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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	**PY313400243**

Product Name	Universal Dual Band WiFi Range Extender
Brand Name	NETGEAR
Model No.	WN2500RPv2
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250 MHz / 5725 ~ 5850 MHz
Received Date	Jul. 07, 2015
Final Test Date	Sep. 18, 2015
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 v01, KDB662911 D01 v02r01.**

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

Testing Laboratory
1190

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR3N1913-02	Rev. 01	Initial issue of report	Oct. 02, 2015

1. VERIFICATION OF COMPLIANCE

Product Name	:	Universal Dual Band WiFi Range Extender
Brand Name	:	NETGEAR
Model No.	:	WN2500RPv2
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 Jul. 07, 2015 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

Sam Chen

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart E				
Part	Rule Section	Description of Test	Result	Under Limit
4.1	15.407(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	6.25 dB
4.4	15.407(a)	Power Spectral Density	Complies	6.43 dB
4.5	15.407(b)	Radiated Emissions	Complies	1.81 dB
4.6	15.407(b)	Band Edge Emissions	Complies	0.03 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 (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From power adapter
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: 25.70 MHz IEEE 802.11n MCS0 (HT20): 26.05 MHz IEEE 802.11n MCS0 (HT40): 39.22 MHz Band 4: IEEE 802.11a: 25.96 MHz IEEE 802.11n MCS0 (HT20): 27.96 MHz IEEE 802.11n MCS0 (HT40): 50.36 MHz
Maximum Conducted Output Power	Band 1: IEEE 802.11a: 23.61 dBm IEEE 802.11n MCS0 (HT20): 23.75 dBm IEEE 802.11n MCS0 (HT40): 21.50 dBm Band 4: IEEE 802.11a: 23.29 dBm IEEE 802.11n MCS0 (HT20): 23.22 dBm IEEE 802.11n MCS0 (HT40): 20.92 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Note: BCM5358UB0KFBG chipset supports 2.4GHz and BCM43236BKMLG chipset supports 2.4GHz/5GHz. The 2.4GHz of BCM43236BKMLG chipset is designed only for installation and it will disable when the installation is completed. Thus, only the test of 5GHz for BCM43236BKMLG chipset is required.

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	Two (TX)	
Band width Mode	20 MHz	40 MHz
IEEE 802.11a	V	X
IEEE 802.11n	V	V

IEEE 11n Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	2	MCS 0-15
802.11n (HT40)	2	MCS 0-15
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. Accessories

Power	Brand	Model	P/N	Rating
Adapter 1	NETGEAR	SAL012F1NA	332-10366-01	Input: 100-120V~47-63Hz 0.6A Output: 12.0V, 1.0A
Adapter 2	NETGEAR	AD810F10	332-10329-02	Input: 100-120V~50/60Hz 0.3A Output: 12V, 1A
Other				
RJ-45 Cable*1: Non-shielded, 1.5m				

3.3. Table for Filed Antenna

For 2.4GHz and 5GHz Band 4

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	
					2.4GHz	5GHz (Band 4)
1	NETGEAR	WN2500RPv2	PCB Antenna	I-PEX	-	4.0
2	NETGEAR	WN2500RPv2	PCB Antenna	N/A	2.8	-
3	NETGEAR	WN2500RPv2	PCB Antenna	I-PEX	-	3.8
4	NETGEAR	WN2500RPv2	PCB Antenna	N/A	1.6	-

For 5GHz Band 1

Ant.	Brand	Model Name	Antenna Type	Connector	Correlated Directional Gain (dBi)
					5GHz (Band 1)
1	NETGEAR	WN2500RPv2	PCB Antenna	I-PEX	4.28
3	NETGEAR	WN2500RPv2	PCB Antenna	I-PEX	

Note: The EUT has four antennas.

For 2.4GHz Band:

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

Only Ant. 2 can be used as transmitting/receiving antenna.

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

Ant. 2 and Ant. 4 can be used as transmitting/receiving antennas.

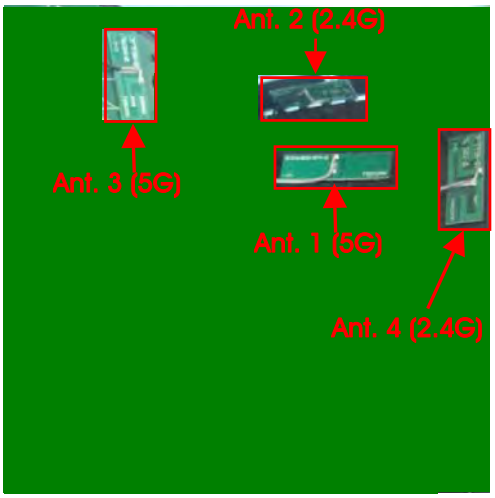
Ant. 2 and Ant. 4 could transmit/receive simultaneously.

For 5GHz Band:

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

Ant. 1 and Ant. 3 can be used as transmitting/receiving antennas.

Ant. 1 and Ant. 3 could transmit/receive simultaneously.



3.4. Table for Carrier Frequencies

There are three bandwidth systems.

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

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

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	-	-

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

The following test modes were performed for all tests:

For Radiated Emission Above 1GHz and Band Edge Emission test:

The EUT was performed at standing and laying position, and the worst case was found at standing. So the measurement will follow this same test configuration.

For Co-location MPE test:

The EUT could be applied with 2.4GHz WLAN function and 5GHz WLAN function; therefore Co-location Maximum Permissible Exposure (Please refer to FA3N1913-02) test is added for simultaneously transmit between 2.4GHz WLAN function and 5GHz WLAN function.

3.6. Table for Testing Locations

Test Site Location					
Address:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.				
TEL:	886-3-656-9065				
FAX:	886-3-656-9085				
Test Site No.	Site Category	Location	FCC 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 Class II Change

This product is an extension of original one reported under Sporton project number: FR3N1913.

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

Modifications	Performance Checking
1. Changing 5GHz Band 1 to “New Rules” from “Old Rules”. 2. Changing 5GHz Band 4 to “New Rules” from “Old Rules”.	1. 26dB Spectrum Bandwidth and 99% Occupied Bandwidth. 2. 6dB Spectrum Bandwidth. 3. Max. Conducted Output Power. 4. Power Spectral Density. 5. Radiated Emission Above 1GHz. 6. Band Edge Emission. 7. Frequency Stability.

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	Mtool 1.0.0.9					
Mode	Test Frequency (MHz)					
	NCB: 20MHz					
	5180 MHz	5200 MHz	5240 MHz	5745 MHz	5785 MHz	5825 MHz
802.11a	67	80	76	59	80	72
802.11n MCS0 HT20	65	80	76	57	80	71

Mode	NCB: 40MHz			
802.11n MCS0 HT40	5190 MHz	5230 MHz	5755 MHz	5795 MHz
	46	71	42	68

3.10. EUT Operation during Test

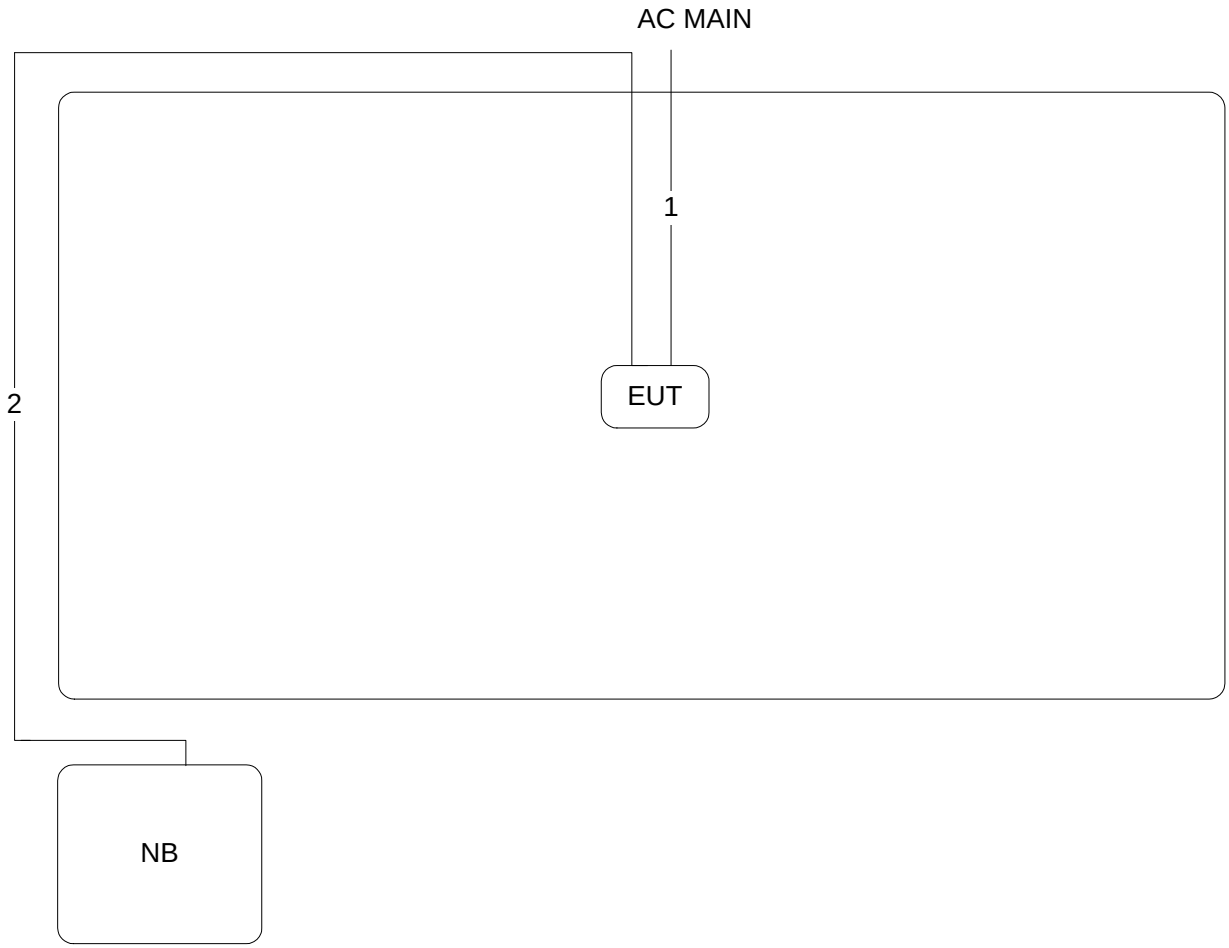
The EUT was programmed to be in continuously transmitting mode.

3.11. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	2.051	2.091	98.09	0.08	0.01
802.11n MCS0 HT20	1.890	2.000	94.50	0.25	0.53
802.11n MCS0 HT40	0.928	0.942	98.51	0.07	0.01

3.12. Test Configurations

3.12.1. Radiation Emissions Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	1.8m
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

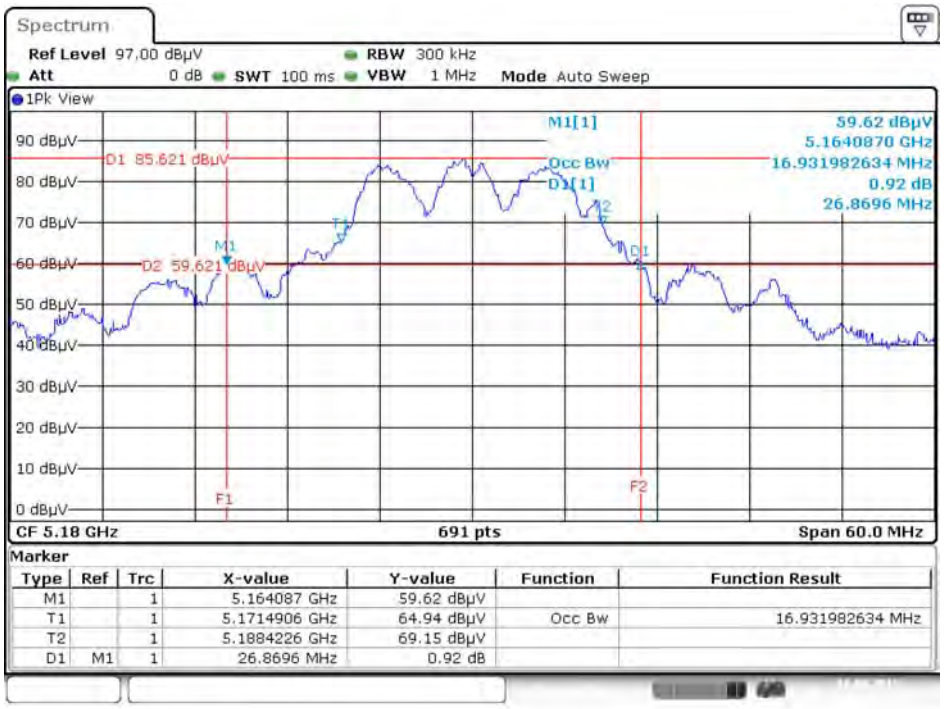
The EUT was programmed to be in continuously transmitting mode.

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

Temperature	25℃	Humidity	60%
Test Engineer	Serway Li		

Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5180 MHz	26.87	16.93
	5200 MHz	41.22	25.70
	5240 MHz	36.52	20.75
	5745 MHz	21.74	16.32
	5785 MHz	40.70	25.96
	5825 MHz	36.09	20.32
802.11n MCS0 HT20	5180 MHz	33.13	17.45
	5200 MHz	43.13	26.05
	5240 MHz	40.35	19.71
	5745 MHz	25.13	17.28
	5785 MHz	44.96	27.96
	5825 MHz	39.91	19.88
802.11n MCS0 HT40	5190 MHz	43.04	37.19
	5230 MHz	85.80	39.22
	5755 MHz	43.04	37.05
	5795 MHz	90.73	50.36

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



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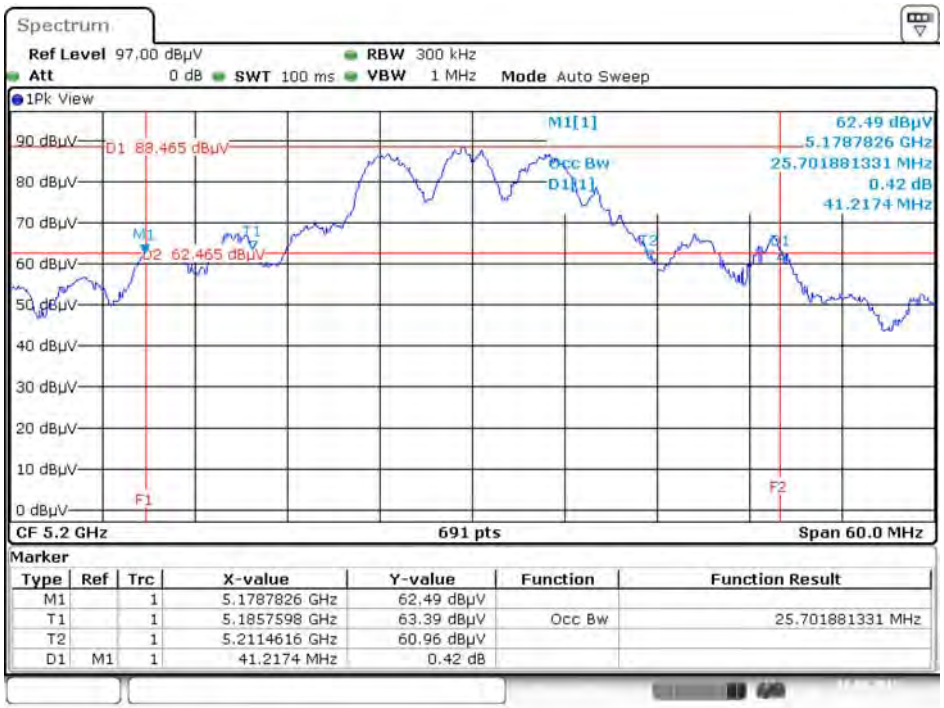
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 3 / 5200 MHz



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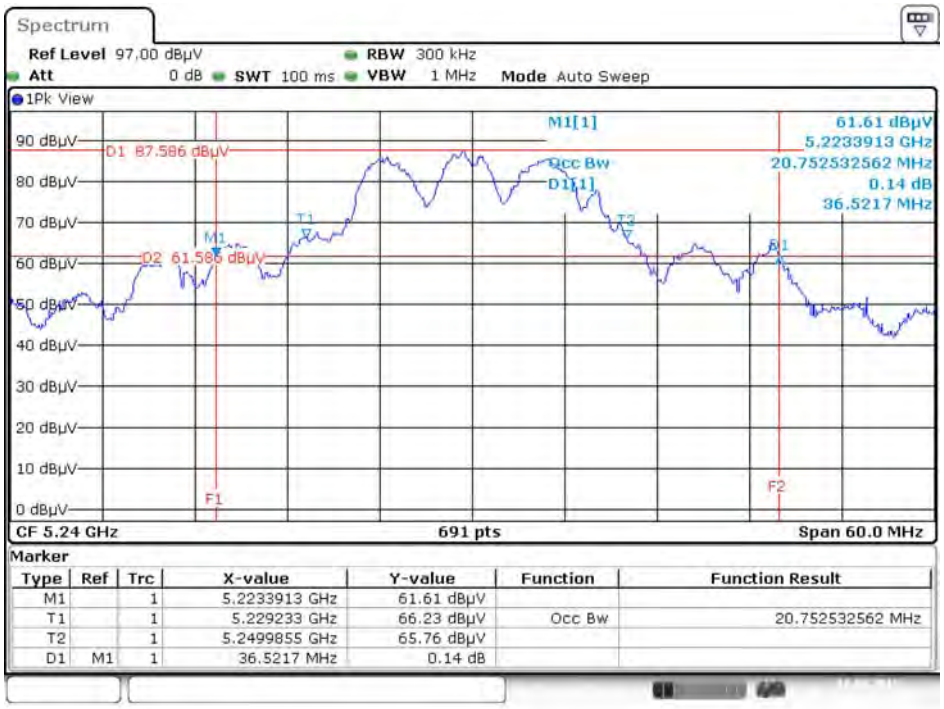
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 3 / 5240 MHz



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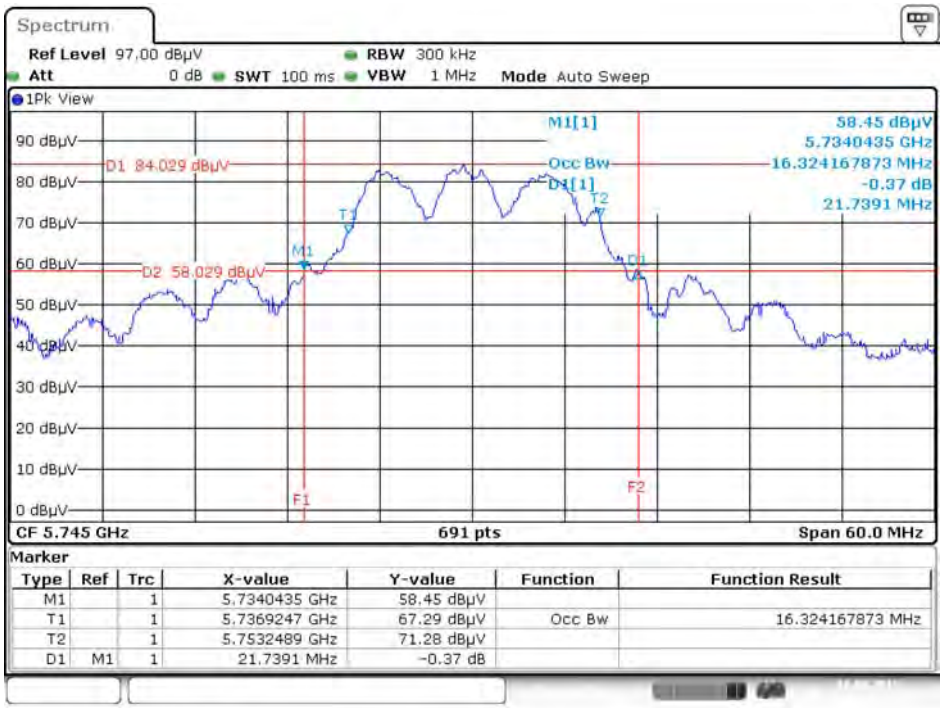
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 3 / 5745 MHz



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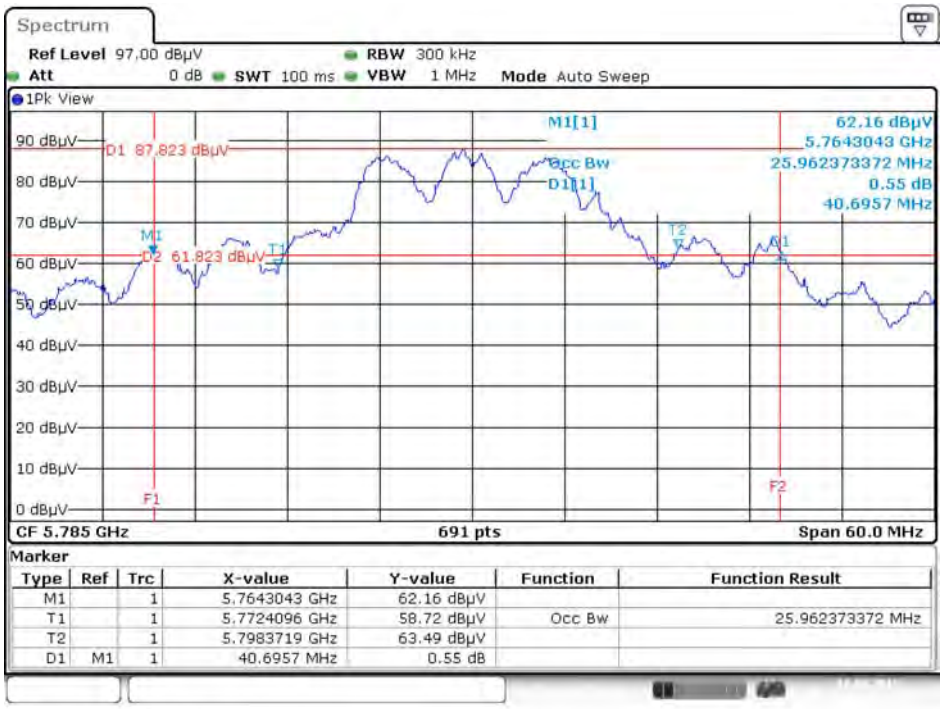
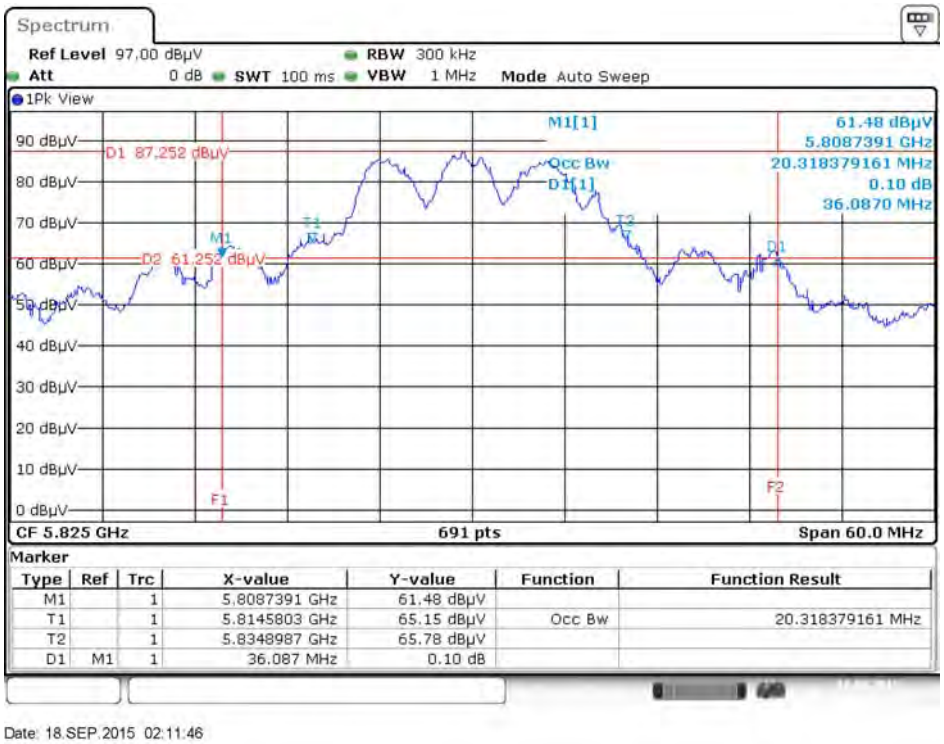
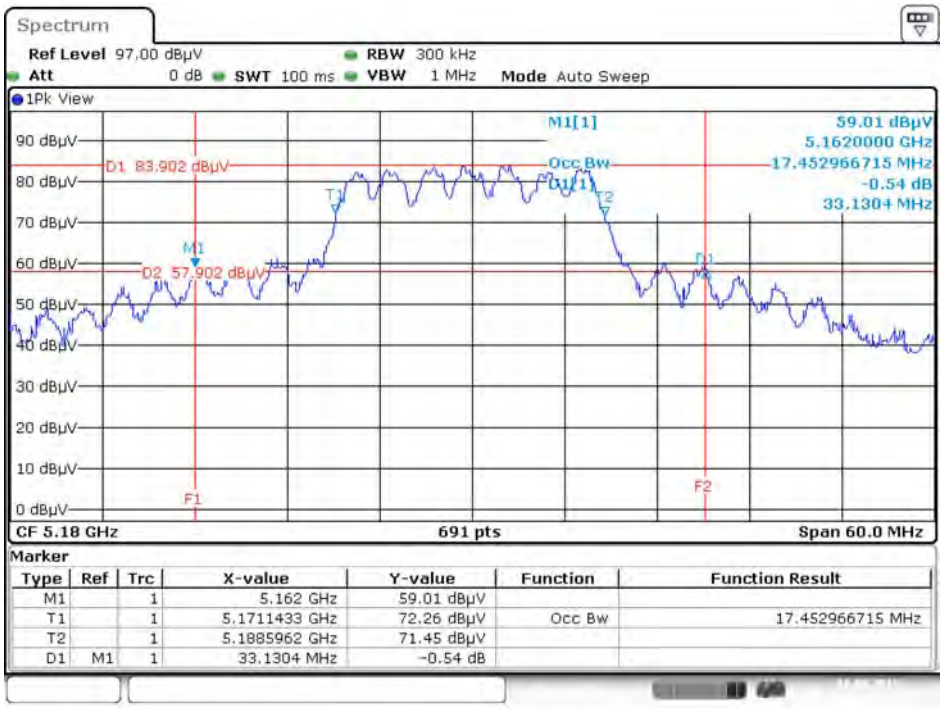
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 3 / 5785 MHz



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



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



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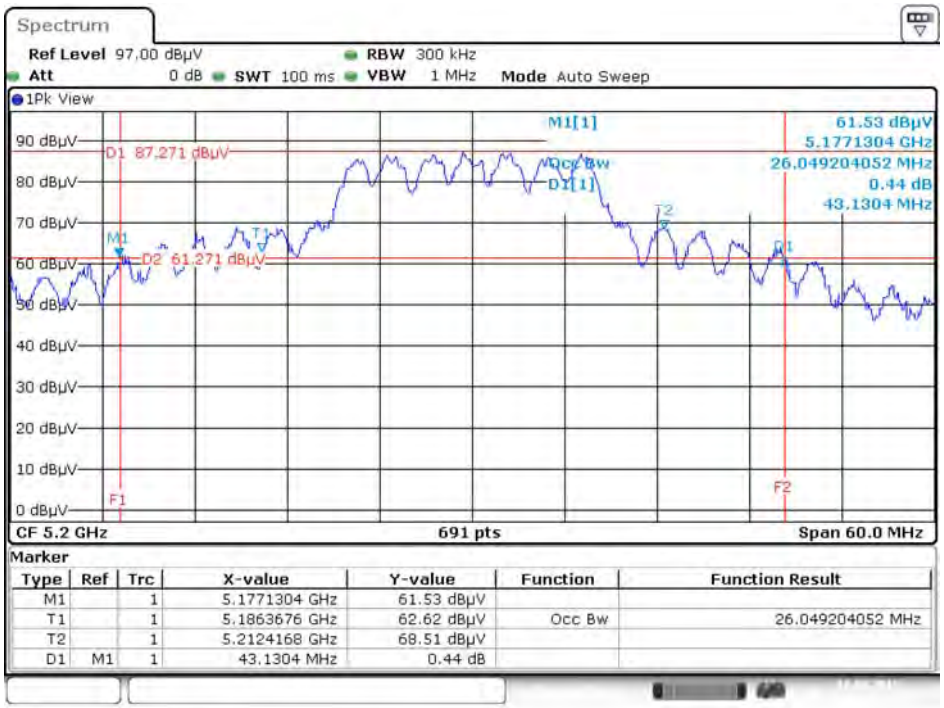
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Ant. 1 + Ant. 3 / 5200 MHz



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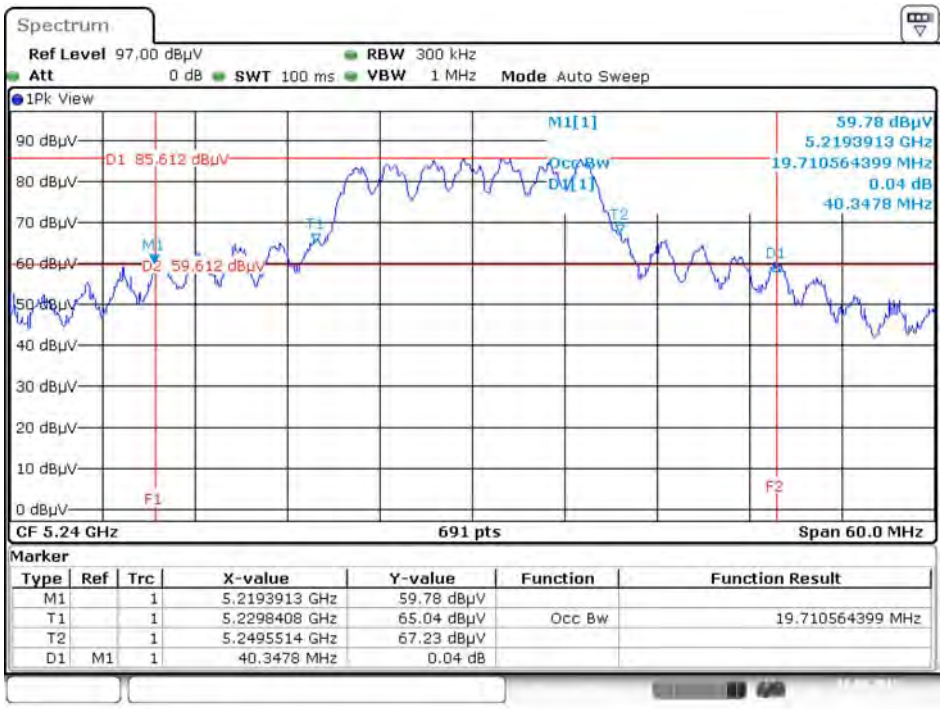
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Ant. 1 + Ant. 3 / 5240 MHz



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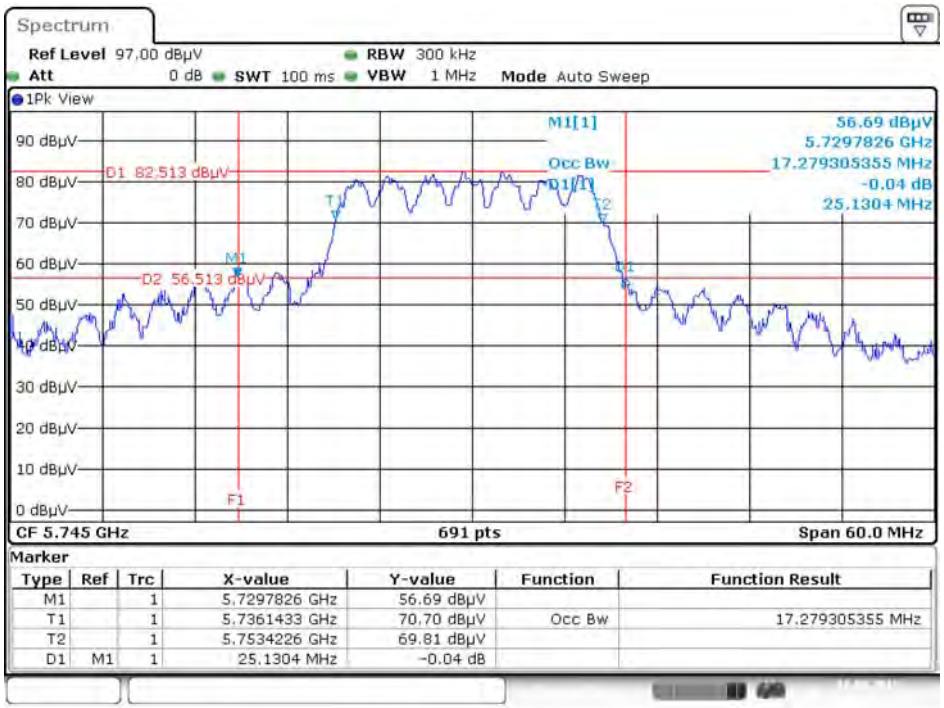
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Ant. 1 + Ant. 3 / 5745 MHz



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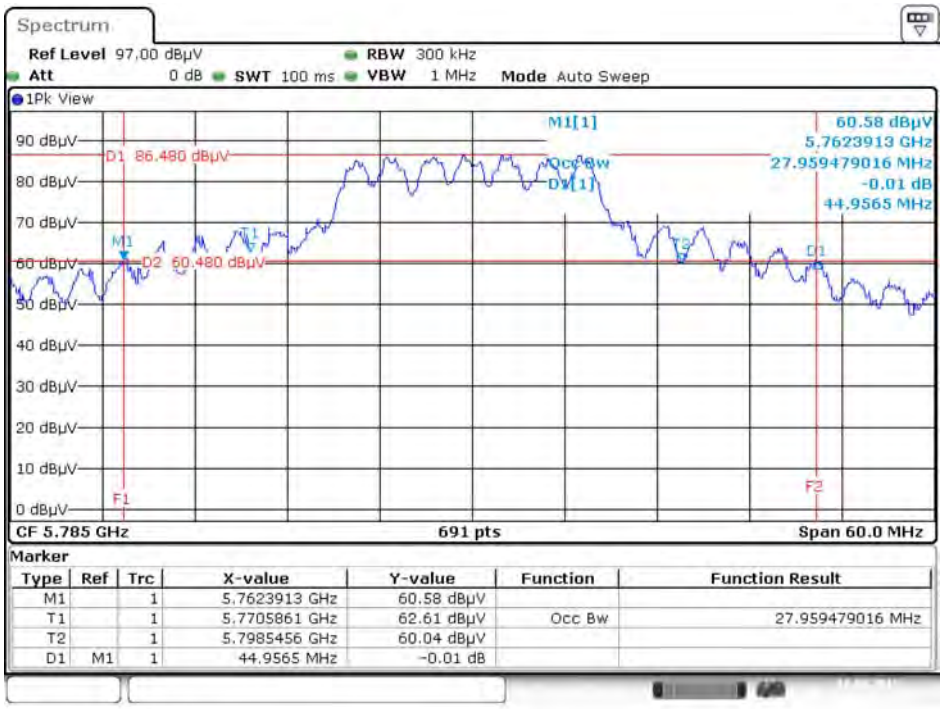
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Ant. 1 + Ant. 3 / 5785 MHz



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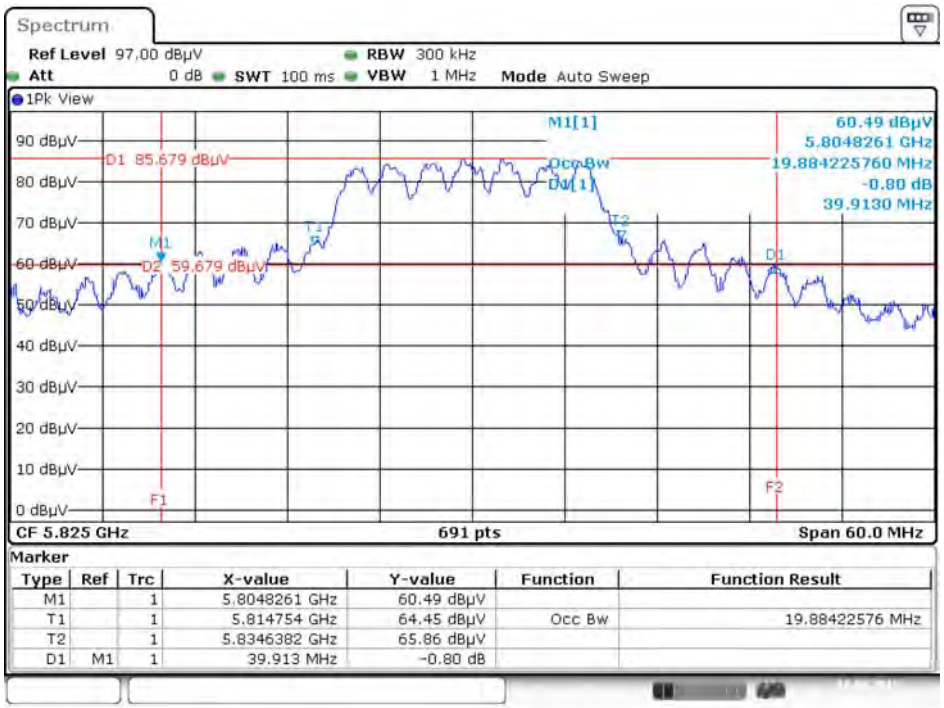
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Ant. 1 + Ant. 3 / 5825 MHz



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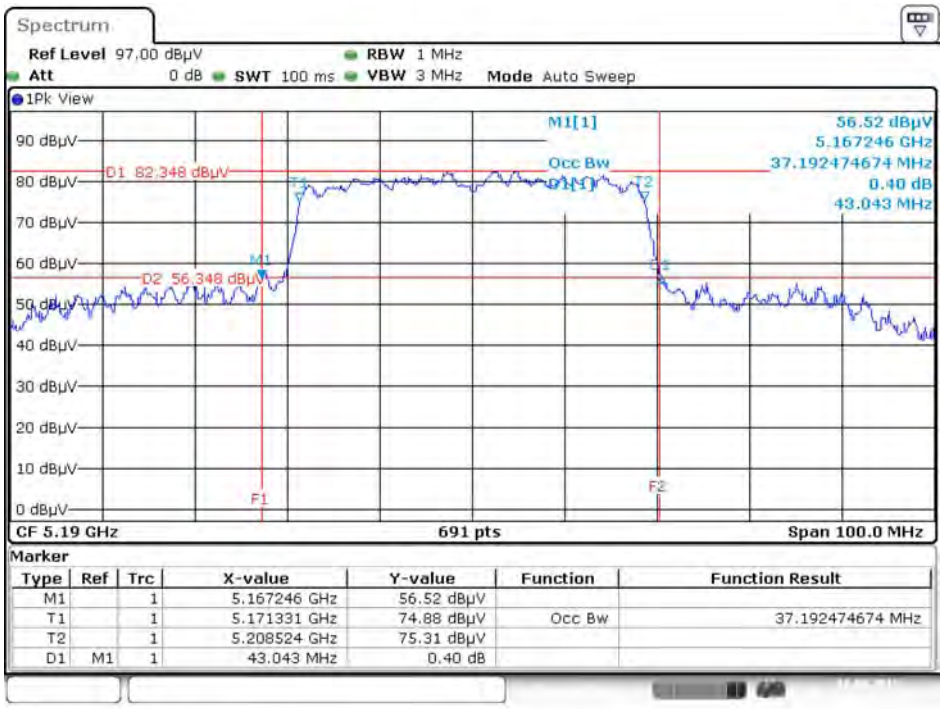
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / Ant. 1 + Ant. 3 / 5190 MHz



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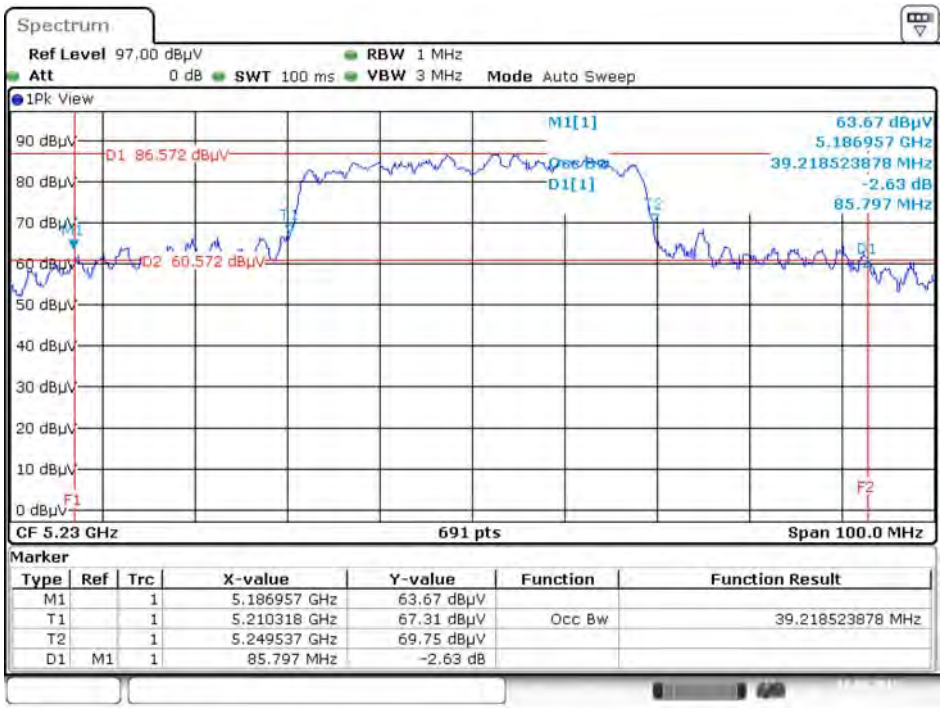
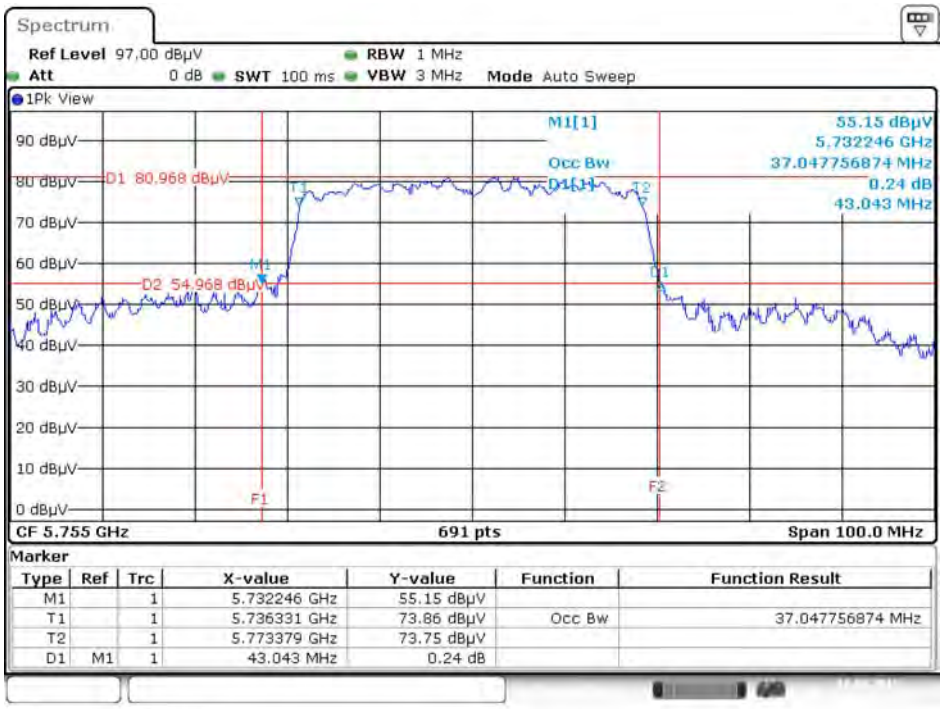
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / Ant. 1 + Ant. 3 / 5230 MHz



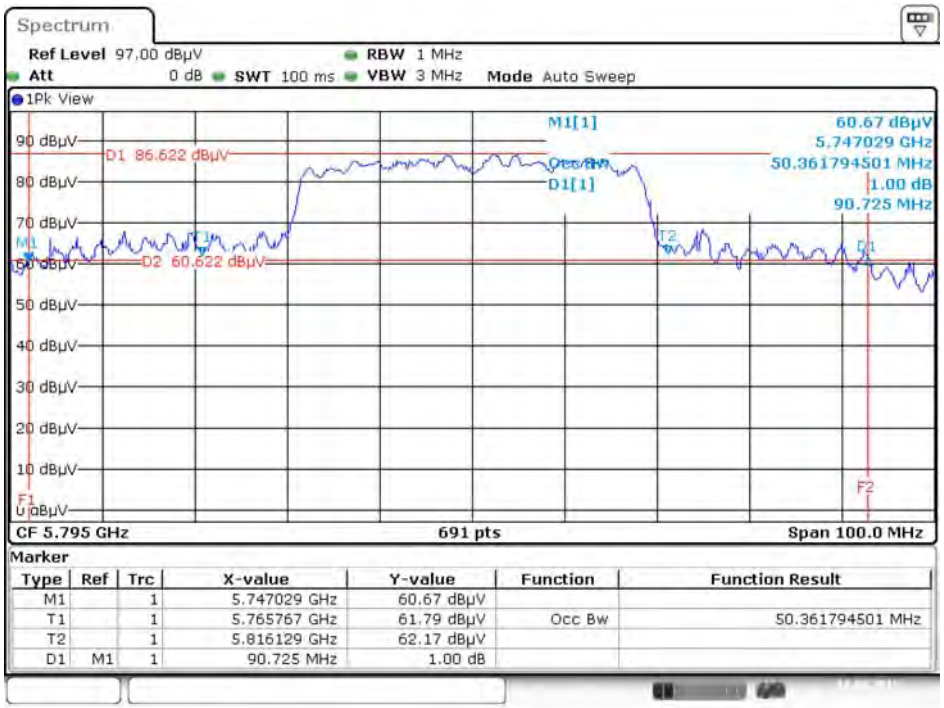
Date: 18.SEP.2015 01:48:49

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



Date: 18.SEP.2015 01:50:32

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



Date: 18.SEP.2015 01:52:57

4.2. 6dB Spectrum Bandwidth Measurement

4.2.1. Limit

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

4.2.2. Measuring Instruments and Setting

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

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

4.2.3. Test Procedures

For Radiated 6dB Bandwidth Measurement:

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

4.2.4. Test Setup Layout

For Radiated 6dB Bandwidth Measurement:

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

4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of 6dB Spectrum Bandwidth

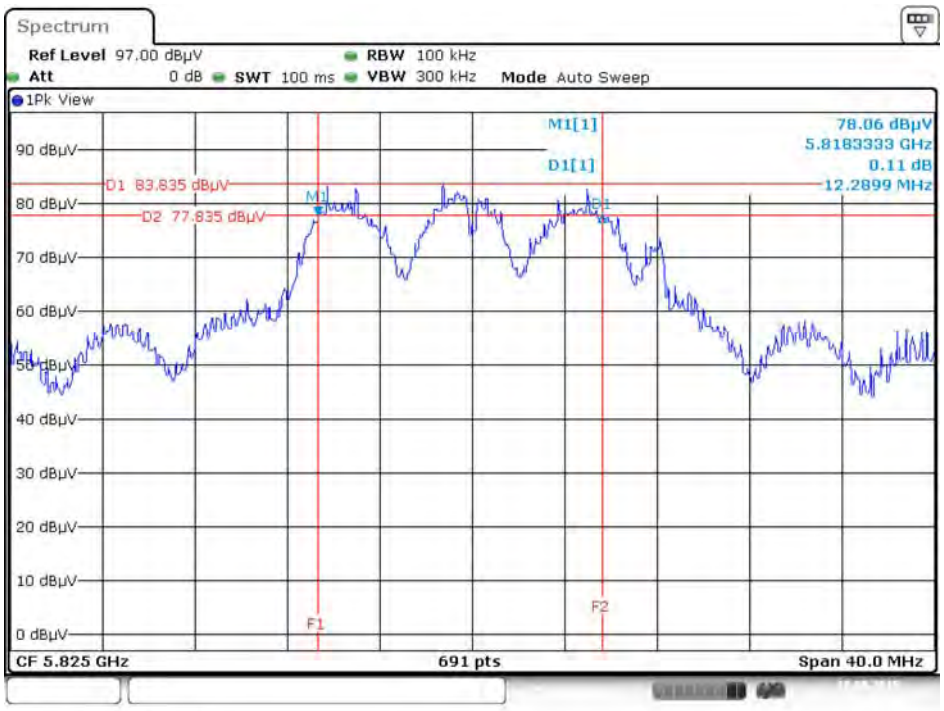
Temperature	25℃	Humidity	60%
Test Engineer	Serway Li		

Mode	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11a	5745 MHz	12.93	500	Complies
	5785 MHz	12.93	500	Complies
	5825 MHz	12.29	500	Complies
802.11n MCS0 HT20	5745 MHz	15.54	500	Complies
	5785 MHz	15.42	500	Complies
	5825 MHz	15.42	500	Complies
802.11n MCS0 HT40	5755 MHz	35.13	500	Complies
	5795 MHz	35.71	500	Complies

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

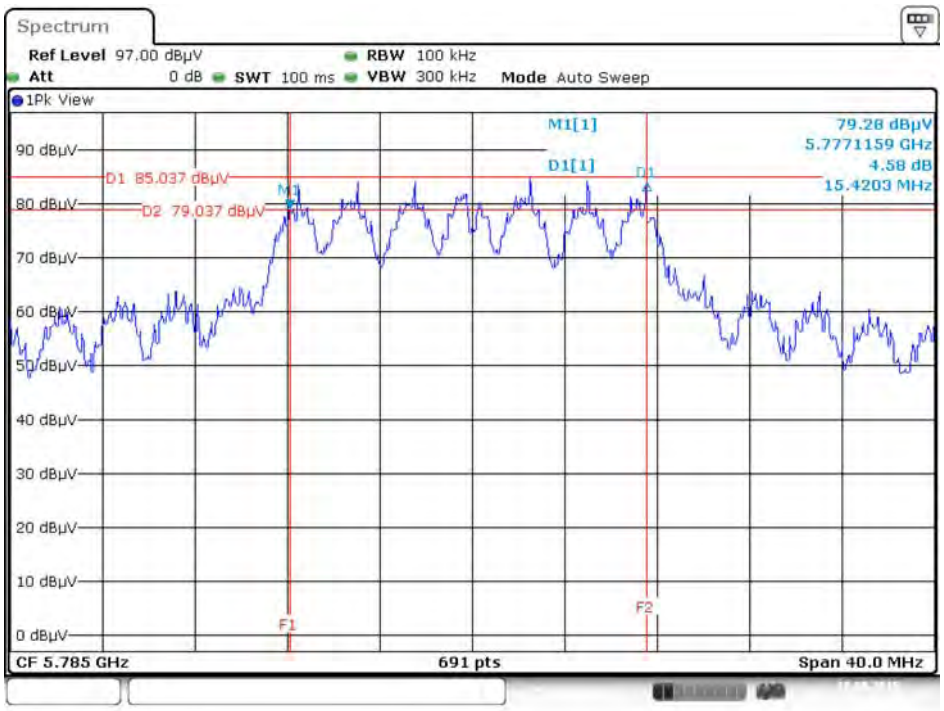
For plots, only the channel with worse result was shown.

6 dB Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 3 / 5825 MHz



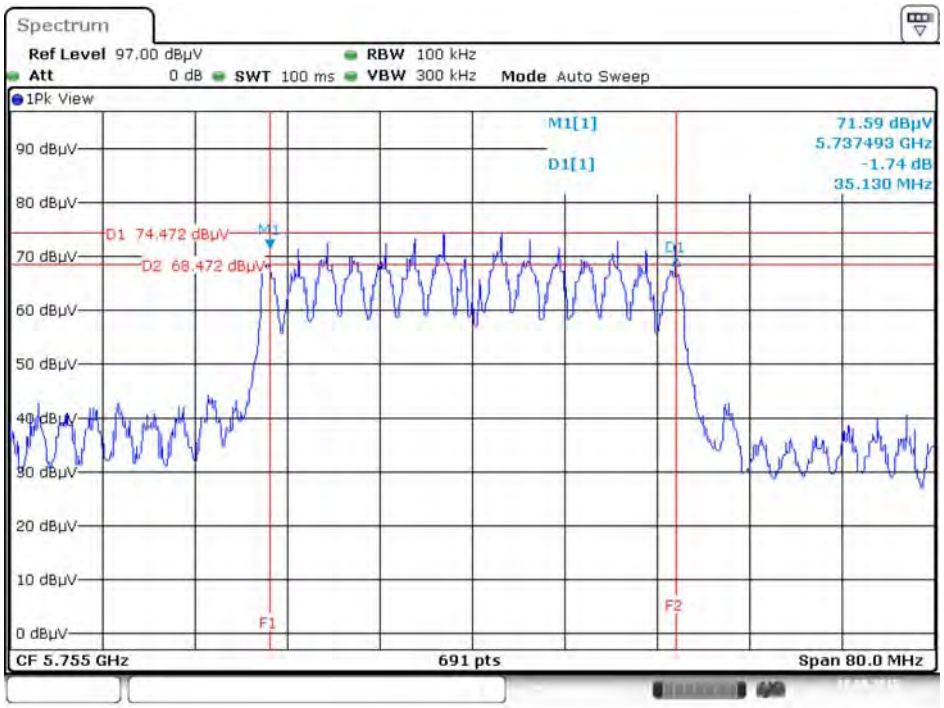
Date: 18.SEP.2015 02:17:27

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Ant. 1 + Ant. 3 / 5785 MHz



Date: 18.SEP.2015 02:19:29

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



Date: 18.SEP.2015 02:21:58

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

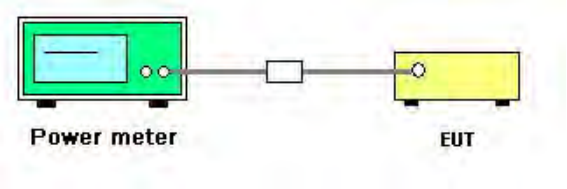
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

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. 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℃	Humidity	60%
Test Engineer	Serway Li	Test Date	Sep. 18, 2015

Mode	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Ant. 1	Ant. 3	Total		
802.11a	5180 MHz	17.34	17.78	20.58	30.00	Complies
	5200 MHz	20.38	20.81	23.61	30.00	Complies
	5240 MHz	19.36	19.56	22.47	30.00	Complies
	5745 MHz	15.97	16.04	19.02	30.00	Complies
	5785 MHz	19.73	20.76	23.29	30.00	Complies
	5825 MHz	19.17	19.05	22.12	30.00	Complies
802.11n MCS0 HT20	5180 MHz	16.97	17.88	20.46	30.00	Complies
	5200 MHz	20.48	20.98	23.75	30.00	Complies
	5240 MHz	19.34	19.76	22.57	30.00	Complies
	5745 MHz	15.26	15.41	18.35	30.00	Complies
	5785 MHz	19.65	20.71	23.22	30.00	Complies
	5825 MHz	18.85	19.61	22.26	30.00	Complies
802.11n MCS0 HT40	5190 MHz	12.37	12.97	15.69	30.00	Complies
	5230 MHz	18.31	18.66	21.50	30.00	Complies
	5755 MHz	12.26	11.87	15.08	30.00	Complies
	5795 MHz	17.94	17.88	20.92	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

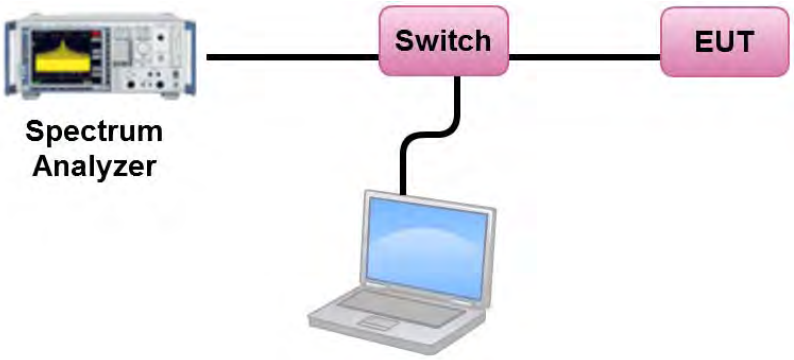
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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. Multiple antenna systems was performed in accordance KDB662911 D01 v02r01 in-Band Power Spectral Density (PSD) Measurements (a) Measure and sum the spectra across the outputs.
4. When measuring first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3 and so on up to the Nth output to obtain the value for the first frequency bin of the summed spectrum. The summed spectrum value for each of the other frequency bins is computed in the same way.
5. For 5.725~5.85 GHz, the measured result of PSD level must add 10log(500kHz/RBW) and the final result should ≤ 30 dBm.

4.4.4. Test Setup Layout



4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7. Test Result of Power Spectral Density

Temperature	25℃	Humidity	60%
Test Engineer	Serway Li	Test Date	Sep. 18, 2015

Configuration IEEE 802.11a / Ant. 1 + Ant. 3

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	7.40	17.00	Complies
40	5200 MHz	10.38	17.00	Complies
48	5240 MHz	9.27	17.00	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =4.28dBi <6dBi, so the limit doesn't reduce.

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
149	5745 MHz	5.89	-3.01	2.88	29.09	Complies
157	5785 MHz	10.02	-3.01	7.01	29.09	Complies
165	5825 MHz	8.97	-3.01	5.96	29.09	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =6.91dBi >6dBi, so the limit=30 – (6.91 – 6)=29.09dBm.

Configuration IEEE 802.11n MCS0 HT20 / Ant. 1 + Ant. 3

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	7.21	17.00	Complies
40	5200 MHz	10.57	17.00	Complies
48	5240 MHz	9.30	17.00	Complies

Note: $Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =4.28dBi <6dBi, so the limit doesn't reduce.

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
149	5745 MHz	5.14	-3.01	2.13	29.09	Complies
157	5785 MHz	10.06	-3.01	7.05	29.09	Complies
165	5825 MHz	9.14	-3.01	6.13	29.09	Complies

Note: $Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =6.91dBi >6dBi, so the limit=30 – (6.91 – 6)=29.09dBm.

Configuration IEEE 802.11n MCS0 HT40 / Ant. 1 + Ant. 3

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
38	5190 MHz	-0.48	17.00	Complies
46	5230 MHz	5.39	17.00	Complies

Note: $Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =4.28dBi <6dBi, so the limit doesn't reduce.

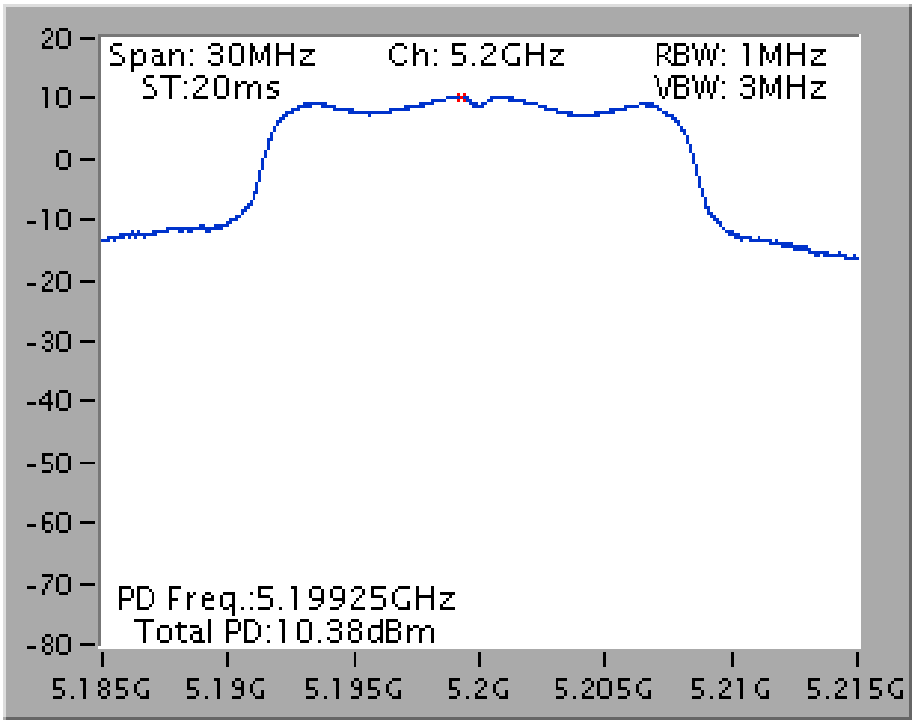
Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
151	5755 MHz	-1.05	-3.01	-4.06	29.09	Complies
159	5795 MHz	4.77	-3.01	1.76	29.09	Complies

Note: $Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =6.91dBi >6dBi, so the limit=30 – (6.91 – 6)=29.09dBm.

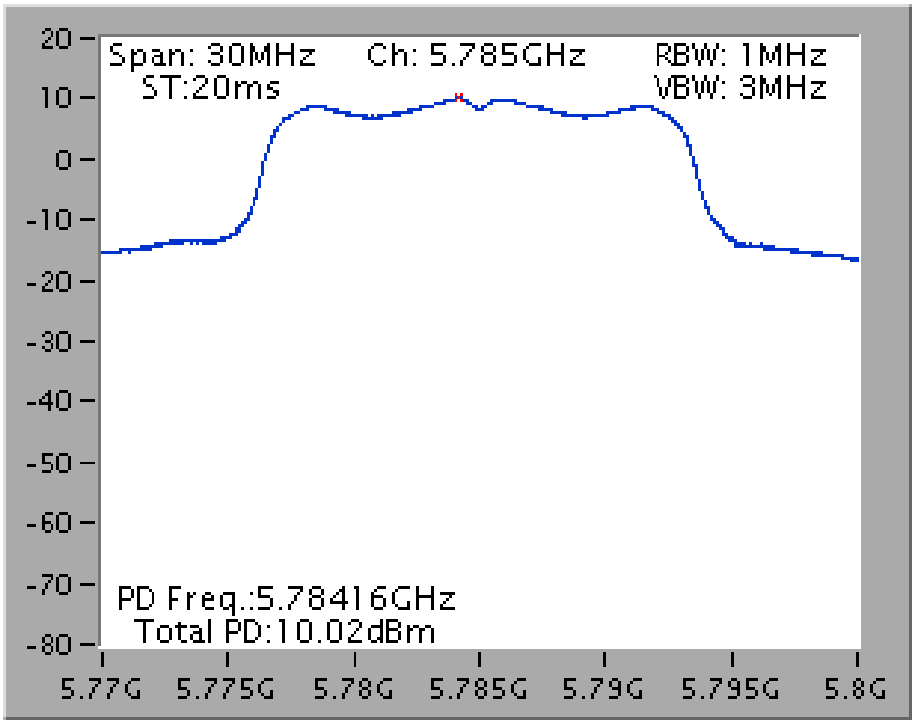
Note: All the test values were listed in the report.

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

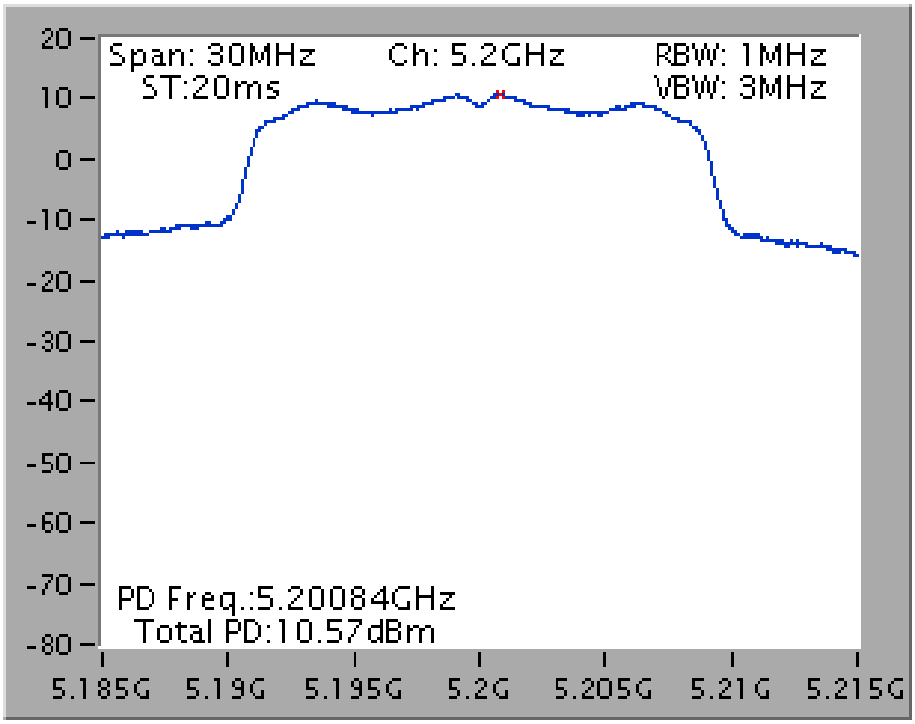
Power Density Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 3 / 5200 MHz



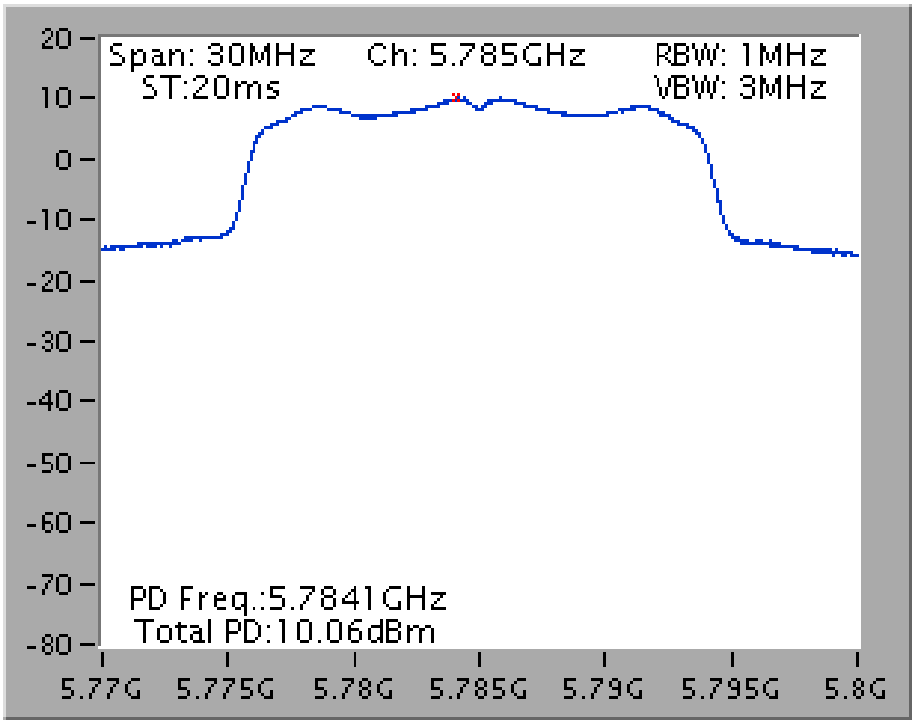
Power Density Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 3 / 5785 MHz



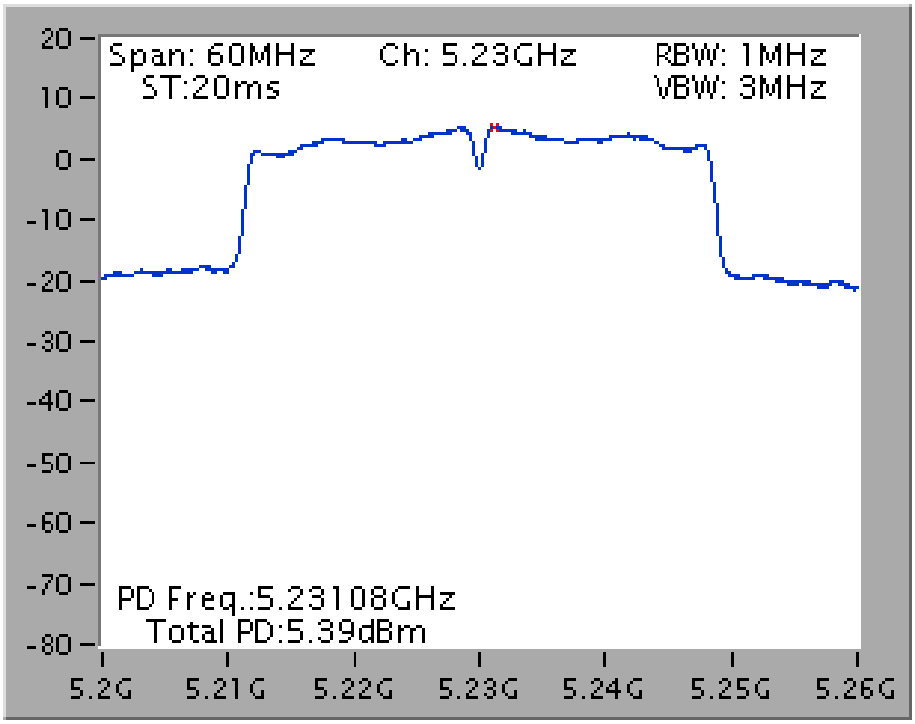
Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / Ant. 1 + Ant. 3 / 5200 MHz



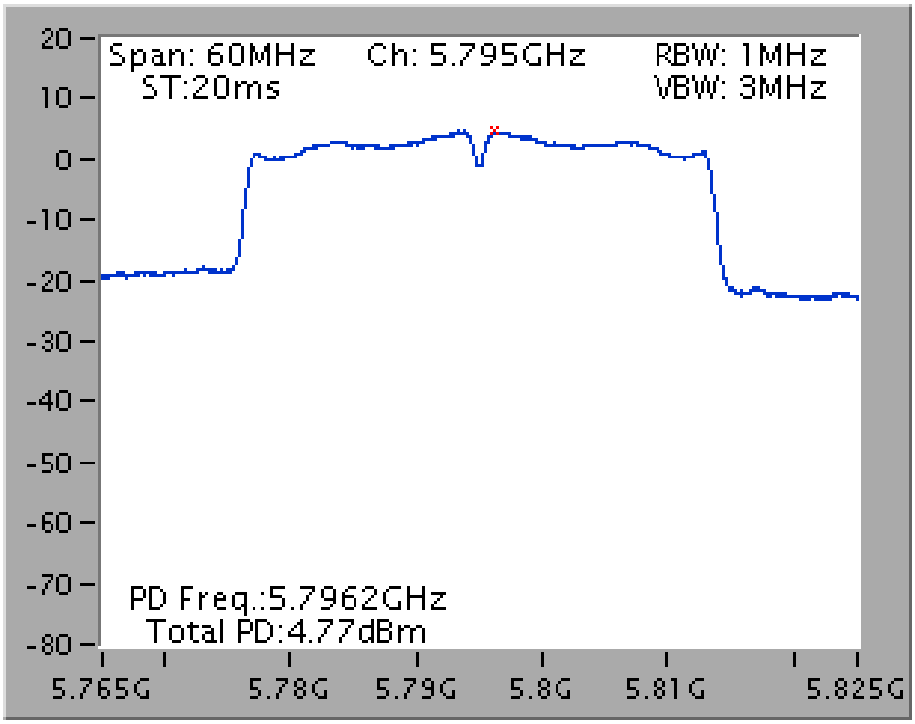
Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / Ant. 1 + Ant. 3 / 5785 MHz



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



Power Density Plot on Configuration IEEE 802.11n MCS0 HT40 / Ant. 1 + Ant. 3 / 5795 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.

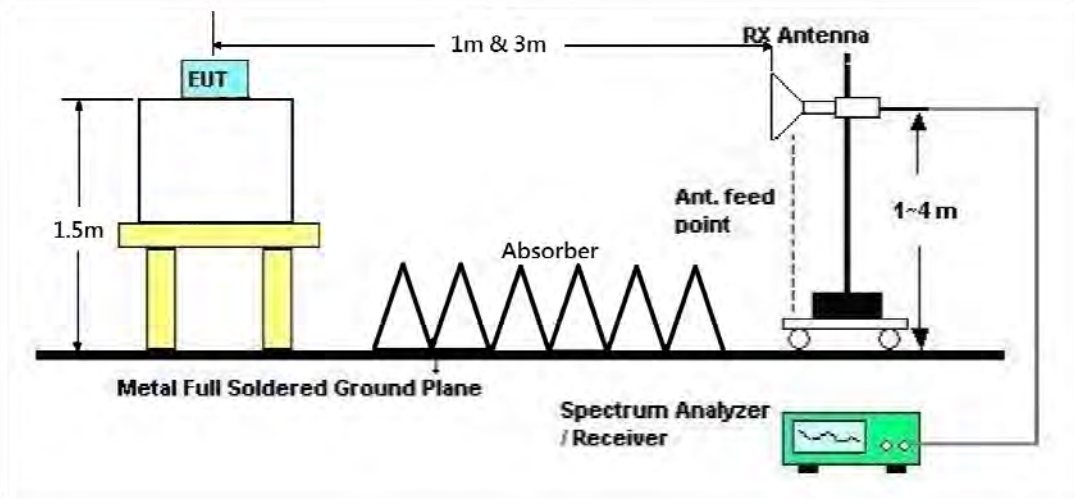
Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	40 GHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	1MHz / 3MHz for peak

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	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11a CH 36 / Ant. 1 + Ant. 3
Test Date	Jul. 07, 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	15538.81	50.42	54.00	-3.58	33.40	12.58	38.14	33.70	Average	144	251	HORIZONTAL
2	15543.62	63.42	74.00	-10.58	46.42	12.58	38.12	33.70	Peak	144	251	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	15540.90	60.95	74.00	-13.05	43.93	12.58	38.14	33.70	197	251	Peak	VERTICAL
2	15545.87	48.25	54.00	-5.75	31.25	12.58	38.12	33.70	197	251	Average	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11a CH 40 / Ant. 1 + Ant. 3
Test Date	Jul. 08, 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	15597.79	49.30	54.00	-4.70	32.44	12.58	38.03	33.75	Average	195	161	HORIZONTAL
2	15607.12	62.16	74.00	-11.84	45.33	12.58	38.03	33.78	Peak	195	161	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	15598.69	51.66	54.00	-2.34	34.80	12.58	38.03	33.75	Average	185	249	VERTICAL
2	15603.65	65.20	74.00	-8.80	48.37	12.58	38.03	33.78	Peak	185	249	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11a CH 48 / Ant. 1 + Ant. 3
Test Date	Jul. 08, 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	15716.70	46.85	54.00	-7.15	30.32	12.57	37.84	33.88	Average	209	172	HORIZONTAL
2	15727.02	59.45	74.00	-14.55	42.94	12.57	37.84	33.90	Peak	209	172	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	15718.81	51.86	54.00	-2.14	35.33	12.57	37.84	33.88	Average	159	253	VERTICAL
2	15723.53	64.94	74.00	-9.06	48.41	12.57	37.84	33.88	Peak	159	253	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11a CH 149 / Ant. 1 + Ant. 3
Test Date	Jul. 08, 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	11488.27	61.42	74.00	-12.58	45.20	10.71	38.88	33.37	Peak	151	88	HORIZONTAL
2	11488.30	48.80	54.00	-5.20	32.58	10.71	38.88	33.37	Average	151	88	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	11488.37	46.11	54.00	-7.89	29.89	10.71	38.88	33.37	Average	167	235	VERTICAL
2	11493.69	59.10	74.00	-14.90	42.87	10.72	38.88	33.37	Peak	167	235	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11a CH 157 / Ant. 1 + Ant. 3
Test Date	Jul. 08, 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	11570.06	51.45	54.00	-2.55	35.14	10.76	38.94	33.39	Average	152	346	HORIZONTAL
2	11570.06	64.13	74.00	-9.87	47.82	10.76	38.94	33.39	Peak	152	346	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	11569.49	63.86	74.00	-10.14	47.55	10.75	38.94	33.38	Peak	147	117	VERTICAL
2	11569.68	52.19	54.00	-1.81	35.88	10.75	38.94	33.38	Average	147	117	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11a CH 165 / Ant. 1 + Ant. 3
Test Date	Jul. 08, 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	11649.71	63.06	74.00	-10.94	46.68	10.81	38.98	33.41	Peak	148	49	HORIZONTAL
2	11649.87	50.65	54.00	-3.35	34.27	10.81	38.98	33.41	Average	148	49	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	11650.00	62.79	74.00	-11.21	46.41	10.81	38.98	33.41	Peak	152	109	VERTICAL
2	11650.32	50.21	54.00	-3.79	33.83	10.81	38.98	33.41	Average	152	109	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT20 CH 36 / Ant. 1 + Ant. 3
Test Date	Jul. 08, 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	15533.75	45.12	54.00	-8.88	28.10	12.58	38.14	33.70	Average	152	257	HORIZONTAL
2	15542.88	58.35	74.00	-15.65	41.33	12.58	38.14	33.70	Peak	152	257	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	15537.05	48.58	54.00	-5.42	31.56	12.58	38.14	33.70	Average	156	248	VERTICAL
2	15539.13	61.35	74.00	-12.65	44.33	12.58	38.14	33.70	Peak	156	248	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT20 CH 40 / Ant. 1 + Ant. 3
Test Date	Jul. 08, 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	15600.87	47.61	54.00	-6.39	30.78	12.58	38.03	33.78	Average	197	165	HORIZONTAL
2	15601.25	60.65	74.00	-13.35	43.82	12.58	38.03	33.78	Peak	197	165	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	15597.05	50.70	54.00	-3.30	33.84	12.58	38.03	33.75	Average	154	253	VERTICAL
2	15597.34	63.34	74.00	-10.66	46.48	12.58	38.03	33.75	Peak	154	253	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT20 CH 48 / Ant. 1 + Ant. 3
Test Date	Jul. 08, 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	15710.51	56.74	74.00	-17.26	40.18	12.57	37.87	33.88	Peak	154	195	HORIZONTAL
2	15717.88	45.07	54.00	-8.93	28.54	12.57	37.84	33.88	Average	154	195	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	15717.15	50.81	54.00	-3.19	34.28	12.57	37.84	33.88	Average	161	251	VERTICAL
2	15717.21	63.43	74.00	-10.57	46.90	12.57	37.84	33.88	Peak	161	251	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT20 CH 149 / Ant. 1 + Ant. 3
Test Date	Jul. 08, 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	11489.10	61.09	74.00	-12.91	44.87	10.71	38.88	33.37	Peak	150	93	HORIZONTAL
2	11489.13	46.87	54.00	-7.13	30.65	10.71	38.88	33.37	Average	150	93	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	11481.99	58.19	74.00	-15.81	41.97	10.71	38.88	33.37	Peak	165	239	VERTICAL
2	11489.04	44.63	54.00	-9.37	28.41	10.71	38.88	33.37	Average	165	239	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT20 CH 157 / Ant. 1 + Ant. 3
Test Date	Jul. 08, 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	11569.74	63.27	74.00	-10.73	46.96	10.75	38.94	33.38	Peak	152	48	HORIZONTAL
2	11574.46	49.87	54.00	-4.13	33.56	10.76	38.94	33.39	Average	152	48	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	11569.29	51.88	54.00	-2.12	35.57	10.75	38.94	33.38	Average	165	234	VERTICAL
2	11569.74	65.69	74.00	-8.31	49.38	10.75	38.94	33.38	Peak	165	234	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT20 CH 165 / Ant. 1 + Ant. 3
Test Date	Jul. 08, 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	11649.58	49.68	54.00	-4.32	33.30	10.81	38.98	33.41	Average	148	46	HORIZONTAL
2	11649.84	63.70	74.00	-10.30	47.32	10.81	38.98	33.41	Peak	148	46	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	11649.81	63.71	74.00	-10.29	47.33	10.81	38.98	33.41	Peak	153	113	VERTICAL
2	11650.10	49.92	54.00	-4.08	33.54	10.81	38.98	33.41	Average	153	113	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT40 CH 38 / Ant. 1 + Ant. 3
Test Date	Jul. 08, 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	15567.66	44.89	54.00	-9.11	27.95	12.58	38.09	33.73	Average	165	295	HORIZONTAL
2	15569.84	57.84	74.00	-16.16	40.90	12.58	38.09	33.73	Peak	165	295	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	15573.48	57.89	74.00	-16.11	40.97	12.58	38.09	33.75	Peak	156	140	VERTICAL
2	15574.23	44.85	54.00	-9.15	27.93	12.58	38.09	33.75	Average	156	140	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT40 CH 46 / Ant. 1 + Ant. 3
Test Date	Jul. 08, 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	15692.95	57.62	74.00	-16.38	40.99	12.58	37.90	33.85	Peak	157	308	HORIZONTAL
2	15694.68	44.88	54.00	-9.12	28.25	12.58	37.90	33.85	Average	157	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	15694.49	47.80	54.00	-6.20	31.17	12.58	37.90	33.85	Average	163	241	VERTICAL
2	15694.90	60.89	74.00	-13.11	44.26	12.58	37.90	33.85	Peak	163	241	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT40 CH 151 / Ant. 1 + Ant. 3
Test Date	Aug. 01, 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	11509.02	44.29	54.00	-9.71	30.74	9.25	39.10	34.80	Average	150	228	HORIZONTAL
2	11514.04	56.87	74.00	-17.13	43.32	9.25	39.10	34.80	Peak	150	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	11506.04	42.68	54.00	-11.32	29.13	9.25	39.10	34.80	Average	155	244	VERTICAL
2	11514.24	55.89	74.00	-18.11	42.34	9.25	39.10	34.80	Peak	155	244	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT40 CH 159 / Ant. 1 + Ant. 3
Test Date	Aug. 01, 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	11585.94	47.66	54.00	-6.34	34.06	9.27	39.15	34.82	Average	150	207	HORIZONTAL
2	11588.62	61.31	74.00	-12.69	47.71	9.27	39.15	34.82	Peak	150	207	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	11586.22	44.57	54.00	-9.43	30.97	9.27	39.15	34.82	Average	153	217	VERTICAL
2	11593.72	56.95	74.00	-17.05	43.35	9.27	39.15	34.82	Peak	153	217	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

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°C	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11a CH 36, 40, 48 / Ant. 1 + Ant. 3
Test Date	Jul. 07, 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	5150.00	53.79	54.00	-0.21	46.89	6.21	33.74	33.05	Average	192	119	HORIZONTAL
2	5150.00	73.02	74.00	-0.98	66.12	6.21	33.74	33.05	Peak	192	119	HORIZONTAL
3	5180.64	99.21			92.23	6.24	33.79	33.05	Average	192	119	HORIZONTAL
4	5180.96	108.82			101.84	6.24	33.79	33.05	Peak	192	119	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	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5147.44	69.72	74.00	-4.28	62.82	6.21	33.74	33.05	Peak	173	298	VERTICAL
2	5150.00	50.73	54.00	-3.27	43.83	6.21	33.74	33.05	Average	173	298	VERTICAL
3	5201.60	100.76			93.72	6.27	33.82	33.05	Average	173	298	VERTICAL
4	5201.60	111.31			104.27	6.27	33.82	33.05	Peak	173	298	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	5109.71	58.67	74.00	-15.33	51.89	6.14	33.69	33.05	Peak	178	120	HORIZONTAL
2	5150.00	45.84	54.00	-8.16	38.94	6.21	33.74	33.05	Average	178	120	HORIZONTAL
3	5240.48	101.47			94.35	6.30	33.87	33.05	Average	178	120	HORIZONTAL
4	5240.96	111.78			104.66	6.30	33.87	33.05	Peak	178	120	HORIZONTAL
5	5350.00	46.23	54.00	-7.77	38.76	6.47	34.06	33.06	Average	178	120	HORIZONTAL
6	5356.25	59.37	74.00	-14.63	51.90	6.47	34.06	33.06	Peak	178	120	HORIZONTAL

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

Temperature	25°C	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11a CH 149, 157, 165 / Ant. 1 + Ant. 3
Test Date	Jul. 07, 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	5715.00	68.13	68.20	-0.07	60.01	6.83	34.42	33.13	Peak	180	117	HORIZONTAL
2	5725.00	77.42	78.20	-0.78	69.29	6.83	34.43	33.13	Peak	180	117	HORIZONTAL
3	5745.64	95.94			87.78	6.86	34.44	33.14	Average	180	117	HORIZONTAL
4	5745.64	104.88			96.72	6.86	34.44	33.14	Peak	180	117	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	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5715.00	62.27	68.20	-5.93	54.15	6.83	34.42	33.13	Peak	158	117	HORIZONTAL
2	5725.00	64.54	78.20	-13.66	56.41	6.83	34.43	33.13	Peak	158	117	HORIZONTAL
3	5785.48	98.89			90.68	6.90	34.47	33.16	Average	158	117	HORIZONTAL
4	5785.96	109.77			101.55	6.90	34.48	33.16	Peak	158	117	HORIZONTAL
5	5850.48	59.66	78.20	-18.54	51.37	6.95	34.51	33.17	Peak	158	117	HORIZONTAL
6	5863.85	58.58	68.20	-9.62	50.27	6.97	34.52	33.18	Peak	158	117	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	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5825.64	99.44			91.18	6.92	34.50	33.16	Average	181	119	HORIZONTAL
2	5825.96	109.51			101.25	6.92	34.50	33.16	Peak	181	119	HORIZONTAL
3	5850.96	74.89	78.20	-3.31	66.60	6.95	34.51	33.17	Peak	181	119	HORIZONTAL
4	5860.64	68.09	68.20	-0.11	59.78	6.97	34.52	33.18	Peak	181	119	HORIZONTAL

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

Temperature	25°C	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT20 CH 36, 40, 48 / Ant. 1 + Ant. 3
Test Date	Jul. 07, 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	5146.03	72.66	74.00	-1.34	65.76	6.21	33.74	33.05	Peak	178	305	VERTICAL
2	5148.91	53.97	54.00	-0.03	47.07	6.21	33.74	33.05	Average	178	305	VERTICAL
3	5180.96	108.27			101.29	6.24	33.79	33.05	Peak	178	305	VERTICAL
4	5186.09	98.20			91.22	6.24	33.79	33.05	Average	178	305	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	5148.40	52.39	54.00	-1.61	45.49	6.21	33.74	33.05	Average	173	304	VERTICAL
2	5148.72	70.14	74.00	-3.86	63.24	6.21	33.74	33.05	Peak	173	304	VERTICAL
3	5198.40	102.19			95.15	6.27	33.82	33.05	Average	173	304	VERTICAL
4	5198.72	112.75			105.71	6.27	33.82	33.05	Peak	173	304	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	5145.19	58.28	74.00	-15.72	51.38	6.21	33.74	33.05	Peak	189	118	HORIZONTAL
2	5150.00	45.87	54.00	-8.13	38.97	6.21	33.74	33.05	Average	189	118	HORIZONTAL
3	5240.48	101.37			94.25	6.30	33.87	33.05	Average	189	118	HORIZONTAL
4	5240.48	110.48			103.36	6.30	33.87	33.05	Peak	189	118	HORIZONTAL
5	5350.00	46.31	54.00	-7.69	38.84	6.47	34.06	33.06	Average	189	118	HORIZONTAL
6	5353.37	59.00	74.00	-15.00	51.53	6.47	34.06	33.06	Peak	189	118	HORIZONTAL

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

Temperature	25°C	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT20 CH 149, 157, 165 / Ant. 1 + Ant. 3
Test Date	Jul. 07, 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	5713.59	68.13	68.20	-0.07	60.01	6.83	34.42	33.13	Peak	173	110	HORIZONTAL
2	5725.00	77.41	78.20	-0.79	69.28	6.83	34.43	33.13	Peak	173	110	HORIZONTAL
3	5743.08	104.34			96.18	6.86	34.44	33.14	Peak	173	110	HORIZONTAL
4	5745.32	95.06			86.90	6.86	34.44	33.14	Average	173	110	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	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5712.89	63.22	68.20	-4.98	55.10	6.83	34.42	33.13	Peak	187	120	HORIZONTAL
2	5723.08	67.35	78.20	-10.85	59.22	6.83	34.43	33.13	Peak	187	120	HORIZONTAL
3	5783.08	109.37			101.16	6.90	34.47	33.16	Peak	187	120	HORIZONTAL
4	5785.48	100.04			91.83	6.90	34.47	33.16	Average	187	120	HORIZONTAL
5	5850.48	59.49	78.20	-18.71	51.20	6.95	34.51	33.17	Peak	187	120	HORIZONTAL
6	5860.48	57.95	68.20	-10.25	49.64	6.97	34.52	33.18	Peak	187	120	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	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5825.32	99.35			91.09	6.92	34.50	33.16	Average	182	121	HORIZONTAL
2	5825.64	108.20			99.94	6.92	34.50	33.16	Peak	182	121	HORIZONTAL
3	5850.32	73.64	78.20	-4.56	65.35	6.95	34.51	33.17	Peak	182	121	HORIZONTAL
4	5865.39	68.11	68.20	-0.09	59.80	6.97	34.52	33.18	Peak	182	121	HORIZONTAL

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

Temperature	25°C	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT40 CH 38, 46 / Ant. 1 + Ant. 3
Test Date	Jul. 07, 2015		

Channel 38

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5148.33	53.91	54.00	-0.09	47.01	6.21	33.74	33.05	Average	179	298	VERTICAL
2	5148.65	68.60	74.00	-5.40	61.70	6.21	33.74	33.05	Peak	179	298	VERTICAL
3	5188.40	101.56			94.58	6.24	33.79	33.05	Peak	179	298	VERTICAL
4	5190.96	90.04			83.03	6.24	33.82	33.05	Average	179	298	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	5148.75	49.92	54.00	-4.08	43.02	6.21	33.74	33.05	Average	177	309	VERTICAL
2	5149.23	65.88	74.00	-8.12	58.98	6.21	33.74	33.05	Peak	177	309	VERTICAL
3	5228.56	93.13			86.01	6.30	33.87	33.05	Average	177	309	VERTICAL
4	5231.92	104.20			97.08	6.30	33.87	33.05	Peak	177	309	VERTICAL
5	5350.00	44.58	54.00	-9.42	37.11	6.47	34.06	33.06	Average	177	309	VERTICAL
6	5351.64	59.12	74.00	-14.88	51.65	6.47	34.06	33.06	Peak	177	309	VERTICAL

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

Temperature	25°C	Humidity	60%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT40 CH 151, 159 / Ant. 1 + Ant. 3
Test Date	Aug. 01, 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	5713.80	53.85	54.00	-0.15	47.80	6.44	34.64	35.03	Average	228	327	HORIZONTAL
2	5713.80	68.90	74.00	-5.10	62.85	6.44	34.64	35.03	Peak	228	327	HORIZONTAL
3	5721.40	73.45	78.20	-4.75	67.39	6.45	34.64	35.03	Peak	228	327	HORIZONTAL
4	5751.80	102.73			96.66	6.46	34.65	35.04	Peak	228	327	HORIZONTAL
5	5754.20	90.48			84.41	6.46	34.65	35.04	Average	228	327	HORIZONTAL

Item 4, 5 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	5714.00	53.84	54.00	-0.16	47.79	6.44	34.64	35.03	Average	225	324	HORIZONTAL
2	5714.00	70.22	74.00	-3.78	64.17	6.44	34.64	35.03	Peak	225	324	HORIZONTAL
3	5724.20	73.36	78.20	-4.84	67.30	6.45	34.64	35.03	Peak	225	324	HORIZONTAL
4	5792.00	108.91			102.83	6.47	34.66	35.05	Peak	225	324	HORIZONTAL
5	5794.40	96.58			90.50	6.47	34.66	35.05	Average	225	324	HORIZONTAL
6	5850.00	72.96	78.20	-5.24	66.86	6.49	34.67	35.06	Peak	225	324	HORIZONTAL
7	5860.00	53.80	54.00	-0.20	47.70	6.50	34.67	35.07	Average	225	324	HORIZONTAL
8	5860.00	72.68	74.00	-1.32	66.58	6.50	34.67	35.07	Peak	225	324	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

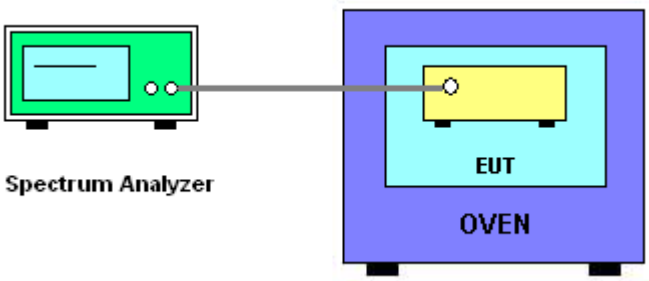
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 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	60%
Test Engineer	Serway Li	Test Date	Sep. 18, 2015

Mode: 20 MHz / Ant. 3

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5200 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5199.9876	5199.9873	5199.9871	5199.9868
110.00	5199.9882	5199.9878	5199.9876	5199.9872
93.50	5199.9872	5199.9869	5199.9867	5199.9863
Max. Deviation (MHz)	0.0128	0.0131	0.0133	0.0137
Max. Deviation (ppm)	2.46	2.52	2.56	2.63
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5200 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5199.9886	5199.9883	5199.9881	5199.9875
10	5199.9884	5199.9881	5199.9878	5199.9874
20	5199.9882	5199.9878	5199.9876	5199.9872
30	5199.9878	5199.9875	5199.9874	5199.9869
40	5199.9874	5199.9872	5199.9871	5199.9867
Max. Deviation (MHz)	0.0126	0.0128	0.0129	0.0133
Max. Deviation (ppm)	2.42	2.46	2.48	2.56
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5785 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5784.9875	5784.9872	5784.9870	5784.9867
110.00	5784.9881	5784.9877	5784.9872	5784.9871
93.50	5784.9871	5784.9868	5784.9866	5784.9862
Max. Deviation (MHz)	0.0129	0.0132	0.0134	0.0138
Max. Deviation (ppm)	2.23	2.28	2.32	2.39
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5785 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5784.9885	5784.9882	5784.9880	5784.9874
10	5784.9883	5784.9880	5784.9877	5784.9873
20	5784.9881	5784.9877	5784.9875	5784.9871
30	5784.9877	5784.9874	5784.9873	5784.9868
40	5784.9873	5784.9871	5784.9870	5784.9866
Max. Deviation (MHz)	0.0127	0.0129	0.0130	0.0134
Max. Deviation (ppm)	2.20	2.23	2.25	2.32
Result	Complies			

Mode: 40 MHz / Ant. 3

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5230 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5229.9877	5229.9874	5229.9872	5229.9869
110.00	5229.9883	5229.9879	5229.9877	5229.9873
93.50	5229.9873	5229.9871	5229.9868	5229.9864
Max. Deviation (MHz)	0.0127	0.0129	0.0132	0.0136
Max. Deviation (ppm)	2.43	2.47	2.52	2.60
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5230 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5229.9888	5229.9885	5229.9883	5229.9877
10	5229.9886	5229.9883	5229.9880	5229.9876
20	5229.9884	5229.9880	5229.9878	5229.9874
30	5229.9880	5229.9877	5229.9876	5229.9871
40	5229.9876	5229.9874	5229.9873	5229.9869
Max. Deviation (MHz)	0.0124	0.0126	0.0127	0.0131
Max. Deviation (ppm)	2.37	2.41	2.43	2.50
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5795 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5794.9874	5794.9871	5794.9869	5794.9866
110.00	5794.9880	5794.9876	5794.9871	5794.9870
93.50	5794.9870	5794.9867	5794.9865	5794.9861
Max. Deviation (MHz)	0.0130	0.0133	0.0135	0.0139
Max. Deviation (ppm)	2.24	2.30	2.33	2.40
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5795 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5794.9883	5794.9880	5794.9878	5794.9872
10	5794.9881	5794.9878	5794.9875	5794.9871
20	5794.9879	5794.9875	5794.9873	5794.9868
30	5794.9875	5794.9872	5794.9871	5794.9866
40	5794.9871	5794.9869	5794.9868	5794.9864
Max. Deviation (MHz)	0.0129	0.0131	0.0132	0.0136
Max. Deviation (ppm)	2.23	2.26	2.28	2.35
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%