



FCC RF Test Report

APPLICANT : Ubiquiti Networks, Inc.
EQUIPMENT : UniFi Access Point
BRAND NAME : UBIQUITI
MODEL NAME : UAP-AC-PRO-O
FCC ID : SWX-UAPACPROO
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

The product was received on Feb. 25, 2016 and testing was completed on Jun. 17, 2016. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.



TABLE OF CONTENTS

REVISION HISTORY	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant	5
1.2 Manufacturer	5
1.3 Product Feature of Equipment Under Test.....	5
1.4 Product Specification of Equipment Under Test.....	6
1.5 Modification of EUT	6
1.6 Testing Location	7
1.7 Applicable Standards.....	8
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	9
2.1 Carrier Frequency and Channel	9
2.2 Pre-Scanned RF Power.....	10
2.3 Test Mode.....	11
2.4 Connection Diagram of Test System.....	12
2.5 Support Unit used in test configuration and system	13
2.6 EUT Operation Test Setup	13
2.7 Measurement Results Explanation Example.....	13
3 TEST RESULT	14
3.1 26dB & 99% Occupied Bandwidth Measurement	14
3.2 Maximum Conducted Output Power Measurement	16
3.3 Power Spectral Density Measurement	18
3.4 Unwanted Emissions Measurement	21
3.5 AC Conducted Emission Measurement.....	26
3.6 Frequency Stability Measurement.....	32
3.7 Automatically Discontinue Transmission	33
3.8 Antenna Requirements.....	34
4 LIST OF MEASURING EQUIPMENT	35
5 UNCERTAINTY OF EVALUATION	36
APPENDIX A. TEST RESULT OF CONDUCTED TEST RESULTS	
APPENDIX B. TEST RESULT OF RADIATED TEST RESULTS	
APPENDIX C. RADIATED SPURIOUS EMISSION PLOTS	
APPENDIX D. DUTY CYCLE PLOTS	
APPENDIX E. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR622510B	Rev. 01	Initial issue of report	Jun. 22, 2016



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	2.1049 15.403(i)	26dB & 99% Bandwidth	-	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	FCC $\leq 30, 24$ dBm (depend on band)	Pass	-
3.3	15.407(a)	Power Spectral Density	FCC $\leq 17, 11$ dBm (depend on band)	Pass	-
3.4	15.407(b)	Unwanted Emissions	$\leq -17, -27$ dBm (depend on band)&15.209(a)	Pass	Under limit 0.46 dB at 10360.000 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 2.00 dB at 0.534 MHz
3.6	15.407(g)	Frequency Stability	Within Operation Band	Pass	-
3.7	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.8	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

Ubiquiti Networks, Inc.

12F, No. 105, Song Ren Rd., SinYi District, Taipei 110, Taiwan

1.2 Manufacturer

Ubiquiti Networks, Inc.

12F, No. 105, Song Ren Rd., SinYi District, Taipei 110, Taiwan

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	UniFi Access Point
Brand Name	UBIQUITI
Model Name	UAP-AC-PRO-O
FCC ID	SWX-UAPACPROO
EUT supports Radios application	WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification				
Tx/Rx Channel Frequency Range	5180 MHz ~ 5240 MHz			
Maximum Output Power	MIMO <Ant. Port 1 + 2+3> 802.11a : 12.99 dBm / 0.0199 W 802.11n HT20 : 12.99 dBm / 0.0199 W 802.11n HT40 : 12.71 dBm / 0.0187 W 802.11ac VHT20: 12.98 dBm / 0.0199 W 802.11ac VHT40: 12.69 dBm / 0.0186 W 802.11ac VHT80: 12.50 dBm / 0.0178 W			
99% Occupied Bandwidth	802.11a : 17.85 MHz 802.11n HT20 : 18.90 MHz 802.11n HT40 : 37.00 MHz 802.11ac VHT20 : 18.80 MHz 802.11ac VHT40 : 37.00 MHz 802.11ac VHT80 : 75.96 MHz			
Antenna Type	Ant. 1 : PCB Antenna Ant. 2 : PCB Antenna Ant. 3 : PCB Antenna			
Antenna Gain	Ant. 1 : 8.00 dBi Ant. 2 : 8.00 dBi Ant. 3 : 8.00 dBi			
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)			
Antenna Function Description		Chain Port 1	Chain Port 2	Chain Port 3
	802.11 a/n/ac MIMO	V	V	V

1.5 Modification of EUT

No modifications are made to the EUT during all test items.



1.6 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	
	TH05-HY	CO05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 58 , Aly. 75, Ln. 564, Wenhua 3rd Rd., Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-0855	
Test Site No.	Sporton Site No.	
	03CH11-HY	

Note: The test site complies with ANSI C63.4 2014 requirement.



1.7 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ FCC KDB 644545 D03 Guidance for IEEE 802.11ac New Rules v01
- ♦ ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5150-5250 MHz Band 1 (U-NII-1)	36	5180	44	5220
	38	5190	46	5230
	40	5200	48	5240
	42	5210		

Note: The above Frequency and Channel in boldface were 802.11n HT40.

2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test in the following tables.

<MIMO Ant. Port 1+2+3>

5GHz 802.11a mode								
Data Rate (MHz)	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
Average Power (dBm)	12.99	12.85	12.87	12.95	12.91	12.91	12.79	12.87

5GHz 802.11n HT20 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Average Power (dBm)	12.99	12.90	12.89	12.91	12.89	12.76	12.82	12.77

5GHz 802.11n HT40 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Average Power (dBm)	12.71	12.66	12.63	12.64	12.60	12.66	12.64	12.64

5GHz 802.11ac VHT20 mode									
Data Rate (MHz)	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8
Average Power (dBm)	12.98	12.95	12.97	12.94	12.96	12.82	12.83	12.84	12.85

5GHz 802.11ac VHT40 mode										
Data Rate (MHz)	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8	MCS 9
Average Power (dBm)	12.69	12.66	12.63	12.63	12.66	12.60	12.64	12.60	12.60	12.66

5GHz 802.11ac VHT80 mode										
Data Rate (MHz)	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8	MCS 9
Average Power (dBm)	12.50	12.44	12.34	12.39	12.38	12.49	12.41	12.48	12.44	12.43

Note: MIMO Ant. 1+2+3 is a calculated result from sum of the power MIMO Ant. 1, MIMO Ant. 2, and MIMO Ant. 3.



2.3 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

MIMO Antenna

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0
802.11ac VHT80	MCS0

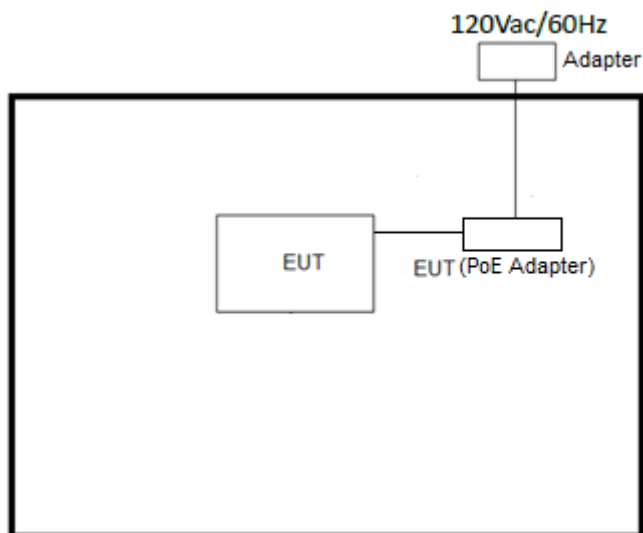
Test Cases	
AC Conducted Emission	Mode 1 : WLAN (5GHz) Link + PoE Adapter + LAN Link

Ch. #		Band I : 5150-5250 MHz	Band I : 5150-5250 MHz	Band I : 5150-5250 MHz
		802.11a	802.11n HT20	802.11n HT40
L	Low	36	36	38
M	Middle	44	44	-
H	High	48	48	46

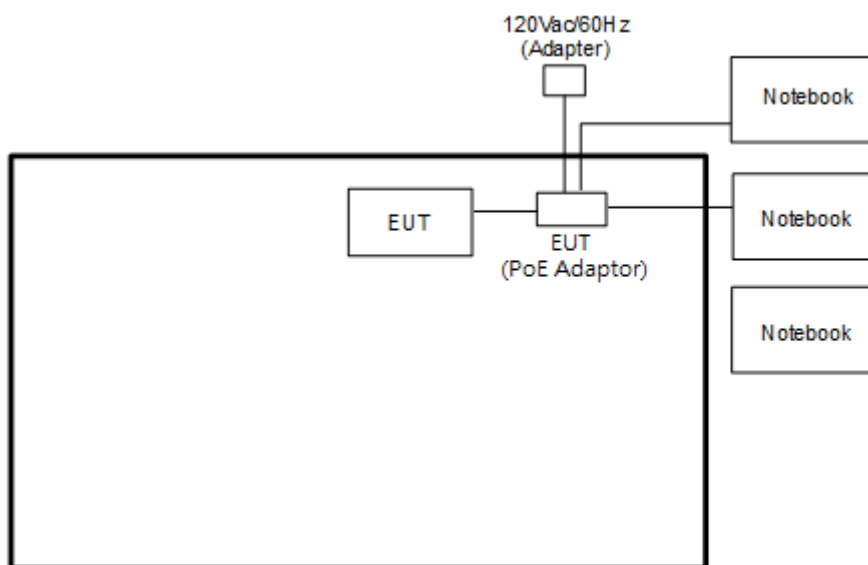
Ch. #		Band I : 5150-5250 MHz	Band I : 5150-5250 MHz	Band I : 5150-5250 MHz
		802.11ac VHT20	802.11ac VHT40	802.11ac VHT80
L	Low	36	38	-
M	Middle	44	-	42
H	High	48	46	-

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>





2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	Notebook	DELL	P20G	FCC DoC/ Contains FCC ID: QDS-BRCM1051	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

2.6 EUT Operation Test Setup

For WLAN function, programmed RF utility, "Cart.exe" installed in the notebook make the EUT provide functions like channel selection and power level for continuous transmitting and receiving signals.

2.7 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4.2 + 10 = 14.2 \text{ (dB)}\end{aligned}$$

3 Test Result

3.1 26dB & 99% Occupied Bandwidth Measurement

3.1.1 Description of 26dB & 99% Occupied Bandwidth

This section is for reporting purpose only.

There is no restriction limits for bandwidth.

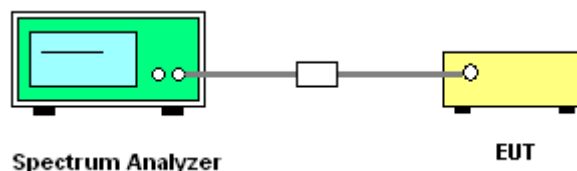
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02. Section C) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
7. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1MHz and set the Video bandwidth (VBW) $\geq 3 * \text{RBW}$.
8. Measure and record the results in the test report.

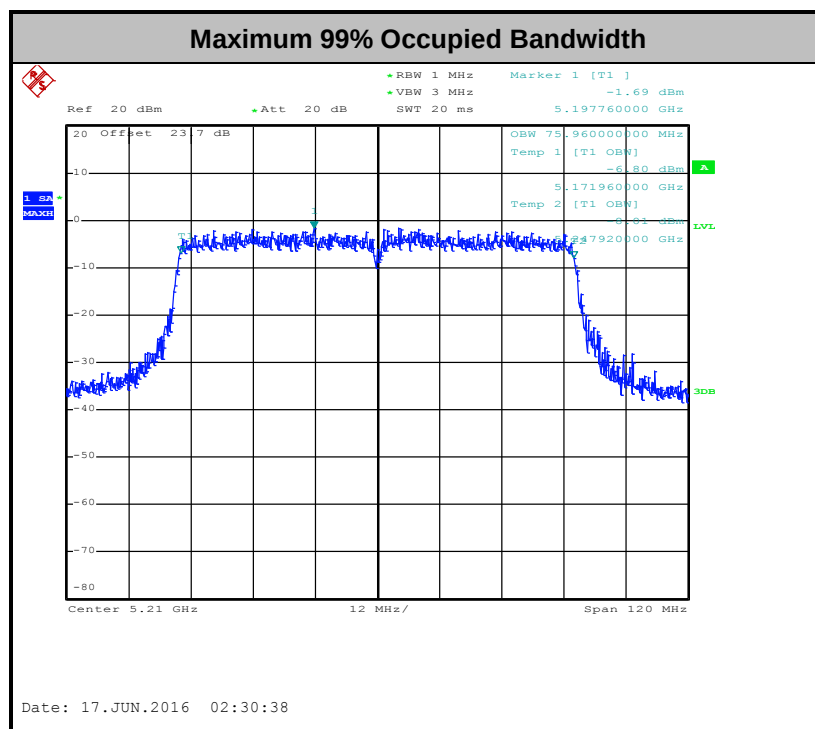
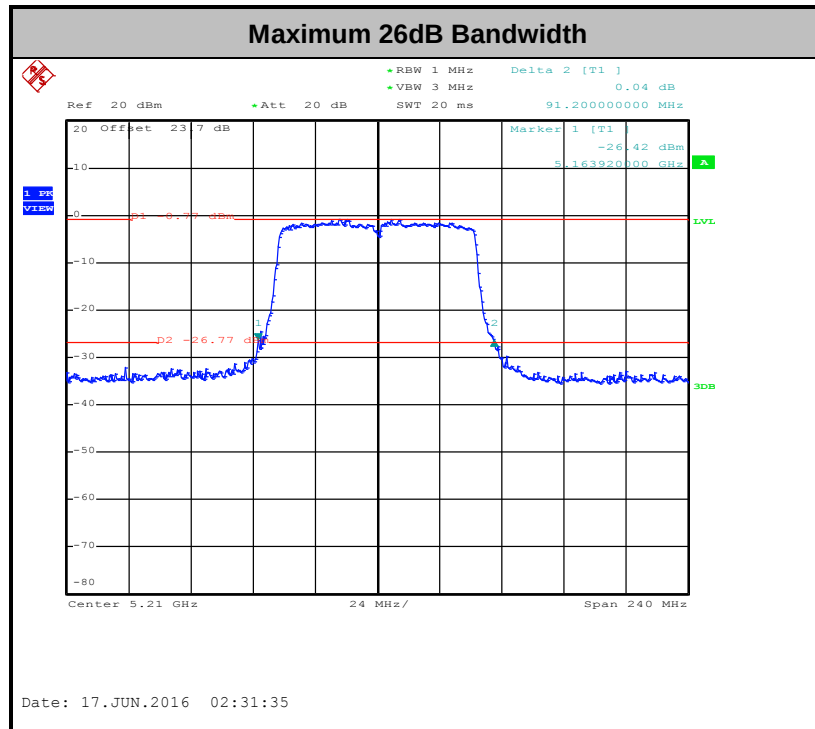
3.1.4 Test Setup





3.1.5 Test Result of 26dB & 99% Occupied Bandwidth

Please refer to Appendix A.



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

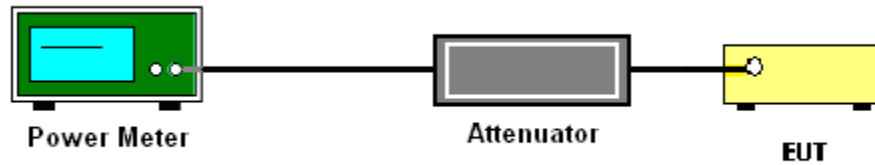
The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, $10 \log(1/x)$, where x is the duty cycle.

3.2.4 Test Setup

For normal channel:



3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.



3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.
Section F) Maximum power spectral density.

Method SA-2

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

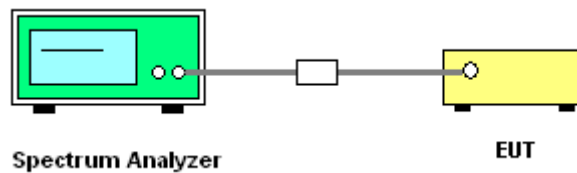
1. The testing follows Method SA-2 of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.
 - Measure the duty cycle.
 - Set span to encompass the entire emission bandwidth (EBW) of the signal.
 - Set RBW = 1 MHz.
 - Set VBW $\geq$ 3 MHz.
 - Number of points in sweep $\geq$ 2 Span / RBW.
 - Sweep time = auto.
 - Detector = RMS
 - Trace average at least 100 traces in power averaging mode.
 - Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add $10 \log(1/0.25) = 6$ dB if the duty cycle is 25 percent.

2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Each plot has already offset with cable loss, and attenuator loss. Measure the PSD and record it.
4. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

Method (1): Measure and sum the spectra across the outputs.

The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

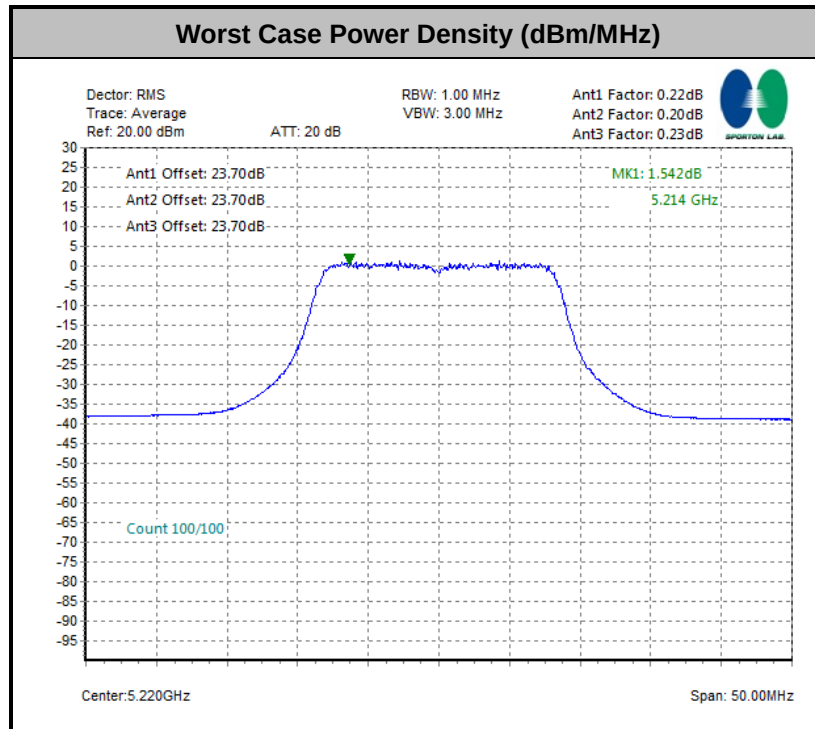
3.3.4 Test Setup





3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



Note: Average Power Density (dB) = Measured value+ Duty Factor

3.4 Unwanted Emissions Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part15.205.

3.4.1 Limit of Unwanted Emissions

- (1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27dBm/MHz.
- (2) Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,

Frequency (MHz)	Field Strength (microvolts/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

Note: The following formula is used to convert the EIRP to field strength.

$$E = \frac{1000000\sqrt{30P}}{3} \quad \mu\text{V/m, where P is the eirp (Watts)}$$

EIRP (dBm)	Field Strength at 3m (dBμV/m)
-17	78.3
- 27	68.3

- (3) KDB789033 D02 v01r02 G)2)c) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.

3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.



3.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.

Section G) Unwanted emissions measurement.

(1) Procedure for Unwanted Emissions Measurements Below 1000MHz

- RBW = 120 kHz
- VBW = 300 kHz
- Detector = Peak
- Trace mode = max hold

(2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

- RBW = 1 MHz
- VBW $\geq$ 3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

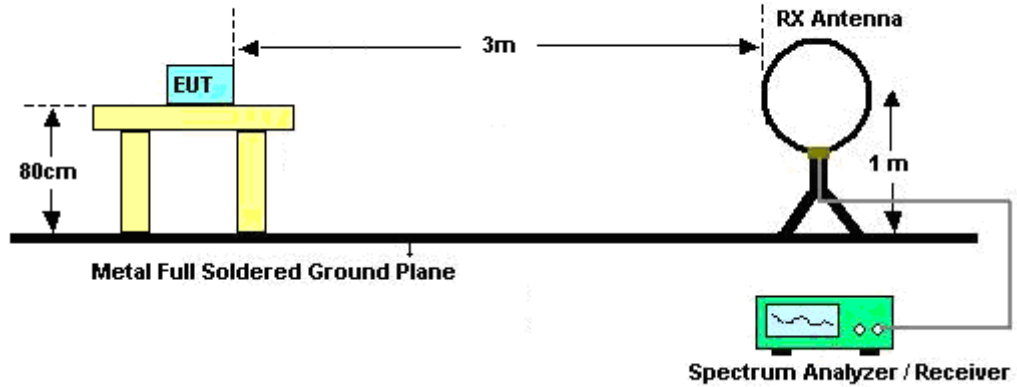
- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW $\geq$ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.



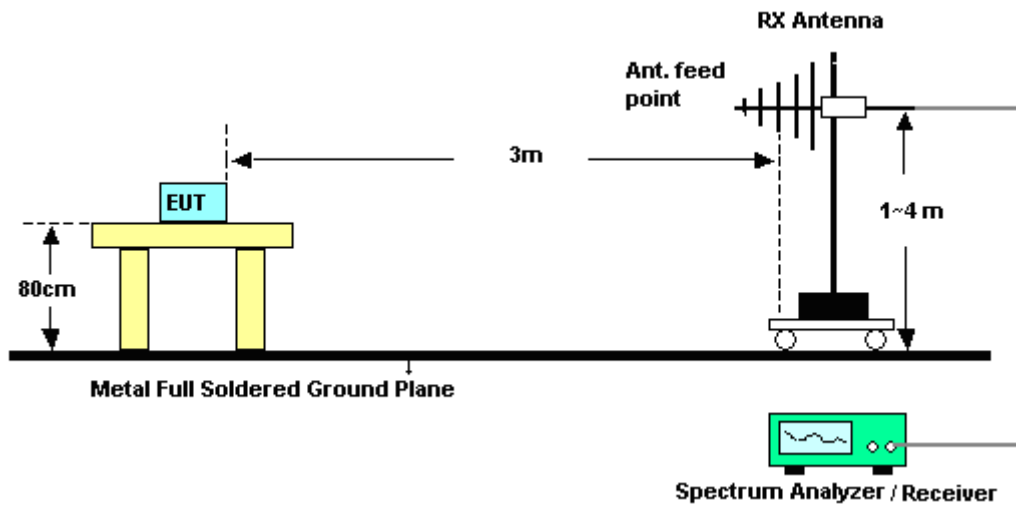
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.4.4 Test Setup

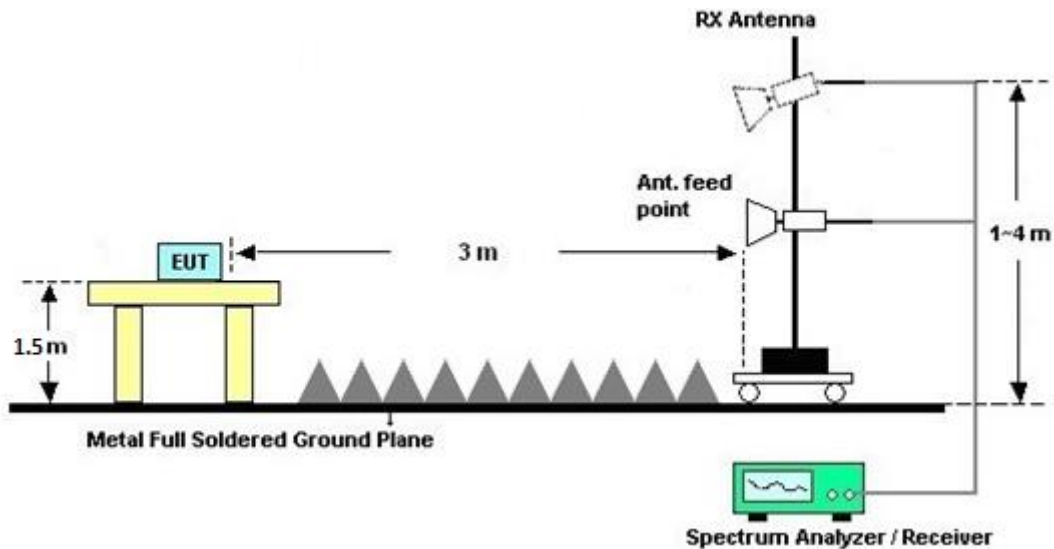
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.4.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.4.6 Test Result of Radiated Band Edges

Please refer to Appendix B and C.

3.4.7 Duty Cycle

Please refer to Appendix D.

3.4.8 Test Result of Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix B and C.

3.5 AC Conducted Emission Measurement

3.5.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (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 the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

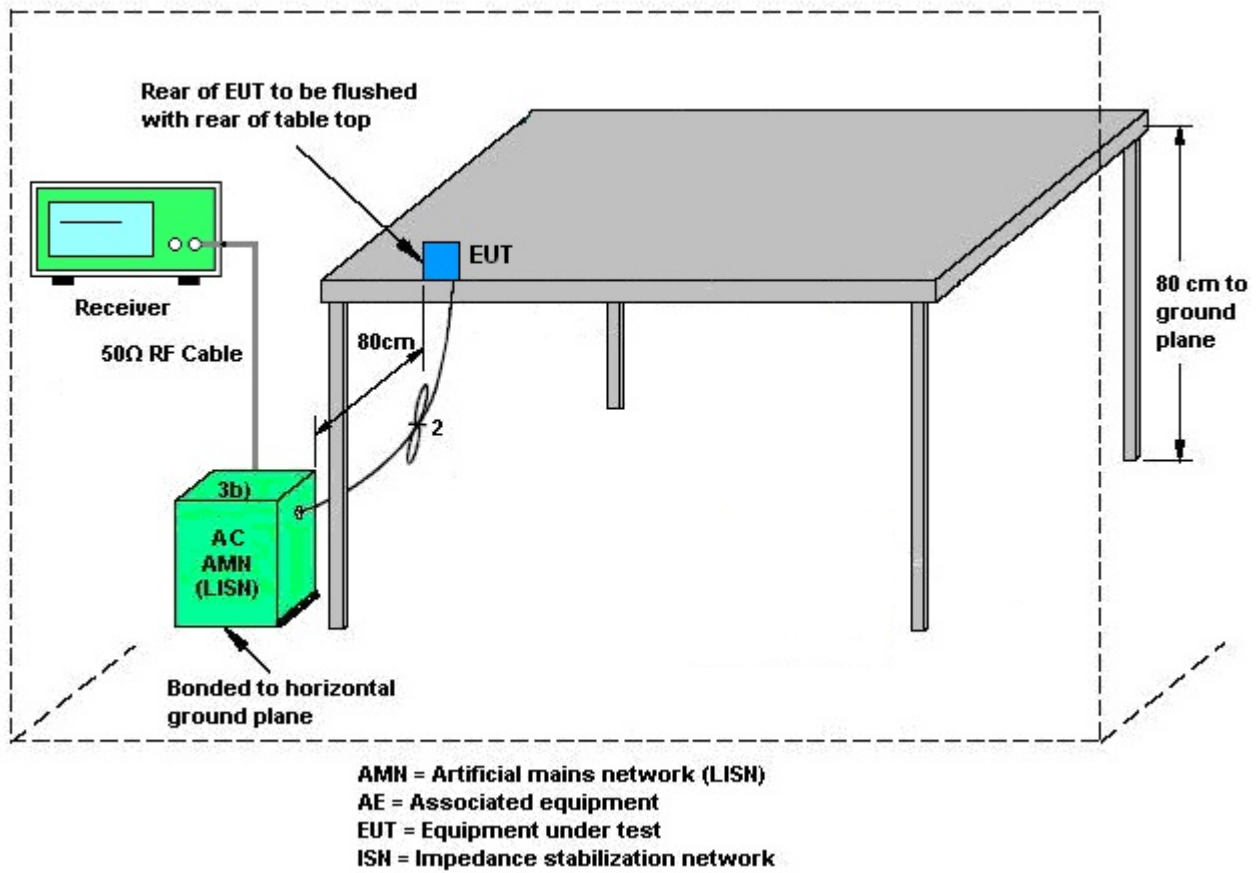
3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

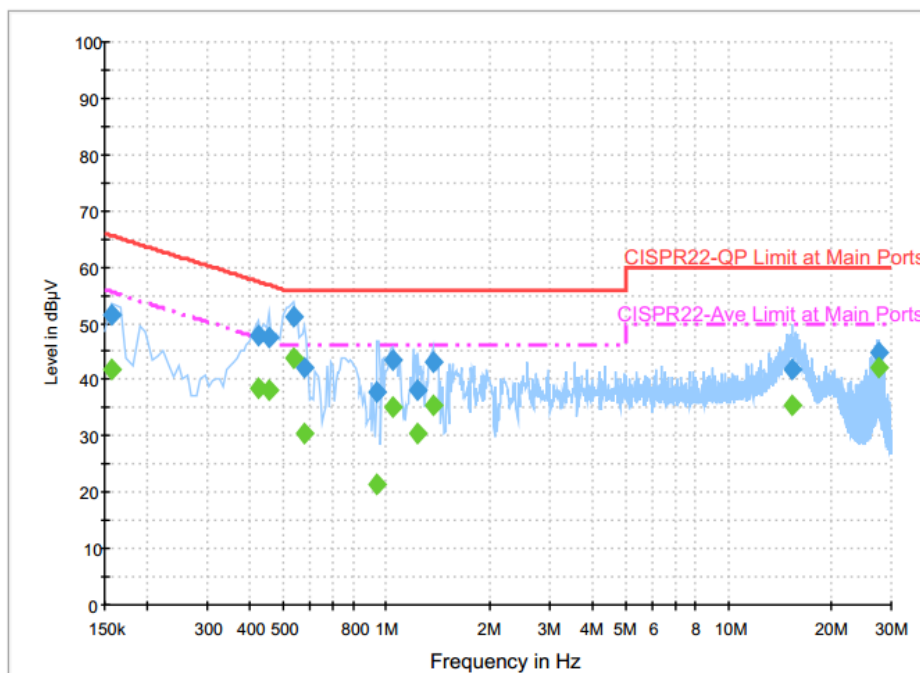
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.5.4 Test Setup



3.5.5 Test Result of AC Conducted Emission

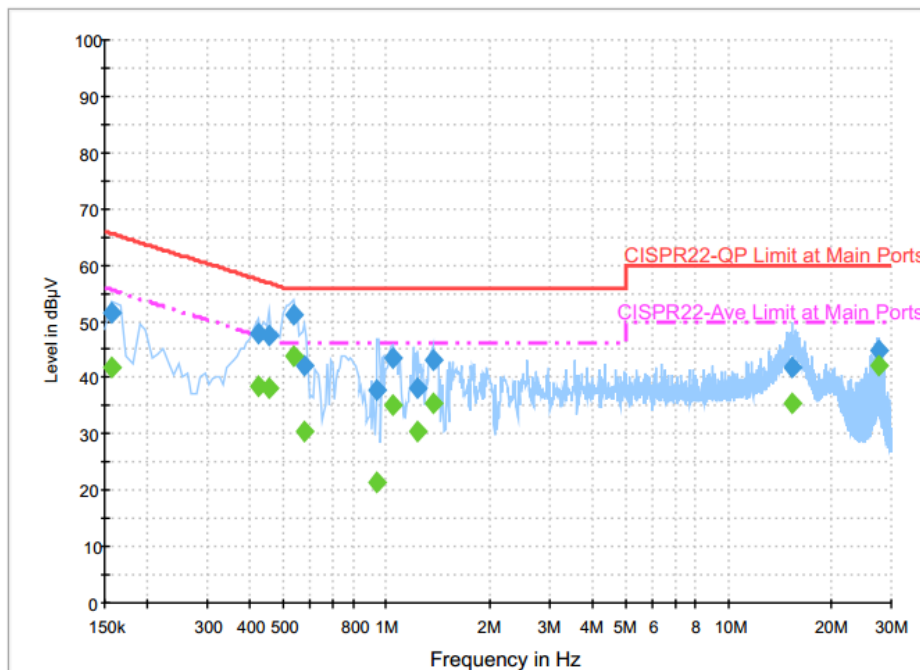
Test Mode :	Mode 1	Temperature :	23~24℃
Test Engineer :	Kai-Chun Chu	Relative Humidity :	41~42%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN (5GHz) Link + PoE Adapter + LAN Link		



Final Result : QuasiPeak

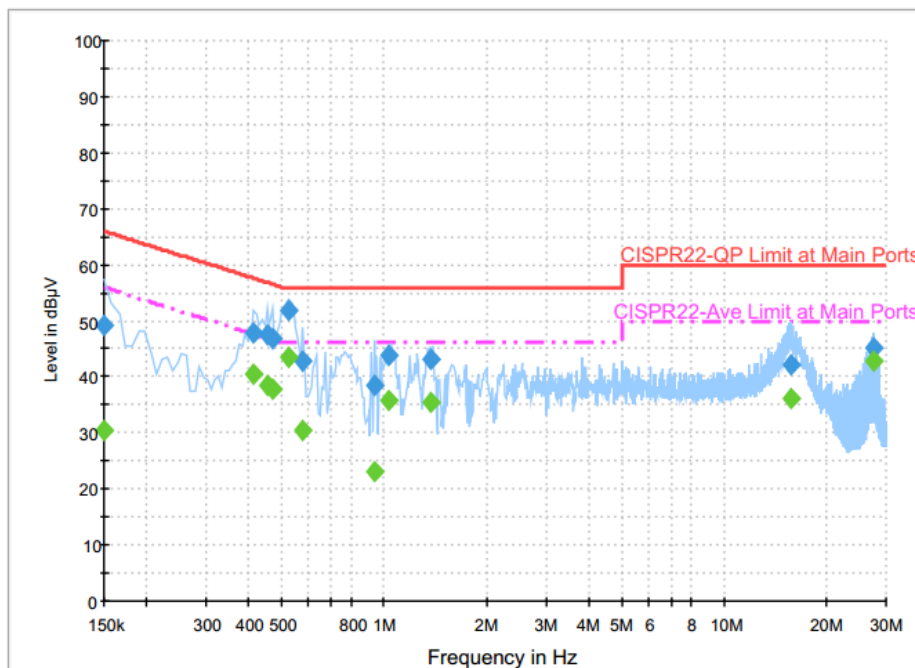
Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.158000	51.5	Off	L1	19.6	14.1	65.6
0.422000	47.9	Off	L1	19.6	9.5	57.4
0.454000	47.5	Off	L1	19.6	9.3	56.8
0.534000	51.3	Off	L1	19.6	4.7	56.0
0.574000	42.0	Off	L1	19.6	14.0	56.0
0.942000	37.8	Off	L1	19.7	18.2	56.0
1.046000	43.4	Off	L1	19.7	12.6	56.0
1.238000	38.3	Off	L1	19.7	17.7	56.0
1.366000	43.0	Off	L1	19.7	13.0	56.0
15.366000	41.8	Off	L1	20.4	18.2	60.0
27.518000	44.9	Off	L1	21.0	15.1	60.0

Test Mode :	Mode 1	Temperature :	23~24°C
Test Engineer :	Kai-Chun Chu	Relative Humidity :	41~42%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN (5GHz) Link + PoE Adapter + LAN Link		


Final Result : Average

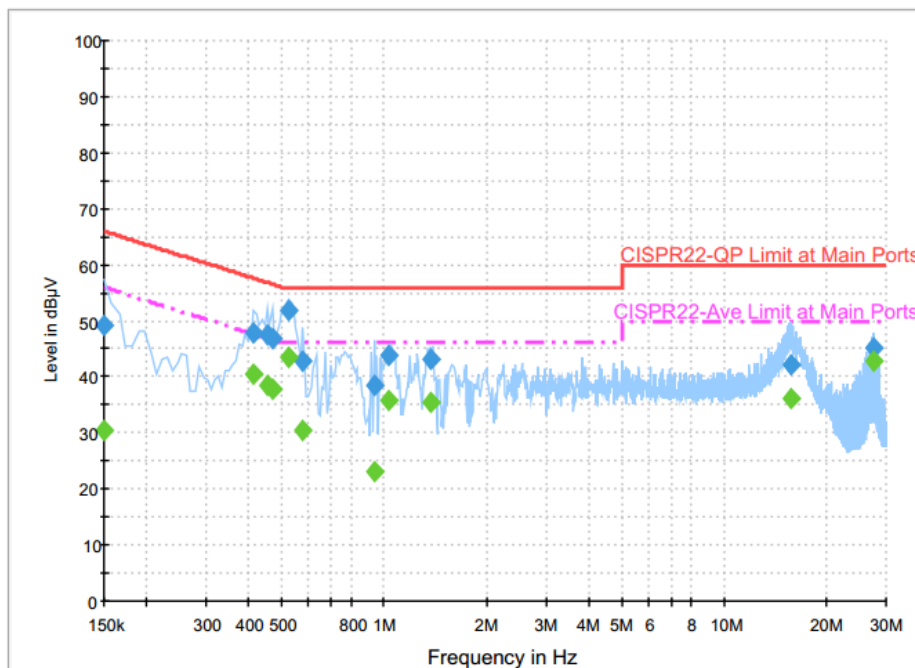
Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.158000	41.8	Off	L1	19.6	13.8	55.6
0.422000	38.4	Off	L1	19.6	9.0	47.4
0.454000	38.0	Off	L1	19.6	8.8	46.8
0.534000	44.0	Off	L1	19.6	2.0	46.0
0.574000	30.4	Off	L1	19.6	15.6	46.0
0.942000	21.5	Off	L1	19.7	24.5	46.0
1.046000	35.2	Off	L1	19.7	10.8	46.0
1.238000	30.5	Off	L1	19.7	15.5	46.0
1.366000	35.5	Off	L1	19.7	10.5	46.0
15.366000	35.4	Off	L1	20.4	14.6	50.0
27.518000	42.1	Off	L1	21.0	7.9	50.0

Test Mode :	Mode 1	Temperature :	23~24°C
Test Engineer :	Kai-Chun Chu	Relative Humidity :	41~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN (5GHz) Link + PoE Adapter + LAN Link		


Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	49.3	Off	N	19.6	16.7	66.0
0.414000	48.0	Off	N	19.6	9.6	57.6
0.454000	47.6	Off	N	19.6	9.2	56.8
0.470000	46.7	Off	N	19.6	9.8	56.5
0.526000	51.9	Off	N	19.6	4.1	56.0
0.574000	42.7	Off	N	19.6	13.3	56.0
0.934000	38.6	Off	N	19.6	17.4	56.0
1.038000	43.8	Off	N	19.6	12.2	56.0
1.366000	43.1	Off	N	19.6	12.9	56.0
15.798000	42.3	Off	N	20.5	17.7	60.0
27.518000	45.0	Off	N	21.2	15.0	60.0

Test Mode :	Mode 1	Temperature :	23~24°C
Test Engineer :	Kai-Chun Chu	Relative Humidity :	41~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN (5GHz) Link + PoE Adapter + LAN Link		


Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	30.5	Off	N	19.6	25.5	56.0
0.414000	40.5	Off	N	19.6	7.1	47.6
0.454000	38.4	Off	N	19.6	8.4	46.8
0.470000	37.8	Off	N	19.6	8.7	46.5
0.526000	43.5	Off	N	19.6	2.5	46.0
0.574000	30.6	Off	N	19.6	15.4	46.0
0.934000	22.9	Off	N	19.6	23.1	46.0
1.038000	35.7	Off	N	19.6	10.3	46.0
1.366000	35.6	Off	N	19.6	10.4	46.0
15.798000	36.1	Off	N	20.5	13.9	50.0
27.518000	42.8	Off	N	21.2	7.2	50.0

3.6 Frequency Stability Measurement

3.6.1 Limit of Frequency Stability

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

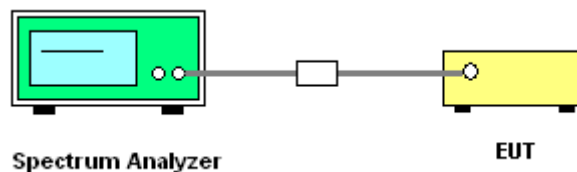
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

1. To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by radiation emissions at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
2. The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10dB lower than the measured peak value.
3. The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two. Those detailed values of frequency deviation are provided in table below.

3.6.4 Test Setup



3.6.5 Test Result of Frequency Stability

Please refer to Appendix A.



3.7 Automatically Discontinue Transmission

3.7.1 Limit of Automatically Discontinue Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

3.7.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.7.3 Test Result of Automatically Discontinue Transmission

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.



3.8 Antenna Requirements

3.8.1 Standard Applicable

According to FCC 47 CFR Section 15.407(a)(1)(2), if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit 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.

3.8.2 Antenna Anti-Replacement Construction

Non-standard antenna connector is used.

3.8.3 Antenna Gain

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = $10 \log(N_{ANT}/N_{SS}=1)$ dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain "DG" is calculated as following table.

				DG	DG	Power	PSD
				for	for	Limit	Limit
	Ant 1	Ant 2	Ant 3	Power	PSD	Reduction	Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
Band I	8.00	8.00	8.00	8.00	12.77	2.00	6.77

Power limit reduction = Composite gain – 6dBi, (min = 0)

PSD limit reduction = Composite gain + PSD Array gain – 6dBi, (min = 0)



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Anritsu	ML2495A	1132003	300MHz~40GHz	Aug. 12, 2015	Apr. 02, 2016 ~ Jun. 17, 2016	Aug. 11, 2016	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1126017	300MHz~40GHz	Aug. 12, 2015	Apr. 02, 2016 ~ Jun. 17, 2016	Aug. 11, 2016	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100057	9kHz-40GHz	Nov. 23, 2015	Apr. 02, 2016 ~ Jun. 17, 2016	Nov. 22, 2016	Conducted (TH05-HY)
AC Power Source y	AC POWER	AFC-500W	F104070011	50Hz~60Hz	Dec. 02, 2015	Apr. 02, 2016 ~ Jun. 17, 2016	Dec. 01, 2016	Conducted (TH05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Sep. 02, 2015	Jun. 11, 2016 ~ Jun. 16, 2016	Sep. 01, 2016	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Nov. 20, 2015	Jun. 11, 2016 ~ Jun. 16, 2016	Nov. 19, 2016	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D	35414	30MHz~1GHz	Nov. 17, 2015	Jun. 11, 2016 ~ Jun. 16, 2016	Nov. 16, 2016	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1326	1GHz ~ 18GHz	Oct. 08, 2015	Jun. 11, 2016 ~ Jun. 16, 2016	Oct. 07, 2016	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 19, 2015	Jun. 11, 2016 ~ Jun. 16, 2016	Nov. 18, 2016	Radiation (03CH11-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1902247	1GHz~18GHz	Jul. 01, 2015	Jun. 11, 2016 ~ Jun. 16, 2016	Jun. 30, 2016	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz ~ 44GHZ	Sep. 24, 2015	Jun. 11, 2016 ~ Jun. 16, 2016	Sep. 23, 2016	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Jun. 11, 2016 ~ Jun. 16, 2016	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Jun. 11, 2016 ~ Jun. 16, 2016	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Jun. 11, 2016 ~ Jun. 16, 2016	N/A	Radiation (03CH11-HY)
Preamplifier	MITEQ	TTA0204	1872107	2GHz~40GHz	Feb. 15, 2016	Jun. 11, 2016 ~ Jun. 16, 2016	Feb. 14, 2017	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 02, 2015	Jun. 11, 2016 ~ Jun. 16, 2016	Nov. 01, 2016	Radiation (03CH11-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	May 31, 2016	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 26, 2015	May 31, 2016	Aug. 25, 2016	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 02, 2015	May 31, 2016	Dec. 01, 2016	Conduction (CO05-HY)



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.26
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.90
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Appendix A. Conducted Test Results

Test Engineer:	Bill Kuo	Temperature:	21~25	°C
Test Date:	2016/04/02 ~ 2016/6/17	Relative Humidity:	51~54	%

TEST RESULTS DATA
26dB and 99% OBW

Band I																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	26 dB Bandwidth (MHz)				99% Bandwidth (MHz)				IC 99% Bandwidth EIRP Limit (dBm)			
					Ant 1	Ant 2	Ant 3	Ant 4	Ant 1	Ant 2	Ant 3	Ant 4	Ant 1	Ant 2	Ant 3	Ant 4
11a	6Mbps	3	36	5180	24.56	24.00	23.52		17.85	17.70	17.50		22.52	22.48	22.43	
11a	6Mbps	3	44	5220	24.5	23.84	23.84		17.75	17.65	17.70		22.49	22.47	22.48	
11a	6Mbps	3	48	5240	23.68	24.24	23.68		17.65	17.75	17.60		22.47	22.49	22.46	
HT20	MCS0	3	36	5180	24.96	24.64	24.32		18.80	18.75	18.70		22.74	22.73	22.72	
HT20	MCS0	3	44	5220	25.28	25.20	24.48		18.80	18.85	18.65		22.74	22.75	22.71	
HT20	MCS0	3	48	5240	25.12	24.78	25.20		18.75	18.90	18.80		22.73	22.76	22.74	
HT40	MCS0	3	38	5190	46.88	47.04	45.12		37.00	36.70	36.70		23.01	23.01	23.01	
HT40	MCS0	3	46	5230	46.72	47.60	46.24		36.80	37.00	36.90		23.01	23.01	23.01	
VHT20	MCS0	3	36	5180	25.29	25.20	24.96		18.75	18.80	18.70		22.73	22.74	22.72	
VHT20	MCS0	3	44	5220	24.79	24.78	24.00		18.75	18.80	18.70		22.73	22.74	22.72	
VHT20	MCS0	3	48	5240	25.28	25.04	24.48		18.80	18.75	18.70		22.74	22.73	22.72	
VHT40	MCS0	3	38	5190	45.44	45.76	46.12		36.80	37.00	36.90		23.01	23.01	23.01	
VHT40	MCS0	3	46	5230	46.24	45.12	45.12		36.70	36.80	36.90		23.01	23.01	23.01	
VHT80	MCS0	3	42	5210	91.2	88.80	88.80		75.84	75.96	75.84		23.01	23.01	23.01	

TEST RESULTS DATA
Average Power Table

FCC Band I															
Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Ant	Average Conducted Power with duty factor (dBm)					FCC Power Limit (dBm)	DG (dBi)	FCC EIRP Power (dBm)	FCC EIRP Power Limit (dBm)	Pass/Fail
						Ant 1	Ant 2	Ant 3	Ant 4	SUM					
11a	6Mbps	3	36	5180	1+2+3	8.20	7.89	8.04		12.81	13.00	8.00	20.81	-	Pass
11a	6Mbps	3	44	5220	1+2+3	8.32	8.12	8.23		12.99	13.00	8.00	20.99	-	Pass
11a	6Mbps	3	48	5240	1+2+3	8.18	8.19	8.26		12.98	13.00	8.00	20.98	-	Pass
HT20	MCS0	3	36	5180	1+2+3	8.12	7.96	7.98		12.80	13.00	8.00	20.80	-	Pass
HT20	MCS0	3	44	5220	1+2+3	8.19	8.23	8.22		12.99	13.00	8.00	20.99	-	Pass
HT20	MCS0	3	48	5240	1+2+3	8.10	8.20	8.24		12.96	13.00	8.00	20.96	-	Pass
HT40	MCS0	3	38	5190	1+2+3	7.93	7.76	7.83		12.61	13.00	8.00	20.61	-	Pass
HT40	MCS0	3	46	5230	1+2+3	7.83	8.03	7.95		12.71	13.00	8.00	20.71	-	Pass
VHT20	MCS0	3	36	5180	1+2+3	8.08	7.85	8.13		12.79	13.00	8.00	20.79	-	Pass
VHT20	MCS0	3	44	5220	1+2+3	8.22	8.22	8.20		12.98	13.00	8.00	20.98	-	Pass
VHT20	MCS0	3	48	5240	1+2+3	8.05	8.16	8.19		12.91	13.00	8.00	20.91	-	Pass
VHT40	MCS0	3	38	5190	1+2+3	7.86	7.77	7.74		12.56	13.00	8.00	20.56	-	Pass
VHT40	MCS0	3	46	5230	1+2+3	7.83	7.98	7.94		12.69	13.00	8.00	20.69	-	Pass
VHT80	MCS0	3	42	5210	1+2+3	7.71	7.74	7.74		12.50	13.00	8.00	20.50	-	Pass

TEST RESULTS DATA
Power Spectral Density

FCC Band I														
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Ant	Duty Factor (dB)				Average PSD with Duty Factor (dBm/MHz)	PSD Limit (dBm/MHz)	DG (dBi)		Pass /Fail
						Ant 1	Ant 2	Ant 3	Ant 4					
11a	6Mbps	3	36	5180	1+2+3	0.22	0.20	0.23		1.498	10.23	12.77		Pass
11a	6Mbps	3	44	5220	1+2+3	0.22	0.20	0.23		1.542	10.23	12.77		Pass
11a	6Mbps	3	48	5240	1+2+3	0.22	0.20	0.23		1.231	10.23	12.77		Pass
HT20	MCS0	3	36	5180	1+2+3	0.21	0.21	0.21		0.961	10.23	12.77		Pass
HT20	MCS0	3	44	5220	1+2+3	0.21	0.21	0.21		0.755	10.23	12.77		Pass
HT20	MCS0	3	48	5240	1+2+3	0.21	0.21	0.21		0.721	10.23	12.77		Pass
HT40	MCS0	3	38	5190	1+2+3	0.44	0.47	0.44		-3.397	10.23	12.77		Pass
HT40	MCS0	3	46	5230	1+2+3	0.44	0.47	0.44		-2.8	10.23	12.77		Pass
VHT20	MCS0	3	36	5180	1+2+3	0.23	0.24	0.24		1.001	10.23	12.77		Pass
VHT20	MCS0	3	44	5220	1+2+3	0.23	0.24	0.24		0.468	10.23	12.77		Pass
VHT20	MCS0	3	48	5240	1+2+3	0.23	0.24	0.24		0.664	10.23	12.77		Pass
VHT40	MCS0	3	38	5190	1+2+3	0.44	0.41	0.42		-3.359	10.23	12.77		Pass
VHT40	MCS0	3	46	5230	1+2+3	0.44	0.41	0.42		-2.767	10.23	12.77		Pass
VHT80	MCS0	3	42	5210	1+2+3	0.82	0.91	0.85		-7.791	10.23	12.77		Pass

TEST RESULTS DATA
Frequency Stability

Band I										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (°C)	Voltage (V)	Note
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	20	108	
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	20	132	
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	20	120	
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	-30	120	
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	50	120	



Appendix B. Radiated Spurious Emission

Test Engineer :	Ken Wu, JC Liang, Bill Chang, and Jacky Su	Temperature :	20~23°C
		Relative Humidity :	45~50%

Band 1 - 5150~5250MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 36 5180MHz		5134.1	52.49	-21.51	74	44.18	31.56	10.22	33.47	333	360	P	H
		5134.25	44.52	-9.48	54	36.21	31.56	10.22	33.47	333	360	A	H
	*	5180	103.65	-	-	95.27	31.62	10.23	33.47	333	360	P	H
	*	5180	98.61	-	-	90.23	31.62	10.23	33.47	333	360	A	H
													H
													H
		5106.95	48.66	-25.34	74	40.37	31.54	10.22	33.47	393	236	P	V
		5000	41.65	-12.35	54	33.53	31.4	10.19	33.47	393	236	A	V
	*	5180	94.05	-	-	85.67	31.62	10.23	33.47	393	236	P	V
	*	5180	84.92	-	-	76.54	31.62	10.23	33.47	393	236	A	V
													V
													V
802.11a CH 44 5220MHz		5138.6	50.56	-23.44	74	42.25	31.56	10.22	33.47	332	3	P	H
		5125.1	43.35	-10.65	54	35.04	31.56	10.22	33.47	332	3	A	H
	*	5220	105.54	-	-	97.11	31.66	10.24	33.47	332	3	P	H
	*	5220	97.77	-	-	89.34	31.66	10.24	33.47	332	3	A	H
		5380.69	51.08	-22.92	74	41.83	31.86	10.87	33.48	332	3	P	H
		5458.79	41.69	-12.31	54	32.39	31.94	10.84	33.48	332	3	A	H
		5085.2	49.1	-24.9	74	40.86	31.5	10.21	33.47	390	246	P	V
		5000	40.74	-13.26	54	32.62	31.4	10.19	33.47	390	246	A	V
	*	5220	94.75	-	-	86.32	31.66	10.24	33.47	390	246	P	V
	*	5220	83.32	-	-	74.89	31.66	10.24	33.47	390	246	A	V
		5415.01	48.93	-25.07	74	39.64	31.9	10.87	33.48	390	246	P	V
		5458.9	39.36	-14.64	54	30.06	31.94	10.84	33.48	390	246	A	V



802.11a CH 48 5240MHz		5087	50.61	-23.39	74	42.37	31.5	10.21	33.47	321	360	P	H
		5082.8	43.58	-10.42	54	35.34	31.5	10.21	33.47	321	360	A	H
	*	5240	104.97	-	-	96.39	31.68	10.37	33.47	321	360	P	H
	*	5240	97.69	-	-	89.11	31.68	10.37	33.47	321	360	A	H
		5442.51	50.34	-23.66	74	41.06	31.92	10.84	33.48	321	360	P	H
		5403.57	41.83	-12.17	54	32.56	31.88	10.87	33.48	321	360	A	H
		5012.75	48.68	-25.32	74	40.54	31.42	10.19	33.47	385	236	P	V
		5000	41.25	-12.75	54	33.13	31.4	10.19	33.47	385	236	A	V
	*	5240	94.59	-	-	86.01	31.68	10.37	33.47	385	236	P	V
	*	5240	84.41	-	-	75.83	31.68	10.37	33.47	385	236	A	V
		5367.38	48.27	-25.73	74	39.16	31.84	10.75	33.48	385	236	P	V
		5438.66	39.49	-14.51	54	30.21	31.92	10.84	33.48	385	236	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 36 5180MHz		10360	62.38	-11.62	74	75.23	39.79	14.86	67.5	184	186	P	H
		10360	53.54	-0.46	54	66.39	39.79	14.86	67.5	184	186	A	H
		15540	49.28	-24.72	74	58.18	38.6	17.89	65.39	100	0	P	H
													H
		10360	62.12	-11.88	74	74.97	39.79	14.86	67.5	175	162	P	V
		10360	52.53	-1.47	54	65.38	39.79	14.86	67.5	175	162	A	V
		15540	43.56	-30.44	74	52.46	38.6	17.89	65.39	100	0	P	V
													V
802.11a CH 44 5220MHz		10440	59.78	-14.22	74	72.48	39.89	14.91	67.5	270	154	P	H
		10440	50.6	-3.4	54	63.3	39.89	14.91	67.5	270	154	A	H
		15660	47.33	-26.67	74	56.53	38.23	17.94	65.37	100	0	P	H
													H
		10440	57.71	-16.29	74	70.41	39.89	14.91	67.5	178	168	P	V
		10440	49.26	-4.74	54	61.96	39.89	14.91	67.5	178	168	A	V
		15660	43.38	-30.62	74	52.58	38.23	17.94	65.37	100	0	P	V
													V
802.11a CH 48 5240MHz		10480	62.11	-11.89	74	74.7	39.97	14.94	67.5	230	173	P	H
		10480	52.67	-1.33	54	65.26	39.97	14.94	67.5	230	173	A	H
		15720	49.05	-24.95	74	58.41	38.03	17.97	65.36	100	0	P	H
													H
		10480	57	-17	74	69.59	39.97	14.94	67.5	177	174	P	V
		10480	49.54	-4.46	54	62.13	39.97	14.94	67.5	177	174	A	V
		15720	42.21	-31.79	74	51.57	38.03	17.97	65.36	100	0	P	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 36 5180MHz		5142.35	52.15	-21.85	74	43.81	31.58	10.23	33.47	333	4	P	H
		5128.55	44.2	-9.8	54	35.89	31.56	10.22	33.47	333	4	A	H
	*	5180	104.62	-	-	96.24	31.62	10.23	33.47	333	4	P	H
	*	5180	94.7	-	-	86.32	31.62	10.23	33.47	333	4	A	H
													H
													H
		5109.5	49.15	-24.85	74	40.86	31.54	10.22	33.47	393	236	P	V
		5000	41.35	-12.65	54	33.23	31.4	10.19	33.47	393	236	A	V
	*	5180	94.02	-	-	85.64	31.62	10.23	33.47	393	236	P	V
	*	5180	84.15	-	-	75.77	31.62	10.23	33.47	393	236	A	V
													V
													V
802.11n HT20 CH 44 5220MHz		5095.25	50.87	-23.13	74	42.61	31.52	10.21	33.47	333	3	P	H
		5124.05	42.68	-11.32	54	34.37	31.56	10.22	33.47	333	3	A	H
	*	5220	105.03	-	-	96.6	31.66	10.24	33.47	333	3	P	H
	*	5220	96.75	-	-	88.32	31.66	10.24	33.47	333	3	A	H
		5439.21	50.24	-23.76	74	40.96	31.92	10.84	33.48	333	3	P	H
		5456.81	41.54	-12.46	54	32.24	31.94	10.84	33.48	333	3	A	H
		5037.05	48.4	-25.6	74	40.23	31.44	10.2	33.47	400	246	P	V
		5049.65	39.78	-14.22	54	31.59	31.46	10.2	33.47	400	246	A	V
	*	5220	91.99	-	-	83.56	31.66	10.24	33.47	400	246	P	V
	*	5220	82.48	-	-	74.05	31.66	10.24	33.47	400	246	A	V
		5367.49	48.03	-25.97	74	38.92	31.84	10.75	33.48	400	246	P	V
		5440.2	39.57	-14.43	54	30.29	31.92	10.84	33.48	400	246	A	V



802.11n HT20 CH 48 5240MHz		5085.95	50.93	-23.07	74	42.69	31.5	10.21	33.47	323	360	P	H
		5085.95	43.48	-10.52	54	35.24	31.5	10.21	33.47	323	360	A	H
	*	5240	104.39	-	-	95.81	31.68	10.37	33.47	323	360	P	H
	*	5240	96.9	-	-	88.32	31.68	10.37	33.47	323	360	A	H
		5363.97	50.4	-23.6	74	41.29	31.84	10.75	33.48	323	360	P	H
		5407.31	41.94	-12.06	54	32.67	31.88	10.87	33.48	323	360	A	H
		5102.15	48.3	-25.7	74	40.03	31.52	10.22	33.47	381	237	P	V
		5000	39.91	-14.09	54	31.79	31.4	10.19	33.47	381	237	A	V
	*	5240	95.22	-	-	86.64	31.68	10.37	33.47	381	237	P	V
	*	5240	84.43	-	-	75.85	31.68	10.37	33.47	381	237	A	V
		5382.34	49.02	-24.98	74	39.77	31.86	10.87	33.48	381	237	P	V
		5452.96	39.38	-14.62	54	30.08	31.94	10.84	33.48	381	237	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 36 5180MHz		10360	61.33	-12.67	74	74.18	39.79	14.86	67.5	267	171	P	H
		10360	52.41	-1.59	54	65.26	39.79	14.86	67.5	267	171	A	H
		15540	49.05	-24.95	74	57.95	38.6	17.89	65.39	100	0	P	H
													H
		10360	59.95	-14.05	74	72.8	39.79	14.86	67.5	175	163	P	V
		10360	52.02	-1.98	54	64.87	39.79	14.86	67.5	175	163	A	V
		15540	44.44	-29.56	74	53.34	38.6	17.89	65.39	100	0	P	V
													V
802.11n HT20 CH 44 5220MHz		10440	61.21	-12.79	74	73.91	39.89	14.91	67.5	230	169	P	H
		10440	52.7	-1.3	54	65.4	39.89	14.91	67.5	230	169	A	H
		15660	48.53	-25.47	74	57.73	38.23	17.94	65.37	100	0	P	H
													H
		10440	60.46	-13.54	74	73.16	39.89	14.91	67.5	247	177	P	V
		10440	50.57	-3.43	54	63.27	39.89	14.91	67.5	247	177	A	V
		15660	42.26	-31.74	74	51.46	38.23	17.94	65.37	100	0	P	V
													V
802.11n HT20 CH 48 5240MHz		10480	60.03	-13.97	74	72.62	39.97	14.94	67.5	290	208	P	H
		10480	51.77	-2.23	54	64.36	39.97	14.94	67.5	290	208	A	H
		15720	47.01	-26.99	74	56.37	38.03	17.97	65.36	100	0	P	H
													H
		10480	58.63	-15.37	74	71.22	39.97	14.94	67.5	100	168	P	V
		10480	50.29	-3.71	54	62.88	39.97	14.94	67.5	100	168	A	V
		15720	43.41	-30.59	74	52.77	38.03	17.97	65.36	100	0	P	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 38 5190MHz		5145.65	51.77	-22.23	74	43.43	31.58	10.23	33.47	312	0	P	H
		5143.7	43.72	-10.28	54	35.38	31.58	10.23	33.47	312	0	A	H
	*	5190	102.39	-	-	94	31.62	10.24	33.47	312	0	P	H
	*	5190	92.62	-	-	84.23	31.62	10.24	33.47	312	0	A	H
		5357.15	50.97	-23.03	74	41.88	31.82	10.75	33.48	312	0	P	H
		5441.85	43.04	-10.96	54	33.76	31.92	10.84	33.48	312	0	A	H
		5085.05	49.13	-24.87	74	40.89	31.5	10.21	33.47	374	247	P	V
		5000	41.2	-12.8	54	33.08	31.4	10.19	33.47	374	247	A	V
	*	5190	90.04	-	-	81.65	31.62	10.24	33.47	374	247	P	V
	*	5190	80.33	-	-	71.94	31.62	10.24	33.47	374	247	A	V
		5432.06	49.52	-24.48	74	40.24	31.92	10.84	33.48	374	247	P	V
		5411.93	40.25	-13.75	54	30.96	31.9	10.87	33.48	374	247	A	V
802.11n HT40 CH 46 5230MHz		5085.95	51.09	-22.91	74	42.85	31.5	10.21	33.47	320	3	P	H
		5119.55	42.74	-11.26	54	34.45	31.54	10.22	33.47	320	3	A	H
	*	5230	102.13	-	-	93.55	31.68	10.37	33.47	320	3	P	H
	*	5230	92.04	-	-	83.46	31.68	10.37	33.47	320	3	A	H
		5422.82	51.27	-22.73	74	42.01	31.9	10.84	33.48	320	3	P	H
		5399.17	41.73	-12.27	54	32.46	31.88	10.87	33.48	320	3	A	H
		5088.5	48.42	-25.58	74	40.18	31.5	10.21	33.47	387	249	P	V
		5000	40.73	-13.27	54	32.61	31.4	10.19	33.47	387	249	A	V
	*	5230	90.12	-	-	81.54	31.68	10.37	33.47	387	249	P	V
	*	5230	80.22	-	-	71.64	31.68	10.37	33.47	387	249	A	V
		5454.72	48.87	-25.13	74	39.57	31.94	10.84	33.48	387	249	P	V
		5443.17	39.94	-14.06	54	30.66	31.92	10.84	33.48	387	249	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 38 5190MHz		10380	49.07	-24.93	74	61.9	39.81	14.86	67.5	100	0	P	H
		15570	39.05	-34.95	74	48.05	38.49	17.9	65.39	100	0	P	H
													H
													H
		10380	46.99	-27.01	74	59.82	39.81	14.86	67.5	100	0	P	V
		15570	39.32	-34.68	74	48.32	38.49	17.9	65.39	100	0	P	V
													V
													V
802.11n HT40 CH 46 5230MHz		10460	56.23	-17.77	74	68.9	39.92	14.91	67.5	257	172	P	H
		10460	48.39	-5.61	54	61.06	39.92	14.91	67.5	257	172	A	H
		15690	43.89	-30.11	74	53.16	38.13	17.96	65.36	100	0	P	H
													H
		10460	54.37	-19.63	74	67.04	39.92	14.91	67.5	100	165	P	V
		10460	46.66	-7.34	54	59.33	39.92	14.91	67.5	100	165	A	V
		15690	39.79	-34.21	74	49.06	38.13	17.96	65.36	100	0	P	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz

WIFI 802.11ac VHT80 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT80 CH 42 5210MHz		5149.85	55.16	-18.84	74	46.82	31.58	10.23	33.47	317	3	P	H
		5150	48.8	-5.2	54	40.46	31.58	10.23	33.47	317	3	A	H
	*	5210	99.45	-	-	91.02	31.66	10.24	33.47	317	3	P	H
	*	5210	89.66	-	-	81.23	31.66	10.24	33.47	317	3	A	H
		5389.27	49.88	-24.12	74	40.63	31.86	10.87	33.48	317	3	P	H
		5445.81	42.92	-11.08	54	33.62	31.94	10.84	33.48	317	3	A	H
		5080.7	48.43	-25.57	74	40.19	31.5	10.21	33.47	370	238	P	V
		5000.15	42.26	-11.74	54	34.14	31.4	10.19	33.47	370	238	A	V
	*	5210	86.55	-	-	78.12	31.66	10.24	33.47	370	238	P	V
	*	5210	76.63	-	-	68.2	31.66	10.24	33.47	370	238	A	V
		5383.22	47.86	-26.14	74	38.61	31.86	10.87	33.48	370	238	P	V
		5450.65	41.04	-12.96	54	31.74	31.94	10.84	33.48	370	238	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

**Band 1 5150~5250MHz****WIFI 802.11ac VHT80 (Harmonic @ 3m)**

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT80 CH 42 5210MHz		10420	44.34	-29.66	74	57.08	39.87	14.89	67.5	100	0	P	H
		15630	38.48	-35.52	74	47.62	38.29	17.94	65.37	100	0	P	H
													H
													H
		10420	46.33	-27.67	74	59.07	39.87	14.89	67.5	100	0	P	V
		15630	37.58	-36.42	74	46.72	38.29	17.94	65.37	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

WIFI 802.11ac VHT80 (LF @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ac VHT80 LF		72.93	35.47	-4.53	40	53.34	12.75	1.17	31.79	125	80	P	H
		139.08	32.07	-11.43	43.5	44.46	17.91	1.48	31.78			P	H
		219.54	33.76	-12.24	46	47.6	16.2	1.74	31.78			P	H
		325.2	27.11	-18.89	46	36.25	20.4	2.23	31.77			P	H
		650	33.36	-12.64	46	35.84	26.2	3.36	32.04			P	H
		974.8	36.31	-17.69	54	32.71	30.55	3.89	30.84			P	H
													H
													H
													H
													H
													H
													H
		38.64	36.02	-3.98	40	46.05	20.86	0.93	31.82			P	V
		82.65	36.41	-3.59	40	53.09	13.94	1.17	31.79	100	5	P	V
		160.14	25.75	-17.75	43.5	38.95	16.9	1.68	31.78			P	V
		325.2	24.37	-21.63	46	33.51	20.4	2.23	31.77			P	V
		650	28.97	-17.03	46	31.45	26.2	3.36	32.04			P	V
		969.9	33.93	-20.07	54	30.36	30.56	3.89	30.88			P	V
													V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is over limit line.
P/A	Peak or Average
H/V	Horizontal or Vertical



A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.



Appendix C. Radiated Spurious Emission

Test Engineer :	Ken Wu, JC Liang, Bill Chang, and Jacky Su	Temperature :	20~23°C
		Relative Humidity :	45~50%

Note symbol

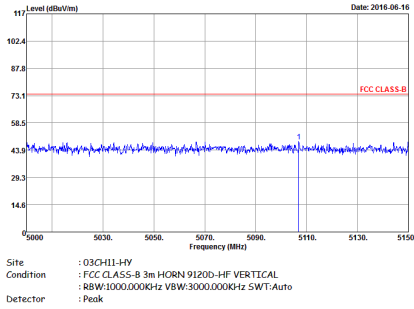
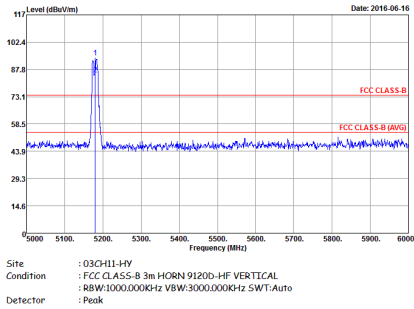
-L	Low channel location
-R	High channel location



Band 1 - 5150~5250MHz
WIFI 802.11a (Band Edge @ 3m)

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH36 5180MHz	
1+2	Horizontal	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL Detector : Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL Detector : Peak
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF HORIZONTAL Detector : Peak	

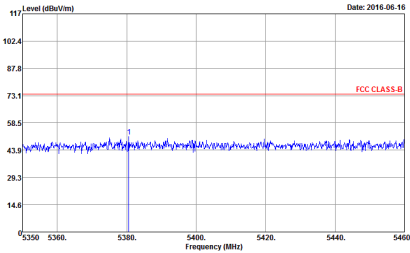
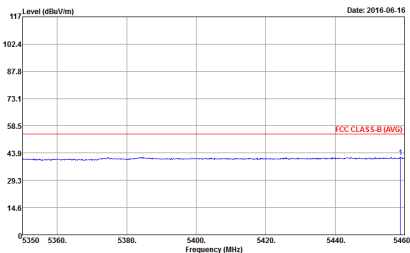


WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH36 5180MHz	
1+2	Vertical	Vertical
Peak		
Avg.		

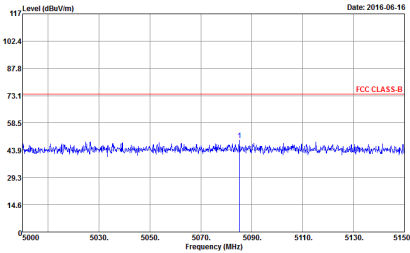
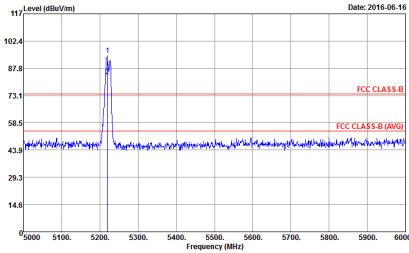
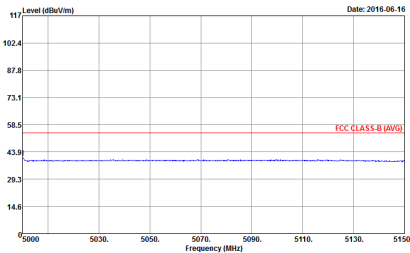


WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH44 5220MHz - L	
1+2	Horizontal	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak	

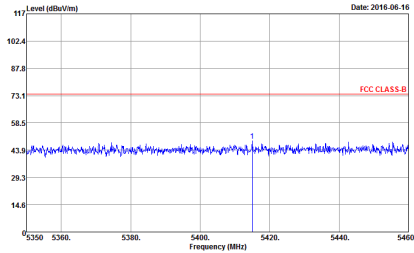
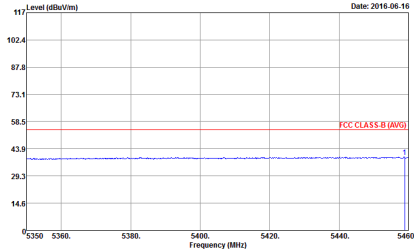


WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH44 5220MHz - R	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	
Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak	



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH44 5220MHz - L	
1+2	Vertical	Fundamental
Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak
Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak	



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH44 5220MHz - R	
1+2	Vertical	Fundamental
Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	
Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak	



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH48 5240MHz - L	
1+2	Horizontal	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak	



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH48 5240MHz - R	
1+2	Horizontal	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak	



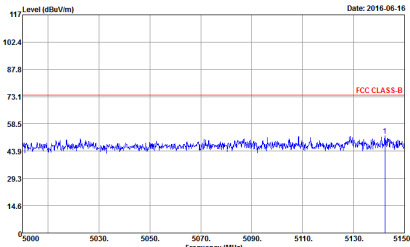
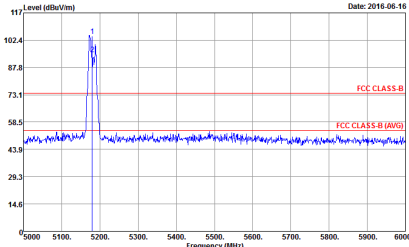
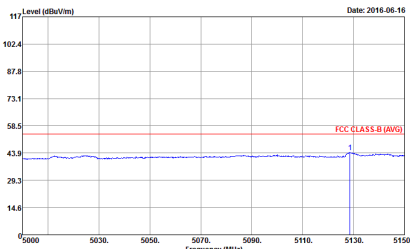
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH48 5240MHz - L	
1+2	Vertical	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak	



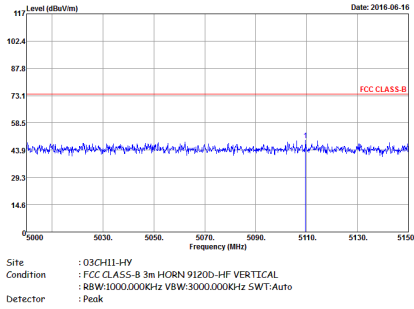
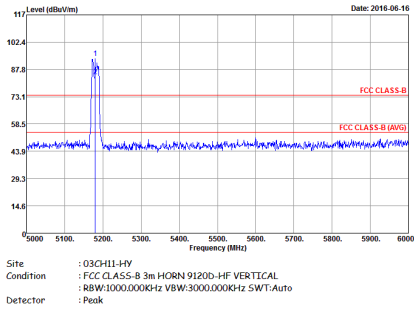
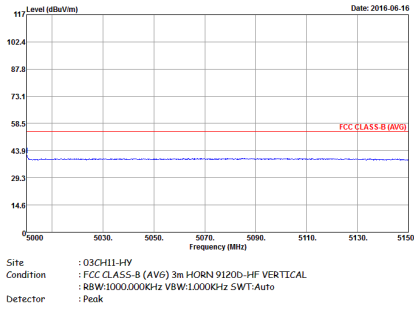
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH48 5240MHz - R	
1+2	Vertical	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak	



Band 1 5150~5250MHz
WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH36 5180MHz	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL Detector : Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL Detector : Peak
Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF HORIZONTAL Detector : Peak	



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH36 5180MHz	
1+2	Vertical	Fundamental
Peak		
Avg.		



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH44 5220MHz - L	
1+2	Horizontal	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak	

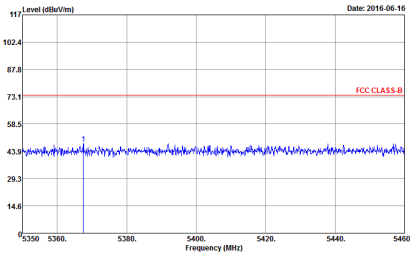
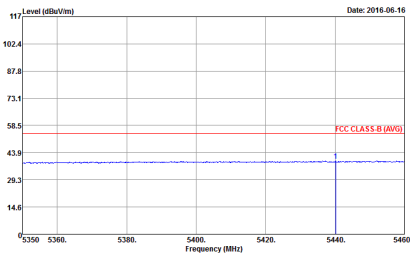


WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH44 5220MHz - R	
1+2	Horizontal	Fundamental
Peak	Site : 03CHI1-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	
Avg.	Site : 03CHI1-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak	

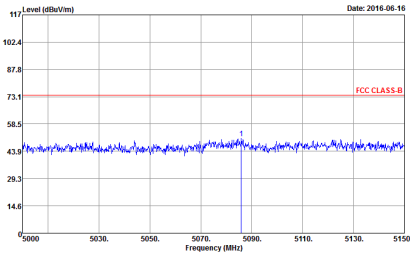
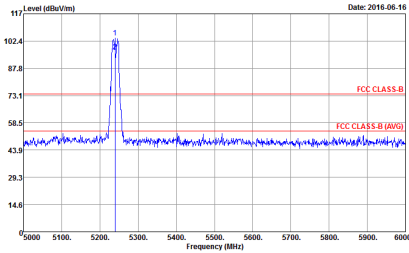
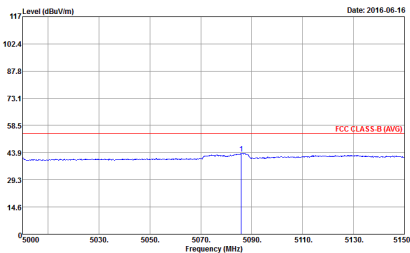


WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH44 5220MHz - L	
1+2	Vertical	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak	

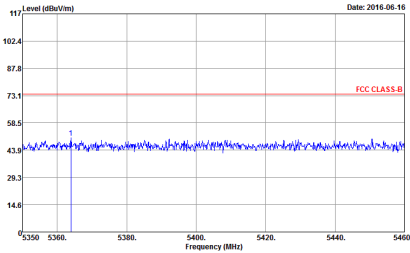
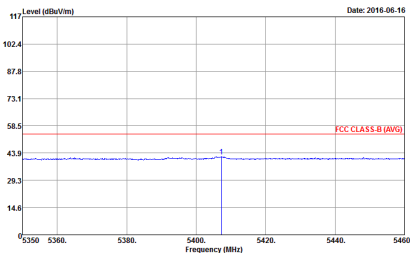


WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH44 5220MHz - R	
1+2	Vertical	Fundamental
Peak	 Site : 03CH11-JHY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	
Avg.	 Site : 03CH11-JHY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak	

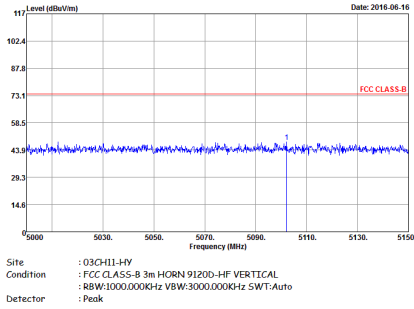
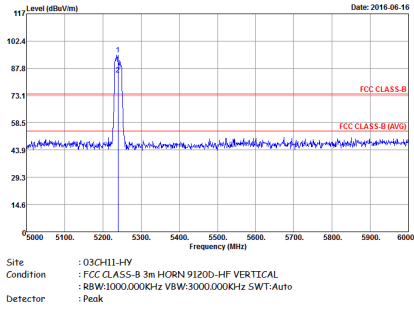
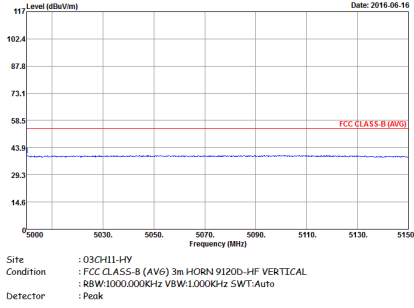


WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH48 5240MHz - L	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak
Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak	

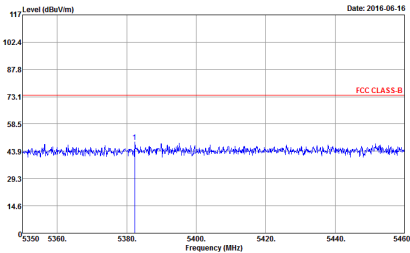
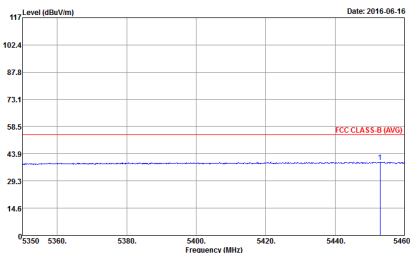


WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH48 5240MHz - R	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	
Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak	



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH48 5240MHz - L	
1+2	Vertical	Fundamental
Peak		
Avg.		



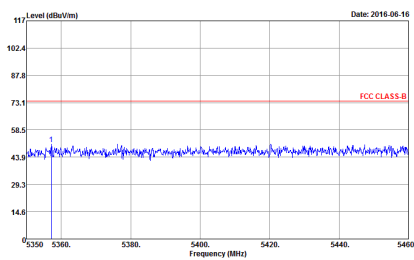
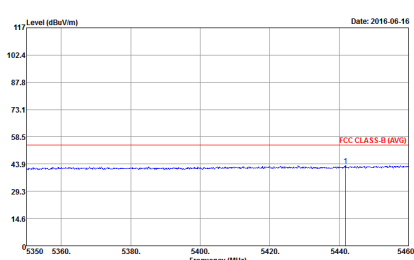
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH48 5240MHz - R	
1+2	Vertical	Fundamental
Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	
Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak	



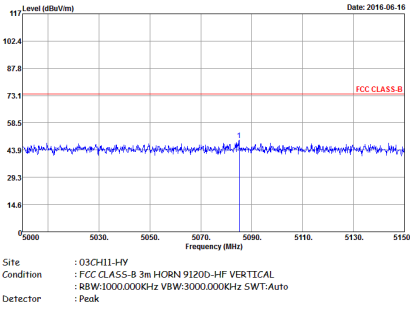
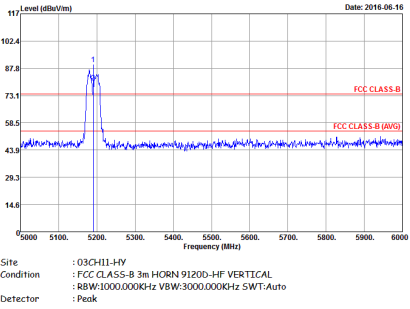
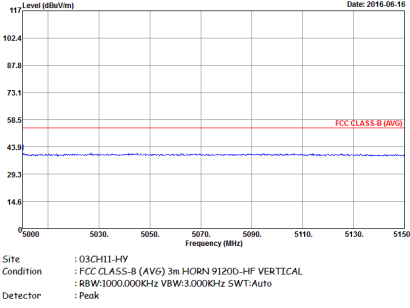
Band 1 5150~5250MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - L	
1+2	Horizontal	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak	



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - R	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	
Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak	



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - L	
1+2	Vertical	Fundamental
Peak		
Avg.		

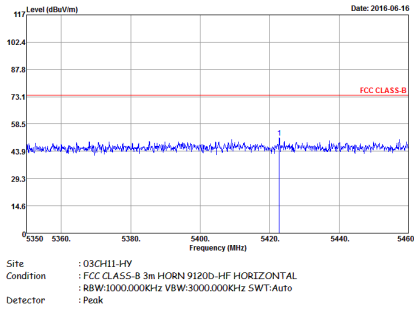
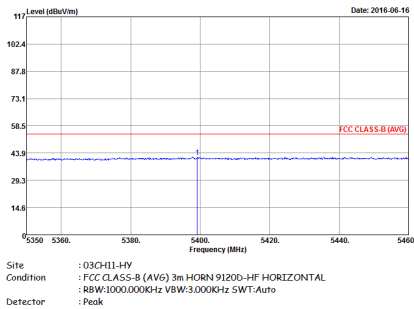


WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - R	
1+2	Vertical	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak	



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH46 5230MHz - L	
1+2	Horizontal	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak	

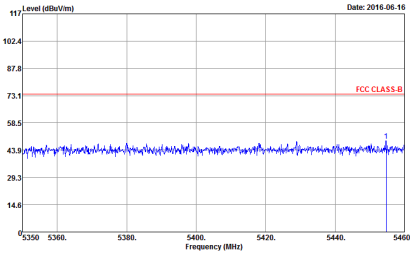
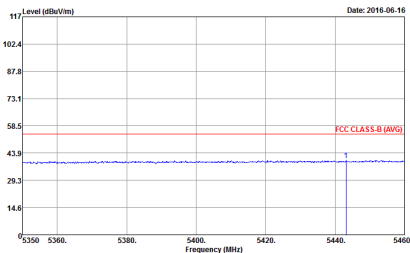


WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH46 5230MHz - R	
1+2	Horizontal	Fundamental
Peak		
Avg.		



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH46 5230MHz - L	
1+2	Vertical	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak	



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH46 5230MHz - R	
1+2	Vertical	Fundamental
Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	
Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak	



Band 1 5150~5250MHz
WIFI 802.11ac VHT80 (Band Edge @ 3m)

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH42 5210MHz - L	
1+2	Horizontal	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:10.000KHz SWT:Auto Detector : Peak	



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH42 5210MHz - R	
1+2	Horizontal	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF HORIZONTAL RBW:1000.000KHz VBW:10.000KHz SWT:Auto Detector : Peak	



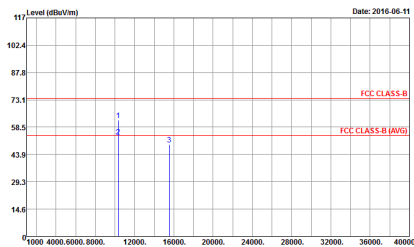
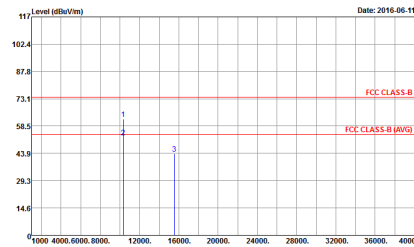
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH42 5210MHz - L	
1+2	Vertical	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:10.000KHz SWT:Auto Detector : Peak	



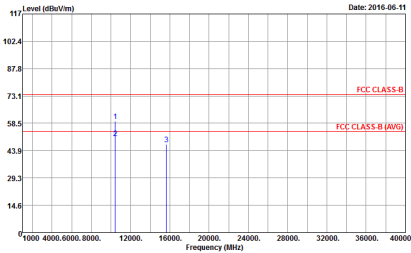
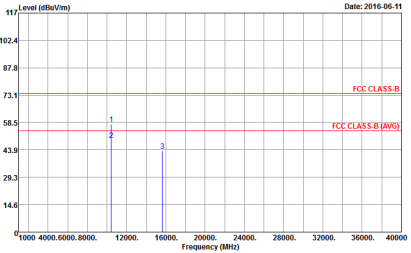
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH42 5210MHz - R	
1+2	Vertical	Fundamental
Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	
Avg.	Site : 03CH11-HY Condition : FCC CLASS-B (AVG) 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:10.000KHz SWT:Auto Detector : Peak	



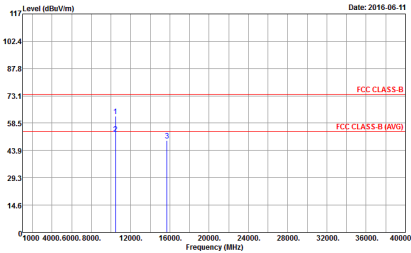
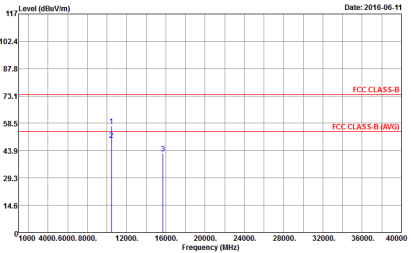
Band 1 - 5150~5250MHz
WIFI 802.11a (Harmonic @ 3m)

WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11a CH36 5180MHz	
1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 HORIZONTAL Detector : Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 VERTICAL Detector : Peak



WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11a CH44 5220MHz	
1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 HORIZONTAL Detector : Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 VERTICAL Detector : Peak



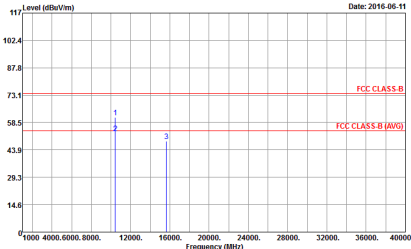
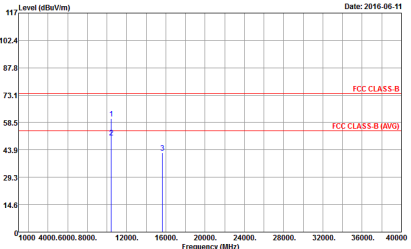
WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11a CH48 5240MHz	
1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 HORIZONTAL Detector : Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 VERTICAL Detector : Peak



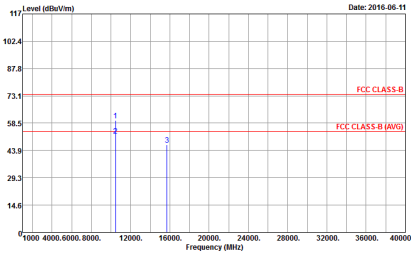
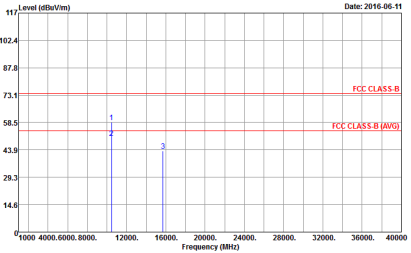
Band 1 5150~5250MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT20 CH36 5180MHz	
1+2	Horizontal	Vertical
Peak Avg.	Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 HORIZONTAL Detector : Peak	Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 VERTICAL Detector : Peak



WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT20 CH44 5220MHz	
1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 HORIZONTAL Detector : Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 VERTICAL Detector : Peak



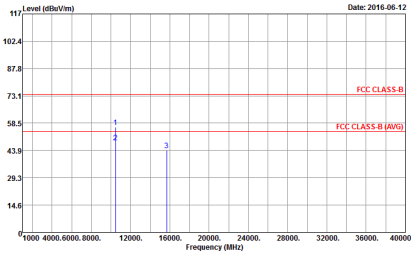
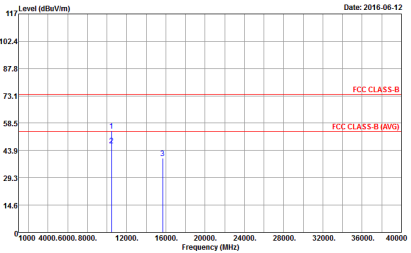
WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT20 CH48 5240MHz	
1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 HORIZONTAL Detector : Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 VERTICAL Detector : Peak



Band 1 5150~5250MHz
WIFI 802.11n HT40 (Harmonic @ 3m)

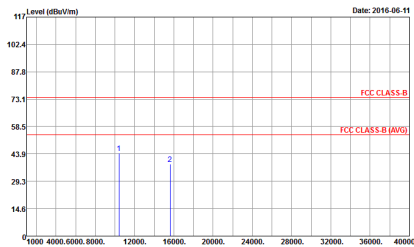
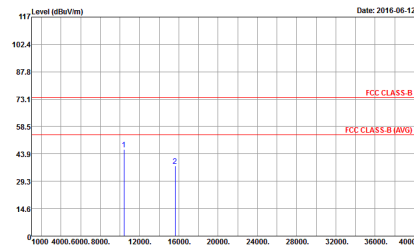
WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT40 CH38 5190MHz	
1+2	Horizontal	Vertical
Peak Avg.	Horizontal Peak and Average spectrum plot. The y-axis is Level (dBuV/m) from 14.6 to 117. The x-axis is Frequency (MHz) from 4000 to 40000. Two peaks are labeled 1 and 2. Peak 1 is at approximately 117 dBuV/m and Peak 2 is at approximately 43.9 dBuV/m. Red lines indicate FCC CLASS-B and FCC CLASS-B (AVG) limits. Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 HORIZONTAL Detector : Peak	Vertical Peak and Average spectrum plot. The y-axis is Level (dBuV/m) from 14.6 to 117. The x-axis is Frequency (MHz) from 4000 to 40000. Two peaks are labeled 1 and 2. Peak 1 is at approximately 117 dBuV/m and Peak 2 is at approximately 43.9 dBuV/m. Red lines indicate FCC CLASS-B and FCC CLASS-B (AVG) limits. Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 VERTICAL Detector : Peak



WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT40 CH46 5230MHz	
1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 HORIZONTAL Detector : Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 VERTICAL Detector : Peak

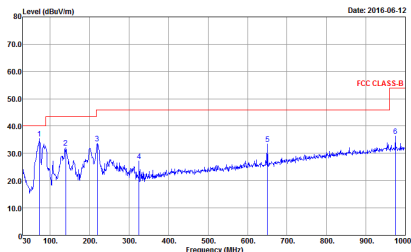
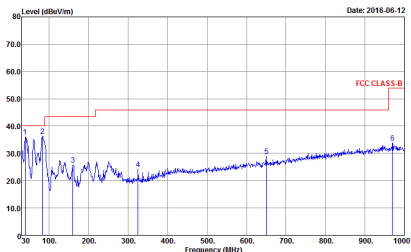


Band 1 5150~5250MHz
WIFI 802.11ac VHT80 (Harmonic @ 3m)

WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11ac VHT80 CH42 5210MHz	
1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 HORIZONTAL Detector : Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m 9170 SHF HORM_150809 VERTICAL Detector : Peak

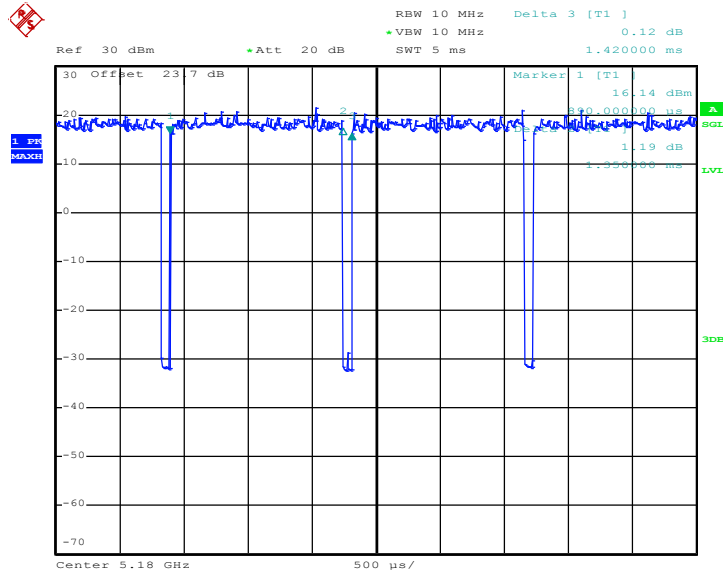


Emission below 1GHz
5GHz WIFI 802.11ac VHT80 (LF)

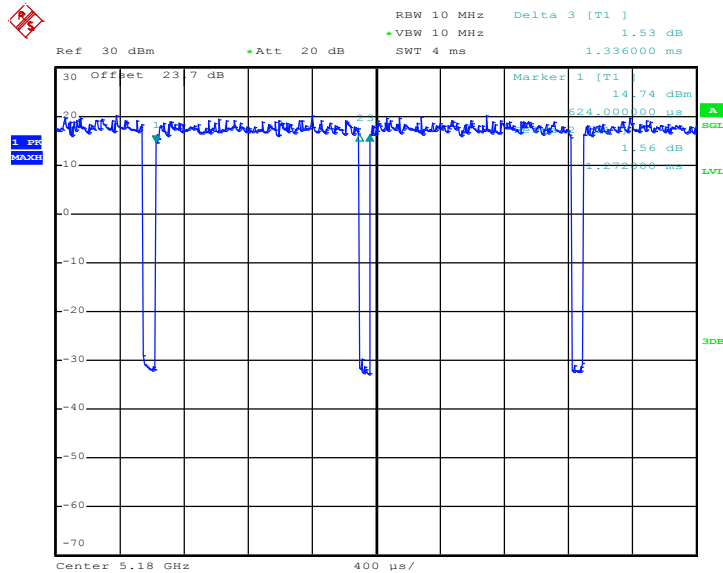
WIFI	5GHz WIFI	
ANT	802.11ac VHT80 LF	
1+2	Horizontal	Vertical
QP / Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m BI-LOG 6111D-LF_ETC HORIZONTAL Detector : Peak	 Site : 03CH11-HY Condition : FCC CLASS-B 3m BI-LOG 6111D-LF_ETC VERTICAL Detector : Peak

Appendix D. Duty Cycle Plots

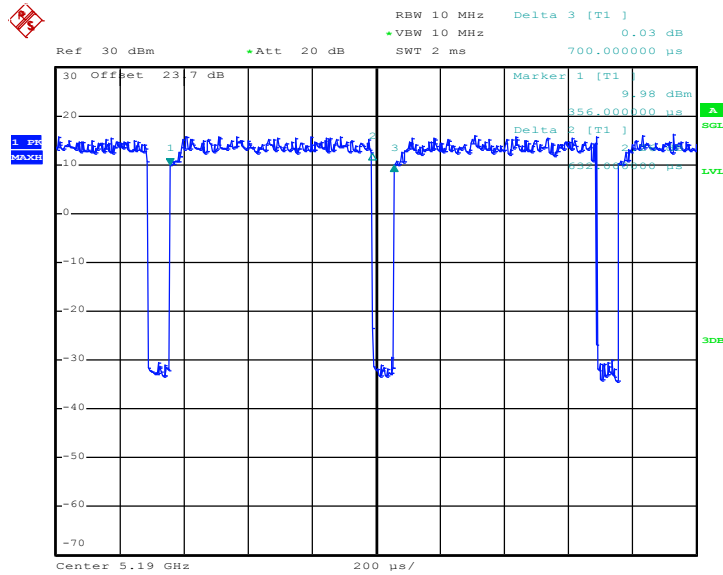
Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
MIMO Ant. 1	802.11a	95.07	1350	0.740740741	1kHz
MIMO Ant. 2	802.11a	95.48	1352	0.73964497	1kHz
MIMO Ant. 3	802.11a	94.94	1352	0.73964497	1kHz
MIMO Ant. 1	5GHz 802.11n HT20	95.21	1272	0.786163522	1kHz
MIMO Ant. 2	5GHz 802.11n HT20	95.18	1264	0.791139241	1kHz
MIMO Ant. 3	5GHz 802.11n HT20	95.21	1272	0.786163522	1kHz
MIMO Ant. 1	5GHz 802.11n HT40	90.29	632	1.582278481	3kHz
MIMO Ant. 2	5GHz 802.11n HT40	89.77	632	1.582278481	3kHz
MIMO Ant. 3	5GHz 802.11n HT40	90.29	632	1.582278481	3kHz
MIMO Ant. 1	5GHz 802.11ac VHT20	94.78	1270	0.787401575	1kHz
MIMO Ant. 2	5GHz 802.11ac VHT20	94.64	1272	0.786163522	1kHz
MIMO Ant. 3	5GHz 802.11ac VHT20	94.64	1272	0.786163522	1kHz
MIMO Ant. 1	5GHz 802.11ac VHT40	90.34	636	1.572327044	3kHz
MIMO Ant. 2	5GHz 802.11ac VHT40	90.91	640	1.5625	3kHz
MIMO Ant. 3	5GHz 802.11ac VHT40	90.86	636	1.572327044	3kHz
MIMO Ant. 1	5GHz 802.11ac VHT80	82.72	316	3.164556962	10kHz
MIMO Ant. 2	5GHz 802.11ac VHT80	81.03	316	3.164556962	10kHz
MIMO Ant. 3	5GHz 802.11ac VHT80	82.29	316	3.164556962	10kHz

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802.11a


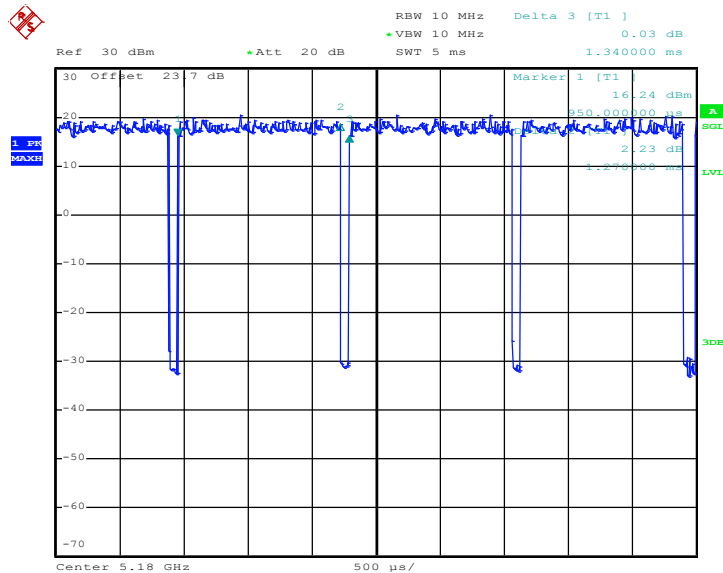
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802.11n HT20


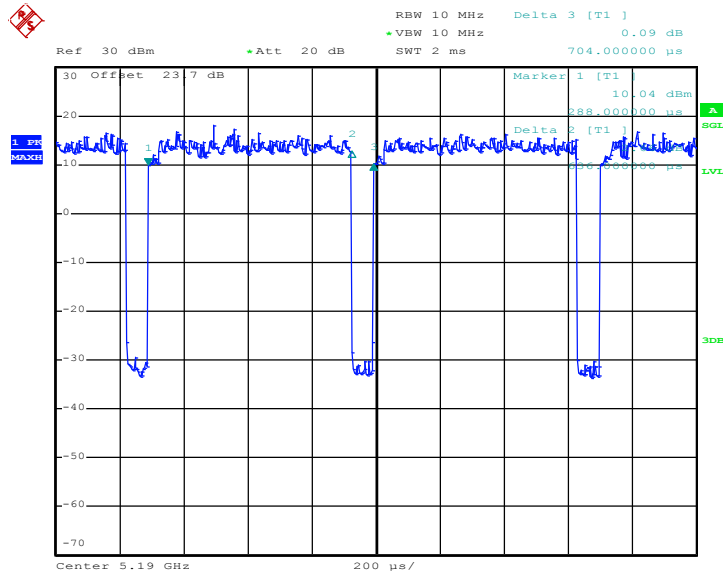
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802.11n HT40


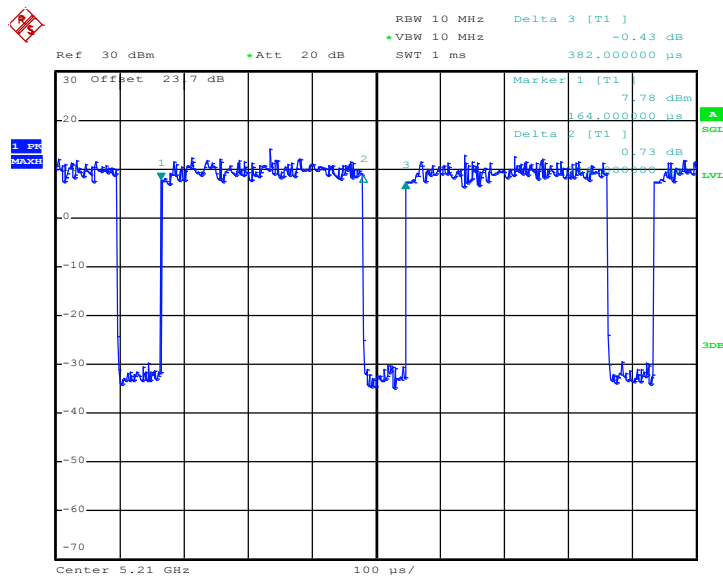
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802.11ac VHT20


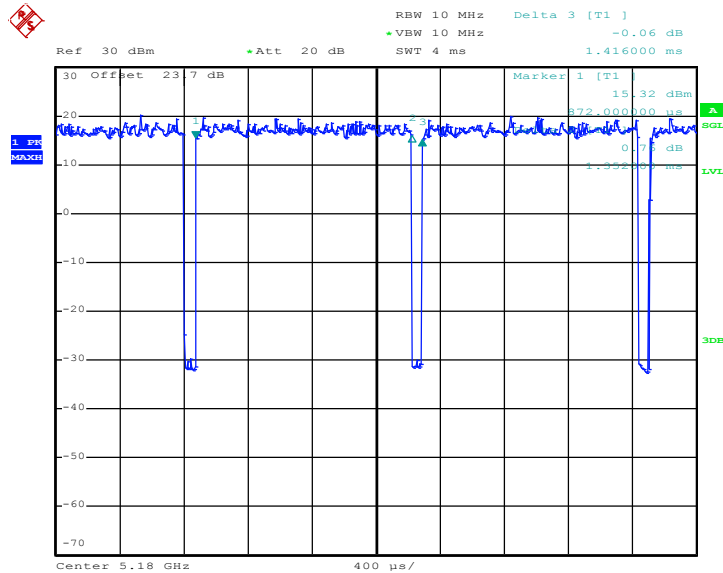
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802.11ac VHT40


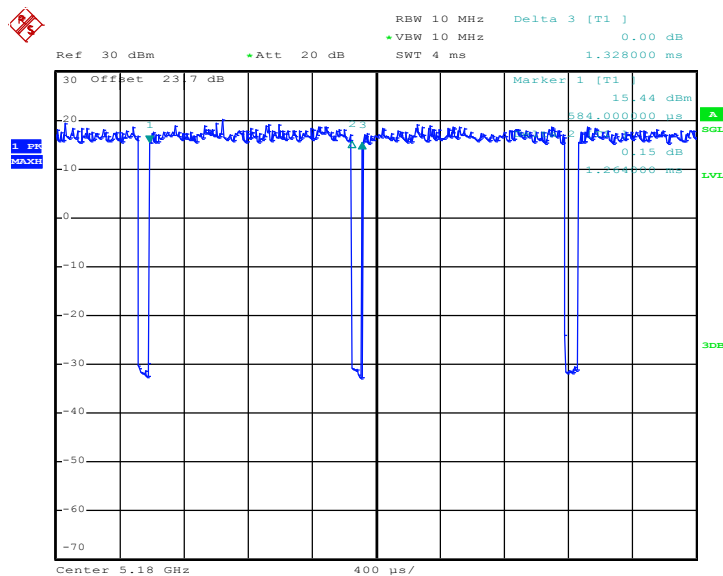
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802.11ac VHT80


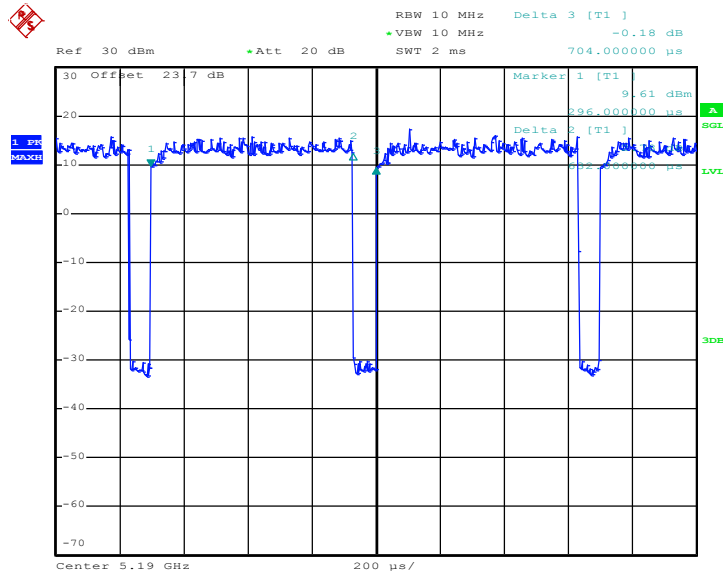
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802.11a


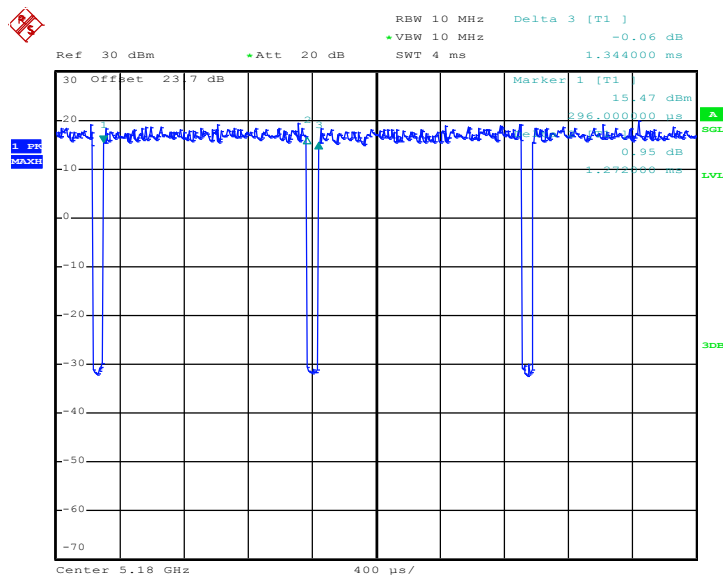
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802.11n HT20


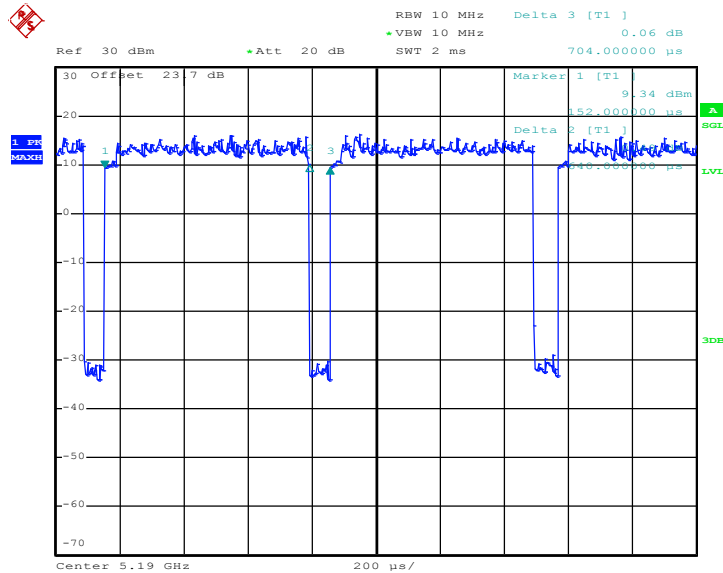
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802.11n HT40


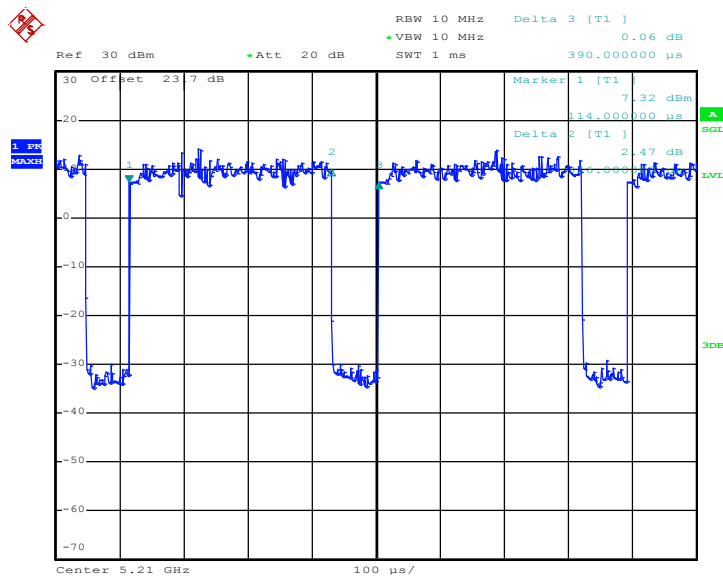
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802.11ac VHT20


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802.11ac VHT40


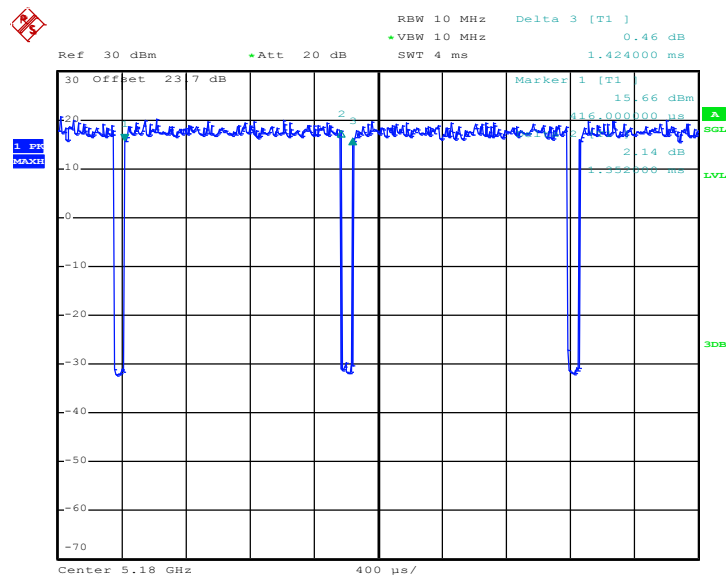
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802.11ac VHT80


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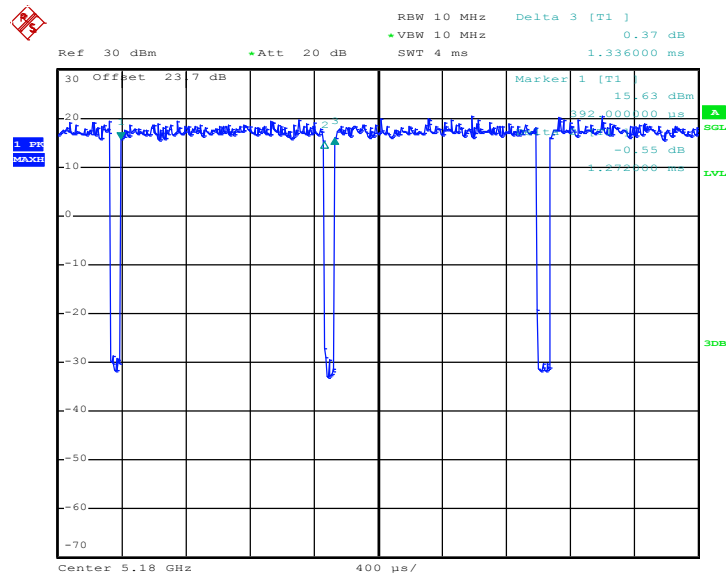
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802.11a

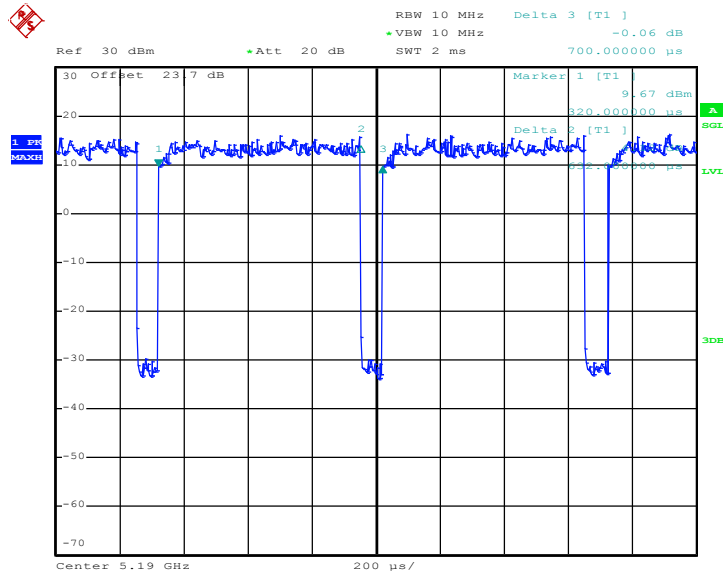


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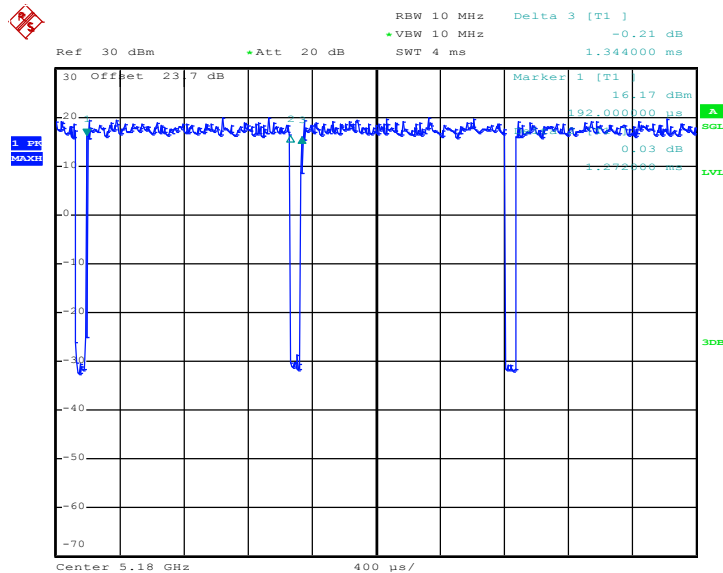
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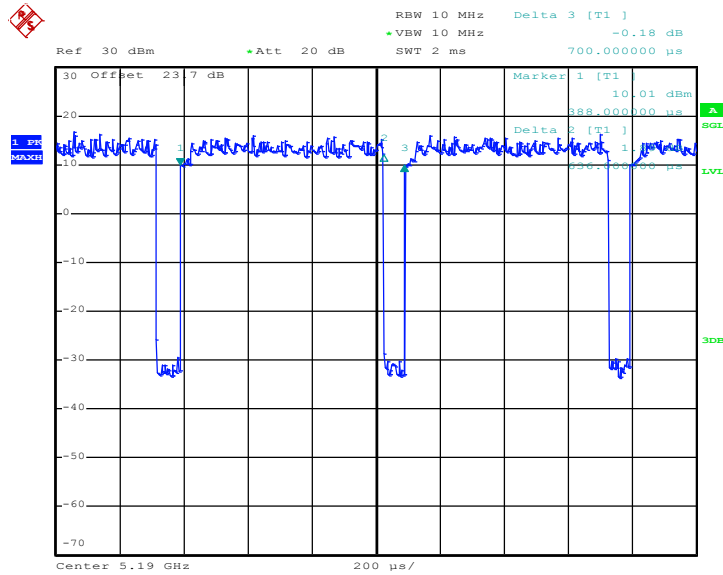
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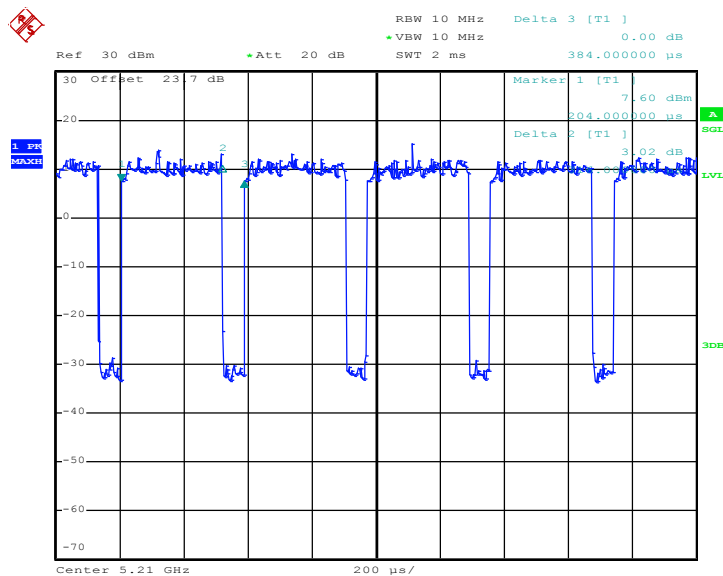
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802.11ac VHT20


Date: 2.APR.2016 12:00:26

802.11ac VHT40


Date: 2.APR.2016 12:46:01

802.11ac VHT80


Date: 2.APR.2016 13:15:22