FCC RF Test Report

APPLICANT	**:**	**AzulFlower LLC**
EQUIPMENT	**:**	**Tablet PC**
MODEL NAME	**:**	**SL056ZE**
FCC ID	**:**	**2AIP5-3975**
STANDARD	**:**	**FCC Part 15 Subpart E §15.407**
CLASSIFICATION	**:**	**(UNII) Unlicensed National Information Infrastructure**

The testing was completed on Feb. 23, 2017. 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

Testing Laboratory 1190

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

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR671336-01D	Rev. 01	Initial issue of report	Mar. 10, 2017

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result
3.1	2.1049 15.403(i)	26dB & 99% Bandwidth	-	Pass
3.2	15.407(a)	Maximum Conducted Output Power	≤ 24 dBm (depend on band)	Pass
3.3	15.407(a)	Power Spectral Density	≤ 11 dBm (depend on band)	Pass
3.4	15.407(b)	Unwanted Emissions	≤ -17, -27 dBm (depend on band) & 15.209(a)	Pass
3.5	15.207	AC Conducted Emission	15.207(a)	Pass
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

AzulFlower LLC
10 Dorrance Street Suite 700 Providence, RI 02903

1.2 Product Feature of Equipment Under Test

Product Feature	
Equipment	Tablet PC
Model Name	SL056ZE
FCC ID	2AIP5-3975
EUT supports Radios application	WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE

1.3 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	5180 MHz ~ 5240 MHz
Maximum Output Power to Antenna	802.11a : 13.41 dBm / 0.0219 W 802.11n HT20 : 13.59 dBm / 0.0229 W 802.11n HT40 : 13.62 dBm / 0.0230 W 802.11ac VHT20 : 13.50 dBm / 0.0224 W 802.11ac VHT40 : 13.61 dBm / 0.0230 W 802.11ac VHT80 : 13.24 dBm / 0.0211 W
99% Occupied Bandwidth	802.11a : 17.50 MHz 802.11n HT20 : 18.05 MHz 802.11n HT40 : 36.20 MHz 802.11ac VHT80 : 75.36 MHz
Antenna Gain / Gain	Fixed Internal Antenna with gain 1.20 dBi
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)

1.4 Modification of EUT

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

1.5 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1190 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 1st 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	03CH07-HY

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

1.6 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 v01r03
- FCC KDB 644545 D03 Guidance for IEEE 802 11ac New Rules v01
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

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 (X plane) were recorded in this report.

2.1 Carrier Frequency 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:

1. The above Frequency and Channel in "*" were 802.11n HT40 and 802.11ac VHT40.
2. The above Frequency and Channel in "#" were 802.11ac VHT80.

2.2 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates as below table.

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

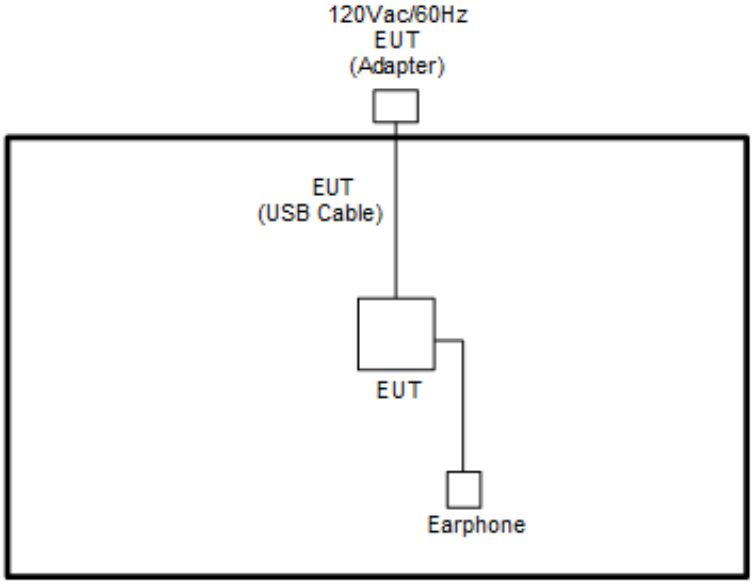
Test Cases	
AC Conducted Emission	Mode 1 : WLAN (5GHz) Link + Bluetooth Link + MPEG4 + Earphone + MicroSD Card + USB Cable (Charging from Adapter)

Ch. #		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

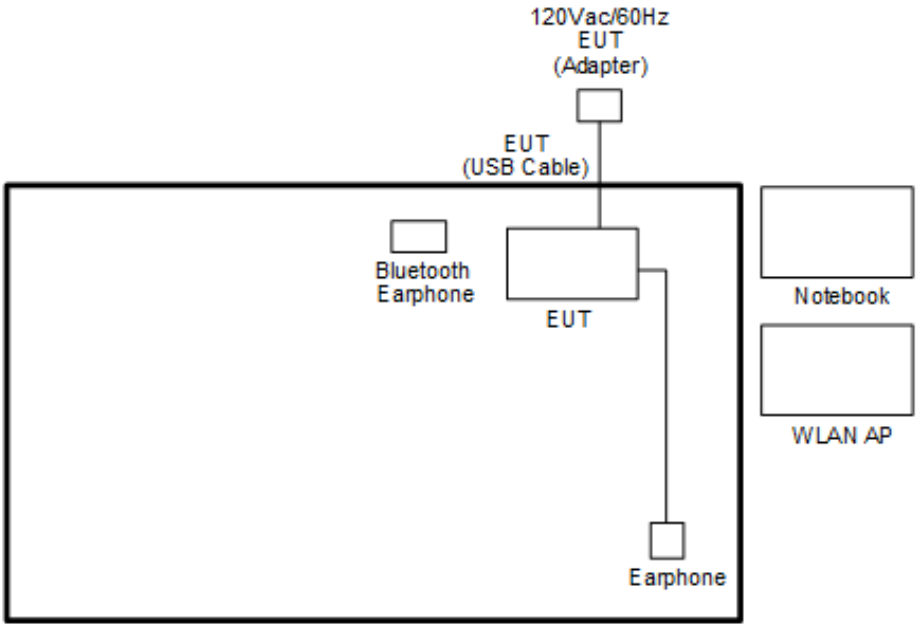
Ch. #		Band I：5150-5250 MHz		
		802.11ac VHT20	802.11ac VHT40	802.11ac VHT80
L	Low	36	38	-
M	Middle	44	-	42
H	High	48	46	-

2.3 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
2.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
3.	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
4.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
5.	Earphone	N/A	N/A	Verification	Unshielded, 1.15 m	N/A

2.5 EUT Operation Test Setup

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

2.6 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.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)

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.

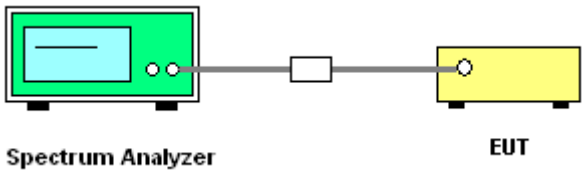
3.1.2 Measuring Instruments

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 v01r03. 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) ≥ 3 * RBW.
8. Measure and record the results in the test report.

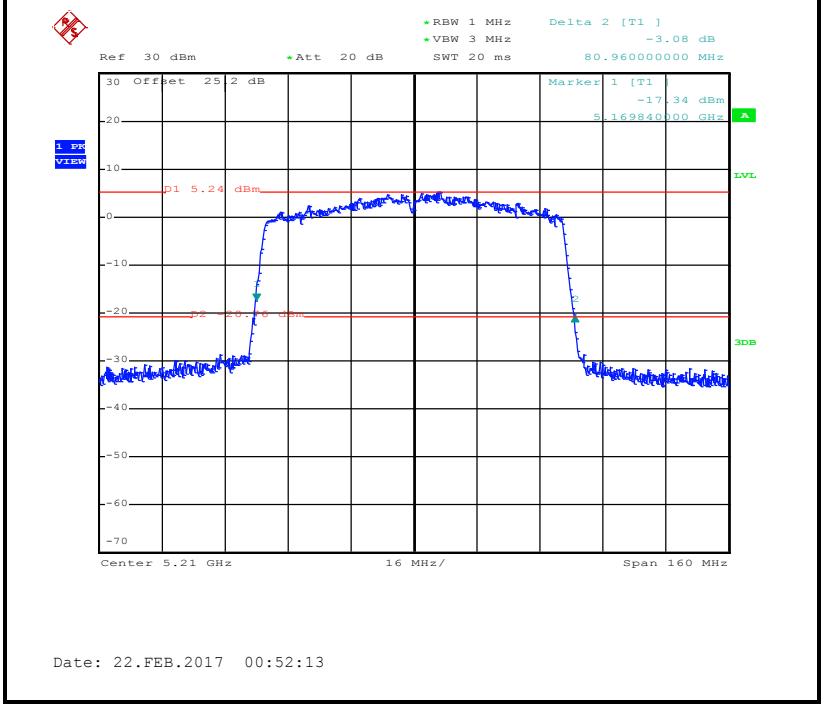
3.1.4 Test Setup



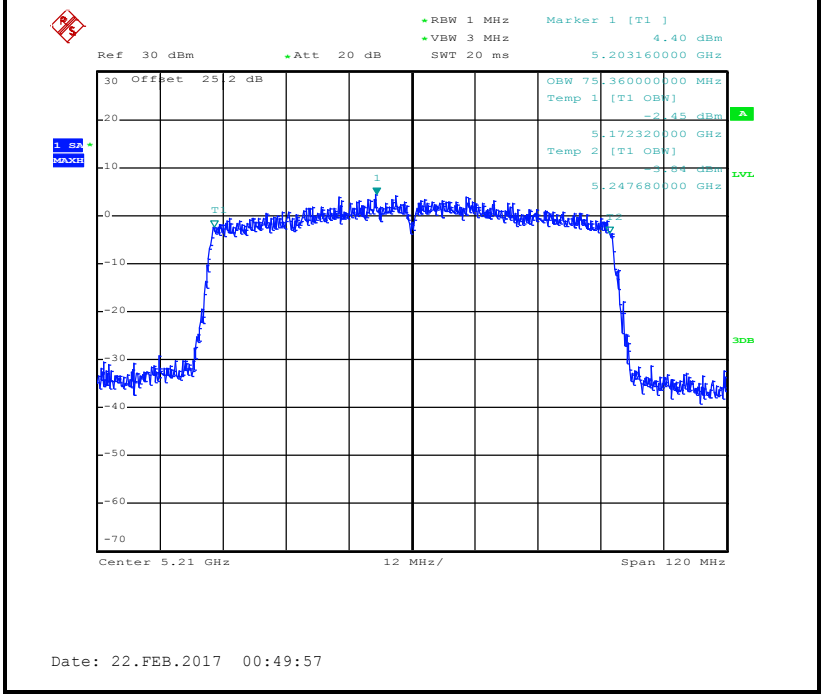
3.1.5 Test Result of 26dB & 99% Occupied Bandwidth Plots

Please refer to Appendix A.

Maximum 26dB Bandwidth



Maximum 99% Occupied Bandwidth



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

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.

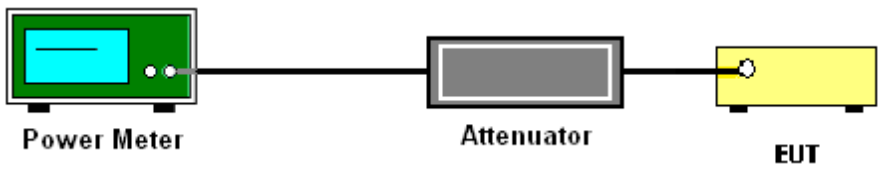
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03.

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



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

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

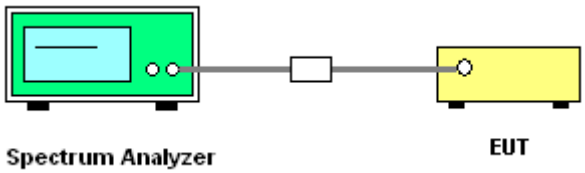
The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03. Section F) Maximum power spectral density.

 # 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 v01r03.
   - Measure the duty cycle.
   - Set span to encompass the entire emission bandwidth (EBW) of the signal.
   - Set RBW = 1 MHz.
   - Set VBW ≥ 3 MHz.
   - Number of points in sweep ≥ 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 PPSD and record it.

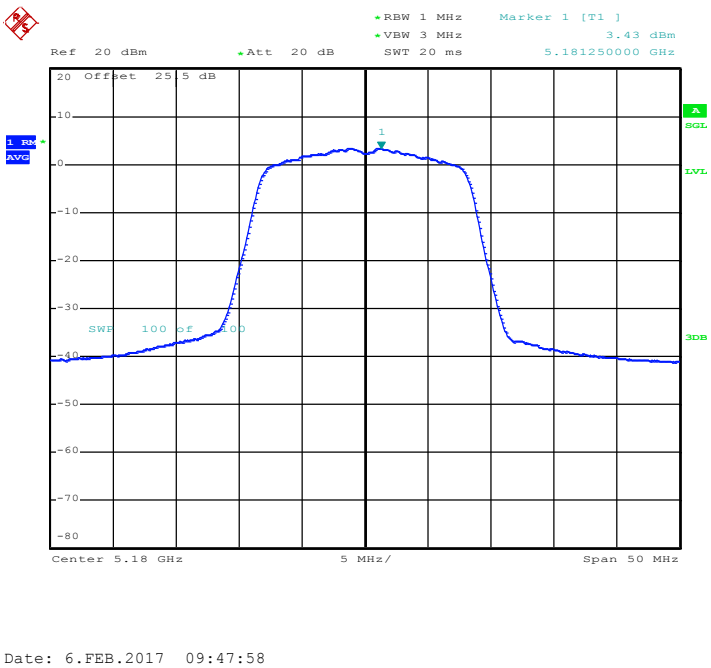
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Spectral Density(dBm/MHz)



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

3.4 Unwanted Radiated Emission 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.

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

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

(3) KDB789033 D02 v01r03 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 v01r03. Section G) Unwanted emissions measurement.

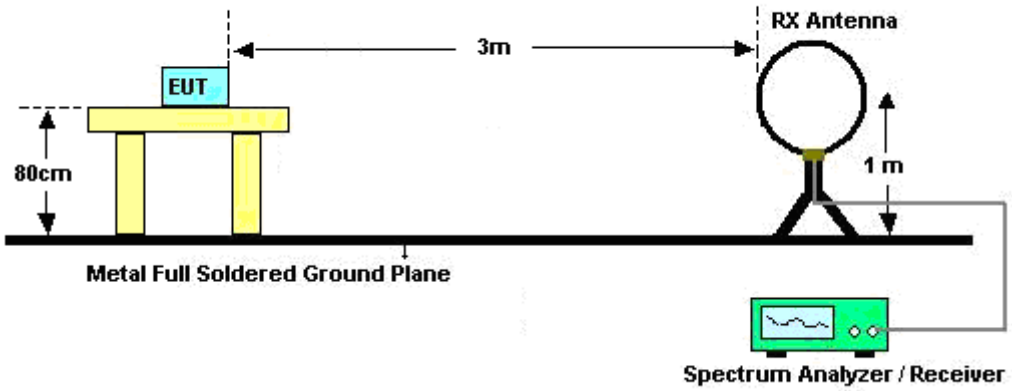
   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

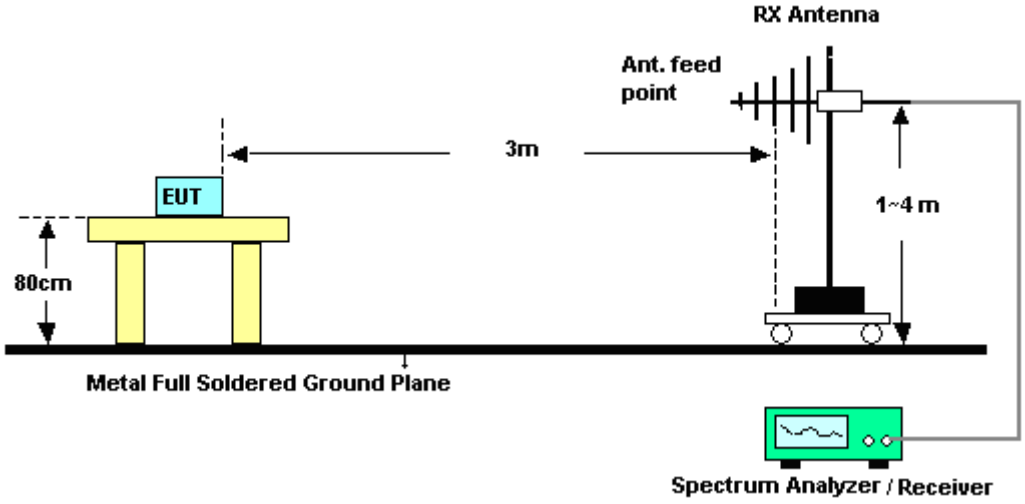
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting 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

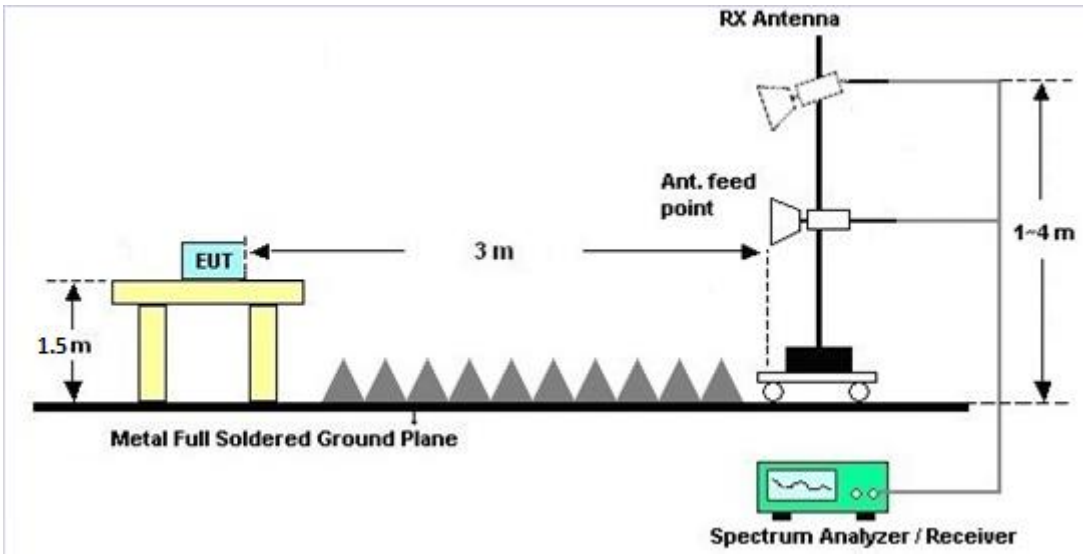
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.4.5 Test Results of Radiated Spurious 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 Spurious at 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 Radiated Spurious 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 (dBμV)	
	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.

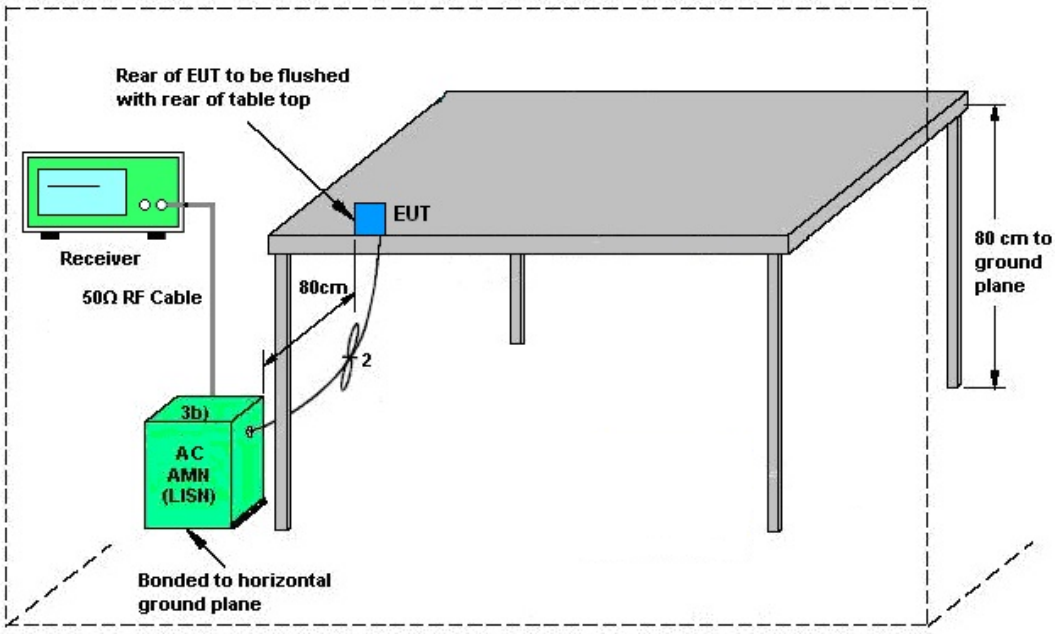
3.5.2 Measuring Instruments

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.

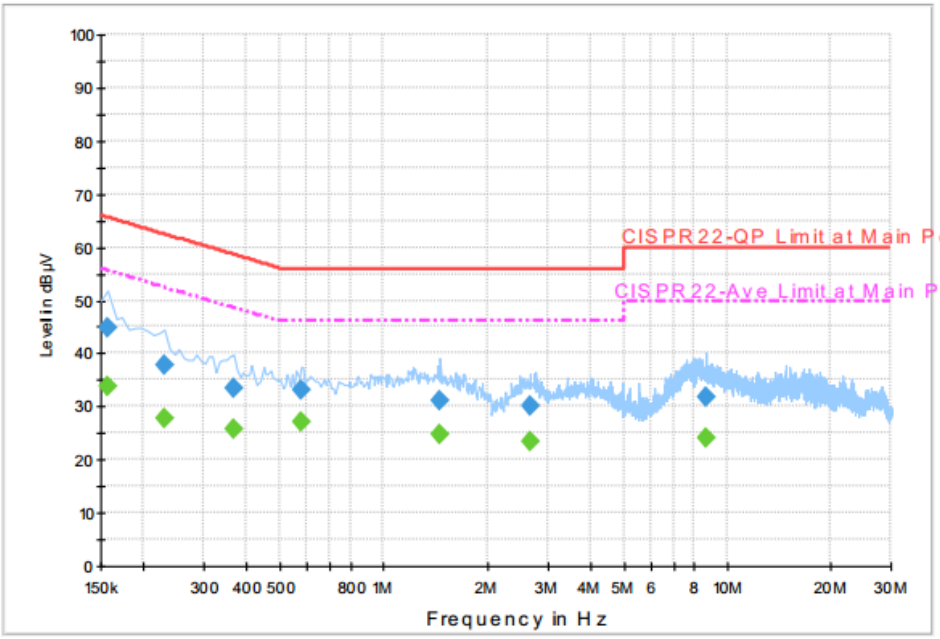
3.5.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.5.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	22~23℃
Test Engineer :	Kai-Chun Chu	Relative Humidity :	51~52%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN (5GHz) Link + Bluetooth Link + MPEG4 + Earphone + MicroSD Card + USB Cable (Charging from Adapter)		



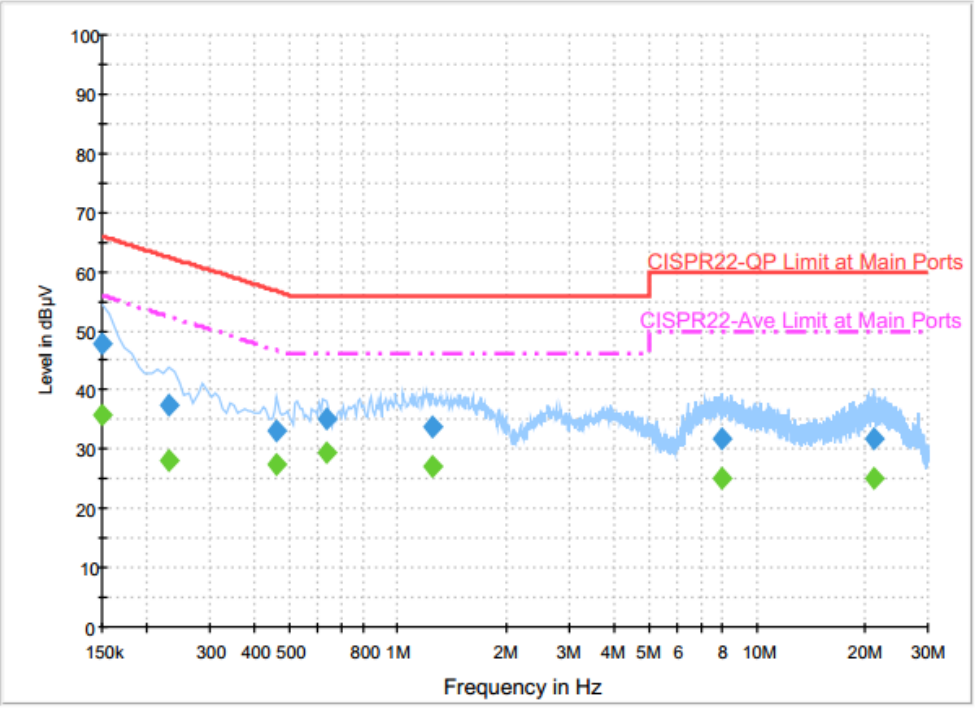
Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	44.9	Off	L1	19.6	20.7	65.6
0.230000	37.7	Off	L1	19.6	24.7	62.4
0.366000	33.6	Off	L1	19.6	25.0	58.6
0.574000	33.0	Off	L1	19.6	23.0	56.0
1.462000	31.0	Off	L1	19.6	25.0	56.0
2.678000	30.2	Off	L1	19.4	25.8	56.0
8.654000	31.7	Off	L1	20.0	28.3	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	33.8	Off	L1	19.6	21.8	55.6
0.230000	27.6	Off	L1	19.6	24.8	52.4
0.366000	25.7	Off	L1	19.6	22.9	48.6
0.574000	27.2	Off	L1	19.6	18.8	46.0
1.462000	24.7	Off	L1	19.6	21.3	46.0
2.678000	23.3	Off	L1	19.4	22.7	46.0
8.654000	24.1	Off	L1	20.0	25.9	50.0

Test Mode :	Mode 1	Temperature :	22~23℃
Test Engineer :	Kai-Chun Chu	Relative Humidity :	51~52%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN (5GHz) Link + Bluetooth Link + MPEG4 + Earphone + MicroSD Card + USB Cable (Charging from Adapter)		



Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	48.0	Off	N	19.6	18.0	66.0
0.230000	37.6	Off	N	19.6	24.8	62.4
0.462000	33.1	Off	N	19.6	23.6	56.7
0.630000	35.1	Off	N	19.6	20.9	56.0
1.246000	33.9	Off	N	19.6	22.1	56.0
7.998000	31.9	Off	N	19.9	28.1	60.0
21.342000	31.9	Off	N	20.7	28.1	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	35.8	Off	N	19.6	20.2	56.0
0.230000	28.0	Off	N	19.6	24.4	52.4
0.462000	27.3	Off	N	19.6	19.4	46.7
0.630000	29.3	Off	N	19.6	16.7	46.0
1.246000	27.1	Off	N	19.6	18.9	46.0
7.998000	25.0	Off	N	19.9	25.0	50.0
21.342000	25.0	Off	N	20.7	25.0	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.

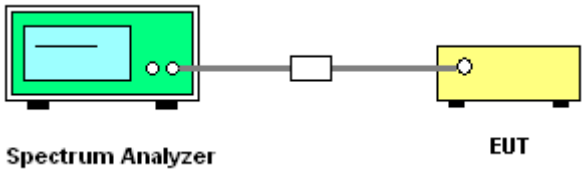
3.6.2 Measuring Instruments

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.

The frequency band 5180-5240MHz which was verified by testing against other standard is less than 20 ppm which is sufficient to maintain the signal within the 5150-5250MHz band.

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

EUT is verified this characteristic during the function check of normal sample associated with an access point:

A. Information start: make EUT supply information to the access point.

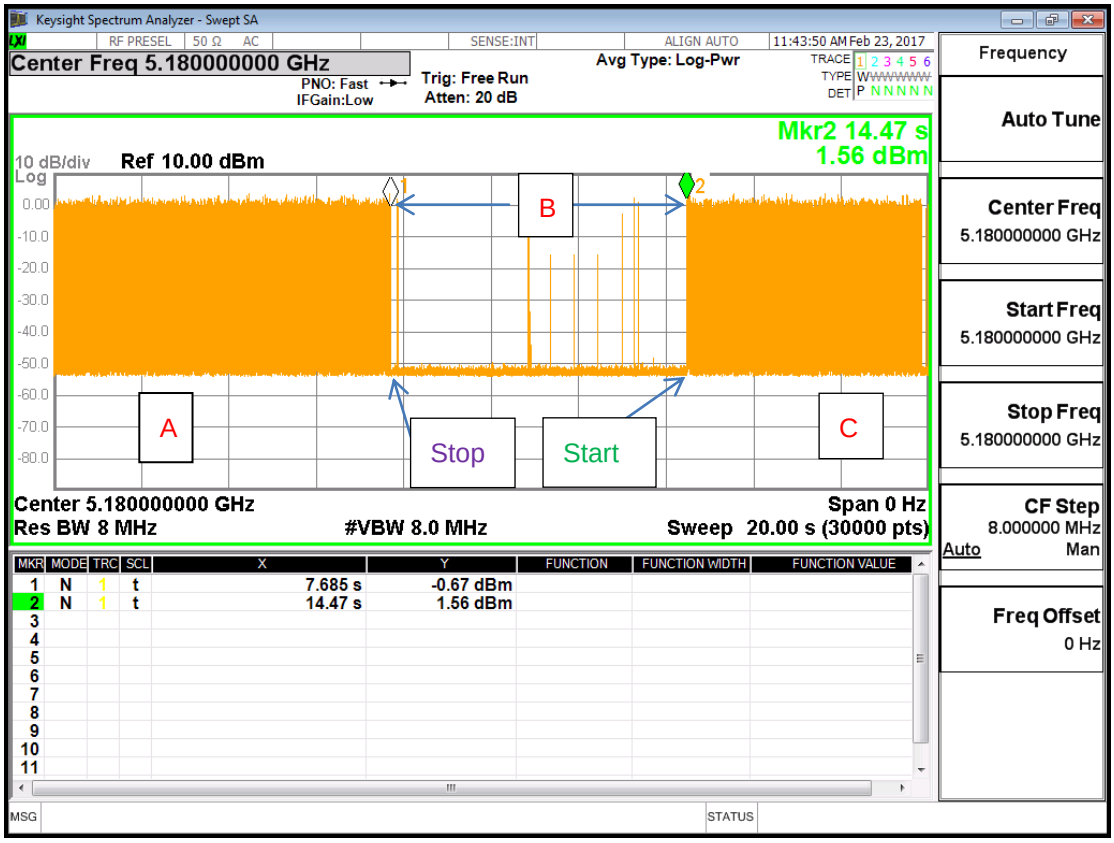
B. Information stop: stop supplying information to the access point.

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving.

C. Information start: make EUT supply information to the access point again.

The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

5180MHz



Note: The control / signalling information during the period B is precluded.

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

An embedded-in antenna design is used.

3.8.3 Antenna Gain

The antenna gain is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Anritsu	ML2495A	0932001	300MHz~40GHz	Sep. 29, 2016	Jan. 25, 2017 ~ Feb. 23, 2017	Sep. 28, 2017	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	0846202	300MHz~40GHz	Sep. 29, 2016	Jan. 25, 2017 ~ Feb. 23, 2017	Sep. 28, 2017	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100057	9kHz-40GHz	Nov. 25, 2016	Jan. 25, 2017 ~ Feb. 23, 2017	Nov. 24, 2017	Conducted (TH05-HY)
Temperature Chamber	ESPEC	SH-641	92013720	-40℃ ~90℃	Sep. 01, 2016	Jan. 25, 2017 ~ Feb. 23, 2017	Aug. 31, 2017	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890094	1V~20V 0.5A~5A	Oct. 11, 2016	Jan. 25, 2017 ~ Feb. 23, 2017	Oct. 10, 2017	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jan. 30, 2017	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 30, 2016	Jan. 30, 2017	Aug. 29, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 29, 2016	Jan. 30, 2017	Nov. 28, 2017	Conduction (CO05-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800 N1D01N-06	35419&03	30MHz to 1GHz	Jan. 07, 2017	Jan. 26, 2017 ~ Feb. 21, 2017	Jan. 06, 2018	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 19, 2016	Jan. 26, 2017 ~ Feb. 21, 2017	Aug. 18, 2017	Radiation (03CH07-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY54130085	20Hz ~ 8.4GHz	Oct. 26, 2016	Jan. 26, 2017 ~ Feb. 21, 2017	Oct. 25, 2017	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Sep. 02, 2015	Jan. 26, 2017 ~ Feb. 21, 2017	Sep. 01, 2017	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590075	1GHz ~ 18GHz	Apr. 15, 2016	Jan. 26, 2017 ~ Feb. 21, 2017	Apr. 14, 2017	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz-1GHz	Mar. 18, 2016	Jan. 26, 2017 ~ Feb. 21, 2017	Mar. 17, 2017	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Oct. 12, 2016	Jan. 26, 2017 ~ Feb. 21, 2017	Oct. 11, 2017	Radiation (03CH07-HY)
Spectrum Analyzer	Agilent	N9010A	MY53470118	10Hz~44GHz	Feb. 27, 2016	Jan. 26, 2017 ~ Feb. 21, 2017	Feb. 26, 2017	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	Jan. 26, 2017 ~ Feb. 21, 2017	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	Jan. 26, 2017 ~ Feb. 21, 2017	N/A	Radiation (03CH07-HY)
Preamplifier	MITEQ	JS44-18004000-33-8P	1840917	18GHz ~ 40GHz	Jun. 14, 2016	Jan. 26, 2017 ~ Feb. 21, 2017	Jun. 13, 2017	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 08, 2016	Jan. 26, 2017 ~ Feb. 21, 2017	Nov. 07, 2017	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.7**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.7**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.5**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.2**

Appendix A. Conducted Test Results

Report Number : FR671336-01D

Test Engineer:	Tommy Lee / Derek Hsu	Temperature:	21~25	°C
Test Date:	2017/01/25~2017/02/23	Relative Humidity:	51~54	%

TEST RESULTS DATA
26dB and 99% OBW

Band I										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)	IC 99% Bandwidth Power Limit (dBm)	IC 99% Bandwidth EIRP Limit (dBm)		
11a	6Mbps	1	36	5180	17.40	21.70	-	22.41		
11a	6Mbps	1	44	5220	17.50	21.50	-	22.43		
11a	6Mbps	1	48	5240	17.50	21.60	-	22.43		
HT20	MCS0	1	36	5180	17.95	21.90	-	22.54		
HT20	MCS0	1	44	5220	18.05	21.90	-	22.56		
HT20	MCS0	1	48	5240	18.00	22.30	-	22.55		
HT40	MCS0	1	38	5190	36.10	41.58	-	23.01		
HT40	MCS0	1	46	5230	36.20	41.58	-	23.01		
VHT80	MCS0	1	42	5210	75.36	80.96	-	23.01		

TEST RESULTS DATA
Average Power Table

FCC Band I										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)		Pass/Fail
11a	6Mbps	1	36	5180	0.36	13.41	24.00	1.20		Pass
11a	6Mbps	1	44	5220	0.36	13.40	24.00	1.20		Pass
11a	6Mbps	1	48	5240	0.36	13.38	24.00	1.20		Pass
HT20	MCS0	1	36	5180	0.38	13.59	24.00	1.20		Pass
HT20	MCS0	1	44	5220	0.38	13.44	24.00	1.20		Pass
HT20	MCS0	1	48	5240	0.38	13.49	24.00	1.20		Pass
HT40	MCS0	1	38	5190	0.67	13.62	24.00	1.20		Pass
HT40	MCS0	1	46	5230	0.67	13.58	24.00	1.20		Pass
VHT20	MCS0	1	36	5180	0.35	13.50	24.00	1.20		Pass
VHT20	MCS0	1	44	5220	0.35	13.42	24.00	1.20		Pass
VHT20	MCS0	1	48	5240	0.35	13.45	24.00	1.20		Pass
VHT40	MCS0	1	38	5190	0.67	13.61	24.00	1.20		Pass
VHT40	MCS0	1	46	5230	0.67	13.57	24.00	1.20		Pass
VHT80	MCS0	1	42	5210	1.30	13.24	24.00	1.20		Pass

TEST RESULTS DATA
Power Spectral Density

FCC Band I										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Power Density (dBm/MHz)	Average PSD Limit (dBm/MHz)	DG (dBi)	-	Pass/Fail
11a	6Mbps	1	36	5180	0.36	3.79	11.00	1.20		Pass
11a	6Mbps	1	44	5220	0.36	3.31	11.00	1.20		Pass
11a	6Mbps	1	48	5240	0.36	2.97	11.00	1.20		Pass
HT20	MCS0	1	36	5180	0.38	3.37	11.00	1.20		Pass
HT20	MCS0	1	44	5220	0.38	2.92	11.00	1.20		Pass
HT20	MCS0	1	48	5240	0.38	2.66	11.00	1.20		Pass
HT40	MCS0	1	38	5190	0.67	0.81	11.00	1.20		Pass
HT40	MCS0	1	46	5230	0.67	0.20	11.00	1.20		Pass
VHT80	MCS0	1	42	5210	1.30	-3.38	11.00	1.20		Pass

TEST RESULTS DATA
Frequency Stability

Band I										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stablility (ppm)	Temperature (°C)	Voltage (V)	Note
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	35	3.8	
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	0	3.8	
11a	6Mbps	1	36	5180	5180.050	0.050	9.65	20	4.2	
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	20	3.4	
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	20	3.8	

Appendix B. Radiated Spurious Emission

Test Engineer :	Jesse Wang, James Chiu and Daniel Lee	Temperature :	21~22°C
		Relative Humidity :	44~48%

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		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 36 5180MHz		5149.76	52.3	-21.7	74	42.48	33.69	11.21	35.08	303	73	P	H
		5150	43.35	-10.65	54	33.53	33.69	11.21	35.08	303	73	A	H
	*	5180	107.61	-	-	97.7	33.78	11.21	35.08	303	73	P	H
	*	5180	100.42	-	-	90.51	33.78	11.21	35.08	303	73	A	H
		5130.78	50.96	-23.04	74	41.21	33.65	11.18	35.08	102	269	P	V
		5150	41.57	-12.43	54	31.75	33.69	11.21	35.08	102	269	A	V
	*	5180	103.76	-	-	93.85	33.78	11.21	35.08	102	269	P	V
	*	5180	96.51	-	-	86.6	33.78	11.21	35.08	102	269	A	V
802.11a CH 44 5220MHz		5124.28	50.66	-23.34	74	40.91	33.65	11.18	35.08	300	82	P	H
		5103.74	41.39	-12.61	54	31.72	33.56	11.18	35.07	300	82	A	H
	*	5220	108.39	-	-	98.36	33.86	11.25	35.08	300	82	P	H
	*	5220	101.21	-	-	91.18	33.86	11.25	35.08	300	82	A	H
		5387.76	49.89	-24.11	74	38.79	34.3	11.89	35.09	300	82	P	H
		5352	41.55	-12.45	54	30.66	34.21	11.76	35.08	300	82	A	H
		5126.36	49.53	-24.47	74	39.78	33.65	11.18	35.08	100	271	P	V
		5142.48	40.77	-13.23	54	30.95	33.69	11.21	35.08	100	271	A	V
	*	5220	103.24	-	-	93.21	33.86	11.25	35.08	100	271	P	V
	*	5220	96.02	-	-	85.99	33.86	11.25	35.08	100	271	A	V
		5352	49.6	-24.4	74	38.71	34.21	11.76	35.08	100	271	P	V
		5455.68	40.67	-13.33	54	29.4	34.47	11.89	35.09	100	271	A	V

802.11a CH 48 5240MHz		5083.2	50.22	-23.78	74	40.63	33.52	11.14	35.07	300	73	P	H
		5134.68	41.14	-12.86	54	31.39	33.65	11.18	35.08	300	73	A	H
	*	5240	108.17	-	-	97.96	33.91	11.38	35.08	300	73	P	H
	*	5240	100.87	-	-	90.66	33.91	11.38	35.08	300	73	A	H
		5350.8	50.1	-23.9	74	39.21	34.21	11.76	35.08	300	73	P	H
		5352.72	41.53	-12.47	54	30.64	34.21	11.76	35.08	300	73	A	H
		5091.78	49.46	-24.54	74	39.83	33.56	11.14	35.07	100	269	P	V
		5149.76	40.64	-13.36	54	30.82	33.69	11.21	35.08	100	269	A	V
	*	5240	103.91	-	-	93.7	33.91	11.38	35.08	100	269	P	V
	*	5240	96.49	-	-	86.28	33.91	11.38	35.08	100	269	A	V
		5447.52	48.92	-25.08	74	37.65	34.47	11.89	35.09	100	269	P	V
		5456.88	40.66	-13.34	54	29.39	34.47	11.89	35.09	100	269	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	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	43.69	-30.31	74	46.64	39.09	17.17	59.21	100	0	P	H
		15540	45.35	-28.65	74	41.85	41.07	19.61	57.18	100	0	P	H
		10360	45.34	-28.66	74	48.29	39.09	17.17	59.21	100	0	P	V
		15540	47.18	-26.82	74	43.68	41.07	19.61	57.18	100	0	P	V
802.11a CH 44 5220MHz		10440	45.4	-28.6	74	48.23	39.15	17.17	59.15	100	0	P	H
		15660	46.17	-27.83	74	42.29	41.31	19.68	57.11	100	0	P	H
		10440	44.51	-29.49	74	47.34	39.15	17.17	59.15	100	0	P	V
		15660	45.95	-28.05	74	42.07	41.31	19.68	57.11	100	0	P	V
802.11a CH 48 5240MHz		10480	44.95	-29.05	74	47.7	39.19	17.17	59.11	100	0	P	H
		15720	47.12	-26.88	74	43.01	41.45	19.73	57.07	100	0	P	H
		10480	45.08	-28.92	74	47.83	39.19	17.17	59.11	100	0	P	V
		15720	46.92	-27.08	74	42.81	41.45	19.73	57.07	100	0	P	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	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)
		5150	54.67	-19.33	74	44.85	33.69	11.21	35.08	303	83	P	H
		5149.76	44.21	-9.79	54	34.39	33.69	11.21	35.08	303	83	A	H
802.11n	*	5180	107.64	-	-	97.73	33.78	11.21	35.08	303	83	P	H
HT20	*	5180	100.4	-	-	90.49	33.78	11.21	35.08	303	83	A	H
CH 36		5141.44	51.02	-22.98	74	41.2	33.69	11.21	35.08	102	268	P	V
5180MHz		5150	42.1	-11.9	54	32.28	33.69	11.21	35.08	102	268	A	V
	*	5180	103.63	-	-	93.72	33.78	11.21	35.08	102	268	P	V
	*	5180	96.33	-	-	86.42	33.78	11.21	35.08	102	268	A	V
		5126.88	49.27	-24.73	74	39.52	33.65	11.18	35.08	300	82	P	H
		5091	41.3	-12.7	54	31.67	33.56	11.14	35.07	300	82	A	H
	*	5220	108.42	-	-	98.39	33.86	11.25	35.08	300	82	P	H
	*	5220	101.16	-	-	91.13	33.86	11.25	35.08	300	82	A	H
802.11n		5367.36	50.46	-23.54	74	39.53	34.25	11.76	35.08	300	82	P	H
HT20		5354.64	41.55	-12.45	54	30.66	34.21	11.76	35.08	300	82	A	H
CH 44		5067.08	48.64	-25.36	74	39.1	33.47	11.14	35.07	102	269	P	V
5220MHz		5138.06	40.74	-13.26	54	30.99	33.65	11.18	35.08	102	269	A	V
	*	5220	103.46	-	-	93.43	33.86	11.25	35.08	102	269	P	V
	*	5220	96.14	-	-	86.11	33.86	11.25	35.08	102	269	A	V
		5435.28	49.94	-24.06	74	38.71	34.43	11.89	35.09	102	269	P	V
		5451.6	40.9	-13.1	54	29.63	34.47	11.89	35.09	102	269	A	V

		5073.06	49.87	-24.13	74	40.28	33.52	11.14	35.07	300	74	P	H
		5114.4	41.14	-12.86	54	31.43	33.6	11.18	35.07	300	74	A	H
	*	5240	107.89	-	-	97.68	33.91	11.38	35.08	300	74	P	H
	*	5240	100.57	-	-	90.36	33.91	11.38	35.08	300	74	A	H
802.11n		5377.68	49.39	-24.61	74	38.42	34.3	11.76	35.09	300	74	P	H
HT20		5382	41.53	-12.47	54	30.43	34.3	11.89	35.09	300	74	A	H
CH 48		5102.7	50.39	-23.61	74	40.72	33.56	11.18	35.07	100	271	P	V
5240MHz		5143	40.66	-13.34	54	30.84	33.69	11.21	35.08	100	271	A	V
	*	5240	103.66	-	-	93.45	33.91	11.38	35.08	100	271	P	V
	*	5240	96.38	-	-	86.17	33.91	11.38	35.08	100	271	A	V
		5455.92	49.73	-24.27	74	38.46	34.47	11.89	35.09	100	271	P	V
		5445.84	40.6	-13.4	54	29.33	34.47	11.89	35.09	100	271	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	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		10360	44.05	-29.95	74	47	39.09	17.17	59.21	100	0	P	H
HT20		15540	46.75	-27.25	74	43.25	41.07	19.61	57.18	100	0	P	H
CH 36		10360	44.69	-29.31	74	47.64	39.09	17.17	59.21	100	0	P	V
5180MHz		15540	46.14	-27.86	74	42.64	41.07	19.61	57.18	100	0	P	V
802.11n		11440	44.16	-29.84	74	45.26	39.19	17.16	57.45	100	0	P	H
HT20		15660	46.54	-27.46	74	42.66	41.31	19.68	57.11	100	0	P	H
CH 44		10440	45.03	-28.97	74	47.86	39.15	17.17	59.15	100	0	P	V
5220MHz		15660	46	-28	74	42.12	41.31	19.68	57.11	100	0	P	V
802.11n		10480	45.56	-28.44	74	48.31	39.19	17.17	59.11	100	0	P	H
HT20		15720	46.28	-27.72	74	42.17	41.45	19.73	57.07	100	0	P	H
CH 48		10480	45.5	-28.5	74	48.25	39.19	17.17	59.11	100	0	P	V
5240MHz		15720	46.48	-27.52	74	42.37	41.45	19.73	57.07	100	0	P	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	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		5149.24	56.86	-17.14	74	47.04	33.69	11.21	35.08	302	84	P	H
		5150	50.27	-3.73	54	40.45	33.69	11.21	35.08	302	84	A	H
	*	5190	105.37	-	-	95.42	33.78	11.25	35.08	302	84	P	H
	*	5190	98.07	-	-	88.12	33.78	11.25	35.08	302	84	A	H
		5432.16	49.18	-24.82	74	37.95	34.43	11.89	35.09	302	84	P	H
		5363.52	41.82	-12.18	54	30.89	34.25	11.76	35.08	302	84	A	H
		5150	54.96	-19.04	74	45.14	33.69	11.21	35.08	102	268	P	V
		5150	47.86	-6.14	54	38.04	33.69	11.21	35.08	102	268	A	V
	*	5190	100.75	-	-	90.8	33.78	11.25	35.08	102	268	P	V
	*	5190	93.68	-	-	83.73	33.78	11.25	35.08	102	268	A	V
		5408.64	49.76	-24.24	74	38.62	34.34	11.89	35.09	102	268	P	V
		5451.36	41.11	-12.89	54	29.84	34.47	11.89	35.09	102	268	A	V
802.11n HT40 CH 46 5230MHz		5046.28	50.54	-23.46	74	41.07	33.43	11.11	35.07	300	80	P	H
		5133.38	42.02	-11.98	54	32.27	33.65	11.18	35.08	300	80	A	H
	*	5230	105.65	-	-	95.44	33.91	11.38	35.08	300	80	P	H
	*	5230	98.59	-	-	88.38	33.91	11.38	35.08	300	80	A	H
		5354.64	50.29	-23.71	74	39.4	34.21	11.76	35.08	300	80	P	H
		5365.2	42.66	-11.34	54	31.73	34.25	11.76	35.08	300	80	A	H
		5128.18	49.78	-24.22	74	40.03	33.65	11.18	35.08	100	272	P	V
		5126.62	41.46	-12.54	54	31.71	33.65	11.18	35.08	100	272	A	V
	*	5230	101.47	-	-	91.26	33.91	11.38	35.08	100	272	P	V
	*	5230	94.29	-	-	84.08	33.91	11.38	35.08	100	272	A	V
		5384.16	48.51	-25.49	74	37.41	34.3	11.89	35.09	100	272	P	V
		5442.72	41.43	-12.57	54	30.2	34.43	11.89	35.09	100	272	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	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		10380	45.06	-28.94	74	47.97	39.11	17.17	59.19	100	0	P	H
HT40		15570	46.28	-27.72	74	42.67	41.14	19.63	57.16	100	0	P	H
CH 38		10380	44.97	-29.03	74	47.88	39.11	17.17	59.19	100	0	P	V
5190MHz		15570	47.15	-26.85	74	43.54	41.14	19.63	57.16	100	0	P	V
802.11n		10460	45.27	-28.73	74	48.08	39.16	17.17	59.14	100	0	P	H
HT40		15690	46.35	-27.65	74	42.36	41.38	19.7	57.09	100	0	P	H
CH 46		10460	44.53	-29.47	74	47.34	39.16	17.17	59.14	100	0	P	V
5230MHz		15690	46.51	-27.49	74	42.52	41.38	19.7	57.09	100	0	P	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	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		5149.76	54.88	-19.12	74	45.06	33.69	11.21	35.08	380	76	P	H
		5149.24	49.28	-4.72	54	39.46	33.69	11.21	35.08	380	76	A	H
	*	5210	101.17	-	-	91.14	33.86	11.25	35.08	380	76	P	H
	*	5210	93.86	-	-	83.83	33.86	11.25	35.08	380	76	A	H
		5361.6	49.33	-24.67	74	38.4	34.25	11.76	35.08	380	76	P	H
		5357.04	42.7	-11.3	54	31.81	34.21	11.76	35.08	380	76	A	H
		5148.98	55.92	-18.08	74	46.1	33.69	11.21	35.08	380	126	P	V
		5149.24	50.89	-3.11	54	41.07	33.69	11.21	35.08	380	126	A	V
	*	5210	99.85	-	-	89.82	33.86	11.25	35.08	380	126	P	V
	*	5210	92.52	-	-	82.49	33.86	11.25	35.08	380	126	A	V
		5443.92	49.37	-24.63	74	38.14	34.43	11.89	35.09	380	126	P	V
		5444.64	42.67	-11.33	54	31.44	34.43	11.89	35.09	380	126	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	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	44.27	-29.73	74	47.14	39.13	17.17	59.17	100	0	P	H
		15630	45.78	-28.22	74	41.94	41.28	19.68	57.12	100	0	P	H
		10420	45.98	-28.02	74	48.85	39.13	17.17	59.17	100	0	P	V
		15630	45.76	-28.24	74	41.92	41.28	19.68	57.12	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

WIFI 802.11n HT40 (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		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 LF		30.27	28.46	-11.54	40	32.74	26	1.07	31.35	100	0	P	H
		115.59	27.1	-16.4	43.5	39.43	17.63	1.55	31.51	-	-	P	H
		255.18	27.53	-18.47	46	37.32	19.5	2.07	31.36	-	-	P	H
		336.4	27.08	-18.92	46	35.08	20.82	2.41	31.23	-	-	P	H
		804	31.57	-14.43	46	30.48	27.78	3.9	30.59	-	-	P	H
		910.4	32.81	-13.19	46	29.97	29.26	4.12	30.54	-	-	P	H
		49.17	32.29	-7.71	40	47.3	15.52	1.07	31.6	100	0	P	V
		106.95	24.48	-19.02	43.5	37.42	17.03	1.55	31.52	-	-	P	V
		257.88	24.48	-21.52	46	33.97	19.8	2.07	31.36	-	-	P	V
		757.1	31.04	-14.96	46	30.59	27.28	3.82	30.65	-	-	P	V
		864.9	32.03	-13.97	46	29.63	28.79	4.17	30.56	-	-	P	V
		939.1	33.03	-12.97	46	29.5	29.94	4.12	30.53	-	-	P	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	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

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		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		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 Plots

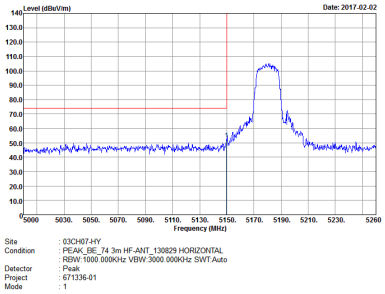
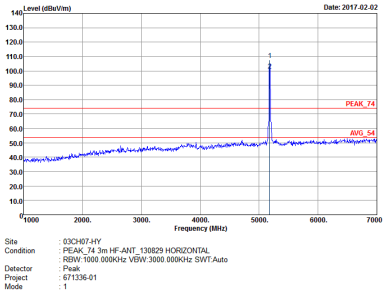
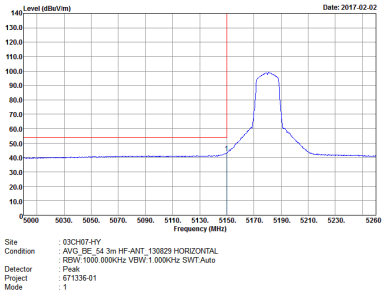
Test Engineer :	Jesse Wang, James Chiu and Daniel Lee	**Temperature :**	21~22°C
		Relative Humidity :	44~48%

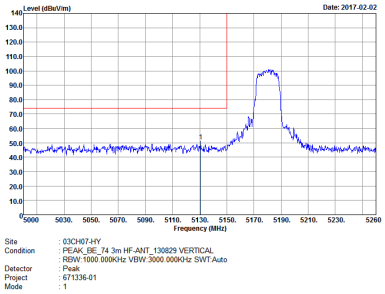
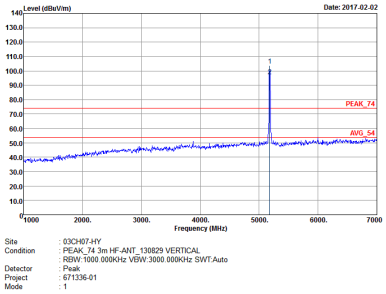
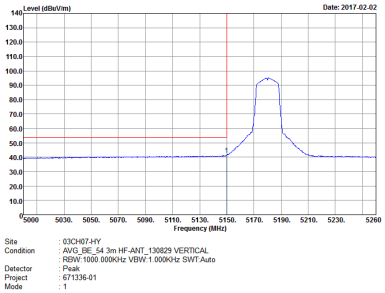
Note symbol

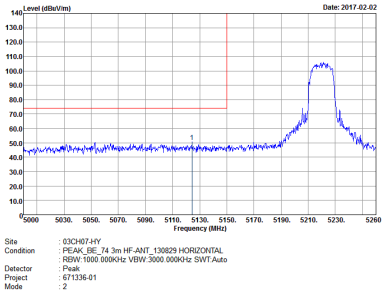
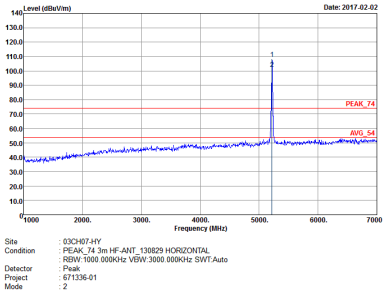
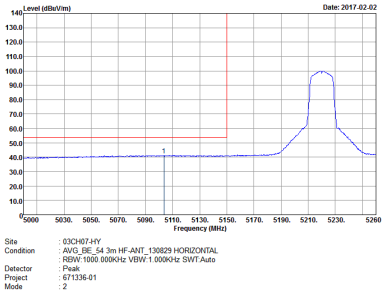
-L	**Low channel location**
-R	**High channel location**

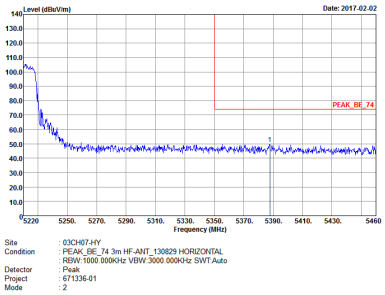
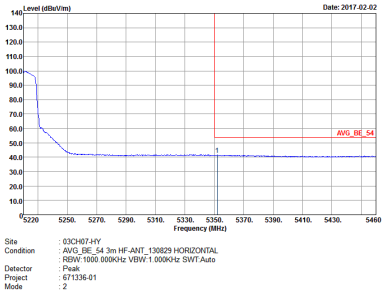
Band 1 - 5150~5250MHz

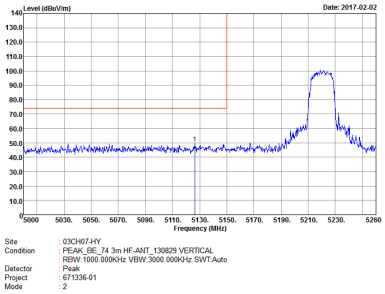
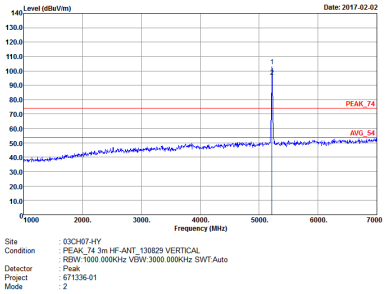
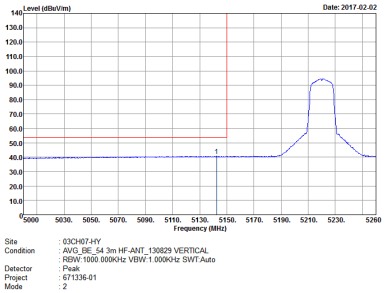
WIFI 802.11a (Band Edge @ 3m)

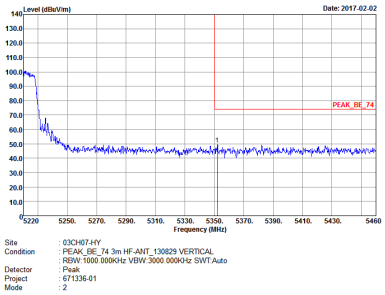
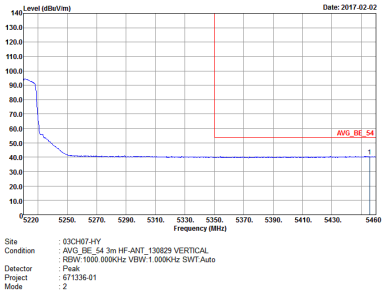
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH36 5180MHz	
1	Horizontal	Fundamental
Peak		
Avg.		Left blank

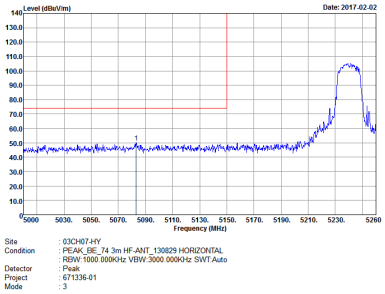
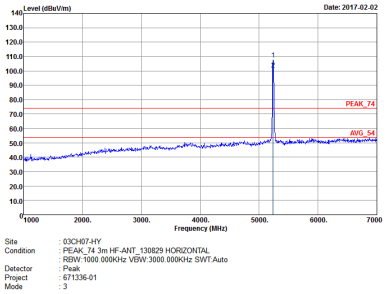
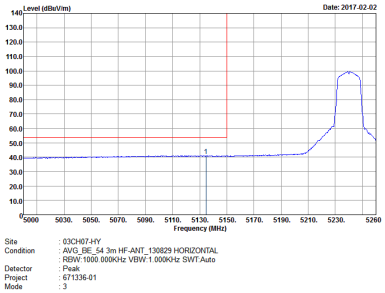
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH36 5180MHz	
1	Vertical	Fundamental
Peak		
Avg.		Left blank

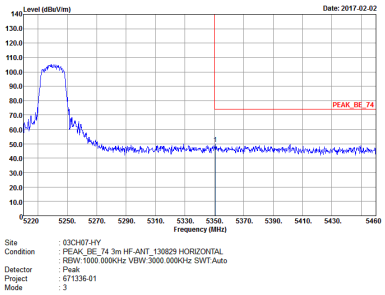
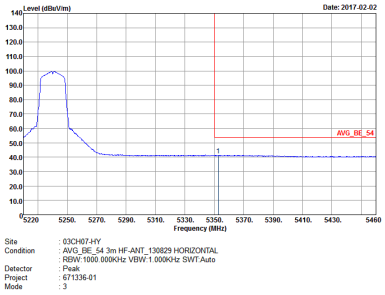
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH44 5220MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		Left blank

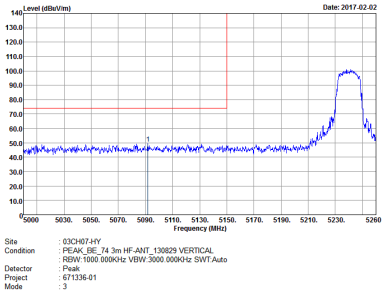
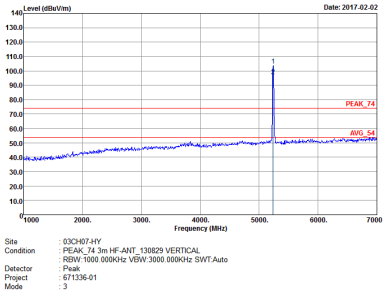
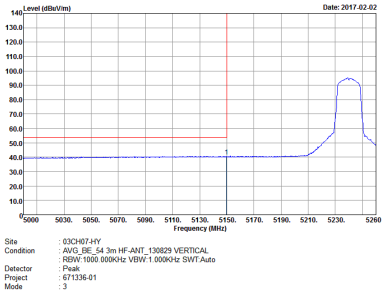
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH44 5220MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

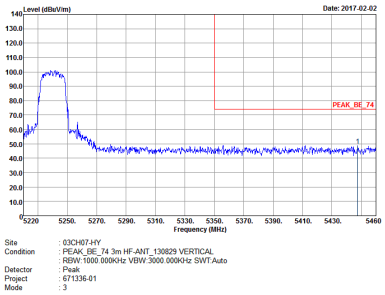
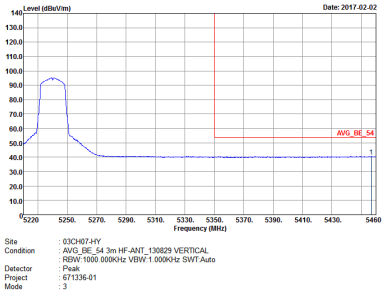
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH44 5220MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		Left blank

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH44 5220MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH48 5240MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		Left blank

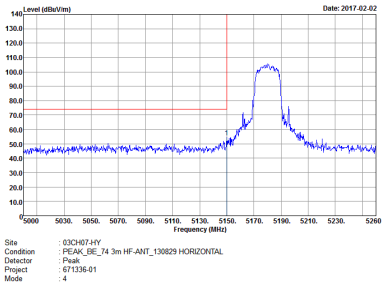
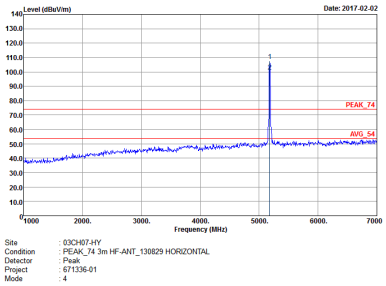
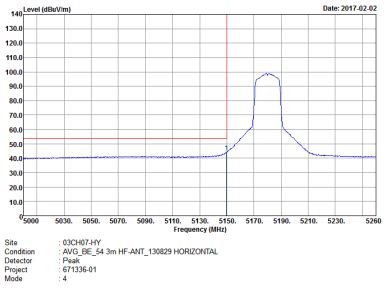
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH48 5240MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

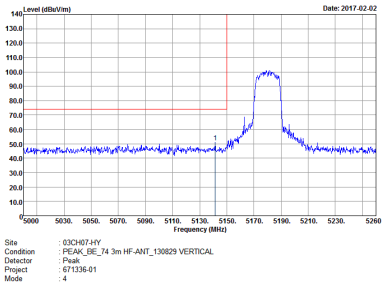
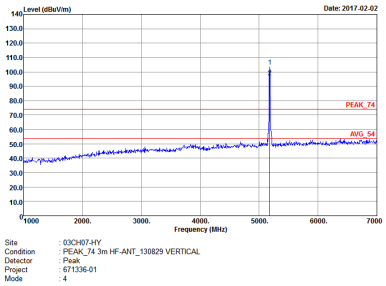
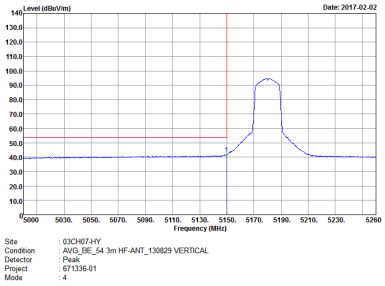
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH48 5240MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		Left blank

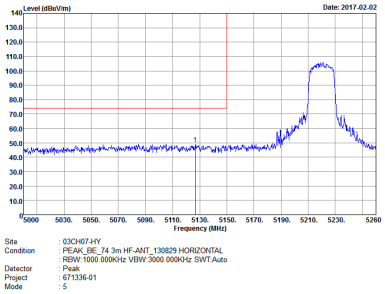
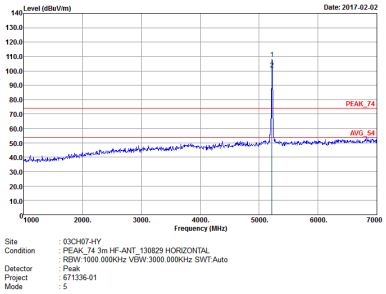
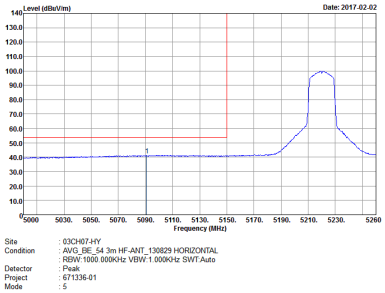
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH48 5240MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

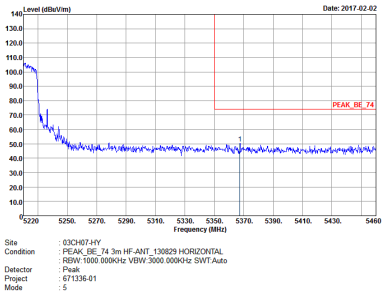
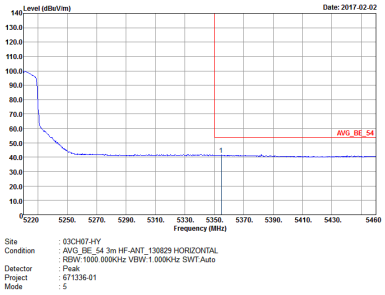
Band 1 5150~5250MHz

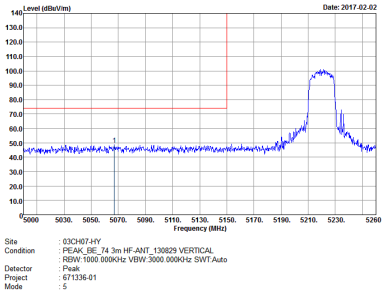
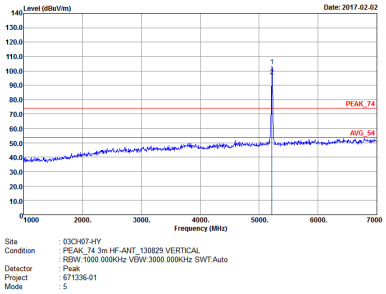
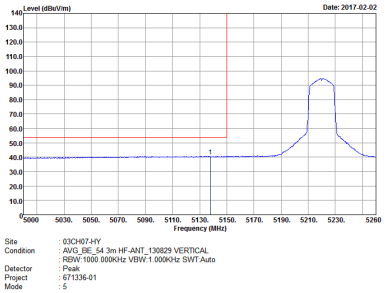
WIFI 802.11n HT20 (Band Edge @ 3m)

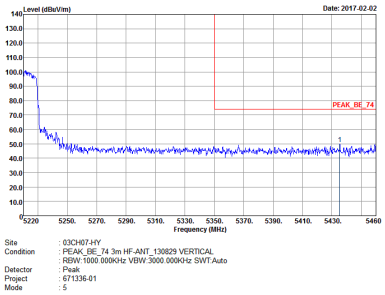
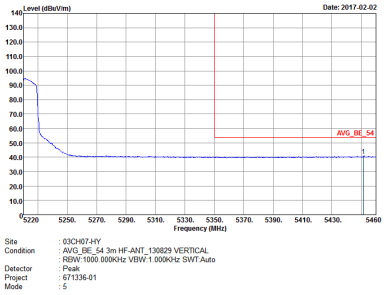
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH36 5180MHz	
1	Horizontal	Fundamental
Peak		
Avg.		Left blank

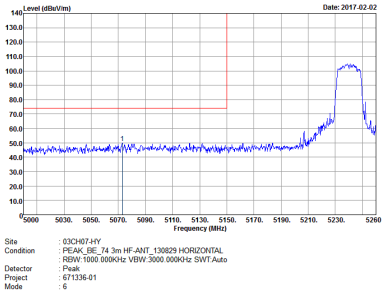
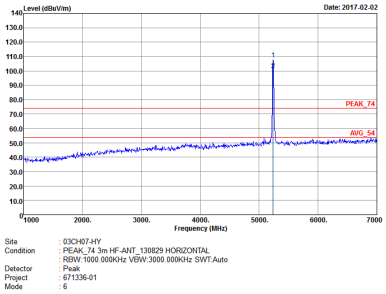
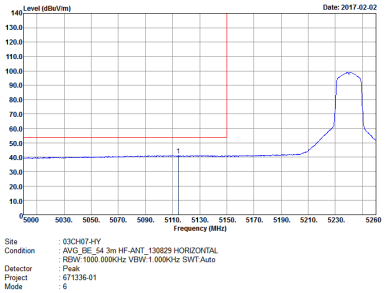
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH36 5180MHz	
1	Vertical	Fundamental
Peak		
Avg.		Left blank

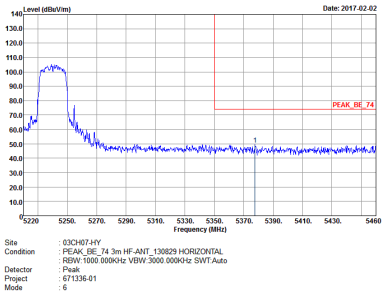
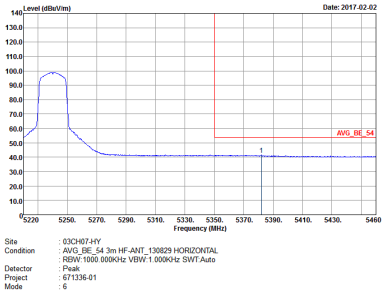
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH44 5220MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		Left blank

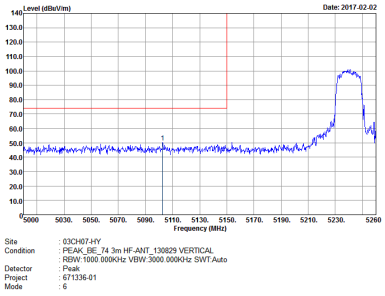
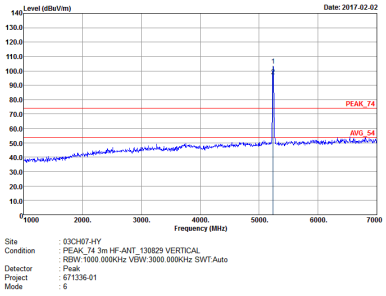
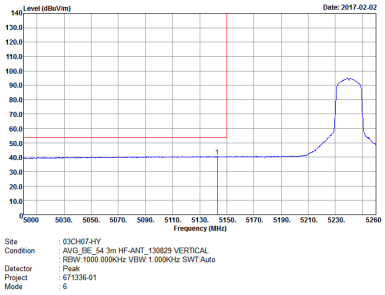
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH44 5220MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

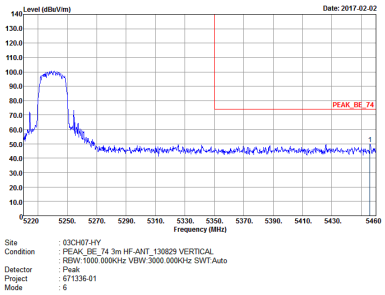
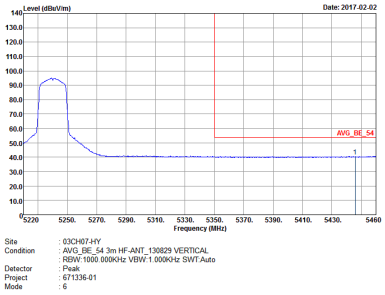
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH44 5220MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		Left blank

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH44 5220MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH48 5240MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		Left blank

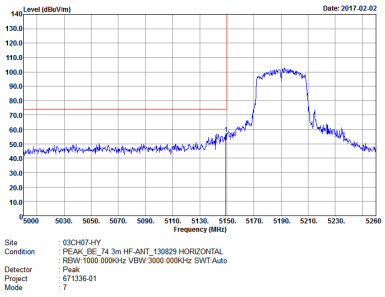
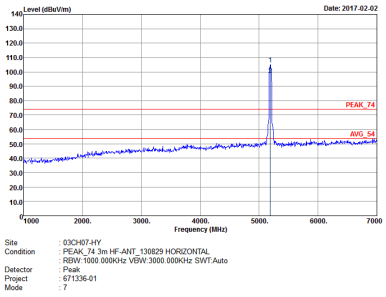
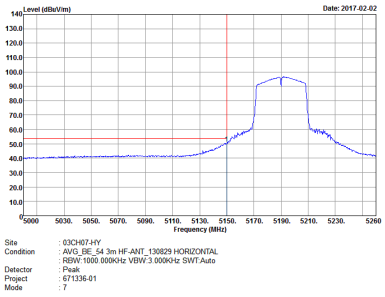
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH48 5240MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

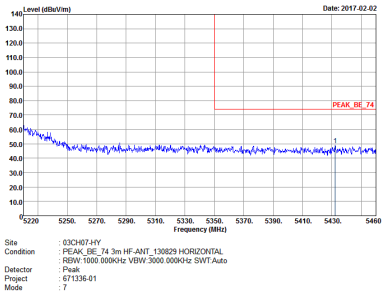
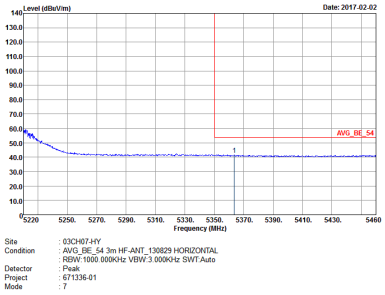
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH48 5240MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		Left blank

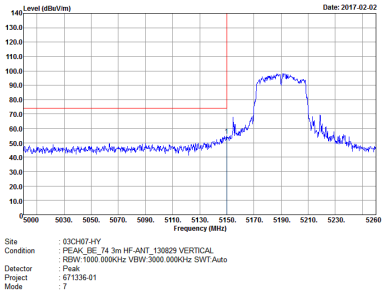
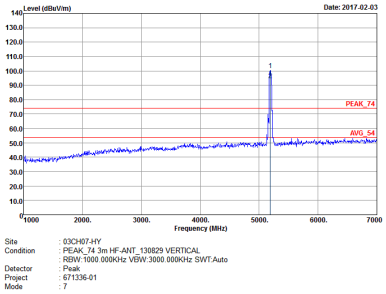
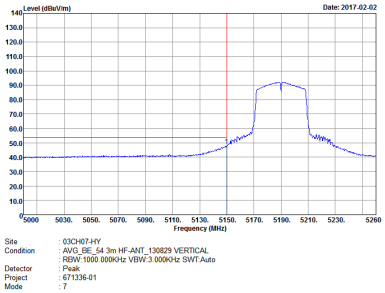
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH48 5240MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

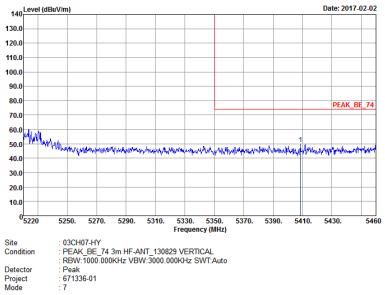
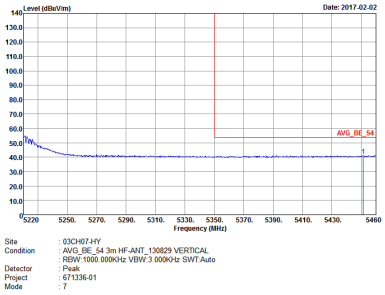
Band 1 5150~5250MHz

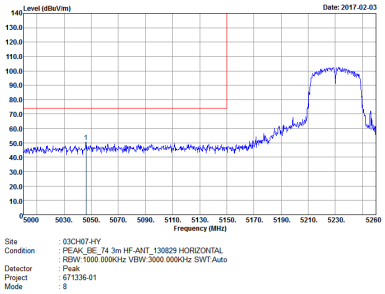
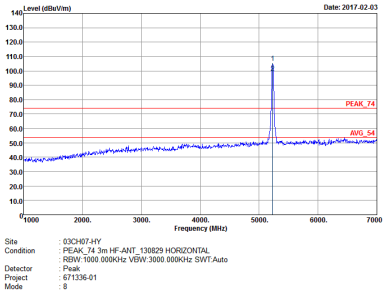
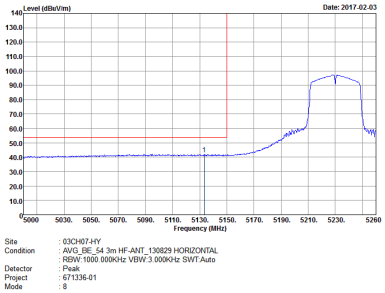
WIFI 802.11n HT40 (Band Edge @ 3m)

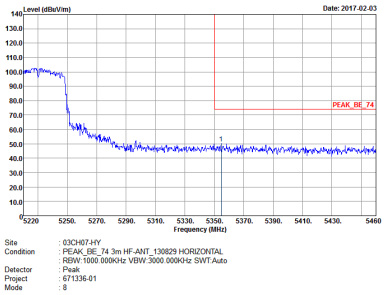
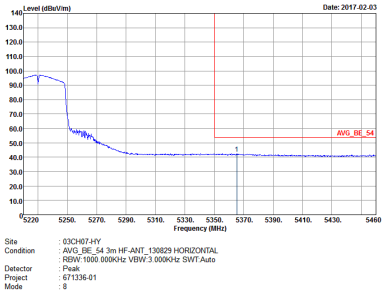
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		Left blank

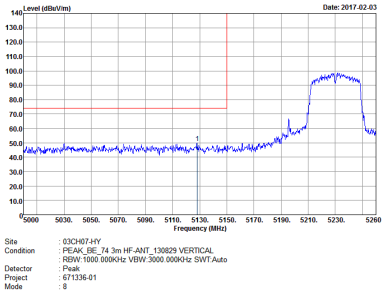
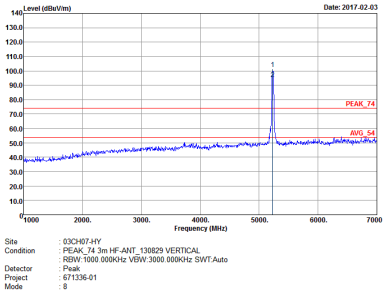
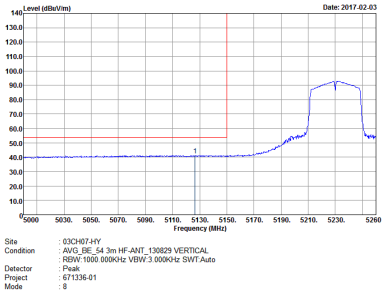
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

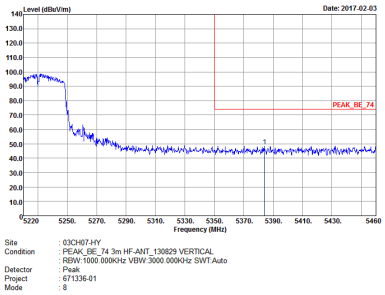
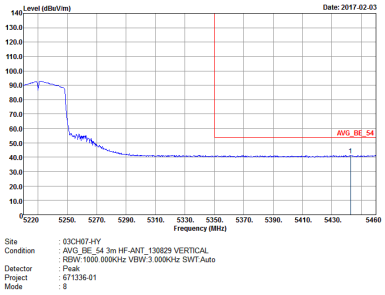
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		Left blank

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH46 5230MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		Left blank

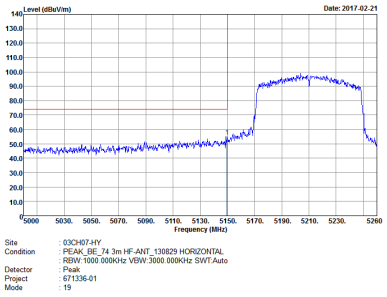
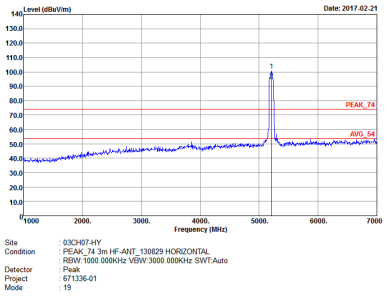
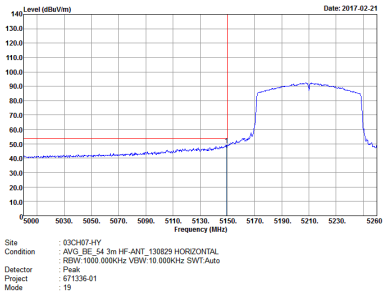
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH46 5230MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

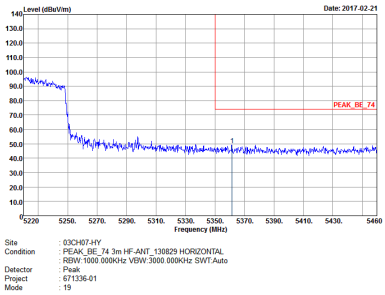
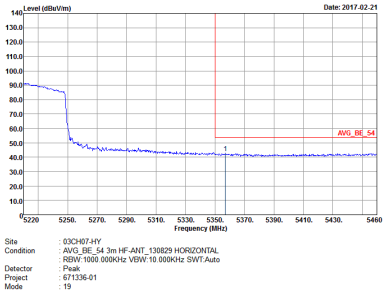
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH46 5230MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		Left blank

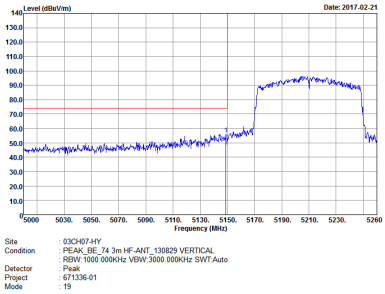
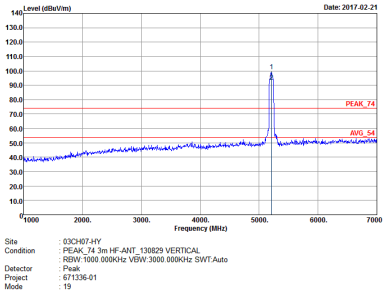
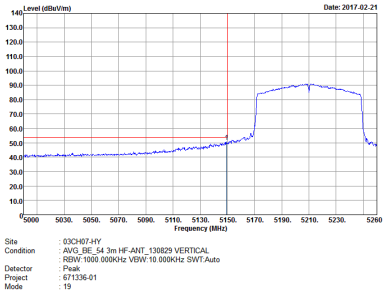
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH46 5230MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

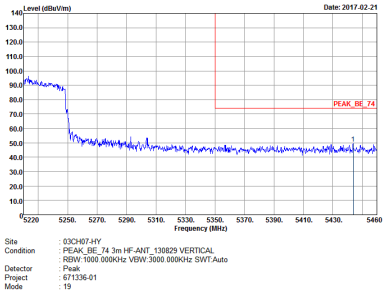
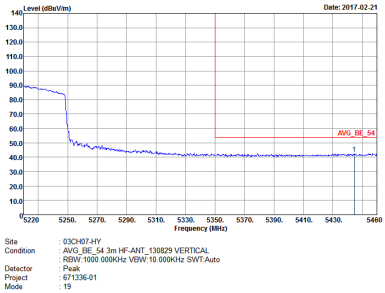
Band 1 5150~5250MHz

WIFI 802.11ac VHT80 (Band Edge @ 3m)

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH42 5210MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		Left blank

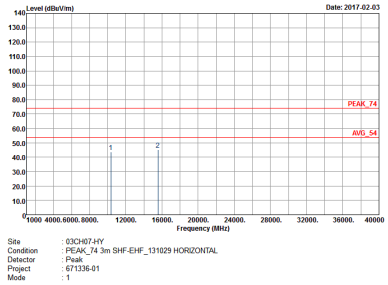
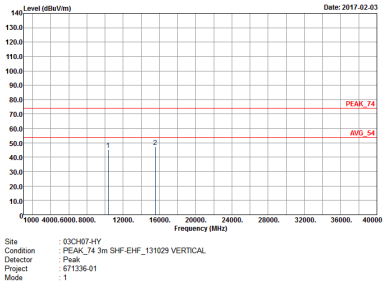
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH42 5210MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

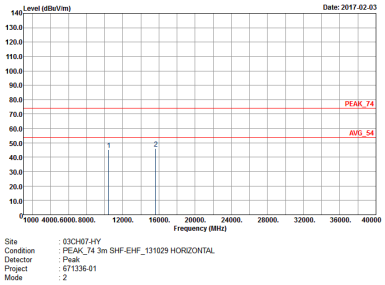
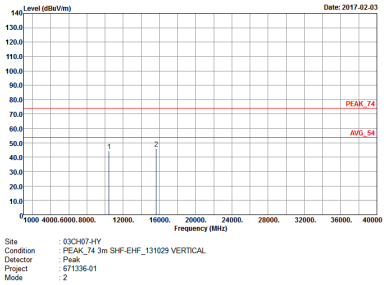
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH42 5210MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		Left blank

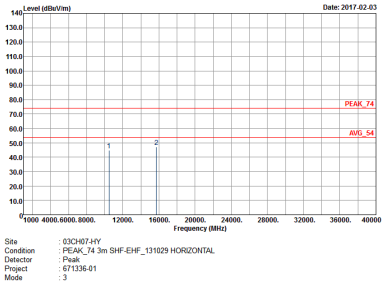
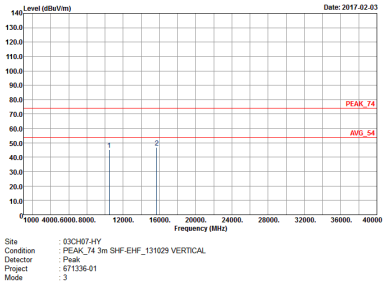
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH42 5210MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

Band 1 - 5150~5250MHz

WIFI 802.11a (Harmonic @ 3m)

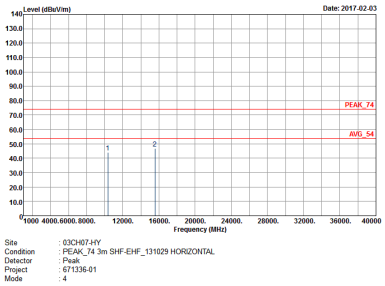
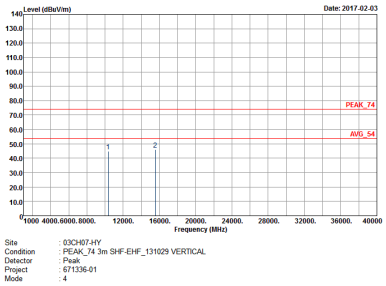
WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11a CH36 5180MHz	
1	Horizontal	Vertical
Peak Avg.		

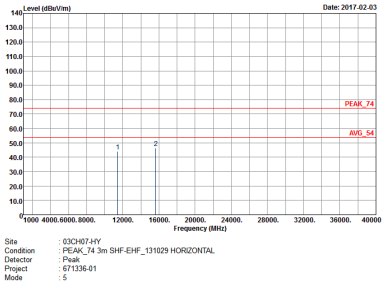
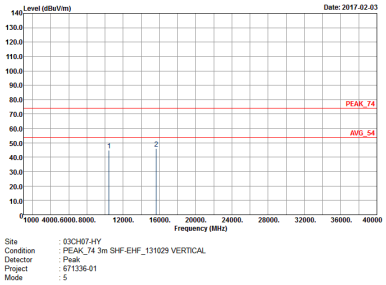
WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11a CH44 5220MHz	
1	Horizontal	Vertical
Peak Avg.		

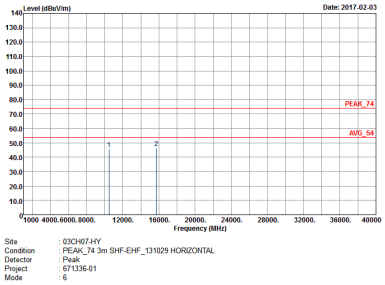
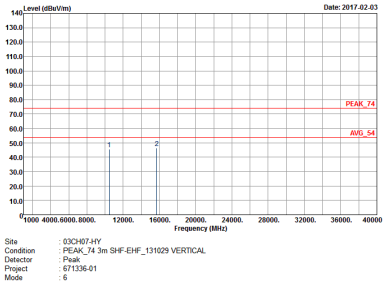
WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11a CH48 5240MHz	
1	Horizontal	Vertical
Peak Avg.		

Band 1 5150~5250MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

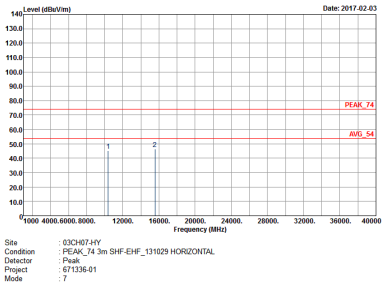
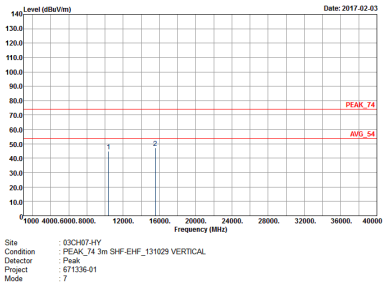
WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT20 CH36 5180MHz	
1	Horizontal	Vertical
Peak Avg.		

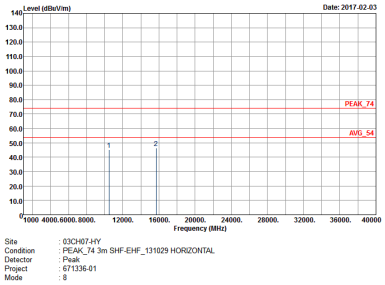
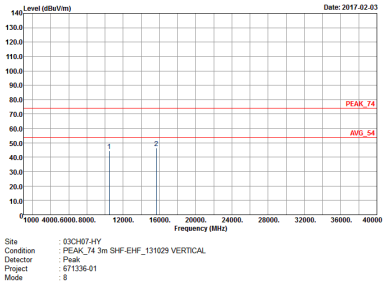
WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT20 CH44 5220MHz	
1	Horizontal	Vertical
Peak Avg.		

WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT20 CH48 5240MHz	
1	Horizontal	Vertical
Peak Avg.		

Band 1 5150~5250MHz

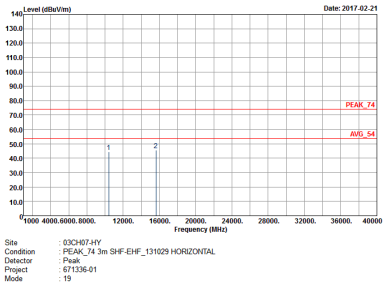
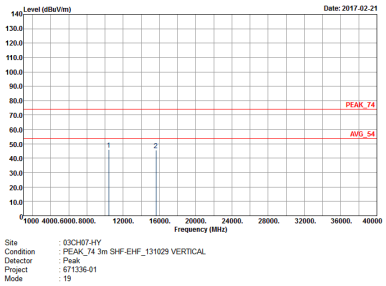
WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT40 CH38 5190MHz	
1	Horizontal	Vertical
Peak Avg.		

WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT40 CH46 5230MHz	
1	Horizontal	Vertical
Peak Avg.		

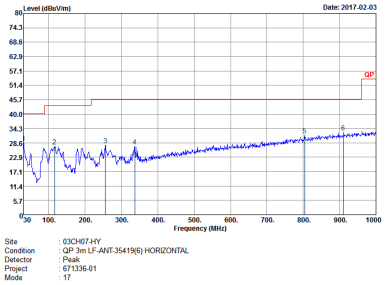
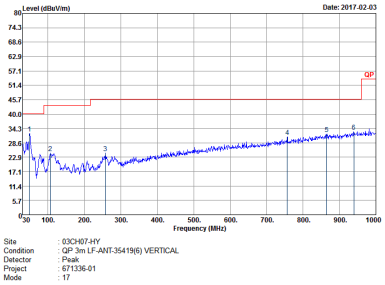
Band 1 5150~5250MHz

WIFI 802.11ac VHT80 (Harmonic @ 3m)

WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11ac VHT80 CH42 5210MHz	
1	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

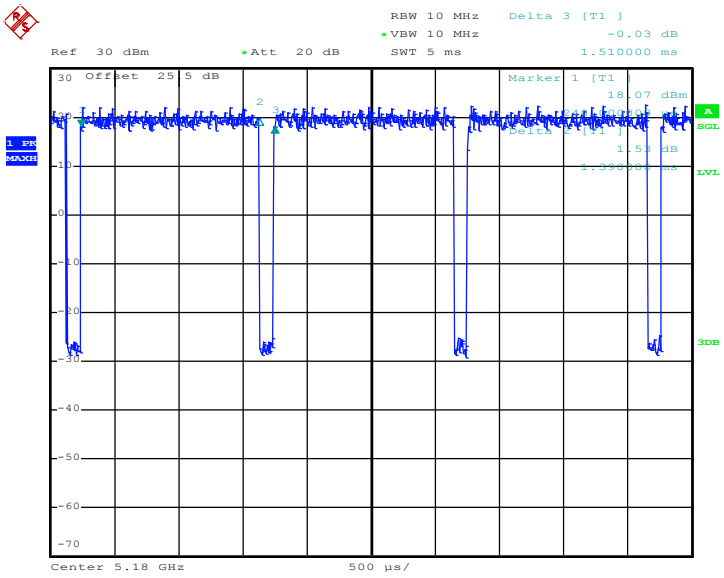
5GHz WIFI 802.11n HT40 (LF)

WIFI	5GHz WIFI	
ANT	802.11n HT40 LF	
1	Horizontal	Vertical
QP / Peak		

Appendix D. Duty Cycle Plots

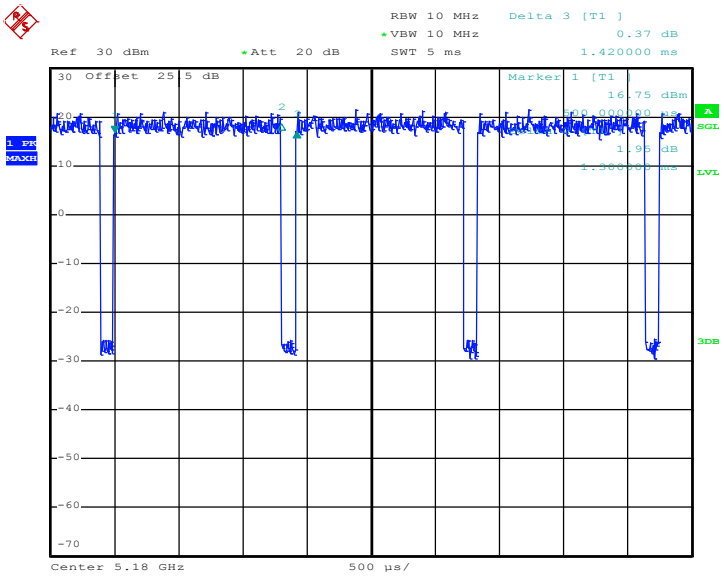
Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
802.11a	92.05	1390.00	0.72	1kHz
5GHz 802.11n HT20	91.55	1300.00	0.77	1kHz
5GHz 802.11n HT40	85.71	648.00	1.54	3kHz
5GHz 802.11ac VHT80	74.07	320.00	3.13	10kHz

802.11a



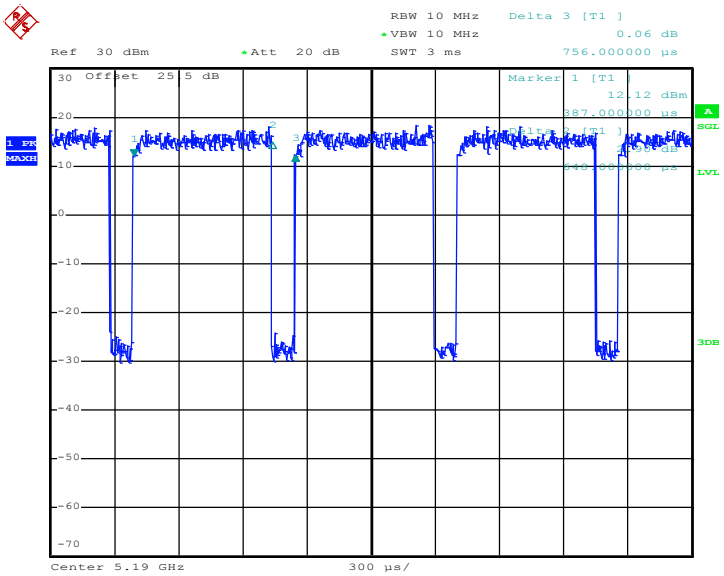
Date: 25.JAN.2017 14:29:07

802.11n HT20



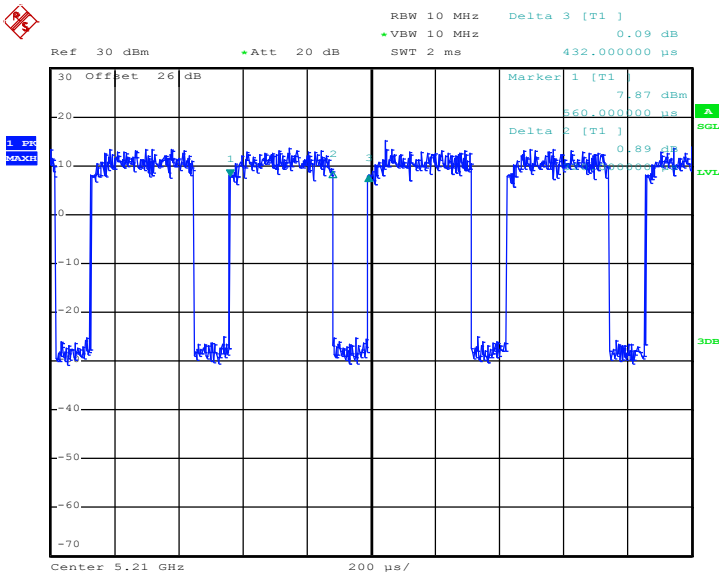
Date: 25.JAN.2017 14:58:01

802.11n HT40



Date: 25.JAN.2017 15:10:21

802.11ac VHT80



Date: 14.FEB.2017 22:32:49