# FCC EMI TEST REPORT

| | | |
|---|---|---|
| **FCC ID** | **:** | **A4RG020D** |
| **Equipment** | **:** | **Smartphone** |
| **Model Name** | **:** | **G020D** |
| **Applicant** | **:** | **Google LLC**<br>**1600 Amphitheatre Parkway,**<br>**Mountain View, CA 94043, USA** |
| **Standard** | **:** | **FCC 47 CFR FCC Part 15 Subpart B** |

**The product was received completed on Dec. 15 , 2018. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4-2014 and has been in compliance with the applicable technical standards.**

**The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.**

**The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.**

Jones Tsai

**Approved by: Jones Tsai**

***SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory***
*No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)*

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# History of this test report

| Report No. | Version | Description | Issued Date |
|---|---|---|---|
| FC891147-01 | 01 | Initial issue of report | Jan. 02, 2019 |
| FC891147-01 | 02 | Revising the frequency. | Jan. 16, 2019 |
| FC891147-01 | 03 | Add the test description. | Jan. 28, 2019 |
| FC891147-01 | 04 | Add the test remark description. | Jan. 30, 2019 |
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# Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---|---|---|---|---|
| 3.1 | 15.107 | AC Conducted Emission | Pass | Under limit 6.29 dB at 0.175 MHz |
| 3.2 | 15.109 | Radiated Emission | Pass | Under limit 4.24 dB at 479.900 MHz for Quasi-Peak |

**Reviewed by: Louis Wu**

**Report Producer: Natasha Hsieh**

# 1. General Description

## 1.1. Product Feature of Equipment Under Test

| Product Feature | |
|---|---|
| **Equipment** | Smartphone |
| **Model Name** | G020D |
| **Sample 1** | The device with 1st battery |
| **Sample 2** | The device with 2nd battery |
| **FCC ID** | A4RG020D |
| **EUT supports Radios application** | GSM/EGPRS/WCDMA/HSPA/LTE/NFC/GNSS<br>WLAN 11b/g/n HT20<br>WLAN 11a/n HT20/HT40<br>WLAN 11ac VHT20/VHT40/VHT80<br>Bluetooth BR/EDR/LE |
| **EUT Stage** | Identical Prototype |

**Remark:** The above EUT's information was declared by manufacturer.

## 1.2. Product Specification of Equipment Under Test

| Standards-related Product Specification | |
|---|---|
| **Tx Frequency** | GSM850: 824.2 MHz ~ 848.8 MHz<br>GSM1900: 1850.2 MHz ~ 1909.8 MHz<br>WCDMA Band V: 826.4 MHz ~ 846.6 MHz<br>WCDMA Band IV : 1712.4 MHz ~ 1752.6 MHz<br>WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz<br>LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz<br>LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz<br>LTE Band 5 : 824.7 MHz ~ 848.3 MHz<br>LTE Band 12 : 699.7 MHz ~ 715.3 MHz<br>LTE Band 13 : 779.5 MHz ~ 784.5 MHz<br>LTE Band 17 : 706.5 MHz ~ 713.5 MHz<br>LTE Band 26 : 814.7 MHz ~ 848.3 MHz<br>LTE Band 38 : 2572.5 MHz ~ 2617.5 MHz<br>LTE Band 41 : 2498.5 MHz ~ 2687.5 MHz<br>802.11b/g/n: 2412 MHz ~ 2472 MHz<br>802.11a/n/ac: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz; 5500 MHz ~ 5720 MHz ; 5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 MHz<br>NFC: 13.56 MHz |
| **Rx Frequency** | GSM850: 869.2 MHz ~ 893.8 MHz<br>GSM1900: 1930.2 MHz ~ 1989.8 MHz<br>WCDMA Band V: 871.4 MHz ~ 891.6 MHz<br>WCDMA Band IV : 2112.4 MHz ~ 2152.6 MHz<br>WCDMA Band II: 1932.4 MHz ~ 1987.6 MHz<br>LTE Band 2: 1930.7 MHz ~ 1989.3 MHz<br>LTE Band 4: 2110.7 MHz ~ 2154.3 MHz<br>LTE Band 5: 869.7 MHz ~ 893.3 MHz<br>LTE Band 12: 729.7 MHz ~ 745.3 MHz<br>LTE Band 13: 748.5 MHz ~ 753.5 MHz<br>LTE Band 17: 736.5 MHz ~ 743.5 MHz<br>LTE Band 26: 859.7 MHz ~ 893.3 MHz<br>LTE Band 38: 2572.5 MHz ~ 2617.5 MHz<br>LTE Band 41: 2498.5 MHz ~ 2687.5 MHz<br>802.11b/g/n: 2412 MHz ~ 2472 MHz<br>802.11a/n/ac: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz; 5500 MHz ~ 5720 MHz ; 5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 MHz<br>GNSS: 1559 MHz ~ 1610 MHz<br>(GPS/GLONASS/Galileo/BDS)<br>NFC: 13.56 MHz |

| Standards-related Product Specification | |
|---|---|
| **Antenna Type** | **WWAN:**<br>Cellular Band : PIFA Antenna type<br>PCS Band : PIFA Antenna type<br>AWS Band : PIFA Antenna type<br>LTE Band 2 : PIFA Antenna type<br>LTE Band 4 : PIFA Antenna type<br>LTE Band 5 : PIFA Antenna type<br>LTE Band 12 : PIFA Antenna type<br>LTE Band 13 : PIFA Antenna type<br>LTE Band 17 : PIFA Antenna type<br>LTE Band 26 : PIFA Antenna type<br>LTE Band 38 : PIFA Antenna type<br>LTE Band 41 : PIFA Antenna type |
| **Antenna Type** | **WLAN:**<br>**<2400 MHz ~ 2483.5 MHz>**<br><Ant. 1> : PIFA Antenna type<br><Ant. 2> : PIFA Antenna type<br>**<5150 MHz ~ 5250 MHz>**<br><Ant. 1> : PIFA Antenna type<br><Ant. 2> : PIFA Antenna type<br>**<5250 MHz ~ 5350 MHz>**<br><Ant. 1> : PIFA Antenna type<br><Ant. 2> : PIFA Antenna type<br>**<5470 MHz ~ 5725 MHz>**<br><Ant. 1> : PIFA Antenna type<br><Ant. 2> : PIFA Antenna type<br>**<5725 MHz ~ 5850 MHz>**<br><Ant. 1> : PIFA Antenna type<br><Ant. 2> : PIFA Antenna type<br>Bluetooth: PIFA Antenna<br>GPS/Glonass/Galileo/BDS: PIFA Antenna<br>NFC: Loop Antenna |
| **Type of Modulation** | GSM / GPRS: GMSK<br>EGPRS : GMSK for MCS 0 ~ 4 & 8PSK for MCS5 ~9<br>WCDMA: QPSK (Uplink)<br>HSDPA: QPSK (Downlink)<br>HSUPA: QPSK (Uplink)<br>LTE: QPSK / 16QAM<br>Bluetooth: GFSK, $\pi$/4-DQPSK, 8-DPSK<br>802.11b: DSSS (BPSK / QPSK / CCK)<br>802.11a/g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM)<br>802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)<br>GPS/Glonass/Galileo/BDS: BPSK<br>NFC: ASK |

## 1.3. Modification of EUT

No modifications are made to the EUT during all test items.

## 1.4. Test Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1093 and TW1098 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

| | |
|---|---|
| **Test Site** | SPORTON INTERNATIONAL INC. |
| **Test Site Location** | No.52, Huaya 1st Rd., Guishan Dist.,<br>Taoyuan City, Taiwan (R.O.C.)<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |
| **Test Site No.** | **Sporton Site No.** |
| | CO05-HY |

| | |
|---|---|
| **Test Site** | SPORTON INTERNATIONAL INC. |
| **Test Site Location** | No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist,<br>Taoyuan City, Taiwan (R.O.C.)<br>TEL: +886-3-327-0868<br>FAX: +886-3-327-0855 |
| **Test Site No.** | **Sporton Site No.** |
| | 03CH10-HY |

## 1.5. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR FCC Part 15 Subpart B
- ANSI C63.4-2014

**Remark:** All test items were verified and recorded according to the standards and without any deviation during the test.

# 2. Test Configuration of Equipment Under Test

## 2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

| Test Items | Function Type |
|---|---|
| **AC Conducted Emission** | Mode 1 : GSM850 (Middle Channel) Idle + Bluetooth Idle + WLAN (2.4GHz) Idle + GPS Rx + Earphone + USB Type C Cable 1 (Charging form Adapter 1) + Battery <10% for Sample 1<br>Mode 2 : GSM1900 Idle + Bluetooth Idle + WLAN (5GHz) Idle + Camera (Front) + Earphone + USB Type C Cable 2 (Charging form Adapter 1) + Battery at 50% for Sample 1<br>Mode 3 : WCDMA Band II Idle + Bluetooth Idle + WLAN (2.4GHz) Idle + Camera (Rear) + Earphone + USB Type C Cable 1 (Charging form Adapter 1) + Battery >90% for Sample 1<br>Mode 4 : WCDMA Band V Idle + Bluetooth Idle + WLAN (5GHz) Idle + MPEG4 + Earphone + USB Type C Cable 2 (Charging form Adapter 1) + Battery <10% for Sample 1<br>Mode 5 : LTE Band 4 Idle + Bluetooth Idle + WLAN (2.4GHz) Idle + NFC On + Earphone + USB Type C Cable 1 (Charging form Adapter 1) + Battery at 50% for Sample 1<br>Mode 6 : LTE Band 17 Idle + Bluetooth Idle + WLAN (5GHz) Idle + Fingerprint + Earphone + USB Type C Cable 1 (Data Link with Notebook) + Battery >90% for Sample 1<br>Mode 7 : LTE Band 17 Idle + Bluetooth Idle + WLAN (5GHz) Idle + Fingerprint + Earphone + USB Type C Cable 2 (Data Link with Notebook) + Battery <10% for Sample 1<br>Mode 8 : GSM850 Idle + Bluetooth Idle + WLAN (2.4GHz Idle) + GPS Rx + Earphone + USB Type C Cable 1 (Charging form Adapter 2) + Battery<10% for Sample 1<br>Mode 9 : GSM850 Idle + Bluetooth Idle + WLAN (2.4GHz) Idle + GPS Rx + Earphone + USB Type C Cable 1 (Charging form Adapter 1) + Battery <10% for Sample 2<br>Mode 10 : GSM850 (Low Channel) Idle + Bluetooth Idle + WLAN (2.4GHz) Idle + GPS Rx + Earphone + USB Type C Cable 1 (Charging form Adapter 1) + Battery <10% for Sample 1<br>Mode 11 : GSM850 (High Channel) Idle + Bluetooth Idle + WLAN (2.4GHz) Idle + GPS Rx + Earphone + USB Type C Cable 1 (Charging form Adapter 1) + Battery <10% for Sample 1 |

| Test Items | Function Type |
|---|---|
| **Radiated Emissions** | Mode 1 : GSM850 (Middle Channel) Idle + Bluetooth Idle + WLAN (2.4GHz) Idle + GPS Rx + Earphone + USB Type C Cable 1 (Charging form Adapter 1) + Battery <10% for Sample 1<br>Mode 2 : GSM1900 Idle + Bluetooth Idle + WLAN (5GHz) Idle + Camera (Front) + Earphone + USB Type C Cable 2 (Charging form Adapter 1) + Battery at 50% for Sample 1<br>Mode 3 : WCDMA Band II Idle + Bluetooth Idle + WLAN (2.4GHz) Idle + Camera (Rear) + Earphone + USB Type C Cable 1 (Charging form Adapter 1) + Battery >90% for Sample 1<br>Mode 4 : WCDMA Band V Idle + Bluetooth Idle + WLAN (5GHz) Idle + MPEG4 + Earphone + USB Type C Cable 2 (Charging form Adapter 1) + Battery <10% for Sample 1<br>Mode 5 : LTE Band 4 Idle + Bluetooth Idle + WLAN (2.4GHz) Idle + NFC On + Earphone + OTG Cable (Data Link with USB Flash Drive) + Battery at 50% for Sample 1<br>Mode 6 : LTE Band 17 Idle + Bluetooth Idle + WLAN (5GHz) Idle + Fingerprint + Earphone + USB Type C Cable 1 (Data Link with Notebook) + Battery >90% for Sample 1<br>Mode 7 : LTE Band 17 Idle + Bluetooth Idle + WLAN (5GHz) Idle + Fingerprint + Earphone + USB Type C Cable 2 (Data Link with Notebook) + Battery <10% for Sample 1<br>Mode 8 : WCDMA Band II Idle + Bluetooth Idle + WLAN (2.4GHz) Idle + GPS Rx + Earphone + USB Type C Cable 1 (Charging form Adapter 2) + Battery >90% for Sample 1<br>Mode 9 : LTE Band 4 Idle + Bluetooth Idle + WLAN (2.4GHz) Idle + NFC On + Earphone + OTG Cable (Data Link with USB Flash Drive) + Battery >90% for Sample 2<br>Mode 10 : GSM850 (Low Channel) Idle + Bluetooth Idle + WLAN (2.4GHz) Idle + NFC On + Earphone + OTG Cable (Data Link with USB Flash Drive) + Battery at 50% for Sample 1<br>Mode 11 : GSM850 (High Channel) Idle + Bluetooth Idle + WLAN (2.4GHz) Idle + NFC On + Earphone + OTG Cable (Data Link with USB Flash Drive) + Battery at 50% for Sample 1 |

**Remark:**

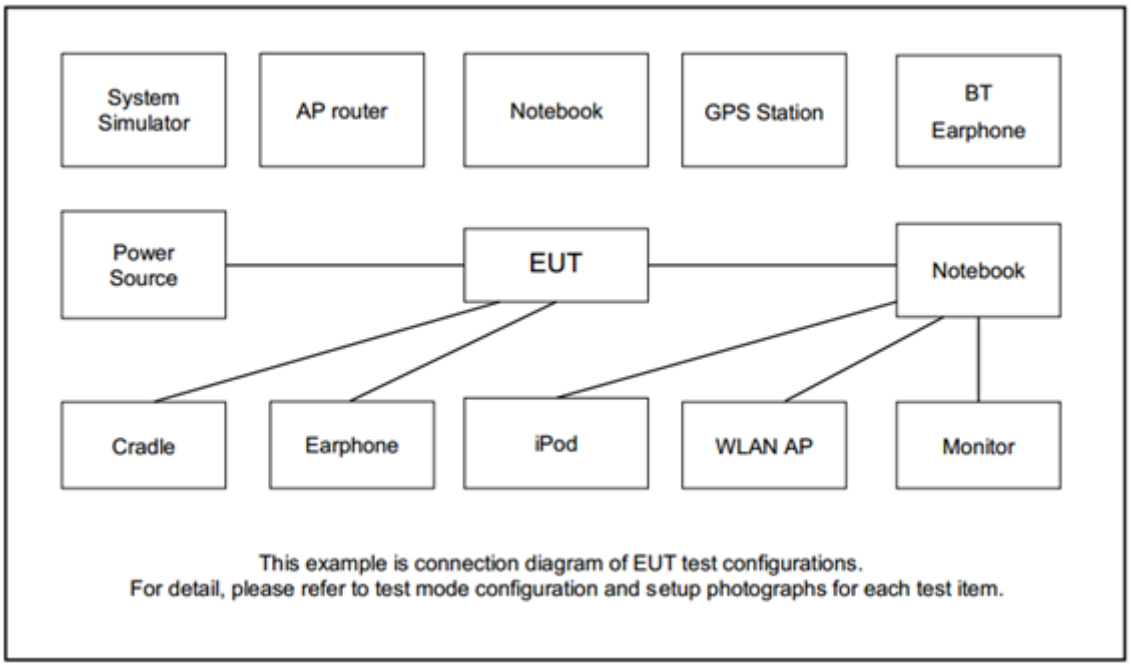
**1.** The worst case of AC is mode 10; only the test data of this mode was reported.

**2.** The worst case of RE is mode 9; only the test data of this mode was reported.

**3.** Data Linking with Notebook/USB Flash Drive means data application transferred mode between EUT and Notebook/USB Flash Drive

**4.** After pre-scanned the all the cellular band between 30MHz ~ 960MHz (GSM850/WCDMA Band V/LTE Band 5/12/13/17/26), the worst case is GSM850; only the test data of this mode was reported

## 2.2. Connection Diagram of Test System




## 2.3. Support Unit used in test configuration and system

| Item | Equipment | Trade Name | Model Name | FCC ID | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| 1. | System Simulator | R&S | CMU 200 | N/A | N/A | Unshielded, 1.8 m |
| 2. | System Simulator | Anritsu | 8820C | N/A | N/A | Unshielded, 1.8 m |
| 3. | Base Station | Anritsu | MT8820C | N/A | N/A | Unshielded, 1.8 m |
| 4. | GPS Station | Pendulum | GSG-54 | N/A | N/A | Unshielded, 1.8 m |
| 5. | Bluetooth Earphone | Sony Ericsson | MW600 | PY7DDA-2029 | N/A | N/A |
| 6. | Bluetooth Earphone | Sony Ericsson | SBH20 | PY7-RD0010 | N/A | N/A |
| 7. | WLAN AP | ASUS | AC66U | NA | N/A | Unshielded, 1.8 m |
| 8. | Notebook | DELL | Latitude E5480 | FCC DoC | N/A | AC I/P：Unshielded, 1.2 m DC O/P：Shielded, 1.8 m |
| 9. | iPod | Apple | A1199 | FCC DoC | Shielded, 1.2 m | N/A |
| 10. | USB Flash Drive | SanDisk | N/A | N/A | N/A | N/A |

## 2.4. EUT Operation Test Setup

The EUT was in GSM or WCDMA idle mode during the testing. The EUT was synchronized to the BCCH, and is in continuous receiving mode by setting system simulator's paging reorganization.

At the same time, the EUT was attached to the Bluetooth earphone or WLAN AP, and the following programs installed in the EUT were programmed during the test.

1. Data application is transferred between Laptop/USB Flash Drive and EUT via OTG cable.
2. Execute "GPS Test" to make the EUT receive continuous signals from GPS station.
3. Execute "Video player" to play MPEG4 files.
4. Turn on camera to capture images.
5. Turn on the Fingerprint function.
6. Turn on the NFC function.

# 3. Test Result

## 3.1. Test of AC Conducted Emission Measurement

### 3.1.1 Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

| Frequency of emission (MHz) | Conducted 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.

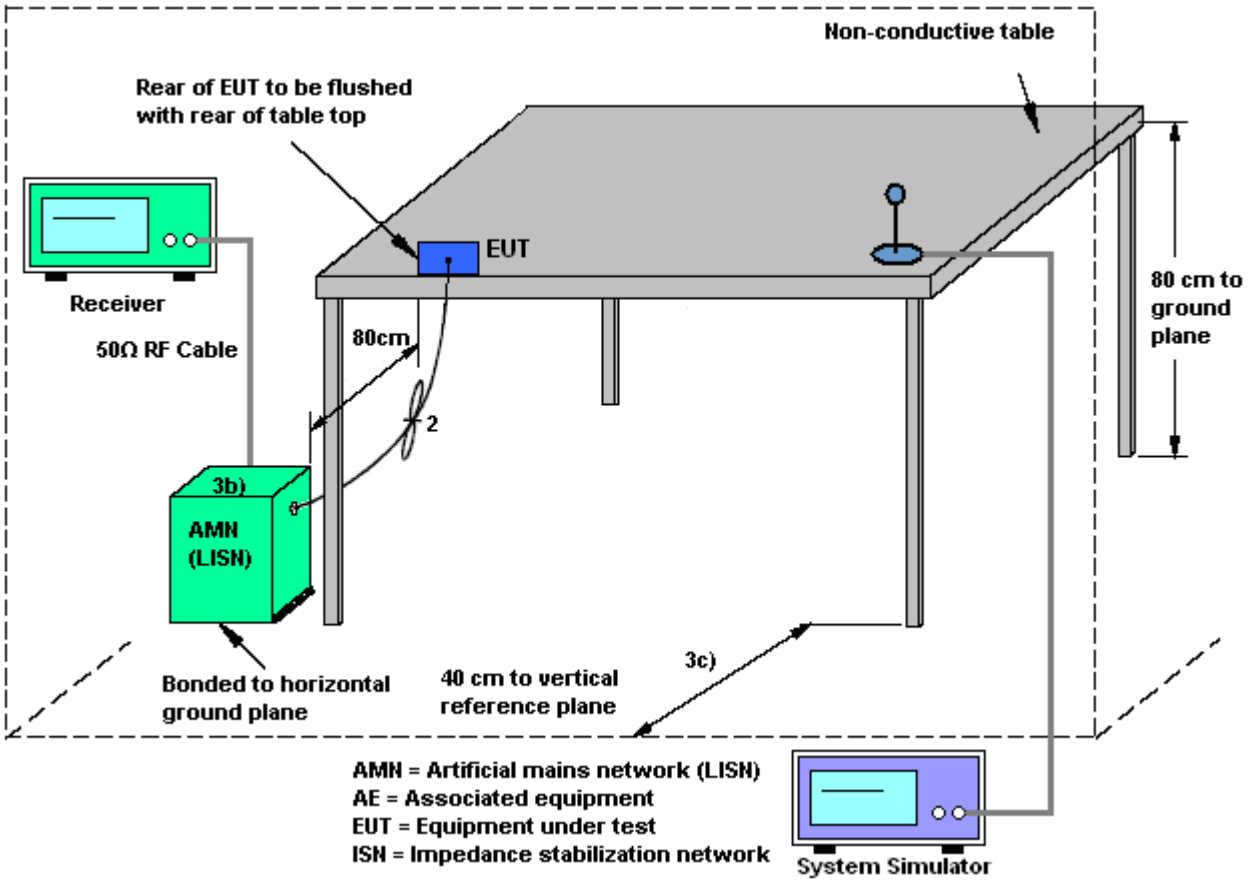
### 3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

### 3.1.3 Test Procedure

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

### 3.1.4 Test Setup




### 3.1.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

## 3.2. Test of Radiated Emission Measurement

### 3.2.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 30 – 88 | 100 | 3 |
| 88 – 216 | 150 | 3 |
| 216 - 960 | 200 | 3 |
| Above 960 | 500 | 3 |

### 3.2.2. Measuring Instruments

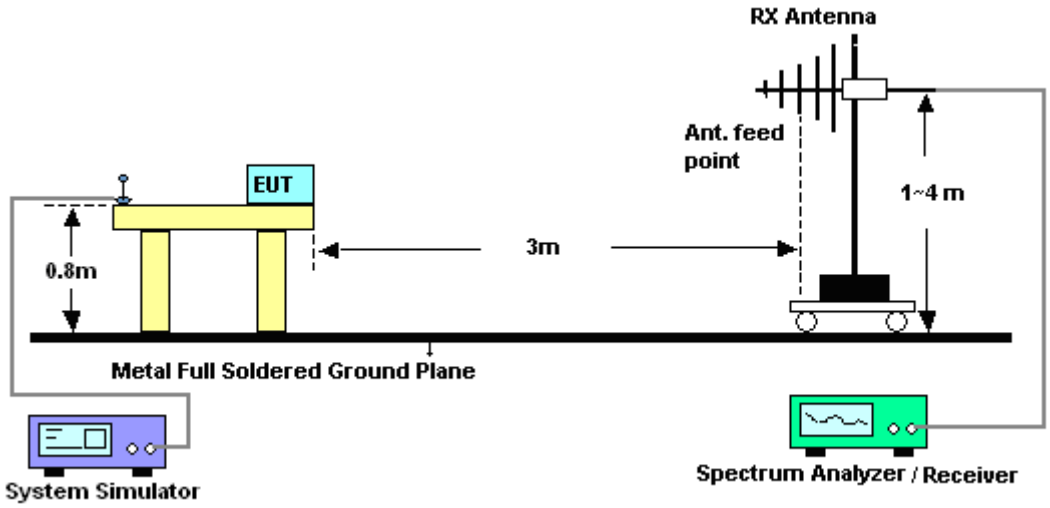
Refer a test equipment and calibration data table in this test report.

### 3.2.3. Test Procedures

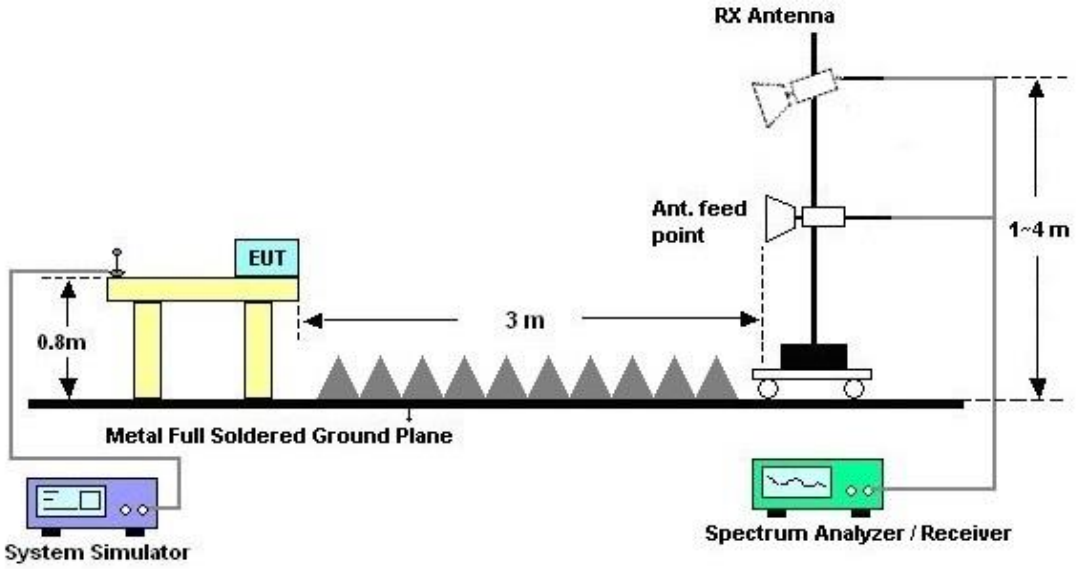
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dBμV/m) = 20 log Emission level (μV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

## 3.2.4. Test Setup of Radiated Emission

**For radiated emissions from 30MHz to 1GHz**




**For radiated emissions above 1GHz**




## 3.2.5. Test Result of Radiated Emission

Please refer to Appendix B.

# 4. List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| Amplifier | SONOMA | 310N | 187231 | 9kHz~1GHz | Jan. 08, 2018 | Nov. 18, 2018~ Dec. 15 , 2018 | Jan. 07, 2019 | Radiation (03CH10-HY) |
| Bilog Antenna | TESEQ | CBL 6111D&00800 N1D01N-06 | 35413&02 | 30MHz~1GHz | Dec. 18, 2017 | Nov. 18, 2018~ Dec. 15 , 2018 | Dec. 17, 2018 | Radiation (03CH10-HY) |
| Horn Antenna | SCHWARZBECK | BBHA 9120 D | 9120D-1325 | 1GHz ~ 18GHz | Oct. 02, 2018 | Nov. 18, 2018~ Dec. 15 , 2018 | Oct. 01, 2019 | Radiation (03CH10-HY) |
| Preamplifier | Jet-Power | JAP00101800-30-10P | 160118550004 | 1GHz~18GHz | Apr. 17, 2018 | Nov. 18, 2018~ Dec. 15 , 2018 | Apr. 16, 2019 | Radiation (03CH10-HY) |
| Spectrum Analyzer | Keysight | N9010A | MY54200485 | 10Hz ~ 44GHz | Nov. 02, 2018 | Nov. 18, 2018~ Dec. 15 , 2018 | Nov. 01, 2019 | Radiation (03CH10-HY) |
| Controller | EMEC | EM 1000 | N/A | Control Turn table & Ant Mast | N/A | Nov. 18, 2018~ Dec. 15 , 2018 | N/A | Radiation (03CH10-HY) |
| Antenna Mast | EMEC | AM-BS-4500-B | N/A | 1~4m | N/A | Nov. 18, 2018~ Dec. 15 , 2018 | N/A | Radiation (03CH10-HY) |
| Turn Table | EMEC | TT 2200 | N/A | 0~360 Degree | N/A | Nov. 18, 2018~ Dec. 15 , 2018 | N/A | Radiation (03CH10-HY) |
| Software | Audix | E3 6.2009-8-24 | RK-001042 | N/A | N/A | Nov. 18, 2018~ Dec. 15 , 2018 | N/A | Radiation (03CH10-HY) |
| EMI Test Receiver | Agilent | N9038A(MXE) | MY53290053 | 20Hz to 26.5GHz | Jan. 16, 2018 | Nov. 18, 2018~ Dec. 15 , 2018 | Jan. 15, 2019 | Radiation (03CH10-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 104 / 102 | MY11692/4PE, MY11693/4PE, MY2855/2 | 30M-1G | Nov. 08, 2018 | Nov. 18, 2018~ Dec. 15 , 2018 | Nov. 07, 2019 | Radiation (03CH10-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 104 / 102 | MY11692/4PE, MY11693/4PE, MY2855/2 | 1G-18G | Nov. 08, 2018 | Nov. 18, 2018~ Dec. 15 , 2018 | Nov. 07, 2019 | Radiation (03CH10-HY) |
| Notch Filter | Wainwright | WRCGV2400/2483-2390/2493-35/10SS | SN4 | 2.4G | Nov. 02, 2018 | Nov. 18, 2018~ Dec. 15 , 2018 | Nov. 01, 2019 | Radiation (03CH10-HY) |
| Notch Filter | Wainwright | WRCT5-901.6-902.3-902.5-903.2-30SS | SN1 | N/A | May 22, 2018 | Nov. 18, 2018~ Dec. 15 , 2018 | May 21, 2019 | Radiation (03CH10-HY) |
| Notch Filter | Wainwright | WRCT10-1920-1980-20-40-40SSK | SN1 | 1920-1980 | May 22, 2018 | Nov. 18, 2018~ Dec. 15 , 2018 | May 21, 2019 | Radiation (03CH10-HY) |
| Notch Filter | Wainwright | WRCJV12-5120-5150-5350-5380-40SS | SN7 | 5G | Jul. 05, 2018 | Nov. 18, 2018~ Dec. 15 , 2018 | Jul. 04, 2019 | Radiation (03CH10-HY) |

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| AC Power Source | ChainTek | APC-1000W | N/A | N/A | N/A | Nov. 17, 2018~ Dec. 14, 2018 | N/A | Conduction (CO05-HY) |
| EMI Test Receiver | Rohde & Schwarz | ESR3 | 102388 | 9KHz~3.6GHz | Nov. 12, 2018 | Nov. 17, 2018~ Dec. 14, 2018 | Nov. 11, 2019 | Conduction (CO05-HY) |
| Hygrometer | Testo | 608-H1 | 34913912 | N/A | Mar. 06, 2018 | Nov. 17, 2018~ Dec. 14, 2018 | Mar. 05, 2019 | Conduction (CO05-HY) |
| LISN | Rohde & Schwarz | ENV216 | 100080 | 9kHz~30MHz | Nov. 14, 2018 | Nov. 17, 2018~ Dec. 14, 2018 | Nov. 13, 2019 | Conduction (CO05-HY) |
| LISN | Rohde & Schwarz | ENV216 | 100081 | 9kHz~30MHz | Nov. 09, 2018 | Nov. 17, 2018~ Dec. 14, 2018 | Nov. 08, 2019 | Conduction (CO05-HY) |
| Software | Rohde & Schwarz | EMC32 V10.30 | N/A | N/A | N/A | Nov. 17, 2018~ Dec. 14, 2018 | N/A | Conduction (CO05-HY) |
| LF Cable | HUBER + SUHNER | RG-214/U | LF01 | N/A | Jan. 03, 2018 | Nov. 17, 2018~ Dec. 14, 2018 | Jan. 02, 2019 | Conduction (CO05-HY) |
| Pulse Limiter | Rohde & Schwarz | ESH3-Z2 | 100851 | N/A | Jan. 03, 2018 | Nov. 17, 2018~ Dec. 14, 2018 | Jan. 02, 2019 | Conduction (CO05-HY) |
| Amplifier | SONOMA | 310N | 187231 | 9kHz~1GHz | Jan. 08, 2018 | Nov. 18, 2018~ Dec. 15 , 2018 | Jan. 07, 2019 | Radiation (03CH10-HY) |

# 5. Uncertainty of Evaluation

**Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **2.20** |

**Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **5.60** |

**Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **5.90** |

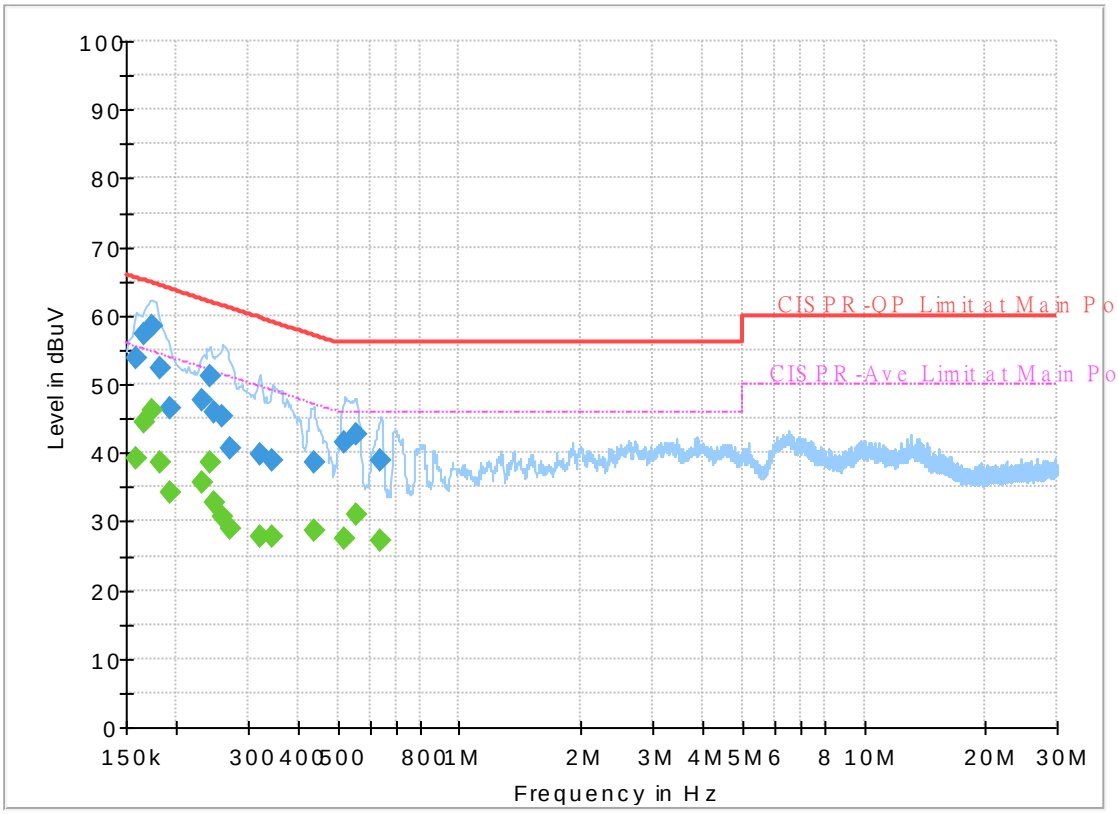
# Appendix A. AC Conducted Emission Test Results

| | | | |
|---|---|---|---|
| **Test Engineer :** | Rick Lin | **Temperature :** | 23~25℃ |
| | | **Relative Humidity :** | 55~58% |

# EUT Information

| | |
|---|---|
| Report NO : | 891147-01 |
| Test Mode : | Mode 10 |
| Test Voltage : | 120Vac/60Hz |
| Phase : | Line |

Full Spectrum




# Final_Result

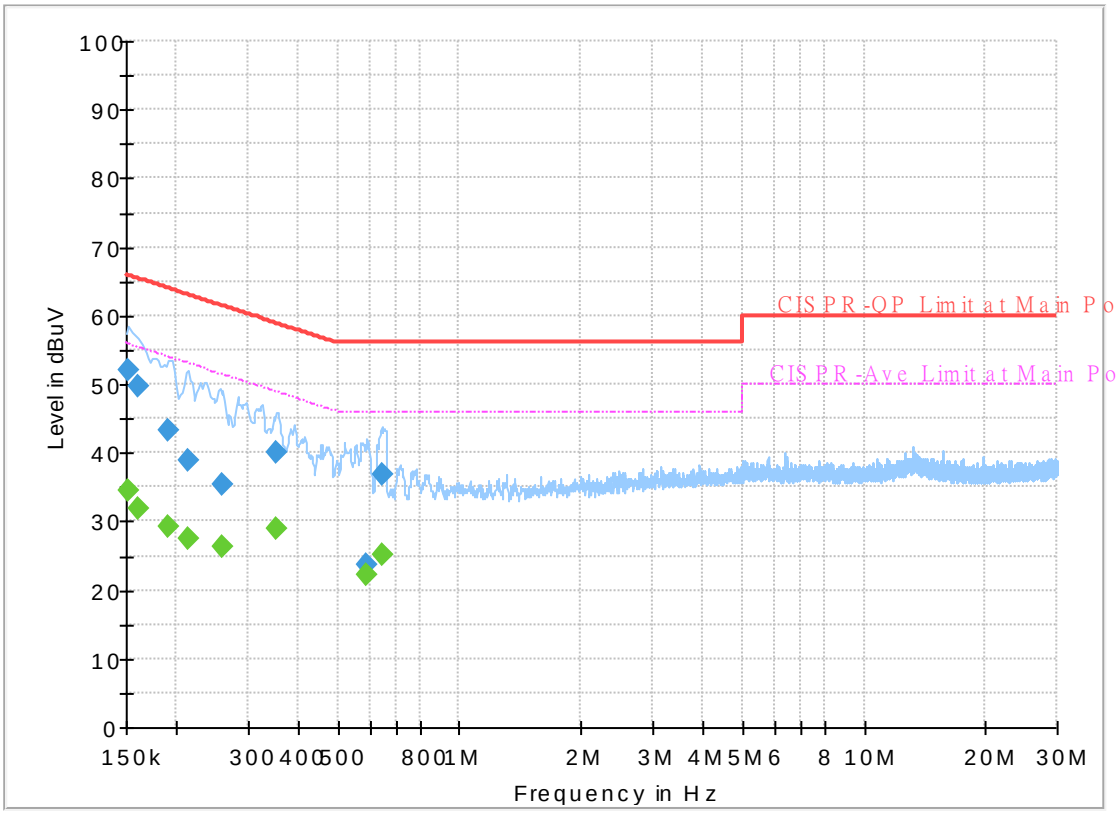
| Frequency (MHz) | QuasiPeak (dBuV) | CAverage (dBuV) | Limit (dBuV) | Margin (dB) | Line | Filter | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 0.159000 | --- | 39.32 | 55.52 | 16.20 | L1 | OFF | 19.5 |
| 0.159000 | 53.83 | --- | 65.52 | 11.69 | L1 | OFF | 19.5 |
| 0.165750 | --- | 44.56 | 55.17 | 10.61 | L1 | OFF | 19.5 |
| 0.165750 | 57.41 | --- | 65.17 | 7.76 | L1 | OFF | 19.5 |
| 0.174750 | --- | 46.25 | 54.73 | 8.48 | L1 | OFF | 19.5 |
| 0.174750 | 58.44 | --- | 64.73 | 6.29 | L1 | OFF | 19.5 |
| 0.181500 | --- | 38.63 | 54.42 | 15.79 | L1 | OFF | 19.5 |
| 0.181500 | 52.37 | --- | 64.42 | 12.05 | L1 | OFF | 19.5 |
| 0.192750 | --- | 34.08 | 53.92 | 19.84 | L1 | OFF | 19.5 |
| 0.192750 | 46.42 | --- | 63.92 | 17.50 | L1 | OFF | 19.5 |
| 0.231000 | --- | 35.70 | 52.41 | 16.71 | L1 | OFF | 19.5 |
| 0.231000 | 47.68 | --- | 62.41 | 14.73 | L1 | OFF | 19.5 |
| 0.242250 | --- | 38.62 | 52.02 | 13.40 | L1 | OFF | 19.5 |
| 0.242250 | 51.07 | --- | 62.02 | 10.95 | L1 | OFF | 19.5 |
| 0.249000 | --- | 32.71 | 51.79 | 19.08 | L1 | OFF | 19.5 |
| 0.249000 | 45.95 | --- | 61.79 | 15.84 | L1 | OFF | 19.5 |
| 0.260250 | --- | 30.83 | 51.42 | 20.59 | L1 | OFF | 19.5 |
| 0.260250 | 45.32 | --- | 61.42 | 16.10 | L1 | OFF | 19.5 |
| 0.271500 | --- | 28.91 | 51.07 | 22.16 | L1 | OFF | 19.5 |
| 0.271500 | 40.51 | --- | 61.07 | 20.56 | L1 | OFF | 19.5 |
| 0.321000 | --- | 27.69 | 49.68 | 21.99 | L1 | OFF | 19.5 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.321000 | 39.78 | --- | 59.68 | 19.90 | L1 | OFF | 19.5 |
| 0.345750 | --- | 27.90 | 49.06 | 21.16 | L1 | OFF | 19.5 |
| 0.345750 | 38.92 | --- | 59.06 | 20.14 | L1 | OFF | 19.5 |
| 0.435750 | --- | 28.64 | 47.14 | 18.50 | L1 | OFF | 19.5 |
| 0.435750 | 38.51 | --- | 57.14 | 18.63 | L1 | OFF | 19.5 |
| 0.521250 | --- | 27.58 | 46.00 | 18.42 | L1 | OFF | 19.5 |
| 0.521250 | 41.39 | --- | 56.00 | 14.61 | L1 | OFF | 19.5 |
| 0.555000 | --- | 30.87 | 46.00 | 15.13 | L1 | OFF | 19.5 |
| 0.555000 | 42.61 | --- | 56.00 | 13.39 | L1 | OFF | 19.5 |
| 0.638250 | --- | 27.26 | 46.00 | 18.74 | L1 | OFF | 19.6 |
| 0.638250 | 38.88 | --- | 56.00 | 17.12 | L1 | OFF | 19.6 |

# EUT Information

| | |
|---|---|
| Report NO : | 891147-01 |
| Test Mode : | Mode 10 |
| Test Voltage : | 120Vac/60Hz |
| Phase : | Neutral |

Full Spectrum

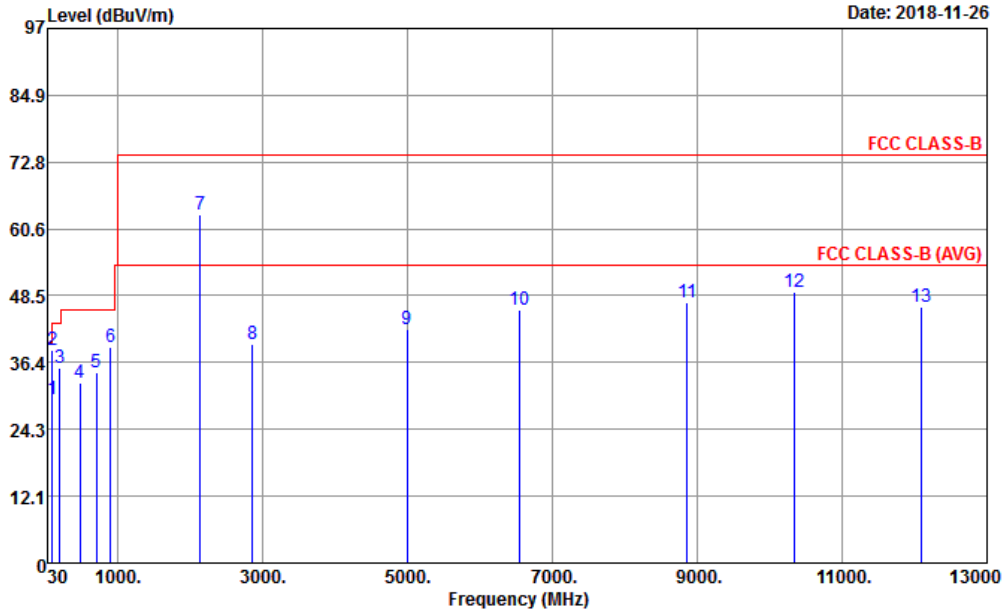



# Final_Result

| Frequency (MHz) | QuasiPeak (dBuV) | CAverage (dBuV) | Limit (dBuV) | Margin (dB) | Line | Filter | Corr. (dB) |
|---|---|---|---|---|---|---|---|
| 0.152250 | --- | 34.40 | 55.88 | 21.48 | N | OFF | 19.5 |
| 0.152250 | 51.95 | --- | 65.88 | 13.93 | N | OFF | 19.5 |
| 0.161250 | --- | 31.73 | 55.40 | 23.67 | N | OFF | 19.5 |
| 0.161250 | 49.58 | --- | 65.40 | 15.82 | N | OFF | 19.5 |
| 0.190500 | --- | 29.32 | 54.02 | 24.70 | N | OFF | 19.5 |
| 0.190500 | 43.39 | --- | 64.02 | 20.63 | N | OFF | 19.5 |
| 0.213000 | --- | 27.54 | 53.09 | 25.55 | N | OFF | 19.5 |
| 0.213000 | 38.75 | --- | 63.09 | 24.34 | N | OFF | 19.5 |
| 0.260250 | --- | 26.30 | 51.42 | 25.12 | N | OFF | 19.5 |
| 0.260250 | 35.50 | --- | 61.42 | 25.92 | N | OFF | 19.5 |
| 0.352500 | --- | 28.87 | 48.90 | 20.03 | N | OFF | 19.5 |
| 0.352500 | 39.96 | --- | 58.90 | 18.94 | N | OFF | 19.5 |
| 0.591000 | --- | 22.36 | 46.00 | 23.64 | N | OFF | 19.5 |
| 0.591000 | 23.72 | --- | 56.00 | 32.28 | N | OFF | 19.5 |
| 0.642750 | --- | 25.08 | 46.00 | 20.92 | N | OFF | 19.6 |
| 0.642750 | 36.91 | --- | 56.00 | 19.09 | N | OFF | 19.6 |

# Appendix B. Radiated Emission Test Result

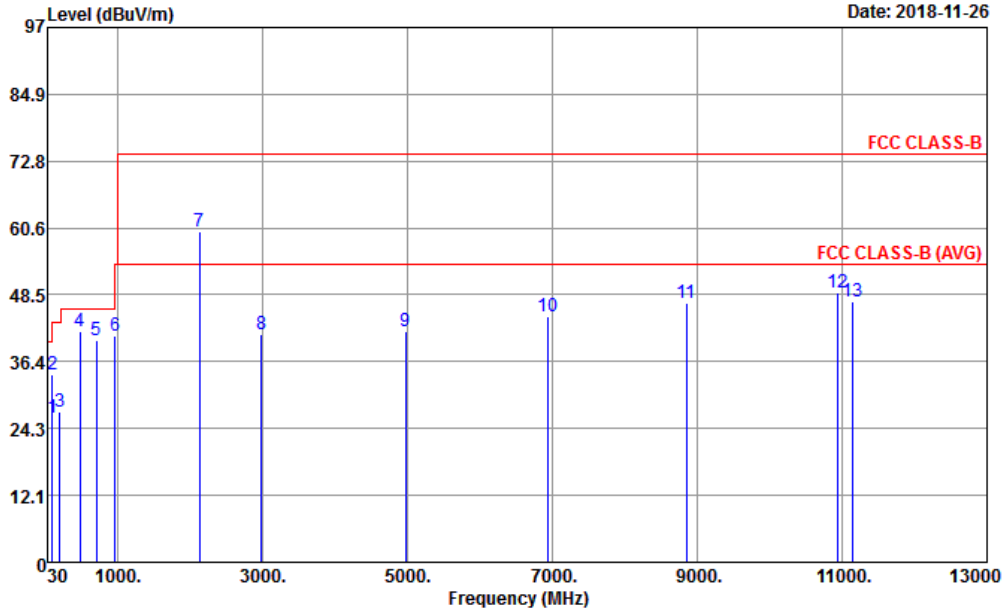
| Test Mode | Mode 9 | Temperature : | 22~24°C |
|---|---|---|---|
| Test Engineer : | Yu Wang and Lewis He | Relative Humidity : | 50~53% |
| Test Distance : | 3m | Polarization : | Horizontal |
| Remark : | #7 is system simulator signal which can be ignored. | | |




Site : 03CH10-HY
Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL
Project : 891147-01
Power : Real Battery
Mode : 9
: USB Dongle to EMMC

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | A/Pos | T/Pos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 92.64 | 29.79 | -13.71 | 43.50 | 46.23 | 15.18 | 1.06 | 32.68 | --- | --- | Peak |
| 2 | 100.20 | 38.73 | -4.77 | 43.50 | 54.19 | 16.08 | 1.13 | 32.67 | 100 | 0 | Peak |
| 3 | 200.37 | 35.53 | -7.97 | 43.50 | 51.62 | 15.02 | 1.48 | 32.59 | --- | --- | Peak |
| 4 | 479.90 | 32.64 | -13.36 | 46.00 | 39.17 | 23.63 | 2.48 | 32.64 | --- | --- | Peak |
| 5 | 701.80 | 34.67 | -11.33 | 46.00 | 37.59 | 26.61 | 3.04 | 32.57 | --- | --- | Peak |
| 6 | 901.30 | 39.09 | -6.91 | 46.00 | 38.42 | 29.05 | 3.43 | 31.81 | --- | --- | Peak |
| 7 | 2134.00 | 63.27 | | | 91.46 | 27.21 | 6.33 | 61.73 | --- | --- | Peak |
| 8 | 2864.00 | 39.80 | -34.20 | 74.00 | 66.07 | 28.13 | 7.47 | 61.87 | --- | --- | Peak |
| 9 | 4994.00 | 42.32 | -31.68 | 74.00 | 64.30 | 31.28 | 9.04 | 62.30 | --- | --- | Peak |
| 10 | 6556.00 | 45.84 | -28.16 | 74.00 | 64.41 | 34.31 | 10.19 | 63.07 | --- | --- | Peak |
| 11 | 8864.00 | 47.33 | -26.67 | 74.00 | 62.42 | 37.64 | 11.81 | 64.54 | --- | --- | Peak |
| 12 | 10332.00 | 49.11 | -24.89 | 74.00 | 61.60 | 39.33 | 12.71 | 64.53 | 100 | 0 | Peak |
| 13 | 12088.00 | 46.43 | -27.57 | 74.00 | 57.79 | 38.88 | 14.01 | 64.25 | --- | --- | Peak |

| Test Mode | Mode 9 | Temperature : | 22~24°C |
|---|---|---|---|
| Test Engineer : | Yu Wang and Lewis He | Relative Humidity : | 50~53% |
| Test Distance : | 3m | Polarization : | Vertical |
| Remark : | #7 is system simulator signal which can be ignored. | | |




Site : 03CH10-HY
Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL
Project : 891147-01
Power : Real Battery
Mode : 9
: USB Dongle to EMMC

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | A/Pos | T/Pos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 93.45 | 26.29 | -17.21 | 43.50 | 42.61 | 15.29 | 1.07 | 32.68 | --- | --- | Peak |
| 2 | 100.20 | 34.04 | -9.46 | 43.50 | 49.50 | 16.08 | 1.13 | 32.67 | --- | --- | Peak |
| 3 | 200.10 | 27.35 | -16.15 | 43.50 | 43.44 | 15.02 | 1.48 | 32.59 | --- | --- | Peak |
| 4 | 479.90 | 41.76 | -4.24 | 46.00 | 48.29 | 23.63 | 2.48 | 32.64 | 116 | 63 | QP |
| 5 | 700.40 | 40.27 | -5.73 | 46.00 | 43.23 | 26.58 | 3.03 | 32.57 | 105 | 46 | QP |
| 6 | 960.10 | 41.01 | -12.99 | 54.00 | 37.56 | 31.15 | 3.53 | 31.23 | --- | --- | Peak |
| 7 | 2132.00 | 59.92 | | | 88.15 | 27.18 | 6.32 | 61.73 | --- | --- | Peak |
| 8 | 2984.00 | 41.41 | -32.59 | 74.00 | 67.21 | 28.37 | 7.73 | 61.90 | --- | --- | Peak |
| 9 | 4974.00 | 41.85 | -32.15 | 74.00 | 63.96 | 31.20 | 8.99 | 62.30 | --- | --- | Peak |
| 10 | 6942.00 | 44.48 | -29.52 | 74.00 | 62.43 | 35.17 | 10.41 | 63.53 | --- | --- | Peak |
| 11 | 8848.00 | 47.01 | -26.99 | 74.00 | 62.03 | 37.70 | 11.80 | 64.52 | --- | --- | Peak |
| 12 | 10930.00 | 48.98 | -25.02 | 74.00 | 59.66 | 40.03 | 13.17 | 63.88 | 100 | 0 | Peak |
| 13 | 11146.00 | 47.35 | -26.65 | 74.00 | 58.34 | 39.51 | 13.33 | 63.83 | --- | --- | Peak |