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FCC RADIO TEST REPORT

Applicant's company	**Belkin International, Inc.**
Applicant Address	12045 East Waterfront Drive, Playa Vista, CA 90094
FCC ID	**K7SF9K1102V2**

Product Name	N600 DB Wireless N+ Router
Brand Name	belkin
Model No.	F9K1102V4
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250 MHz / 5725 ~ 5850 MHz
Received Date	Mar. 04, 2016
Final Test Date	Jun. 06, 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.

Testing Laboratory
1190

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4N1172-29AB	Rev. 01	Initial issue of report	Jun. 22, 2016

1. VERIFICATION OF COMPLIANCE

Product Name	:	N600 DB Wireless N+ Router
Brand Name	:	belkin
Model No.	:	F9K1102V4
Applicant	:	Belkin International, 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 Mar. 04, 2016 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	15.207	AC Power Line Conducted Emissions	Complies
4.2	15.407(a)	26dB Spectrum Bandwidth and 99% Occupied Bandwidth	Complies
4.3	15.407(e)	6dB Spectrum Bandwidth	Complies
4.4	15.407(a)	Maximum Conducted Output Power	Complies
4.5	15.407(a)	Power Spectral Density	Complies
4.6	15.407(b)	Radiated Emissions	Complies
4.7	15.407(b)	Band Edge Emissions	Complies
4.8	15.407(g)	Frequency Stability	Complies
4.9	15.203	Antenna Requirements	Complies

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	IEEE 802.11a: WLAN (1TX, 1RX) IEEE 802.11n: 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: 21.45 MHz IEEE 802.11n MCS8 (HT20): 18.49 MHz IEEE 802.11n MCS8 (HT40): 37.05 MHz Band 4: IEEE 802.11a: 23.10 MHz IEEE 802.11n MCS8 (HT20): 18.76 MHz IEEE 802.11n MCS8 (HT40): 37.34 MHz
Maximum Conducted Output Power	Band 1: IEEE 802.11a: 18.66 dBm IEEE 802.11n MCS8 (HT20): 20.02 dBm IEEE 802.11n MCS8 (HT40): 20.78 dBm Band 4: IEEE 802.11a: 18.42 dBm IEEE 802.11n MCS8 (HT20): 19.95 dBm IEEE 802.11n MCS8 (HT40): 20.41 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

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

Antenna and Band width

Antenna	Single (TX)		Two (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)	2	MCS 8-15
802.11n (HT40)	2	MCS 8-15
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	Rating
Adapter	LEI	MU12AR120100-A1	Input: 100-240V ~ 50/60Hz 0.3A Output: 12V, 1A
Others			
RJ-45 Cable*1, Non-shielded, 1.2m			

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)		Remark
					2.4GHz	5GHz	
1	-	-	PIFA Antenna	I-PEX	3.95	6.27	TX/RX
2	-	-	PIFA Antenna	I-PEX	3.80	4.51	TX/RX

Note: The EUT has two antennas.

<For 2.4GHz Band>:

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

Only Chain 1 can be used as transmitting/receiving antenna.

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

Both Chain 1 and Chain 2 could transmit/receive simultaneously.

<For 5GHz Band>:

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

Only Chain 1 can be used as transmitting/receiving antenna.

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

Both Chain 1 and Chain 2 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	Chain
AC Power Conducted Emission	Normal Link		-	-	-
Max. Conducted Output Power	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1
	11n HT20	Band 1&4	MCS8	36/40/48/149/157/165	1+2
	11n HT40	Band 1&4	MCS8	38/46/151/159	1+2
Power Spectral Density	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1
	11n HT20	Band 1&4	MCS8	36/40/48/149/157/165	1+2
	11n HT40	Band 1&4	MCS8	38/46/151/159	1+2
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	MCS8	36/40/48/149/157/165	1+2
	11n HT40	Band 1&4	MCS8	38/46/151/159	1+2
6dB Spectrum Bandwidth Measurement	11a/BPSK	Band 4	6Mbps	149/157/165	1
	11n HT20	Band 4	MCS8	149/157/165	1+2
	11n HT40	Band 4	MCS8	151/159	1+2
Radiated Emission Below 1GHz	Normal Link		-	-	-
Radiated Emission Above 1GHz	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1
	11n HT20	Band 1&4	MCS8	36/40/48/149/157/165	1+2
	11n HT40	Band 1&4	MCS8	38/46/151/159	1+2
Band Edge Emission	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/157/165	1
	11n HT20	Band 1&4	MCS8	36/40/48/149/157/165	1+2
	11n HT40	Band 1&4	MCS8	38/46/151/159	1+2
Frequency Stability	20 MHz	Band 1&4	-	40/157	1
	40 MHz	Band 1&4	-	38/151	1

Note: The EUT can only be used at Y axis position

The following test modes were performed for all tests:

For Conducted Emission test:

Test Mode: Normal Link

For Radiated Emission below 1GHz test:

Test Mode: Normal Link

For Radiated Emission above 1GHz test:

Mode 1. CTX - EUT

For Co-location MPE and Radiated Emission Co-location Test:

The EUT could be applied with 2.4GHz WLAN function and 5GHz WLAN function; therefore Co-location Maximum Permissible Exposure (Please refer to FA4N1172-29) and Radiated Emission Co-location (please refer to Appendix B) tests are added for simultaneously transmit between 2.4GHz WLAN function and 5GHz WLAN function.

3.6. Table for Testing Locations

Test Site Location					
Address:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.				
TEL:	886-3-656-9065				
FAX:	886-3-656-9085				
Test Site No.	**Site Category**	**Location**	**FCC Designation No.**	**IC File No.**	**VCCI Reg. No**
03CH01-CB	SAC	Hsin Chu	TW0006	IC 4086D	-
CO01-CB	Conduction	Hsin Chu	TW0006	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: FR241874AI and FR241847AN

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

Modifications	Performance Checking
1. Adding a new power adapter (Model Name: MU12AR120100-A1). 2. Updating the flash memory. 3. Adding RJ-45 Cable	1. AC Power Line Conducted Emissions 2. Radiated Emissions (below 1GHz)
4. Updating Band 1 to “New Rules ” from “Old Rules”.	1. 26dB Bandwidth and 99% Occupied Bandwidth 2. Maximum Conducted Output Power 3. Power Spectral Density 4. Radiated Emissions (above 1GHz) 5. Band Edge Emissions 6. Frequency Stability
5. 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”.	1. 26dB Bandwidth and 99% Occupied Bandwidth 2. 6dB Spectrum Bandwidth 3. Maximum Conducted Output Power 4. Power Spectral Density 5. Radiated Emissions (above 1GHz) 6. Band Edge Emissions 7. Frequency Stability
6. Updating brand name to “belkin” from “Belkin”. 7. Updating model name to “F9K1102V4” from “F9K1102V2”. 8. Updating applicant to applicant address to “12045 East Waterfront Drive, Playa Vista, CA 90094 ” from “12045 E. Waterfront Driv Playa Viste, CA 90094, USA”. 9. Removing two adapters (Model No.: DSA-12PFE-12 BUS 120100 and Model No.: SYS1381-1212-W2).	It is not necessary to perform for all tests.

3.8. Table for Supporting Units

For Test Site No: 03CH01-CB <Below 1GHz>

Support Unit	Brand	Model	FCC ID
NB*4	DELL	E4300	DoC
Flash disk	Silicon Power	Touch 835	DoC

For Test Site No: 03CH01-CB <Above 1GHz>

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
NB*4	DELL	E6430	DoC
Flash disk	Silicon	I-Series	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	RTL819x 2.2.4 -12/09/28					
Mode	Test Frequency (MHz)					
	NCB: 20MHz					
	5180 MHz	5200 MHz	5240 MHz	5745 MHz	5785 MHz	5825 MHz
802.11a	61	63	59	63	63	63
802.11n MCS8 HT20	63/60	63/61	60/59	62/63	62/63	62/63
Mode	**NCB: 40MHz**					
802.11n MCS8 HT40	5190 MHz		5230 MHz	5755 MHz		5795 MHz
	55/53		61/60	62/63		62/63

3.10. EUT Operation during Test

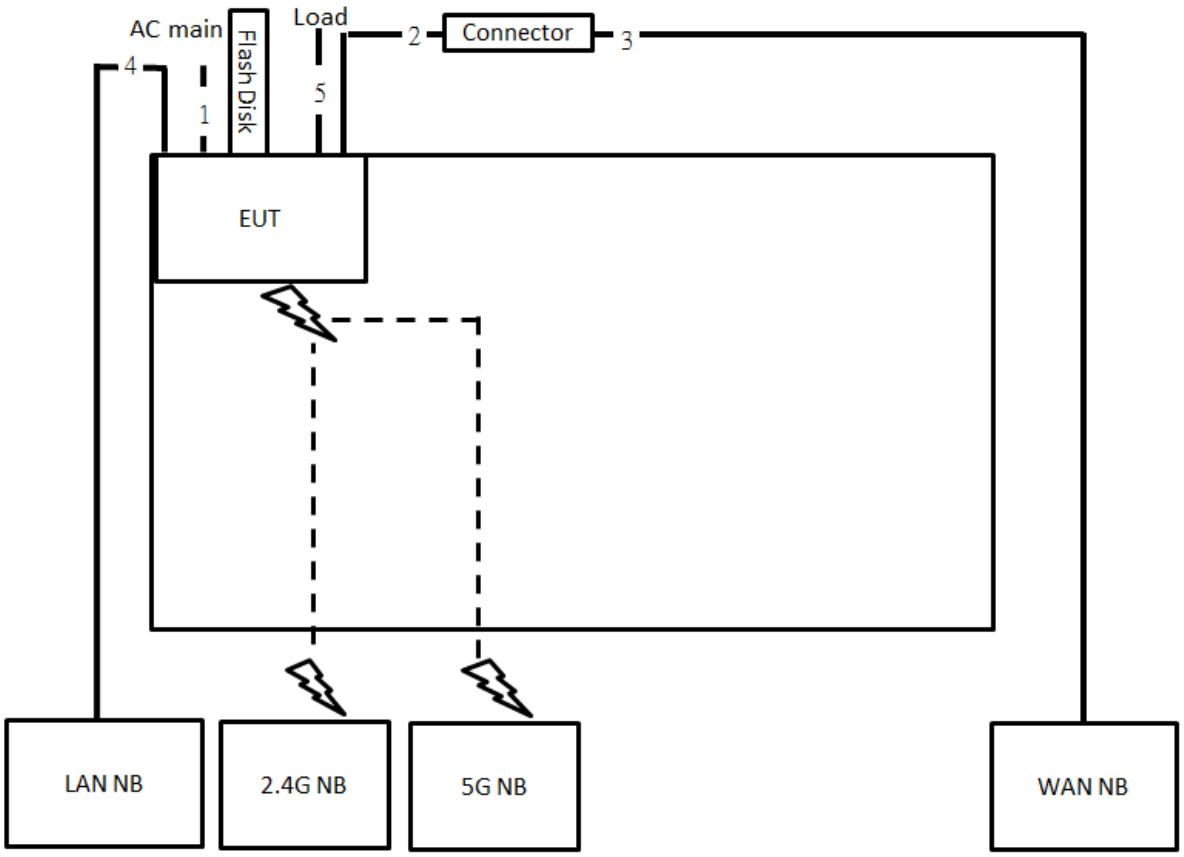
The EUT was programmed to be in continuously transmitting mode.

3.11. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	1.000	1.000	100.00%	0.00	0.01
802.11n MCS8 HT20	1.000	1.000	100.00%	0.00	0.01
802.11n MCS8 HT40	1.000	1.000	100.00%	0.00	0.01

3.12. Test Configurations

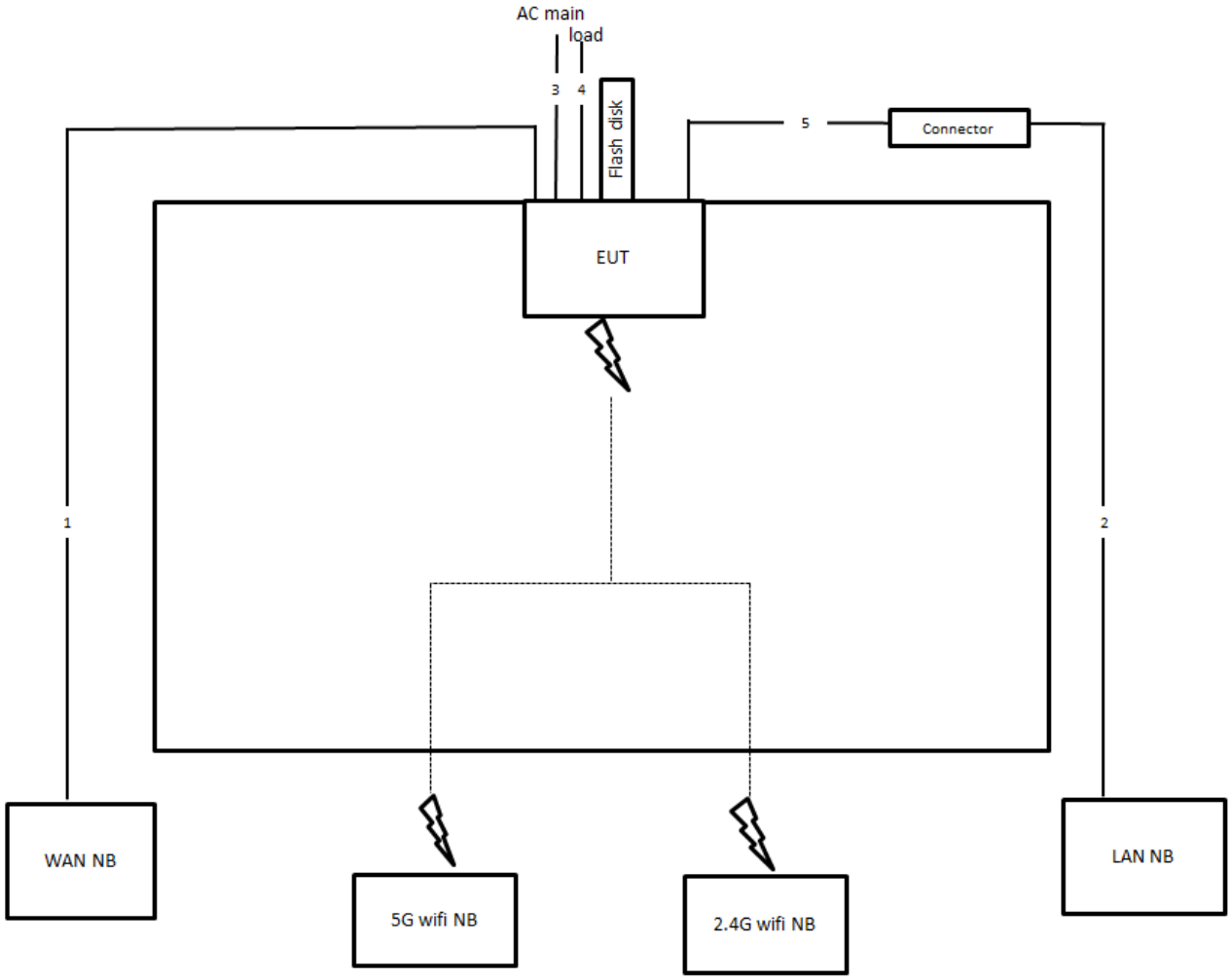
3.12.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	RJ-45 cable	No	1.2m
3	RJ-45 cable	No	10m
4	RJ-45 cable	No	10m
5	RJ-45 cable*3	No	1.5m

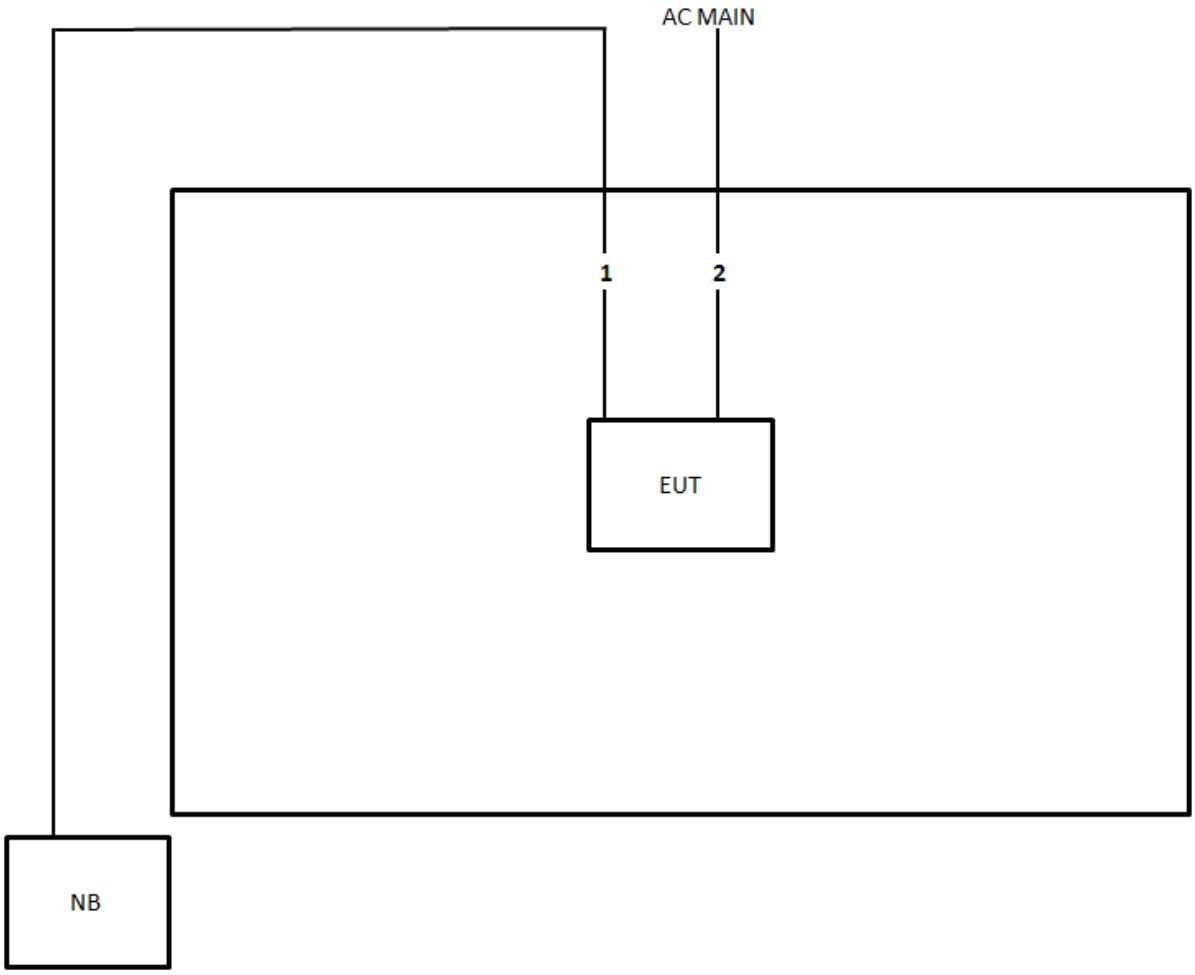
3.12.2. Radiation Emissions Test Configuration

Test Configuration: 30MHz ~1GHz



Item	Connection	Shielded	Length
1	RJ-45 cable	No	10m
2	RJ-45 cable	No	10m
3	Power cable	No	1.5m
4	RJ-45 cable*3	No	1.5m
5	RJ-45 cable	No	1.2m

Test Configuration: above 1GHz



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

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product that is designed to connect to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

4.1.2. Measuring Instruments and Setting

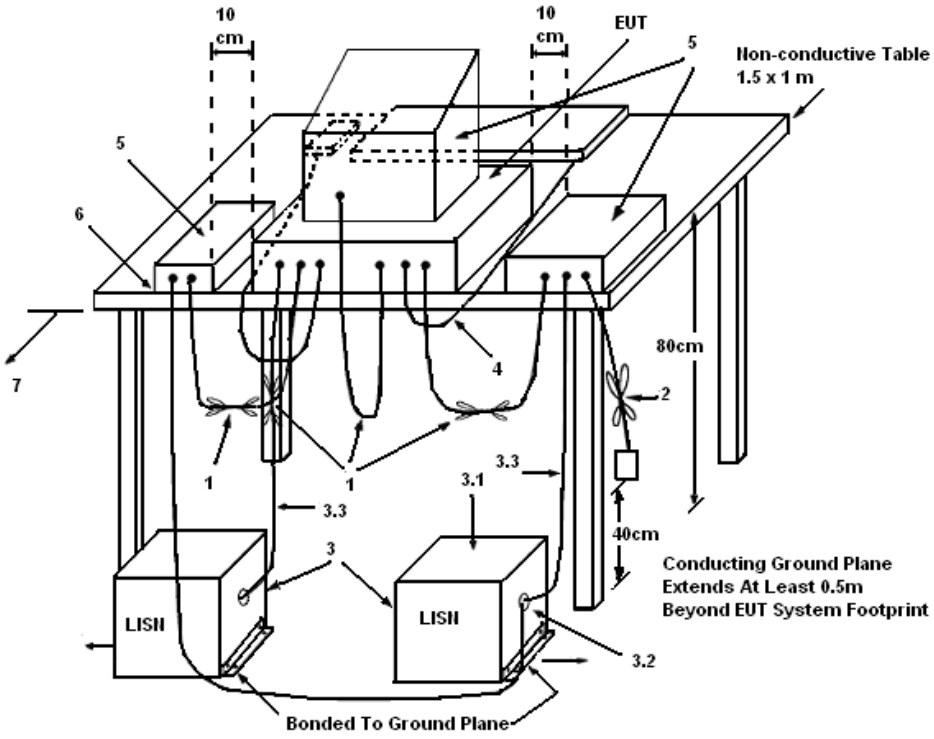
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

4.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

4.1.4. Test Setup Layout



LEGEND:

(1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

(2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

(3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.

(3.1) All other equipment powered from additional LISN(s).

(3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

(3.3) LISN at least 80 cm from nearest part of EUT chassis.

(4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

(5) Non-EUT components of EUT system being tested.

(6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

(7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

4.1.5. Test Deviation

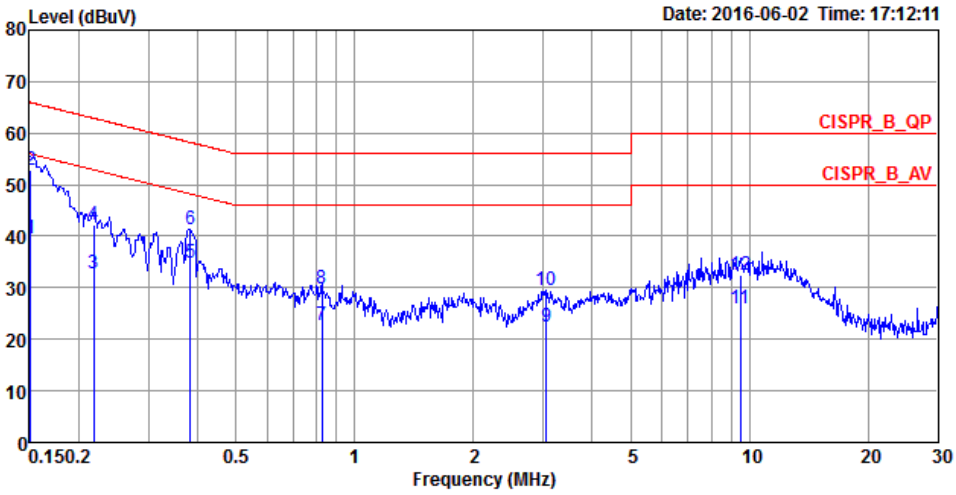
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

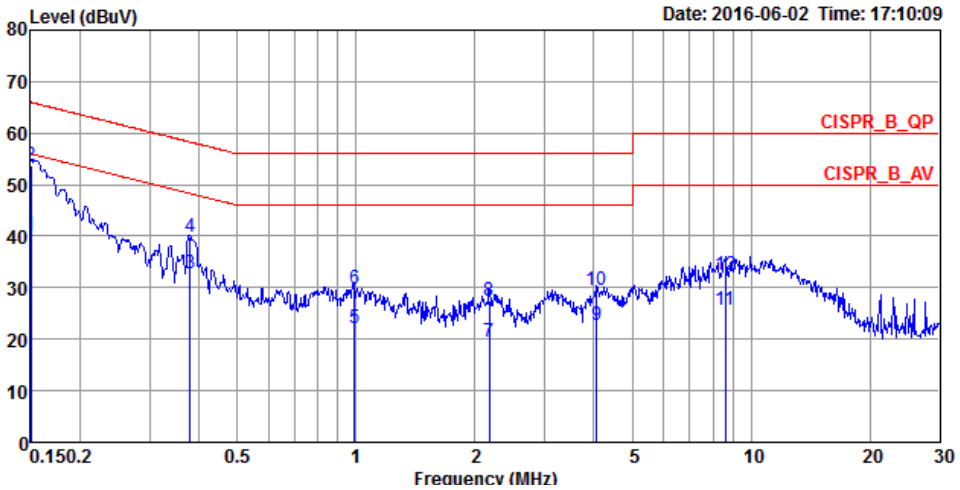
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	23℃	Humidity	58%
Test Engineer	Da Deng	Phase	Line
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1508	39.69	-16.27	55.96	29.57	9.96	0.16	Average	LINE
2	0.1508	52.92	-13.04	65.96	42.80	9.96	0.16	QP	LINE
3	0.2185	32.84	-20.04	52.88	22.70	9.96	0.18	Average	LINE
4	0.2185	42.27	-20.61	62.88	32.13	9.96	0.18	QP	LINE
5	0.3832	34.92	-13.29	48.21	24.71	10.01	0.20	Average	LINE
6	0.3832	41.19	-17.02	58.21	30.98	10.01	0.20	QP	LINE
7	0.8261	22.85	-23.15	46.00	12.62	10.04	0.19	Average	LINE
8	0.8261	29.79	-26.21	56.00	19.56	10.04	0.19	QP	LINE
9	3.0576	22.45	-23.55	46.00	12.05	10.10	0.30	Average	LINE
10	3.0576	29.39	-26.61	56.00	18.99	10.10	0.30	QP	LINE
11	9.5016	25.93	-24.07	50.00	15.40	10.15	0.38	Average	LINE
12	9.5016	32.53	-27.47	60.00	22.00	10.15	0.38	QP	LINE

Temperature	23°C	Humidity	58%
Test Engineer	Da Deng	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1500	40.03	-15.97	56.00	29.91	9.96	0.16	Average	NEUTRAL
2	0.1500	53.64	-12.36	66.00	43.52	9.96	0.16	QP	NEUTRAL
3	0.3791	32.65	-15.65	48.30	22.48	9.97	0.20	Average	NEUTRAL
4	0.3791	39.71	-18.59	58.30	29.54	9.97	0.20	QP	NEUTRAL
5	0.9891	22.05	-23.95	46.00	11.89	9.97	0.19	Average	NEUTRAL
6	0.9891	29.80	-26.20	56.00	19.64	9.97	0.19	QP	NEUTRAL
7	2.1783	19.41	-26.59	46.00	9.15	9.99	0.27	Average	NEUTRAL
8	2.1783	27.40	-28.60	56.00	17.14	9.99	0.27	QP	NEUTRAL
9	4.0704	22.72	-23.28	46.00	12.37	10.02	0.33	Average	NEUTRAL
10	4.0704	29.54	-26.46	56.00	19.19	10.02	0.33	QP	NEUTRAL
11	8.5917	25.72	-24.28	50.00	15.22	10.13	0.37	Average	NEUTRAL
12	8.5917	32.38	-27.62	60.00	21.88	10.13	0.37	QP	NEUTRAL

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. 26dB Bandwidth and 99% Occupied Bandwidth Measurement

4.2.1. Limit

No restriction limits.

4.2.2. Measuring Instruments and Setting

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

4.2.3. 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%.

4.2.4. Test Setup Layout

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

This test setup layout is the same as that shown in section 4.6.4.

4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

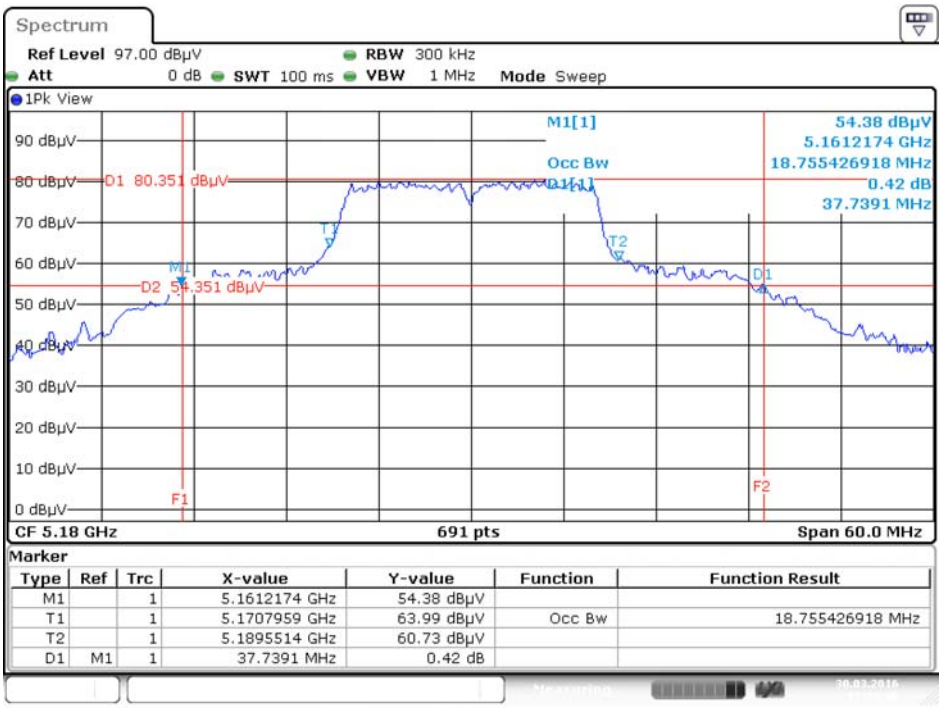
The EUT was programmed to be in continuously transmitting mode.

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

Temperature	20°C	Humidity	61%
Test Engineer	Peter Wu		

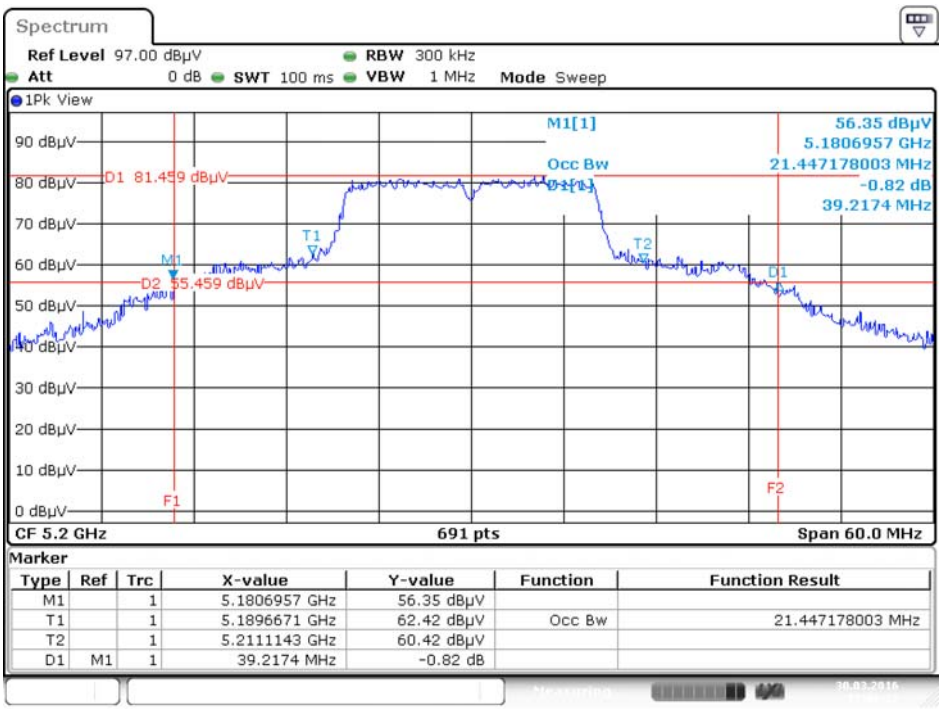
Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5180 MHz	37.74	18.76
	5200 MHz	39.22	21.45
	5240 MHz	37.74	18.06
	5745 MHz	38.52	21.62
	5785 MHz	38.61	23.10
	5825 MHz	37.83	21.27
802.11n MCS8 HT20	5180 MHz	34.70	18.49
	5200 MHz	33.22	18.49
	5240 MHz	32.61	18.32
	5745 MHz	36.26	18.76
	5785 MHz	35.65	18.49
	5825 MHz	35.39	18.41
802.11n MCS8 HT40	5190 MHz	42.32	36.47
	5230 MHz	73.91	37.05
	5755 MHz	74.64	37.19
	5795 MHz	79.57	37.34

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



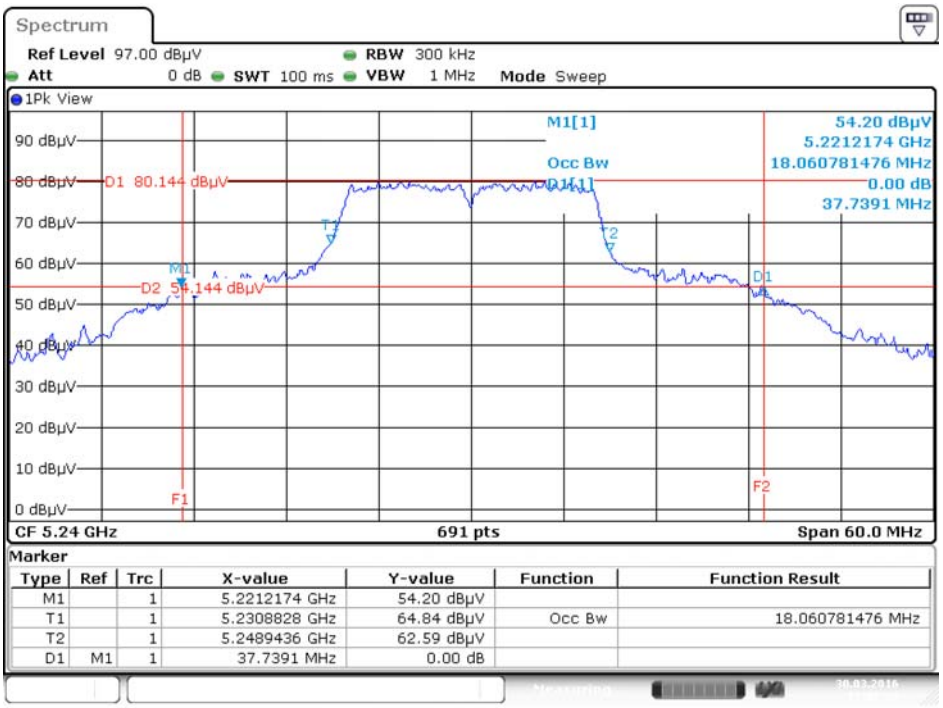
Date: 30.MAR.2016 17:03:47

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



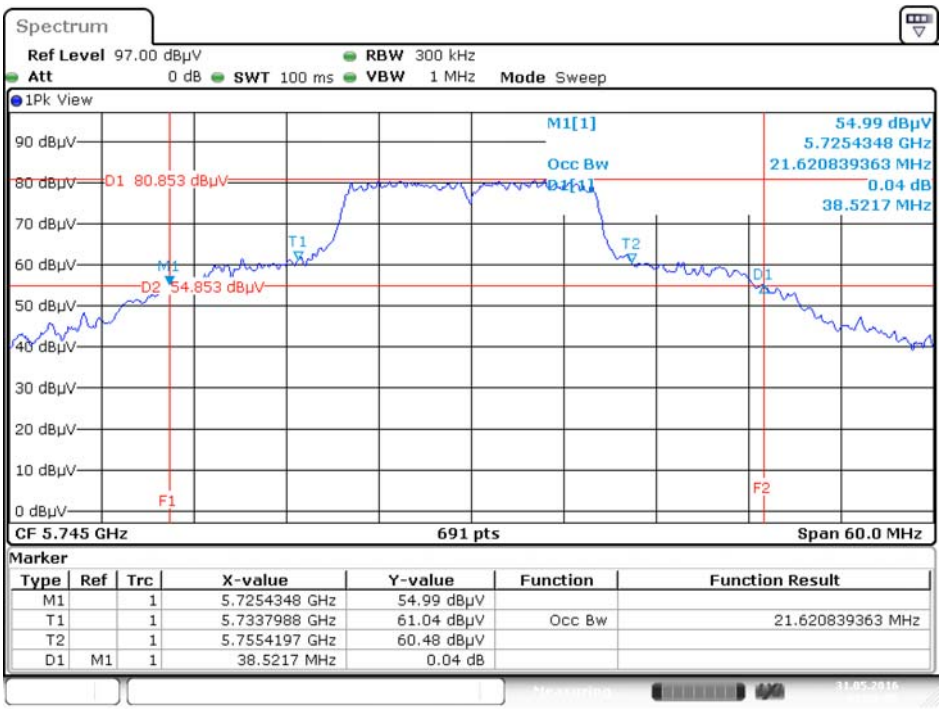
Date: 30.MAR.2016 17:06:17

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



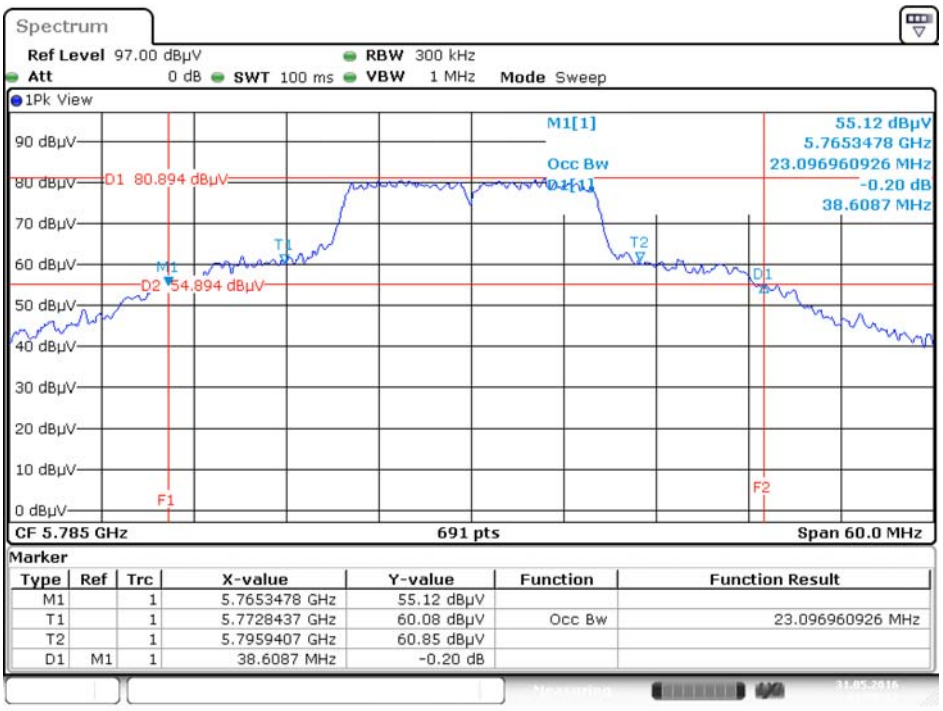
Date: 30.MAR.2016 17:07:24

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



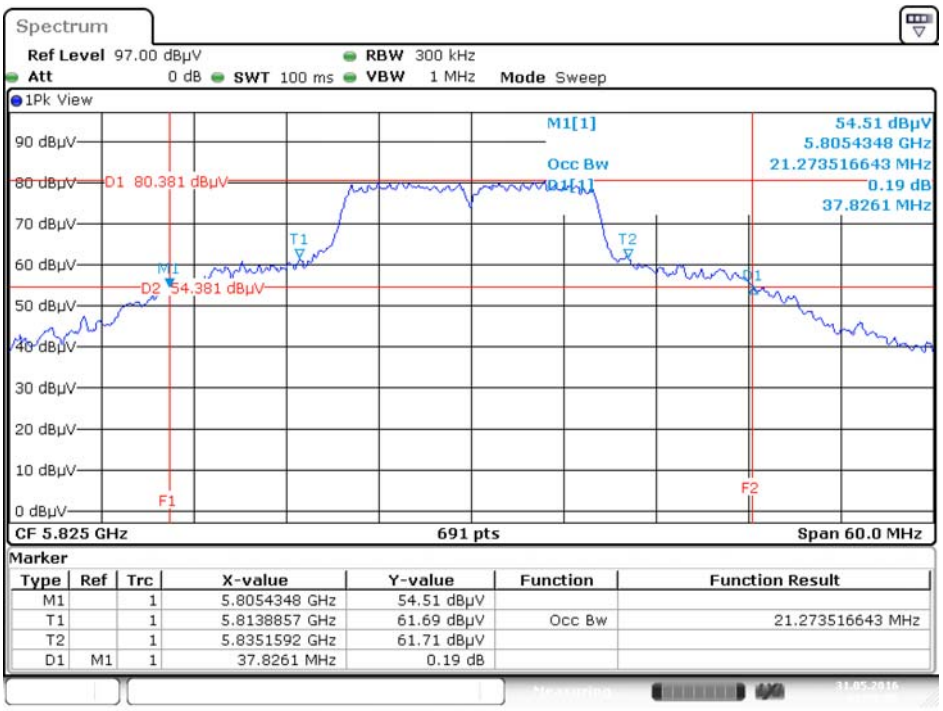
Date: 31.MAY.2016 03:56:56

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



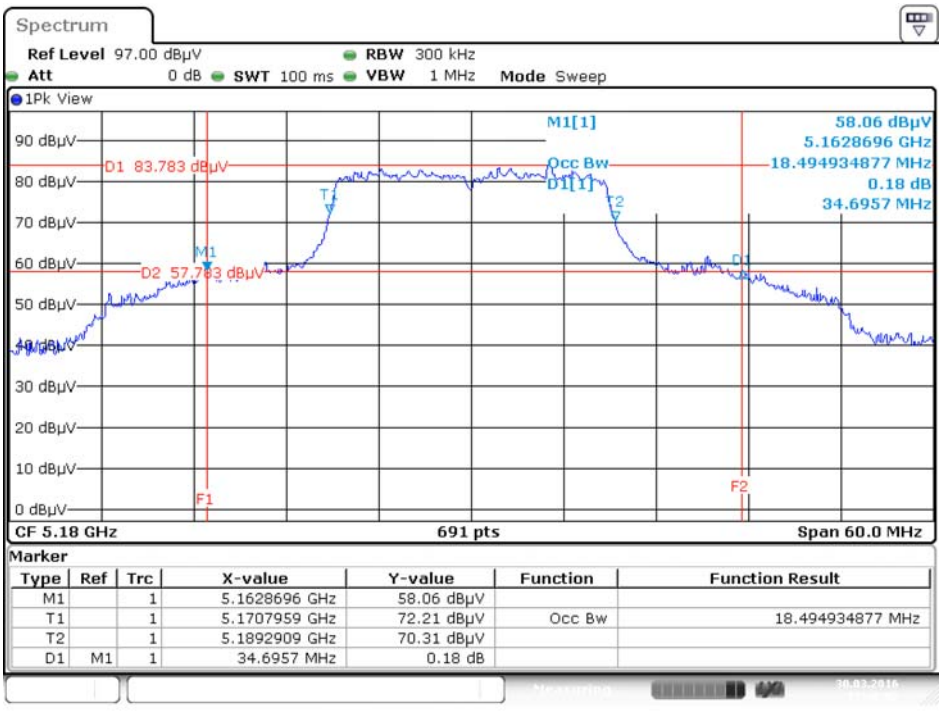
Date: 31.MAY.2016 03:58:22

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



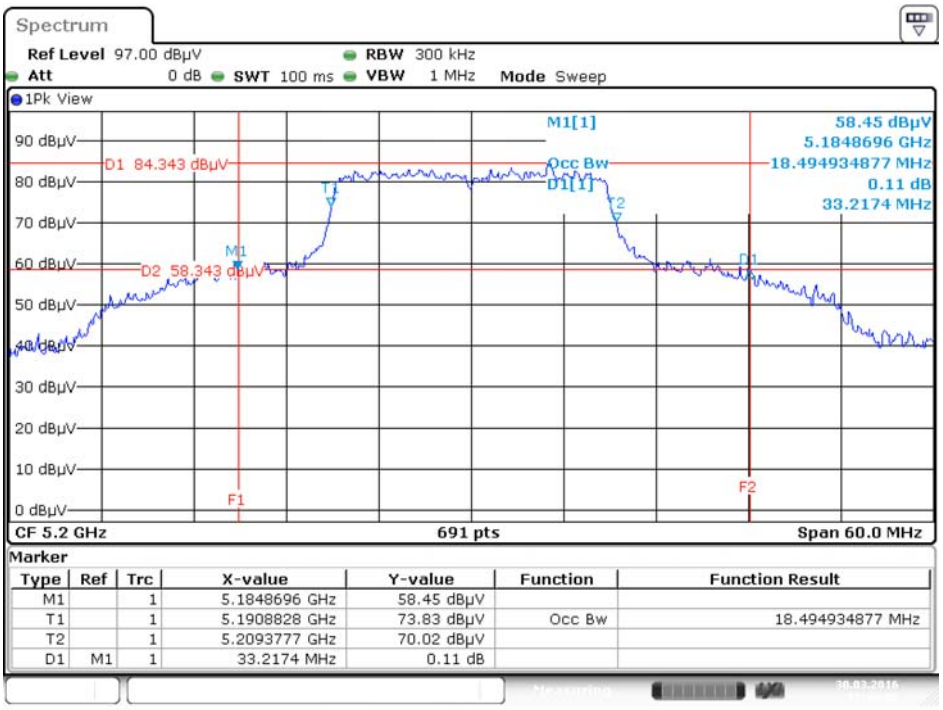
Date: 31.MAY.2016 03:58:55

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT20 / Chain 1 + Chain 2 / 5180 MHz



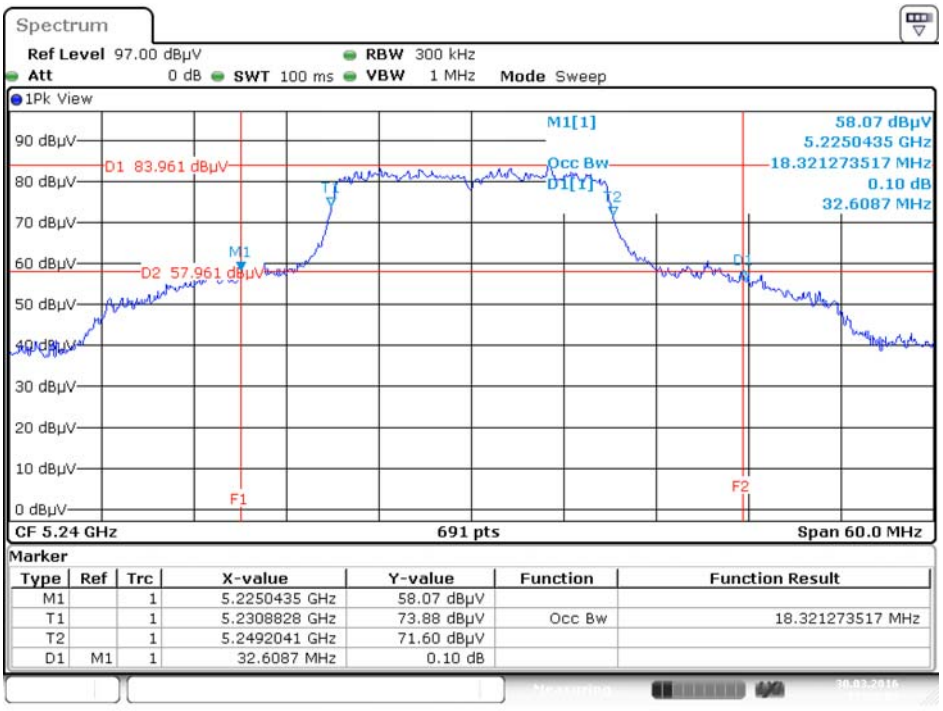
Date: 30.MAR.2016 17:48:02

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT20 / Chain 1 + Chain 2 / 5200 MHz



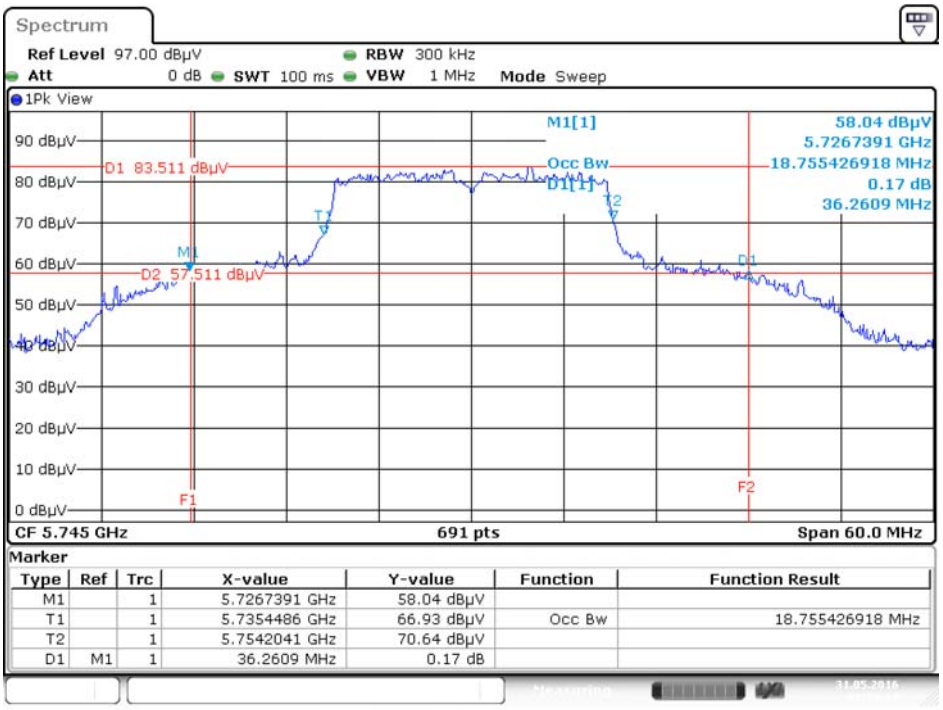
Date: 30.MAR.2016 17:49:36

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT20 / Chain 1 + Chain 2 / 5240 MHz



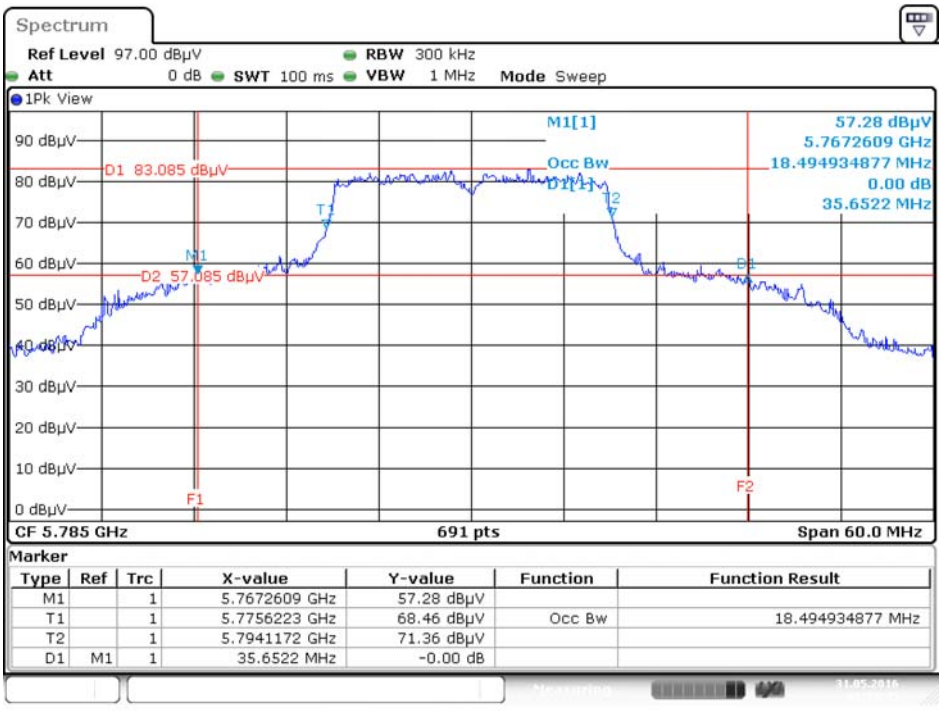
Date: 30.MAR.2016 17:50:03

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT20 / Chain 1 + Chain 2 / 5745 MHz



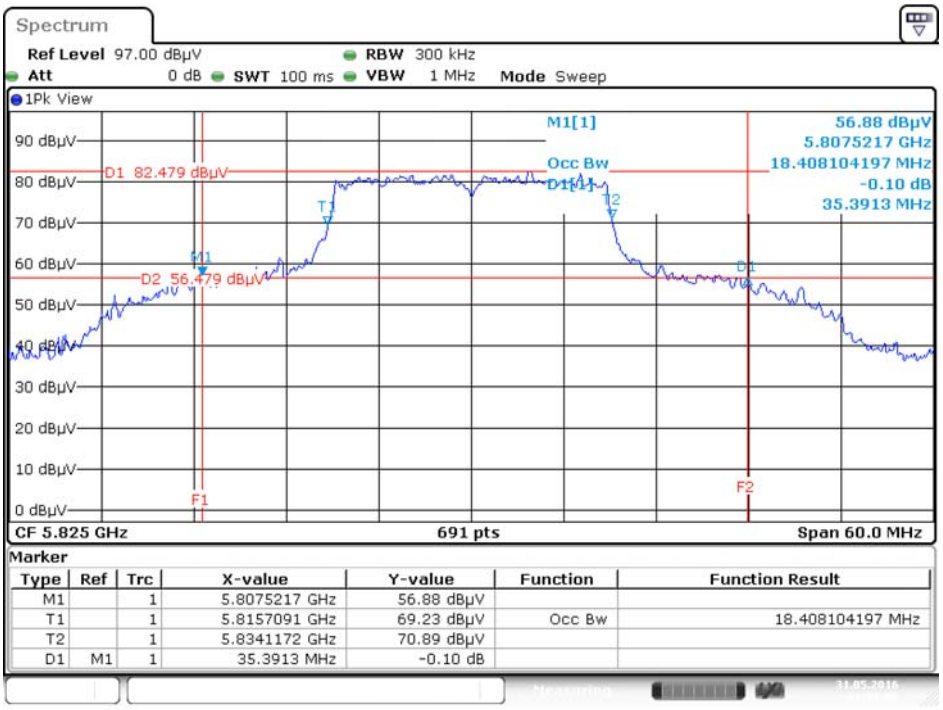
Date: 31.MAY.2016 03:54:13

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT20 / Chain 1 + Chain 2 / 5785 MHz



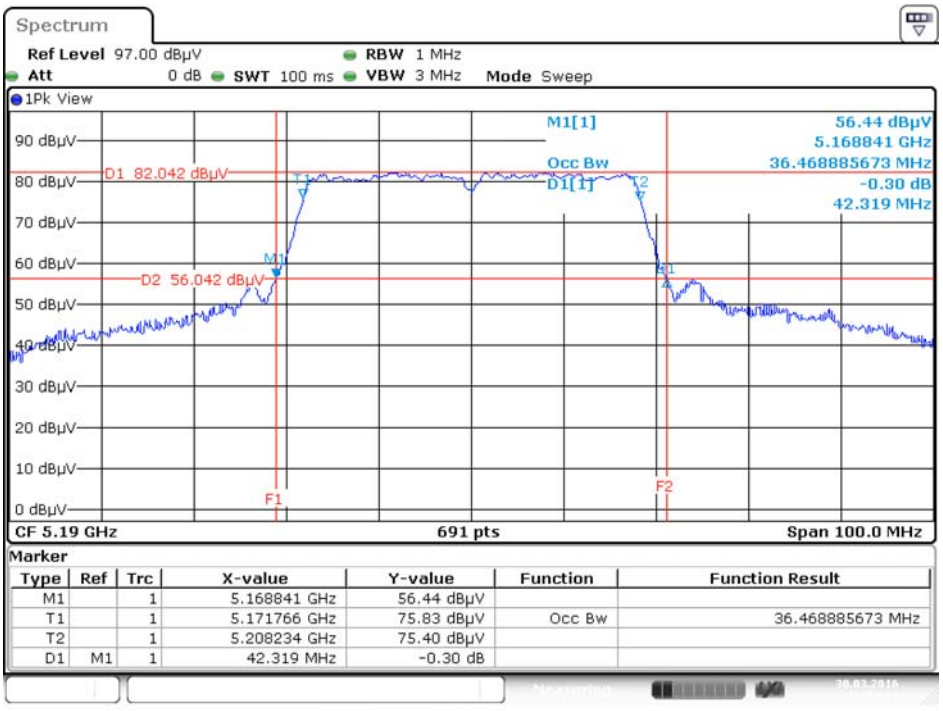
Date: 31.MAY.2016 03:53:46

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT20 / Chain 1 + Chain 2 / 5825 MHz



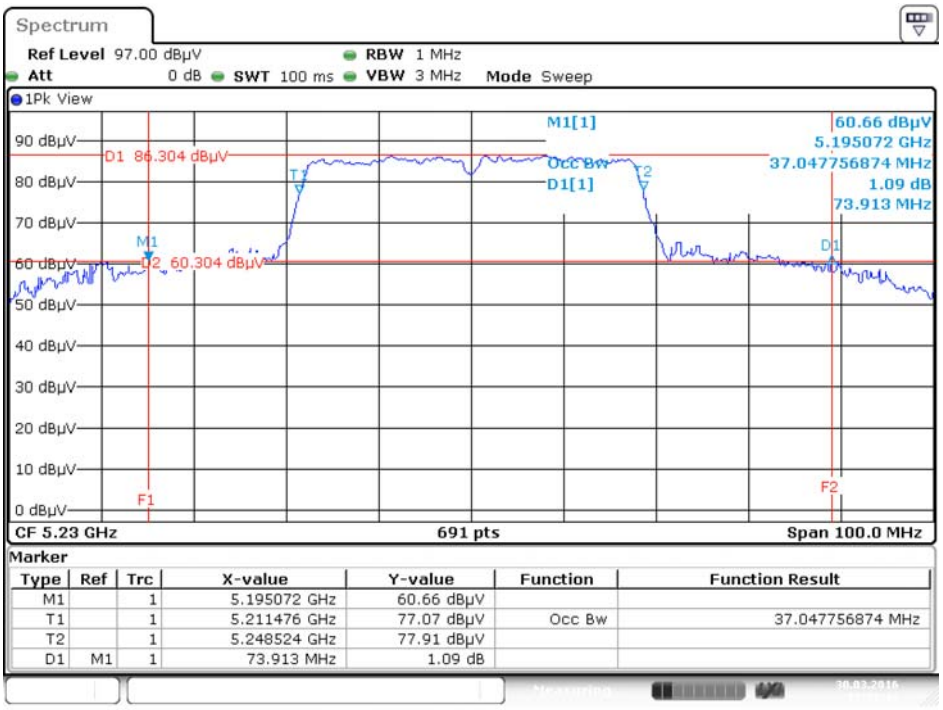
Date: 31.MAY.2016 03:52:55

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT40 / Chain 1 + Chain 2 / 5190 MHz



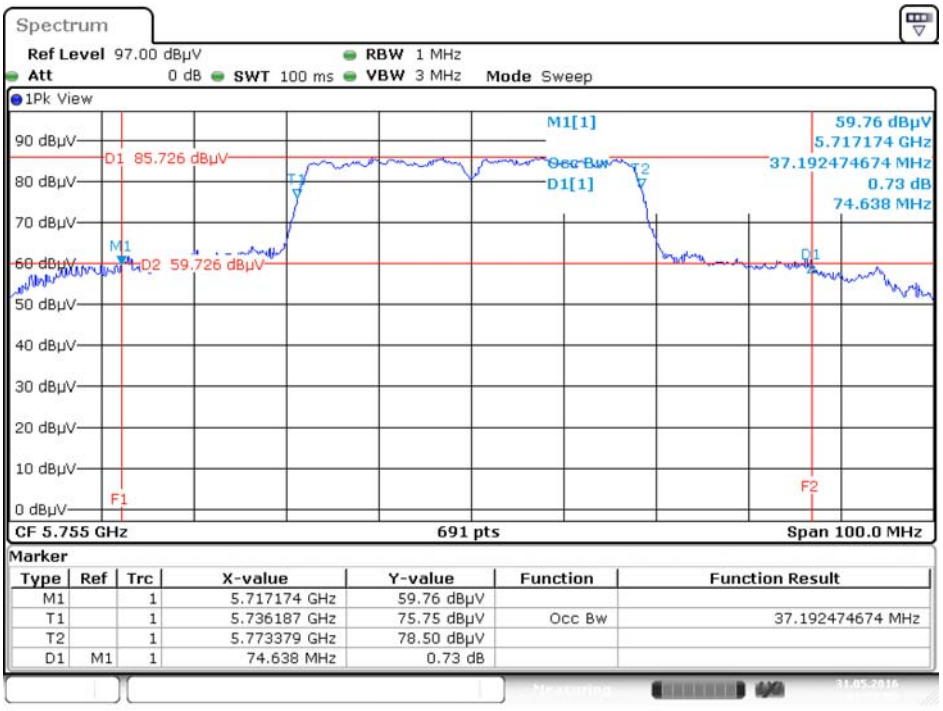
Date: 30.MAR.2016 17:52:10

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT40 / Chain 1 + Chain 2 / 5230 MHz



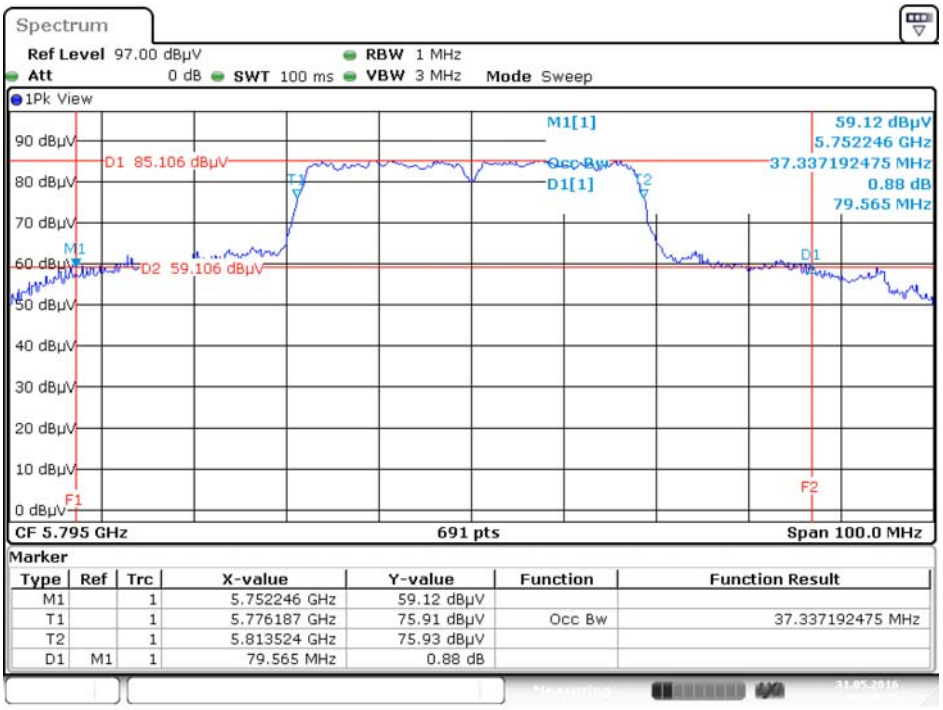
Date: 30.MAR.2016 17:52:41

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT40 / Chain 1 + Chain 2 / 5755 MHz



Date: 31.MAY.2016 03:51:02

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT40 / Chain 1 + Chain 2 / 5795 MHz



Date: 31.MAY.2016 03:48:46

4.3. 6dB Spectrum Bandwidth Measurement

4.3.1. Limit

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

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 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

4.3.3. 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.

4.3.4. Test Setup Layout

For Radiated 6dB Bandwidth Measurement:

This test setup layout is the same as that shown in section 4.6.4.

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 6dB Spectrum Bandwidth

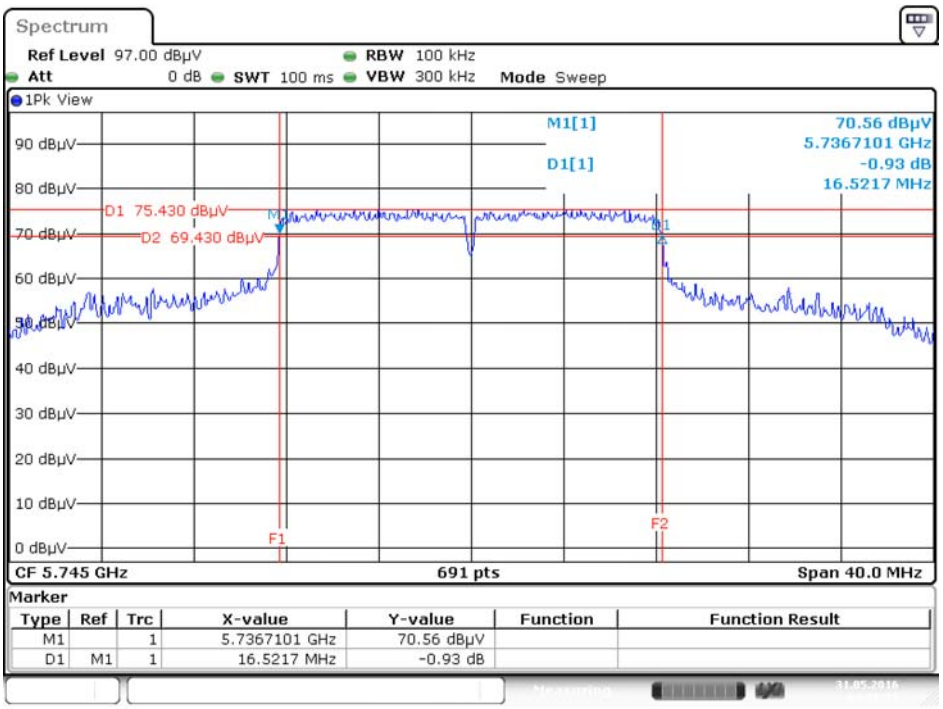
Temperature	20°C	Humidity	61%
Test Engineer	Peter Wu		

Mode	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11a	5745 MHz	16.52	500	Complies
	5785 MHz	16.58	500	Complies
	5825 MHz	16.58	500	Complies
802.11n MCS8 HT20	5745 MHz	17.68	500	Complies
	5785 MHz	17.74	500	Complies
	5825 MHz	17.74	500	Complies
802.11n MCS8 HT40	5755 MHz	36.29	500	Complies
	5795 MHz	36.29	500	Complies

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

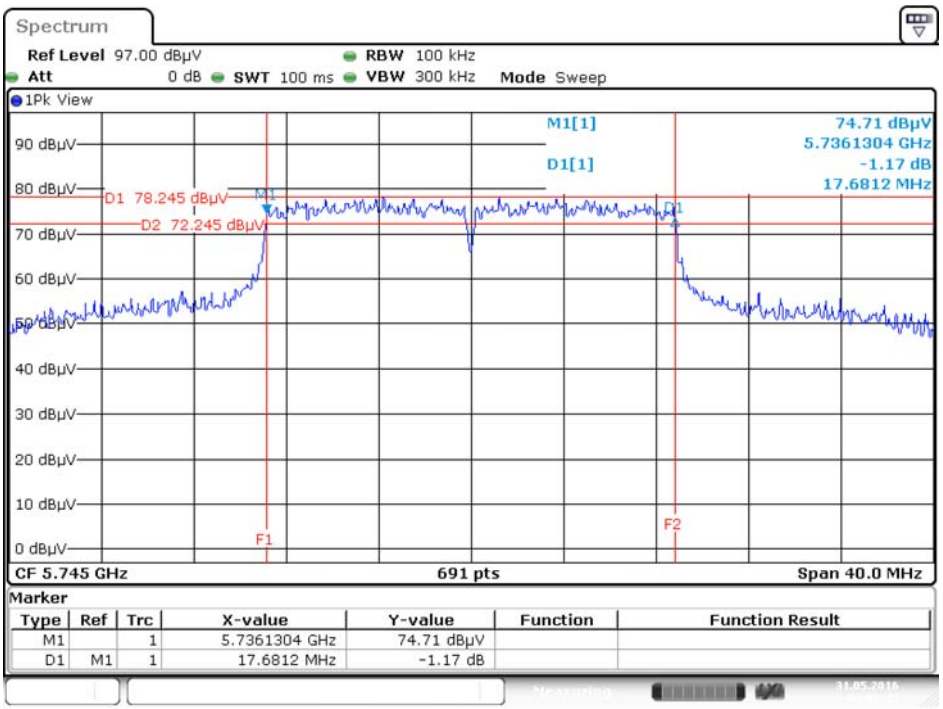
For plots, only the channel with worse result was shown.

6 dB Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 / 5745 MHz



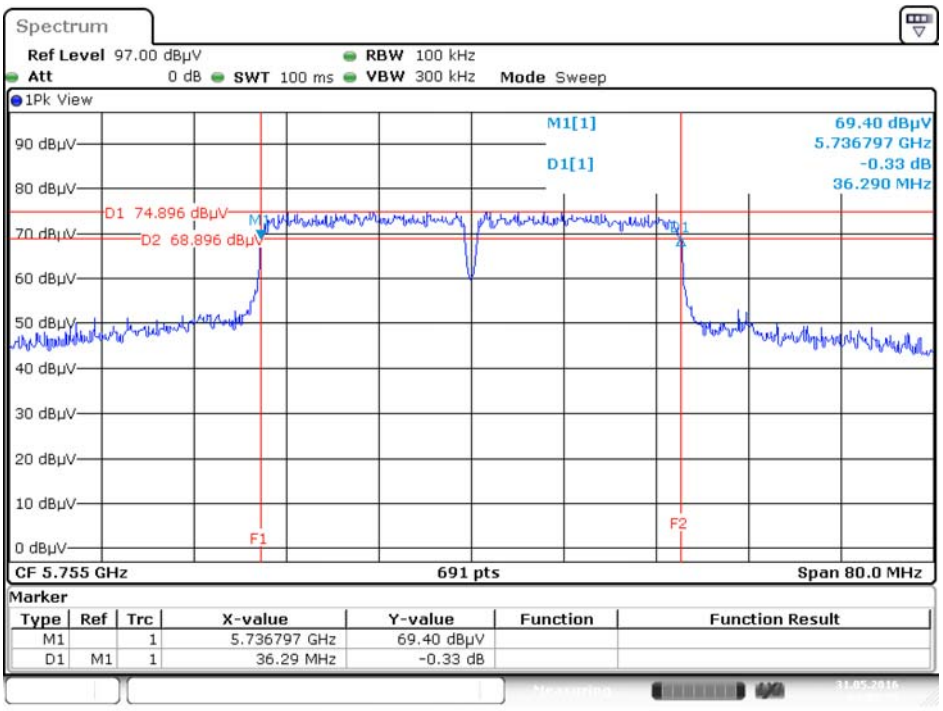
Date: 31.MAY.2016 04:01:15

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT20 / Chain 1 + Chain 2 / 5745 MHz



Date: 31.MAY.2016 04:02:45

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT40 / Chain 1 + Chain 2 / 5755MHz



Date: 31.MAY.2016 04:05:36

4.4. Maximum Conducted Output Power Measurement

4.4.1. 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.

4.4.2. Measuring Instruments and Setting

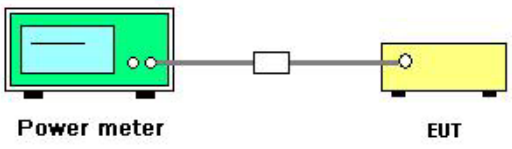
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	AVERAGE

4.4.3. 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.

4.4.4. 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 Maximum Conducted Output Power

Temperature	20°C	Humidity	61%
Test Engineer	Peter Wu	Test Date	Mar. 30, 2016~May 31, 2016

Mode	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1		
802.11a	5180 MHz	17.71	29.73	Complies
	5200 MHz	18.66	29.73	Complies
	5240 MHz	17.58	29.73	Complies
	5745 MHz	18.42	29.73	Complies
	5785 MHz	17.93	29.73	Complies
	5825 MHz	17.18	29.73	Complies

Mode	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Chain 1	Chain 2	Total		
802.11n MCS8 HT20	5180 MHz	17.16	16.85	20.02	29.73	Complies
	5200 MHz	16.76	16.85	19.82	29.73	Complies
	5240 MHz	17.03	16.95	20.00	29.73	Complies
	5745 MHz	17.28	16.58	19.95	29.73	Complies
	5785 MHz	16.18	15.86	19.03	29.73	Complies
	5825 MHz	15.36	15.54	18.46	29.73	Complies
802.11n MCS8 HT40	5190 MHz	13.82	13.59	16.72	29.73	Complies
	5230 MHz	17.65	17.89	20.78	29.73	Complies
	5755 MHz	17.89	16.84	20.41	29.73	Complies
	5795 MHz	16.21	16.35	19.29	29.73	Complies

Note: Ant. Gain: 6.27 dBi, so limit =30-(6.27-6)=29.73 dBm

4.5. Power Spectral Density Measurement

4.5.1. Limit

The following table is power spectral density limits and decrease power density limit rule refer to section 4.4.1.

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

4.5.2. Measuring Instruments and Setting

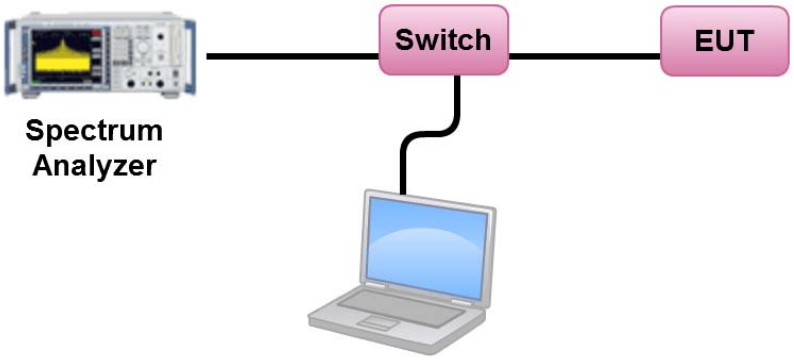
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	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.	

4.5.3. 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.

4.5.4. 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. Test Result of Power Spectral Density

Temperature	20°C	Humidity	61%
Test Engineer	Peter Wu		

Configuration IEEE 802.11a / Chain 1

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	4.27	17.00	Complies
40	5200 MHz	5.11	17.00	Complies
48	5240 MHz	4.24	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	5.10	-3.01	2.09	30.00	Complies
157	5785 MHz	4.57	-3.01	1.56	30.00	Complies
165	5825 MHz	3.84	-3.01	0.83	30.00	Complies

Configuration IEEE 802.11n MCS8 HT20 / Chain 1 + Chain 2

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	6.58	17.00	Complies
40	5200 MHz	6.46	17.00	Complies
48	5240 MHz	6.69	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	6.62	-3.01	3.61	30.00	Complies
157	5785 MHz	5.68	-3.01	2.67	30.00	Complies
165	5825 MHz	5.13	-3.01	2.12	30.00	Complies

Configuration IEEE 802.11n MCS8 HT40 / Chain 1 + Chain 2

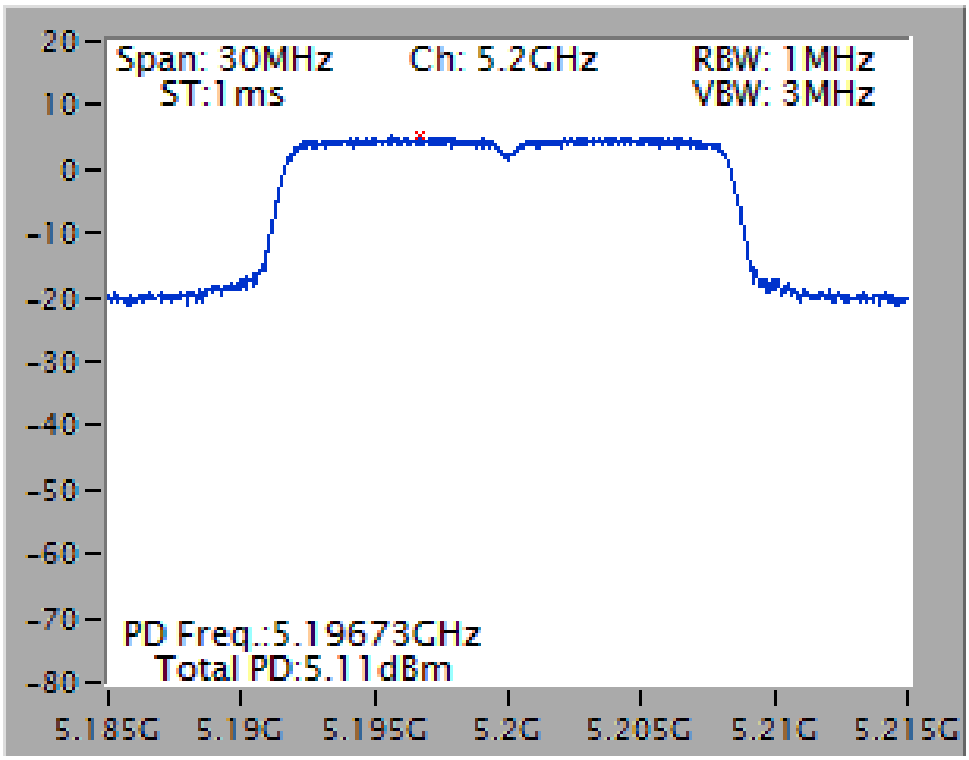
Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
38	5190 MHz	0.70	17.00	Complies
46	5230 MHz	4.74	17.00	Complies

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
151	5755 MHz	4.40	-3.01	1.39	30.00	Complies
159	5795 MHz	3.26	-3.01	0.25	30.00	Complies

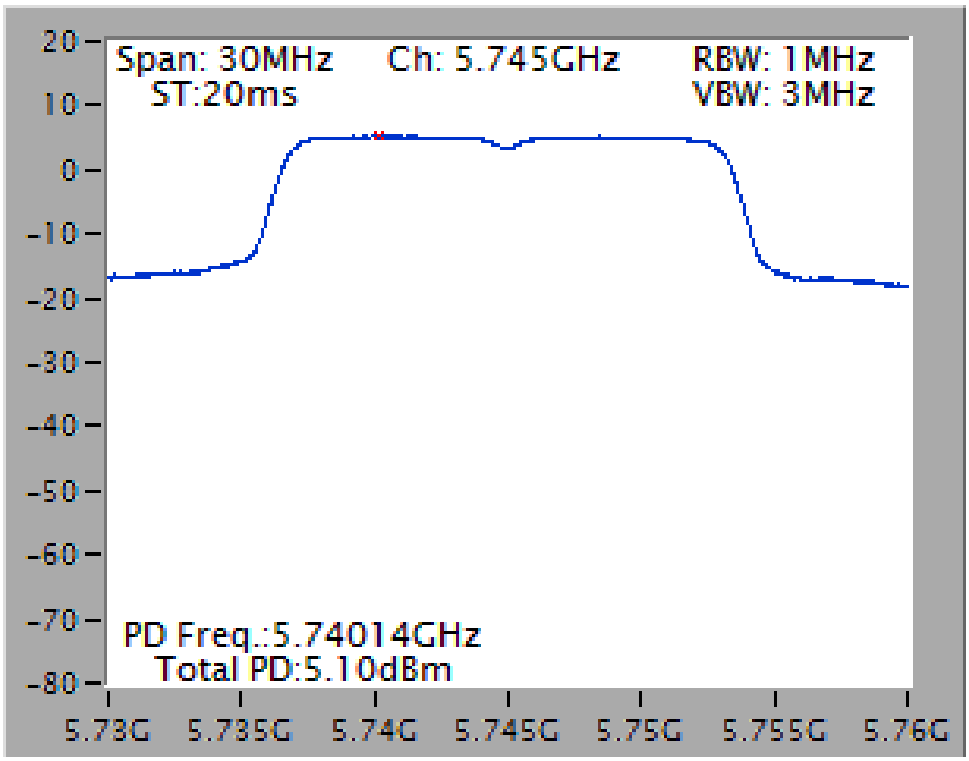
Note: All the test values were listed in the report.

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

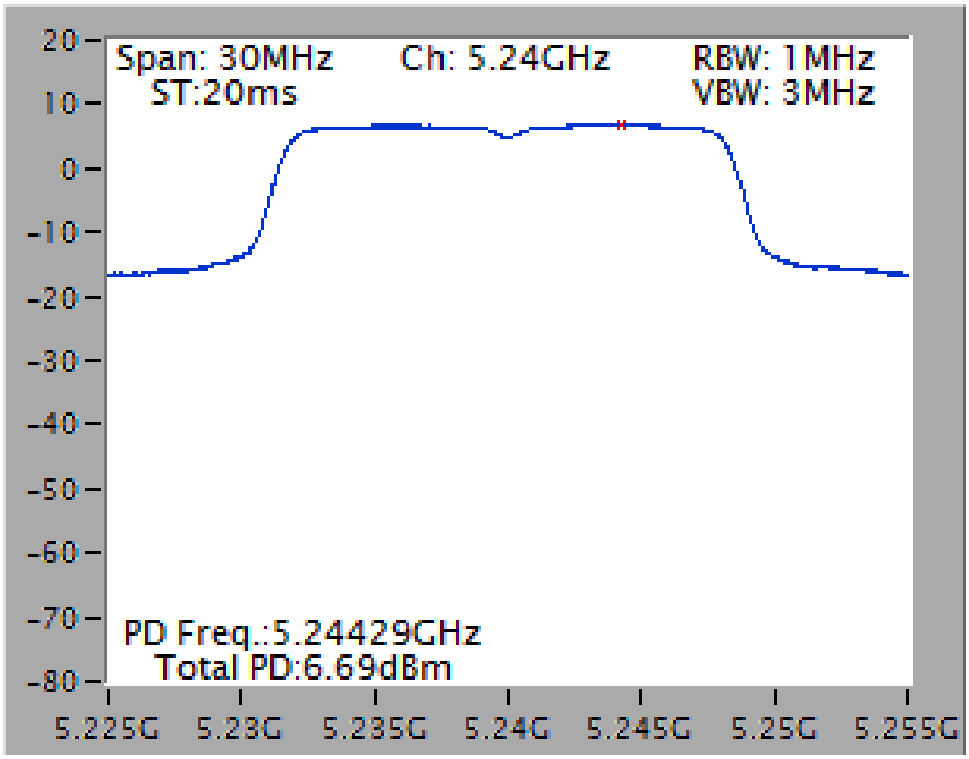
Power Density Plot on Configuration IEEE 802.11a / Chain 1 / 5200 MHz



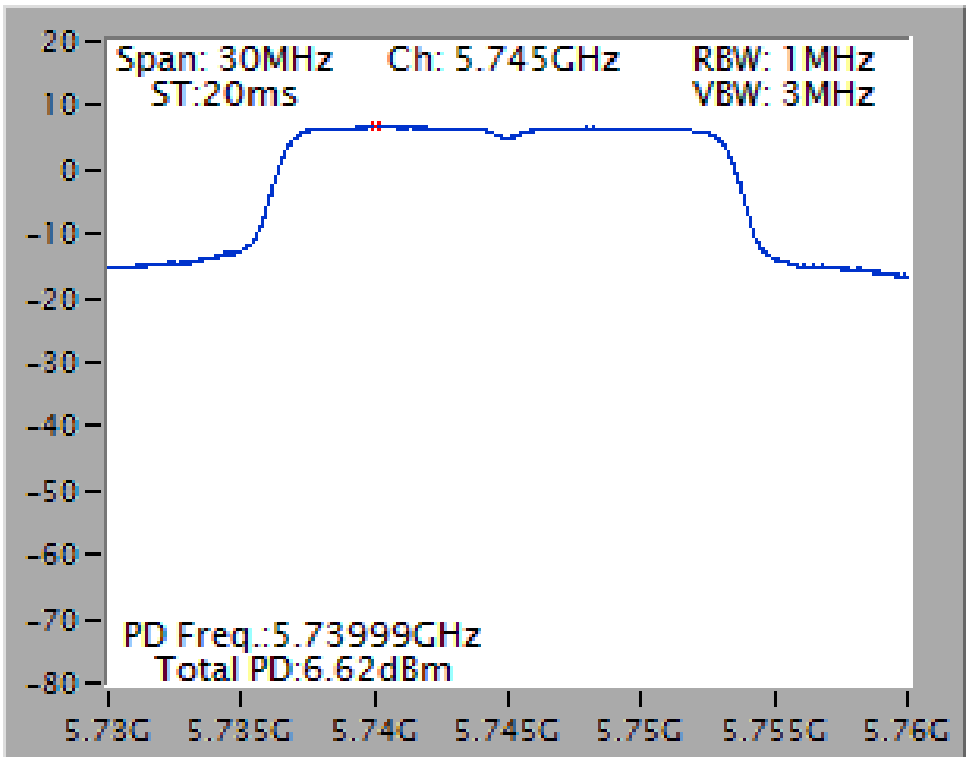
Power Density Plot on Configuration IEEE 802.11a / Chain 1 / 5745 MHz



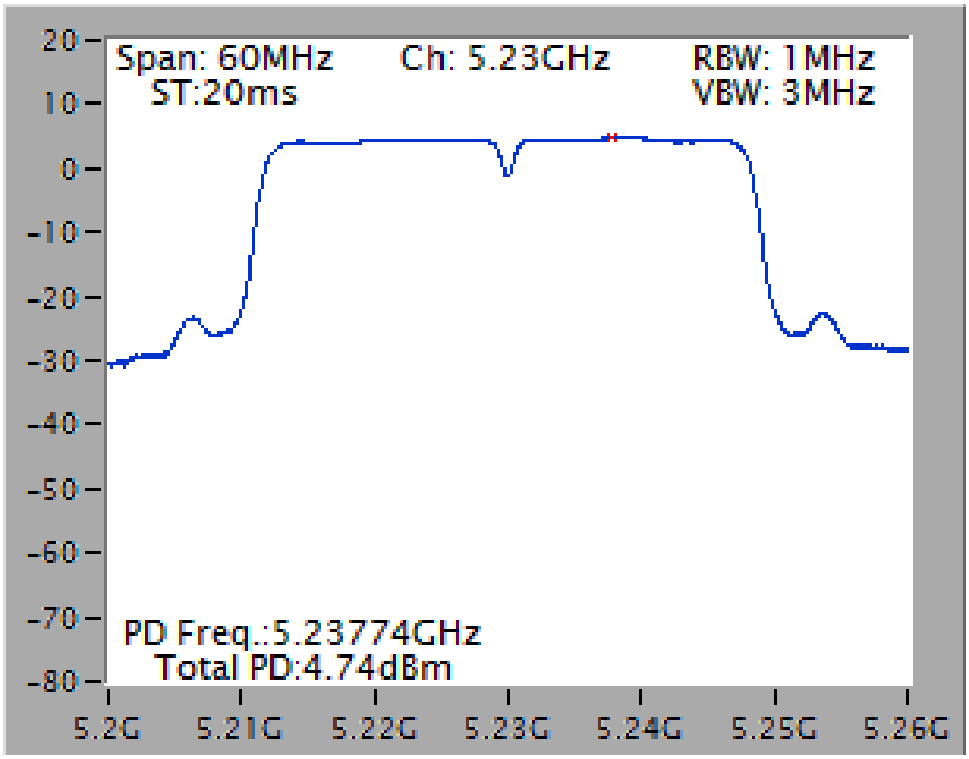
Power Density Plot on Configuration IEEE 802.11n MCS8 HT20 / Chain 1 + Chain 2 / 5240 MHz



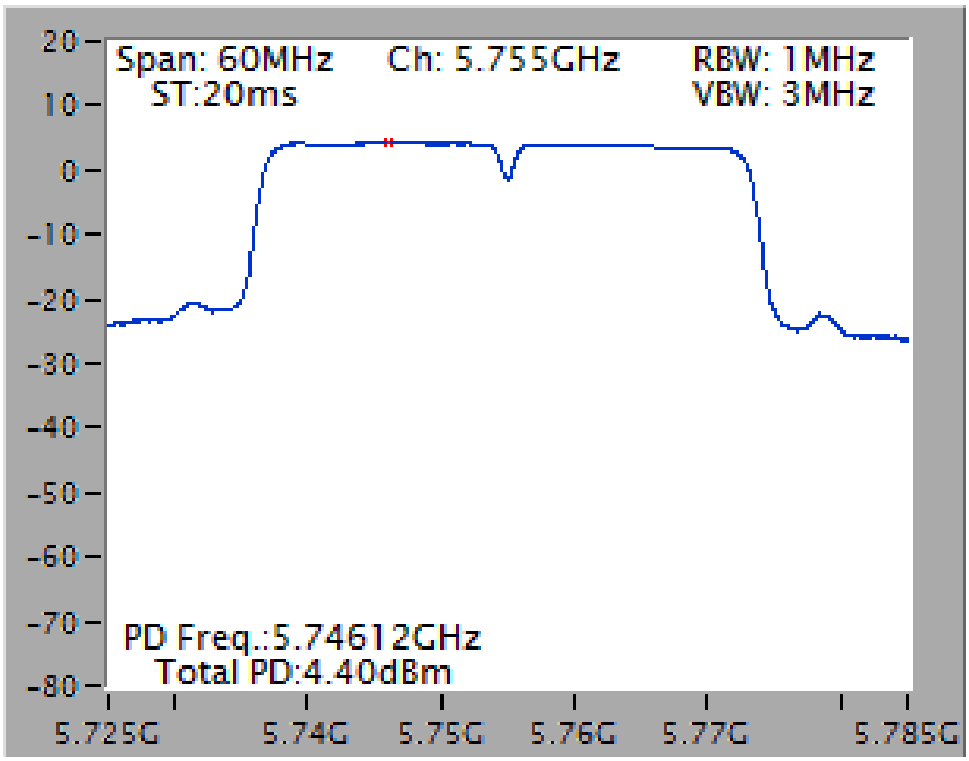
Power Density Plot on Configuration IEEE 802.11n MCS8 HT20 / Chain 1 + Chain 2 / 5745 MHz



Power Density Plot on Configuration IEEE 802.11n MCS8 HT40 / Chain 1 + Chain 2 / 5230 MHz



Power Density Plot on Configuration IEEE 802.11n MCS8 HT40 / Chain 1 + Chain 2 / 5755 MHz



4.6. Radiated 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 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

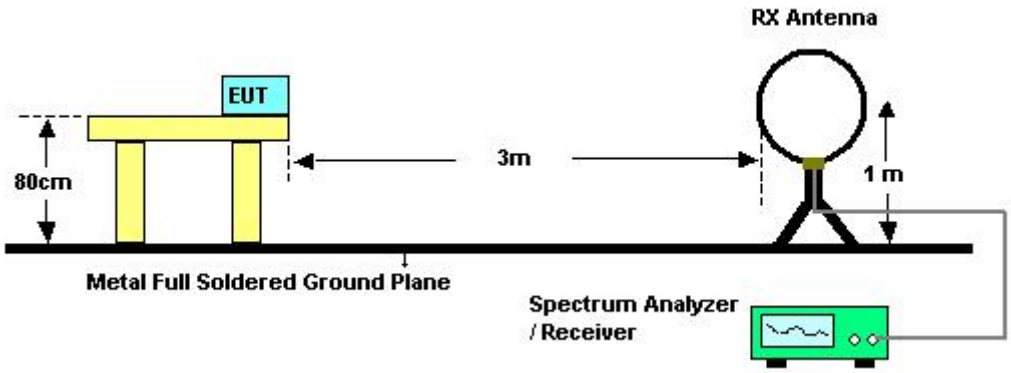
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.6.3. Test Procedures

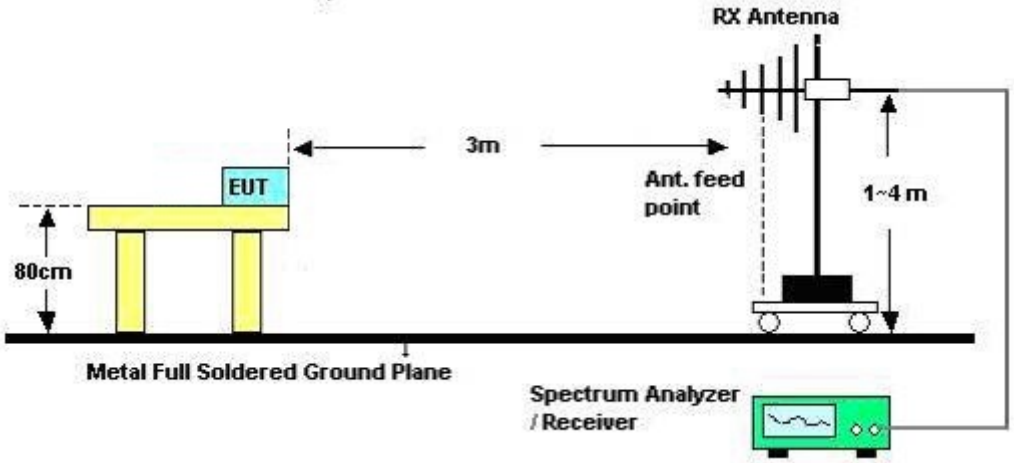
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting 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.

4.6.4. Test Setup Layout

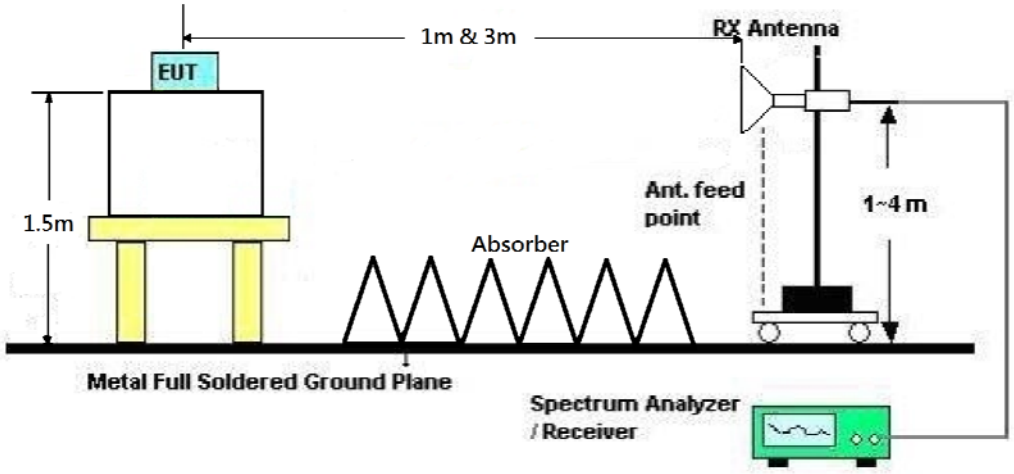
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



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. Results of Radiated Emissions (9kHz~30MHz)

Temperature	22.6℃	Humidity	51%
Test Engineer	Serway Li	Configurations	Normal Link
Test Date	Jun. 06, 2016		

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

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

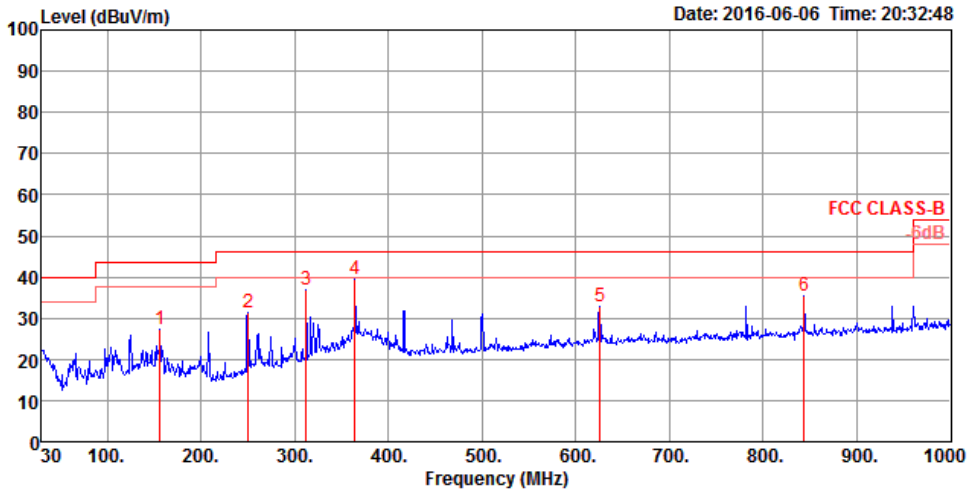
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

4.6.8. Results of Radiated Emissions (30MHz~1GHz)

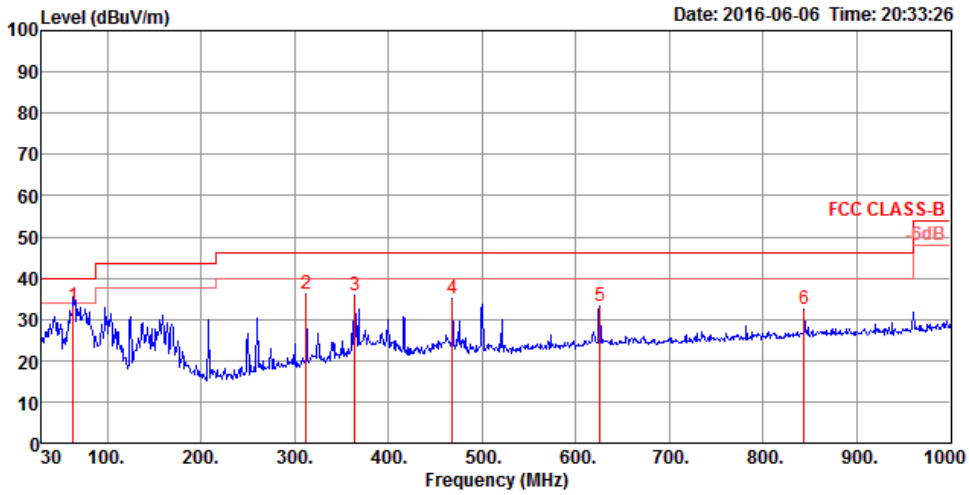
Temperature	22.6°C	Humidity	51%
Test Engineer	Serway Li	Configurations	Normal Link

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	156.10	27.14	43.50	-16.36	41.36	1.07	17.06	32.35	300	172	Peak	HORIZONTAL
2	250.19	31.19	46.00	-14.81	43.05	1.34	19.10	32.30	125	235	Peak	HORIZONTAL
3	312.27	36.89	46.00	-9.11	47.32	1.51	20.35	32.29	125	138	Peak	HORIZONTAL
4	364.65	39.61	46.00	-6.39	48.50	1.64	21.78	32.31	125	138	Peak	HORIZONTAL
5	625.58	32.83	46.00	-13.17	37.30	2.16	25.77	32.40	150	207	Peak	HORIZONTAL
6	843.83	35.25	46.00	-10.75	37.43	2.51	27.33	32.02	125	37	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	63.95	33.25	40.00	-6.75	51.58	0.70	13.37	32.40	150	314	QP	VERTICAL
2	312.27	36.01	46.00	-9.99	46.44	1.51	20.35	32.29	200	155	Peak	VERTICAL
3	364.65	35.90	46.00	-10.10	44.79	1.64	21.78	32.31	125	155	Peak	VERTICAL
4	468.44	35.04	46.00	-10.96	41.98	1.88	23.52	32.34	150	184	Peak	VERTICAL
5	625.58	33.03	46.00	-12.97	37.50	2.16	25.77	32.40	100	324	Peak	VERTICAL
6	843.83	32.40	46.00	-13.60	34.58	2.51	27.33	32.02	100	1	Peak	VERTICAL

Note:

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

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

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

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

Temperature	22.6℃	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 36 / Chain 1
Test Date	Mar. 27, 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	15540.74	63.59	74.00	-10.41	45.33	15.36	38.25	35.35	157	212	Peak	HORIZONTAL
2	15541.93	50.36	54.00	-3.64	32.10	15.36	38.25	35.35	157	212	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	15538.87	63.35	74.00	-10.65	45.09	15.36	38.25	35.35	150	270	Peak	VERTICAL
2	15542.01	49.71	54.00	-4.29	31.45	15.36	38.25	35.35	150	270	Average	VERTICAL

Temperature	22.6℃	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 40 / Chain 1
Test Date	Mar. 27, 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	15602.18	62.97	74.00	-11.03	44.82	15.37	38.14	35.36	159	73	Peak	HORIZONTAL
2	15602.20	50.10	54.00	-3.90	31.95	15.37	38.14	35.36	159	73	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	15596.08	63.31	74.00	-10.69	45.12	15.36	38.19	35.36	161	76	Peak	VERTICAL
2	15597.62	49.90	54.00	-4.10	31.71	15.36	38.19	35.36	161	76	Average	VERTICAL

Temperature	22.6℃	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 48 / Chain 1
Test Date	Mar. 27, 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	15716.30	49.74	54.00	-4.26	31.71	15.38	38.03	35.38	160	92	Average	HORIZONTAL
2	15724.60	62.89	74.00	-11.11	44.86	15.38	38.03	35.38	160	92	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	15720.16	63.00	74.00	-11.00	44.97	15.38	38.03	35.38	153	45	Peak	VERTICAL
2	15723.12	49.50	54.00	-4.50	31.47	15.38	38.03	35.38	153	45	Average	VERTICAL

Temperature	22.6°C	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 149 / Chain 1
Test Date	May 26, 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	11489.58	47.69	54.00	-6.31	27.04	14.82	39.20	33.37	182	138	Average	HORIZONTAL
2	11490.08	61.28	74.00	-12.72	40.63	14.82	39.20	33.37	182	138	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	11490.21	47.93	54.00	-6.07	27.28	14.82	39.20	33.37	162	96	Average	VERTICAL
2	11490.29	61.21	74.00	-12.79	40.56	14.82	39.20	33.37	162	96	Peak	VERTICAL

Temperature	22.6℃	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 157 / Chain 1
Test Date	May 26, 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	11565.64	47.62	54.00	-6.38	28.98	14.00	39.87	35.23	149	85	Average	HORIZONTAL
2	11566.76	60.59	74.00	-13.41	41.95	14.00	39.87	35.23	149	85	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	11565.76	61.09	74.00	-12.91	42.45	14.00	39.87	35.23	159	108	Peak	VERTICAL
2	11568.02	47.09	54.00	-6.91	28.45	14.00	39.87	35.23	159	108	Average	VERTICAL

Temperature	22.6°C	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 165 / Chain 1
Test Date	May 26, 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	11645.88	48.06	54.00	-5.94	29.52	14.03	39.73	35.22	157	62	Average	HORIZONTAL
2	11649.80	61.32	74.00	-12.68	42.78	14.03	39.73	35.22	157	62	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	11645.98	48.10	54.00	-5.90	29.56	14.03	39.73	35.22	155	104	Average	VERTICAL
2	11647.20	61.72	74.00	-12.28	43.18	14.03	39.73	35.22	155	104	Peak	VERTICAL

Temperature	22.6°C	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT20 CH 36 / Chain 1
Test Date	Mar. 27, 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	15540.20	63.43	74.00	-10.57	45.17	15.36	38.25	35.35	154	83	Peak	HORIZONTAL
2	15541.26	50.22	54.00	-3.78	31.96	15.36	38.25	35.35	154	83	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	15535.22	50.03	54.00	-3.97	31.77	15.36	38.25	35.35	164	111	Average	VERTICAL
2	15539.12	63.72	74.00	-10.28	45.46	15.36	38.25	35.35	164	111	Peak	VERTICAL

Temperature	22.6℃	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT20 CH 40 / Chain 1 + Chain 2
Test Date	Mar. 27, 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	15596.00	62.94	74.00	-11.06	44.75	15.36	38.19	35.36	150	111	Peak	HORIZONTAL
2	15597.64	49.93	54.00	-4.07	31.74	15.36	38.19	35.36	150	111	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	15595.40	63.34	74.00	-10.66	45.15	15.36	38.19	35.36	160	90	Peak	VERTICAL
2	15596.64	49.81	54.00	-4.19	31.62	15.36	38.19	35.36	160	90	Average	VERTICAL

Temperature	22.6°C	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT20 CH 48 / Chain 1 + Chain 2
Test Date	Mar. 27, 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	15717.86	49.56	54.00	-4.44	31.53	15.38	38.03	35.38	153	78	Average	HORIZONTAL
2	15723.96	62.95	74.00	-11.05	44.92	15.38	38.03	35.38	153	78	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	15717.82	63.40	74.00	-10.60	45.37	15.38	38.03	35.38	159	117	Peak	VERTICAL
2	15722.36	49.20	54.00	-4.80	31.17	15.38	38.03	35.38	159	117	Average	VERTICAL

Temperature	22.6°C	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT20 CH 149 / Chain 1 + Chain 2
Test Date	May 26, 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	11490.49	47.61	54.00	-6.39	26.96	14.82	39.20	33.37	174	43	Average	HORIZONTAL
2	11490.71	60.32	74.00	-13.68	39.67	14.82	39.20	33.37	174	43	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	11490.54	60.76	74.00	-13.24	40.11	14.82	39.20	33.37	188	91	Peak	VERTICAL
2	11490.66	47.68	54.00	-6.32	27.03	14.82	39.20	33.37	188	91	Average	VERTICAL

Temperature	22.6℃	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT20 CH 157 / Chain 1 + Chain 2
Test Date	May 26, 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	11565.34	47.01	54.00	-6.99	28.37	14.00	39.87	35.23	152	88	Average	HORIZONTAL
2	11566.04	60.49	74.00	-13.51	41.85	14.00	39.87	35.23	152	88	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	11565.36	47.05	54.00	-6.95	28.41	14.00	39.87	35.23	160	154	Average	VERTICAL
2	11568.78	59.89	74.00	-14.11	41.25	14.00	39.87	35.23	160	154	Peak	VERTICAL

Temperature	22.6°C	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT20 CH 165 / Chain 1 + Chain 2
Test Date	May 26, 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	11646.04	48.09	54.00	-5.91	29.55	14.03	39.73	35.22	169	36	Average	HORIZONTAL
2	11650.60	61.86	74.00	-12.14	43.32	14.03	39.73	35.22	169	36	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	11645.76	61.40	74.00	-12.60	42.86	14.03	39.73	35.22	157	162	Peak	VERTICAL
2	11646.08	47.95	54.00	-6.05	29.41	14.03	39.73	35.22	157	162	Average	VERTICAL

Temperature	22.6°C	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT40 CH 38 / Chain 1 + Chain 2
Test Date	Mar. 27, 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	15568.54	63.33	74.00	-10.67	45.14	15.36	38.19	35.36	152	159	Peak	HORIZONTAL
2	15570.20	50.19	54.00	-3.81	32.00	15.36	38.19	35.36	152	159	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	15565.00	50.06	54.00	-3.94	31.87	15.36	38.19	35.36	160	137	Average	VERTICAL
2	15565.12	62.83	74.00	-11.17	44.64	15.36	38.19	35.36	160	137	Peak	VERTICAL

Temperature	22.6°C	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT40 CH 46 / Chain 1 + Chain 2
Test Date	Mar. 27, 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	15691.56	62.14	74.00	-11.86	44.10	15.38	38.03	35.37	150	111	Peak	HORIZONTAL
2	15694.32	49.54	54.00	-4.46	31.50	15.38	38.03	35.37	150	111	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	15694.52	49.29	54.00	-4.71	31.25	15.38	38.03	35.37	161	137	Average	VERTICAL
2	15694.52	60.05	74.00	-13.95	42.01	15.38	38.03	35.37	161	137	Peak	VERTICAL

Temperature	22.6°C	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT40 CH 151 / Chain 1 + Chain 2
Test Date	May 26, 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	11511.27	47.64	54.00	-6.36	27.00	14.82	39.20	33.38	164	156	Average	HORIZONTAL
2	11511.84	60.97	74.00	-13.03	40.33	14.82	39.20	33.38	164	156	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	11511.59	48.08	54.00	-5.92	27.44	14.82	39.20	33.38	176	87	Average	VERTICAL
2	11511.65	61.03	74.00	-12.97	40.39	14.82	39.20	33.38	176	87	Peak	VERTICAL

Temperature	22.6℃	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT40 CH 159 / Chain 1 + Chain 2
Test Date	May 26, 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	11589.90	47.47	54.00	-6.53	26.75	14.92	39.20	33.40	190	302	Average	HORIZONTAL
2	11590.17	60.91	74.00	-13.09	40.19	14.92	39.20	33.40	190	302	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	11589.00	47.82	54.00	-6.18	27.10	14.92	39.20	33.40	170	106	Average	VERTICAL
2	11592.17	62.17	74.00	-11.83	41.45	14.92	39.20	33.40	170	106	Peak	VERTICAL

Note:

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

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

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

4.7. Band Edge Emissions Measurement

4.7.1. 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

4.7.2. 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	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

4.7.3. Test Procedures

The test procedure is the same as section 4.6.3.

4.7.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.6.4.

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 transmitting mode.

4.7.7. Test Result of Band Edge and Fundamental Emissions

Temperature	22.6℃	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 36, 40, 48 / Chain 1
Test Date	Mar. 27, 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	5150.00	52.93	54.00	-1.07	43.79	10.56	31.52	32.94	245	70	Average	HORIZONTAL
2	5150.00	68.74	74.00	-5.26	59.60	10.56	31.52	32.94	245	70	Peak	HORIZONTAL
3	5182.80	109.02			99.82	10.59	31.55	32.94	245	70	Peak	HORIZONTAL
4	5184.40	99.41			90.21	10.59	31.55	32.94	245	70	Average	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	5143.20	61.19	74.00	-12.81	52.05	10.56	31.52	32.94	245	77	Peak	HORIZONTAL
2	5150.00	48.45	54.00	-5.55	39.31	10.56	31.52	32.94	245	77	Average	HORIZONTAL
3	5203.20	110.40			101.15	10.62	31.57	32.94	245	77	Peak	HORIZONTAL
4	5204.40	100.56			91.31	10.62	31.57	32.94	245	77	Average	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	5147.60	60.85	74.00	-13.15	51.71	10.56	31.52	32.94	185	84	Peak	HORIZONTAL
2	5150.00	47.61	54.00	-6.39	38.47	10.56	31.52	32.94	185	84	Average	HORIZONTAL
3	5242.40	110.84			101.53	10.65	31.59	32.93	185	84	Peak	HORIZONTAL
4	5243.60	101.17			91.86	10.65	31.59	32.93	185	84	Average	HORIZONTAL
5	5350.00	49.26	54.00	-4.74	39.77	10.74	31.68	32.93	185	84	Average	HORIZONTAL
6	5351.20	62.33	74.00	-11.67	52.84	10.74	31.68	32.93	185	84	Peak	HORIZONTAL

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

Temperature	22.6°C	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11a CH 149, 157, 165 / Chain 1
Test Date	May 26, 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	5501.00	63.87	68.20	-4.33	51.97	10.66	34.30	33.06	186	63	Peak	HORIZONTAL
2	5739.00	103.33			91.26	10.76	34.45	33.14	186	63	Average	HORIZONTAL
3	5739.00	112.64			100.57	10.76	34.45	33.14	186	63	Peak	HORIZONTAL
4	5951.00	60.29	68.20	-7.91	47.66	11.26	34.57	33.20	186	63	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	5548.00	62.27	68.20	-5.93	50.26	10.76	34.33	33.08	178	59	Peak	HORIZONTAL
2	5779.00	111.44			99.38	10.74	34.47	33.15	178	59	Peak	HORIZONTAL
3	5788.00	102.19			90.13	10.74	34.47	33.15	178	59	Average	HORIZONTAL
4	5981.00	61.29	68.20	-6.91	48.54	11.37	34.59	33.21	178	59	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	5579.00	61.34	68.20	-6.86	49.25	10.83	34.35	33.09	192	62	Peak	HORIZONTAL
2	5819.00	109.17			97.05	10.79	34.49	33.16	192	62	Peak	HORIZONTAL
3	5820.00	99.82			87.70	10.79	34.49	33.16	192	62	Average	HORIZONTAL
4	6058.00	61.31	68.20	-6.89	48.45	11.48	34.61	33.23	192	62	Peak	HORIZONTAL

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

Temperature	22.6°C	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT20 CH 36, 40, 48 / Chain 1 + Chain 2
Test Date	Mar. 27, 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	5150.00	52.45	54.00	-1.55	43.31	10.56	31.52	32.94	200	85	Average	HORIZONTAL
2	5150.00	70.65	74.00	-3.35	61.51	10.56	31.52	32.94	200	85	Peak	HORIZONTAL
3	5176.00	110.32			101.12	10.59	31.55	32.94	200	85	Peak	HORIZONTAL
4	5184.40	99.32			90.12	10.59	31.55	32.94	200	85	Average	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	5148.00	60.68	74.00	-13.32	51.54	10.56	31.52	32.94	212	76	Peak	HORIZONTAL
2	5150.00	47.61	54.00	-6.39	38.47	10.56	31.52	32.94	212	76	Average	HORIZONTAL
3	5194.40	110.02			100.80	10.60	31.56	32.94	212	76	Peak	HORIZONTAL
4	5204.40	99.88			90.63	10.62	31.57	32.94	212	76	Average	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	5144.60	60.24	74.00	-13.76	51.10	10.56	31.52	32.94	203	86	Peak	HORIZONTAL
2	5150.00	47.52	54.00	-6.48	38.38	10.56	31.52	32.94	203	86	Average	HORIZONTAL
3	5235.20	99.63			90.33	10.65	31.59	32.94	203	86	Average	HORIZONTAL
4	5237.00	111.20			101.90	10.65	31.59	32.94	203	86	Peak	HORIZONTAL
5	5350.00	48.95	54.00	-5.05	39.46	10.74	31.68	32.93	203	86	Average	HORIZONTAL
6	5358.40	62.65	74.00	-11.35	53.14	10.75	31.69	32.93	203	86	Peak	HORIZONTAL

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

Temperature	22.6°C	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT20 CH 149, 157, 165 / Chain 1 + Chain 2
Test Date	May 26, 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	5513.00	62.19	68.20	-6.01	50.26	10.69	34.31	33.07	228	106	Peak	VERTICAL
2	5739.00	99.70			87.63	10.76	34.45	33.14	228	106	Average	VERTICAL
3	5743.00	110.30			98.23	10.76	34.45	33.14	228	106	Peak	VERTICAL
4	5988.00	60.32	68.20	-7.88	47.57	11.37	34.59	33.21	228	106	Peak	VERTICAL

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	5545.00	61.89	68.20	-6.31	49.88	10.76	34.33	33.08	228	98	Peak	VERTICAL
2	5779.00	99.68			87.62	10.74	34.47	33.15	228	98	Average	VERTICAL
3	5780.00	110.24			98.18	10.74	34.47	33.15	228	98	Peak	VERTICAL
4	6020.00	60.88	68.20	-7.32	48.05	11.45	34.60	33.22	228	98	Peak	VERTICAL

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	5584.00	62.25	68.20	-5.95	50.16	10.83	34.35	33.09	177	55	Peak	HORIZONTAL
2	5819.00	99.32			87.20	10.79	34.49	33.16	177	55	Average	HORIZONTAL
3	5820.00	109.35			97.23	10.79	34.49	33.16	177	55	Peak	HORIZONTAL
4	5932.00	60.97	68.20	-7.23	48.41	11.20	34.56	33.20	177	55	Peak	HORIZONTAL

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

Temperature	22.6℃	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT40 CH 38, 46 / Chain 1 + Chain 2
Test Date	Mar. 27, 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	5150.00	52.51	54.00	-1.49	43.37	10.56	31.52	32.94	241	86	Average	HORIZONTAL
2	5150.00	66.36	74.00	-7.64	57.22	10.56	31.52	32.94	241	86	Peak	HORIZONTAL
3	5199.00	93.40			84.18	10.60	31.56	32.94	241	86	Average	HORIZONTAL
4	5200.20	104.33			95.11	10.60	31.56	32.94	241	86	Peak	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	5149.00	63.10	74.00	-10.90	53.96	10.56	31.52	32.94	180	82	Peak	HORIZONTAL
2	5150.00	49.48	54.00	-4.52	40.34	10.56	31.52	32.94	180	82	Average	HORIZONTAL
3	5238.40	98.04			88.74	10.65	31.59	32.94	180	82	Average	HORIZONTAL
4	5244.40	108.81			99.50	10.65	31.59	32.93	180	82	Peak	HORIZONTAL

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

Temperature	22.6°C	Humidity	51%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT40 CH 151, 159 / Chain 1 + Chain 2
Test Date	May 26, 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	5650.00	63.51	68.20	-4.69	51.40	10.83	34.39	33.11	188	59	Peak	HORIZONTAL
2	5750.00	108.39			96.32	10.76	34.45	33.14	188	59	Peak	HORIZONTAL
3	5751.00	99.56			87.49	10.76	34.45	33.14	178	59	Average	HORIZONTAL
4	5994.00	60.78	68.20	-7.42	47.96	11.43	34.60	33.21	188	59	Peak	HORIZONTAL

Item 2, 3 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	5563.00	61.55	68.20	-6.65	49.50	10.79	34.34	33.08	223	121	Peak	VERTICAL
2	5800.00	106.52			94.46	10.73	34.48	33.15	223	121	Peak	VERTICAL
3	5803.00	95.89			83.84	10.73	34.48	33.16	223	121	Average	VERTICAL
4	5973.00	60.61	68.20	-7.59	47.93	11.31	34.58	33.21	223	121	Peak	VERTICAL

Item 2, 3 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

4.8. Frequency Stability Measurement

4.8.1. 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).

4.8.2. Measuring Instruments and Setting

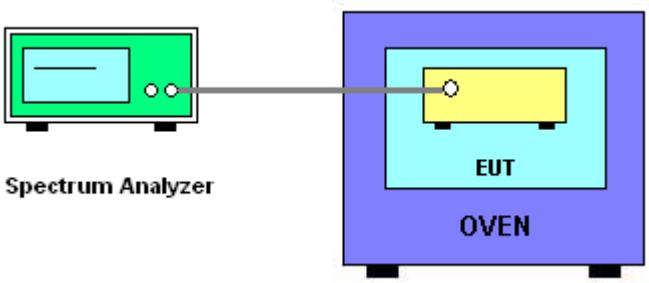
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

4.8.3. 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.

4.8.4. Test Setup Layout



4.8.5. Test Deviation

There is no deviation with the original standard.

4.8.6. EUT Operation during Test

The EUT was programmed to be in continuously un-modulation transmitting mode.

4.8.7. Test Result of Frequency Stability

Temperature	20°C	Humidity	61%
Test Engineer	Peter Wu	Test Date	Mar. 30, 2016~May 31, 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	5199.9932	5199.9925	5199.9915	5199.9905
110.00	5199.9928	5199.9927	5199.9922	5199.9918
93.50	5199.9924	5199.9915	5199.9913	5199.9909
Max. Deviation (MHz)	0.0076	0.0085	0.0087	0.0095
Max. Deviation (ppm)	1.46	1.63	1.67	1.83
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5200 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
-30	5199.9976	5199.9962	5199.9944	5199.9921
-20	5199.9960	5199.9947	5199.9930	5199.9906
-10	5199.9945	5199.9933	5199.9917	5199.9898
0	5199.9931	5199.9919	5199.9900	5199.9878
10	5199.9918	5199.9905	5199.9890	5199.9872
20	5199.9906	5199.9893	5199.9877	5199.9858
30	5199.9892	5199.9881	5199.9867	5199.9851
40	5199.9876	5199.9861	5199.9845	5199.9825
50	5199.9859	5199.9847	5199.9832	5199.9805
Max. Deviation (MHz)	0.0141	0.0153	0.0168	0.0195
Max. Deviation (ppm)	2.71	2.94	3.23	3.75
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5785 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5784.9975	5784.9971	5784.9970	5784.9963
110.00	5784.9968	5784.9965	5784.9956	5784.9953
93.50	5784.9959	5784.9954	5784.9951	5784.9949
Max. Deviation (MHz)	0.0041	0.0046	0.0049	0.0051
Max. Deviation (ppm)	0.71	0.80	0.85	0.88
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5785 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
-30	5785.0037	5785.0023	5785.0005	5784.9982
-20	5785.0021	5785.0008	5784.9991	5784.9967
-10	5785.0006	5784.9994	5784.9978	5784.9959
0	5784.9992	5784.9980	5784.9961	5784.9939
10	5784.9979	5784.9966	5784.9951	5784.9933
20	5784.9967	5784.9954	5784.9938	5784.9919
30	5784.9953	5784.9942	5784.9928	5784.9912
40	5784.9937	5784.9922	5784.9906	5784.9886
50	5784.9920	5784.9908	5784.9893	5784.9866
Max. Deviation (MHz)	0.0080	0.0092	0.0107	0.0134
Max. Deviation (ppm)	1.38	1.59	1.85	2.32
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	5189.9958	5189.9951	5189.9944	5189.9936
110.00	5189.9952	5189.9946	5189.9945	5189.9939
93.50	5189.9951	5189.9943	5189.9939	5189.9933
Max. Deviation (MHz)	0.0049	0.0057	0.0061	0.0067
Max. Deviation (ppm)	0.94	1.10	1.18	1.29
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5190 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
-30	5190.0027	5190.0013	5189.9995	5189.9972
-20	5190.0011	5189.9998	5189.9981	5189.9957
-10	5189.9996	5189.9984	5189.9968	5189.9949
0	5189.9982	5189.9970	5189.9951	5189.9929
10	5189.9969	5189.9956	5189.9941	5189.9923
20	5189.9957	5189.9944	5189.9928	5189.9909
30	5189.9943	5189.9932	5189.9918	5189.9902
40	5189.9927	5189.9912	5189.9896	5189.9876
50	5189.9910	5189.9898	5189.9883	5189.9856
Max. Deviation (MHz)	0.0090	0.0102	0.0117	0.0144
Max. Deviation (ppm)	1.73	1.97	2.25	2.77
Result	Complies			

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5755 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5754.9978	5754.9972	5754.9967	5754.9964
110.00	5754.9977	5754.9974	5754.9969	5754.9963
93.50	5754.9968	5754.9967	5754.9962	5754.9957
Max. Deviation (MHz)	0.0032	0.0033	0.0038	0.0043
Max. Deviation (ppm)	0.56	0.57	0.66	0.75
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5755 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
-30	5755.0054	5755.0040	5755.0022	5754.9999
-20	5755.0038	5755.0025	5755.0008	5754.9984
-10	5755.0023	5755.0011	5754.9995	5754.9976
0	5755.0009	5754.9997	5754.9978	5754.9956
10	5754.9996	5754.9983	5754.9968	5754.9950
20	5754.9984	5754.9971	5754.9955	5754.9936
30	5754.9970	5754.9959	5754.9945	5754.9929
40	5754.9954	5754.9939	5754.9923	5754.9903
50	5754.9937	5754.9925	5754.9910	5754.9883
Max. Deviation (MHz)	0.0063	0.0075	0.0090	0.0117
Max. Deviation (ppm)	1.09	1.30	1.56	2.03
Result	Complies			

4.9. Antenna Requirements

4.9.1. 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.

4.9.2. 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
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Jan. 27, 0216	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 08, 2015	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 23, 2015	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	0.15MHz ~ 30MHz	Dec. 01, 2015	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	37880	20MHz ~ 2GHz	Sep. 03, 2015	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 16, 2016*	Radiation (03CH01-CB)
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	8447D	2944A10991	0.1MHz ~ 1.3GHz	Mar. 15, 2016	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)
EMI Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8.4GHz	Jan. 27, 2016	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz ~ 1 GHz	Nov. 02, 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)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
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.

"*" Calibration Interval of instruments listed above is two years.

NCR means Non-Calibration required.

6. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
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%