Shenzhen CTL Testing Technology Co., Ltd.
Tel: +86-755-89486194 E-mail: ctl@ctl-lab.com

# TEST REPORT

## FCC PART 15 SUBPART E 15.407

| | | |
|---|---|---|
| **Report Reference No.** ..... : | **CTL2311012013-WF04** | |
| Compiled by:<br>( position+printed name+signature) | Happy Guo<br>(File administrators) | |
| Tested by:<br>( position+printed name+signature) | Jack Wang<br>(Test Engineer) | |
| Approved by:<br>( position+printed name+signature) | Ivan Xie<br>(Manager) | |

| | |
|---|---|
| **Product Name** ..... : | Auto Diagnostic System |
| **Model/Type reference** ..... : | HD8000 |
| **List Model(s)**..... : | HD8000 Pro, HD8000 BT, HD8000 Elite BT, HD8100, HD8100 Pro, HD8100 BT, HD8100 Elite BT, HD8200, HD8200 Pro, HD8200 BT, HD8200 Elite BT, HD8300, HD8300 Pro,HD8300 BT, HD8300 Elite BT, HD8400, HD8400 Pro, HD8400 BT, HD8400 Elite BT, HD8500, HD8500 Pro, HD8500 BT, HD8500 Elite BT, HD8600, HD8600 Pro, HD8600 BT, HD8600 Elite BT, HD8700, HD8700 Pro, HD8700 BT, HD8700 Elite BT, HD8800, HD8800 Pro, HD8800 BT, HD8800 Elite BT, HD8900, HD8900 Pro, HD8900 BT, HD8900 Elite BT |
| **Trade Mark**..... : | N/A |
| **FCC ID**..... : | **2ASC7-IDHD8X000** |
| **Applicant's name** ..... : | **OBDSPACE TECHNOLOGY CO,.LTD** |
| **Address of applicant** ..... : | Room D03, Building A, No.973, MinZhi Avenue LongHua district, Shenzhen City, China |
| **Test Firm**..... : | **Shenzhen CTL Testing Technology Co., Ltd.** |
| **Address of Test Firm** ..... : | Zone A, 1st Floor, Warehouse 2, Baisha Logistics Company, No. 3011 Shahe West Road, Nanshan District, Shenzhen |
| **Test specification**..... : | |
| Standard ..... : | **47 CFR FCC Part 15 Subpart E 15.407** |
| TRF Originator ..... : | Shenzhen CTL Testing Technology Co., Ltd. |
| Master TRF..... : | Dated 2011-01 |
| **Date of receipt of test item** ..... : | Nov. 02, 2023 |
| **Date of Test Date**..... : | Nov. 02, 2023-Dec. 13, 2023 |
| **Date of Issue** ..... : | Dec. 14, 2023 |
| **Result**..... : | **Pass** |

# TEST REPORT

| Test Report No. : | CTL2311012013-WF04 | Dec. 14, 2023<br>Date of issue |
|---|---|---|

| | | |
|---|---|---|
| Equipment under Test | : | Auto Diagnostic System |
| Sample No | : | CTL2311012013 |
| Model /Type | : | HD8000 |
| Listed Models | : | HD8000 Pro, HD8000 BT, HD8000 Elite BT, HD8100, HD8100 Pro, HD8100 BT, HD8100 Elite BT, HD8200, HD8200 Pro, HD8200 BT, HD8200 Elite BT, HD8300, HD8300 Pro,HD8300 BT, HD8300 Elite BT, HD8400, HD8400 Pro, HD8400 BT, HD8400 Elite BT, HD8500, HD8500 Pro, HD8500 BT, HD8500 Elite BT, HD8600, HD8600 Pro, HD8600 BT, HD8600 Elite BT, HD8700, HD8700 Pro, HD8700 BT, HD8700 Elite BT, HD8800, HD8800 Pro, HD8800 BT, HD8800 Elite BT, HD8900, HD8900 Pro, HD8900 BT, HD8900 Elite BT |
| **Applicant** | : | **OBDSPACE TECHNOLOGY CO,.LTD** |
| Address | : | Room D03, Building A, No.973, MinZhi Avenue LongHua district, Shenzhen City, China |
| **Manufacturer** | : | **SHENZHEN FCAR TECHNOLOGY CO.,LTD** |
| Address | : | 8F, Chuangyi Bldg., No. 3025,Nanhai Ave., Nanshan, Shenzhen, China |

| Test result | Pass * |
|---|---|

* In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

# ** Modified History **

| Revisions | Description | Issued Data | Report No. | Remark |
|---|---|---|---|---|
| Version 1.0 | Initial Test Report Release | 2023-12-14 | CTL2311012013-WF04 | Tracy Qi |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## Table of Contents Page

# 1. SUMMARY

## 1.1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15 Subpart E—Unlicensed National Information Infrastructure Devices

ANSI C63.10: 2013: American National Standard for Testing Unlicensed Wireless Devices

KDB789033 D02: General UNII Test Procedures New Rules v02r01

## 1.2. Test Description

| FCC Requirement | | |
|---|---|---|
| FCC Part 15.207 | AC Power Conducted Emission | PASS |
| FCC Part 15.407(a) | Emission Bandwidth(26dBm Bandwidth) | PASS$_{Note1}$ |
| 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 15.203/15.247(b) | Antenna Requirement | PASS |

## 1.3. Test Facility

### 1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.
Zone A, 1st Floor, Warehouse 2, Baisha Logistics Company, No. 3011 Shahe West Road, Nanshan District, Shenzhen

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

### 1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

**CNAS-Lab Code: L7497**

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

**A2LA-Lab Cert. No. 4343.01**

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

**IC Registration No.: 9618B**

**CAB identifier: CN0041**

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9618B on Jan. 22, 2019.

**FCC-Registration No.: 399832**

**Designation No.: CN1216**

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 399832, December 08, 2017.

## 1.4. 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 CISPR 16 - 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL 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 CTL laboratory is reported:

| Test | Measurement Uncertainty | Notes |
|---|---|---|
| Transmitter power conducted | ±0.57 dB | (1) |
| Transmitter power Radiated | ±2.20 dB | (1) |
| Conducted spurious emission 9KHz-40 GHz | ±2.20 dB | (1) |
| Occupied Bandwidth | ±0.01ppm | (1) |
| Radiated Emission9KHz~30MHz | ±3.66dB | (1) |
| Radiated Emission 30~1000MHz | ±4.10dB | (1) |
| Radiated Emission Above 1GHz | ±4.32dB | (1) |
| Conducted Disturbance0.15~30MHz | ±3.20dB | (1) |

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

# 2. GENERAL INFORMATION

## 2.1. Environmental conditions

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

| | |
|---|---|
| Normal Temperature: | 25°C |
| Relative Humidity: | 55 % |
| Air Pressure: | 101 kPa |

## 2.2. General Description of EUT

| | | | | |
|---|---|---|---|---|
| Product Name: | Auto Diagnostic System | | | |
| Model/Type reference: | HD8000 | | | |
| Power supply: | Adapter:<br>Model:XYY-38CA<br>Input: 100-240V 50/60Hz 0.9A<br>Output: USB-C, 20W MAX<br>5V-3A, 9V-2.22A, 12V-1.67A<br>USB-A, 18W MAX<br>5V-3A, 9V-2A, 12V-1.5A<br>DC 3.7V from battery (6000mAh) | | | |
| **5G WIFI :** | | | | |
| Supported type: | 20MHz system | 40MHz system | 80MHz system | 160MHz system |
| | 802.11a<br>802.11n<br>802.11ac | 802.11n<br>802.11ac | N/A | N/A |
| Operation frequency: | 5180-5240MHz<br>5745-5825MHz | 5190MHz<br>5230MHz<br>5755MHz<br>5795MHz | N/A | N/A |
| Modulation: | OFDM | OFDM | N/A | N/A |
| Channel number: | 9 | 4 | N/A | N/A |
| Channel separation: | 20MHz | 40MHz | N/A | N/A |
| Antenna type: | PIFA Antenna | | | |
| Antenna gain: | 2.99dBi | | | |

Note1: For more details, please refer to the user's manual of the EUT.
Note2: Antenna gain provided by the applicant.

## 2.3. Description of Test Modes and Test Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) 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 | | 40MHz | | 80MHz | |
|---|---|---|---|---|---|---|
| | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| U-NII 1 (5150MHz-5250MHz) | 36 | 5180 | 38 | 5190 | -- | -- |
| | 40 | 5200 | | | | |
| | 44 | 5220 | 46 | 5230 | | |
| | 48 | 5240 | | | | |
| U-NII 3 (5725MHz-5850MHz) | 149 | 5745 | 151 | 5755 | -- | -- |
| | 153 | 5765 | | | | |
| | 157 | 5785 | 159 | 5795 | | |
| | 161 | 5805 | | | | |
| | 165 | 5825 | -- | -- | -- | -- |

Note:

1. "--"Means no channel(s) available any more.
2. The line display in grey is those Channels/Frequencies select to test in this report for each operation mode.

**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>Emission Bandwidth(26dBm Bandwidth)<br>Minimum Emission Bandwidth(6dBm Bandwidth)<br>Undesirable emission<br>Frequency Stability | 11a/OFDM | 6 Mbps |
| | 11n(20MHz), /OFDM | 7.2 Mbps |
| | 11n(40MHz), /OFDM | 15.0Mbps |

## 2.4. Equipments Used during the Test

| Test Equipment | Manufacturer | Model No. | Serial No. | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| LISN | R&S | ESH2-Z5 | 860014/010 | 2023/05/04 | 2024/05/03 |
| Double cone logarithmic antenna | Schwarzbeck | VULB 9168 | 824 | 2023/02/13 | 2026/02/12 |
| Horn Antenna | Ocean Microwave | OBH100400 | 26999002 | 2021/12/22 | 2024/12/21 |
| EMI Test Receiver | R&S | ESCI | 1166.5950.03 | 2023/05/04 | 2024/05/03 |
| Spectrum Analyzer | Agilent | E4407B | MY41440676 | 2023/05/05 | 2024/05/04 |
| Spectrum Analyzer | Agilent | N9020A | UE22220290 | 2023/05/05 | 2024/05/04 |
| Spectrum Analyzer | Keysight | N9020A | MY53420874 | 2023/05/05 | 2024/05/04 |
| Horn Antenna | Sunol Sciences Corp. | DRH-118 | A062013 | 2021/12/23 | 2024/12/22 |
| Active Loop Antenna | Da Ze | ZN30900A | / | 2021/05/13 | 2024/05/12 |
| Amplifier | Agilent | 8449B | 3008A02306 | 2023/05/04 | 2024/05/03 |
| Amplifier | Agilent | 8447D | 2944A10176 | 2023/05/04 | 2024/05/03 |
| Amplifier | Brief&Smart | LNA-4018 | 2104197 | 2023/05/05 | 2024/05/04 |
| Temperature/Humidity Meter | Ji Yu | MC501 | / | 2023/05/09 | 2024/05/08 |
| Power Sensor | Agilent | U2021XA | MY55130004 | 2023/05/05 | 2024/05/04 |
| Power Sensor | Agilent | U2021XA | MY55130006 | 2023/05/05 | 2024/05/04 |
| Power Sensor | Agilent | U2021XA | MY54510008 | 2023/05/05 | 2024/05/04 |
| Power Sensor | Agilent | U2021XA | MY55060003 | 2023/05/05 | 2024/05/04 |
| Spectrum Analyzer | RS | FSP | 1164.4391.38 | 2023/05/05 | 2024/05/04 |

Test Software

| Name of Software | Version |
|---|---|
| TST-PASS | V1.1.0 |
| EZ_EMC(Below 1GHz) | V1.1.4.2 |
| EZ_EMC((Above 1GHz) | V1.1.4.2 |

The calibration interval was one year

## 2.5. 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.

## 2.6. Modifications

No modifications were implemented to meet testing criteria.

# 3. TEST CONDITIONS AND RESULTS

## 3.1. Conducted Emissions Test

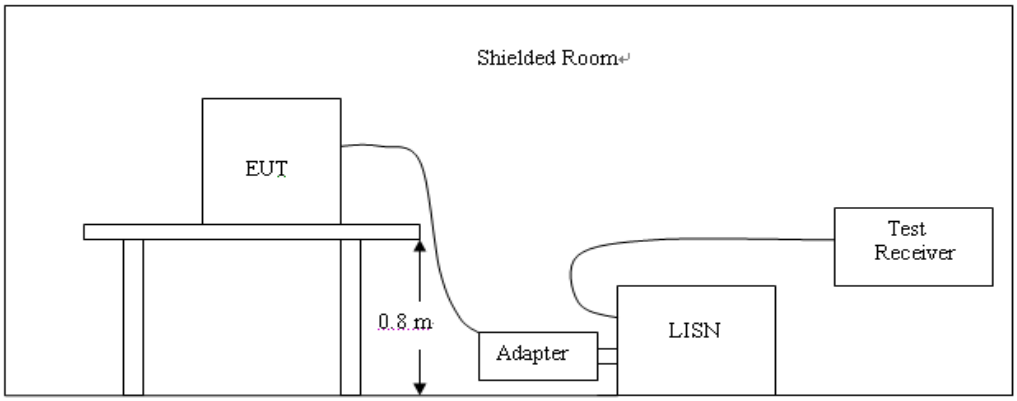
**LIMIT**

According to FCC CFR Title 47 Part 15 Subpart C Section 15.207, AC Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus as below:

| 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 CONFIGURATION**




**TEST PROCEDURE**

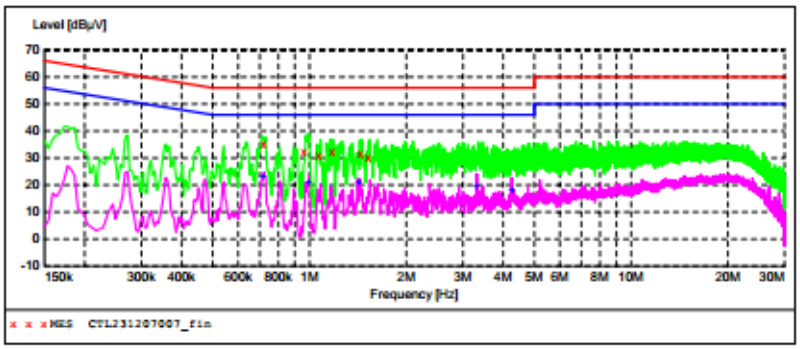
1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a Laser Projector op system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The adapter received AC120V/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.

## TEST RESULTS

Remark: 802.11a / 802.11n (HT20) / 802.11ac (HT20) / 802.11n (HT40) / 802.11ac (HT40) mode all have been tested, only worse case is reported

| Test Mode | WIFI | Line: | L |
|---|---|---|---|

SCAN TABLE: "Voltage (9K-30M) FIN"
Short Description: 150K-30M Voltage




MEASUREMENT RESULT: "CTL231207007_fin"

12/7/2023 9:06AM

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.721500 | 35.30 | 10.0 | 56 | 20.7 | QP | L1 | GND |
| 0.964500 | 32.40 | 10.1 | 56 | 23.6 | QP | L1 | GND |
| 1.072500 | 31.10 | 10.1 | 56 | 24.9 | QP | L1 | GND |
| 1.176000 | 32.50 | 10.1 | 56 | 23.5 | QP | L1 | GND |
| 1.441500 | 31.90 | 10.1 | 56 | 24.1 | QP | L1 | GND |
| 1.522500 | 30.50 | 10.1 | 56 | 25.5 | QP | L1 | GND |

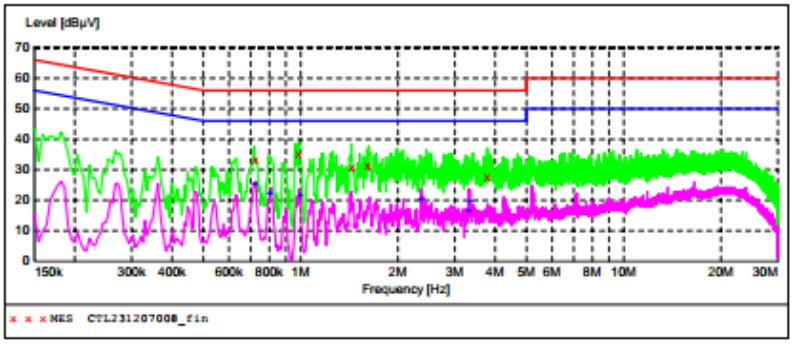
MEASUREMENT RESULT: "CTL231207007_fin2"

12/7/2023 9:06AM

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.717000 | 23.30 | 10.0 | 46 | 22.7 | AV | L1 | GND |
| 0.991500 | 20.80 | 10.1 | 46 | 25.2 | AV | L1 | GND |
| 1.419000 | 21.10 | 10.1 | 46 | 24.9 | AV | L1 | GND |
| 3.300000 | 19.30 | 10.1 | 46 | 26.7 | AV | L1 | GND |
| 4.254000 | 17.80 | 10.1 | 46 | 28.2 | AV | L1 | GND |

| Test Mode | WIFI | Line: | N |
|---|---|---|---|

***SCAN TABLE: "Voltage (9K-30M) FIN"***
Short Description: 150K-30M Voltage




***MEASUREMENT RESULT: "CTL231207008_fin"***

12/7/2023 9:09AM

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.726000 | 33.40 | 10.0 | 56 | 22.6 | QP | N | GND |
| 0.987000 | 35.00 | 10.1 | 56 | 21.0 | QP | N | GND |
| 1.446000 | 30.70 | 10.1 | 56 | 25.3 | QP | N | GND |
| 1.621500 | 31.50 | 10.1 | 56 | 24.5 | QP | N | GND |
| 3.795000 | 28.00 | 10.1 | 56 | 28.0 | QP | N | GND |

***MEASUREMENT RESULT: "CTL231207008_fin2"***

12/7/2023 9:09AM

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.721500 | 25.40 | 10.0 | 46 | 20.6 | AV | N | GND |
| 0.802500 | 21.90 | 10.0 | 46 | 24.1 | AV | N | GND |
| 0.996000 | 21.60 | 10.1 | 46 | 24.4 | AV | N | GND |
| 2.359500 | 20.10 | 10.1 | 46 | 25.9 | AV | N | GND |
| 3.313500 | 16.20 | 10.1 | 46 | 29.8 | AV | N | GND |
| 3.349500 | 19.70 | 10.1 | 46 | 26.3 | AV | N | GND |

## 3.2. Radiated 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

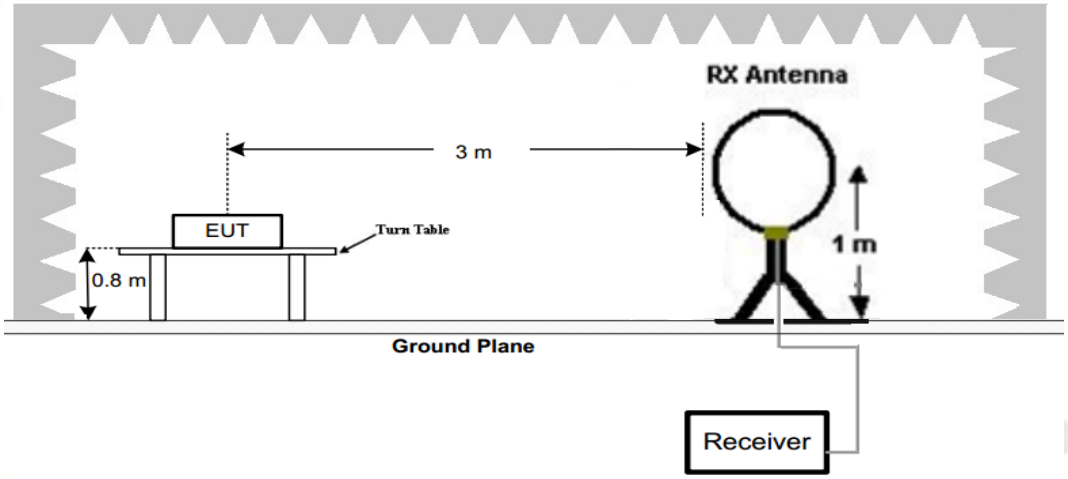
(6)In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

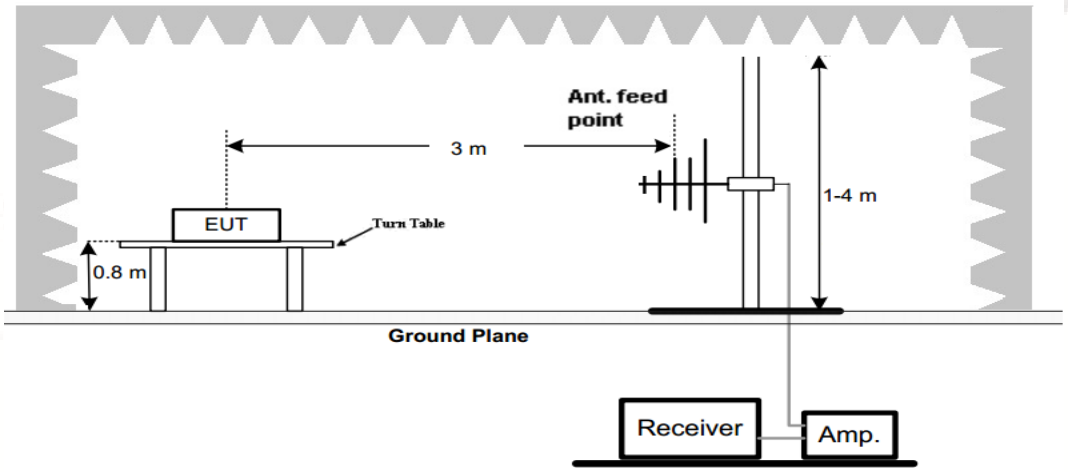
| Frequency (MHz) | Distance (Meters) | Radiated (dBμV/m) | Radiated (μV/m) |
|---|---|---|---|
| 0.009-0.49 | 3 | 20log(2400/F(KHz))+40log(300/3) | 2400/F(KHz) |
| 0.49-1.705 | 3 | 20log(24000/F(KHz))+ 40log(30/3) | 24000/F(KHz) |
| 1.705-30 | 3 | 20log(30)+ 40log(30/3) | 30 |
| 30-88 | 3 | 40.0 | 100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

## TEST CONFIGURATION

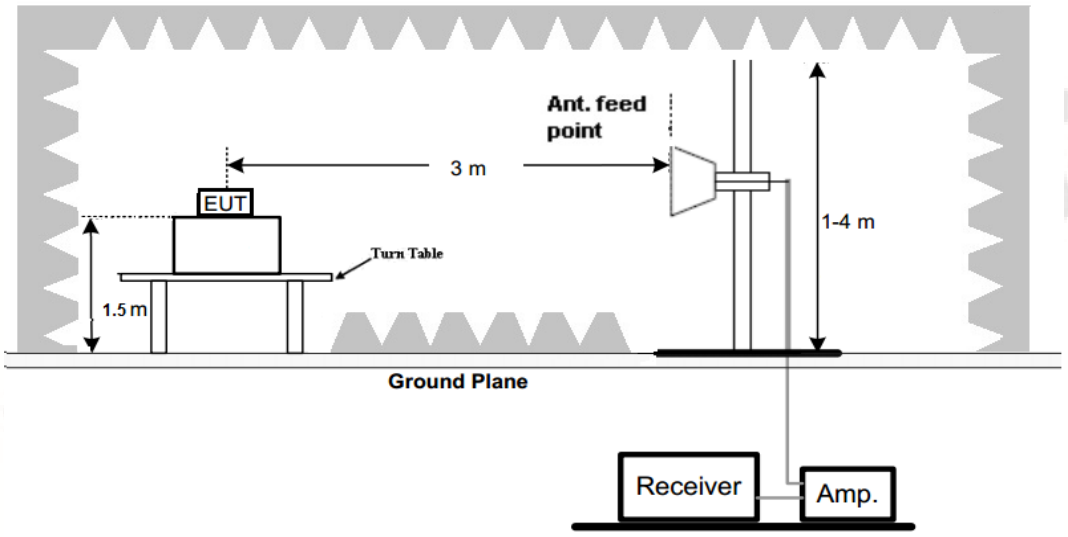
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz




(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:

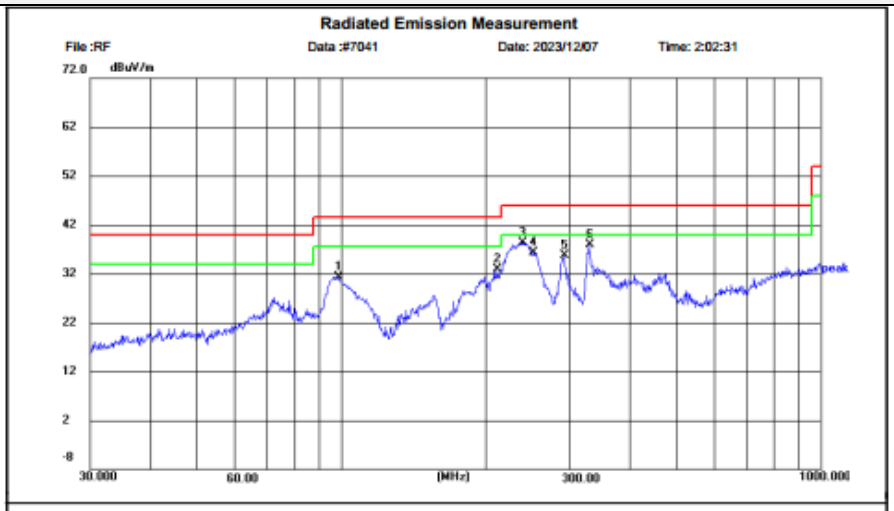
| Test Frequency range | Test Receiver/Spectrum Setting | Detector |
|---|---|---|
| 9KHz-150KHz | RBW=200Hz/VBW=3KHz,Sweep time=Auto | QP |
| 150KHz-30MHz | RBW=9KHz/VBW=100KHz,Sweep time=Auto | QP |
| 30MHz-1GHz | RBW=120KHz/VBW=1000KHz,Sweep time=Auto | QP |
| 1GHz-40GHz | Peak Value: RBW=1MHz/VBW=3MHz, 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 802.11a / 802.11n (HT20) / 802.11ac (HT20) / 802.11n (HT40) / 802.11ac (HT40) modes have been tested for below 1GHz test, only the worst case 802.11n (HT20) low channel of U-NII 1 band was recorded.
3. All 802.11a / 802.11n (HT20) / 802.11ac (HT20) / 802.11n (HT40) / 802.11ac (HT40) modes have been tested for above 1GHz test, only the worst case 802.11n (HT20) was recorded.
4. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

**For 30MHz-1GHz**

Horizontal



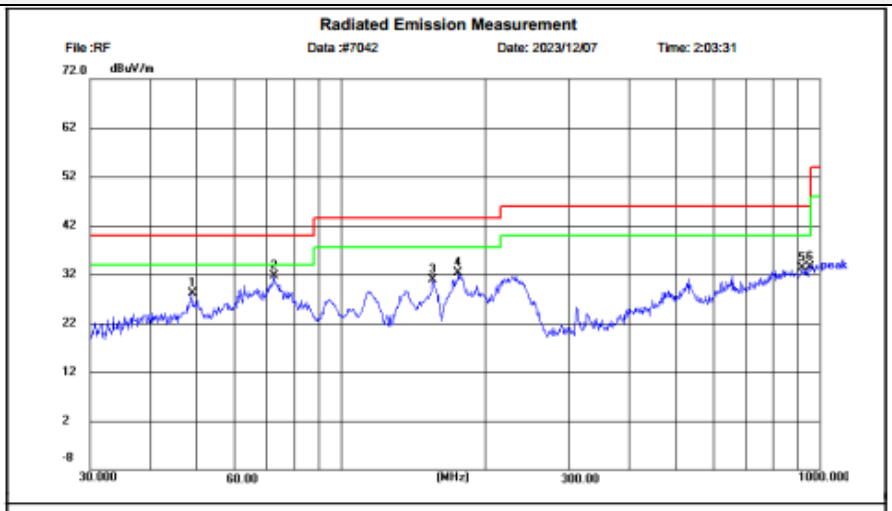

Site LAB Chamber 2
Limit: FCC Part15 RE-Class C_30-1000MHz
EUT: /
M/N: HD8000
Mode: WIFI5.1G 5180MHz
Note: OBDSPACE TECHNOLOGY Co., LTD

Polarization: *Horizontal*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 98.8324 | 20.31 | 11.08 | 31.39 | 43.50 | 12.11 | peak | 100 | 0 | P | |
| 2 | 211.5264 | 21.13 | 11.74 | 32.87 | 43.50 | 10.63 | peak | 100 | 323 | P | |
| 3 | 239.9873 | 25.39 | 12.98 | 38.37 | 46.00 | 7.63 | peak | 100 | 315 | P | |
| 4 | 252.0627 | 23.43 | 12.86 | 36.29 | 46.00 | 9.71 | peak | 100 | 341 | P | |
| 5 | 292.0583 | 21.79 | 13.92 | 35.71 | 46.00 | 10.29 | peak | 100 | 341 | P | |
| 6 | 329.0390 | 22.93 | 14.92 | 37.85 | 46.00 | 8.15 | peak | 100 | 341 | P | |

Vertical




Site LAB Chamber 2
Limit: FCC Part15 RE-Class C_30-1000MHz
EUT: /
M/N: HD8000
Mode: WIFI5.1G 5180MHz
Note: OBDSPACE TECHNOLOGY Co., LTD

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 48.8429 | 13.98 | 14.21 | 28.19 | 40.00 | 11.81 | peak | 100 | 357 | P | |
| 2 | 72.5916 | 20.29 | 11.35 | 31.64 | 40.00 | 8.36 | peak | 100 | 305 | P | |
| 3 | 155.9101 | 17.32 | 13.60 | 30.92 | 43.50 | 12.58 | peak | 100 | 175 | P | |
| 4 | 176.2686 | 20.10 | 12.15 | 32.25 | 43.50 | 11.25 | peak | 100 | 183 | P | |
| 5 | 919.2866 | 7.24 | 26.00 | 33.24 | 46.00 | 12.76 | peak | 100 | 236 | P | |
| 6 | 955.4381 | 7.07 | 26.36 | 33.43 | 46.00 | 12.57 | peak | 100 | 132 | P | |

***For 1GHz to 40GHz***

Note: 1. All 802.11a / 802.11n (HT20) / 802.11ac (HT20) / 802.11n (HT40) / 802.11ac (HT40) modes have been tested for above 1GHz test, only the worst case 802.11n (HT20) was recorded.

***U-NII 1 & 802.11n (HT20) 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 (5180MHz) | 5150.00 | 48.78 | PK | H | 68.20 | 19.42 | 37.42 | 37.64 | 9.28 | 35.56 | 11.36 |
| | 10360.00 | 50.69 | PK | H | 68.20 | 17.51 | 34.96 | 39.20 | 11.45 | 34.92 | 15.73 |
| | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 40 (5200MHz) | 10400.00 | 49.98 | PK | H | 68.20 | 18.22 | 34.17 | 39.22 | 11.48 | 34.89 | 15.81 |
| | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 48 (5240MHz) | 5350.50 | 48.57 | PK | H | 68.20 | 19.63 | 37.16 | 37.64 | 9.28 | 35.51 | 11.41 |
| | 10480.00 | 50.89 | PK | H | 68.20 | 17.31 | 34.90 | 39.27 | 11.55 | 34.83 | 15.99 |
| | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

| 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 (5180MHz) | 5150.00 | 47.98 | PK | V | 68.20 | 20.22 | 36.62 | 37.64 | 9.28 | 35.56 | 11.36 |
| | 10360.00 | 50.54 | PK | V | 68.20 | 17.66 | 34.81 | 39.20 | 11.45 | 34.92 | 15.73 |
| | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 40 (5200MHz) | 10400.00 | 49.35 | PK | V | 68.20 | 18.85 | 33.54 | 39.22 | 11.48 | 34.89 | 15.81 |
| | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 48 (5240MHz) | 5350.50 | 48.14 | PK | V | 68.20 | 20.06 | 36.73 | 37.64 | 9.28 | 35.51 | 11.41 |
| | 10480.00 | 51.24 | PK | V | 68.20 | 16.96 | 35.25 | 39.27 | 11.55 | 34.83 | 15.99 |
| | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

***U-NII 3 & 802.11n (HT20) 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 (5745MHz) | 5720.00 | 63.66 | PK | H | 110.80 | 34.56 | 76.78 | 37.64 | 9.28 | 35.41 | 11.51 |
| | 5725.00 | 69.11 | PK | H | 122.20 | 35.85 | 86.88 | 37.64 | 9.28 | 35.41 | 11.51 |
| | 11490.00 | 51.09 | PK | H | 68.20 | 17.11 | 32.83 | 39.69 | 12.90 | 34.33 | 18.26 |
| | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 157 (5785MHz) | 11570.00 | 50.55 | PK | H | 68.20 | 17.65 | 32.10 | 39.71 | 13.05 | 34.31 | 18.45 |
| | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 165 (5825MHz) | 5850.00 | 58.62 | PK | H | 122.50 | 30.23 | 80.73 | 37.64 | 9.28 | 35.38 | 11.54 |
| | 5855.00 | 56.04 | PK | H | 110.80 | 22.99 | 76.27 | 37.64 | 9.28 | 35.38 | 11.54 |
| | 11650.00 | 50.57 | PK | H | 68.20 | 17.63 | 31.95 | 39.73 | 13.19 | 34.30 | 18.62 |
| | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

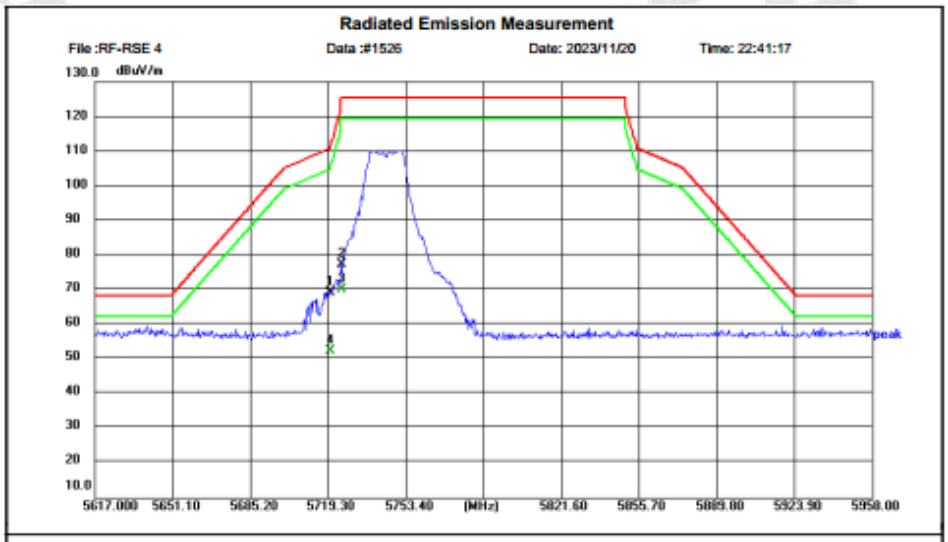
| Tested Channel | Frequency (MHz) | Emission Level (dBuV/m) | Detector Mode | ANT Pol | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre amplifier (dB) | Correction Factor (dB/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 149 (5745MHz) | 5720.00 | 63.29 | PK | V | 110.80 | 21.65 | 77.64 | 37.64 | 9.28 | 35.41 | 11.51 |
| | 5725.00 | 68.70 | PK | V | 122.20 | 23.22 | 87.47 | 37.64 | 9.28 | 35.41 | 11.51 |
| | 11490.00 | 50.23 | PK | V | 68.20 | 17.97 | 31.97 | 39.69 | 12.90 | 34.33 | 18.26 |
| | -- | -- | -- | -- | -- | -- | | -- | -- | -- | -- |
| 157 (5785MHz) | 11570.00 | 51.00 | PK | V | 68.20 | 17.20 | | 39.71 | 13.05 | 34.31 | 18.45 |
| | -- | -- | -- | -- | -- | -- | | -- | -- | -- | -- |
| 165 (5825MHz) | 5850.00 | 62.30 | PK | V | 122.50 | 17.61 | 81.65 | 37.64 | 9.28 | 35.38 | 11.54 |
| | 5855.00 | 56.34 | PK | V | 110.80 | 33.77 | 76.89 | 37.64 | 9.28 | 35.38 | 11.54 |
| | 11650.00 | 51.52 | PK | V | 68.20 | 16.68 | 32.90 | 39.73 | 13.19 | 34.30 | 18.62 |
| | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

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. -- Mean the other emission levels were very low against the limit.
5. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.
6. Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11ac VHT20 ,IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;

## Band Edge Test Plots

5745MHz 802.11n (HT20)

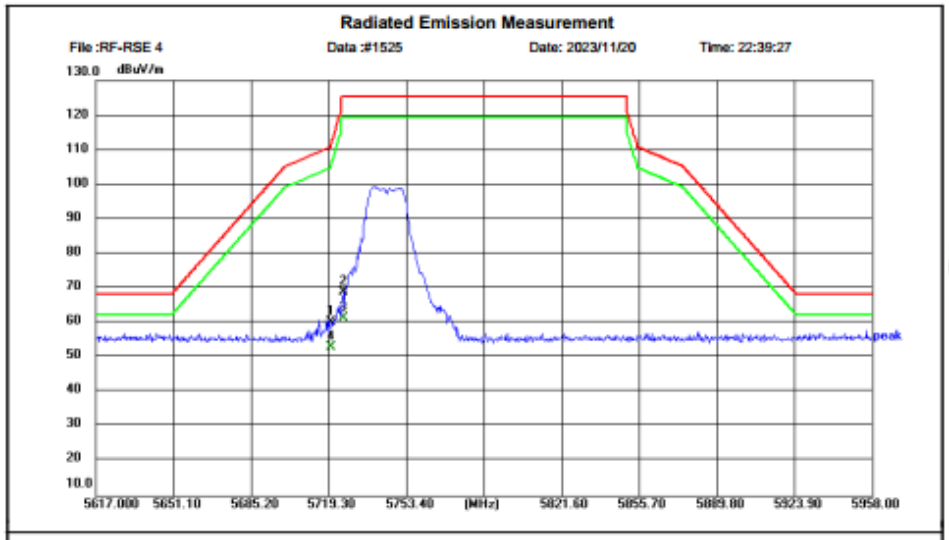



Site LAB Chamber 2
Limit: 5725-5850 BAND
EUT:
M/N: HD8000
Mode: WIFI5.8G 5745MHz TX
Note: Company Name: OBDSPACE TECHNOLOGY Co., LTD

Polarization: *Horizontal*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5720.323 | 51.20 | 18.11 | 69.31 | 111.54 | 42.23 | peak | 150 | 360 | P | |
| 2 | 5725.097 | 59.38 | 18.12 | 77.50 | 125.20 | 47.70 | peak | 150 | 360 | P | |
| 3 | 5725.097 | 52.02 | 18.12 | 70.14 | 125.20 | 55.06 | AVG | 150 | 0 | P | |
| 4 | 5720.323 | 34.31 | 18.11 | 52.42 | 111.54 | 59.12 | AVG | 150 | 0 | P | |




Site LAB Chamber 2
Limit: 5725-5850 BAND
EUT:
M/N: HD8000
Mode: WIFI5.8G 5745MHz TX
Note: Company Name: OBDSPACE TECHNOLOGY Co., LTD

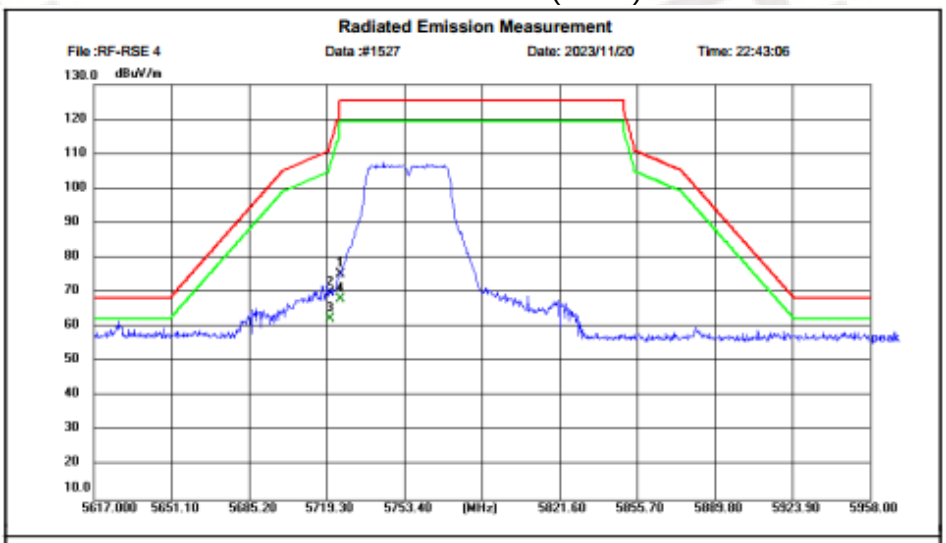
Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5720.323 | 42.13 | 18.11 | 60.24 | 111.54 | 51.30 | peak | 150 | 360 | P | |
| 2 | 5725.779 | 50.78 | 18.12 | 68.90 | 125.20 | 56.30 | peak | 150 | 360 | P | |
| 3 | 5725.779 | 43.42 | 18.12 | 61.54 | 125.20 | 63.66 | AVG | 150 | 0 | P | |
| 4 | 5720.323 | 35.03 | 18.11 | 53.14 | 111.54 | 58.40 | AVG | 150 | 0 | P | |

## Band Edge Test Plots

5755MHz 802.11n (HT40)

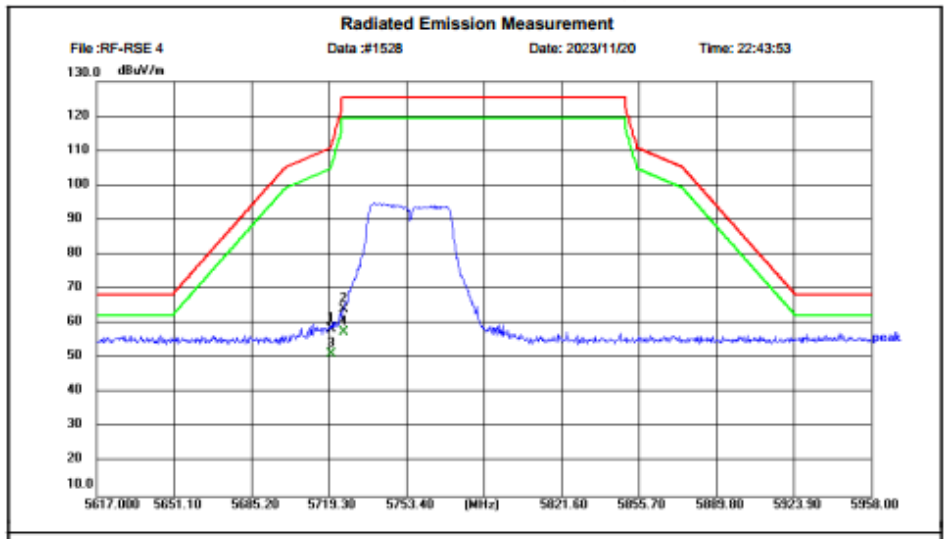



Site LAB Chamber 2
Limit: 5725-5850 BAND
EUT:
M/N: HD8000
Mode: WIFI5.8G 5755MHz TX
Note: Company Name: OBDSPACE TECHNOLOGY Co., LTD

Polarization: *Horizontal*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5725.097 | 57.04 | 18.12 | 75.16 | 125.20 | 50.04 | peak | 150 | 360 | P | |
| 2 | 5720.664 | 51.83 | 18.11 | 69.94 | 112.31 | 42.37 | peak | 150 | 360 | P | |
| 3 | 5720.664 | 44.31 | 18.11 | 62.42 | 112.31 | 49.89 | AVG | 150 | 0 | P | |
| 4 | 5725.097 | 50.03 | 18.12 | 68.15 | 125.20 | 57.05 | AVG | 150 | 0 | P | |




Site LAB Chamber 2
Limit: 5725-5850 BAND
EUT:
M/N: HD8000
Mode: WIFI5.8G 5755MHz TX
Note: Company Name: OBDSPACE TECHNOLOGY Co., LTD

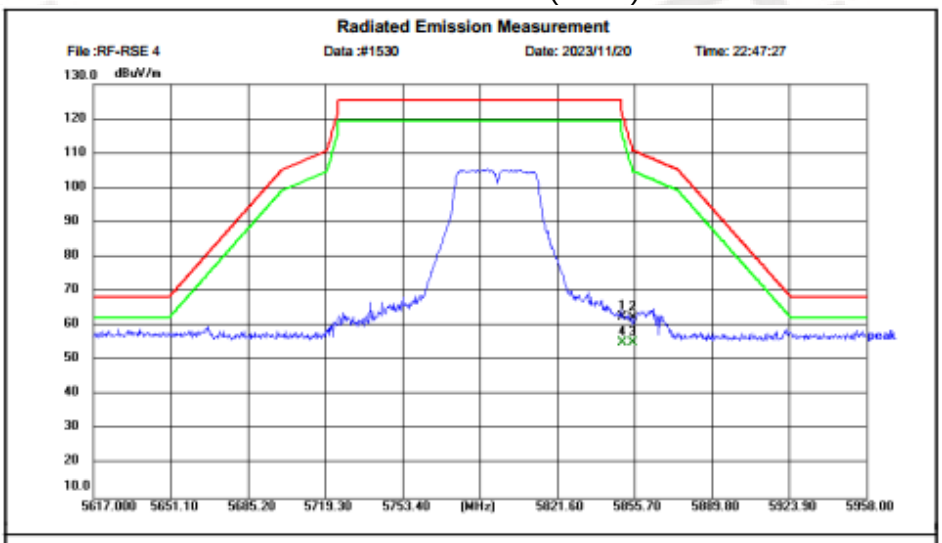
Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5720.323 | 40.45 | 18.11 | 58.56 | 111.54 | 52.98 | peak | 150 | 360 | P | |
| 2 | 5725.779 | 46.13 | 18.12 | 64.25 | 125.20 | 60.95 | peak | 150 | 360 | P | |
| 3 | 5720.323 | 33.04 | 18.11 | 51.15 | 111.54 | 60.39 | AVG | 150 | 0 | P | |
| 4 | 5725.779 | 39.33 | 18.12 | 57.45 | 125.20 | 67.75 | AVG | 150 | 0 | P | |

## Band Edge Test Plots

5795MHz 802.11n (HT40)

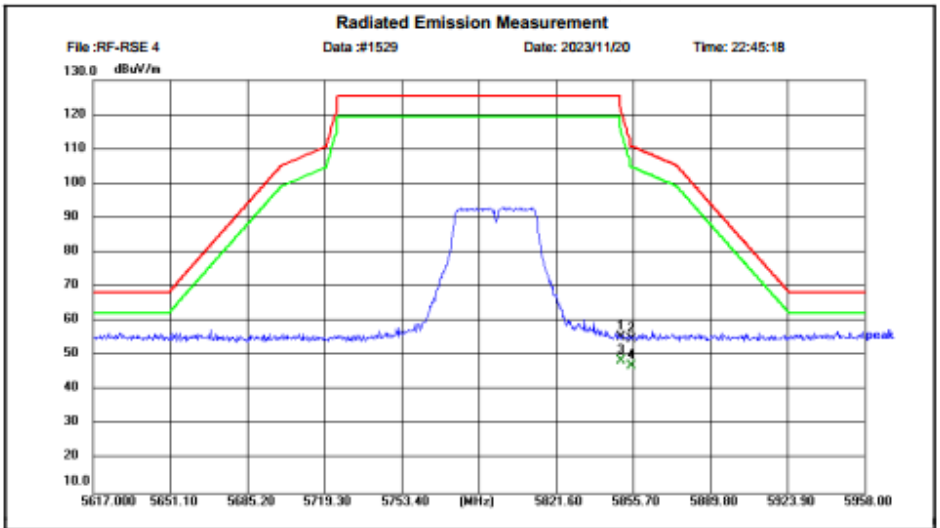



Site LAB Chamber 2
Limit: 5725-5850 BAND
EUT:
M/N: HD8000
Mode: WIFI5.8G 5795MHz TX
Note: Company Name: OBDSPACE TECHNOLOGY Co., LTD

Polarization: *Horizontal*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5850.585 | 44.27 | 18.30 | 62.57 | 120.87 | 58.30 | peak | 150 | 360 | P | |
| 2 | 5855.018 | 44.12 | 18.32 | 62.44 | 110.79 | 48.35 | peak | 150 | 360 | P | |
| 3 | 5855.018 | 36.80 | 18.32 | 55.12 | 110.79 | 55.67 | AVG | 150 | 0 | P | |
| 4 | 5850.585 | 36.89 | 18.30 | 55.19 | 120.87 | 65.68 | AVG | 150 | 0 | P | |




Site LAB Chamber 2
Limit: 5725-5850 BAND
EUT:
M/N: HD8000
Mode: WIFI5.8G 5795MHz TX
Note: Company Name: OBDSPACE TECHNOLOGY Co., LTD

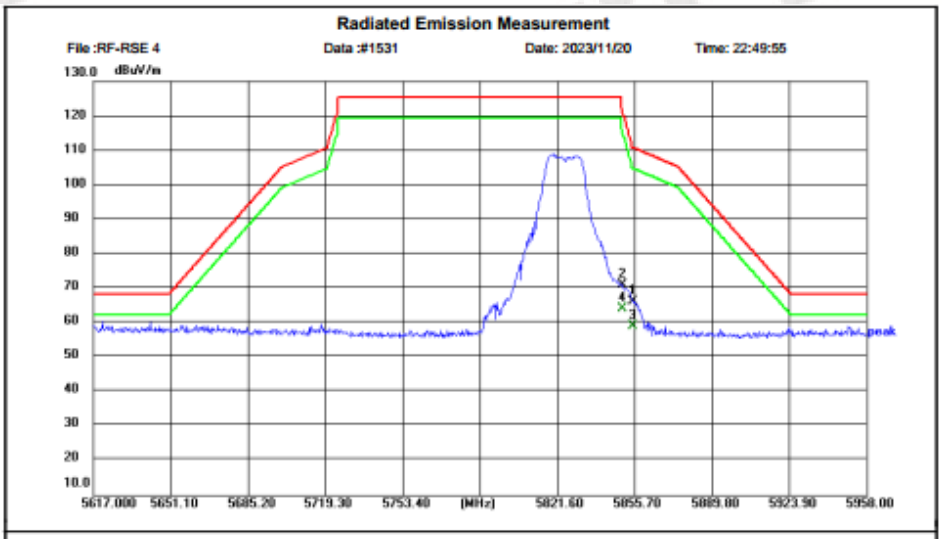
Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5850.244 | 37.03 | 18.30 | 55.33 | 121.64 | 66.31 | peak | 150 | 360 | P | |
| 2 | 5855.018 | 36.43 | 18.32 | 54.75 | 110.79 | 56.04 | peak | 150 | 360 | P | |
| 3 | 5850.244 | 30.15 | 18.30 | 48.45 | 121.64 | 73.19 | AVG | 150 | 0 | P | |
| 4 | 5855.018 | 28.80 | 18.32 | 47.12 | 110.79 | 63.67 | AVG | 150 | 0 | P | |

## Band Edge Test Plots

5825MHz 802.11n (HT20)

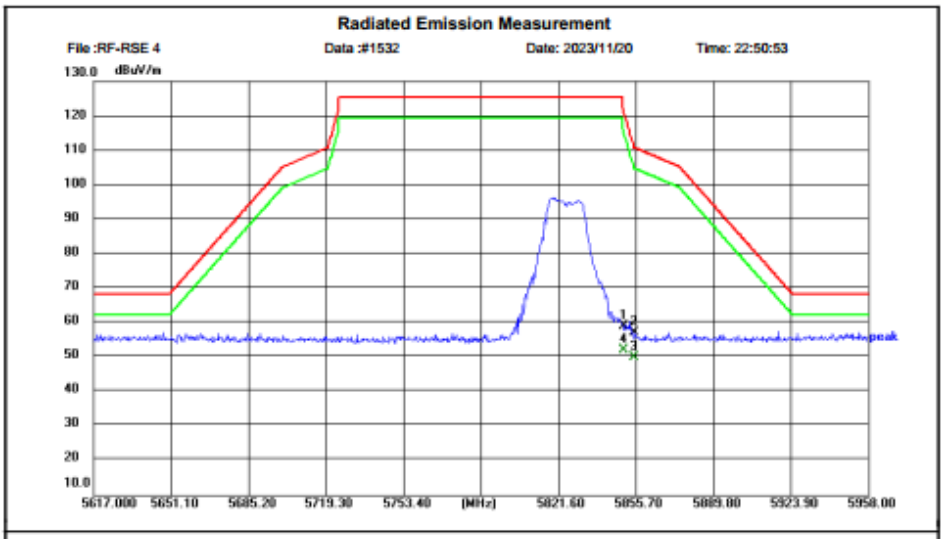



Site LAB Chamber 2
Limit: 5725-5850 BAND
EUT:
M/N: HD8000
Mode: WIFI5.8G 5825MHz TX
Note: Company Name: OBDSPACE TECHNOLOGY Co., LTD

Polarization: *Horizontal*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5855.018 | 47.93 | 18.32 | 66.25 | 110.79 | 44.54 | peak | 150 | 360 | P | |
| 2 | 5850.244 | 52.85 | 18.30 | 71.15 | 121.64 | 50.49 | peak | 150 | 360 | P | |
| 3 | 5855.018 | 40.87 | 18.32 | 59.19 | 110.79 | 51.60 | AVG | 150 | 0 | P | |
| 4 | 5850.244 | 45.89 | 18.30 | 64.19 | 121.64 | 57.45 | AVG | 150 | 0 | P | |




Site LAB Chamber 2
Limit: 5725-5850 BAND
EUT:
M/N: HD8000
Mode: WIFI5.8G 5825MHz TX
Note: Company Name: OBDSPACE TECHNOLOGY Co., LTD

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5850.244 | 40.72 | 18.30 | 59.02 | 121.64 | 62.62 | peak | 150 | 360 | P | |
| 2 | 5855.018 | 38.97 | 18.32 | 57.29 | 110.79 | 53.50 | peak | 150 | 360 | P | |
| 3 | 5855.018 | 31.87 | 18.32 | 50.19 | 110.79 | 60.60 | AVG | 150 | 0 | P | |
| 4 | 5850.244 | 33.89 | 18.30 | 52.19 | 121.64 | 69.45 | AVG | 150 | 0 | P | |

## 3.3. Maximum Conducted Average Output Power

**Limit**

**FCC requirement:**
**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 6dBi.

(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 6dBi.

(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 250mW provided the maximum antenna gain does not exceed 6dBi.

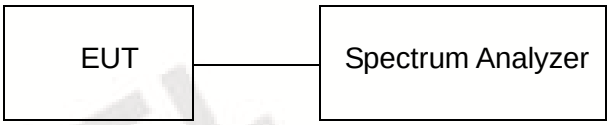
**For the 5.25-5.35 GHz and 5.47-5.725 GHz bands**, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or 11dBm + 10log B, where B is the 26 dB emission bandwidth in megahertz.

**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 spectrum.

**Test Configuration**




**Test Results**

Raw data reference to Section 2 Appendix RF test data for 5G_U-NII BAND1.
Raw data reference to Section 2 Appendix RF test data for 5G_U-NII BAND3.

## 3.4. Power Spectral Density

**Limit**

**FCC requirement:**
**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 17dBm 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 17dBm 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 23dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23dBi.

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

**For the 5.25-5.35 GHz and 5.47-5.725 GHz bands**

The maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.

**IC requirement:**

**For the band 5.15-5.25 GHz.**

The e.i.r.p. spectral density shall not exceed 10dBm in any 1.0 MHz band.

**Frequency band 5250-5350 MHz**

The power spectral density shall not exceed 11dBm in any 1.0 MHz band

**Frequency bands 5470-5600 MHz and 5650-5725 MHz**

The power spectral density shall not exceed 11dBm in any 1.0 MHz band.

**For the band 5.725 - 5.85 GHz**

The maximum power spectral density shall not exceed 30dBm in any 500 kHz band. [note1, note2]

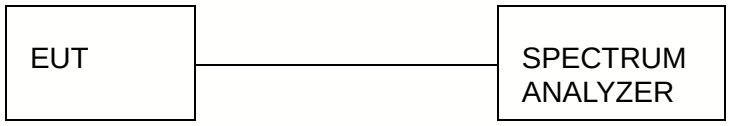
Note1: If transmitting antennas of directional gain greater than 6dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Note2: Fixed point - to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi 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 510KHz for U-NII 3 band.
3. Set the VBW ≥ 3× RBW.
4. Set the span to encompass the entire EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.

**Test Configuration**




**Test Results**

Raw data reference to Section 3 Appendix RF test data for 5G_U-NII BAND1.
Raw data reference to Section 3 Appendix RF test data for 5G_U-NII BAND3.

## 3.5. Emission Bandwidth (26dBm Bandwidth)

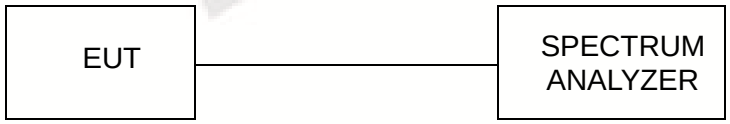
**Limit**

N/A

**Test Procedure**

1. Set resolution bandwidth (RBW) = approximately 1 % of the EBW.
2. Set the video bandwidth (VBW) > 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 %.

**Test Configuration**




**Test Results**

Raw data reference to Section 1 Appendix RF test data for 5G_U-NII BAND1.
Raw data reference to Section 1 Appendix RF test data for 5G_U-NII BAND3.

## 3.6. Minimum Emission Bandwidth (6dBm Bandwidth)

**Limit**

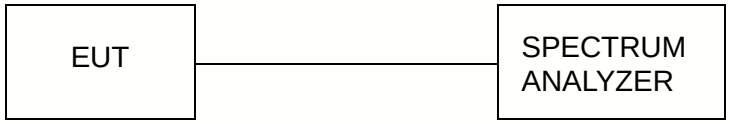
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 kHz for the band

5.725-5.85 GHz

**Test Procedure**

1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth 3 x RBW.
3. Detector = Peak.
4. Trace mode = Max hold.
5. 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**

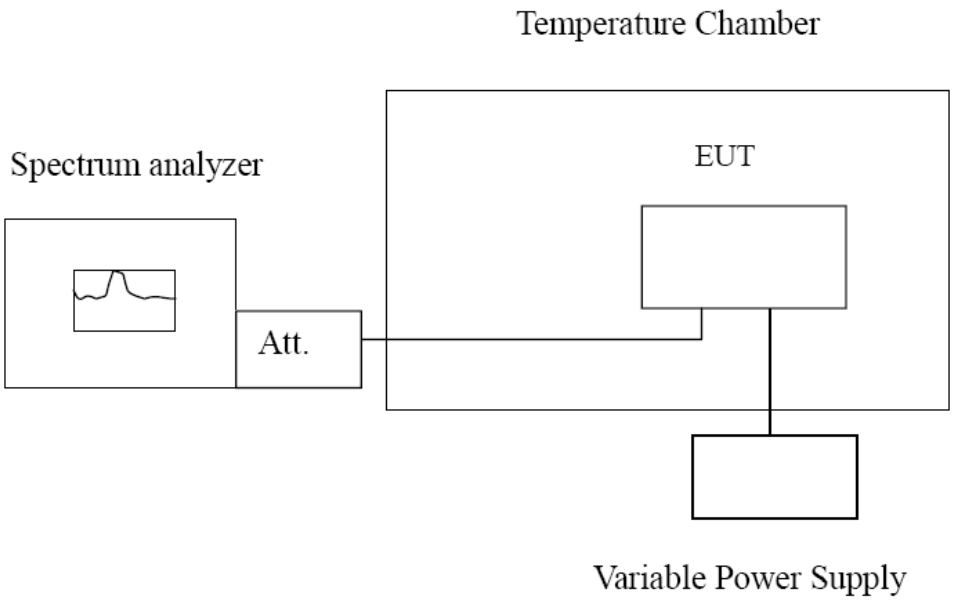
Raw data reference to Section 1 Appendix RF test data for 5G_U-NII BAND1.
Raw data reference to Section 1 Appendix RF test data for 5G_U-NII BAND3.

## 3.7. 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**

Raw data reference to Section 4 Appendix RF test data for 5G_U-NII BAND1.
Raw data reference to Section 4 Appendix RF test data for 5G_U-NII BAND3.

## 3.8. 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

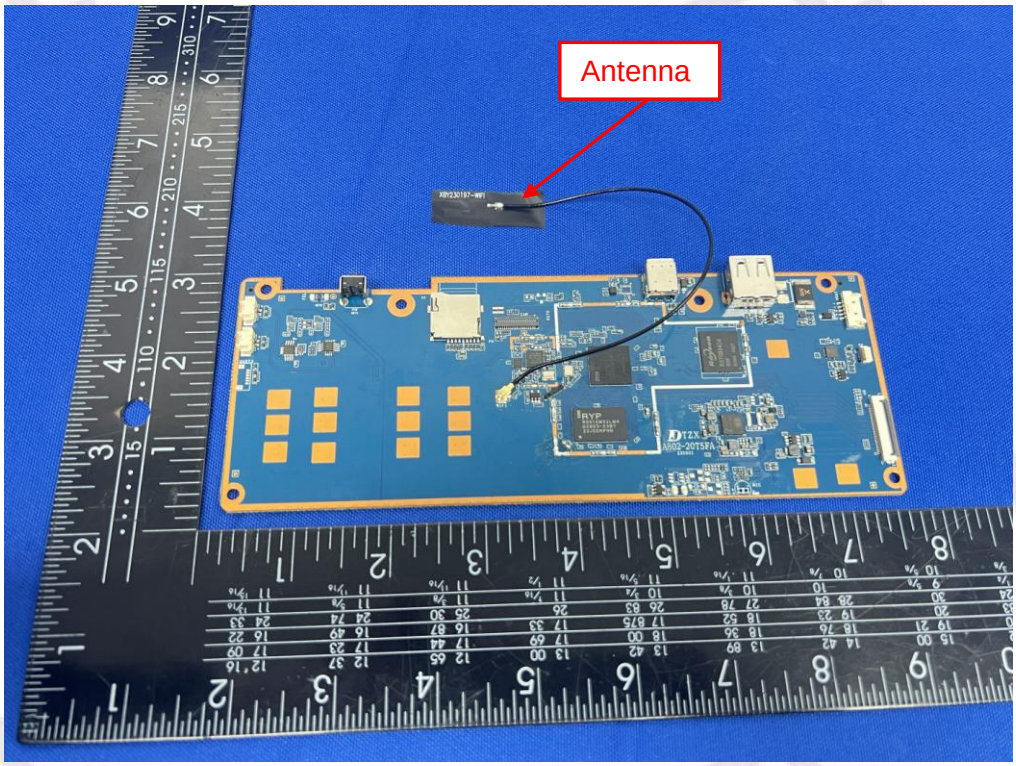
And according to FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

**Refer to statement below for compliance**

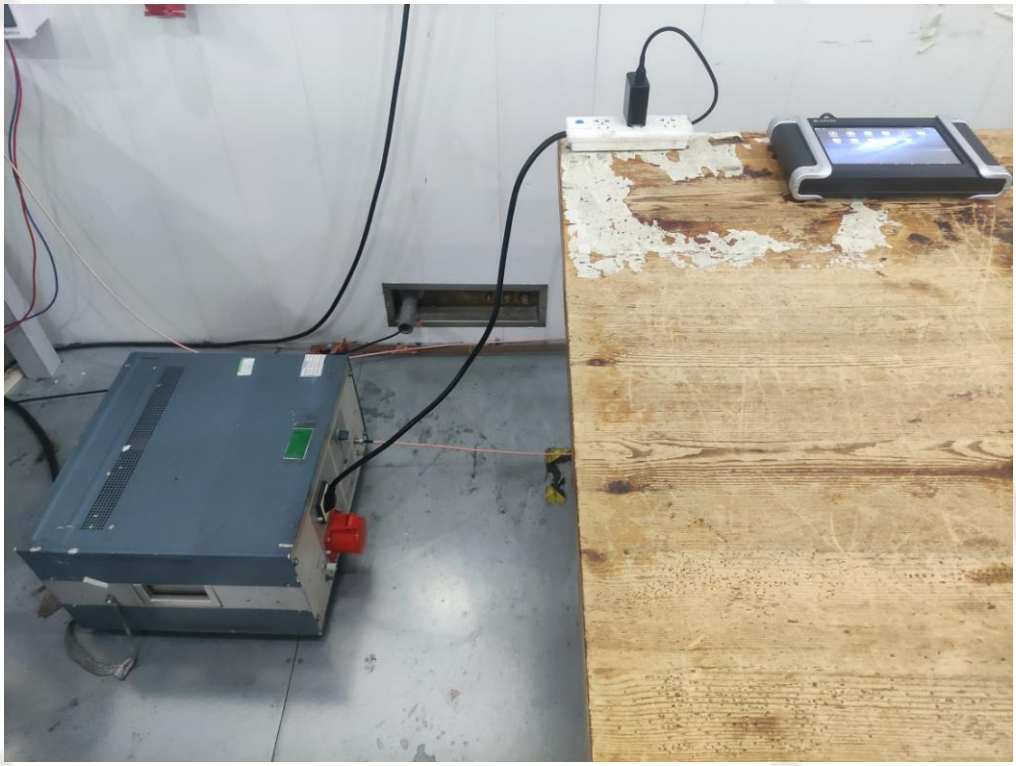
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

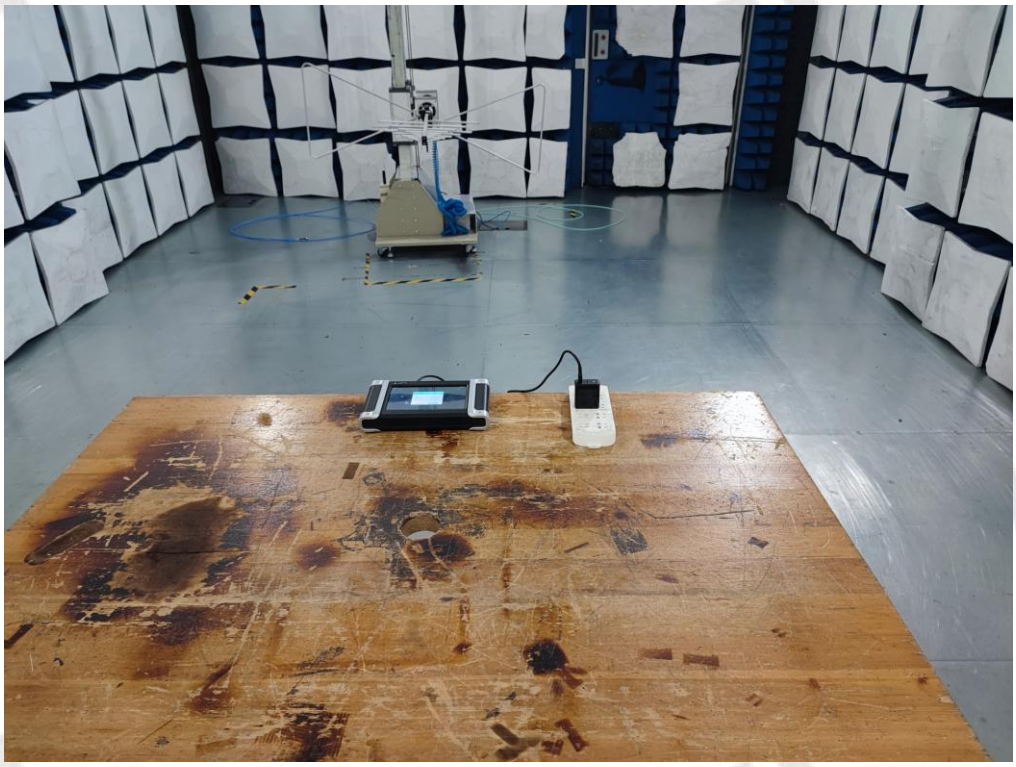
**Antenna Connected Construction**

The maximum gain of antenna was 2.99dBi



# 4. Test Setup Photos of the EUT





# 5. Photos of the EUT

Reference to the test report No. CTL2311012013-WF01

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