



FCC RF Test Report

APPLICANT : HTC Corporation
EQUIPMENT : Smartphone
MODEL NAME : 2Q3F300
FCC ID : NM82Q3F300
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

The product was received on May 23, 2017 and testing was completed on Jun. 25, 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.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR752311G	Rev. 01	Initial issue of report	Sep. 04, 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 10.26 dB at 32.970 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 7.30 dB at 17.982 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

HTC Corporation

No.23, Xinghua Rd., Taoyuan District, Taoyuan City, Taiwan 330

1.2 Manufacturer

HTC Corporation

1F, 6-3 Baoqiang Rd., Xindian District, New Taipei City, Taiwan 231

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/ac, NFC, Ant+, and GPS

Product Specification subjective to this standard	
Sample 1	EUT with battery 1 and 1st PCB
Sample 2	EUT with battery 2 and 1st PCB
Sample 3	EUT with battery 1 and 2nd PCB
Antenna Type	WWAN: Fixed Internal Antenna WLAN: PIFA Antenna Bluetooth: PIFA Antenna GPS/GLONASS/BDS: PIFA Antenna NFC: Loop Antenna

Remark:

1. There are 1st PCB and 2nd PCB, the hardware change are USB board, antenna board and speaker module. Regarding the differences, perform full RSE testing on sample 1 and sample 3.
2. For the LTE setting which controlled by software, there are two Skus of device. Sku 1 supports LTE category 9 (up to 450 Mbps), and Sku 2 support category 11 (up to 600 Mbps) and 256QAM downlink. Since the differences, we only performed on Sku 2 device.
3. All tests 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 1 st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	
	TH05-HY	CO05-HY

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

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855	
Test Site No.	Sporton Site No.	
	03CH13-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 644545 D03 Guidance for IEEE 802 11ac New Rules v01.
- ♦ ANSI C63.10-2013

Remark:

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



2 Test Configuration of Equipment Under Test

- 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 (Y 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
	155#	5775	165	5825

Note:

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



2.2 Test Mode

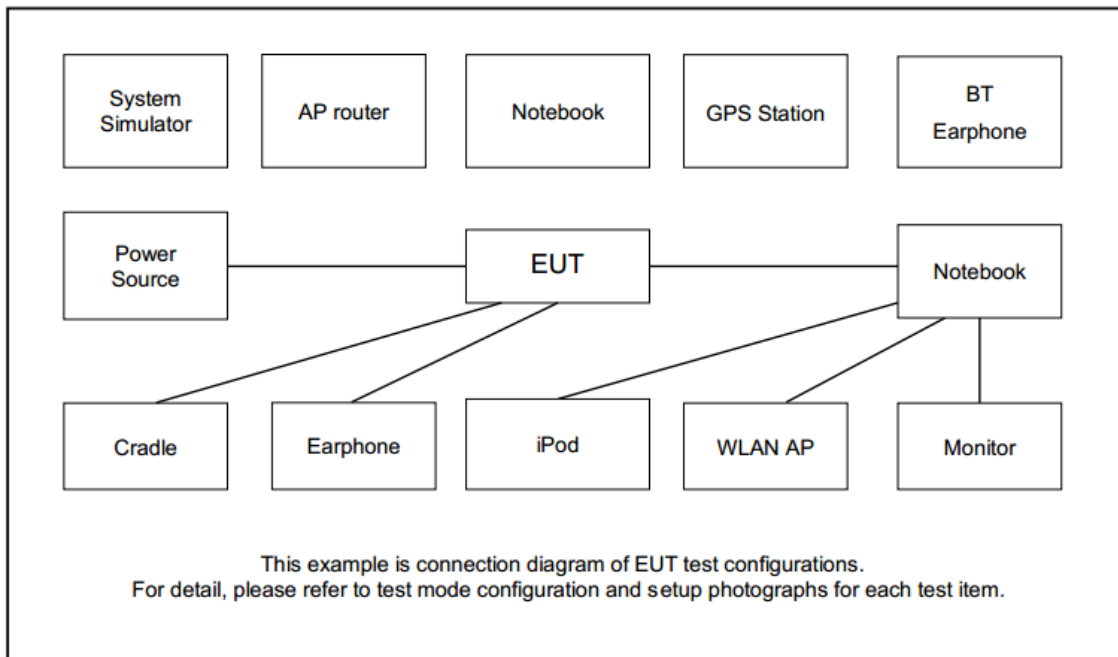
Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates as below table.

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 : LTE Band 7 Idle + Bluetooth Link + WLAN (5GHz) Link + Camera (Front) + USB Cable 2 (Charging from Adapter 2)

Ch. #		Band IV : 5725-5850 MHz		
		802.11n HT20	802.11n HT40	802.11ac VHT80
L	Low	149	151	-
M	Middle	157	-	155
H	High	165	159	-

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
3.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
4.	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
5.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

2.5 EUT Operation Test Setup

The RF test items, programmed RF utility, “WIFI Routerc” 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.

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

3 Test Result

3.1 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.

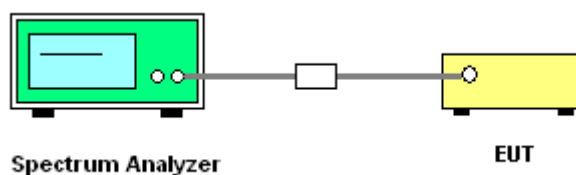
3.1.2 Measuring Instruments

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 $\geq 3 \times$ 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.

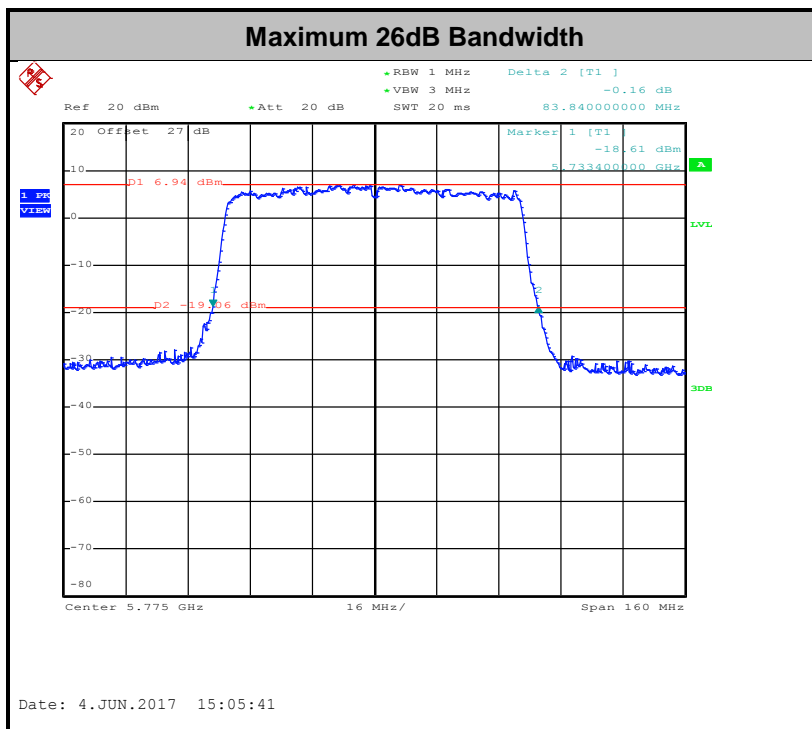
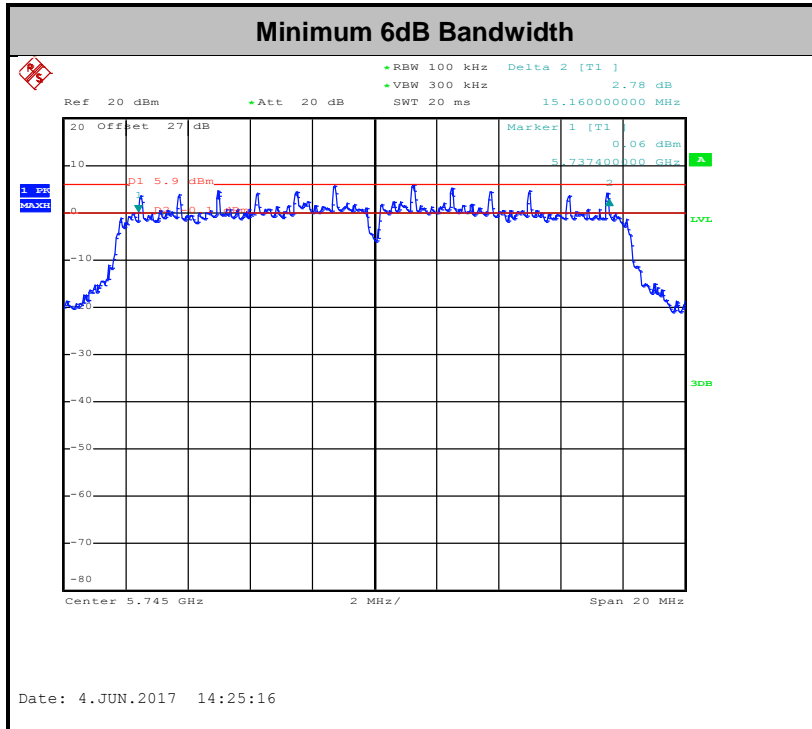
3.1.4 Test Setup

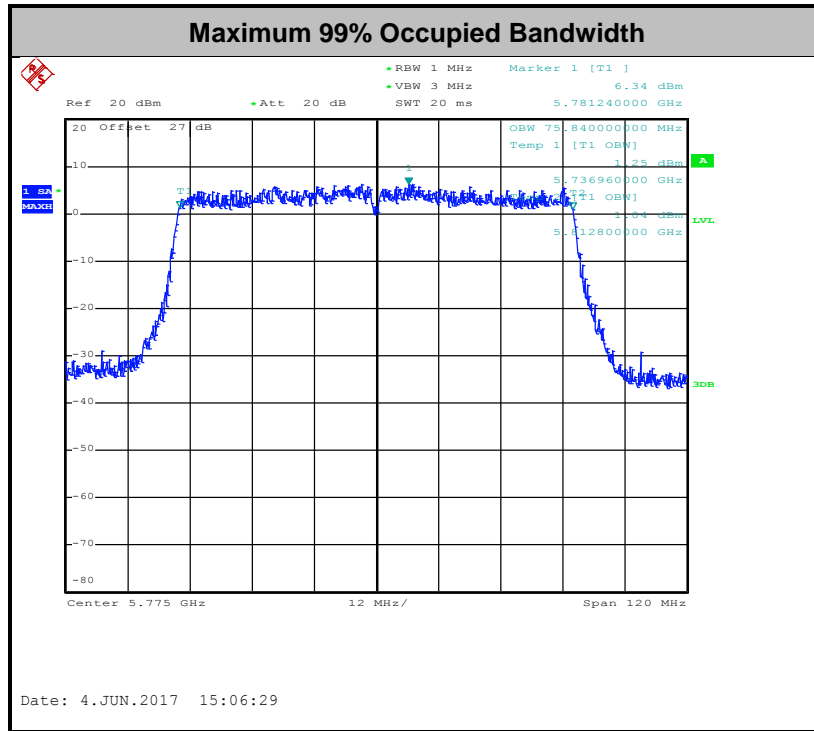




3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.





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.

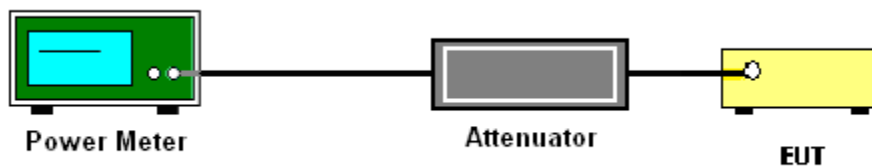
3.2.3 Test Procedures

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

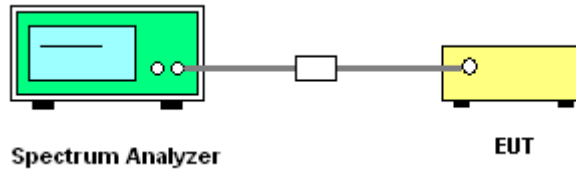
The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04. Section F) Maximum power spectral density.

Method SA-2

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

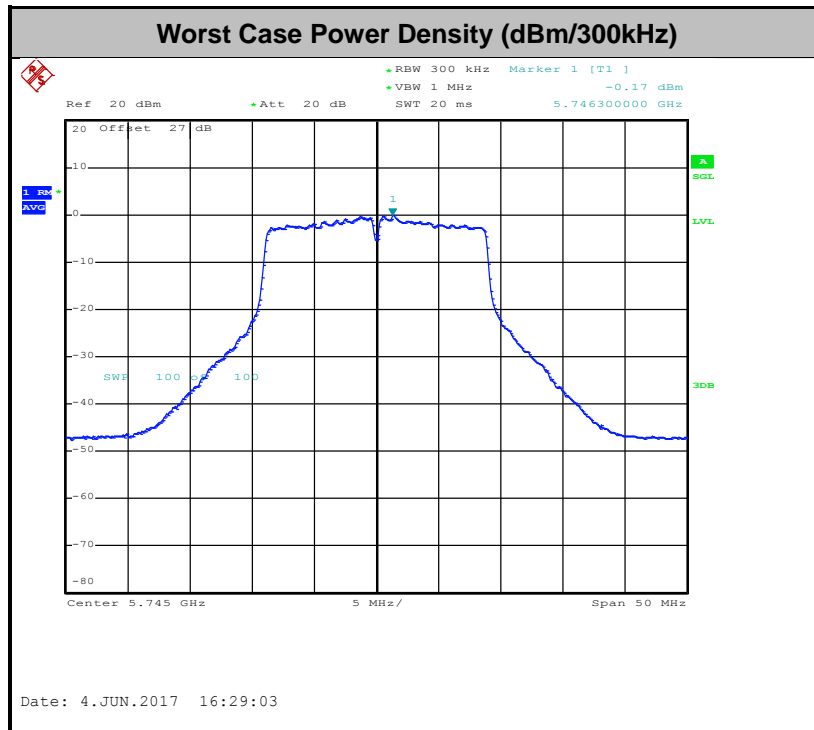
- Measure the duty cycle.
 - Set span to encompass the entire emission bandwidth (EBW) of the signal.
 - Set RBW = 300 kHz.
 - Set VBW \geq 1 MHz.
 - Number of points in sweep \geq 2 Span / RBW.
 - Sweep time = auto.
 - Detector = RMS
 - Trace average at least 100 traces in power averaging mode.
 - Add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

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.





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.

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



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

(3) KDB789033 D02 v01r04 G)2)c)

- (i) Section 15.407(b)(1) to (b)(3) specify the unwanted emission limits for the U-NII-1 and U-NII-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.³
- (ii) Section 15.407(b)(4) specifies the unwanted emission limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are in terms of a Peak detector. 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 devices using the alternative limit.⁴

Note 3: 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 peak emission limit.

Note 4: Only devices with antenna gains of 10 dBi or less may be approved using the emission limits specified in Section 15.247(d) till March 2, 2018; all other devices operating in this band must use the mask specified in Section 15.407(b)(4)(i).

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 \geq 3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

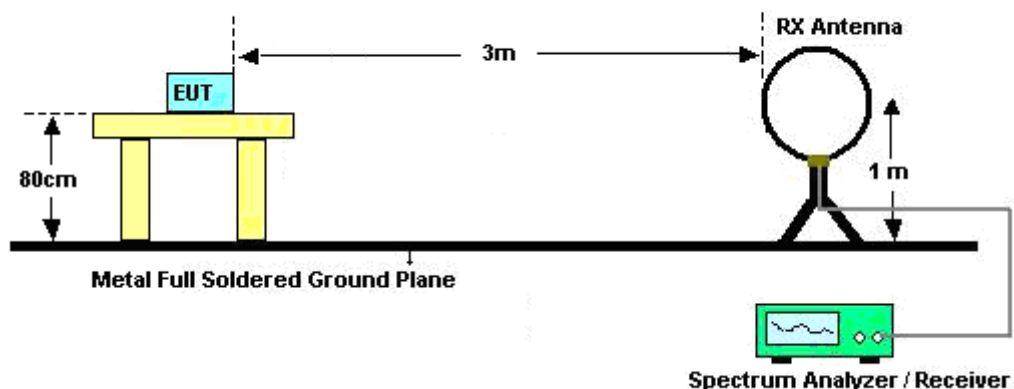
(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

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

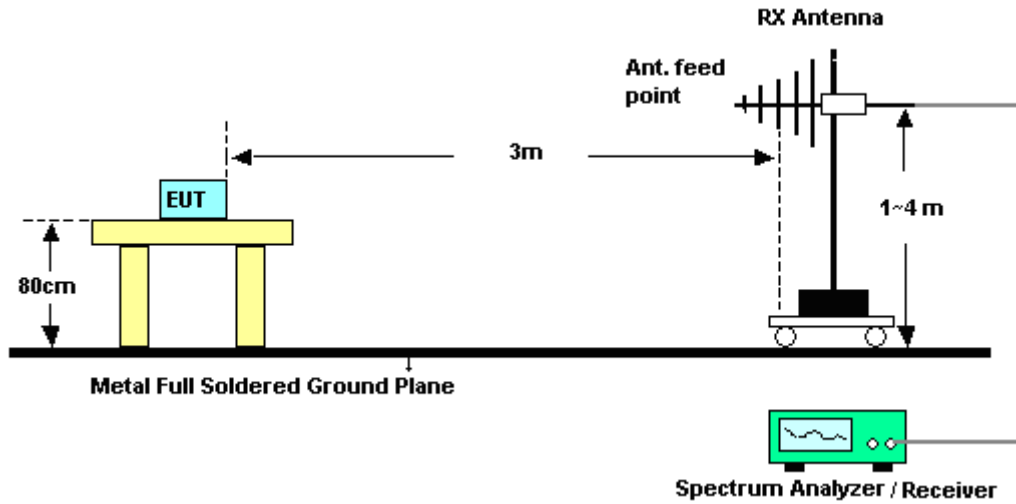
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband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

3.4.4 Test Setup

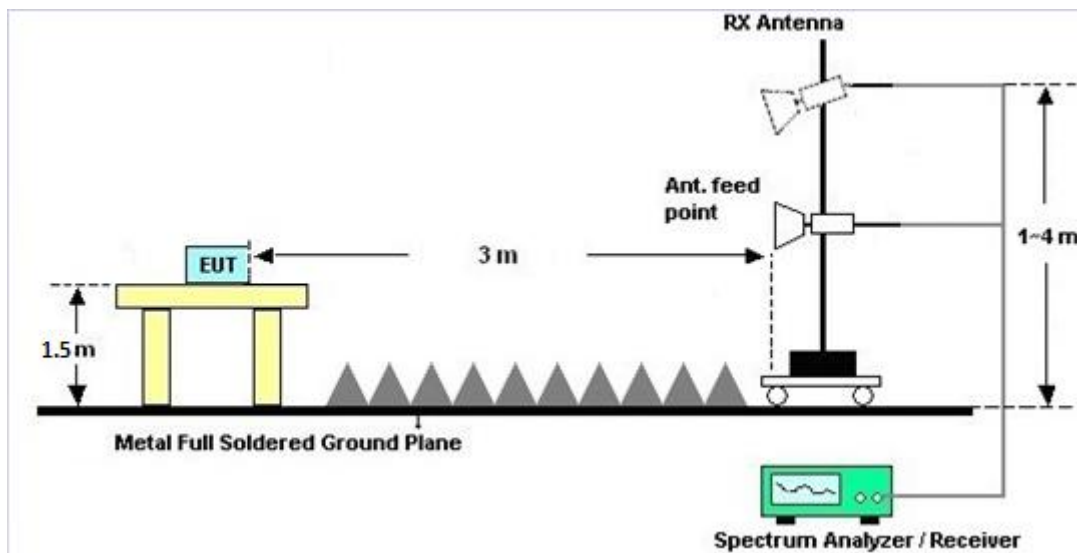
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz





3.4.5 Test Results of Radiated 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 (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

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

3.5.4 Test Setup



3.5.5 Test Result of AC Conducted Emission

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	300MHz~40GHz	Sep. 29, 2016	Jun. 01, 2017 ~ Jun. 04, 2017	Sep. 28, 2017	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	0846202	300MHz~40GHz	Sep. 29, 2016	Jun. 01, 2017 ~ Jun. 04, 2017	Sep. 28, 2017	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Jul. 17, 2016	Jun. 01, 2017 ~ Jun. 04, 2017	Jul. 16, 2017	Conducted (TH05-HY)
Temperature Chamber	ESPEC	SH-641	92013720	-40°C ~90°C	Sep. 01, 2016	Jun. 01, 2017 ~ Jun. 04, 2017	Aug. 31, 2017	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890094	1V~20V 0.5A~5A	Oct. 11, 2016	Jun. 01, 2017 ~ Jun. 04, 2017	Oct. 10, 2017	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jun. 25, 2017	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 30, 2016	Jun. 25, 2017	Aug. 29, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 29, 2016	Jun. 25, 2017	Nov. 28, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Dec. 06, 2016	Jun. 25, 2017	Dec. 05, 2017	Conduction (CO05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	May 15, 2017	Jun. 16, 2017 ~ Jun. 19, 2017	May 14, 2019	Radiation (03CH13-HY)
Amplifier	Sonoma-Instrument	310 N	187282	9KHz~1GHz	Dec. 21, 2016	Jun. 16, 2017 ~ Jun. 19, 2017	Dec. 20, 2017	Radiation (03CH13-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800 N1D01N-06	40103&04	30MHz to 1GHz	Jan. 07, 2017	Jun. 16, 2017 ~ Jun. 19, 2017	Jan. 06, 2018	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1241	1GHz ~ 18GHz	May 02, 2017	Jun. 16, 2017 ~ Jun. 19, 2017	May 01, 2018	Radiation (03CH13-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590074	1GHz~18GHz	May 22, 2017	Jun. 16, 2017 ~ Jun. 19, 2017	May 21, 2018	Radiation (03CH13-HY)
Preamplifier	MITEQ	TTA 1840-35-HG	1887435	18GHz ~ 40GHz	Oct. 13, 2016	Jun. 16, 2017 ~ Jun. 19, 2017	Oct. 12, 2017	Radiation (03CH13-HY)
Preamplifier	Keysight	83017A	MY53270147	1GHz~26.5GHz	Jan. 09, 2017	Jun. 16, 2017 ~ Jun. 19, 2017	Jan. 08, 2018	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY55370526	N/A	Mar. 15, 2017	Jun. 16, 2017 ~ Jun. 19, 2017	Mar. 14, 2018	Radiation (03CH13-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Jun. 16, 2017 ~ Jun. 19, 2017	N/A	Radiation (03CH13-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Jun. 16, 2017 ~ Jun. 19, 2017	N/A	Radiation (03CH13-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290053	20Hz to 26.5GHz	Jan. 12, 2017	Jun. 16, 2017 ~ Jun. 19, 2017	Jan. 11, 2018	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 08, 2016	Jun. 16, 2017 ~ Jun. 19, 2017	Nov. 07, 2017	Radiation (03CH13-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
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.90
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.40
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.30
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Appendix A. Test Result of Conducted Test Items

Test Engineer:	Shiming Liu/Bill Kuo	Temperature:	21~25	°C
Test Date:	2017/6/1~6/4	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	24.6	15.16	0.5	Pass
11a	6Mbps	1	157	5785	17.5	24	15.36	0.5	Pass
11a	6Mbps	1	165	5825	17.45	24.2	15.36	0.5	Pass
HT20	MCS 0	1	149	5745	18.5	24.3	15.16	0.5	Pass
HT20	MCS 0	1	157	5785	18.7	24.2	15.16	0.5	Pass
HT20	MCS 0	1	165	5825	18.5	25	15.8	0.5	Pass
HT40	MCS 0	1	151	5755	36.5	42.12	35.44	0.5	Pass
HT40	MCS 0	1	159	5795	36.5	41.58	35.28	0.5	Pass
VHT80	MCS 0	1	155	5775	75.84	83.84	75.2	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	0.29	15.97	30.00	-2.00		Pass
11a	6Mbps	1	157	5785	0.29	15.96	30.00	-2.00		Pass
11a	6Mbps	1	165	5825	0.29	15.95	30.00	-2.00		Pass
HT20	MCS 0	1	149	5745	0.30	15.99	30.00	-2.00		Pass
HT20	MCS 0	1	157	5785	0.30	15.98	30.00	-2.00		Pass
HT20	MCS 0	1	165	5825	0.30	15.97	30.00	-2.00		Pass
HT40	MCS 0	1	151	5755	0.58	15.98	30.00	-2.00		Pass
HT40	MCS 0	1	159	5795	0.58	15.99	30.00	-2.00		Pass
VHT20	MCS 0	1	149	5745	0.28	15.98	30.00	-2.00		Pass
VHT20	MCS 0	1	157	5785	0.28	15.97	30.00	-2.00		Pass
VHT20	MCS 0	1	165	5825	0.28	15.96	30.00	-2.00		Pass
VHT40	MCS 0	1	151	5755	0.48	15.91	30.00	-2.00		Pass
VHT40	MCS 0	1	159	5795	0.48	15.98	30.00	-2.00		Pass
VHT80	MCS 0	1	155	5775	0.70	16.52	30.00	-2.00		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	0.29	2.22	2.11	30.00	-2.00	Pass
11a	6Mbps	1	157	5785	0.29	2.22	1.72	30.00	-2.00	Pass
11a	6Mbps	1	165	5825	0.29	2.22	2.11	30.00	-2.00	Pass
HT20	MCS 0	1	149	5745	0.30	2.22	2.34	30.00	-2.00	Pass
HT20	MCS 0	1	157	5785	0.30	2.22	1.89	30.00	-2.00	Pass
HT20	MCS 0	1	165	5825	0.30	2.22	2.13	30.00	-2.00	Pass
HT40	MCS 0	1	151	5755	0.58	2.22	-1.77	30.00	-2.00	Pass
HT40	MCS 0	1	159	5795	0.58	2.22	-1.67	30.00	-2.00	Pass
VHT80	MCS 0	1	155	5775	0.70	2.22	-4.65	30.00	-2.00	Pass

TEST RESULTS DATA
Frequency Stability

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (°C)	Voltage (V)	Note
11a	6M bps	1	149	5745	5745.000	0.000	0.00	50	3.85	
11a	6M bps	1	149	5745	5745.000	0.000	0.00	-30	3.85	
11a	6M bps	1	149	5745	5745.000	0.000	0.00	20	4.4	
11a	6M bps	1	149	5745	5745.000	0.000	0.00	20	3.6	
11a	6M bps	1	149	5745	5745.000	0.000	0.00	20	3.85	



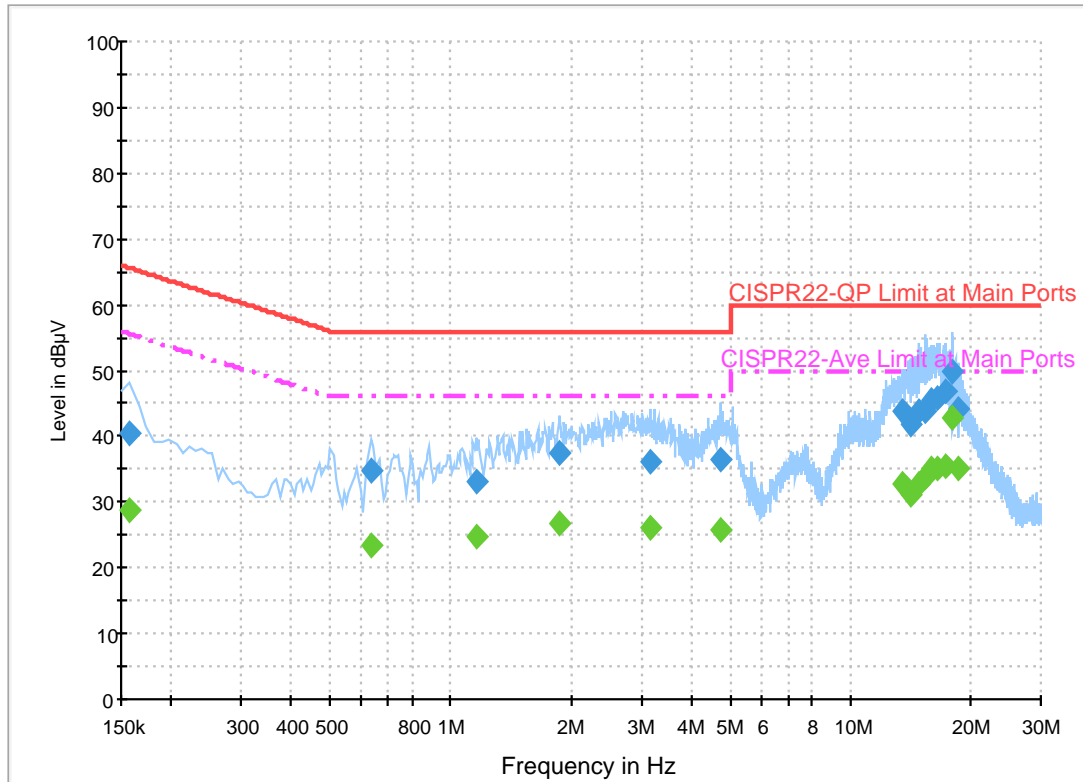
Appendix B. AC Conducted Emission Test Results

Test Engineer :	Kai-Chun Chu	Temperature :	24~25°C
		Relative Humidity :	44~45%

EUT Information

Report NO : 752311
 Test Mode : Mode 1
 Test Voltage : 120Vac/60Hz
 Phase : Line

ENV216 Auto Test FCC Power Bar - L



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	40.6	Off	L1	19.6	25.0	65.6
0.630000	34.6	Off	L1	19.6	21.4	56.0
1.158000	33.2	Off	L1	19.6	22.8	56.0
1.878000	37.3	Off	L1	19.6	18.7	56.0
3.158000	36.0	Off	L1	19.6	20.0	56.0
4.742000	36.3	Off	L1	19.8	19.7	56.0
13.494000	43.8	Off	L1	20.2	16.2	60.0
14.214000	41.7	Off	L1	20.3	18.3	60.0
14.870000	43.7	Off	L1	20.3	16.3	60.0
15.446000	43.7	Off	L1	20.3	16.3	60.0
16.030000	45.6	Off	L1	20.4	14.4	60.0
16.518000	45.9	Off	L1	20.4	14.1	60.0
17.382000	46.8	Off	L1	20.5	13.2	60.0
17.982000	49.8	Off	L1	20.5	10.2	60.0
18.574000	44.2	Off	L1	20.5	15.8	60.0

Final Result 2

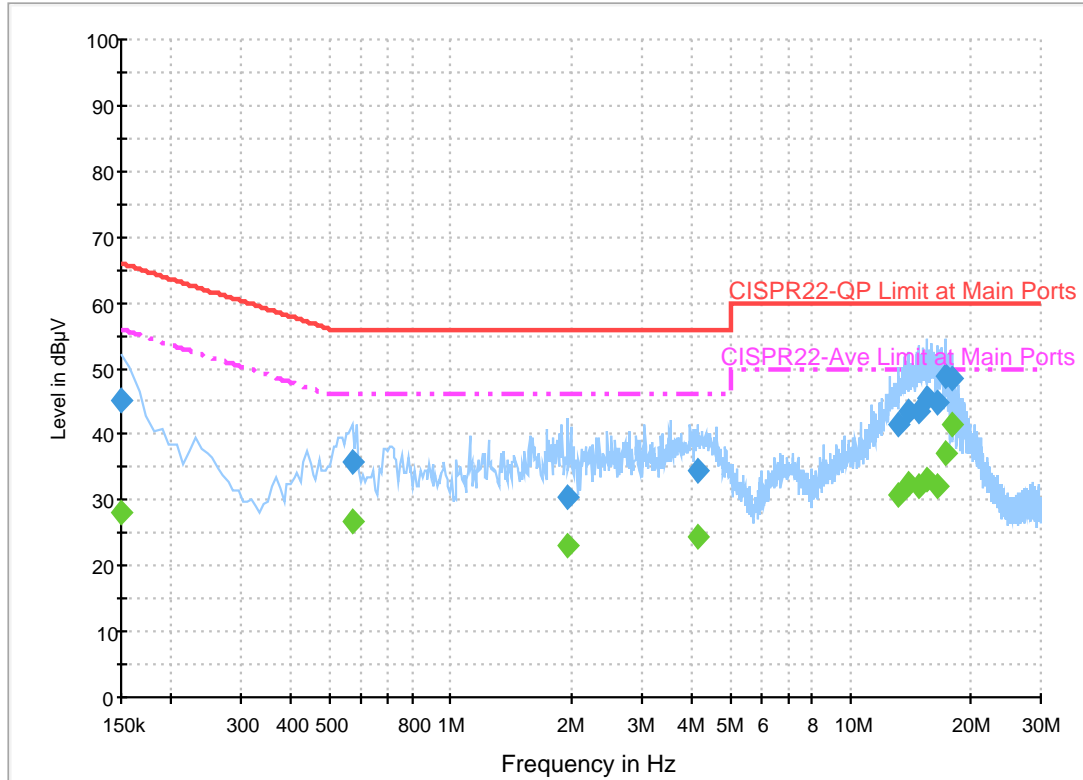
Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	28.8	Off	L1	19.6	26.8	55.6
0.630000	23.4	Off	L1	19.6	22.6	46.0
1.158000	24.8	Off	L1	19.6	21.2	46.0

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
1.878000	26.9	Off	L1	19.6	19.1	46.0
3.158000	25.9	Off	L1	19.6	20.1	46.0
4.742000	25.8	Off	L1	19.8	20.2	46.0
13.494000	32.7	Off	L1	20.2	17.3	50.0
14.214000	31.3	Off	L1	20.3	18.7	50.0
14.870000	32.9	Off	L1	20.3	17.1	50.0
15.446000	33.7	Off	L1	20.3	16.3	50.0
16.030000	35.0	Off	L1	20.4	15.0	50.0
16.518000	35.0	Off	L1	20.4	15.0	50.0
17.382000	35.3	Off	L1	20.5	14.7	50.0
17.982000	42.7	Off	L1	20.5	7.3	50.0
18.574000	35.2	Off	L1	20.5	14.8	50.0

EUT Information

Report NO : 752311
 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	45.1	Off	N	19.5	20.9	66.0
0.566000	35.9	Off	N	19.5	20.1	56.0
1.966000	30.3	Off	N	19.6	25.7	56.0
4.142000	34.4	Off	N	19.7	21.6	56.0
13.206000	41.4	Off	N	20.3	18.6	60.0
14.062000	43.4	Off	N	20.3	16.6	60.0
14.830000	43.6	Off	N	20.4	16.4	60.0
15.558000	45.6	Off	N	20.4	14.4	60.0
16.534000	44.9	Off	N	20.5	15.1	60.0
17.294000	48.8	Off	N	20.5	11.2	60.0
17.998000	48.6	Off	N	20.6	11.4	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	28.2	Off	N	19.5	27.8	56.0
0.566000	26.6	Off	N	19.5	19.4	46.0
1.966000	23.0	Off	N	19.6	23.0	46.0
4.142000	24.5	Off	N	19.7	21.5	46.0
13.206000	30.9	Off	N	20.3	19.1	50.0
14.062000	32.6	Off	N	20.3	17.4	50.0
14.830000	32.0	Off	N	20.4	18.0	50.0

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
15.558000	33.2	Off	N	20.4	16.8	50.0
16.534000	32.2	Off	N	20.5	17.8	50.0
17.294000	37.2	Off	N	20.5	12.8	50.0
17.998000	41.3	Off	N	20.6	8.7	50.0



Appendix C. Radiated Spurious Emission

Test Engineer :	Alex Jeng, Bill Chang, and Wilson Wu	Temperature :	24~25°C
		Relative Humidity :	50~58%

Band 4 - 5725~5850MHz

WIFI 802.11n HT20 (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)	
802.11n HT20 CH 149 5745MHz		5607.2	51.59	-16.61	68.2	41.69	32.88	7.68	30.66	177	47	P	H	
		5697.4	53.15	-50.13	103.28	43.22	32.86	7.77	30.7	177	47	P	H	
		5709.6	53.68	-54.21	107.89	43.73	32.86	7.79	30.7	177	47	P	H	
		5723	56.22	-61.42	117.64	46.26	32.86	7.81	30.71	177	47	P	H	
	*	5745	110.29	-	-	100.34	32.85	7.83	30.73	177	47	P	H	
	*	5745	102.79	-	-	92.84	32.85	7.83	30.73	177	47	A	H	
														H
														H
			5612.2	49.95	-18.25	68.2	40.03	32.88	7.7	30.66	240	190	P	V
			5691.2	50.9	-47.81	98.71	40.97	32.86	7.77	30.7	240	190	P	V
			5719.2	49.91	-60.67	110.58	39.95	32.86	7.81	30.71	240	190	P	V
			5723.2	50.86	-67.24	118.1	40.9	32.86	7.81	30.71	240	190	P	V
		*	5745	104.12	-	-	94.17	32.85	7.83	30.73	240	190	P	V
		*	5745	96.65	-	-	86.7	32.85	7.83	30.73	240	190	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)
		5647.4	50.25	-17.95	68.2	40.33	32.87	7.73	30.68	176	48	P	H
		5668.4	50.45	-31.4	81.85	40.52	32.87	7.75	30.69	176	48	P	H
		5712.2	50.53	-58.09	108.62	40.58	32.86	7.79	30.7	176	48	P	H
		5720.4	52.03	-59.68	111.71	42.07	32.86	7.81	30.71	176	48	P	H
	*	5785	110.48	-	-	100.52	32.84	7.86	30.74	176	48	P	H
	*	5785	103.01	-	-	93.05	32.84	7.86	30.74	176	48	A	H
		5854.8	50.64	-60.62	111.26	40.7	32.83	7.88	30.77	176	48	P	H
		5874.2	51.54	-53.88	105.42	41.62	32.82	7.88	30.78	176	48	P	H
		5913	50.93	-26.12	77.05	41.03	32.82	7.89	30.81	176	48	P	H
		5943	49.29	-18.91	68.2	39.41	32.81	7.89	30.82	176	48	P	H
802.11n													H
HT20													H
CH 157		5630.4	50.98	-17.22	68.2	41.05	32.88	7.72	30.67	252	186	P	V
5785MHz		5680.2	49.71	-40.88	90.59	39.78	32.87	7.75	30.69	252	186	P	V
		5708.6	48.32	-59.29	107.61	38.37	32.86	7.79	30.7	252	186	P	V
		5720.8	48.65	-63.97	112.62	38.69	32.86	7.81	30.71	252	186	P	V
	*	5785	103.91	-	-	93.95	32.84	7.86	30.74	252	186	P	V
	*	5785	96.32	-	-	86.36	32.84	7.86	30.74	252	186	A	V
		5853.2	49.94	-64.96	114.9	40	32.83	7.88	30.77	252	186	P	V
		5856.6	48.82	-61.53	110.35	38.88	32.83	7.88	30.77	252	186	P	V
		5876.6	50.47	-53.54	104.01	40.55	32.82	7.88	30.78	252	186	P	V
		5940.2	48.51	-19.69	68.2	38.63	32.81	7.89	30.82	252	186	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)	
802.11n HT20 CH 165 5825MHz	*	5825	110.42	-	-	100.47	32.83	7.88	30.76	175	47	P	H	
	*	5825	102.87	-	-	92.92	32.83	7.88	30.76	175	47	A	H	
		5852.4	53.52	-63.21	116.73	43.58	32.83	7.88	30.77	175	47	P	H	
		5864.4	53.41	-54.76	108.17	43.48	32.83	7.88	30.78	175	47	P	H	
		5892.4	52.53	-39.76	92.29	42.62	32.82	7.88	30.79	175	47	P	H	
		5925.6	50.8	-17.4	68.2	40.91	32.81	7.89	30.81	175	47	P	H	
														H
														H
	*	5825	103.96	-	-	94.01	32.83	7.88	30.76	246	187	P	V	
	*	5825	96.33	-	-	86.38	32.83	7.88	30.76	246	187	A	V	
		5853.2	49.26	-65.64	114.9	39.32	32.83	7.88	30.77	246	187	P	V	
		5858.6	50.97	-58.82	109.79	41.03	32.83	7.88	30.77	246	187	P	V	
		5885	50.11	-47.66	97.77	40.19	32.82	7.88	30.78	246	187	P	V	
		5932.4	49.82	-18.38	68.2	39.93	32.81	7.89	30.81	246	187	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 (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 HT20 CH 149 5745MHz		11490	43.24	-30.76	74	47.46	40.38	11.3	56.41	100	0	P	H
		17235	49.66	-18.54	68.2	49.45	42.4	13.44	56.27	100	0	P	H
													H
													H
		11490	44.27	-29.73	74	48.49	40.38	11.3	56.41	100	0	P	V
		17235	48.98	-19.22	68.2	48.77	42.4	13.44	56.27	100	0	P	V
													V
802.11n HT20 CH 157 5785MHz		11570	42.59	-31.41	74	46.92	40.29	11.31	56.44	100	0	P	H
		17355	48.44	-19.76	68.2	48.35	42.4	13.52	56.46	100	0	P	H
													H
													H
		11570	44.03	-29.97	74	48.36	40.29	11.31	56.44	100	0	P	V
		17355	49.56	-18.64	68.2	49.47	42.4	13.52	56.46	100	0	P	V
													V
802.11n HT20 CH 165 5825MHz		11650	42.2	-31.8	74	46.65	40.18	11.34	56.48	100	0	P	H
		17475	48.74	-19.46	68.2	48.78	42.4	13.59	56.65	100	0	P	H
													H
													H
		11650	44.08	-29.92	74	48.53	40.18	11.34	56.48	100	0	P	V
		17475	48.21	-19.99	68.2	48.25	42.4	13.59	56.65	100	0	P	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)
		5601.4	50.49	-17.71	68.2	40.59	32.88	7.68	30.66	179	46	P	H
		5698.2	53.34	-50.53	103.87	43.41	32.86	7.77	30.7	179	46	P	H
		5719	60.04	-50.48	110.52	50.08	32.86	7.81	30.71	179	46	P	H
		5724.8	60.67	-61.07	121.74	50.71	32.86	7.81	30.71	179	46	P	H
	*	5755	108.25	-		98.29	32.85	7.84	30.73	179	46	P	H
	*	5755	100.51	-	-	90.55	32.85	7.84	30.73	179	46	A	H
		5851.6	48.9	-69.65	118.55	38.96	32.83	7.88	30.77	179	46	P	H
		5856.6	50.39	-59.96	110.35	40.45	32.83	7.88	30.77	179	46	P	H
		5890.8	50.48	-42.99	93.47	40.57	32.82	7.88	30.79	179	46	P	H
		5931.8	49.87	-18.33	68.2	39.98	32.81	7.89	30.81	179	46	P	H
802.11n													H
HT40													H
CH 151		5625.2	50.18	-18.02	68.2	40.27	32.88	7.7	30.67	232	193	P	V
5755MHz		5692.8	51.05	-48.84	99.89	41.12	32.86	7.77	30.7	232	193	P	V
		5717.8	53.13	-57.05	110.18	43.17	32.86	7.81	30.71	232	193	P	V
		5724.8	53.99	-67.75	121.74	44.03	32.86	7.81	30.71	232	193	P	V
	*	5755	101.92	-		91.96	32.85	7.84	30.73	232	193	P	V
	*	5755	93.91	-	-	83.95	32.85	7.84	30.73	232	193	A	V
		5854.2	48.6	-64.02	112.62	38.66	32.83	7.88	30.77	232	193	P	V
		5866.4	50.32	-57.29	107.61	40.39	32.83	7.88	30.78	232	193	P	V
		5884.8	49.77	-48.15	97.92	39.85	32.82	7.88	30.78	232	193	P	V
		5939.2	50.01	-18.19	68.2	40.13	32.81	7.89	30.82	232	193	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)
		5641.8	50.72	-17.48	68.2	40.81	32.87	7.72	30.68	177	46	P	H
		5685.2	51.14	-43.14	94.28	41.2	32.86	7.77	30.69	177	46	P	H
		5709.8	52	-55.95	107.95	42.05	32.86	7.79	30.7	177	46	P	H
		5721.6	50.57	-63.88	114.45	40.61	32.86	7.81	30.71	177	46	P	H
	*	5795	108.28	-		98.31	32.84	7.88	30.75	177	46	P	H
	*	5795	100.61	-	-	90.64	32.84	7.88	30.75	177	46	A	H
		5852.2	52.66	-64.52	117.18	42.72	32.83	7.88	30.77	177	46	P	H
		5863.2	52.37	-56.13	108.5	42.44	32.83	7.88	30.78	177	46	P	H
		5878.8	52.42	-49.96	102.38	42.5	32.82	7.88	30.78	177	46	P	H
		5940.4	50.85	-17.35	68.2	40.97	32.81	7.89	30.82	177	46	P	H
802.11n													H
HT40													H
CH 159		5614.2	49.54	-18.66	68.2	39.63	32.88	7.7	30.67	236	186	P	V
5795MHz		5672.8	49.71	-35.4	85.11	39.78	32.87	7.75	30.69	236	186	P	V
		5712.2	49.52	-59.1	108.62	39.57	32.86	7.79	30.7	236	186	P	V
		5723.4	48.1	-70.45	118.55	38.14	32.86	7.81	30.71	236	186	P	V
	*	5795	101.31	-		91.34	32.84	7.88	30.75	236	186	P	V
	*	5795	93.6	-	-	83.63	32.84	7.88	30.75	236	186	A	V
		5854	50.65	-62.43	113.08	40.71	32.83	7.88	30.77	236	186	P	V
		5861.2	50.11	-58.95	109.06	40.17	32.83	7.88	30.77	236	186	P	V
		5875.8	50.04	-54.57	104.61	40.12	32.82	7.88	30.78	236	186	P	V
		5940.6	49.31	-18.89	68.2	39.43	32.81	7.89	30.82	236	186	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 802.11ac 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)
		5617.2	50.9	-17.3	68.2	40.99	32.88	7.7	30.67	181	46	P	H
		5688.4	60.28	-36.36	96.64	50.35	32.86	7.77	30.7	181	46	P	H
		5712.6	63.76	-44.97	108.73	53.82	32.86	7.79	30.71	181	46	P	H
		5720.6	64.66	-47.51	112.17	54.7	32.86	7.81	30.71	181	46	P	H
	*	5775	105.33	-		95.37	32.84	7.86	30.74	181	46	P	H
	*	5775	97.65	-	-	87.69	32.84	7.86	30.74	181	46	A	H
		5853.8	56.3	-57.24	113.54	46.36	32.83	7.88	30.77	181	46	P	H
		5865.2	54	-53.94	107.94	44.07	32.83	7.88	30.78	181	46	P	H
		5887.6	51.44	-44.41	95.85	41.53	32.82	7.88	30.79	181	46	P	H
		5939.8	49.65	-18.55	68.2	39.77	32.81	7.89	30.82	181	46	P	H
													H
													H
802.11ac VHT80 CH 155 5775MHz		5619.4	49.47	-18.73	68.2	39.56	32.88	7.7	30.67	239	191	P	V
		5699	55.17	-49.29	104.46	45.24	32.86	7.77	30.7	239	191	P	V
		5708.4	57.78	-49.77	107.55	47.83	32.86	7.79	30.7	239	191	P	V
		5724	57.59	-62.33	119.92	47.63	32.86	7.81	30.71	239	191	P	V
	*	5775	99.39	-		89.43	32.84	7.86	30.74	239	191	P	V
	*	5775	91.78	-	-	81.82	32.84	7.86	30.74	239	191	A	V
		5850.2	52.56	-69.18	121.74	42.62	32.83	7.88	30.77	239	191	P	V
		5859	51.69	-57.99	109.68	41.75	32.83	7.88	30.77	239	191	P	V
		5876.4	49.62	-54.54	104.16	39.7	32.82	7.88	30.78	239	191	P	V
		5947.6	48.11	-20.09	68.2	38.23	32.81	7.89	30.82	239	191	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 802.11n HT20 (LF @ 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)	
5GHz 802.11n HT20 LF		77.52	21.76	-18.24	40	42.71	10.31	0.95	32.3	-	-	P	H	
		90.21	21.83	-21.67	43.5	42.99	10.11	0.95	32.3	-	-	P	H	
		263.55	19.05	-26.95	46	33.01	16.52	1.63	32.18	-	-	P	H	
		505.1	21.89	-24.11	46	30.96	20.85	2.2	32.2	-	-	P	H	
		715.8	26.14	-19.86	46	31.33	24.21	2.64	32.14	-	-	P	H	
		956.6	30.42	-15.58	46	29.87	28.33	3.07	30.99	100	0	P	H	
														H
														H
														H
														H
														H
														H
			32.97	29.74	-10.26	40	41.37	20.14	0.59	32.34	100	0	P	V
			119.91	21.61	-21.89	43.5	39.24	13.51	1.09	32.29	-	-	P	V
			259.77	18.26	-27.74	46	31.96	16.78	1.63	32.19	-	-	P	V
			419	20.84	-25.16	46	31.55	19.33	2.03	32.16	-	-	P	V
			643.7	25.58	-20.42	46	31.69	23.48	2.48	32.19	-	-	P	V
			946.8	30.4	-15.6	46	30.57	27.71	3.06	31.08	-	-	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	Peak or Average
H/V	Horizontal or Vertical



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

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

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

For Peak Limit @ 2390MHz:

- 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)
- Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

- 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)
- 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

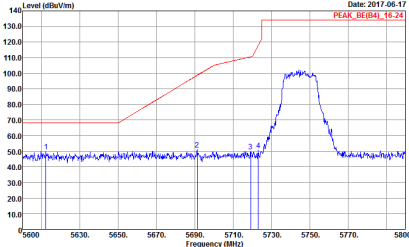
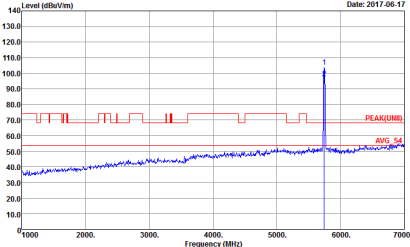
Test Engineer :	Alex Jeng, Bill Chang, and Wilson Wu	Temperature :	24~25°C
		Relative Humidity :	50~58%

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	<p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1522 HORIZONTAL Detector : Peak Project : 752311 Mode : 33 Power : 17</p>	<p>Site : 03CH13-HY Condition : PEAK(UN1) 3m HORN_91200_1522 HORIZONTAL Detector : Peak Project : 752311 Mode : 33 Power : 17</p>

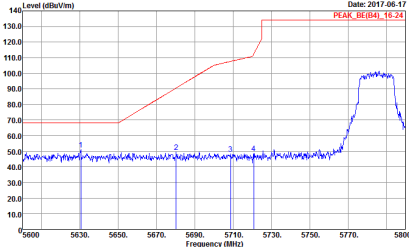
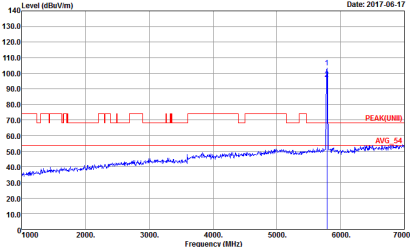
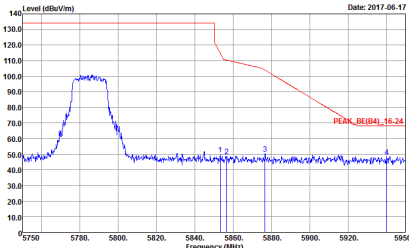


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH149 5745MHz	
1	Vertical	Fundamental
<p>Peak</p>	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1522 VERTICAL Detector : Peak Project : 752311 Mode : 33 Power : 17</p>	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK(UMB) 3m HORN_91200_1522 VERTICAL Detector : Peak Project : 752311 Mode : 33 Power : 17</p>

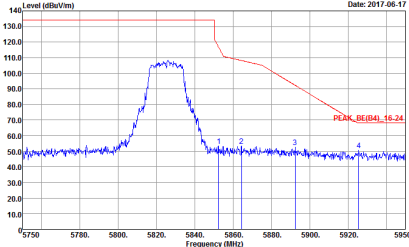
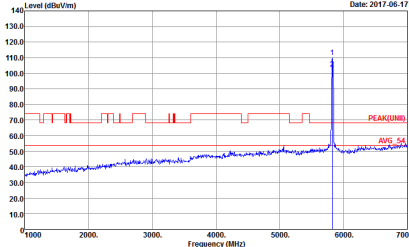


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH157 5785MHz	
1	Horizontal	Fundamental
Peak	<p>Date: 2017-06-17 PEAK_BE(B4)_16-24</p> <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1522 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 752311 Mode : 34 Power : 17</p>	<p>Date: 2017-06-17 PEAK(UMB) AVG 54</p> <p>Site : 03CH13-HY Condition : PEAK(UMB) 3m HORN_91200_1522 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 752311 Mode : 34 Power : 17</p>
Peak	<p>Date: 2017-06-17 PEAK_BE(B4)_16-24</p> <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1522 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 752311 Mode : 34 Power : 17</p>	Left blank

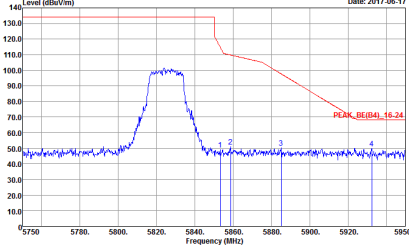
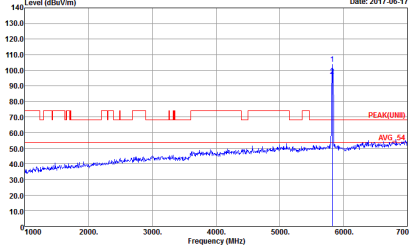


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH157 5785MHz	
1	Vertical	Fundamental
Peak	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1522 VERTICAL Detector : Peak Project : 752311 Mode : 34 Power : 17</p>	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK(UMBI) 3m HORN_91200_1522 VERTICAL Detector : Peak Project : 752311 Mode : 34 Power : 17</p>
Peak	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1522 VERTICAL Detector : Peak Project : 752311 Mode : 34 Power : 17</p>	Left blank



WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH165 5825MHz	
1	Horizontal	Fundamental
Peak	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_9120D_1522 HORIZONTAL Detector : Peak Project : 752311 Mode : 35 Power : 17</p>	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK(UNII) 3m HORN_9120D_1522 HORIZONTAL Detector : Peak Project : 752311 Mode : 35 Power : 17</p>



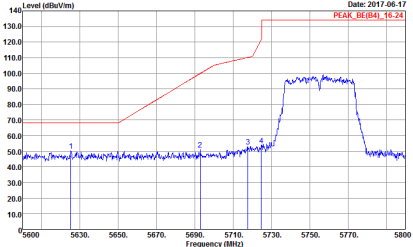
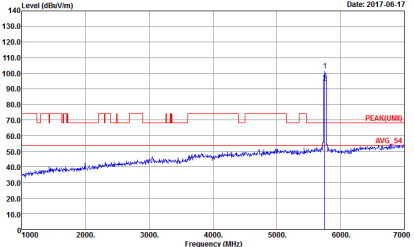
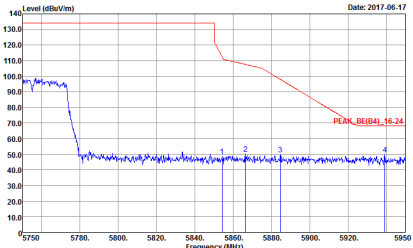
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH165 5825MHz	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_9120D_1522 VERTICAL Detector : Peak Project : 752311 Mode : 35 Power : 17</p>	 <p>Site : 03CH13-HY Condition : PEAK(UNIT) 3m HORN_9120D_1522 VERTICAL Detector : Peak Project : 752311 Mode : 35 Power : 17</p>



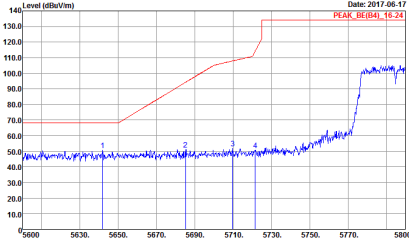
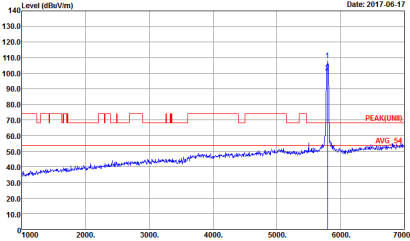
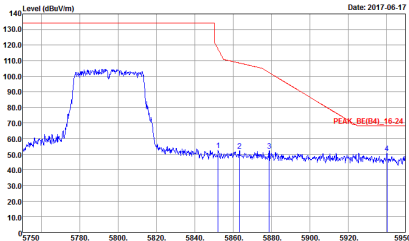
Band 4 5725~5850MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

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

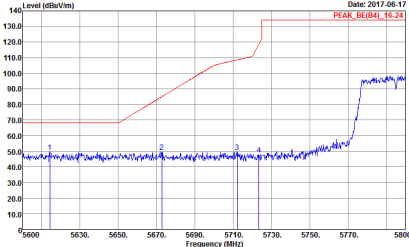
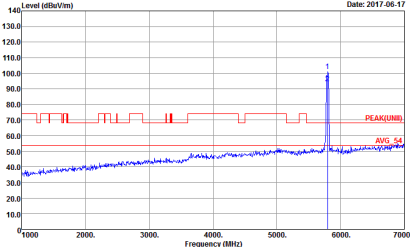
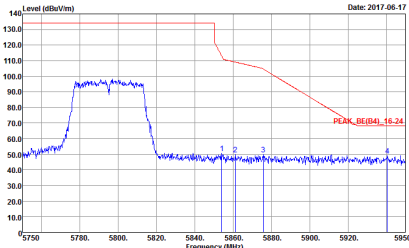


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH151 5755MHz	
1	Vertical	Fundamental
Peak	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1522 VERTICAL Detector : Peak Project : 752311 Mode : 36 Power : 17</p>	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK(UMBI) 3m HORN_91200_1522 VERTICAL Detector : Peak Project : 752311 Mode : 36 Power : 17</p>
Peak	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1522 VERTICAL Detector : Peak Project : 752311 Mode : 36 Power : 17</p>	Left blank



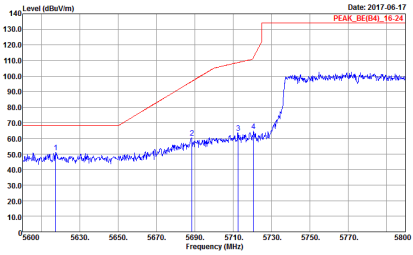
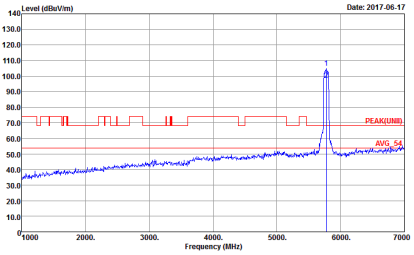
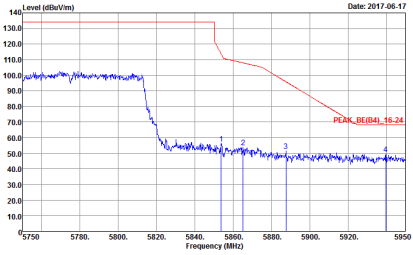
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH159 5795MHz	
1	Horizontal	Fundamental
Peak	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1522 HORIZONTAL Detector : Peak Project : 752311 Mode : 37 Power : 17</p>	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK(UM) 3m HORN_91200_1522 HORIZONTAL Detector : Peak Project : 752311 Mode : 37 Power : 17</p>
Peak	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1522 HORIZONTAL Detector : Peak Project : 752311 Mode : 37 Power : 17</p>	Left blank



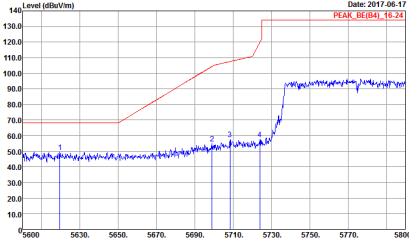
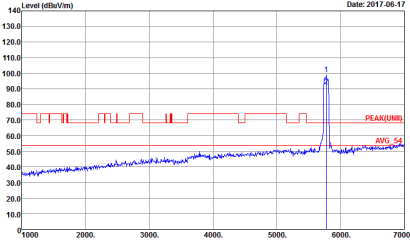
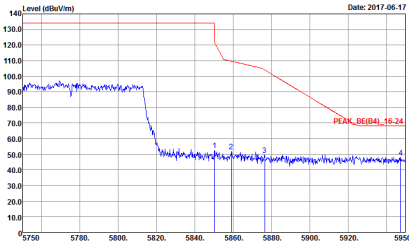
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH159 5795MHz	
1	Vertical	Fundamental
Peak	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1522 VERTICAL Detector : Peak Project : 752311 Mode : 37 Power : 17</p>	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK(UMBI) 3m HORN_91200_1522 VERTICAL Detector : Peak Project : 752311 Mode : 37 Power : 17</p>
Peak	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1522 VERTICAL Detector : Peak Project : 752311 Mode : 37 Power : 17</p>	Left blank



Band 4 5725~5850MHz
WIFI 802.11ac VHT80 (Band Edge @ 3m)

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH155 5775MHz	
1	<p align="center">Horizontal</p>  <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_9120D_1522 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 752311 Mode : 38 Power : 17.5</p>	<p align="center">Fundamental</p>  <p>Site : 03CH13-HY Condition : PEAK(LMB) 3m HORN_9120D_1522 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 752311 Mode : 38 Power : 17.5</p>
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_9120D_1522 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 752311 Mode : 38 Power : 17.5</p>	<p align="center">Left blank</p>



WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH155 5775MHz	
1	Vertical	Fundamental
Peak	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1522 VERTICAL Detector : Peak Project : 752311 Mode : 38 Power : 17.5</p>	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK(UMBI) 3m HORN_91200_1522 VERTICAL Detector : Peak Project : 752311 Mode : 38 Power : 17.5</p>
Peak	 <p>Date: 2017-06-17</p> <p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1522 VERTICAL Detector : Peak Project : 752311 Mode : 38 Power : 17.5</p>	Left blank

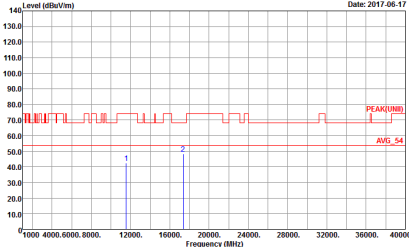
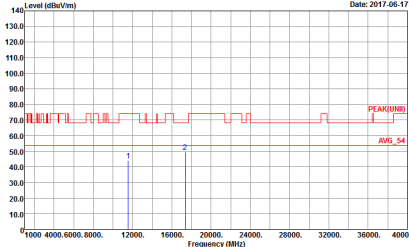


Band 4 - 5725~5850MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11n HT20 CH149 5745MHz	
1	Horizontal	Vertical
<p>Peak</p> <p>Avg.</p>	<p>Site : 03CH13-HY Condition : PEAK(UNIT) 3m SHF_HORN_584 HORIZONTAL Detector : Peak Project : 752311 Mode : 33 Power : 17</p>	<p>Site : 03CH13-HY Condition : PEAK(UNIT) 3m SHF_HORN_584 VERTICAL Detector : Peak Project : 752311 Mode : 33 Power : 17</p>



WIFI	Band 4 5725-5850MHz Harmonic @ 3m	
ANT	802.11n HT20 CH157 5785MHz	
1	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH13-HY Condition : PEAK(UNII) 3m SHF_HORN_584 HORIZONTAL Detector : Peak Project : 752311 Mode : 34 Power : 17</p>	 <p>Site : 03CH13-HY Condition : PEAK(UNII) 3m SHF_HORN_584 VERTICAL Detector : Peak Project : 752311 Mode : 34 Power : 17</p>

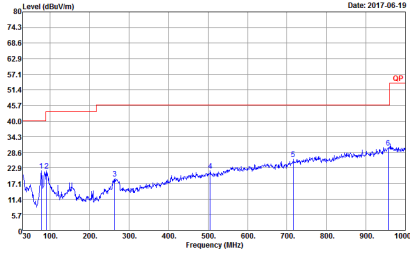
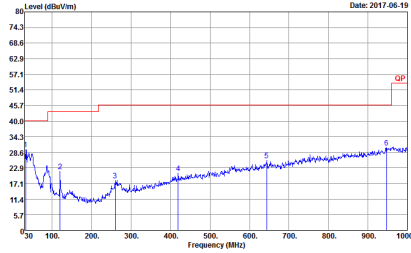


WIFI	Band 4 5725-5850MHz Harmonic @ 3m	
ANT	802.11n HT20 CH165 5825MHz	
1	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH13-HY Condition : PEAK(UNII) 3m SHF_HORN_584 HORIZONTAL Detector : Peak Project : 752311 Mode : 35 Power : 17</p>	<p>Site : 03CH13-HY Condition : PEAK(UNII) 3m SHF_HORN_584 VERTICAL Detector : Peak Project : 752311 Mode : 35 Power : 17</p>



Emission below 1GHz

5GHz WIFI 802.11n HT20 (LF)

WIFI	5GHz 5725~5850MHz	
ANT	802.11n HT20 LF	
1	Horizontal	Vertical
<p>QP / Peak</p>	 <p>Site : 03CH13-HY Condition : QP 3m BILOG_40103 HORIZONTAL Detector : Peak Project : 752311 Mode : 40</p>	 <p>Site : 03CH13-HY Condition : QP 3m BILOG_40103 VERTICAL Detector : Peak Project : 752311 Mode : 40</p>

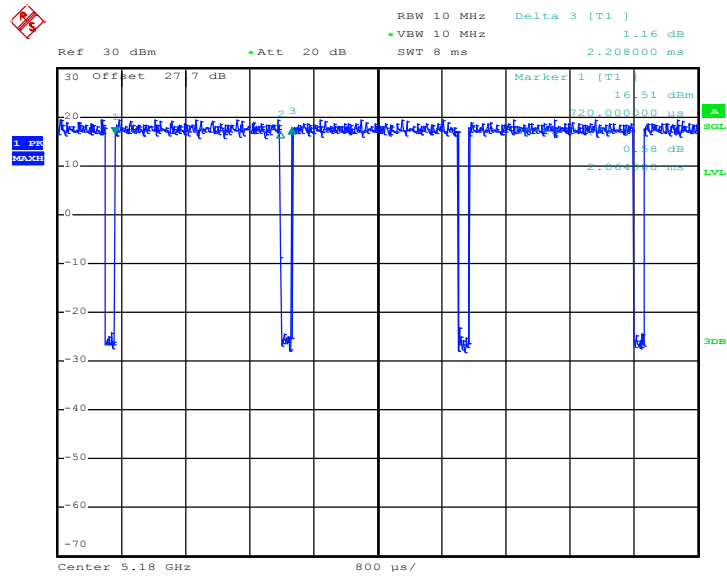


Appendix E. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
802.11a	93.478	2064	0.48	1kHz
5GHz 802.11n HT20	93.411	1928	0.52	1kHz
5GHz 802.11n HT40	87.407	944	1.06	3kHz
5GHz 802.11ac VHT20	93.798	1936	0.52	1kHz
5GHz 802.11ac VHT40	89.474	952	1.05	3kHz
5GHz 802.11ac VHT80	85.185	736	1.36	3kHz

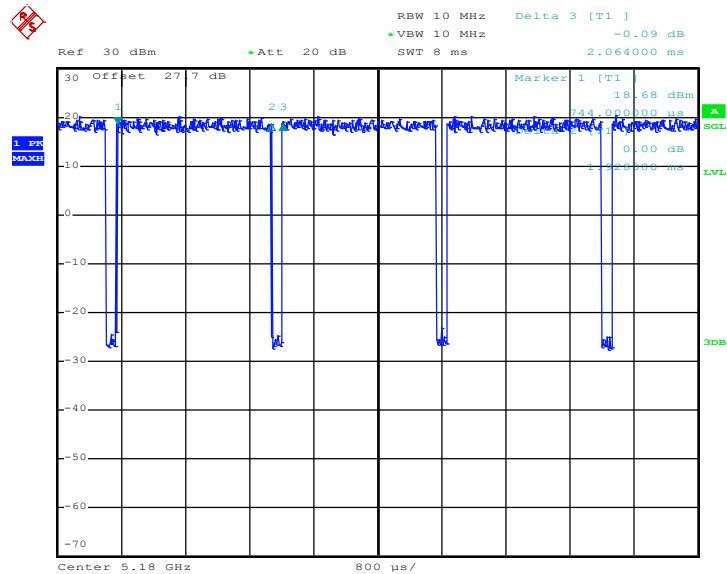


802.11a



Date: 1.JUN.2017 02:01:30

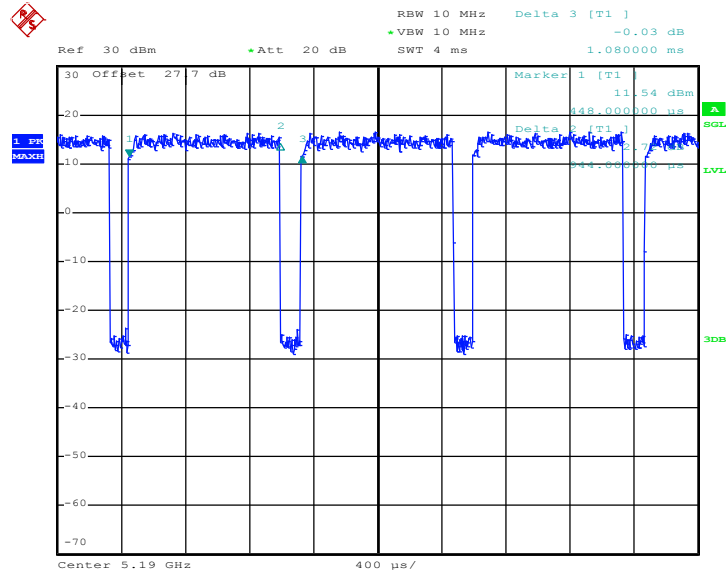
802.11n HT20



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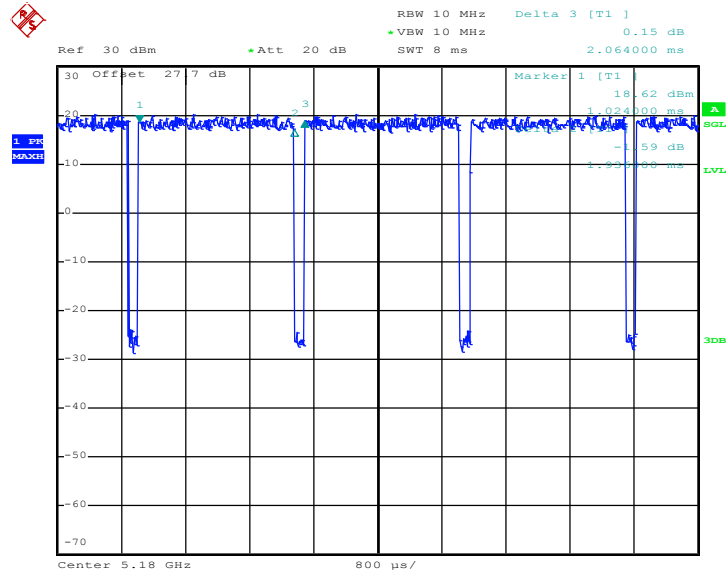


802.11n HT40



Date: 1.JUN.2017 02:52:15

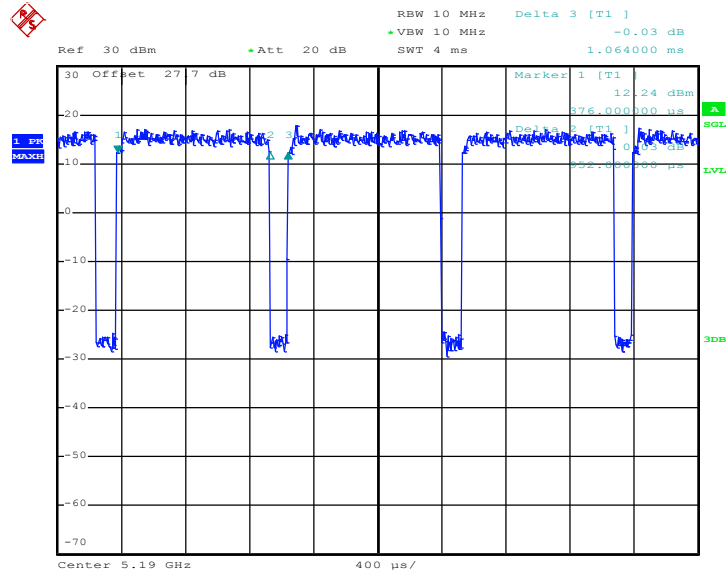
802.11ac VHT20



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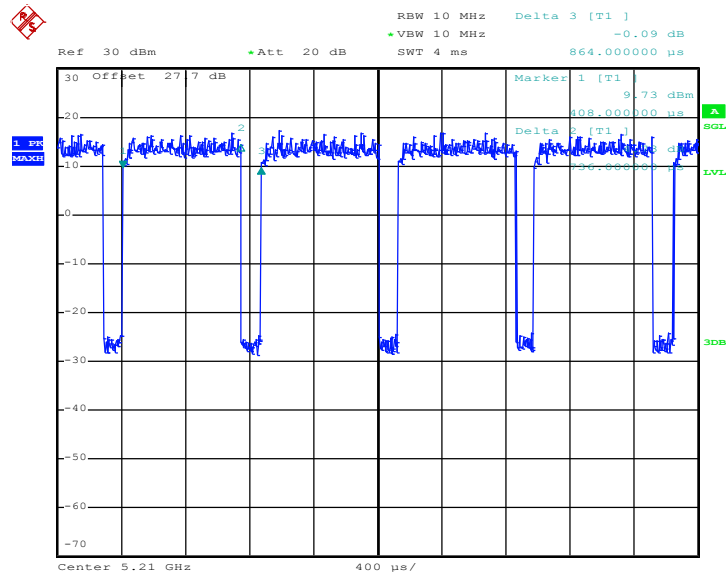


802.11ac VHT40



Date: 1.JUN.2017 03:02:43

802.11ac VHT80



Date: 1.JUN.2017 03:23:36