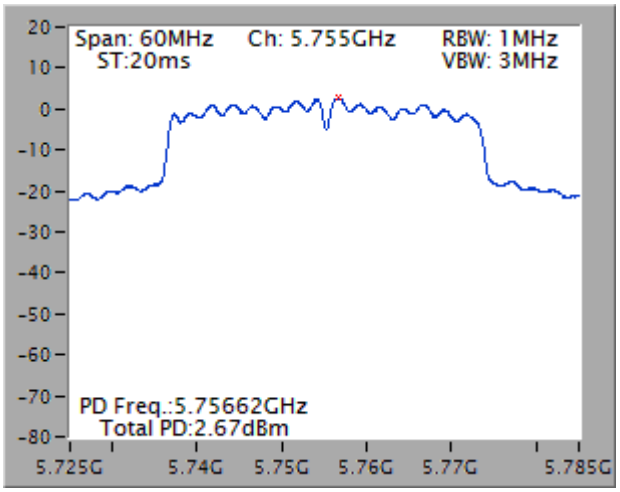
Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 + Chain 3 / 5745 MHz



Power Density Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 1 + Chain 2 + Chain 3 / 5230 MHz



Power Density Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 1 + Chain 2 + Chain 3 / 5755 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 shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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.

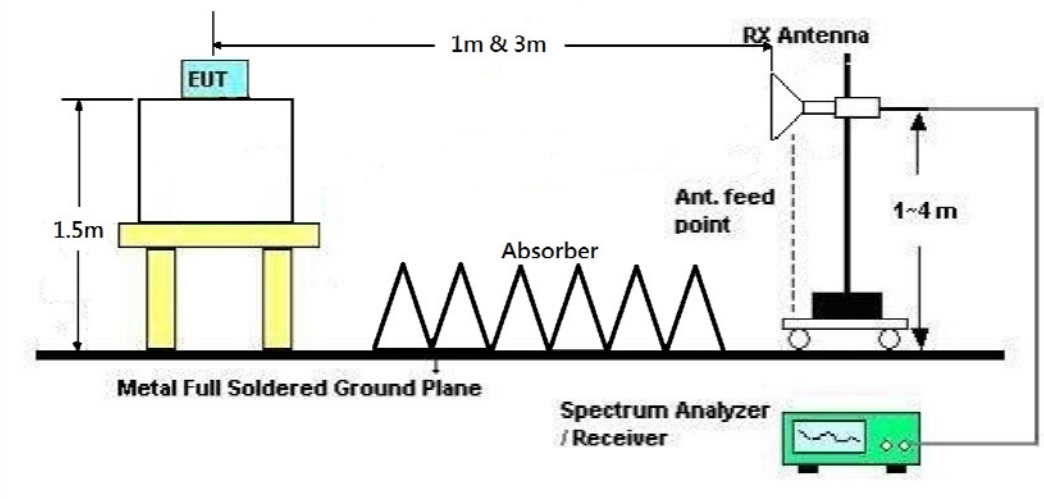
Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	40 GHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	1MHz / 3MHz for peak

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	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 36 / Chain 1
Test Date	Apr. 30, 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	15539.50	46.37	54.00	-7.63	29.68	13.38	38.45	35.14	119	247	Average	HORIZONTAL
2	15540.47	58.35	74.00	-15.65	41.66	13.38	38.45	35.14	119	247	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	15539.52	46.15	54.00	-7.85	29.46	13.38	38.45	35.14	106	127	Average	VERTICAL
2	15540.00	58.66	74.00	-15.34	41.97	13.38	38.45	35.14	106	127	Peak	VERTICAL

Temperature	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 40 / Chain 1
Test Date	Apr. 30, 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	15599.80	58.78	74.00	-15.22	42.17	13.38	38.39	35.16	118	161	Peak	HORIZONTAL
2	15600.37	46.31	54.00	-7.69	29.70	13.38	38.39	35.16	118	161	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	15599.50	45.82	54.00	-8.18	29.21	13.38	38.39	35.16	114	229	Average	VERTICAL
2	15600.05	58.77	74.00	-15.23	42.16	13.38	38.39	35.16	114	229	Peak	VERTICAL

Temperature	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 48 / Chain 1
Test Date	Apr. 30, 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	15719.71	46.27	54.00	-7.73	29.89	13.39	38.23	35.24	126	93	Average	HORIZONTAL
2	15719.89	58.70	74.00	-15.30	42.32	13.39	38.23	35.24	126	93	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	15719.61	59.61	74.00	-14.39	43.23	13.39	38.23	35.24	130	189	Peak	VERTICAL
2	15719.70	46.94	54.00	-7.06	30.56	13.39	38.23	35.24	130	189	Average	VERTICAL

Temperature	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 149 / Chain 1
Test Date	Apr. 30, 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	11489.11	59.65	74.00	-14.35	43.95	10.75	39.70	34.75	102	115	Peak	HORIZONTAL
2	11489.21	46.69	54.00	-7.31	30.99	10.75	39.70	34.75	102	115	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	11488.84	59.82	74.00	-14.18	44.12	10.75	39.70	34.75	100	150	Peak	VERTICAL
2	11489.30	46.56	54.00	-7.44	30.86	10.75	39.70	34.75	100	150	Average	VERTICAL

Temperature	22℃	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 157 / Chain 1
Test Date	Apr. 30, 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	11569.73	46.46	54.00	-7.54	30.81	10.76	39.65	34.76	107	113	Average	HORIZONTAL
2	11570.42	59.60	74.00	-14.40	43.95	10.76	39.65	34.76	107	113	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	11568.78	60.04	74.00	-13.96	44.39	10.76	39.65	34.76	106	154	Peak	VERTICAL
2	11568.90	46.83	54.00	-7.17	31.18	10.76	39.65	34.76	106	154	Average	VERTICAL

Temperature	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 165 / Chain 1
Test Date	Apr. 30, 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	11650.30	46.09	54.00	-7.91	30.50	10.77	39.59	34.77	106	114	Average	HORIZONTAL
2	11650.44	58.91	74.00	-15.09	43.32	10.77	39.59	34.77	106	114	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	11650.70	47.06	54.00	-6.94	31.47	10.77	39.59	34.77	104	153	Average	VERTICAL
2	11650.82	59.27	74.00	-14.73	43.71	10.77	39.57	34.78	104	153	Peak	VERTICAL

Temperature	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT20 CH 36 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 30, 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	15539.51	46.45	54.00	-7.55	29.76	13.38	38.45	35.14	128	195	Average	HORIZONTAL
2	15540.14	59.10	74.00	-14.90	42.41	13.38	38.45	35.14	128	195	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	15539.78	58.62	74.00	-15.38	41.93	13.38	38.45	35.14	102	112	Peak	VERTICAL
2	15539.89	45.51	54.00	-8.49	28.82	13.38	38.45	35.14	102	112	Average	VERTICAL

Temperature	22℃	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT20 CH 40 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 30, 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	15600.03	58.86	74.00	-15.14	42.25	13.38	38.39	35.16	100	153	Peak	HORIZONTAL
2	15600.25	45.99	54.00	-8.01	29.38	13.38	38.39	35.16	100	153	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	15599.57	59.16	74.00	-14.84	42.55	13.38	38.39	35.16	107	241	Peak	VERTICAL
2	15600.41	45.81	54.00	-8.19	29.20	13.38	38.39	35.16	107	241	Average	VERTICAL

Temperature	22℃	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT20 CH 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 30, 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	15720.31	60.22	74.00	-13.78	43.84	13.39	38.23	35.24	140	110	Peak	HORIZONTAL
2	15720.57	46.93	54.00	-7.07	30.55	13.39	38.23	35.24	140	110	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	15719.83	46.52	54.00	-7.48	30.14	13.39	38.23	35.24	122	206	Average	VERTICAL
2	15720.03	59.59	74.00	-14.41	43.21	13.39	38.23	35.24	122	206	Peak	VERTICAL

Temperature	22℃	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT20 CH 149 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 30, 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	5425.13	67.17	74.00	-6.83	59.33	7.64	35.12	34.92	206	261	Peak	HORIZONTAL
2	5425.24	53.55	54.00	-0.45	45.71	7.64	35.12	34.92	206	261	Average	HORIZONTAL
3	11489.69	42.92	54.00	-11.08	27.22	10.75	39.70	34.75	128	194	Average	HORIZONTAL
4	11490.12	55.62	74.00	-18.38	39.92	10.75	39.70	34.75	128	194	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	5424.90	62.64	74.00	-11.36	54.80	7.64	35.12	34.92	161	239	Peak	VERTICAL
2	5425.06	49.42	54.00	-4.58	41.58	7.64	35.12	34.92	161	239	Average	VERTICAL
3	11489.99	55.66	74.00	-18.34	39.96	10.75	39.70	34.75	119	173	Peak	VERTICAL
4	11490.29	42.65	54.00	-11.35	26.95	10.75	39.70	34.75	119	173	Average	VERTICAL

Temperature	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT20 CH 157 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 30, 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	5412.46	67.72	74.00	-6.28	59.92	7.61	35.11	34.92	225	257	Peak	HORIZONTAL
2	5412.92	53.53	54.00	-0.47	45.73	7.61	35.11	34.92	225	257	Average	HORIZONTAL
3	11569.59	56.20	74.00	-17.80	40.55	10.76	39.65	34.76	122	162	Peak	HORIZONTAL
4	11569.97	43.05	54.00	-10.95	27.40	10.76	39.65	34.76	122	162	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	5411.57	49.27	54.00	-4.73	41.47	7.61	35.11	34.92	159	243	Average	VERTICAL
2	5412.18	62.92	74.00	-11.08	55.12	7.61	35.11	34.92	159	243	Peak	VERTICAL
3	11569.68	56.36	74.00	-17.64	40.71	10.76	39.65	34.76	100	103	Peak	VERTICAL
4	11570.42	43.54	54.00	-10.46	27.89	10.76	39.65	34.76	100	103	Average	VERTICAL

Temperature	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT20 CH 165 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 30, 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	5424.18	67.98	74.00	-6.02	60.14	7.64	35.12	34.92	219	258	Peak	HORIZONTAL
2	5424.43	53.58	54.00	-0.42	45.74	7.64	35.12	34.92	219	258	Average	HORIZONTAL
3	11649.79	42.97	54.00	-11.03	27.38	10.77	39.59	34.77	100	247	Average	HORIZONTAL
4	11650.10	56.41	74.00	-17.59	40.82	10.77	39.59	34.77	100	247	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	5423.58	50.99	54.00	-3.01	43.15	7.64	35.12	34.92	166	242	Average	VERTICAL
2	5423.77	63.93	74.00	-10.07	56.09	7.64	35.12	34.92	166	242	Peak	VERTICAL
3	11649.66	43.24	54.00	-10.76	27.65	10.77	39.59	34.77	118	157	Average	VERTICAL
4	11649.74	55.76	74.00	-18.24	40.17	10.77	39.59	34.77	118	157	Peak	VERTICAL

Temperature	22℃	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT40 CH 38 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 30, 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	15569.76	59.08	74.00	-14.92	42.47	13.38	38.39	35.16	103	134	Peak	HORIZONTAL
2	15569.92	45.75	54.00	-8.25	29.14	13.38	38.39	35.16	103	134	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	15570.27	45.39	54.00	-8.61	28.78	13.38	38.39	35.16	110	236	Average	VERTICAL
2	15570.49	59.52	74.00	-14.48	42.91	13.38	38.39	35.16	110	236	Peak	VERTICAL

Temperature	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT40 CH 46 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 30, 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	15690.14	47.05	54.00	-6.95	30.59	13.39	38.28	35.21	105	229	Average	HORIZONTAL
2	15690.32	59.71	74.00	-14.29	43.25	13.39	38.28	35.21	105	229	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	15689.59	46.88	54.00	-7.12	30.42	13.39	38.28	35.21	100	148	Average	VERTICAL
2	15690.22	59.67	74.00	-14.33	43.21	13.39	38.28	35.21	100	148	Peak	VERTICAL

Temperature	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT40 CH 151 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 30, 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	5435.19	53.84	54.00	-0.16	45.96	7.66	35.14	34.92	217	260	Average	HORIZONTAL
2	5435.81	68.62	74.00	-5.38	60.74	7.66	35.14	34.92	217	260	Peak	HORIZONTAL
3	11510.27	55.74	74.00	-18.26	40.04	10.75	39.70	34.75	142	216	Peak	HORIZONTAL
4	11510.30	42.65	54.00	-11.35	26.95	10.75	39.70	34.75	142	216	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	5434.78	63.40	74.00	-10.60	55.52	7.66	35.14	34.92	165	242	Peak	VERTICAL
2	5435.06	50.10	54.00	-3.90	42.22	7.66	35.14	34.92	165	242	Average	VERTICAL
3	11509.78	42.90	54.00	-11.10	27.20	10.75	39.70	34.75	127	146	Average	VERTICAL
4	11510.20	55.62	74.00	-18.38	39.92	10.75	39.70	34.75	127	146	Peak	VERTICAL

Temperature	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT40 CH 159 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 30, 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	5454.64	53.71	54.00	-0.29	45.79	7.69	35.15	34.92	200	257	Average	HORIZONTAL
2	5454.96	66.89	74.00	-7.11	58.97	7.69	35.15	34.92	200	257	Peak	HORIZONTAL
3	11590.39	56.25	74.00	-17.75	40.64	10.76	39.62	34.77	103	133	Peak	HORIZONTAL
4	11590.49	42.07	54.00	-11.93	26.46	10.76	39.62	34.77	103	133	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	5453.74	63.28	74.00	-10.72	55.36	7.69	35.15	34.92	177	240	Peak	VERTICAL
2	5454.02	49.70	54.00	-4.30	41.78	7.69	35.15	34.92	177	240	Average	VERTICAL
3	11589.59	52.29	74.00	-21.71	36.68	10.76	39.62	34.77	116	230	Peak	VERTICAL
4	11590.28	39.57	54.00	-14.43	23.96	10.76	39.62	34.77	116	230	Average	VERTICAL

Note:

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

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

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

4.6. Band Edge Emissions Measurement

4.6.1. Limit

For transmitters operating in the 5.15-5.25 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 shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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

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	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 36, 40, 48 / Chain 1
Test Date	Apr. 30, 2016		

Channel 36

	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	5148.60	72.61	74.00	-1.39	65.19	7.48	34.85	34.91	213	267	Peak	HORIZONTAL
2	5150.00	53.46	54.00	-0.54	46.04	7.48	34.85	34.91	213	267	Average	HORIZONTAL
3	5183.40	100.78			93.33	7.48	34.88	34.91	213	267	Average	HORIZONTAL
4	5183.40	111.28			103.83	7.48	34.88	34.91	213	267	Peak	HORIZONTAL

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

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5149.60	49.85	54.00	-4.15	42.43	7.48	34.85	34.91	226	267	Average	HORIZONTAL
2	5150.00	63.87	74.00	-10.13	56.45	7.48	34.85	34.91	226	267	Peak	HORIZONTAL
3	5203.20	102.25			94.76	7.49	34.91	34.91	226	267	Average	HORIZONTAL
4	5203.20	113.07			105.58	7.49	34.91	34.91	226	267	Peak	HORIZONTAL

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

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5147.00	46.09	54.00	-7.91	38.67	7.48	34.85	34.91	215	268	Average	HORIZONTAL
2	5149.40	57.71	74.00	-16.29	50.29	7.48	34.85	34.91	215	268	Peak	HORIZONTAL
3	5243.60	99.31			91.78	7.50	34.94	34.91	215	268	Average	HORIZONTAL
4	5244.80	109.51			101.98	7.50	34.94	34.91	215	268	Peak	HORIZONTAL
5	5353.00	59.62	74.00	-14.38	51.92	7.56	35.05	34.91	215	268	Peak	HORIZONTAL
6	5356.00	47.46	54.00	-6.54	39.75	7.56	35.06	34.91	215	268	Average	HORIZONTAL

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

Temperature	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 149, 157, 165 / Chain 1
Test Date	Apr. 30, 2016		

Channel 149

	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	5590.00	60.61	68.20	-7.59	52.41	7.91	35.22	34.93	213	268	Peak	HORIZONTAL
2	5741.00	103.01			94.93	7.77	35.25	34.94	213	268	Average	HORIZONTAL
3	5748.00	113.82			105.74	7.77	35.25	34.94	213	268	Peak	HORIZONTAL
4	5930.00	59.81	68.20	-8.39	51.54	7.94	35.29	34.96	213	268	Peak	HORIZONTAL

Item 2, 3 are the fundamental frequency at 5745 MHz.

Channel 157

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5536.00	59.98	68.20	-8.22	51.86	7.83	35.21	34.92	214	270	Peak	HORIZONTAL
2	5781.00	102.83			94.79	7.73	35.26	34.95	214	270	Average	HORIZONTAL
3	5781.00	112.84			104.80	7.73	35.26	34.95	214	270	Peak	HORIZONTAL
4	5945.00	59.60	68.20	-8.60	51.31	7.97	35.29	34.97	214	270	Peak	HORIZONTAL

Item 2, 3 are the fundamental frequency at 5785 MHz.

Channel 165

	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	5635.00	59.53	68.20	-8.67	51.33	7.90	35.23	34.93	204	268	Peak	HORIZONTAL
2	5820.00	114.47			106.42	7.74	35.26	34.95	204	268	Peak	HORIZONTAL
3	5822.00	103.33			95.28	7.74	35.26	34.95	204	268	Average	HORIZONTAL
4	5930.00	61.01	68.20	-7.19	52.74	7.94	35.29	34.96	204	268	Peak	HORIZONTAL

Item 2, 3 are the fundamental frequency at 5825 MHz.

Temperature	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT20 CH 36, 40, 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 30, 2016		

Channel 36

	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	5102.00	64.44	74.00	-9.56	57.05	7.48	34.81	34.90	201	258	Peak	HORIZONTAL
2	5102.40	53.33	54.00	-0.67	45.94	7.48	34.81	34.90	201	258	Average	HORIZONTAL
3	5182.80	102.40			94.95	7.48	34.88	34.91	201	258	Average	HORIZONTAL
4	5182.80	113.17			105.72	7.48	34.88	34.91	201	258	Peak	HORIZONTAL

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

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5112.20	65.00	74.00	-9.00	57.60	7.48	34.82	34.90	203	258	Peak	HORIZONTAL
2	5127.20	53.86	54.00	-0.14	46.45	7.48	34.84	34.91	203	258	Average	HORIZONTAL
3	5203.00	103.67			96.18	7.49	34.91	34.91	203	258	Average	HORIZONTAL
4	5203.00	114.11			106.62	7.49	34.91	34.91	203	258	Peak	HORIZONTAL

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

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5087.00	61.72	74.00	-12.28	54.35	7.48	34.79	34.90	200	259	Peak	HORIZONTAL
2	5088.00	51.14	54.00	-2.86	43.77	7.48	34.79	34.90	200	259	Average	HORIZONTAL
3	5238.00	105.19			97.66	7.50	34.94	34.91	200	259	Average	HORIZONTAL
4	5248.00	114.81			107.25	7.51	34.96	34.91	200	259	Peak	HORIZONTAL
5	5408.00	50.61	54.00	-3.39	42.81	7.61	35.11	34.92	200	259	Average	HORIZONTAL
6	5409.00	62.27	74.00	-11.73	54.47	7.61	35.11	34.92	200	259	Peak	HORIZONTAL

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

Temperature	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT20 CH 149, 157, 165 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 30, 2016		

Channel 149

	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	5576.50	65.14	68.20	-3.06	56.94	7.91	35.22	34.93	206	250	Peak	HORIZONTAL
2	5581.00	65.33	68.20	-2.87	57.13	7.91	35.22	34.93	206	250	Peak	HORIZONTAL
3	5741.00	103.58			95.50	7.77	35.25	34.94	206	250	Average	HORIZONTAL
4	5741.00	113.85			105.77	7.77	35.25	34.94	206	250	Peak	HORIZONTAL
5	5961.00	60.93	68.20	-7.27	52.62	7.99	35.29	34.97	206	250	Peak	HORIZONTAL

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

Channel 157

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5617.00	64.09	68.20	-4.11	55.88	7.92	35.22	34.93	210	248	Peak	HORIZONTAL
2	5622.00	63.92	68.20	-4.28	55.71	7.92	35.22	34.93	210	248	Peak	HORIZONTAL
3	5781.00	102.24			94.20	7.73	35.26	34.95	210	248	Average	HORIZONTAL
4	5782.00	112.01			103.97	7.73	35.26	34.95	210	248	Peak	HORIZONTAL
5	6024.00	61.19	68.20	-7.01	52.78	8.07	35.31	34.97	210	248	Peak	HORIZONTAL

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

Channel 165

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5576.00	63.78	68.20	-4.42	55.58	7.91	35.22	34.93	203	249	Peak	HORIZONTAL
2	5579.50	63.07	68.20	-5.13	54.87	7.91	35.22	34.93	203	249	Peak	HORIZONTAL
3	5821.00	103.17			95.12	7.74	35.26	34.95	203	249	Average	HORIZONTAL
4	5821.00	112.83			104.78	7.74	35.26	34.95	203	249	Peak	HORIZONTAL
5	6042.00	61.67	68.20	-6.53	53.24	8.09	35.31	34.97	203	249	Peak	HORIZONTAL

Item 3, 4 are the fundamental frequency at 5825 MHz.

Temperature	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT40 CH 38, 46 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 30, 2016		

Channel 38

	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	5147.60	53.66	54.00	-0.34	46.24	7.48	34.85	34.91	200	261	Average	HORIZONTAL
2	5147.60	67.14	74.00	-6.86	59.72	7.48	34.85	34.91	200	261	Peak	HORIZONTAL
3	5187.60	107.55			100.08	7.48	34.90	34.91	200	261	Peak	HORIZONTAL
4	5188.00	97.87			90.40	7.48	34.90	34.91	200	261	Average	HORIZONTAL

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

Channel 46

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5067.00	62.20	74.00	-11.80	54.86	7.48	34.76	34.90	207	257	Peak	HORIZONTAL
2	5068.00	50.97	54.00	-3.03	43.61	7.48	34.78	34.90	207	257	Average	HORIZONTAL
3	5228.00	103.33			95.81	7.50	34.93	34.91	207	257	Average	HORIZONTAL
4	5228.00	112.93			105.41	7.50	34.93	34.91	207	257	Peak	HORIZONTAL
5	5379.00	62.29	74.00	-11.71	54.56	7.57	35.08	34.92	207	257	Peak	HORIZONTAL
6	5388.00	51.17	54.00	-2.83	43.42	7.58	35.09	34.92	207	257	Average	HORIZONTAL

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

Temperature	22°C	Humidity	54%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT40 CH 151, 159 / Chain 1 + Chain 2 + Chain 3
Test Date	Apr. 30, 2016		

Channel 151

	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	5520.00	64.20	68.20	-4.00	56.12	7.80	35.20	34.92	208	250	Peak	HORIZONTAL
2	5582.00	64.54	68.20	-3.66	56.34	7.91	35.22	34.93	208	250	Peak	HORIZONTAL
3	5756.00	101.24			93.19	7.75	35.25	34.95	208	250	Average	HORIZONTAL
4	5756.00	110.09			102.04	7.75	35.25	34.95	208	250	Peak	HORIZONTAL
5	5988.00	61.76	68.20	-6.44	53.41	8.02	35.30	34.97	208	250	Peak	HORIZONTAL

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

Channel 159

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	5547.00	64.33	68.20	-3.87	56.18	7.86	35.21	34.92	216	249	Peak	HORIZONTAL
2	5626.00	63.94	68.20	-4.26	55.74	7.90	35.23	34.93	216	249	Peak	HORIZONTAL
3	5632.00	63.81	68.20	-4.39	55.61	7.90	35.23	34.93	216	249	Peak	HORIZONTAL
4	5796.00	100.49			92.47	7.71	35.26	34.95	216	249	Average	HORIZONTAL
5	5797.00	110.17			102.15	7.71	35.26	34.95	216	249	Peak	HORIZONTAL
6	5988.00	61.32	68.20	-6.88	52.97	8.02	35.30	34.97	216	249	Peak	HORIZONTAL

Item 4, 5 are the fundamental frequency at 5795 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

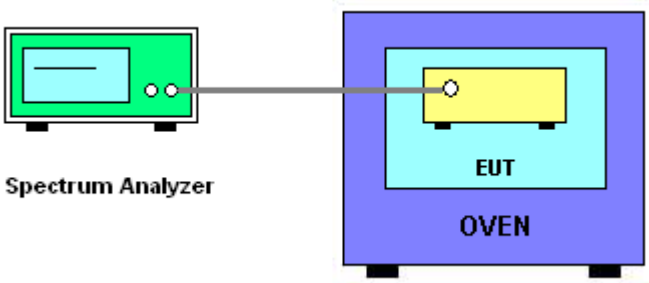
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

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 -30°C~50°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	65%
Test Engineer	Andy Tsai	Test Date	May 20, 2016

Mode: 20 MHz / Chain 1

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5200 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5199.9743	5199.9734	5199.9728	5199.9722
110.00	5199.9735	5199.9729	5199.9728	5199.9720
93.50	5199.9730	5199.9720	5199.9716	5199.9707
Max. Deviation (MHz)	0.0270	0.0280	0.0284	0.0293
Max. Deviation (ppm)	5.19	5.38	5.46	5.63
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5200 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
-30	5199.9704	5199.9702	5199.9698	5199.9691
-20	5199.9707	5199.9706	5199.9702	5199.9693
-10	5199.9711	5199.9703	5199.9697	5199.9696
0	5199.9715	5199.9712	5199.9703	5199.9697
10	5199.9729	5199.9719	5199.9718	5199.9714
20	5199.9735	5199.9731	5199.9725	5199.9718
30	5199.9757	5199.9750	5199.9749	5199.9739
40	5199.9764	5199.9762	5199.9756	5199.9750
50	5199.9782	5199.9779	5199.9771	5199.9767
Max. Deviation (MHz)	0.0296	0.0298	0.0303	0.0309
Max. Deviation (ppm)	5.69	5.73	5.82	5.94
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5785 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5784.9730	5784.9723	5784.9720	5784.9712
110.00	5784.9725	5784.9718	5784.9717	5784.9711
93.50	5784.9720	5784.9710	5784.9707	5784.9699
Max. Deviation (MHz)	0.0280	0.0290	0.0293	0.0301
Max. Deviation (ppm)	4.84	5.01	5.06	5.20
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5785 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
-30	5784.9660	5784.9654	5784.9646	5784.9640
-20	5784.9669	5784.9659	5784.9653	5784.9651
-10	5784.9679	5784.9670	5784.9665	5784.9664
0	5784.9696	5784.9691	5784.9684	5784.9680
10	5784.9708	5784.9701	5784.9692	5784.9683
20	5784.9725	5784.9719	5784.9713	5784.9707
30	5784.9757	5784.9748	5784.9744	5784.9736
40	5784.9773	5784.9766	5784.9756	5784.9747
50	5784.9782	5784.9778	5784.9768	5784.9764
Max. Deviation (MHz)	0.0340	0.0346	0.0354	0.0360
Max. Deviation (ppm)	5.87	5.98	6.12	6.22
Result	Complies			

Mode: 40 MHz / Chain 1

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5190 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5189.9747	5189.9745	5189.9736	5189.9732
110.00	5189.9745	5189.9741	5189.9739	5189.9734
93.50	5189.9738	5189.9736	5189.9728	5189.9718
Max. Deviation (MHz)	0.0262	0.0264	0.0272	0.0282
Max. Deviation (ppm)	5.04	5.08	5.24	5.43
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5190 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
-30	5189.9686	5189.9682	5189.9680	5189.9675
-20	5189.9689	5189.9687	5189.9685	5189.9684
-10	5189.9706	5189.9696	5189.9695	5189.9692
0	5189.9717	5189.9712	5189.9709	5189.9705
10	5189.9727	5189.9726	5189.9716	5189.9710
20	5189.9745	5189.9743	5189.9739	5189.9729
30	5189.9767	5189.9763	5189.9754	5189.9752
40	5189.9784	5189.9775	5189.9774	5189.9771
50	5189.9795	5189.9791	5189.9787	5189.9784
Max. Deviation (MHz)	0.0314	0.0318	0.0320	0.0325
Max. Deviation (ppm)	6.05	6.12	6.16	6.26
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5755 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5754.9727	5754.9723	5754.9720	5754.9712
110.00	5754.9724	5754.9723	5754.9719	5754.9712
93.50	5754.9716	5754.9709	5754.9699	5754.9697
Max. Deviation (MHz)	0.0284	0.0291	0.0301	0.0303
Max. Deviation (ppm)	4.93	5.05	5.23	5.26
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5755 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
-30	5754.9669	5754.9667	5754.9657	5754.9654
-20	5754.9679	5754.9669	5754.9666	5754.9656
-10	5754.9684	5754.9678	5754.9677	5754.9671
0	5754.9696	5754.9690	5754.9689	5754.9679
10	5754.9716	5754.9713	5754.9707	5754.9700
20	5754.9724	5754.9715	5754.9710	5754.9700
30	5754.9764	5754.9761	5754.9757	5754.9755
40	5754.9774	5754.9767	5754.9765	5754.9756
50	5754.9778	5754.9769	5754.9767	5754.9762
Max. Deviation (MHz)	0.0331	0.0333	0.0343	0.0346
Max. Deviation (ppm)	5.75	5.78	5.96	6.01
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. 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. 02, 2015	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%