FCC RF Test Report

APPLICANT	:	**Bullitt Group**
EQUIPMENT	:	**Rugged Smart Phone**
BRAND NAME	:	**CAT**
MODEL NAME	:	**S41**
MARKETING NAME	:	**S41**
FCC ID	:	**ZL5S41**
STANDARD	:	**FCC Part 15 Subpart E §15.407**
CLASSIFICATION	:	**(NII) Unlicensed National Information Infrastructure**

The product was received on Jun. 09, 2017 and testing was completed on Aug. 09, 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.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR732839-01F	Rev. 01	Initial issue of report	Aug. 23, 2017

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	6dB, 26dB and 99% Occupied Bandwidth	> 500kHz	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	Unwanted Emissions	15.407(b)(4)(i) &15.209(a)	Pass	Under limit 3.84 dB at 17235.000 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 17.50 dB at 0.606 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

Bullitt Group
One Valpy, Valpy Street, Reading, Berkshire, England RG1 1AR

1.2 Manufacturer

Compal Electronics, INC.
No. 385, Yangguang St. Neihu District, Taipei City 11491, Taiwan, R.O.C

1.3 Product Feature of Equipment Under Test

GSM/WCDMA/LTE, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n, FM Receiver, NFC, and GPS.

Product Specification subjective to this standard	
Antenna Type	WWAN: PIFA + Coupling type (LDS) Antenna WLAN: PIFA Antenna Bluetooth: PIFA Antenna GPS / Glonass : PIFA Antenna NFC: Loop Antenna FM: Integral Antenna (Earphone acting as FM antenna deemed as an integral antenna)

<Sample Information>

S41 has two different variant	
Sample 1	Dual SIM
Sample 2	Single SIM
For Dual-SIM or Single-SIM control by SW, the HW difference is SIM holder.	

Remark: All test items were performed with Sample 1.

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. TW0007 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

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. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH11-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 v01r04.
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- 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

a. 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: conduction emission (150 kHz to 30 MHz), radiation 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.

b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5725-5850 MHz Band 4 (U-NII-3)	149	5745	157	5785
	151*	5755	159*	5795
	153	5765	161	5805
	-	-	165	5825

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

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.

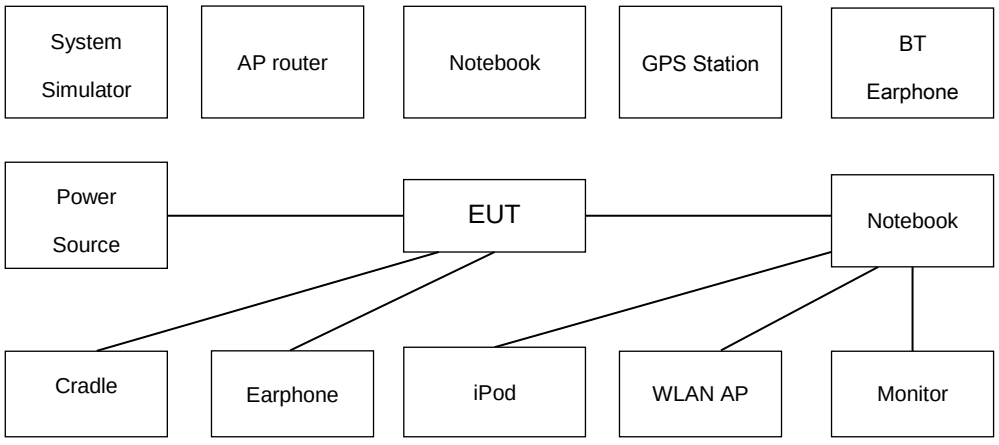
Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

AC Conducted Emission	Mode 1 : LTE Band 7 Idle + Bluetooth Link + WIFI (5GHz) Link + NFC on + FM Rx (98MHz) + Earphone + Battery + USB Cable (charging from Adapter)

Ch. #		Band IV：5725-5850 MHz		
		802.11a	802.11n HT20	802.11n HT40
L	Low	149	149	151
M	Middle	157	157	-
H	High	165	165	159

Ch. #		Band IV：5725-5850 MHz		
		802.11ac VHT20	802.11ac VHT40	802.11ac VHT80
L	Low	149	151	-
M	Middle	157	-	155
H	High	165	159	-

2.3 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8 m
2.	Bluetooth Earphone	SonyErricsson	MW600	PY700A2029	N/A	N/A
3.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded,1.8 m
4.	NOTE BOOK	Dell	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded,1.2 m DC O/P: Shielded, 1.8 m
5.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

2.5 EUT Operation Test Setup

The RF test items, an engineering code was provided and enabled to make EUT continuous transmit/receive.

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 6dB and 26dB and 99% Occupied Bandwidth Measurement

3.1.1 Description of 6dB and 26dB and 99% Occupied Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

26dB and 99% Occupied bandwidth are reporting only.

3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

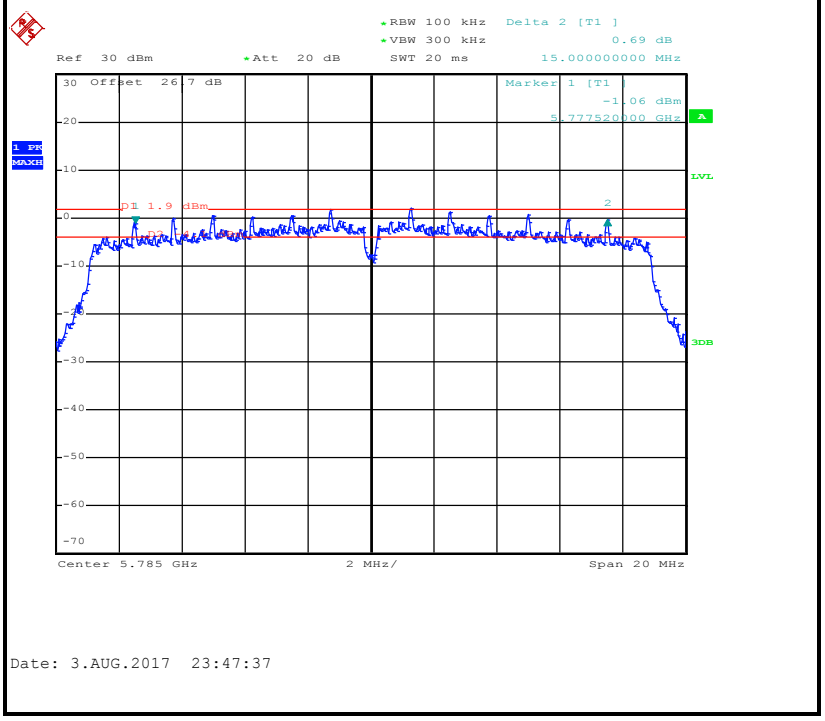
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04. Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW ≥ 3 x RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

3.1.4 Test Setup

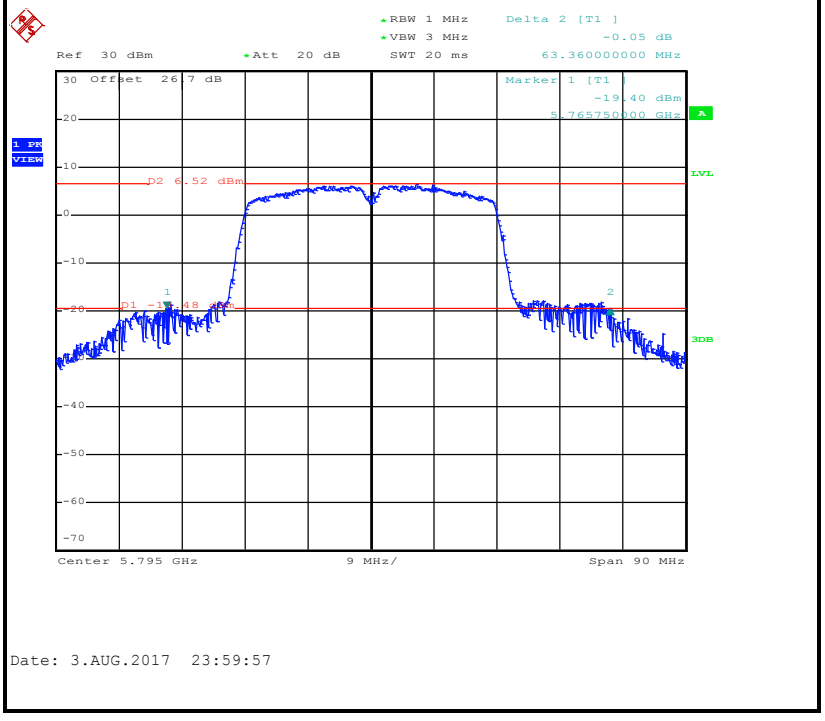
3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

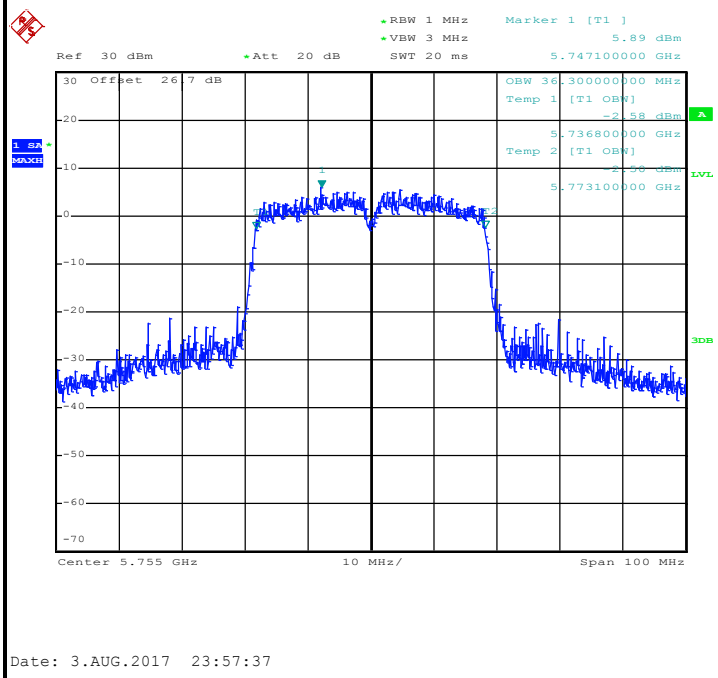
Minimum 6dB Bandwidth



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 the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

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.

3.2.2 Measuring Instruments

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

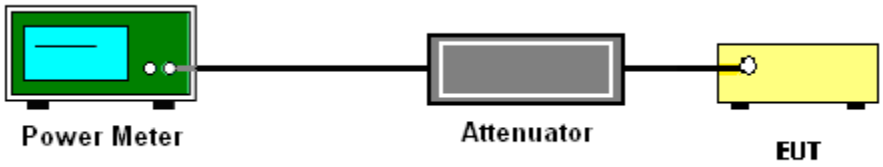
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04.

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 the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz 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 v01r04. 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).

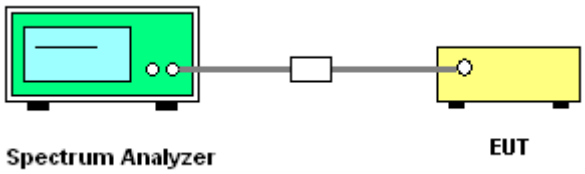
- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 300 kHz.
- Set VBW ≥ 1 MHz.
- Number of points in sweep ≥ 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add 10 log(500kHz/RBW) to the test result.
- 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.

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

   Method (c): Measure and add 10 log(N_{ANT}) dB.

   With this technique, spectrum measurements are performed at each output of the device, but rather than summing the spectra or the spectral peaks across the outputs, the quantity 10 log(N_{ANT}) dB is added to each spectrum value before comparing to the emission limit. The addition of 10 log(N_{ANT}) dB serves to apportion the emission limit among the N_{ANT} outputs so that each output is permitted to contribute no more than $1/N_{ANT}$ th of the PSD limit.

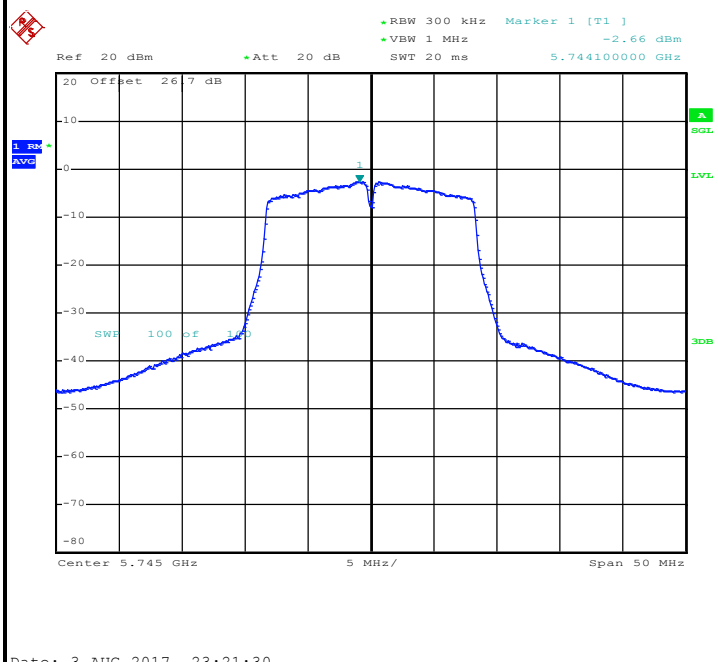
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/300kHz)



3.4 Unwanted Emissions Measurement

This section is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement.

3.4.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5.725-5.85 GHz band:

15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(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 v01r04 G)2)c)

(i) Section 15.407(b)(1-3) specifies the unwanted emissions limit for the U-NII-1 and 2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz. However, an out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz dBm/MHz peak emission limit.

(ii) Section 15.407(b)(4) specifies the unwanted emissions limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). An alternative to the band emissions mask is specified in Section 15.407(b)(4)(ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the alternative 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 v01r04. 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

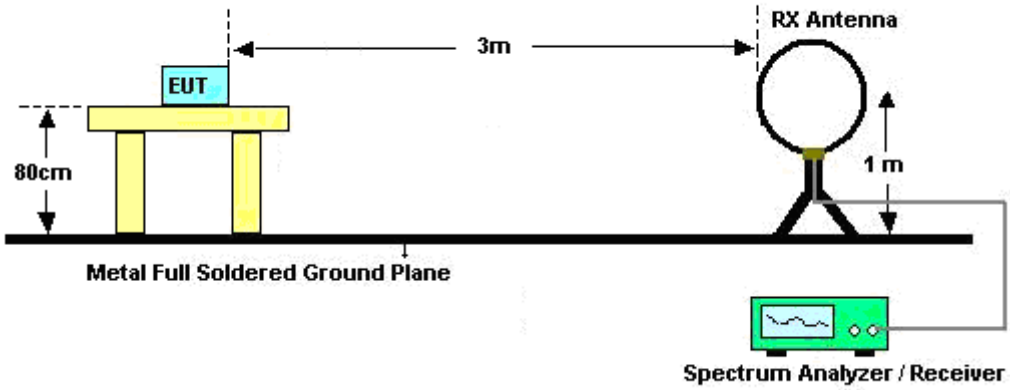
(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

- 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.

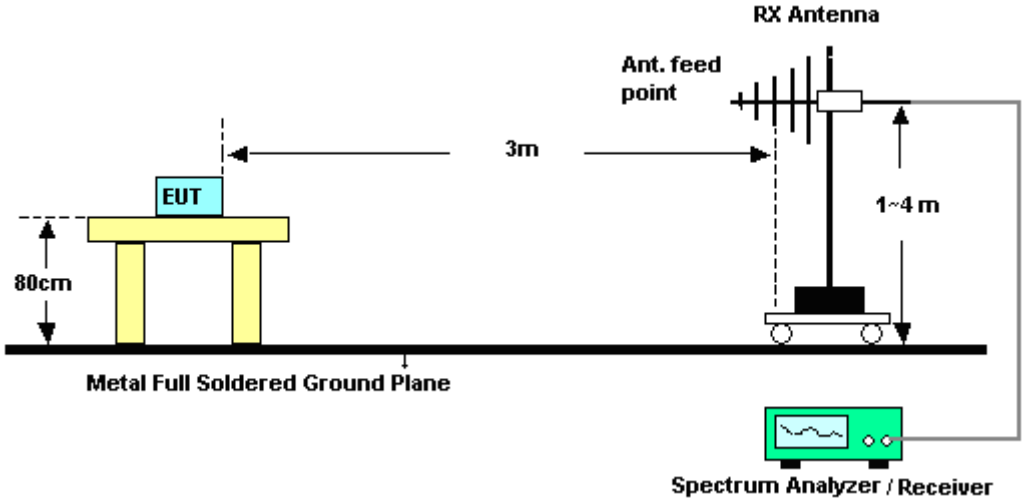
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband 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

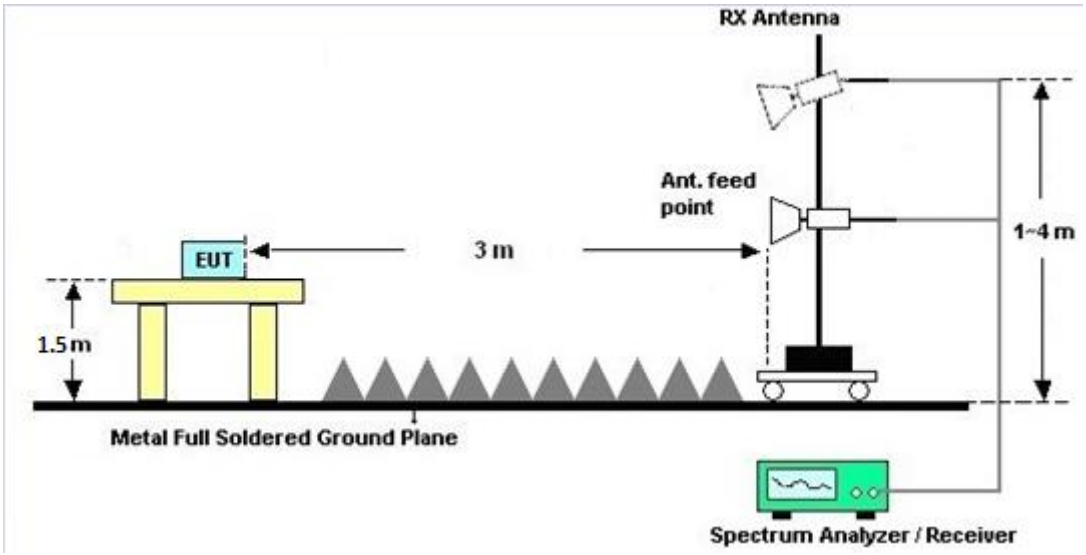
For radiated emissions below 30MHz



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 was not reported.

3.4.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C and D.

3.4.7 Duty Cycle

Please refer to Appendix E.

3.4.8 Test Result of Radiated Spurious Emissions (30MHz ~ 10th Harmonic)

Please refer to Appendix C and D.

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.

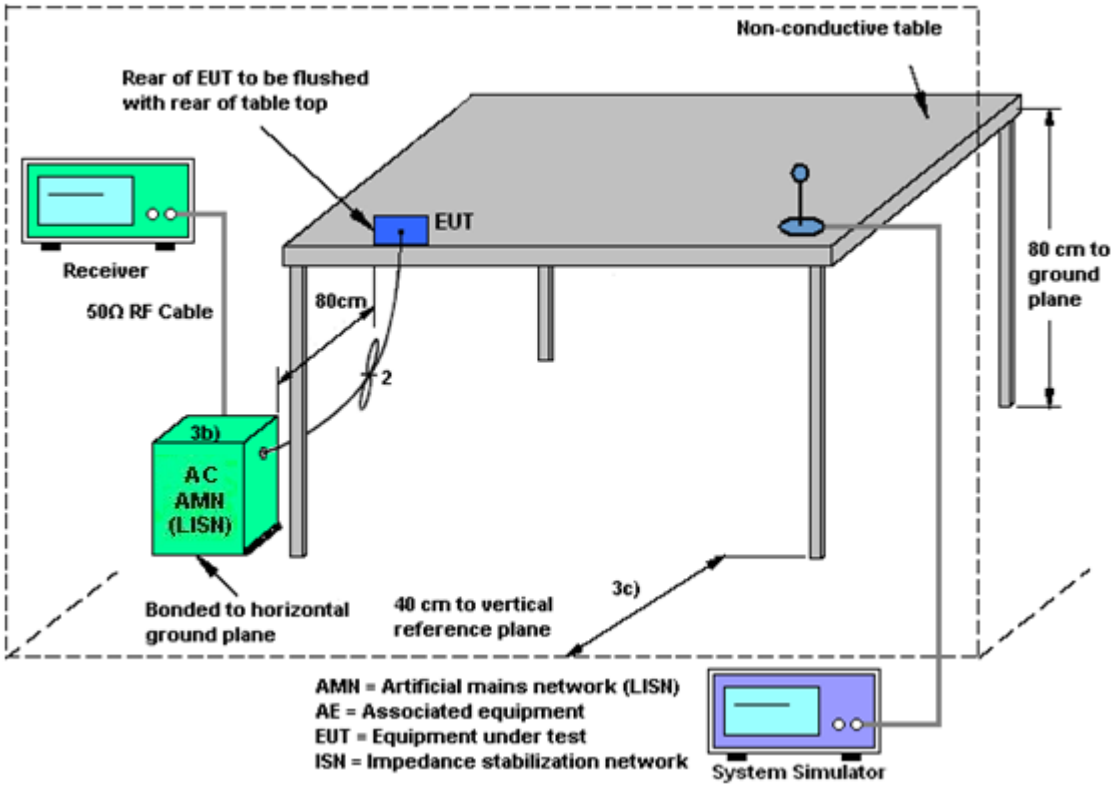
3.5.2 Measuring Instruments

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



3.5.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

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.

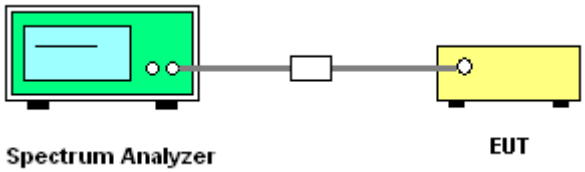
3.6.2 Measuring Instruments

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

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 Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 29, 2016	Jul.27.2017~ Aug.04.2017	Sep. 28, 2017	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	0846202	300MHz~40GHz	Sep. 29, 2016	Jul.27.2017~ Aug.04.2017	Sep. 28, 2017	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9kHz ~ 30GHz	Nov. 17, 2016	Jul.27.2017~ Aug.04.2017	Nov. 16, 2017	Conducted (TH05-HY)
Temperature Chamber	ESPEC	SH-641	92013720	-40℃ ~90℃	Sep. 01, 2016	Jul.27.2017~ Aug.04.2017	Aug. 31, 2017	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Aug. 04, 2017	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 30, 2016	Aug. 04, 2017	Aug. 29, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 29, 2016	Aug. 04, 2017	Nov. 28, 2017	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 05, 2017	Aug. 04, 2017	Jan. 04, 2018	Conduction (CO05-HY)
Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz, VSWR : 2.5:1 max	Jul. 21, 2017	Aug. 04, 2017~ Aug. 09, 2017	Jul. 20, 2018	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Nov. 10, 2016	Aug. 04, 2017~ Aug. 09, 2017	Nov. 09, 2017	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D&N-6-06	35414&AT-N 0602	30MHz~1GHz	Oct. 15, 2016	Aug. 04, 2017~ Aug. 09, 2017	Oct. 14, 2017	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1326	1GHz ~ 18GHz	Oct. 07, 2016	Aug. 04, 2017~ Aug. 09, 2017	Oct. 06, 2017	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Oct. 20, 2016	Aug. 04, 2017~ Aug. 09, 2017	Oct. 19, 2018	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 10, 2016	Aug. 04, 2017~ Aug. 09, 2017	Nov. 09, 2017	Radiation (03CH11-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1902247	1GHz~18GHz	Jun. 23, 2017	Aug. 04, 2017~ Aug. 09, 2017	Jun. 22, 2018	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz ~ 44GHz	Oct. 12, 2016	Aug. 04, 2017~ Aug. 09, 2017	Oct. 11, 2017	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Aug. 04, 2017~ Aug. 09, 2017	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Aug. 04, 2017~ Aug. 09, 2017	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Aug. 04, 2017~ Aug. 09, 2017	N/A	Radiation (03CH11-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290053	20Hz to 26.5GHz	Jan. 12, 2017	Aug. 04, 2017~ Aug. 09, 2017	Jan. 11, 2018	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 08, 2016	Aug. 04, 2017~ Aug. 09, 2017	Nov. 07, 2017	Radiation (03CH11-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.70**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.20**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.50**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.20**

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Shiming Liu/Allen Lin	Temperature:	21~25	°C
Test Date:	2017/7/28~2017/8/4	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 26dB EBW and 99% OBW

Band IV									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)	6 dB Bandwidth (MHz)	6dB Bandwidth min. Limit (MHz)	Pass/Fail
11a	6M bps	1	149	5745	17.4	24.1	15.02	0.5	Pass
11a	6Mbps	1	157	5785	17.3	29.85	15.24	0.5	Pass
11a	6Mbps	1	165	5825	17.35	30.3	15.02	0.5	Pass
HT20	MCS 0	1	149	5745	18.3	23.3	15.02	0.5	Pass
HT20	MCS 0	1	157	5785	18.25	30.4	15	0.5	Pass
HT20	MCS 0	1	165	5825	18.2	28.7	15.02	0.5	Pass
HT40	MCS 0	1	151	5755	36.3	61.29	35.08	0.5	Pass
HT40	MCS 0	1	159	5795	36.3	63.36	35.08	0.5	Pass

TEST RESULTS DATA
Average Power Table

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)		Pass/Fail
11a	6M bps	1	149	5745	0.12	13.74	30.00	-1.69		Pass
11a	6Mbps	1	157	5785	0.12	13.62	30.00	-1.69		Pass
11a	6Mbps	1	165	5825	0.12	13.59	30.00	-1.69		Pass
HT20	MCS 0	1	149	5745	0.13	12.98	30.00	-1.69		Pass
HT20	MCS 0	1	157	5785	0.13	12.95	30.00	-1.69		Pass
HT20	MCS 0	1	165	5825	0.13	12.93	30.00	-1.69		Pass
HT40	MCS 0	1	151	5755	0.23	12.78	30.00	-1.69		Pass
HT40	MCS 0	1	159	5795	0.23	12.75	30.00	-1.69		Pass

TEST RESULTS DATA
Power Spectral Density

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	10log (500kHz /RBW) Factor (dB)	Average Power Density (dBm/500kHz)	Average PSD Limit (dBm/500kHz)	DG (dBi)	Pass/Fail
11a	6M bps	1	149	5745	0.12	2.22	-0.32	30.00	-1.69	Pass
11a	6Mbps	1	157	5785	0.12	2.22	-0.33	30.00	-1.69	Pass
11a	6Mbps	1	165	5825	0.12	2.22	-0.59	30.00	-1.69	Pass
HT20	MCS 0	1	149	5745	0.13	2.22	-0.89	30.00	-1.69	Pass
HT20	MCS 0	1	157	5785	0.13	2.22	-1.07	30.00	-1.69	Pass
HT20	MCS 0	1	165	5825	0.13	2.22	-1.15	30.00	-1.69	Pass
HT40	MCS 0	1	151	5755	0.23	2.22	-5.09	30.00	-1.69	Pass
HT40	MCS 0	1	159	5795	0.23	2.22	-5.03	30.00	-1.69	Pass

TEST RESULTS DATA
Frequency Stability

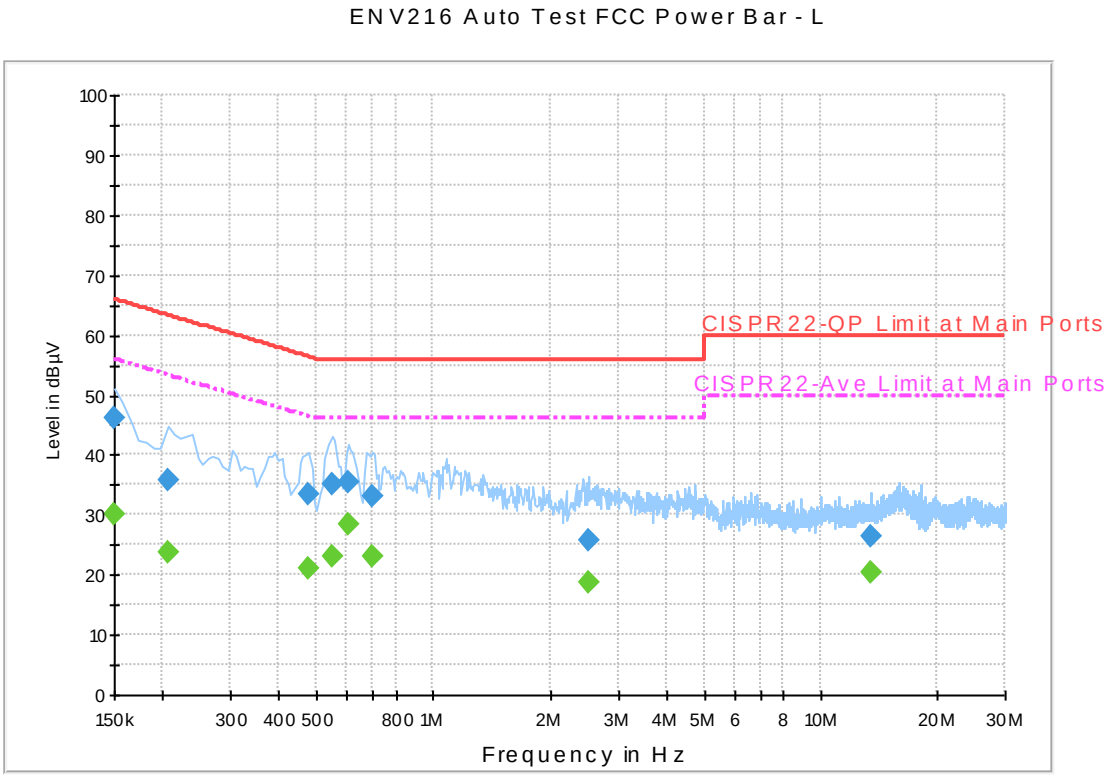
Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stablility (ppm)	Temperature (°C)	Voltage (V)	Note
11a	6M bps	1	149	5745	5745.025	0.025	4.35	50	4	
11a	6M bps	1	149	5745	5745.000	0.000	0.00	-30	4	
11a	6M bps	1	149	5745	5744.975	-0.025	-4.35	20	4.4	
11a	6M bps	1	149	5745	5745.025	0.025	4.35	20	3.6	
11a	6M bps	1	149	5745	5745.025	0.025	4.35	20	4	

Appendix B. AC Conducted Emission Test Results

Test Engineer :	Shareef-Yu	**Temperature :**	26~27℃
		Relative Humidity :	40~42%

EUT Information

Report NO :	732839-01
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Line



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	46.0	Off	L1	19.6	20.0	66.0
0.206000	35.8	Off	L1	19.6	27.6	63.4
0.478000	33.6	Off	L1	19.6	22.8	56.4
0.550000	35.2	Off	L1	19.6	20.8	56.0
0.606000	35.3	Off	L1	19.6	20.7	56.0
0.694000	33.2	Off	L1	19.6	22.8	56.0
2.526000	25.9	Off	L1	19.3	30.1	56.0
13.558000	26.3	Off	L1	20.2	33.7	60.0

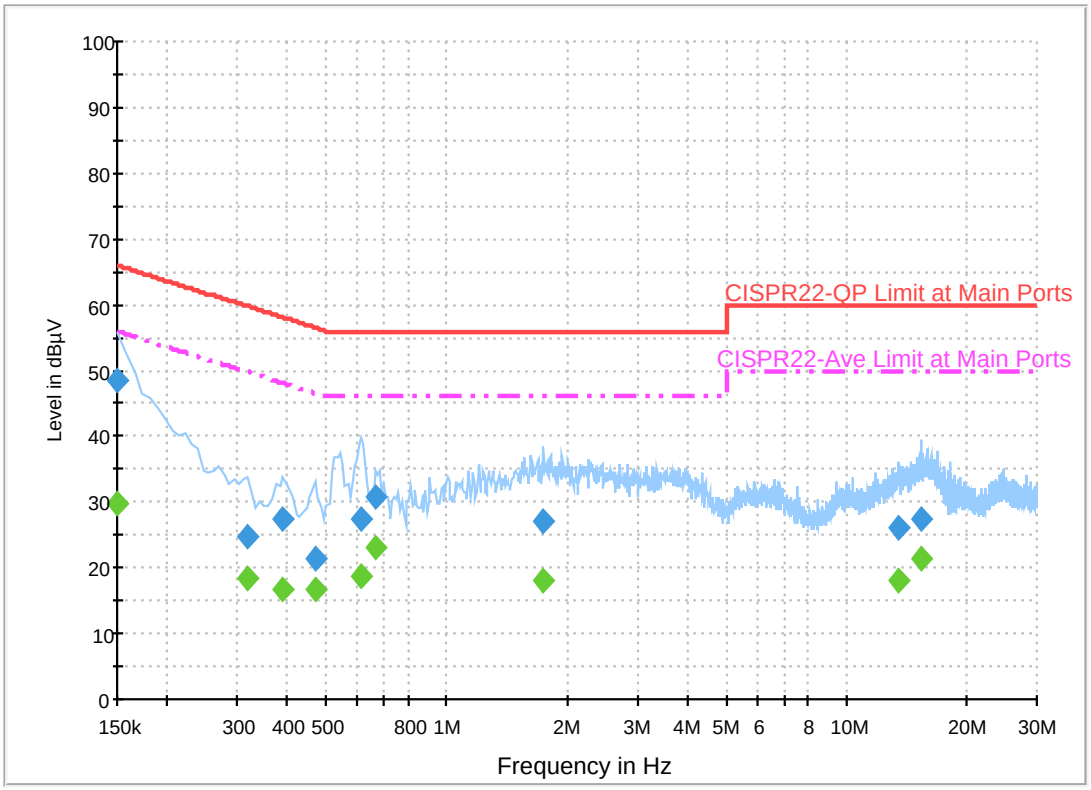
Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	29.9	Off	L1	19.6	26.1	56.0
0.206000	23.8	Off	L1	19.6	29.6	53.4
0.478000	21.0	Off	L1	19.6	25.4	46.4
0.550000	23.1	Off	L1	19.6	22.9	46.0
0.606000	28.5	Off	L1	19.6	17.5	46.0
0.694000	23.2	Off	L1	19.6	22.8	46.0
2.526000	18.8	Off	L1	19.3	27.2	46.0
13.558000	20.4	Off	L1	20.2	29.6	50.0

EUT Information

Report NO :	732839-01
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Neutral

ENV216 Auto Test FCC Power Bar - N



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	48.3	Off	N	19.5	17.7	66.0
0.318000	24.7	Off	N	19.5	35.1	59.8
0.390000	27.4	Off	N	19.5	30.7	58.1
0.470000	21.4	Off	N	19.5	35.1	56.5
13.558000	26.0	Off	N	19.5	30.0	56.0
0.614000	27.3	Off	N	19.5	28.7	56.0
0.662000	30.9	Off	N	19.5	25.1	56.0
1.750000	27.1	Off	N	19.6	28.9	56.0
15.430000	27.5	Off	N	20.4	32.5	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	29.8	Off	N	19.5	26.2	56.0
0.318000	18.4	Off	N	19.5	31.4	49.8
0.390000	16.8	Off	N	19.5	31.3	48.1
0.470000	16.8	Off	N	19.5	29.7	46.5
13.558000	18.0	Off	N	19.5	28.0	46.0
0.614000	18.8	Off	N	19.5	27.2	46.0
0.662000	22.9	Off	N	19.5	23.1	46.0
1.750000	18.1	Off	N	19.6	27.9	46.0
15.430000	21.4	Off	N	20.4	28.6	50.0

Appendix C. Radiated Spurious Emission

Test Engineer :	J.C. Liang, Jacky Hung and Ken Wu	Temperature :	24~26°C
		Relative Humidity :	50~56%

Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		5646.4	51.73	-16.47	68.2	42.49	32.73	9.61	33.1	296	274	P	H
		5682.8	53.82	-38.69	92.51	44.38	32.81	9.75	33.12	296	274	P	H
		5718.2	55.47	-54.83	110.3	45.85	32.94	9.81	33.13	296	274	P	H
		5724.6	69.2	-52.09	121.29	59.58	32.94	9.81	33.13	296	274	P	H
	*	5745	108.16	-	-	98.45	32.98	9.88	33.15	296	274	P	H
	*	5745	100.91	-	-	91.2	32.98	9.88	33.15	296	274	A	H
													H
													H
		5608.8	51.52	-16.68	68.2	42.4	32.65	9.55	33.08	396	44	P	V
		5697.6	51.71	-51.72	103.43	42.22	32.86	9.75	33.12	396	44	P	V
		5719.2	55.07	-55.51	110.58	45.45	32.94	9.81	33.13	396	44	P	V
		5725	62.86	-59.34	122.2	53.24	32.94	9.81	33.13	396	44	P	V
	*	5745	105.18	-	-	95.47	32.98	9.88	33.15	396	44	P	V
	*	5745	98.05	-	-	88.34	32.98	9.88	33.15	396	44	A	V
													V
													V

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)
		5630.4	52.19	-16.01	68.2	42.99	32.69	9.61	33.1	307	272	P	H
		5683.8	52.05	-41.2	93.25	42.56	32.86	9.75	33.12	307	272	P	H
		5719.4	54.75	-55.88	110.63	45.13	32.94	9.81	33.13	307	272	P	H
		5724.2	54.62	-65.76	120.38	45	32.94	9.81	33.13	307	272	P	H
	*	5785	108.06	-	-	98.16	33.06	10.01	33.17	307	272	P	H
	*	5785	100.87	-	-	90.97	33.06	10.01	33.17	307	272	A	H
		5852.6	52.27	-64	116.27	42.21	33.23	10.02	33.19	307	272	P	H
		5857.4	51.68	-58.45	110.13	41.58	33.27	10.02	33.19	307	272	P	H
		5877.8	51.07	-52.05	103.12	40.95	33.31	10.02	33.21	307	272	P	H
		5931.4	49.77	-18.43	68.2	39.55	33.43	10.02	33.23	307	272	P	H
													H
802.11a CH 157 5785MHz													H
		5639.6	51.01	-17.19	68.2	41.77	32.73	9.61	33.1	392	32	P	V
		5699.6	51.2	-53.71	104.91	41.71	32.86	9.75	33.12	392	32	P	V
		5719	51.32	-59.2	110.52	41.7	32.94	9.81	33.13	392	32	P	V
		5725	49.3	-72.9	122.2	39.68	32.94	9.81	33.13	392	32	P	V
	*	5785	103.81	-	-	93.91	33.06	10.01	33.17	392	32	P	V
	*	5785	96.5	-	-	86.6	33.06	10.01	33.17	392	32	A	V
		5851.2	49.54	-69.92	119.46	39.48	33.23	10.02	33.19	392	32	P	V
		5864.8	50.4	-57.65	108.05	40.32	33.27	10.02	33.21	392	32	P	V
		5879.8	51.78	-49.85	101.63	41.66	33.31	10.02	33.21	392	32	P	V
		5935.4	49.41	-18.79	68.2	39.2	33.43	10.02	33.24	392	32	P	V
													V
													V

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)
	*	5825	107.32	-	-	97.29	33.19	10.02	33.18	258	274	P	H
	*	5825	100.05	-	-	90.02	33.19	10.02	33.18	258	274	A	H
		5850.8	54.45	-65.93	120.38	44.39	33.23	10.02	33.19	258	274	P	H
		5863.2	54.89	-53.61	108.5	44.81	33.27	10.02	33.21	258	274	P	H
		5895.4	52.47	-37.6	90.07	42.32	33.35	10.02	33.22	258	274	P	H
		5941.6	50.28	-17.92	68.2	40.02	33.48	10.02	33.24	258	274	P	H
													H
802.11a													H
CH 165	*	5825	104.06	-	-	94.03	33.19	10.02	33.18	385	40	P	V
5825MHz	*	5825	96.87	-	-	86.84	33.19	10.02	33.18	385	40	A	V
		5850.6	51.42	-69.41	120.83	41.36	33.23	10.02	33.19	385	40	P	V
		5865.4	51.7	-56.19	107.89	41.62	33.27	10.02	33.21	385	40	P	V
		5901	51.58	-34.34	85.92	41.43	33.35	10.02	33.22	385	40	P	V
		5928.4	51.11	-17.09	68.2	40.89	33.43	10.02	33.23	385	40	P	V
													V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.

Band 4 5725~5850MHz

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 149 5745MHz		11490	46.52	-27.48	74	55.31	38.52	15.44	63.03	100	0	P	H
		17235	64.36	-3.84	68.2	65.07	40.76	19.24	61.07	100	0	P	H
													H
													H
		11490	47.2	-26.8	74	55.99	38.52	15.44	63.03	100	0	P	V
		17235	61.79	-6.41	68.2	62.5	40.76	19.24	61.07	100	0	P	V
													V
													V
802.11a CH 157 5785MHz		11570	44.63	-29.37	74	53.22	38.56	15.49	62.92	100	0	P	H
		17355	63.33	-4.87	68.2	63.21	40.69	19.31	60.25	100	0	P	H
													H
													H
		11570	45.21	-28.79	74	53.8	38.56	15.49	62.92	100	0	P	V
		17355	58.78	-9.42	68.2	58.66	40.69	19.31	60.25	100	0	P	V
													V
													V
802.11a CH 165 5825MHz		11650	46.17	-27.83	74	54.55	38.61	15.56	62.83	100	0	P	H
		17475	60.32	-7.88	68.2	59.38	40.62	19.37	59.43	100	0	P	H
													H
													H
		11650	46.68	-27.32	74	55.06	38.61	15.56	62.83	100	0	P	V
		17475	56.1	-12.1	68.2	55.16	40.62	19.37	59.43	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

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)
		5640.2	52.42	-15.78	68.2	43.18	32.73	9.61	33.1	312	273	P	H
		5692.2	54.57	-44.88	99.45	45.08	32.86	9.75	33.12	312	273	P	H
		5719.6	58.2	-52.49	110.69	48.58	32.94	9.81	33.13	312	273	P	H
		5724.4	67.12	-53.71	120.83	57.5	32.94	9.81	33.13	312	273	P	H
	*	5745	107.78	-	-	98.07	32.98	9.88	33.15	312	273	P	H
	*	5745	100.45	-	-	90.74	32.98	9.88	33.15	312	273	A	H
802.11n													H
HT20													H
CH 149		5636.8	49.89	-18.31	68.2	40.65	32.73	9.61	33.1	397	43	P	V
5745MHz		5671.4	50.04	-34.04	84.08	40.66	32.81	9.68	33.11	397	43	P	V
		5718.8	52.79	-57.67	110.46	43.17	32.94	9.81	33.13	397	43	P	V
		5725	66.66	-55.54	122.2	57.04	32.94	9.81	33.13	397	43	P	V
	*	5745	104.49	-	-	94.78	32.98	9.88	33.15	397	43	P	V
	*	5745	97.3	-	-	87.59	32.98	9.88	33.15	397	43	A	V
													V
													V

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)
		5644.6	51.47	-16.73	68.2	42.23	32.73	9.61	33.1	308	273	P	H
		5690.8	52.49	-45.93	98.42	43	32.86	9.75	33.12	308	273	P	H
		5706.8	52.71	-54.4	107.11	43.13	32.9	9.81	33.13	308	273	P	H
		5721	52.23	-60.85	113.08	42.61	32.94	9.81	33.13	308	273	P	H
	*	5785	107.19	-	-	97.29	33.06	10.01	33.17	308	273	P	H
	*	5785	99.93	-	-	90.03	33.06	10.01	33.17	308	273	A	H
		5851.2	51.25	-68.21	119.46	41.19	33.23	10.02	33.19	308	273	P	H
		5864.8	50.86	-57.19	108.05	40.78	33.27	10.02	33.21	308	273	P	H
		5924.6	51.46	-17.03	68.49	41.24	33.43	10.02	33.23	308	273	P	H
		5932.8	50.96	-17.24	68.2	40.74	33.43	10.02	33.23	308	273	P	H
802.11n													H
HT20													H
CH 157		5612	50.24	-17.96	68.2	41.12	32.65	9.55	33.08	393	32	P	V
5785MHz		5677.4	50.24	-38.28	88.52	40.86	32.81	9.68	33.11	393	32	P	V
		5718	50.09	-60.15	110.24	40.47	32.94	9.81	33.13	393	32	P	V
		5720.2	49.55	-61.71	111.26	39.93	32.94	9.81	33.13	393	32	P	V
	*	5785	103.05	-	-	93.15	33.06	10.01	33.17	393	32	P	V
	*	5785	95.69	-	-	85.79	33.06	10.01	33.17	393	32	A	V
		5853.6	49.22	-64.77	113.99	39.12	33.27	10.02	33.19	393	32	P	V
		5858.8	50.94	-58.79	109.73	40.86	33.27	10.02	33.21	393	32	P	V
		5910	50.89	-28.38	79.27	40.71	33.39	10.02	33.23	393	32	P	V
		5946.4	50.26	-17.94	68.2	40	33.48	10.02	33.24	393	32	P	V
													V
													V

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)
	*	5825	106.73	-	-	96.7	33.19	10.02	33.18	257	273	P	H
	*	5825	99.52	-	-	89.49	33.19	10.02	33.18	257	273	A	H
		5850	57.42	-64.78	122.2	47.36	33.23	10.02	33.19	257	273	P	H
		5855.2	53.44	-57.3	110.74	43.34	33.27	10.02	33.19	257	273	P	H
		5881	52.58	-48.16	100.74	42.46	33.31	10.02	33.21	257	273	P	H
		5929.4	51.05	-17.15	68.2	40.83	33.43	10.02	33.23	257	273	P	H
802.11n													H
HT20													H
CH 165	*	5825	103.23	-	-	93.2	33.19	10.02	33.18	384	42	P	V
5825MHz	*	5825	96.17	-	-	86.14	33.19	10.02	33.18	384	42	A	V
		5850.2	52.09	-69.65	121.74	42.03	33.23	10.02	33.19	384	42	P	V
		5861.4	51.65	-57.36	109.01	41.57	33.27	10.02	33.21	384	42	P	V
		5914.2	51.39	-24.78	76.17	41.21	33.39	10.02	33.23	384	42	P	V
		5926.4	50.59	-17.61	68.2	40.37	33.43	10.02	33.23	384	42	P	V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.

Band 4 5725~5850MHz

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)
		5610.2	51.64	-16.56	68.2	42.52	32.65	9.55	33.08	312	272	P	H
		5680.6	56.27	-34.61	90.88	46.83	32.81	9.75	33.12	312	272	P	H
		5719.2	72.2	-38.38	110.58	62.58	32.94	9.81	33.13	312	272	P	H
		5725	72.43	-49.77	122.2	62.81	32.94	9.81	33.13	312	272	P	H
	*	5755	105.96	-	-	96.21	33.02	9.88	33.15	312	272	P	H
	*	5755	97.02	-	-	87.27	33.02	9.88	33.15	312	272	A	H
		5853.2	50.01	-64.89	114.9	39.95	33.23	10.02	33.19	312	272	P	H
		5874.4	49.93	-55.44	105.37	39.81	33.31	10.02	33.21	312	272	P	H
		5903	50.73	-33.71	84.44	40.58	33.35	10.02	33.22	312	272	P	H
		5928.4	51.03	-17.17	68.2	40.81	33.43	10.02	33.23	312	272	P	H
802.11n													H
HT40													H
CH 151		5606.6	51.75	-16.45	68.2	42.63	32.65	9.55	33.08	397	42	P	V
5755MHz		5699.2	51.66	-52.95	104.61	42.17	32.86	9.75	33.12	397	42	P	V
		5719	68.21	-42.31	110.52	58.59	32.94	9.81	33.13	397	42	P	V
		5724.6	69.8	-51.49	121.29	60.18	32.94	9.81	33.13	397	42	P	V
	*	5755	101.38	-	-	91.63	33.02	9.88	33.15	397	42	P	V
	*	5755	93.52	-	-	83.77	33.02	9.88	33.15	397	42	A	V
		5854.4	49.49	-62.68	112.17	39.39	33.27	10.02	33.19	397	42	P	V
		5870	50.51	-56.09	106.6	40.43	33.27	10.02	33.21	397	42	P	V
		5886.4	50.11	-46.63	96.74	40	33.31	10.02	33.22	397	42	P	V
		5939.2	49.25	-18.95	68.2	38.99	33.48	10.02	33.24	397	42	P	V
													V
													V

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)
		5644.4	52.21	-15.99	68.2	42.97	32.73	9.61	33.1	258	271	P	H
		5684.4	51.16	-42.53	93.69	41.67	32.86	9.75	33.12	258	271	P	H
		5714	53.16	-55.96	109.12	43.58	32.9	9.81	33.13	258	271	P	H
		5723.4	52.25	-66.3	118.55	42.63	32.94	9.81	33.13	258	271	P	H
	*	5795	104.17	-	-	94.23	33.1	10.01	33.17	258	271	P	H
	*	5795	96.41	-	-	86.47	33.1	10.01	33.17	258	271	A	H
		5853.6	51.7	-62.29	113.99	41.6	33.27	10.02	33.19	258	271	P	H
		5861.2	51.82	-57.24	109.06	41.74	33.27	10.02	33.21	258	271	P	H
		5886.8	51.78	-44.66	96.44	41.67	33.31	10.02	33.22	258	271	P	H
		5945.4	49.92	-18.28	68.2	39.66	33.48	10.02	33.24	258	271	P	H
802.11n													H
HT40													H
CH 159		5649.8	50.84	-17.36	68.2	41.56	32.77	9.61	33.1	390	39	P	V
5795MHz		5665.6	50.19	-29.59	79.78	40.85	32.77	9.68	33.11	390	39	P	V
		5717.4	50.58	-59.49	110.07	41	32.9	9.81	33.13	390	39	P	V
		5722	48.51	-66.85	115.36	38.89	32.94	9.81	33.13	390	39	P	V
	*	5795	100.38	-	-	90.44	33.1	10.01	33.17	390	39	P	V
	*	5795	93.23	-	-	83.29	33.1	10.01	33.17	390	39	A	V
		5852.2	49.92	-67.26	117.18	39.86	33.23	10.02	33.19	390	39	P	V
		5868.2	50.42	-56.68	107.1	40.34	33.27	10.02	33.21	390	39	P	V
		5876.2	50.82	-53.49	104.31	40.7	33.31	10.02	33.21	390	39	P	V
		5936	50.92	-17.28	68.2	40.71	33.43	10.02	33.24	390	39	P	V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.

Emission below 1GHz

5GHz WIFI 802.11a (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)
5GHz 802.11a LF		97.77	29.32	-14.18	43.5	44.6	15.79	1.39	32.48	-	-	P	H
		119.64	28.78	-14.72	43.5	42.37	17.44	1.39	32.46	-	-	P	H
		143.94	35.59	-7.91	43.5	49.15	17.3	1.51	32.44	100	209	P	H
		304.9	23.81	-22.19	46	34.51	19.27	2.31	32.37	-	-	P	H
		557.6	27.65	-18.35	46	30.92	26.09	2.98	32.43	-	-	P	H
		955.9	34.54	-11.46	46	30.55	31.06	3.9	31.14	-	-	P	H
													H
													H
													H
													H
													H
													H
		48.09	34.23	-5.77	40	50.73	14.96	1.02	32.49	120	303	P	V
		73.74	24.93	-15.07	40	43.74	12.44	1.22	32.49	-	-	P	V
		95.61	26.56	-16.94	43.5	42.15	15.48	1.39	32.48	-	-	P	V
		563.9	26.93	-19.07	46	30.07	26.17	3.03	32.43	-	-	P	V
		850.9	32.14	-13.86	46	31.03	29.2	3.67	31.91	-	-	P	V
		957.3	33.9	-12.1	46	29.87	31.1	3.9	31.14	-	-	P	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	**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 D. Radiated Spurious Emission Plots

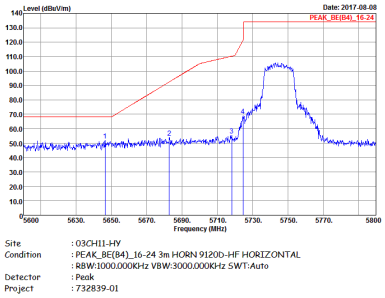
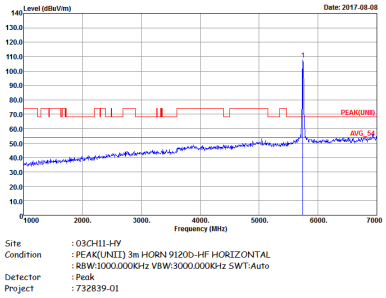
Test Engineer :	J.C. Liang, Jacky Hung and Ken Wu	**Temperature :**	24~26°C
		Relative Humidity :	50~56%

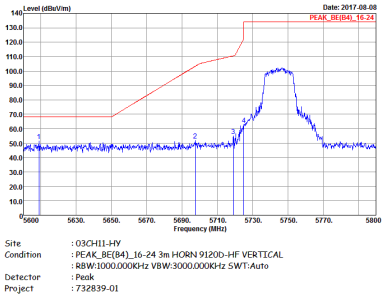
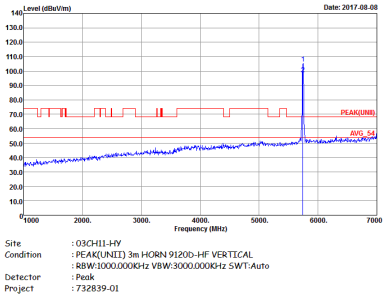
Note symbol

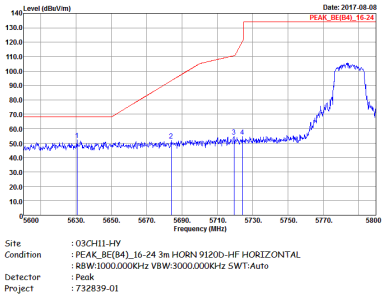
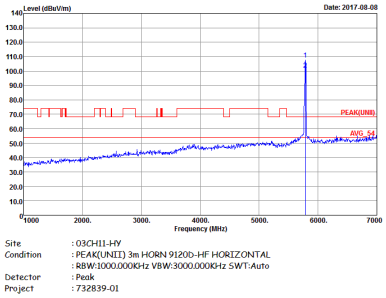
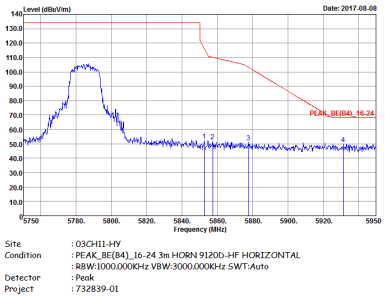
-L	**Low channel location**
-R	**High channel location**

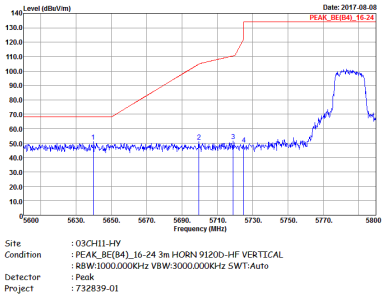
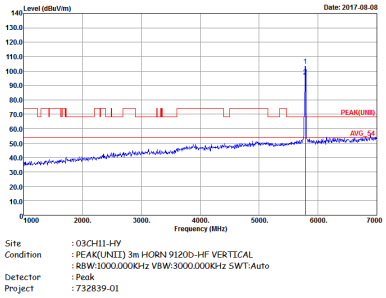
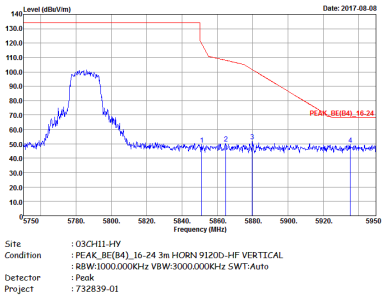
Band 4 - 5725~5850MHz

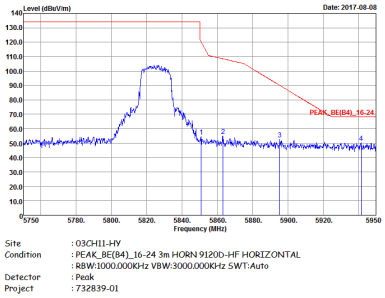
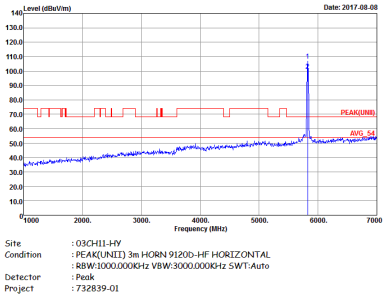
WIFI 802.11a (Band Edge @ 3m)

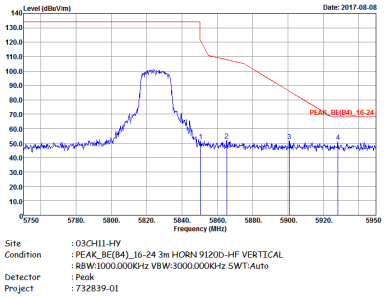
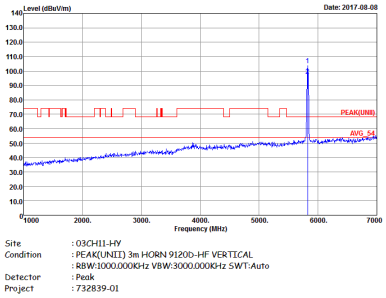
WIFI	**Band 4 5725~5850MHz Band Edge @ 3m**	
ANT	**802.11a CH149 5745MHz**	
1	**Horizontal**	**Fundamental**
Peak		

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH149 5745MHz	
1	Vertical	Fundamental
Peak		

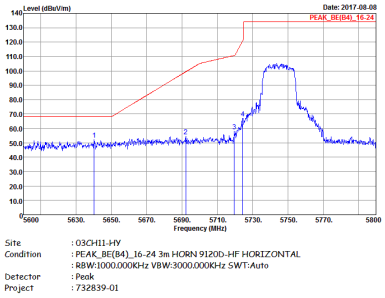
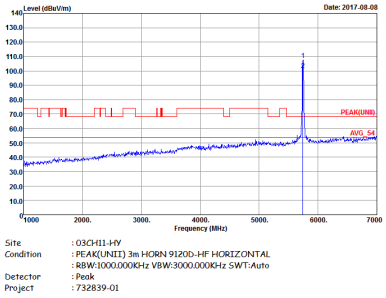
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
1	Horizontal	Fundamental
Peak	 Site : 03CH11-HV Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 732839-01	 Site : 03CH11-HV Condition : PEAK(UNII) 3m HORN 9120D-HF HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 732839-01
Peak	 Site : 03CH11-HV Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 732839-01	Left blank

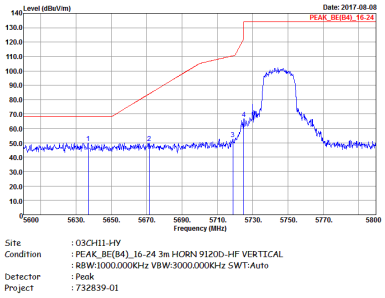
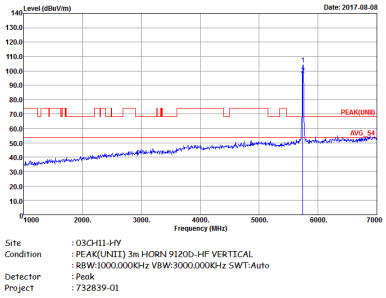
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
1	Vertical	Fundamental
Peak		
Peak		Left blank

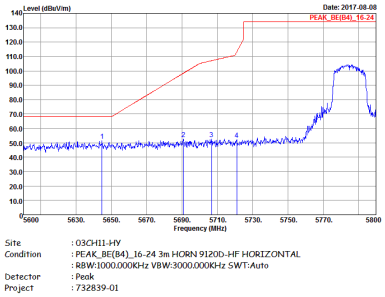
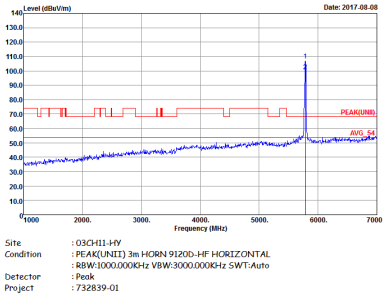
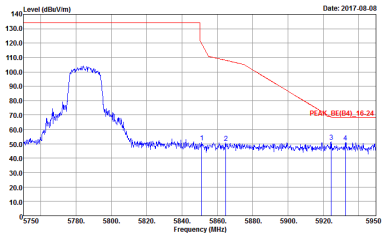
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH165 5825MHz	
1	Horizontal	Fundamental
Peak		

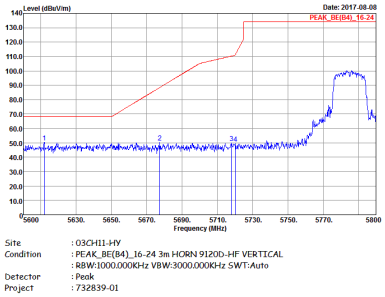
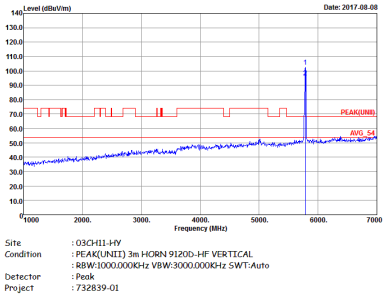
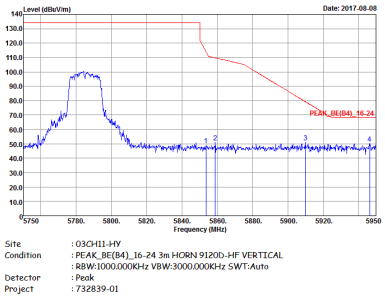
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH165 5825MHz	
1	Vertical	Fundamental
Peak		

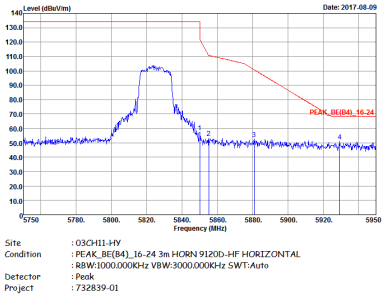
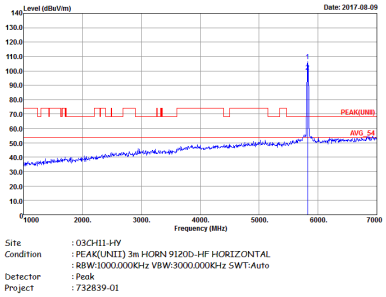
Band 4 5725~5850MHz
WIFI 802.11n HT20 (Band Edge @ 3m)

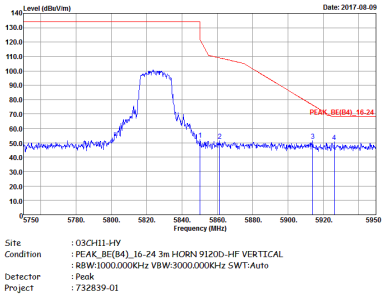
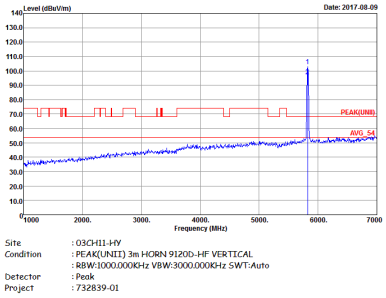
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH149 5745MHz	
1	Horizontal	Fundamental
Peak		

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH149 5745MHz	
1	Vertical	Fundamental
Peak		

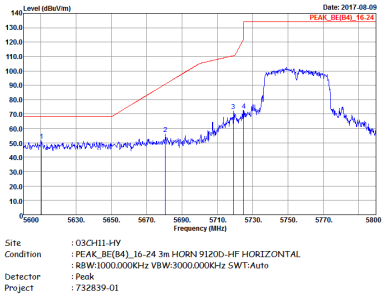
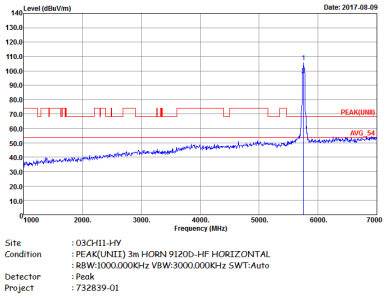
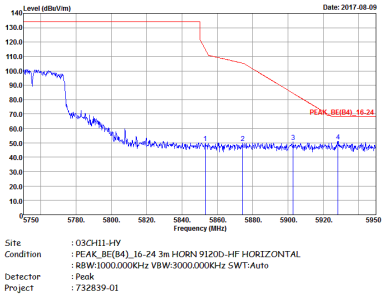
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH157 5785MHz	
1	Horizontal	Fundamental
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 732839-01	 Site : 03CH11-HY Condition : PEAK(UNII) 3m HORN 9120D-HF HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 732839-01
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 732839-01	Left blank

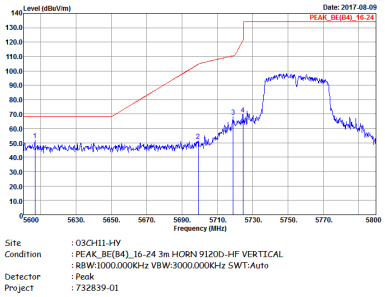
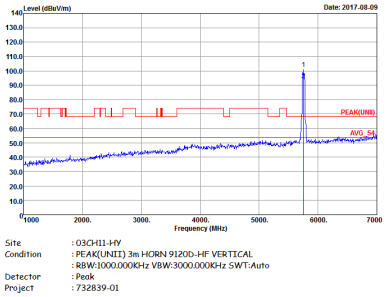
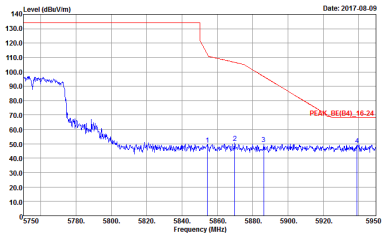
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH157 5785MHz	
1	Vertical	Fundamental
Peak		
Peak		Left blank

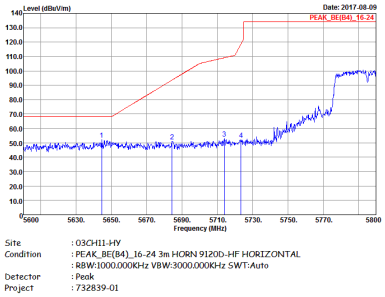
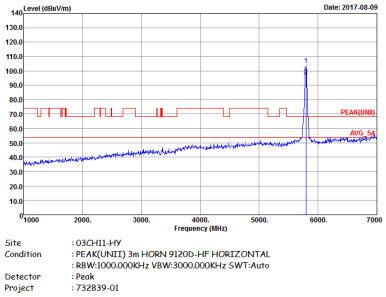
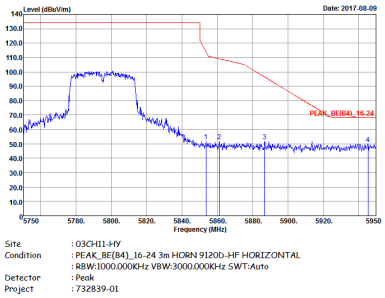
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH165 5825MHz	
1	Horizontal	Fundamental
Peak		

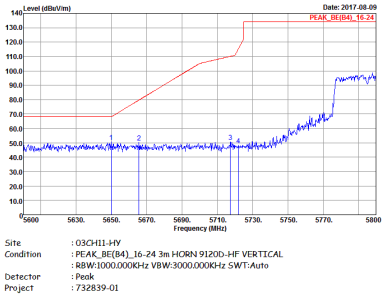
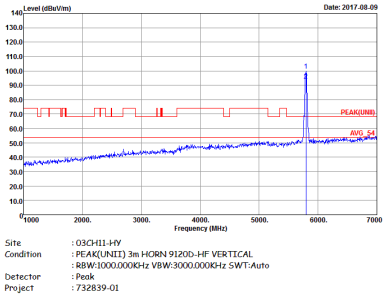
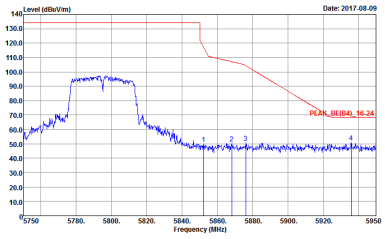
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH165 5825MHz	
1	Vertical	Fundamental
Peak		

Band 4 5725~5850MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH151 5755MHz	
1	Horizontal	Fundamental
Peak		
Peak		Left blank

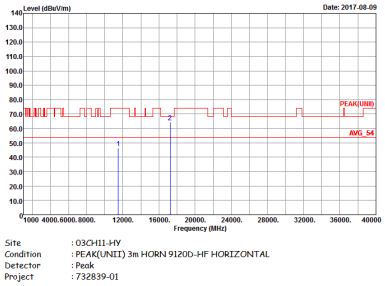
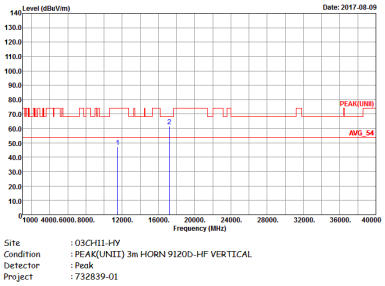
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH151 5755MHz	
1	Vertical	Fundamental
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 732839-01	 Site : 03CH11-HY Condition : PEAK(UNII) 3m HORN 9120D-HF VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 732839-01
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 732839-01	Left blank

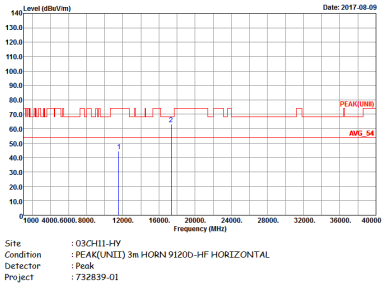
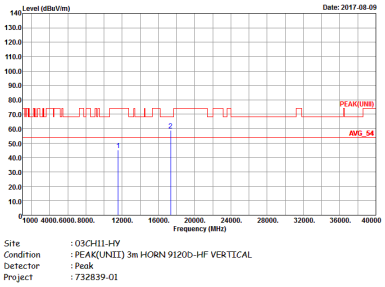
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH159 5795MHz	
1	Horizontal	Fundamental
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 732839-01	 Site : 03CH11-HY Condition : PEAK(UNII) 3m HORN 9120D-HF HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 732839-01
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 732839-01	Left blank

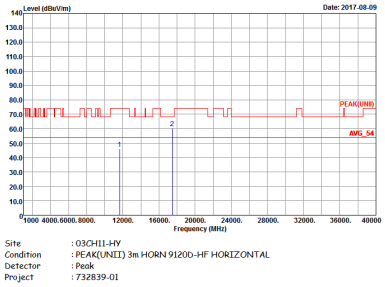
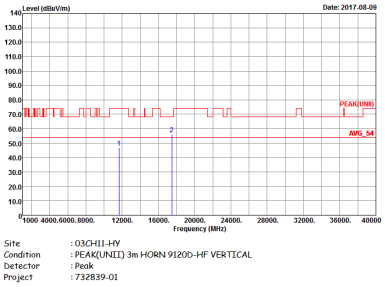
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH159 5795MHz	
1	Vertical	Fundamental
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 732839-01	 Site : 03CH11-HY Condition : PEAK(UNII) 3m HORN 9120D-HF VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 732839-01
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 732839-01	Left blank

Band 4 - 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

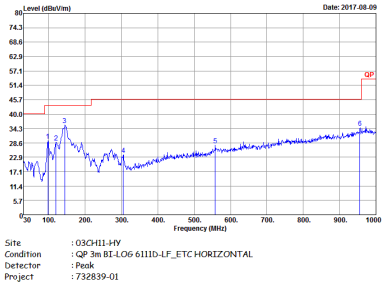
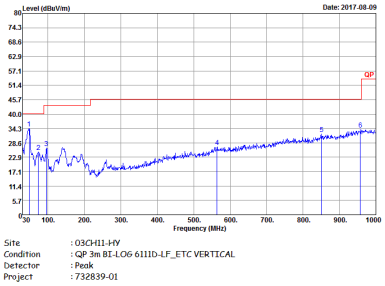
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH149 5745MHz	
1	Horizontal	Vertical
Peak Avg.		

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH157 5785MHz	
1	Horizontal	Vertical
Peak Avg.		

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH165 5825MHz	
1	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

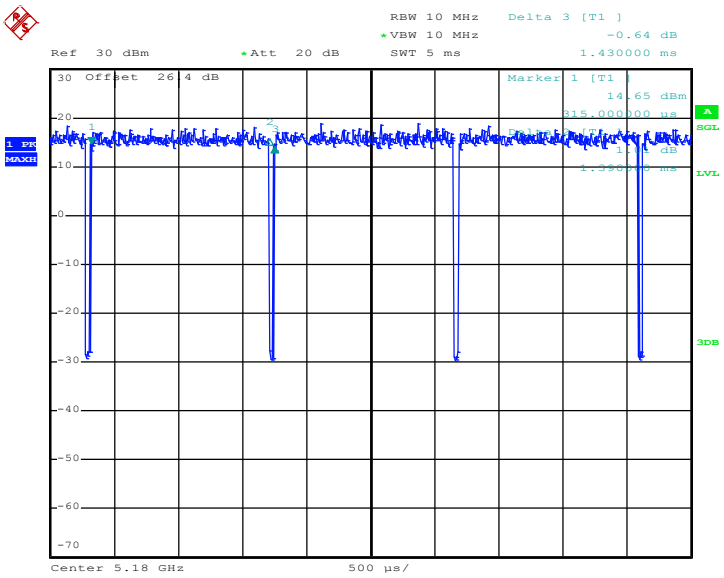
5GHz WIFI 802.11a (LF)

WIFI	5GHz 5725~5850MHz	
ANT	802.11a LF	
1	Horizontal	Vertical
QP / Peak		

Appendix E. Duty Cycle Plots

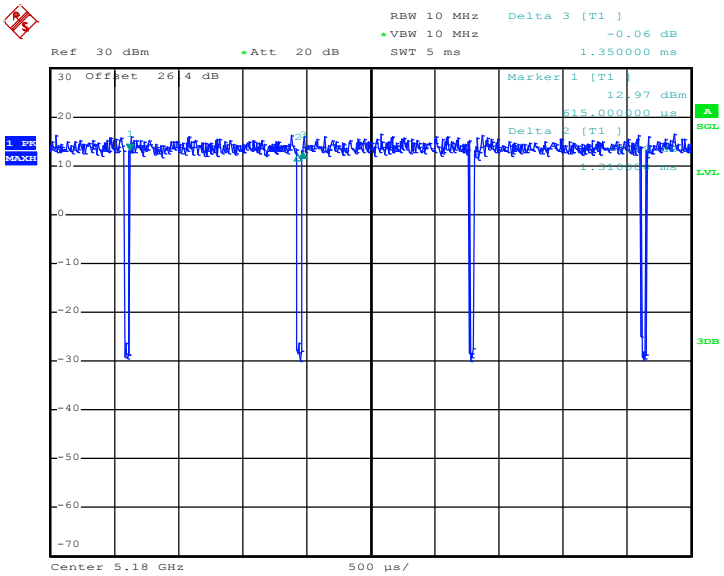
Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
802.11a	97.203	1390	0.72	1kHz
5GHz 802.11n HT20	97.037	1310	0.76	1kHz
5GHz 802.11n HT40	94.737	648	1.54	3kHz

802.11a



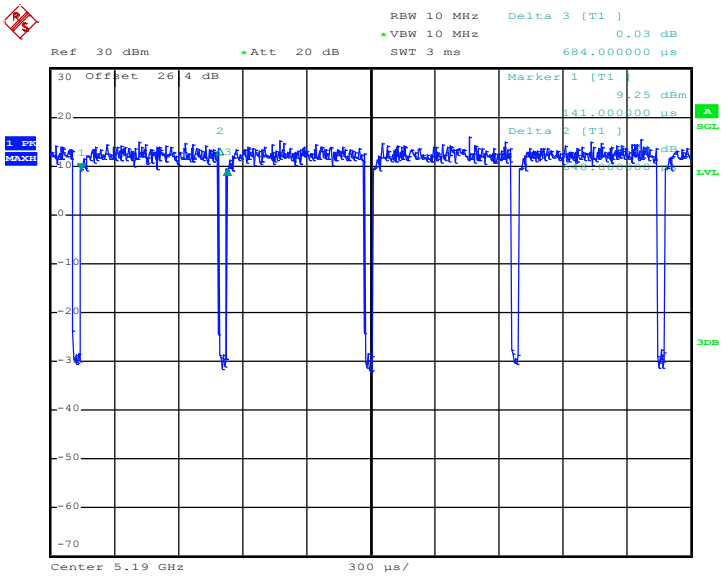
Date: 27.JUL.2017 23:08:31

802.11n HT20



Date: 28.JUL.2017 00:58:09

802.11n HT40



Date: 28.JUL.2017 01:11:11