# Shenzhen HTT Technology Co., Ltd.

## FCC PART 15 SUBPART C TEST REPORT

### FCC PART 15.247

| | |
|---|---|
| **Report Reference No.** .....: | **HTT202609419F01** |
| **FCC ID.** ..... : | **2BYI4-BSAD-001** |
| Compiled by ( position+printed name+signature) .: | File administrators Heber He |
| Supervised by ( position+printed name+signature) .: | Project Engineer Bruce Zhu |
| Approved by ( position+printed name+signature) .: | RF Manager Kevin Yang |
| Date of issue .....: | Sep. 24, 2026 |
| **Testing Laboratory Name** .....: | **Shenzhen HTT Technology Co.,Ltd.** |
| Address .....: | 1F, Building B, Huafeng International Robotics Industrial Park, Hangcheng Road,Nanchang Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China |
| **Applicant's name** .....: | **Guangzhou Bems Electronics Co., Ltd.** |
| Address .....: | 201, No. 19, Qiaoda Road, Pingshan 1st Village, Shibi Subdistrict, Panyu District, Guangzhou, Guangdong, China |
| **Test specification**..... : | |
| Standard .....: | **FCC Part 15.247** |
| TRF Originator .....: | Shenzhen HTT Technology Co.,Ltd. |

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| | |
|---|---|
| **Test item description**..... : | **Advertising Player** |
| Trade Mark.....: | BENSHI |
| Manufacturer.....: | Guangzhou Bems Electronics Co., Ltd. |
| Model/Type reference.....: | BSAD-001 |
| Listed Models.....: | BSAD-002,BSAD-003,BSAD-004,BSAD-005,BSAD-006, BSAD-007,BSAD-008,BSAD-009,BSAD-010 |
| Modulation Type .....: | CCK/DSSS/OFDM |
| Operation Frequency .....: | From 2412 - 2462MHz |
| Rating.....: | AC 100-240V |
| Result.....: | **PASS** |

# T E S T  R E P O R T

| | | |
|---|---|---|
| Equipment under Test | : | Advertising Player |
| Model /Type | : | BSAD-001 |
| Listed Models | : | BSAD-002,BSAD-003,BSAD-004,BSAD-005,BSAD-006, BSAD-007,BSAD-008,BSAD-009,BSAD-010 |
| Model Declaration | | The PCB board, circuit, structure and internal of these models are the same, Only model number is different for these model. |
| **Applicant** | : | **Guangzhou Bems Electronics Co., Ltd.** |
| Address | : | 201, No. 19, Qiaoda Road, Pingshan 1st Village, Shibi Subdistrict, Panyu District, Guangzhou, Guangdong, China |
| **Manufacturer** | : | **Guangzhou Bems Electronics Co., Ltd.** |
| Address | : | 201, No. 19, Qiaoda Road, Pingshan 1st Village, Shibi Subdistrict, Panyu District, Guangzhou, Guangdong, 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 ....9
3.6 Equipments Used during the Test....10
4 TEST CONDITIONS AND RESULTS ....11
4.1 AC Power Conducted Emission ....11
4.2 Radiated Emission ....14
4.3 Maximum Peak Conducted Output Power....21
4.4 On Time and Duty Cycle ....22
4.5 Power Spectral Density....23
4.6 6dB Bandwidth ....24
4.7 Out-of-band Emissions....25
4.8 Antenna Requirement ....26
5 Test Setup Photos of the EUT....27
6 Photos of the EUT ....31

# 1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
ANSI C63.10-2020 +Cor. 1-2023+ C63.10a-2024+ Errata to C63.10a-2024: American National Standard for Testing Unlicensed Wireless Devices
KDB558074 D01 v05r02: Guidance for Compliance Measurements on Digital Transmission Systems (DTS) ,Frequency Hopping Spread Spectrum System(HFSS), and Hybrid System Devices Operating Under §15.247 of The FCC rules.

# 2 SUMMARY

## 2.1 General Remarks

| | | |
|---|---|---|
| Date of receipt of test sample | : | Sep. 16, 2026 |
| | | |
| Testing commenced on | : | Sep. 16, 2026 |
| | | |
| Testing concluded on | : | Sep. 24, 2026 |

## 2.2 Product Description

| | |
|---|---|
| Product description: | Advertising Player |
| Model/Type reference: | BSAD-001 |
| Power supply: | AC 100-240V |
| Testing sample ID： | HTT202609419-1# (Engineer sample)<br>HTT202609419-2# (Normal sample) |
| Hardware version: | / |
| Software version: | / |
| **WIFI :** | |
| Supported type: | 802.11b/802.11g/802.11n(HT20)/ 802.11n(HT40) |
| Modulation: | 802.11b: DSSS<br>802.11g/802.11n(HT20)/ 802.11n(HT40): OFDM |
| Operation frequency: | 802.11b/802.11g/802.11n(H20): 2412MHz~2462MHz<br>802.11n(H40): 2422MHz~2452MHz |
| Channel number: | 802.11b/802.11g/802.11n(HT20): 11<br>802.11n(HT40):7 |
| Channel separation: | 5MHz |
| Antenna type: | External Antenna |
| Antenna gain: | 1.50 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 Advertising Player.
For more details, refer to the user’s manual of the EUT.

| Test Software Version | Tools software(ADB command) | | |
|---|---|---|---|
| Frequency | 2412 MHz | 2437MHz | 2462 MHz |
| 802.11b | Default | Default | Default |
| 802.11g | Default | Default | Default |
| 802.11n20 | Default | Default | Default |
| Frequency | 2422 MHz | 2437MHz | 2452 MHz |
| 802.11n40 | Default | Default | Default |

## 2.5 EUT configuration

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

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

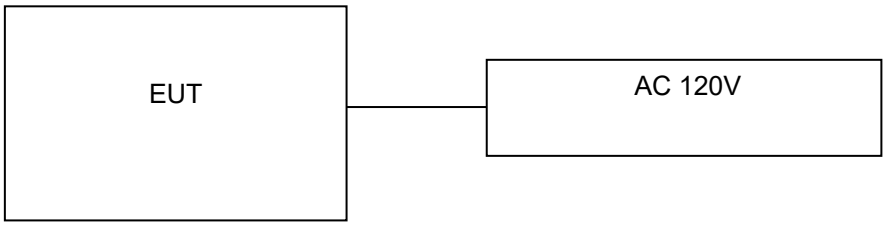
| | | | |
|---|---|---|---|
| | | | |

## 2.6 EUT operation mode

The application provider specific test softwareto control sample in continuous TX and RX for testing meet KDB558074 test requirement.
IEEE 802.11b/g/n: Eleven channels are provided to the EUT.

| Channel | Frequency(MHz) | Channel | Frequency(MHz) |
|---|---|---|---|
| 1 | 2412 | 8 | 2447 |
| 2 | 2417 | 9 | 2452 |
| 3 | 2422 | 10 | 2457 |
| 4 | 2427 | 11 | 2462 |
| 5 | 2432 | | |
| **6** | 2437 | | |
| 7 | 2442 | | |

## 2.7 Block Diagram of Test Setup




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

This submittal(s) (test report) is intended for filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

## 2.9 Modifications

No modifications were implemented to meet testing criteria.

# 3 TEST ENVIRONMENT

## 3.1 Address of the test laboratory

**Shenzhen HTT Technology Co.,Ltd.**
1F, Building B, Huafeng International Robotics Industrial Park, Hangcheng Road,Nanchang Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China

## 3.2 Test Facility

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

**FCC-Registration No.: 779513 Designation Number: CN1319**
Shenzhen HTT 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.: 6435.01**
Shenzhen HTT Technology Co.,Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

**ISED#: 27952 CAB identifier: CN0128**
Shenzhen HTT Technology Co.,Ltd. has been listed by Innovation, Science and Economic Development Canada 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: | 23 ° C |
| | |
| Humidity: | 48 % |
| | |
| Atmospheric pressure: | 950-1050mbar |

AC Main Conducted testing：

| | |
|---|---|
| Temperature: | 24 ° C |
| | |
| Humidity: | 45 % |
| | |
| Atmospheric pressure: | 950-1050mbar |

Conducted testing：

| | |
|---|---|
| Temperature: | 24 ° C |
| | |
| Humidity: | 45 % |
| | |
| Atmospheric pressure: | 950-1050mbar |

## 3.4 Test Description

| FCC PART 15.247 | | |
|---|---|---|
| FCC Part 15.207 | AC Power Conducted Emission | PASS |
| FCC Part 15.247(a)(2) | 6dB Bandwidth | PASS |
| FCC Part 15.247(d) | Spurious RF Conducted Emission | PASS |
| FCC Part 15.247(b) | Maximum Peak Conducted Output Power | PASS |
| FCC Part 15.247(e) | Power Spectral Density | PASS |
| FCC Part 15.109/ 15.205/ 15.209 | Radiated Emissions | PASS |
| FCC Part 15.247(d) | Band Edge | PASS |
| FCC Part 15.203/15.247 (b) | Antenna Requirement | PASS |

Remark:
1. The measurement uncertainty is not included in the test result.
2. We tested all test mode and recorded worst case in report
3. RF Conducted test Offset= cable loss,For conducted spurious emission test, cable loss is the maximum value in the range of test.

**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 | Channel |
|---|---|---|---|
| Maximum Peak Conducted Output Power<br>Power Spectral Density<br>6dB Bandwidth<br>Spurious RF conducted emission<br>Radiated Emission 9KHz~1GHz&<br>Radiated Emission 1GHz~10th Harmonic | 11b/DSSS | 1 Mbps | 1/6/11 |
| | 11g/OFDM | 6 Mbps | 1/6/11 |
| | 11n(20MHz)/OFDM | MCS0 | 1/6/11 |
| | 11n(40MHz)/OFDM | MCS0 | 3/6/9 |
| Band Edge | 11b/DSSS | 1 Mbps | 1/11 |
| | 11g/OFDM | 6 Mbps | 1/11 |
| | 11n(20MHz)/OFDM | MCS0 | 1/11 |
| | 11n(40MHz)/OFDM | MCS0 | 3/9 |

## 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 HTT 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 HTT Technology Co.,Ltd. :

| Test Item | Frequency Range | Measurement Uncertainty | Notes |
|---|---|---|---|
| Radiated Emission | 9KHz~30MHz | 3.12 dB | (1) |
| Radiated Emission | 30~1000MHz | 4.37 dB | (1) |
| Radiated Emission | 1~18GHz | 5.40 dB | (1) |
| Radiated Emission | 18-40GHz | 5.45 dB | (1) |
| Conducted Disturbance | 0.15~30MHz | 2.68 dB | (1) |
| Spectrum bandwidth | / | 1.2% | (1) |
| Output Peak power | 30MHz~18GHz | 0.57dB | (1) |
| Time | / | ±10% | (1) |
| Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%. | | | |

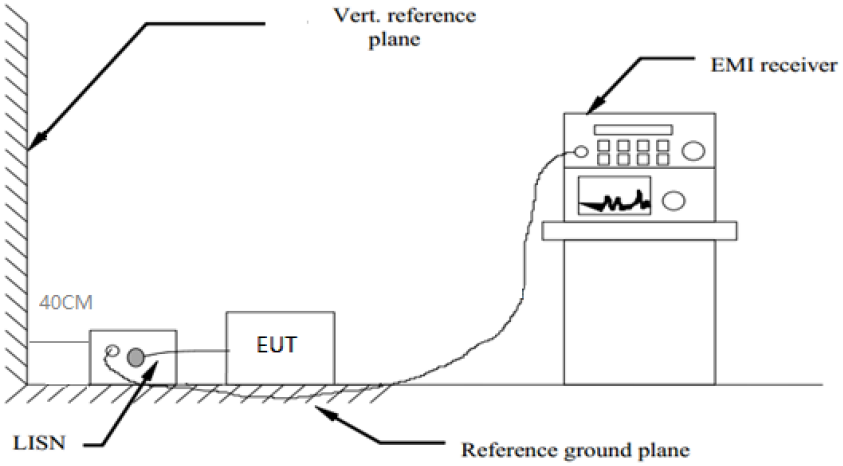
## 3.6 Equipments Used during the Test

| Item | Test Equipment | Manufacturer | Model No. | Inventory No. | Cal.Date (mm-dd-yy) | Cal.Due date (mm-dd-yy) |
|---|---|---|---|---|---|---|
| 1 | 3m Semi- Anechoic Chamber | Shenzhen C.R.T technology co., LTD | 9*6*6 | HTT-E028 | Aug. 10 2024 | Aug. 09 2027 |
| 2 | Control Room | Shenzhen C.R.T technology co., LTD | 4.8*3.5*3.0 | HTT-E030 | Aug. 10 2024 | Aug. 09 2027 |
| 3 | EMI Test Receiver | Rohde&Schwar | ESCI7 | HTT-E022 | Apr. 20 2026 | Apr. 19 2027 |
| 4 | Spectrum Analyzer | ROHDE&SCHWARZ | FSV40-N | HTT-E050 | Apr. 20 2026 | Apr. 19 2027 |
| 5 | Coaxial Cable | ZDecl | ZT26-NJ-NJ-0.6M | HTT-E018 | Apr. 20 2026 | Apr. 19 2027 |
| 6 | Coaxial Cable | ZDecl | ZT26-NJ-SMAJ-2M | HTT-E019 | Apr. 20 2026 | Apr. 19 2027 |
| 7 | Coaxial Cable | ZDecl | ZT26-NJ-SMAJ-0.6M | HTT-E020 | Apr. 20 2026 | Apr. 19 2027 |
| 8 | Coaxial Cable | ZDecl | ZT26-NJ-SMAJ-8.5M | HTT-E021 | Apr. 20 2026 | Apr. 19 2027 |
| 9 | Composite logarithmic antenna | Schwarzbeck | VULB 9168 | HTT-E017 | Apr. 18 2026 | Apr. 17 2027 |
| 10 | Horn Antenna | Schwarzbeck | BBHA9120D | HTT-E016 | Apr. 18 2026 | Apr. 17 2027 |
| 11 | Loop Antenna | Zhinan | ZN30900C | HTT-E039 | Apr. 21 2026 | Apr. 20 2027 |
| 12 | Horn Antenna | A.H. Systems, inc. | SAS-574 | HTT-E040 | Jun. 06 2026 | Jun. 05 2027 |
| 13 | low frequency Amplifier | Sonoma Instrument | 310 | HTT-E015 | Apr. 20 2026 | Apr. 19 2027 |
| 14 | high-frequency Amplifier | HP | 8449B | HTT-E014 | Apr. 22 2026 | Apr. 21 2027 |
| 15 | Variable frequency power supply | Shenzhen Anbiao Instrument Co., Ltd | ANB-10VA | HTT-082 | Apr. 20 2026 | Apr. 19 2027 |
| 16 | EMI Test Receiver | Rohde & Schwarz | ESCI3 | HTT-E043 | Apr. 20 2026 | Apr. 19 2027 |
| 17 | Artificial Mains | Rohde & Schwarz | ESH3-Z5 | HTT-E006 | Apr. 20 2026 | Apr. 19 2027 |
| 18 | Artificial Mains | Rohde & Schwarz | ENV-216 | HTT-E038 | Apr. 20 2026 | Apr. 19 2027 |
| 19 | Cable Line | Robinson | Z302S-NJ-BNCJ-1.5M | HTT-E001 | Apr. 20 2026 | Apr. 19 2027 |
| 20 | Filter | ROHDE&SCHWARZ | ESH3-Z2 | HTT-E045 | Apr. 20 2026 | Apr. 19 2027 |
| 21 | Variable frequency power supply | Shenzhen Yanghong Electric Co., Ltd | YF-650（5KVA） | HTT-E032 | Apr. 20 2026 | Apr. 19 2027 |
| 22 | Control Room | Shenzhen C.R.T technology co., LTD | 8*4*3.5 | HTT-E029 | Aug. 10 2024 | Aug. 09 2027 |
| 23 | DC power supply | Agilent | E3632A | HTT-E023 | Jun. 03 2026 | Jun. 02 2027 |
| 24 | EMI Test Receiver | Agilent | N9020A | HTT-E024 | Apr. 20 2026 | Apr. 19 2027 |
| 25 | Analog signal generator | Agilent | N5181A | HTT-E025 | Apr. 20 2026 | Apr. 19 2027 |
| 26 | Vector signal generator | Agilent | N5182A | HTT-E026 | Apr. 20 2026 | Apr. 19 2027 |
| 27 | RF Switch box | TST | Switchbox | HTT-E047 | Apr. 20 2026 | Apr. 19 2027 |
| 28 | Temperature and humidity meter | Shenzhen Anbiao Instrument Co., Ltd | TH10R | HTT-090 | Apr. 22 2026 | Apr. 21 2027 |
| 29 | Radiated Emission Test Software | Farad | EZ-EMC | N/A | N/A | N/A |
| 30 | Conducted Emission Test Software | Farad | EZ-EMC | N/A | N/A | N/A |
| 31 | RF Test Software | TST | panshanrf | N/A | N/A | N/A |
| 32 | Amplifier(1-18G) | / | DLNA8-1-18G-9562 | HTT-E059 | Jun. 03 2026 | Jun. 02 2027 |

# 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 tabletop system, a wooden table with a height of 0 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：

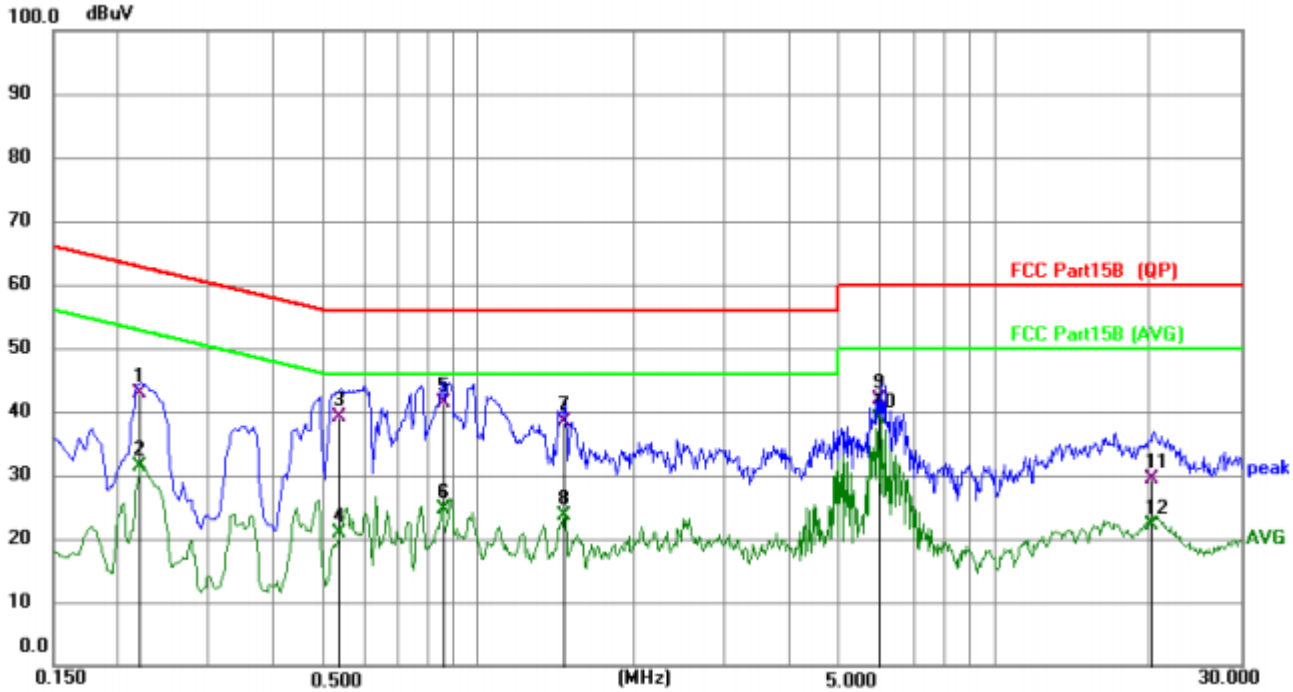
| Frequency range (MHz) | Limit (dBuV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |
| * Decreases with the logarithm of the frequency. | | |

**TEST RESULTS**

Remark: Both high and low voltages have been tested to show only the worst low voltage test data.

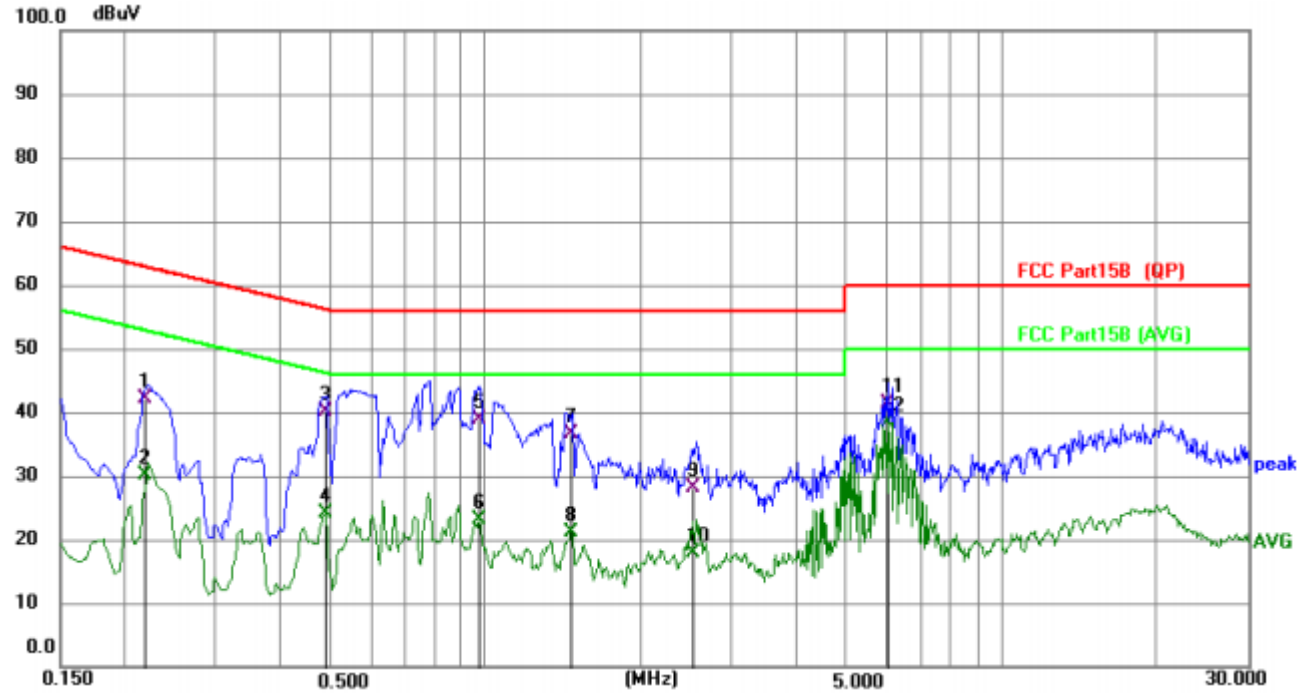
**Measurement data:**

**Line:**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | | dB | dBuV | dBuV | dB | Detector |
| 1 | | 0.2206 | 32.71 | 10.07 | 42.78 | 62.80 | -20.02 | QP |
| 2 | | 0.2206 | 21.36 | 10.07 | 31.43 | 52.80 | -21.37 | AVG |
| 3 | | 0.5398 | 29.16 | 10.07 | 39.23 | 56.00 | -16.77 | QP |
| 4 | | 0.5398 | 10.79 | 10.07 | 20.86 | 46.00 | -25.14 | AVG |
| 5 | | 0.8577 | 31.29 | 10.10 | 41.39 | 56.00 | -14.61 | QP |
| 6 | | 0.8577 | 14.54 | 10.10 | 24.64 | 46.00 | -21.36 | AVG |
| 7 | | 1.4714 | 28.18 | 10.15 | 38.33 | 56.00 | -17.67 | QP |
| 8 | | 1.4714 | 13.49 | 10.15 | 23.64 | 46.00 | -22.36 | AVG |
| 9 | | 6.0068 | 31.77 | 10.17 | 41.94 | 60.00 | -18.06 | QP |
| 10 | * | 6.0068 | 28.74 | 10.17 | 38.91 | 50.00 | -11.09 | AVG |
| 11 | | 20.3586 | 18.33 | 10.97 | 29.30 | 60.00 | -30.70 | QP |
| 12 | | 20.3586 | 11.19 | 10.97 | 22.16 | 50.00 | -27.84 | AVG |

**Neutral:**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | | dB | dBuV | dBuV | dB | Detector |
| 1 | | 0.2193 | 32.04 | 10.05 | 42.09 | 62.85 | -20.76 | QP |
| 2 | | 0.2193 | 20.04 | 10.05 | 30.09 | 52.85 | -22.76 | AVG |
| 3 | | 0.4898 | 30.14 | 10.04 | 40.18 | 56.17 | -15.99 | QP |
| 4 | | 0.4898 | 14.03 | 10.04 | 24.07 | 46.17 | -22.10 | AVG |
| 5 | | 0.9745 | 28.79 | 10.09 | 38.88 | 56.00 | -17.12 | QP |
| 6 | | 0.9745 | 13.14 | 10.09 | 23.23 | 46.00 | -22.77 | AVG |
| 7 | | 1.4724 | 26.67 | 10.08 | 36.75 | 56.00 | -19.25 | QP |
| 8 | | 1.4724 | 10.99 | 10.08 | 21.07 | 46.00 | -24.93 | AVG |
| 9 | | 2.5472 | 18.15 | 10.09 | 28.24 | 56.00 | -27.76 | QP |
| 10 | | 2.5472 | 7.68 | 10.09 | 17.77 | 46.00 | -28.23 | AVG |
| 11 | | 6.0093 | 31.36 | 10.14 | 41.50 | 60.00 | -18.50 | QP |
| 12 | * | 6.0093 | 28.31 | 10.14 | 38.45 | 50.00 | -11.55 | AVG |

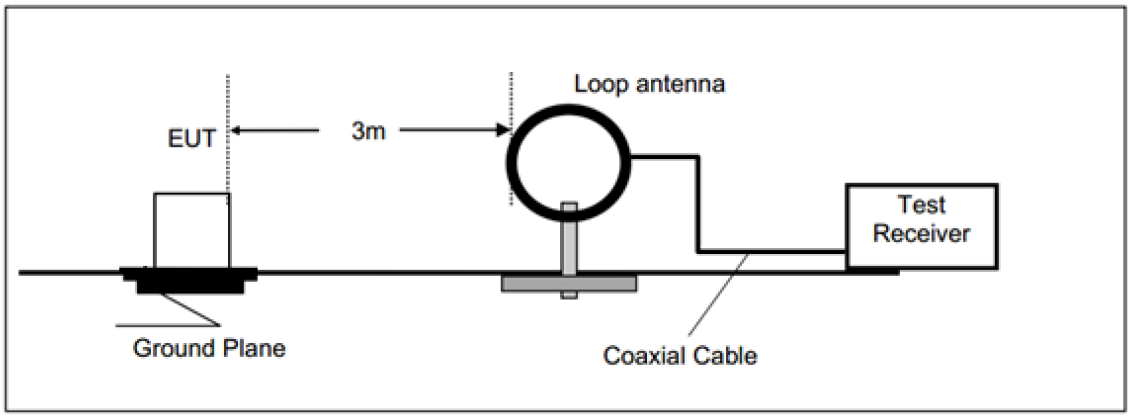
*Notes:*

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Los

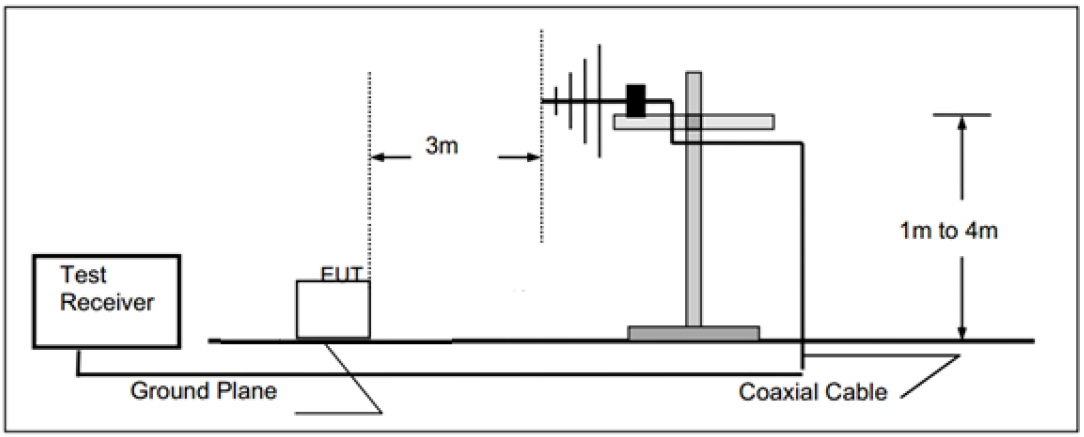
## 4.2 Radiated Emission

**TEST CONFIGURATION**

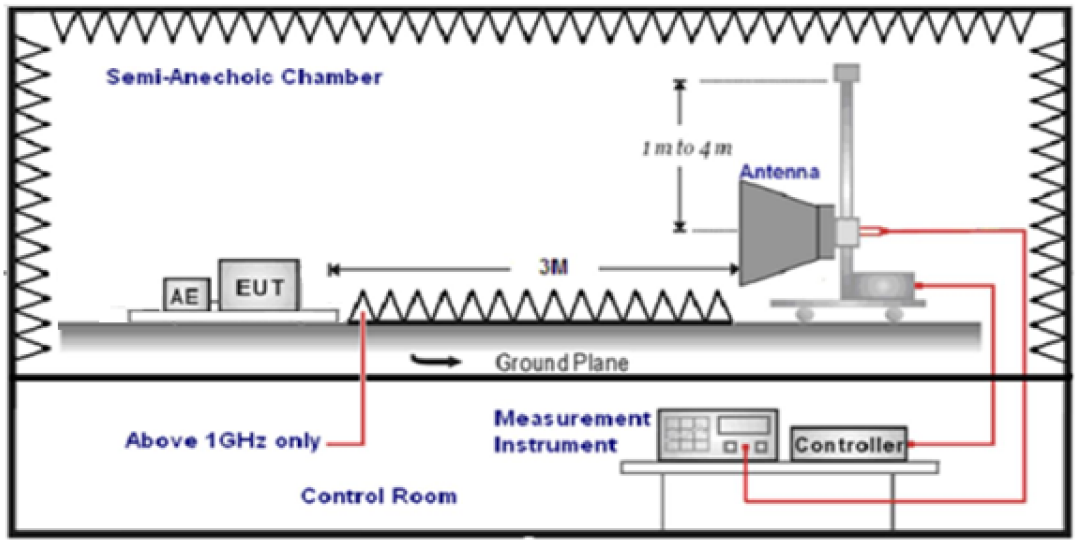
Frequency range 9 KHz – 30MHz

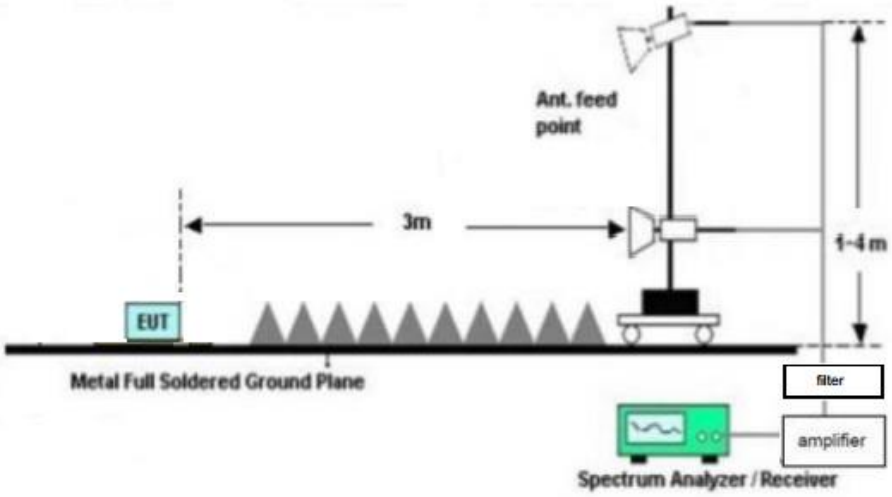



Frequency range 30MHz – 1000MHz




Frequency range above 1GHz-25GHz






## TEST PROCEDURE

1. The EUT was placed on a turn table which is 0m above ground plane when testing frequency range 9 KHz –1GHz;the EUT was placed on a turn table which is 0m above ground plane when testing frequency range 1GHz – 25GHz.
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 25GHz.
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 | Ultra-Broadband Antenna | 3 |
| 1GHz-18GHz | Double Ridged 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 |

## Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

**FS = RA + AF + CL - AG**

| | |
|---|---|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude | AG = Amplifier Gain |
| AF = Antenna Factor | |

Transd=AF +CL-AG

## RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

| 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 |

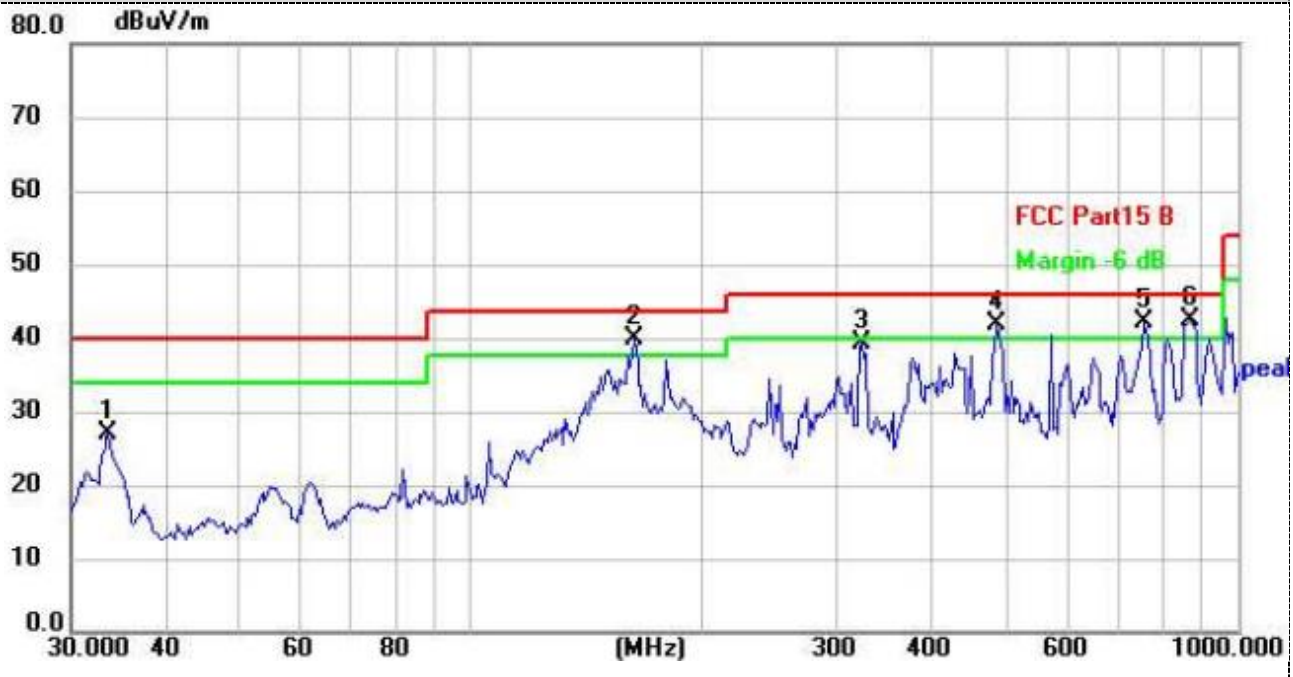
**TEST RESULTS**

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 three channels (lowest/middle/highest) of each mode were measured below 1GHz and recorded worst case at 802.11b low channel.
3. 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



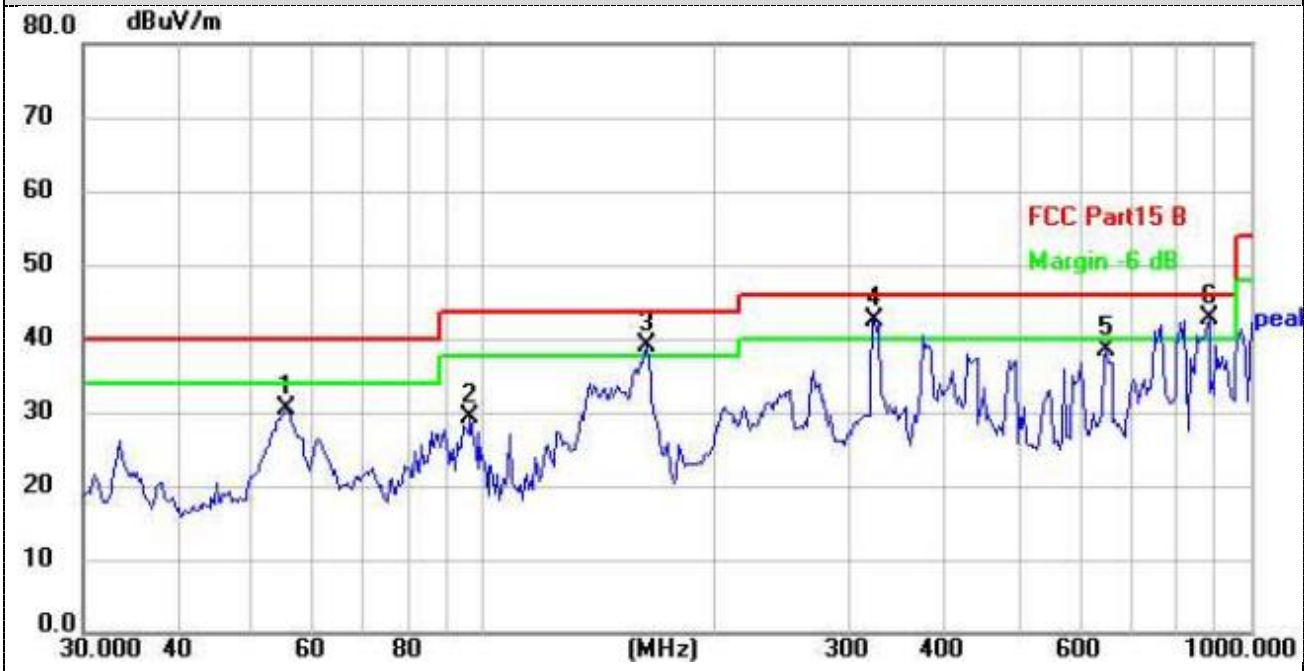

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 33.5623 | 39.54 | -12.47 | 27.07 | 40.00 | -12.93 | peak |
| 2 | ! | 162.6105 | 50.02 | -10.30 | 39.72 | 43.50 | -3.78 | peak |
| 3 | | 323.3202 | 48.64 | -9.27 | 39.37 | 46.00 | -6.63 | peak |
| 4 | ! | 485.6091 | 47.43 | -5.54 | 41.89 | 46.00 | -4.11 | peak |
| 5 | ! | 755.3872 | 43.65 | -1.44 | 42.21 | 46.00 | -3.79 | peak |
| 6 | * | 869.1301 | 41.85 | 0.67 | 42.52 | 46.00 | -3.48 | peak |

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




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 55.2207 | 42.16 | -11.79 | 30.37 | 40.00 | -9.63 | peak |
| 2 | | 96.0985 | 44.73 | -15.39 | 29.34 | 43.50 | -14.16 | peak |
| 3 | ! | 162.6105 | 49.41 | -10.30 | 39.11 | 43.50 | -4.39 | peak |
| 4 | ! | 323.3201 | 51.64 | -9.27 | 42.37 | 46.00 | -3.63 | peak |
| 5 | | 647.3854 | 40.93 | -2.54 | 38.39 | 46.00 | -7.61 | peak |
| 6 | * | 875.2470 | 41.93 | 0.75 | 42.68 | 46.00 | -3.32 | peak |

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 25GHz**

*Note: 802.11b/802.11g/802.11n (HT20)/802.11n (HT40) Mode all have been tested, only worse case 802.11n20 mode is reported*

***(above 1GHz)***

| Frequency(MHz): | | | 2412 | | Polarity: | | HORIZONTAL | | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4824.00 | 58.52 | PK | 74 | 15.48 | 52.70 | 31.05 | 6.52 | 31.75 | 5.82 |
| 4824.00 | 44.50 | AV | 54 | 9.50 | 38.68 | 31.05 | 6.52 | 31.75 | 5.82 |
| 7236.00 | 56.92 | PK | 74 | 17.08 | 44.11 | 36.08 | 8.18 | 31.45 | 12.81 |
| 7236.00 | 46.61 | AV | 54 | 7.39 | 33.80 | 36.08 | 8.18 | 31.45 | 12.81 |

| Frequency(MHz): | | | 2412 | | Polarity: | | VERTICAL | | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4824.00 | 59.30 | PK | 74 | 14.70 | 53.48 | 31.05 | 6.52 | 31.75 | 5.82 |
| 4824.00 | 44.20 | AV | 54 | 9.80 | 38.38 | 31.05 | 6.52 | 31.75 | 5.82 |
| 7236.00 | 56.73 | PK | 74 | 17.27 | 43.92 | 36.08 | 8.18 | 31.45 | 12.81 |
| 7236.00 | 47.28 | AV | 54 | 6.72 | 34.47 | 36.08 | 8.18 | 31.45 | 12.81 |

| Frequency(MHz): | | | 2437 | | Polarity: | | HORIZONTAL | | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4874.00 | 61.28 | PK | 74 | 12.72 | 54.84 | 31.25 | 6.7 | 31.51 | 6.44 |
| 4874.00 | 45.72 | AV | 54 | 8.28 | 39.28 | 31.25 | 6.7 | 31.51 | 6.44 |
| 7311.00 | 55.28 | PK | 74 | 18.72 | 42.14 | 36.25 | 8.31 | 31.42 | 13.14 |
| 7311.00 | 46.50 | AV | 54 | 7.50 | 33.36 | 36.25 | 8.31 | 31.42 | 13.14 |

| Frequency(MHz): | | | 2437 | | Polarity: | | VERTICAL | | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4874.00 | 60.65 | PK | 74 | 13.35 | 54.21 | 31.25 | 6.7 | 31.51 | 6.44 |
| 4874.00 | 45.29 | AV | 54 | 8.71 | 38.85 | 31.25 | 6.7 | 31.51 | 6.44 |
| 7311.00 | 56.60 | PK | 74 | 17.40 | 43.46 | 36.25 | 8.31 | 31.42 | 13.14 |
| 7311.00 | 46.01 | AV | 54 | 7.99 | 32.87 | 36.25 | 8.31 | 31.42 | 13.14 |

| Frequency(MHz): | | | 2462 | | Polarity: | | HORIZONTAL | | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4924.00 | 60.37 | PK | 74 | 13.63 | 53.50 | 31.52 | 6.8 | 31.45 | 6.87 |
| 4924.00 | 44.60 | AV | 54 | 9.40 | 37.73 | 31.52 | 6.8 | 31.45 | 6.87 |
| 7386.00 | 55.97 | PK | 74 | 18.03 | 42.41 | 36.51 | 8.4 | 31.35 | 13.56 |
| 7386.00 | 45.71 | AV | 54 | 8.29 | 32.15 | 36.51 | 8.4 | 31.35 | 13.56 |

| Frequency(MHz): | | | 2462 | | Polarity: | | VERTICAL | | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4924.00 | 60.69 | PK | 74 | 13.31 | 53.82 | 31.52 | 6.8 | 31.45 | 6.87 |
| 4924.00 | 44.72 | AV | 54 | 9.28 | 37.85 | 31.52 | 6.8 | 31.45 | 6.87 |
| 7386.00 | 55.94 | PK | 74 | 18.06 | 42.38 | 36.51 | 8.4 | 31.35 | 13.56 |
| 7386.00 | 47.58 | AV | 54 | 6.42 | 34.02 | 36.51 | 8.4 | 31.35 | 13.56 |

1) Emission level (dBuV/m) = Meter Reading+ antenna Factor+ cable loss- preamp factor.
2) Margin value = Limits-Emission level.
3) -- Mean the PK detector measured value is below average limit.
4) 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.

***Results of Band Edges Test (Radiated)***

*Note: 802.11b/802.11g/802.11n (HT20)/802.11n (HT40) Mode all have been tested, only worse case 802.11n20 mode is reported*

| **Frequency(MHz):** | | | **2412** | | **Polarity:** | | **HORIZONTAL** | | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 2390.00 | 61.93 | PK | 74 | 12.07 | 63.32 | 27.2 | 4.31 | 32.9 | -1.39 |
| 2390.00 | 43.20 | AV | 54 | 10.80 | 44.59 | 27.2 | 4.31 | 32.9 | -1.39 |
| **Frequency(MHz):** | | | **2412** | | **Polarity:** | | **VERTICAL** | | |
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 2390.00 | 59.91 | PK | 74 | 14.09 | 61.30 | 27.2 | 4.31 | 32.9 | -1.39 |
| 2390.00 | 46.67 | AV | 54 | 7.33 | 48.06 | 27.2 | 4.31 | 32.9 | -1.39 |
| **Frequency(MHz):** | | | **2462** | | **Polarity:** | | **HORIZONTAL** | | |
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 2483.50 | 56.12 | PK | 74 | 17.88 | 57.05 | 27.4 | 4.47 | 32.8 | -0.93 |
| 2483.50 | 43.71 | AV | 54 | 10.29 | 44.64 | 27.4 | 4.47 | 32.8 | -0.93 |
| **Frequency(MHz):** | | | **2462** | | **Polarity:** | | **VERTICAL** | | |
| Frequency (MHz) | Emission Level (dBuV/m) | | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 2483.50 | 55.61 | PK | 74 | 18.39 | 56.54 | 27.4 | 4.47 | 32.8 | -0.93 |
| 2483.50 | 44.83 | AV | 54 | 9.17 | 45.76 | 27.4 | 4.47 | 32.8 | -0.93 |

Note：

1) Emission level (dBuV/m) = Meter Reading+ antenna Factor+ cable loss- preamp factor.
2) Margin value = Limits-Emission level.
3) -- Mean the PK detector measured value is below average limit.
4) 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.

## 4.3 Maximum Peak Conducted Output Power

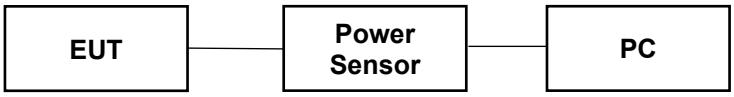
**Limit**

The Maximum Peak Output Power Measurement is 30dBm.

**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 Peak power sensor. The procedure for this method is as follows:
1. The testing follows the ANSI C63.10 Section 11.9.1.2
2. The maximum peak conducted output power may be measured using a broadband peak RF power sensor.
3. The power sensor shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

**Test Configuration**




**Test Results**

Please refer to Appendix RF Test Data for 2.4GWIFI.

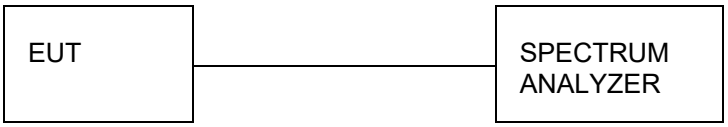
Note:
1) Measured output power at difference data rate for each mode and recorded worst case for each mode.
2) Test results including cable loss.
3) Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; MCS0 at IEEE 802.11n HT20; MCS0 at IEEE 802.11n HT40.

## 4.4 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 Appendix RF Test Data for 2.4GWIFI.
Duty Cycle= Transmission Duration/ Transmission Period

## 4.5 Power Spectral Density

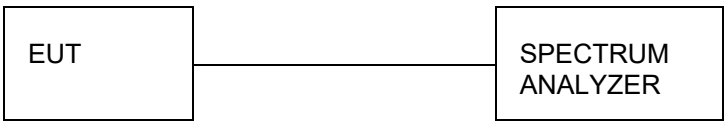
**Limit**

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

**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 3 kHz ⩽ RBW ⩽ 100 kHz..
3. Set the VBW ≥ 3× RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
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.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be 8dBm.

**Test Configuration**




**Test Results**

Please refer to Appendix RF Test Data for 2.4GWIFI.

Note:
1) Measured peak power spectrum density at difference data rate for each mode and recorded worst case for each mode.
2) Test results including cable loss;
3) Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; MCS0 at IEEE 802.11n HT20; MCS0 at IEEE 802.11n HT40.

## 4.6 6dB Bandwidth

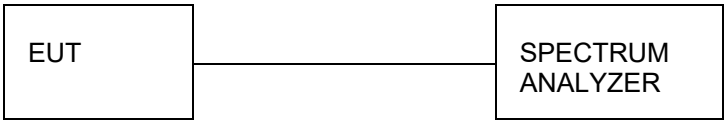
**Limit**

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

**Test Procedure**

a) Set RBW = shall be in the range of 1% to 5% of the OBW but not less than 100 kHz.
b) Set the 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.

**Test Configuration**




**Test Results**

Please refer to Appendix RF Test Data for 2.4GWIFI.

Note:
1) Measured peak power spectrum density at difference data rate for each mode and recorded worst case for each mode.
2) Test results including cable loss;
3) Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; MCS0 at IEEE 802.11n HT20; MCS0 at IEEE 802.11n HT40.

## 4.7 Out-of-band Emissions

**Limit**

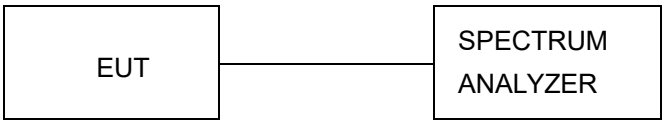
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF con-ducted or a radiated measurement, pro-vided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter com-plies 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.

**Test Procedure**

The testing follows the ANSI C63.10 Section 11.11.2 and 11.11.3 and 6.10.4:
●Reference level measurement
Establish a reference level by using the following procedure:
a) Set instrument center frequency to DTS channel center frequency.
b) Set the span to≥1.5 times the DTS bandwidth.
c) Set the RBW = 100 kHz.
d) Set the VBW≥[3*RBW].
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum PSD level.
Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

●Emission level measurement
Establish an emission level by using the following procedure:
a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW⩾[3*RBW].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

**Test Configuration**




**Test Results**

Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandage measurement data. And record the worst data in the report.

Please refer to Appendix RF Test Data for 2.4GWIFI.

## 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.

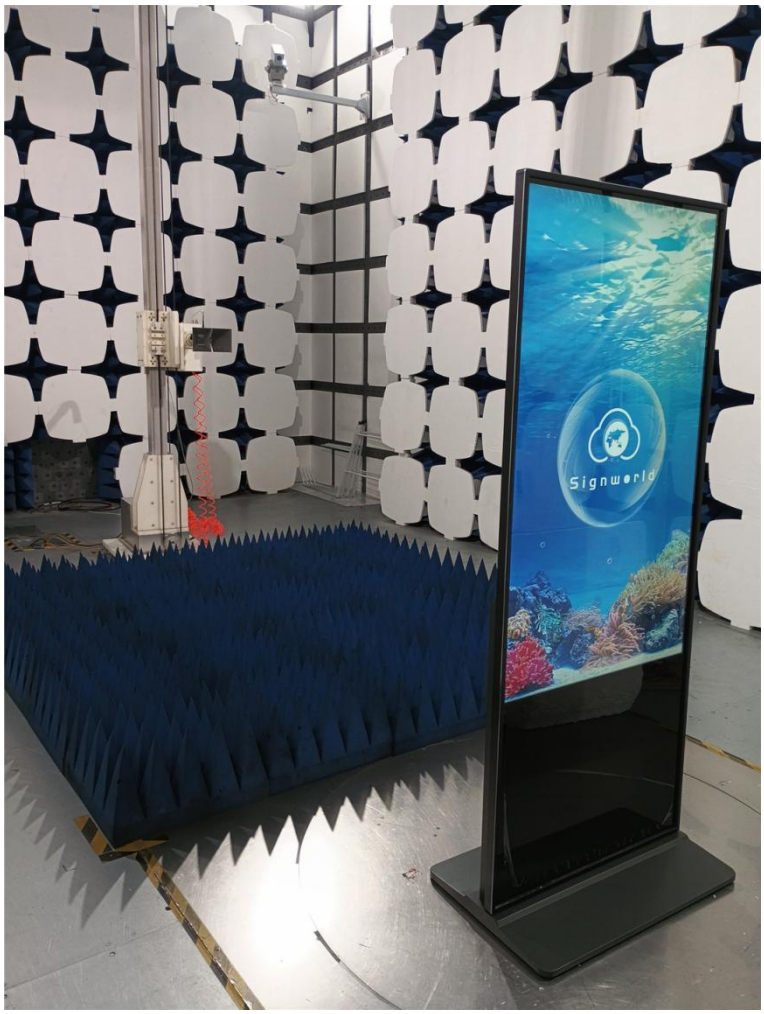
**Test Result:**

The External Antenna maximum gain of antenna was 1.50 dBi.

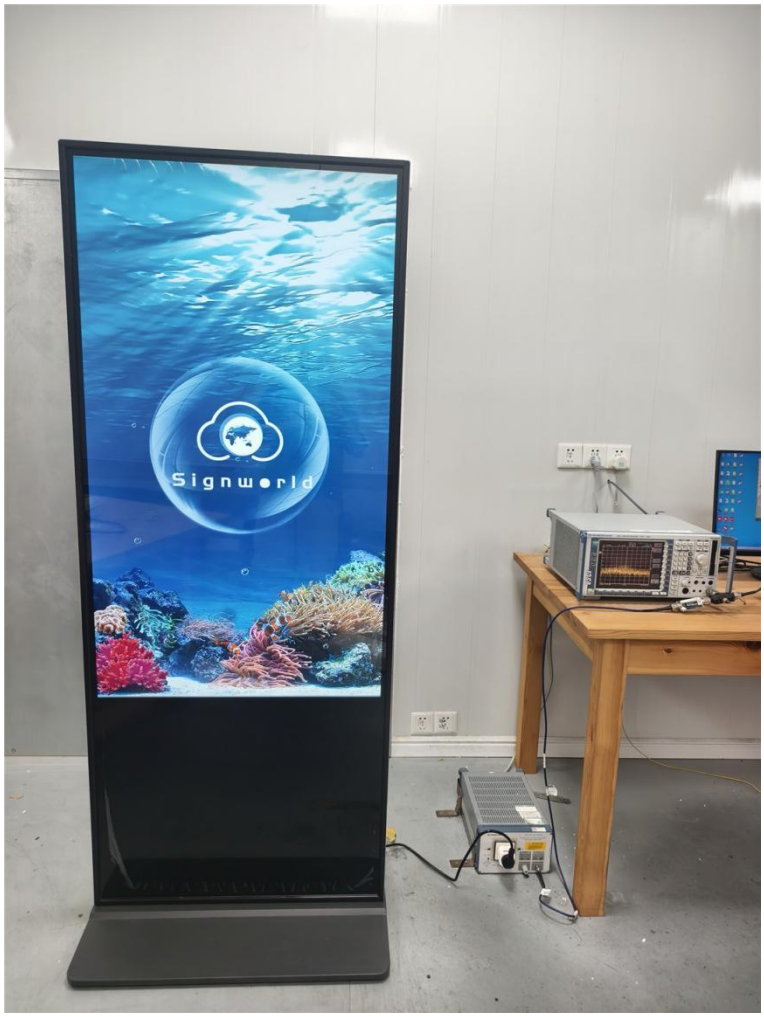
Remark:The antenna gain is provided by the customer , if the data provided by the customer is not accurate, Shenzhen HTT Technology Co.,Ltd. does not assume any responsibility.

# 5 Test Setup Photos of the EUT

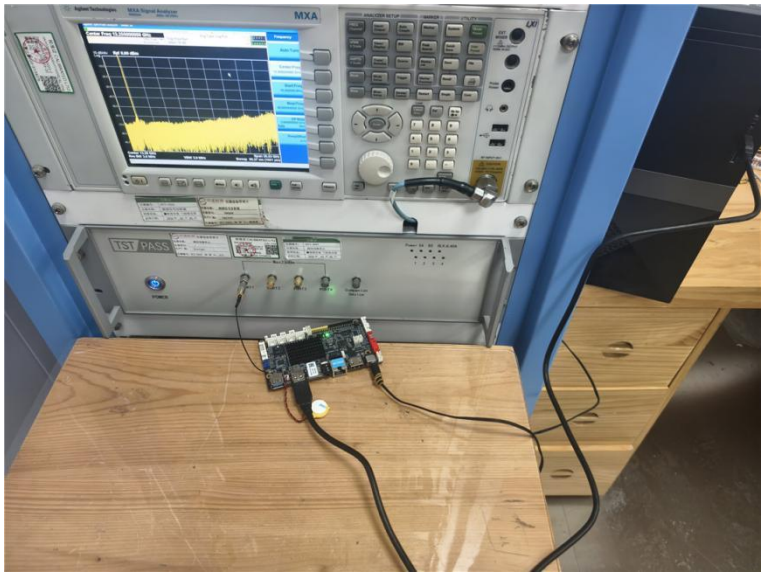
Radiated Emission


Signworld

Conducted Emission



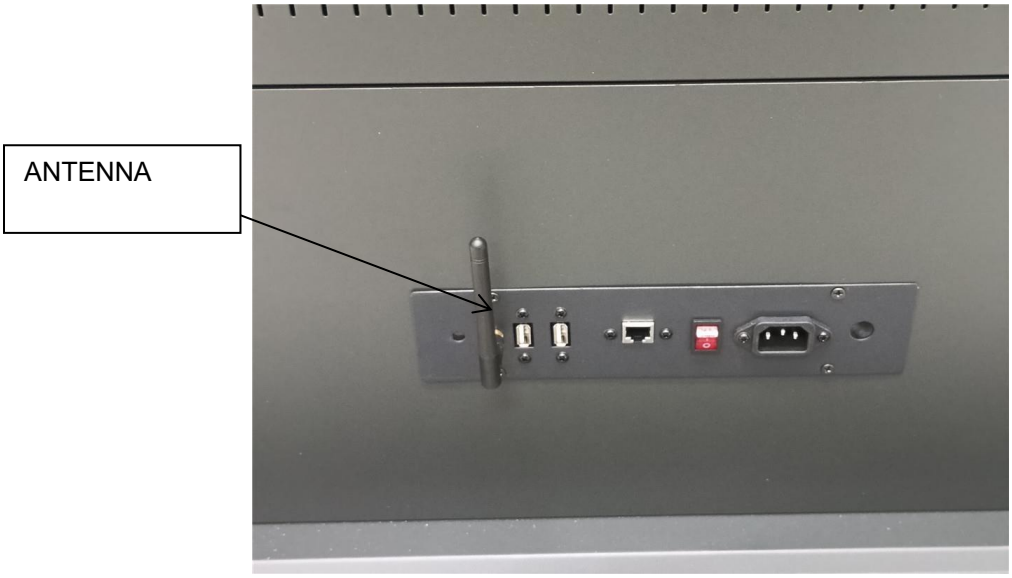
RF Test

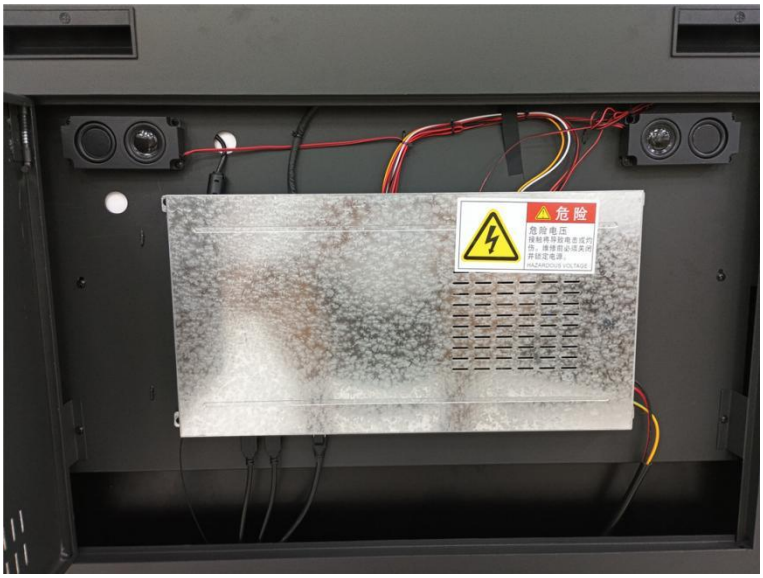


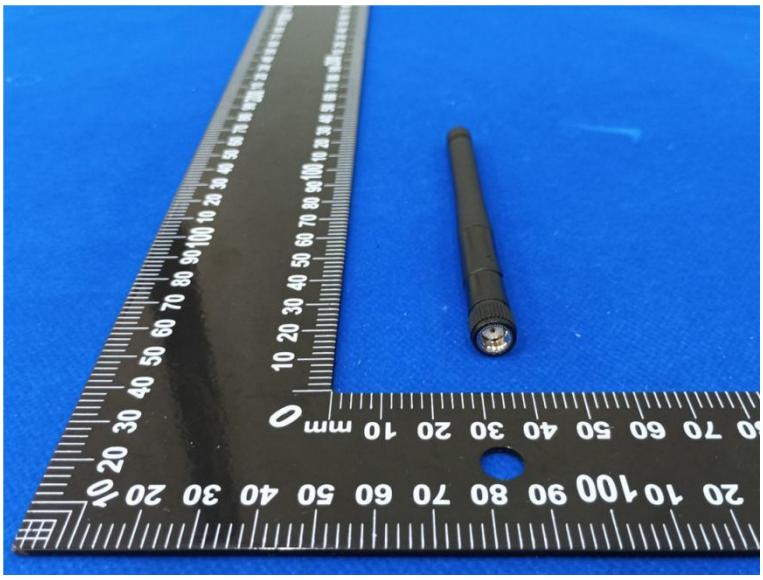
# 6 Photos of the EUT

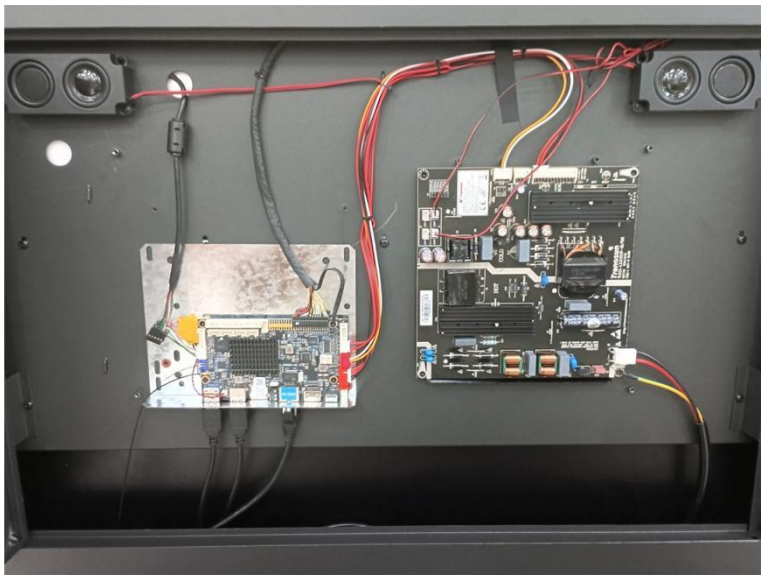
**External Photo**

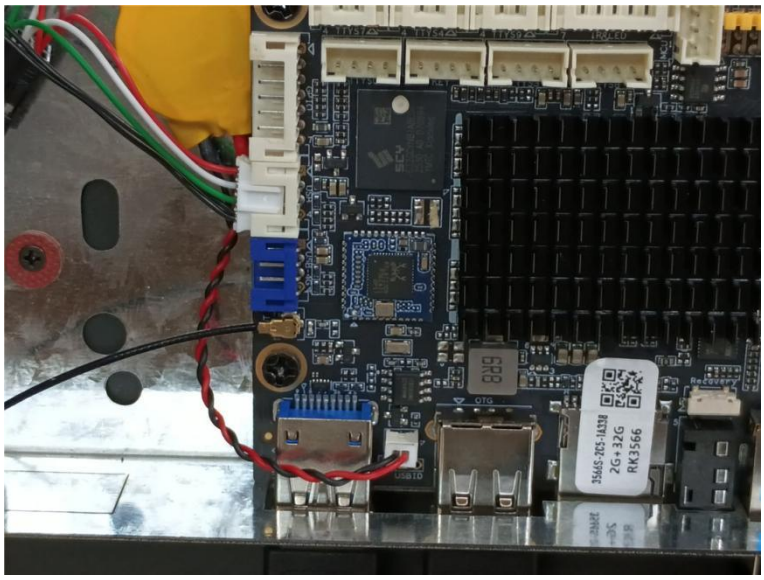
**Internal Photo**





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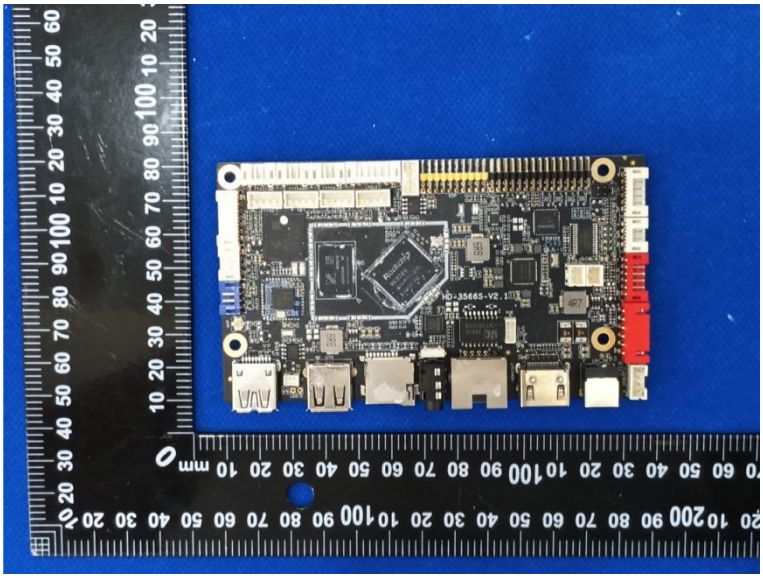

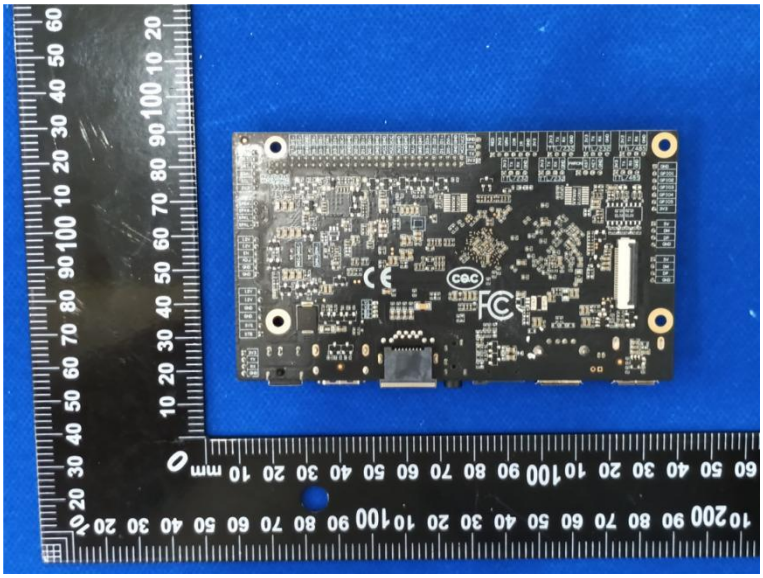

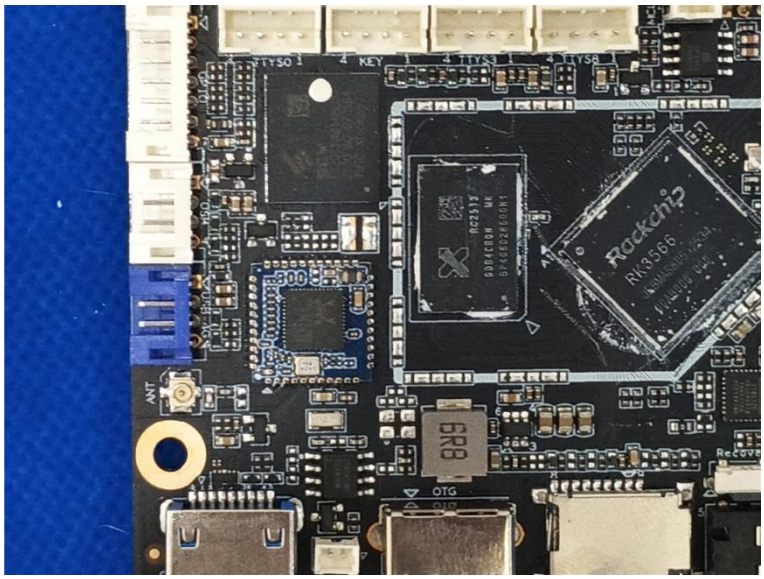
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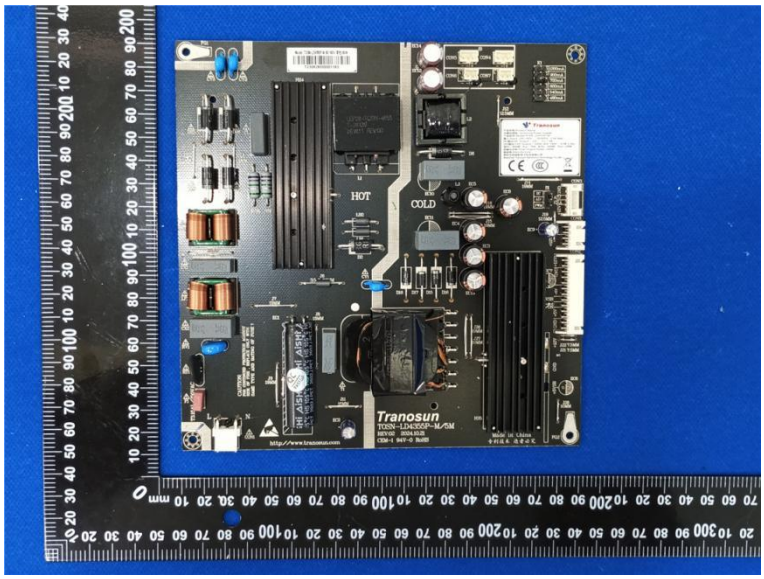
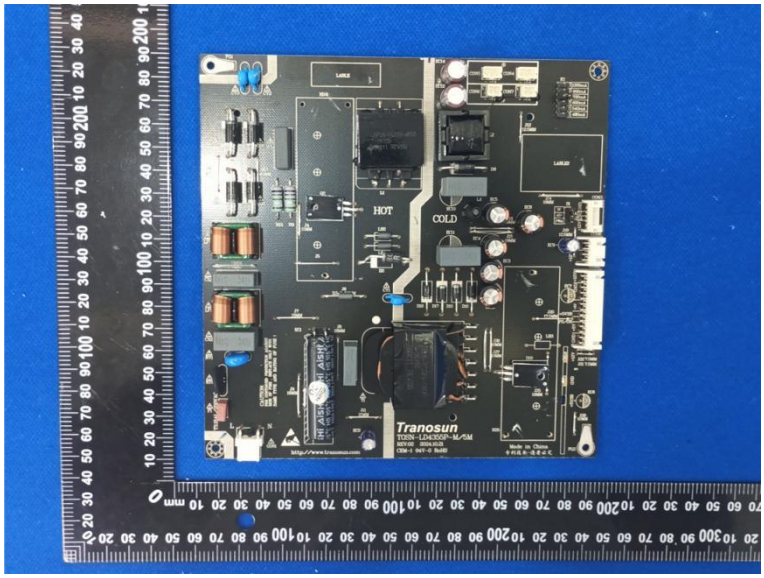
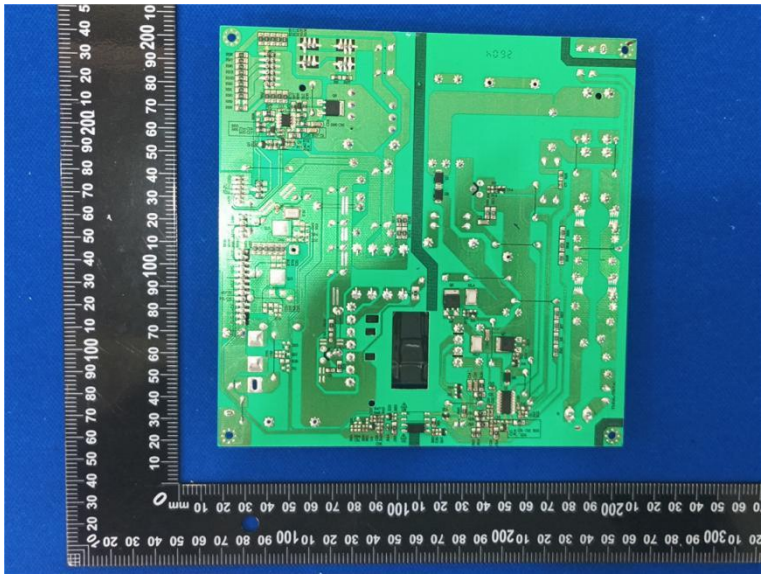
ANT
OTG
Rockchip
RK3566


HOT
COLD
Tranosun



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