



SPORTON International Inc.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
Ph: 886-3-327-3456 / FAX: 886-3-327-0973 / www.sporton.com.tw

FCC RADIO TEST REPORT

Applicant's company	Broadcom Corporation
Applicant Address	190 Mathilda Place Sunnyvale CA 94086 U.S.A.
FCC ID	QDS-BRCM1084
Manufacturer's company	Broadcom Corporation
Manufacturer Address	190 Mathilda Place Sunnyvale CA 94086 U.S.A.

Product Name	Broadcom 802.11a/b/g/n WLAN+ Bluetooth PCI-E NGFF2230 card
Brand Name	Broadcom
Model No.	BCM943228Z
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5350MHz / 5470 ~ 5725MHz
Received Date	Apr. 01, 2014
Final Test Date	Jun. 16, 2014
Submission Type	Original Equipment
Operating Mode	Client (without radar detection function)

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.

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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 C63.10-2009, 47 CFR FCC Part 15 Subpart E, KDB 789033 D01 v01r03, KDB 662911 D01 v02r01.**

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



Table of Contents

1. CERTIFICATE OF COMPLIANCE	1
2. SUMMARY OF THE TEST RESULT	2
3. GENERAL INFORMATION	3
3.1. Product Details.....	3
3.2. Accessories.....	4
3.3. Table for Filed Antenna.....	5
3.4. Table for Carrier Frequencies	6
3.5. Table for Test Modes	7
3.6. Table for Testing Locations.....	9
3.7. Table for Supporting Units	9
3.8. Table for Parameters of Test Software Setting	10
3.9. EUT Operation during Test	10
3.10. Test Signal Duty Cycle	11
3.11. Duty Cycle	12
3.12. Test Configurations	14
4. TEST RESULT	17
4.1. AC Power Line Conducted Emissions Measurement.....	17
4.2. 26dB Bandwidth and 99% Occupied Bandwidth Measurement.....	21
4.3. Maximum Conducted Output Power Measurement.....	37
4.4. Power Spectral Density Measurement	44
4.5. Peak Excursion Measurement	53
4.6. Radiated Emissions Measurement	63
4.7. Band Edge Emissions Measurement	95
4.8. Frequency Stability Measurement	106
4.9. Antenna Requirements	108
5. LIST OF MEASURING EQUIPMENTS	109
6. MEASUREMENT UNCERTAINTY.....	111
APPENDIX A. TEST PHOTOS	A1 ~ A8
APPENDIX B. RADIATED EMISSION CO-LOCATION REPORT	B1 ~ B5

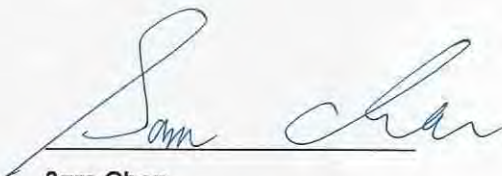
History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR440181AB	Rev. 01	Initial issue of report	Jun. 17, 2014

1. CERTIFICATE OF COMPLIANCE

Product Name : Broadcom 802.11a/b/g/n WLAN+ Bluetooth PCI-E NGFF2230 card
Brand Name : Broadcom
Model No. : BCM943228Z
Applicant : Broadcom Corporation
Test Rule Part(s) : 47 CFR FCC Part 15 Subpart E § 15.407

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Apr. 01, 2014 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	14.24 dB
4.2	15.407(a)	26dB Spectrum Bandwidth and 99% Occupied Bandwidth	Complies	-
4.3	15.407(a)	Maximum Conducted Output Power	Complies	0.92 dB
4.4	15.407(a)	Power Spectral Density	Complies	0.06 dB
4.5	15.407(a)	Peak Excursion	Complies	2.62 dB
4.6	15.407(b)	Radiated Emissions	Complies	0.40 dB
4.7	15.407(b)	Band Edge Emissions	Complies	0.02 dB
4.8	15.407(g)	Frequency Stability	Complies	-
4.9	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n

Items	Description
Product Type	WLAN (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From host system
Modulation	see the below table for IEEE 802.11n
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	see the below table for IEEE 802.11n
Frequency Range	5150 ~ 5350MHz / 5470 ~ 5725MHz
Channel Number	19 for 20MHz bandwidth ; 9 for 40MHz bandwidth
Channel Band Width (99%)	MCS0 (HT20): 19.04 MHz ; MCS0 (HT40): 46.72 MHz
Maximum Conducted Output Power	Band 1: MCS0 (HT20): 14.10 dBm ; MCS0 (HT40): 16.08 dBm Band 2: MCS0 (HT20): 20.45 dBm ; MCS0 (HT40): 21.51 dBm Band 3: MCS0 (HT20): 20.71 dBm ; MCS0 (HT40): 19.93 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

IEEE 802.11a

Items	Description
Product Type	WLAN (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From host system
Modulation	OFDM for IEEE 802.11a
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	OFDM (6/9/12/18/24/36/48/54)
Frequency Range	5150 ~ 5350MHz / 5470 ~ 5725MHz
Channel Number	19
Channel Band Width (99%)	18.40 MHz
Maximum Conducted Output Power	Band 1: 14.19 dBm ; Band 2: 20.48 dBm ; Band 3: 20.69 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Note: The MIMO transmission mode is correlated.

Items	Description	
Communication Mode	☒ IP Based (Load Based)	☐ Frame Based
TPC Function	☒ With TPC	☐ Without TPC
Weather Band (5600~5650MHz)	☒ With 5600~5650MHz	☐ Without 5600~5650MHz
Beamforming Function	☐ With beamforming	☒ Without beamforming

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	MCS0-15
802.11n (HT40)	2	MCS0-15
Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT support HT20 and HT40. Note 2: Modulation modes consist of below configuration: HT20/HT40: IEEE 802.11n		

3.2. Accessories

N/A

3.3. Table for Filed Antenna

Set	Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)				
						2.4G	5G B1	5G B2	5G B3	5G B4
1	1	MAG.LAYERS	PCA-4077-25GC1-A1-RT	WLAN/BT antenna	I-PEX A13	3.33	5.85	5.85	6.21	6.21
	2	MAG.LAYERS	PCA-4077-25GC1-A1-RT	WLAN/BT antenna	I-PEX A13	3.33	5.85	5.85	6.21	6.21

Note1: The each set has two antennas.

For 2.4GHz:

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

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

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

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

Chain 1 and Chain 2 could transmit/receive simultaneously.

For 5GHz:

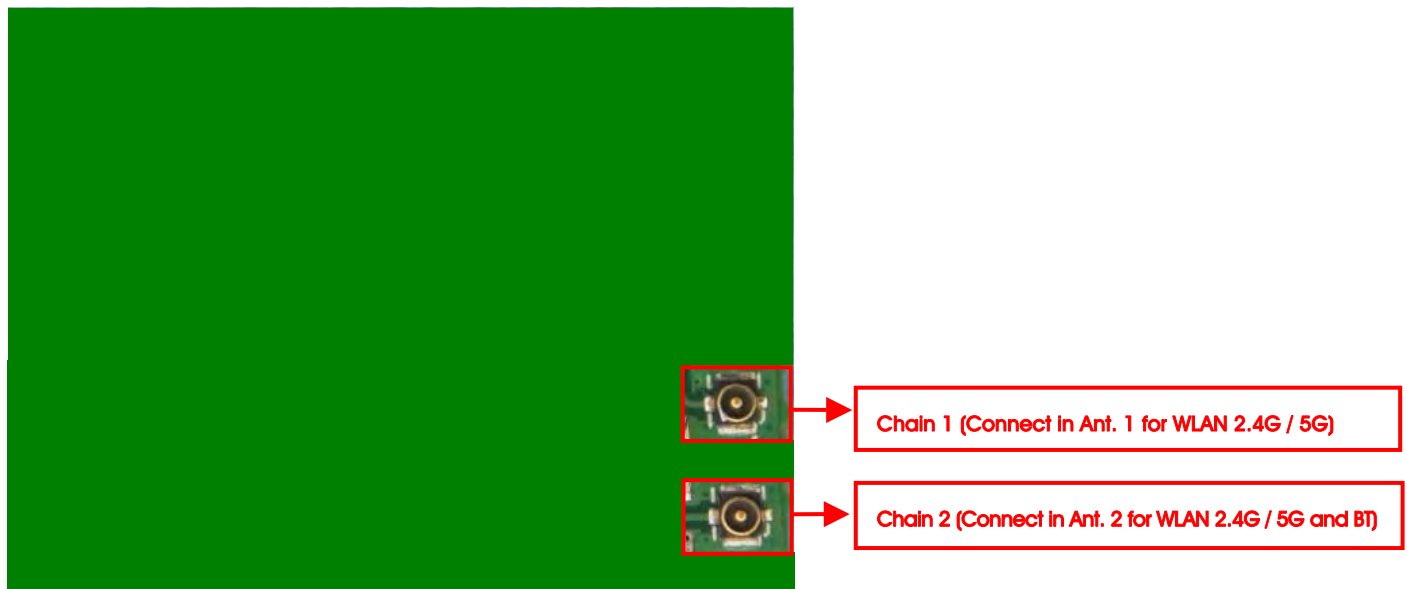
For IEEE 802.11a/n mode (2TX/2RX)

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

Chain 1 and Chain 2 could transmit/receive simultaneously.

For Bluetooth mode (1TX/1RX)

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



3.4. Table for Carrier Frequencies

The EUT has two bandwidth system.

For 20MHz bandwidth systems, use Channel 36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140.

For 40MHz bandwidth systems, use Channel 38, 46, 54, 62, 102, 110, 118, 126, 134.

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
5250~5350 MHz Band 2	52	5260 MHz	60	5300 MHz
	54	5270 MHz	62	5310 MHz
	56	5280 MHz	64	5320 MHz
5470~5725 MHz Band 3	100	5500 MHz	120	5600 MHz
	102	5510 MHz	124	5620 MHz
	104	5520 MHz	126	5630 MHz
	108	5540 MHz	128	5640 MHz
	110	5550 MHz	132	5660 MHz
	112	5560 MHz	134	5670 MHz
	116	5580 MHz	136	5680 MHz
	118	5590 MHz	140	5700 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	11n HT20	Band 1-3	MCS0	36/40/48/52/60/64 /100/116/140	1+2
	11n HT40	Band 1-3	MCS0	38/46/54/62/ 102/110/134	1+2
	11a/BPSK	Band 1-3	6Mbps	36/40/48/52/60/64 /100/116/140	1+2
Power Spectral Density	11n HT20	Band 1-3	MCS0	36/40/48/52/60/64 /100/116/140	1+2
	11n HT40	Band 1-3	MCS0	38/46/54/62/ 102/110/134	1+2
	11a/BPSK	Band 1-3	6Mbps	36/40/48/52/60/64 /100/116/140	1+2
26dB Spectrum Bandwidth 99% Occupied Bandwidth Measurement	11n HT20	Band 1-3	MCS0	36/40/48/52/60/64 /100/116/140	1+2
	11n HT40	Band 1-3	MCS0	38/46/54/62/ 102/110/134	1+2
	11a/BPSK	Band 1-3	6Mbps	36/40/48/52/60/64 /100/116/140	1+2
Peak Excursion	11n HT20	Band 1-3	MCS0	36/40/48/52/60/64 /100/116/140	1+2
	11n HT40	Band 1-3	MCS0	38/46/54/62/ 102/110/134	1+2
	11a/BPSK	Band 1-3	6Mbps	36/40/48/52/60/64 /100/116/140	1+2

Radiated Emission Below 1GHz	Normal Link		-	-	-
Radiated Emission Above 1GHz	11n HT20	Band 1-3	MCS0	36/40/48/52/60/64 /100/116/140	1+2
	11n HT40	Band 1-3	MCS0	38/46/54/62/ 102/110/134	1+2
	11a/BPSK	Band 1-3	6Mbps	36/40/48/52/60/64 /100/116/140	1+2
Band Edge Emission	11n HT20	Band 1-3	MCS0	36/40/48/52/60/64 /100/116/140	1+2
	11n HT40	Band 1-3	MCS0	38/46/54/62/ 102/110/134	1+2
	11a/BPSK	Band 1-3	6Mbps	36/40/48/52/60/64 /100/116/140	1+2
Frequency Stability	Un-modulation		-	40/60/100	1+2

The following test modes were performed for all tests:

For Conducted Emission test:

Mode 1. 2.4GHz WLAN Function + Bluetooth Function

Mode 2. 5GHz WLAN Function + Bluetooth Function

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

For Radiated Emission Below 1GHz test:

Mode 1. 2.4GHz WLAN Function + Bluetooth Function

Mode 2. 5GHz WLAN Function + Bluetooth Function

Mode 1 is the worst case, so it was selected to record in this test report.

For Radiated Emission Above 1GHz test:

Mode 1. CTX-EUT

For Co-location test:

Mode 1. 2.4GHz WLAN function + Bluetooth function

Mode 2. 5GHz WLAN function + Bluetooth function

3.6. Table for Testing Locations

Test Site Location					
Address:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.				
TEL:	886-3-656-9065				
FAX:	886-3-656-9085				
Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.	VCCI Reg. No
03CH01-CB	SAC	Hsin Chu	262045	IC 4086D	-
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
AP Router	Planex	GW-AP54SGX	KA220030603014-1
NB	DELL	E6430	DoC
Broadcom 802.11a/b/g/n WLAN+ Bluetooth PCI-E NGFF2230 card (Device)	Broadcom	BCM943228Z	QDS-BRCM1084
NB	DELL	E6510	N/A
Mouse	Logitech	M-U0026	DoC
Earphone	SHYARO CHI	MIC-04	N/A
Test Fixture*2	Broadcom	BCM9NGFF2EC_1	N/A

For Test Site No: 03CH01-CB (For Below 1GHz)

Support Unit	Brand	Model	FCC ID
AP Router	Planex	GW-AP54SGX	KA220030603014-1
NB	DELL	E6430	DoC
Broadcom 802.11a/b/g/n WLAN+ Bluetooth PCI-E NGFF2230 card (Device)	Broadcom	BCM943228Z	QDS-BRCM1084
NB	DELL	M1330	DoC
Mouse	Logitech	M-U0026	DoC
Earphone	SHYARO CHI	MIC-04	N/A
Test Fixture*2	Broadcom	BCM9NGFF2EC_1	N/A

For Test Site No: 03CH01-CB (For Above 1GHz)

Support Unit	Brand	Model	FCC ID
NB	DELL	M1330	DoC
Test Fixture	Broadcom	BCM9NGFF2EC_1	N/A

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6430	DoC
Test Fixture	Broadcom	BCM9NGFF2EC_1	N/A

3.8. Table for Parameters of Test Software Setting

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

Power Parameters of IEEE 802.11n MCS0 HT20

Test Software Version	Manual Tool Version : 2.0.1.6								
Frequency	5180 MHz	5200 MHz	5240 MHz	5260 MHz	5300 MHz	5320 MHz	5500 MHz	5580 MHz	5700 MHz
MCS0 HT20	44	44	44	70	70	58	57	70	57

Power Parameters of IEEE 802.11n MCS0 HT40

Test Software Version	Manual Tool Version : 2.0.1.6						
Frequency	5190 MHz	5230 MHz	5270 MHz	5310 MHz	5510 MHz	5550 MHz	5670 MHz
MCS0 HT40	41	56	74	37	34	65	64

Power Parameters of IEEE 802.11a

Test Software Version	Manual Tool Version : 2.0.1.6								
Frequency	5180 MHz	5200 MHz	5240 MHz	5260 MHz	5300 MHz	5320 MHz	5500 MHz	5580 MHz	5700 MHz
802.11a	44	44	44	70	64	46	47	70	49

3.9. EUT Operation during Test

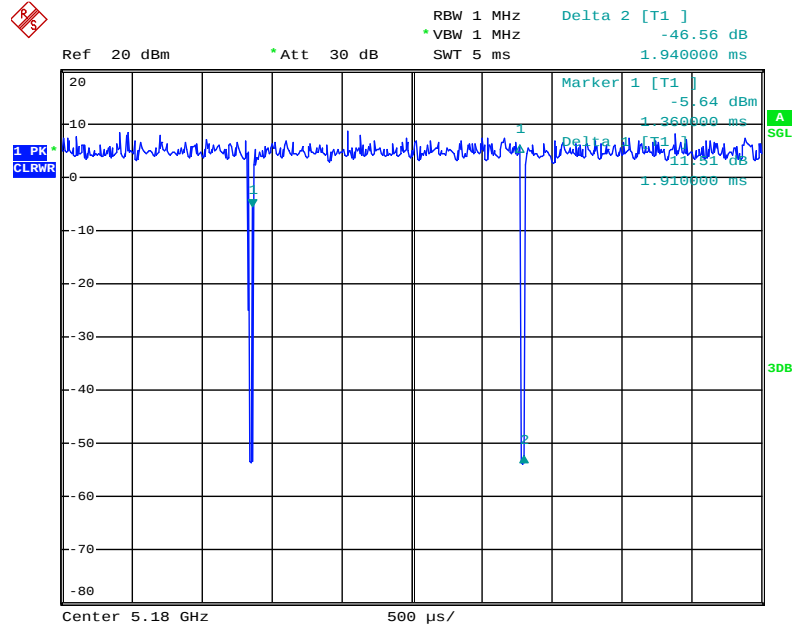
The EUT was programmed to be in continuously transmitting mode.

3.10. Test Signal Duty Cycle

Band	Mode	TX-on (ms)	TX-on+TX-off (ms)	TX-on/(TX-on+TX-off)x100= Duty cycle (%)	Duty Factor (dB)
5G	802.11a	2.060	2.090	98.56	0.06
	802.11n MCS0 HT20	1.910	1.940	98.45	0.07
	802.11n MCS0 HT40	0.930	0.950	97.89	0.09

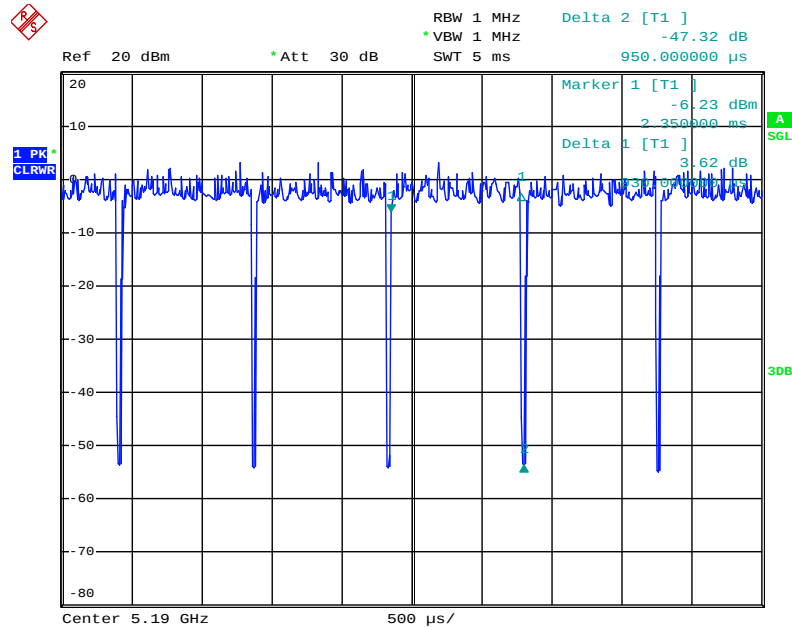
3.11. Duty Cycle

IEEE 802.11n MCS0 HT20



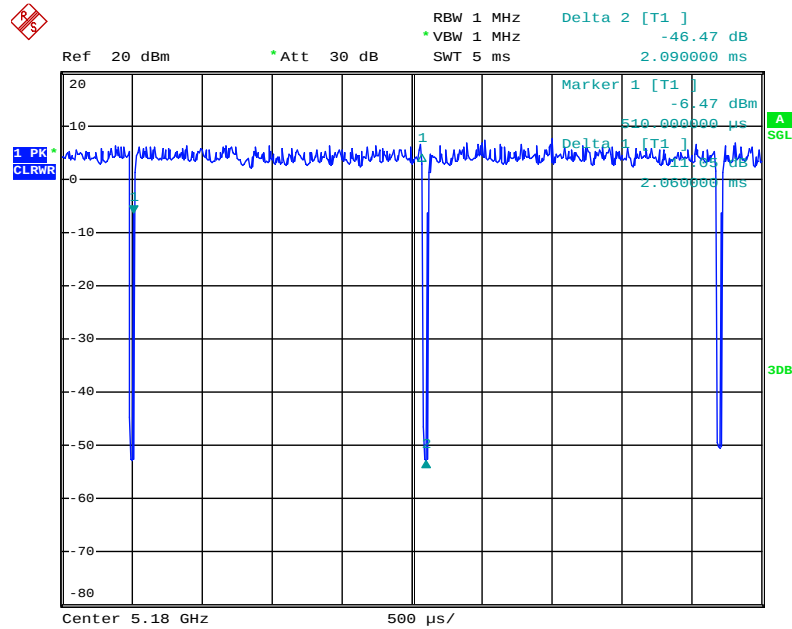
Date: 29.APR.2014 21:41:23

IEEE 802.11n MCS0 HT40



Date: 29.APR.2014 21:42:21

IEEE 802.11a

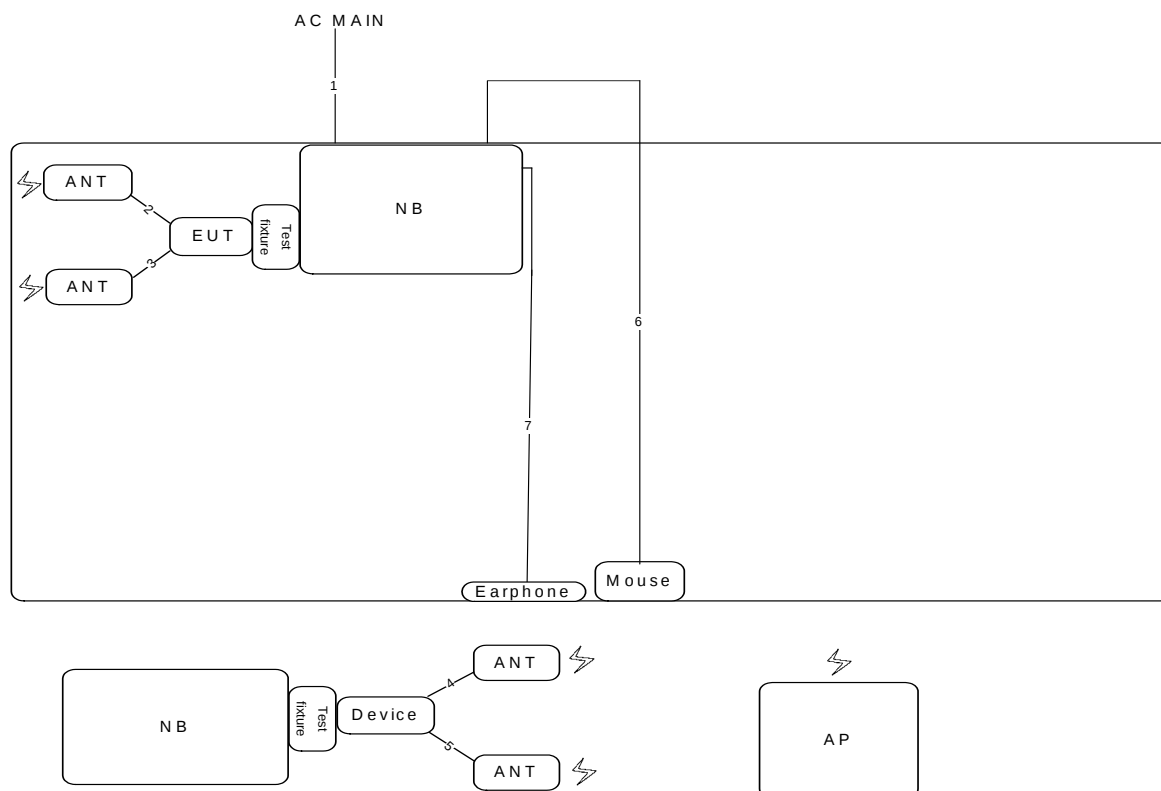


Date: 29.APR.2014 21:40:08

3.12. Test Configurations

3.12.1. AC Power Line Conduction Emissions Test Configuration

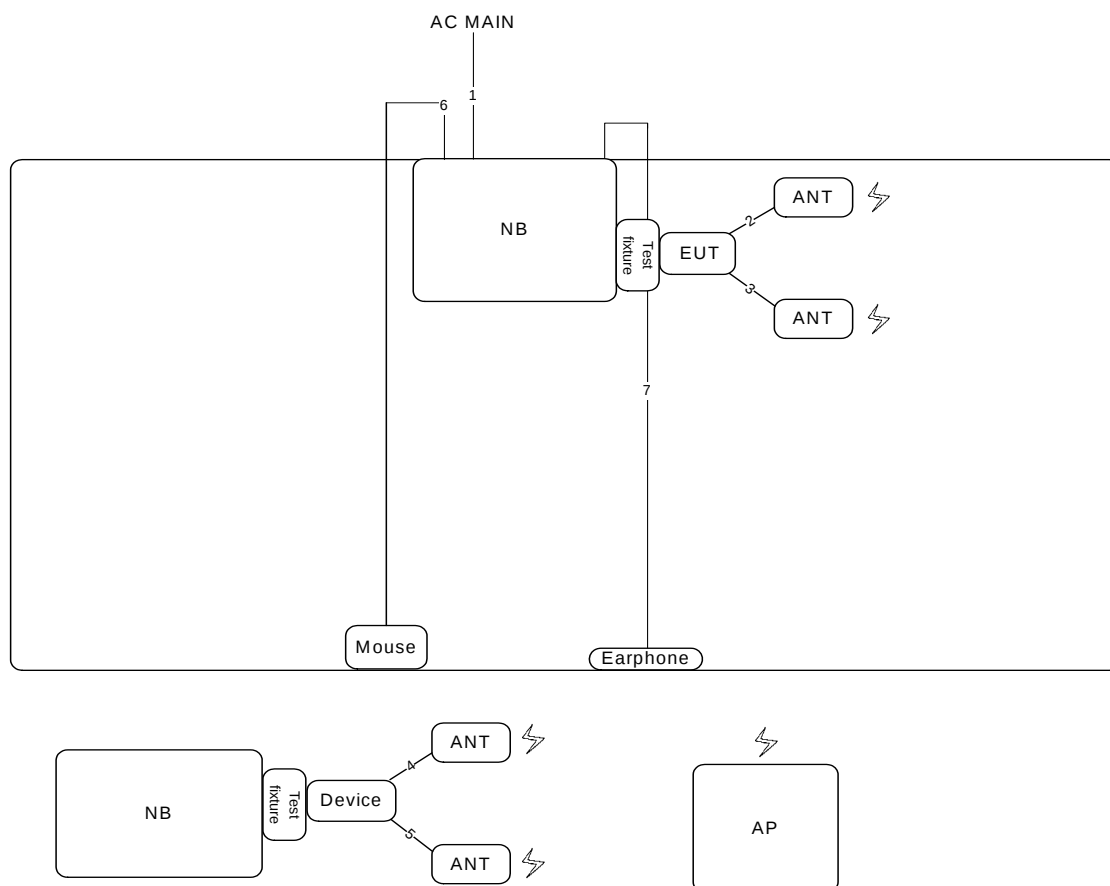
Test Mode: Mode 2



Item	Connection	Shield	Length
1	Power cable	No	1.8m
2	ANT cable	Yes	0.2m
3	ANT cable	Yes	0.2m
4	ANT cable	Yes	0.2m
5	ANT cable	Yes	0.2m
6	USB cable	Yes	1.8m
7	Audio cable	No	1.5m

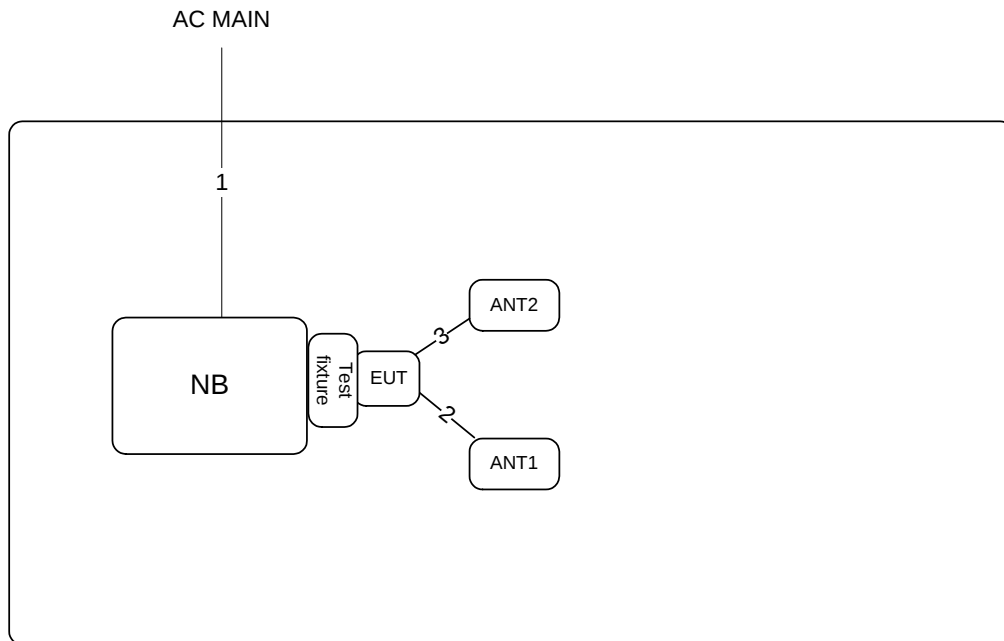
3.12.2. Radiation Emissions Test Configuration

Test Configuration: 30MHz ~ 1GHz / Test Mode: Mode 1



Item	Connection	Shield	Length
1	Power cable	No	1.8m
2	ANT cable	Yes	0.2m
3	ANT cable	Yes	0.2m
4	ANT cable	Yes	0.2m
5	ANT cable	Yes	0.2m
6	USB cable	Yes	1.8m
7	Audio cable	No	1.5m

Test Configuration: above 1GHz



Item	Connection	Shield	Length
1	Power cable	No	2.6m
2	ANT cable	Yes	0.2m
3	ANT cable	Yes	0.2m

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.

[illegible]

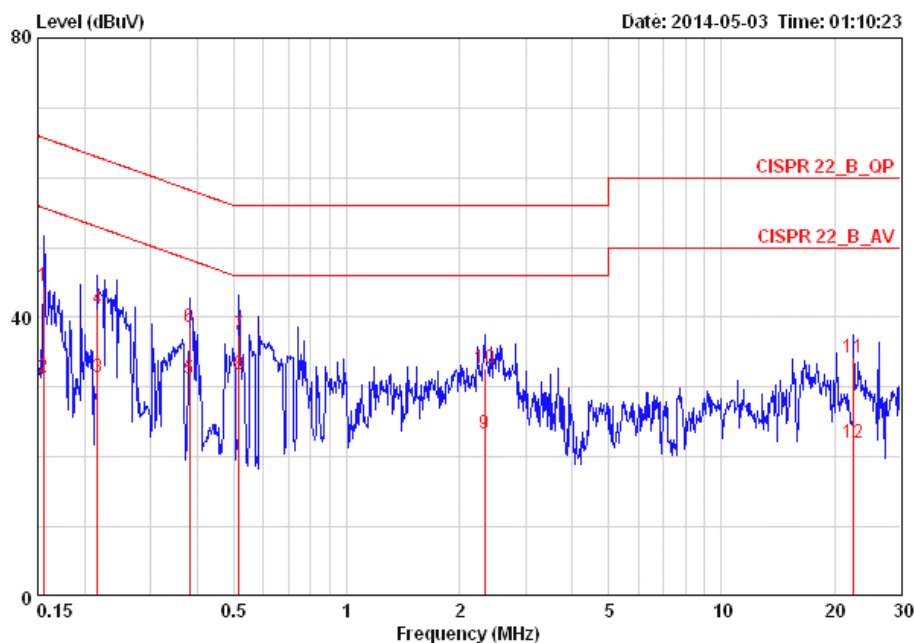
- (1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- (2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using 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.

There is no deviation with the original standard.

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

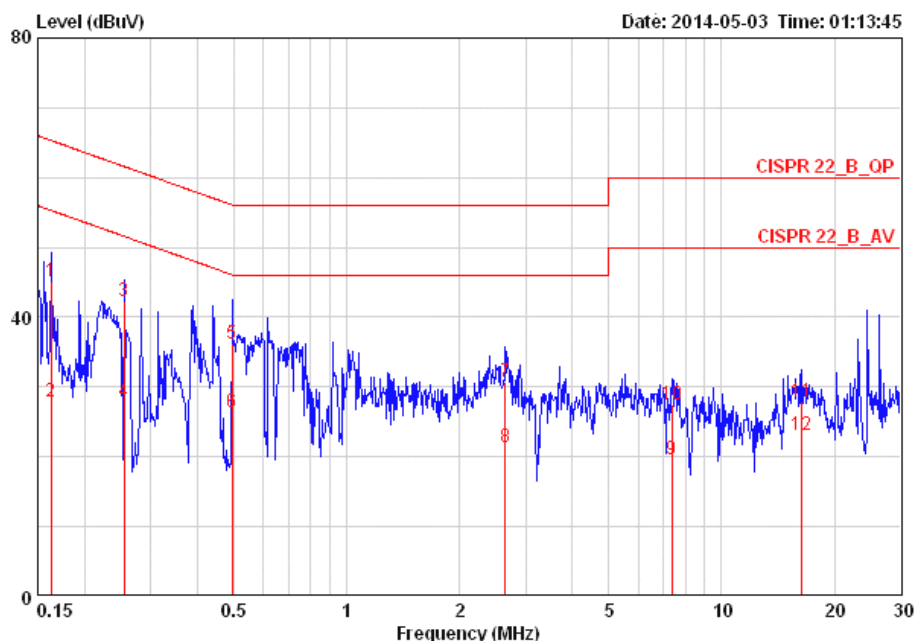
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	25°C	Humidity	52%
Test Engineer	Parody Lin	Phase	Line
Configuration	Normal Link / Mode 2		



	Freq	Level	Over	Limit	LISN	Read	Cable	Pol/Phase	Remark
	MHz	dBuV	Limit	Line	Factor	Level	Loss		
			dB	dBuV	dB	dBuV	dB		
1	0.15567	44.55	-21.14	65.69	0.08	44.29	0.18	LINE	QP
2	0.15567	31.40	-24.29	55.69	0.08	31.14	0.18	LINE	AVERAGE
3	0.21620	31.45	-21.51	52.96	0.08	31.17	0.20	LINE	AVERAGE
4	0.21620	41.28	-21.68	62.96	0.08	41.00	0.20	LINE	QP
5	0.38113	31.09	-17.16	48.25	0.08	30.81	0.20	LINE	AVERAGE
6	0.38113	38.51	-19.74	58.25	0.08	38.23	0.20	LINE	QP
7	0.51550	37.44	-18.56	56.00	0.08	37.16	0.20	LINE	QP
8	0.51550	31.76	-14.24	46.00	0.08	31.48	0.20	LINE	AVERAGE
9	2.334	23.23	-22.77	46.00	0.13	22.87	0.24	LINE	AVERAGE
10	2.334	32.60	-23.40	56.00	0.13	32.24	0.24	LINE	QP
11	22.535	34.22	-25.78	60.00	0.39	33.31	0.52	LINE	QP
12	22.535	21.96	-28.04	50.00	0.39	21.05	0.52	LINE	AVERAGE

Temperature	25°C	Humidity	52%
Test Engineer	Parody Lin	Phase	Neutral
Configuration	Normal Link / Mode 2		



	Freq	Level	Over	Limit	LISN	Read	Cable	Pol/Phase	Remark
	MHz	dBuV	Limit	Line	Factor	Level	Loss		
			dB	dBuV	dB	dBuV	dB		
1	0.16241	45.18	-20.16	65.34	0.08	44.92	0.18	NEUTRAL	QP
2	0.16241	27.91	-27.43	55.34	0.08	27.65	0.18	NEUTRAL	AVERAGE
3	0.25480	42.32	-19.28	61.60	0.08	42.04	0.20	NEUTRAL	QP
4	0.25480	27.94	-23.66	51.60	0.08	27.66	0.20	NEUTRAL	AVERAGE
5	0.49411	36.26	-19.84	56.10	0.09	35.97	0.20	NEUTRAL	QP
6	0.49411	26.42	-19.68	46.10	0.09	26.13	0.20	NEUTRAL	AVERAGE
7	2.650	30.77	-25.23	56.00	0.13	30.39	0.24	NEUTRAL	QP
8	2.650	21.45	-24.55	46.00	0.13	21.07	0.24	NEUTRAL	AVERAGE
9	7.368	19.56	-30.44	50.00	0.22	19.04	0.30	NEUTRAL	AVERAGE
10	7.368	27.50	-32.50	60.00	0.22	26.98	0.30	NEUTRAL	QP
11	16.398	27.97	-32.03	60.00	0.32	27.24	0.41	NEUTRAL	QP
12	16.398	23.02	-26.98	50.00	0.32	22.29	0.41	NEUTRAL	AVERAGE

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	$\geq 3 \times \text{RBW}$
Detector	Peak
Trace	Max Hold

4.2.3. Test Procedures

1. The transmitter was conducted 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.
3. 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. Measurement perform conducted of each port.

4.2.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.4.4.

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	26°C	Humidity	63%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11n

Configuration IEEE 802.11n MCS0 HT20

Channel	Frequency	26dB Bandwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 1	Chain 2	Chain 1	Chain 2
36	5180 MHz	19.74	19.74	17.69	17.69
40	5200 MHz	19.87	19.61	17.69	17.69
48	5240 MHz	19.87	19.61	17.69	17.69
52	5260 MHz	31.53	31.41	18.08	17.94
60	5300 MHz	30.51	31.28	18.20	18.07
64	5320 MHz	26.02	20.51	17.94	17.20
100	5500 MHz	27.69	19.74	17.94	17.69
116	5580 MHz	38.84	27.69	22.56	17.94
140	5700 MHz	24.35	19.61	17.94	17.69

Configuration IEEE 802.11n MCS0 HT40

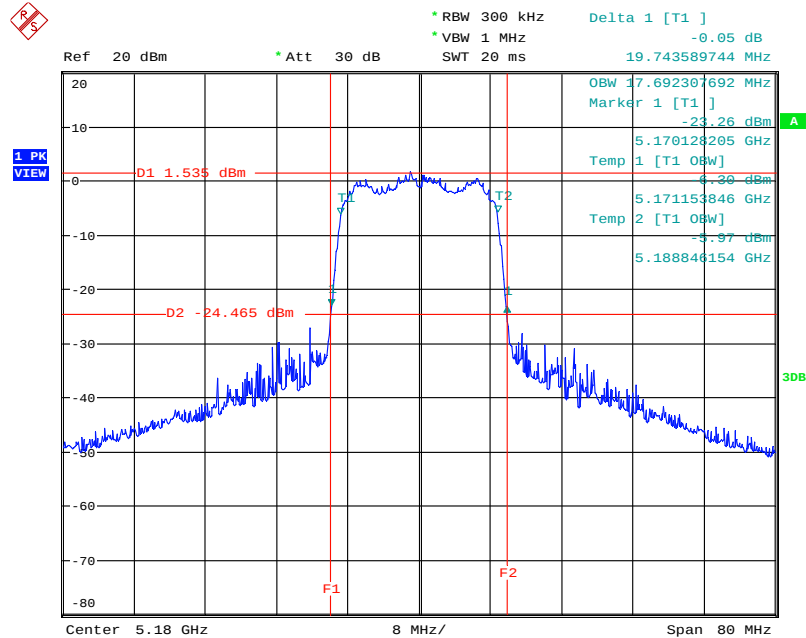
Channel	Frequency	26dB Bandwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 1	Chain 2	Chain 1	Chain 2
38	5190 MHz	38.97	39.23	36.41	36.41
46	5230 MHz	59.74	39.23	36.66	36.41
54	5270 MHz	87.94	86.15	41.28	43.84
62	5310 MHz	39.48	38.97	36.41	36.41
102	5510 MHz	39.23	38.71	36.41	36.41
110	5550 MHz	86.41	43.84	40.76	36.41
134	5670 MHz	85.12	67.69	37.69	36.41

Temperature	26°C	Humidity	63%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11a

Configuration IEEE 802.11a

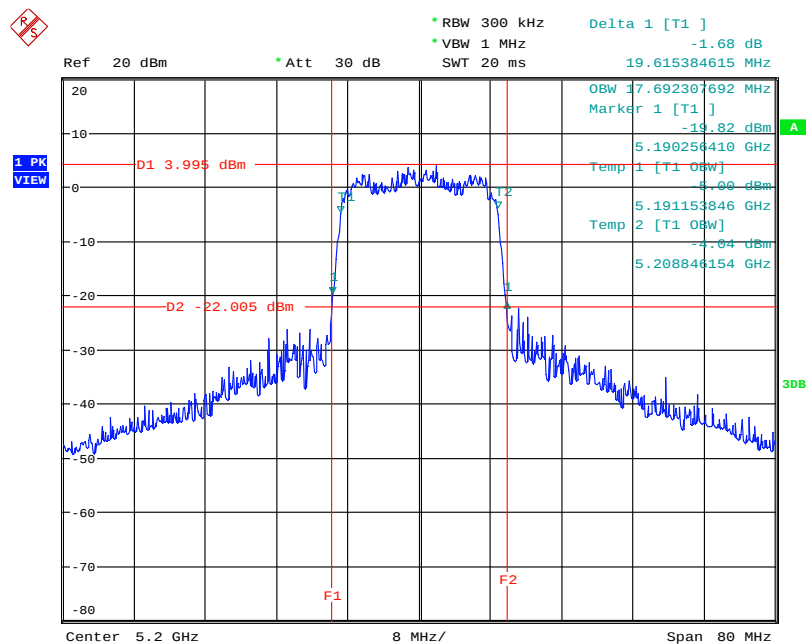
Channel	Frequency	26dB Bandwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 1	Chain 2	Chain 1	Chain 2
36	5180 MHz	19.61	19.61	16.66	16.66
40	5200 MHz	19.48	19.61	16.66	16.66
48	5240 MHz	19.35	19.35	16.66	16.66
52	5260 MHz	31.28	30.12	17.30	17.17
60	5300 MHz	23.84	24.87	16.92	16.92
64	5320 MHz	19.61	19.48	16.66	16.66
100	5500 MHz	19.61	19.48	16.66	16.66
116	5580 MHz	38.97	30.38	22.05	16.92
140	5700 MHz	19.48	19.35	16.66	16.66

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



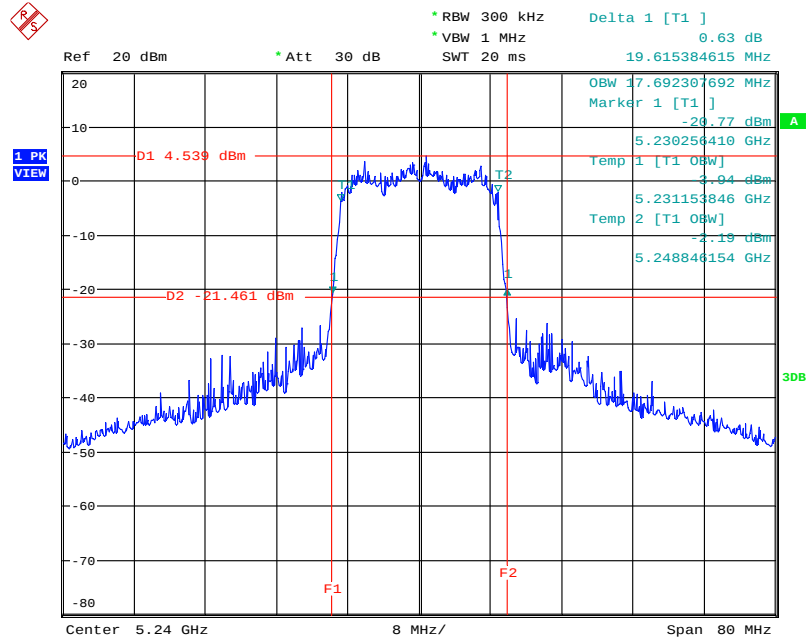
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 2 / 5200 MHz



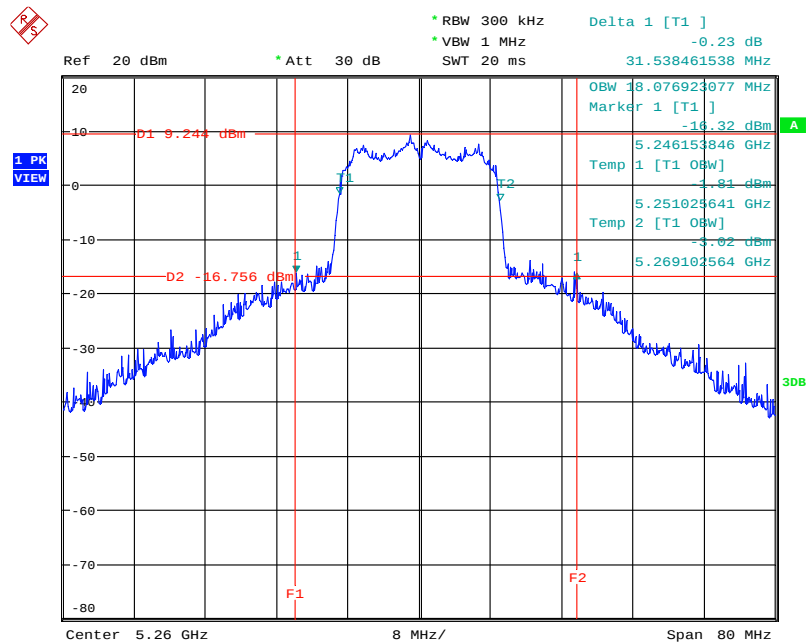
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 2 / 5240 MHz



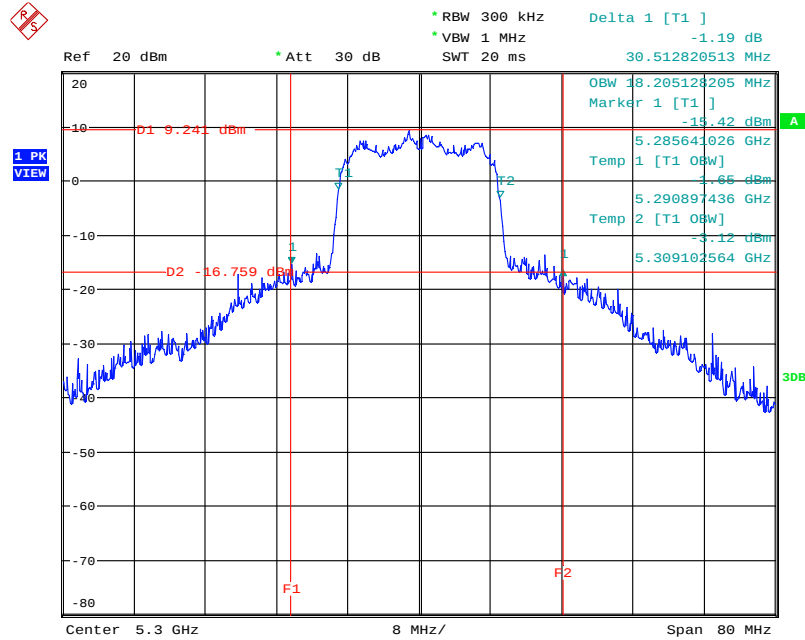
Date: 16.JUN.2014 20:35:40

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 / 5260 MHz



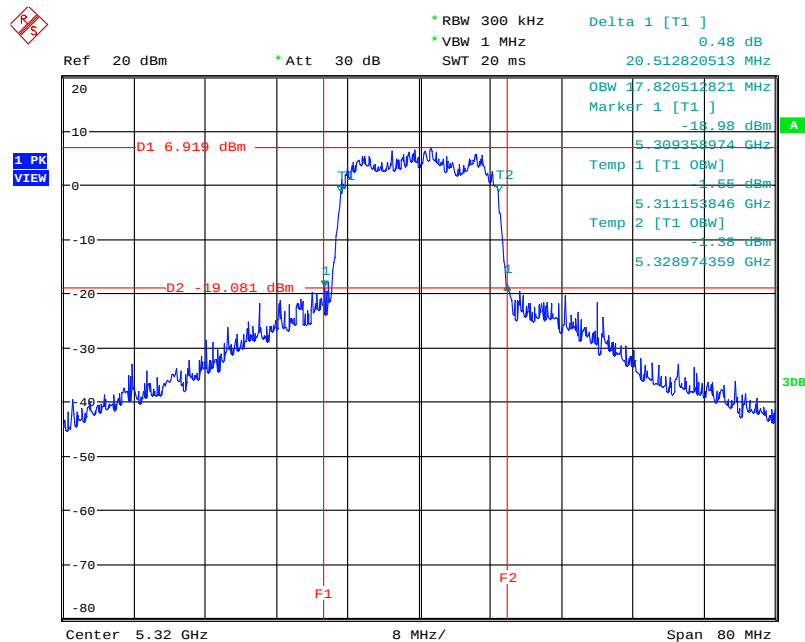
Date: 16.JUN.2014 20:45:50

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 / 5300 MHz



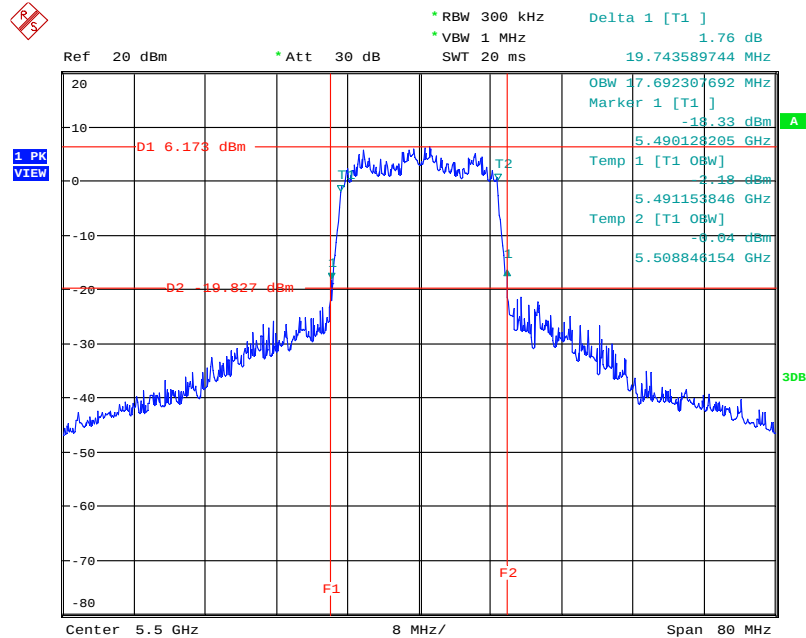
Date: 16.JUN.2014 20:45:33

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 2 / 5320 MHz



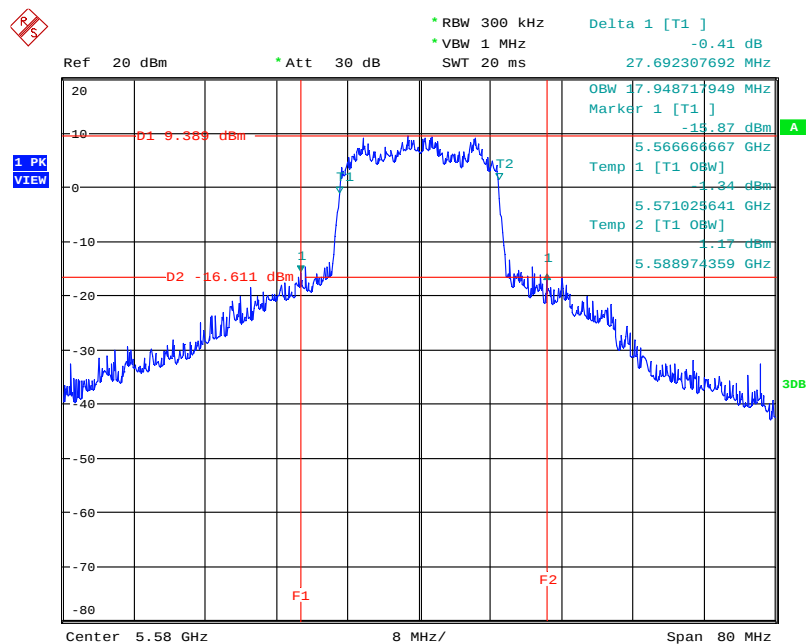
Date: 16.JUN.2014 20:37:52

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 2 / 5500 MHz



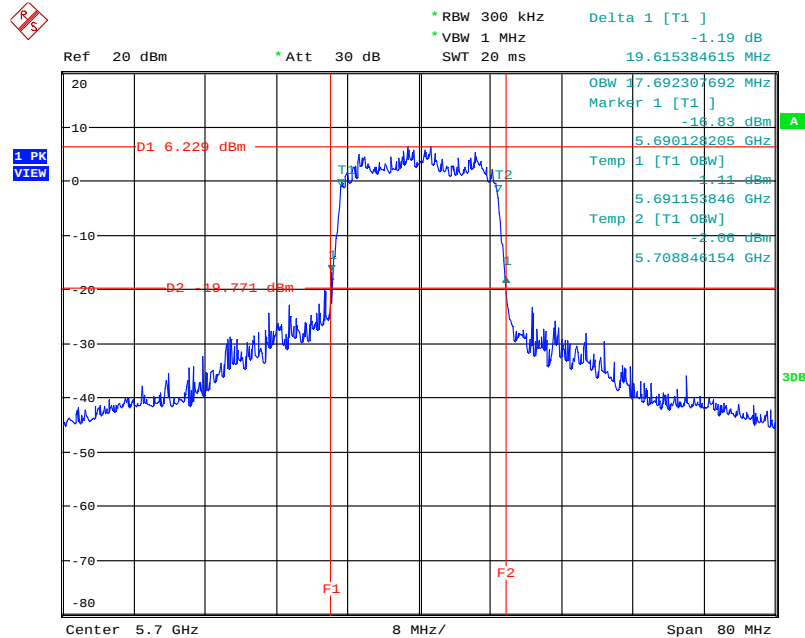
Date: 16.JUN.2014 20:38:42

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 2 / 5580 MHz



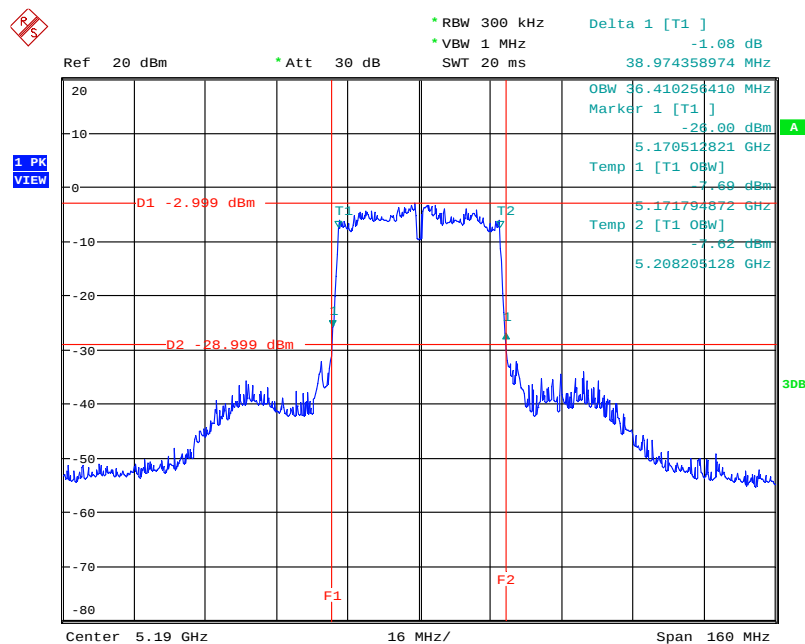
Date: 16.JUN.2014 20:39:16

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 2 / 5700 MHz



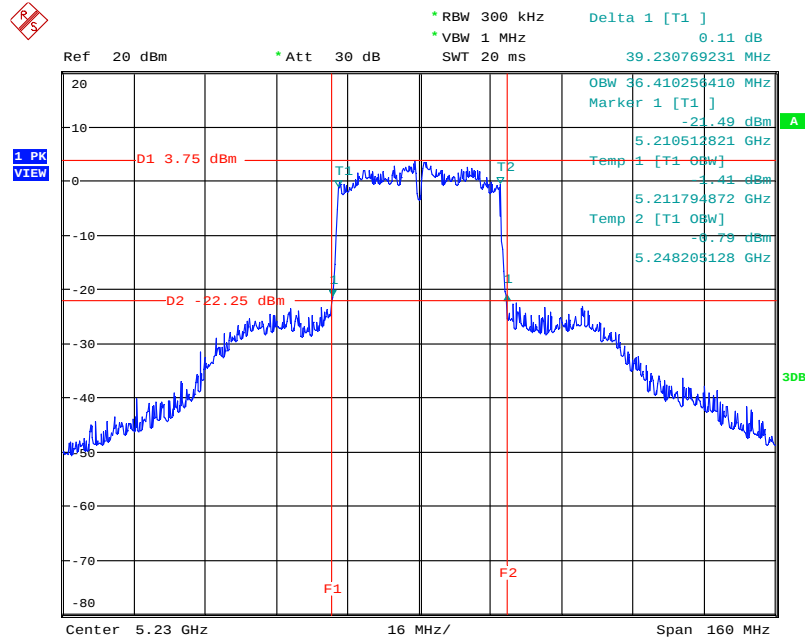
Date: 16.JUN.2014 20:39:40

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



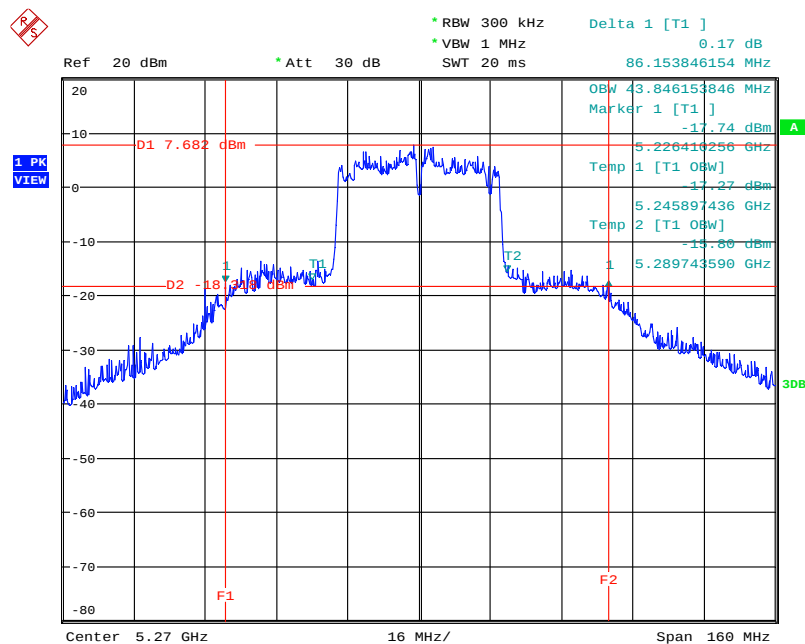
Date: 16.JUN.2014 20:48:55

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



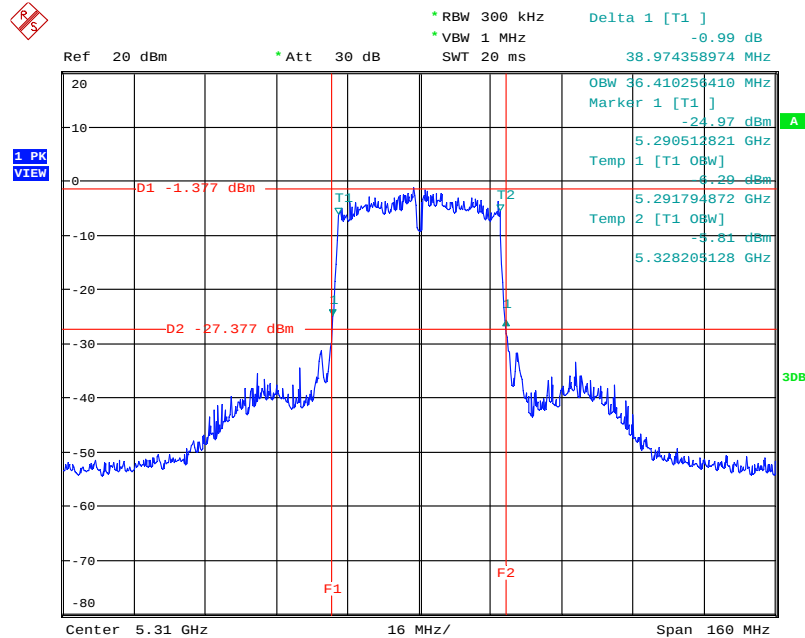
Date: 16.JUN.2014 20:56:27

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 2 / 5270 MHz



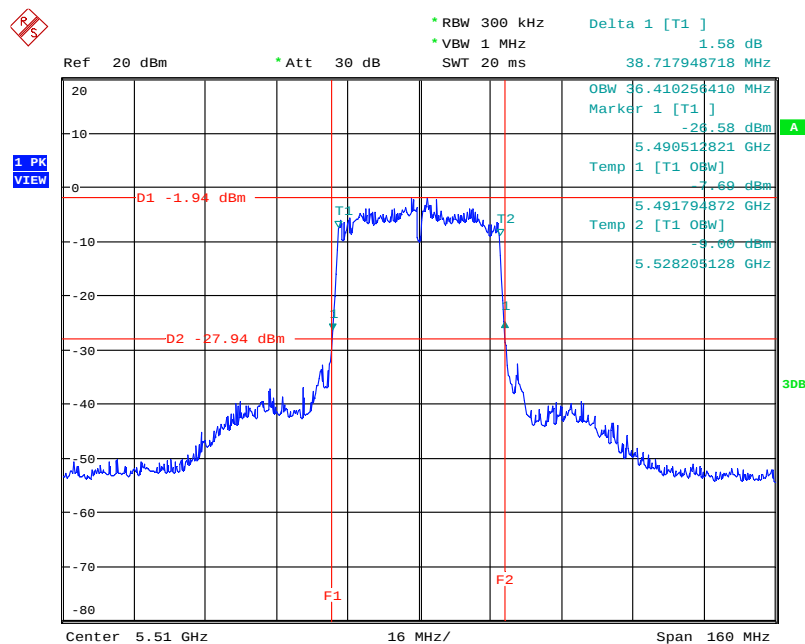
Date: 16.JUN.2014 20:56:03

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 2 / 5310 MHz



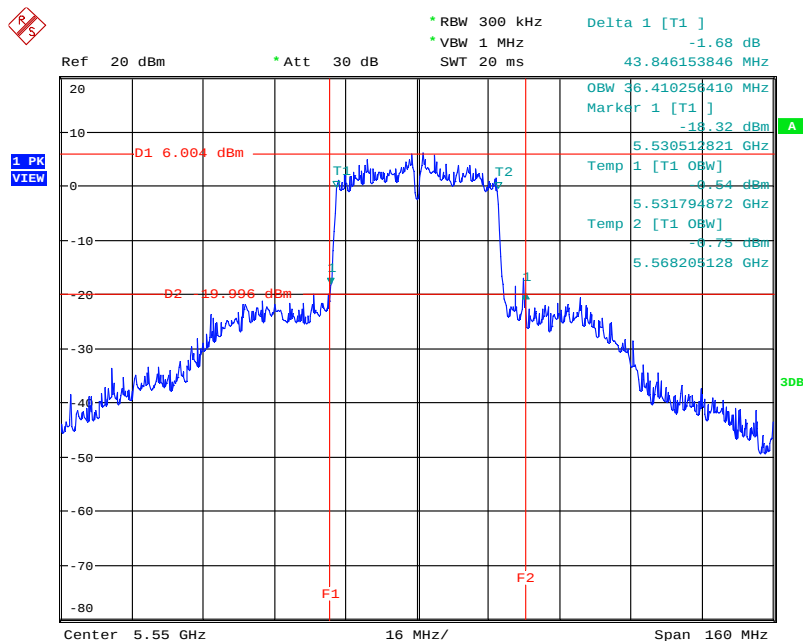
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 2 / 5510 MHz



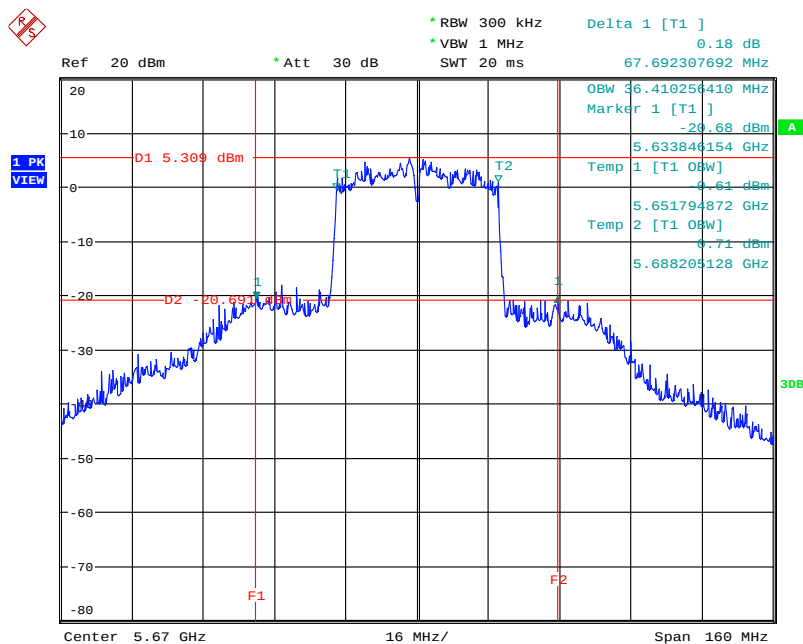
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 2 / 5550 MHz



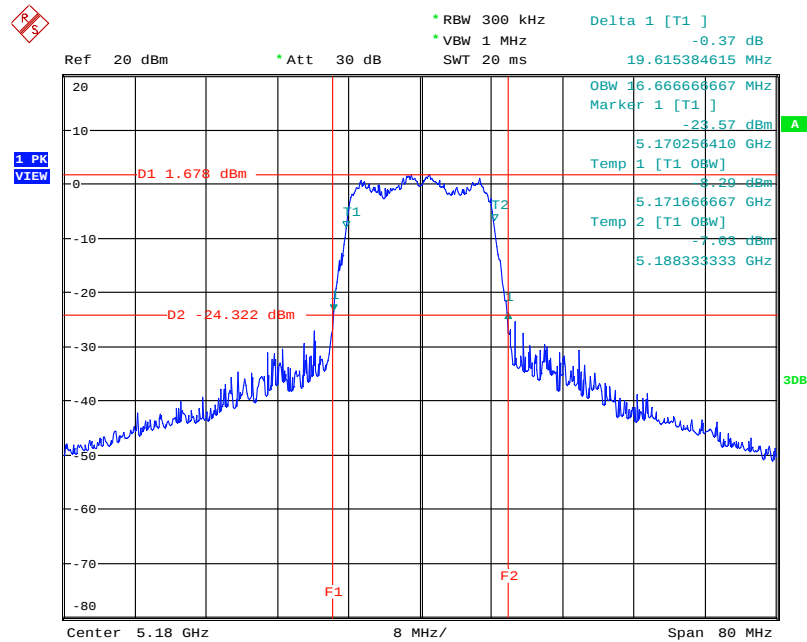
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 2 / 5670 MHz



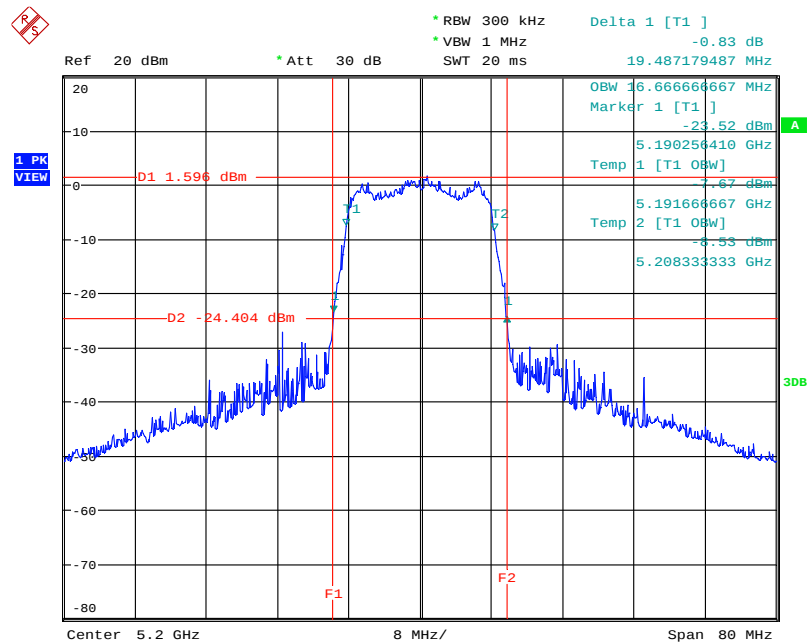
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 / 5180 MHz



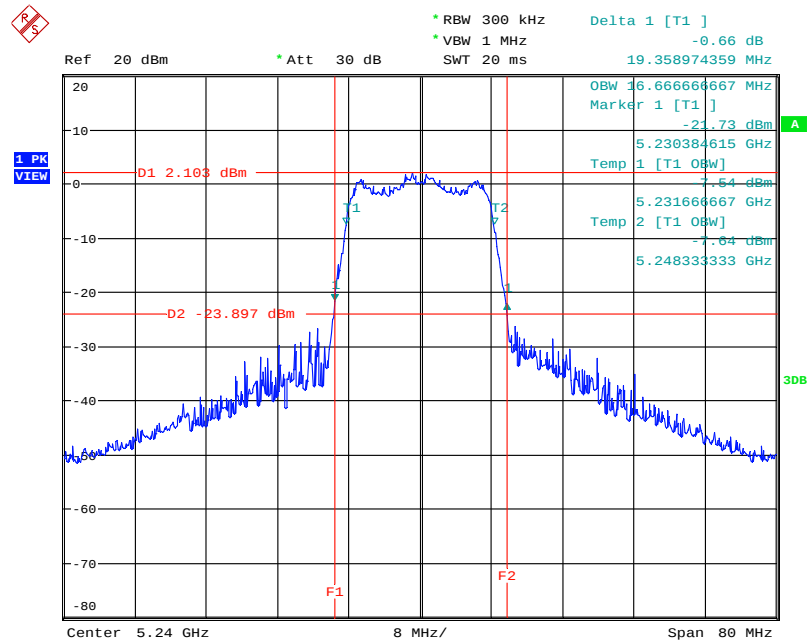
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 / 5200 MHz



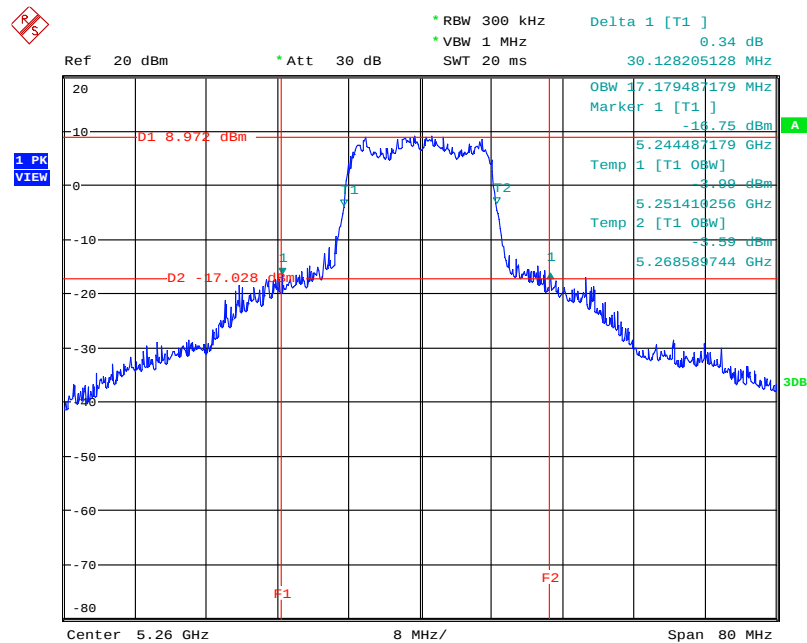
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 / 5240 MHz



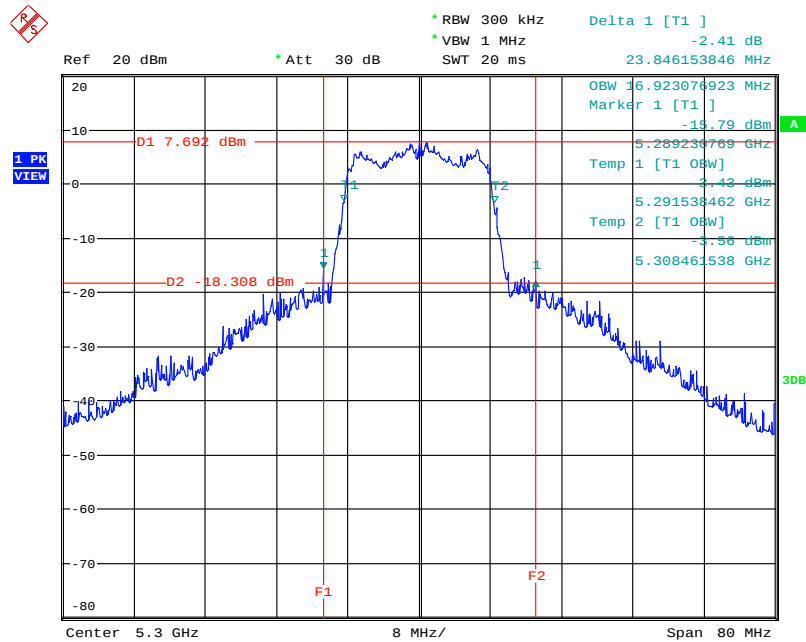
Date: 16.JUN.2014 20:14:00

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 2 / 5260 MHz



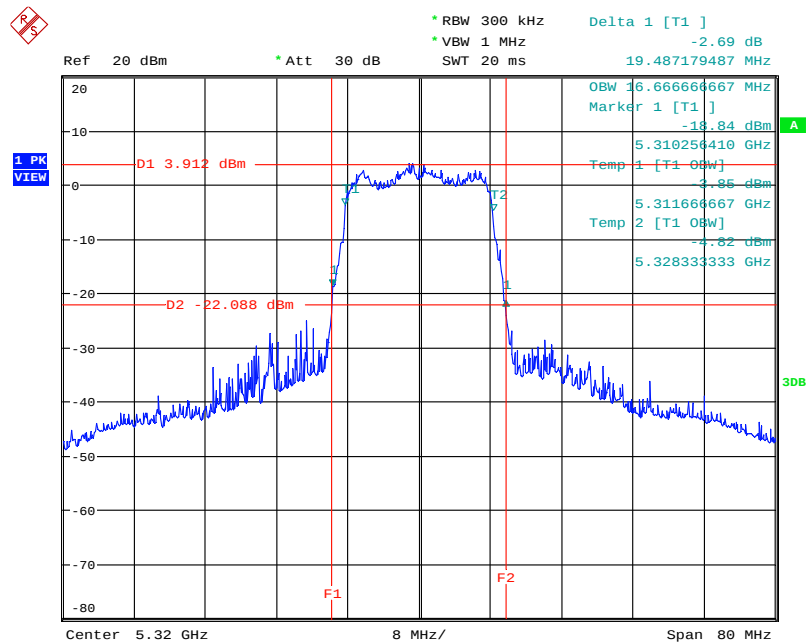
Date: 16.JUN.2014 20:25:08

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 / 5300 MHz



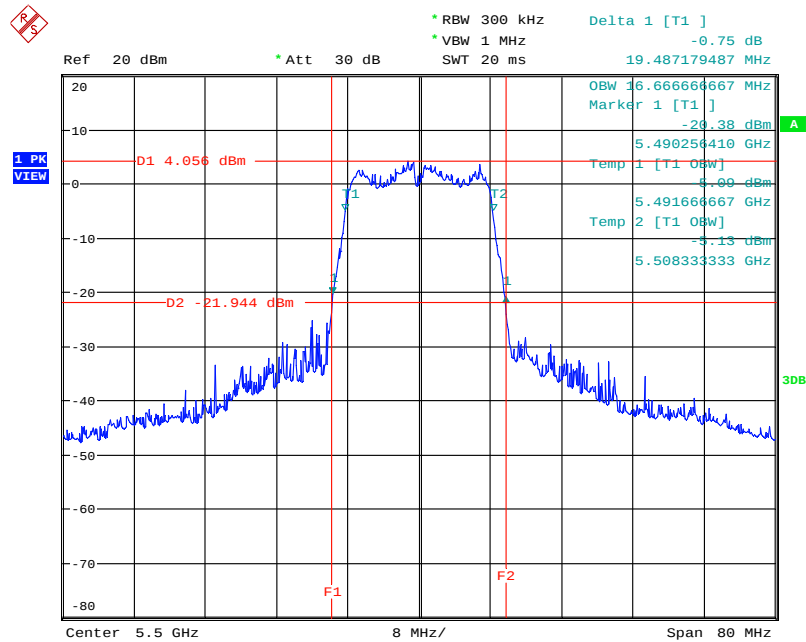
Date: 16.JUN.2014 20:15:18

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 2 / 5320 MHz



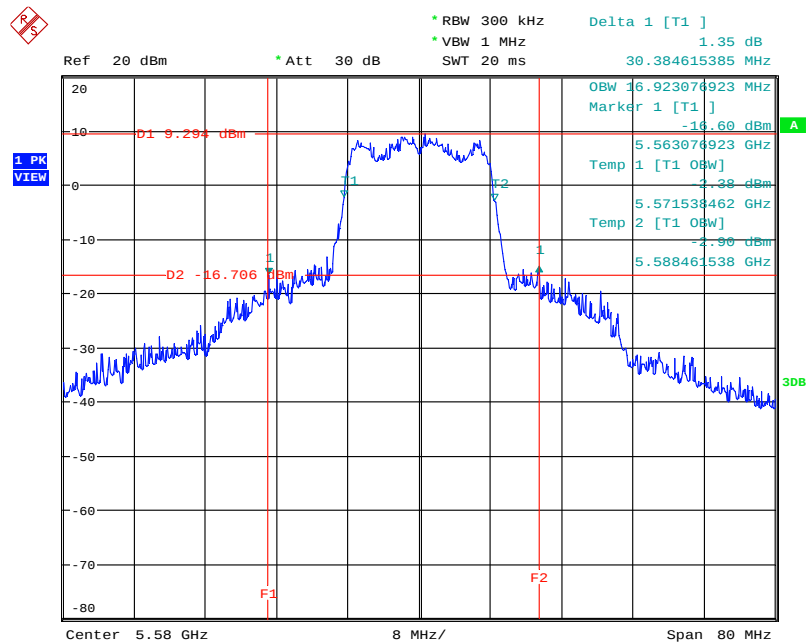
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 2 / 5500 MHz



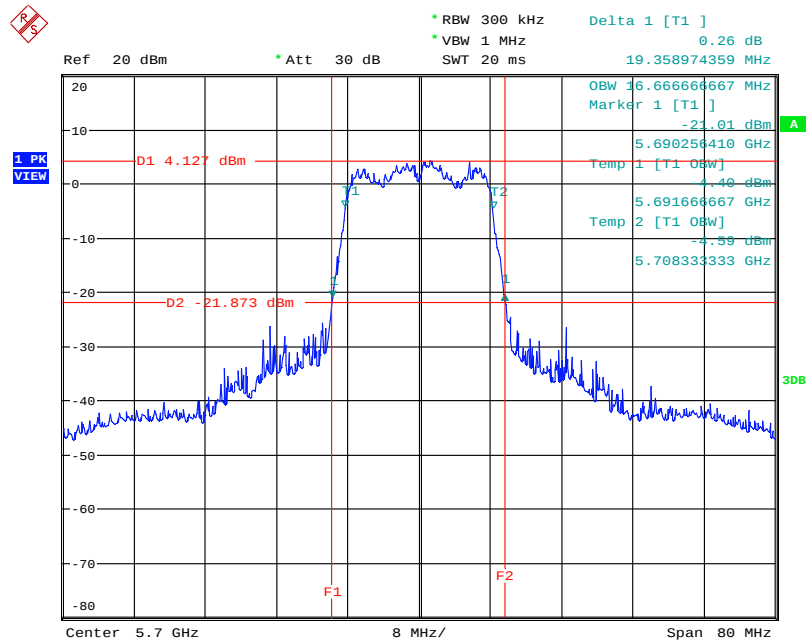
Date: 16.JUN.2014 20:21:55

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 2 / 5580 MHz



Date: 16.JUN.2014 20:21:30

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 2 / 5700 MHz



Date: 16.JUN.2014 20:20:59

4.3. Maximum Conducted Output Power Measurement

4.3.1. Limit

For the band 5.15~5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW (17dBm) or $4 \text{ dBm} + 10\log B$, where B is the 26 dB emissions bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.470-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW (24dBm) or $11 \text{ dBm} + 10\log B$, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.3.2. Measuring Instruments and Setting

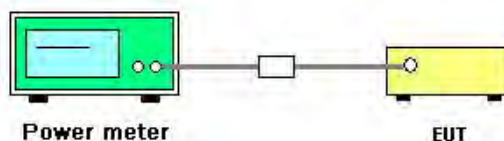
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Bandwidth	50MHz bandwidth is greater than the EUT emission bandwidth
Detector	AVERAGE

4.3.3. Test Procedures

- The transmitter output (antenna port) was connected to the power meter.
- Test was performed in accordance with KDB 789033 D01 v01r03 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, section (E) Maximum conducted output power =>(3) Method PM (Measurement using an RF average power meter) Multiple antenna systems was performed in accordance with KDB 662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
- When measuring maximum conducted output power with multiple antenna systems, add every result of the values by mathematic formula.

4.3.4. Test Setup Layout



4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of Maximum Conducted Output Power

Temperature	26°C	Humidity	63%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11n
Test Date	May 18, 2014		

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

Channel	Frequency	Duty Factor	Conducted Power (dBm)			Max. Limit (dBm)	Result
			Chain 1	Chain 2	Total		
36	5180 MHz	0.07	11.24	10.93	14.10	16.95	Complies
40	5200 MHz		10.95	10.54	13.76	16.98	Complies
48	5240 MHz		11.06	11.12	14.10	16.98	Complies
52	5260 MHz		17.55	17.33	20.45	24.00	Complies
60	5300 MHz		17.46	17.31	20.40	24.00	Complies
64	5320 MHz		14.79	14.84	17.83	24.00	Complies
100	5500 MHz		14.42	14.36	17.40	23.79	Complies
116	5580 MHz		17.79	17.61	20.71	23.79	Complies
140	5700 MHz		14.18	14.15	17.18	23.79	Complies

Note:

CH36 Conducted Output power limit = $4 + 10\log(B)$; $4 + 10\log(19.74) = 16.95\text{dBm} < 17\text{dBm}$, so CH36 power limit = 16.95dBm

CH40 Conducted Output power limit = $4 + 10\log(B)$; $4 + 10\log(19.87) = 16.98\text{dBm} < 17\text{dBm}$, so CH40 power limit = 16.98dBm

CH48 Conducted Output power limit = $4 + 10\log(B)$; $4 + 10\log(19.87) = 16.98\text{dBm} < 17\text{dBm}$, so CH48 power limit = 16.98dBm

Note:

CH100, 116, 140 Conducted Output power limit = Antenna gain 6.21dBi > 6dBi, so B3 Power Limit = $24 - (6.21 - 6) = 23.79\text{dBm}$

Only for power table of SAR

Channel	Frequency	Duty Factor	Total Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	0.07	14.10	30.00	Complies
40	5200 MHz		13.76	30.00	Complies
44	5220 MHz		14.12	30.00	Complies
48	5240 MHz		14.10	30.00	Complies
52	5260 MHz		16.35	30.00	Complies
56	5280 MHz		16.34	30.00	Complies
60	5300 MHz		16.39	30.00	Complies
64	5320 MHz		16.41	30.00	Complies
100	5500 MHz		16.48	30.00	Complies
104	5520 MHz		16.53	30.00	Complies
108	5540 MHz		16.48	30.00	Complies
112	5560 MHz		16.56	30.00	Complies
116	5580 MHz		16.48	30.00	Complies
120	5600 MHz		16.46	30.00	Complies
124	5620 MHz		16.54	30.00	Complies
128	5640 MHz		16.48	30.00	Complies
132	5660 MHz		16.61	30.00	Complies
136	5680 MHz		16.64	30.00	Complies
140	5700 MHz		16.64	30.00	Complies

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

Channel	Frequency	Duty Factor	Conducted Power (dBm)			Max. Limit (dBm)	Result
			Chain 1	Chain 2	Total		
38	5190 MHz	0.09	8.73	10.55	12.74	17.00	Complies
46	5230 MHz		12.85	13.27	16.08	17.00	Complies
54	5270 MHz		18.76	18.23	21.51	24.00	Complies
62	5310 MHz		7.23	9.60	11.59	24.00	Complies
102	5510 MHz		9.63	8.51	12.12	23.79	Complies
110	5550 MHz		16.35	17.42	19.93	23.79	Complies
134	5670 MHz		15.96	16.72	19.37	23.79	Complies

Note:

CH102, 110, 134 Conducted Output power limit=Antenna gain 6.21dBi>6dBi, so B3 Power Limit=24-(6.21-6)=23.79dBm

Only for power table of SAR

Channel	Frequency	Duty Factor	Total Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	0.09	12.74	30.00	Complies
46	5230 MHz		14.08	30.00	Complies
54	5270 MHz		16.30	30.00	Complies
62	5310 MHz		11.59	30.00	Complies
102	5510 MHz		12.12	30.00	Complies
110	5550 MHz		16.55	30.00	Complies
118	5590 MHz		16.41	30.00	Complies
126	5630 MHz		16.46	30.00	Complies
134	5670 MHz		16.49	30.00	Complies

Temperature	26°C	Humidity	63%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11a
Test Date	May 18, 2014		

Configuration IEEE 802.11a / Chain 1 + Chain 2

Channel	Frequency	Duty Factor	Conducted Power (dBm)			Max. Limit (dBm)	Result
			Chain 1	Chain 2	Total		
36	5180 MHz	0.06	11.08	10.75	13.93	16.92	Complies
40	5200 MHz		11.35	11.01	14.19	16.92	Complies
48	5240 MHz		11.17	10.85	14.02	16.87	Complies
52	5260 MHz		17.54	17.39	20.48	24.00	Complies
60	5300 MHz		16.32	16.28	19.31	24.00	Complies
64	5320 MHz		11.33	12.12	14.75	23.92	Complies
100	5500 MHz		13.01	12.34	15.70	23.79	Complies
116	5580 MHz		17.83	17.52	20.69	23.79	Complies
140	5700 MHz		12.78	12.71	15.76	23.79	Complies

Note:

CH36 Conducted Output power limit= $4+10\log(B)$; $4+10\log(19.61)=16.92\text{dBm}<17\text{dBm}$, so CH36 power limit=16.92dBm

CH40 Conducted Output power limit= $4+10\log(B)$; $4+10\log(19.61)=16.92\text{dBm}<17\text{dBm}$, so CH40 power limit=16.92dBm

CH48 Conducted Output power limit= $4+10\log(B)$; $4+10\log(19.35)=16.87\text{dBm}<17\text{dBm}$, so CH48 power limit=16.87dBm

CH64 Conducted Output power limit= $11+10\log(B)$; $11+10\log(19.61)=23.92\text{dBm}<24\text{dBm}$, so CH64 power limit=23.92dBm

Note:

CH100, 116, 140 Conducted Output power limit=Antenna gain 6.21 dBi>6dBi, so B3 Power Limit= $24-(6.21-6)=23.79\text{dBm}$

Only for power table of SAR

Channel	Frequency	Duty Factor	Total Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	0.06	13.93	30.00	Complies
40	5200 MHz		14.19	30.00	Complies
44	5220 MHz		14.19	30.00	Complies
48	5240 MHz		14.02	30.00	Complies
52	5260 MHz		16.31	30.00	Complies
56	5280 MHz		16.20	30.00	Complies
60	5300 MHz		16.30	30.00	Complies
64	5320 MHz		14.75	30.00	Complies
100	5500 MHz		15.70	30.00	Complies
104	5520 MHz		16.39	30.00	Complies
108	5540 MHz		16.41	30.00	Complies
112	5560 MHz		16.49	30.00	Complies
116	5580 MHz		16.53	30.00	Complies
120	5600 MHz		16.47	30.00	Complies
124	5620 MHz		16.52	30.00	Complies
128	5640 MHz		16.43	30.00	Complies
132	5660 MHz		16.48	30.00	Complies
136	5680 MHz		16.47	30.00	Complies
140	5700 MHz		15.76	30.00	Complies

4.4. Power Spectral Density Measurement

4.4.1. Limit

The power spectral density is defined as the highest level of power in dBm per MHz generated by the transmitter within the power envelope. The following table is power spectral density limits and decrease power density limit rule refer to section 4.3.1.

Frequency Range	Power Spectral Density limit (dBm/MHz)
5.15~5.25 GHz	4
5.25-5.35 GHz	11
5.470-5.725 GHz	11

4.4.2. Measuring Instruments and Setting

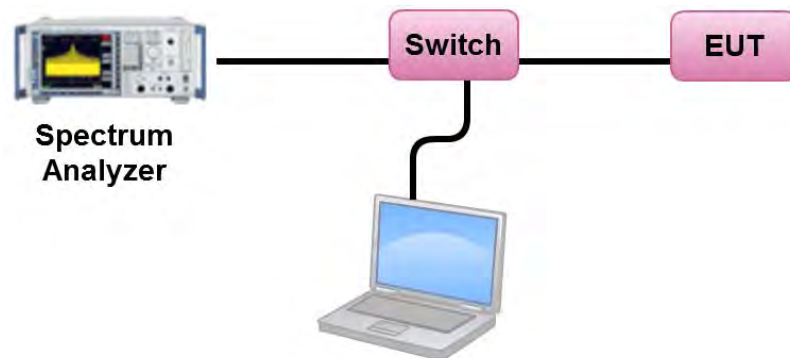
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RBW	1000 kHz
VBW	3000 kHz
Detector	RMS
Trace	AVERAGE
Sweep Time	Auto
Trace Average	100 times

4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected RF switch to the spectrum analyzer.
2. Test was performed in accordance with KDB 789033 D01 v01r03 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, section (C) Maximum conducted output power => (d) Method SA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).
3. Multiple antenna systems was performed in accordance KDB 662911 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.

4.4.4. Test Setup Layout



4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7. Test Result of Power Spectral Density

Temperature	26°C	Humidity	63%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11n
Test Date	May 18, 2014		

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

Channel	Frequency	Total Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	1.06	1.14	Complies
40	5200 MHz	0.77	1.14	Complies
48	5240 MHz	1.00	1.14	Complies
52	5260 MHz	7.91	8.14	Complies
60	5300 MHz	7.65	8.14	Complies
64	5320 MHz	5.38	8.14	Complies
100	5500 MHz	5.58	7.78	Complies
116	5580 MHz	7.66	7.78	Complies
140	5700 MHz	4.81	7.78	Complies

Note: Antenna gain=8.86dBi > 6dBi, So Band1 Limit = 4-(8.86-6)=1.14dBm/MHz
= 8.86dBi > 6dBi, So Band2 Limit = 11-(8.86-6)=8.14dBm/MHz
= 9.22dBi > 6dBi, So Band3 Limit = 11-(9.22-6)=7.78dBm/MHz

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

Channel	Frequency	Total Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
38	5190 MHz	-2.25	1.14	Complies
46	5230 MHz	0.86	1.14	Complies
54	5270 MHz	6.32	8.14	Complies
62	5310 MHz	-3.50	8.14	Complies
102	5510 MHz	-2.81	7.78	Complies
110	5550 MHz	5.12	7.78	Complies
134	5670 MHz	3.99	7.78	Complies

Note: Antenna gain=8.86dBi > 6dBi, So Band1 Limit = 4-(8.86-6)=1.14dBm/MHz
= 8.86dBi > 6dBi, So Band2 Limit = 11-(8.86-6)=8.14dBm/MHz
= 9.22dBi > 6dBi, So Band3 Limit = 11-(9.22-6)=7.78dBm/MHz

Temperature	26°C	Humidity	63%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11a
Test Date	May 18, 2014		

Configuration IEEE 802.11a / Chain 1 + Chain 2

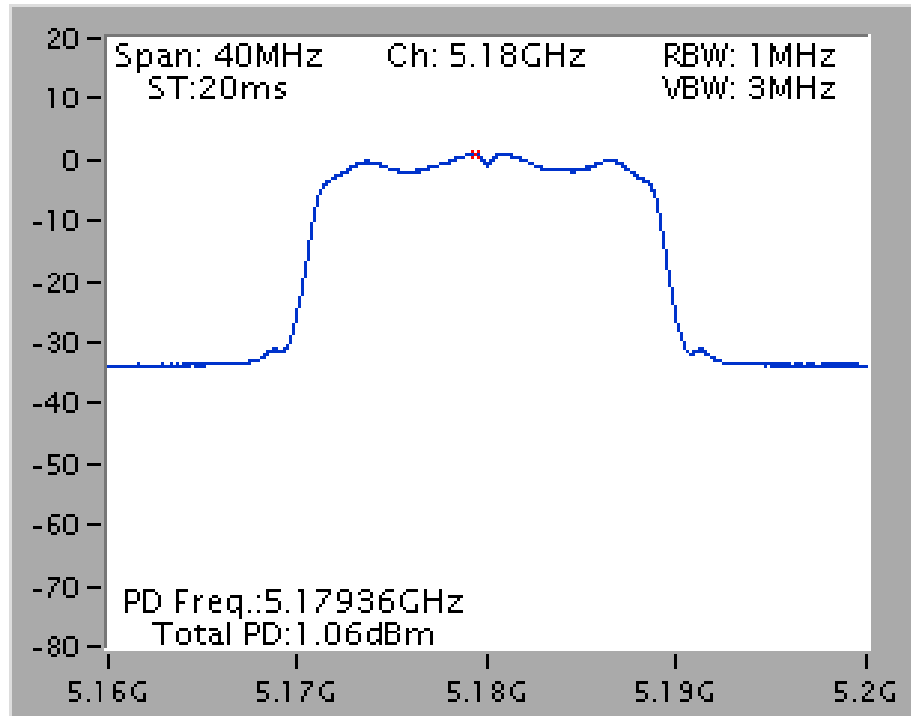
Channel	Frequency	Total Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	0.84	1.14	Complies
40	5200 MHz	1.02	1.14	Complies
48	5240 MHz	0.89	1.14	Complies
52	5260 MHz	7.80	8.14	Complies
60	5300 MHz	6.97	8.14	Complies
64	5320 MHz	2.44	8.14	Complies
100	5500 MHz	3.37	7.78	Complies
116	5580 MHz	7.72	7.78	Complies
140	5700 MHz	2.84	7.78	Complies

Note: Antenna gain=8.86dBi > 6dBi, So Band1 Limit = $4 - (8.86 - 6) = 1.14 \text{ dBm/MHz}$
= 8.86dBi > 6dBi, So Band2 Limit = $11 - (8.86 - 6) = 8.14 \text{ dBm/MHz}$
= 9.22dBi > 6dBi, So Band3 Limit = $11 - (9.22 - 6) = 7.78 \text{ dBm/MHz}$

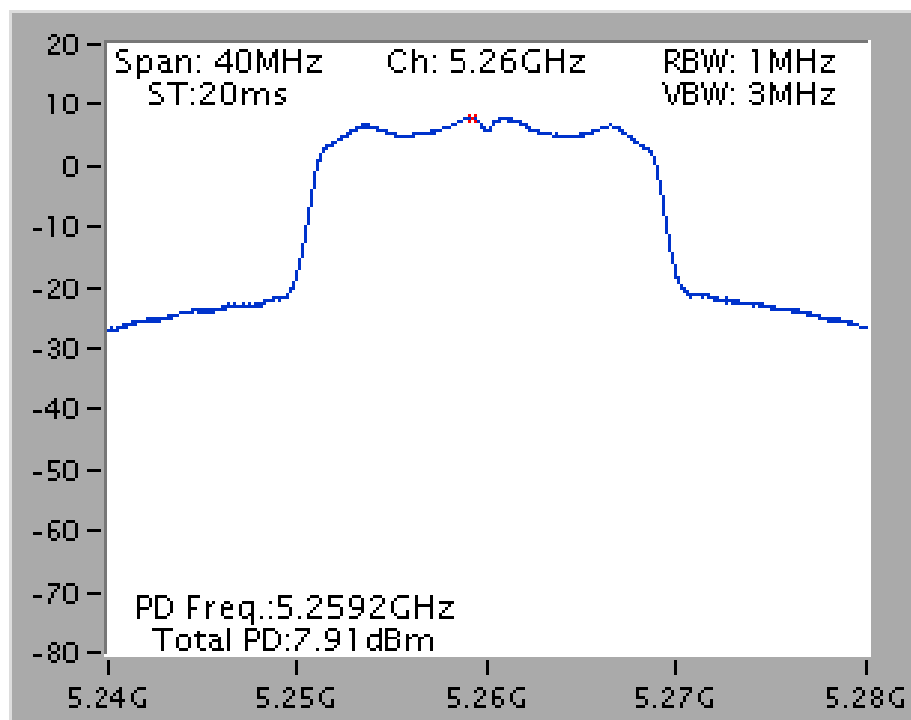
Note: All the test values were listed in the report.

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

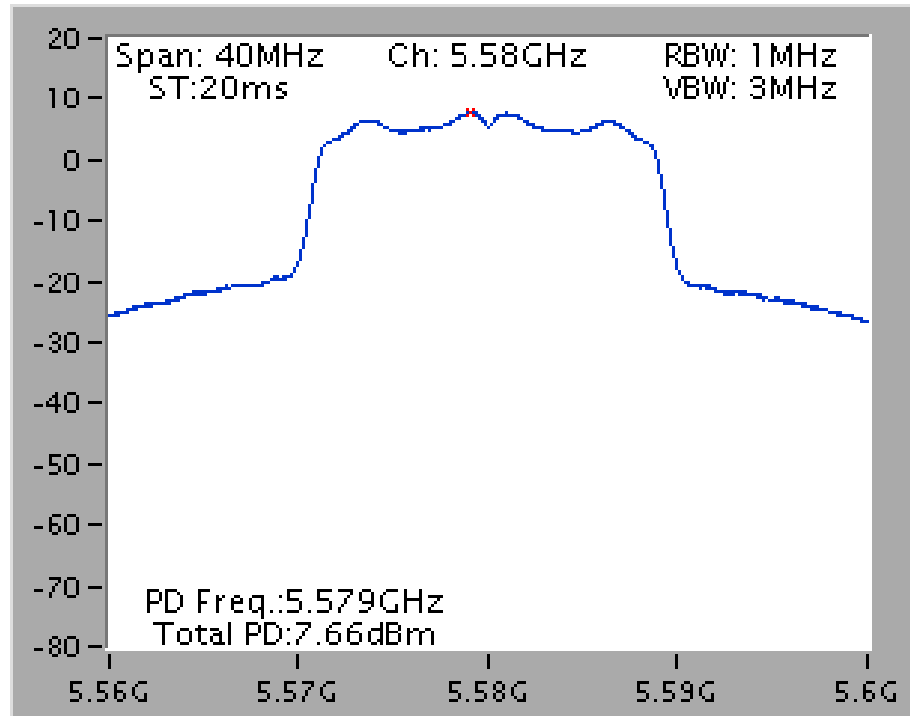
Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 / 5180 MHz



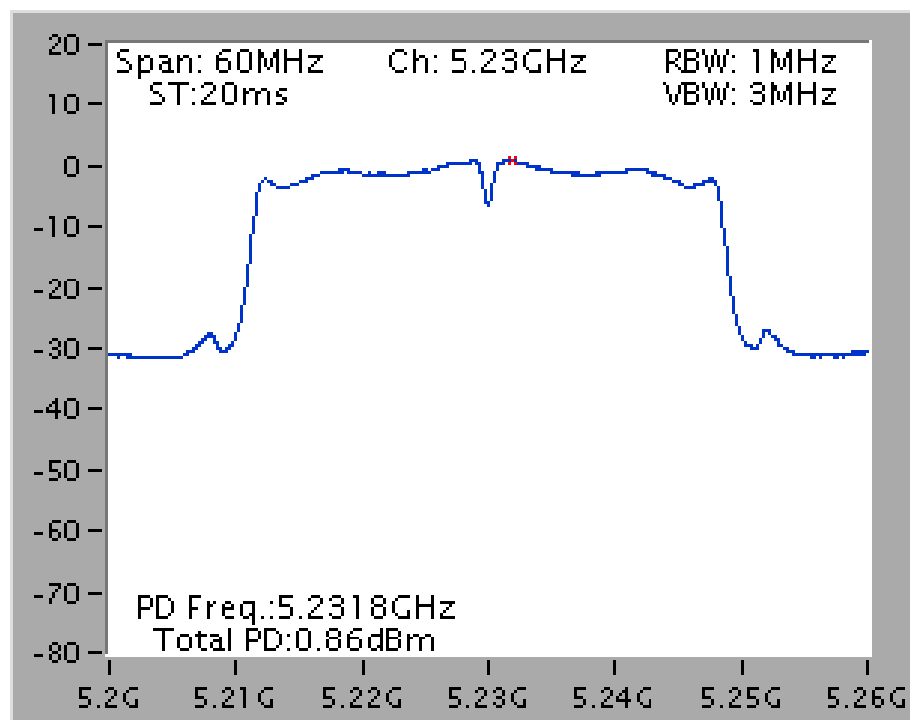
Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 / 5260 MHz



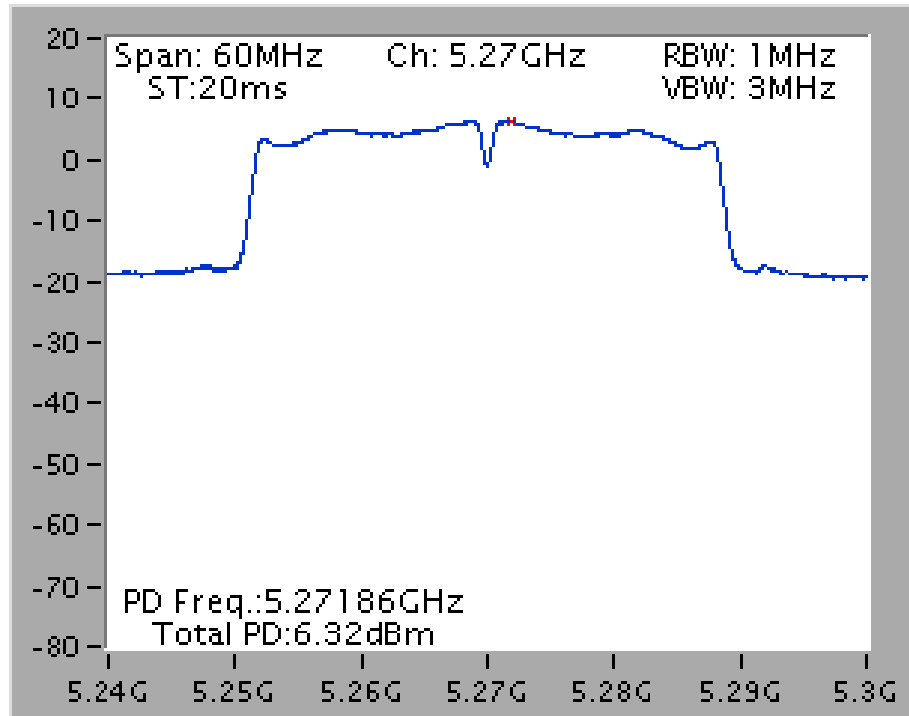
Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 / 5580 MHz



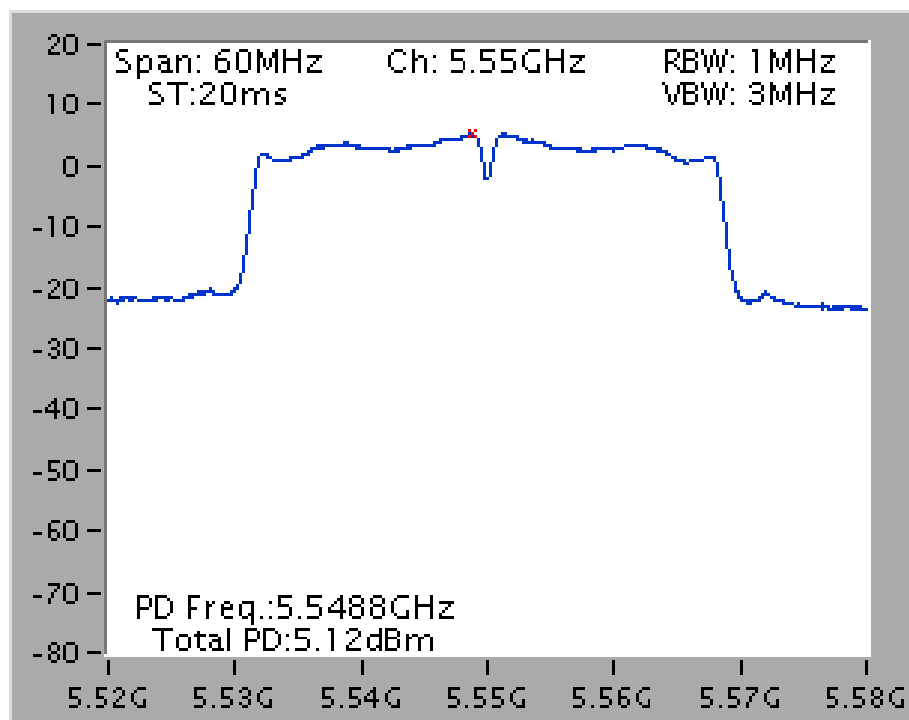
Power Density Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 1 + Chain 2 / 5230 MHz



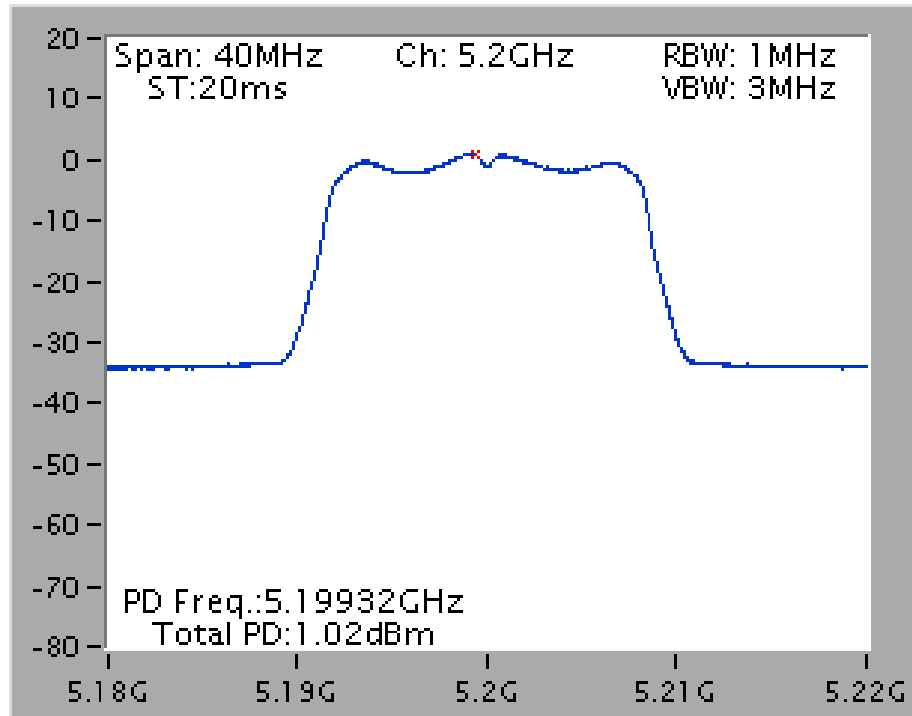
Power Density Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 1 + Chain 2 / 5270 MHz



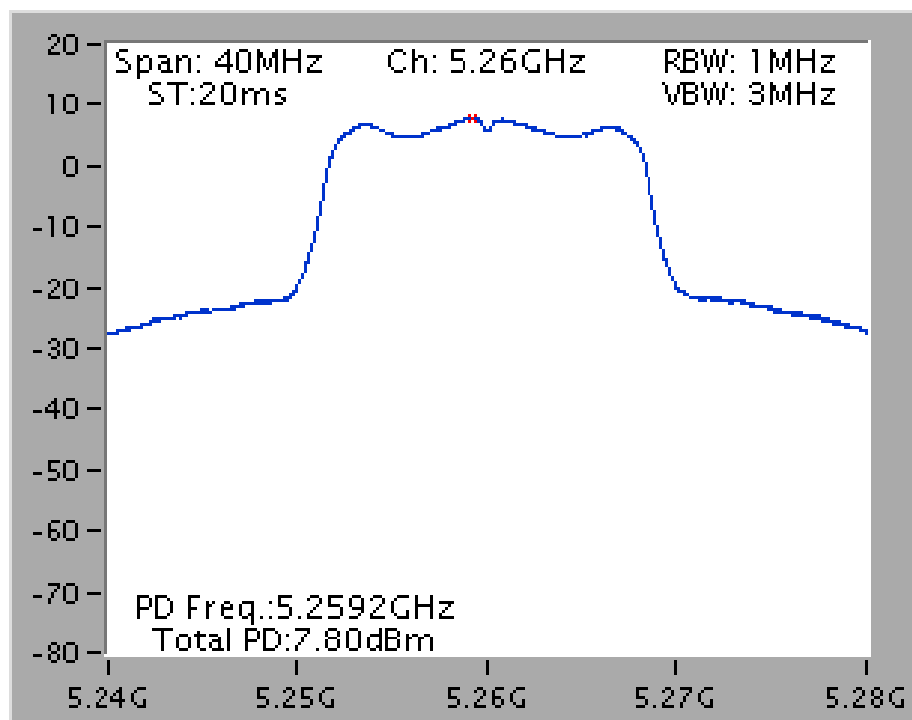
Power Density Plot on Configuration IEEE 802.11n MCS0 HT40 / Chain 1 + Chain 2 / 5550 MHz



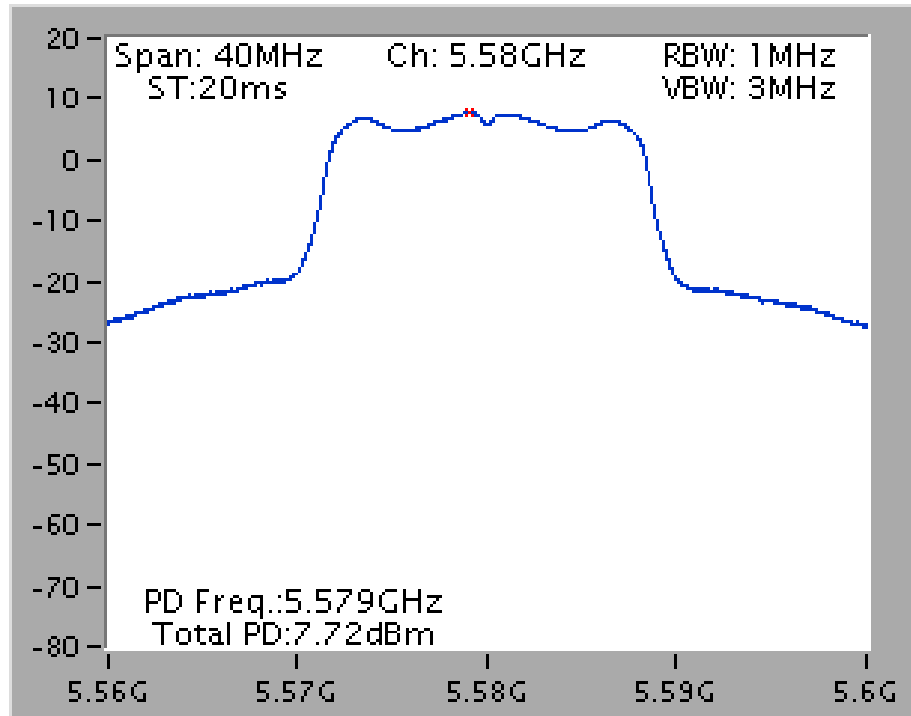
Power Density Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 / 5200 MHz



Power Density Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 / 5260 MHz



Power Density Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 / 5580 MHz



4.5. Peak Excursion Measurement

4.5.1. Limit

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emissions bandwidth whichever is less.

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	1 MHz (Peak Trace) / 1 MHz (Average Trace)
VBW	≥ 3 MHz (Peak Trace) / ≥ 3 MHz (Average Trace)
Detector	Peak (Peak Trace) / RMS (Average Trace)
Trace	Trace: Max hold (Peak Trace) / Trace Average Sweep Count 100 (Average Trace)
Sweep Time	AUTO

4.5.3. Test Procedures

1. Trace A, Set RBW = 1 MHz, VBW = 3 MHz, Span > 26 dB bandwidth, Max. hold.
2. Delta Mark trace A Maximum frequency and trace B same frequency.
3. Repeat the above procedure until measurements for all frequencies were complete.
4. Testing each modulation mode on a single channel in single operating band at single output port.
All signal types need test (DSSS, OFDM). All modulation types need test (BPSK, QPSK, 16-QAM, 64-QAM). All bandwidth modes need test.

4.5.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.4.4.

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 Peak Excursion

Temperature	26°C	Humidity	63%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11n

Configuration IEEE 802.11n HT20 / Chain 1

Modulation	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
BPSK (MCS0)	5240MHz	8.91	13	Complies
QPSK (MCS1)	5240MHz	9.90	13	Complies
16QAM (MCS3)	5240MHz	8.68	13	Complies
64QAM (MCS5)	5240MHz	8.66	13	Complies
BPSK (MCS0)	5260MHz	8.56	13	Complies
QPSK (MCS1)	5260MHz	8.40	13	Complies
16QAM (MCS3)	5260MHz	8.84	13	Complies
64QAM (MCS5)	5260MHz	9.06	13	Complies
BPSK (MCS0)	5580MHz	8.52	13	Complies
QPSK (MCS1)	5580MHz	8.37	13	Complies
16QAM (MCS3)	5580MHz	8.63	13	Complies
64QAM (MCS5)	5580MHz	8.95	13	Complies

Configuration IEEE 802.11n HT40 / Chain 1

Modulation	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
BPSK (MCS0)	5230MHz	9.31	13	Complies
QPSK (MCS1)	5230MHz	9.69	13	Complies
16QAM (MCS3)	5230MHz	9.77	13	Complies
64QAM (MCS5)	5230MHz	10.04	13	Complies
BPSK (MCS0)	5270MHz	9.51	13	Complies
QPSK (MCS1)	5270MHz	8.72	13	Complies
16QAM (MCS3)	5270MHz	10.15	13	Complies
64QAM (MCS5)	5270MHz	9.22	13	Complies
BPSK (MCS0)	5550MHz	9.42	13	Complies
QPSK (MCS1)	5550MHz	9.26	13	Complies
16QAM (MCS3)	5550MHz	9.07	13	Complies
64QAM (MCS5)	5550MHz	9.23	13	Complies

Temperature	26°C	Humidity	63%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11a

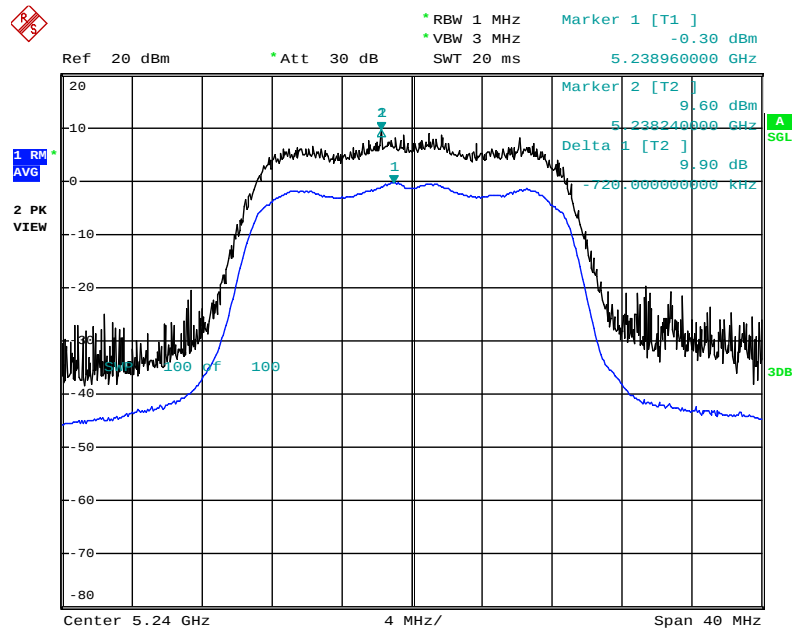
Configuration IEEE 802.11a / Chain 1

Modulation	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
BPSK (6Mbps)	5200MHz	9.43	13	Complies
QPSK (12Mbps)	5200MHz	8.67	13	Complies
16QAM (24Mbps)	5200MHz	8.61	13	Complies
64QAM (48Mbps)	5200MHz	9.94	13	Complies
BPSK (6Mbps)	5260MHz	9.00	13	Complies
QPSK (12Mbps)	5260MHz	8.29	13	Complies
16QAM (24Mbps)	5260MHz	9.03	13	Complies
64QAM (48Mbps)	5260MHz	8.71	13	Complies
BPSK (6Mbps)	5580MHz	10.38	13	Complies
QPSK (12Mbps)	5580MHz	8.34	13	Complies
16QAM (24Mbps)	5580MHz	9.58	13	Complies
64QAM (48Mbps)	5580MHz	8.93	13	Complies

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

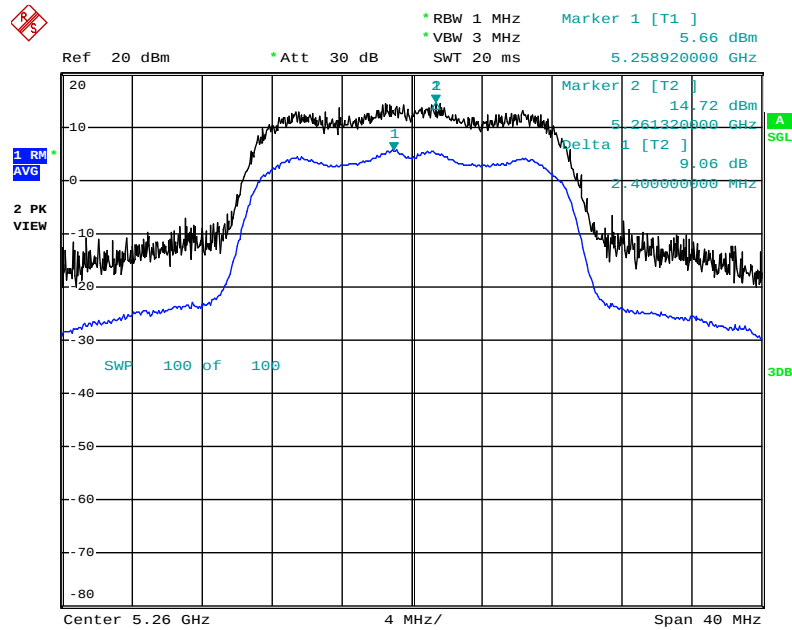
For plots, only the modulation with worse result was shown.

Peak Excursion Plot on Configuration IEEE 802.11n HT20 / Chain 1 / QPSK(MCS1) / 5240 MHz



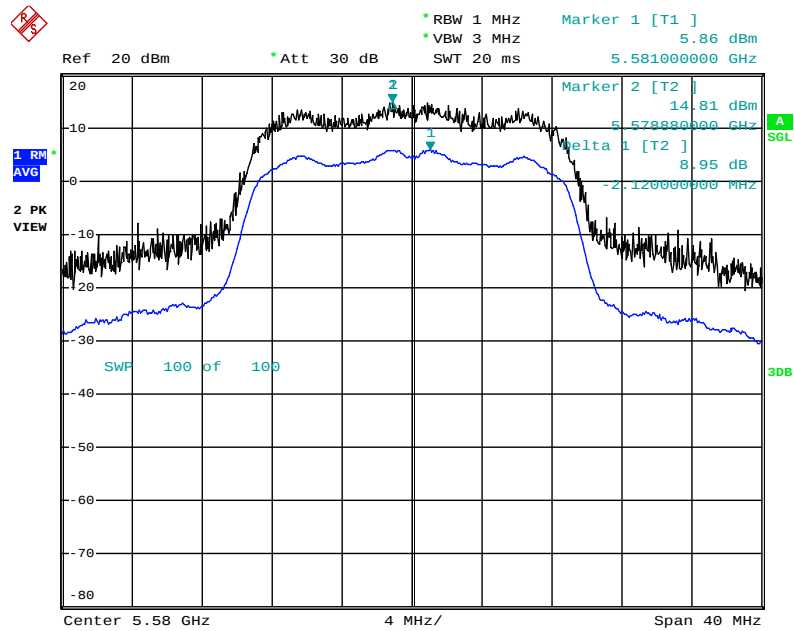
Date: 18.MAY.2014 15:38:51

Peak Excursion Plot on Configuration IEEE 802.11n HT20 / Chain 1 / 64QAM(MCS5) / 5260 MHz



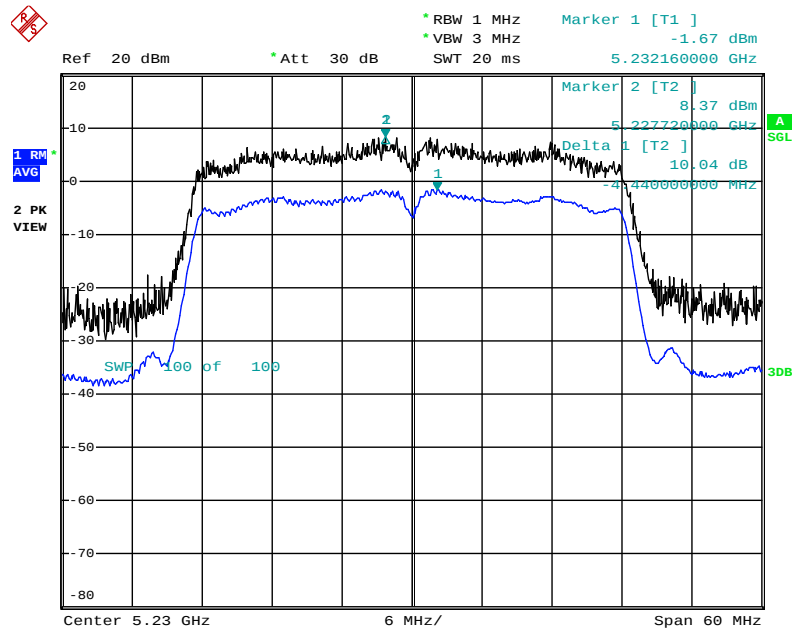
Date: 18.MAY.2014 15:40:42

Peak Excursion Plot on Configuration IEEE 802.11n HT20 / Chain 1 / 64QAM(MCS5) / 5580 MHz



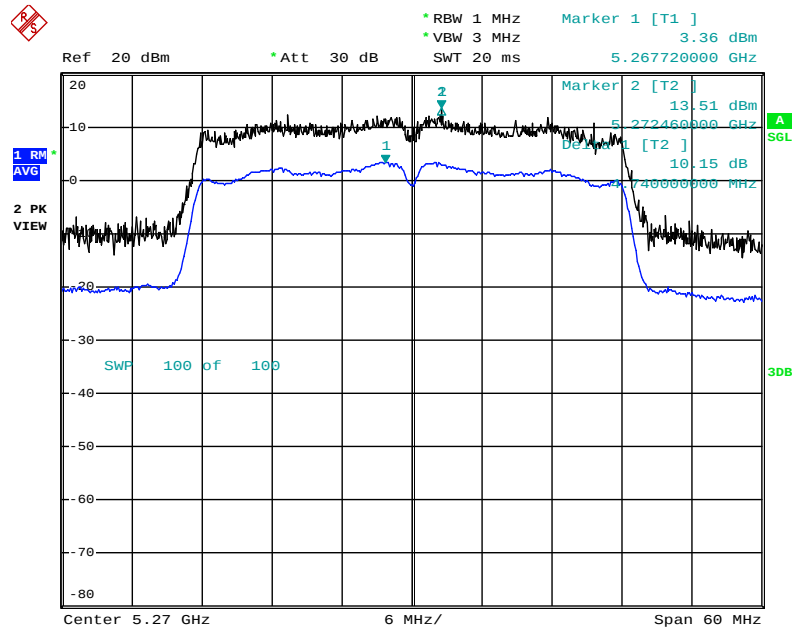
Date: 18.MAY.2014 15:50:04

Peak Excursion Plot on Configuration IEEE 802.11n HT40 / Chain 1 / 64QAM(MCS5) / 5230 MHz



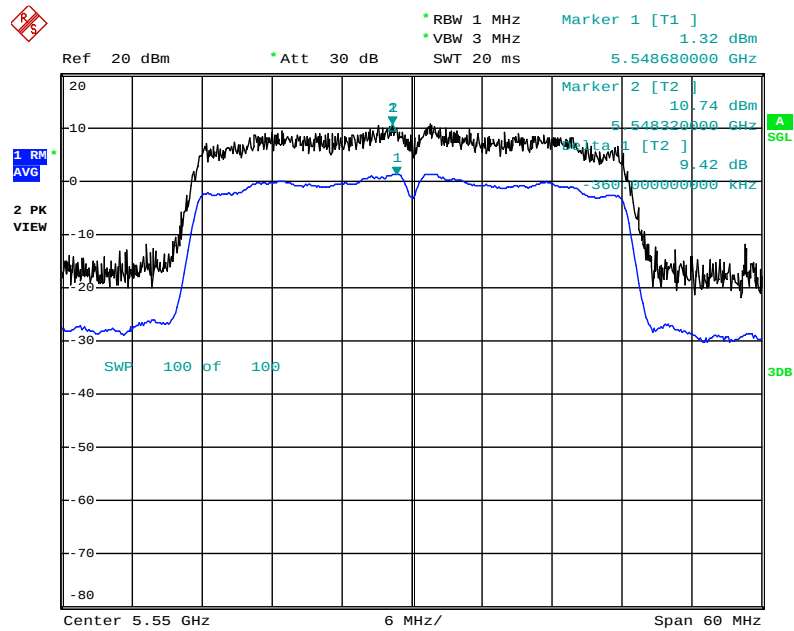
Date: 18.MAY.2014 15:44:35

Peak Excursion Plot on Configuration IEEE 802.11n HT40 / Chain 1 / 16QAM(MCS3) / 5270 MHz



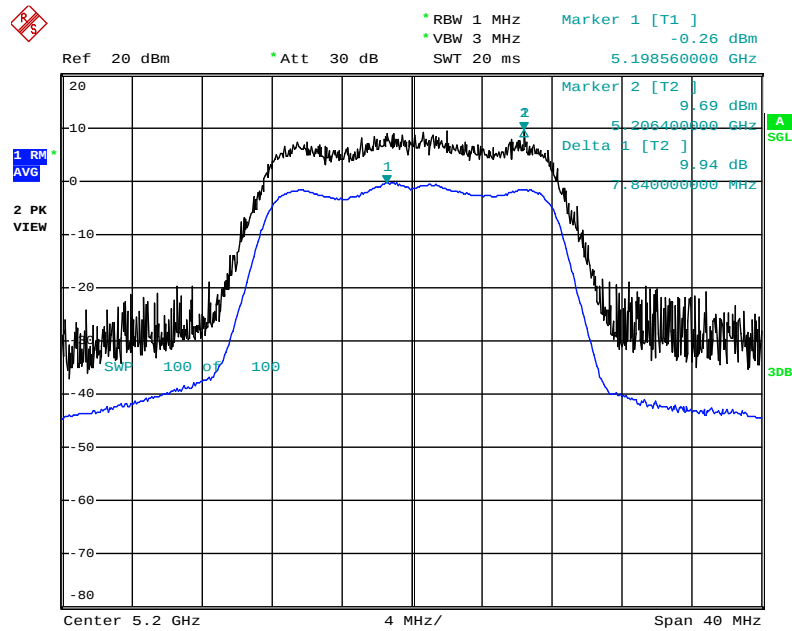
Date: 18.MAY.2014 15:45:51

Peak Excursion Plot on Configuration IEEE 802.11n HT40 / Chain 1 / BPSK (MCS0) / 5550 MHz



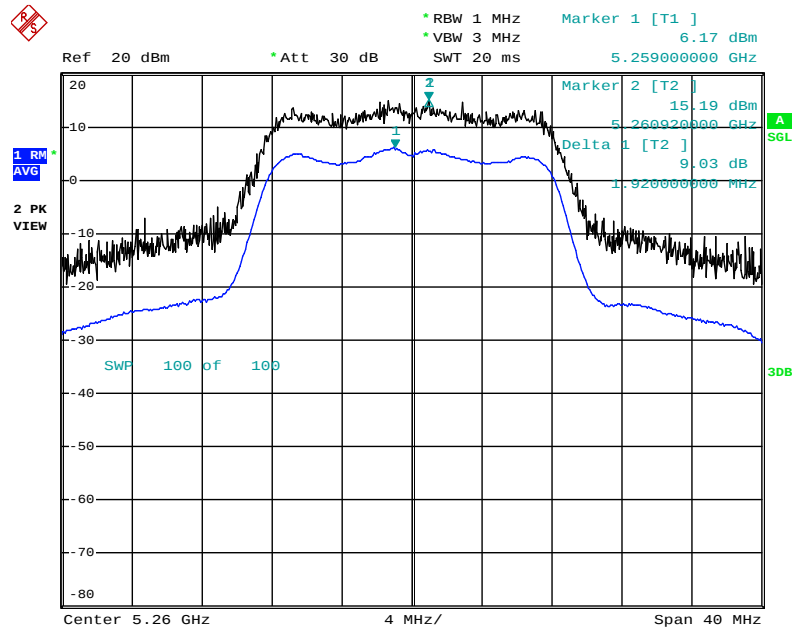
Date: 18.MAY.2014 15:47:53

Peak Excursion Plot on Configuration IEEE 802.11a / Chain 1 / 64QAM(48Mbps) / 5200 MHz



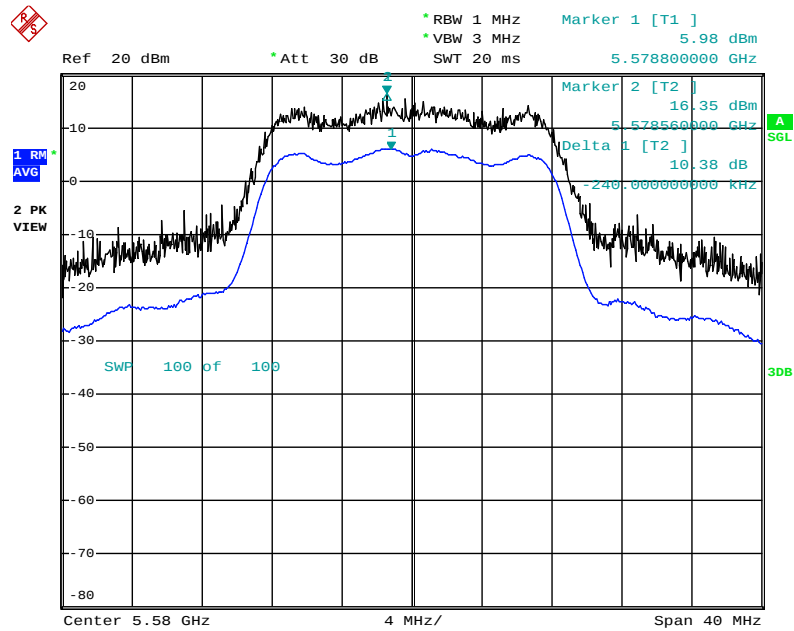
Date: 18.MAY.2014 15:32:01

Peak Excursion Plot on Configuration IEEE 802.11a / Chain 1 / 16QAM(24Mbps) / 5260 MHz



Date: 18.MAY.2014 15:33:33

Peak Excursion Plot on Configuration IEEE 802.11a / Chain 1 / BPSK (6Mbps) / 5580 MHz



Date: 18.MAY.2014 15:35:17

4.6. Radiated Emissions Measurement

4.6.1. Limit

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed a -27dBm peak limit or average 54dBuV/m and peak 74dBuV/m limits. For transmitters operating in the 5.470-5.725 GHz band: all emissions outside of the 5.470-5.725 GHz band shall not exceed a -27dBm peak limit or average 54dBuV/m and peak 74dBuV/m limits. For transmitters operating in the 5.725-5.825 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 EIRP of -17 dBm/MHz (78.3dBuV/m at 3m). 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)	1 MHz / 3MHz for Peak, Please refer to below table for Average
RBW / VBW (Emission in non-restricted band)	1 MHz / 3MHz for peak

Mode	On Time(ms)	On+Off Time(ms)	Duty Cycle(%)	1/T Minimum VBW (kHz)
802.11a	2.060	2.090	98.56	0.01
802.11n MCS0 HT20	1.910	1.940	98.45	0.01
802.11n MCS0 HT40	0.930	0.950	97.89	1.08

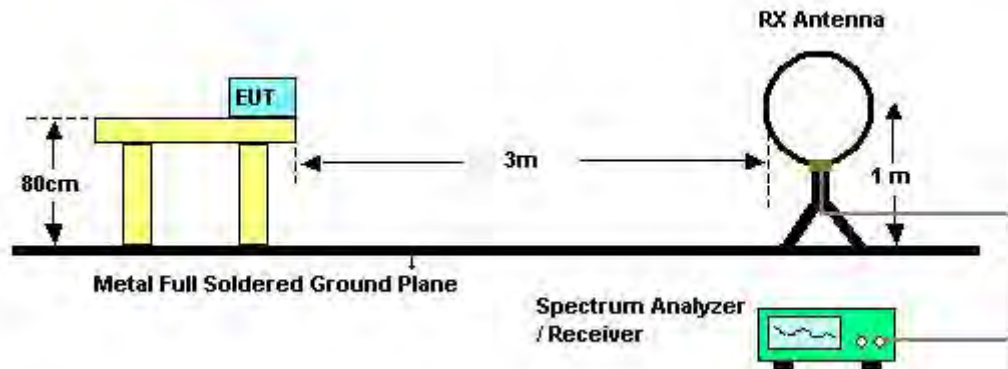
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.6.3. Test Procedures

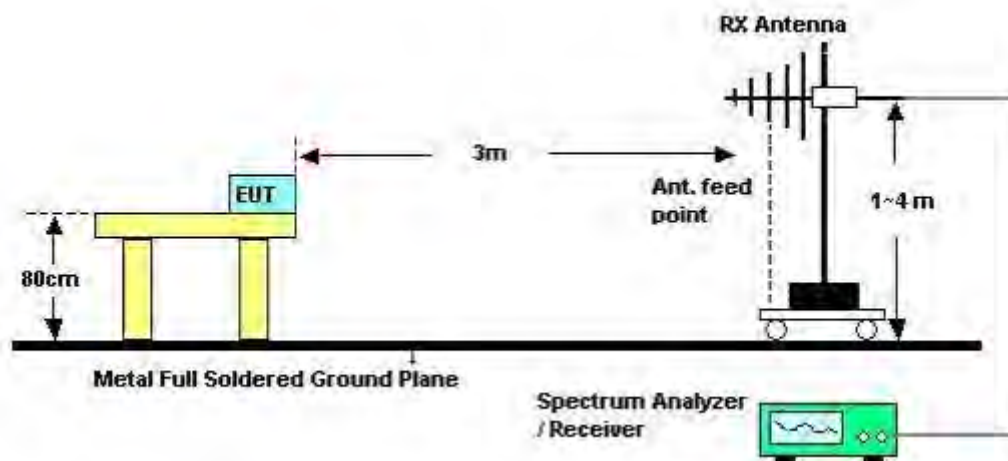
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. 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.
9. 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.
10. 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

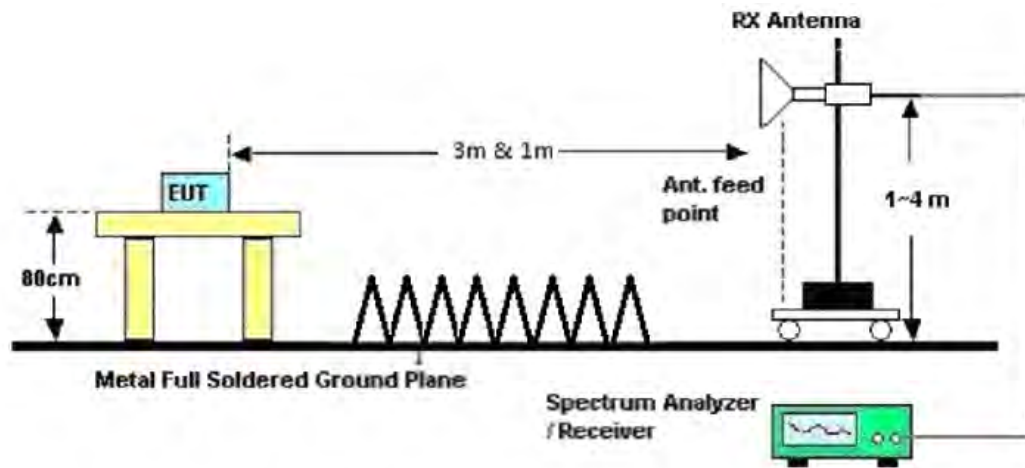
For Radiated Emissions: 9kHz ~30MHz



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	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	Normal Link / Mode 1
Test Date	Apr. 28, 2014		

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.

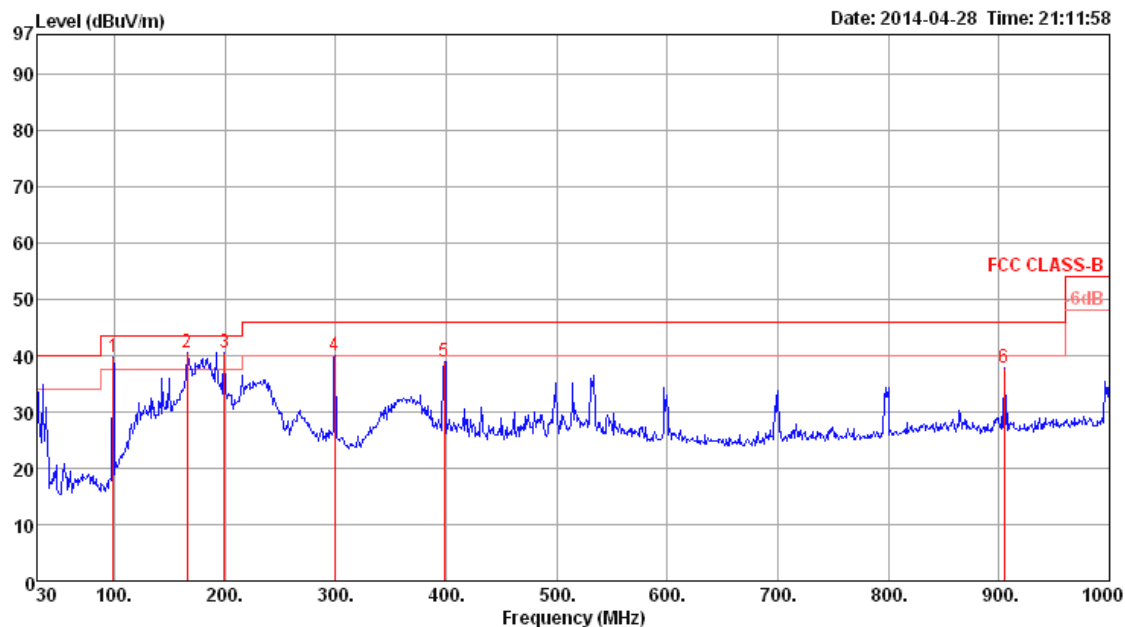
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

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

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

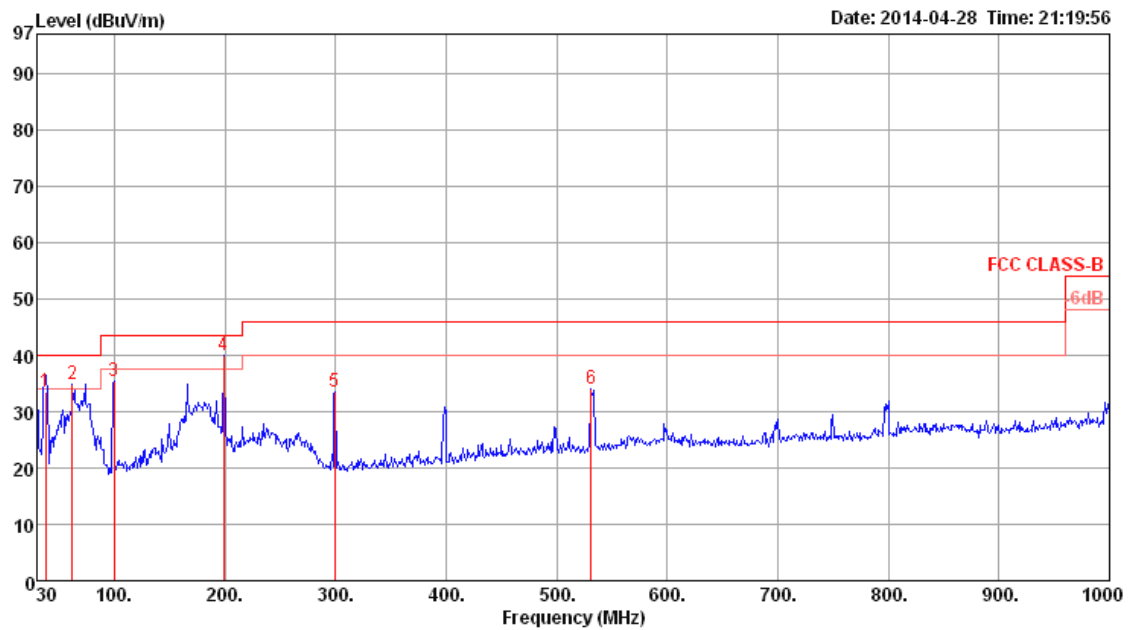
Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	Normal Link / Mode 1

Horizontal



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg
1	98.87	39.60	43.50	-3.90	55.25	1.17	10.79	27.61	Peak	400	0 HORIZONTAL
2	165.80	40.40	43.50	-3.10	53.75	1.45	12.47	27.27	Peak	400	0 HORIZONTAL
3	199.75	40.41	43.50	-3.09	56.80	1.66	9.05	27.10	Peak	400	0 HORIZONTAL
4	299.66	40.04	46.00	-5.96	51.55	2.03	13.36	26.90	Peak	400	0 HORIZONTAL
5	398.60	38.96	46.00	-7.04	48.22	2.30	16.03	27.59	Peak	400	0 HORIZONTAL
6	904.94	37.75	46.00	-8.25	41.01	3.55	20.57	27.38	Peak	400	0 HORIZONTAL

Vertical



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	Remark	cm	deg	Pol/Phase
1	37.76	33.50	40.00	-6.50	46.32	0.68	14.30	27.80	QP	198	221	VERTICAL
2	62.01	34.87	40.00	-5.13	54.96	0.92	6.74	27.75	Peak	400	0	VERTICAL
3	99.84	35.38	43.50	-8.12	50.82	1.17	10.99	27.60	Peak	400	0	VERTICAL
4	198.78	40.12	43.50	-3.38	56.32	1.66	9.25	27.11	Peak	400	0	VERTICAL
5	299.66	33.55	46.00	-12.45	45.06	2.03	13.36	26.90	Peak	400	0	VERTICAL
6	531.49	33.98	46.00	-12.02	41.36	2.74	17.98	28.10	Peak	400	0	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	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT20 CH 36 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15541.92	38.66	54.00	-15.34	29.25	6.13	38.45	35.17	Average	100	249	HORIZONTAL
2	15549.36	51.68	74.00	-22.32	42.29	6.13	38.43	35.17	Peak	100	249	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15534.65	39.08	54.00	-14.92	29.67	6.13	38.45	35.17	Average	100	144	VERTICAL
2	15537.21	52.10	74.00	-21.90	42.69	6.13	38.45	35.17	Peak	100	144	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT20 CH 40 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15595.42	38.85	54.00	-15.15	29.54	6.13	38.36	35.18	Average	100	186	HORIZONTAL
2	15597.53	51.14	74.00	-22.86	41.83	6.13	38.36	35.18	Peak	100	186	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15601.99	54.24	74.00	-19.76	44.94	6.13	38.36	35.19	Peak	100	73	VERTICAL
2	15602.31	40.44	54.00	-13.56	31.14	6.13	38.36	35.19	Average	100	73	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT20 CH 48 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	15710.29	38.85	54.00	-15.15	29.71	6.14	38.21	35.21	100	101	HORIZONTAL
2	15719.01	51.36	74.00	-22.64	42.24	6.14	38.19	35.21	100	101	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	15718.14	52.38	74.00	-21.62	43.26	6.14	38.19	35.21	100	260	VERTICAL
2	15723.91	39.05	54.00	-14.95	29.93	6.14	38.19	35.21	100	260	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT20 CH 52 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	15774.97	38.69	54.00	-15.31	29.67	6.14	38.11	35.23	Average	100	129	HORIZONTAL
2	15779.81	51.13	74.00	-22.87	42.12	6.14	38.11	35.24	Peak	100	129	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	15772.82	51.92	74.00	-22.08	42.90	6.14	38.11	35.23	Peak	100	277	VERTICAL
2	15780.42	39.79	54.00	-14.21	30.78	6.14	38.11	35.24	Average	100	277	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT20 CH 60 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10597.24	56.43	74.00	-17.57	47.75	5.01	38.92	35.25	Peak	159	348	HORIZONTAL
2	10599.62	43.14	54.00	-10.86	34.46	5.01	38.92	35.25	Average	159	348	HORIZONTAL
3	15890.19	37.88	54.00	-16.12	29.05	6.15	37.94	35.26	Average	100	246	HORIZONTAL
4	15908.43	50.58	74.00	-23.42	41.78	6.15	37.92	35.27	Peak	100	246	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10599.68	44.70	54.00	-9.30	36.02	5.01	38.92	35.25	Average	100	31	VERTICAL
2	10602.24	58.34	74.00	-15.66	49.64	5.01	38.92	35.23	Peak	100	31	VERTICAL
3	15893.17	38.19	54.00	-15.81	29.36	6.15	37.94	35.26	Average	100	128	VERTICAL
4	15893.91	50.61	74.00	-23.39	41.78	6.15	37.94	35.26	Peak	100	128	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT20 CH 64 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10640.00	49.98	74.00	-24.02	41.26	5.01	38.93	35.22	Peak	100	90	HORIZONTAL
2	10642.15	38.00	54.00	-16.00	29.28	5.01	38.93	35.22	Average	100	90	HORIZONTAL
3	15951.03	37.90	54.00	-16.10	29.16	6.15	37.87	35.28	Average	100	296	HORIZONTAL
4	15952.50	50.70	74.00	-23.30	41.98	6.15	37.85	35.28	Peak	100	296	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10634.04	53.34	74.00	-20.66	44.62	5.01	38.93	35.22	Peak	118	31	VERTICAL
2	10639.68	39.66	54.00	-14.34	30.94	5.01	38.93	35.22	Average	118	31	VERTICAL
3	15950.61	50.67	74.00	-23.33	41.93	6.15	37.87	35.28	Peak	100	165	VERTICAL
4	15951.41	37.97	54.00	-16.03	29.23	6.15	37.87	35.28	Average	100	165	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT20 CH 100 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	10999.87	40.17	54.00	-13.83	31.14	5.01	39.00	34.98	Average	100	340	HORIZONTAL
2	11001.76	53.50	74.00	-20.50	44.47	5.01	39.00	34.98	Peak	100	340	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	10999.10	44.98	54.00	-9.02	35.95	5.01	39.00	34.98	Average	100	68	VERTICAL
2	11001.28	59.01	74.00	-14.99	49.98	5.01	39.00	34.98	Peak	100	68	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT20 CH 116 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11155.22	59.76	74.00	-14.24	50.60	5.04	39.12	35.00	Peak	183	320	HORIZONTAL
2	11159.84	45.28	54.00	-8.72	36.11	5.04	39.13	35.00	Average	183	320	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11160.29	53.57	54.00	-0.43	44.40	5.04	39.13	35.00	Average	120	80	VERTICAL
2	11162.82	67.90	74.00	-6.10	58.72	5.05	39.13	35.00	Peak	120	80	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT20 CH 140 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11399.71	42.58	54.00	-11.42	33.20	5.10	39.32	35.04	Average	100	332	HORIZONTAL
2	11402.60	56.34	74.00	-17.66	46.96	5.10	39.32	35.04	Peak	100	332	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11400.13	50.86	54.00	-3.14	41.48	5.10	39.32	35.04	Average	124	80	VERTICAL
2	11400.51	66.07	74.00	-7.93	56.69	5.10	39.32	35.04	Peak	124	80	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT40 CH 38 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	15568.33	38.85	54.00	-15.15	29.49	6.13	38.40	35.17	Average	100	150	HORIZONTAL
2	15583.46	51.47	74.00	-22.53	42.14	6.13	38.38	35.18	Peak	100	150	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	15575.96	38.85	54.00	-15.15	29.50	6.13	38.40	35.18	Average	100	168	VERTICAL
2	15580.26	51.35	74.00	-22.65	42.02	6.13	38.38	35.18	Peak	100	168	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT40 CH 46 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	15699.29	51.89	74.00	-22.11	42.75	6.14	38.21	35.21	Peak	100	89	HORIZONTAL
2	15701.99	38.99	54.00	-15.01	29.85	6.14	38.21	35.21	Average	100	89	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	15670.45	51.38	74.00	-22.62	42.18	6.14	38.26	35.20	Peak	100	228	VERTICAL
2	15695.90	39.77	54.00	-14.23	30.61	6.14	38.23	35.21	Average	100	228	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT40 CH 54 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15791.15	38.27	54.00	-15.73	29.28	6.14	38.09	35.24	Average	100	87	HORIZONTAL
2	15825.13	51.04	74.00	-22.96	42.10	6.14	38.04	35.24	Peak	100	87	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15791.92	38.43	54.00	-15.57	29.44	6.14	38.09	35.24	Average	100	180	VERTICAL
2	15827.56	50.84	74.00	-23.16	41.90	6.14	38.04	35.24	Peak	100	180	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT40 CH 62 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10624.04	37.75	54.00	-16.25	29.05	5.01	38.92	35.23	Average	100	151	HORIZONTAL
2	10638.33	50.39	74.00	-23.61	41.67	5.01	38.93	35.22	Peak	100	151	HORIZONTAL
3	15910.19	50.65	74.00	-23.35	41.85	6.15	37.92	35.27	Peak	100	282	HORIZONTAL
4	15941.09	38.43	54.00	-15.57	29.69	6.15	37.87	35.28	Average	100	282	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10608.91	37.70	54.00	-16.30	29.00	5.01	38.92	35.23	Average	100	259	VERTICAL
2	10622.56	50.32	74.00	-23.68	41.62	5.01	38.92	35.23	Peak	100	259	VERTICAL
3	15938.85	51.42	74.00	-22.58	42.68	6.15	37.87	35.28	Peak	100	345	VERTICAL
4	15945.13	38.37	54.00	-15.63	29.63	6.15	37.87	35.28	Average	100	345	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT40 CH 102 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11019.94	37.91	54.00	-16.09	28.86	5.02	39.01	34.98	Average	100	147	HORIZONTAL
2	11031.60	50.15	74.00	-23.85	41.08	5.02	39.03	34.98	Peak	100	147	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11019.74	38.60	54.00	-15.40	29.55	5.02	39.01	34.98	Average	100	259	VERTICAL
2	11020.45	50.88	74.00	-23.12	41.83	5.02	39.01	34.98	Peak	100	259	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT40 CH 110 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11099.81	39.99	54.00	-14.01	30.87	5.03	39.08	34.99	Average	100	103	HORIZONTAL
2	11103.72	52.50	74.00	-21.50	43.38	5.03	39.08	34.99	Peak	100	103	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11098.46	60.17	74.00	-13.83	51.05	5.03	39.08	34.99	Peak	134	37	VERTICAL
2	11100.38	45.87	54.00	-8.13	36.75	5.03	39.08	34.99	Average	134	37	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT40 CH 134 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	11340.00	55.24	74.00	-18.76	45.92	5.08	39.27	35.03	Peak	100	344	HORIZONTAL
2	11340.06	41.06	54.00	-12.94	31.74	5.08	39.27	35.03	Average	100	344	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	11340.13	52.45	54.00	-1.55	43.13	5.08	39.27	35.03	Average	125	81	VERTICAL
2	11340.19	66.33	74.00	-7.67	57.01	5.08	39.27	35.03	Peak	125	81	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.

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11a CH 36 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15524.87	51.57	74.00	-22.43	42.13	6.13	38.48	35.17	Peak	100	66	HORIZONTAL
2	15540.58	38.83	54.00	-15.17	29.42	6.13	38.45	35.17	Average	100	66	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15540.00	39.25	54.00	-14.75	29.84	6.13	38.45	35.17	Average	100	259	VERTICAL
2	15541.67	51.64	74.00	-22.36	42.23	6.13	38.45	35.17	Peak	100	259	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11a CH 40 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15581.09	51.72	74.00	-22.28	42.39	6.13	38.38	35.18	Peak	100	200	HORIZONTAL
2	15601.09	38.75	54.00	-15.25	29.45	6.13	38.36	35.19	Average	100	200	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15599.68	40.40	54.00	-13.60	31.10	6.13	38.36	35.19	Average	100	306	VERTICAL
2	15610.83	52.45	74.00	-21.55	43.15	6.13	38.36	35.19	Peak	100	306	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11a CH 48 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15710.87	51.57	74.00	-22.43	42.43	6.14	38.21	35.21	Peak	100	144	HORIZONTAL
2	15718.24	38.37	54.00	-15.63	29.25	6.14	38.19	35.21	Average	100	144	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15712.88	39.35	54.00	-14.65	30.21	6.14	38.21	35.21	Average	100	274	VERTICAL
2	15720.92	51.99	74.00	-22.01	42.87	6.14	38.19	35.21	Peak	100	274	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11a CH 52 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15770.19	38.56	54.00	-15.44	29.54	6.14	38.11	35.23	Average	100	212	HORIZONTAL
2	15779.46	52.14	74.00	-21.86	43.13	6.14	38.11	35.24	Peak	100	212	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15774.87	40.97	54.00	-13.03	31.95	6.14	38.11	35.23	Average	100	108	VERTICAL
2	15784.87	51.06	74.00	-22.94	42.07	6.14	38.09	35.24	Peak	100	108	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11a CH 60 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10598.72	38.24	54.00	-15.76	29.56	5.01	38.92	35.25	Average	100	56	HORIZONTAL
2	10608.33	50.26	74.00	-23.74	41.56	5.01	38.92	35.23	Peak	100	56	HORIZONTAL
3	15890.96	37.78	54.00	-16.22	28.95	6.15	37.94	35.26	Average	100	209	HORIZONTAL
4	15908.91	50.34	74.00	-23.66	41.54	6.15	37.92	35.27	Peak	100	209	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10594.84	55.90	74.00	-18.10	47.22	5.01	38.92	35.25	Peak	113	33	VERTICAL
2	10599.78	42.67	54.00	-11.33	33.99	5.01	38.92	35.25	Average	113	33	VERTICAL
3	15894.87	50.91	74.00	-23.09	42.08	6.15	37.94	35.26	Peak	100	125	VERTICAL
4	15901.28	37.94	54.00	-16.06	29.13	6.15	37.92	35.26	Average	100	125	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11a CH 64 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10635.29	37.27	54.00	-16.73	28.55	5.01	38.93	35.22	Average	100	61	HORIZONTAL
2	10647.63	49.98	74.00	-24.02	41.26	5.01	38.93	35.22	Peak	100	61	HORIZONTAL
3	15951.03	37.84	54.00	-16.16	29.10	6.15	37.87	35.28	Average	100	183	HORIZONTAL
4	15953.53	50.56	74.00	-23.44	41.84	6.15	37.85	35.28	Peak	100	183	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	10639.13	38.06	54.00	-15.94	29.34	5.01	38.93	35.22	Average	100	208	VERTICAL
2	10644.04	50.54	74.00	-23.46	41.82	5.01	38.93	35.22	Peak	100	208	VERTICAL
3	15955.83	37.64	54.00	-16.36	28.92	6.15	37.85	35.28	Average	100	270	VERTICAL
4	15963.88	50.71	74.00	-23.29	41.99	6.15	37.85	35.28	Peak	100	270	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11a CH 100 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	Limit	Level	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	10999.46	38.07	54.00	-15.93	29.04	5.01	39.00	34.98	Average	100	277	HORIZONTAL
2	10999.46	50.05	74.00	-23.95	41.02	5.01	39.00	34.98	Peak	100	277	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	Limit	Level	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	10993.17	56.93	74.00	-17.07	47.90	5.01	39.00	34.98	Peak	101	68	VERTICAL
2	10998.43	42.25	54.00	-11.75	33.22	5.01	39.00	34.98	Average	101	68	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11a CH 116 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11160.00	44.91	54.00	-9.09	35.74	5.04	39.13	35.00	Average	111	339	HORIZONTAL
2	11160.00	58.85	74.00	-15.15	49.68	5.04	39.13	35.00	Peak	111	339	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11155.80	68.15	74.00	-5.85	58.99	5.04	39.12	35.00	Peak	120	80	VERTICAL
2	11160.64	53.60	54.00	-0.40	44.43	5.04	39.13	35.00	Average	120	80	VERTICAL

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11a CH 140 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11398.30	53.86	74.00	-20.14	44.48	5.10	39.32	35.04	Peak	100	332	HORIZONTAL
2	11399.97	40.99	54.00	-13.01	31.61	5.10	39.32	35.04	Average	100	332	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11394.74	64.31	74.00	-9.69	54.94	5.10	39.31	35.04	Peak	120	83	VERTICAL
2	11400.03	49.43	54.00	-4.57	40.05	5.10	39.32	35.04	Average	120	83	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 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed a -27dBm peak limit or average 54dBuV/m and peak 74dBuV/m limits. For transmitters operating in the 5.470-5.725 GHz band: all emissions outside of the 5.470-5.725 GHz band shall not exceed a -27dBm peak limit or average 54dBuV/m and peak 74dBuV/m limits. For transmitters operating in the 5.725-5.825 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 EIRP of -17 dBm/MHz (78.3dBuV/m at 3m). 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)	1 MHz / 3MHz for Peak, Please refer to below table for Average
RBW / VBW (Emission in non-restricted band)	1 MHz / 3MHz for Peak

Mode	On Time(ms)	On+Off Time(ms)	Duty Cycle(%)	1/T Minimum VBW (kHz)
802.11a	2.060	2.090	98.56	0.01
802.11n MCS0 HT20	1.910	1.940	98.45	0.01
802.11n MCS0 HT40	0.930	0.950	97.89	1.08

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 bandedges.

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	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT20 CH 36, 40, 48 / Chain 1 + Chain 2
Test Date	May 08, 2014		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5148.40	70.81	74.00	-3.19	68.18	3.43	34.11	34.91	Peak	114	5	VERTICAL
2	5150.00	53.50	54.00	-0.50	50.87	3.43	34.11	34.91	Average	114	5	VERTICAL
3	5179.68	102.92			100.23	3.44	34.16	34.91	Average	114	5	VERTICAL
4	5186.73	113.44			110.75	3.44	34.16	34.91	Peak	114	5	VERTICAL

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

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5120.19	51.38	54.00	-2.62	48.80	3.43	34.06	34.91	Average	113	11	VERTICAL
2	5145.83	69.89	74.00	-4.11	67.26	3.43	34.11	34.91	Peak	113	11	VERTICAL
3	5199.68	105.12			102.40	3.45	34.18	34.91	Average	113	11	VERTICAL
4	5199.68	114.86			112.14	3.45	34.18	34.91	Peak	113	11	VERTICAL

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

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5150.00	44.28	54.00	-9.72	41.65	3.43	34.11	34.91	Average	100	5	VERTICAL
2	5150.00	58.21	74.00	-15.79	55.58	3.43	34.11	34.91	Peak	100	5	VERTICAL
3	5239.52	107.50			104.72	3.46	34.23	34.91	Average	100	5	VERTICAL
4	5242.40	117.64			114.84	3.46	34.25	34.91	Peak	100	5	VERTICAL
5	5350.00	43.34	54.00	-10.66	40.37	3.49	34.39	34.91	Average	100	5	VERTICAL
6	5367.31	57.19	74.00	-16.81	54.20	3.49	34.41	34.91	Peak	100	5	VERTICAL

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

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT20 CH 52, 60, 64 / Chain 1 + Chain 2
Test Date	May 08, 2014 ~ May 10, 2014		

Channel 52

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5147.60	57.70	74.00	-16.30	55.07	3.43	34.11	34.91	Peak	100	354	VERTICAL
2	5150.00	43.00	54.00	-11.00	40.37	3.43	34.11	34.91	Average	100	354	VERTICAL
3	5259.52	107.78			104.96	3.46	34.27	34.91	Average	100	354	VERTICAL
4	5259.52	118.44			115.62	3.46	34.27	34.91	Peak	100	354	VERTICAL
5	5350.00	44.85	54.00	-9.15	41.88	3.49	34.39	34.91	Average	100	354	VERTICAL
6	5351.44	62.12	74.00	-11.88	59.15	3.49	34.39	34.91	Peak	100	354	VERTICAL

Item 3, 4 are the fundamental frequency at 5260 MHz.

Channel 60

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5299.36	105.87			102.98	3.48	34.32	34.91	Average	100	358	VERTICAL
2	5299.36	116.49			113.60	3.48	34.32	34.91	Peak	100	358	VERTICAL
3	5351.28	50.96	54.00	-3.04	47.99	3.49	34.39	34.91	Average	100	358	VERTICAL
4	5354.17	69.87	74.00	-4.13	66.90	3.49	34.39	34.91	Peak	100	358	VERTICAL

Item 1, 2 are the fundamental frequency at 5300 MHz.

Channel 64

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5319.68	101.48			98.57	3.48	34.34	34.91	Average	119	342	VERTICAL
2	5321.92	111.66			108.75	3.48	34.34	34.91	Peak	119	342	VERTICAL
3	5351.28	53.38	54.00	-0.62	50.41	3.49	34.39	34.91	Average	119	342	VERTICAL
4	5352.24	69.74	74.00	-4.26	66.77	3.49	34.39	34.91	Peak	119	342	VERTICAL

Item 1, 2 are the fundamental frequency at 5320 MHz.

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT20 CH 100, 140 / Chain 1 + Chain 2
Test Date	May 10, 2014		

Channel 100

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	5459.52	67.07	74.00	-6.93	63.94	3.52	34.53	34.92	112	37	VERTICAL
2	5460.00	47.91	54.00	-6.09	44.78	3.52	34.53	34.92	112	37	VERTICAL
3	5469.36	72.07	74.00	-1.93	68.92	3.52	34.55	34.92	112	37	VERTICAL
4	5469.52	53.31	54.00	-0.69	50.16	3.52	34.55	34.92	112	37	VERTICAL
5	5500.80	114.07			110.85	3.54	34.60	34.92	112	37	VERTICAL
6	5500.96	103.49			100.27	3.54	34.60	34.92	112	37	VERTICAL

Item 5, 6 are the fundamental frequency at 5500 MHz.

Channel 140

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	5698.72	113.18			109.85	3.59	34.68	34.94	100	8	VERTICAL
2	5699.04	102.30			98.97	3.59	34.68	34.94	100	8	VERTICAL
3	5726.28	53.92	54.00	-0.08	50.57	3.60	34.69	34.94	100	8	VERTICAL
4	5727.24	69.63	74.00	-4.37	66.28	3.60	34.69	34.94	100	8	VERTICAL

Item 1, 2 are the fundamental frequency at 5700 MHz.

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT40 CH 38, 46 / Chain 1 + Chain 2
Test Date	Apr. 28, 2014 ~ May 10, 2014		

Channel 38

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5148.40	53.68	54.00	-0.32	51.05	3.43	34.11	34.91	Average	100	240	VERTICAL
2	5148.40	70.79	74.00	-3.21	68.16	3.43	34.11	34.91	Peak	100	240	VERTICAL
3	5188.40	105.89			103.20	3.44	34.16	34.91	Peak	100	240	VERTICAL
4	5188.80	94.26			91.57	3.44	34.16	34.91	Average	100	240	VERTICAL

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

Channel 46

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5150.00	53.68	54.00	-0.32	51.05	3.43	34.11	34.91	Average	100	14	VERTICAL
2	5150.00	73.68	74.00	-0.32	71.05	3.43	34.11	34.91	Peak	100	14	VERTICAL
3	5227.76	101.55			98.77	3.46	34.23	34.91	Average	100	14	VERTICAL
4	5227.76	113.49			110.71	3.46	34.23	34.91	Peak	100	14	VERTICAL

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

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT40 CH 54, 62 / / Chain 1 + Chain 2
Test Date	Apr. 29, 2014 ~ May 10, 2014		

Channel 54

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5272.24	101.30			98.47	3.47	34.27	34.91	Average	100	342	VERTICAL
2	5272.56	112.91			110.08	3.47	34.27	34.91	Peak	100	342	VERTICAL
3	5350.00	53.63	54.00	-0.37	50.66	3.49	34.39	34.91	Average	100	342	VERTICAL
4	5350.00	68.11	74.00	-5.89	65.14	3.49	34.39	34.91	Peak	100	342	VERTICAL

Item 1, 2 are the fundamental frequency at 5270 MHz.

Channel 62

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5312.00	95.23			92.32	3.48	34.34	34.91	Average	100	160	VERTICAL
2	5312.00	106.85			103.94	3.48	34.34	34.91	Peak	100	160	VERTICAL
3	5350.00	53.98	54.00	-0.02	51.01	3.49	34.39	34.91	Average	100	160	VERTICAL
4	5352.80	68.80	74.00	-5.20	65.83	3.49	34.39	34.91	Peak	100	160	VERTICAL

Item 1, 2 are the fundamental frequency at 5310 MHz.

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 HT40 CH 102, 110, 134 / Chain 1 + Chain 2
Test Date	Apr. 29, 2014 ~ May 10, 2014		

Channel 102

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5459.16	46.82	54.00	-7.18	43.69	3.52	34.53	34.92	Average	100	151	VERTICAL
2	5459.16	61.77	74.00	-12.23	58.64	3.52	34.53	34.92	Peak	100	151	VERTICAL
3	5468.74	69.29	74.00	-4.71	66.14	3.52	34.55	34.92	Peak	100	151	VERTICAL
4	5469.16	53.93	54.00	-0.07	50.78	3.52	34.55	34.92	Average	100	151	VERTICAL
5	5512.10	92.84			89.62	3.54	34.60	34.92	Average	100	151	VERTICAL
6	5512.10	103.56			100.34	3.54	34.60	34.92	Peak	100	151	VERTICAL

Item 5, 6 are the fundamental frequency at 5510 MHz.

Channel 110

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5458.40	65.30	74.00	-8.70	62.17	3.52	34.53	34.92	Peak	100	37	VERTICAL
2	5459.04	50.20	54.00	-3.80	47.07	3.52	34.53	34.92	Average	100	37	VERTICAL
3	5469.04	70.24	74.00	-3.76	67.09	3.52	34.55	34.92	Peak	100	37	VERTICAL
4	5469.36	53.42	54.00	-0.58	50.27	3.52	34.55	34.92	Average	100	37	VERTICAL
5	5551.28	101.49			98.24	3.55	34.62	34.92	Average	100	37	VERTICAL
6	5551.28	112.88			109.63	3.55	34.62	34.92	Peak	100	37	VERTICAL

Item 5, 6 are the fundamental frequency at 5550 MHz.

Channel 134

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5671.60	99.05			95.72	3.59	34.67	34.93	Average	100	351	VERTICAL
2	5671.60	110.64			107.31	3.59	34.67	34.93	Peak	100	351	VERTICAL
3	5725.96	53.95	54.00	-0.05	50.60	3.60	34.69	34.94	Average	100	351	VERTICAL
4	5726.28	72.73	74.00	-1.27	69.38	3.60	34.69	34.94	Peak	100	351	VERTICAL

Item 1, 2 are the fundamental frequency at 5670 MHz.

Note:

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

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

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11a CH 36, 40, 48 / Chain 1 + Chain 2
Test Date	Apr. 28, 2014 ~ Apr. 29, 2014		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	5146.00	71.21	74.00	-2.79	68.58	3.43	34.11	34.91	Peak	100	244 VERTICAL
2	5150.00	53.63	54.00	-0.37	51.00	3.43	34.11	34.91	Average	100	244 VERTICAL
3	5180.80	101.60			98.91	3.44	34.16	34.91	Average	100	244 VERTICAL
4	5180.80	114.12			111.43	3.44	34.16	34.91	Peak	100	244 VERTICAL

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

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	5126.40	53.62	54.00	-0.38	51.01	3.43	34.09	34.91	Average	115	145 VERTICAL
2	5126.40	64.83	74.00	-9.17	62.22	3.43	34.09	34.91	Peak	115	145 VERTICAL
3	5201.20	106.35			103.63	3.45	34.18	34.91	Average	115	145 VERTICAL
4	5201.20	116.56			113.84	3.45	34.18	34.91	Peak	115	145 VERTICAL

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

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	5149.40	48.01	54.00	-5.99	45.38	3.43	34.11	34.91	Average	100	227 VERTICAL
2	5150.00	67.24	74.00	-6.76	64.61	3.43	34.11	34.91	Peak	100	227 VERTICAL
3	5234.60	122.07			119.29	3.46	34.23	34.91	Peak	100	227 VERTICAL
4	5238.80	112.29			109.51	3.46	34.23	34.91	Average	100	227 VERTICAL
5	5350.00	58.04	74.00	-15.96	55.07	3.49	34.39	34.91	Peak	100	227 VERTICAL
6	5350.60	44.20	54.00	-9.80	41.23	3.49	34.39	34.91	Average	100	227 VERTICAL

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

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11a CH 52, 60, 64 / Chain 1 + Chain 2
Test Date	Apr. 29, 2014		

Channel 52

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5149.40	57.34	74.00	-16.66	54.71	3.43	34.11	34.91	Peak	101	161	VERTICAL
2	5150.00	42.16	54.00	-11.84	39.53	3.43	34.11	34.91	Average	101	161	VERTICAL
3	5258.80	121.38			118.56	3.46	34.27	34.91	Peak	101	161	VERTICAL
4	5259.40	110.90			108.08	3.46	34.27	34.91	Average	101	161	VERTICAL
5	5352.40	46.03	54.00	-7.97	43.06	3.49	34.39	34.91	Average	101	161	VERTICAL
6	5352.40	58.41	74.00	-15.59	55.44	3.49	34.39	34.91	Peak	101	161	VERTICAL

Item 3, 4 are the fundamental frequency at 5260 MHz.

Channel 60

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5299.20	106.98			104.09	3.48	34.32	34.91	Average	100	158	VERTICAL
2	5299.20	116.57			113.68	3.48	34.32	34.91	Peak	100	158	VERTICAL
3	5373.60	65.53	74.00	-8.47	62.54	3.50	34.41	34.92	Peak	100	158	VERTICAL
4	5374.00	53.91	54.00	-0.09	50.92	3.50	34.41	34.92	Average	100	158	VERTICAL

Item 1, 2 are the fundamental frequency at 5300 MHz.

Channel 64

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5319.00	103.26			100.35	3.48	34.34	34.91	Average	101	158	VERTICAL
2	5319.00	113.88			110.97	3.48	34.34	34.91	Peak	101	158	VERTICAL
3	5350.00	53.61	54.00	-0.39	50.64	3.49	34.39	34.91	Average	101	158	VERTICAL
4	5350.60	67.54	74.00	-6.46	64.57	3.49	34.39	34.91	Peak	101	158	VERTICAL

Item 1, 2 are the fundamental frequency at 5320 MHz.

Temperature	20°C	Humidity	55%
Test Engineer	Nick Peng	Configurations	IEEE 802.11a CH 100, 140 / Chain 1 + Chain 2
Test Date	Apr. 29, 2014		

Channel 100

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	5413.20	64.85	74.00	-9.15	61.78	3.51	34.48	34.92	Peak	100	150 VERTICAL
2	5418.00	52.69	54.00	-1.31	49.62	3.51	34.48	34.92	Average	100	150 VERTICAL
3	5469.20	69.64	74.00	-4.36	66.49	3.52	34.55	34.92	Peak	100	150 VERTICAL
4	5469.60	53.92	54.00	-0.08	50.77	3.52	34.55	34.92	Average	100	150 VERTICAL
5	5498.00	101.46			98.25	3.53	34.60	34.92	Average	100	150 VERTICAL
6	5498.40	111.66			108.45	3.53	34.60	34.92	Peak	100	150 VERTICAL

Item 5, 6 are the fundamental frequency at 5500 MHz.

Channel 140

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	5699.20	102.78			99.45	3.59	34.68	34.94	Average	100	234 VERTICAL
2	5699.20	112.76			109.43	3.59	34.68	34.94	Peak	100	234 VERTICAL
3	5725.00	53.60	54.00	-0.40	50.25	3.60	34.69	34.94	Average	100	234 VERTICAL
4	5725.40	68.75	74.00	-5.25	65.40	3.60	34.69	34.94	Peak	100	234 VERTICAL

Item 1, 2 are the fundamental frequency at 5700 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

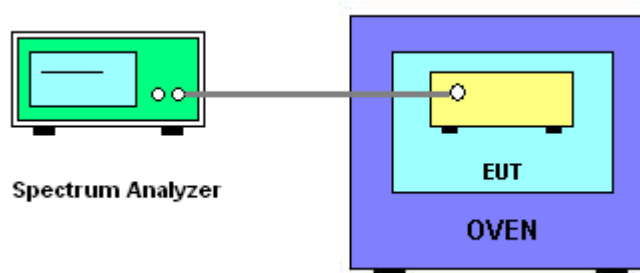
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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. f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f_c \times 10^6$ ppm and the limit is less than ± 20 ppm (IEEE 802.11n specification).
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 $0^\circ\text{C} \sim 70^\circ\text{C}$.

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	26°C	Humidity	63%
Test Engineer	Kenneth Huang	Test Date	May 18, 2014

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)		
(V)	5200 MHz	5300 MHz	5500 MHz
126.50	5199.9900	5299.9560	5499.9930
110.00	5199.9880	5299.9550	5499.9928
93.50	5199.9880	5299.9550	5499.9926
Max. Deviation (MHz)	0.012000	0.045000	0.007400
Max. Deviation (ppm)	2.31	8.49	1.35

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)		
(°C)	5200 MHz	5300 MHz	5500 MHz
0	5199.9900	5299.9560	5499.9928
10	5199.9880	5299.9550	5499.9928
20	5199.9880	5299.9550	5499.9928
30	5199.9880	5299.9550	5499.9928
40	5199.9880	5299.9550	5499.9928
50	5199.9860	5299.9540	5499.9926
60	5199.9860	5299.9540	5499.9926
70	5199.9840	5299.9520	5499.9924
Max. Deviation (MHz)	0.016000	0.048000	0.007600
Max. Deviation (ppm)	3.08	9.06	1.38

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	9 kHz ~ 2.75 GHz	Apr. 23, 2014	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150 kHz ~ 100 MHz	Nov. 23, 2013	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Nov. 11, 2013	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150 kHz ~ 30 MHz	Dec. 04, 2013	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	2888	20MHz ~ 2GHz	Jan. 15, 2014	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Nov. 05, 2012*	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 01, 2013	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Dec. 17, 2013	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 12, 2013	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Dec. 16, 2013	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Oct. 23, 2013	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100019	9kHz~40GHz	Dec. 02, 2013	Radiation (03CH01-CB)
EMI Test Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8GHz	Dec. 12, 2013	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	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. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9kHz~40GHz	Nov. 29, 2013	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 04, 2013	Conducted (TH01-CB)
RF Power Divider	Woken	2 Way	0120A02056002D	2GHz ~ 18GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Power Divider	Woken	3 Way	MDC2366	2GHz ~ 18GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Power Divider	Woken	4 Way	0120A04056002D	2GHz ~ 18GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz ~ 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz ~ 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Sep. 18, 2013	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Sep. 18, 2013	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

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	0.026	dB	normal(k=2)	0.013
Cable loss	0.002	dB	normal(k=2)	0.001
AMN/LISN specification	1.200	dB	normal(k=2)	0.600
Mismatch Receiver VSWR 1 = AMN/LISN VSWR 2 =	-0.080	dB	U-shaped	0.060
Combined standard uncertainty $U_c(y)$				1.2
Measuring uncertainty for a level of confidence of 95% $U=2U_c(y)$				2.4

Uncertainty of Radiated Emission Measurement (30MHz ~ 1,000MHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	± 0.173	dB	k=1	0.086
Cable loss	± 0.174	dB	k=2	0.087
Antenna gain	± 0.169	dB	k=2	0.084
Site imperfection	± 0.433	dB	Triangular	0.214
Pre-amplifier gain	± 0.366	dB	k=2	0.183
Transmitter antenna	± 1.200	dB	Rectangular	0.600
Signal generator	± 0.461	dB	Rectangular	0.231
Mismatch	± 0.080	dB	U-shape	0.040
Spectrum analyzer	± 0.500	dB	Rectangular	0.250
Combined standard uncertainty $U_c(y)$				1.778
Measuring uncertainty for a level of confidence of 95% $U=2U_c(y)$				3.555

Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	± 0.191	dB	k=1	0.095
Cable loss	± 0.169	dB	k=2	0.084
Antenna gain	± 0.191	dB	k=2	0.096
Site imperfection	± 0.582	dB	Triangular	0.291
Pre-amplifier gain	± 0.304	dB	k=2	0.152
Transmitter antenna	± 1.200	dB	Rectangular	0.600
Signal generator	± 0.461	dB	Rectangular	0.231
Mismatch	± 0.080	dB	U-shape	0.040
Spectrum analyzer	± 0.500	dB	Rectangular	0.250
Combined standard uncertainty $U_c(y)$				1.839
Measuring uncertainty for a level of confidence of 95% $U=2U_c(y)$				3.678

Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	± 0.186	dB	k=1	0.093
Cable loss	± 0.167	dB	k=2	0.083
Antenna gain	± 0.190	dB	k=2	0.095
Site imperfection	± 0.488	dB	Triangular	0.244
Pre-amplifier gain	± 0.269	dB	k=2	0.134
Transmitter antenna	± 1.200	dB	Rectangular	0.600
Signal generator	± 0.461	dB	Rectangular	0.231
Mismatch	± 0.080	dB	U-shape	0.040
Spectrum analyzer	± 0.500	dB	Rectangular	0.250
Combined standard uncertainty $U_c(y)$				1.771
Measuring uncertainty for a level of confidence of 95% $U=2U_c(y)$				3.541

Uncertainty of Conducted Emission Measurement

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Cable loss	± 0.038	dB	k=2	0.019
Attenuator	± 0.047	dB	k=2	0.024
Power Meter specification	± 0.300	dB	Triangular	0.150
Power Sensor specification	± 0.300	dB	Rectangular	0.150
Signal generator	± 0.461	dB	Rectangular	0.231
Mismatch	± 0.080	dB	U-shape	0.040
Spectrum analyzer	± 0.500	dB	Rectangular	0.250
Combined standard uncertainty $U_c(y)$				0.863
Measuring uncertainty for a level of confidence of 95% $U=2U_c(y)$				1.726