

# TEST REPORT

*For*

**Applicant** : Shenzhen Wanchuangbo Industry Development Co., Ltd.

**Address** : LOOR 3-4, BUILDING 4, NO.7 LIPU STREET, BANTIAN AREA,  
LONGGANG DISTRICT, SHENZHEN, CHINA

**Product Name** : Mini (Portable) Projector

**Model Name** : P100A, P200A, P300A, P400A, P500A,  
Z100A, Z200A, Z300A, Z400A, Z500A

**Brand Name** : iDea USA & Z-EDGE

**FCC ID** : 2AAGR15P-01

**Report No.** : MTE/DYY/A15101367

**Date of Issue** : Oct. 15, 2015

**Issued by** : Most Technology Service Co., Ltd.

**Address** : No.5, 2nd Langshan Road, North District, Hi-tech Industrial Park,  
Nanshan, Shenzhen, Guangdong, China

**Tel** : 86-755-8602 6850

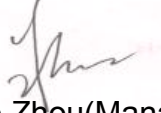
**Fax** : 86-755-2601 3350

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## VERIFICATION OF CONFORMITY

**EUT:** Mini (Portable) Projector  
**Brand Name:** iDea USA & Z-EDGE  
**Model Number:** P100A  
**FCC ID:** 2AAGR15P-01  
**Applicant:** Shenzhen Wanchuangbo Industry Development Co., Ltd.  
LOOR 3-4, BUILDING 4, NO.7 LIPU STREET, BANTIAN AREA,  
LONGGANG DISTRICT, SHENZHEN, CHINA  
**Manufacturer:** Shenzhen Wanchuangbo Industry Development Co., Ltd.  
LOOR 3-4, BUILDING 4, NO.7 LIPU STREET, BANTIAN AREA,  
LONGGANG DISTRICT, SHENZHEN, CHINA  
**Technical Standards:** 47 CFR Part 15 Subpart E  
**File Number:** MTE/DYY/A15101367  
**Date of test:** Aug.14 - Oct.13, 2015  
**Deviation:** None  
**Condition of Test Sample:** Normal  
**Test Result:** PASS

The above equipment was tested by Most Technology Service Co., Ltd. for compliance with the requirements set forth in FCC rules and the Technical Standards mentioned above. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment and the level of the immunity endurance of the equipment are within the compliance requirements. The test results of this report relate only to the tested sample identified in this report.

Tested by (+ signature):   
Daisy Yu Aug.14 - Oct.13, 2015  
Review by (+ signature):   
Henry Chen Oct. 15, 2015  
Approved by (+ signature):   
Yvette Zhou(Manager) Oct. 15, 2015



# 1. GENERAL INFORMATION

## 1.1 Product Information

|                                      |                                                                                     |                                                                                     |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Product                              | Mini (Portable) Projector                                                           |                                                                                     |
| Brand Name                           | iDea USA & Z-EDGE                                                                   |                                                                                     |
| Model Number                         | P100A                                                                               |                                                                                     |
| Series Model Name:                   | P200A, P300A, P400A, P500A, Z100A, Z200A, Z300A, Z400A, Z500A                       |                                                                                     |
| Series Model Difference description: | Only difference in the model name.                                                  |                                                                                     |
| Power Supply                         | 1. DC 5V by AC adapter 100-240V, 50/60Hz<br>2. DC 7.4V by Battery                   |                                                                                     |
| Frequency Range                      | 5150 MHz ~ 5250 MHz, 5725 MHz ~ 5850 MHz                                            |                                                                                     |
| Modulation Technique                 | OFDM                                                                                |                                                                                     |
| Modulation Type:                     | BPSK, QPSK, 16QAM, 64QAM                                                            |                                                                                     |
| Channel Number                       | 5150 MHz ~ 5250 MHz:<br>802.11 a Mode: 4 channels<br>802.11 an 20M Mode: 4 channels | 5725 MHz ~ 5850 MHz:<br>802.11 a Mode: 5 channels<br>802.11 an 20M Mode: 5 channels |
| Antenna Type                         | Internal PCB Antenna, 2dBi                                                          |                                                                                     |
| Temperature Range                    | -10°C ~ +70°C                                                                       |                                                                                     |

### NOTE:

1. For a more detailed features description about the EUT, please refer to User's Manual.

## 1.2 Objective

The objective of the report is to perform tests according to FCC Part 15 Subpart E for the EUT FCC ID Certification:

| No. | Identity       | Document Title                                                                                                               |
|-----|----------------|------------------------------------------------------------------------------------------------------------------------------|
| 1   | 47 CFR Part 15 | Radio Frequency Devices                                                                                                      |
| 2   | KDB 789033     | GUIDELINES FOR COMPLIANCE TESTING OF<br>UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)<br>DEVICES PART 15, SUBPART E |

### 1.3 Test Standards and Results

| No. | Section                            | Test Items                               | Result | Date of Test |
|-----|------------------------------------|------------------------------------------|--------|--------------|
| 1   | 15.203                             | Antenna Requirement                      | --     | 2015-10-09   |
| 2   | 15.407(f),                         | RF Exposure                              | PASS   | 2015-10-13   |
| 3   | --                                 | Duty Cycle                               | PASS   | 2015-10-13   |
| 4   | 15.207&15.407(b)                   | Conducted Emission                       | PASS   | 2015-08-14   |
| 5   | 15.407(a)(5)                       | 26dB Bandwidth                           | PASS   | 2015-10-13   |
| 6   | 15.407(e)(only for 5.725-5.85GHz), | 6dB Bandwidth                            | PASS   | 2015-10-13   |
| 7   | 15.407(a)                          | Maximum Conducted Output Power           | PASS   | 2015-10-13   |
| 8   | 15.407(a)                          | Power Spectral Density                   | PASS   | 2015-10-13   |
| 9   | 15.205&15.209&15.407(b)            | Radiated Spurious Emission and Band Edge | PASS   | 2015-10-09   |
| 10  | 15.407(b)                          | Conducted Spurious Emission              | PASS   | 2015-10-13   |

Note: 1. The test result judgment is decided by the limit of measurement standard  
2. The information of measurement uncertainty is available upon the customer's request.

### 1.4 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

## 2. TEST METHODOLOGY

### 2.1 TEST FACILITY

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Site:</b>    | Most Technology Service Co., Ltd                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Location:</b>     | No.5, Langshan 2nd Rd., North Hi-Tech Industrial park, Nanshan, Shenzhen, Guangdong, China                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description:</b>  | <p>There is one 3m semi-anechoic an area test sites and two line conducted labs for final test. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2009 and CISPR 16 requirements.</p> <p>The FCC Registration Number is <b>490827</b>. The <b>IC</b> Registration Number is <b>7103A-1</b>.</p>                                                                                                                                                                                                                                                                                                                        |
| <b>Site Filing:</b>  | The site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Instrument</b>    | All measuring equipment is in accord with ANSI C63.4:2009 and CISPR 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Tolerance:</b>    | requirements that meet industry regulatory agency and accreditation agency requirement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Ground Plane:</b> | Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna. |

### 2.2 GENERAL TEST PROCEDURES

#### Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 8.3.1 of ANSI C63.4:2009.

#### Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 7.3 of ANSI C63.4:2009, Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

### 3. SETUP OF EQUIPMENT UNDER TEST

#### 3.1 SETUP CONFIGURATION OF EUT

See test setup photographs for the actual connections between EUT and support equipment.

#### 3.2 SUPPORT EQUIPMENT

| Device Type | Manufacturer | Model Name | Serial No. | Data Cable          | Power Cable         |
|-------------|--------------|------------|------------|---------------------|---------------------|
| Notebook    | Lenovo       | E425       | R9-KZL4B   | 1.6m<br>Un-shielded | 1.8m<br>Un-shielded |

*Remark:*

*All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

### 3.3 TEST EQUIPMENT LIST

**Instrumentation:** The following list contains equipment used at Most for testing. The equipment conforms to the CISPR 16-1 / ANSI C63.2 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 10 kHz to 1.0 GHz or above.

| No. | Equipment                            | Manufacturer      | Model No.      | S/N         | Calibration date | Calibration Interval |
|-----|--------------------------------------|-------------------|----------------|-------------|------------------|----------------------|
| 1   | Test Receiver                        | Rohde & Schwarz   | ESCI           | 100492      | 2015/03/10       | 1 Year               |
| 2   | L.I.S.N.                             | Rohde & Schwarz   | ENV216         | 100093      | 2015/03/10       | 1 Year               |
| 3   | Coaxial Switch                       | Anritsu Corp      | MP59B          | 6200283933  | 2015/03/10       | 1 Year               |
| 4   | Terminator                           | Hubersuhner       | 50Ω            | No.1        | 2015/03/10       | 1 Year               |
| 5   | RF Cable                             | SchwarzBeck       | N/A            | No.1        | 2015/03/10       | 1 Year               |
| 6   | Test Receiver                        | Rohde & Schwarz   | ESPI           | 101202      | 2015/03/10       | 1 Year               |
| 7   | Bilog Antenna                        | Sunol             | JB3            | A121206     | 2015/03/10       | 1 Year               |
| 8   | Horn Antenna                         | SCHWARZBECK       | BBHA9120D      | 756         | 2015/03/10       | 1 Year               |
| 9   | Horn Antenna                         | Penn Engineering  | 9034           | 8376        | 2015/03/10       | 1 Year               |
| 10  | Cable                                | Resenberger       | N/A            | NO.1        | 2015/03/10       | 1 Year               |
| 11  | Cable                                | SchwarzBeck       | N/A            | NO.2        | 2015/03/10       | 1 Year               |
| 12  | Cable                                | SchwarzBeck       | N/A            | NO.3        | 2015/03/10       | 1 Year               |
| 13  | DC Power Filter                      | DuoJi             | DL2×30B        | N/A         | 2015/03/10       | 1 Year               |
| 14  | Single Phase Power Line Filter       | DuoJi             | FNF 202B30     | N/A         | 2015/03/10       | 1 Year               |
| 15  | 3 Phase Power Line Filter            | DuoJi             | FNF 402B30     | N/A         | 2015/03/10       | 1 Year               |
| 16  | Test Receiver                        | Rohde & Schwarz   | ESCI           | 100492      | 2015/03/10       | 1 Year               |
| 17  | Absorbing Clamp                      | Luthi             | MDS21          | 3635        | 2015/03/10       | 1 Year               |
| 18  | Coaxial Switch                       | Anritsu Corp      | MP59B          | 6200283933  | 2015/03/10       | 1 Year               |
| 19  | AC Power Source                      | Kikusui           | AC40MA         | LM003232    | 2015/03/10       | 1 Year               |
| 20  | Test Analyzer                        | Kikusui           | KHA1000        | LM003720    | 2015/03/10       | 1 Year               |
| 21  | Line Impendence Network              | Kikusui           | LIN40MA-PCR-L  | LM002352    | 2015/03/10       | 1 Year               |
| 22  | ESD Tester                           | Kikusui           | KES4021        | LM003537    | 2015/03/10       | 1 Year               |
| 23  | EMC PRO System                       | EM Test           | UCS-500-M4     | V0648102026 | 2015/03/10       | 1 Year               |
| 24  | Signal Generator                     | IFR               | 2032           | 203002/100  | 2015/03/10       | 1 Year               |
| 25  | Amplifier                            | A&R               | 150W1000       | 301584      | 2015/03/10       | 1 Year               |
| 26  | CDN                                  | FCC               | FCC-801-M2-25  | 47          | 2015/03/10       | 1 Year               |
| 27  | CDN                                  | FCC               | FCC-801-M3-25  | 107         | 2015/03/10       | 1 Year               |
| 28  | EM Injection Clamp                   | FCC               | F-203I-23mm    | 403         | 2015/03/10       | 1 Year               |
| 29  | RF Cable                             | MIYAZAKI          | N/A            | No.1/No.2   | 2015/03/10       | 1 Year               |
| 30  | Universal Radio Communication Tester | ROHDE&SCHWARZ     | CMU200         | 0304789     | 2015/03/10       | 1 Year               |
| 31  | Telecommunication Antenna            | European Antennas | PSA 75301R/170 | 0304213     | 2015/03/10       | 1 Year               |
| 32  | Telecommunication Test Equipment     | R&S               | CMU200         | N/A         | 2015/03/10       | 1 Year               |
| 33  | 8 Loop Antenna                       | ARA               | PLA-1030/B     | 1029        | 2015/03/10       | 1 Year               |
| 34  | Spectrum Analyzer                    | Agilent           | E7405A         | US44210471  | 2015/03/10       | 1 Year               |
| 35  | Spectrum Analyzer                    | Agilent           | E4446A         | MY44020154  | 2015/03/10       | 1 Year               |

**NOTE:** Equipments listed above have been calibrated and are in the period of validation.

## **4. 47 CFR Part 15E Requirements**

### **4.1 ANTENNA REQUIREMENT**

#### **4.1.1 Applicable Standard**

According to FCC § 15.203, each applicant for equipment certification must provide a list of all antenna types that may be used with the transmitter, indicating the maximum permissible antenna gain (in dBi). 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.

#### **4.1.2 Evaluation Criteria**

(a) Antenna must be permanently attached to the unit.

(b) Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, Installer shall be responsible for verifying that the correct antenna is employed with the unit.

#### **4.1.3 Result: Compliance.**

The EUT has one integral antenna arrangement, which was permanently attached and the antenna gain is 2 dBi, fulfill the requirement of this section.

## 4.2 RF EXPOSURE

### 4.2.1 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.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

| (B) Limits for General Population/Uncontrolled Exposure |                               |                               |                                     |                          |
|---------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| Frequency range (MHz)                                   | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
| 0.3-1.34                                                | 614                           | 1.63                          | *100                                | 30                       |
| 1.34-30                                                 | 824/f                         | 2.19/f                        | *180/f <sup>2</sup>                 | 30                       |
| 30-300                                                  | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300-1,500                                               |                               |                               | f/1500                              | 30                       |
| 1,500-100,000                                           |                               |                               | 1.0                                 | 30                       |

f = frequency in MHz; \* = Plane-wave equivalent power density;  
According to §1.1310 and §2.1091 RF exposure is calculated.

#### Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$  = power density (in appropriate units, e.g. mW/cm<sup>2</sup>);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

### 4.2.2 Result:

| Frequency (MHz) | Antenna Gain |           | Conducted Power |       | Evaluation Distance(cm) | Power Density (mW/cm <sup>2</sup> ) | MPE Limit (mW/cm <sup>2</sup> ) |
|-----------------|--------------|-----------|-----------------|-------|-------------------------|-------------------------------------|---------------------------------|
|                 | (dBi)        | (numeric) | (dBm)           | (mW)  |                         |                                     |                                 |
| 5785            | 2            | 1.58      | 10.21           | 11.32 | 20                      | 0.0036                              | 1                               |

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

**Result: Compliance**

## 4.3 Duty Cycle

### 4.3.1 Measurement:

| Measurement Parameter |                                 |
|-----------------------|---------------------------------|
| Detector:             | Peak                            |
| Sweep Time:           | Auto                            |
| Resolution Bandwidth: | 10MHz                           |
| Video Bandwidth:      | 10MHz                           |
| Span:                 | Zero                            |
| Trace-Mode:           | Video trigger/view/single sweep |

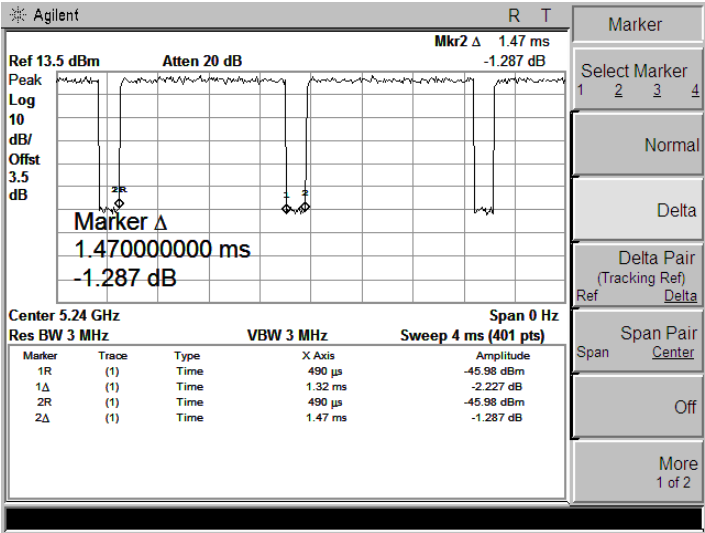
### 4.3.2 Results:

| Mode          | Duty cycle | Correction Factor |
|---------------|------------|-------------------|
| 802.11 a      | 0.90       | 0.43              |
| 802.11 an 20M | 0.90       | 0.46              |

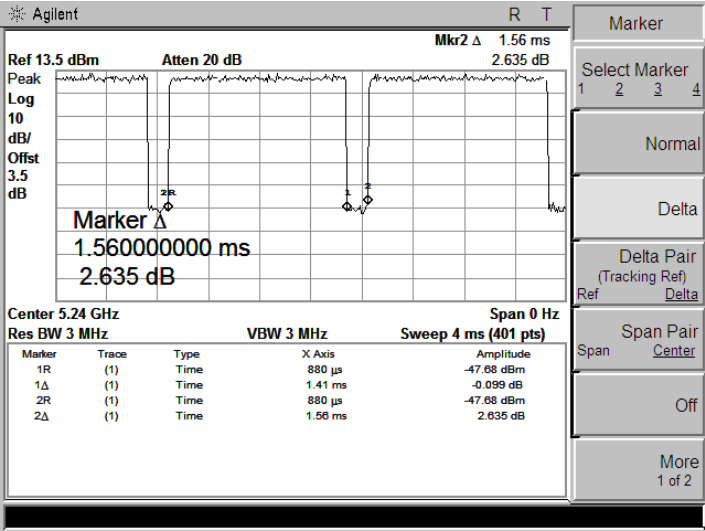
**Note:** Correction Factor= $10\log(1/\text{Duty Cycle})$

Please refer the following pages.

Duty Cycle



802.11 an 20M



802.11 a

## 4.4 AC Power Line Conducted Emission

### 4.4.1 Requirement

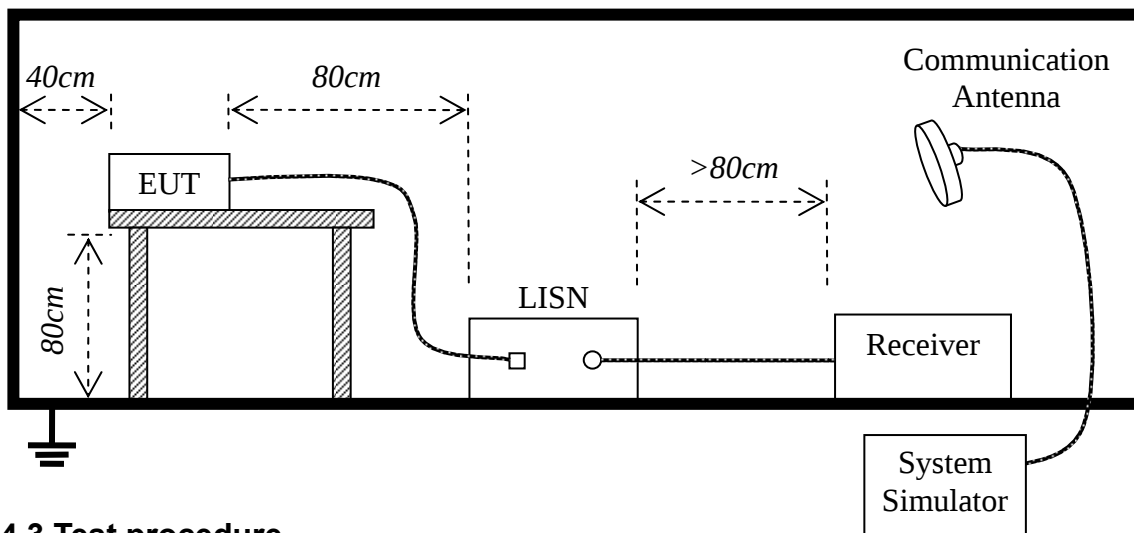
A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the and 150 kHz-30 MHz, shall not exceed the limits in the following table:

| Frequency     | Maximum RF Line Voltage |                |
|---------------|-------------------------|----------------|
|               | Q.P.( dBuV)             | Average( dBuV) |
| 150kHz-500kHz | 66-56                   | 56-46          |
| 500kHz-5MHz   | 56                      | 46             |
| 5MHz-30MHz    | 60                      | 50             |

**\*\*Note:** 1. the lower limit shall apply at the band edges.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz

### 4.4.2 Block Diagram of Test Setup



### 4.4.3 Test procedure

1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.
2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).
3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2009 on conducted measurement.
4. The bandwidth of test receiver (ESCI) set at 9 KHz.
5. All data was recorded in the Quasi-peak and average detection mode.

### 4.4.4 Test Result

Pass

Note: All test modes are performed, only the worst case is recorded in this report.

Please refer the following pages.

### Conducted Emission Measurement

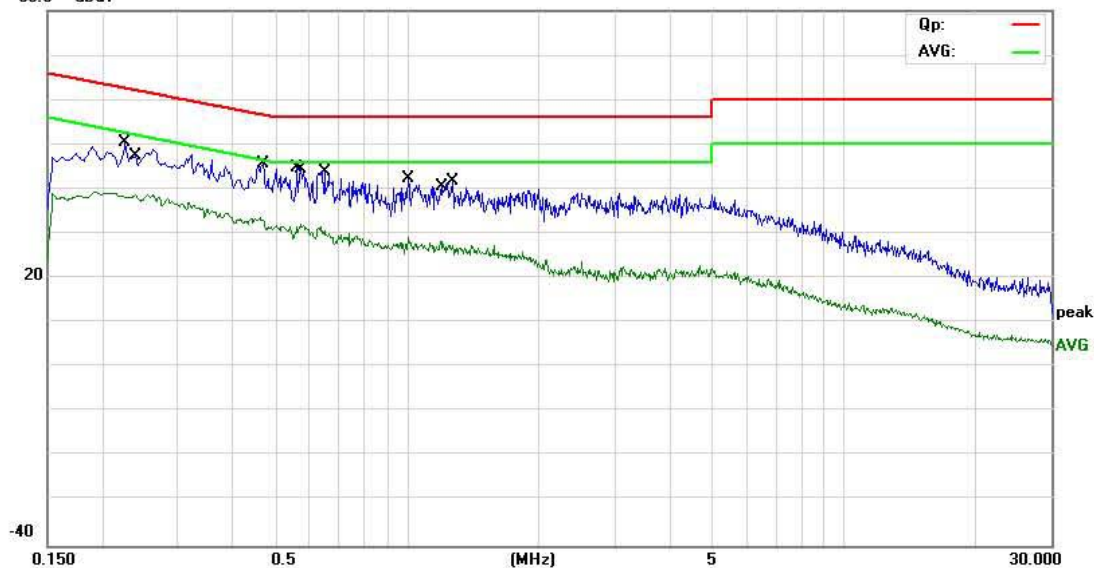
File: ORT-P200A

Data: #7

Date: 15/08/14/

Time: 9/35/12

80.0 dBuV



Site: MOST #1

Phase: N

Temperature: 23.4

Limit: FCC Part15 C Class B QP

Power: DC 5.0V by Adapter

Humidity: 52.7 %

EUT: Mini (Portable) Projector

M/N: P100A

Mode: 802.11a

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.2260       | 38.57                    | 11.83                   | 50.40                    | 62.60         | -12.20     | QP       |         |
| 2   |     | 0.2380       | 26.97                    | 11.75                   | 38.72                    | 52.17         | -13.45     | AVG      |         |
| 3   |     | 0.4620       | 23.30                    | 10.25                   | 33.55                    | 46.66         | -13.11     | AVG      |         |
| 4   | *   | 0.4700       | 35.39                    | 10.20                   | 45.59                    | 56.51         | -10.92     | QP       |         |
| 5   |     | 0.5620       | 34.71                    | 10.00                   | 44.71                    | 56.00         | -11.29     | QP       |         |
| 6   |     | 0.5740       | 22.21                    | 10.00                   | 32.21                    | 46.00         | -13.79     | AVG      |         |
| 7   |     | 0.6380       | 21.50                    | 10.00                   | 31.50                    | 46.00         | -14.50     | AVG      |         |
| 8   |     | 0.6500       | 33.83                    | 10.00                   | 43.83                    | 56.00         | -12.17     | QP       |         |
| 9   |     | 1.0060       | 32.31                    | 9.99                    | 42.30                    | 56.00         | -13.70     | QP       |         |
| 10  |     | 1.0060       | 19.28                    | 9.99                    | 29.27                    | 46.00         | -16.73     | AVG      |         |
| 11  |     | 1.1940       | 18.49                    | 9.81                    | 28.30                    | 46.00         | -17.70     | AVG      |         |
| 12  |     | 1.2740       | 32.14                    | 9.73                    | 41.87                    | 56.00         | -14.13     | QP       |         |

\*:Maximum data x:Over limit l:over margin

Engineer Signature: lidegan

### Conducted Emission Measurement

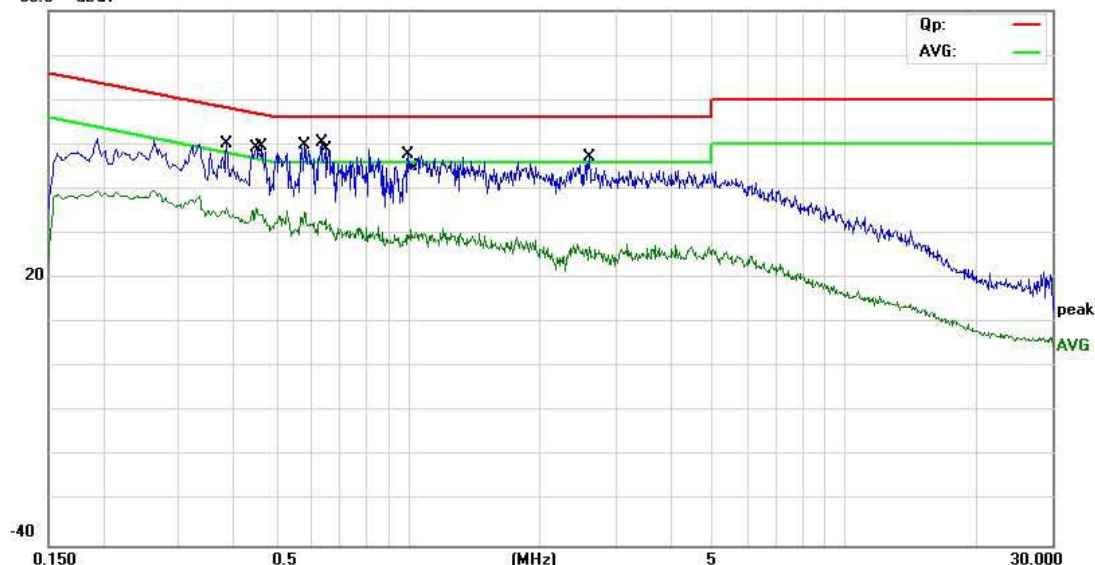
File: ORT-P200A

Data: #8

Date: 15/08/14/

Time: 9/39/57

80.0 dBuV



Site MOST #1

Phase: **L1**

Temperature: 23.4

Limit: FCC Part15 C Class B QP

Power: DC 5.0V by Adapter

Humidity: 52.7 %

EUT: Mini (Portable) Projector

M/N: P100A

Mode: 802.11a

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.3860       | 39.40                    | 10.76                   | 50.16                    | 58.15         | -7.99      | QP       |         |
| 2   |     | 0.3860       | 25.03                    | 10.76                   | 35.79                    | 48.15         | -12.36     | AVG      |         |
| 3   |     | 0.4500       | 25.50                    | 10.33                   | 35.83                    | 46.88         | -11.05     | AVG      |         |
| 4   |     | 0.4660       | 39.45                    | 10.23                   | 49.68                    | 56.58         | -6.90      | QP       |         |
| 5   |     | 0.5820       | 39.83                    | 10.00                   | 49.83                    | 56.00         | -6.17      | QP       |         |
| 6   |     | 0.5820       | 24.79                    | 10.00                   | 34.79                    | 46.00         | -11.21     | AVG      |         |
| 7   | *   | 0.6340       | 40.48                    | 10.00                   | 50.48                    | 56.00         | -5.52      | QP       |         |
| 8   |     | 0.6500       | 23.40                    | 10.00                   | 33.40                    | 46.00         | -12.60     | AVG      |         |
| 9   |     | 1.0020       | 37.62                    | 10.00                   | 47.62                    | 56.00         | -8.38      | QP       |         |
| 10  |     | 1.0180       | 20.91                    | 9.98                    | 30.89                    | 46.00         | -15.11     | AVG      |         |
| 11  |     | 2.6180       | 37.61                    | 9.62                    | 47.23                    | 56.00         | -8.77      | QP       |         |
| 12  |     | 2.6180       | 17.34                    | 9.62                    | 26.96                    | 46.00         | -19.04     | AVG      |         |

\*:Maximum data x:Over limit l:over margin

Engineer Signature: lidegan

## 4.5 26dB Emission Bandwidth

### 4.5.1 Test Requirement

Measurement of the 26dB bandwidth of the modulated signal.

### 4.5.2 Test Procedure

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW  $\geq$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

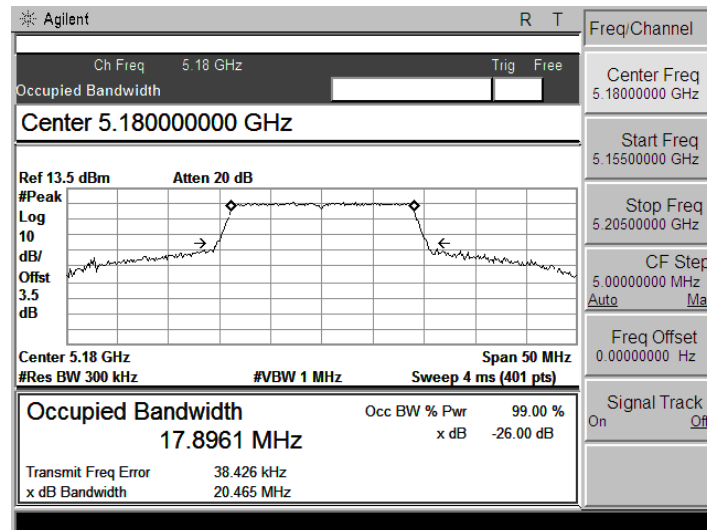
### 4.5.3 Test Result

|                       |                         |                            |      |
|-----------------------|-------------------------|----------------------------|------|
| <b>Test Item:</b>     | 26dB Emission Bandwidth | <b>Temperature :</b>       | 23°C |
| <b>Test Engineer:</b> | Kang                    | <b>Relative Humidity :</b> | 65%  |

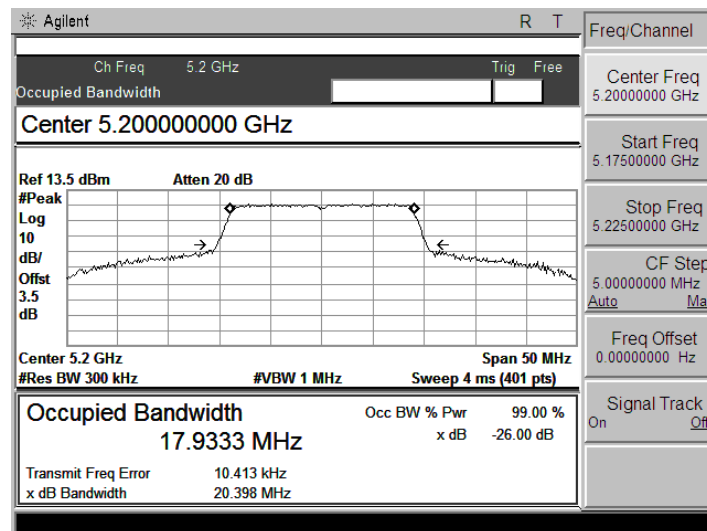
| Mode                            | Channel | Frequency (MHz) | 26dB Bandwidth(MHz) |
|---------------------------------|---------|-----------------|---------------------|
| 802.11 an 20M<br>(5150-5250MHz) | Low     | 5180            | 20.465              |
|                                 | Middle  | 5200            | 20.398              |
|                                 | High    | 5240            | 20.393              |
| 802.11 a<br>(5150-5250MHz)      | Low     | 5180            | 20.425              |
|                                 | Middle  | 5200            | 20.111              |
|                                 | High    | 5240            | 20.073              |
| 802.11 an 20M<br>(5725-5850MHz) | Low     | 5745            | 20.113              |
|                                 | Middle  | 5785            | 22.212              |
|                                 | High    | 5825            | 28.787              |
| 802.11 a<br>(5725-5850MHz)      | Low     | 5745            | 19.797              |
|                                 | Middle  | 5785            | 20.353              |
|                                 | High    | 5825            | 24..508             |

Please refer the following pages.

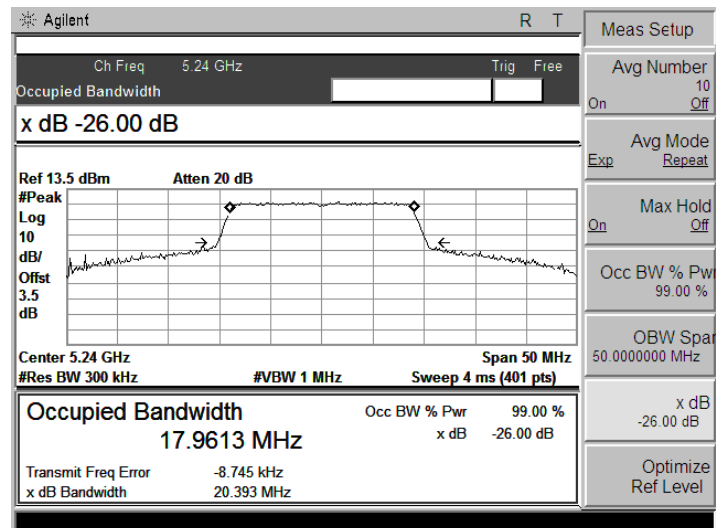
# 802.11 an 20M mode



## 5180 MHz

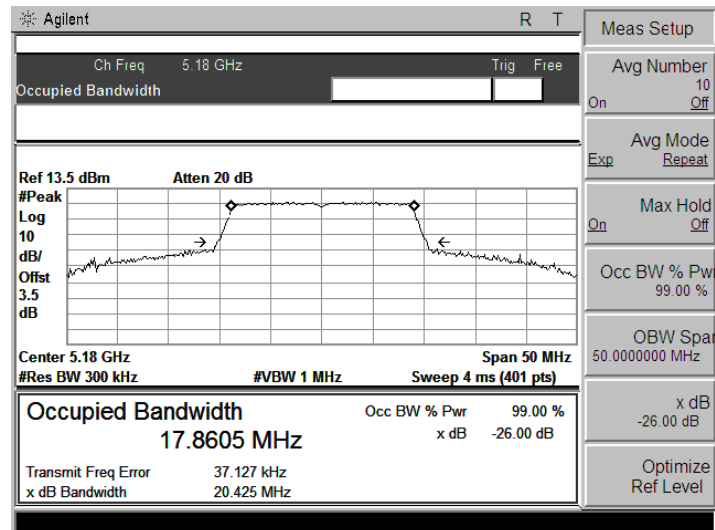


## 5200 MHz

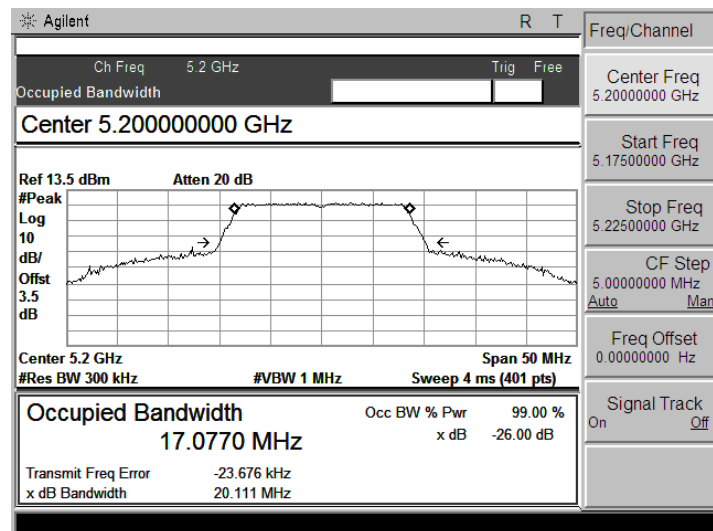


## 5240 MHz

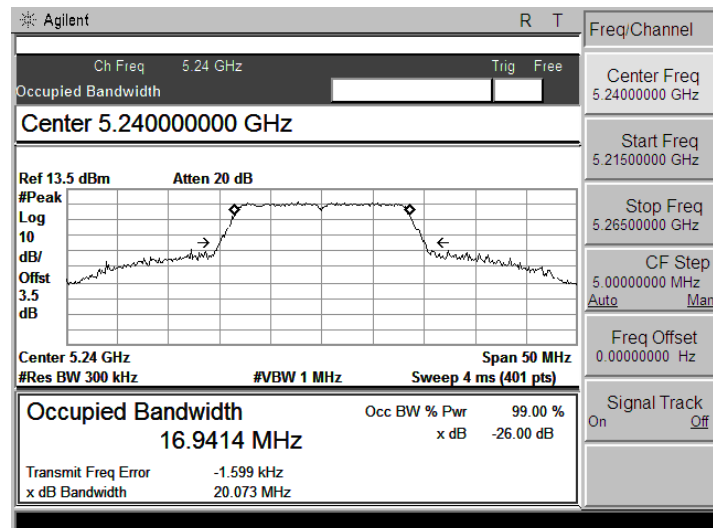
## 802.11 a mode



## 5180 MHz

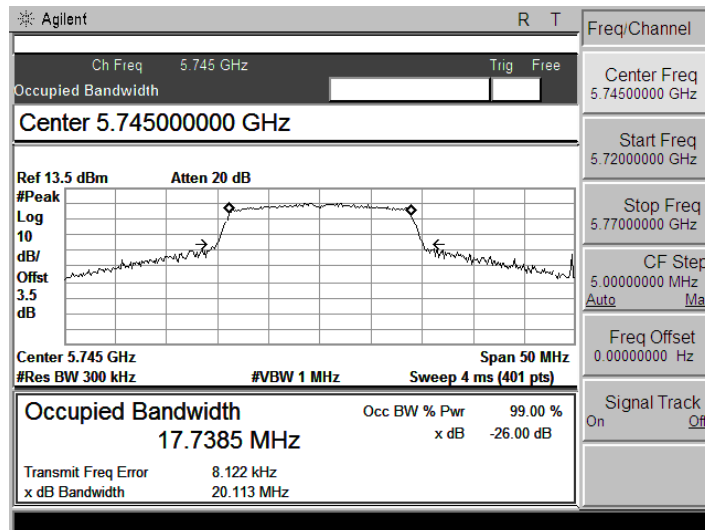


## 5200 MHz

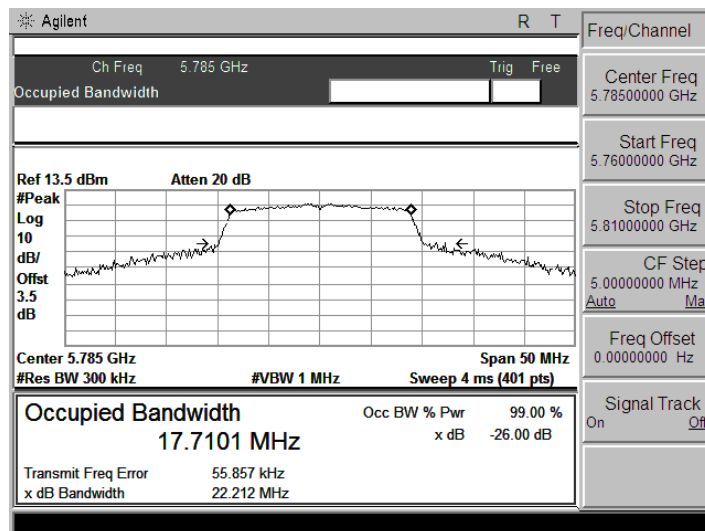


## 5240 MHz

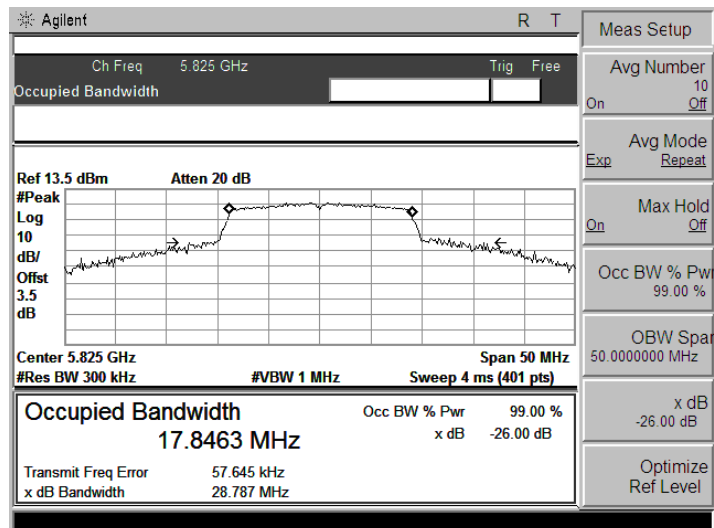
# 802.11 an 20M mode



5745 MHz

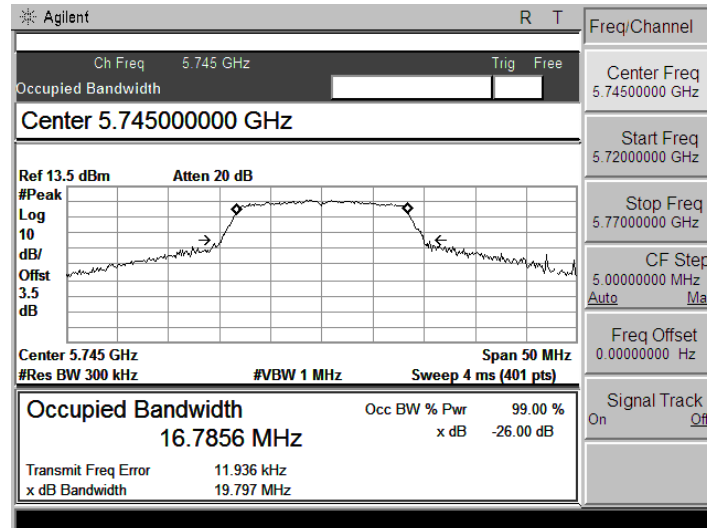


5785 MHz

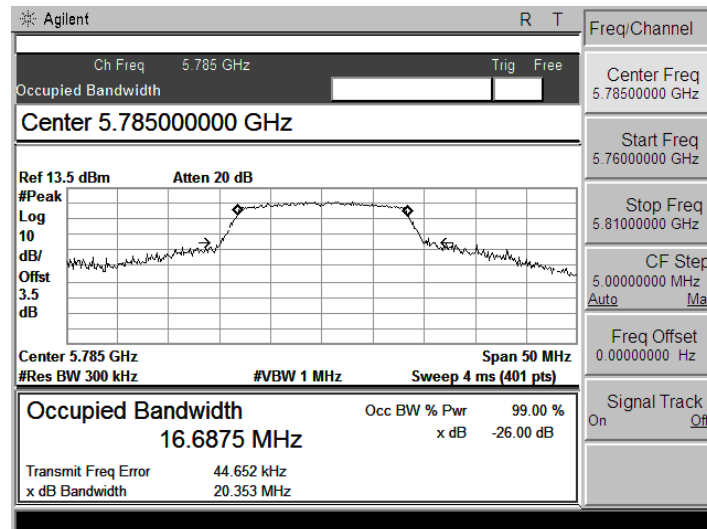


5825 MHz

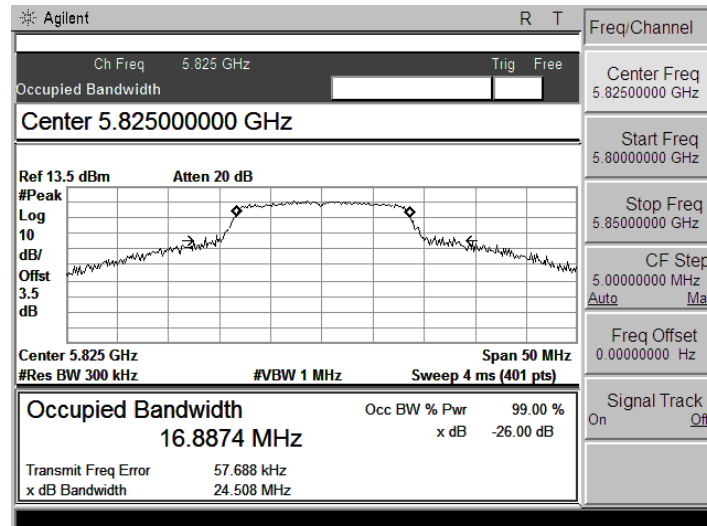
# 802.11 a mode



5745 MHz



5785 MHz



5825 MHz

## 4.6 6dB Emission Bandwidth

### 4.6.1 Test Requirement

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

### 4.6.2 Test Procedure

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW  $\geq$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Measure the maximum width of the emission that is 6 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

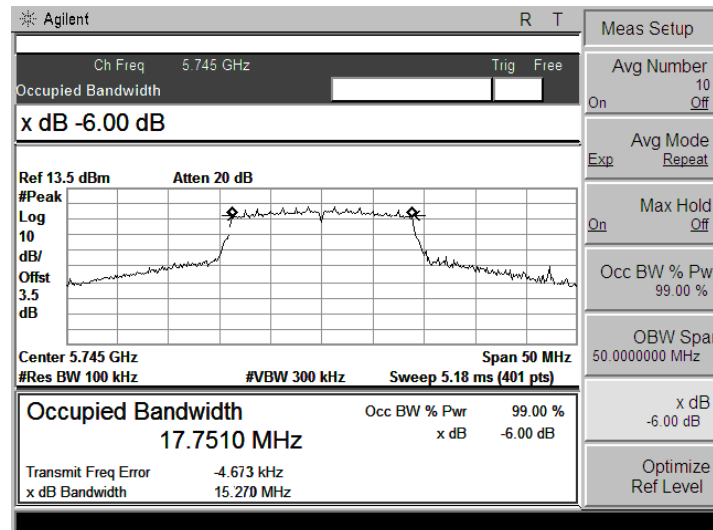
### 4.6.3 Test Result

|                       |                        |                            |      |
|-----------------------|------------------------|----------------------------|------|
| <b>Test Item:</b>     | 6dB Emission Bandwidth | <b>Temperature :</b>       | 23°C |
| <b>Test Engineer:</b> | Kang                   | <b>Relative Humidity :</b> | 65%  |

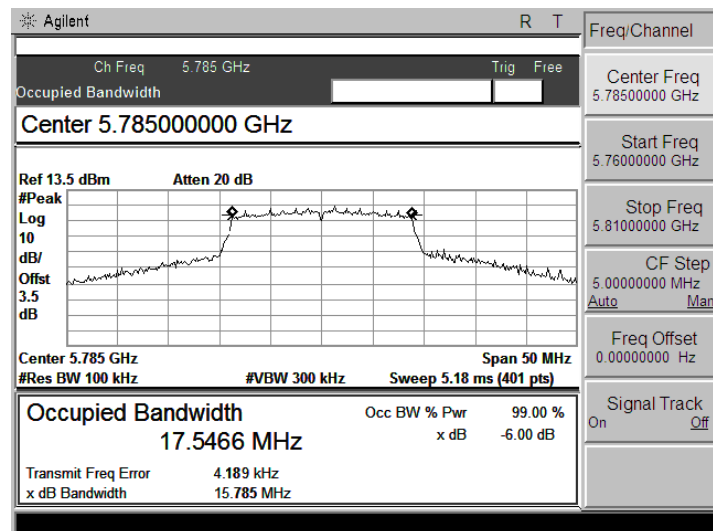
| Mode                            | Channel | Frequency (MHz) | 6dB Bandwidth(MHz) | Limit(KHz) |
|---------------------------------|---------|-----------------|--------------------|------------|
| 802.11 an 20M<br>(5725-5850MHz) | Low     | 5745            | 15.270             | $\geq 500$ |
|                                 | Middle  | 5785            | 15.785             | $\geq 500$ |
|                                 | High    | 5825            | 16.029             | $\geq 500$ |
| 802.11 a<br>(5725-5850MHz)      | Low     | 5745            | 14.421             | $\geq 500$ |
|                                 | Middle  | 5785            | 15.412             | $\geq 500$ |
|                                 | High    | 5825            | 15.849             | $\geq 500$ |

Please refer the following pages.

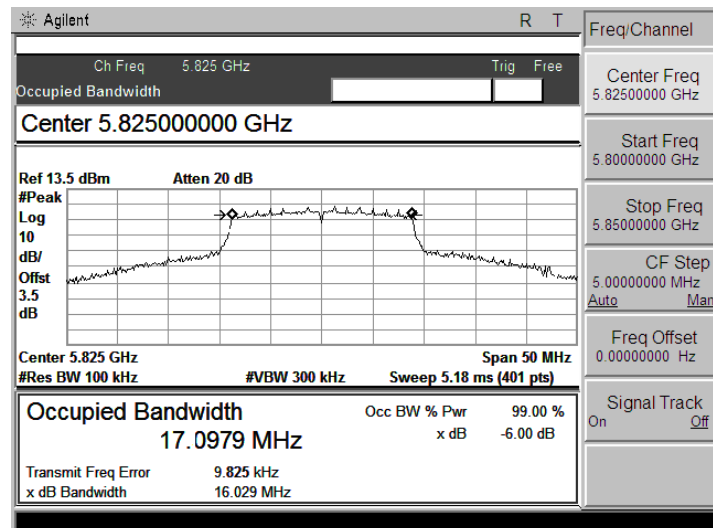
# 802.11 an 20M mode



5745 MHz

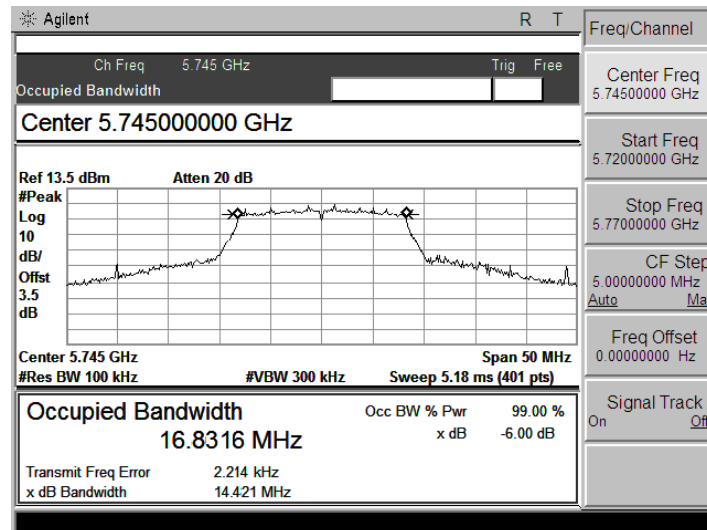


5785 MHz

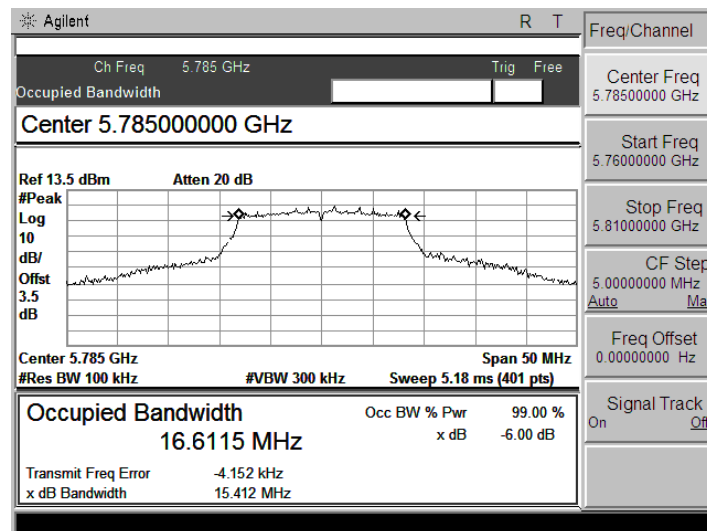


5825 MHz

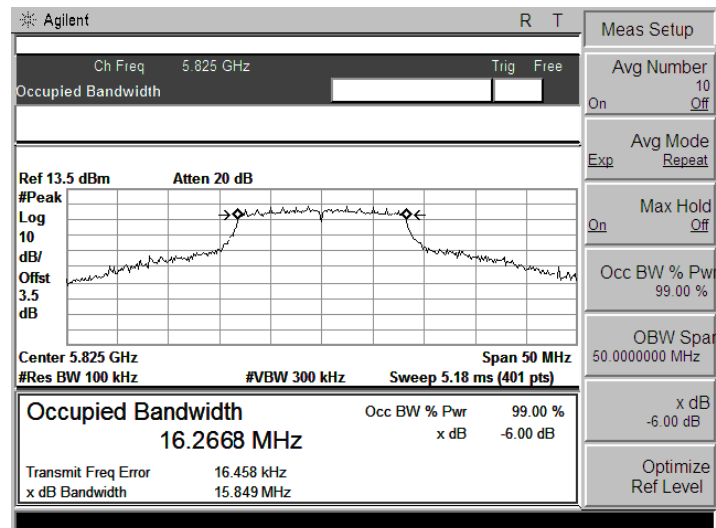
# 802.11 a mode



5745 MHz



5785 MHz



5825 MHz

## 4.7 MAXIMUM CONDUCTED OUTPUT POWER

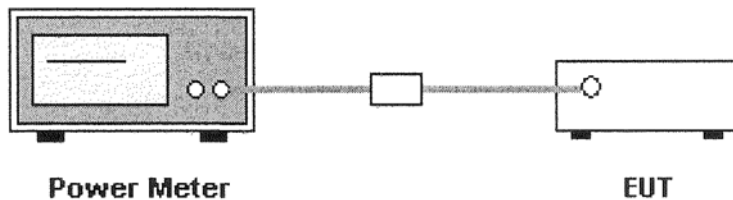
### 4.7.1 LIMIT

According to §15.407(a),

1. 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.
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.
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.

If transmitting antennas of directional gain greater than 6dBi are used, both the maximum transmit power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### 4.7.2 Block Diagram of Test Setup



### 4.7.3 Test Procedure

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01. Method PM (Measurement using an RF average power meter):

1. Measurement is performed using an RF average 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.

#### 4.7.4 Test Result

|                       |                  |                            |      |
|-----------------------|------------------|----------------------------|------|
| <b>Test Item:</b>     | Max Output Power | <b>Temperature :</b>       | 23°C |
| <b>Test Engineer:</b> | Kang             | <b>Relative Humidity :</b> | 65%  |

| Mode                         | Channel                                                                                                                                                            | Frequency (MHz) | Reading Power(dBm) | Actual Power (dBm) | Limit |       | Pass /Fail |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------|--------------------|-------|-------|------------|
|                              |                                                                                                                                                                    |                 |                    |                    | (mW)  | (dBm) |            |
| 802.11 an 20M (5150-5250MHz) | Low                                                                                                                                                                | 5180            | 8.87               | 9.33               | 1000  | 30    | Pass       |
|                              | Middle                                                                                                                                                             | 5200            | 9.13               | 9.59               | 1000  | 30    | Pass       |
|                              | High                                                                                                                                                               | 5240            | 8.97               | 9.43               | 1000  | 30    | Pass       |
| 802.11 a (5150-5250MHz)      | Low                                                                                                                                                                | 5180            | 8.93               | 9.36               | 1000  | 30    | Pass       |
|                              | Middle                                                                                                                                                             | 5200            | 9.14               | 9.57               | 1000  | 30    | Pass       |
|                              | High                                                                                                                                                               | 5240            | 8.85               | 9.28               | 1000  | 30    | Pass       |
| 802.11 an 20M (5725-5850MHz) | Low                                                                                                                                                                | 5745            | 9.36               | 9.82               | 1000  | 30    | Pass       |
|                              | Middle                                                                                                                                                             | 5785            | 9.75               | 10.21              | 1000  | 30    | Pass       |
|                              | High                                                                                                                                                               | 5825            | 9.53               | 9.99               | 1000  | 30    | Pass       |
| 802.11 a (5725-5850MHz)      | Low                                                                                                                                                                | 5745            | 9.34               | 9.77               | 1000  | 30    | Pass       |
|                              | Middle                                                                                                                                                             | 5785            | 9.68               | 10.11              | 1000  | 30    | Pass       |
|                              | High                                                                                                                                                               | 5825            | 9.57               | 10.00              | 1000  | 30    | Pass       |
| Remark:                      | 1: Actual Power= Reading Power + duty factor<br>duty factor (802.11 a):0.43<br>duty factor (802.11 an 20M):0.46<br><br>2:Duty factor is reference to section 4.3.2 |                 |                    |                    |       |       |            |

## 4.8 POWER SPECTRAL DENSITY TEST

### 4.8.1 LIMIT

According to §15.407(a),

1. For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.
2. For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.
3. For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

If transmitting antennas of directional gain greater than 6dBi are used, both the maximum transmit power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### 4.8.2 Block Diagram of Test Setup



### 4.8.3 Test Procedure

1. The testing follows Method SA-2 of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
  - Measure the duty cycle.
  - Set span to encompass the entire emission bandwidth (EBW) of the signal.
  - Set RBW = 1 MHz.
  - Set VBW  $\geq$  3 MHz.
  - Number of points in sweep  $\geq$  2 Span / RBW.
  - Sweep time = auto.
  - Detector = RMS
  - Trace average at least 100 traces in power averaging mode.
  - Add  $10 \log(1/x)$ , where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add  $10 \log(1/0.25) = 6$  dB if the duty cycle is 25 percent.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.

#### 4.8.4 Test Result

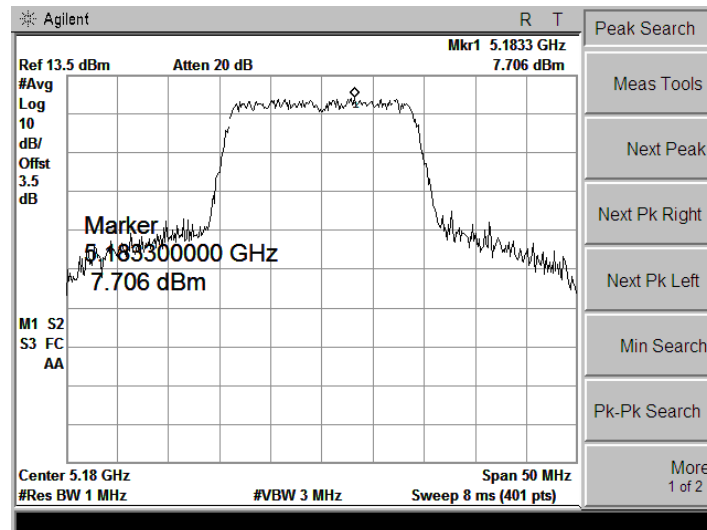
|                       |          |                            |      |
|-----------------------|----------|----------------------------|------|
| <b>Test Item:</b>     | PSD TEST | <b>Temperature :</b>       | 23°C |
| <b>Test Engineer:</b> | Kang     | <b>Relative Humidity :</b> | 65%  |

| Mode                         | Channel | Frequency (MHz) | Duty Factor(dB) | Average PSD | Total PPSD | Limit ed | Result |
|------------------------------|---------|-----------------|-----------------|-------------|------------|----------|--------|
|                              |         |                 |                 | (dBm/MHz)   |            |          |        |
| 802.11 an 20M (5150-5250MHz) | Low     | 5180            | 0.46            | 7.706       | 8.166      | 17       | PASS   |
|                              | Middle  | 5200            | 0.46            | 8.092       | 8.552      | 17       | PASS   |
|                              | High    | 5240            | 0.46            | 8.306       | 8.766      | 17       | PASS   |
| 802.11 a (5150-5250MHz)      | Low     | 5180            | 0.43            | 8.311       | 8.741      | 17       | PASS   |
|                              | Middle  | 5200            | 0.43            | 7.378       | 7.808      | 17       | PASS   |
|                              | High    | 5240            | 0.43            | 7.411       | 7.841      | 17       | PASS   |

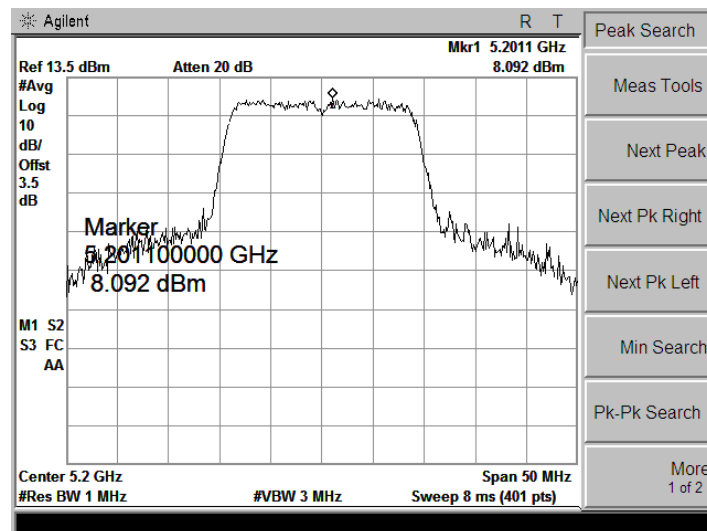
| Mode                            | Channel                                             | Frequency<br>(MHz) | Factor(dB) | Average<br>PSD | Total<br>PPSD | Limited | Result |
|---------------------------------|-----------------------------------------------------|--------------------|------------|----------------|---------------|---------|--------|
|                                 |                                                     |                    |            | (dBm/300KHz)   |               |         |        |
| 802.11 an 20M<br>(5725-5850MHz) | Low                                                 | 5745               | 2.66       | 7.645          | 10.305        | 30      | PASS   |
|                                 | Middle                                              | 5785               | 2.66       | 7.674          | 10.334        | 30      | PASS   |
|                                 | High                                                | 5825               | 2.66       | 8.734          | 11.394        | 30      | PASS   |
| 802.11 a<br>(5725-5850MHz)      | Low                                                 | 5745               | 2.63       | 6.520          | 9.150         | 30      | PASS   |
|                                 | Middle                                              | 5785               | 2.63       | 7.655          | 10.285        | 30      | PASS   |
|                                 | High                                                | 5825               | 2.63       | 8.503          | 11.133        | 30      | PASS   |
| Remark:                         | 1: Factor= duty cycle+10log(500KHz/RBW); RBW=300KHz |                    |            |                |               |         |        |

Please refer the following pages.

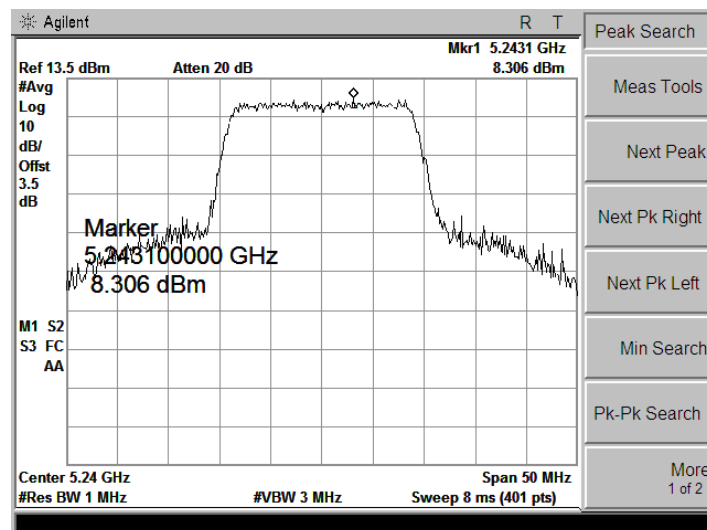
# 802.11 an 20M mode



5180 MHz

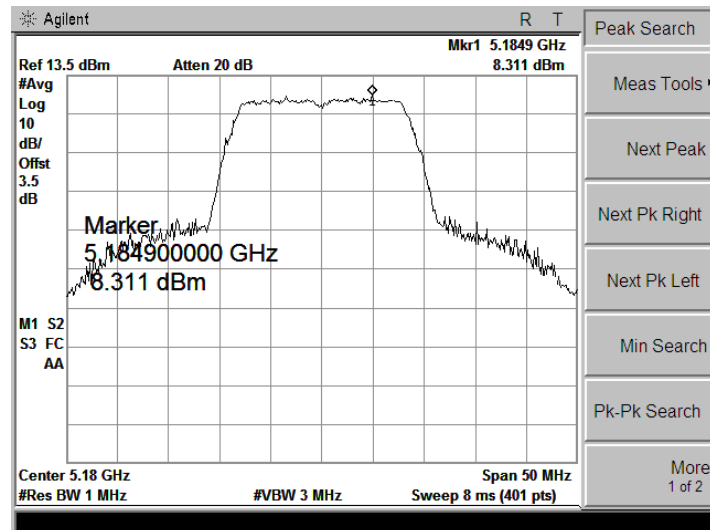


5200 MHz

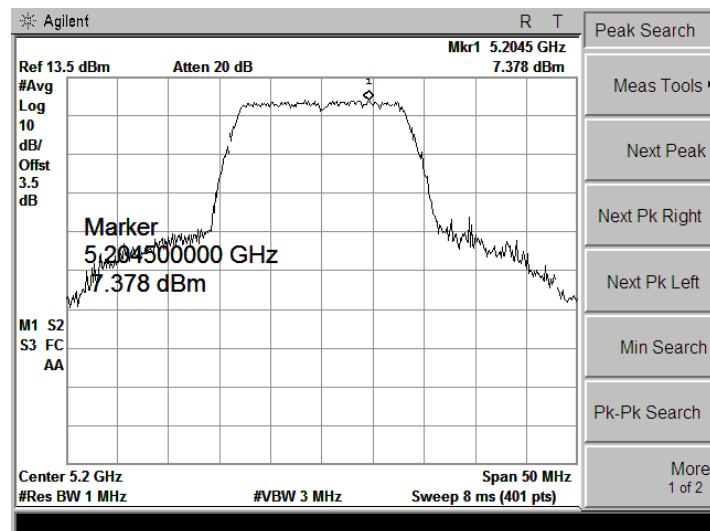


5240 MHz

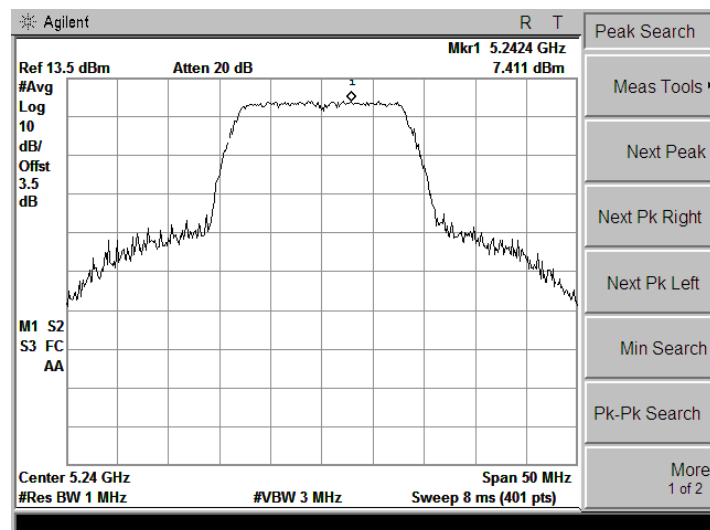
## 802.11 a mode



5180 MHz

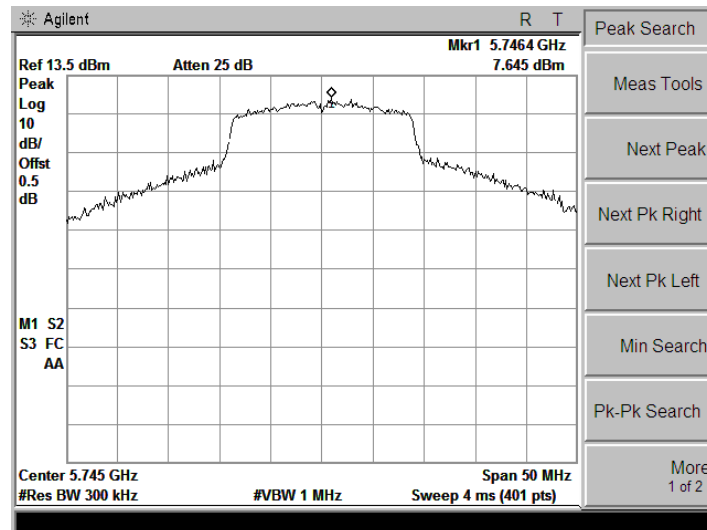


5200 MHz

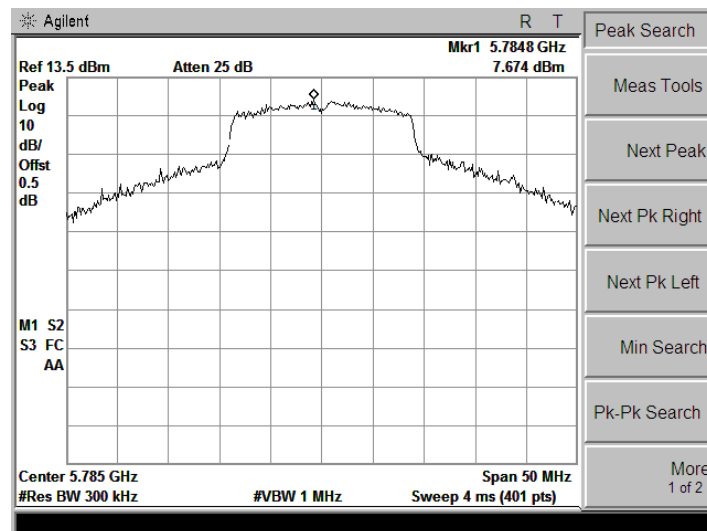


5240 MHz

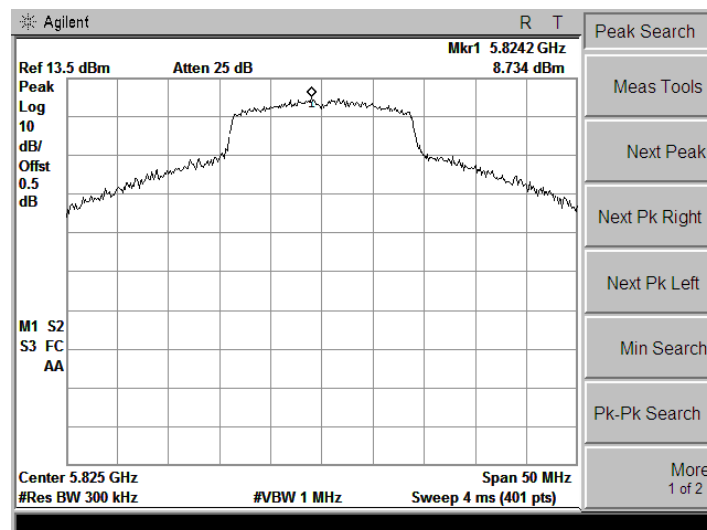
# 802.11 an 20M mode



5745 MHz

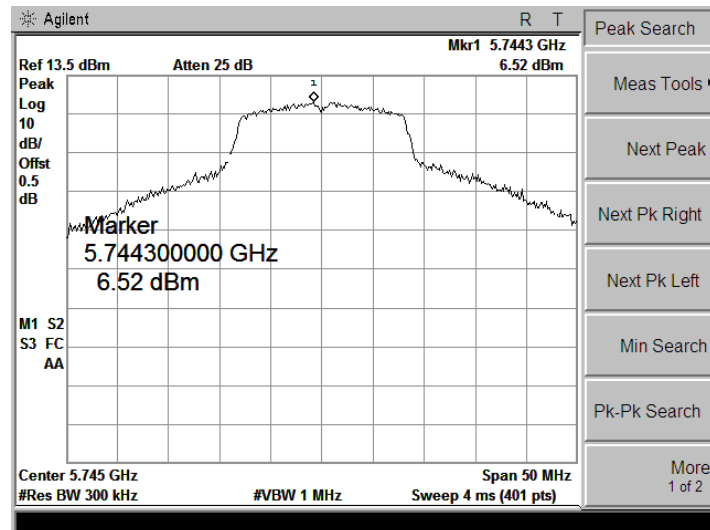


5785 MHz

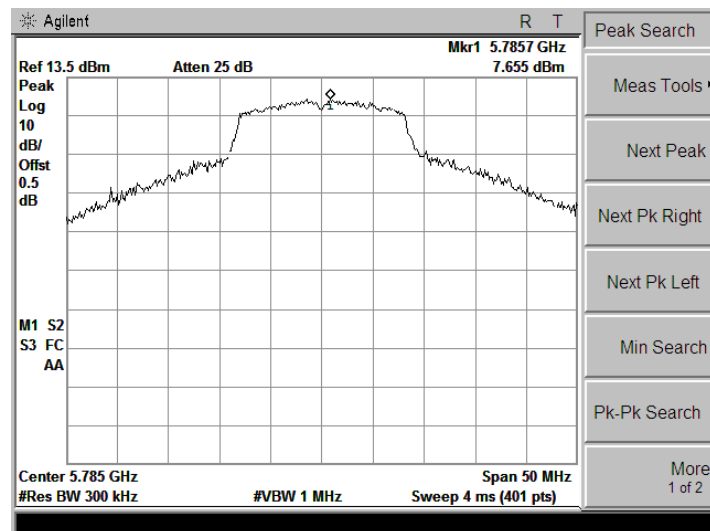


5825 MHz

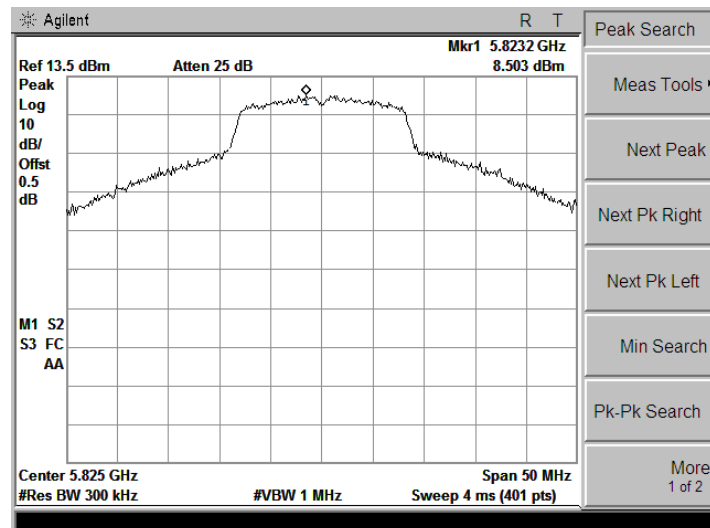
## 802.11 a mode



5745 MHz



5785 MHz



5825 MHz

## 4.9 Radiated Emission and Band Edges

### 4.9.1 Requirement

According to §15.407(b),

1. The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.
2. When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.
3. According to FCC section 15.209(a), Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength ( $\mu\text{V}/\text{m}$ at 3-meter) | Test Distance (m) | Field Strength ( $\text{dB}\mu\text{V}/\text{m}$ at 3-meter) |
|-----------------|-----------------------------------------------------|-------------------|--------------------------------------------------------------|
| 0.009 - 0.490   | $2400/F(\text{kHz})$                                | 300               |                                                              |
| 0.490 - 1.705   | $24000/F(\text{kHz})$                               | 30                |                                                              |
| 1.705-30        | 30                                                  | 30                |                                                              |
| 30-88           | 100                                                 | 3                 | 40                                                           |
| 88-216          | 150                                                 | 3                 | 43.5                                                         |
| 216-960         | 200                                                 | 3                 | 46                                                           |
| Above 960       | 500                                                 | 3                 | 54                                                           |

Note:

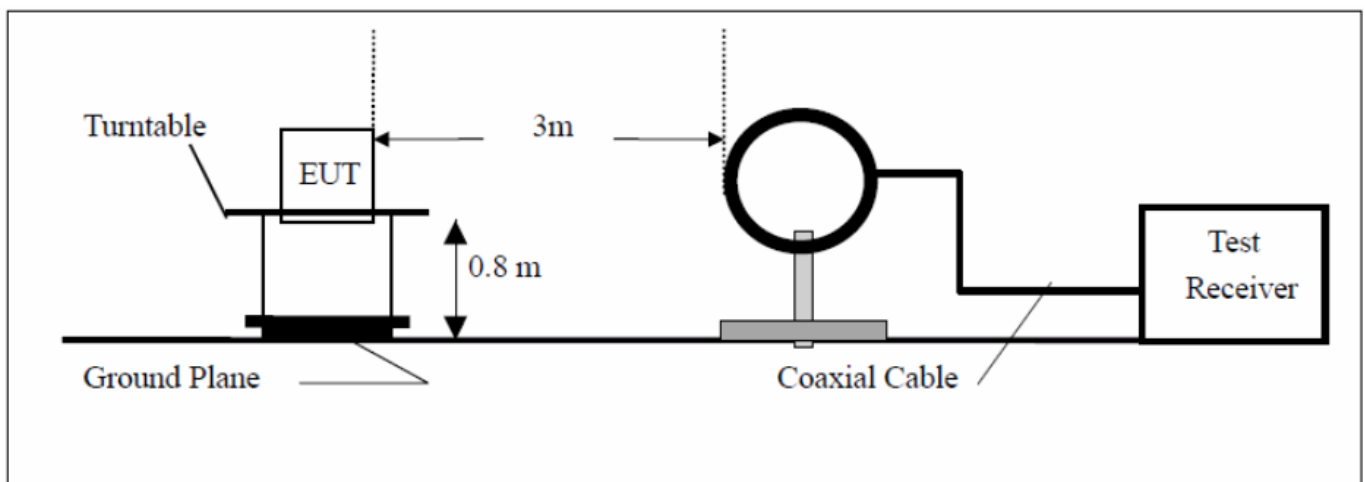
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength of harmonics:  $54\text{dB}\mu\text{V}/\text{m}@3\text{m}$  (AV) and  $74\text{dB}\mu\text{V}/\text{m}@3\text{m}$  (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

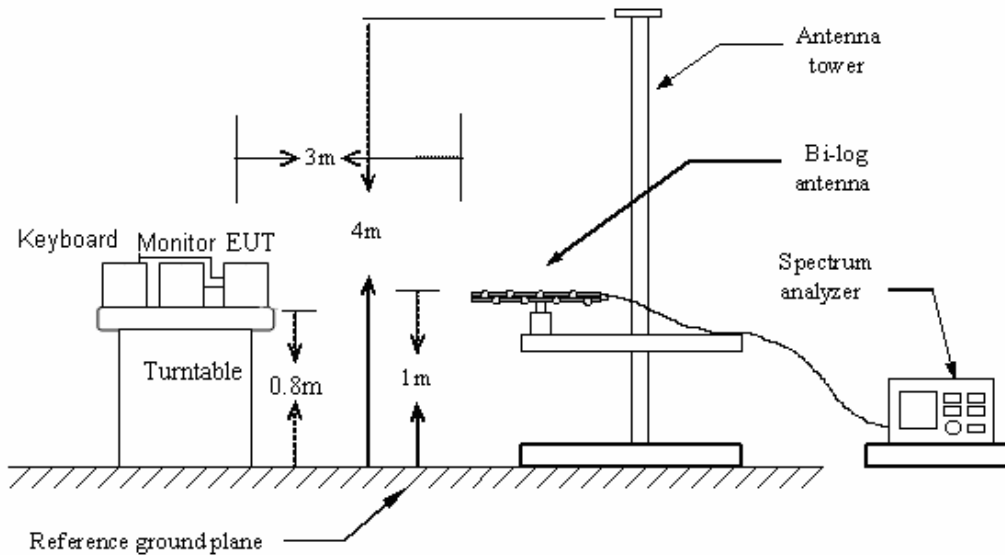
### 4.9.2 Test Configuration

#### Test Setup:

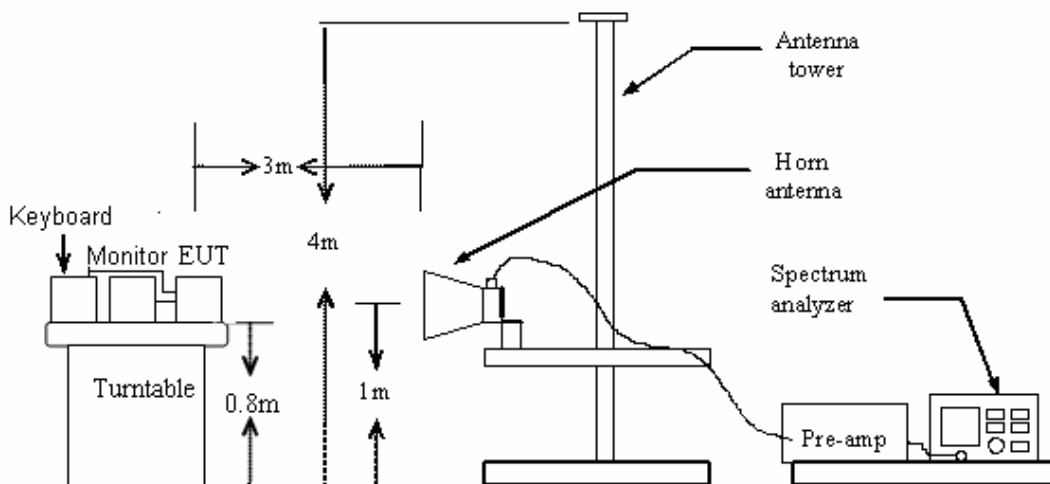
- 1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to 1GHz



3) For radiated emissions above 1GHz



#### 4.9.3 Test Procedure:

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.

5. Set the spectrum analyzer in the following setting as:

Below 1GHz: PEAK: RBW=100 kHz / VBW=300 kHz / Sweep=AUTO QP: RBW=120 kHz / Sweep=AUTO

Above 1GHz: (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

#### **4.9.4 Test Result**

**Pass**

##### **Remark:**

1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

1. Pre-scan 802.11a and 802.11an(20M) mode, found the 802.11a is worse case.

Please refer the following pages.

**Test Item:** Radiated Emission(below 1GHz) **Test data:** 2015.10.09  
**Operation Mode:** 802.11 a **Temperature:** 26°C  
**Tested by:** John **Humidity:** 50 % RH



Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park  
 Guangdong, China  
 Tel: 0755-86026850 Fax: 0755-26013350

### Radiated Emission Measurement

File: ORT-P200A

Data: #23

Date: 2015-10-9

Time: 12:30:55

70.0 dBuV/m



Site: site #1

Polarization: **Horizontal**

Temperature: 24

Limit: FCC Part15 C 3M Radiation

Power: DC 7.4V by battery

Humidity: 50.5 %

EUT: Mini (Portable) Projector

Distance: 3m

M/N: P100A

Mode: 802.11a

Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 31.3992  | 3.03          | 21.15          | 24.18       | 40.00  | -15.82 | QP             |              |         |
| 2   |     | 118.6014 | 17.43         | 17.30          | 34.73       | 43.50  | -8.77  | QP             |              |         |
| 3   | *   | 148.4410 | 20.26         | 16.61          | 36.87       | 43.50  | -6.63  | QP             |              |         |
| 4   |     | 220.6171 | 14.50         | 16.31          | 30.81       | 46.00  | -15.19 | QP             |              |         |
| 5   |     | 297.2241 | 16.56         | 19.33          | 35.89       | 46.00  | -10.11 | QP             |              |         |
| 6   |     | 381.2487 | 11.67         | 18.12          | 29.79       | 46.00  | -16.21 | QP             |              |         |

\*:Maximum data x:Over limit l:over margin

Engineer Signature: lidegan

### Radiated Emission Measurement

File: ORT-P200A

Data: #22

Date: 2015-10-9

Time: 12:19:56

70.0 dBuV/m



Site site #1

Polarization: **Vertical**

Temperature: 24

Limit: FCC Part15 C 3M Radiation

Power: DC 7.4V by battery

Humidity: 50.5 %

EUT: Mini (Portable) Projector

Distance: 3m

M/N: P100A

Mode: 802.11a

Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measure-ment | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|--------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m       | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 72.5916  | 12.21         | 11.62          | 23.83        | 40.00  | -16.17 | QP             |              |         |
| 2   |     | 148.4410 | 15.86         | 16.61          | 32.47        | 43.50  | -11.03 | QP             |              |         |
| 3   |     | 219.0753 | 17.98         | 16.26          | 34.24        | 46.00  | -11.76 | QP             |              |         |
| 4   |     | 237.4760 | 18.71         | 17.02          | 35.73        | 46.00  | -10.27 | QP             |              |         |
| 5   | *   | 297.2241 | 21.95         | 19.33          | 41.28        | 46.00  | -4.72  | QP             |              |         |
| 6   |     | 533.8321 | 12.58         | 22.14          | 34.72        | 46.00  | -11.28 | QP             |              |         |

\*:Maximum data    x:Over limit    !:over margin

Engineer Signature:

lidegan

**Test Item:** Radiated Emission(Above 1GHz)      **Test data:** 2015.10.13  
**Operation Mode:** 802.11 a      **Temperature:** 24.3°C  
(5150-5250MHz)  
**Tested by:** John      **Humidity:** 54.8 % RH

| Freq.<br>(MHz) | Ant. Pol<br>H/V | Peak<br>Reading<br>(dBuV) | AV<br>Reading<br>(dBuV) | Ant. / CL<br>CF<br>(dB) | Actual Fs        |                | Peak<br>Limit<br>(dBuV/m) | AV<br>Limit<br>(dBuV/m) | AV<br>Margin<br>(dB) |
|----------------|-----------------|---------------------------|-------------------------|-------------------------|------------------|----------------|---------------------------|-------------------------|----------------------|
|                |                 |                           |                         |                         | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |                           |                         |                      |
| 1060.00        | H               | 53.56                     | 49.53                   | -9.32                   | 44.24            | 40.21          | 74.00                     | 54.00                   | -13.79               |
| 1060.00        | V               | 52.63                     | 45.78                   | -9.32                   | 43.31            | 36.46          | 74.00                     | 54.00                   | -17.54               |
| 1780.00        | H               | 50.27                     | 47.64                   | -7.64                   | 42.63            | 40.00          | 74.00                     | 54.00                   | -14.00               |
| 1780.00        | V               | 47.19                     | 44.51                   | -7.64                   | 39.55            | 36.87          | 74.00                     | 54.00                   | -17.13               |
| 5980.14        | H               | 53.18                     | 41.34                   | -2.76                   | 50.42            | 38.58          | 74.00                     | 54.00                   | -15.42               |
| 5980.14        | V               | 47.52                     | 34.47                   | -2.76                   | 44.76            | 31.71          | 74.00                     | 54.00                   | -22.29               |
| 8860.00        | H               | 50.92                     | 41.62                   | -1.08                   | 49.84            | 40.54          | 74.00                     | 54.00                   | -13.46               |
| 8860.00        | V               | 39.48                     | 26.12                   | -1.08                   | 38.40            | 25.04          | 74.00                     | 54.00                   | -28.96               |
| 11260.00       | H               | 54.09                     | 41.92                   | -0.97                   | 53.12            | 40.95          | 74.00                     | 54.00                   | -13.05               |
| 11260.00       | V               | 43.56                     | 35.48                   | -0.97                   | 42.59            | 34.51          | 74.00                     | 54.00                   | -19.49               |
| N/A            |                 |                           |                         |                         |                  |                |                           |                         | >20                  |

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.

**Test Item:** Radiated Emission(Above 1GHz)      **Test data:** 2015.10.13  
**Operation Mode:** 802.11 a      **Temperature:** 24.3°C  
(5725-5850MHz)  
**Tested by:** John      **Humidity:** 54.8 % RH

| Freq.<br>(MHz) | Ant. Pol<br>H/V | Peak<br>Reading<br>(dBuV) | AV<br>Reading<br>(dBuV) | Ant. / CL<br>CF<br>(dB) | Actual Fs        |                | Peak<br>Limit<br>(dBuV/m) | AV<br>Limit<br>(dBuV/m) | AV<br>Margin<br>(dB) |
|----------------|-----------------|---------------------------|-------------------------|-------------------------|------------------|----------------|---------------------------|-------------------------|----------------------|
|                |                 |                           |                         |                         | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |                           |                         |                      |
| 1120.00        | H               | 48.85                     | 42.08                   | -9.05                   | 39.80            | 33.03          | 74.00                     | 54.00                   | -20.97               |
| 1120.00        | V               | 40.75                     | 34.27                   | -9.05                   | 31.70            | 25.22          | 74.00                     | 54.00                   | -28.78               |
| 2440.00        | H               | 49.12                     | 42.33                   | -8.36                   | 40.76            | 33.97          | 74.00                     | 54.00                   | -20.03               |
| 2440.00        | V               | 42.35                     | 35.17                   | -8.36                   | 33.99            | 26.81          | 74.00                     | 54.00                   | -27.19               |
| 5980.00        | H               | 41.54                     | 32.95                   | -2.76                   | 38.78            | 30.19          | 74.00                     | 54.00                   | -23.81               |
| 5980.00        | V               | 34.35                     | 27.56                   | -2.76                   | 31.59            | 24.80          | 74.00                     | 54.00                   | -29.20               |
| 8320.00        | H               | 42.27                     | 30.15                   | -0.59                   | 41.68            | 29.56          | 74.00                     | 54.00                   | -24.44               |
| 8320.00        | V               | 34.99                     | 22.48                   | -0.59                   | 34.40            | 21.89          | 74.00                     | 54.00                   | -32.11               |
| 16240.00       | H               | 40.89                     | 31.57                   | 3.83                    | 44.72            | 35.40          | 74.00                     | 54.00                   | -18.60               |
| 16240.00       | V               | 32.55                     | 28.16                   | 3.83                    | 36.38            | 31.99          | 74.00                     | 54.00                   | -22.01               |
| N/A            |                 |                           |                         |                         |                  |                |                           |                         | >20                  |

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.

Test Item:

Operation Mode:

Tested by:

Band edge

802.11 a  
(5150-5250MHz)

John

Test data:

Temperature:

Humidity:

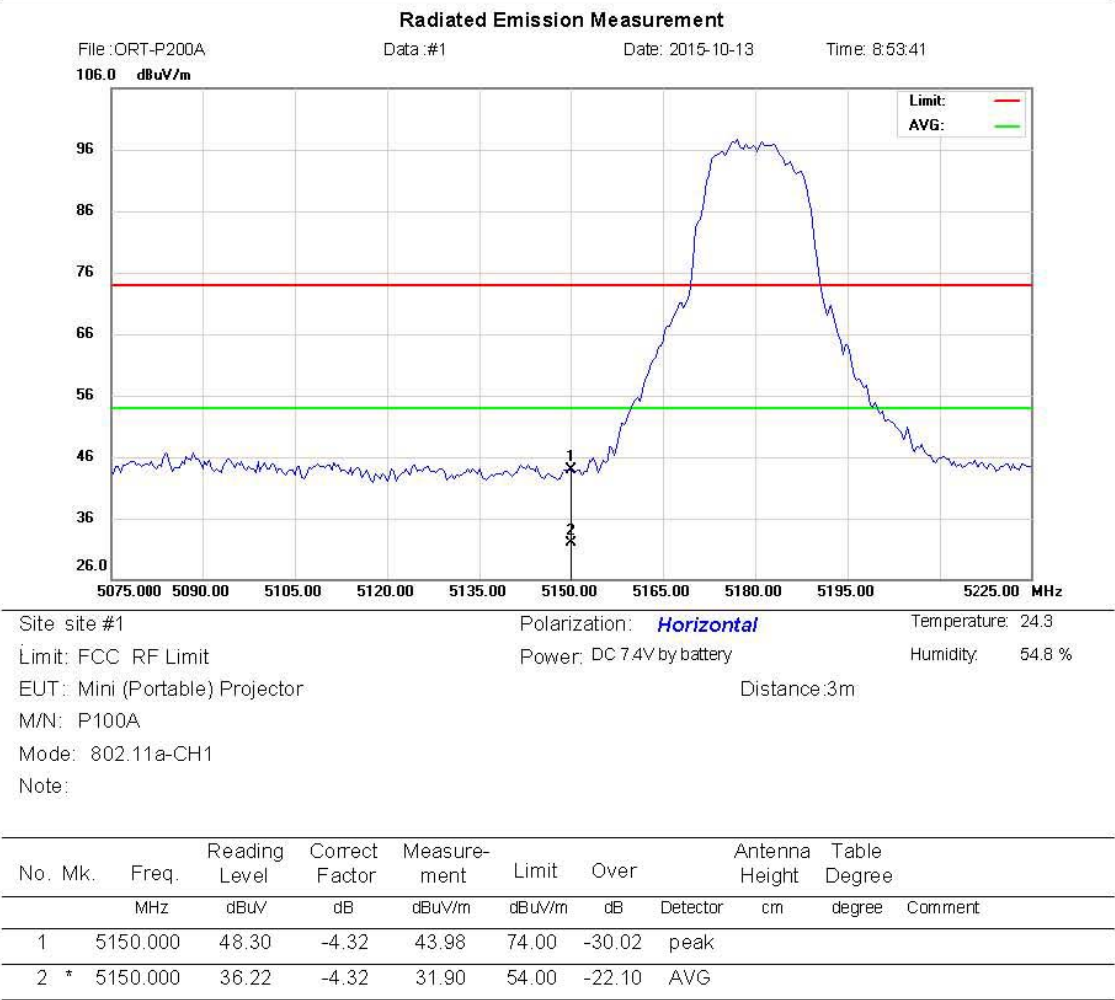
2015.10.13

24.3°C

54.8 % RH



Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350



\*:Maximum data    x:Over limit    l:over margin

Engineer Signature:      Sunny

# Radiated Emission Measurement

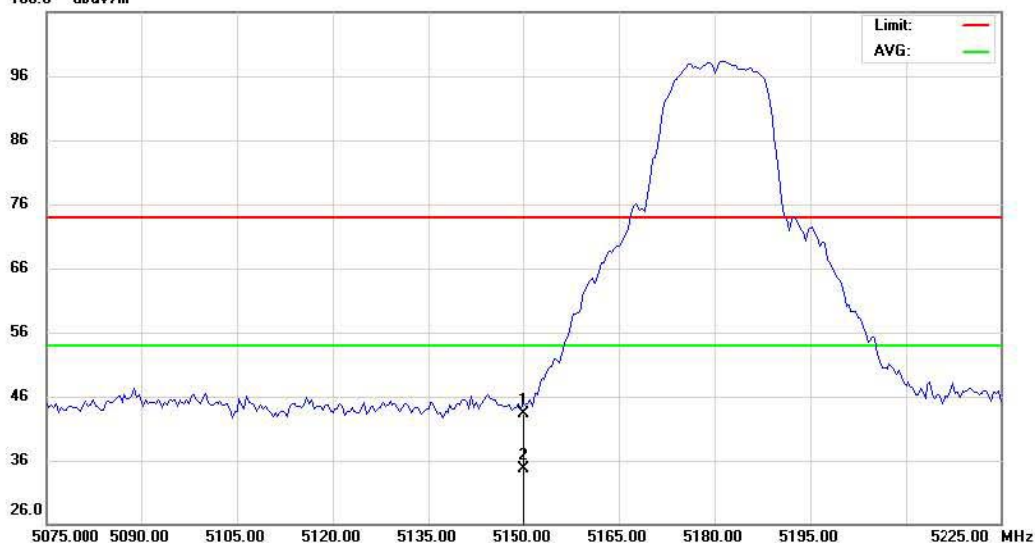
File: ORT-P200A

Data: #2

Date: 2015-10-13

Time: 9:02:10

106.0 dBuV/m



Site: site #1

Polarization: **Vertical**

Temperature: 24.3

Limit: FCC RF Limit

Power: DC 7.4V by battery

Humidity: 54.8 %

EUT: Mini (Portable) Projector

Distance: 3m

M/N: P100A

Mode: 802.11a-CH1

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Antenna<br>Height<br>cm | Table<br>Degree<br>degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|---------------------------|---------|
| 1   |     | 5150.000     | 47.55                    | -4.32                   | 43.23                      | 74.00           | -30.77     | peak                    |                           |         |
| 2   | *   | 5150.000     | 39.02                    | -4.32                   | 34.70                      | 54.00           | -19.30     | AVG                     |                           |         |

\*:Maximum data x:Over limit l:over margin

Engineer Signature: Sunny

# Radiated Emission Measurement

File: ORT-P200A

Data: #8

Date: 2015-10-13

Time: 10:07:21

106.0 dBuV/m



Site: site #1

Polarization: **Vertical**

Temperature: 24.5

Limit: FCC RF Limit

Power: DC 7.4V by battery

Humidity: 51.7 %

EUT: Mini (Portable) Projector

Distance: 3m

M/N: P100A

Mode: 802.11a-CH4

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Antenna<br>Height<br>cm | Table<br>Degree<br>degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|---------------------------|---------|
| 1   |     | 5350.000     | 47.93                    | -4.44                   | 43.49                      | 74.00           | -30.51     | peak                    |                           |         |
| 2   | *   | 5350.000     | 38.55                    | -4.44                   | 34.11                      | 54.00           | -19.89     | AVG                     |                           |         |

\*:Maximum data    x:Over limit    l:over margin

Engineer Signature:

Sunny

# Radiated Emission Measurement

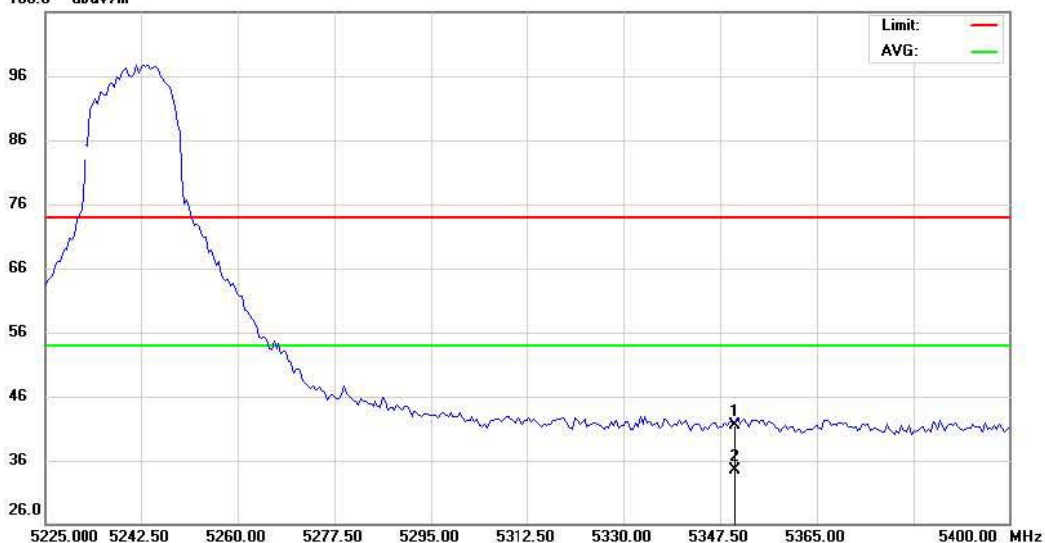
File: ORT-P200A

Data: #7

Date: 2015-10-13

Time: 9:53:00

106.0 dBuV/m



Site: site #1

Polarization: **Horizontal**

Temperature: 24.5

Limit: FCC RF Limit

Power: DC 7.4V by battery

Humidity: 51.7 %

EUT: Mini (Portable) Projector

Distance: 3m

M/N: P100A

Mode: 802.11a-CH4

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Antenna<br>Height<br>cm | Table<br>Degree<br>degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|---------------------------|---------|
| 1   |     | 5350.000     | 45.87                    | -4.44                   | 41.43                      | 74.00           | -32.57     | peak                    |                           |         |
| 2   | *   | 5350.000     | 38.97                    | -4.44                   | 34.53                      | 54.00           | -19.47     | AVG                     |                           |         |

\*:Maximum data    x:Over limit    l:over margin

Engineer Signature:

Sunny

Operation Mode: 802.11 a  
(5725-5850MHz)  
Temperature: 23°C  
Humidity: 56 % RH

Test Date: 2015.10.13  
Tested by: John  
Polarity: Ver. / Hor.



Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park  
Guangdong, China  
Tel: 0755-86026850 Fax: 0755-26013350

### Radiated Emission Measurement

File: ORT-P200A

Data: #3

Date: 2015-10-13

Time: 9:12:43

106.0 dBuV/m



Site site #1

Polarization: **Horizontal**

Temperature: 24.3

Limit: FCC RF Limit

Power: DC 7.4V by battery

Humidity: 54.8 %

EUT: Mini (Portable) Projector

Distance: 3m

M/N: P100A

Mode: 802.11a-CH1

Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 5725.000 | 55.36         | -3.57          | 51.79       | 74.00  | -22.21 | peak           |              |         |
| 2   | *   | 5725.000 | 47.28         | -3.57          | 43.71       | 54.00  | -10.29 | AVG            |              |         |

\*:Maximum data x:Over limit l:over margin

Engineer Signature:

Sunny

### Radiated Emission Measurement

File: ORT-P200A

Data: #4

Date: 2015-10-13

Time: 9:23:22

106.0 dBuV/m



Site: site #1

Polarization: **Vertical**

Temperature: 24.3

Limit: FCC RF Limit

Power: DC 7.4V by battery

Humidity: 54.8 %

EUT: Mini (Portable) Projector

Distance: 3m

M/N: P100A

Mode: 802.11a-CH1

Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 5725.000 | 56.98         | -3.57          | 53.41       | 74.00  | -20.59 | peak           |              |         |
| 2   | *   | 5725.000 | 47.06         | -3.57          | 43.49       | 54.00  | -10.51 | AVG            |              |         |

\*: Maximum data    x: Over limit    l: over margin

Engineer Signature:

Sunny

### Radiated Emission Measurement

File: ORT-P200A

Data: #6

Date: 2015-10-13

Time: 9:45:35

106.0 dBuV/m



Site site #1

Polarization: **Vertical**

Temperature: 24.3

Limit: FCC RF Limit

Power: DC 7.4V by battery

Humidity: 54.8 %

EUT: Mini (Portable) Projector

Distance: 3m

M/N: P100A

Mode: 802.11a-CH5

Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measure-ment | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|--------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m       | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 5850.000 | 57.36         | -2.98          | 54.38        | 74.00  | -19.62 | peak           |              |         |
| 2   | *   | 5850.000 | 46.98         | -2.98          | 44.00        | 54.00  | -10.00 | AVG            |              |         |

\*:Maximum data    x:Over limit    !:over margin

Engineer Signature:

Sunny

### Radiated Emission Measurement

File: ORT-P200A

Data: #5

Date: 2015-10-13

Time: 9:33:22

106.0 dBuV/m



Site site #1

Polarization: **Horizontal**

Temperature: 24.3

Limit: FCC RF Limit

Power: DC 7.4V by battery

Humidity: 54.8 %

EUT: Mini (Portable) Projector

Distance: 3m

M/N: P100A

Mode: 802.11a-CH5

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Antenna<br>Height<br>cm | Table<br>Degree<br>degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|---------------------------|---------|
| 1   |     | 5850.000     | 59.88                    | -2.98                   | 56.90                      | 74.00           | -17.10     | peak                    |                           |         |
| 2   | *   | 5850.000     | 47.96                    | -2.98                   | 44.98                      | 54.00           | -9.02      | AVG                     |                           |         |

\*:Maximum data x:Over limit l:over margin

Engineer Signature:

Sunny

## 4.10 Conducted Spurious Emissions

### 4.10.1 Test Requirement

According to §15.407(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: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

(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.

(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

### 4.10.3 Test Result

Not applicable

Remark: According to KDB 789033, Section G.2.C, out-of-band emission reference to section 4.9 (Radiated Emission and Band Edges) is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz maximum emission limit.