



## FCC PART 15.407

## TEST REPORT

For

**Beijing Noitom Technology Limited**

Room 432 ,Main Tower 28 Xijiekouwai Blvd, Beijing, China

**FCC ID: 2ABTRN10030020**

|  |  |
|--|--|
| <b>Report Type:</b><br>Original Report | <b>Product Name:</b><br>Noitom Tablet  |
| <b>Test Engineer:</b>                  | <i>Tom Tang</i><br><u>Tom Tang</u>   |
| <b>Report Number:</b>                  | <u>RBJ161012051D</u>   |
| <b>Report Date:</b>                    | <u>2016-12-06</u>  |
| <b>Reviewed By:</b>                    | Henry Ding<br>EMC Leader<br><i>Henry Ding</i>  |
| <b>Test Laboratory:</b>                | Bay Area Compliance Laboratories Corp. (Chengdu)<br>5040, HuiLongWan Plaza, No. 1, ShaWan Road,<br>JinNiu District, ChengDu, China<br>Tel: 028-65523123, Fax: 028-65525125<br>www.baclcorp.com |

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The **Beijing Noitom Technology Limited's** product, model number: **n10030020** (**FCC ID: 2ABTRN10030020**) (the "EUT") in this report was a **Noitom Tablet**, which was measured approximately: 25.7 cm (L) × 17.2 cm (W) × 0.93 cm (H), rated input voltage: DC3.7V rechargeable Li-ion battery or DC5V from adapter.

Adapter information:

MODEL: MX12X8-0502000UX

INPUT: 100-240V~ 50-60Hz 0.35A

OUTPUT: DC5.0V 2A

*\*All measurement and test data in this report was gathered from final production sample, serial number: 161012051 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2016-10-12, and EUT conformed to test requirement.*

### Objective

This type approval report is prepared on behalf of **Beijing Noitom Technology Limited** in accordance with Part 2-Subpart J, Part 15-Subparts A, B and E of the Federal Communications Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

### Related Submittal(s)/Grant(s)

FCC Part 15B JBP submissions with FCC ID: 2ABTRN10030020.

FCC Part 15C DTS submissions with FCC ID: 2ABTRN10030020.

FCC Part 15C DSS submissions with FCC ID: 2ABTRN10030020.

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Chengdu). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

The uncertainty of any RF tests which use conducted method measurement is  $\pm 3.17$  dB, the uncertainty of any radiation on emissions measurement is:

30M~200MHz:  $\pm 4.7$  dB;

200M~1GHz:  $\pm 6.0$  dB;

1G~6GHz:  $\pm 5.13$  dB;

6G~25GHz:  $\pm 5.47$  dB;

And the uncertainty will not be taken into consideration for all test data recorded in the report.

## **Test Facility**

The test site used by BACL to collect test data is located in the 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, China.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing in an engineering mode, which is provided by manufacture.

The system only support 802.11a.

For 5150~5250 MHz band, 4 channels are provided:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 36      | 5180            | 44      | 5220            |
| 40      | 5200            | 48      | 5240            |

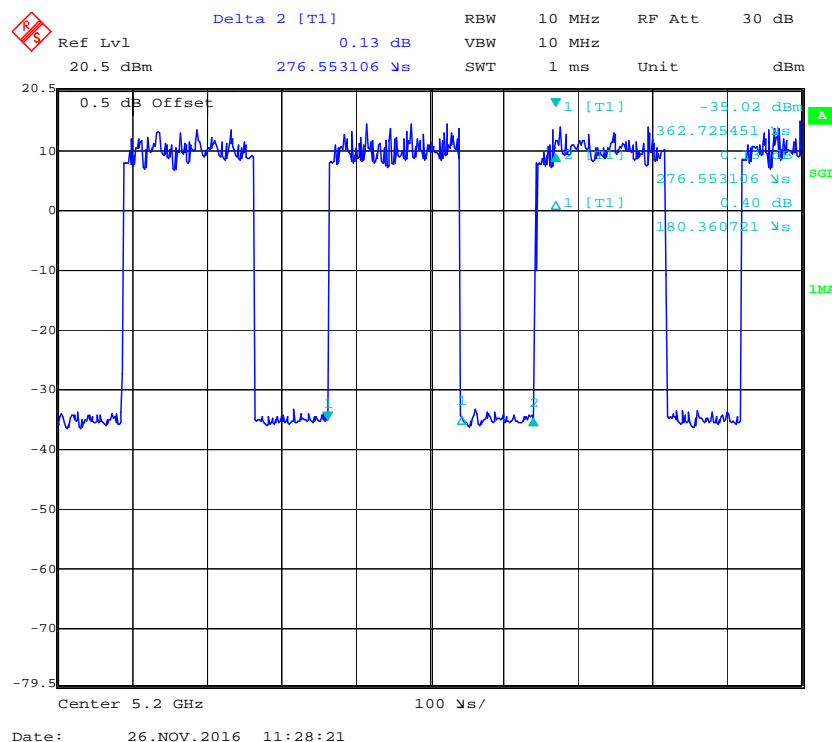
For 802.11a, Channel 36, 40 and 48 was tested.

### EUT Exercise Software

The maximum duty cycle was setting in engineering mode as following table:

| Test mode | T <sub>on</sub> (ms) | T <sub>on+off</sub> (ms) | Duty Cycle (%) |
|-----------|----------------------|--------------------------|----------------|
| 802.11 a  | 0.180                | 0.277                    | 65%            |

#### 802.11 a



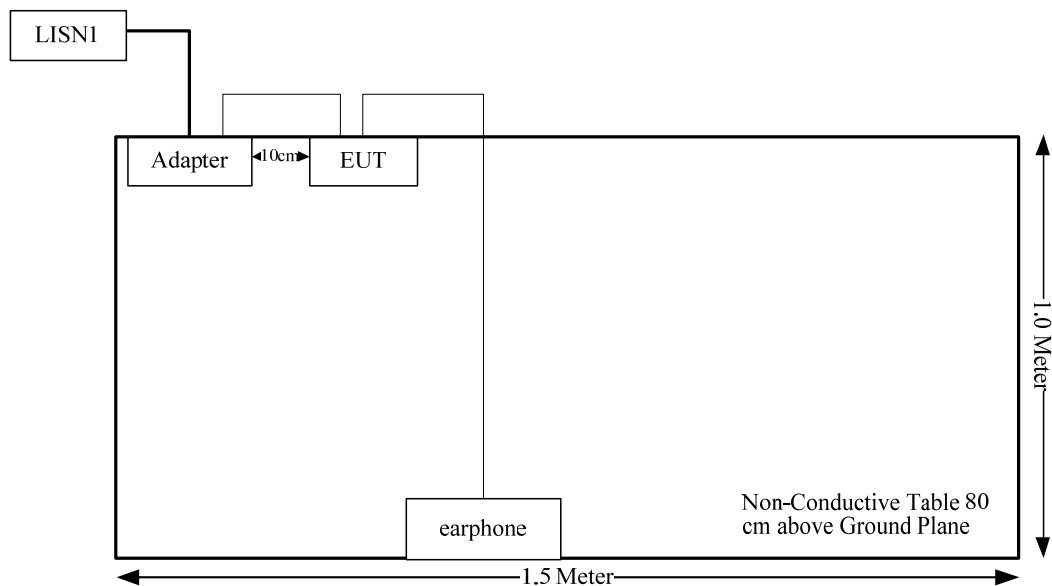
## Equipment Modifications

No modification was made to the EUT.

## External Cable

| Cable Description | Shielding Type | Ferrite Core | Length (m) | From Port | To       |
|-------------------|----------------|--------------|------------|-----------|----------|
| Adapter Cable     | Yes            | Yes          | 1.04       | Adapter   | EUT      |
| Earphone Cable    | No             | No           | 1.02       | EUT       | Earphone |

## Block Diagram of Test Setup



## **SUMMARY OF TEST RESULTS**

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| <b>FCC Rules</b>                            | <b>Description of Test</b>             | <b>Result</b>  |
|---|--|----------------|
| FCC §15.407 (f) & §1.1310<br>& §2.1093      | RF Exposure                            | Compliance     |
| §15.203                                     | Antenna Requirement                    | Compliance     |
| §15.407(b)(6)& §15.207(a)                   | Conducted Emissions                    | Compliance     |
| §15.205& §15.209<br>&§15.407(b) (1),(6),(7) | Undesirable Emission& Restricted Bands | Compliance     |
| &§15.407(b) (1),(6),(7)                     | Spurious Emission Attenna Ports        | Compliance     |
| §15.407(a) (1)& §15.407(e)                  | 26 dB Bandwidth & 6 dB Bandwidth       | Compliance     |
| §15.407(a)(1),                              | Conducted Transmitter Output Power     | Compliance     |
| §15.407 (a)(1),(5)                          | Power Spectral Density                 | Compliance     |
| §15.407(H)                                  | Dynamic Frequency Selection            | Not Applicable |



## **FCC §15.407 (f) & §1.1310 & §2.1093- RF EXPOSURE**

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### **Applicable Standard**

According to §15.247(i) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB447498 D01 General RF Exposure Guidance v06

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR and  $\leq 7.5$  for 10-g extremity SAR, where

- $f(\text{GHz})$  is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is  $\leq 50$  mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

### **Measurement Result**

The tune-up power is 8.0dBm (6.31 mW).

$[(\text{max. power of channel, mW})/(\text{min. test separation distance, mm})][\sqrt{f(\text{GHz})}]$   
 $= 6.31/5 \cdot (\sqrt{5.240}) = 2.9 < 3.0$

**So the stand-alone SAR evaluation is not necessary.**

## **FCC §15.203 – ANTENNA REQUIREMENT**

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### **Applicable Standard**

According to § 15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC 47 CFR section 15.407 (a)(1),if transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output 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.

### **Antenna Connector Construction**

The EUT has one internal antenna arrangement for WLAN, and the max antenna gain is 2.0 dBi@ 5GHz band, fulfill the requirement of this section, please refer to the EUT photos.

**Result:** Compliance.

## FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS

### Applicable Standard

FCC §15.207, §15.407(b) (6)

### Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If  $U_{lab}$  is less than or equal to  $U_{cisp}$  of Table 1, then:

–compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;  
 –non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If  $U_{lab}$  is greater than  $U_{cisp}$  of Table 1, then:

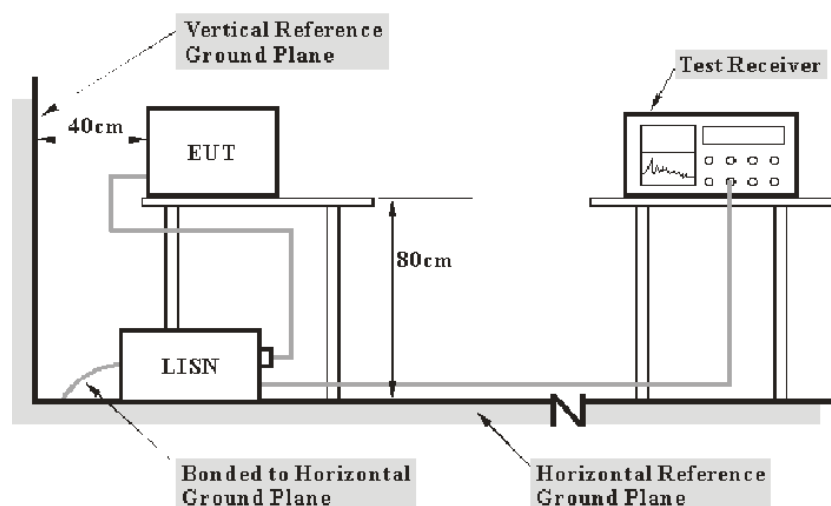
–compliance is deemed to occur if no measured disturbance level, increased by  $(U_{lab} - U_{cisp})$ , exceeds the disturbance limit;  
 –non-compliance is deemed to occur if any measured disturbance level, increased by  $(U_{lab} - U_{cisp})$ , exceeds the disturbance limit.

Based on CISPR 16-4-2:2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Chengdu) is  $\pm 3.17$  dB (150 kHz to 30 MHz).

Table 1 – Values of  $U_{cisp}$

| Measurement   | $U_{cisp}$ |
|---|------------|
| Conducted disturbance at mains port using AMN (150 kHz to 30 MHz) | 3.4 dB     |

### EUT Setup



Note: 1. Support units were connected to second LISN.  
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120V/60 Hz AC power source.

### EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

| Frequency Range  | IF B/W |
|------------------|--------|
| 150 kHz – 30 MHz | 9 kHz  |

### Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

$$C_f = A_C + VDF$$

Herein,

$V_C$  (cord. Reading): corrected voltage amplitude

$V_R$ : reading voltage amplitude

$A_C$ : attenuation caused by cable loss

VDF: voltage division factor of AMN

$C_f$ : Correction Factor

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Equipment List and Details

| Manufacturer    | Description       | Model   | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|---------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCS 30 | 836858/0016   | 2016-12-02       | 2017-12-01           |
| Rohde & Schwarz | L.I.S.N.          | ENV216  | 3560.6550.06  | 2016-12-02       | 2017-12-01           |
| N/A             | Conducted Cable   | NO.5    | N/A           | 2016-11-10       | 2017-11-09           |
| Rohde & Schwarz | PULSE LIMITER     | ESH3Z2  | 357.8810.52   | 2016-10-31       | 2017-10-30           |
| R&S             | Test Software     | EMC32   | Version8.53.0 | N/A              | N/A                  |

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Procedure

During the conducted emission test, the adapter was connected to the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

## Test Data

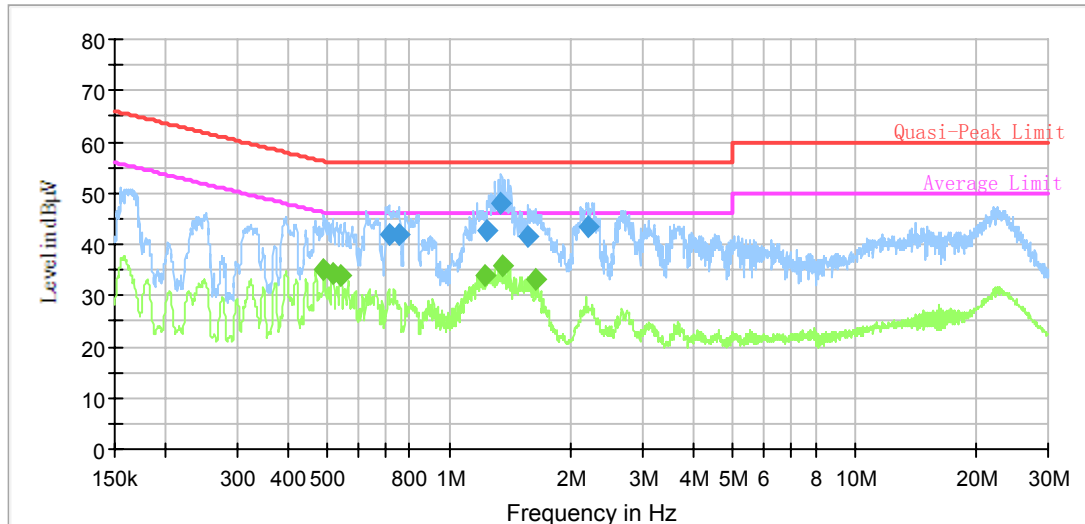
### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 28.6 °C   |
| Relative Humidity: | 60 %      |
| ATM Pressure:      | 101.1 kPa |

*The testing was performed by Tom Tang on 2016-12-05.*

Test Mode: Transmitting

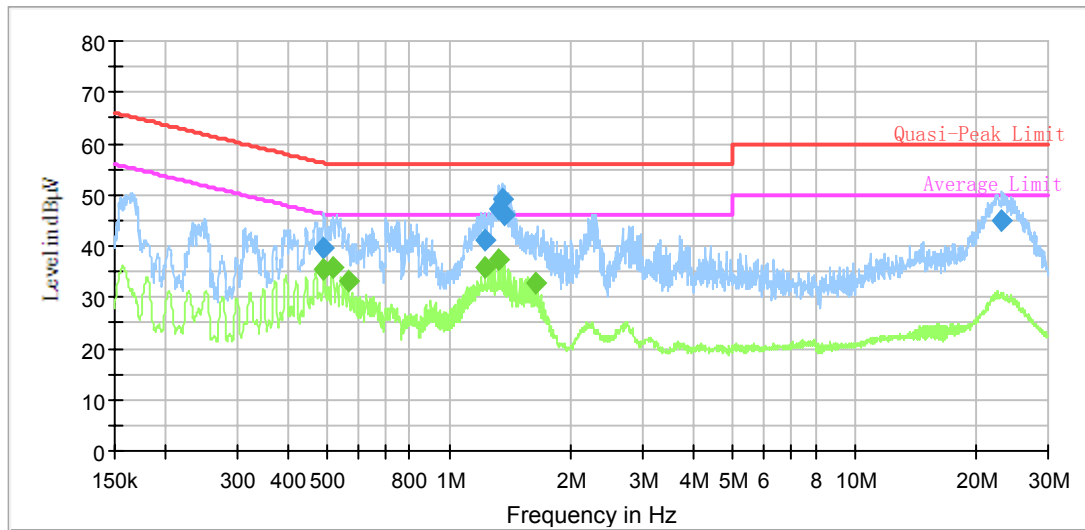
Line:



| Frequency (MHz) | QuasiPeak (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment    |
|-----------------|------------------|-----------------|------|------------|-------------|--------------|------------|
| 0.709870        | 42.0             | 9.000           | L1   | 19.6       | 14.0        | 56.0         | Compliance |
| 0.756739        | 41.9             | 9.000           | L1   | 19.6       | 14.1        | 56.0         | Compliance |
| 1.242055        | 42.5             | 9.000           | L1   | 19.6       | 13.5        | 56.0         | Compliance |
| 1.345395        | 48.0             | 9.000           | L1   | 19.6       | 8.0         | 56.0         | Compliance |
| 1.562892        | 41.6             | 9.000           | L1   | 19.7       | 14.4        | 56.0         | Compliance |
| 2.203825        | 43.4             | 9.000           | L1   | 19.7       | 12.6        | 56.0         | Compliance |

| Frequency (MHz) | Average (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment    |
|-----------------|----------------|-----------------|------|------------|-------------|--------------|------------|
| 0.492477        | 35.0           | 9.000           | L1   | 19.6       | 11.1        | 46.1         | Compliance |
| 0.516668        | 34.3           | 9.000           | L1   | 19.6       | 11.7        | 46.0         | Compliance |
| 0.540965        | 33.9           | 9.000           | L1   | 19.6       | 12.1        | 46.0         | Compliance |
| 1.224805        | 33.7           | 9.000           | L1   | 19.6       | 12.3        | 46.0         | Compliance |
| 1.348086        | 35.9           | 9.000           | L1   | 19.6       | 10.1        | 46.0         | Compliance |
| 1.636389        | 33.3           | 9.000           | L1   | 19.7       | 12.7        | 46.0         | Compliance |

**Neutral:**



| Frequency (MHz) | QuasiPeak (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment    |
|-----------------|------------------|-----------------|------|------------|-------------|--------------|------------|
| 0.492477        | 39.6             | 9.000           | N    | 19.7       | 16.5        | 56.1         | Compliance |
| 1.227254        | 41.1             | 9.000           | N    | 19.7       | 14.9        | 56.0         | Compliance |
| 1.324061        | 47.4             | 9.000           | N    | 19.7       | 8.6         | 56.0         | Compliance |
| 1.348086        | 49.0             | 9.000           | N    | 19.7       | 7.0         | 56.0         | Compliance |
| 1.375291        | 45.9             | 9.000           | N    | 19.7       | 10.1        | 56.0         | Compliance |
| 23.100295       | 45.0             | 9.000           | N    | 20.1       | 15.0        | 60.0         | Compliance |

| Frequency (MHz) | Average (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment    |
|-----------------|----------------|-----------------|------|------------|-------------|--------------|------------|
| 0.492477        | 35.3           | 9.000           | N    | 19.7       | 10.8        | 46.1         | Compliance |
| 0.516668        | 35.8           | 9.000           | N    | 19.7       | 10.2        | 46.0         | Compliance |
| 0.565274        | 33.2           | 9.000           | N    | 19.7       | 12.8        | 46.0         | Compliance |
| 1.227254        | 36.0           | 9.000           | N    | 19.7       | 10.0        | 46.0         | Compliance |
| 1.324061        | 37.2           | 9.000           | N    | 19.7       | 8.8         | 46.0         | Compliance |
| 1.636389        | 32.7           | 9.000           | N    | 19.7       | 13.3        | 46.0         | Compliance |

## **FCC §15.209, §15.205 & §15.407(b) (1) (6) (7) –UNWANTED EMISSION**

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### **Applicable Standard**

FCC §15.407; §15.209; §15.205;

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

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

(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.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.



## Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If  $U_{lab}$  is less than or equal to  $U_{cispr}$  of Table 2, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If  $U_{lab}$  is greater than  $U_{cispr}$  of Table 2, then:

- compliance is deemed to occur if no measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit.

Based on CISPR 16-4-2-2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Chengdu) is:

30M~200MHz:  $\pm 4.7$  dB;

200M~1GHz:  $\pm 6.0$  dB;

1G~6GHz:  $\pm 5.13$  dB;

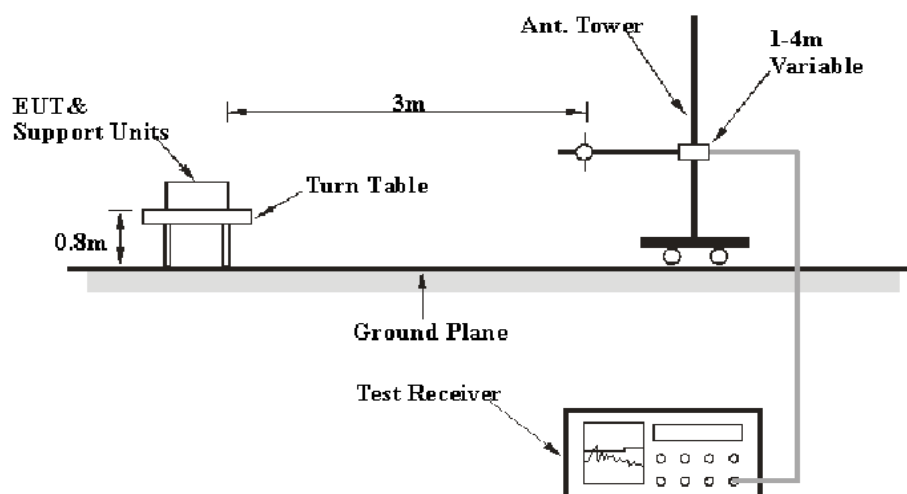
6G~25GHz:  $\pm 5.47$  dB;

Table 2 – Values of  $U_{cispr}$

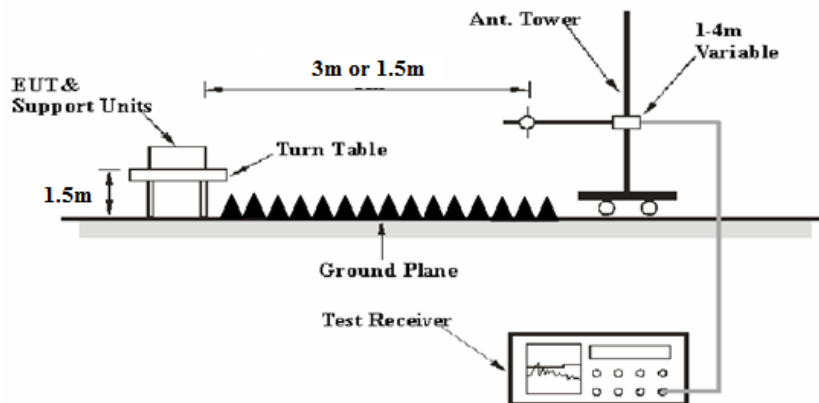
| Measurement  | $U_{cispr}$ |
|--|-------------|
| Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz) | 6.3 dB      |
| Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)                   | 5.2 dB      |
| Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)                  | 5.5 dB      |

## EUT Setup

Below 1 GHz:



### Above 1 GHz:



The radiated emission tests were performed in the 3 meters chamber, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.407 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter connected to a 120 V/60 Hz AC power source,

### EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

| Frequency Range   | RBW     | Video B/W | IF B/W  | Detector |
|-------------------|---------|-----------|---------|----------|
| 30 MHz – 1000 MHz | 120 kHz | 300 kHz   | 120 kHz | QP       |
| Above 1 GHz       | 1MHz    | 3 MHz     | /       | PK       |
|                   | 1MHz    | 10 Hz     | /       | Av       |

### Test Procedure

During the radiated emission test, the adapter was connected to the first AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

According to C63.10-2013, emission shall be computed as:  $E [dB\mu V/m] = EIRP[dBm] + 95.2$ , for  $d = 3$  meters.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Extrapolation result}$$

## Test Equipment List and Details

| Manufacturer          | Description           | Model           | Serial Number   | Calibration Date | Calibration Due Date |
|-----------------------|-----------------------|-----------------|-----------------|------------------|----------------------|
| Agilent               | Amplifier             | 8447D           | 2944A10442      | 2015-12-02       | 2016-12-01           |
| Rohde & Schwarz       | EMI Test Receiver     | ESCI            | 100028          | 2015-12-02       | 2016-12-01           |
| Sunol Sciences        | Broadband Antenna     | JB3             | A101808         | 2016-04-10       | 2019-04-09           |
| Rohde & Schwarz       | Spectrum Analyzer     | FSEM30          | 100018          | 2015-12-02       | 2016-12-01           |
| ETS                   | Horn Antenna          | 3115            | 003-6076        | 2015-12-02       | 2016-12-01           |
| Ducommun Technologies | Horn Antenna          | ARH-4223-02     | 1007726-0113024 | 2014-06-16       | 2017-06-15           |
| Mini-circuits         | Amplifier             | ZVA-183-S+      | 771001215       | 2016-05-20       | 2017-05-19           |
| EMCT                  | Semi-Anechoic Chamber | 966             | N/A             | 2015-04-24       | 2018-04-23           |
| N/A                   | RF Cable (below 1GHz) | NO.1            | N/A             | 2016-11-10       | 2017-11-09           |
| N/A                   | RF Cable (below 1GHz) | NO.4            | N/A             | 2016-11-10       | 2017-11-09           |
| N/A                   | RF Cable (above 1GHz) | NO.2            | N/A             | 2016-11-10       | 2017-11-09           |
| Ducommun Technologies | Horn Antenna          | ARH-2823-02     | 1007726-011312  | 2016-08-18       | 2017-08-18           |
| Quinstar              | Amplifier             | QLW-18405536-JO | 15964001032     | 2016-08-18       | 2017-08-18           |
| Agilent               | Spectrum Analyzer     | 8564E           | 5943A01752      | 2016-08-18       | 2017-08-18           |

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, Section 15.205, 15.209 and Subpart E, section 15.407.

## Test Data

### Environmental Conditions

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 24.1 °C   |
| <b>Relative Humidity:</b> | 60 %      |
| <b>ATM Pressure:</b>      | 101.2 kPa |

*The testing was performed by Tom Tang on 2016-11-24.*

**Result:** Compliance.

*Note 1: the emission compliance 15.209 general requirements, or compliance the outside band emission limits in the un-restricted bands.*

Please refer to the following tables

**30MHz-40GHz:**

5150-5250MHz Band: 802.11a Mode:

| Frequency<br>(MHz)      | Receiver          |          | Rx Antenna     |                | Cable<br>loss<br>(dB) | Amplifier<br>Gain<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|-------------------------|-------------------|----------|----------------|----------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
|                         | Reading<br>(dBμV) | Detector | Polar<br>(H/V) | Factor<br>(dB) |                       |                           |                                    |                   |                |
| Low Channel:5180 MHz    |                   |          |                |                |                       |                           |                                    |                   |                |
| 5180                    | 65.62             | PK       | H              | 31.46          | 5.40                  | 0.00                      | 102.48                             | N/A               | N/A            |
| 5180                    | 51.46             | AV       | H              | 31.46          | 5.40                  | 0.00                      | 88.32                              | N/A               | N/A            |
| 5180                    | 59.76             | PK       | V              | 31.46          | 5.40                  | 0.00                      | 96.62                              | N/A               | N/A            |
| 5180                    | 45.32             | AV       | V              | 31.46          | 5.40                  | 0.00                      | 82.18                              | N/A               | N/A            |
| 5150                    | 27.43             | PK       | H              | 31.40          | 5.26                  | 0.00                      | 64.09                              | 74.00             | 9.91           |
| 5150                    | 16.33             | AV       | H              | 31.40          | 5.26                  | 0.00                      | 52.99                              | 54.00             | 1.01           |
| 10360                   | 30.62             | PK       | H              | 36.97          | 8.36                  | 25.52                     | 50.43                              | 74.00             | 23.57          |
| 10360                   | 30.25             | AV       | H              | 36.97          | 8.36                  | 25.52                     | 50.06                              | 54.00             | 3.94           |
| 1663                    | 43.16             | PK       | H              | 23.93          | 2.90                  | 27.72                     | 42.27                              | 74.00             | 31.73          |
| 1663                    | 42.86             | AV       | H              | 23.93          | 2.90                  | 27.72                     | 41.97                              | 54.00             | 12.03          |
| 1995                    | 38.67             | PK       | H              | 24.59          | 3.12                  | 27.48                     | 38.90                              | 74.00             | 35.10          |
| 1995                    | 38.92             | AV       | H              | 24.59          | 3.12                  | 27.48                     | 39.15                              | 54.00             | 14.85          |
| 307.42                  | 44.69             | QP       | V              | 14.29          | 1.10                  | 27.57                     | 32.51                              | 46.00             | 13.49          |
| 364.65                  | 43.75             | QP       | V              | 15.70          | 1.47                  | 27.95                     | 32.97                              | 46.00             | 13.03          |
| Middle Channel:5200 MHz |                   |          |                |                |                       |                           |                                    |                   |                |
| 5200                    | 64.55             | PK       | H              | 31.50          | 5.49                  | 0.00                      | 101.54                             | N/A               | N/A            |
| 5200                    | 49.40             | AV       | H              | 31.50          | 5.49                  | 0.00                      | 86.39                              | N/A               | N/A            |
| 5200                    | 63.37             | PK       | V              | 31.50          | 5.49                  | 0.00                      | 100.36                             | N/A               | N/A            |
| 5200                    | 44.53             | AV       | V              | 31.50          | 5.49                  | 0.00                      | 81.52                              | N/A               | N/A            |
| 10400                   | 30.22             | PK       | H              | 36.98          | 8.32                  | 25.50                     | 50.02                              | 74.00             | 23.98          |
| 10400                   | 30.84             | AV       | H              | 36.98          | 8.32                  | 25.50                     | 50.64                              | 54.00             | 3.36           |
| 1663                    | 44.05             | PK       | H              | 23.93          | 2.90                  | 27.72                     | 43.16                              | 74.00             | 30.84          |
| 1663                    | 43.82             | AV       | H              | 23.93          | 2.90                  | 27.72                     | 42.93                              | 54.00             | 11.07          |
| 1995                    | 38.50             | PK       | H              | 24.59          | 3.12                  | 27.48                     | 38.73                              | 74.00             | 35.27          |
| 1995                    | 39.38             | AV       | H              | 24.59          | 3.12                  | 27.48                     | 39.61                              | 54.00             | 14.39          |
| 307.42                  | 44.89             | QP       | V              | 14.29          | 1.10                  | 27.57                     | 32.71                              | 46.00             | 13.29          |
| 364.65                  | 43.86             | QP       | V              | 15.70          | 1.47                  | 27.95                     | 33.08                              | 46.00             | 12.92          |
| High Channel:5240 MHz   |                   |          |                |                |                       |                           |                                    |                   |                |
| 5240                    | 64.17             | PK       | H              | 31.58          | 5.28                  | 0.00                      | 101.03                             | N/A               | N/A            |
| 5240                    | 48.77             | AV       | H              | 31.58          | 5.28                  | 0.00                      | 85.63                              | N/A               | N/A            |
| 5240                    | 57.64             | PK       | V              | 31.58          | 5.28                  | 0.00                      | 94.50                              | N/A               | N/A            |
| 5240                    | 42.49             | AV       | V              | 31.58          | 5.28                  | 0.00                      | 79.35                              | N/A               | N/A            |
| 5350                    | 28.31             | PK       | H              | 31.80          | 5.61                  | 0.00                      | 65.72                              | 74.00             | 8.28           |
| 5350                    | 16.20             | AV       | H              | 31.80          | 5.61                  | 0.00                      | 53.61                              | 54.00             | 0.39           |
| 10480                   | 29.81             | PK       | H              | 37.00          | 8.23                  | 26.01                     | 49.03                              | 74.00             | 24.97          |
| 10480                   | 30.66             | AV       | H              | 37.00          | 8.23                  | 26.01                     | 49.88                              | 54.00             | 4.12           |
| 1663                    | 43.84             | PK       | H              | 23.93          | 2.90                  | 27.72                     | 42.95                              | 74.00             | 31.05          |
| 1663                    | 42.42             | AV       | H              | 23.93          | 2.90                  | 27.72                     | 41.53                              | 54.00             | 12.47          |
| 1995                    | 38.58             | PK       | H              | 24.59          | 3.12                  | 27.48                     | 38.81                              | 74.00             | 35.19          |
| 1995                    | 39.55             | AV       | H              | 24.59          | 3.12                  | 27.48                     | 39.78                              | 54.00             | 14.22          |
| 307.42                  | 45.06             | QP       | V              | 14.29          | 1.10                  | 27.57                     | 32.88                              | 46.00             | 13.12          |
| 364.65                  | 44.14             | QP       | V              | 15.70          | 1.47                  | 27.95                     | 33.36                              | 46.00             | 12.64          |

## **FCC §15.407(a)&15.407 (e) –EMISSION BANDWIDTH**

### **Applicable Standard**

15.407(a)

### **Test Equipment List and Details**

| <b>Manufacturer</b> | <b>Description</b> | <b>Model</b> | <b>Serial Number</b> | <b>Calibration Date</b> | <b>Calibration Due Date</b> |
|---------------------|--------------------|--------------|----------------------|-------------------------|-----------------------------|
| Rohde & Schwarz     | Signal Analyzer    | FSIQ26       | 831929/005           | 2016-09-21              | 2017-09-20                  |
| N/A                 | RF Cable           | N/A          | N/A                  | Each Time               | /                           |

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### **Test Procedure**

1. According to KDB789033 D02 General U-NII Test Procedures New Rules v01r03

### **Test Data**

#### **Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 29.8 °C   |
| <b>Relative Humidity:</b> | 39 %      |
| <b>ATM Pressure:</b>      | 101.2 kPa |

*The testing was performed by Tom Tang on 2016-11-26.*

**Test Result:** Pass.

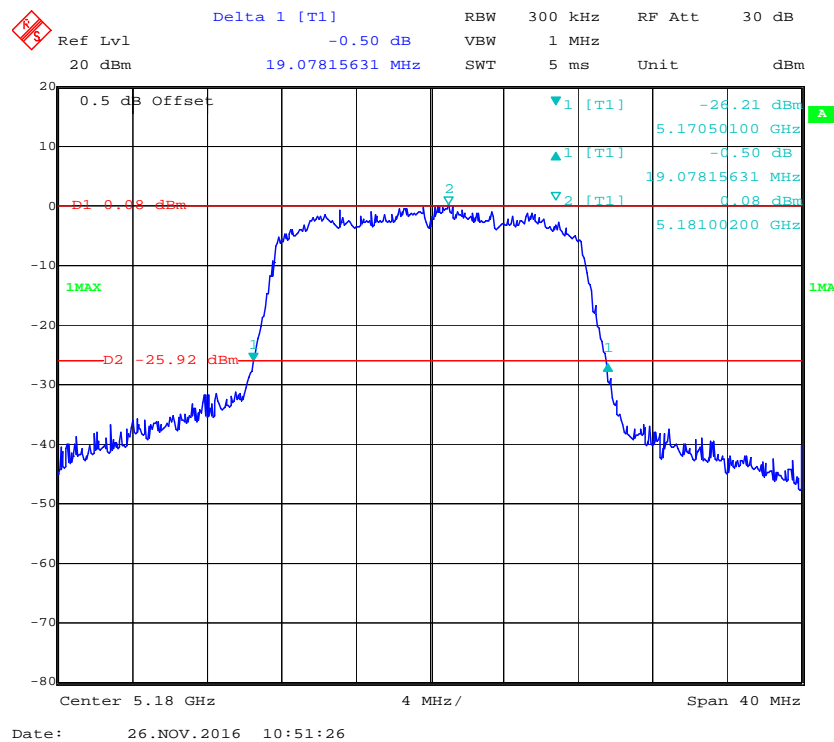
Please refer to the following tables and plots.

*Test mode: Transmitting*

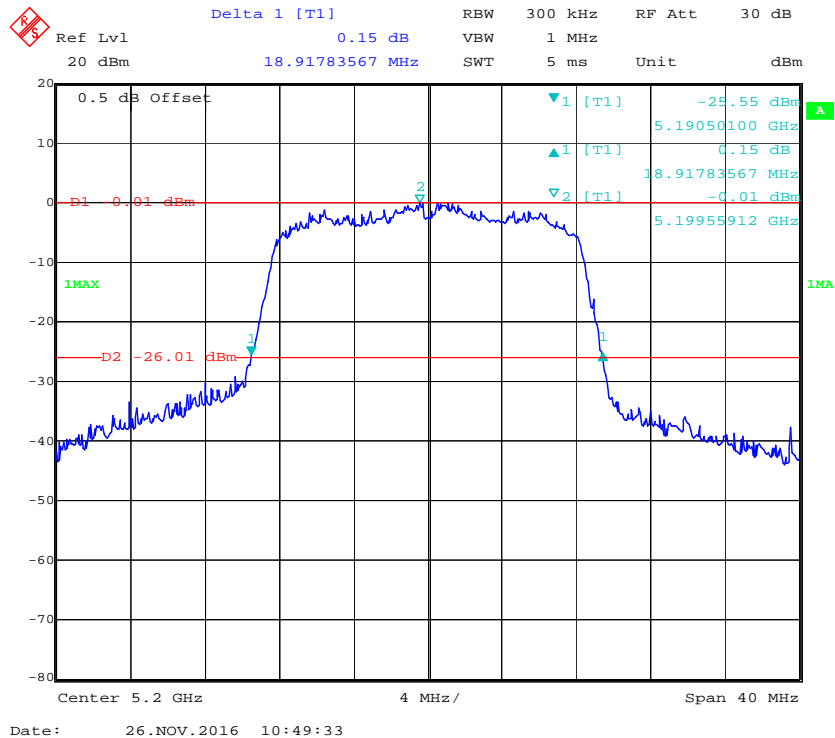
| Mode     | Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|----------|---------|-----------------|--------------------------------|
| 802.11 a | Low     | 5180            | 19.08                          |
|          | Middle  | 5200            | 18.92                          |
|          | High    | 5240            | 18.92                          |

5150-5250MHz:

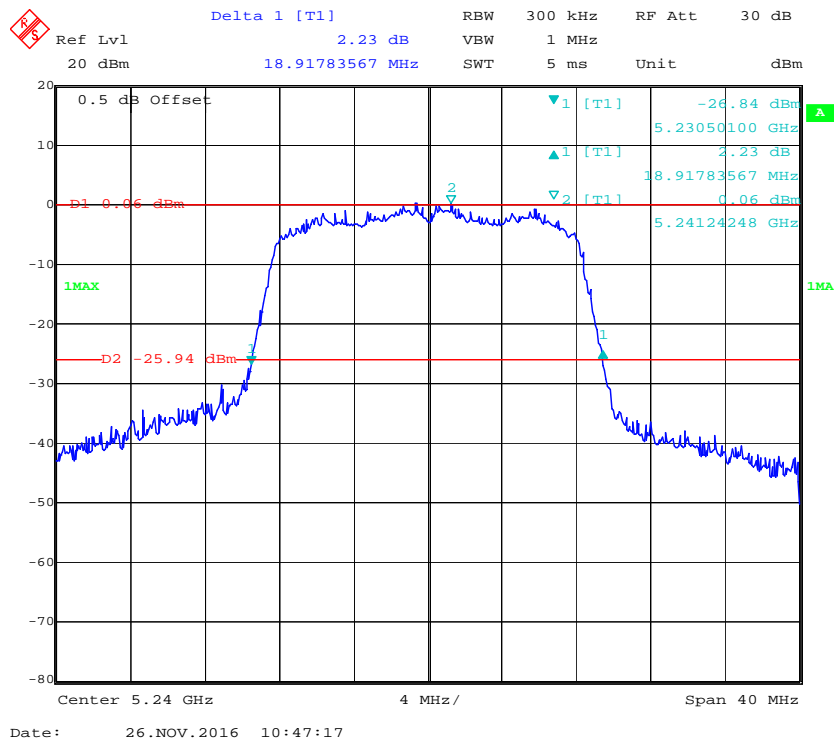
### 802.11a Low Channel



### 802.11a Middle Channel



### 802.11a High Channel





## **FCC §15.407(A) (1) (II) (4) –MAXIMUM CONDUCTED OUTPUT POWER**

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### **Applicable Standard**

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor 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 provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) 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 provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points 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. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For 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 provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, 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, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna

exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple colocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is

professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Note to paragraph (a)(3): The Commission strongly recommends that parties employing U-NII devices to provide critical communications services should determine if there are any nearby Government radar systems that could affect their operation.

(4) The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

(5) The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

## Test Equipment List and Details

| Manufacturer | Description           | Model  | Serial Number | Calibration Date | Calibration Due Date |
|--------------|-----------------------|--------|---------------|------------------|----------------------|
| Agilent      | Wideband Power Sensor | N1921A | MY54170074    | 2016-01-03       | 2017-01-03           |
| Agilent      | P-Series Power Meter  | N1912A | MY5000798     | 2016-01-03       | 2017-01-03           |
| N/A          | RF Cable              | N/A    | N/A           | Each Time        | /                    |

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Procedure

According to KDB789033 D02 General U-NII Test Procedures New Rules v01r03

## Test Data

### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 29.8 °C   |
| Relative Humidity: | 39 %      |
| ATM Pressure:      | 101.2 kPa |

*The testing was performed by Tom Tang on 2016-11-26.*

*Test Mode: Transmitting*

| Mode     | Channel | Frequency (MHz) | RMS Channel Power (dBm) | Limit (dBm) |
|----------|---------|-----------------|-------------------------|-------------|
| 802.11 a | Low     | 5180            | 7.84                    | 24          |
|          | Middle  | 5200            | 7.78                    | 24          |
|          | High    | 5240            | 7.84                    | 24          |

## **FCC §15.407(a) - POWER SPECTRAL DENSITY**

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### **Applicable Standard**

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor 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 provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) 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 provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points 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. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For 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 provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, 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, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna

exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple colocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is

professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Note to paragraph (a)(3): The Commission strongly recommends that parties employing U-NII devices to provide critical communications services should determine if there are any nearby Government radar systems that could affect their operation.

(4) The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

(5) The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

## Test Procedure

According to KDB 789033 D02 General U-NII Test Procedures New Rules v01r03

## Test Equipment List and Details

| Manufacturer    | Description     | Model  | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-----------------|--------|---------------|------------------|----------------------|
| Rohde & Schwarz | Signal Analyzer | FSIQ26 | 831929/005    | 2016-09-21       | 2017-09-20           |
| N/A             | RF Cable        | N/A    | N/A           | Each Time        | /                    |

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 29.8 °C   |
| Relative Humidity: | 39 %      |
| ATM Pressure:      | 101.2 kPa |

*The testing was performed by Tom Tang on 2016-11-26.*

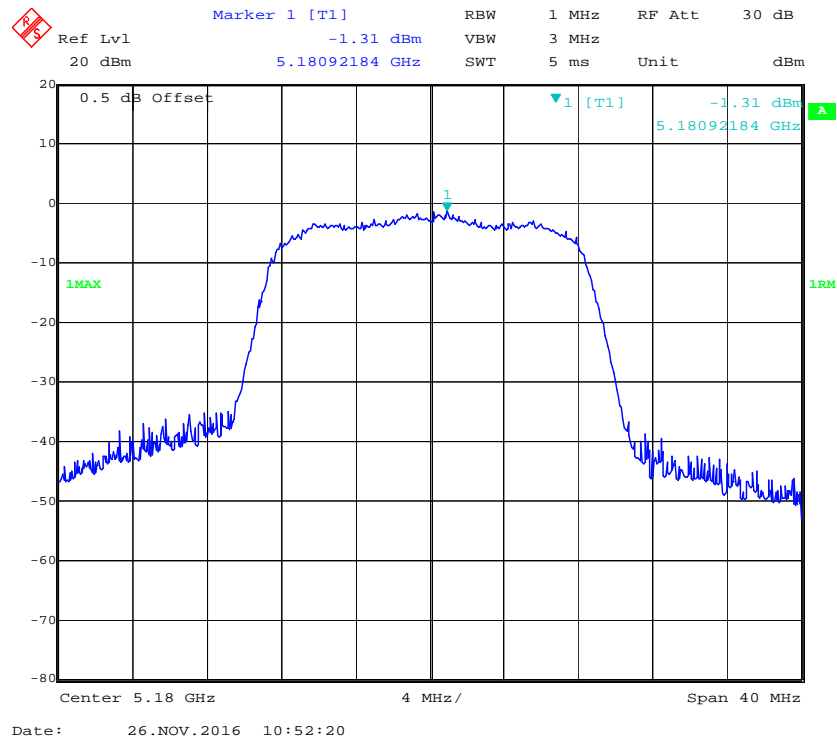
**Test Result: Compliance.**

Test Mode: Transmitting

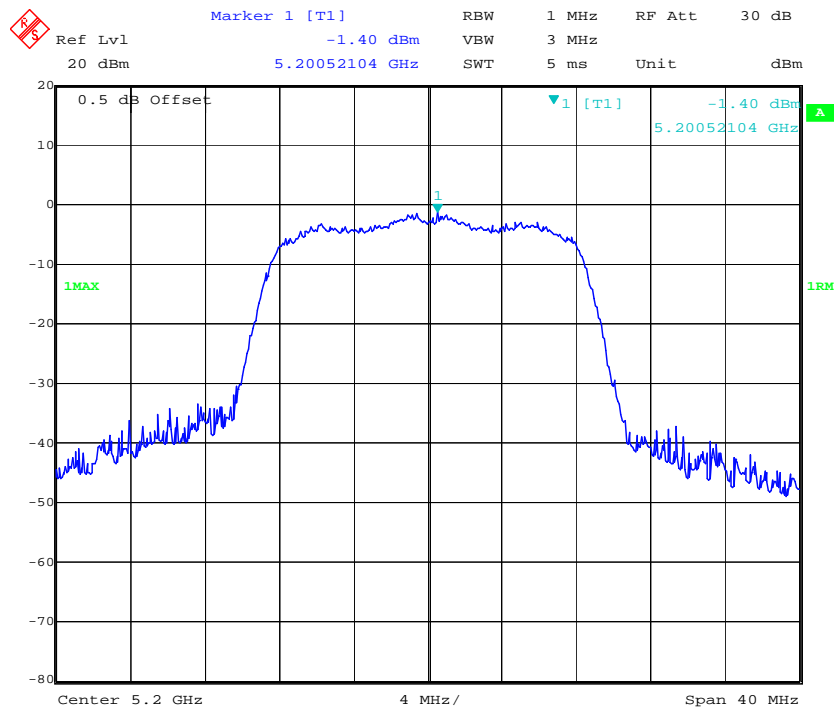
| Mode     | Channel | Frequency (MHz) | Power Spectral Density (dBm/MHz) | Limit (dBm/MHz) |
|----------|---------|-----------------|----------------------------------|-----------------|
| 802.11 a | Low     | 5180            | -1.31                            | 11              |
|          | Middle  | 5200            | -1.4                             | 11              |
|          | High    | 5240            | -1.68                            | 11              |

5150-5250MHz:

### Power Spectral Density, 802.11a Low Channel

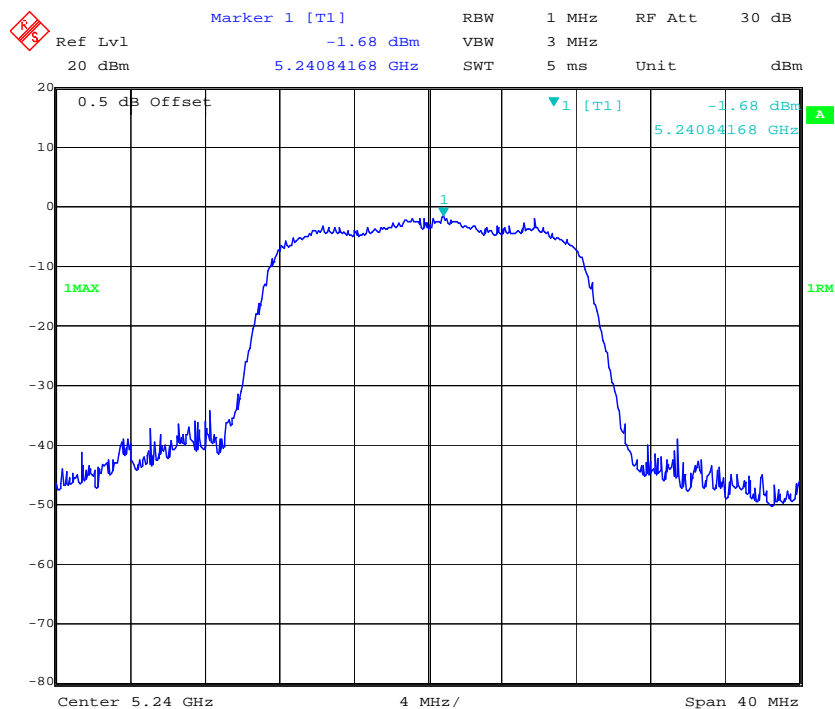


### Power Spectral Density, 802.11a Middle Channel



Date: 26.NOV.2016 10:50:28

### Power Spectral Density, 802.11a High Channel



Date: 26.NOV.2016 10:48:12

\*\*\*\*\* END OF REPORT \*\*\*\*\*