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FCC RADIO TEST REPORT

Applicant's company	**CyberTAN Technology Inc.**
Applicant Address	No. 99, Park Avenue III, Science-based Industrial Park, Hsinchu, 308 Taiwan
FCC ID	**N89-RM5110**
Manufacturer's company	**CyberTAN Technology Inc.**
Manufacturer Address	No. 99, Park Avenue III, Science-based Industrial Park, Hsinchu, 308 Taiwan

Product Name	ViaSat Residential Broadband Gateway
Brand Name	ViaSat
Model No.	RM5110
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250 MHz / 5725 ~ 5850 MHz
Received Date	Feb. 04, 2015
Final Test Date	Mar. 25, 2015
Submission Type	Original Equipment

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.

TAF
Testing Laboratory
1190

Table of Contents

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR530462AB	Rev. 01	Initial issue of report	May 06, 2015

1. VERIFICATION OF COMPLIANCE

Product Name	:	ViaSat Residential Broadband Gateway
Brand Name	:	ViaSat
Model No.	:	RM5110
Applicant	:	CyberTAN Technology 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 Feb. 04, 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	15.207	AC Power Line Conducted Emissions	Complies	17.94 dB
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	5.93 dB
4.5	15.407(a)	Power Spectral Density	Complies	11.72 dB
4.6	15.407(b)	Radiated Emissions	Complies	1.27 dB
4.7	15.407(b)	Band Edge Emissions	Complies	1.04 dB
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 802.11 a/n: 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) IEEE 802.11n: 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: 16.15 MHz IEEE 802.11n MCS0 (HT20): 17.28 MHz IEEE 802.11n MCS0 (HT40): 37.77 MHz Band 4: IEEE 802.11a: 30.74 MHz IEEE 802.11n MCS0 (HT20): 32.13 MHz IEEE 802.11n MCS0 (HT40): 37.92 MHz
Maximum Conducted Output Power	Band 1: IEEE 802.11a: 17.75 dBm IEEE 802.11n MCS0 (HT20): 17.97 dBm IEEE 802.11n MCS0 (HT40): 19.55 dBm Band 4: IEEE 802.11a: 24.06 dBm IEEE 802.11n MCS0 (HT20): 24.07 dBm IEEE 802.11n MCS0 (HT40): 19.35 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

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

Antenna and Band width

Antenna	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	Rating
Adapter	ViaSat	ADP-90AR B	Input: 100-240V~1A 50-60Hz Output: 48V, 1.875A
Others			
RJ-45 Cable*1: Non-shielded, 1.5m			
Foot Holder*1			

3.3. Table for Filed Antenna

Ant.	Brand Name	Model Name	Antenna Type	Connector	Gain (dBi)		
					2.4GHz	5GHz	
						Band 1	Band 4
1	dockon	-	Printed Antenna	Murata	1.7	2.1	3.0
2	dockon	-	Printed Antenna	Murata	2.3	2.6	3.7

Note: The EUT has two antennas.

<For 2.4GHz Band>

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

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

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

Chain 1, Chain 2 will transmit/receive the same signal simultaneously.

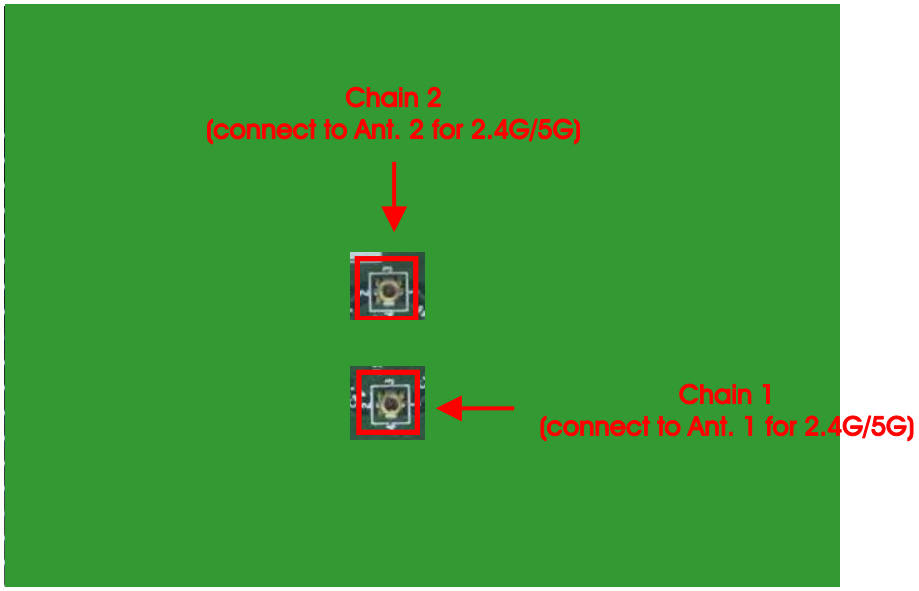
Chain 1, Chain 2 can be used as transmitting/receiving antennas.

<For 5GHz Band>

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

Chain 1, Chain 2 will transmit/receive the same signal simultaneously.

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



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

The following test modes were performed for all tests:

For Conducted Emission test:

Mode 1. Normal Link_2.4GHz

Mode 2. Normal Link_5GHz

Mode 2 is the worst case, so it was selected to record in this test report.

For Radiated Emission test (Below 1GHz):

Mode 1. Normal Link_2.4GHz

Mode 2. Normal Link_5GHz

Mode 2 is the worst case, so it was selected to record in this test report.

For Radiated Emission test (Above 1GHz):

Mode 1: Place EUT in Y axis

Note: USB port is for upgrading FW.

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	-
CO01-CB	Conduction	Hsin Chu	262045	IC 4086D	-
TH01-CB	OVEN Room	Hsin Chu	-	-	-

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

3.7. Table for Supporting Units

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
Signal generator	ROHDE&SCHWARZ	SMR 40	N/A
NB	DELL	E6430	DoC
NB	DELL	E6430	DoC
Fixture	Cybertan	ZEM-4300+	N/A
Flash disk3.0	Sony	USML	DoC
Phone	WONDER	WD-303	N/A

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

Support Unit	Brand	Model	FCC ID
Signal generator	ROHDE&SCHWARZ	SMR 40	N/A
NB	DELL	E6430	DoC
NB	DELL	E6430	DoC
Fixture	Cybertan	ZEM-4300+	N/A
Flash disk3.0	SONY	N/A	DoC
Phone	ISITO	IS-858	N/A

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

Support Unit	Brand	Model	FCC ID
NB	DELL	E6430	DoC

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E6220	DoC

3.8. Table for Parameters of Test Software Setting

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

Test Software Version	DOS					
Mode	Test Frequency (MHz)					
	NCB: 20MHz					
	5180 MHz	5200 MHz	5240 MHz	5745 MHz	5785 MHz	5825 MHz
802.11a	60	56	52	66	76	68
802.11n MCS0 HT20	60	56	58	62	76	70
Mode	NCB: 40MHz					
802.11n MCS0 HT40	5190 MHz		5230 MHz		5755 MHz	5795 MHz
	51		67		55	67

3.9. EUT Operation during Test

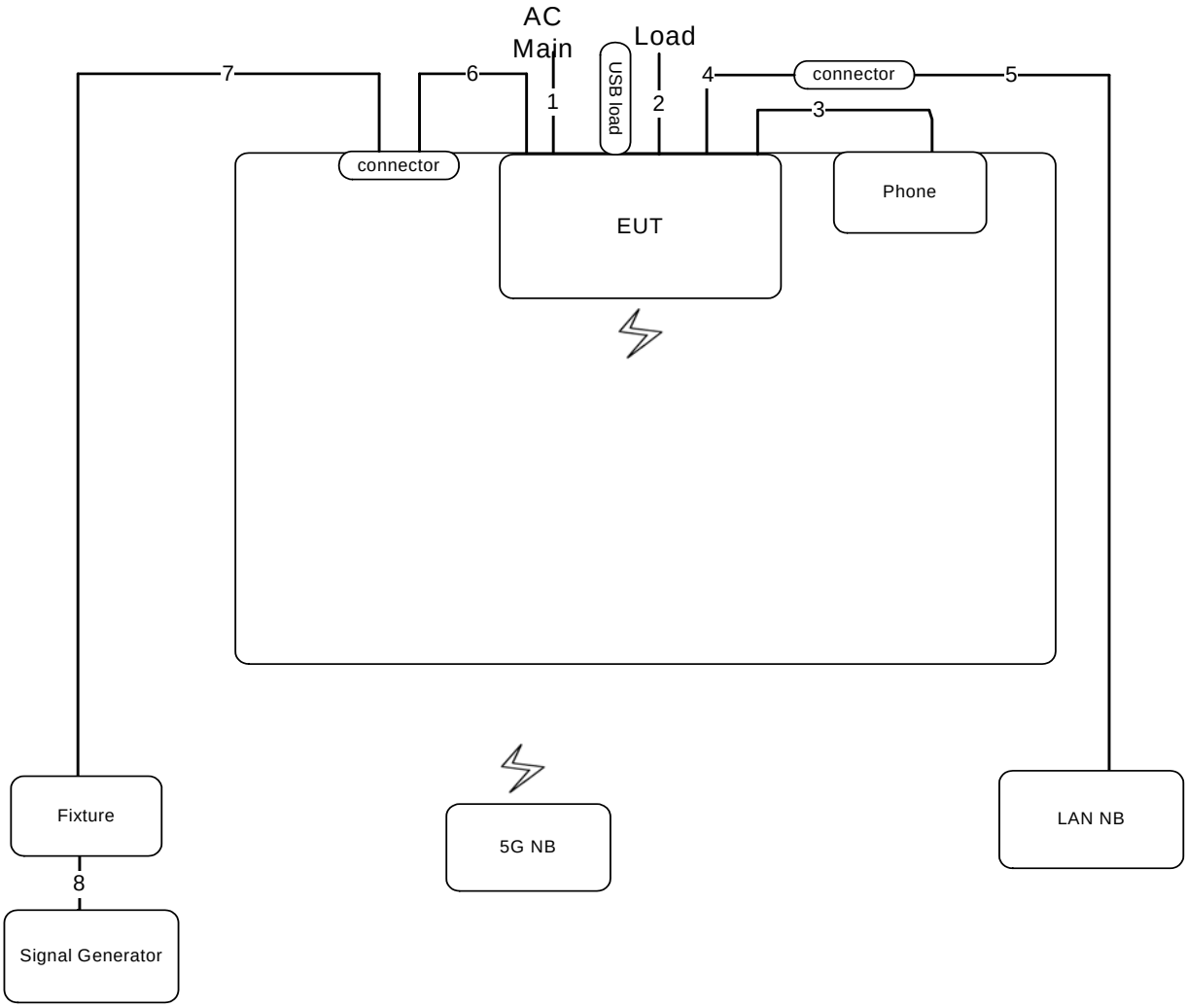
The EUT was programmed to be in continuously transmitting mode.

3.10. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	2.070	2.088	99.14%	0.04	0.01
802.11n MCS0 HT20	1.913	1.939	98.66%	0.06	0.01
802.11n MCS0 HT40	0.624	0.722	86.43%	0.63	1.60

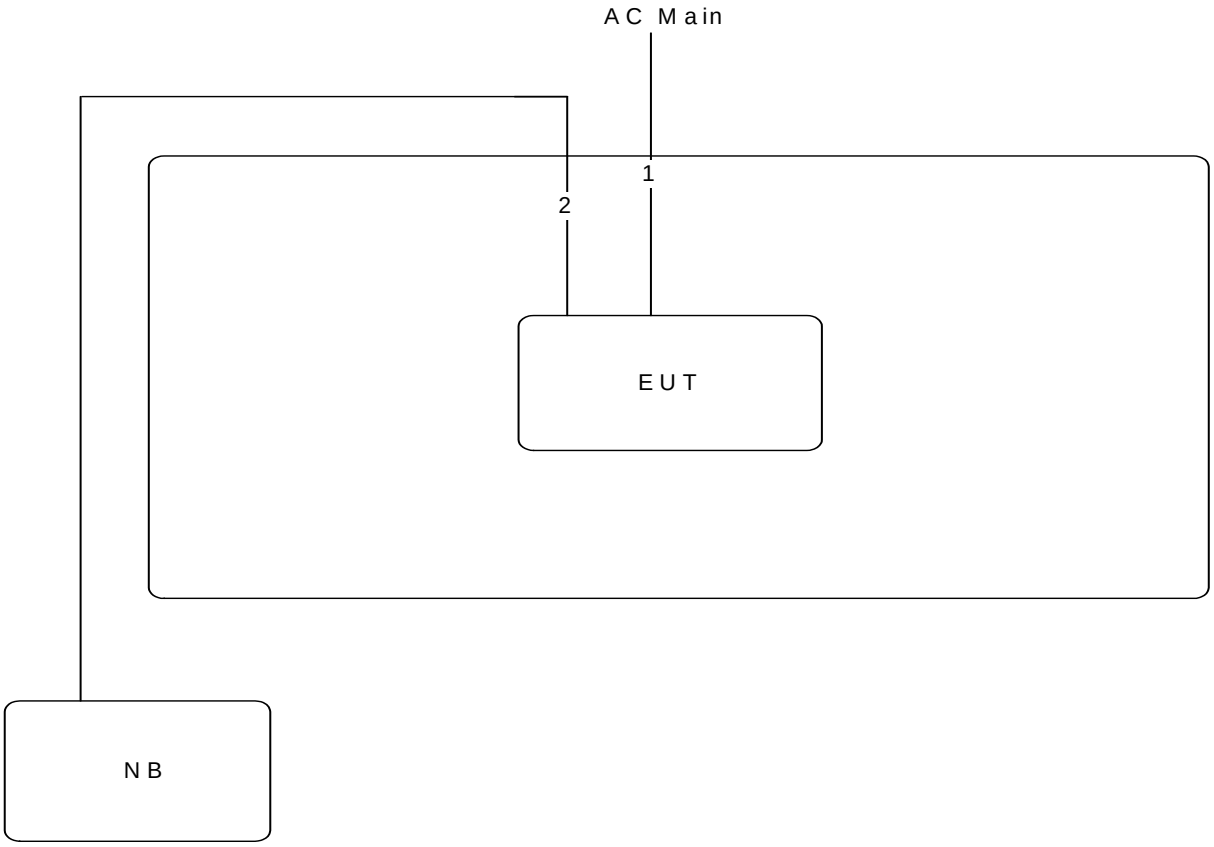
3.11.Test Configurations

3.11.1. AC Power Line Conduction Emissions and Radiation Emissions (Below 1GHz) Test Configuration



Item	Connection	Shielded	Length(m)	Remark
1	Power cable	No	3m	-
2	RJ-45 cable *3	No	1.5m	Load
3	RJ-11 cable	No	1.5m	-
4	RJ-45 cable	No	1.5m	-
5	RJ-45 cable	No	10m	-
6	Coaxial cable	Yes	2m	-
7	Coaxial cable	Yes	10m	-
8	RF cable	Yes	0.3m	-

3.11.2. Radiation Emissions (Above 1GHz)Test Configuration



Item	Connection	Shielded	Length(m)
1	Power cable	No	3m
2	RJ-45 cable	No	10m

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

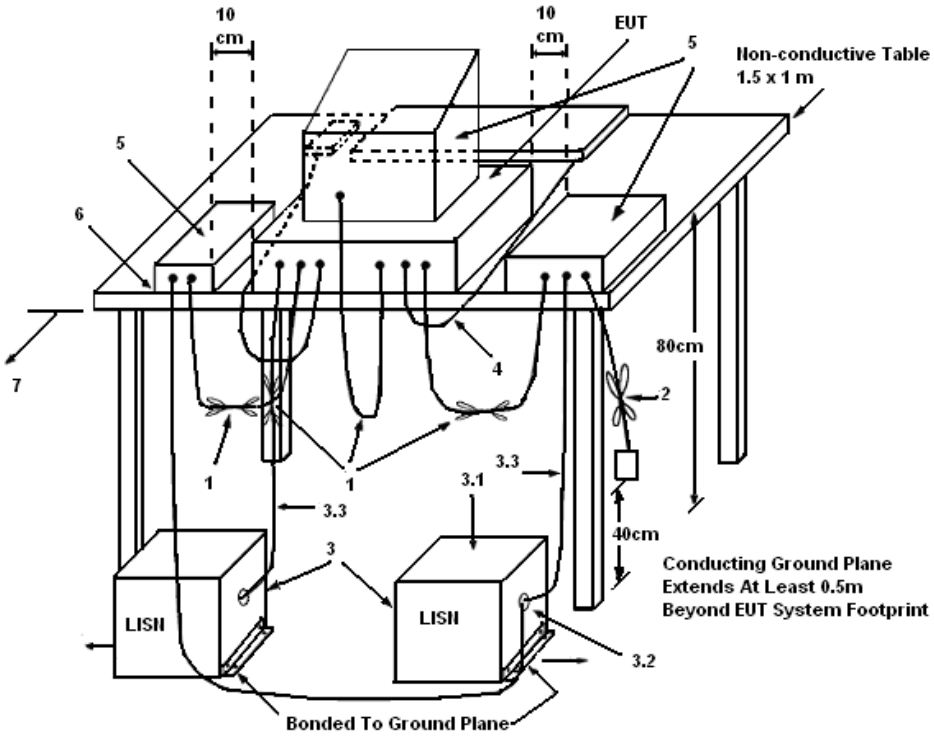
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

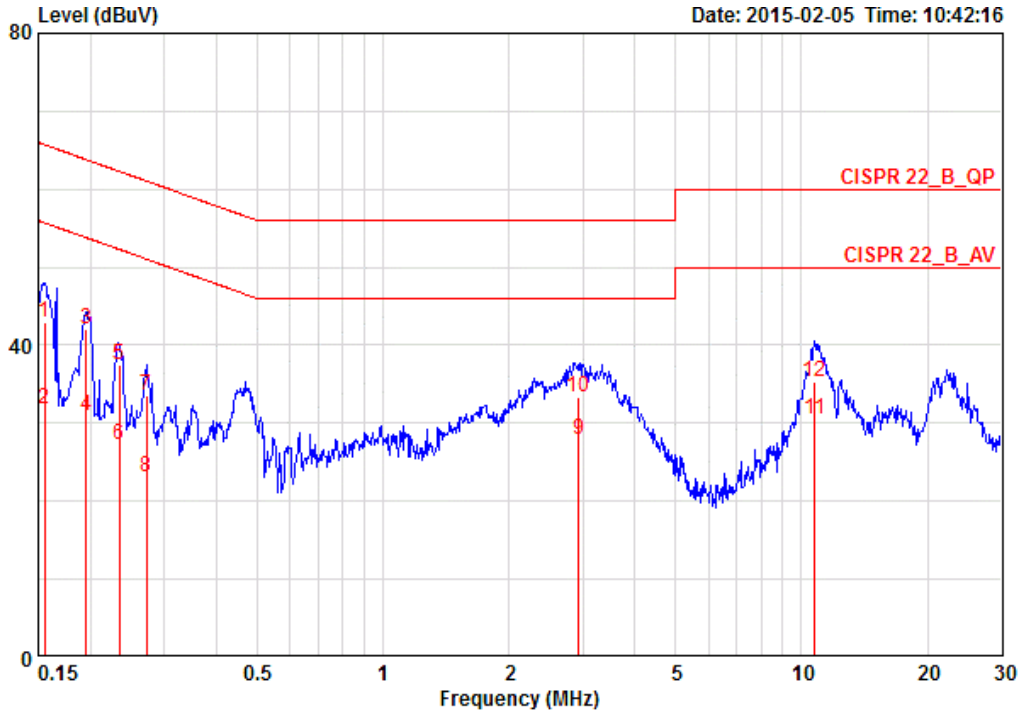
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

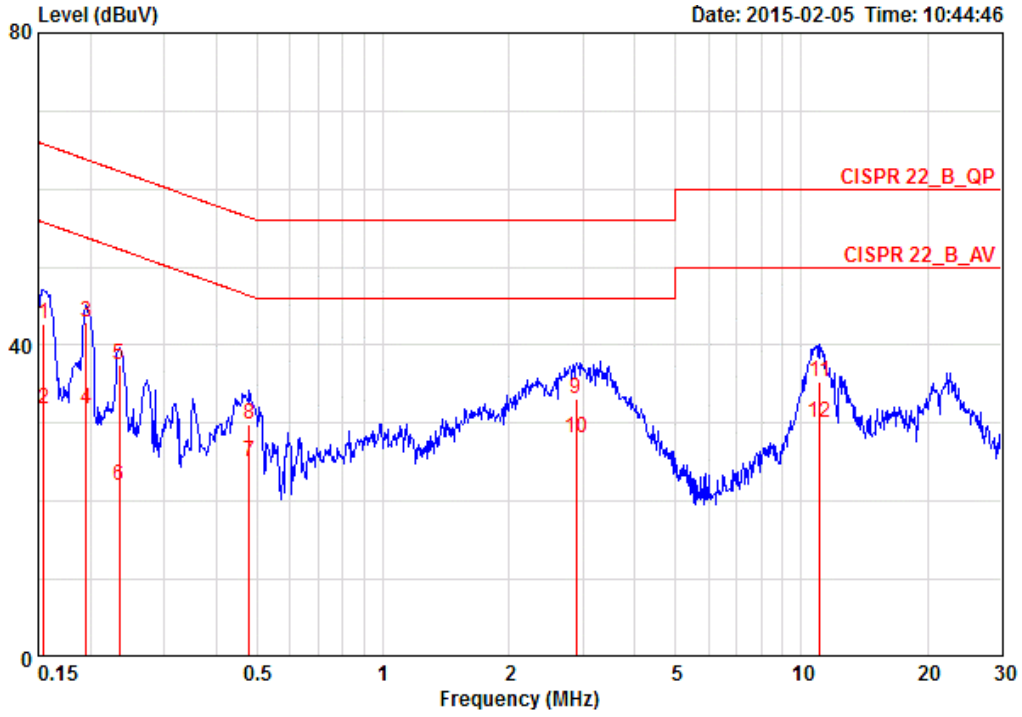
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	23°C	Humidity	62%
Test Engineer	Kane Liu	Phase	Line
Configuration	Normal Link	Test Mode	Mode 2



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.15567	42.95	-22.74	65.69	32.76	10.03	0.16	QP	LINE
2	0.15567	31.77	-23.92	55.69	21.58	10.03	0.16	AVERAGE	LINE
3	0.19550	41.96	-21.84	63.80	31.77	10.03	0.16	QP	LINE
4	0.19550	31.01	-22.79	53.80	20.82	10.03	0.16	AVERAGE	LINE
5	0.23409	37.45	-24.85	62.30	27.25	10.03	0.17	QP	LINE
6	0.23409	27.23	-25.07	52.30	17.03	10.03	0.17	AVERAGE	LINE
7	0.27152	33.52	-27.55	61.07	23.32	10.03	0.17	QP	LINE
8	0.27152	23.02	-28.05	51.07	12.82	10.03	0.17	AVERAGE	LINE
9 @	2.931	27.82	-18.18	46.00	17.51	10.03	0.28	AVERAGE	LINE
10	2.931	33.37	-22.63	56.00	23.06	10.03	0.28	QP	LINE
11	10.733	30.51	-19.49	50.00	20.03	10.09	0.39	AVERAGE	LINE
12	10.733	35.36	-24.64	60.00	24.88	10.09	0.39	QP	LINE

Temperature	23°C	Humidity	62%
Test Engineer	Kane Liu	Phase	Neutral
Configuration	Normal Link	Test Mode	Mode 2



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.15485	42.74	-22.99	65.74	32.64	9.94	0.16	QP	NEUTRAL
2	0.15485	31.93	-23.80	55.74	21.83	9.94	0.16	AVERAGE	NEUTRAL
3	0.19550	42.93	-20.87	63.80	32.79	9.98	0.16	QP	NEUTRAL
4	0.19550	31.88	-21.92	53.80	21.74	9.98	0.16	AVERAGE	NEUTRAL
5	0.23409	37.40	-24.91	62.30	27.27	9.96	0.17	QP	NEUTRAL
6	0.23409	22.10	-30.21	52.30	11.97	9.96	0.17	AVERAGE	NEUTRAL
7	0.47865	24.98	-21.38	46.36	14.92	9.88	0.18	AVERAGE	NEUTRAL
8	0.47865	29.94	-26.42	56.36	19.88	9.88	0.18	QP	NEUTRAL
9	2.900	33.08	-22.92	56.00	22.91	9.89	0.28	QP	NEUTRAL
10 @	2.900	28.06	-17.94	46.00	17.89	9.89	0.28	AVERAGE	NEUTRAL
11	11.080	35.35	-24.65	60.00	25.03	9.93	0.39	QP	NEUTRAL
12	11.080	30.11	-19.89	50.00	19.79	9.93	0.39	AVERAGE	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

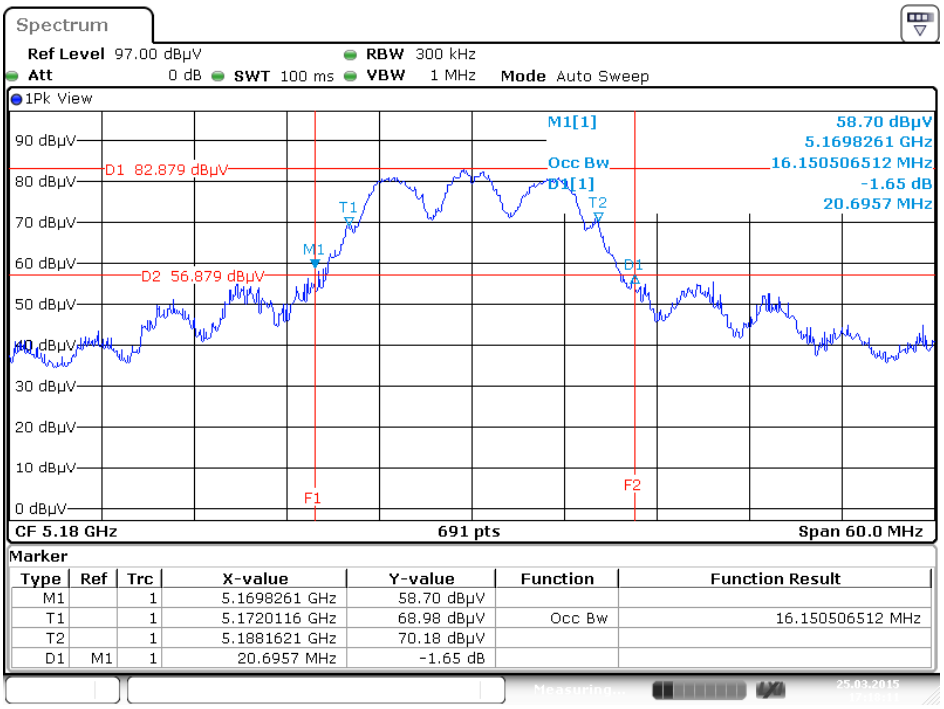
The EUT was programmed to be in continuously transmitting mode.

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

Temperature	20°C	Humidity	51%
Test Engineer	Sam Lee		

Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5180 MHz	20.70	16.15
	5200 MHz	20.87	16.15
	5240 MHz	20.87	15.98
	5745 MHz	19.22	15.98
	5785 MHz	41.83	30.74
	5825 MHz	31.04	16.67
802.11n MCS0 HT20	5180 MHz	30.17	17.28
	5200 MHz	24.96	17.19
	5240 MHz	25.04	17.28
	5745 MHz	25.30	17.37
	5785 MHz	45.30	32.13
	5825 MHz	35.04	17.54
802.11n MCS0 HT40	5190 MHz	57.25	37.19
	5230 MHz	85.65	37.77
	5755 MHz	65.22	37.05
	5795 MHz	88.55	37.92

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



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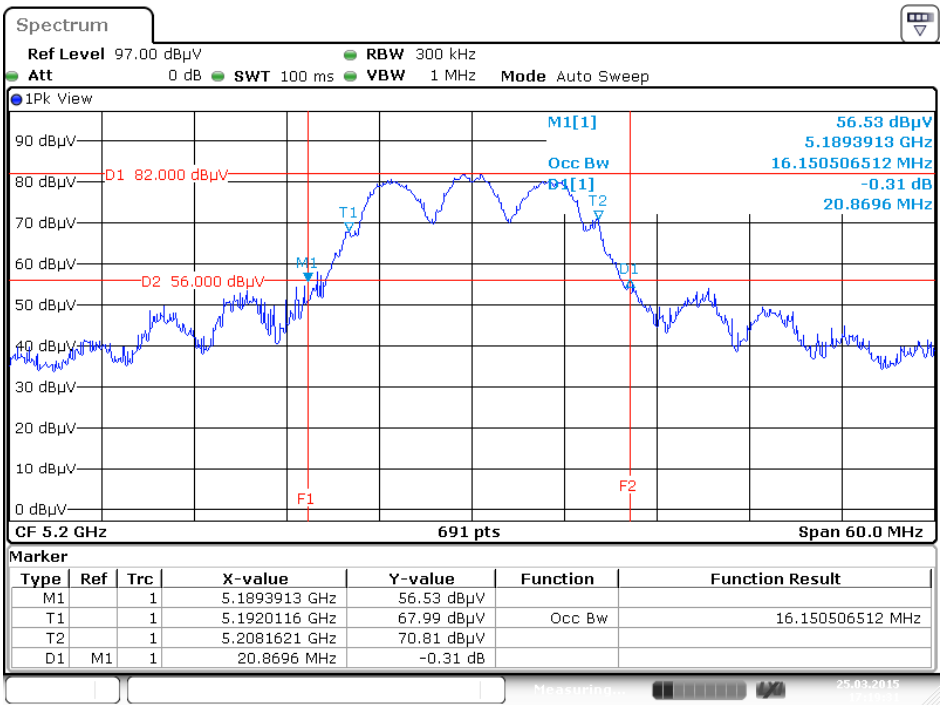
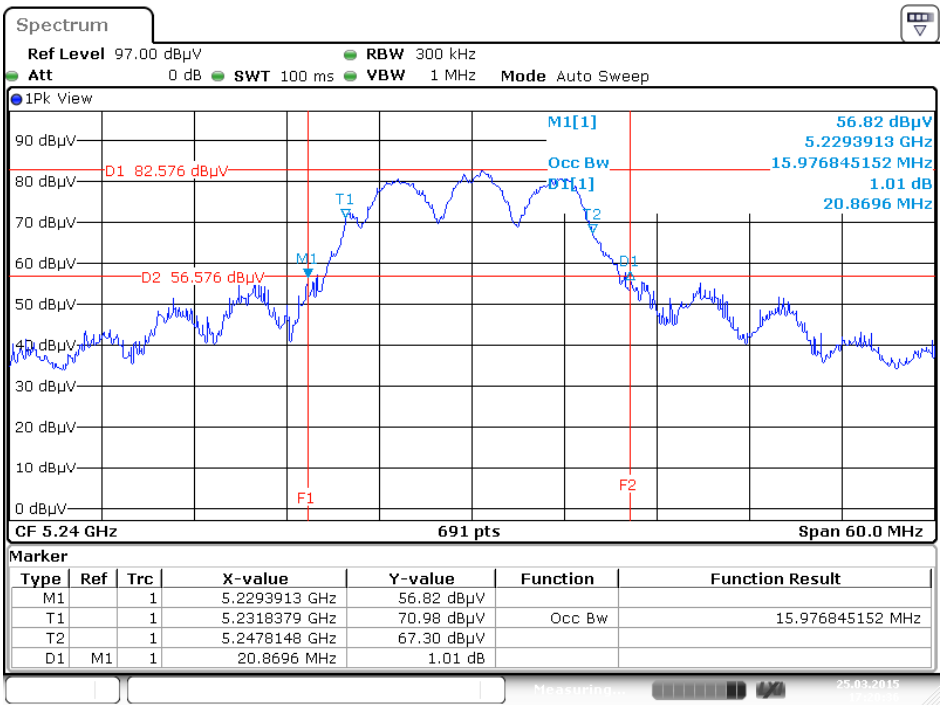
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 / 5200 MHz



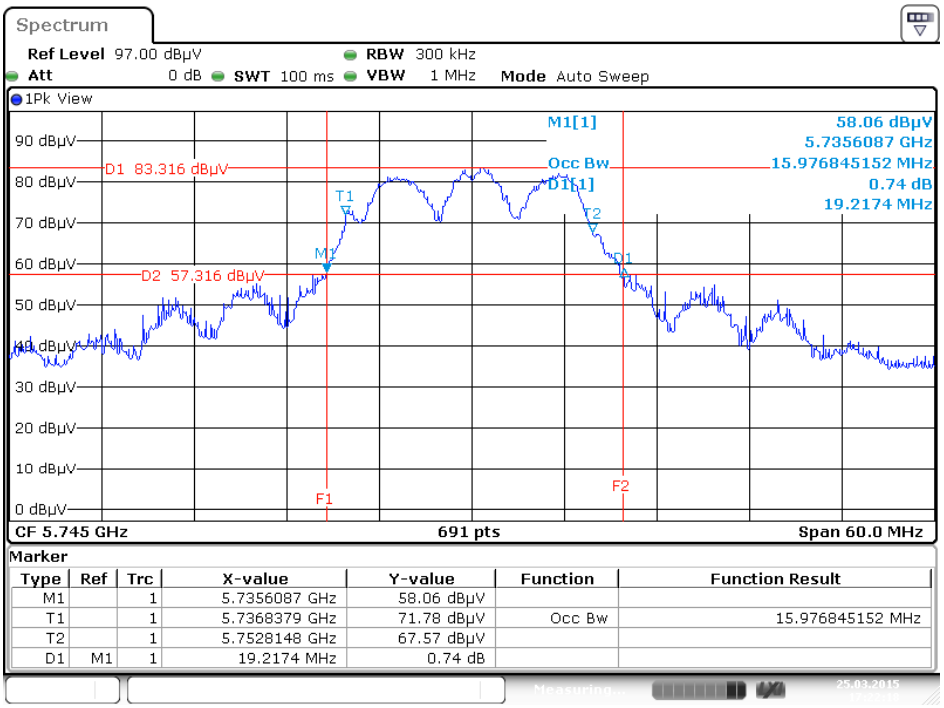
Date: 25 MAR 2015 17:19:31

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



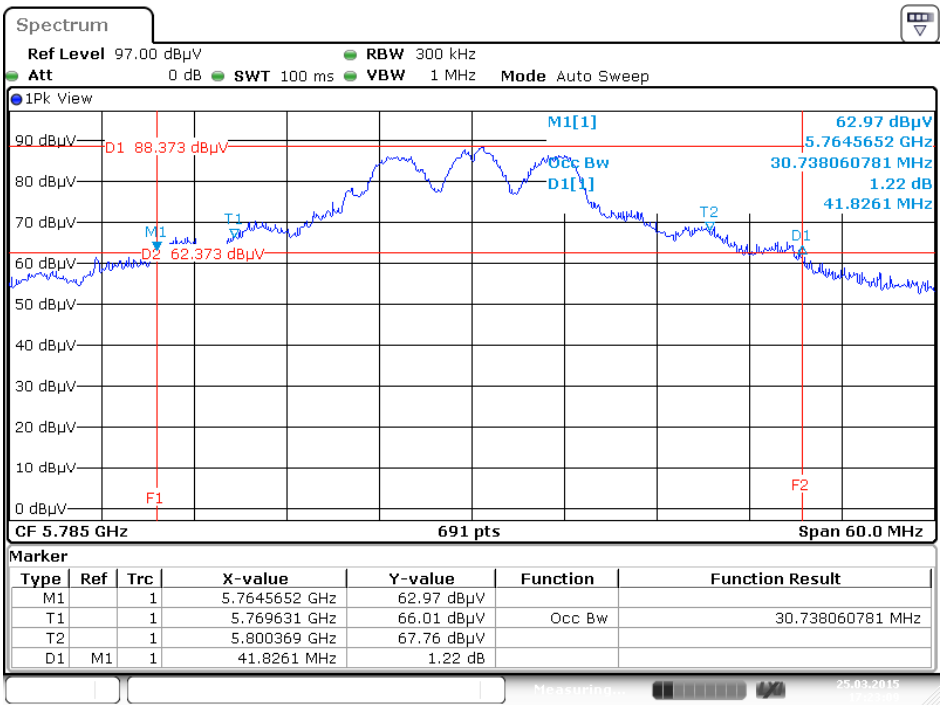
Date: 25 MAR 2015 17:20:36

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



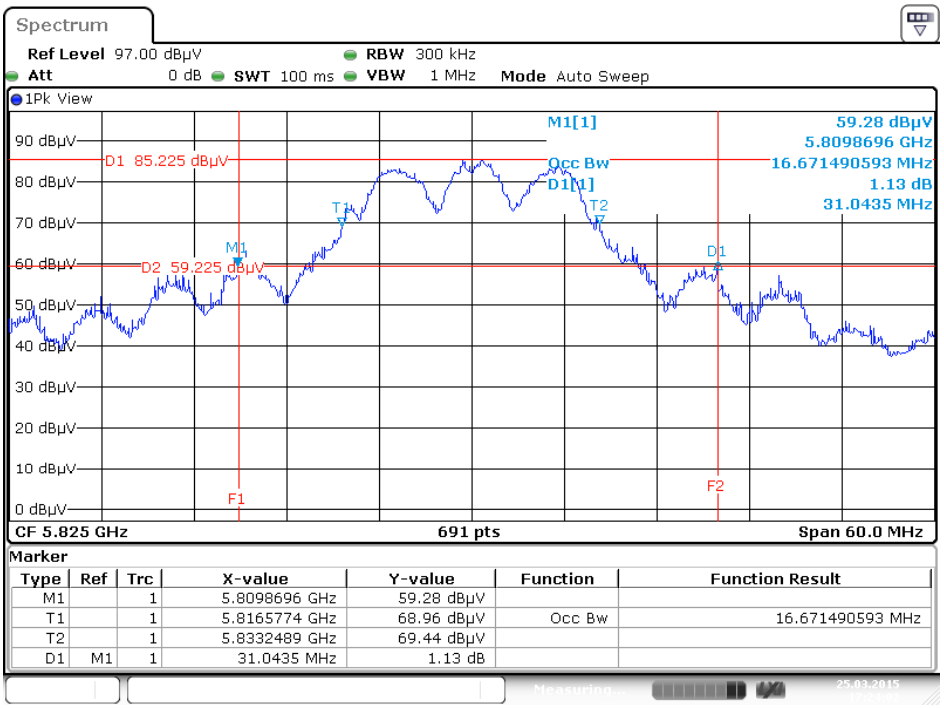
Date: 25 MAR 2015 17:22:18

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



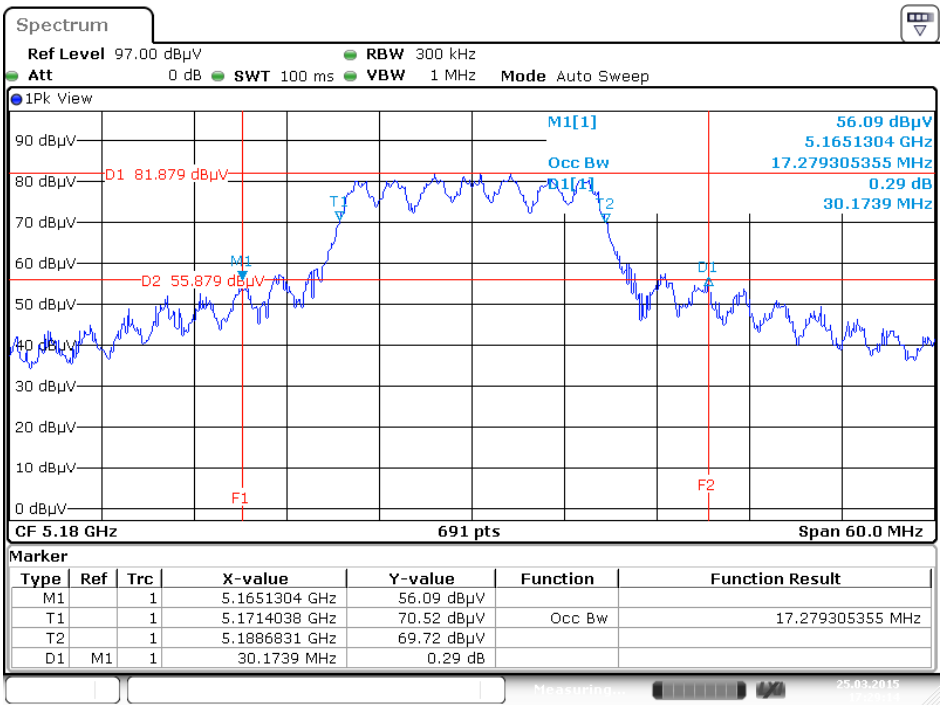
Date: 25.MAR.2015 17:23:10

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



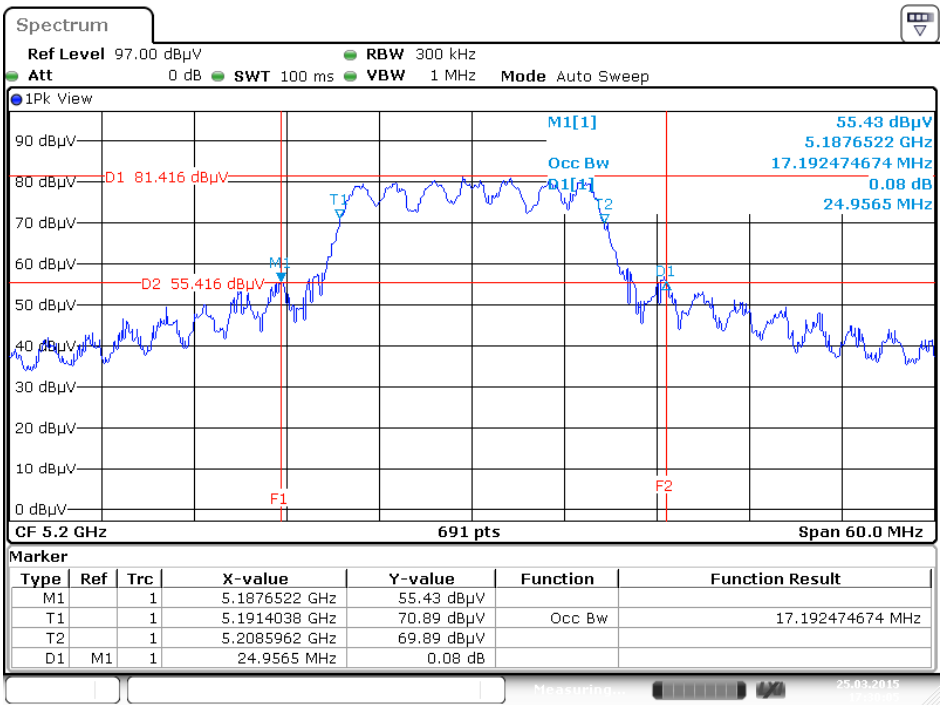
Date: 25.MAR.2015 17:24:02

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



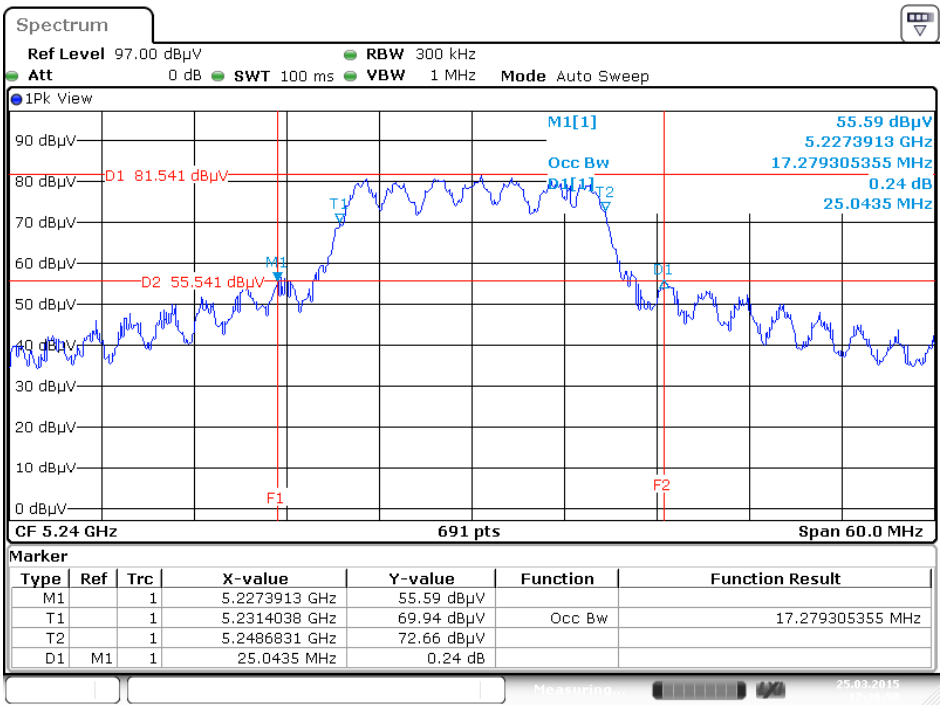
Date: 25.MAR.2015 17:29:15

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



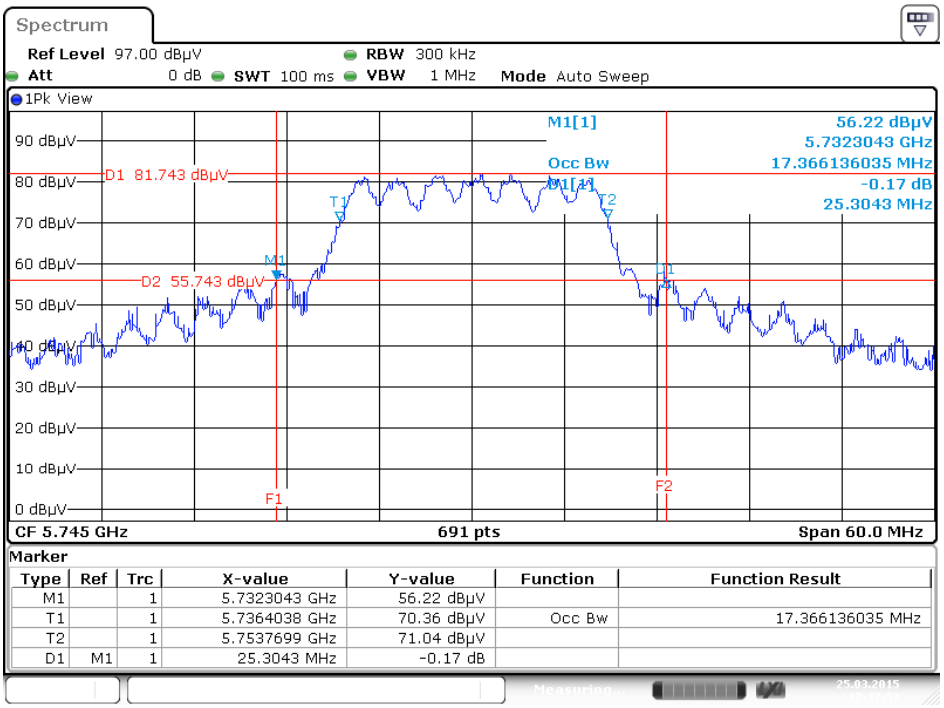
Date: 25.MAR.2015 17:30:05

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



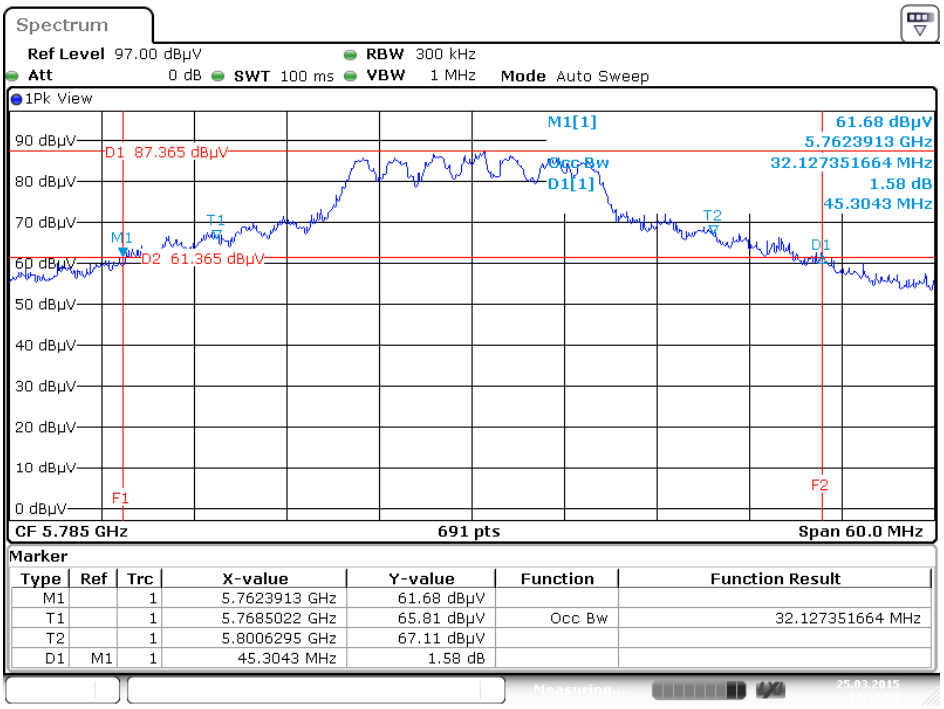
Date: 25.MAR.2015 17:36:50

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



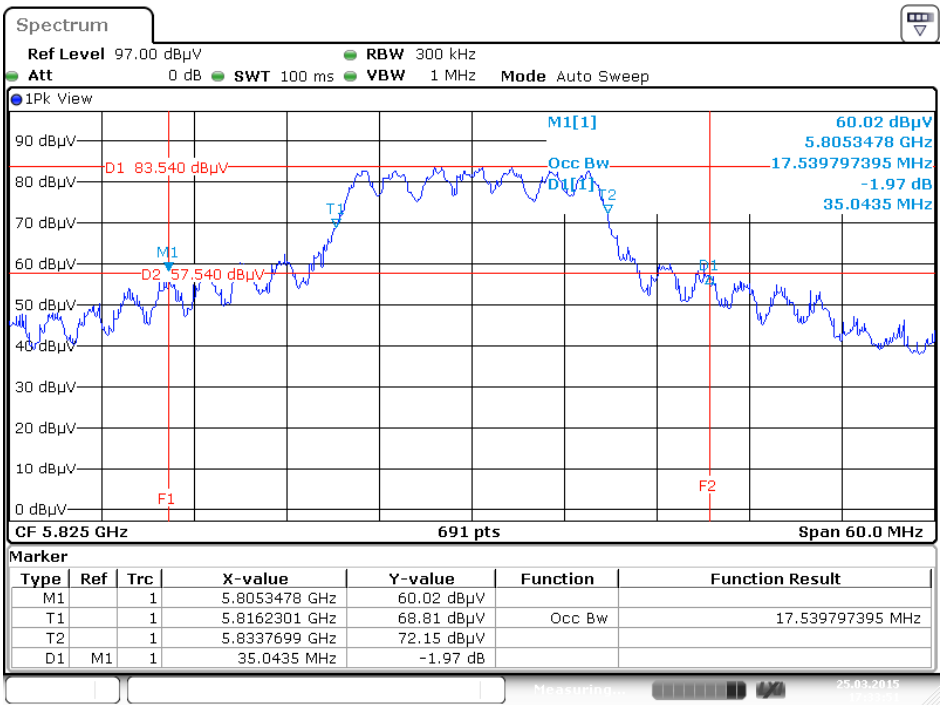
Date: 25.MAR.2015 17:37:53

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



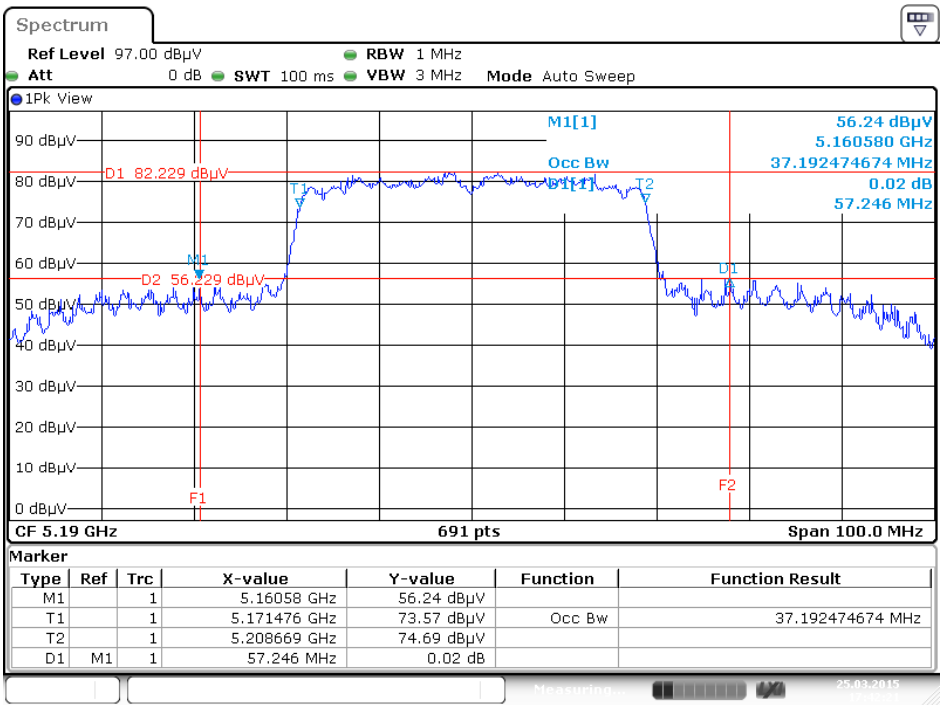
Date: 25.MAR.2015 17:33:08

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



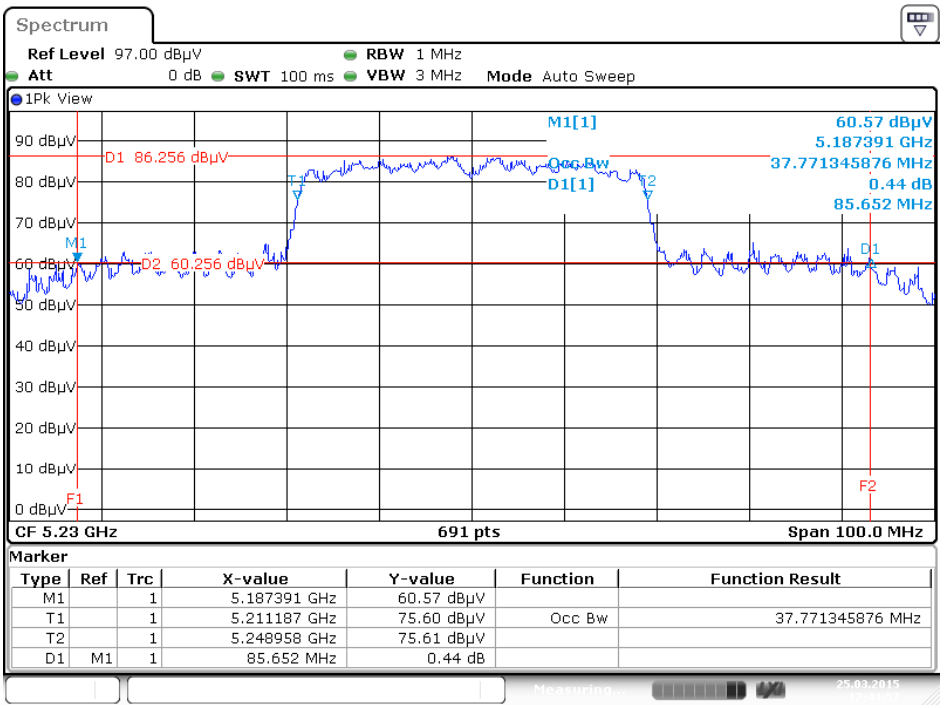
Date: 25.MAR.2015 17:33:52

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



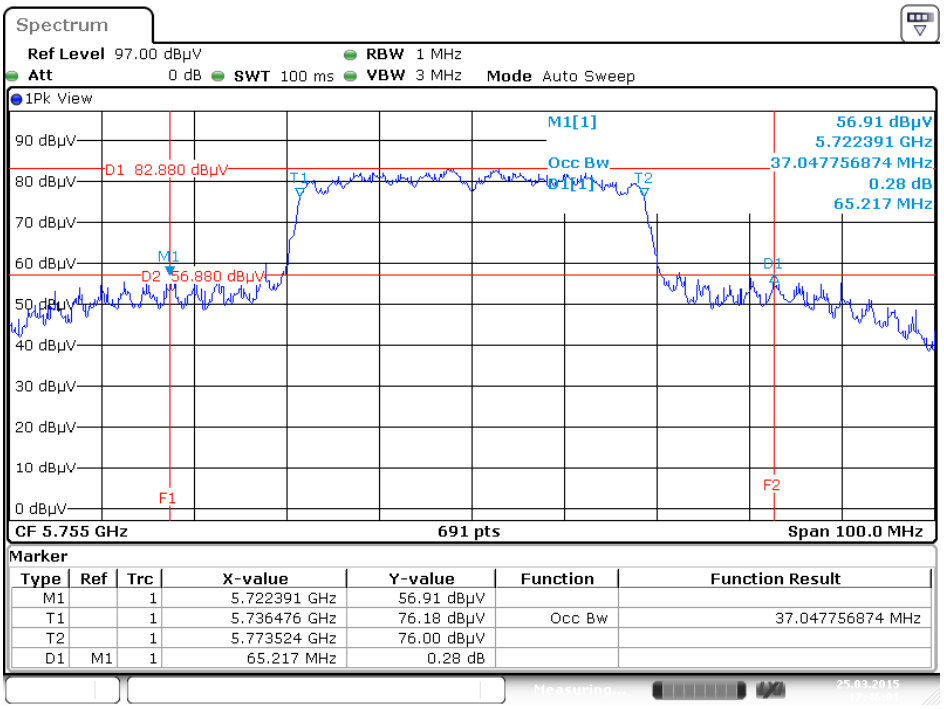
Date: 25.MAR.2015 17:42:22

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



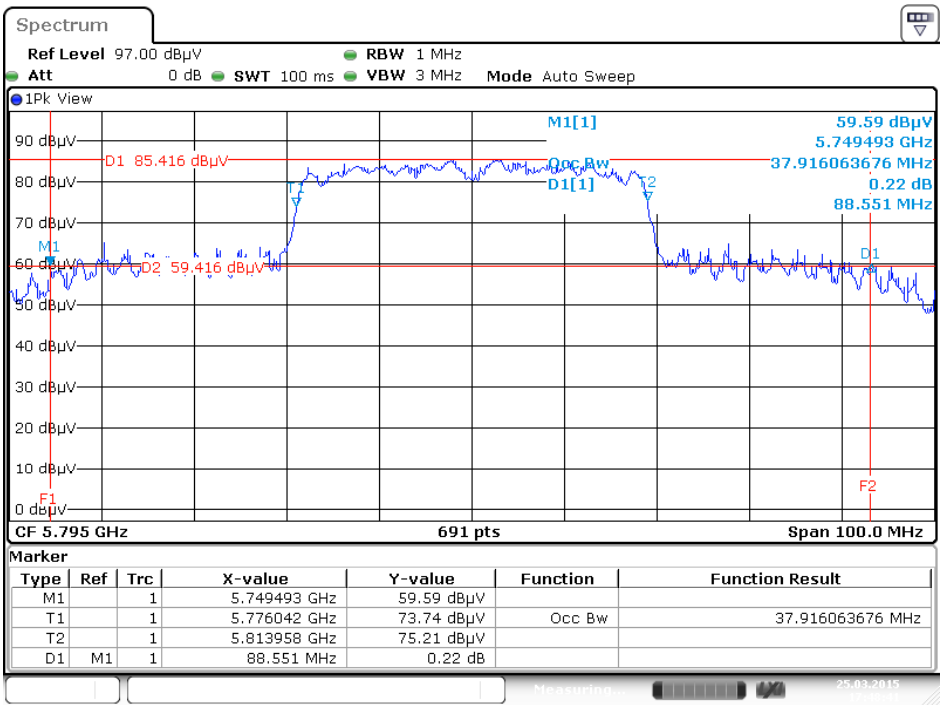
Date: 25.MAR.2015 17:44:57

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



Date: 25.MAR.2015 17:46:01

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



Date: 25.MAR.2015 17:48:40

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	approximately 1% of the emission bandwidth
VBW	VBW > 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 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.

4.3.4. 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

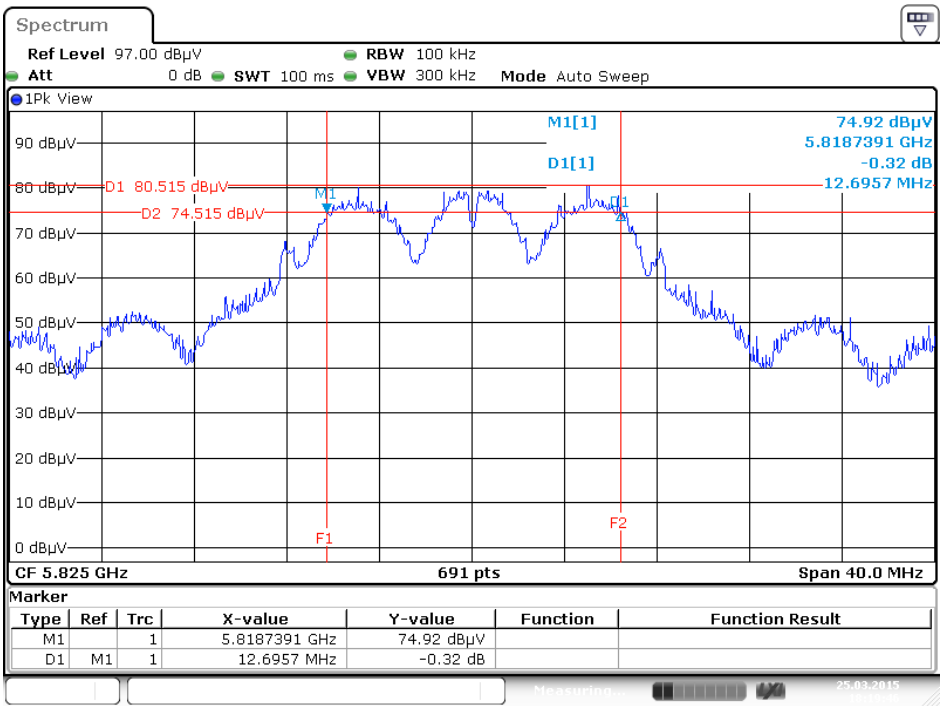
Temperature	20°C	Humidity	51%
Test Engineer	Andy Tsai		

Mode	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11a	5745 MHz	12.75	500	Complies
	5785 MHz	12.99	500	Complies
	5825 MHz	12.70	500	Complies
802.11n MCS0 HT20	5745 MHz	15.13	500	Complies
	5785 MHz	15.59	500	Complies
	5825 MHz	15.48	500	Complies
802.11n MCS0 HT40	5755 MHz	35.13	500	Complies
	5795 MHz	35.13	500	Complies

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

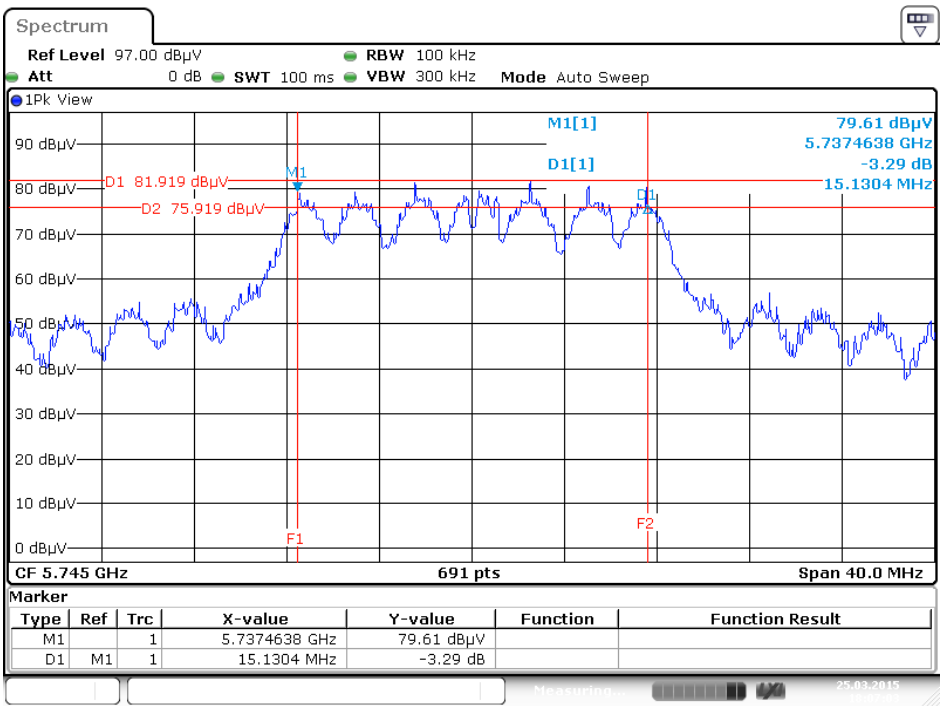
For plots, only the channel with worse result was shown.

6 dB Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 / 5825 MHz



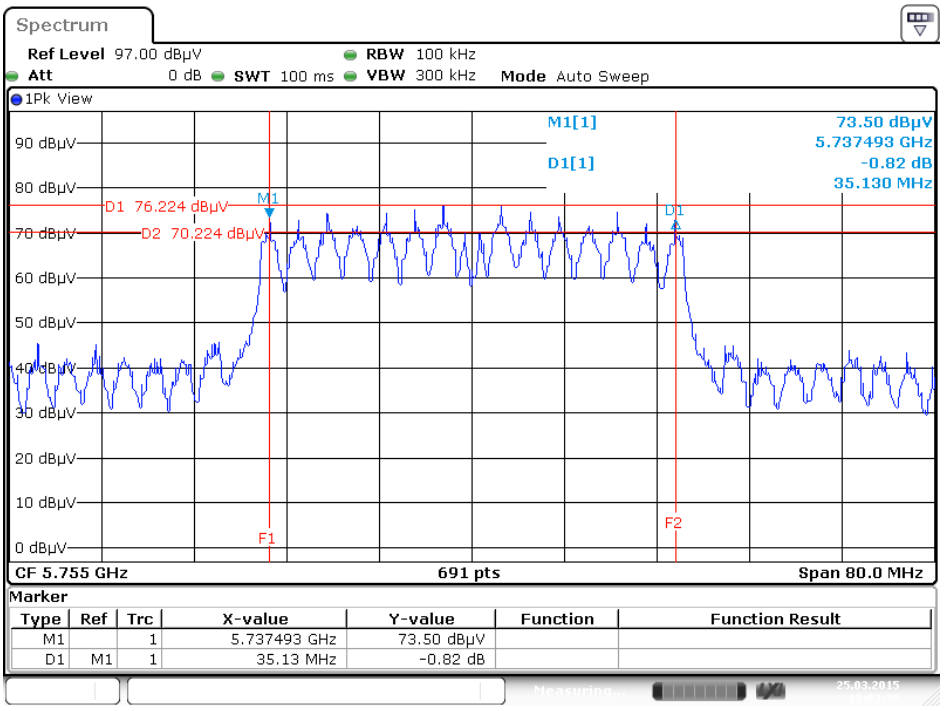
Date: 25.MAR.2015 18:19:47

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 / 5745 MHz



Date: 25.MAR.2015 18:07:03

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



Date: 25.MAR.2015 18:03:30

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.
	☐	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.

4.4.2. Measuring Instruments and Setting

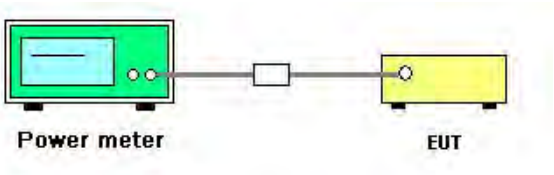
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

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 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.

4.4.4. 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	51%
Test Engineer	Andy Tsai	Test Date	Mar. 25, 2015

Mode	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Chain 1	Chain 2	Total		
802.11a	5180 MHz	14.93	14.54	17.75	30.00	Complies
	5200 MHz	14.67	14.02	17.37	30.00	Complies
	5240 MHz	13.82	13.12	16.49	30.00	Complies
	5745 MHz	15.71	15.62	18.68	30.00	Complies
	5785 MHz	22.36	19.17	24.06	30.00	Complies
	5825 MHz	16.98	16.9	19.95	30.00	Complies
802.11n MCS0 HT20	5180 MHz	15.02	14.43	17.75	30.00	Complies
	5200 MHz	14.99	13.65	17.38	30.00	Complies
	5240 MHz	15.4	14.47	17.97	30.00	Complies
	5745 MHz	15.09	14.67	17.90	30.00	Complies
	5785 MHz	22.22	19.46	24.07	30.00	Complies
	5825 MHz	17.44	17.25	20.36	30.00	Complies
802.11n MCS0 HT40	5190 MHz	12.43	12.07	15.26	30.00	Complies
	5230 MHz	16.78	16.28	19.55	30.00	Complies
	5755 MHz	13.03	13.19	16.12	30.00	Complies
	5795 MHz	16.36	16.32	19.35	30.00	Complies

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
	☐	Mobile and portable client devices	11 dBm/MHz
☒	5.725~5.85 GHz		30 dBm/500kHz

4.5.2. Measuring Instruments and Setting

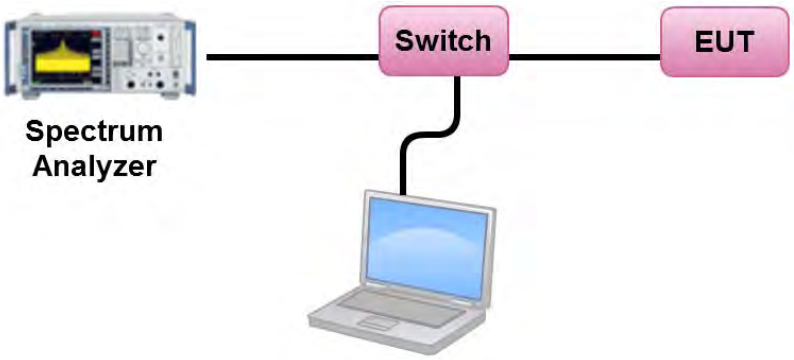
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 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.

4.5.4. 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	51%
Test Engineer	Andy Tsai	Test Date	Mar. 25, 2015

Configuration IEEE 802.11a / Chain 1 + Chain 2

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	4.78	17.00	Complies
40	5200 MHz	4.02	17.00	Complies
48	5240 MHz	2.96	17.00	Complies

Note: $Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =5.37dBi <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	7.26	-3.01	4.25	29.63	Complies
157	5785 MHz	11.45	-3.01	8.44	29.63	Complies
165	5825 MHz	7.89	-3.01	4.88	29.63	Complies

Note: $Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =6.37dBi, so limit =30-(6.37-6)=29.63 dBm/500kHz

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

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	5.28	17.00	Complies
40	5200 MHz	4.34	17.00	Complies
48	5240 MHz	5.26	17.00	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =5.37dBi <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	5.35	-3.01	2.34	29.63	Complies
157	5785 MHz	11.08	-3.01	8.07	29.63	Complies
165	5825 MHz	7.83	-3.01	4.82	29.63	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =6.37dBi, so limit =30-(6.37-6)=29.63 dBm/500kHz

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

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
38	5190 MHz	0.02	17.00	Complies
46	5230 MHz	3.88	17.00	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =5.37dBi <6dBi, so the limit doesn't reduce.

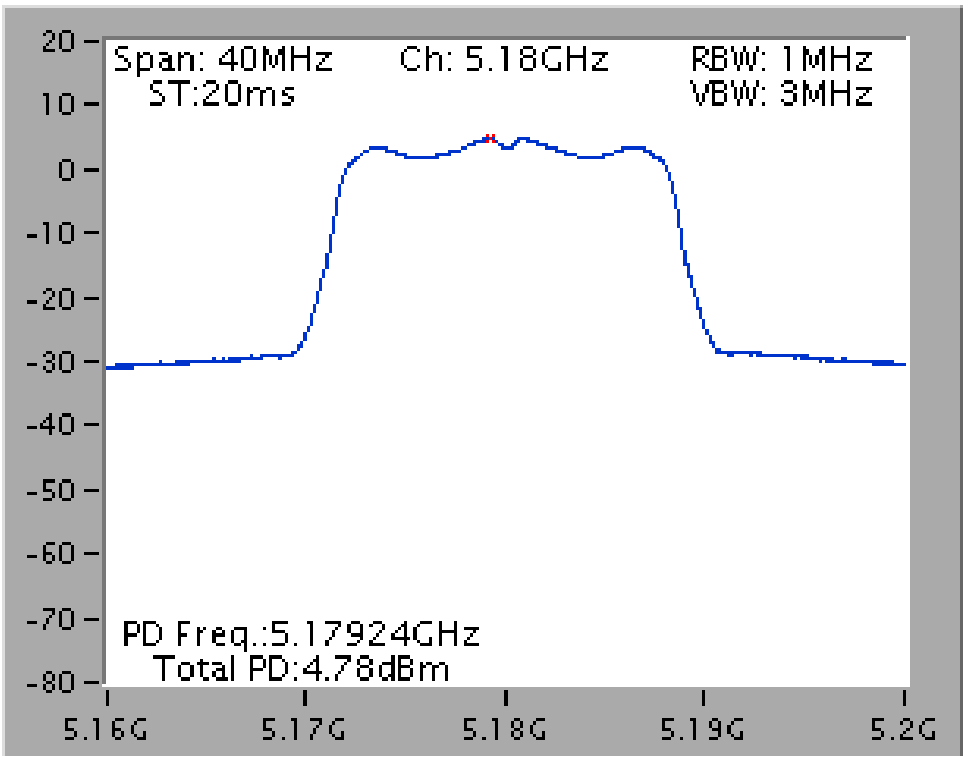
Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
151	5755 MHz	0.07	-3.01	-2.94	29.63	Complies
159	5795 MHz	3.33	-3.01	0.32	29.63	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =6.37dBi, so limit =30-(6.37-6)=29.63 dBm/500kHz

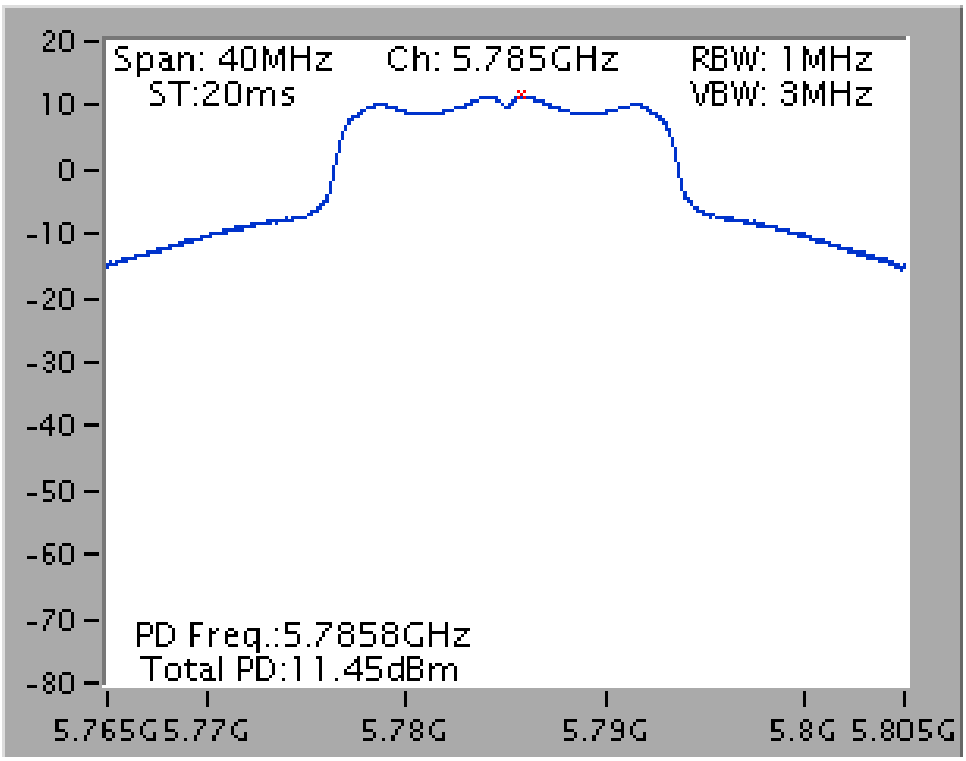
Note: All the test values were listed in the report.

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

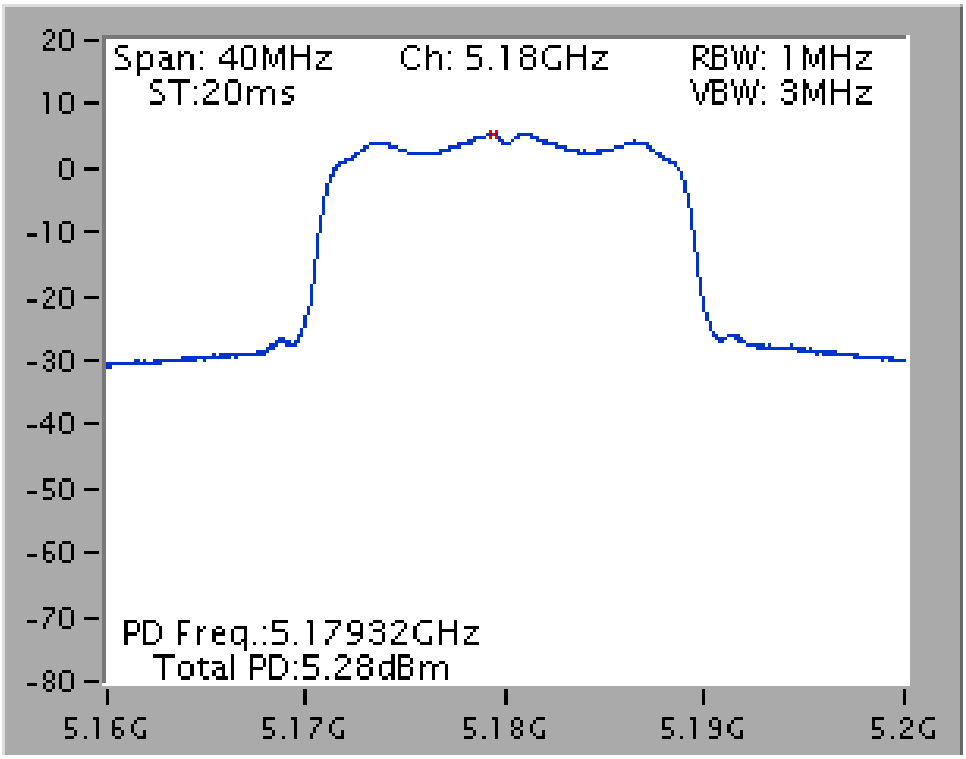
Power Density Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 / 5180 MHz



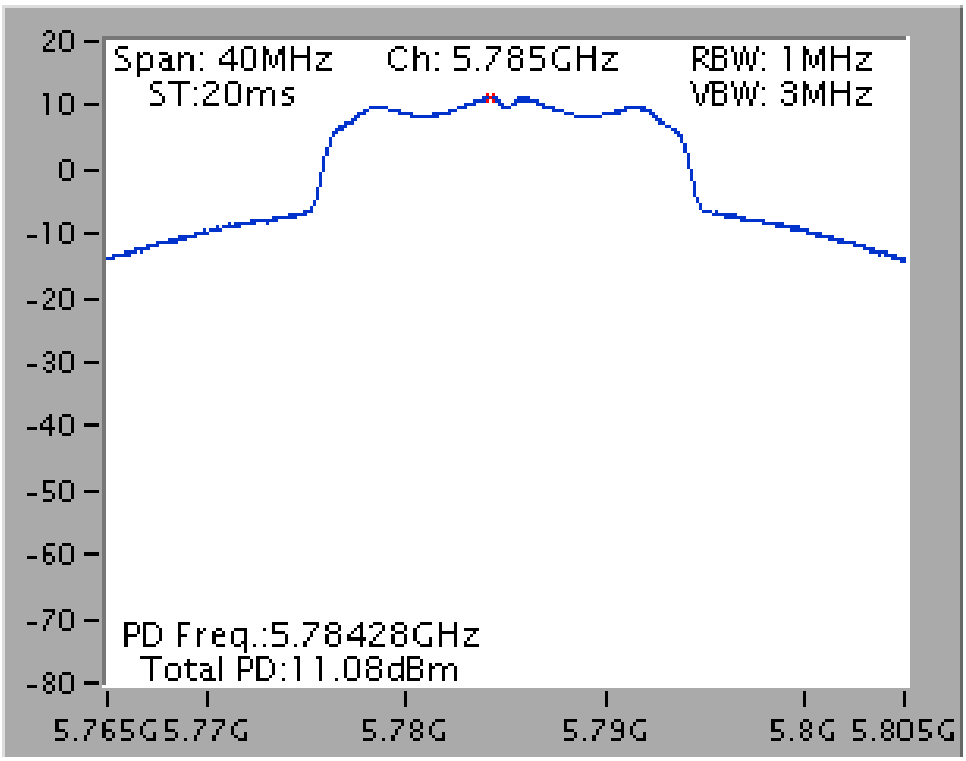
Power Density Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 / 5785 MHz



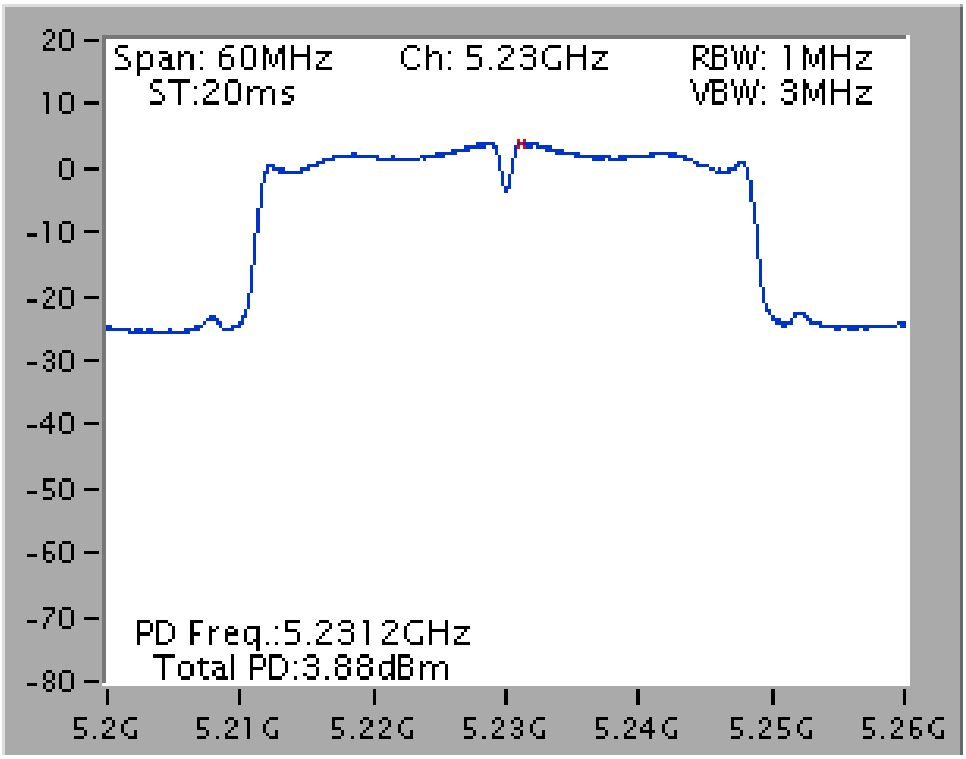
Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 / 5180 MHz



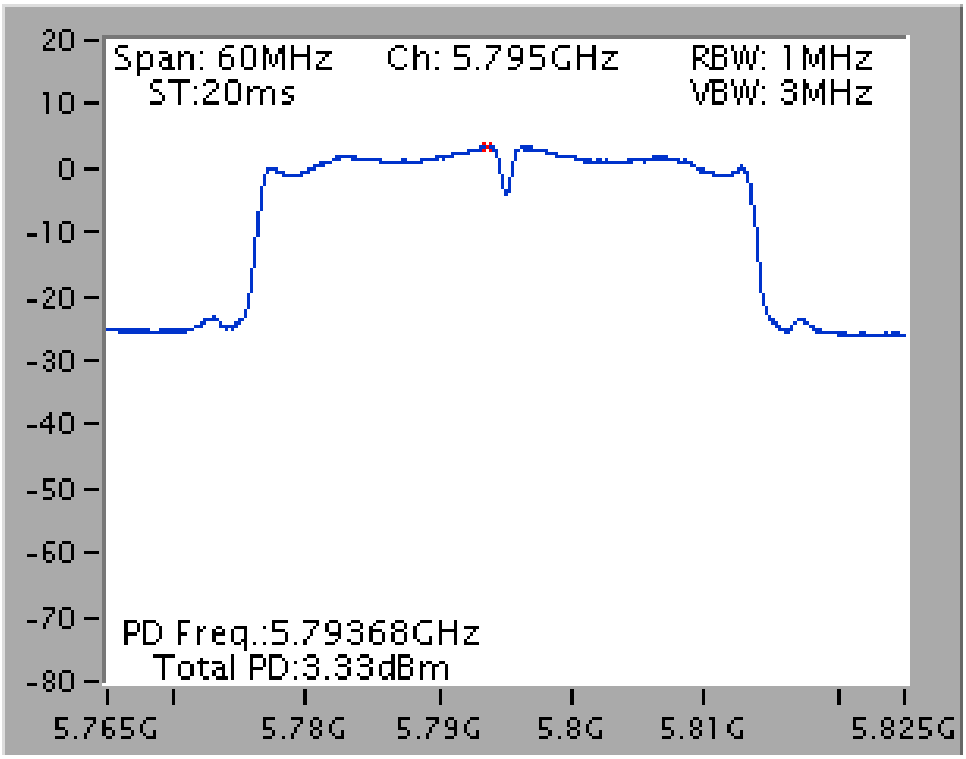
Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 / 5785 MHz



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



Power Density Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 1 + Chain 2 / 5795 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 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 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

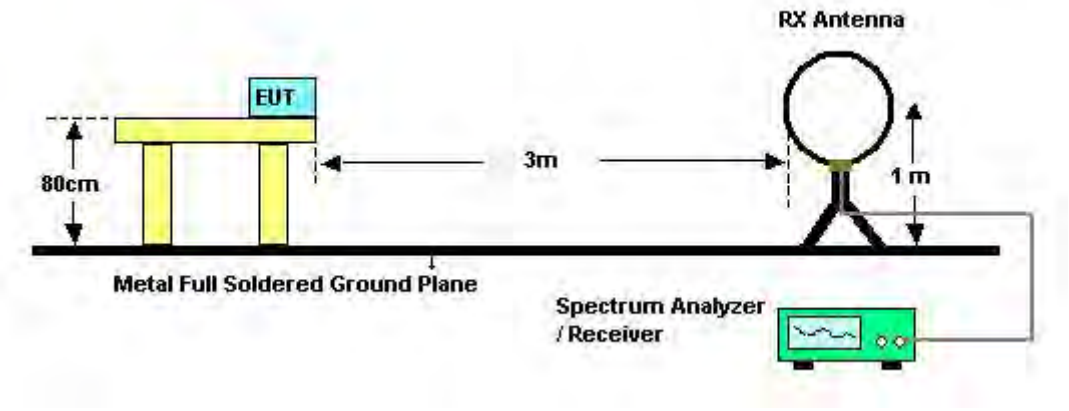
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.6.3. Test Procedures

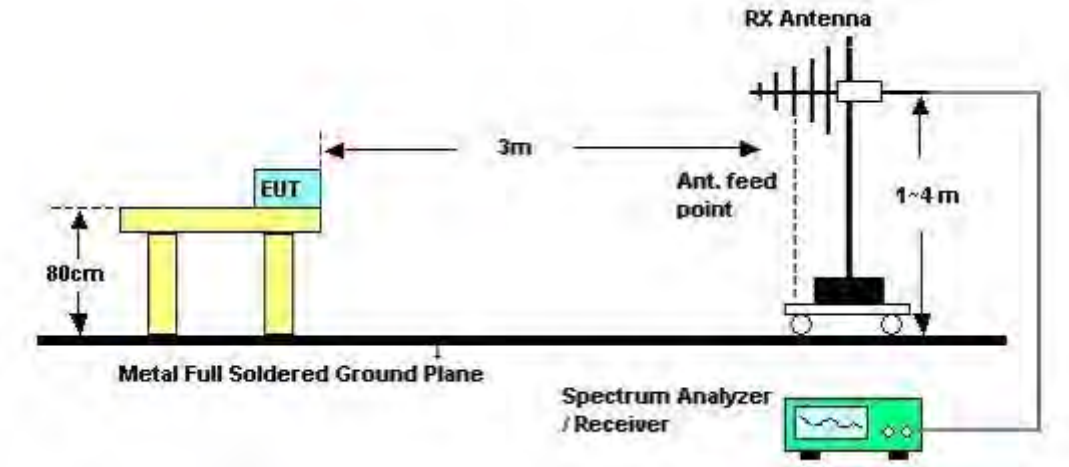
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting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

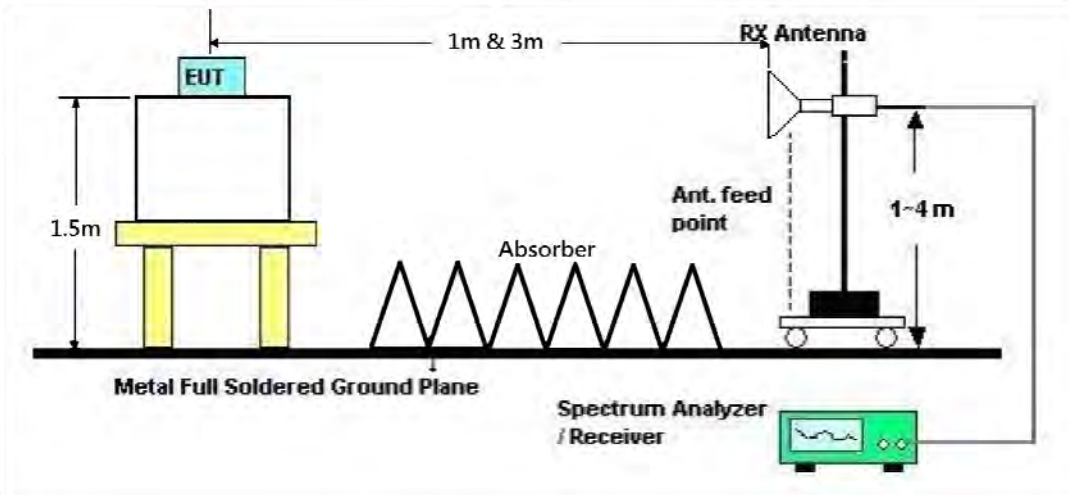
For Radiated Emissions: 9kHz ~30MHz



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	25°C	Humidity	40%
Test Engineer	JC Yang	Configurations	Normal Link
Test Date	Feb. 04, 2015	Test Mode	Mode 2

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

Note:

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

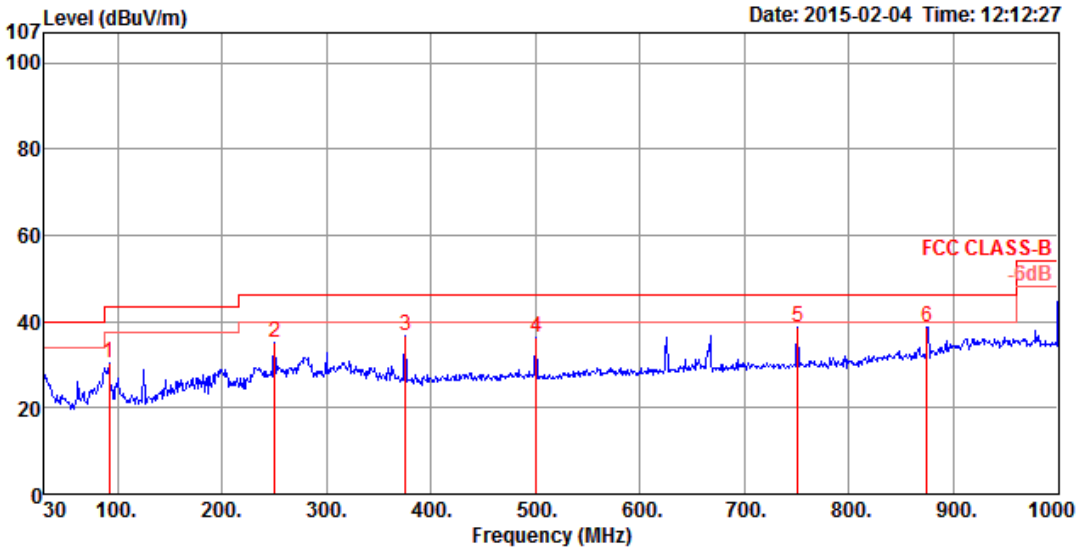
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

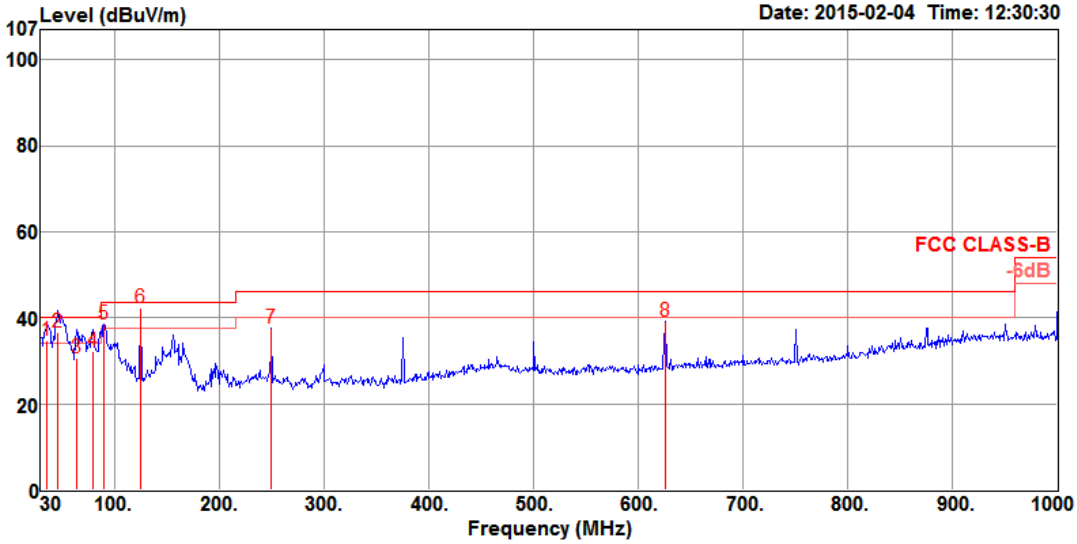
Temperature	25°C	Humidity	40%
Test Engineer	JC Yang	Configurations	Normal Link
Test Mode	Mode 2		

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	92.08	30.48	43.50	-13.02	52.59	0.69	32.41	9.61	HORIZONTAL	195	400	Peak
2	250.19	35.12	46.00	-10.88	53.30	1.13	32.33	13.02	HORIZONTAL	251	125	Peak
3	375.32	36.79	46.00	-9.21	51.80	1.38	32.32	15.93	HORIZONTAL	64	100	Peak
4	500.45	36.13	46.00	-9.87	49.13	1.60	32.41	17.81	HORIZONTAL	249	100	Peak
5	750.71	38.70	46.00	-7.30	48.94	1.97	32.42	20.21	HORIZONTAL	184	125	Peak
6	874.87	38.68	46.00	-7.32	47.25	2.13	32.05	21.35	HORIZONTAL	44	125	Peak

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	35.82	34.69	40.00	-5.31	50.27	16.42	0.43	32.43	100	174	VERTICAL	QP
2	46.49	36.70	40.00	-3.30	58.19	10.47	0.49	32.45	100	259	VERTICAL	QP
3	63.95	30.60	40.00	-9.40	55.74	6.80	0.58	32.52	150	360	VERTICAL	QP
4	79.47	32.29	40.00	-7.71	56.48	7.53	0.64	32.36	125	132	VERTICAL	QP
5	90.14	38.63	43.50	-4.87	61.18	9.20	0.68	32.43	125	238	VERTICAL	Peak
6	125.06	42.23	43.50	-1.27	61.20	12.65	0.80	32.42	100	226	VERTICAL	QP
7	250.19	37.50	46.00	-8.50	55.70	13.00	1.13	32.33	100	158	VERTICAL	Peak
8	625.58	39.18	46.00	-6.82	50.65	19.25	1.81	32.53	100	102	VERTICAL	Peak

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB 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	25°C	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11a CH 36 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10361.70	50.88	54.00	-3.12	35.48	10.15	39.01	33.76	253	148	Average	HORIZONTAL
2	10361.90	65.11	74.00	-8.89	49.71	10.15	39.01	33.76	253	148	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10357.40	46.86	54.00	-7.14	31.44	10.15	39.02	33.75	108	100	Average	VERTICAL
2	10358.70	56.88	74.00	-17.12	41.48	10.15	39.01	33.76	108	100	Peak	VERTICAL

Temperature	25℃	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11a CH 40 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10399.36	66.58	74.00	-7.42	57.24	6.14	38.34	35.14	250	236	Peak	HORIZONTAL
2	10401.68	50.70	54.00	-3.30	41.36	6.14	38.34	35.14	250	236	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10402.40	48.66	54.00	-5.34	39.32	6.14	38.34	35.14	90	199	Average	VERTICAL
2	10403.04	63.86	74.00	-10.14	54.52	6.14	38.34	35.14	90	199	Peak	VERTICAL

Temperature	25℃	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11a CH 48 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10478.00	63.96	74.00	-10.04	54.49	6.16	38.39	35.08	280	140	Peak	HORIZONTAL
2	10478.04	48.26	54.00	-5.74	38.79	6.16	38.39	35.08	280	140	Average	HORIZONTAL
3	15710.32	54.18	74.00	-19.82	42.91	7.62	38.53	34.88	69	137	Peak	HORIZONTAL
4	15712.20	41.10	54.00	-12.90	29.83	7.62	38.53	34.88	69	137	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10478.40	66.63	74.00	-7.37	57.16	6.16	38.39	35.08	92	131	Peak	VERTICAL
2	10478.96	50.44	54.00	-3.56	40.97	6.16	38.39	35.08	92	131	Average	VERTICAL
3	15713.36	54.52	74.00	-19.48	43.25	7.62	38.53	34.88	51	157	Peak	VERTICAL
4	15729.32	41.31	54.00	-12.69	30.07	7.62	38.52	34.90	51	157	Average	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11a CH 149 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11491.40	47.68	54.00	-6.32	32.61	10.71	39.39	35.03	290	142	Average	HORIZONTAL
2	11491.80	59.14	74.00	-14.86	44.07	10.71	39.39	35.03	290	142	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11487.70	55.80	74.00	-18.20	40.73	10.71	39.39	35.03	84	192	Peak	VERTICAL
2	11492.00	43.60	54.00	-10.40	28.53	10.71	39.39	35.03	84	192	Average	VERTICAL

Temperature	25℃	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11a CH 157 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11565.36	58.55	74.00	-15.45	48.36	6.55	38.32	34.68	197	161	Peak	HORIZONTAL
2	11571.28	46.43	54.00	-7.57	36.24	6.55	38.33	34.69	197	161	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11572.20	45.89	54.00	-8.11	35.70	6.55	38.33	34.69	96	150	Average	VERTICAL
2	11573.24	57.83	74.00	-16.17	47.64	6.55	38.33	34.69	96	150	Peak	VERTICAL

Temperature	25℃	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11a CH 165 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11656.44	57.25	74.00	-16.75	47.05	6.56	38.36	34.72	221	222	Peak	HORIZONTAL
2	11658.08	45.68	54.00	-8.32	35.48	6.56	38.36	34.72	221	222	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11652.00	54.14	74.00	-19.86	43.94	6.56	38.36	34.72	98	184	Peak	VERTICAL
2	11658.36	41.85	54.00	-12.15	31.65	6.56	38.36	34.72	98	184	Average	VERTICAL

Temperature	25℃	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11n MCS0 HT20 CH 36 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10360.40	64.58	74.00	-9.42	49.18	10.15	39.01	33.76	253	144	Peak	HORIZONTAL
2	10361.60	50.76	54.00	-3.24	35.36	10.15	39.01	33.76	253	144	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10354.00	59.05	74.00	-14.95	43.63	10.15	39.02	33.75	257	189	Peak	VERTICAL
2	10358.50	46.66	54.00	-7.34	31.25	10.15	39.02	33.76	257	189	Average	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11n MCS0 HT20 CH 40 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10400.88	50.07	54.00	-3.93	40.73	6.14	38.34	35.14	228	237	Average	HORIZONTAL
2	10408.56	65.47	74.00	-8.53	56.13	6.14	38.34	35.14	228	237	Peak	HORIZONTAL
3	15600.72	42.17	54.00	-11.83	30.76	7.58	38.62	34.79	360	154	Average	HORIZONTAL
4	15602.08	55.00	74.00	-19.00	43.59	7.58	38.62	34.79	360	154	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10398.64	66.54	74.00	-7.46	57.20	6.14	38.34	35.14	87	139	Peak	VERTICAL
2	10398.72	50.82	54.00	-3.18	41.48	6.14	38.34	35.14	87	139	Average	VERTICAL
3	15580.64	55.56	74.00	-18.44	44.13	7.57	38.63	34.77	58	154	Peak	VERTICAL
4	15591.44	42.47	54.00	-11.53	31.04	7.57	38.63	34.77	58	154	Average	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11n MCS0 HT20 CH 48 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10479.12	65.10	74.00	-8.90	55.63	6.16	38.39	35.08	282	147	Peak	HORIZONTAL
2	10479.20	49.25	54.00	-4.75	39.78	6.16	38.39	35.08	282	147	Average	HORIZONTAL
3	15712.32	41.23	54.00	-12.77	29.96	7.62	38.53	34.88	352	160	Average	HORIZONTAL
4	15715.04	53.82	74.00	-20.18	42.56	7.62	38.52	34.88	352	160	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10479.20	50.66	54.00	-3.34	41.19	6.16	38.39	35.08	92	136	Average	VERTICAL
2	10484.08	65.59	74.00	-8.41	56.12	6.16	38.39	35.08	92	136	Peak	VERTICAL
3	15708.48	53.24	74.00	-20.76	41.97	7.62	38.53	34.88	11	163	Peak	VERTICAL
4	15715.92	41.15	54.00	-12.85	29.89	7.62	38.52	34.88	11	163	Average	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11n MCS0 HT20 CH 149 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11489.50	57.73	74.00	-16.27	42.66	10.71	39.39	35.03	237	166	Peak	HORIZONTAL
2	11490.50	46.13	54.00	-7.87	31.06	10.71	39.39	35.03	237	166	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11485.64	43.12	54.00	-10.88	28.05	10.71	39.39	35.03	99	150	Average	VERTICAL
2	11493.00	56.72	74.00	-17.28	41.65	10.71	39.39	35.03	99	150	Peak	VERTICAL

Temperature	25℃	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11n MCS0 HT20 CH 157 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11566.92	62.47	74.00	-11.53	52.27	6.55	38.33	34.68	227	226	Peak	HORIZONTAL
2	11571.72	49.68	54.00	-4.32	39.49	6.55	38.33	34.69	227	226	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11566.56	58.66	74.00	-15.34	48.46	6.55	38.33	34.68	88	146	Peak	VERTICAL
2	11567.28	46.21	54.00	-7.79	36.01	6.55	38.33	34.68	88	146	Average	VERTICAL

Temperature	25℃	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11n MCS0 HT20 CH 165 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11650.40	52.84	74.00	-21.16	42.64	6.56	38.36	34.72	66	171	Peak	HORIZONTAL
2	11650.88	39.77	54.00	-14.23	29.57	6.56	38.36	34.72	66	171	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11645.60	54.30	74.00	-19.70	44.09	6.56	38.36	34.71	84	158	Peak	VERTICAL
2	11650.48	41.98	54.00	-12.02	31.78	6.56	38.36	34.72	84	158	Average	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11n MCS0 HT40 CH 38 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10384.50	57.41	74.00	-16.59	42.09	10.14	38.99	33.81	257	150	Peak	HORIZONTAL
2	10384.80	45.10	54.00	-8.90	29.78	10.14	38.99	33.81	257	150	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10366.70	55.76	74.00	-18.24	40.37	10.15	39.01	33.77	22	150	Peak	VERTICAL
2	10380.20	43.07	54.00	-10.93	27.74	10.14	38.99	33.80	22	150	Average	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11n MCS0 HT40 CH 46 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10456.48	64.54	74.00	-9.46	55.12	6.15	38.37	35.10	282	150	Peak	HORIZONTAL
2	10461.60	48.07	54.00	-5.93	38.63	6.16	38.38	35.10	282	150	Average	HORIZONTAL
3	15688.48	53.65	74.00	-20.35	42.34	7.61	38.55	34.85	350	150	Peak	HORIZONTAL
4	15690.16	41.10	54.00	-12.90	29.79	7.61	38.55	34.85	350	150	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10456.56	67.11	74.00	-6.89	57.69	6.15	38.37	35.10	92	139	Peak	VERTICAL
2	10464.16	50.63	54.00	-3.37	41.19	6.16	38.38	35.10	92	139	Average	VERTICAL
3	15676.08	54.41	74.00	-19.59	43.10	7.60	38.56	34.85	15	143	Peak	VERTICAL
4	15692.40	41.27	54.00	-12.73	29.96	7.61	38.55	34.85	15	143	Average	VERTICAL

Temperature	25℃	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11n MCS0 HT40 CH 151 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11516.76	55.69	74.00	-18.31	40.59	10.72	39.41	35.03	341	150	Peak	HORIZONTAL
2	11519.76	43.02	54.00	-10.98	27.91	10.73	39.41	35.03	341	150	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11513.76	56.00	74.00	-18.00	40.91	10.72	39.40	35.03	137	140	Peak	VERTICAL
2	11515.56	43.59	54.00	-10.41	28.49	10.72	39.41	35.03	137	140	Average	VERTICAL

Temperature	25℃	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11n MCS0 HT40 CH 159 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11587.72	39.07	54.00	-14.93	28.88	6.55	38.33	34.69	65	155	Average	HORIZONTAL
2	11590.48	51.42	74.00	-22.58	41.23	6.55	38.33	34.69	65	155	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11588.76	39.26	54.00	-14.74	29.07	6.55	38.33	34.69	101	173	Average	VERTICAL
2	11591.88	51.91	74.00	-22.09	41.72	6.55	38.33	34.69	101	173	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 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

4.7.2. 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

1. The test procedure is the same as section 4.6.3, only the frequency range investigated is limited to 100MHz around band edges.

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	25°C	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11a CH 36, 40, 48 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5150.00	52.84	54.00	-1.16	46.10	6.21	34.11	33.58	264	151	Average	VERTICAL
2	5150.00	68.92	74.00	-5.08	62.18	6.21	34.11	33.58	264	151	Peak	VERTICAL
3	5180.80	100.39			93.56	6.24	34.16	33.57	264	151	Average	VERTICAL
4	5181.20	109.32			102.49	6.24	34.16	33.57	264	151	Peak	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	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5113.78	44.62	54.00	-9.38	38.02	6.14	34.06	33.60	79	247	Average	VERTICAL
2	5114.42	57.00	74.00	-17.00	50.40	6.14	34.06	33.60	79	247	Peak	VERTICAL
3	5199.04	107.61			100.72	6.27	34.18	33.56	79	247	Peak	VERTICAL
4	5199.68	97.71			90.82	6.27	34.18	33.56	79	247	Average	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	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5149.60	54.89	74.00	-19.11	52.02	4.26	33.14	34.53	80	189	Peak	VERTICAL
2	5150.00	42.00	54.00	-12.00	39.13	4.26	33.14	34.53	80	189	Average	VERTICAL
3	5239.20	105.27			102.23	4.30	33.27	34.53	80	189	Peak	VERTICAL
4	5239.20	95.49			92.45	4.30	33.27	34.53	80	189	Average	VERTICAL

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

Temperature	25℃	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11a CH 149, 157, 165 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Channel 149

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5715.00	66.69	68.20	-1.51	58.56	6.83	34.68	33.38	353	141	Peak	VERTICAL
2	5725.00	72.75	78.20	-5.45	64.60	6.83	34.69	33.37	353	141	Peak	VERTICAL
3	5744.20	101.11			92.92	6.86	34.70	33.37	353	141	Average	VERTICAL
4	5744.20	110.35			102.16	6.86	34.70	33.37	353	141	Peak	VERTICAL

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

Channel 157

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5715.00	67.16	68.20	-1.04	62.93	4.49	34.32	34.58	87	191	Peak	VERTICAL
2	5724.60	73.59	78.20	-4.61	69.30	4.50	34.37	34.58	87	191	Peak	VERTICAL
3	5784.20	114.26			109.80	4.52	34.53	34.59	87	191	Peak	VERTICAL
4	5784.20	103.70			99.24	4.52	34.53	34.59	87	191	Average	VERTICAL
5	5850.00	65.82	78.20	-12.38	61.15	4.54	34.73	34.60	87	191	Peak	VERTICAL
6	5860.00	64.34	68.20	-3.86	59.60	4.55	34.79	34.60	87	191	Peak	VERTICAL

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

Channel 165

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5824.60	99.54			94.93	4.53	34.68	34.60	92	176	Average	VERTICAL
2	5825.40	110.75			106.14	4.53	34.68	34.60	92	176	Peak	VERTICAL
3	5850.00	72.63	78.20	-5.57	67.96	4.54	34.73	34.60	92	176	Peak	VERTICAL
4	5860.00	66.73	68.20	-1.47	61.99	4.55	34.79	34.60	92	176	Peak	VERTICAL

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

Temperature	25℃	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11n MCS0 HT20 CH 36, 40, 48 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5150.00	52.73	54.00	-1.27	45.99	6.21	34.11	33.58	72	159	Average	VERTICAL
2	5150.00	68.21	74.00	-5.79	61.47	6.21	34.11	33.58	72	159	Peak	VERTICAL
3	5179.60	97.71			90.88	6.24	34.16	33.57	72	159	Average	VERTICAL
4	5179.60	106.88			100.05	6.24	34.16	33.57	72	159	Peak	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	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5119.60	43.44	54.00	-10.56	40.64	4.24	33.09	34.53	74	181	Average	VERTICAL
2	5131.60	55.36	74.00	-18.64	52.53	4.25	33.11	34.53	74	181	Peak	VERTICAL
3	5199.20	94.55			91.58	4.28	33.22	34.53	74	181	Average	VERTICAL
4	5199.60	104.58			101.61	4.28	33.22	34.53	74	181	Peak	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	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5149.20	54.38	74.00	-19.62	51.51	4.26	33.14	34.53	84	208	Peak	VERTICAL
2	5150.00	42.02	54.00	-11.98	39.15	4.26	33.14	34.53	84	208	Average	VERTICAL
3	5239.20	106.39			103.35	4.30	33.27	34.53	84	208	Peak	VERTICAL
4	5239.60	95.50			92.46	4.30	33.27	34.53	84	208	Average	VERTICAL

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

Temperature	25℃	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11n MCS0 HT20 CH 149, 157, 165 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Channel 149

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5715.00	67.03	68.20	-1.17	58.90	6.83	34.68	33.38	348	164	Peak	VERTICAL
2	5725.00	72.86	78.20	-5.34	64.71	6.83	34.69	33.37	348	164	Peak	VERTICAL
3	5744.20	106.49			98.30	6.86	34.70	33.37	348	164	Peak	VERTICAL
4	5744.60	98.44			90.25	6.86	34.70	33.37	348	164	Average	VERTICAL

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

Channel 157

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5714.60	66.87	68.20	-1.33	62.64	4.49	34.32	34.58	3	166	Peak	VERTICAL
2	5721.80	74.12	78.20	-4.08	69.83	4.50	34.37	34.58	3	166	Peak	VERTICAL
3	5784.60	113.92			109.46	4.52	34.53	34.59	3	166	Peak	VERTICAL
4	5784.60	102.72			98.26	4.52	34.53	34.59	3	166	Average	VERTICAL
5	5850.80	63.93	78.20	-14.27	59.26	4.54	34.73	34.60	3	166	Peak	VERTICAL
6	5860.00	61.42	68.20	-6.78	56.68	4.55	34.79	34.60	3	166	Peak	VERTICAL

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

Channel 165

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5824.60	108.61			104.00	4.53	34.68	34.60	89	182	Peak	VERTICAL
2	5825.00	98.47			93.86	4.53	34.68	34.60	89	182	Average	VERTICAL
3	5850.00	73.29	78.20	-4.91	68.62	4.54	34.73	34.60	89	182	Peak	VERTICAL
4	5860.00	67.11	68.20	-1.09	62.37	4.55	34.79	34.60	89	182	Peak	VERTICAL

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

Temperature	25°C	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11n MCS0 HT40 CH 38, 46 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Channel 38

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5150.00	52.96	54.00	-1.04	46.22	6.21	34.11	33.58	91	149	Average	VERTICAL
2	5150.00	68.66	74.00	-5.34	61.92	6.21	34.11	33.58	91	149	Peak	VERTICAL
3	5187.60	91.49			84.66	6.24	34.16	33.57	91	149	Average	VERTICAL
4	5188.20	100.64			93.81	6.24	34.16	33.57	91	149	Peak	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	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5146.40	58.03	74.00	-15.97	55.16	4.26	33.14	34.53	89	218	Peak	VERTICAL
2	5149.20	43.34	54.00	-10.66	40.47	4.26	33.14	34.53	89	218	Average	VERTICAL
3	5232.00	104.50			101.46	4.30	33.27	34.53	89	218	Peak	VERTICAL
4	5232.40	88.15			85.11	4.30	33.27	34.53	89	218	Average	VERTICAL

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

Temperature	25°C	Humidity	40%
Test Engineer	JC Yang	Configurations	IEEE 802.11n MCS0 HT40 CH 151, 159 / Chain 1 + Chain 2
Test Date	Mar. 14, 2015		

Channel 151

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5713.00	66.78	68.20	-1.42	58.65	6.83	34.68	33.38	243	141	Peak	VERTICAL
2	5722.60	73.10	78.20	-5.10	64.95	6.83	34.69	33.37	243	141	Peak	VERTICAL
3	5752.00	101.37			93.17	6.86	34.70	33.36	243	141	Peak	VERTICAL
4	5753.20	91.64			83.44	6.86	34.70	33.36	243	141	Average	VERTICAL

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

Channel 159

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5714.20	63.11	68.20	-5.09	58.88	4.49	34.32	34.58	358	198	Peak	VERTICAL
2	5724.20	72.35	78.20	-5.85	68.06	4.50	34.37	34.58	358	198	Peak	VERTICAL
3	5791.80	105.33			100.82	4.52	34.58	34.59	358	198	Peak	VERTICAL
4	5797.00	88.72			84.21	4.52	34.58	34.59	358	198	Average	VERTICAL
5	5850.00	67.27	78.20	-10.93	62.60	4.54	34.73	34.60	358	198	Peak	VERTICAL
6	5860.00	66.65	68.20	-1.55	61.91	4.55	34.79	34.60	358	198	Peak	VERTICAL

Item 3, 4 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

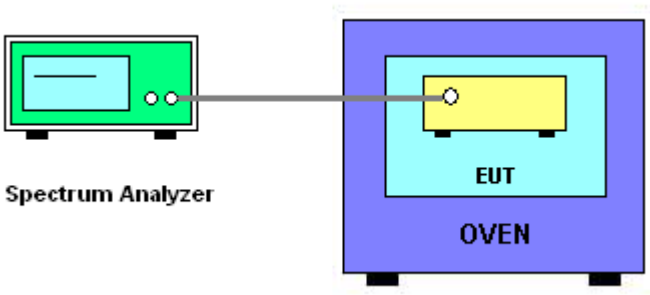
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is 0°C~40°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	51%
Test Engineer	Andy Tsai	Test Date	Mar. 25, 2015

Mode: 20 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5200 MHz	5785 MHz
126.50	5200.0312	5785.0254
110.00	5200.0238	5785.0312
93.50	5200.0313	5785.0298
Max. Deviation (MHz)	0.031320	0.031150
Max. Deviation (ppm)	6.02	5.38

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5200 MHz	5785 MHz
0	5200.0308	5785.0343
10	5200.0231	5785.0248
20	5200.0204	5785.0243
30	5200.0316	5785.0252
40	5200.0246	5785.0285
Max. Deviation (MHz)	0.031600	0.034300
Max. Deviation (ppm)	6.08	5.93

Mode: 40 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5190 MHz	5755 MHz
126.50	5190.0216	5755.0213
110.00	5190.0315	5755.0312
93.50	5190.0308	5755.0234
Max. Deviation (MHz)	0.031470	0.031150
Max. Deviation (ppm)	6.06	5.41

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5190 MHz	5755 MHz
0	5190.0308	5755.0205
10	5190.0239	5755.0205
20	5190.0208	5755.0225
30	5190.0213	5755.0234
40	5190.0315	5755.0211
Max. Deviation (MHz)	0.031453	0.023370
Max. Deviation (ppm)	6.06	4.06

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 Test Receiver	R&S	ESCS 30	100355	9kHz ~ 2.75GHz	Apr. 23, 2014	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 02, 2014	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 02, 2014	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	Dec. 03, 2014	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	May 26, 2014	Radiation (03CH01-CB)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Jul. 28, 2014	Radiation (03CH01-CB)
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	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 15, 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)
EMI Test Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8GHz	Jan. 21, 2015	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R.	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO 2000	N/A	1 m ~ 4 m	N.C.R.	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz ~ 1 GHz	Nov. 15, 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	FSV40	100979	9kHz~40GHz	Dec.12, 2014	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)
Power Sensor	Agilent	U2021XA	MY53410002	50MHz~18GHz	Nov. 03, 2014	Conducted (TH01-CB)

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

N.C.R. means Non-Calibration required.

6. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	2.4 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%