# TEST REPORT

## FCC PART 15 SUBPART E 15.407

| | |
|---|---|
| **Report Reference No.....:** | **CTA26012800902** |
| **FCC ID..... :** | **2BUWA-A19PRO** |
| Compiled by ( position+printed name+signature)..: | File administrators Zoey Cao |
| Supervised by ( position+printed name+signature)..: | Project Engineer Ace Chai |
| Approved by ( position+printed name+signature)..: | RF Manager Eric Wang |
| Date of issue.....: | Feb. 05, 2026 |
| **Testing Laboratory Name .....:** | **Shenzhen CTA Testing Technology Co., Ltd.** |
| Address.....: | Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China |
| **Applicant's name.....:** | **Shenzhen Aoruiwei Technology Co., Ltd.** |
| Address.....: | Room 211, Building 5, COFCO Robot Technology Park, Dayang Road, Fuhai Subdistrict, Bao'an District, Shenzhen, China |
| **Test specification ..... :** | |
| Standard .....: | **FCC Part 15 Subpart E 15.407** |
| TRF Originator.....: | Shenzhen CTA Testing Technology Co., Ltd. |

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| | |
|---|---|
| **Test item description ..... :** | **projector** |
| Trade Mark .....: | N/A |
| Manufacturer.....: | Shenzhen Aoruiwei Technology Co., Ltd. |
| Model/Type reference.....: | A19 Pro |
| Listed Models.....: | A29, A39 |
| Modulation .....: | OFDM |
| Frequency.....: | From 5745MHz-5825MHz |
| Rating .....: | DC 12.0V From external circuit |
| Result.....: | **PASS** |

# TEST REPORT

| | | |
|---|---|---|
| Equipment under Test | : | projector |
| Model /Type | : | A19 Pro |
| Listed Models | : | A29, A39 |
| Model difference | : | The PCB board, circuit, structure and internal of these models are the same, Only model number and colour is different for these model. |
| **Applicant** | : | **Shenzhen Aoruiwei Technology Co., Ltd.** |
| Address | : | Room 211, Building 5, COFCO Robot Technology Park, Dayang Road, Fuhai Subdistrict, Bao'an District, Shenzhen, China |
| **Manufacturer** | : | **Shenzhen Aoruiwei Technology Co., Ltd.** |
| Address | : | Room 211, Building 5, COFCO Robot Technology Park, Dayang Road, Fuhai Subdistrict, Bao'an District, Shenzhen, China |

| | |
|---|---|
| **Test Result**: | **PASS** |

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

# Contents

1 TEST STANDARDS....4
2 SUMMARY....5
2.1 General Remarks....5
2.2 Product Description....5
2.3 Equipment Under Test....5
2.4 Short description of the Equipment under Test (EUT)....5
2.5 EUT configuration....6
2.6 EUT operation mode....6
2.7 Block Diagram of Test Setup....6
2.8 Related Submittal(s) / Grant (s)....6
2.9 Modifications....6
3 TEST ENVIRONMENT....7
3.1 Address of the test laboratory....7
3.2 Test Facility....7
3.3 Environmental conditions....7
3.4 Test Description....8
3.5 Statement of the measurement uncertainty....8
3.1 Equipments Used during the Test....10
4 TEST CONDITIONS AND RESULTS....11
4.1 AC Power Conducted Emission....11
4.2 Radiated and Conducted Unwanted Emissions....14
4.3 Maximum Conducted Average Output Power....21
4.4 Power Spectral Density....22
4.5 Minimum Emission Bandwidth (6dB Bandwidth)....24
4.6 Frequency Stability....25
4.7 On Time and Duty Cycle....27
4.8 Antenna Requirement....28
4.9 Emissions at Restricted Band....29
5 Test Setup Photos of the EUT....31
6 Photos of the EUT....32

# 1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15 Subpart E—Unlicensed National Information Infrastructure Devices
ANSI C63.10-2020 +Cor. 1-2023+ C63.10a-2024+ Errata to C63.10a-2024: American National Standard for Testing Unlicensed Wireless Devices
KDB789033 D02: General UNII Test Procedures New Rules v02r01

# 2 SUMMARY

## 2.1 General Remarks

| | | |
|---|---|---|
| Date of receipt of test sample | : | Jan. 28, 2026 |
| | | |
| Testing commenced on | : | Jan. 28, 2026 |
| | | |
| Testing concluded on | : | Feb. 04, 2026 |

## 2.2 Product Description

| | | | | |
|---|---|---|---|---|
| Product Description: | projector | | | |
| Model: | A19 Pro | | | |
| Power supply: | DC 12.0V From external circuit | | | |
| Adapter information: | Model: FX36U-120200C<br>Input: AC 100-240V 50/60Hz 0.8A<br>Output: DC 12V 2A (24.0W) | | | |
| Hardware version: | V1.0 | | | |
| Software version: | V1.0 | | | |
| Testing sample ID: | CTA260128009-1# (Engineer sample)<br>CTA260128009-2# (Normal sample) | | | |
| **WIFI** | | | | |
| Supported type: | 20MHz system | 40MHz system | 80MHz system | 160MHz system |
| | 802.11a<br>802.11n | N/A | N/A | N/A |
| Operation frequency: | 5745MHz-5825MHz | N/A | N/A | N/A |
| Modulation: | OFDM | N/A | N/A | N/A |
| Channel number: | 5 | N/A | N/A | N/A |
| Channel separation: | 20MHz | N/A | N/A | N/A |
| Antenna type: | PIFA antenna | | | |
| Antenna gain: | 1.38 dBi | | | |

## 2.3 Equipment Under Test

### Power supply system utilised

Refer to section 2.2

## 2.4 Short description of the Equipment under Test (EUT)

This is a projector.
For more details, refer to the user's manual of the EUT.

| Test Software Version | Tools software(ADB command) | | |
|---|---|---|---|
| Frequency | 5745 MHz | 5785 MHz | 5825 MHz |
| 802.11a | 16 | 16 | 16 |
| 802.11n20 | 16 | 16 | 16 |

## 2.5 EUT configuration

**The following peripheral devices and interface cables were connected during the measurement:**

○ - supplied by the manufacturer
● - supplied by the lab

| | | |
|---|---|---|

## 2.6 EUT operation mode

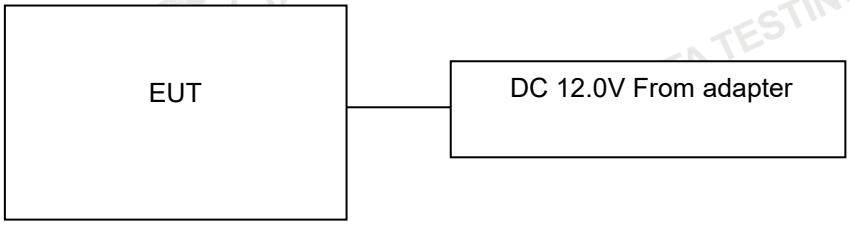
The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.
All test performed at the low, middle and high of operational frequency range of each mode.

Operation Frequency List WIFI on 5G Band：

| Operating band | 20MHz | |
|---|---|---|
| | Channel | Frequency (MHz) |
| U-NII 3 (5725MHz-5850MHz) | 149 | 5745 |
| | 153 | 5765 |
| | 157 | 5785 |
| | 161 | 5805 |
| | 165 | 5825 |

Note: The line display in grey is those Channels/Frequencies select to test in this report for each operation mode.

## 2.7 Block Diagram of Test Setup




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

This submittal(s) (test report) is intended to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.

## 2.9 Modifications

No modifications were implemented to meet testing criteria.

# 3 TEST ENVIRONMENT

## 3.1 Address of the test laboratory

**Shenzhen CTA Testing Technology Co., Ltd.**
Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

## 3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:
**FCC-Registration No.: 517856 Designation Number: CN1318**

Shenzhen CTA Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

**A2LA-Lab Cert. No.: 6534.01**

Shenzhen CTA Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

## 3.3 Environmental conditions

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

| | |
|---|---|
| Temperature: | 25 ° C |
| | |
| Humidity: | 45 % |
| | |
| Atmospheric pressure: | 950-1050mbar |

Conducted testing：

| | |
|---|---|
| Temperature: | 25 ° C |
| | |
| Humidity: | 44 % |
| | |
| Atmospheric pressure: | 950-1050mbar |

AC Power Conducted Emission

| | |
|---|---|
| Temperature: | 24 ° C |
| | |
| Humidity: | 44 % |
| | |
| Atmospheric pressure: | 950-1050mbar |

## 3.4 Test Description

| FCC Requirement | | |
|---|---|---|
| FCC Part 15.207 | AC Power Conducted Emission | PASS |
| FCC Part 15.407(e) | Minimum Emission Bandwidth(6dBm Bandwidth) | PASS Note2 |
| FCC Part 15.407(a) | Maximum Conducted Output Power | PASS |
| FCC Part 15.407(a) | Peak Power Spectral Density | PASS |
| FCC Part 15.407(g) | Frequency Stability | PASS |
| FCC Part 15.407(b) | Undesirable emission | PASS |
| FCC Part 15.407(b)/15.205/15.209 | Radiated Emissions | PASS |
| FCC Part 15.407(h) | Dynamic Frequency Selection | N/A Note 3 |
| FCC Part 15.203/15.247(b) | Antenna Requirement | PASS |

Note 1: Apply to U-NII 1 band.
Note 2: Apply to U-NII 3 band only.
Note 3: This device not work in DFS band.

**Data Rate Used:**
Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

| Test Items | Mode | Data Rate |
|---|---|---|
| Maximum Conducted Output Power<br>Power Spectral Density<br>Minimum Emission Bandwidth(6dBm Bandwidth)<br>Undesirable emission<br>Frequency Stability | 11a/OFDM | 6 Mbps |
| | 11n(20MHz),OFDM, | MCS0 |

## 3.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Shenzhen CTA Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.
Hereafter the best measurement capability for Shenzhen CTA Testing Technology Co., Ltd. :

| Test | Range | Measurement Uncertainty | Notes |
|---|---|---|---|
| Radiated Emission | 9KHz~30MHz | 3.02 dB | (1) |
| Radiated Emission | 30~1000MHz | 4.06 dB | (1) |
| Radiated Emission | 1~18GHz | 5.14 dB | (1) |
| Radiated Emission | 18-40GHz | 5.38 dB | (1) |
| Conducted Disturbance | 0.15~30MHz | 2.14 dB | (1) |
| Output Peak power | 30MHz~18GHz | 0.55 dB | (1) |
| Power spectral density | / | 0.57 dB | (1) |
| Spectrum bandwidth | / | 1.1% | (1) |
| Radiated spurious emission (30MHz-1GHz) | 30~1000MHz | 4.10 dB | (1) |
| Radiated spurious emission (1GHz-18GHz) | 1~18GHz | 4.32 dB | (1) |
| Radiated spurious emission (18GHz-40GHz) | 18-40GHz | 5.54 dB | (1) |
| Time | / | ±2% | (1) |

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 3.1 Equipments Used during the Test

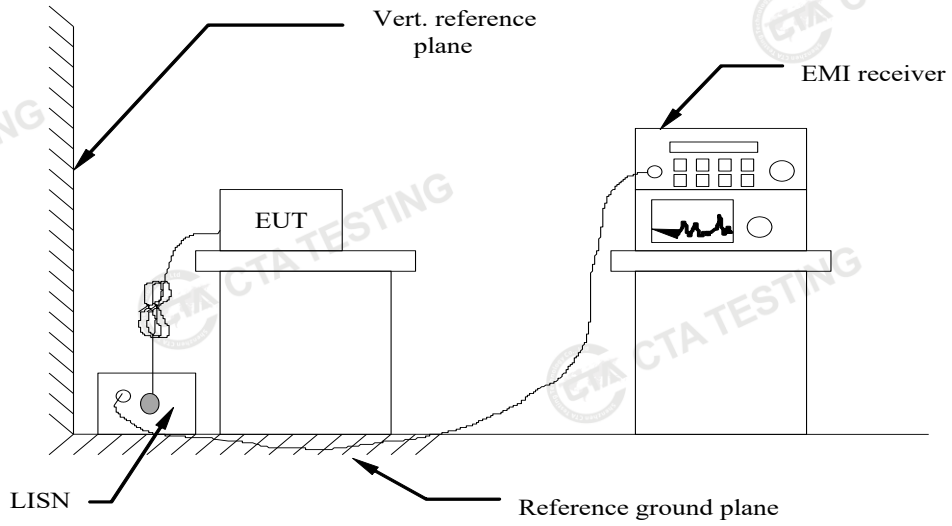
| Test Equipment | Manufacturer | Model No. | Equipment No. | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| LISN | R&S | ENV216 | CTA-308 | 2025/08/04 | 2026/08/03 |
| LISN | R&S | ENV216 | CTA-314 | 2025/07/30 | 2026/07/29 |
| EMI Test Receiver | R&S | ESPI | CTA-307 | 2025/07/30 | 2026/07/29 |
| EMI Test Receiver | R&S | ESCI | CTA-306 | 2025/07/30 | 2026/07/29 |
| Spectrum Analyzer | Agilent | N9020A | CTA-301 | 2025/05/17 | 2026/05/16 |
| Spectrum Analyzer | Agilent | N9020A | CTA-301 | 2025/07/30 | 2026/07/29 |
| Vector Signal generator | Agilent | N5182A | CTA-305 | 2025/07/30 | 2026/07/29 |
| Analog Signal Generator | R&S | E4421B | CTA-304 | 2025/07/30 | 2026/07/29 |
| WIDEBAND RADIO COMMUNICATION TESTER | R&S | CMW500 | CTA-302 | 2025/07/30 | 2026/07/29 |
| Temperature and humidity meter | Chigo | ZG-7020 | CTA-326 | 2025/07/31 | 2026/07/30 |
| Ultra-Broadband Antenna | Schwarzbeck | VULB9163 | CTA-310 | 2023/10/17 | 2026/10/16 |
| Horn Antenna | Schwarzbeck | BBHA 9120D | CTA-309 | 2023/10/13 | 2026/10/12 |
| Loop Antenna | Zhinan | ZN30900C | CTA-311 | 2023/10/17 | 2026/10/16 |
| Horn Antenna | Schwarzbeck | BBHA 9170 | CTA-346 | 2025/05/18 | 2028/05/17 |
| Amplifier | Schwarzbeck | BBV9745 | CTA-312 | 2025/07/30 | 2026/07/29 |
| Amplifier | Tonscend | TAP-011840 | CTA-313 | 2025/07/30 | 2026/07/29 |
| High-Pass Filter | XingBo | XBLBQ-GTA18 | CTA-402 | 2025/07/30 | 2026/07/29 |
| High-Pass Filter | XingBo | XBLBQ-GTA27 | CTA-403 | 2025/07/30 | 2026/07/29 |
| Automatic control unit | Tonscend | JS0806-2 | CTA-351 | 2025/07/30 | 2026/07/29 |
| Amplifier | SKET | LNPA 1840G-50 | CTA-345 | 2025/05/17 | 2026/05/16 |
| Spectrum analyzer | R&S | FSV40-N | CTA-344 | 2025/05/17 | 2026/05/16 |
| Attenuator | XINQY | 10dB | N/A | N/A | N/A |
| Programmable Constant Temperature And Humidity Test Chamber | DONGGUAN JINGYU | HT-H-408 | CTA-053 | 2025/07/30 | 2026/07/29 |
| EMI Test Software | Tonscend | TS®JS32-RE | 5.0.0.2 | N/A | N/A |
| EMI Test Software | Tonscend | TS®JS32-CE | 5.0.0.1 | N/A | N/A |
| RF Test Software | Tonscend | TS®JS1120-3 | 3.1.65 | N/A | N/A |
| RF Test Software | Tonscend | TS®JS1120 | 3.1.46 | N/A | N/A |

Note: The automatic control unit integrated Power sensor

# 4 TEST CONDITIONS AND RESULTS

## 4.1 AC Power Conducted Emission

**TEST CONFIGURATION**




**TEST PROCEDURE**

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a Multi-System Scannerop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2020.
2 Support equipment, if needed, was placed as per ANSI C63.10-2020
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2020
4 The EUT received power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT.The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.

**AC Power Conducted Emission Limit**

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

| Frequency range (MHz) | Limit (dBuV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |
| * Decreases with the logarithm of the frequency. | | |

**TEST RESULTS**

**Passed**

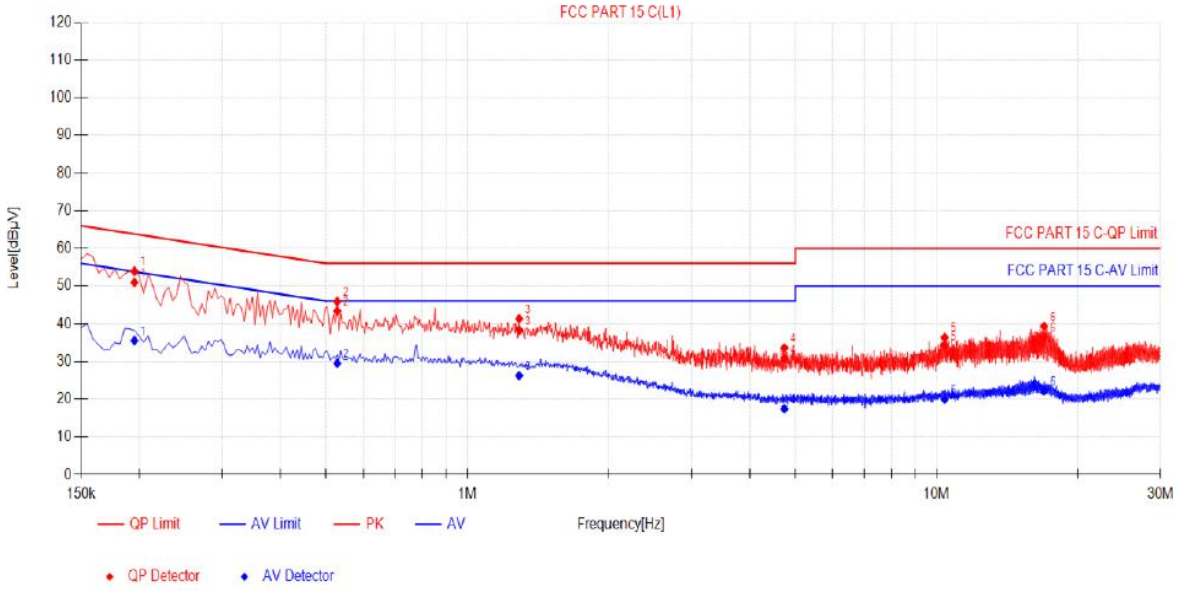
Please refer to the below test data:

Remark:

1. 1. All modes of 802.11a/n were test at Low, Middle, and High channel; only the worst result of a Middle Channel was reported as below:

2. Both 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz power supply have been tested, only the worst result of 120 VAC, 60 Hz was reported as below:

| Polarization: | L |
|---|---|




**Final Data List**

| NO. | Freq. [MHz] | Factor [dB] | QP Reading[dBμV] | QP Value [dBμV] | QP Limit [dBμV] | QP Margin [dB] | AV Reading [dBμV] | AV Value [dBμV] | AV Limit [dBμV] | AV Margin [dB] | Verdict |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.195 | 10.01 | 40.95 | 50.96 | 63.82 | 12.86 | 25.53 | 35.54 | 53.82 | 18.28 | PASS |
| 2 | 0.528 | 10.28 | 33.06 | 43.34 | 56.00 | 12.66 | 19.23 | 29.51 | 46.00 | 16.49 | PASS |
| 3 | 1.2885 | 10.44 | 27.92 | 38.36 | 56.00 | 17.64 | 15.78 | 26.22 | 46.00 | 19.78 | PASS |
| 4 | 4.74 | 10.84 | 19.86 | 30.70 | 56.00 | 25.30 | 6.63 | 17.47 | 46.00 | 28.53 | PASS |
| 5 | 10.401 | 11.60 | 22.67 | 34.27 | 60.00 | 25.73 | 8.35 | 19.95 | 50.00 | 30.05 | PASS |
| 6 | 16.9485 | 12.49 | 24.02 | 36.51 | 60.00 | 23.49 | 9.73 | 22.22 | 50.00 | 27.78 | PASS |

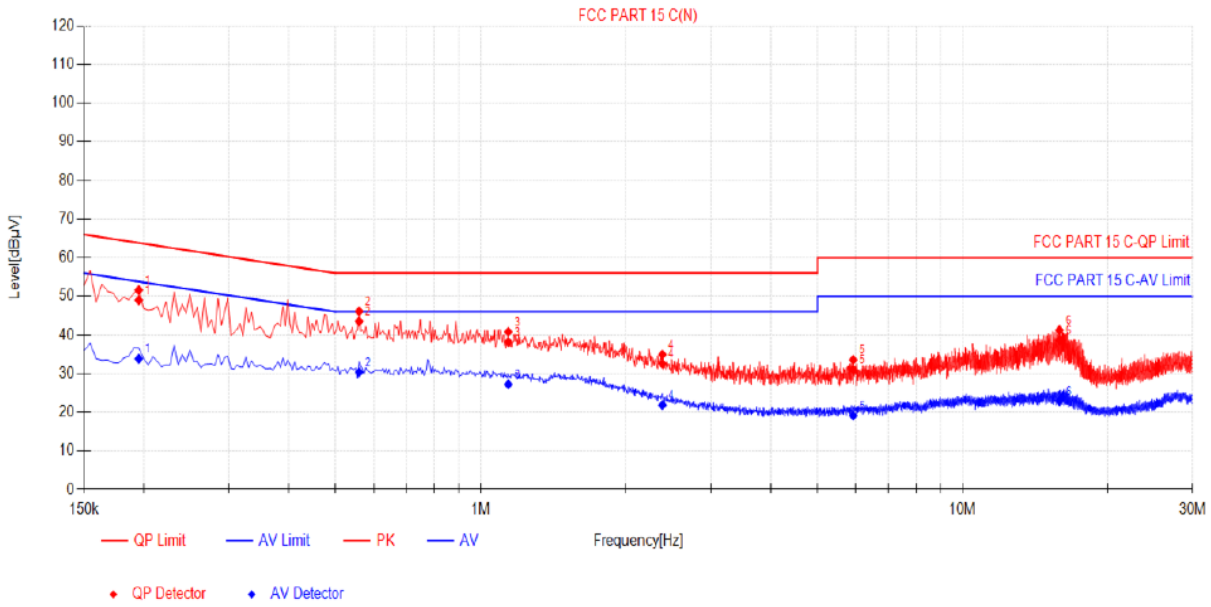
Note:1).QP Value (dBμV)= QP Reading (dBμV)+ Factor (dB)

2). Factor (dB)=insertion loss of LISN (dB) + Cable loss (dB)

3). QPMargin(dB) = QP Limit (dBμV) - QP Value (dBμV)

4). AVMargin(dB) = AV Limit (dBμV) - AV Value (dBμV)

| Polarization: | N |
|---|---|




## Final Data List

| NO. | Freq. [MHz] | Factor [dB] | QP Reading[dBμV] | QP Value [dBμV] | QP Limit [dBμV] | QP Margin [dB] | AV Reading [dBμV] | AV Value [dBμV] | AV Limit [dBμV] | AV Margin [dB] | Verdict |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.195 | 9.96 | 39.04 | 49.00 | 63.82 | 14.82 | 23.88 | 33.84 | 53.82 | 19.98 | PASS |
| 2 | 0.5595 | 10.24 | 33.29 | 43.53 | 56.00 | 12.47 | 20.12 | 30.36 | 46.00 | 15.64 | PASS |
| 3 | 1.14 | 10.39 | 27.82 | 38.21 | 56.00 | 17.79 | 16.85 | 27.24 | 46.00 | 18.76 | PASS |
| 4 | 2.382 | 10.51 | 22.08 | 32.59 | 56.00 | 23.41 | 11.34 | 21.85 | 46.00 | 24.15 | PASS |
| 5 | 5.9235 | 11.04 | 20.01 | 31.05 | 60.00 | 28.95 | 8.08 | 19.12 | 50.00 | 30.88 | PASS |
| 6 | 15.8865 | 12.47 | 26.17 | 38.64 | 60.00 | 21.36 | 10.44 | 22.91 | 50.00 | 27.09 | PASS |

Note:1).QP Value (dBμV)= QP Reading (dBμV)+ Factor (dB)
2). Factor (dB)=insertion loss of LISN (dB) + Cable loss (dB)
3). QPMargin(dB) = QP Limit (dBμV) - QP Value (dBμV)
4). AVMargin(dB) = AV Limit (dBμV) - AV Value (dBμV)

## 4.2 Radiated and Conducted Unwanted Emissions

**Limit**

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 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.

**Undesirable emission limits**

| Requirement | Limit(EIRP) | Limit (Field strength at 3m) Note1 |
|---|---|---|
| 15.407(b)(1) | PK:-27(dBm/MHz) | PK:68.2(dBμV/m) |
| 15.407(b)(2) | | |
| 15.407(b)(3) | | |
| 15.407(b)(4) | | |

Note1: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

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

(5) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209
(6)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)

Radiated emission limits

| Frequency (MHz) | Distance (Meters) | Radiated (dBμV/m) | Radiated (μV/m) |
|---|---|---|---|
| 0.009-0.49 | 3 | 20log(2400/F(KHz))+40log(300/3) | 2400/F(KHz) |
| 0.49-1.705 | 3 | 20log(24000/F(KHz))+ 40log(30/3) | 24000/F(KHz) |
| 1.705-30 | 3 | 20log(30)+ 40log(30/3) | 30 |
| 30-88 | 3 | 40.0 | 100 |
| 88-216 | 3 | 43.5 | 150 |
| 216-960 | 3 | 46.0 | 200 |
| Above 960 | 3 | 54.0 | 500 |

**Conducted measurement Test Procedure:**

The testing follows the ANSI C63.10 Section 12.7.6 and 6.10.4:

The procedure for peak unwanted emissions measurements above 1000 MHz is as follows:
b) Peak emission levels are measured by setting the instrument as follows:
1) RBW = 1 MHz.
2) VBW ⩾ [3 × RBW]
3) Detector = peak.
4) Sweep time = No faster than coupled (auto) time.
5) Trace mode = max-hold.
6) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, then the time required for the trace to stabilize will increase by a factor of approximately 1 / D, where D is the duty cycle. For example, at 50% duty cycle, the measurement time will increase by a factor of two, relative to measurement time for continuous transmission.

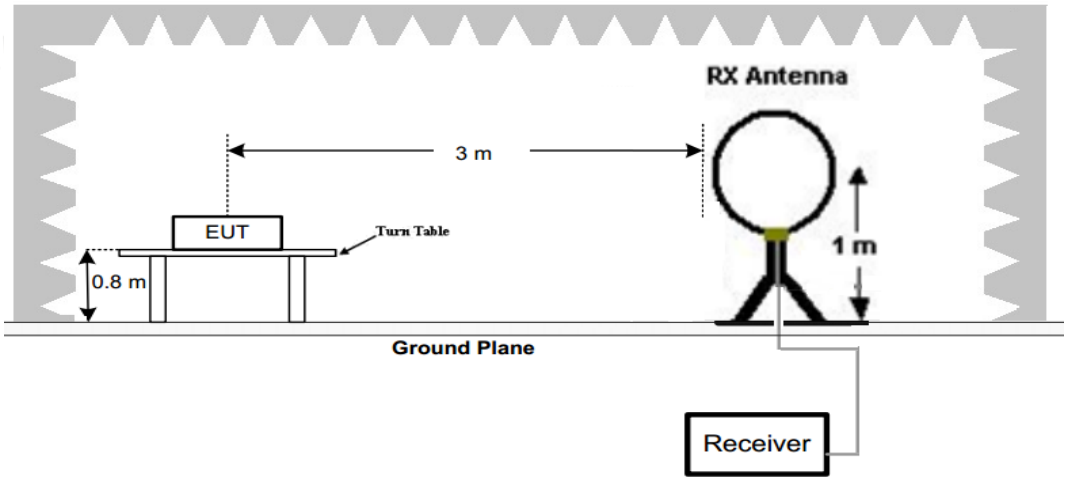
**Test Results**

Please refer to FCC Appendix RF Test Data for 5.8GWIFI

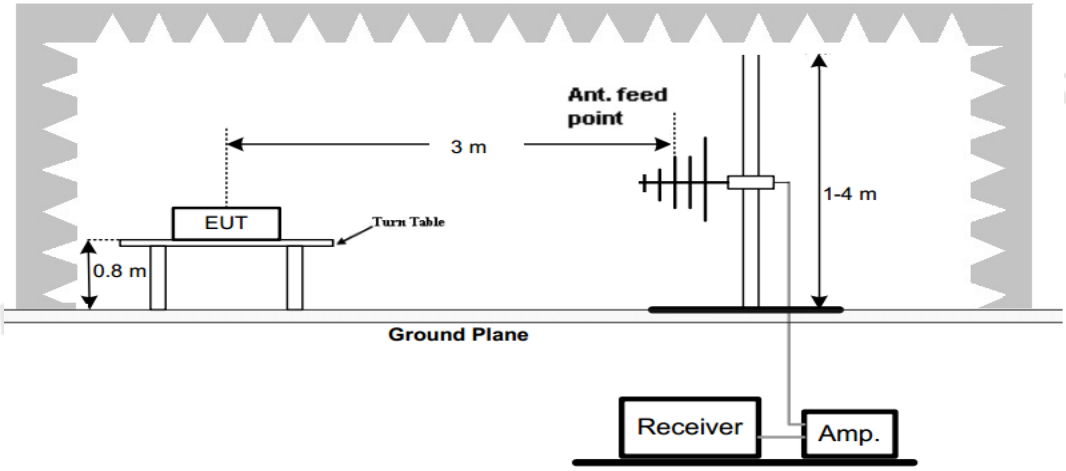
Note:RF Conducted test Offset= cable loss,For conducted spurious emission test, cable loss is the maximum value in the range of test.

**TEST CONFIGURATION**

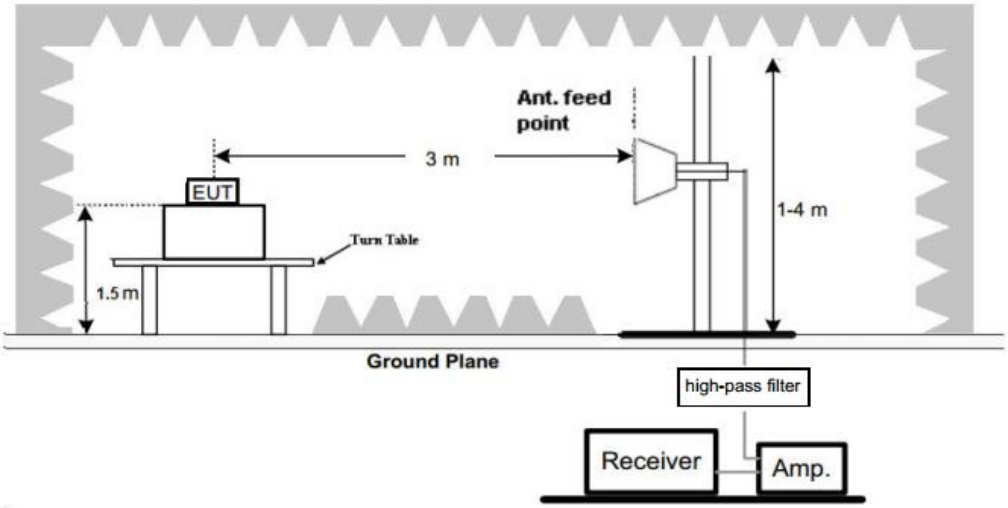
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz

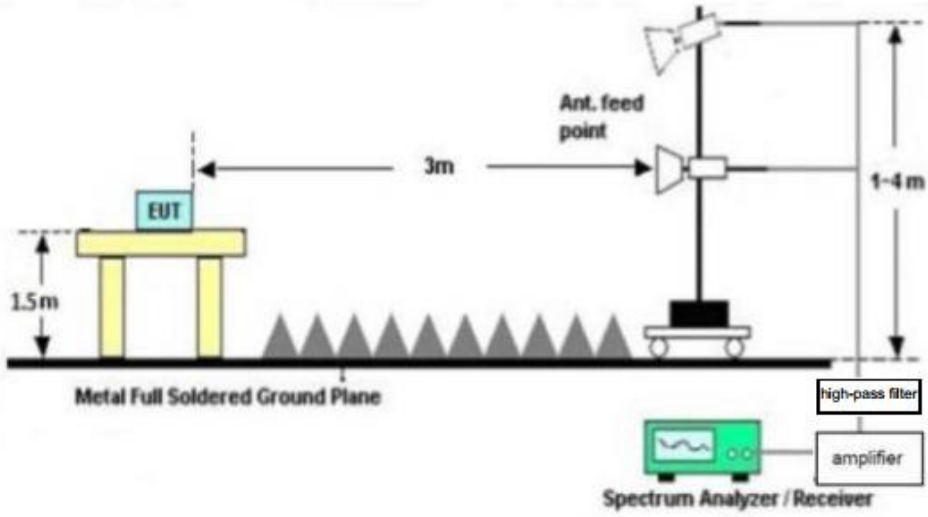



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz




(C) Radiated Emission Test Set-Up, Frequency above 1000MHz






**Test Procedure**

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. Radiated emission test frequency band from 9KHz to 40GHz.
6. The distance between test antenna and EUT as following table states:

| Test Frequency range | Test Antenna Type | Test Distance |
|---|---|---|
| 9KHz-30MHz | Active Loop Antenna | 3 |
| 30MHz-1GHz | Bilog Antenna | 3 |
| 1GHz-18GHz | Horn Antenna | 3 |
| 18GHz-25GHz | Horn Anternna | 1 |

7. Setting test receiver/spectrum as following table states:

| Test Frequency range | Test Receiver/Spectrum Setting | Detector |
|---|---|---|
| 9KHz-150KHz | RBW=200Hz/VBW=3KHz,Sweep time=Auto | QP |
| 150KHz-30MHz | RBW=9KHz/VBW=100KHz,Sweep time=Auto | QP |
| 30MHz-1GHz | RBW=120KHz/VBW=1000KHz,Sweep time=Auto | QP |
| 1GHz-40GHz | Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto<br>Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto | Peak |

**TEST RESULTS**

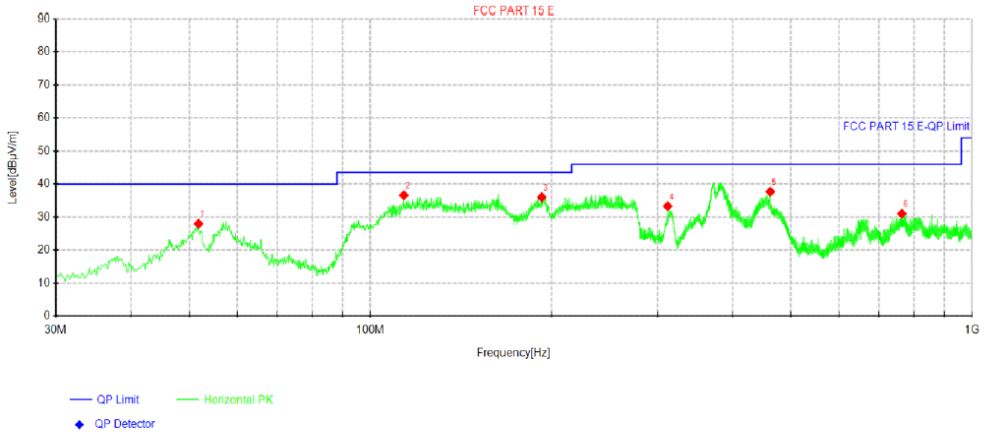
Remark:
1. This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.
2. All modes of 802.11a/n have been tested for below 1GHz test, only the worst case 802.11a low channel was recorded.
3. All modes of 802.11a/n have been tested for above 1GHz test, only the worst case 802.11a was recorded.
4. Radiated emission test from 9 KHz to 40GHz harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

5. Conducted emission test from 30MHz to 40GHz harmonic of fundamental was verified, and emission margin is greater than 20dB in 27GHz to 40GHz and not recorded in this report.

5.8G WIFI :

**For 30MHz-1GHz**

Horizontal



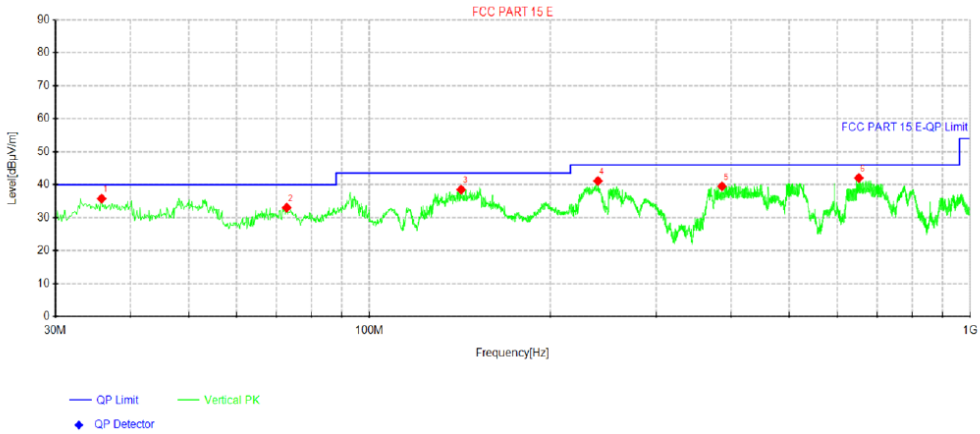

| Suspected Data List | | | | | | | |
|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Reading [dBμV] | Level [dBμV/m] | Factor [dB/m] | Limit [dBμV/m] | Margin [dB] | Polarity |
| 1 | 51.825 | 38.65 | 28.00 | -10.65 | 40.00 | 12.00 | Horizontal |
| 2 | 113.6625 | 50.26 | 36.59 | -13.67 | 43.50 | 6.91 | Horizontal |
| 3 | 192.5962 | 50.02 | 36.00 | -14.02 | 43.50 | 7.50 | Horizontal |
| 4 | 311.9062 | 45.02 | 33.27 | -11.75 | 46.00 | 12.73 | Horizontal |
| 5 | 462.0138 | 46.96 | 37.68 | -9.28 | 46.00 | 8.32 | Horizontal |
| 6 | 764.1688 | 34.55 | 30.99 | -3.56 | 46.00 | 15.01 | Horizontal |

Note:1).Level (dBμV/m)= Reading (dBμV)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin(dB) = Limit (dBμV/m) - Level (dBμV/m)

Vertical




| Suspected Data List | | | | | | | |
|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Reading [dBμV] | Level [dBμV/m] | Factor [dB/m] | Limit [dBμV/m] | Margin [dB] | Polarity |
| 1 | 35.82 | 48.95 | 35.77 | -13.18 | 40.00 | 4.23 | Vertical |
| 2 | 72.8012 | 49.16 | 33.03 | -16.13 | 40.00 | 6.97 | Vertical |
| 3 | 142.1562 | 55.53 | 38.51 | -17.02 | 43.50 | 4.99 | Vertical |
| 4 | 240.005 | 54.34 | 41.13 | -13.21 | 46.00 | 4.87 | Vertical |
| 5 | 386.3538 | 49.90 | 39.50 | -10.40 | 46.00 | 6.50 | Vertical |
| 6 | 652.3762 | 47.18 | 42.05 | -5.13 | 46.00 | 3.95 | Vertical |

Note:1).Level (dBμV/m)= Reading (dBμV)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin(dB) = Limit (dBμV/m) - Level (dBμV/m)

For 1GHz to 40GHz

Note: All 802.11a / 802.11n (HT20) modes have been tested for above 1GHz test, only the worst case 802.11a was recorded.

**5725-5850MHz:**

***U-NII 3 & 802.11N20 Mode (above 1GHz)***

| Tested Channel | Frequency (MHz) | Emission Level (dBuV/m) | Detector Mode | ANT Pol | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre amplifier (dB) | Correction Factor (dB/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 149.00 | 11490.0 | 60.90 | PK | H | 68.3 | 7.40 | 66.20 | 39.41 | 8.69 | 53.40 | -5.30 |
| (5745MHz) | 11490.0 | 51.89 | AV | H | 54.0 | 2.11 | 57.19 | 39.41 | 8.69 | 53.40 | -5.30 |
| 157.00 | 11570.0 | 61.89 | PK | H | 68.3 | 6.41 | 67.25 | 39.33 | 8.72 | 53.41 | -5.36 |
| (5785MHz) | 11570.0 | 51.33 | AV | H | 54.0 | 2.67 | 56.69 | 39.33 | 8.72 | 53.41 | -5.36 |
| 165.00 | 11650.0 | 63.04 | PK | H | 68.3 | 5.26 | 68.46 | 39.25 | 8.76 | 53.43 | -5.42 |
| (5825MHz) | 11650.0 | 51.13 | AV | H | 54.0 | 2.87 | 56.55 | 39.25 | 8.76 | 53.43 | -5.42 |

| Tested Channel | Frequency (MHz) | Emission Level (dBuV/m) | Detector Mode | ANT Pol | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre amplifier (dB) | Correction Factor (dB/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 149.00 | 11490.0 | 57.39 | PK | V | 68.3 | 10.91 | 62.69 | 39.41 | 8.69 | 53.40 | -5.30 |
| (5745MHz) | 11490.0 | 47.23 | AV | V | 54.0 | 6.77 | 52.53 | 39.41 | 8.69 | 53.40 | -5.30 |
| 157.00 | 11570.0 | 58.06 | PK | V | 68.3 | 10.24 | 63.42 | 39.33 | 8.72 | 53.41 | -5.36 |
| (5785MHz) | 11570.0 | 47.49 | AV | V | 54.0 | 6.51 | 52.85 | 39.33 | 8.72 | 53.41 | -5.36 |
| 165.00 | 11650.0 | 58.63 | PK | V | 68.3 | 9.67 | 64.05 | 39.25 | 8.76 | 53.43 | -5.42 |
| (5825MHz) | 11650.0 | 47.78 | AV | V | 54.0 | 6.22 | 53.20 | 39.25 | 8.76 | 53.43 | -5.42 |

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.
5. Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20;

## 4.3 Maximum Conducted Average Output Power

**Limit**

**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.

(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.

(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.

(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.

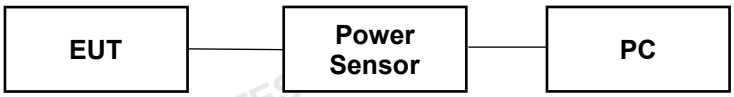
**For the 5.25-5.35 GHz and 5.47-5.725 GHz bands**, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

**For the band 5.725-5.85 GHz**, the maximum conducted output power over the frequency band of operation shall not exceed 1 W

**Test Procedure**

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.
Method PM is Measurement using an RF average power sensor. The procedure for this method is as follows:
1. The testing follows the ANSI C63.10 Section 12.4.3
2. The maximum average conducted output power may be measured using a broadband average RF power sensor.
3. The power sensor shall have a video bandwidth that is greater than or equal to the OBW bandwidth and shall use a fast-responding diode detector.

**Test Configuration**




**Test Results**

Please refer to FCC Appendix RF Test Data for 5.8GWIFI

Total Output Average power(dBm)= Output Average power(dBm)+ Duty Factor(dB)

## 4.4 Power Spectral Density

**Limit**

(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 power spectral density shall not exceed 17 dBm in any 1 MHz band.[note1]

(ii) 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 MHz band.[note1]

(iii) For fixed point-to-point access points operating in the band 5.15 - 5.25 GHz, transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

(iv) For mobile and portable client devices in the 5.15 - 5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band. [note1]

(2) For the 5.25 - 5.35 GHz and 5.47 - 5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. [note1]

(3) For the band 5.725 - 5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band. [note1, note2]

Note1: If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note2: 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 collocated transmitters transmitting the same information.

**Test Procedure**

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 1MHz for U-NII 1, U-NII 2A, U-NII C band and 500KHz for U-NII 3 band.
3. Set the VBW ≥ 3× RBW.
4. Set the span to encompass the entire EBW.
5. Detector = Average.
6. Sweep time = auto couple.
7. Trace mode = Average hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.

**Test Configuration**

**Test Results**

Please refer to FCC Appendix RF Test Data for 5.8GWIFI

Total Power Spectral Density (dBm/MHz)= Power Spectral Density (dBm/MHz)+ Duty Factor (dB)
Remark: P.S.D(dBm/500KHz)= P.S.D(dBm/300KHz)+10 log (500 kHz/300KHz).

RBW factor = 10 log (500 KHz / 300 KHz) = 2.22 dB

## 4.5 Minimum Emission Bandwidth (6dB Bandwidth)

**Limit**

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

**Test Procedure**

The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max-hold.
e) Sweep = No faster than coupled (auto) time.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

**Test Configuration**

**Test Results**

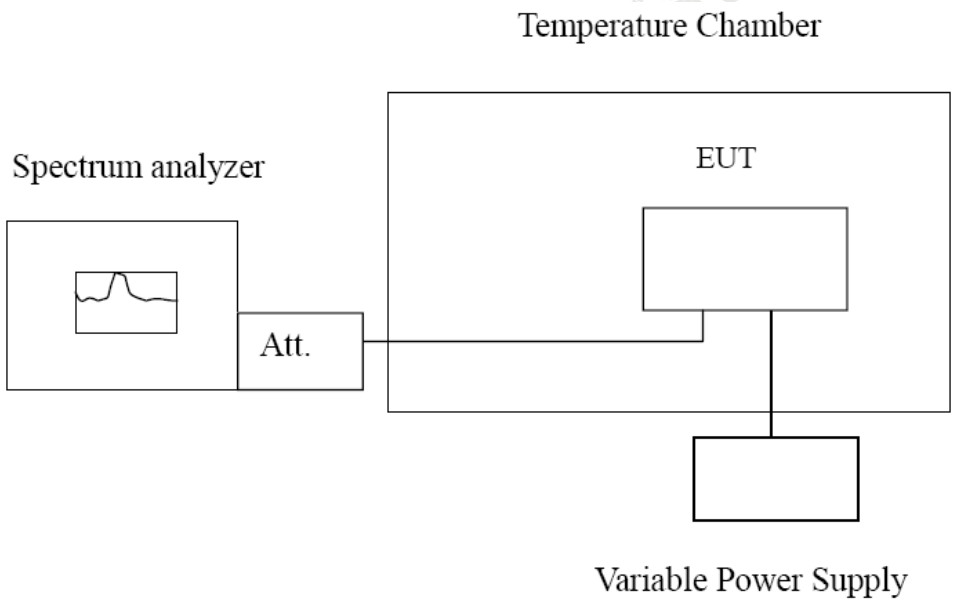
Please refer to FCC Appendix RF Test Data for 5.8GWIFI

## 4.6 Frequency Stability

**LIMIT**

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

**TEST CONFIGURATION**




**TEST PROCEDURE**

**Frequency Stability under Temperature Variations:**
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

**Frequency Stability under Voltage Variations:**
Set chamber temperature to 20℃. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.
Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

**TEST RESULTS**

| Reference Frequency: 802.11n20 channel=149 frequency=5745MHz | | | | | |
|---|---|---|---|---|---|
| Voltage ( V ) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| AC 120 | -30 | 135.73 | 0.023626 | Within the band of operation | Pass |
| | -20 | 129.55 | 0.022550 | | |
| | -10 | 167.34 | 0.029128 | | |
| | 0 | 169.82 | 0.029560 | | |
| | 10 | 136.37 | 0.023737 | | |
| | 20 | 144.84 | 0.025211 | | |
| | 30 | 116.83 | 0.020336 | | |
| | 40 | 168.56 | 0.029340 | | |
| | 50 | 160.83 | 0.027995 | | |
| AC 132 | 25 | 150.97 | 0.026279 | | |
| AC 108 | 25 | 129.90 | 0.022611 | | |

## 4.7 On Time and Duty Cycle

**Standard Applicable**

None; for reporting purpose only.

**TEST CONFIGURATION**

**Test Procedures**

1). Set the Centre frequency of the spectrum analyzer to the transmitting frequency;
2). Set the span=0MHz, RBW=8MHz, VBW=8MHz, Sweep time=Auto;
3). Detector = peak;
4). Trace mode = Single hold.

**TEST RESULTS**

Please refer to FCC Appendix RF Test Data for 5.8GWIFI

## 4.8 Antenna Requirement

**Standard Applicable**

**For intentional device, according to FCC 47 CFR Section 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, 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

**FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1) (I):**

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

**Antenna Connected Construction**

The PIFA antenna maximum gain of antenna was 1.38 dBi.

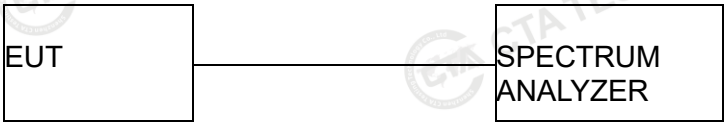
Remark:The antenna gain is provided by the customer , if the data provided by the customer is not accurate, Shenzhen CTA Testing Technology Co., Ltd. does not assume any responsibility.

## 4.9 Emissions at Restricted Band

**Standard Applicable**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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)).

**TEST CONFIGURATION**




**Test Procedures**

According to ANSI C63.10 Field Strength Approach (linear terms):

$$E = EIRP - 20 \log d + 104.8$$

Where:
E is the electric field strength in dBuV/m
EIRP is the equivalent isotropically radiated power in dBm
d is the specified measurement distance in m
f) Compare the resultant electric field strength level with the applicable regulatory limit.
g) Perform the radiated spurious emission test.

Where all terms are as previously defined.

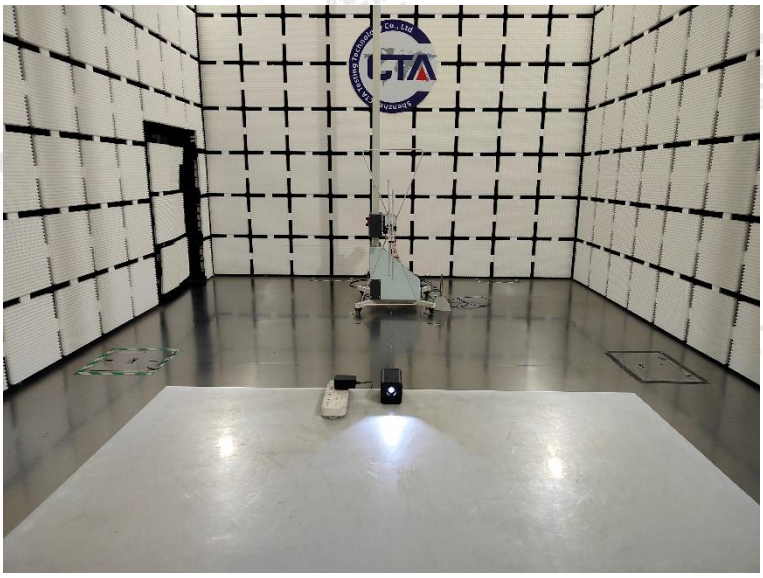
1). Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2). Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to an EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3). Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz for peak detector and RBW=1MHz, VBW=3MHz for RMS detector, Max Hold=Average, Trace=100times for AV test.
4). Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5). Repeat above procedures until all measured frequencies were complete.
6). Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
7). Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see 12.2.5 for guidance on determining the applicable antenna gain)
8). Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies ≤ 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz).

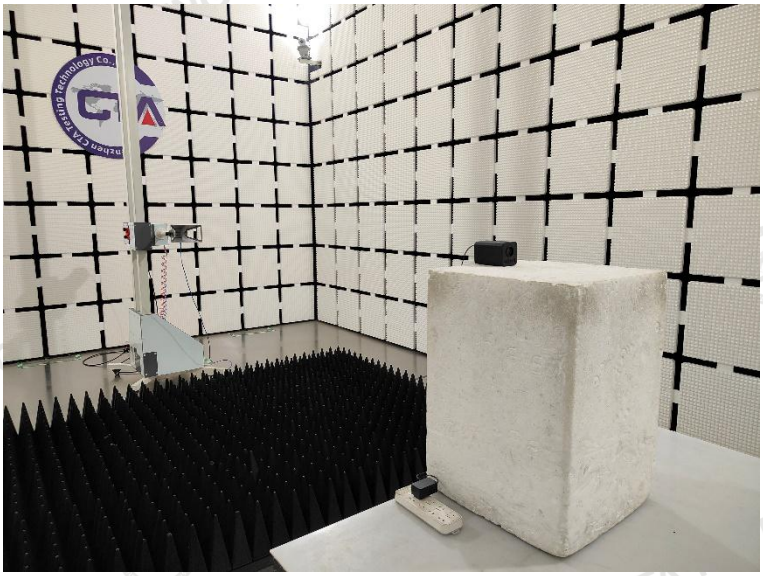
9). For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW).
10). Compare the resultant electric field strength level to the applicable regulatory limit.
11). Perform radiated spurious emission test duress until all measured frequencies were complete.

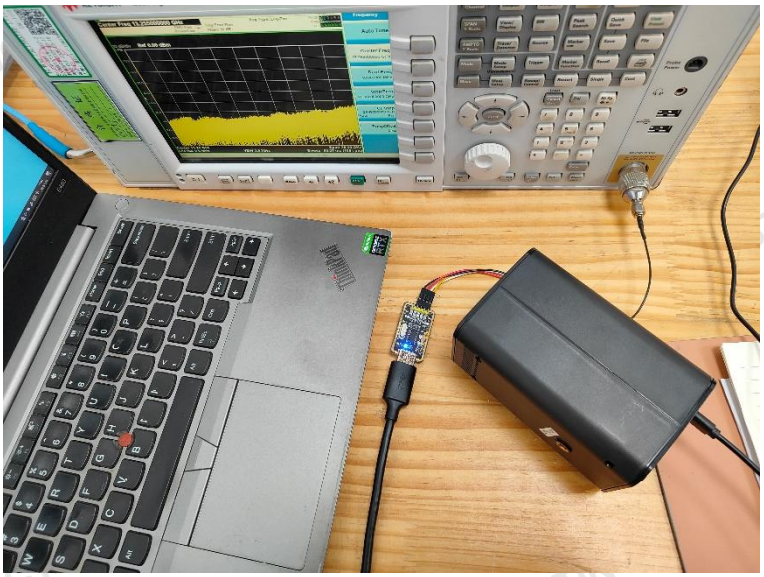
**Test Results**

Please refer to FCC Appendix RF Test Data for 5.8GWIFI.
Remark:
1). Test results including cable loss;
2). Measured at difference Packet Type for each mode and recorded worst case for each mode.
3). "---"means that the fundamental frequency not for 15.209 limits requirement.
4). Measured at Hopping and Non-Hopping mode, recorded worst at Non-Hopping mode.
5). The other emission levels were very low against the limit.
6). The average measurement was not performed when the peak measured data under the limit of average detection.
7). Detector AV is setting spectrum/receiver. RBW=1MHz/VBW=3MHz/Sweep time=Auto/Detector=RMS, Max Hold=Average,Trace=100times.
*8). Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.*

# 5 Test Setup Photos of the EUT







## 6 Photos of the EUT

Reference to the test report No. **CTA26012800901**

********** **End of Report** **********