



# FCC RADIO TEST REPORT

**FCC ID** : 2AFZZ-XMD2TG  
**Equipment** : Mobile Phone  
**Brand Name** : MI  
**Model name** : M1808D2TG  
**Applicant** : Xiaomi Communications Co., Ltd.  
The Rainbow City of China Resources, NO.68, Qinghe  
Middle Street, Haidian District, Beijing, China  
**Manufacturer** : Xiaomi Communications Co., Ltd.  
The Rainbow City of China Resources, NO.68, Qinghe  
Middle Street, Haidian District, Beijing, China  
**Standard** : FCC Part 15 Subpart E §15.407

The product was received on Aug. 02, 2018 and testing was started from Aug. 09, 2018 and completed on Sep. 01, 2018. 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 report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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

Approved by: Joseph Lin

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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## History of this test report

Report No.	Version	Description	Issued Date
FR880207C	01	Initial issue of report	Sep. 07, 2018

## Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.403 (i)	6dB & 26dB Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Reporting only	-
3.2	15.407 (a)	Maximum Conducted Output Power	Pass	-
3.3	15.407 (a)	Power Spectral Density	Pass	-
3.4	15.407(b)	Unwanted Emissions	Pass	Under limit 4.48 dB at 49.170 MHz
3.5	15.207	AC Conducted Emission	Pass	Under limit 14.54 dB at 0.152 MHz
3.6	15.407 (c)	Automatically Discontinue Transmission	Pass	-
3.7	15.203 & 15.407 (a)	Antenna Requirement	Pass	-

**Reviewed by: Wii Chang**

**Report Producer: Nancy Yang**

# 1 General Description

## 1.1 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, and GNSS

Product Specification subjective to this standard	
Sample 1	6+128G
Sample 2	4+64G
Antenna Type	WWAN Top Antenna: Fixed Internal Antenna Bottom Antenna: Fixed Internal Antenna WLAN: PIFA Antenna Bluetooth: PIFA Antenna GPS / Glonass / Beidou / Galileo: PIFA Antenna

**Remark:** All the test results were performed with Sample 1.

## 1.2 Modification of EUT

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

## 1.3 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1190 and 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, Huaya 1st Rd., Guishan Dist., Taoyuan 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.



## **1.4 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 v02r01.
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01.
- ♦ ANSI C63.10-2013

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

## 2 Test Configuration of Equipment Under Test

- 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 <sup>#</sup>	5775	-	-

**Note:**

1. The above Frequency and Channel in "\*" were 802.11n HT40 and 802.11ac VHT40.
2. The above Frequency and Channel in "<sup>#</sup>" were 802.11ac VHT80.

### 2.2 Test Mode

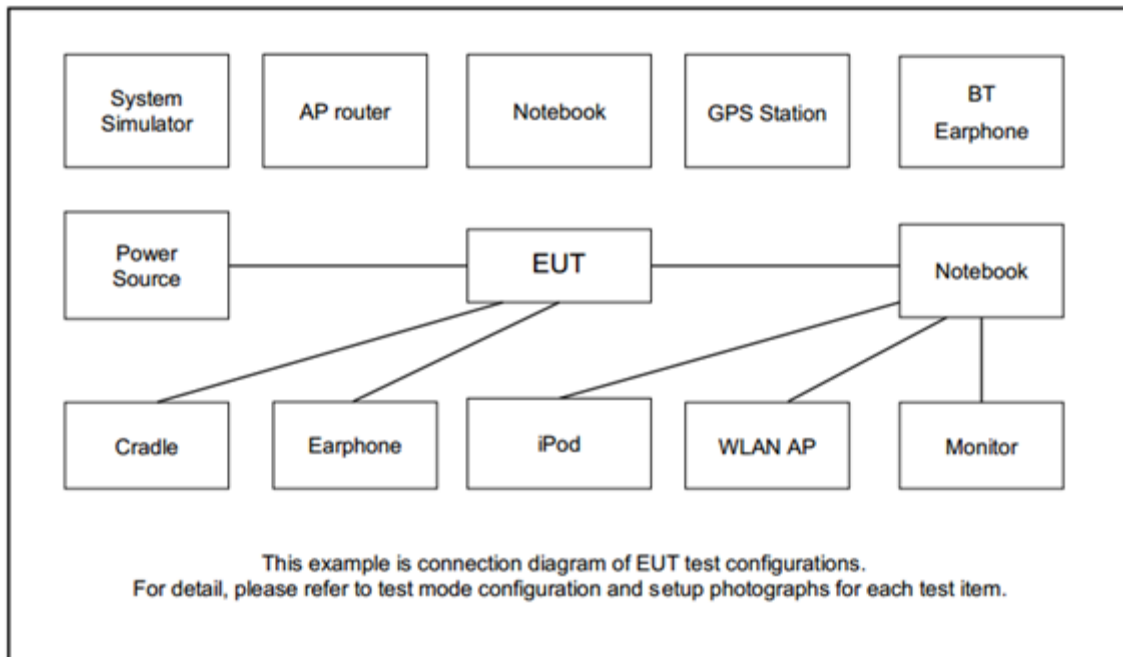
Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20 (Covered by HT20)	MCS0
802.11ac VHT40 (Covered by HT40)	MCS0
802.11ac VHT80	MCS0

Test Cases	
<b>AC Conducted Emission</b>	Mode 1 : GSM1900 Idle + Bluetooth Link + WLAN (5GHz) Link + Camera (Front) + USB Cable 2 (Charging from Adapter 2) for Top Antenna
<b>Remark:</b> For Radiated test cases, the tests were performed with Adapter 1, and USB Cable 1.	

Ch. #		Band IV : 5725-5850 MHz			
		802.11a	802.11n HT20	802.11n HT40	802.11ac VHT80
L	Low	149	149	151	-
M	Middle	157	157	-	155
H	High	161	161	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, make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting 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.

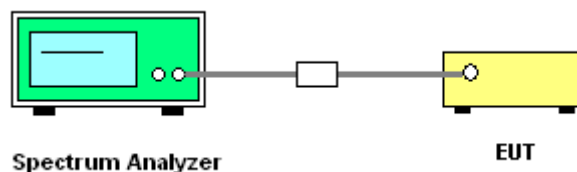
##### 3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

##### 3.1.3 Test Procedures

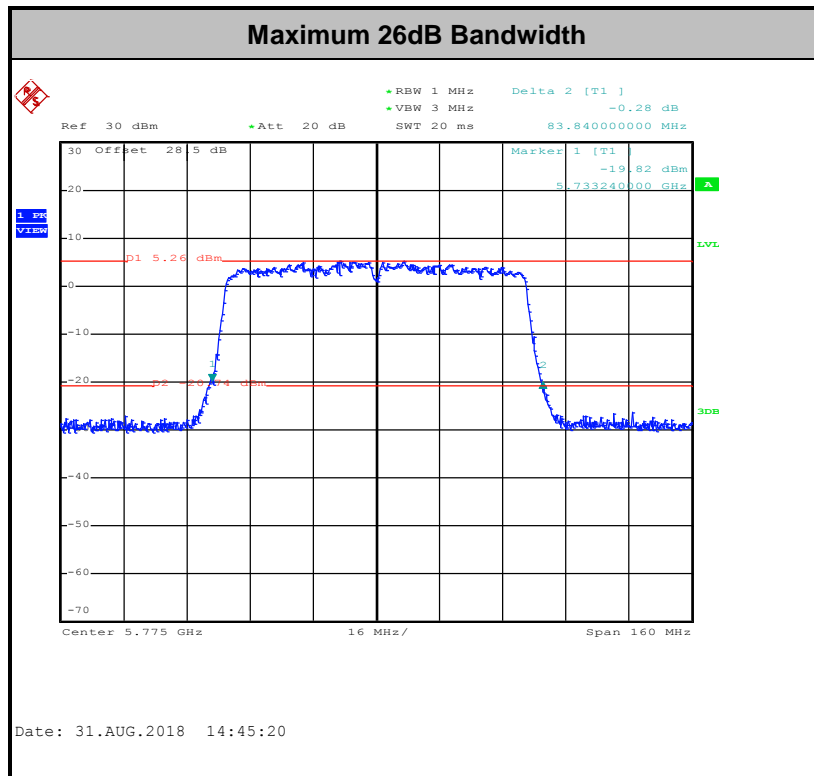
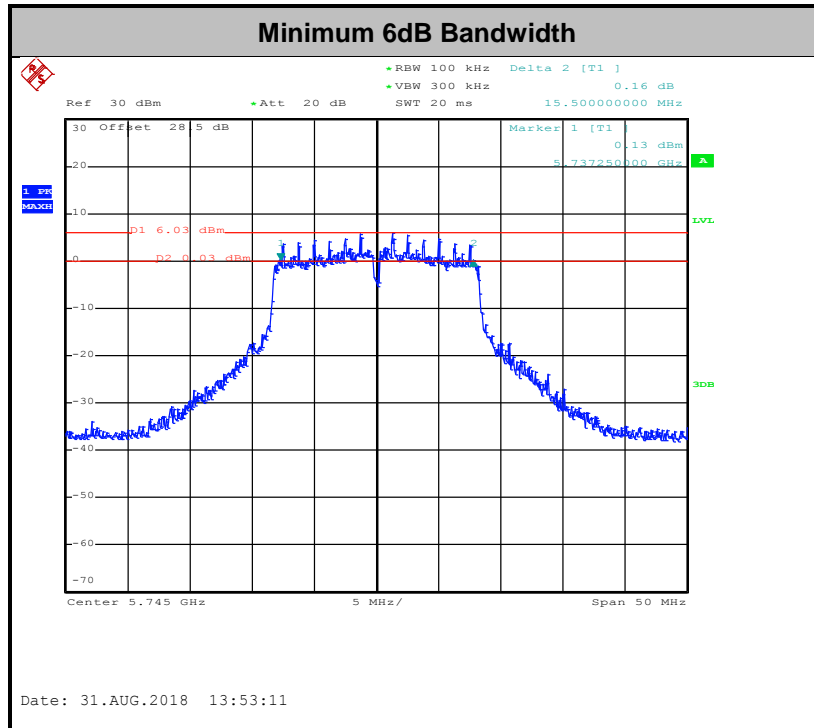
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.  
Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW  $\geq 3 \times$  RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

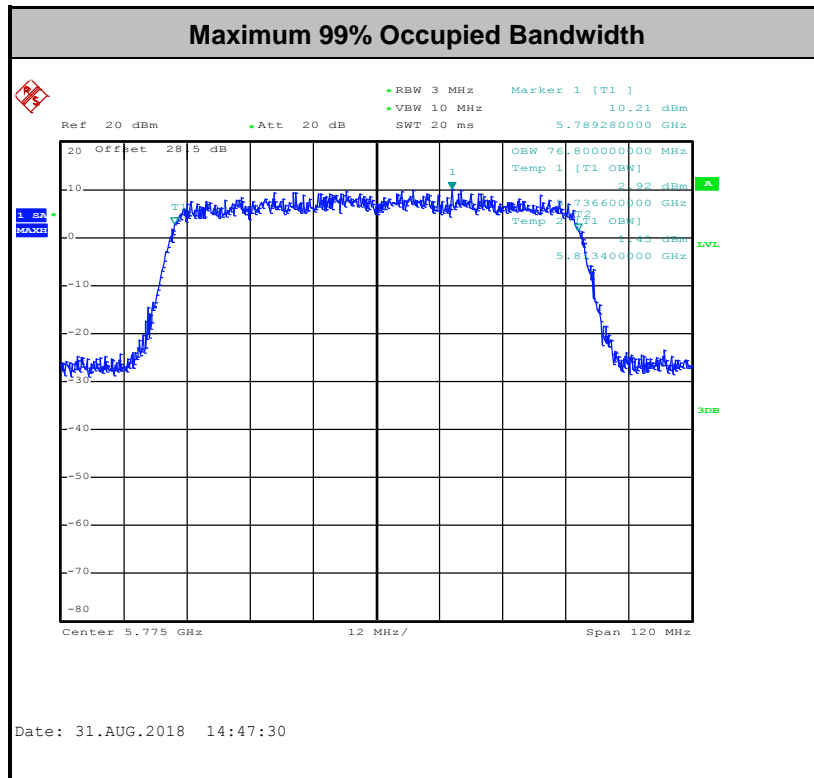
##### 3.1.4 Test Setup



##### 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

See list of measuring equipment of this test report.

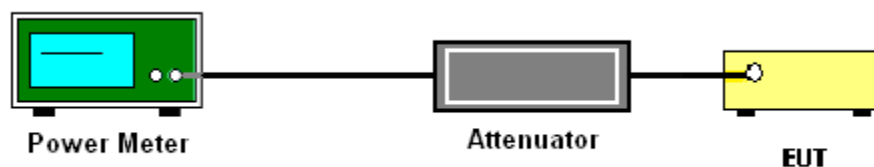
### 3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

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**

See list of measuring equipment of this test report.

#### **3.3.3 Test Procedures**

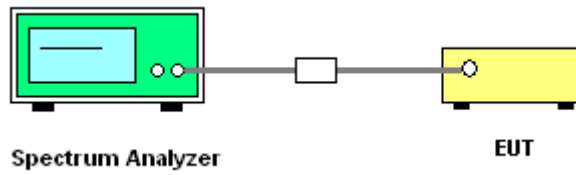
The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.  
Section F) Maximum power spectral density.

##### **# Method SA-2 #**

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

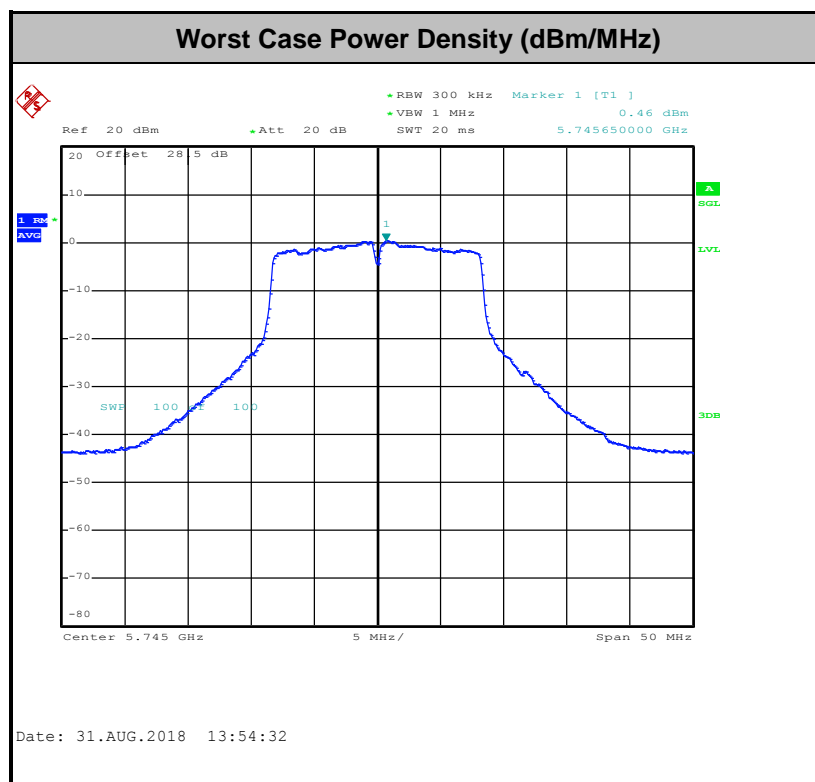
- Measure the duty cycle.
  - Set span to encompass the entire emission bandwidth (EBW) of the signal.
  - Set RBW = 300 kHz.
  - Set VBW  $\geq$  1 MHz.
  - Number of points in sweep  $\geq$  2 Span / RBW.
  - Sweep time = auto.
  - Detector = RMS
  - Trace average at least 100 traces in power averaging 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 shall comply with the general field strength limits as below table,

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

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

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





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

(3) KDB789033 D02 v02r01 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.<sup>3</sup>
- (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.<sup>4</sup>

**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

See list of measuring equipment of this test report.



### 3.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Section G) Unwanted emissions measurement.

(1) Procedure for Unwanted Emissions Measurements Below 1000MHz

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

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

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

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

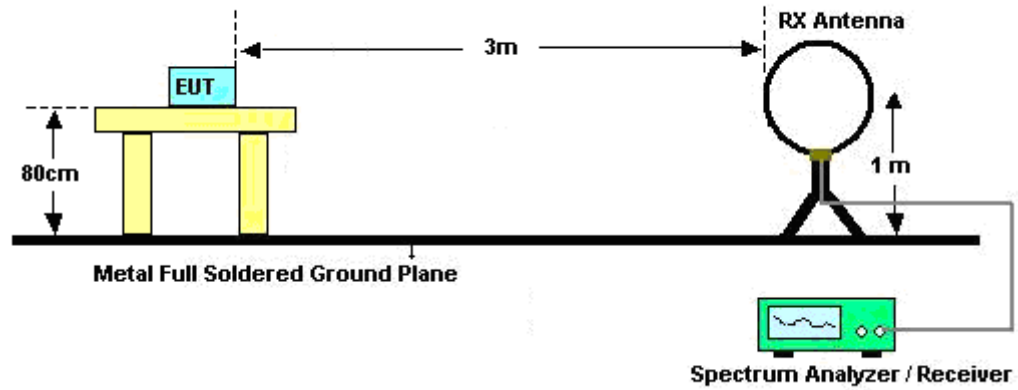
- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW  $\geq$  1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.



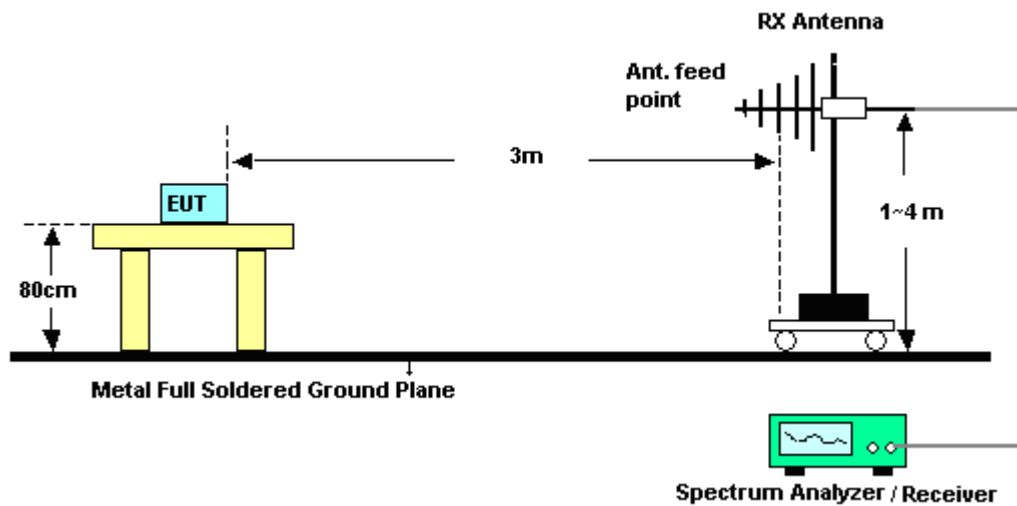
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband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

### 3.4.4 Test Setup

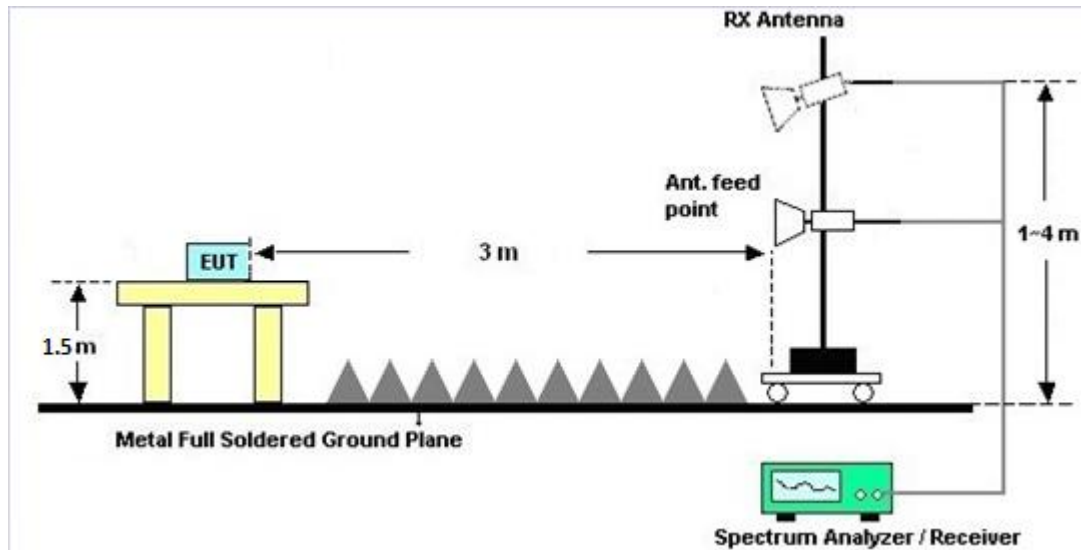
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

### 3.4.6 Test Result of Radiated 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 Unwanted Radiated Emission (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 $\mu$ 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.

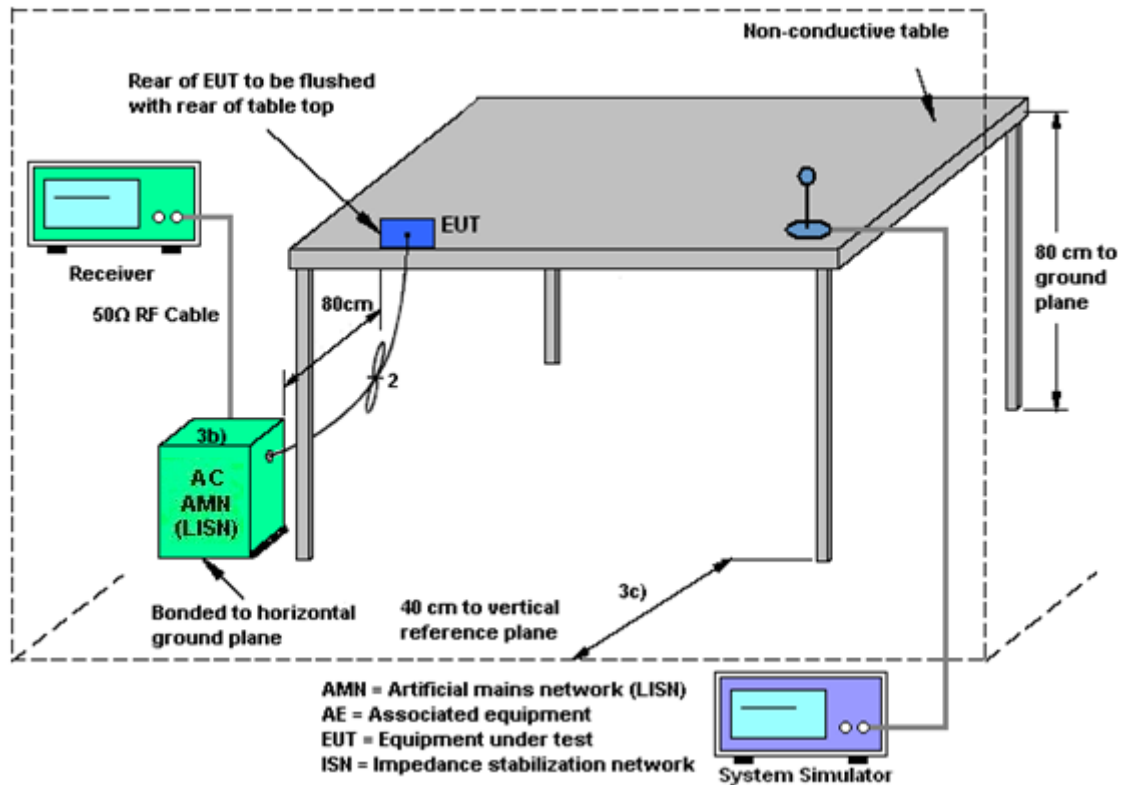
#### 3.5.2 Measuring Instruments

See list of measuring equipment 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 Automatically Discontinue Transmission**

### **3.6.1 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.

### **3.6.2 Measuring Instruments**

See list of measuring equipment of this test report.

### **3.6.3 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.





## **3.7 Antenna Requirements**

### **3.7.1 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.

### **3.7.2 Antenna Anti-Replacement Construction**

An embedded-in antenna design is used.

### **3.7.3 Antenna Gain**

The antenna peak gain of EUT 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	1240001	N/A	Sep. 07, 2017	Aug. 09, 2018 ~ Aug. 31, 2018	Sep. 06, 2018	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1207349	300MHz~40GHz	Sep. 07, 2017	Aug. 09, 2018 ~ Aug. 31, 2018	Sep. 06, 2018	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100057	9kHz~40GHz	Nov. 21, 2017	Aug. 09, 2018 ~ Aug. 31, 2018	Nov. 20, 2018	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101397	10Hz~40GHz	Nov. 07, 2017	Aug. 09, 2018 ~ Aug. 31, 2018	Nov. 06, 2018	Conducted (TH05-HY)
Switch Box & RF Cable	Burgeon	ETF-058	EC1300484	N/A	Mar. 01, 2018	Aug. 09, 2018 ~ Aug. 31, 2018	Feb. 28, 2019	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Aug. 31, 2018	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9KHz~3.6GHz	Dec. 08, 2017	Aug. 31, 2018	Dec. 07, 2018	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 30, 2017	Aug. 31, 2018	Nov. 29, 2018	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Aug. 31, 2018	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 03, 2018	Aug. 31, 2018	Jan. 02, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 03, 2018	Aug. 31, 2018	Jan. 02, 2019	Conduction (CO05-HY)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Nov. 10, 2017	Aug. 16, 2018 ~ Sep. 01, 2018	Nov. 09, 2018	Radiation (03CH13-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800 N1D01N-06	40103&07	30MHz to 1GHz	Jan. 10, 2018	Aug. 16, 2018 ~ Sep. 01, 2018	Jan. 09, 2019	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1241	1GHz ~ 18GHz	Jun. 29, 2018	Aug. 16, 2018 ~ Sep. 01, 2018	Jun. 28, 2019	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 27, 2017	Aug. 16, 2018 ~ Sep. 01, 2018	Nov. 26, 2018	Radiation (03CH13-HY)
Amplifier	Sonoma-Instrument	310 N	187282	9KHz~1GHz	Jan. 19, 2018	Aug. 16, 2018 ~ Sep. 01, 2018	Jan. 18, 2020	Radiation (03CH13-HY)
Preamplifier	Jet-Power	JPA0118-55-303K	1710001800054002	1GHz~18GHz	Apr. 16, 2018	Aug. 16, 2018 ~ Sep. 01, 2018	Apr. 15, 2019	Radiation (03CH13-HY)
Preamplifier	Keysight	83017A	MY53270147	1GHz~26.5GHz	Feb. 02, 2018	Aug. 16, 2018 ~ Sep. 01, 2018	Feb. 01, 2019	Radiation (03CH13-HY)
Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz, VSWR : 2.5:1 max	Jul. 16, 2018	Aug. 16, 2018 ~ Sep. 01, 2018	Jul. 15, 2019	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY55370526	10Hz~44GHz	Mar. 15, 2018	Aug. 16, 2018 ~ Sep. 01, 2018	Mar. 14, 2019	Radiation (03CH13-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Aug. 16, 2018 ~ Sep. 01, 2018	N/A	Radiation (03CH13-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Aug. 16, 2018 ~ Sep. 01, 2018	N/A	Radiation (03CH13-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290053	20Hz to 26.5GHz	Jan. 16, 2018	Aug. 16, 2018 ~ Sep. 01, 2018	Jan. 15, 2019	Radiation (03CH13-HY)
Filter	Wainwright	WLK4-1000-1530-8000-40S	SN1	1G Lowpass Filter	Sep. 18, 2017	Aug. 16, 2018 ~ Sep. 01, 2018	Sep. 17, 2018	Radiation (03CH13-HY)
Filter	Woken	WHKX8-5872.5-6750-18000-40ST	SN3	6.75G Highpass	Sep. 18, 2017	Aug. 16, 2018 ~ Sep. 01, 2018	Sep. 17, 2018	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0030/126E	30M-18G	Jan. 22, 2018	Aug. 16, 2018 ~ Sep. 01, 2018	Jan. 21, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	335041/4	30M-18G	Jan. 22, 2018	Aug. 16, 2018 ~ Sep. 01, 2018	Jan. 21, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24961/4	30M~18GHz	Jan. 22, 2018	Aug. 16, 2018 ~ Sep. 01, 2018	Jan. 21, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30M~40GHz	Oct. 17, 2017	Aug. 16, 2018 ~ Sep. 01, 2018	Oct. 16, 2018	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30M~40GHz	Oct. 17, 2017	Aug. 16, 2018 ~ Sep. 01, 2018	Oct. 16, 2018	Radiation (03CH13-HY)
Software	AUDIX	E3 6.2009-8-24c	RK-001124	N/A	N/A	Aug. 16, 2018 ~ Sep. 01, 2018	N/A	Radiation (03CH13-HY)

## 5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.7
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### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.9
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### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.4
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### Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.3
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**Appendix A. Test Result of Conducted Test Items**

Test Engineer:	Eason Huang	Temperature:	21~25	°C
Test Date:	2018/8/9~2018/8/31	Relative Humidity:	51~54	%

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

Band IV												
Mod.	Data Rate	N <sub>TX</sub>	CH.	Freq. (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		6 dB Bandwidth (MHz)		6 dB Bandwidth Min. Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2		
11a	6Mbps	1	149	5745	16.75	-	24.70	-	15.50	-	0.5	Pass
11a	6Mbps	1	157	5785	16.75	-	24.70	-	15.50	-	0.5	Pass
11a	6Mbps	1	161	5805	16.80	-	25.40	-	15.50	-	0.5	Pass
HT20	MCS0	1	149	5745	17.90	-	26.55	-	16.05	-	0.5	Pass
HT20	MCS0	1	157	5785	17.90	-	25.95	-	16.50	-	0.5	Pass
HT20	MCS0	1	161	5805	17.90	-	25.40	-	16.55	-	0.5	Pass
HT40	MCS0	1	151	5755	36.70	-	41.93	-	34.98	-	0.5	Pass
HT40	MCS0	1	159	5795	36.70	-	41.90	-	35.01	-	0.5	Pass
VHT80	MCS0	1	155	5775	76.80	-	83.84	-	75.20	-	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
					Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	1	149	5745	0.24	-	15.66	-	30.00	-	-0.24	-	Pass
11a	6Mbps	1	157	5785	0.24	-	15.53	-	30.00	-	-0.24	-	Pass
11a	6Mbps	1	161	5805	0.24	-	15.28	-	30.00	-	-0.24	-	Pass
HT20	MCS0	1	149	5745	0.26	-	14.54	-	30.00	-	-0.24	-	Pass
HT20	MCS0	1	157	5785	0.26	-	14.40	-	30.00	-	-0.24	-	Pass
HT20	MCS0	1	161	5805	0.26	-	14.64	-	30.00	-	-0.24	-	Pass
HT40	MCS0	1	151	5755	0.44	-	13.47	-	30.00	-	-0.24	-	Pass
HT40	MCS0	1	159	5795	0.44	-	13.63	-	30.00	-	-0.24	-	Pass
VHT20	MCS0	1	149	5745	0.26	-	14.50	-	30.00	-	-0.24	-	Pass
VHT20	MCS0	1	157	5785	0.26	-	14.37	-	30.00	-	-0.24	-	Pass
VHT20	MCS0	1	161	5805	0.26	-	14.61	-	30.00	-	-0.24	-	Pass
VHT40	MCS0	1	151	5755	0.44	-	13.44	-	30.00	-	-0.24	-	Pass
VHT40	MCS0	1	159	5795	0.44	-	13.58	-	30.00	-	-0.24	-	Pass
VHT80	MCS0	1	155	5775	0.91	-	13.47	-	30.00	-	-0.24	-	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
					Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	1	149	5745	0.24	-	2.22	-	2.92	-	30.00	-	-0.24	-	Pass
11a	6Mbps	1	157	5785	0.24	-	2.22	-	2.48	-	30.00	-	-0.24	-	Pass
11a	6Mbps	1	161	5805	0.24	-	2.22	-	2.07	-	30.00	-	-0.24	-	Pass
HT20	MCS0	1	149	5745	0.26	-	2.22	-	1.17	-	30.00	-	-0.24	-	Pass
HT20	MCS0	1	157	5785	0.26	-	2.22	-	0.97	-	30.00	-	-0.24	-	Pass
HT20	MCS0	1	161	5805	0.26	-	2.22	-	1.00	-	30.00	-	-0.24	-	Pass
HT40	MCS0	1	151	5755	0.44	-	2.22	-	-3.02	-	30.00	-	-0.24	-	Pass
HT40	MCS0	1	159	5795	0.44	-	2.22	-	-2.92	-	30.00	-	-0.24	-	Pass
VHT80	MCS0	1	155	5775	0.91	-	2.22	-	-5.92	-	30.00	-	-0.24	-	Pass

Note: PSD Sum = Max PSD(Ant. 1, Ant. 2) + 10 log (n)





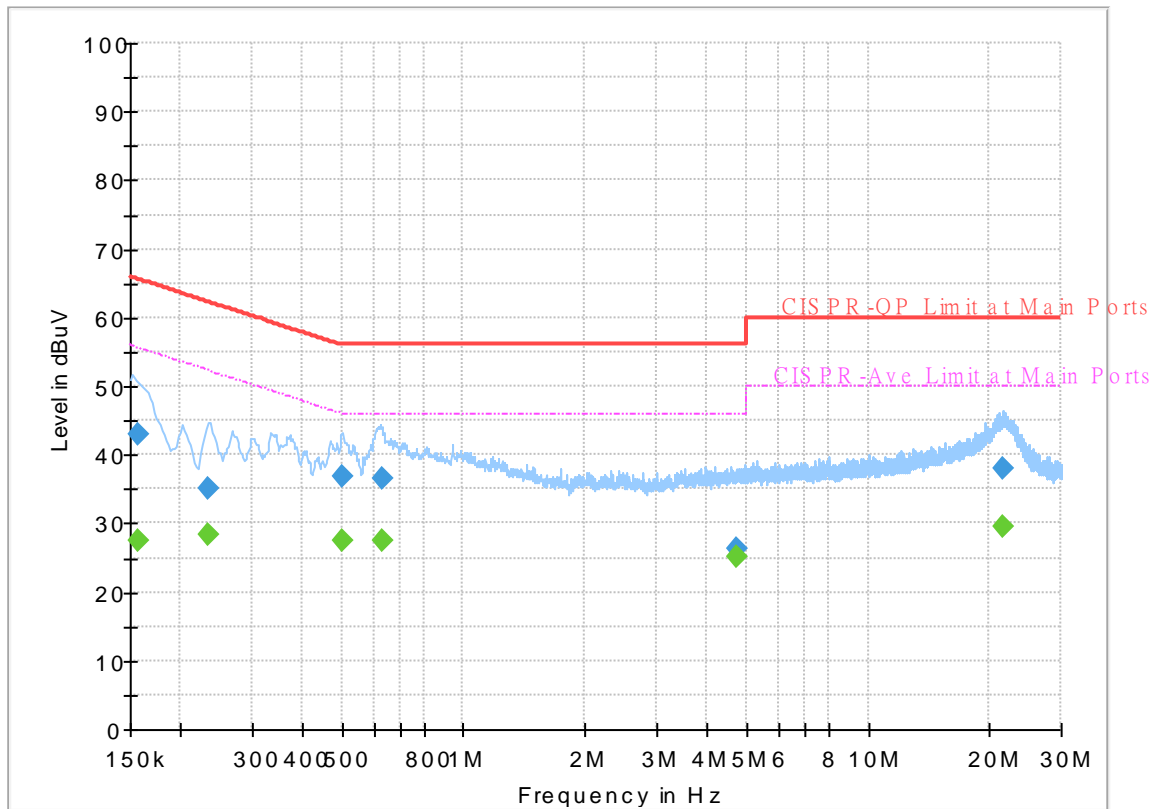
## Appendix B. AC Conducted Emission Test Results

Test Engineer :	Jimmy Chang	Temperature :	24~26°C
		Relative Humidity :	51~54%

## EUT Information

Report NO : 880207  
Test Mode : Mode 1  
Test Voltage : 120Vac/60Hz  
Phase : Line

Full Spectrum



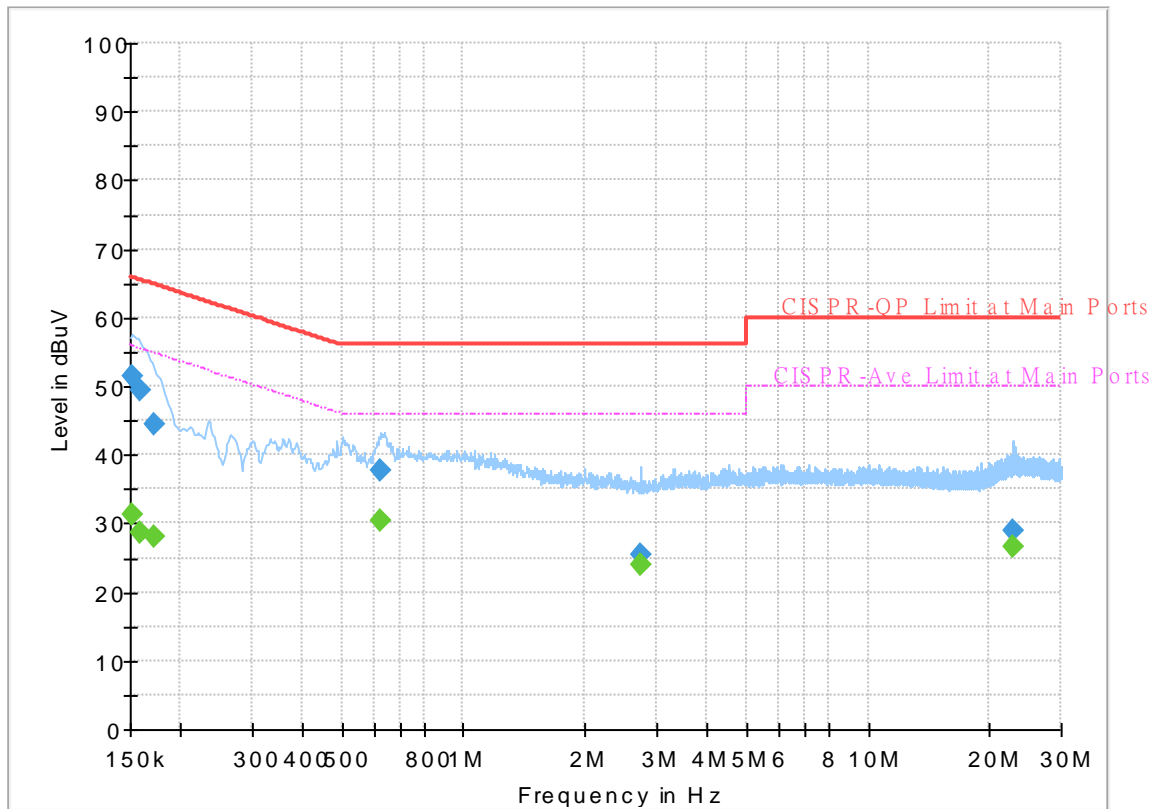
## Final\_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.156750	---	27.37	55.63	28.26	L1	OFF	19.5
0.156750	43.02	---	65.63	22.61	L1	OFF	19.5
0.233250	---	28.29	52.33	24.04	L1	OFF	19.5
0.233250	35.00	---	62.33	27.33	L1	OFF	19.5
0.503250	---	27.38	46.00	18.62	L1	OFF	19.5
0.503250	36.83	---	56.00	19.17	L1	OFF	19.5
0.627000	---	27.43	46.00	18.57	L1	OFF	19.6
0.627000	36.45	---	56.00	19.55	L1	OFF	19.6
4.710750	---	25.03	46.00	20.97	L1	OFF	19.7
4.710750	26.44	---	56.00	29.56	L1	OFF	19.7
21.457500	---	29.57	50.00	20.43	L1	OFF	20.3
21.457500	38.14	---	60.00	21.86	L1	OFF	20.3

## EUT Information

Report NO : 880207  
Test Mode : Mode 1  
Test Voltage : 120Vac/60Hz  
Phase : Neutral

Full Spectrum



## Final\_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	31.15	55.88	24.73	N	OFF	19.5
0.152250	51.34	---	65.88	14.54	N	OFF	19.5
0.159000	---	28.53	55.52	26.99	N	OFF	19.5
0.159000	49.53	---	65.52	15.99	N	OFF	19.5
0.172500	---	28.08	54.84	26.76	N	OFF	19.5
0.172500	44.54	---	64.84	20.30	N	OFF	19.5
0.624750	---	30.47	46.00	15.53	N	OFF	19.6
0.624750	37.82	---	56.00	18.18	N	OFF	19.6
2.730750	---	24.01	46.00	21.99	N	OFF	19.6
2.730750	25.44	---	56.00	30.56	N	OFF	19.6
22.749000	---	26.51	50.00	23.49	N	OFF	20.4
22.749000	28.89	---	60.00	31.11	N	OFF	20.4



## Appendix C. Radiated Spurious Emission

Test Engineer :	Fu Chen, Alex Jheng, and Wilson Wu	Temperature :	24~26°C
		Relative Humidity :	48~51%

### Band 4 - 5725~5850MHz

#### WIFI 802.11a (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11a CH 149 5745MHz		5624	51.16	-17.04	68.2	39.88	32.07	8.85	29.64	154	308	P	H
		5696.4	57.73	-44.82	102.55	46.4	32.17	8.83	29.67	154	308	P	H
		5716.4	62.4	-47.39	109.79	51.07	32.19	8.82	29.68	154	308	P	H
		5724.6	70	-51.29	121.29	58.65	32.21	8.82	29.68	154	308	P	H
	*	5745	109.07	-	-	97.71	32.24	8.81	29.69	154	308	P	H
	*	5745	101.61	-	-	90.25	32.24	8.81	29.69	154	308	A	H
													H
													H
		5619.2	51.95	-16.25	68.2	40.67	32.07	8.85	29.64	100	341	P	V
		5679.2	53.09	-36.76	89.85	41.78	32.14	8.83	29.66	100	341	P	V
		5715	59.76	-49.64	109.4	48.43	32.19	8.82	29.68	100	341	P	V
		5724.6	66.06	-55.23	121.29	54.71	32.21	8.82	29.68	100	341	P	V
	*	5745	106.26	-	-	94.9	32.24	8.81	29.69	100	341	P	V
	*	5745	99.03	-	-	87.67	32.24	8.81	29.69	100	341	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 )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. (P/A)	Pol. (H/V)
<b>802.11a CH 157 5785MHz</b>		5616.6	51.78	-16.42	68.2	40.5	32.07	8.85	29.64	151	309	P	H
		5682.4	51.27	-40.94	92.21	39.97	32.14	8.83	29.67	151	309	P	H
		5712.8	51.54	-57.25	108.79	40.21	32.19	8.82	29.68	151	309	P	H
		5722.8	51.07	-66.11	117.18	39.72	32.21	8.82	29.68	151	309	P	H
	*	5785	108.67	-	-	97.3	32.29	8.8	29.72	151	309	P	H
	*	5785	101.4	-	-	90.03	32.29	8.8	29.72	151	309	A	H
		5851	51	-68.92	119.92	39.51	32.38	8.85	29.74	151	309	P	H
		5859.8	52.11	-57.34	109.45	40.6	32.41	8.85	29.75	151	309	P	H
		5915.4	52.04	-23.24	75.28	40.42	32.48	8.91	29.77	151	309	P	H
		5931.6	52.52	-15.68	68.2	40.88	32.5	8.91	29.77	151	309	P	H
													H
													H
		5622	51.03	-17.17	68.2	39.75	32.07	8.85	29.64	108	340	P	V
		5663.6	51.17	-27.13	78.3	39.88	32.12	8.83	29.66	108	340	P	V
		5704.2	52.69	-53.69	106.38	41.35	32.19	8.82	29.67	108	340	P	V
		5724	50.95	-68.97	119.92	39.6	32.21	8.82	29.68	108	340	P	V
	*	5785	106.38	-	-	95.01	32.29	8.8	29.72	108	340	P	V
	*	5785	98.88	-	-	87.51	32.29	8.8	29.72	108	340	A	V
		5853	50.63	-64.73	115.36	39.14	32.38	8.85	29.74	108	340	P	V
		5865.2	51.43	-56.51	107.94	39.9	32.41	8.87	29.75	108	340	P	V
		5884.8	51.3	-46.62	97.92	39.75	32.43	8.88	29.76	108	340	P	V
		5931.2	50.91	-17.29	68.2	39.27	32.5	8.91	29.77	108	340	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 )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
<b>802.11a CH 161 5805MHz</b>	*	5805	108.12	-	-	96.71	32.33	8.8	29.72	154	309	P	H
	*	5805	100.97	-	-	89.56	32.33	8.8	29.72	154	309	A	H
		5854	52.48	-60.6	113.08	40.96	32.41	8.85	29.74	154	309	P	H
		5868	51.97	-55.19	107.16	40.44	32.41	8.87	29.75	154	309	P	H
		5885.4	52.63	-44.85	97.48	41.08	32.43	8.88	29.76	154	309	P	H
		5934.8	50.76	-17.44	68.2	39.11	32.5	8.93	29.78	154	309	P	H
													H
													H
	*	5805	105.26	-	-	93.85	32.33	8.8	29.72	104	352	P	V
	*	5805	97.75	-	-	86.34	32.33	8.8	29.72	104	352	A	V
		5854.2	52.18	-60.44	112.62	40.66	32.41	8.85	29.74	104	352	P	V
		5862.6	51.11	-57.56	108.67	39.58	32.41	8.87	29.75	104	352	P	V
		5916.2	52.06	-22.63	74.69	40.44	32.48	8.91	29.77	104	352	P	V
		5949.2	50.4	-17.8	68.2	38.72	32.53	8.93	29.78	104	352	P	V
													V
													V
													V
													V
<b>Remark</b>	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 )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11a CH 149 5745MHz		11490	58.68	-15.32	74	67.61	39.92	12.75	61.6	145	359	P	H
		11490	47.79	-6.21	54	56.72	39.92	12.75	61.6	145	359	A	H
		17235	48.21	-19.99	68.2	48.05	40.84	15.11	55.79	100	0	P	H
													H
		11490	56.06	-17.94	74	64.99	39.92	12.75	61.6	202	33	P	V
		11490	46.42	-7.58	54	55.35	39.92	12.75	61.6	202	33	A	V
		17235	48.44	-19.76	68.2	48.28	40.84	15.11	55.79	100	0	P	V
													V
802.11a CH 157 5785MHz		11570	57.88	-16.12	74	67.08	39.76	12.79	61.75	147	354	P	H
		11570	47.8	-6.2	54	57	39.76	12.79	61.75	147	354	A	H
		17355	48.42	-19.78	68.2	47.54	41.26	15.15	55.53	100	0	P	H
													H
		11570	57.51	-16.49	74	66.71	39.76	12.79	61.75	200	33	P	V
		11570	47.57	-6.43	54	56.77	39.76	12.79	61.75	200	33	A	V
		17355	48.44	-19.76	68.2	47.56	41.26	15.15	55.53	100	0	P	V
													V
802.11a CH 161 5805MHz		11610	57.43	-16.57	74	66.77	39.69	12.8	61.83	151	354	P	H
		11610	47.64	-6.36	54	56.98	39.69	12.8	61.83	151	354	A	H
		17415	48.59	-19.61	68.2	47.29	41.5	15.18	55.38	100	0	P	H
													H
		11610	57.35	-16.65	74	66.69	39.69	12.8	61.83	207	18	P	V
		11610	47.32	-6.68	54	56.66	39.69	12.8	61.83	207	18	A	V
		17415	48.11	-20.09	68.2	46.81	41.5	15.18	55.38	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 )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11n HT40 CH 151 5755MHz		5626.4	51.86	-16.34	68.2	40.58	32.07	8.85	29.64	153	310	P	H
		5699.6	57.21	-47.7	104.91	45.89	32.17	8.82	29.67	153	310	P	H
		5719.6	60.56	-50.13	110.69	49.21	32.21	8.82	29.68	153	310	P	H
		5724.8	63.59	-58.15	121.74	52.24	32.21	8.82	29.68	153	310	P	H
	*	5755	104.11	-	-	92.73	32.26	8.81	29.69	153	310	P	H
	*	5755	97.14	-	-	85.76	32.26	8.81	29.69	153	310	A	H
		5850.2	52.31	-69.43	121.74	40.82	32.38	8.85	29.74	153	310	P	H
		5861.2	51.1	-57.96	109.06	39.59	32.41	8.85	29.75	153	310	P	H
		5897.8	51.49	-36.8	88.29	39.89	32.46	8.9	29.76	153	310	P	H
		5927.6	50.5	-17.7	68.2	38.86	32.5	8.91	29.77	153	310	P	H
													H
													H
		5628.2	51.49	-16.71	68.2	40.22	32.07	8.84	29.64	100	352	P	V
		5684.2	51.66	-41.88	93.54	40.33	32.17	8.83	29.67	100	352	P	V
		5719.6	58.64	-52.05	110.69	47.29	32.21	8.82	29.68	100	352	P	V
		5724	61.5	-58.42	119.92	50.15	32.21	8.82	29.68	100	352	P	V
	*	5755	101.8	-	-	90.42	32.26	8.81	29.69	100	352	P	V
	*	5755	94.14	-	-	82.76	32.26	8.81	29.69	100	352	A	V
		5851.2	51.06	-68.4	119.46	39.57	32.38	8.85	29.74	100	352	P	V
		5856.8	51.82	-58.48	110.3	40.3	32.41	8.85	29.74	100	352	P	V
		5910	51.23	-28.04	79.27	39.62	32.48	8.9	29.77	100	352	P	V
		5936.6	51.12	-17.08	68.2	39.47	32.5	8.93	29.78	100	352	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 )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11n HT40 CH 159 5795MHz		5647.6	51.27	-16.93	68.2	39.99	32.09	8.84	29.65	152	309	P	H
		5693.4	50.75	-49.58	100.33	39.42	32.17	8.83	29.67	152	309	P	H
		5718.6	56.65	-53.76	110.41	45.3	32.21	8.82	29.68	152	309	P	H
		5721	56.7	-56.38	113.08	45.35	32.21	8.82	29.68	152	309	P	H
	*	5795	104.3	-	-	92.91	32.31	8.8	29.72	152	309	P	H
	*	5795	96.98	-	-	85.59	32.31	8.8	29.72	152	309	A	H
		5851.8	57.35	-60.75	118.1	45.86	32.38	8.85	29.74	152	309	P	H
		5865.6	54.76	-53.07	107.83	43.23	32.41	8.87	29.75	152	309	P	H
		5885.8	52.36	-44.82	97.18	40.81	32.43	8.88	29.76	152	309	P	H
		5946	50.59	-17.61	68.2	38.91	32.53	8.93	29.78	152	309	P	H
													H
													H
		5647.6	52	-16.2	68.2	40.72	32.09	8.84	29.65	100	341	P	V
		5686	52.29	-42.58	94.87	40.96	32.17	8.83	29.67	100	341	P	V
		5712.6	51.93	-56.8	108.73	40.6	32.19	8.82	29.68	100	341	P	V
		5724.2	51.59	-68.79	120.38	40.24	32.21	8.82	29.68	100	341	P	V
	*	5795	100.18	-	-	88.79	32.31	8.8	29.72	100	341	P	V
	*	5795	93.44	-	-	82.05	32.31	8.8	29.72	100	341	A	V
		5852.2	53.74	-63.44	117.18	42.25	32.38	8.85	29.74	100	341	P	V
		5855.8	52.54	-58.04	110.58	41.02	32.41	8.85	29.74	100	341	P	V
		5879.8	52.16	-49.47	101.63	40.6	32.43	8.88	29.75	100	341	P	V
		5932.8	51.69	-16.51	68.2	40.05	32.5	8.91	29.77	100	341	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 )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ac VHT80 CH 155 5775MHz		5631.6	51.49	-16.71	68.2	40.23	32.07	8.84	29.65	215	355	P	H
		5699.4	57.09	-47.67	104.76	45.76	32.17	8.83	29.67	215	355	P	H
		5719.8	61.61	-49.13	110.74	50.26	32.21	8.82	29.68	215	355	P	H
		5720.6	62.61	-49.56	112.17	51.26	32.21	8.82	29.68	215	355	P	H
	*	5775	101.32	-	-	89.94	32.29	8.8	29.71	215	355	P	H
	*	5775	94.49	-	-	83.11	32.29	8.8	29.71	215	355	A	H
		5853.8	60.88	-52.66	113.54	49.36	32.41	8.85	29.74	215	355	P	H
		5861.4	59.35	-49.66	109.01	47.82	32.41	8.87	29.75	215	355	P	H
		5877	55.83	-47.88	103.71	44.28	32.43	8.87	29.75	215	355	P	H
		5934	50.86	-17.34	68.2	39.2	32.5	8.93	29.77	215	355	P	H
													H
													H
		5625.8	51.79	-16.41	68.2	40.51	32.07	8.85	29.64	102	350	P	V
		5699.2	55.11	-49.5	104.61	43.78	32.17	8.83	29.67	102	350	P	V
		5720	58.65	-52.15	110.8	47.3	32.21	8.82	29.68	102	350	P	V
		5720.6	59.59	-52.58	112.17	48.24	32.21	8.82	29.68	102	350	P	V
	*	5775	97.57	-	-	86.19	32.29	8.8	29.71	102	350	P	V
	*	5775	90.29	-	-	78.91	32.29	8.8	29.71	102	350	A	V
		5850.4	56.88	-64.41	121.29	45.39	32.38	8.85	29.74	102	350	P	V
		5862.2	55.39	-53.39	108.78	43.86	32.41	8.87	29.75	102	350	P	V
		5881	52.49	-48.25	100.74	40.93	32.43	8.88	29.75	102	350	P	V
		5932	51.04	-17.16	68.2	39.4	32.5	8.91	29.77	102	350	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	Path	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		30.81	22.47	-17.53	40	30.06	23.96	0.79	32.34	-	-	P	H
		48.9	22.03	-17.97	40	38.06	15.3	0.99	32.32	-	-	P	H
		100.47	23.93	-19.57	43.5	38.63	16.23	1.36	32.29	-	-	P	H
		770.4	30.7	-15.3	46	31.25	28.2	3.29	32.04	-	-	P	H
		895.7	31.96	-14.04	46	30.92	29.02	3.55	31.53	-	-	P	H
		953.8	33.42	-12.58	46	29.92	30.81	3.71	31.02	100	0	P	H
													H
													H
													H
													H
													H
													H
		30	35.11	-4.89	40	42.27	24.39	0.79	32.34	-	-	P	V
		49.17	35.52	-4.48	40	51.94	14.91	0.99	32.32	100	0	P	V
		60.51	26.58	-13.42	40	45.79	12.06	1.04	32.31	-	-	P	V
		763.4	30.22	-15.78	46	30.85	28.14	3.29	32.06	-	-	P	V
		865.6	32.36	-13.64	46	31.44	29.08	3.51	31.67	-	-	P	V
		956.6	34.16	-11.84	46	30.48	30.96	3.71	30.99	-	-	P	V
													V
													V
												V	
												V	
												V	
												V	
												V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

**Note symbol**

*	<b>Fundamental Frequency</b> which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is <b>over limit</b> line.
P/A	<b>P</b> eak or <b>A</b> verage
H/V	<b>H</b> orizontal or <b>V</b> ertical

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

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	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

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

**For Peak Limit @ 2390MHz:**

1. Level(dBμV/m)  
= Antenna Factor(dB/m) + Path 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) + Path 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

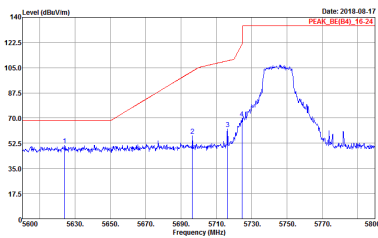
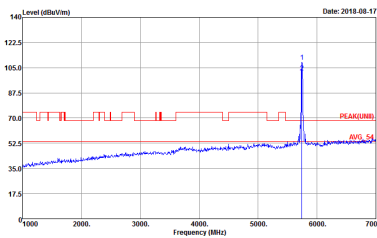
Test Engineer :	Fu Chen, Alex Jheng, and Wilson Wu	Temperature :	24~26°C
		Relative Humidity :	48~51%

Note symbol

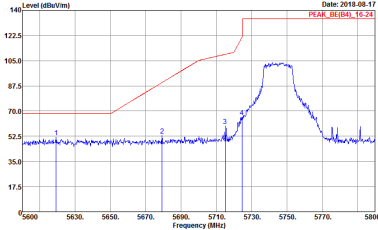
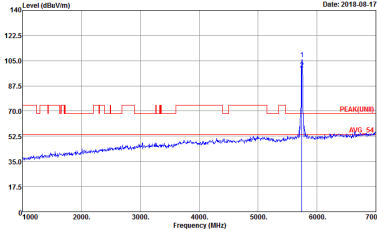
-L	Low channel location
-R	High channel location

### Band 4 - 5725~5850MHz

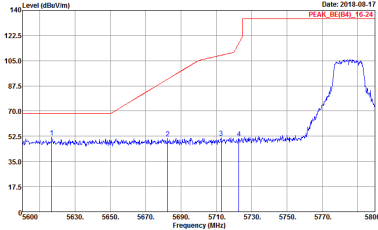
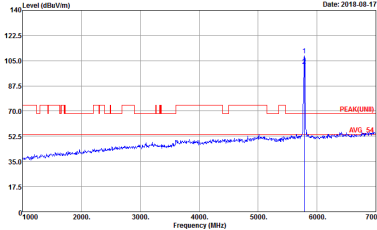
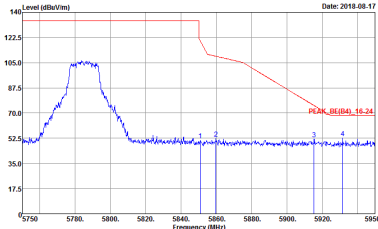
#### WIFI 802.11a (Band Edge @ 3m)

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH149 5745MHz	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH13-4HY Condition : PEAK_BE(84)_16-24 3m HORN_91200_1241 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : 880207 Mode : 35</p>	 <p>Site : 03CH13-4HY Condition : PEAK(UNII) 3m HORN_91200_1241 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : 880207 Mode : 35</p>



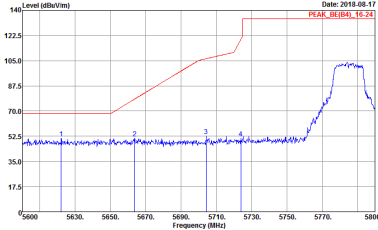
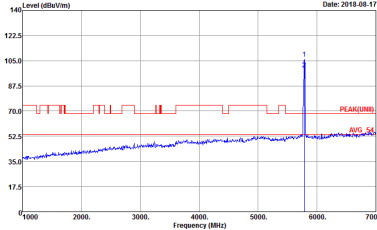
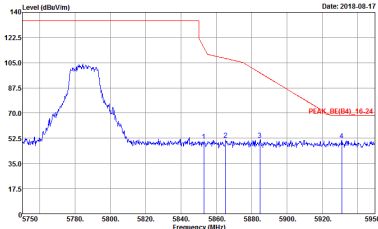
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH149 5745MHz	
1	Vertical	Fundamental
Peak	<div><p>Site : 03CH13-4M Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1241 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 880207 Mode : 35</p></div>	<div><p>Site : 03CH13-4M Condition : PEAK(UNIT) 3m HORN_91200_1241 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 880207 Mode : 35</p></div>



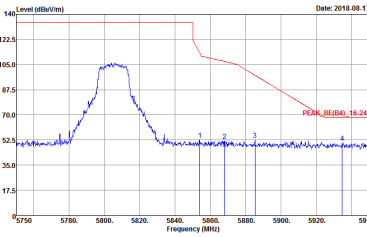
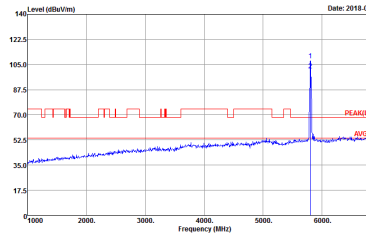
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
1	Horizontal	Fundamental
Peak	<div><p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 880207 Mode : 36</p></div>	<div><p>Site : 03CH13-HY Condition : PEAK(UNIT) 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 880207 Mode : 36</p></div>
	<div><p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 880207 Mode : 36</p></div>	Left blank



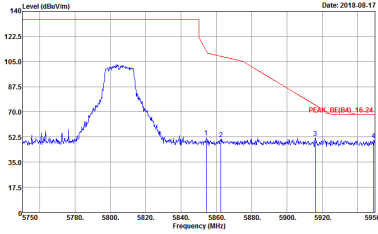
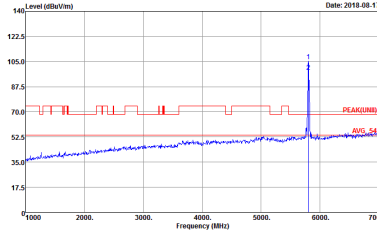


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
1	Vertical	Fundamental
Peak	<div><p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1241 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 880207 Mode : 36</p></div>	<div><p>Site : 03CH13-HY Condition : PEAK(B4)_16-24 3m HORN_91200_1241 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 880207 Mode : 36</p></div>
	<div><p>Site : 03CH13-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1241 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 880207 Mode : 36</p></div>	Left blank

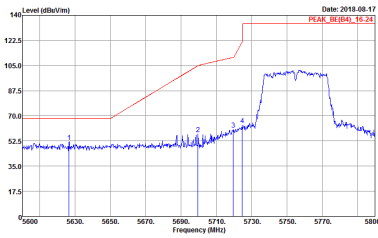
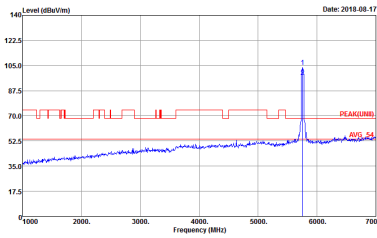
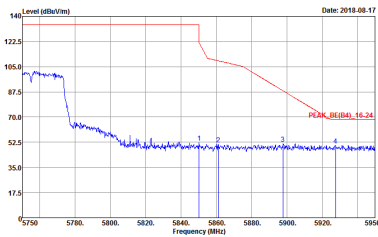


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH161 5805MHz	
1	Horizontal	Fundamental
Peak	<div><p>Site : 03CH13-4Y Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 880207 Mode : 37</p></div>	<div><p>Site : 03CH13-4Y Condition : PEAK(UNII) 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 880207 Mode : 37</p></div>

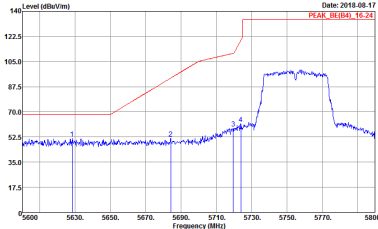
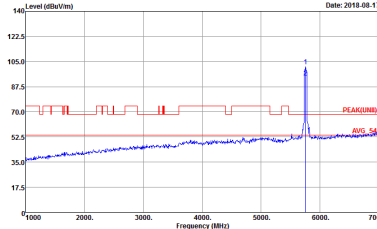
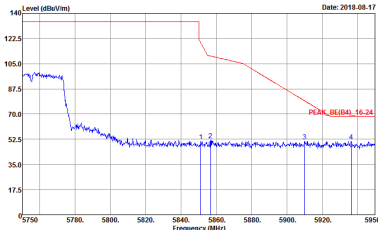


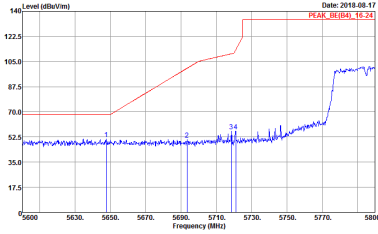
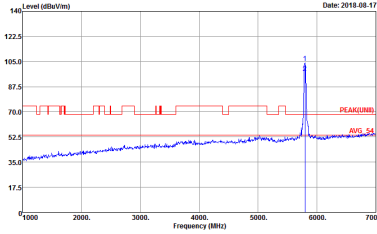
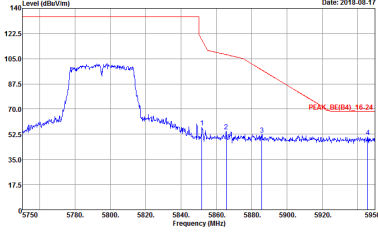
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH161 5805MHz	
1	Vertical	Fundamental
Peak	<div><p>Site : 03CH13-4Y Condition : PEAK_BE(84)_16-24 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 880207 Mode : 37</p></div>	<div><p>Site : 03CH13-4Y Condition : PEAK(UNII) 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 880207 Mode : 37</p></div>

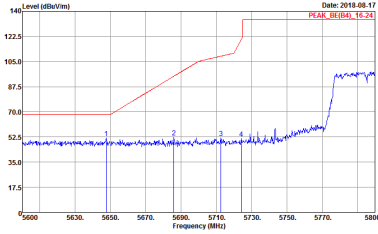
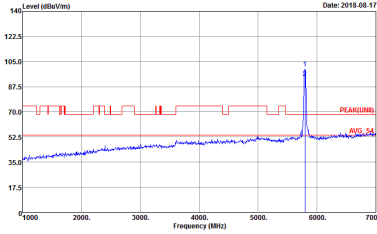
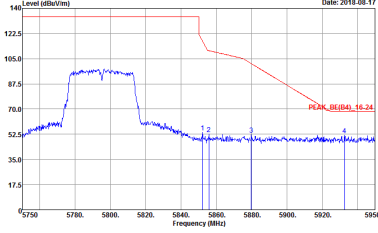
**Band 4 5725~5850MHz**  
**WIFI 802.11n HT40 (Band Edge @ 3m)**

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH151 5755MHz	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH13-HY  Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1241 HORIZONTAL  RBW:1000.000KHz VBW:3000.000KHz SWT:Auto  Detector : Peak  Project : 880207  Mode : 41</p>	 <p>Site : 03CH13-HY  Condition : PEAK(B4)_16-24 3m HORN_91200_1241 HORIZONTAL  RBW:1000.000KHz VBW:3000.000KHz SWT:Auto  Detector : Peak  Project : 880207  Mode : 41</p>
	 <p>Site : 03CH13-HY  Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1241 HORIZONTAL  RBW:1000.000KHz VBW:3000.000KHz SWT:Auto  Detector : Peak  Project : 880207  Mode : 41</p>	Left blank

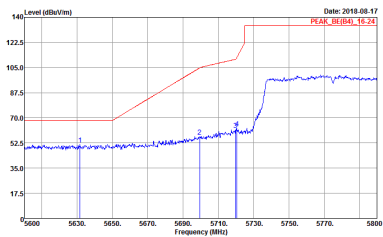
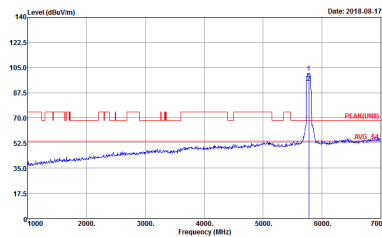
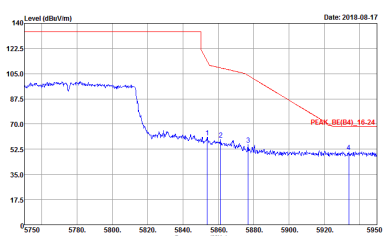


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH151 5755MHz	
1	Vertical	Fundamental
Peak	<div><p>Site : 03CH13-4Y Condition : PEAK_BE(84)_16-24 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 880207 Mode : 41</p></div>	<div><p>Site : 03CH13-4Y Condition : PEAK(UNIT) 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 880207 Mode : 41</p></div>
	<div><p>Site : 03CH13-4Y Condition : PEAK_BE(84)_16-24 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 880207 Mode : 41</p></div>	Left blank

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH159 5795MHz	
1	Horizontal	Fundamental
Peak	 <p>           Date: 2018.08.17            PEAK_8E(84)_16-24            Site : 03CH13-4HY            Condition : PEAK_8E(84)_16-24 3m HORN_91200_1241 HORIZONTAL            RBW:1000.000KHz VBW:3000.000KHz SWT:Auto            Detector : Peak            Project : 880207            Mode : 42         </p>	 <p>           Date: 2018.08.17            PEAK_8E(84)_16-24            Site : 03CH13-4HY            Condition : PEAK(UNIT) 3m HORN_91200_1241 HORIZONTAL            RBW:1000.000KHz VBW:3000.000KHz SWT:Auto            Detector : Peak            Project : 880207            Mode : 42         </p>
	 <p>           Date: 2018.08.17            PEAK_8E(84)_16-24            Site : 03CH13-4HY            Condition : PEAK_8E(84)_16-24 3m HORN_91200_1241 HORIZONTAL            RBW:1000.000KHz VBW:3000.000KHz SWT:Auto            Detector : Peak            Project : 880207            Mode : 42         </p>	Left blank

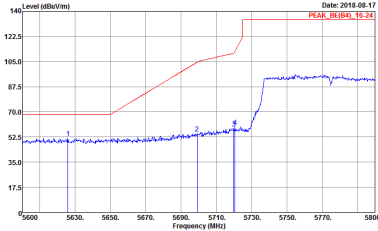
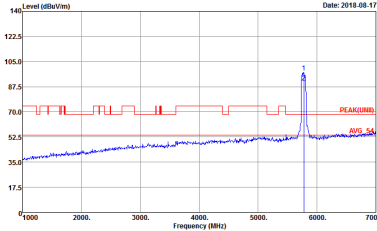
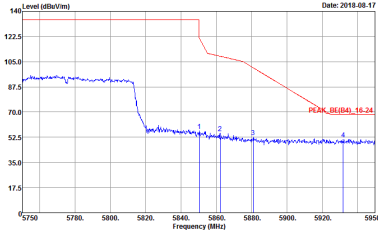
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH159 5795MHz	
1	Vertical	Fundamental
Peak	 <p>           Date: 2018.08.17            PEAK_8E(84)_16-24            Site : 03CH13-4HY            Condition : PEAK_8E(84)_16-24 3m HORN_91200_1241 VERTICAL            RBW:1000.000KHz VBW:3000.000KHz SWT:Auto            Detector : Peak            Project : 880207            Mode : 42         </p>	 <p>           Date: 2018.08.17            PEAK_8E(84)_16-24            Site : 03CH13-4HY            Condition : PEAK(UNIT) 3m HORN_91200_1241 VERTICAL            RBW:1000.000KHz VBW:3000.000KHz SWT:Auto            Detector : Peak            Project : 880207            Mode : 42         </p>
	 <p>           Date: 2018.08.17            PEAK_8E(84)_16-24            Site : 03CH13-4HY            Condition : PEAK_8E(84)_16-24 3m HORN_91200_1241 VERTICAL            RBW:1000.000KHz VBW:3000.000KHz SWT:Auto            Detector : Peak            Project : 880207            Mode : 42         </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	Horizontal	Fundamental
<b>Peak</b>	 <p>Site : 03CH13-HY  Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1241 HORIZONTAL  RBW:1000.000KHz VBW:3000.000KHz SWT:Auto  Detector : Peak  Project : 880207  Mode : 43</p>	 <p>Site : 03CH13-HY  Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1241 HORIZONTAL  RBW:1000.000KHz VBW:3000.000KHz SWT:Auto  Detector : Peak  Project : 880207  Mode : 43</p>
	 <p>Site : 03CH13-HY  Condition : PEAK_BE(B4)_16-24 3m HORN_91200_1241 HORIZONTAL  RBW:1000.000KHz VBW:3000.000KHz SWT:Auto  Detector : Peak  Project : 880207  Mode : 43</p>	<b>Left blank</b>



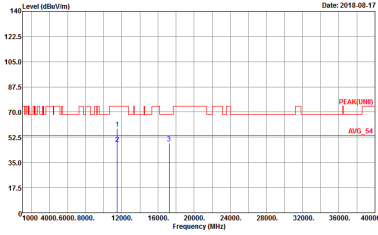
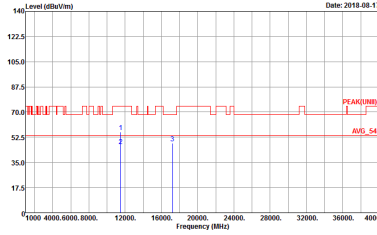


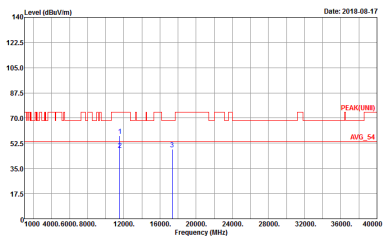
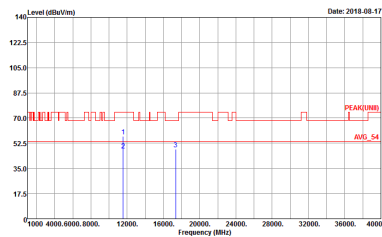
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH155 5775MHz	
1	Vertical	Fundamental
Peak	<div><p>Site : 03CH13-4HY Condition : PEAK_8E(84)_16-24 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 880207 Mode : 43</p></div>	<div><p>Site : 03CH13-4HY Condition : PEAK(UNIT) 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 880207 Mode : 43</p></div>
	<div><p>Site : 03CH13-4HY Condition : PEAK_8E(84)_16-24 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 880207 Mode : 43</p></div>	Left blank



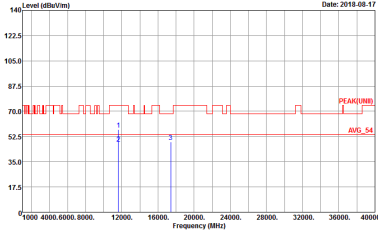
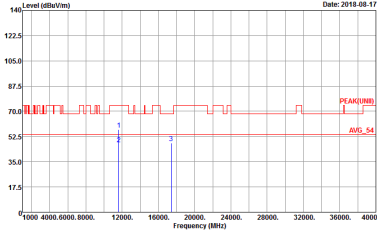
Band 4 - 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

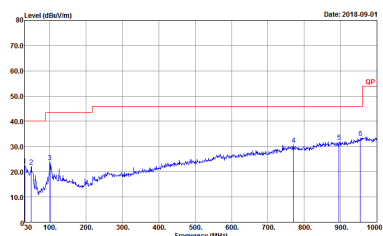
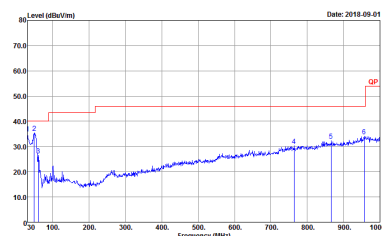
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH149 5745MHz	
1	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH13-HY Condition : PEAK(UNIT) 3m SHF_HORN_576 HORIZONTAL Detector : Peak Project : 880207 Mode : 35</p>	 <p>Site : 03CH13-HY Condition : PEAK(UNIT) 3m SHF_HORN_576 VERTICAL Detector : Peak Project : 880207 Mode : 35</p>

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH157 5785MHz	
1	Horizontal	Vertical
<b>Peak Avg.</b>	 <p>Site : 03CH13-11Y Condition : PEAK(UNII) 3m SHF_HORN_576 HORIZONTAL Detector : Peak Project : 880207 Mode : 36</p>	 <p>Site : 03CH13-11Y Condition : PEAK(UNII) 3m SHF_HORN_576 VERTICAL Detector : Peak Project : 880207 Mode : 36</p>



WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH161 5805MHz	
1	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH13-4V Condition : PEAK(UNIT) 3m SHF_HORN_576 HORIZONTAL Detector : Peak Project : 880207 Mode : 37</p>	 <p>Site : 03CH13-4V Condition : PEAK(UNIT) 3m SHF_HORN_576 VERTICAL Detector : Peak Project : 880207 Mode : 37</p>

**Emission below 1GHz**
**5GHz WIFI 802.11a (LF)**

WIFI	5GHz 5725~5850MHz	
ANT	802.11a LF	
1	Horizontal	Vertical
<b>QP / Peak</b>	 <p>           Site : 03CH13-HY            Condition : QP 3m 81LO6_40103 HORIZONTAL            Detector : Peak            Project : 880207            Mode : 44         </p>	 <p>           Site : 03CH13-HY            Condition : QP 3m 81LO6_40103 VERTICAL            Detector : Peak            Project : 880207            Mode : 44         </p>



## Appendix E. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
802.11a	94.52	2070.00	0.48	1kHz	0.24
5GHz 802.11n HT20	94.15	1930.00	0.52	1kHz	0.26
5GHz 802.11n HT40	90.29	948.00	1.05	3kHz	0.44
5GHz 802.11ac VHT20	94.17	1940.00	0.52	1kHz	0.26
5GHz 802.11ac VHT40	90.29	948.00	1.05	3kHz	0.44
5GHz 802.11ac VHT80	81.12	464.00	2.16	3kHz	0.91



## 802.11n HT20

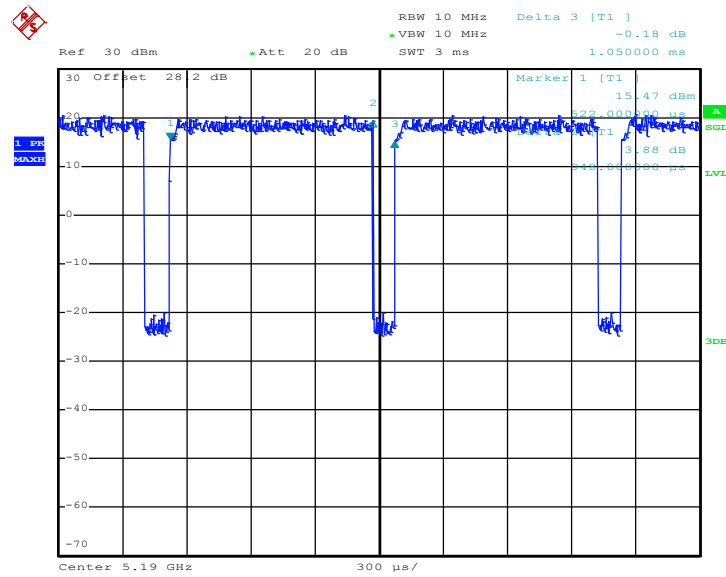




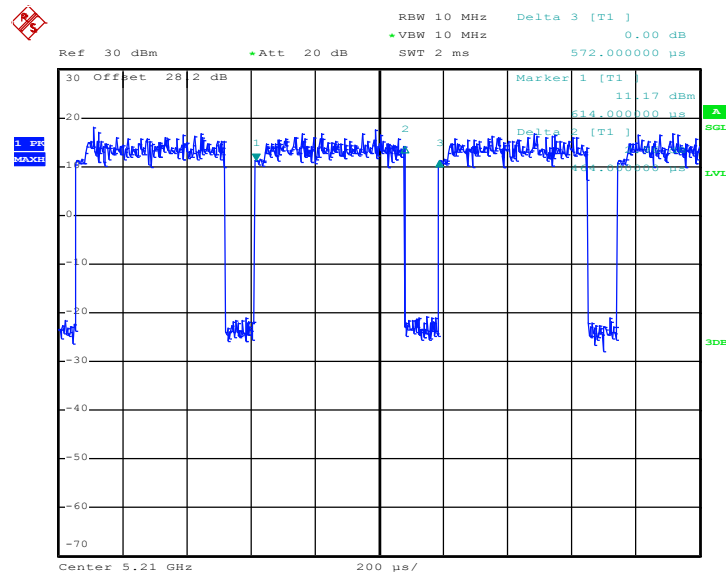
## 802.11ac VHT20





**802.11ac VHT40**


Date: 9.AUG.2018 14:25:52

**802.11ac VHT80**


Date: 9.AUG.2018 14:41:45