# FCC RADIO TEST REPORT

| | | |
|---|---|---|
| **FCC ID** | : | **P4Q-N536A** |
| **Equipment** | : | **Tablet** |
| **Brand Name** | : | **Mitac, Magellan** |
| **Model Name** | : | **N536A** |
| **Applicant** | : | **MiTAC Digital Technology Corporation<br>No.200, Wen Hua 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)** |
| **Manufacturer** | : | **MITAC COMPUTER (KUSHAN) CO. LTD<br>No. 269, 2nd Rd, Export Processing Zone Changjiang South Road Kushan, Jiangsu China** |
| **Standard** | : | **FCC Part 15 Subpart E §15.407** |

**The product was received on Mar. 23, 2018 and testing was started from Apr. 24, 2018 and completed on Jul. 15, 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 variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.**

Jones Tsai

**Approved by: Jones Tsai**

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

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

# Table of Contents

**History of this test report** ..... **3**
**Summary of Test Result** ..... **4**
**1 General Description** ..... **5**
1.1 Product Feature of Equipment Under Test ..... 5
1.2 Modification of EUT ..... 5
1.3 Testing Location ..... 6
1.4 Applicable Standards ..... 6
**2 Test Configuration of Equipment Under Test** ..... **7**
2.1 Carrier Frequency and Channel ..... 7
2.2 Test Mode ..... 8
2.3 Connection Diagram of Test System ..... 9
2.4 Support Unit used in test configuration and system ..... 9
2.5 EUT Operation Test Setup ..... 9
**3 Test Result** ..... **10**
3.1 Maximum Conducted Output Power Measurement ..... 10
3.2 Unwanted Emissions Measurement ..... 12
3.3 AC Conducted Emission Measurement ..... 17
3.4 Automatically Discontinue Transmission ..... 19
3.5 Antenna Requirements ..... 20
**4 List of Measuring Equipment** ..... **21**
**5 Uncertainty of Evaluation** ..... **23**
**Appendix A. Conducted Test Results**
**Appendix B. AC Conducted Emission Test Result**
**Appendix C. Radiated Spurious Emission**
**Appendix D. Radiated Spurious Emission Plots**
**Appendix E. Duty Cycle Plots**
**Appendix F. Setup Photographs**

# History of this test report

| Report No. | Version | Description | Issued Date |
|---|---|---|---|
| FR720610-11E | 01 | Initial issue of report | Jul. 30, 2018 |
| FR720610-11E | 02 | Add the power level for WWAN+WLAN SKU applied in WLAN is 3dB lower than WLAN SKU power in appendix A | Aug. 03, 2018 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---|---|---|---|---|
| - | 15.403(i) | 26dB Bandwidth | Not Required | - |
| - | 2.1049 | 99% Occupied Bandwidth | Not Required | - |
| 3.1 | 15.407(a) | Maximum Conducted Output Power | Pass | - |
| - | 15.407(a) | Power Spectral Density | Not Required | - |
| 3.2 | 15.407(b) | Unwanted Emissions | Pass | Under limit 5.06 dB at 5352.240 MHz |
| 3.3 | 15.207 | AC Conducted Emission | Pass | Under limit 4.72 dB at 3.579 MHz |
| 3.4 | 15.407(c) | Automatically Discontinue Transmission | Pass | - |
| 3.5 | 15.203<br>15.407(a) | Antenna Requirement | Pass | - |

**Remark:**

1. Not required means after assessing, test items are not necessary to carry out.
2. This is a variant report which can be referred change list. All the test cases were performed on original report which can be referred to Sporton Report Number FR720610-10E (FCC ID: P4Q-N536B).
3. The WWAN+WLAN SKU(Model name: N536B) refers the WLAN test data from the WLAN SKU(Model name: N536A) according to KDB 484596 D01. We have spot check the WWAN+WLAN SKU for WLAN at the same power level as WLAN SKU, and the result is similar with the result of WLAN SKU. The WWAN+WLAN SKU reduces its WLAN power by 3dB for SAR compliance, we measured the power with 3dB reduction setting for the report purpose.

**Reviewed by: Joseph Lin**

**Report Producer: Nancy Yang**

# 1 General Description

## 1.1 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n, and NFC

| Product Specification subjective to this standard | |
|---|---|
| **Sample 1** | EUT with SKU 5 |
| **Sample 2** | EUT with SKU 6 |
| **Sample 3** | EUT with SKU 7 |
| **Integrated WLAN Module** | Brand Name: Qualcomm<br>Model Name: WCN3660B |
| **Antenna Type** | WLAN: Holder with FPC Antenna<br>Bluetooth: Holder with FPC Antenna<br>NFC : Loop Antenna |

**Remark:** All the tests were performed with Sample 1.

**<Sample Information>**

| Sample List | | | |
|---|---|---|---|
| **SKU** | **SKU 5** | **SKU 6** | **SKU 7** |
| **Model name** | N536A | N536A | N536A |
| **WLAN** | Support | Support | Support |
| **WWAN** | Not Support | Not Support | Not Support |
| **RFID(13.56MHz)** | Support | Not Support | Support |
| **Barcode** | Support(MR) | Not Support | Support(SR) |
| **GPS** | Not Support | Not Support | Not Support |

## 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.,<br>Taoyuan City, Taiwan (R.O.C.)<br>TEL: +886-3-327-3456<br>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.,<br>Taoyuan City, Taiwan (R.O.C.)<br>TEL: +886-3-327-0868<br>FAX: +886-3-327-0855 |
| **Test Site No.** | **Sporton Site No.** |
| | 03CH12-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.
- 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 (Z 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) |
|---|---|---|---|---|
| 5150-5250 MHz Band 1 (U-NII-1) | 36 | 5180 | 44 | 5220 |
| | 38* | 5190 | 46* | 5230 |
| | 40 | 5200 | 48 | 5240 |
| | - | - | | |

| Frequency Band | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---|---|---|---|---|
| 5250-5350 MHz Band 2 (U-NII-2A) | 52 | 5260 | 60 | 5300 |
| | 54* | 5270 | 62* | 5310 |
| | 56 | 5280 | 64 | 5320 |
| | - | - | | |

| Frequency Band | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---|---|---|---|---|
| 5470-5725 MHz Band 3 (U-NII-2C) | 100 | 5500 | 112 | 5560 |
| | 102* | 5510 | 116 | 5580 |
| | 104 | 5520 | 132 | 5660 |
| | - | - | 134* | 5670 |
| | 108 | 5540 | 136 | 5680 |
| | 110* | 5550 | 140 | 5700 |

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

## 2.2 Test Mode

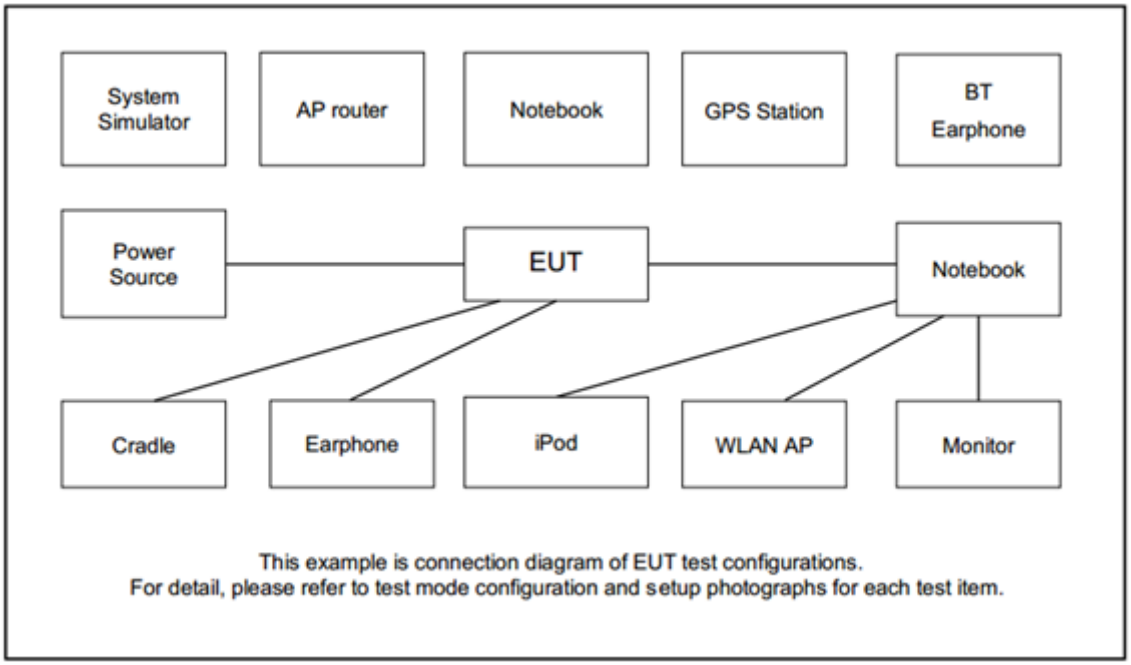
**Final test modes are considering the modulation and worse data rates as below table.**

| Modulation | Data Rate |
|---|---|
| 802.11a | 6 Mbps |

| Test Cases | |
|---|---|
| AC Conducted Emission | Mode 1 : Bluetooth Link + WLAN (5GHz) Link + NFC Link + Earphone + USB Cable (Charging from AC Adapter) |

| Ch. # | | Band II：5250-5350 MHz |
|---|---|---|
| | | 802.11a |
| L | Low | - |
| M | Middle | 60 |
| H | High | - |

## 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. | Bluetooth Earphone | Sony Ericsson | MW600 | PY7DDA-2029 | N/A | N/A |
| 2. | WLAN AP | ASUS | RT-AC66U | MSQ-RTAC66U | N/A | Unshielded,1.8m |
| 3. | iPod Earphone | Apple | N/A | Verification | Unshielded, 1.0 m | N/A |
| 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, utility “QRCT” was installed in Notebook which was programmed in order to 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.

# 3 Test Result

## 3.1 Maximum Conducted Output Power Measurement

### 3.1.1 Limit of Maximum Conducted Output Power

**<FCC 14-30 CFR 15.407>**

**For the 5.15–5.25 GHz bands:**

- For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW. For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

**For the 5.25–5.725 GHz bands:**

- The maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz.

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

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

### 3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

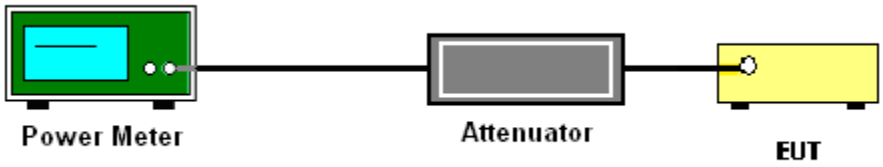
### 3.1.3 Test Procedures

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.

### 3.1.4 Test Setup




### 3.1.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

## 3.2 Unwanted Emissions Measurement

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

### 3.2.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5250-5350 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band must meet all applicable technical requirements for operation in the 5150-5250 MHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5150-5250 MHz band.

(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.

$$E=\frac{1000000\sqrt{30P}}{3}$$ μV/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.[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).

### 3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

### 3.2.3 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 ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

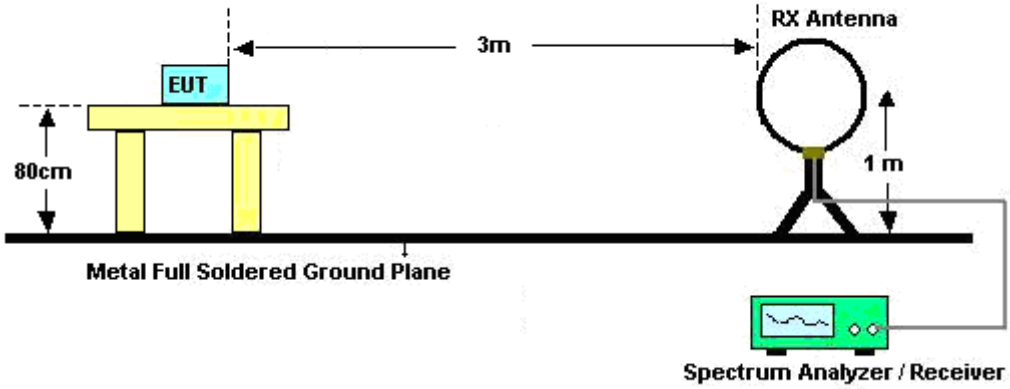
(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

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

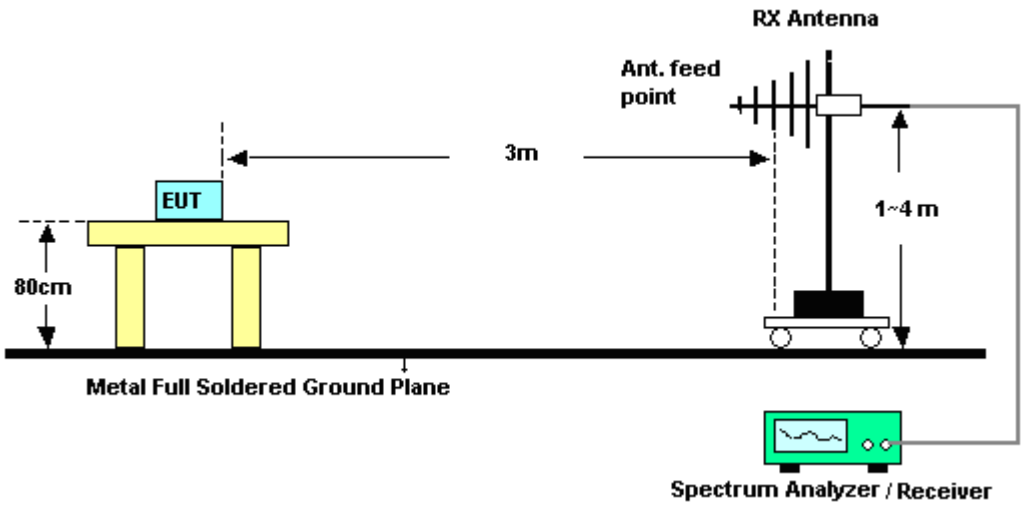
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband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

### 3.2.4 Test Setup

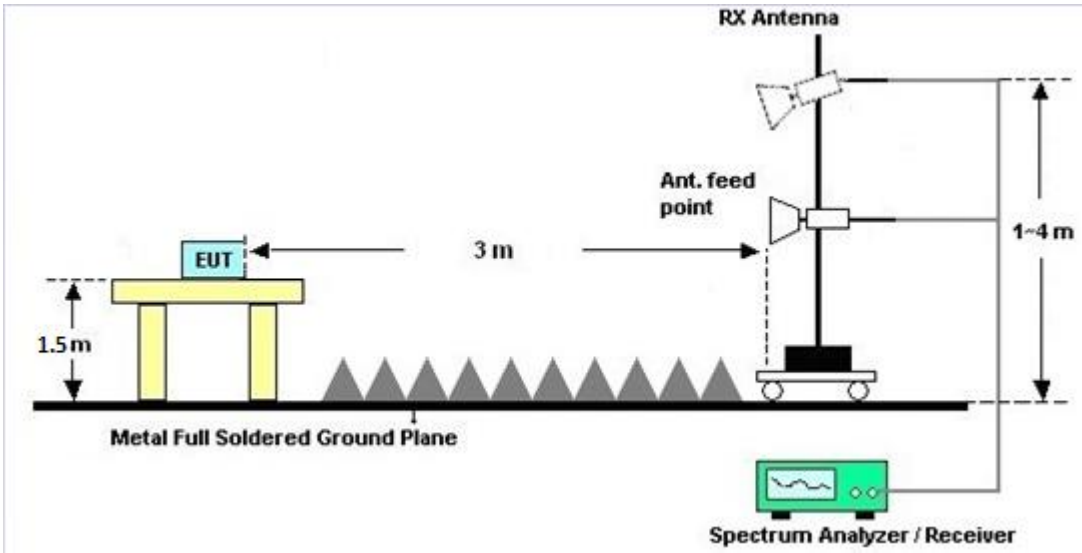
**For radiated emissions below 30MHz**




**For radiated emissions from 30MHz to 1GHz**



**For radiated emissions above 1GHz**




### 3.2.5 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.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

### 3.2.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C and D.

### 3.2.7 Duty Cycle

Please refer to Appendix E.

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

Please refer to Appendix C and D.

## 3.3 AC Conducted Emission Measurement

### 3.3.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

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

*Decreases with the logarithm of the frequency.

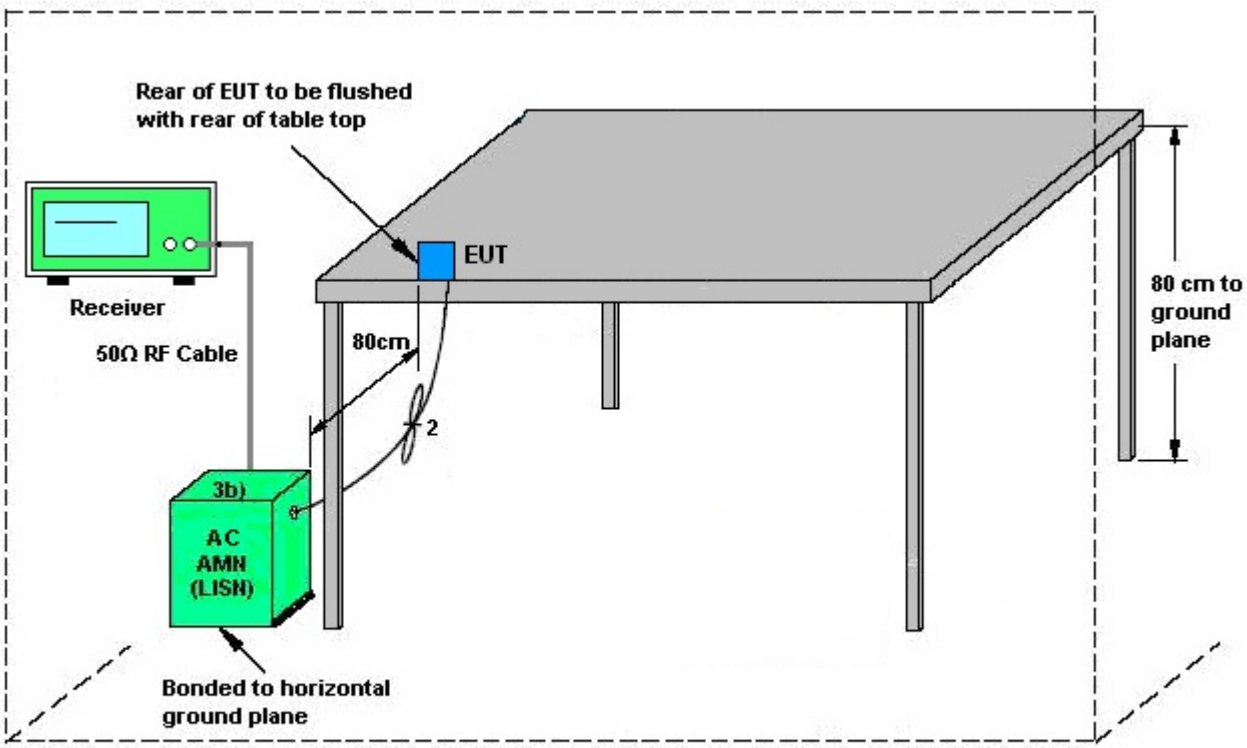
### 3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

### 3.3.3 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.

### 3.3.4 Test Setup




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

### 3.3.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

## 3.4 Automatically Discontinue Transmission

### 3.4.1 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.

### 3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

### 3.4.3 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.

## 3.5 Antenna Requirements

### 3.5.1 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.

### 3.5.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

### 3.5.3 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 | 1218006 | N/A | Oct. 06, 2017 | Apr. 28, 2018 ~ Jun. 06, 2018 | Oct. 05, 2018 | Conducted (TH05-HY) |
| Power Sensor | Anritsu | MA2411B | 1207363 | 300MHz~40GHz | Oct. 06, 2017 | Apr. 28, 2018 ~ Jun. 06, 2018 | Oct. 05, 2018 | Conducted (TH05-HY) |
| Spectrum Analyzer | Rohde & Schwarz | FSP40 | 100057 | 9kHz-40GHz | Nov. 21, 2017 | Apr. 28, 2018 ~ Jun. 06, 2018 | Nov. 20, 2018 | Conducted (TH05-HY) |
| Switch Box & RF Cable | Burgeon | ETF-058 | EC1300484 | N/A | Mar. 01, 2018 | Apr. 28, 2018 ~ Jun. 06, 2018 | Feb. 28, 2019 | Conducted (TH05-HY) |
| AC Power Source | ChainTek | APC-1000W | N/A | N/A | N/A | Apr. 24, 2018~ Apr. 25, 2018 | N/A | Conduction (CO05-HY) |
| EMI Test Receiver | Rohde & Schwarz | ESR3 | 102388 | 3.6GHz | Dec. 08, 2017 | Apr. 24, 2018~ Apr. 25, 2018 | Dec. 07, 2018 | Conduction (CO05-HY) |
| LISN | Rohde & Schwarz | ENV216 | 100080 | 9kHz~30MHz | Nov. 30, 2017 | Apr. 24, 2018~ Apr. 25, 2018 | Nov. 29, 2018 | Conduction (CO05-HY) |
| LISN | Rohde & Schwarz | ENV216 | 100081 | 9kHz~30MHz | Dec. 08, 2017 | Apr. 24, 2018~ Apr. 25, 2018 | Dec. 07, 2018 | Conduction (CO05-HY) |
| Software | Rohde & Schwarz | EMC32 V10.30 | N/A | N/A | N/A | Apr. 24, 2018~ Apr. 25, 2018 | N/A | Conduction (CO05-HY) |
| LF Cable | HUBER + SUHNER | RG-214/U | LF01 | N/A | Jan. 03, 2018 | Apr. 24, 2018~ Apr. 25, 2018 | Jan. 02, 2019 | Conduction (CO05-HY) |
| Pulse Limiter | Rohde & Schwarz | ESH3-Z2 | 100851 | N/A | Jan. 03, 2018 | Apr. 24, 2018~ Apr. 25, 2018 | Jan. 02, 2019 | Conduction (CO05-HY) |

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| Amplifier | MITEQ | TTA1840-35-HG | 1871923 | 18GHz~40GHz, VSWR : 2.5:1 max | Jul. 18, 2017 | May 15, 2018 ~ Jul. 15, 2018 | Jul. 17, 2018 | Radiation (03CH12-HY) |
| Spectrum Analyzer | Keysight | N9010A | MY54200485 | 10Hz ~ 44GHz | Oct. 31, 2017 | May 15, 2018 ~ Jul. 15, 2018 | Oct. 30, 2018 | Radiation (03CH12-HY) |
| Bilog Antenna | TESEQ | CBL 6111D&N-6-06 | 35414&AT-N0602 | 30MHz~1GHz | Oct. 14, 2017 | May 15, 2018 ~ Jul. 15, 2018 | Oct. 13, 2018 | Radiation (03CH12-HY) |
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 100488 | 9 kHz~30 MHz | Nov. 23, 2017 | May 15, 2018 ~ Jul. 15, 2018 | Nov. 22, 2018 | Radiation (03CH12-HY) |
| EMI Test Receiver | Rohde & Schwarz | ESU26 | 100390 | 20Hz~26.5GHz | Dec. 25, 2017 | May 15, 2018 ~ Jul. 15, 2018 | Dec. 24, 2018 | Radiation (03CH12-HY) |
| Horn Antenna | SCHWARZBECK | BBHA 9120D | 9120D-1328 | 1GHz ~ 18GHz | Oct. 20, 2017 | May 15, 2018 ~ Jul. 15, 2018 | Oct. 19, 2018 | Radiation (03CH12-HY) |
| Preamplifier | COM-POWER | PA-103 | 161075 | 10MHz~1GHz | Mar. 26, 2018 | May 15, 2018 ~ Jul. 15, 2018 | Mar. 25, 2019 | Radiation (03CH12-HY) |
| Preamplifier | Keysight | 83017A | MY53270148 | 1GHz~26.5GHz | Jan. 15, 2018 | May 15, 2018 ~ Jul. 15, 2018 | Jan. 14, 2019 | Radiation (03CH12-HY) |
| Filter | Wainwright | WLKS1200-12SS | SN2 | 1.2G Low Pass | Jul. 17, 2017 | May 15, 2018 ~ Jul. 15, 2018 | Jul. 16, 2018 | Radiation (03CH12-HY) |
| Filter | Woken | WHKX8-5272.5-6750-18000-40ST | SN2 | 6.75G High pass | Jul. 17, 2017 | May 15, 2018 ~ Jul. 15, 2018 | Jul. 16, 2018 | Radiation (03CH12-HY) |
| Antenna Mast | EMEC | AM-BS-4500-B | N/A | 1m~4m | N/A | May 15, 2018 ~ Jul. 15, 2018 | N/A | Radiation (03CH12-HY) |
| Turn Table | EMEC | TT2000 | N/A | 0~360 Degree | N/A | May 15, 2018 ~ Jul. 15, 2018 | N/A | Radiation (03CH12-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK | BBHA 9170 | BBHA9170584 | 18GHz ~ 40GHz | Nov. 27, 2017 | May 15, 2018 ~ Jul. 15, 2018 | Nov. 26, 2018 | Radiation (03CH12-HY) |
| Preamplifier | Jet-Power | JPA0118-55-303K | 1710001800054002 | 1GHz~18GHz | Apr. 17, 2018 | May 15, 2018 ~ Jul. 15, 2018 | Apr. 16, 2019 | Radiation (03CH12-HY) |
| Software | Audix | E3 6.2009-8-24 | RK-000989 | N/A | N/A | May 15, 2018 ~ Jul. 15, 2018 | N/A | Radiation (03CH12-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 126E | 0058/126E | 30M-18G | Mar. 14, 2018 | May 15, 2018 ~ Jul. 15, 2018 | Mar. 13, 2019 | Radiation (03CH12-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 104 | MY15539/4 | 30M-18G | Mar. 14, 2018 | May 15, 2018 ~ Jul. 15, 2018 | Mar. 13, 2019 | Radiation (03CH12-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 104 | MY36979/4 | 30M-18G | Mar. 14, 2018 | May 15, 2018 ~ Jul. 15, 2018 | Mar. 13, 2019 | Radiation (03CH12-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | 505134/2 | 30M~40GHz | Oct. 17, 2017 | May 15, 2018 ~ Jul. 15, 2018 | Oct. 16, 2018 | Radiation (03CH12-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | 800740/2 | 30M~40GHz | Oct. 17, 2017 | May 15, 2018 ~ Jul. 15, 2018 | Oct. 16, 2018 | Radiation (03CH12-HY) |

# 5 Uncertainty of Evaluation

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

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

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

| | |
|---|---|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 5.10 |

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

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

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

| | |
|---|---|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 4.70 |

# Appendix A. Test Result of Conducted Test Items

<WWAN+WLAN SKU for WLAN at the same power level as WLAN SKU>

| | | | | |
|---|---|---|---|---|
| Test Engineer: | Tommy Lee | Temperature: | 21~25 | °C |
| Test Date: | 2018/4/28~2018/05/11 | Relative Humidity: | 51~54 | % |

Report Number : FR720610-11E

***TEST RESULTS DATA***
***Average Power Table***

| FCC Band I | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Duty Factor (dB) | | Average Conducted Power (dBm) | | | FCC Conducted Power Limit (dBm) | | DG (dBi) | | | Pass/Fail |
| | | | | | Ant 1 | Ant 2 | Ant 1 | Ant 2 | SUM | Ant 1 | Ant 2 | Ant 1 | Ant 2 | | |
| 11a | 6Mbps | 1 | 36 | 5180 | 0.62 | - | 19.16 | - | | 24.00 | - | 0.32 | - | | Pass |
| 11a | 6Mbps | 1 | 44 | 5220 | 0.62 | - | 18.88 | - | | 24.00 | - | 0.32 | - | | Pass |
| 11a | 6Mbps | 1 | 48 | 5240 | 0.62 | - | 18.86 | - | | 24.00 | - | 0.32 | - | | Pass |
| HT20 | MCS0 | 1 | 36 | 5180 | 0.66 | - | 18.79 | - | | 24.00 | - | 0.32 | - | | Pass |
| HT20 | MCS0 | 1 | 44 | 5220 | 0.66 | - | 18.83 | - | | 24.00 | - | 0.32 | - | | Pass |
| HT20 | MCS0 | 1 | 48 | 5240 | 0.66 | - | 18.21 | - | | 24.00 | - | 0.32 | - | | Pass |
| HT40 | MCS0 | 1 | 38 | 5190 | 0.69 | - | 13.63 | - | | 24.00 | - | 0.32 | - | | Pass |
| HT40 | MCS0 | 1 | 46 | 5230 | 0.69 | - | 19.29 | - | | 24.00 | - | 0.32 | - | | Pass |

Report Number : FR720610-11E

## ***TEST RESULTS DATA***
## ***Average Power Table***

| FCC Band II | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Duty Factor (dB) | | Average Conducted Power (dBm) | | | FCC Conducted Power Limit (dBm) | | DG (dBi) | | EIRP Power Limit (dBm) | Pass/Fail |
| | | | | | Ant 1 | Ant 2 | Ant 1 | Ant 2 | SUM | Ant 1 | Ant 2 | Ant 1 | Ant 2 | | |
| 11a | 6Mbps | 1 | 52 | 5260 | 0.62 | - | 21.41 | - | | 23.98 | - | 0.16 | - | 26.99 | Pass |
| 11a | 6Mbps | 1 | 60 | 5300 | 0.62 | - | 21.35 | - | | 23.98 | - | 0.16 | - | 26.99 | Pass |
| 11a | 6Mbps | 1 | 64 | 5320 | 0.62 | - | 18.56 | - | | 23.98 | - | 0.16 | - | 26.99 | Pass |
| HT20 | MCS0 | 1 | 52 | 5260 | 0.66 | - | 21.07 | - | | 23.98 | - | 0.16 | - | 26.99 | Pass |
| HT20 | MCS0 | 1 | 60 | 5300 | 0.66 | - | 19.88 | - | | 23.98 | - | 0.16 | - | 26.99 | Pass |
| HT20 | MCS0 | 1 | 64 | 5320 | 0.66 | - | 18.61 | - | | 23.98 | - | 0.16 | - | 26.99 | Pass |
| HT40 | MCS0 | 1 | 54 | 5270 | 0.69 | - | 20.03 | - | | 23.98 | - | 0.16 | - | 26.99 | Pass |
| HT40 | MCS0 | 1 | 62 | 5310 | 0.69 | - | 8.62 | - | | 23.98 | - | 0.16 | - | 26.99 | Pass |

Report Number : FR720610-11E

***TEST RESULTS DATA***
***Average Power Table***

| FCC Band III | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Duty Factor (dB) | | Average Conducted Power (dBm) | | | FCC Conducted Power Limit (dBm) | | DG (dBi) | | EIRP Power Limit (dBm) | Pass/Fail |
| | | | | | Ant 1 | Ant 2 | Ant 1 | Ant 2 | SUM | Ant 1 | Ant 2 | Ant 1 | Ant 2 | | |
| 11a | 6Mbps | 1 | 100 | 5500 | 0.62 | - | 19.85 | - | | 23.98 | - | 0.49 | - | 26.99 | Pass |
| 11a | 6Mbps | 1 | 116 | 5580 | 0.62 | - | 21.76 | - | | 23.98 | - | 0.49 | - | 26.99 | Pass |
| 11a | 6Mbps | 1 | 140 | 5700 | 0.62 | - | 15.39 | - | | 23.98 | - | 0.49 | - | 26.99 | Pass |
| HT20 | MCS0 | 1 | 100 | 5500 | 0.66 | - | 19.49 | - | | 23.98 | - | 0.49 | - | 26.99 | Pass |
| HT20 | MCS0 | 1 | 116 | 5580 | 0.66 | - | 21.80 | - | | 23.98 | - | 0.49 | - | 26.99 | Pass |
| HT20 | MCS0 | 1 | 140 | 5700 | 0.66 | - | 15.24 | - | | 23.98 | - | 0.49 | - | 26.99 | Pass |
| HT40 | MCS0 | 1 | 102 | 5510 | 0.69 | - | 17.02 | - | | 23.98 | - | 0.49 | - | 26.99 | Pass |
| HT40 | MCS0 | 1 | 110 | 5550 | 0.69 | - | 19.77 | - | | 23.98 | - | 0.49 | - | 26.99 | Pass |
| HT40 | MCS0 | 1 | 134 | 5670 | 0.69 | - | 17.95 | - | | 23.98 | - | 0.49 | - | 26.99 | Pass |

<The power level for WWAN+WLAN SKU applied in WLAN is 3dB lower than WLAN SKU>

| | | | | |
|---|---|---|---|---|
| Test Engineer: | Tommy Lee | Temperature: | 21~25 | °C |
| Test Date: | 2018/4/28~2018/06/06 | Relative Humidity: | 51~54 | % |

Report Number : FR720610-11E

## ***TEST RESULTS DATA***
## ***Average Power Table***

| FCC Band I | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Duty Factor (dB) | | Average Conducted Power (dBm) | | | FCC Conducted Power Limit (dBm) | | DG (dBi) | | | Pass/Fail |
| | | | | | Ant 1 | Ant 2 | Ant 1 | Ant 2 | SUM | Ant 1 | Ant 2 | Ant 1 | Ant 2 | | |
| 11a | 6Mbps | 1 | 36 | 5180 | 0.62 | - | 19.16 | - | | 24.00 | 24.00 | 0.32 | 0.00 | | Pass |
| 11a | 6Mbps | 1 | 44 | 5220 | 0.62 | - | 18.88 | - | | 24.00 | 24.00 | 0.32 | 0.00 | | Pass |
| 11a | 6Mbps | 1 | 48 | 5240 | 0.62 | - | 18.86 | - | | 24.00 | 24.00 | 0.32 | 0.00 | | Pass |
| HT20 | MCS0 | 1 | 36 | 5180 | 0.66 | - | 18.79 | - | | 24.00 | 24.00 | 0.32 | 0.00 | | Pass |
| HT20 | MCS0 | 1 | 44 | 5220 | 0.66 | - | 18.83 | - | | 24.00 | 24.00 | 0.32 | 0.00 | | Pass |
| HT20 | MCS0 | 1 | 48 | 5240 | 0.66 | - | 18.21 | - | | 24.00 | 24.00 | 0.32 | 0.00 | | Pass |
| HT40 | MCS0 | 1 | 38 | 5190 | 0.69 | - | 13.63 | - | | 24.00 | 24.00 | 0.32 | 0.00 | | Pass |
| HT40 | MCS0 | 1 | 46 | 5230 | 0.69 | - | 19.29 | - | | 24.00 | 24.00 | 0.32 | 0.00 | | Pass |

Report Number : FR720610-11E

## ***TEST RESULTS DATA***
## ***Average Power Table***

| FCC Band II | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Duty Factor (dB) | | Average Conducted Power (dBm) | | | FCC Conducted Power Limit (dBm) | | DG (dBi) | | EIRP Power Limit (dBm) | Pass/Fail |
| | | | | | Ant 1 | Ant 2 | Ant 1 | Ant 2 | SUM | Ant 1 | Ant 2 | Ant 1 | Ant 2 | | |
| 11a | 6Mbps | 1 | 52 | 5260 | 0.62 | | 20.17 | | | 23.98 | 23.98 | 0.16 | 0.00 | 26.99 | Pass |
| 11a | 6Mbps | 1 | 60 | 5300 | 0.62 | | 20.20 | | | 23.98 | 23.98 | 0.16 | 0.00 | 26.99 | Pass |
| 11a | 6Mbps | 1 | 64 | 5320 | 0.62 | | 18.56 | | | 23.98 | 23.98 | 0.16 | 0.00 | 26.99 | Pass |
| HT20 | MCS0 | 1 | 52 | 5260 | 0.66 | | 19.92 | | | 23.98 | 23.98 | 0.16 | 0.00 | 26.99 | Pass |
| HT20 | MCS0 | 1 | 60 | 5300 | 0.66 | | 19.95 | | | 23.98 | 23.98 | 0.16 | 0.00 | 26.99 | Pass |
| HT20 | MCS0 | 1 | 64 | 5320 | 0.66 | | 18.61 | | | 23.98 | 23.98 | 0.16 | 0.00 | 26.99 | Pass |
| HT40 | MCS0 | 1 | 54 | 5270 | 0.69 | | 19.99 | | | 23.98 | 23.98 | 0.16 | 0.00 | 26.99 | Pass |
| HT40 | MCS0 | 1 | 62 | 5310 | 0.69 | | 8.62 | | | 23.98 | 23.98 | 0.16 | 0.00 | 26.99 | Pass |

Report Number : FR720610-11E

## ***TEST RESULTS DATA***
## ***Average Power Table***

| FCC Band III | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Duty Factor (dB) | | Average Conducted Power (dBm) | | | FCC Conducted Power Limit (dBm) | | DG (dBi) | | EIRP Power Limit (dBm) | Pass/Fail |
| | | | | | Ant 1 | Ant 2 | Ant 1 | Ant 2 | SUM | Ant 1 | Ant 2 | Ant 1 | Ant 2 | | |
| 11a | 6Mbps | 1 | 100 | 5500 | 0.62 | | 19.85 | | | 23.98 | 23.98 | 0.49 | 0.00 | 26.99 | Pass |
| 11a | 6Mbps | 1 | 116 | 5580 | 0.62 | | 21.76 | | | 23.98 | 23.98 | 0.49 | 0.00 | 26.99 | Pass |
| 11a | 6Mbps | 1 | 140 | 5700 | 0.62 | | 15.39 | | | 23.98 | 23.98 | 0.49 | 0.00 | 26.99 | Pass |
| HT20 | MCS0 | 1 | 100 | 5500 | 0.66 | | 19.49 | | | 23.98 | 23.98 | 0.49 | 0.00 | 26.99 | Pass |
| HT20 | MCS0 | 1 | 116 | 5580 | 0.66 | | 21.80 | | | 23.98 | 23.98 | 0.49 | 0.00 | 26.99 | Pass |
| HT20 | MCS0 | 1 | 140 | 5700 | 0.66 | | 15.24 | | | 23.98 | 23.98 | 0.49 | 0.00 | 26.99 | Pass |
| HT40 | MCS0 | 1 | 102 | 5510 | 0.69 | | 17.02 | | | 23.98 | 23.98 | 0.49 | 0.00 | 26.99 | Pass |
| HT40 | MCS0 | 1 | 110 | 5550 | 0.69 | | 19.77 | | | 23.98 | 23.98 | 0.49 | 0.00 | 26.99 | Pass |
| HT40 | MCS0 | 1 | 134 | 5670 | 0.69 | | 17.95 | | | 23.98 | 23.98 | 0.49 | 0.00 | 26.99 | Pass |

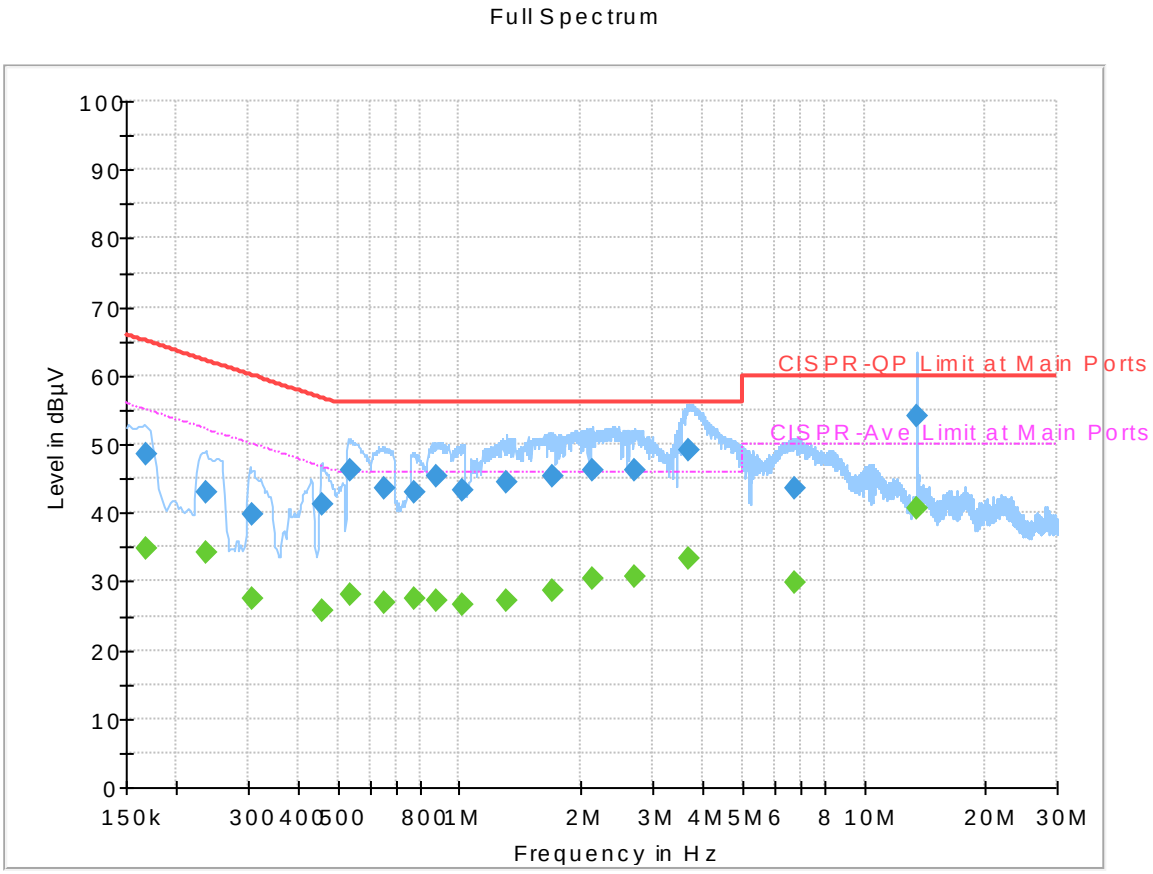
Note: The above Frequency and Channel in "*" were straddle channel.

# Appendix B. AC Conducted Emission Test Results

| | | | |
|---|---|---|---|
| **Test Engineer :** | Shareef Yu | **Temperature :** | 23~24℃ |
| | | **Relative Humidity :** | 58~63% |

## EUT Information

| | |
|---|---|
| Report NO : | 720610-11 |
| Test Mode : | Mode 1 |
| Test Voltage : | 120Vac/60Hz |
| Phase : | Line |



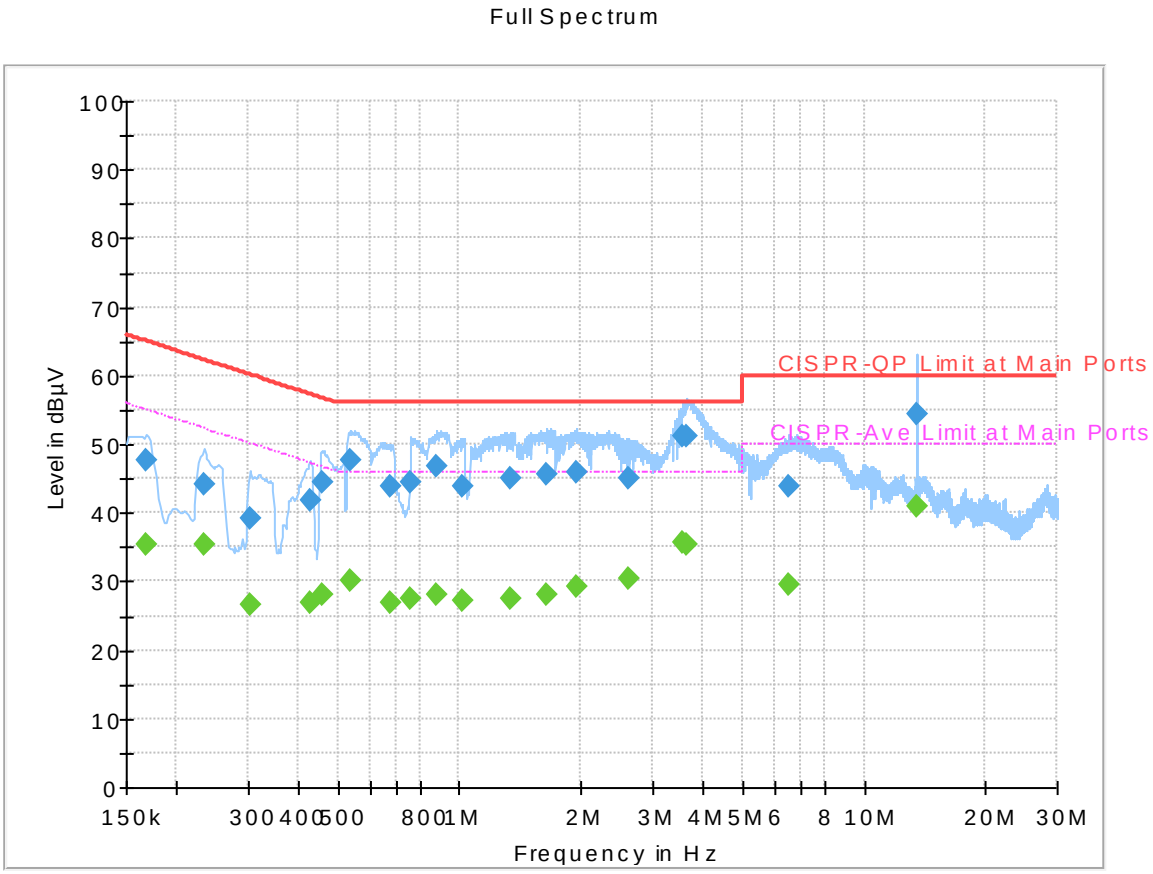

## Final_Result

| Frequency (MHz) | QuasiPeak (dBµV) | CAverage (dBµV) | Limit (dBµV) | Margin (dB) | Line | Filter | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 0.168000 | --- | 34.66 | 55.06 | 20.40 | L1 | OFF | 19.5 |
| 0.168000 | 48.43 | --- | 65.06 | 16.63 | L1 | OFF | 19.5 |
| 0.235500 | --- | 34.26 | 52.25 | 17.99 | L1 | OFF | 19.5 |
| 0.235500 | 43.04 | --- | 62.25 | 19.21 | L1 | OFF | 19.5 |
| 0.307500 | --- | 27.39 | 50.04 | 22.65 | L1 | OFF | 19.5 |
| 0.307500 | 39.68 | --- | 60.04 | 20.36 | L1 | OFF | 19.5 |
| 0.456000 | --- | 25.78 | 46.77 | 20.99 | L1 | OFF | 19.5 |
| 0.456000 | 41.25 | --- | 56.77 | 15.52 | L1 | OFF | 19.5 |
| 0.534750 | --- | 28.16 | 46.00 | 17.84 | L1 | OFF | 19.5 |
| 0.534750 | 46.05 | --- | 56.00 | 9.95 | L1 | OFF | 19.5 |
| 0.651750 | --- | 26.90 | 46.00 | 19.10 | L1 | OFF | 19.5 |
| 0.651750 | 43.59 | --- | 56.00 | 12.41 | L1 | OFF | 19.5 |
| 0.771000 | --- | 27.63 | 46.00 | 18.37 | L1 | OFF | 19.5 |
| 0.771000 | 43.06 | --- | 56.00 | 12.94 | L1 | OFF | 19.5 |
| 0.881250 | --- | 27.08 | 46.00 | 18.92 | L1 | OFF | 19.5 |
| 0.881250 | 45.22 | --- | 56.00 | 10.78 | L1 | OFF | 19.5 |
| 1.014000 | --- | 26.73 | 46.00 | 19.27 | L1 | OFF | 19.5 |
| 1.014000 | 43.39 | --- | 56.00 | 12.61 | L1 | OFF | 19.5 |
| 1.311000 | --- | 27.26 | 46.00 | 18.74 | L1 | OFF | 19.6 |
| 1.311000 | 44.56 | --- | 56.00 | 11.44 | L1 | OFF | 19.6 |
| 1.691250 | --- | 28.72 | 46.00 | 17.28 | L1 | OFF | 19.6 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1.691250 | 45.42 | --- | 56.00 | 10.58 | L1 | OFF | 19.6 |
| 2.130000 | --- | 30.28 | 46.00 | 15.72 | L1 | OFF | 19.4 |
| 2.130000 | 46.26 | --- | 56.00 | 9.74 | L1 | OFF | 19.4 |
| 2.706000 | --- | 30.78 | 46.00 | 15.22 | L1 | OFF | 19.5 |
| 2.706000 | 46.11 | --- | 56.00 | 9.89 | L1 | OFF | 19.5 |
| 3.687000 | --- | 33.41 | 46.00 | 12.59 | L1 | OFF | 19.6 |
| 3.687000 | 49.23 | --- | 56.00 | 6.77 | L1 | OFF | 19.6 |
| 6.749250 | --- | 29.95 | 50.00 | 20.05 | L1 | OFF | 19.6 |
| 6.749250 | 43.70 | --- | 60.00 | 16.30 | L1 | OFF | 19.6 |
| 13.560000 | --- | 40.73 | 50.00 | 9.27 | L1 | OFF | 19.7 |
| 13.560000 | 53.97 | --- | 60.00 | 6.03 | L1 | OFF | 19.7 |

# EUT Information

| | |
|---|---|
| Report NO : | 720610-11 |
| Test Mode : | Mode 1 |
| Test Voltage : | 120Vac/60Hz |
| Phase : | Neutral |




# Final_Result

| Frequency (MHz) | QuasiPeak (dBµV) | CAverage (dBµV) | Limit (dBµV) | Margin (dB) | Line | Filter | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 0.168000 | --- | 35.41 | 55.06 | 19.65 | N | OFF | 19.5 |
| 0.168000 | 47.67 | --- | 65.06 | 17.39 | N | OFF | 19.5 |
| 0.233250 | --- | 35.52 | 52.33 | 16.81 | N | OFF | 19.5 |
| 0.233250 | 44.03 | --- | 62.33 | 18.30 | N | OFF | 19.5 |
| 0.303000 | --- | 26.61 | 50.16 | 23.55 | N | OFF | 19.5 |
| 0.303000 | 39.26 | --- | 60.16 | 20.90 | N | OFF | 19.5 |
| 0.426750 | --- | 27.02 | 47.32 | 20.30 | N | OFF | 19.5 |
| 0.426750 | 41.87 | --- | 57.32 | 15.45 | N | OFF | 19.5 |
| 0.458250 | --- | 28.05 | 46.72 | 18.67 | N | OFF | 19.5 |
| 0.458250 | 44.55 | --- | 56.72 | 12.17 | N | OFF | 19.5 |
| 0.539250 | --- | 30.08 | 46.00 | 15.92 | N | OFF | 19.5 |
| 0.539250 | 47.58 | --- | 56.00 | 8.42 | N | OFF | 19.5 |
| 0.676500 | --- | 26.94 | 46.00 | 19.06 | N | OFF | 19.5 |
| 0.676500 | 43.73 | --- | 56.00 | 12.27 | N | OFF | 19.5 |
| 0.759750 | --- | 27.58 | 46.00 | 18.42 | N | OFF | 19.5 |
| 0.759750 | 44.54 | --- | 56.00 | 11.46 | N | OFF | 19.5 |
| 0.874500 | --- | 28.07 | 46.00 | 17.93 | N | OFF | 19.5 |
| 0.874500 | 46.78 | --- | 56.00 | 9.22 | N | OFF | 19.5 |
| 1.020750 | --- | 27.23 | 46.00 | 18.77 | N | OFF | 19.5 |
| 1.020750 | 43.90 | --- | 56.00 | 12.10 | N | OFF | 19.5 |
| 1.331250 | --- | 27.38 | 46.00 | 18.62 | N | OFF | 19.5 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1.331250 | 44.91 | --- | 56.00 | 11.09 | N | OFF | 19.5 |
| 1.639500 | --- | 28.01 | 46.00 | 17.99 | N | OFF | 19.6 |
| 1.639500 | 45.74 | --- | 56.00 | 10.26 | N | OFF | 19.6 |
| 1.952250 | --- | 29.24 | 46.00 | 16.76 | N | OFF | 19.6 |
| 1.952250 | 45.86 | --- | 56.00 | 10.14 | N | OFF | 19.6 |
| 2.604750 | --- | 30.42 | 46.00 | 15.58 | N | OFF | 19.5 |
| 2.604750 | 45.03 | --- | 56.00 | 10.97 | N | OFF | 19.5 |
| 3.579000 | --- | 35.71 | 46.00 | 10.29 | N | OFF | 19.6 |
| 3.579000 | 51.28 | --- | 56.00 | 4.72 | N | OFF | 19.6 |
| 3.662250 | --- | 35.33 | 46.00 | 10.67 | N | OFF | 19.6 |
| 3.662250 | 51.12 | --- | 56.00 | 4.88 | N | OFF | 19.6 |
| 6.488250 | --- | 29.62 | 50.00 | 20.38 | N | OFF | 19.6 |
| 6.488250 | 43.72 | --- | 60.00 | 16.28 | N | OFF | 19.6 |
| 13.560000 | --- | 41.07 | 50.00 | 8.93 | N | OFF | 19.8 |
| 13.560000 | 54.32 | --- | 60.00 | 5.68 | N | OFF | 19.8 |

# Appendix C. Radiated Spurious Emission

| Test Engineer : | Watt Tseng, Karl Hou, and Nick Yu | Temperature : | 23~25°C |
|---|---|---|---|
| | | Relative Humidity : | 61~65% |

**Band 2 - 5250~5350MHz**

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

| WIFI Ant. | Note | Frequency | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Path Loss | Preamp Factor | Ant Pos | Table Pos | Peak Avg. | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | (dBμV) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 802.11a CH 60 5300MHz | | 5115.6 | 53.58 | -20.42 | 74 | 43.01 | 31.77 | 9.94 | 31.14 | 100 | 128 | P | H |
| | | 5113.56 | 42.45 | -11.55 | 54 | 31.88 | 31.77 | 9.94 | 31.14 | 100 | 128 | A | H |
| | * | 5300 | 111.87 | - | - | 101.02 | 31.88 | 10.12 | 31.15 | 100 | 128 | P | H |
| | * | 5300 | 100.86 | - | - | 90.01 | 31.88 | 10.12 | 31.15 | 100 | 128 | A | H |
| | | 5357.04 | 58.26 | -15.74 | 74 | 47.33 | 31.91 | 10.17 | 31.15 | 100 | 128 | P | H |
| | | 5352.24 | 48.07 | -5.93 | 54 | 37.15 | 31.91 | 10.16 | 31.15 | 100 | 128 | A | H |
| | | 5145.86 | 52.99 | -21.01 | 74 | 42.36 | 31.79 | 9.98 | 31.14 | 201 | 94 | P | V |
| | | 5139.4 | 42.47 | -11.53 | 54 | 31.86 | 31.78 | 9.97 | 31.14 | 201 | 94 | A | V |
| | * | 5300 | 113.51 | - | - | 102.66 | 31.88 | 10.12 | 31.15 | 201 | 94 | P | V |
| | * | 5300 | 102.04 | - | - | 91.19 | 31.88 | 10.12 | 31.15 | 201 | 94 | A | V |
| | | 5352.72 | 60.63 | -13.37 | 74 | 49.71 | 31.91 | 10.16 | 31.15 | 201 | 94 | P | V |
| | | 5352.24 | 48.94 | -5.06 | 54 | 38.02 | 31.91 | 10.16 | 31.15 | 201 | 94 | A | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## Band 2 5250~5350MHz

## 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 60 5300MHz | | 10600 | 53.24 | -20.76 | 74 | 54.08 | 40.18 | 15.26 | 56.82 | 193 | 353 | P | H |
| | | 10600 | 41.27 | -12.73 | 54 | 42.11 | 40.18 | 15.26 | 56.82 | 193 | 353 | A | H |
| | | 15900 | 46.37 | -27.63 | 74 | 45.05 | 37.81 | 19 | 56.22 | 100 | 0 | P | H |
| | | | | | | | | | | | | | H |
| | | 10600 | 53.44 | -20.56 | 74 | 54.28 | 40.18 | 15.26 | 56.82 | 305 | 346 | P | V |
| | | 10600 | 45.38 | -8.62 | 54 | 46.22 | 40.18 | 15.26 | 56.82 | 305 | 346 | A | V |
| | | 15900 | 46.71 | -27.29 | 74 | 45.39 | 37.81 | 19 | 56.22 | 100 | 0 | P | V |
| | | | | | | | | | | | | | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## Emission below 1GHz

## WIFI 802.11a (LF @ 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 LF | | 65.64 | 27.41 | -12.59 | 40 | 44.79 | 12.36 | 0.68 | 30.46 | - | - | P | H |
| | | 158.25 | 30.29 | -13.21 | 43.5 | 42.25 | 17.24 | 1.02 | 30.37 | - | - | P | H |
| | | 200.37 | 37.69 | -5.81 | 43.5 | 50.62 | 16.12 | 1.14 | 30.32 | 100 | 0 | P | H |
| | | 400.1 | 29.74 | -16.26 | 46 | 35.54 | 22.52 | 1.61 | 29.98 | - | - | P | H |
| | | 650.7 | 28.66 | -17.34 | 46 | 29.95 | 26.11 | 2.05 | 29.57 | - | - | P | H |
| | | 801.2 | 36.07 | -9.93 | 46 | 34.83 | 28.11 | 2.29 | 29.29 | - | - | P | H |
| | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | H |
| | | 31.08 | 33.52 | -6.48 | 40 | 37.66 | 25.62 | 0.48 | 30.2 | 100 | 0 | P | V |
| | | 114.24 | 29.64 | -13.86 | 43.5 | 41.64 | 17.48 | 0.89 | 30.41 | - | - | P | V |
| | | 200.37 | 35.49 | -8.01 | 43.5 | 48.42 | 16.12 | 1.14 | 30.32 | - | - | P | V |
| | | 550.6 | 29.32 | -16.68 | 46 | 32.18 | 24.82 | 1.9 | 29.7 | - | - | P | V |
| | | 801.2 | 38.21 | -7.79 | 46 | 36.97 | 28.11 | 2.29 | 29.29 | - | - | P | V |
| | | 967.8 | 33.11 | -20.89 | 54 | 29.28 | 30.03 | 2.51 | 28.94 | - | - | P | V |
| | | | | | | | | | | | | | V |
| | | | | | | | | | | | | | V |
| | | | | | | | | | | | | | V |
| | | | | | | | | | | | | | V |
| | | | | | | | | | | | | | V |
| | | | | | | | | | | | | | V |
| **Remark** | 1. No other spurious found.<br>2. All results are PASS against limit line. | | | | | | | | | | | | |

## Note symbol

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

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

| WIFI | Note | Frequency | Level | Over | Limit | Read | Antenna | 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 CH 01 2412MHz | | 2390 | 55.45 | -18.55 | 74 | 54.51 | 32.22 | 4.58 | 35.86 | 103 | 308 | P | H |
| | | 2390 | 43.54 | -10.46 | 54 | 42.6 | 32.22 | 4.58 | 35.86 | 103 | 308 | A | H |

1. 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

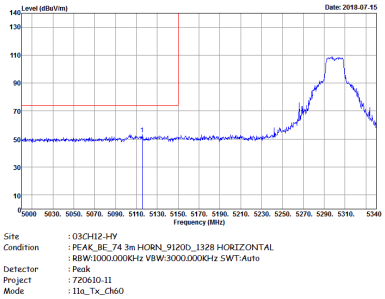
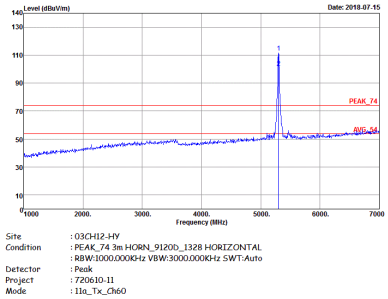
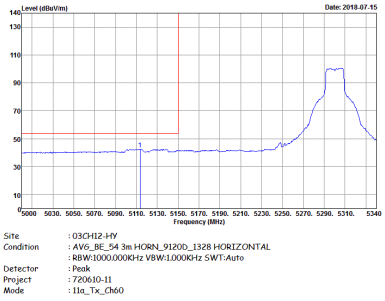
| | | | |
|---|---|---|---|
| **Test Engineer :** | Watt Tseng, Karl Hou, and Nick Yu | **Temperature :** | 23~25°C |
| | | **Relative Humidity :** | 61~65% |

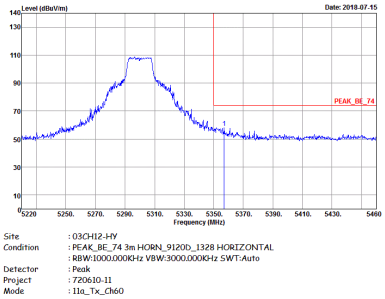
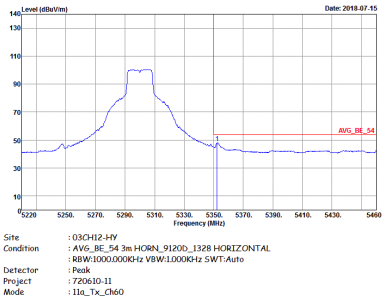
**Note symbol**

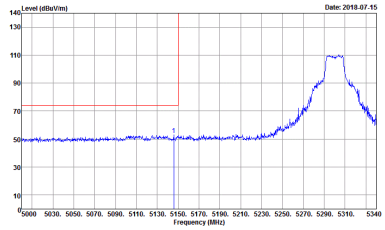
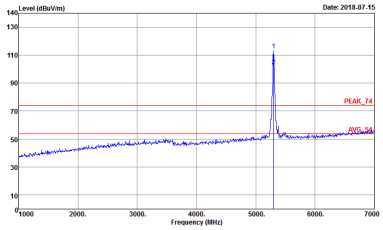
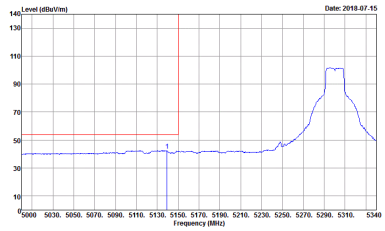
| | |
|---|---|
| -L | **Low channel location** |
| -R | **High channel location** |

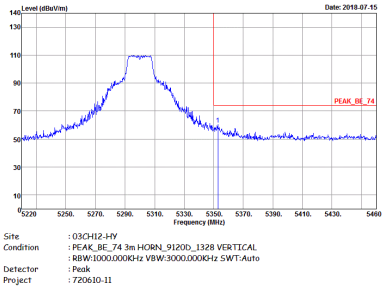
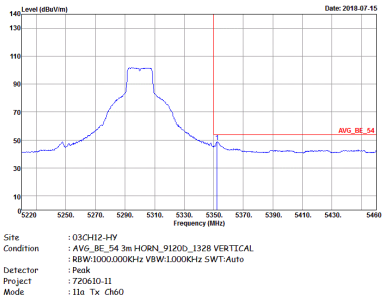
## Band 2 - 5250~5350MHz

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

| WIFI | Band 2 5250~5350MHz Band Edge @ 3m | |
|---|---|---|
| ANT | 802.11a CH60 5300MHz - L | |
| 1 | Horizontal | Fundamental |
| Peak |  |  |
| Avg. |  | Left blank |

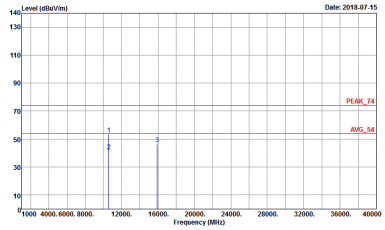
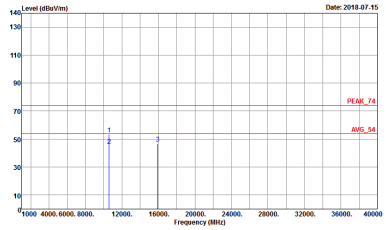
| WIFI | Band 2 5250~5350MHz Band Edge @ 3m | |
|---|---|---|
| ANT | 802.11a CH60 5300MHz - R | |
| 1 | Horizontal | Fundamental |
| Peak |  | Left blank |
| Avg. |  | Left blank |

| WIFI | Band 2 5250~5350MHz Band Edge @ 3m | |
|---|---|---|
| ANT | 802.11a CH60 5300MHz - L | |
| 1 | Vertical | Fundamental |
| Peak |  <br>Site : 03CH12-HY<br>Condition : PEAK_BE_74 3m HORN_9120D_1328 VERTICAL<br>: RBW:1000.000KHz VBW:3000.000KHz SWT:Auto<br>Detector : Peak<br>Project : 720610-11<br>Mode : 11a_Tx_Ch60 |  <br>Site : 03CH12-HY<br>Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL<br>: RBW:1000.000KHz VBW:3000.000KHz SWT:Auto<br>Detector : Peak<br>Project : 720610-11 |
| Avg. |  <br>Site : 03CH12-HY<br>Condition : AVG_BE_54 3m HORN_9120D_1328 VERTICAL<br>: RBW:1000.000KHz VBW:1.000KHz SWT:Auto<br>Detector : Peak<br>Project : 720610-11<br>Mode : 11a_Tx_Ch60 | Left blank |

| WIFI | Band 2 5250~5350MHz Band Edge @ 3m | |
|---|---|---|
| ANT | 802.11a CH60 5300MHz - R | |
| 1 | Vertical | Fundamental |
| Peak |  | Left blank |
| Avg. |  | Left blank |

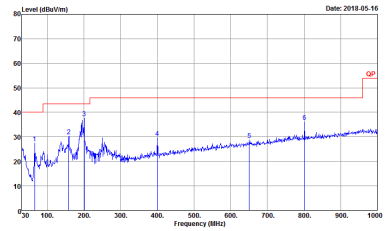
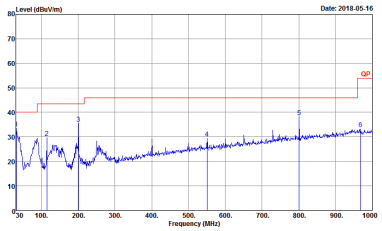
## Band 2 - 5250~5350MHz

## WIFI 802.11a (Harmonic @ 3m)

| WIFI | Band 2 5250~5350MHz Harmonic @ 3m | |
|---|---|---|
| ANT | 802.11a CH60 5300MHz | |
| 1 | Horizontal | Vertical |
| Peak<br>Avg. |  <br>Site : 03CH12-HY<br>Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL<br>Detector : Peak<br>Project : 720610-11<br>Mode : 11a_Tx_Ch60 |  <br>Site : 03CH12-HY<br>Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL<br>Detector : Peak<br>Project : 720610-11<br>Mode : 11a_Tx_Ch60 |

## Emission below 1GHz

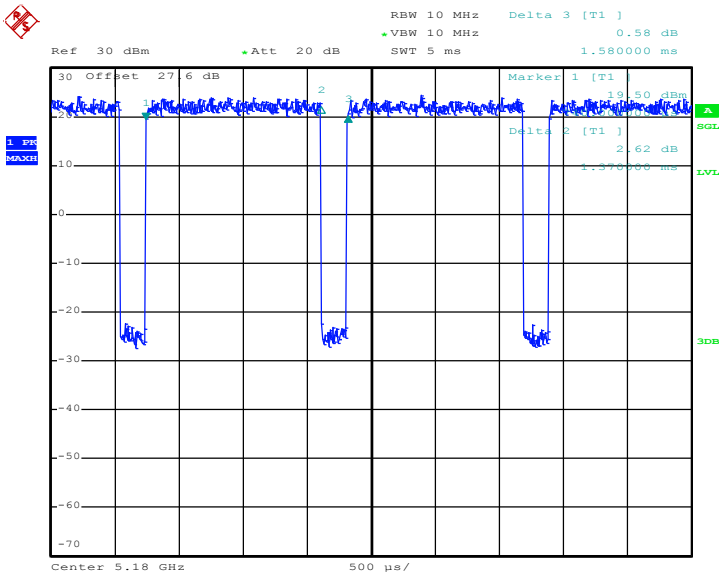
## 5GHz WIFI 802.11a (LF)

| WIFI | 5GHz WIFI | |
|---|---|---|
| ANT | 802.11a LF | |
| 1 | Horizontal | Vertical |
| QP / Peak |  <br>Site : 03CH12-HY<br>Condition : QP 3m BILOG_611D_47020&06 HORIZONTAL<br>Detector : Peak<br>Project : 720610-11<br>Mode : 34 |  <br>Site : 03CH12-HY<br>Condition : QP 3m BILOG_611D_47020&06 VERTICAL<br>Detector : Peak<br>Project : 720610-11<br>Mode : 34 |

# Appendix E. Duty Cycle Plots

| Band | Duty Cycle(%) | T(us) | 1/T(kHz) | VBW Setting | Duty Factor(dB) |
|---|---|---|---|---|---|
| 802.11a | 86.71 | 1370 | 0.73 | 1kHz | 0.62 |

**802.11a**




Date: 28.APR.2018 17:34:32