

FCC REPORT

Applicant: HUNG WAI PRODUCTS LIMITED

Address of Applicant: Unit 11, 12/F., New Commerce Centre, 19 On Sum Street,
Shatin, Hong Kong

Equipment Under Test (EUT)

Product Name: 17.3" Android non-touch LCD Media Player

Model No.: DT173-AS4-720, 502-1739ATM

FCC ID: 2AB6Z-DT173-AS4

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Date of sample receipt: 13 Aug., 2015

Date of Test: 13 Aug., to 15 Sep., 2015

Date of report issued: 15 Sep., 2015

Test Result: PASS*

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

Authorized Signature:



Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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2 Version

| Version No. | Date | Description |
|-------------|---------------|---|
| 00 | 15 Sep., 2015 | Android player Main board with wireless module (FCC ID: 2AB6Z-1859ATMB) and same antenna were used by the device, only conducted emission and Radiated emission were re-tested. |
| | | |
| | | |
| | | |
| | | |

Tested by:

Viki zhu

Date:

15 Sep., 2015

Test Engineer

Reviewed by:

Carey Chen

Date:

15 Sep., 2015

Project Engineer

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4 Test Summary

| Test Item | Section in CFR 47 | Result |
|----------------------------------|-------------------|--------|
| Antenna Requirement | 15.203/15.247 (c) | Pass |
| AC Power Line Conducted Emission | 15.207 | Pass |
| Conducted Peak Output Power | 15.247 (b)(1) | Pass* |
| 20dB Occupied Bandwidth | 15.247 (a)(1) | Pass* |
| Carrier Frequencies Separation | 15.247 (a)(1) | Pass* |
| Hopping Channel Number | 15.247 (a)(1) | Pass* |
| Dwell Time | 15.247 (a)(1) | Pass* |
| Radiated Emission | 15.205/15.209 | Pass |
| Band Edge | 15.247(d) | Pass* |

Pass: The EUT complies with the essential requirements in the standard.

Pass: The test data refer to FCC ID: 2AB6Z-1859ATMB.*

Remark: Test according to ANSI C63.4-2009

5 General Information

5.1 Client Information

| | |
|--------------------------|--|
| Applicant: | HUNG WAI PRODUCTS LIMITED |
| Address of Applicant: | Unit 11, 12/F., New Commerce Centre, 19 On Sum Street, Shatin, Hong Kong |
| Manufacturer: | HUNG WAI ELECTRONICS (HUIZHOU) LTD. |
| Address of Manufacturer: | 3 rd floor, NO. 3, Minfeng Road, Huinan High and New Technology Industry Park, Huiao Avenue, Huizhou City, Guangdong, China |

5.2 General Description of E.U.T.

| | |
|------------------------|---|
| Product Name: | 17.3" Android non-touch LCD Media Player |
| Model No.: | DT173-AS4-720, 502-1739ATM |
| Operation Frequency: | 2402MHz~2480MHz |
| Transfer rate: | 1/2/3 Mbits/s |
| Number of channel: | 79 |
| Modulation type: | GFSK, $\pi/4$ -DQPSK, 8DPSK |
| Modulation technology: | FHSS |
| Antenna Type: | Omni-directional |
| Antenna gain: | 2.5 dBi |
| AC Adapter: | MODEL: PS24A120K2000UD Input: AC 100-240V 50/60Hz 1.0A Output: DC 12V, 2000mA |
| Remark: | Model No. : DT173-AS4-720; 502-1739ATM are electrically identical , only model no is different for customer and for HUNG WAI. |

| Operation Frequency each of channel for GFSK, $\pi/4$ -DQPSK, 8DPSK | | | | | | | |
|---|-----------|---------|-----------|---------|-----------|---------|-----------|
| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 0 | 2402MHz | 20 | 2422MHz | 40 | 2442MHz | 60 | 2462MHz |
| 1 | 2403MHz | 21 | 2423MHz | 41 | 2443MHz | 61 | 2463MHz |
| 2 | 2404MHz | 22 | 2424MHz | 42 | 2444MHz | 62 | 2464MHz |
| 3 | 2405MHz | 23 | 2425MHz | 43 | 2445MHz | 63 | 2465MHz |
| 4 | 2406MHz | 24 | 2426MHz | 44 | 2446MHz | 64 | 2466MHz |
| 5 | 2407MHz | 25 | 2427MHz | 45 | 2447MHz | 65 | 2467MHz |
| 6 | 2408MHz | 26 | 2428MHz | 46 | 2448MHz | 66 | 2468MHz |
| 7 | 2409MHz | 27 | 2429MHz | 47 | 2449MHz | 67 | 2469MHz |
| 8 | 2410MHz | 28 | 2430MHz | 48 | 2450MHz | 68 | 2470MHz |
| 9 | 2411MHz | 29 | 2431MHz | 49 | 2451MHz | 69 | 2471MHz |
| 10 | 2412MHz | 30 | 2432MHz | 50 | 2452MHz | 70 | 2472MHz |
| 11 | 2413MHz | 31 | 2433MHz | 51 | 2453MHz | 71 | 2473MHz |
| 12 | 2414MHz | 32 | 2434MHz | 52 | 2454MHz | 72 | 2474MHz |
| 13 | 2415MHz | 33 | 2435MHz | 53 | 2455MHz | 73 | 2475MHz |
| 14 | 2416MHz | 34 | 2436MHz | 54 | 2456MHz | 74 | 2476MHz |
| 15 | 2417MHz | 35 | 2437MHz | 55 | 2457MHz | 75 | 2477MHz |
| 16 | 2418MHz | 36 | 2438MHz | 56 | 2458MHz | 76 | 2478MHz |
| 17 | 2419MHz | 37 | 2439MHz | 57 | 2459MHz | 77 | 2479MHz |
| 18 | 2420MHz | 38 | 2440MHz | 58 | 2460MHz | 78 | 2480MHz |
| 19 | 2421MHz | 39 | 2441MHz | 59 | 2461MHz | | |
| Remark: Channel 0, 39 & 78 selected for GFSK, $\pi/4$ -DQPSK and 8DPSK. | | | | | | | |

5.3 Test mode

| | |
|--|--|
| Transmitting mode: | Keep the EUT in transmitting mode with worst case data rate. |
| Remark | 8DPSK (3 Mbps) is the worst case mode. |
| <p>The sample was placed 0.8m above the ground plane of 3m chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working with a fresh battery, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.</p> | |

5.4 Laboratory Facility

| |
|---|
| <p>The test facility is recognized, certified, or accredited by the following organizations:</p> <p>● FCC - Registration No.: 817957 Shenzhen Zhongjian Nanfang Testing 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 out files. Registration 817957, February 27, 2012.</p> <p>● IC - Registration No.: 10106A-1 The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.</p> <p>● CNAS - Registration No.: CNAS L6048 Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.</p> |
|---|

5.5 Laboratory Location

| |
|---|
| <p>Shenzhen Zhongjian Nanfang Testing Co., Ltd. Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road, Bao'an District, Shenzhen, Guangdong, China Tel: +86-755-23118282 Fax: +86-755-23116366</p> |
|---|


5.6 Test Instruments list

| Radiated Emission: | | | | | | |
|--------------------|--------------------------------------|--------------------------------------|-----------------------------|---------------|----------------------|--------------------------|
| Item | Test Equipment | Manufacturer | Model No. | Inventory No. | Cal. Date (mm-dd-yy) | Cal. Due date (mm-dd-yy) |
| 1 | 3m Semi- Anechoic Chamber | SAEMC | 9(L)*6(W)* 6(H) | CCIS0001 | 08-23-2014 | 08-22-2017 |
| 2 | BiConiLog Antenna | SCHWARZBECK MESS-ELEKTRONIK | VULB9163 | CCIS0005 | 03-28-2015 | 03-28-2016 |
| 3 | Double -ridged waveguide horn | SCHWARZBECK MESS-ELEKTRONIK | BBHA9120D | CCIS0006 | 03-28-2015 | 03-28-2016 |
| 4 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| 5 | Amplifier(10kHz-1.3GHz) | HP | 8447D | CCIS0003 | 04-01-2015 | 03-31-2016 |
| 6 | Amplifier(1GHz-18GHz) | Compliance Direction Systems Inc. | PAP-1G18 | CCIS0011 | 04-01-2015 | 03-31-2016 |
| 7 | Pre-amplifier (18-26GHz) | Rohde & Schwarz | AFS33-18002 650-30-8P-44 | GTS218 | 04-01-2015 | 03-31-2016 |
| 8 | Horn Antenna | ETS-LINDGREN | 3160 | GTS217 | 04-01-2015 | 03-31-2016 |
| 9 | Printer | HP | HP LaserJet P1007 | N/A | N/A | N/A |
| 10 | Positioning Controller | UC | UC3000 | CCIS0015 | N/A | N/A |
| 11 | Spectrum analyzer 9k-30GHz | Rohde & Schwarz | FSP | CCIS0023 | 03-28-2015 | 03-28-2016 |
| 12 | EMI Test Receiver | Rohde & Schwarz | ESCI | CCIS0002 | 03-28-2015 | 03-28-2016 |
| 13 | Loop antenna | Laplace instrument | RF300 | EMC0701 | 04-01-2015 | 03-31-2016 |
| 14 | Universal radio communication tester | Rhode & Schwarz | CMU200 | CCIS0069 | 03-28-2015 | 03-28-2016 |
| 15 | Signal Analyzer | Rohde & Schwarz | FSIQ3 | CCIS0088 | 04-08-2015 | 04-08-2016 |

| Conducted Emission: | | | | | | |
|---------------------|-------------------|--------------------|-----------------------|---------------|----------------------|--------------------------|
| Item | Test Equipment | Manufacturer | Model No. | Inventory No. | Cal. Date (mm-dd-yy) | Cal. Due date (mm-dd-yy) |
| 1 | Shielding Room | ZhongShuo Electron | 11.0(L)x4.0(W)x3.0(H) | CCIS0061 | 11-10-2012 | 11-09-2015 |
| 2 | EMI Test Receiver | Rohde & Schwarz | ESCI | CCIS0002 | 03-28-2015 | 03-28-2016 |
| 3 | LISN | CHASE | MN2050D | CCIS0074 | 03-28-2015 | 03-28-2016 |
| 4 | Coaxial Cable | CCIS | N/A | CCIS0086 | 04-01-2015 | 03-31-2016 |
| 5 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |

6 Test results and Measurement Data

6.1 Antenna requirement

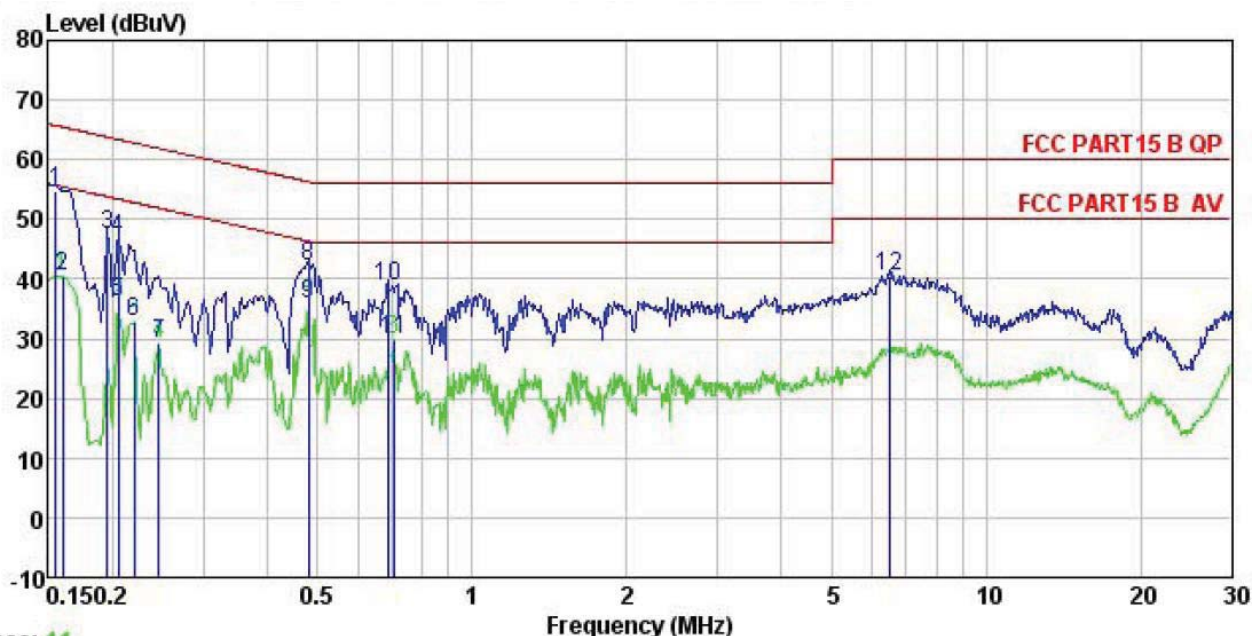
| | |
|--|--------------------------------------|
| Standard requirement: | FCC Part 15 C Section 15.203 /247(c) |
| <p>15.203 requirement: <i>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use 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.</i></p> <p>15.247(c) (1)(i) requirement: <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.</i></p> | |
| E.U.T Antenna: | |
| <p>The antenna of EUT is a reverse-SMA connector, which cannot be replaced by end-user. And the antenna gain is 2.5 dBi.</p>  | |

6.2 Conducted Emissions

| Test Requirement: | FCC Part 15 C Section 15.207 | | | | | | | | | | | | | | | | |
|-----------------------|--|-----------|--|-----------------------|--------------|--|------------|---------|----------|-----------|-----------|-------|----|----|------|----|----|
| Test Method: | ANSI C63.4:2009 | | | | | | | | | | | | | | | | |
| Test Frequency Range: | 150 kHz to 30 MHz | | | | | | | | | | | | | | | | |
| Class / Severity: | Class B | | | | | | | | | | | | | | | | |
| Receiver setup: | RBW=9 kHz, VBW=30 kHz, Sweep time=auto | | | | | | | | | | | | | | | | |
| Limit: | <table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table> <p>* Decreases with the logarithm of the frequency.</p> | | | 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 |
| 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 | | | | | | | | | | | | | | | |
| Test setup: | <div><p style="text-align: center;">Reference Plane</p></div> <p>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p> | | | | | | | | | | | | | | | | |
| Test procedure: | <ol style="list-style-type: none">1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2009 on conducted measurement. | | | | | | | | | | | | | | | | |
| Test Instruments: | Refer to section 5.7 for details | | | | | | | | | | | | | | | | |
| Test mode: | Bluetooth (Continuous transmitting) mode | | | | | | | | | | | | | | | | |
| Test results: | Pass | | | | | | | | | | | | | | | | |

Measurement Data

Line:

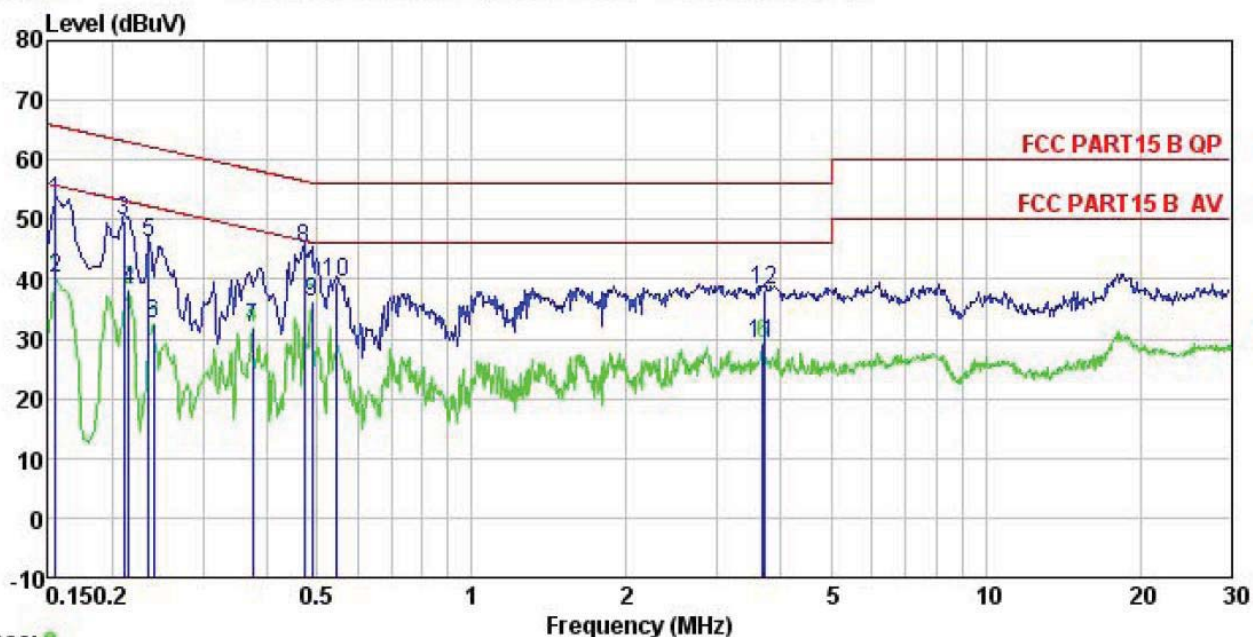


Trace: 11

Site : CCIS Shielding Room
 Condition : FCC PART15 B QP LISN LINE
 EUT : 17.3" Android non-touch LCD Media Player
 Model : DT173- AS4-720
 Test Mode : BT mode
 Power Rating : AC120V/60Hz
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa
 Test Engineer: Wiki
 Remark :

| | Freq | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|----|-------|------------|-------------|------------|-------|------------|------------|---------|
| | MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.155 | 43.62 | 0.27 | 10.78 | 54.67 | 65.74 | -11.07 | QP |
| 2 | 0.160 | 29.53 | 0.27 | 10.78 | 40.58 | 55.47 | -14.89 | Average |
| 3 | 0.195 | 36.52 | 0.28 | 10.76 | 47.56 | 63.80 | -16.24 | QP |
| 4 | 0.205 | 35.64 | 0.28 | 10.76 | 46.68 | 63.40 | -16.72 | QP |
| 5 | 0.205 | 25.27 | 0.28 | 10.76 | 36.31 | 53.40 | -17.09 | Average |
| 6 | 0.220 | 21.78 | 0.28 | 10.76 | 32.82 | 52.83 | -20.01 | Average |
| 7 | 0.246 | 18.14 | 0.27 | 10.75 | 29.16 | 51.91 | -22.75 | Average |
| 8 | 0.481 | 30.95 | 0.29 | 10.75 | 41.99 | 56.32 | -14.33 | QP |
| 9 | 0.481 | 24.66 | 0.29 | 10.75 | 35.70 | 46.32 | -10.62 | Average |
| 10 | 0.686 | 27.74 | 0.22 | 10.77 | 38.73 | 56.00 | -17.27 | QP |
| 11 | 0.705 | 18.95 | 0.22 | 10.77 | 29.94 | 46.00 | -16.06 | Average |
| 12 | 6.488 | 29.45 | 0.31 | 10.81 | 40.57 | 60.00 | -19.43 | QP |

Neutral:



Trace: 9

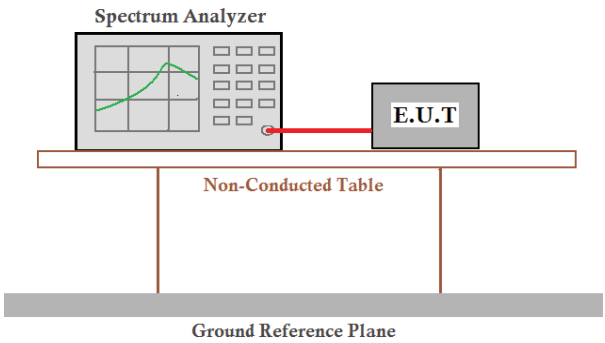
Site : CCIS Shielding Room
 Condition : FCC PART15 B QP LISN NEUTRAL
 EUT : 17.3" Android non-touch LCD Media Player
 Model : DT173- AS4-720
 Test Mode : BT mode
 Power Rating : AC120V/60Hz
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa
 Test Engineer: Wiki
 Remark :

| | Freq | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|----|-------|------------|-------------|------------|-------|------------|------------|---------|
| | MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.155 | 42.09 | 0.25 | 10.78 | 53.12 | 65.74 | -12.62 | QP |
| 2 | 0.155 | 29.04 | 0.25 | 10.78 | 40.07 | 55.74 | -15.67 | Average |
| 3 | 0.211 | 38.73 | 0.25 | 10.76 | 49.74 | 63.18 | -13.44 | QP |
| 4 | 0.215 | 27.14 | 0.25 | 10.76 | 38.15 | 53.01 | -14.86 | Average |
| 5 | 0.235 | 35.04 | 0.25 | 10.75 | 46.04 | 62.26 | -16.22 | QP |
| 6 | 0.240 | 21.39 | 0.25 | 10.75 | 32.39 | 52.08 | -19.69 | Average |
| 7 | 0.375 | 20.93 | 0.25 | 10.72 | 31.90 | 48.39 | -16.49 | Average |
| 8 | 0.471 | 34.23 | 0.28 | 10.75 | 45.26 | 56.49 | -11.23 | QP |
| 9 | 0.489 | 25.21 | 0.29 | 10.76 | 36.26 | 46.19 | -9.93 | Average |
| 10 | 0.546 | 28.59 | 0.26 | 10.76 | 39.61 | 56.00 | -16.39 | QP |
| 11 | 3.681 | 17.88 | 0.29 | 10.90 | 29.07 | 46.00 | -16.93 | Average |
| 12 | 3.720 | 26.85 | 0.29 | 10.90 | 38.04 | 56.00 | -17.96 | QP |

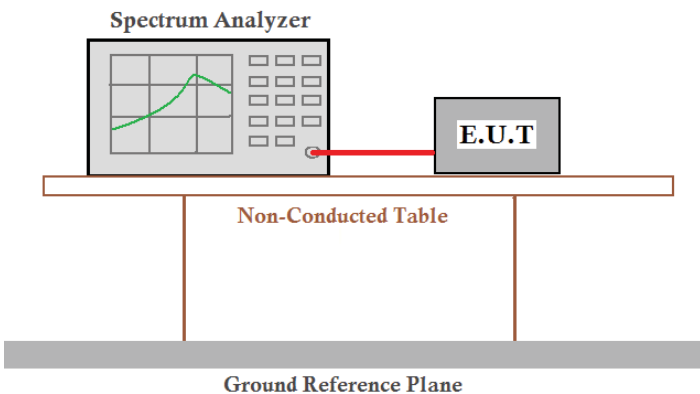
Notes:

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 Loss

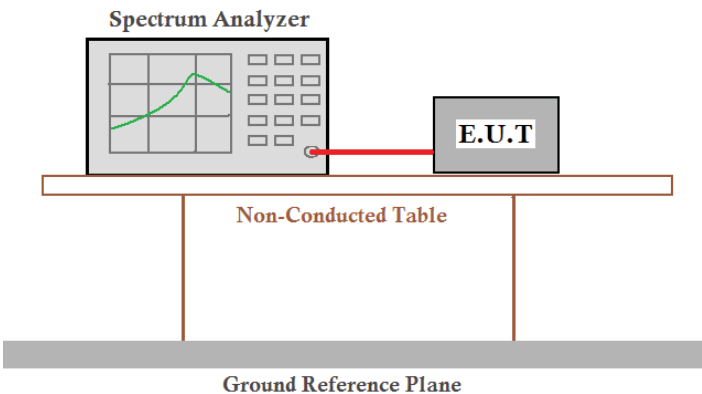
6.3 Conducted Output Power

| | |
|-------------------|--|
| Test Requirement: | FCC Part 15 C Section 15.247 (b)(3) |
| Test Method: | ANSI C63.4:2009 and DA00-705 |
| Receiver setup: | RBW=1MHz, VBW=3MHz, Detector=Peak (If 20dB BW ≤ 1 MHz) RBW=3MHz, VBW=10MHz, Detector=Peak (If 20dB BW > 1 MHz and < 3MHz) |
| Limit: | 125 mW(21 dBm) |
| Test setup: |  |
| Test Instruments: | Refer to section 5.7 for details |
| Test mode: | Non-hopping mode |
| Test results: | Refer to FCC ID: 2AB6Z-1859ATMB |

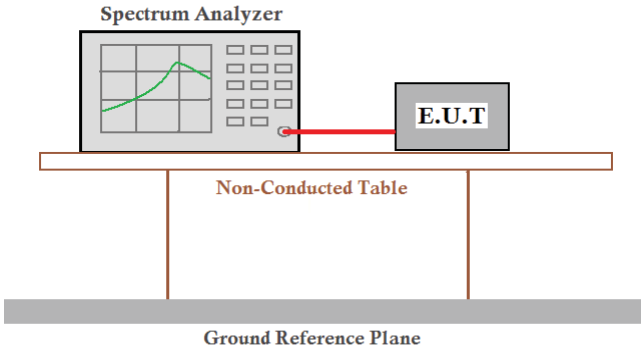
6.4 20dB Occupy Bandwidth

| | |
|-------------------|--|
| Test Requirement: | FCC Part 15 C Section 15.247 (a)(1) |
| Test Method: | ANSI C63.4:2009 and DA00-705 |
| Receiver setup: | RBW=30 kHz, VBW=100 kHz, detector=Peak |
| Limit: | NA |
| Test setup: |  |
| Test Instruments: | Refer to section 5.7 for details |
| Test mode: | Non-hopping mode |
| Test results: | Refer to FCC ID: 2AB6Z-1859ATMB |

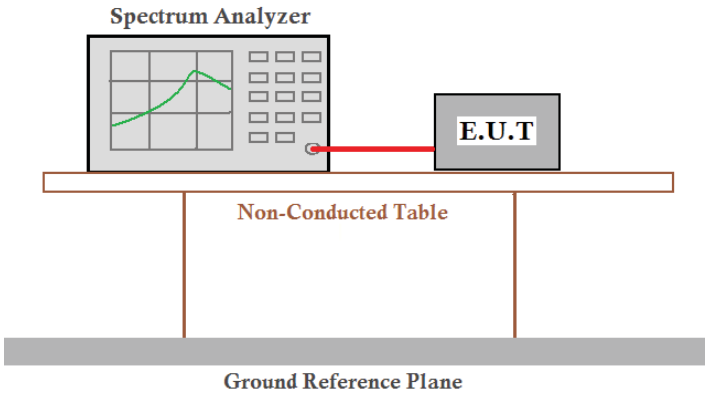
6.5 Carrier Frequencies Separation

| | |
|-------------------|---|
| Test Requirement: | FCC Part 15 C Section 15.247 (a)(1) |
| Test Method: | ANSI C63.4:2009 and DA00-705 |
| Receiver setup: | RBW=100 kHz, VBW=300 kHz, detector=Peak |
| Limit: | 0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater) |
| Test setup: |  <p>The diagram illustrates the test setup. A Spectrum Analyzer, shown with a grid and a green curve, is connected to an E.U.T. (Equipment Under Test) box by a red cable. Both the Spectrum Analyzer and the E.U.T. are positioned on a 'Non-Conducted Table', which is a rectangular platform supported by two vertical legs. Below this table is a 'Ground Reference Plane', represented by a thick grey horizontal bar.</p> |
| Test Instruments: | Refer to section 5.7 for details |
| Test mode: | Hopping mode |
| Test results: | Refer to FCC ID: 2AB6Z-1859ATMB |

6.6 Hopping Channel Number

| | |
|-------------------|--|
| Test Requirement: | FCC Part 15 C Section 15.247 (a)(1) |
| Test Method: | ANSI C63.4:2009 and DA00-705 |
| Receiver setup: | RBW=100 kHz, VBW=300 kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak |
| Limit: | 15 channels |
| Test setup: |  <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p> |
| Test Instruments: | Refer to section 5.7 for details |
| Test mode: | Hopping mode |
| Test results: | Refer to FCC ID: 2AB6Z-1859ATMB |

6.7 Dwell Time

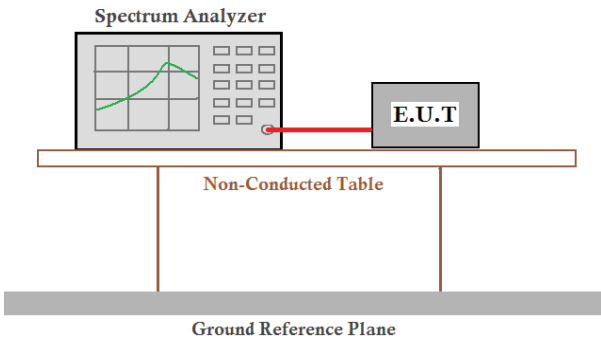
| | |
|-------------------|--|
| Test Requirement: | FCC Part 15 C Section 15.247 (a)(1) |
| Test Method: | ANSI C63.4:2009 and KDB DA00-705 |
| Receiver setup: | RBW=1 MHz, VBW=1 MHz, Span=0 Hz, Detector=Peak |
| Limit: | 0.4 Second |
| Test setup: |  <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by two vertical legs. Below the table is a Ground Reference Plane.</p> |
| Test Instruments: | Refer to section 5.7 for details |
| Test mode: | Hopping mode |
| Test results: | Refer to FCC ID: 2AB6Z-1859ATMB |

6.8 Pseudorandom Frequency Hopping Sequence

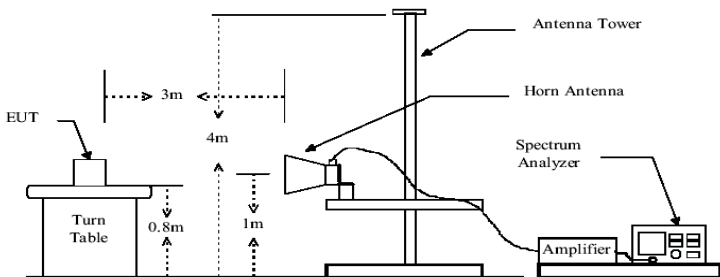
| Test Requirement: | FCC Part 15 C Section 15.247 (a)(1) requirement: |
|---|--|
| <p>Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.</p> <p>Alternatively, Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.</p> | |
| EUT Pseudorandom Frequency Hopping Sequence | |
| <p>The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones.</p> <ul style="list-style-type: none"> • Number of shift register stages: 9 • Length of pseudo-random sequence: $2^9 - 1 = 511$ bits • Longest sequence of zeros: 8 (non-inverted signal) <div data-bbox="255 940 1292 1086" data-label="Diagram"> </div> <p style="text-align: center;"><i>Linear Feedback Shift Register for Generation of the PRBS sequence</i></p> <p>An example of Pseudorandom Frequency Hopping Sequence as follow:</p> <div data-bbox="255 1187 1244 1332" data-label="Diagram"> </div> <p>Each frequency used equally on the average by each transmitter.</p> <p>The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.</p> | |

6.9 Band Edge

6.9.1 Conducted Emission Method

| | |
|-------------------|---|
| Test Requirement: | FCC Part 15 C Section 15.247 (d) |
| Test Method: | ANSI C63.4:2009 and DA00-705 |
| Receiver setup: | RBW=100 kHz, VBW=300 kHz, Detector=Peak |
| Limit: | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. |
| Test setup: |  <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T are placed on a table labeled 'Non-Conducted Table'. This table is supported by a 'Ground Reference Plane'.</p> |
| Test Instruments: | Refer to section 5.7 for details |
| Test mode: | Non-hopping mode and hopping mode |
| Test results: | Refer to FCC ID: 2AB6Z-1859ATMB |

6.9.2 Radiated Emission Method

| | | | | | |
|-----------------------|--|----------|--------------------|------|---------------|
| Test Requirement: | FCC Part 15 C Section 15.209 and 15.205 | | | | |
| Test Method: | ANSI C63.4: 2009 | | | | |
| Test Frequency Range: | 2.3GHz to 2.5GHz | | | | |
| Test site: | Measurement Distance: 3m | | | | |
| Receiver setup: | Frequency | Detector | RBW | VBW | Remark |
| | Above 1GHz | Peak | 1MHz | 3MHz | Peak Value |
| | | Peak | 1MHz | 10Hz | Average Value |
| Limit: | Frequency | | Limit (dBuV/m @3m) | | Remark |
| | Above 1GHz | | 54.00 | | Average Value |
| | | | 74.00 | | Peak Value |
| Test setup: |  | | | | |
| Test Procedure: | <div>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</div> <div>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</div> <div>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</div> <div>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</div> <div>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</div> <div>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</div> | | | | |
| Test Instruments: | Refer to section 5.7 for details | | | | |
| Test mode: | Non-hopping mode | | | | |
| Test results: | Passed | | | | |

Measurement data

| Test mode: GFSK | | | Test channel: Lowest | | | Remark: Peak | | |
|-----------------|-------------------|-----------------------|----------------------|--------------------|----------------|---------------------|-----------------|------------|
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polar. |
| 2390.00 | 20.30 | 27.58 | 6.63 | 0.00 | 54.51 | 74.00 | -19.49 | Vertical |
| 2390.00 | 20.15 | 27.58 | 6.63 | 0.00 | 54.36 | 74.00 | -19.64 | Horizontal |
| Test mode: GFSK | | | Test channel: Lowest | | | Remark: Average | | |
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polar. |
| 2390.00 | 11.56 | 27.58 | 6.63 | 0.00 | 45.77 | 54.00 | -8.23 | Vertical |
| 2390.00 | 11.48 | 27.58 | 6.63 | 0.00 | 45.69 | 54.00 | -8.31 | Horizontal |

| Test mode: GFSK | | | Test channel: Highest | | | Remark: Peak | | |
|-----------------|-------------------|-----------------------|-----------------------|--------------------|----------------|---------------------|-----------------|------------|
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polar. |
| 2483.50 | 22.47 | 27.52 | 6.85 | 0.00 | 56.84 | 74.00 | -17.16 | Vertical |
| 2483.50 | 22.68 | 27.52 | 6.85 | 0.00 | 57.05 | 74.00 | -16.95 | Horizontal |
| Test mode: GFSK | | | Test channel: Highest | | | Remark: Average | | |
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polar. |
| 2483.50 | 10.58 | 27.52 | 6.85 | 0.00 | 44.95 | 54.00 | -9.05 | Vertical |
| 2483.50 | 10.36 | 27.52 | 6.85 | 0.00 | 44.73 | 54.00 | -9.27 | Horizontal |

| Test mode: $\pi/4$ -DQPSK | | | Test channel: Lowest | | | Remark: Peak | | |
|---------------------------|-------------------|-----------------------|----------------------|--------------------|----------------|---------------------|-----------------|------------|
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polar. |
| 2390.00 | 21.88 | 27.58 | 6.63 | 0.00 | 56.09 | 74.00 | -17.91 | Vertical |
| 2390.00 | 21.95 | 27.58 | 6.63 | 0.00 | 56.16 | 74.00 | -17.84 | Horizontal |
| Test mode: $\pi/4$ -DQPSK | | | Test channel: Lowest | | | Remark: Average | | |
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polar. |
| 2390.00 | 11.25 | 27.58 | 6.63 | 0.00 | 45.46 | 54.00 | -8.54 | Vertical |
| 2390.00 | 11.66 | 27.58 | 6.63 | 0.00 | 45.87 | 54.00 | -8.13 | Horizontal |

| Test mode: $\pi/4$ -DQPSK | | | Test channel: Highest | | | Remark: Peak | | |
|---------------------------|-------------------|-----------------------|-----------------------|--------------------|----------------|---------------------|-----------------|------------|
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polar. |
| 2483.50 | 22.21 | 27.52 | 6.85 | 0.00 | 56.58 | 74.00 | -17.42 | Vertical |
| 2483.50 | 21.49 | 27.52 | 6.85 | 0.00 | 55.86 | 74.00 | -18.14 | Horizontal |
| Test mode: $\pi/4$ -DQPSK | | | Test channel: Highest | | | Remark: Average | | |
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polar. |
| 2483.50 | 11.26 | 27.52 | 6.85 | 0.00 | 45.63 | 54.00 | -8.37 | Vertical |
| 2483.50 | 11.32 | 27.52 | 6.85 | 0.00 | 45.69 | 54.00 | -8.31 | Horizontal |

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

| Test mode: 8DPSK | | | Test channel: Lowest | | | Remark: Peak | | |
|------------------|-------------------|-----------------------|----------------------|--------------------|----------------|---------------------|-----------------|------------|
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polar. |
| 2390.00 | 21.58 | 27.58 | 6.63 | 0.00 | 55.79 | 74.00 | -18.21 | Vertical |
| 2390.00 | 21.16 | 27.58 | 6.63 | 0.00 | 55.37 | 74.00 | -18.63 | Horizontal |
| Test mode: 8DPSK | | | Test channel: Lowest | | | Remark: Average | | |
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polar. |
| 2390.00 | 10.54 | 27.58 | 6.63 | 0.00 | 44.75 | 54.00 | -9.25 | Vertical |
| 2390.00 | 10.26 | 27.58 | 6.63 | 0.00 | 44.47 | 54.00 | -9.53 | Horizontal |

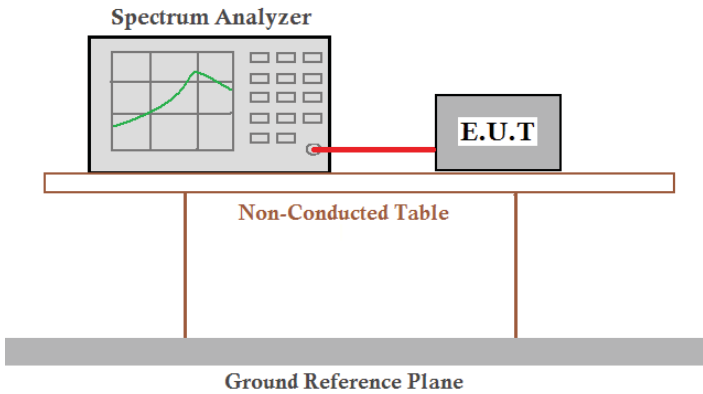
| Test mode: 8DPSK | | | Test channel: Highest | | | Remark: Peak | | |
|------------------|-------------------|-----------------------|-----------------------|--------------------|----------------|---------------------|-----------------|------------|
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polar. |
| 2483.50 | 22.47 | 27.52 | 6.85 | 0.00 | 56.84 | 74.00 | -17.16 | Vertical |
| 2483.50 | 22.36 | 27.52 | 6.85 | 0.00 | 56.73 | 74.00 | -17.27 | Horizontal |
| Test mode: 8DPSK | | | Test channel: Highest | | | Remark: Average | | |
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polar. |
| 2483.50 | 11.36 | 27.52 | 6.85 | 0.00 | 45.73 | 54.00 | -8.27 | Vertical |
| 2483.50 | 11.25 | 27.52 | 6.85 | 0.00 | 45.62 | 54.00 | -8.38 | Horizontal |

Remark:

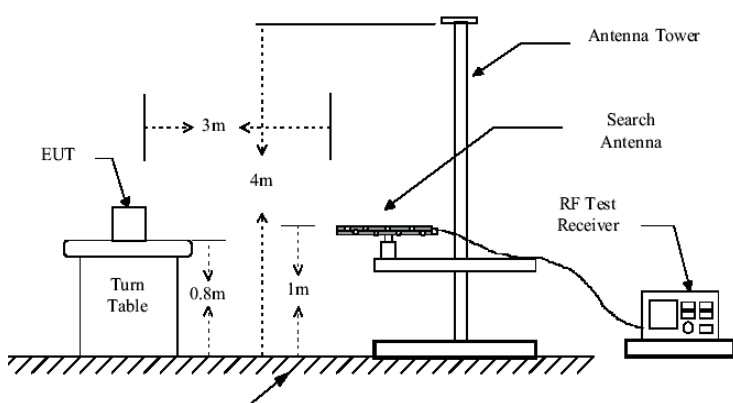
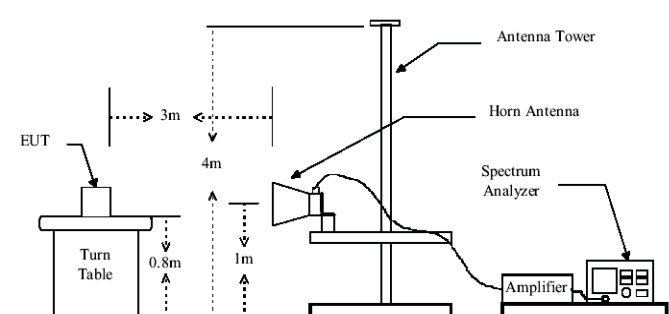
1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

6.10 Spurious Emission

6.10.1 Conducted Emission Method

| | |
|-------------------|--|
| Test Requirement: | FCC Part 15 C Section 15.247 (d) |
| Test Method: | ANSI C63.4:2009 and DA00-705 |
| Limit: | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. |
| Test setup: |  <p>The diagram illustrates the test setup for conducted emission measurement. A Spectrum Analyzer is connected via a red cable to an E.U.T (Equipment Under Test). Both are placed on a Non-Conducted Table, which is supported by two vertical legs. Below the table is a Ground Reference Plane.</p> |
| Test Instruments: | Refer to section 5.7 for details |
| Test mode: | Non-hopping mode |
| Test results: | Refer to FCC ID: 2AB6Z-1859ATMB |

6.10.2 Radiated Emission Method

| | | | | | |
|-----------------------|--|------------|--------------------|--------|------------------|
| Test Requirement: | FCC Part 15 C Section 15.209 | | | | |
| Test Method: | ANSI C63.4: 2009 | | | | |
| Test Frequency Range: | 9 kHz to 25 GHz | | | | |
| Test site: | Measurement Distance: 3m | | | | |
| Receiver setup: | Frequency | Detector | RBW | VBW | Remark |
| | 30MHz-1GHz | Quasi-peak | 120kHz | 300kHz | Quasi-peak Value |
| | Above 1GHz | Peak | 1MHz | 3MHz | Peak Value |
| | | Peak | 1MHz | 10Hz | Average Value |
| Limit: | Frequency | | Limit (dBuV/m @3m) | | Remark |
| | 30MHz-88MHz | | 40.0 | | Quasi-peak Value |
| | 88MHz-216MHz | | 43.5 | | Quasi-peak Value |
| | 216MHz-960MHz | | 46.0 | | Quasi-peak Value |
| | 960MHz-1GHz | | 54.0 | | Quasi-peak Value |
| | Above 1GHz | | 54.0 | | Average Value |
| | | | 74.0 | | Peak Value |
| Test setup: | Below 1GHz | | | | |
| |  | | | | |
| | Above 1GHz | | | | |
| |  | | | | |

| | |
|-------------------|---|
| Test Procedure: | <ol style="list-style-type: none"> 1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. |
| Test Instruments: | Refer to section 5.7 for details |
| Test mode: | Non-hopping mode |
| Test results: | Pass |

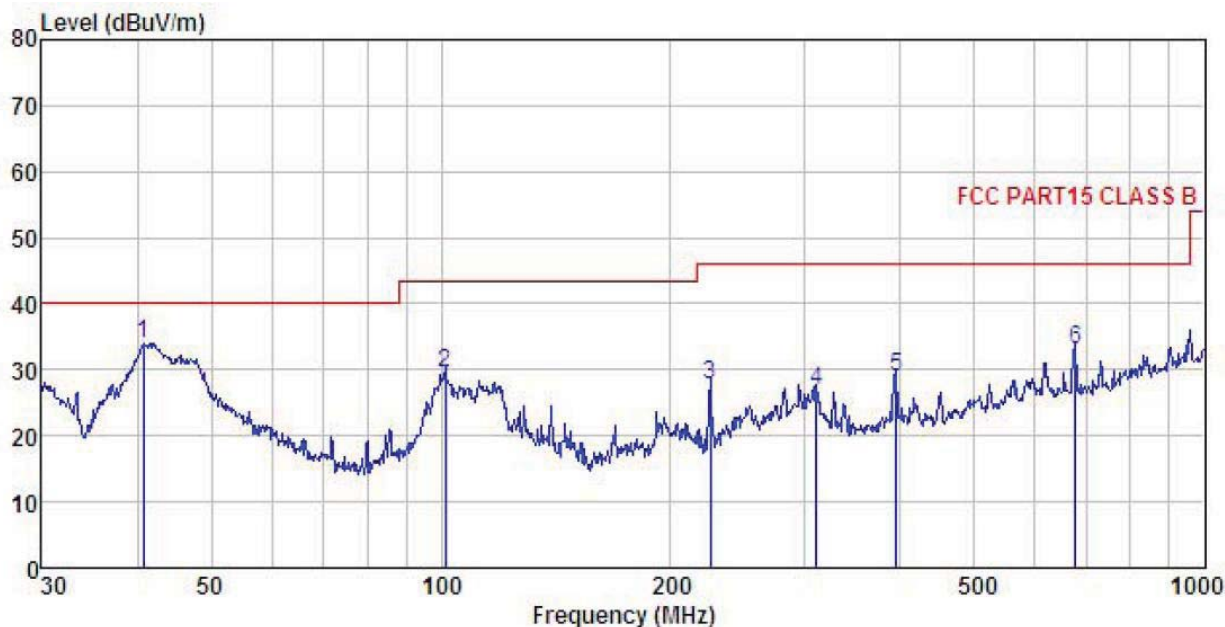
Remark:

1. During the test, pre-scan the GFSK, $\pi/4$ -DQPSK, 8DPSK modulation, and found the GFSK modulation is the worst case.
2. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case.
3. 9 kHz to 30 MHz is noise floor, so only shows the data of above 30MHz in this report.

Measurement data:

Below 1GHz

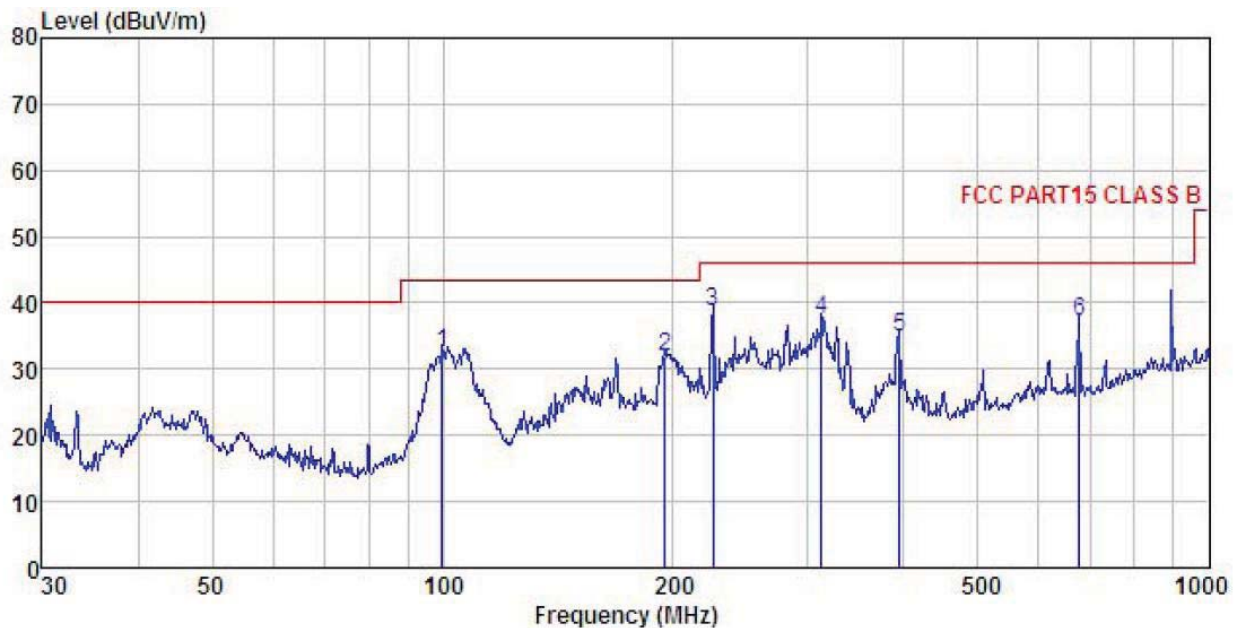
Vertical:



Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M1G) VERTICAL
 EUT : 17.3" Android non-touch LCD Media Player
 Model : DT173-AS4-720
 Test mode : BT mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55% 101KPa
 Test Engineer: Viki
 REMARK :

| | Freq | ReadAntenna | Cable | Preamp | Level | Limit | Over | |
|---|---------|-------------|--------|--------|--------|--------|--------|-----------|
| | | Level | Factor | Loss | Factor | Line | Limit | Remark |
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB |
| 1 | 40.702 | 49.83 | 13.58 | 0.53 | 29.89 | 34.05 | 40.00 | -5.95 QP |
| 2 | 101.289 | 45.11 | 13.02 | 0.97 | 29.52 | 29.58 | 43.50 | -13.92 QP |
| 3 | 225.308 | 43.60 | 11.41 | 1.51 | 28.68 | 27.84 | 46.00 | -18.16 QP |
| 4 | 309.998 | 40.29 | 13.19 | 1.80 | 28.47 | 26.81 | 46.00 | -19.19 QP |
| 5 | 394.855 | 40.62 | 14.97 | 2.10 | 28.76 | 28.93 | 46.00 | -17.07 QP |
| 6 | 677.580 | 40.13 | 18.73 | 2.86 | 28.72 | 33.00 | 46.00 | -13.00 QP |

Horizontal:



Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M1G) HORIZONTAL
 EUT : 17.3" Android non-touch LCD Media Player
 Model : DT173-AS4-720
 Test mode : BT mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55% 101KPa
 Test Engineer: Viki
 REMARK :

| | Freq | ReadAntenna | Cable | Preamp | | Limit | Over | |
|---|---------|-------------|--------|--------|--------|--------|--------|-----------|
| | | Level | Factor | Loss | Factor | Level | Line | Limit |
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB |
| 1 | 99.878 | 48.02 | 13.16 | 0.96 | 29.53 | 32.61 | 43.50 | -10.89 QP |
| 2 | 195.137 | 48.78 | 10.57 | 1.37 | 28.86 | 31.86 | 43.50 | -11.64 QP |
| 3 | 225.308 | 54.31 | 11.41 | 1.51 | 28.68 | 38.55 | 46.00 | -7.45 QP |
| 4 | 312.179 | 50.84 | 13.22 | 1.81 | 28.48 | 37.39 | 46.00 | -8.61 QP |
| 5 | 394.855 | 46.49 | 14.97 | 2.10 | 28.76 | 34.80 | 46.00 | -11.20 QP |
| 6 | 677.580 | 44.26 | 18.73 | 2.86 | 28.72 | 37.13 | 46.00 | -8.87 QP |

Above 1GHz:

| Test channel: | | | Lowest | | Level: | | Peak | |
|-----------------|-------------------|-----------------------|-----------------|--------------------|----------------|---------------------|-----------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
| 4804.00 | 44.25 | 31.53 | 10.57 | 40.24 | 46.11 | 74.00 | -27.89 | Vertical |
| 4804.00 | 45.48 | 31.53 | 10.57 | 40.24 | 47.34 | 74.00 | -26.66 | Horizontal |
| Test channel: | | | Lowest | | Level: | | Average | |
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
| 4804.00 | 34.15 | 31.53 | 10.57 | 40.24 | 36.01 | 54.00 | -17.99 | Vertical |
| 4804.00 | 34.28 | 31.53 | 10.57 | 40.24 | 36.14 | 54.00 | -17.86 | Horizontal |

| Test channel: | | | Middle | | Level: | | Peak | |
|-----------------|-------------------|-----------------------|-----------------|--------------------|----------------|---------------------|-----------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
| 4882.00 | 44.25 | 31.58 | 10.66 | 40.15 | 46.34 | 74.00 | -27.66 | Vertical |
| 4882.00 | 44.74 | 31.58 | 10.66 | 40.15 | 46.83 | 74.00 | -27.17 | Horizontal |
| Test channel: | | | Middle | | Level: | | Average | |
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
| 4882.00 | 34.85 | 31.58 | 10.66 | 40.15 | 36.94 | 54.00 | -17.06 | Vertical |
| 4882.00 | 34.26 | 31.58 | 10.66 | 40.15 | 36.35 | 54.00 | -17.65 | Horizontal |

| Test channel: | | | Highest | | Level: | | Peak | |
|-----------------|-------------------|-----------------------|-----------------|--------------------|----------------|---------------------|-----------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
| 4960.00 | 46.18 | 31.69 | 10.73 | 40.03 | 48.57 | 74.00 | -25.43 | Vertical |
| 4960.00 | 46.91 | 31.69 | 10.73 | 40.03 | 49.30 | 74.00 | -24.70 | Horizontal |
| Test channel: | | | Highest | | Level: | | Average | |
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
| 4960.00 | 35.16 | 31.69 | 10.73 | 40.03 | 37.55 | 54.00 | -16.45 | Vertical |
| 4960.00 | 35.29 | 31.69 | 10.73 | 40.03 | 37.68 | 54.00 | -16.32 | Horizontal |

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamp Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.