# FCC Test Report

Report No.:AGC09966200501FE05

| | | |
|---|---|---|
| **FCC ID** | : | 2AVSK-620 |
| **APPLICATION PURPOSE** | : | Original Equipment |
| **PRODUCT DESIGNATION** | : | Smart Phone |
| **BRAND NAME** | : | ClearCellular |
| **MODEL NAME** | : | CLEARPHONE 620 |
| **APPLICNAT** | : | ClearCellular, Limited. |
| **DATE OF ISSUE** | : | Jun. 18, 2020 |
| **STANDARD(S)**<br>**TEST PROCEDURE(S)** | : | FCC Part 15.247<br>KDB 558074 D01 15.247 Meas Guidance v05r01 |
| **REPORT VERSION** | : | V1.0 |

Attestation of Global Compliance (Shenzhen) Co., Ltd

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## Report Revise Record

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|---|---|---|---|---|
| V1.0 | / | Jun. 18, 2020 | Valid | Initial Release |

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## 1. VERIFICATION OF CONFORMITY

| | |
|---|---|
| **Applicant** | ClearCellular, Limited. |
| **Address** | 107 Richmond Street Lower Hutt state New Zealand |
| **Manufacturer** | COOSEA GROUP (HK) COMPANY LIMITED |
| **Address** | UNIT 5-6 16F MULTIFIELD PLAZA 3-7A PRAT AVENUE TSIM SHA TSUI KL HONGKONG |
| **Factory** | ClearCellular, Limited. |
| **Address** | 107 Richmond Street Lower Hutt state New Zealand |
| **Product Designation** | Smart Phone |
| **Brand Name** | ClearCellular |
| **Test Model** | ClearPHONE 620 |
| **Date of test** | May 15, 2020~Jun. 18, 2020 |
| **Deviation** | No any deviation from the test method |
| **Condition of Test Sample** | Normal |
| **Report Template** | AGCRT-US-BGN/RF |

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance(Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with requirement of FCC Part 15 Rules requirement.

The test results of this report relate only to the tested sample identified in this report.

| | | |
|---|---|---|
| Prepared By | Donjon Huang<br>(Project Engineer) | Jun. 18, 2020 |
| Reviewed By | Max Zhang<br>( Reviewer ) | Jun. 18, 2020 |
| Approved By | Forrest Lei<br>(Authorized Officer) | Jun. 18, 2020 |

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# 2. GENERAL INFORMATION

## 2.1. PRODUCT DESCRIPTION

The EUT is designed as “Smart Phone”. It is designed by way of utilizing the DSSS and OFDM technology to achieve the system operation.

A major technical description of EUT is described as following

| | |
|---|---|
| **Operation Frequency** | 2.412 GHz～2.462GHz |
| **Output Power** | IEEE 802.11b: **13.08**dBm, IEEE 802.11g: **12.47**dBm;<br>IEEE 802.11n(20): **12.45**dBm,IEEE 802.11n(40): **12.34**dBm |
| **Modulation** | DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM) |
| **Number of channels** | 11 Channels (IEEE802.11b/g/n20)& 7 Channels (IEEE802.11n40) |
| **Hardware Version** | K7011Q-01 |
| **Software Version** | K7011.GB.HD J.Q0.ANASAPA9DATJDFTL.0402_1614.V2.1 |
| **Antenna Designation** | PIFA Antenna(Comply with requirements of the FCC part 15.203) |
| **Antenna Gain** | -1.0dBi |
| **Power Supply** | DC 3.85V by Built-in Li-ion Battery |

## 2.2. TABLE OF CARRIER FREQUENCYS

| Frequency Band | Channel Number | Frequency |
|---|---|---|
| 2400~2483.5MHZ | 1 | 2412 MHZ |
| | 2 | 2417 MHZ |
| | 3 | 2422 MHZ |
| | 4 | 2427 MHZ |
| | 5 | 2432 MHZ |
| | 6 | 2437 MHZ |
| | 7 | 2442 MHZ |
| | 8 | 2447 MHZ |
| | 9 | 2452 MHZ |
| | 10 | 2457 MHZ |
| | 11 | 2462 MHZ |

Note: For 20MHZ bandwidth system use Channel 1 to Channel 11

For 802.11n 40MHZ bandwidth system use Channel 3 to Channel 9.

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### 2.3. IEEE 802.11N MODULATION SCHEME

| MCS Index | Nss | Modulation | R | NBPSC | NCBPS | | NDBPS | | Data rate(Mbps) 800nsGI | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 20MHz | 40MHz | 20MHz | 40MHz | 20MHz | 40MHz |
| 0 | 1 | BPSK | 1/2 | 1 | 52 | 108 | 26 | 54 | 6.5 | 13.5 |
| 1 | 1 | QPSK | 1/2 | 2 | 104 | 216 | 52 | 108 | 13.0 | 27.0 |
| 2 | 1 | QPSK | 3/4 | 2 | 104 | 216 | 78 | 162 | 19.5 | 40.5 |
| 3 | 1 | 16-QAM | 1/2 | 4 | 208 | 432 | 104 | 216 | 26.0 | 54.0 |
| 4 | 1 | 16-QAM | 3/4 | 4 | 208 | 432 | 156 | 324 | 39.0 | 81.0 |
| 5 | 1 | 64-QAM | 2/3 | 6 | 312 | 648 | 208 | 432 | 52.0 | 108.0 |
| 6 | 1 | 64-QAM | 3/4 | 6 | 312 | 648 | 234 | 489 | 58.5 | 121.5 |
| 7 | 1 | 64-QAM | 5/6 | 6 | 312 | 648 | 260 | 540 | 65.0 | 135.0 |

| Symbol | Explanation |
|---|---|
| NSS | Number of spatial streams |
| R | Code rate |
| NBPSC | Number of coded bits per single carrier |
| NCBPS | Number of coded bits per symbol |
| NDBPS | Number of data bits per symbol |
| GI | Guard interval |

### 2.4. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AVSK-620** filing to comply with the FCC Part 15 requirements.

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## 2.5. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013).
Radiated testing was performed at an antenna to EUT distance 3 meters.
Others testing (listed at item 5.3) was performed according to the procedures in FCC Part 15.247 rules KDB 558074 D01 15.247 Meas Guidance v05r01.

## 2.6. SPECIAL ACCESSORIES

Refer to section 5.2.

## 2.7. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

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## 3. MEASUREMENT UNCERTAINTY

| 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 Emission 30~1000MHz | ±4.10dB | (1) |
| Radiated Emission Above 1GHz | ±4.32dB | (1) |
| Conducted Disturbance0.15~30MHz | ±3.20dB | (1) |

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

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## 4. DESCRIPTION OF TEST MODES

| NO. | TEST MODE DESCRIPTION |
|---|---|
| 1 | Low channel TX |
| 2 | Middle channel TX |
| 3 | High channel TX |
| 4 | Normal operating |

Note:
Transmit by 802.11b with Date rate (1/2/5.5/11)
Transmit by 802.11g with Date rate (6/9/12/18/24/36/48/54)
Transmit by 802.11n (20MHz) with Date rate (6.5/13/19.5/26/39/52/58.5/65)
Transmit by 802.11n (40MHz) with Date rate (13.5/27/40.5/54/81/108/121.5/135)

**Note:**

1. The EUT has been set to operate continuously on the lowest, middle and highest operation frequency Individually, and the eut is operating at its maximum duty cycle>or equal 98%
2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.
3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

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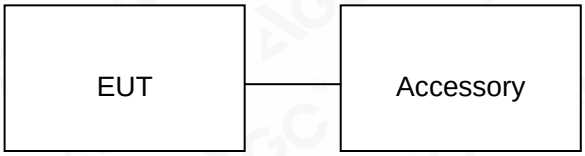
# 5 SYSTEM TEST CONFIGURATION

## 5.1. CONFIGURATION OF EUT SYSTEM

**Configure:**




## 5.2. EQUIPMENT USED IN EUT SYSTEM

| Item | Equipment | Model No. | ID or Specification | Remark |
|---|---|---|---|---|
| 1 | Smart Phone | ClearPHONE 620 | 2AVSK-620 | EUT |
| 2 | Adapter | HJ-FC017K7-US | Input: AC 100-240V, 50/60Hz, 0.6A<br>Output: DC 9V, 2A | AE |
| 3 | Battery | BL-A5CT | DC3.85V 4900mAh | AE |
| 4 | USB Cable | N/A | N/A | AE |

Note: All the accessories have been used during the test in conduction emission test.

## 5.3. SUMMARY OF TEST RESULTS

| FCC RULES | DESCRIPTION OF TEST | RESULT |
|---|---|---|
| §15.247 | Output Power | Compliant |
| §15.247 | 6 dB Bandwidth | Compliant |
| §15.247 | Conducted Spurious Emission | Compliant |
| §15.247 | Maximum Conducted Output Power SPECTRAL Density | Compliant |
| §15.209 | Radiated Emission | Compliant |
| §15.247 | Band Edges | Compliant |
| §15.207 | Line Conduction Emission | Compliant |

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## 6. TEST FACILITY

| | |
|---|---|
| **Test Site** | Attestation of Global Compliance (Shenzhen) Co., Ltd |
| **Location** | 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong,China |
| **Designation Number** | CN1259 |
| **FCC Test Firm Registration Number** | 975832 |
| **A2LA Cert. No.** | 5054.02 |
| **Description** | Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA |

### TEST EQUIPMENT OF CONDUCTED EMISSION TEST

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| TEST RECEIVER | R&S | ESPI | 101206 | May 15, 2020 | May 14, 2022 |
| LISN | R&S | ESH2-Z5 | 100086 | Aug. 26, 2019 | Aug. 25, 2020 |
| Test software | R&S | ES-K1(Ver.V1.71) | N/A | N/A | N/A |

### TEST EQUIPMENT OF RADIATED EMISSION TEST

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| TEST RECEIVER | R&S | ESCI | 10096 | May 15, 2020 | May 14, 2022 |
| EXA Signal Analyzer | Aglient | N9010A | MY53470504 | Dec. 12, 2019 | Dec. 11, 2020 |
| 2.4GHz Fliter | EM Electronics | 2400-2500MHz | N/A | Feb. 23, 2020 | Feb. 22, 2022 |
| Attenuator | ZHINAN | E-002 | N/A | Sep. 09, 2019 | Sep. 08, 2020 |
| Horn antenna | SCHWARZBECK | BBHA 9170 | #768 | Sep. 09, 2019 | Sep. 08, 2021 |
| Active loop antenna (9K-30MHz) | ZHINAN | ZN30900C | 18051 | May 22, 2020 | May 21, 2022 |
| Double-Ridged Waveguide Horn | ETS LINDGREN | 3117 | 00034609 | May. 17, 2019 | May. 16, 2021 |
| Broadband Preamplifier | ETS LINDGREN | 3117PA | 00225134 | Oct. 15, 2019 | Oct. 14, 2020 |
| ANTENNA | SCHWARZBECK | VULB9168 | 494 | Jan. 09, 2019 | Jan. 08, 2021 |
| Test software | FARA | EZ-EMC (Ver RA-03A) | N/A | N/A | N/A |

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**TEST EQUIPMENT OF RF CONDUCTED TEST**

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| USB Wideband Power Sensor | Aglient | U2021XA | MY54110007 | Sep. 09, 2019 | Sep. 08, 2020 |
| USB Wideband Power Sensor | Aglient | U2021XA | MY54110009 | Sep. 09, 2019 | Sep. 08, 2020 |
| SIGNAL ANALYZER | Aglient | N9020A | MY52090123 | Sep. 09, 2019 | Sep. 08, 2020 |

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# 7. OUTPUT POWER

## 7.1. MEASUREMENT PROCEDURE

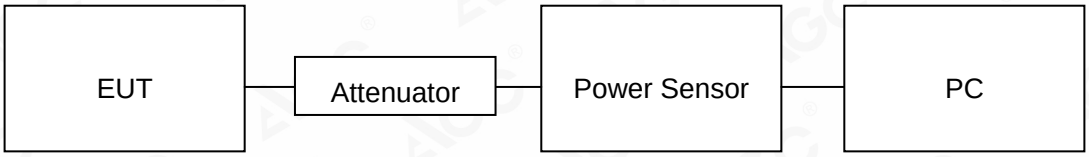
For max average conducted output power test:

1. Connect EUT RF output port to power probe through an RF attenuator.
2. Connect the power probe to the PC.
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Record the maximum power from the software.

**Note**：The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

## 7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

**AVERAGE POWER SETUP**

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## 7.3. LIMITS AND MEASUREMENT RESULT

| | |
|---|---|
| **TEST ITEM** | OUTPUT POWER |
| **TEST MODE** | 802.11b with data rate 1 |

| Frequency (GHz) | Average Power (dBm) | Applicable Limits (dBm) | Pass or Fail |
|---|---|---|---|
| 2.412 | 12.49 | 30 | Pass |
| 2.437 | **13.08** | 30 | Pass |
| 2.462 | 12.88 | 30 | Pass |

| | |
|---|---|
| **TEST ITEM** | OUTPUT POWER |
| **TEST MODE** | 802.11g with data rate 6 |

| Frequency (GHz) | Average Power (dBm) | Applicable Limits (dBm) | Pass or Fail |
|---|---|---|---|
| 2.412 | 12.09 | 30 | Pass |
| 2.437 | **12.47** | 30 | Pass |
| 2.462 | 12.11 | 30 | Pass |

| | |
|---|---|
| **TEST ITEM** | OUTPUT POWER |
| **TEST MODE** | 802.11n 20 with data rate 6.5 |

| Frequency (GHz) | Average Power (dBm) | Applicable Limits (dBm) | Pass or Fail |
|---|---|---|---|
| 2.412 | 11.84 | 30 | Pass |
| 2.437 | **12.45** | 30 | Pass |
| 2.462 | 12.06 | 30 | Pass |

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| | |
|---|---|
| **TEST ITEM** | OUTPUT POWER |
| **TEST MODE** | 802.11n 40 with data rate 13.5 |

| Frequency (GHz) | Average Power (dBm) | Applicable Limits (dBm) | Pass or Fail |
|---|---|---|---|
| 2.422 | 12.20 | 30 | Pass |
| 2.437 | **12.34** | 30 | Pass |
| 2.452 | 11.69 | 30 | Pass |

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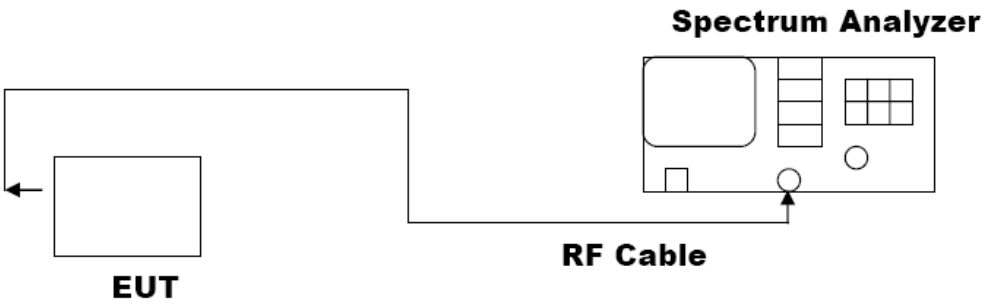
# 8. 6dB BANDWIDTH

## 8.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW⩾3×RBW.
4. Set SPA Trace 1 Max hold, then View.

**Note:** The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

## 8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

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## 8.3. LIMITS AND MEASUREMENT RESULTS

| Mode | Channel | 6dB Bandwidth [MHz] | Verdict |
|---|---|---|---|
| 11b | LCH | 8.074 | PASS |
| | MCH | 8.083 | PASS |
| | HCH | 8.091 | PASS |
| 11g | LCH | 15.10 | PASS |
| | MCH | 15.12 | PASS |
| | HCH | 15.45 | PASS |
| 11nHT20 | LCH | 15.12 | PASS |
| | MCH | 15.11 | PASS |
| | HCH | 15.95 | PASS |
| 11nHT40 | LCH | 35.08 | PASS |
| | MCH | 32.55 | PASS |
| | HCH | 35.33 | PASS |

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## Test Graph

| 11b-LCH | 11b-MCH |
|---|---|
| | |





| 11b-HCH | 11g-LCH |
|---|---|
| | |





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| 11g-MCH | 11g-HCH |
|---|---|
| | |





| 11nHT20-LCH | 11nHT20-MCH |
|---|---|
| | |





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| 11nHT20-HCH | 11nHT40-LCH |
|---|---|
| | |

| 11nHT40-MCH | 11nHT40-HCH |
|---|---|
| | |

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# 9. CONDUCTED SPURIOUS EMISSION

## 9.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Trace 1 Max hold, then View.

**Note:** The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements. Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW＞RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW＞RBW) are conform to the requirement.

## 9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2.

## 9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

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## 9.4. LIMITS AND MEASUREMENT RESULT

| LIMITS AND MEASUREMENT RESULT | | |
|---|---|---|
| Applicable Limits | Measurement Result | |
| | Test Data | Criteria |
| In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 30 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.<br>In addition, radiation 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)) | Refer Test Graph | PASS |

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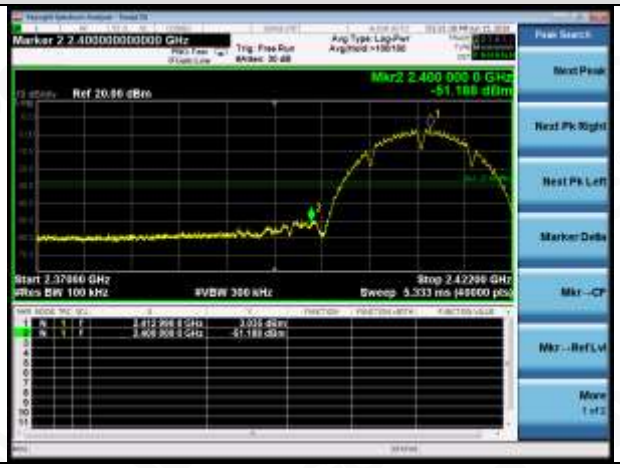
## Test Graph

| 11B-LCH | 11B-LCH |
|---|---|
| |  |

| 11B-LCH | 11B-MCH |
|---|---|
| | |

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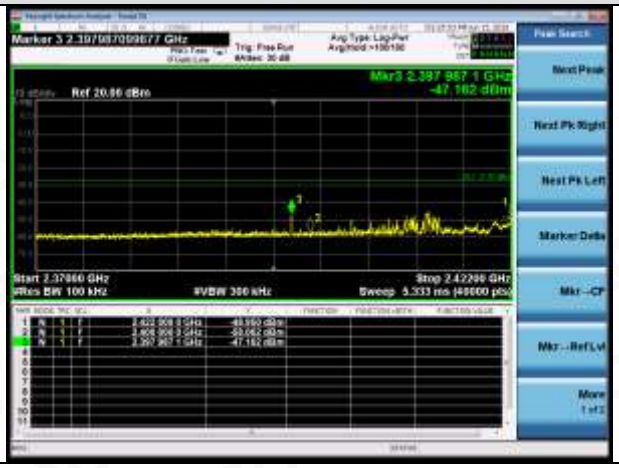
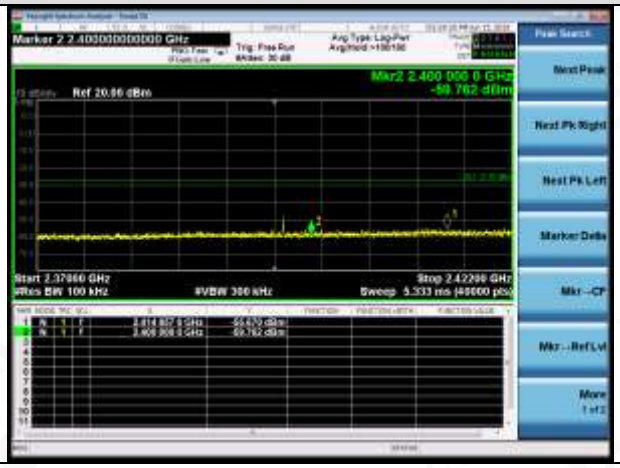
| 11B-MCH | 11B-MCH |
|---|---|
|  | |

| 11B-HCH | 11B-HCH |
|---|---|
| |  |

| 11B-HCH | 11G-LCH |
|---|---|
| | |

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| 11G-LCH | 11G-LCH |
|---|---|
| | |

| 11G-MCH | 11G-MCH |
|---|---|
| | |

| 11G-MCH | 11G-HCH |
|---|---|
| | |

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| 11G-HCH | 11G-HCH |
|---|---|
| | |

| 11nHT20-LCH | 11nHT20-LCH |
|---|---|
| | |

| 11nHT20-LCH | 11nHT20-MCH |
|---|---|
| | |

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| 11nHT20-MCH | 11nHT20-MCH |
|---|---|
| | |

| 11nHT20-HCH | 11nHT20-HCH |
|---|---|
| | |

| 11nHT20-HCH | 11nHT40-LCH |
|---|---|
| | |

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| 11nHT40-LCH | 11nHT40-LCH |
|---|---|
| | |

| 11nHT40-MCH | 11nHT40-MCH |
|---|---|
| | |

| 11nHT40-MCH | 11nHT40-HCH |
|---|---|
| | |

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| 11nHT40-HCH | 11nHT40-HCH |
|---|---|
| | |

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# 10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

## 10.1 MEASUREMENT PROCEDURE

(1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
(2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
(3). Set SPA Trace 1 Max hold, then View.

Note: The method of AVGPSD-1 in the ANSI C63.10 (2013) item 11.10 was used in this testing.

## 10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 8.2.

## 10.3 MEASUREMENT EQUIPMENT USED

Refer To Section 6.

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## 10.4 LIMITS AND MEASUREMENT RESULT

| Mode | Channel | PSD [dBm/20kHz] | Limit[dBm/3kHz] | Verdict |
|---|---|---|---|---|
| 11b | LCH | -3.387 | 8 | PASS |
| | MCH | -3.230 | 8 | PASS |
| | HCH | -2.963 | 8 | PASS |
| 11g | LCH | -5.215 | 8 | PASS |
| | MCH | -3.896 | 8 | PASS |
| | HCH | -4.475 | 8 | PASS |
| 11nHT20 | LCH | -5.248 | 8 | PASS |
| | MCH | -4.275 | 8 | PASS |
| | HCH | -4.921 | 8 | PASS |
| 11NHT40 | LCH | -7.323 | 8 | PASS |
| | MCH | -7.086 | 8 | PASS |
| | HCH | -7.905 | 8 | PASS |

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## Test Graph

| 11b-LCH | 11b-MCH |
|---|---|
| | |

| 11b-HCH | 11g-LCH |
|---|---|
| | |

| 11g-MCH | 11g-HCH |
|---|---|
| | |

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| 11nHT20-LCH | 11nHT20-MCH |
|---|---|
| | |

| 11nHT20-HCH | 11nHT40-LCH |
|---|---|
| | |

| 11nHT40-MCH | 11nHT40-HCH |
|---|---|
| | |

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# 11. RADIATED EMISSION

## 11.1. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

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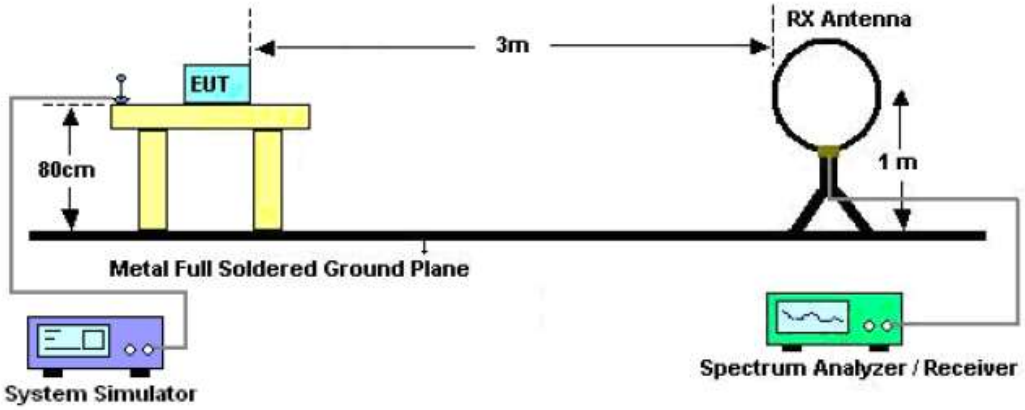
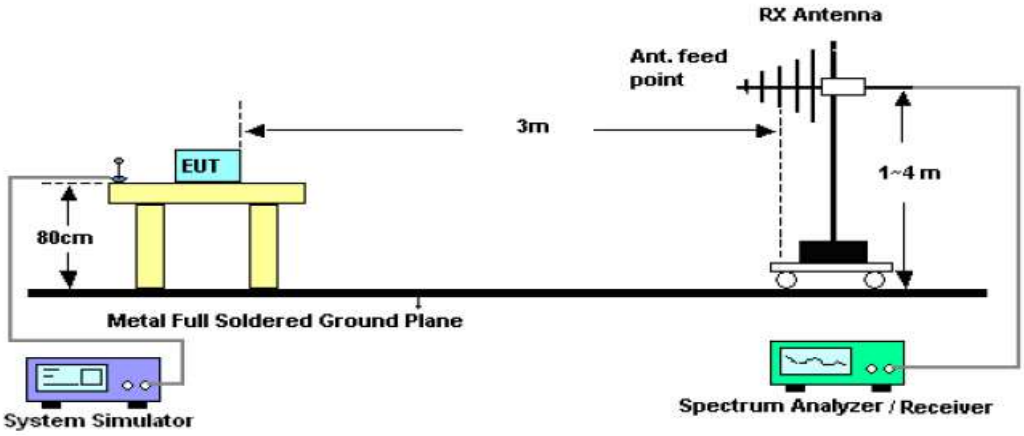
## 11.2. TEST SETUP

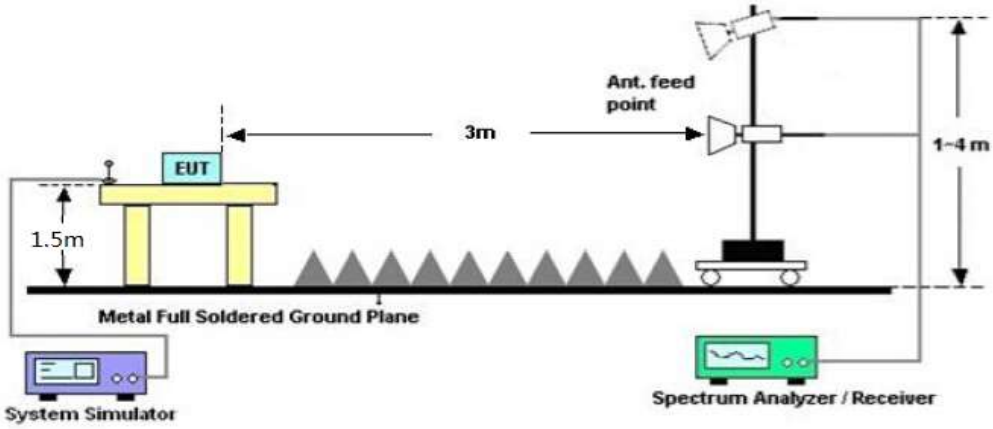
Radiated Emission Test-Setup Frequency Below 30MHz




RADIATED EMISSION TEST SETUP 30MHz-1000MHz




RADIATED EMISSION TEST SETUP ABOVE 1000MHz

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## 11.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(KHz) | 300 |
| 0.490~1.705 | 24000/F(KHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

Note: All modes were tested For restricted band radiated emission,
the test records reported below are the worst result compared to other modes.

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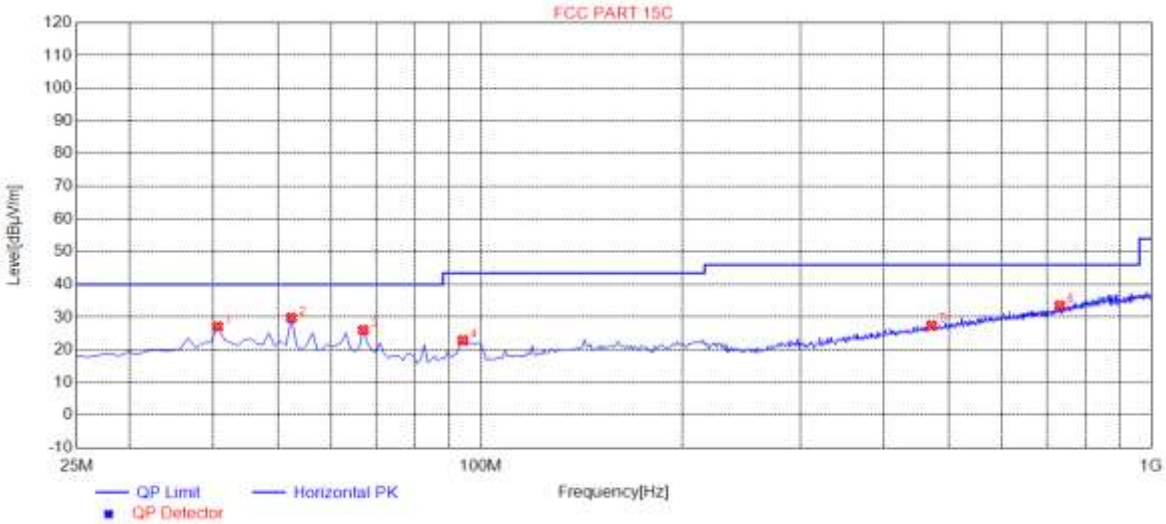
## 11.4. TEST RESULT

### RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

### RADIATED EMISSION BELOW 1GHZ

RADIATED EMISSION TEST- (30MHZ-1GHZ) -HORIZONTAL




| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 40.6000 | 27.12 | 14.92 | 40.00 | 12.88 | 100 | 54 | Horizontal |
| 2 | 52.3000 | 29.80 | 14.50 | 40.00 | 10.20 | 100 | 359 | Horizontal |
| 3 | 66.9250 | 26.06 | 12.75 | 40.00 | 13.94 | 100 | 182 | Horizontal |
| 4 | 94.2250 | 22.90 | 10.73 | 43.50 | 20.60 | 200 | 4 | Horizontal |
| 5 | 470.5750 | 27.48 | 21.43 | 46.00 | 18.52 | 200 | 334 | Horizontal |
| 6 | 730.9000 | 33.54 | 26.74 | 46.00 | 12.46 | 200 | 228 | Horizontal |

**RESULT: PASS**

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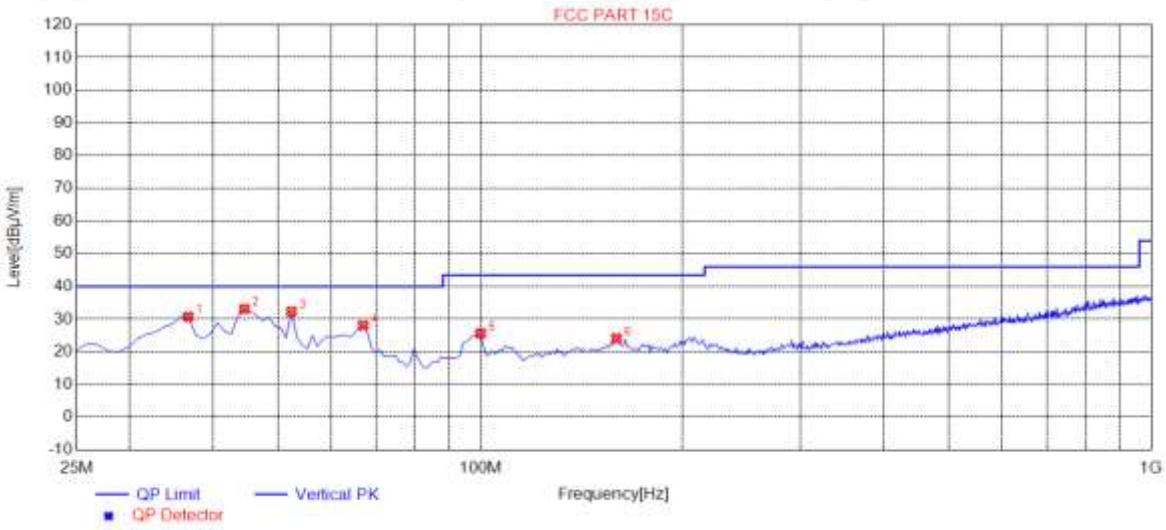
RADIATED EMISSION TEST- (30MHZ-1GHZ) -VERTICAL




| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 36.7000 | 30.75 | 14.14 | 40.00 | 9.25 | 100 | 195 | Vertical |
| 2 | 44.5000 | 33.12 | 14.82 | 40.00 | 6.88 | 100 | 230 | Vertical |
| 3 | 52.3000 | 32.33 | 14.50 | 40.00 | 7.67 | 100 | 330 | Vertical |
| 4 | 66.9250 | 28.09 | 12.75 | 40.00 | 11.91 | 100 | 285 | Vertical |
| 5 | 100.0750 | 25.67 | 11.38 | 43.50 | 17.83 | 100 | 116 | Vertical |
| 6 | 159.5500 | 24.17 | 14.94 | 43.50 | 19.33 | 100 | 330 | Vertical |

**RESULT: PASS**

**Note:** 1. Factor=Antenna Factor + Cable loss, Margin= Result -Limit.

2. The “Factor” value can be calculated automatically by software of measurement system.

3. All test modes had been pre-tested. The 802.11b at low channel is the worst case and recorded in the report.

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**RADIATED EMISSION ABOVE 1GHZ**

| Frequency (MHz) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type | Comment |
|---|---|---|---|---|---|
| TX 11b 2412MHz | | | | | |
| 4824 | 50.25 | 74 | -23.75 | Pk | Horizontal |
| 4824 | 35.52 | 54 | -18.48 | AV | Horizontal |
| 7236 | 51.13 | 74 | -22.87 | pk | Horizontal |
| 7236 | 32.10 | 54 | -21.9 | AV | Horizontal |
| 4824 | 51.73 | 74 | -22.27 | Pk | Vertical |
| 4824 | 33.85 | 54 | -20.15 | AV | Vertical |
| 7236 | 47.83 | 74 | -26.17 | Pk | Vertical |
| 7236 | 38.68 | 54 | -15.32 | AV | Vertical |
| TX 11b 2437MHz | | | | | |
| 4874 | 50.84 | 74 | -23.16 | Pk | Horizontal |
| 4874 | 32.19 | 54 | -21.81 | AV | Horizontal |
| 7311 | 47.87 | 74 | -26.13 | Pk | Horizontal |
| 7311 | 32.53 | 54 | -21.47 | AV | Horizontal |
| 4874 | 50.02 | 74 | -23.98 | Pk | Vertical |
| 4874 | 39.76 | 54 | -14.24 | AV | Vertical |
| 7311 | 45.47 | 74 | -28.53 | Pk | Vertical |
| 7311 | 38.25 | 54 | -15.75 | AV | Vertical |
| TX 11b 2462MHz | | | | | |
| 4924 | 50.10 | 74 | -23.9 | Pk | Horizontal |
| 4924 | 32.25 | 54 | -21.75 | AV | Horizontal |
| 7386 | 47.52 | 74 | -26.48 | Pk | Horizontal |
| 7386 | 32.18 | 54 | -21.82 | AV | Horizontal |
| 4924 | 51.48 | 74 | -22.52 | Pk | Vertical |
| 4924 | 38.70 | 54 | -15.3 | AV | Vertical |
| 7386 | 45.25 | 74 | -28.75 | Pk | Vertical |
| 7386 | 37.55 | 54 | -16.45 | AV | Vertical |

**RESULT: PASS**

**Note:**

1. Margin = Emission Level - Limit

2.1GHz-25GHz(All test modes had been pre-tested. The 802.11b mode is the worst case and recorded in the report. No recording in the test report at least have 20dB margin).

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Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd
Tel: +86-755 2523 4088 E-mail: agc@agc-cert.com Web: http://cn.agc-cert.com/

# 12. BAND EDGE EMISSION

## 12.1. MEASUREMENT PROCEDURE

1)Radiated restricted band edge measurements

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting

2)Conducted Emissions at the bang edge

a)The transmitter output was connected to the spectrum analyzer

b)Set RBW=1MHz,VBW=3MHz

c)Suitable frequency span including 100kHz bandwidth from band edge

## 12.2. TEST SET-UP

Radiated same as 11.2

**Note**:

1. Factor=Antenna Factor + Cable loss - Amplifier gain. Field Strength=Factor + Reading level
2. The factor had been edited in the “Input Correction” of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB(μV) to represent the Amplitude. Use the F dB(μV/m) to represent the Field Strength. So A=F.

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## 12.3. TEST RESULT

| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25°C | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11b with data rate 1 2412MHZ | **Antenna** | Horizontal |

PK

AV

**RESULT: PASS**

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| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25˚C | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11b with data rate 1<br>2412MHZ | **Antenna** | Vertical |

PK

AV

**RESULT: PASS**

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| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25˚C | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11b with data rate 1<br>2462MHZ | **Antenna** | Horizontal |

PK

AV

**RESULT: PASS**

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| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25℃ | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11b with data rate 1<br>2462MHZ | **Antenna** | Vertical |

PK

AV

**RESULT: PASS**

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| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25˚C | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11g with data rate 6 2412MHZ | **Antenna** | Horizontal |

PK

AV

**RESULT: PASS**

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| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25˚C | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11g with data rate 6 2412MHZ | **Antenna** | Vertical |

PK

AV

**RESULT: PASS**

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| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25˚C | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11g with data rate 6 2462MHZ | **Antenna** | Horizontal |

PK

AV

**RESULT: PASS**

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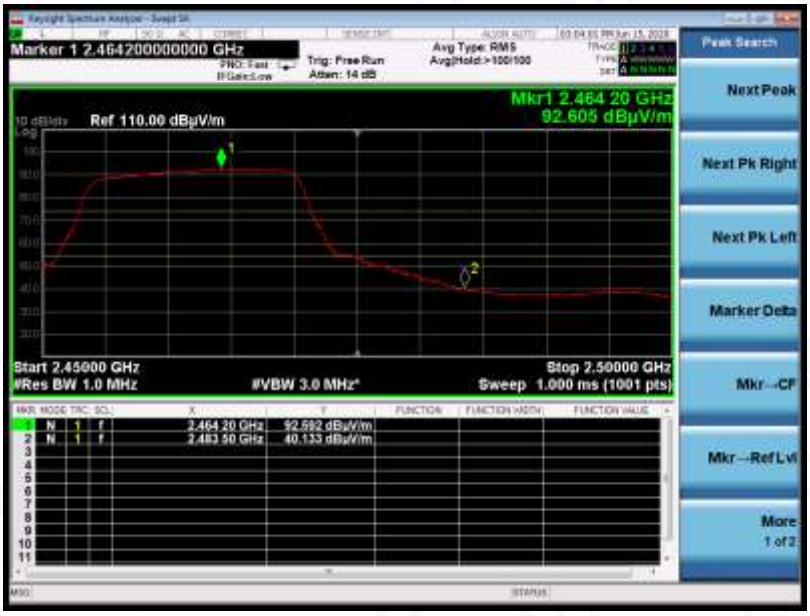
| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25℃ | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11g with data rate 6<br>2462MHZ | **Antenna** | Vertical |

PK

AV




**RESULT: PASS**

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| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25˚C | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11n 20 with data rate 6.5 2412MHZ | **Antenna** | Horizontal |

PK

AV

**RESULT: PASS**

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| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25˚C | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11n 20 with data rate 6.5 2412MHZ | **Antenna** | Vertical |

PK

AV

**RESULT: PASS**

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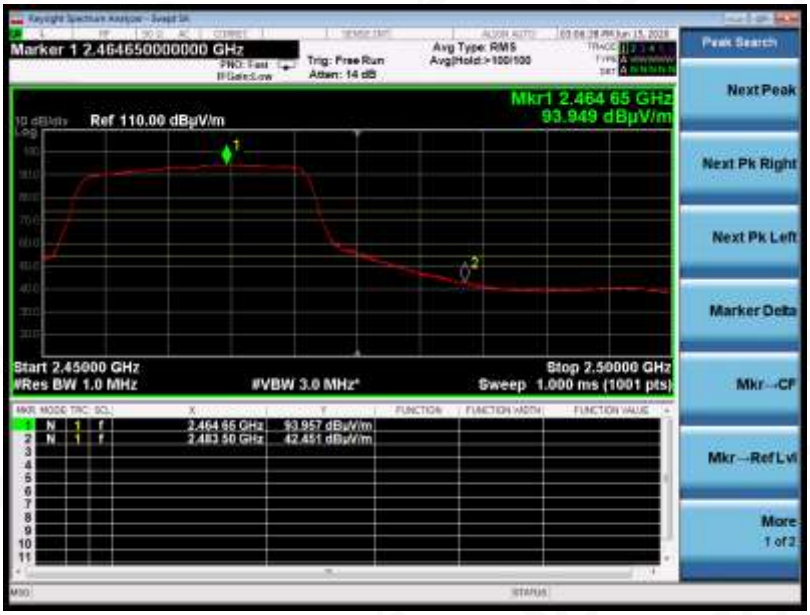
| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25˚C | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11n 20 with data rate 6.5 2462MHZ | **Antenna** | Horizontal |

PK

AV

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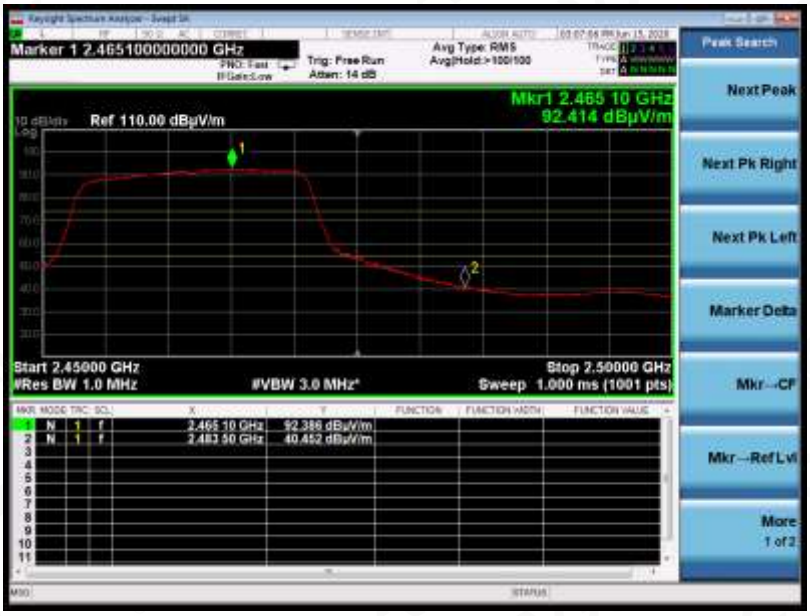
| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25°C | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11n 20 with data rate 6.5 2462MHZ | **Antenna** | Vertical |

PK

AV

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| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25˚C | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11n 40 with data rate 13.5 2422MHZ | **Antenna** | Horizontal |

PK

AV

**RESULT: PASS**

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| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25˚C | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11n 40 with data rate 13.5 2422MHZ | **Antenna** | Vertical |

PK

AV

**RESULT: PASS**

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| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25˚C | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11n 40with data rate 13.5 2452MHZ | **Antenna** | Horizontal |

PK

AV

**RESULT: PASS**

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| | | | |
|---|---|---|---|
| **EUT** | Smart Phone | **Model Name** | CLEARPHONE 620 |
| **Temperature** | 25℃ | **Relative Humidity** | 52% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | 802.11n 40 with data rate 13.5 2452MHZ | **Antenna** | Vertical |

PK

AV

**RESULT: PASS**

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# 13. FCC LINE CONDUCTED EMISSION TEST

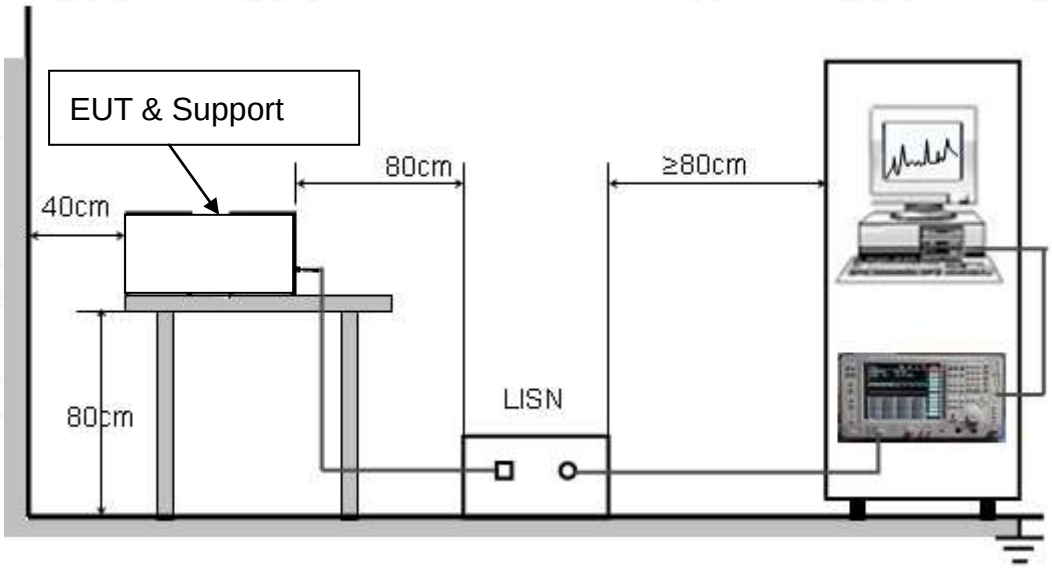
## 13.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

## 13.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST

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### 13.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a Mara Phones X1 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 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received charging voltage by adapter which received 120V/60Hzpower by a LISN..
6. The 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.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

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## 13.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

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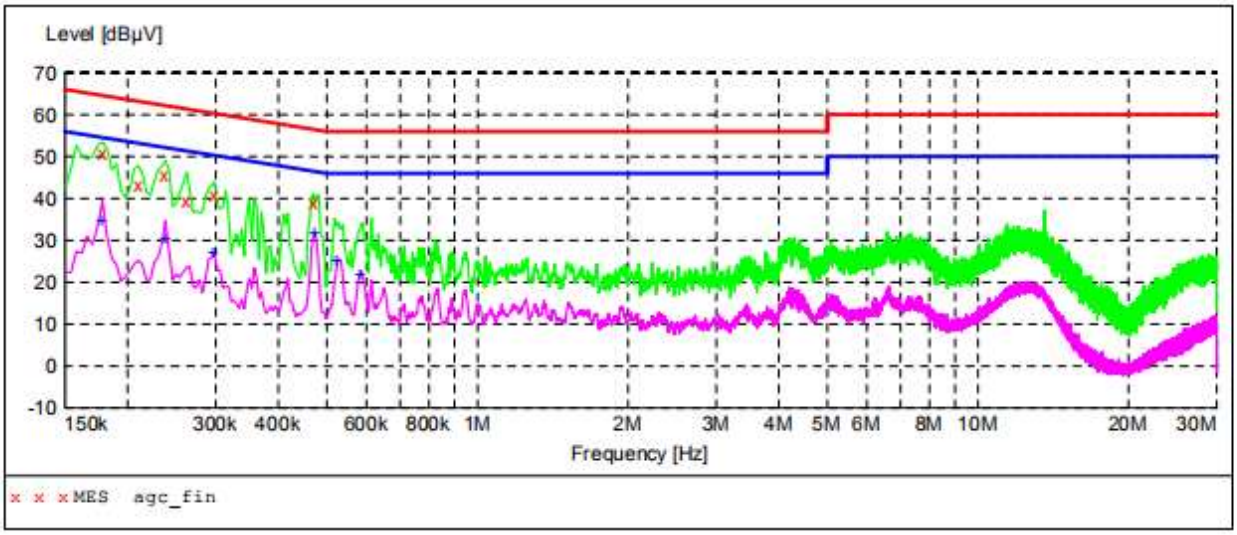
## 13.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST LINE 1-L




***MEASUREMENT RESULT: "agc_fin"***

2020/5/22 22:39

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.178000 | 51.00 | 10.3 | 65 | 13.6 | QP | L1 | GND |
| 0.210000 | 43.10 | 10.3 | 63 | 20.1 | QP | L1 | GND |
| 0.238000 | 45.80 | 10.3 | 62 | 16.4 | QP | L1 | GND |
| 0.262000 | 39.20 | 10.3 | 61 | 22.2 | QP | L1 | GND |
| 0.298000 | 40.90 | 10.3 | 60 | 19.4 | QP | L1 | GND |
| 0.470000 | 38.70 | 10.3 | 57 | 17.8 | QP | L1 | GND |

***MEASUREMENT RESULT: "agc_fin2"***

2020/5/22 22:39

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.178000 | 34.80 | 10.3 | 55 | 19.8 | AV | L1 | GND |
| 0.238000 | 30.50 | 10.3 | 52 | 21.7 | AV | L1 | GND |
| 0.298000 | 26.90 | 10.3 | 50 | 23.4 | AV | L1 | GND |
| 0.474000 | 31.70 | 10.3 | 46 | 14.7 | AV | L1 | GND |
| 0.526000 | 25.10 | 10.3 | 46 | 20.9 | AV | L1 | GND |
| 0.586000 | 21.90 | 10.3 | 46 | 24.1 | AV | L1 | GND |

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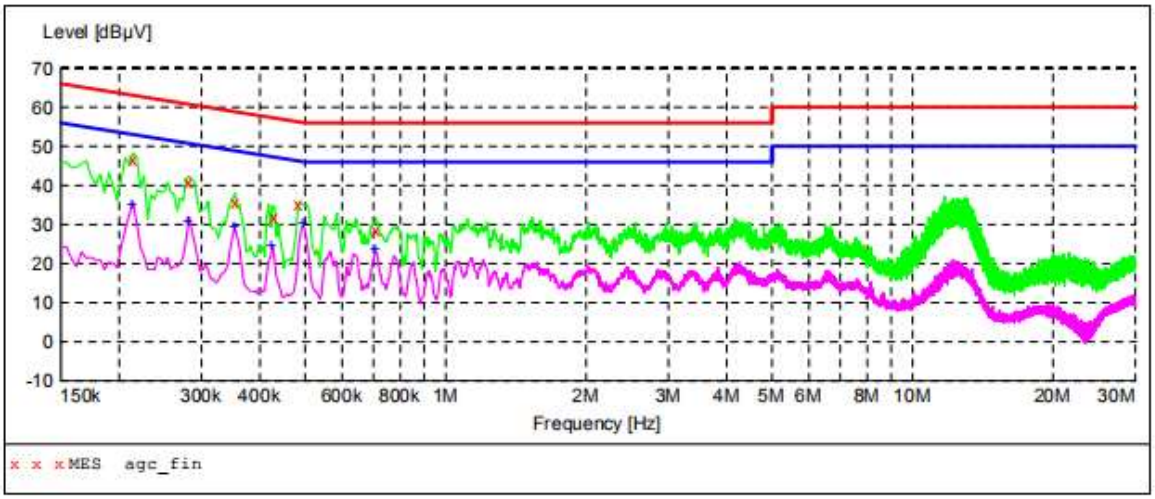
Line Conducted Emission Test Line 2-N




***MEASUREMENT RESULT: "agc_fin"***

2020/5/22 22:57

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.214000 | 46.60 | 10.3 | 63 | 16.4 | QP | N | GND |
| 0.282000 | 40.90 | 10.3 | 61 | 19.9 | QP | N | GND |
| 0.354000 | 35.40 | 10.3 | 59 | 23.5 | QP | N | GND |
| 0.430000 | 31.80 | 10.3 | 57 | 25.5 | QP | N | GND |
| 0.486000 | 35.00 | 10.3 | 56 | 21.2 | QP | N | GND |
| 0.710000 | 28.70 | 10.3 | 56 | 27.3 | QP | N | GND |

***MEASUREMENT RESULT: "agc_fin2"***

2020/5/22 22:57

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.214000 | 35.10 | 10.3 | 53 | 17.9 | AV | N | GND |
| 0.282000 | 30.80 | 10.3 | 51 | 20.0 | AV | N | GND |
| 0.354000 | 29.60 | 10.3 | 49 | 19.3 | AV | N | GND |
| 0.426000 | 24.60 | 10.3 | 47 | 22.7 | AV | N | GND |
| 0.494000 | 30.30 | 10.3 | 46 | 15.8 | AV | N | GND |
| 0.710000 | 23.60 | 10.3 | 46 | 22.4 | AV | N | GND |

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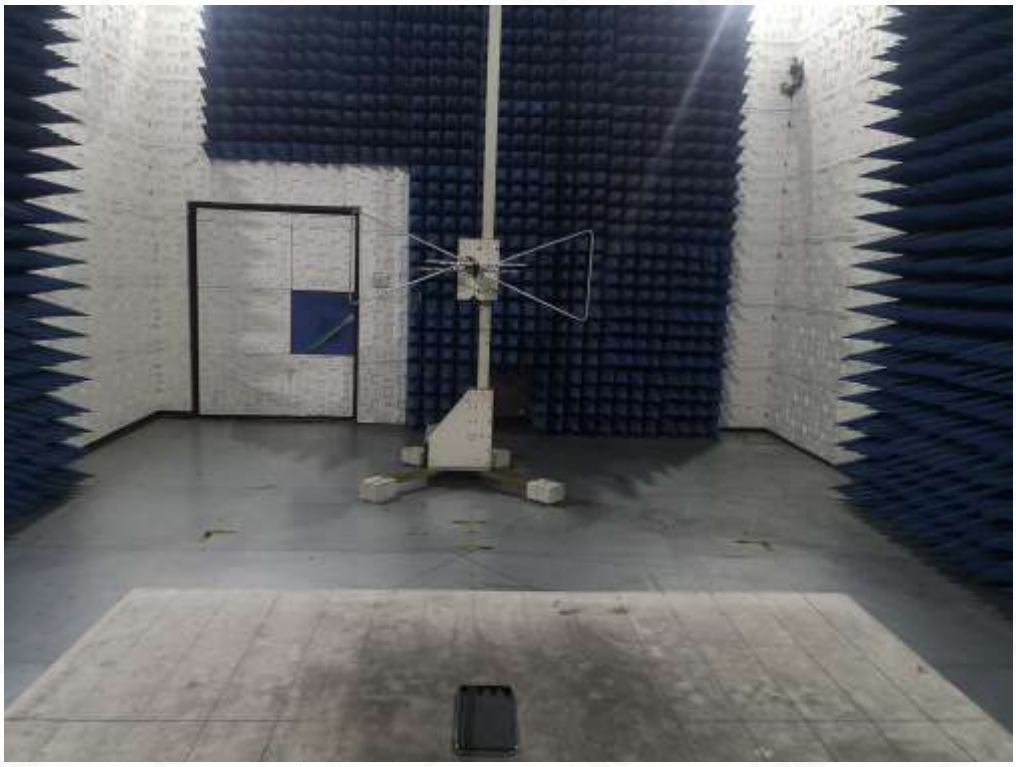
# APPENDIX A: PHOTOGRAPHS OF TEST SETUP

RADIATED EMISSION TEST SETUP BELOW 1GHZ



RADIATED EMISSION TEST SETUP ABOVE 1GHZ

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CONDUCTED EMISSION TEST SETUP

**----END OF REPORT----**

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Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd
Tel: +86-755 2523 4088 E-mail: agc@agc-cert.com Web: http://cn.agc-cert.com/

Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

3.The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. The non-CMA report issued by AGC is only permitted to be used by the client as internal reference use and shall not be used for public demonstration purpose.

5. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

6. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

7. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.

8.Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

9. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.

10. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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