# FCC Test Report

| | | |
|---|---|---|
| APPLICANT | : | Sonim Technologies, Inc. |
| EQUIPMENT | : | LTE Phone |
| BRAND NAME | : | Sonim |
| MODEL NAME | : | XP5800(PG2112) |
| FCC ID | : | WYPPG2132 |
| STANDARD | : | FCC 47 CFR FCC Part 15 Subpart B |
| CLASSIFICATION | : | Certification |

**The product was received on Sep. 21, 2017 and testing was completed on Nov. 24, 2017. We, Sporton International (Kunshan) 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 test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.**

James Huang

NVLAP®
TESTING
NVLAP LAB CODE 600155-0

**Approved by: James Huang / Manager**

***Sporton International (Kunshan) Inc.***
***No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China***

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**APPENDIX A. SETUP PHOTOGRAPHS**

# REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|---|
| FC792101-01 | Rev. 01 | Initial issue of report | Dec. 04, 2017 |
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# SUMMARY OF TEST RESULT

| Report Section | FCC Rule | Description | Limit | Result | Remark |
|---|---|---|---|---|---|
| 3.1 | 15.107 | AC Conducted Emission | < 15.107 limits | PASS | Under limit 5.67 dB at 18.232 MHz |
| 3.2 | 15.109 | Radiated Emission | < 15.109 limits | PASS | Under limit 3.24 dB at 239.52 MHz for Quasi-Peak |

# 1. General Description

## 1.1. Applicant

**Sonim Technologies, Inc.**
1825 S. Grant St., Suite 200., San Mateo, CA, 94402

## 1.2. Manufacturer

**Sonim Technologies (Shenzhen) Limited**
2nd Floor, No. 2 Building Phase B, Daqian Industrial park, Longchang Road, 67 District, Baoan, Shenzhen, P. R. China

## 1.3. Product Feature of Equipment Under Test

| Product Feature | |
|---|---|
| **Equipment** | LTE Phone |
| **Brand Name** | Sonim |
| **Model Name** | XP5800(PG2112) |
| **FCC ID** | WYPPG2132 |
| **EUT supports Radios application** | GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/<br>HSPA+(16QAM uplink is not supported)/LTE<br>WLAN 2.4GHz 802.11b/g/n HT20/HT40<br>WLAN 5GHz 802.11a/n HT20/HT40<br>Bluetooth v3.0 + EDR/Bluetooth v4.0 LE / v4.2 LE |
| **IMEI Code** | Conduction: 001080001912428/0010800001912436<br>Radiation: 001080001912428/0010800001912436 |
| **HW Version** | A |
| **SW Version** | 5SA.0.0-00-7.1.2-10.32.01 |
| **EUT Stage** | Identical Prototype |

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.4. Product Specification of Equipment Under Test

| Standards-related Product Specification | |
|---|---|
| **Tx Frequency** | GSM850: 824.2 MHz ~ 848.8 MHz<br>GSM1900: 1850.2 MHz ~ 1909.8MHz<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 7 : 2502.5 MHz ~ 2567.5 MHz<br>LTE Band 12: 699.7 MHz ~ 715.3 MHz<br>LTE Band 13 : 779.5 MHz ~ 784.5 MHz<br>LTE Band 14 : 790.5 MHz ~ 795.5 MHz<br>LTE Band 25 : 1850.7 MHz ~ 1914.3 MHz<br>LTE Band 26 : 814.7 MHz ~ 848.3 MHz<br>LTE Band 30 : 2307.5 MHz ~ 2312.5 MHz<br>LTE Band 38 : 2572.5 MHz ~ 2617.5 MHz<br>LTE Band 41 : 2498.5 MHz ~ 2687.5 MHz<br>LTE Band 66 : 1710.7 MHz ~ 1779.3 MHz<br>802.11b/g/n: 2412 MHz ~ 2462 MHz<br>802.11a/n: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz; 5500 MHz ~ 5580 MHz and 5660 MHz ~ 5720 MHz ; 5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 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 7 : 2622.5 MHz ~ 2687.5 MHz<br>LTE Band 12 : 729.7 MHz ~ 745.3 MHz<br>LTE Band 13 : 748.5 MHz ~ 753.5 MHz<br>LTE Band 14 : 760.5 MHz ~ 765.5 MHz<br>LTE Band 25 : 1930.7 MHz ~ 1994.3 MHz<br>LTE Band 26 : 859.7MHz ~ 893.3 MH<br>LTE Band 30 : 2352.5 MHz ~2357.5 MHz<br>LTE Band 38 : 2572.5 MHz ~ 2617.5 MHz<br>LTE Band 41 : 2498.5 MHz ~ 2687.5 MHz<br>LTE Band 66 : 2110.7 MHz~ 2179.3 MHz<br>802.11b/g/n: 2412 MHz ~ 2462 MHz<br>802.11a/n: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz; 5500 MHz ~ 5580 MHz and 5660 MHz ~ 5720 MHz ; 5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 MHz<br>GNSS : 1559 MHz ~ 1610 MHz<br>FM : 88 MHz ~ 108 MHz |
| **Antenna Type** | WWAN: PIFA Antenna<br>WLAN: PIFA Antenna<br>Bluetooth: PIFA Antenna |

| | |
|---|---|
| | GNSS: IFA Antenna<br>FM: External headset Antenna |
| **Type of Modulation** | GSM: GMSK<br>GPRS: GMSK<br>EDGE(MCS 0-4): GMSK / (MCS 5-9): 8PSK<br>WCDMA : BPSK (Uplink)<br>HSDPA/DC-HSDPA : QPSK (Uplink)<br>HSUPA : QPSK (Uplink)<br>HSPA+ : 16QAM (16QAM uplink is not supported)<br>DC-HSDPA : 64QAM<br>LTE: QPSK / 16QAM<br>802.11b : DSSS (DBPSK / DQPSK / CCK)<br>802.11a/g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)<br>Bluetooth LE : GFSK<br>Bluetooth (1Mbps) : GFSK<br>Bluetooth (2Mbps) : $\pi$ /4-DQPSK<br>Bluetooth (3Mbps) : 8-DPSK<br>GNSS : BPSK<br>FM |

## 1.5. Modification of EUT

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

## 1.6. Test Location

Sporton Lab is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0) and the FCC designation No. is CN5013.

| | | | |
|---|---|---|---|
| **Test Site** | Sporton International (Kunshan) Inc. | | |
| **Test Site Location** | No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China<br>TEL : +86-512-57900158<br>FAX : +86-512-57900958 | | |
| **Test Site No.** | **Sporton Site No.** | | **FCC Test Firm Registration No.** |
| | CO01-KS | 03CH02-KS | 630927 |

**Note:** The test site complies with ANSI C63.4 2014 requirement.

## 1.7. 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

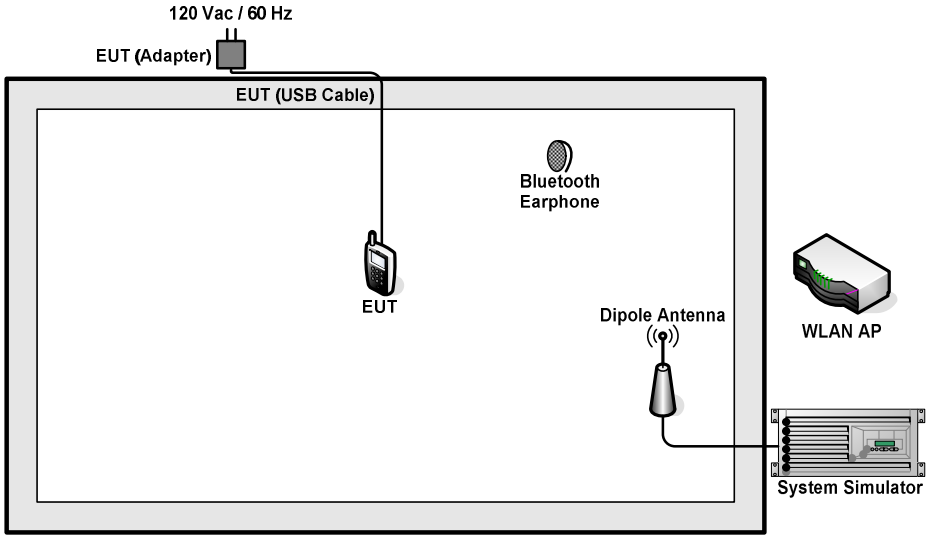
## 2.1. Test Mode

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.

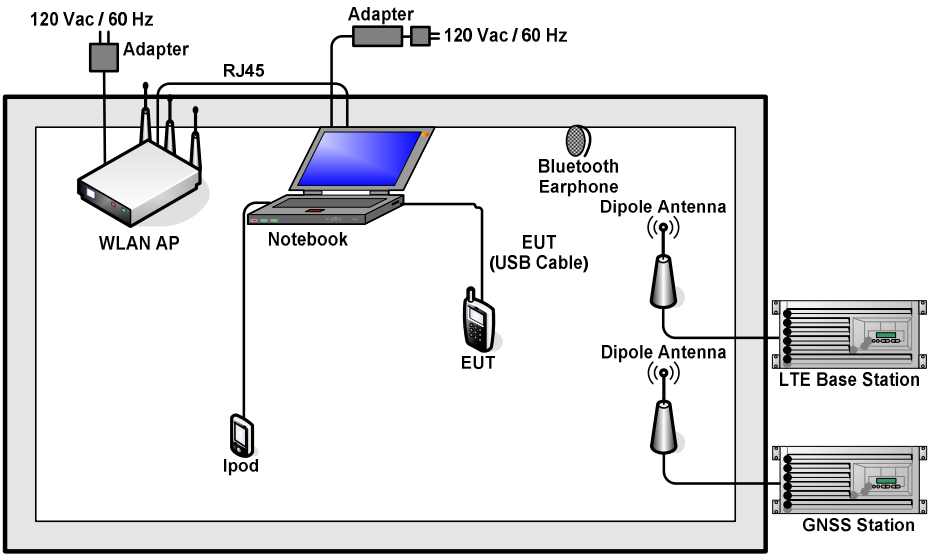
Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

| Test Items | Function Type |
|---|---|
| AC Conducted Emission | Mode 1 : GSM850 Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable 1(Charging from Adapter) + Camera + SIM 1 <Fig. 1><br>Mode 2 : GSM1900 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable 1(Charging from Adapter) + Camera + SIM 2 <Fig. 1><br>Mode 3 : WCDMA Band V Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable 1(Charging from Adapter) + MPEG4 + SIM 1 <Fig. 1><br>Mode 4 : LTE Band4 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable 1(Data Link with Notebook) + GNSS RX + SIM2 <Fig. 2><br>Mode 5 : LTE Band4 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable 2(Data Link with Notebook) + GNSS RX + SIM2<Fig. 2><br>Mode 6 : WCDMA Band V Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable 2(Charging from Adapter) + MPEG4 + SIM 1<Fig. 1> |
| Radiated Emissions | Mode 1 : GSM850 Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable 1(Charging from Adapter) + Camera(Rear) + SIM 1 <Fig. 1><br>Mode 2 : GSM1900 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable 1(Charging from Adapter) + Camera(Rear) + SIM 2 <Fig. 1><br>Mode 3 : WCDMA Band V Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable 1(Charging from Adapter) + MPEG4 + SIM 1 <Fig. 1><br>Mode 4 : LTE Band4 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable 1(Data Link with Notebook) + GNSS RX + SIM2 <Fig. 2><br>Mode 5 : LTE Band4 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable 2(Data Link with Notebook) + GNSS RX + SIM2<Fig. 2><br>Mode 6 : WCDMA Band V Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable 2(Charging from Adapter) + MPEG4 + SIM 1 <Fig. 1> |
| **Remark:**<br>1. The worst case of AC is mode 6; and the worst case of USB Link mode is mode 4, the test data of these modes were reported.<br>2. The worst case of RE is mode 5, only the test data of this mode was reported.<br>3. Data Link with Notebook means data application transferred mode between EUT and Notebook. | |

## 2.2. Connection Diagram of Test System




<Fig. 1>




<Fig. 2>

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

| Item | Equipment | Trade Name | Model Name | FCC ID | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| 1. | LTE Base Station | Anritsu | MT8820C | N/A | N/A | Unshielded, 1.8 m |
| 2. | System Simulator | R&S | CMU200 | N/A | N/A | Unshielded, 1.8 m |
| 3. | LABSAT GPS Simulator | RACELOGIC | RLLS03-2RP | N/A | N/A | Unshielded,1.8 m |
| 4. | GPS Station | ADIVIC | MP9000 | N/A | N/A | Unshielded,1.8 m |
| 5. | Signal Generator | R&S | SMBV100A | N/A | N/A | Unshielded,1.8 m |
| 6. | WLAN AP | LINKSYS | WRT600N | Q87-WRT600NV11 | N/A | Unshielded,1.8m |
| 7. | WLAN AP | TP-Link | TL-WDR5600 | N/A | N/A | Unshielded,1.8m |
| 8. | Bluetooth Earphone | Lenovo | LBH308 | N/A | N/A | N/A |
| 9. | Notebook | DELL | Latitude3440 | N/A | N/A | AC I/P : Unshielded, 1.8m DC O/P : Shielded, 1.8m |
| 10. | Notebook | Lenovo | G480 | N/A | N/A | AC I/P : Unshielded, 1.8m DC O/P : Shielded, 1.8m |
| 11. | SD Card | Kingston | 4GB | N/A | N/A | N/A |
| 12. | SD Card | SanDisk | Uitra | N/A | N/A | N/A |
| 13. | iPod | Apple | A1199 | FCC DoC | Shielded, 1.2m | N/A |

## 2.4. EUT Operation Test Setup

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 Notebook and EUT via USB cable.
2. Execute “GNSS Test” to make the EUT receive continuous signals from GNSS station
3. Execute “Video player” to play MPEG4 files
4. Turn on camera to capture images.

# 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.

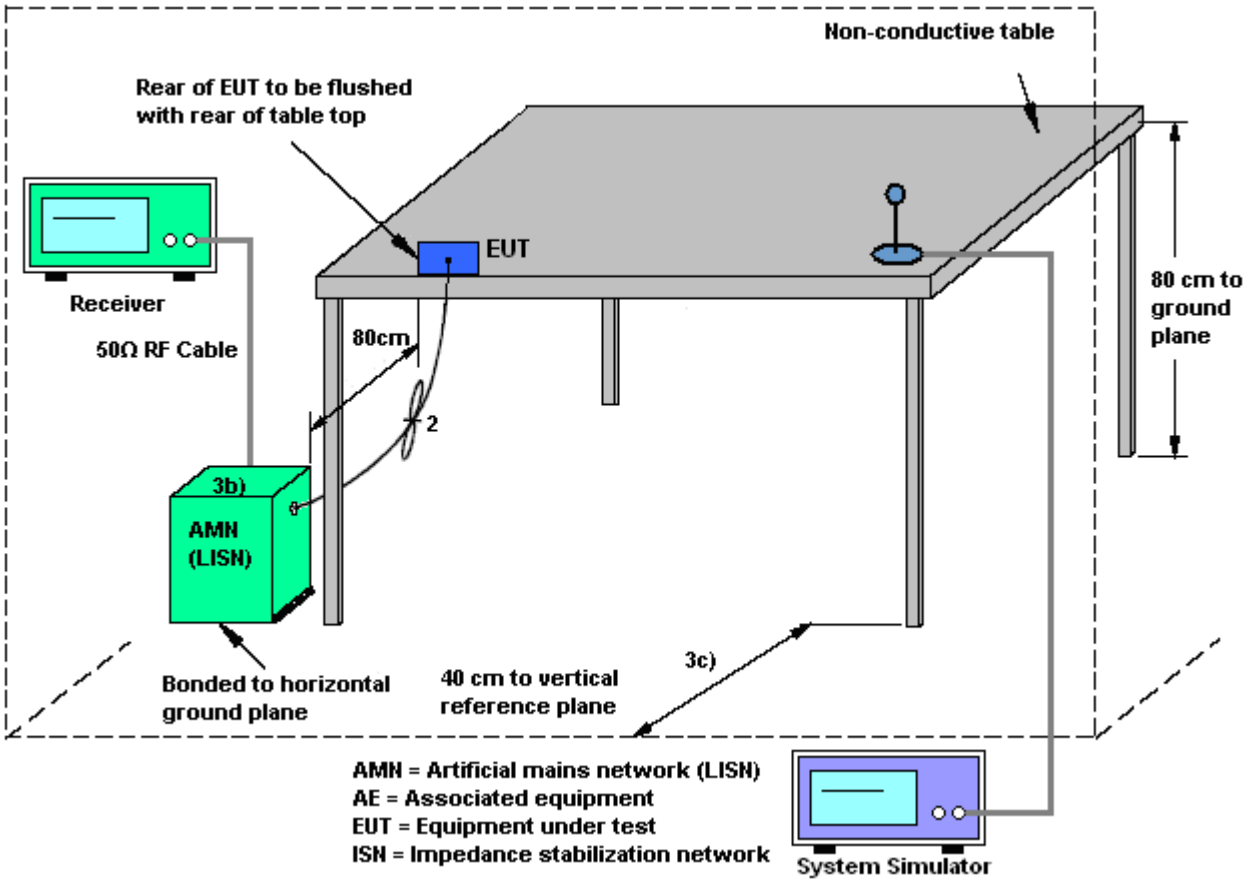
### 3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.1.3 Test Procedure

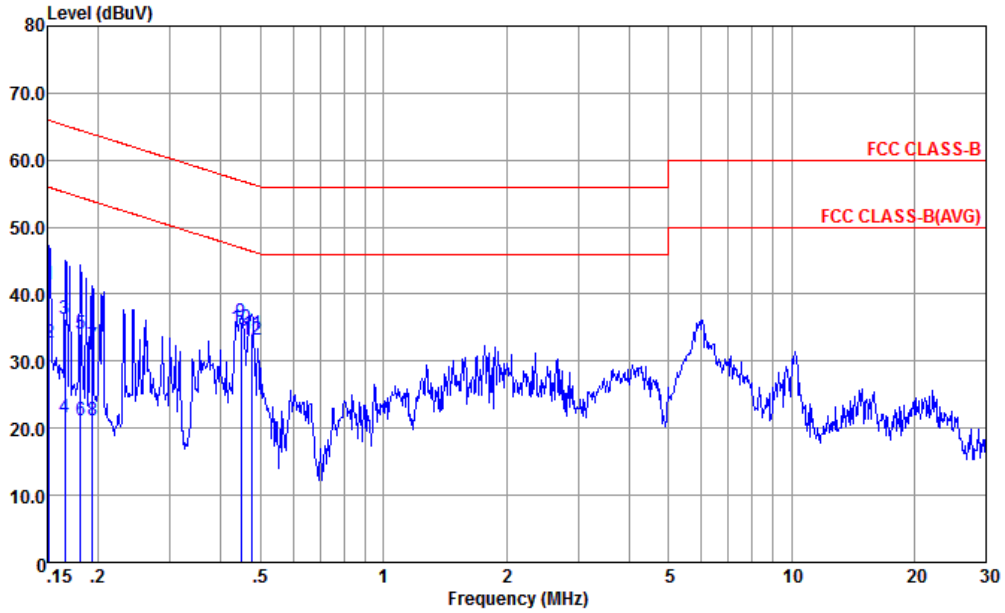
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
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

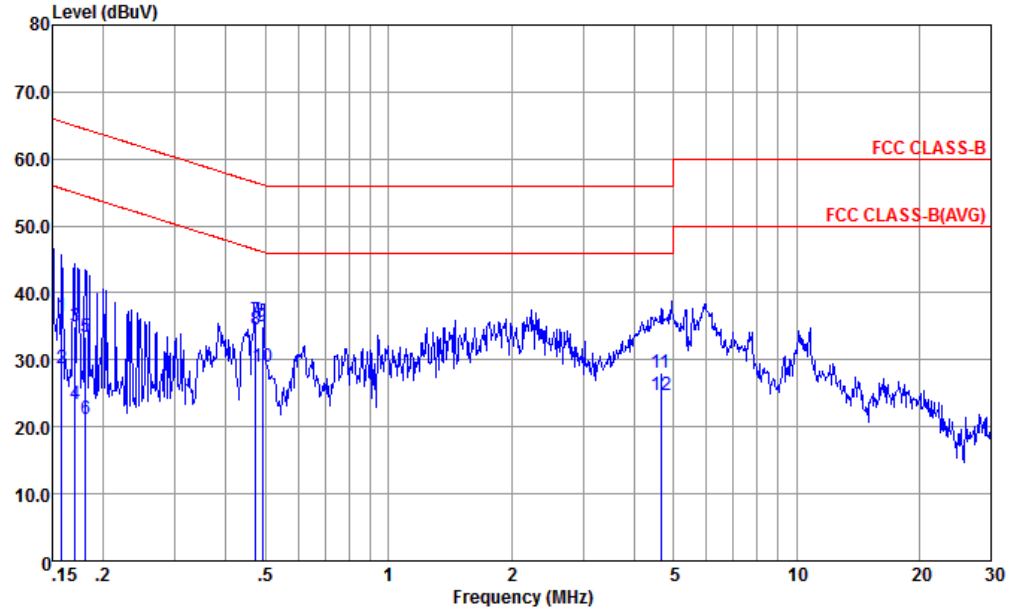
| | | | |
|---|---|---|---|
| **Test Mode :** | Mode 4 | **Temperature :** | 22~24℃ |
| **Test Engineer :** | Amos Zhang | **Relative Humidity :** | 42~46% |
| **Test Voltage :** | 120Vac / 60Hz | **Phase :** | Line |
| **Function Type :** | LTE Band4 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable 1(Data Link with Notebook) + GNSS RX + SIM2 | | |




Site : CO01-KS
Condition : FCC CLASS-B LISN-L-161017-060103 LINE
Project : (FC) 792101-01
mode : Mode 4
: 001080001912428/001080001912436 #7

| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.152 | 41.45 | -24.46 | 65.91 | 30.30 | 0.54 | 10.61 | QP |
| 2 | 0.152 | 32.65 | -23.26 | 55.91 | 21.50 | 0.54 | 10.61 | Average |
| 3 | 0.166 | 36.22 | -28.94 | 65.16 | 25.21 | 0.45 | 10.56 | QP |
| 4 | 0.166 | 21.62 | -33.54 | 55.16 | 10.61 | 0.45 | 10.56 | Average |
| 5 | 0.181 | 34.18 | -30.28 | 64.46 | 23.30 | 0.37 | 10.51 | QP |
| 6 | 0.181 | 21.08 | -33.38 | 54.46 | 10.20 | 0.37 | 10.51 | Average |
| 7 | 0.193 | 32.38 | -31.51 | 63.89 | 21.61 | 0.30 | 10.47 | QP |
| 8 | 0.193 | 21.08 | -32.81 | 53.89 | 10.31 | 0.30 | 10.47 | Average |
| 9 | 0.447 | 35.83 | -21.10 | 56.93 | 25.20 | 0.27 | 10.36 | QP |
| 10 * | 0.447 | 34.93 | -12.00 | 46.93 | 24.30 | 0.27 | 10.36 | Average |
| 11 | 0.476 | 34.20 | -22.21 | 56.41 | 23.60 | 0.27 | 10.33 | QP |
| 12 | 0.476 | 33.20 | -13.21 | 46.41 | 22.60 | 0.27 | 10.33 | Average |

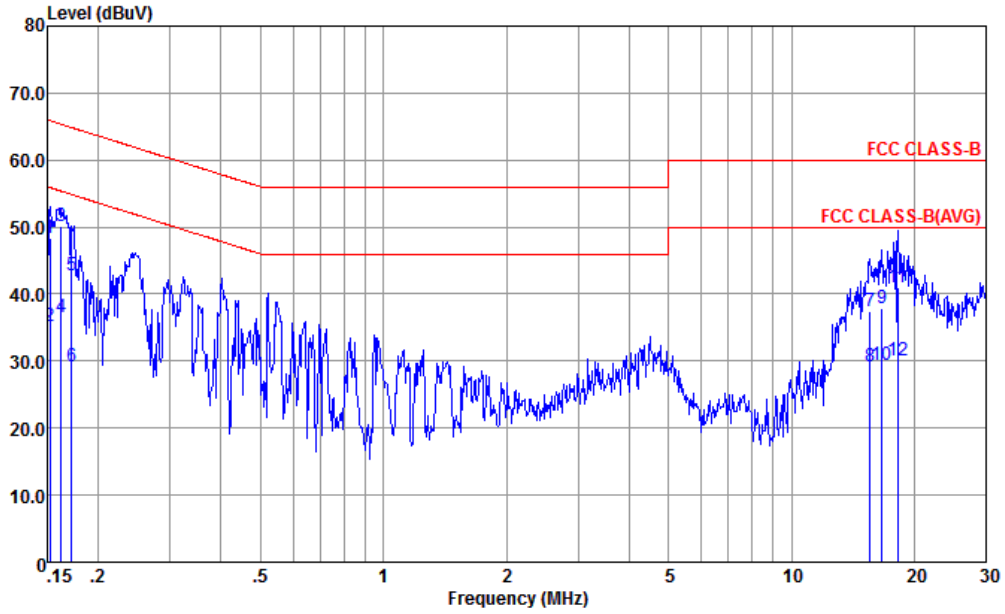
| Test Mode : | Mode 4 | Temperature : | 22~24℃ |
|---|---|---|---|
| Test Engineer : | Amos Zhang | Relative Humidity : | 42~46% |
| Test Voltage : | 120Vac / 60Hz | Phase : | Neutral |
| Function Type : | LTE Band4 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable 1(Data Link with Notebook) + GNSS RX + SIM2 | | |




Site : CO01-KS
Condition : FCC CLASS-B LISN-N-161017-060103 NEUTRAL
Project : (FC) 792101-01
mode : Mode 4
: 001080001912428/001080001912436

| | | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | | 0.158 | 36.53 | -29.03 | 65.56 | 25.60 | 0.34 | 10.59 | QP |
| 2 | | 0.158 | 28.83 | -26.73 | 55.56 | 17.90 | 0.34 | 10.59 | Average |
| 3 | | 0.170 | 35.08 | -29.86 | 64.94 | 24.19 | 0.34 | 10.55 | QP |
| 4 | | 0.170 | 23.48 | -31.46 | 54.94 | 12.59 | 0.34 | 10.55 | Average |
| 5 | | 0.181 | 33.45 | -31.01 | 64.46 | 22.61 | 0.33 | 10.51 | QP |
| 6 | | 0.181 | 21.15 | -33.31 | 54.46 | 10.31 | 0.33 | 10.51 | Average |
| 7 | | 0.474 | 35.91 | -20.54 | 56.45 | 25.20 | 0.38 | 10.33 | QP |
| 8 | * | 0.474 | 34.51 | -11.94 | 46.45 | 23.80 | 0.38 | 10.33 | Average |
| 9 | | 0.491 | 34.99 | -21.15 | 56.14 | 24.30 | 0.38 | 10.31 | QP |
| 10 | | 0.491 | 28.89 | -17.25 | 46.14 | 18.20 | 0.38 | 10.31 | Average |
| 11 | | 4.647 | 28.09 | -27.91 | 56.00 | 17.50 | 0.38 | 10.21 | QP |
| 12 | | 4.647 | 24.79 | -21.21 | 46.00 | 14.20 | 0.38 | 10.21 | Average |

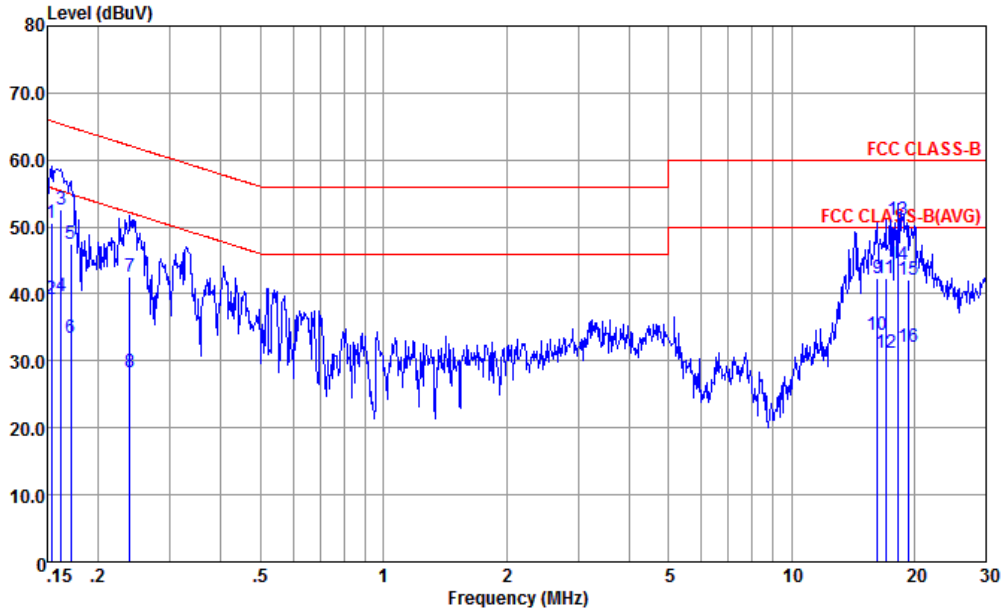
| | | | |
|---|---|---|---|
| **Test Mode :** | Mode 6 | **Temperature :** | 22~24℃ |
| **Test Engineer :** | Amos Zhang | **Relative Humidity :** | 42~46% |
| **Test Voltage :** | 120Vac / 60Hz | **Phase :** | Line |
| **Function Type :** | WCDMA Band V Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable 2(Charging from Adapter) + MPEG4 + SIM 1 | | |




Site : CO01-KS
Condition : FCC CLASS-B LISN-L-161017-060103 LINE
Project : (FC) 792101-01
mode : Mode 6
: 001080001912428/001080001912436 #7

| | | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | | 0.152 | 48.34 | -17.53 | 65.87 | 37.20 | 0.53 | 10.61 | QP |
| 2 | | 0.152 | 35.24 | -20.63 | 55.87 | 24.10 | 0.53 | 10.61 | Average |
| 3 | * | 0.162 | 50.24 | -15.10 | 65.34 | 39.20 | 0.47 | 10.57 | QP |
| 4 | | 0.162 | 36.64 | -18.70 | 55.34 | 25.60 | 0.47 | 10.57 | Average |
| 5 | | 0.172 | 42.76 | -22.10 | 64.86 | 31.81 | 0.41 | 10.54 | QP |
| 6 | | 0.172 | 29.16 | -25.70 | 54.86 | 18.21 | 0.41 | 10.54 | Average |
| 7 | | 15.552 | 37.50 | -22.50 | 60.00 | 26.80 | 0.28 | 10.42 | QP |
| 8 | | 15.552 | 29.30 | -20.70 | 50.00 | 18.60 | 0.28 | 10.42 | Average |
| 9 | | 16.661 | 37.82 | -22.18 | 60.00 | 27.09 | 0.29 | 10.44 | QP |
| 10 | | 16.661 | 29.32 | -20.68 | 50.00 | 18.59 | 0.29 | 10.44 | Average |
| 11 | | 18.232 | 40.95 | -19.05 | 60.00 | 30.20 | 0.29 | 10.46 | QP |
| 12 | | 18.232 | 30.05 | -19.95 | 50.00 | 19.30 | 0.29 | 10.46 | Average |

| Test Mode : | Mode 6 | Temperature : | 22~24℃ |
|---|---|---|---|
| Test Engineer : | Amos Zhang | Relative Humidity : | 42~46% |
| Test Voltage : | 120Vac / 60Hz | Phase : | Neutral |
| Function Type : | WCDMA Band V Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable 2(Charging from Adapter) + MPEG4 + SIM 1 | | |




Site : CO01-KS
Condition : FCC CLASS-B LISN-N-161017-060103 NEUTRAL
Project : (FC) 792101-01
mode : Mode 6
080001912428/001080001912436

| | | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | | 0.153 | 50.55 | -15.27 | 65.82 | 39.60 | 0.34 | 10.61 | QP |
| 2 | | 0.153 | 39.25 | -16.57 | 55.82 | 28.30 | 0.34 | 10.61 | Average |
| 3 | | 0.162 | 52.51 | -12.83 | 65.34 | 41.60 | 0.34 | 10.57 | QP |
| 4 | | 0.162 | 39.71 | -15.63 | 55.34 | 28.80 | 0.34 | 10.57 | Average |
| 5 | | 0.171 | 47.48 | -17.42 | 64.90 | 36.59 | 0.34 | 10.55 | QP |
| 6 | | 0.171 | 33.48 | -21.42 | 54.90 | 22.59 | 0.34 | 10.55 | Average |
| 7 | | 0.239 | 42.58 | -19.55 | 62.13 | 31.80 | 0.34 | 10.44 | QP |
| 8 | | 0.239 | 28.38 | -23.75 | 52.13 | 17.60 | 0.34 | 10.44 | Average |
| 9 | | 16.226 | 42.31 | -17.69 | 60.00 | 31.60 | 0.28 | 10.43 | QP |
| 10 | | 16.226 | 33.91 | -16.09 | 50.00 | 23.20 | 0.28 | 10.43 | Average |
| 11 | | 17.018 | 42.32 | -17.68 | 60.00 | 31.60 | 0.28 | 10.44 | QP |
| 12 | | 17.018 | 31.22 | -18.78 | 50.00 | 20.50 | 0.28 | 10.44 | Average |
| 13 | | 18.232 | 50.93 | -9.07 | 60.00 | 40.20 | 0.27 | 10.46 | QP |
| 14 | * | 18.232 | 44.33 | -5.67 | 50.00 | 33.60 | 0.27 | 10.46 | Average |
| 15 | | 19.326 | 42.04 | -17.96 | 60.00 | 31.30 | 0.27 | 10.47 | QP |
| 16 | | 19.326 | 32.04 | -17.96 | 50.00 | 21.30 | 0.27 | 10.47 | Average |

# 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

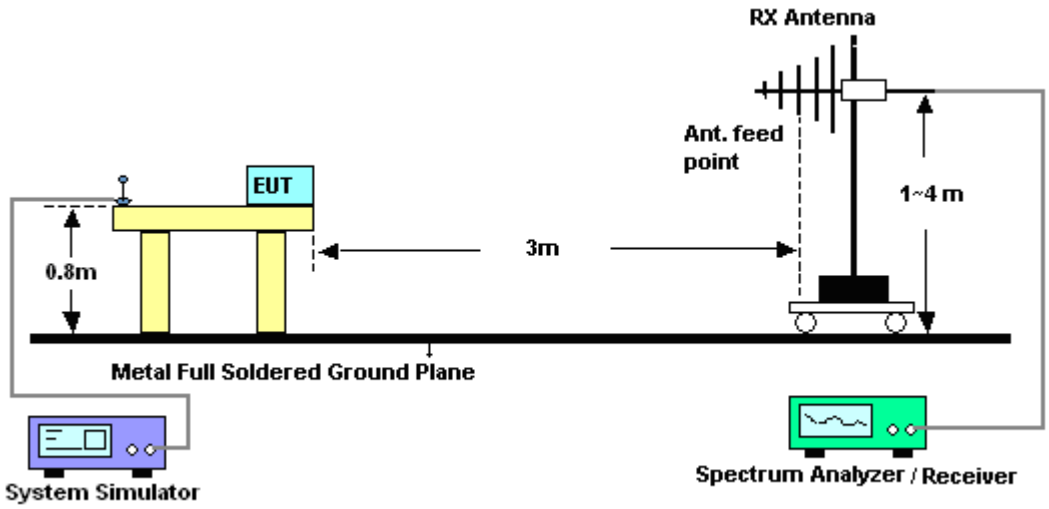
The measuring equipment is listed in the section 4 of this test report.

## 3.2.3. Test Procedures

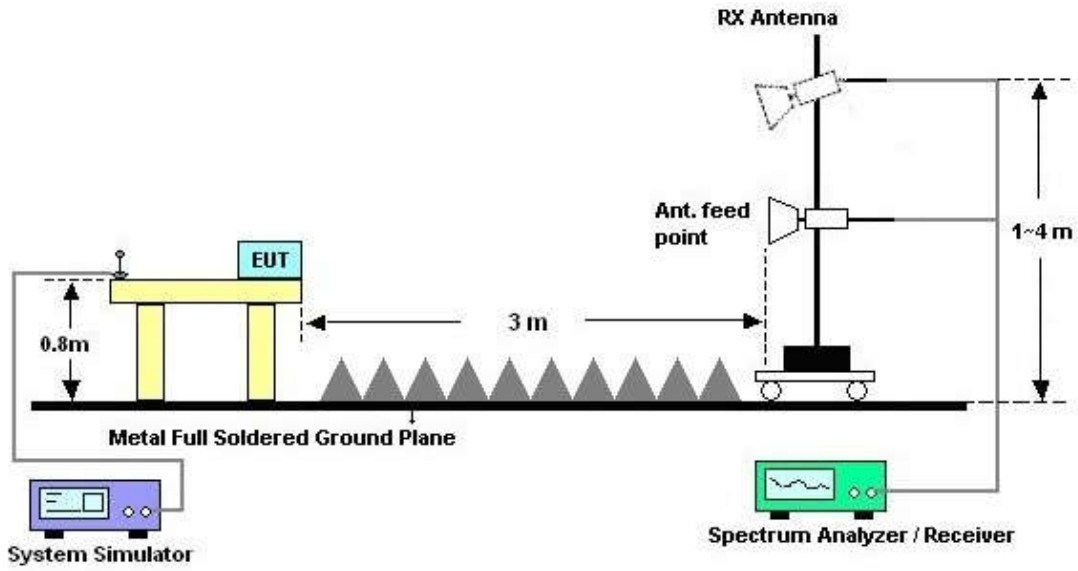
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its 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**

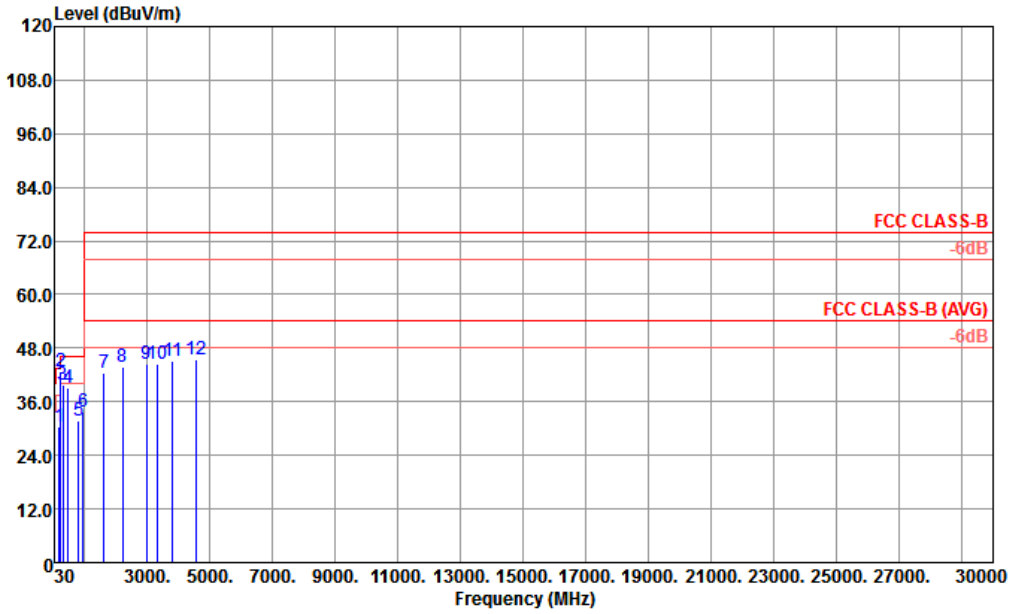



**For radiated emissions above 1GHz**



## 3.2.5. Test Result of Radiated Emission

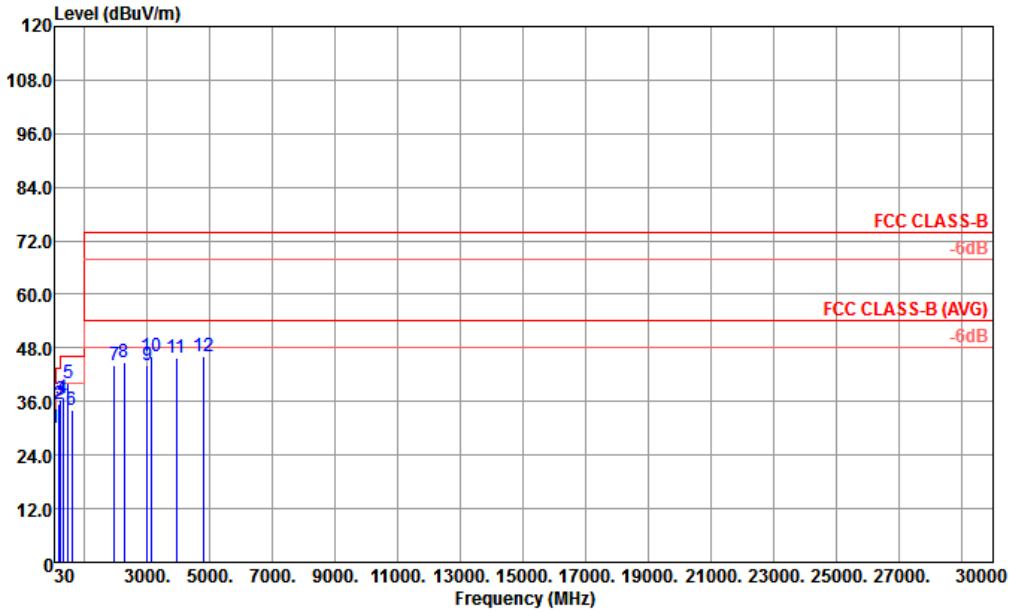
| | | | |
|---|---|---|---|
| **Test Mode :** | Mode 5 | **Temperature :** | 21~22°C |
| **Test Engineer :** | Carl Ni | **Relative Humidity :** | 41~42% |
| **Test Distance :** | 3m | **Polarization :** | Horizontal |
| **Function Type :** | LTE Band4 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable 2(Data Link with Notebook) + GNSS RX + SIM2 | | |




Site : 03CH02-KS
Condition : FCC CLASS-B 3m 02 LF ANT HORIZONTAL
Project : (FR)792101-01
Mode : 5
IMEI : 001080001912428 001080001912436 #7

| | | 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 | | 181.32 | 30.34 | -13.16 | 43.50 | 44.28 | 16.41 | 1.38 | 31.73 | --- | --- | Peak |
| 2 | ! | 239.52 | 42.76 | -3.24 | 46.00 | 56.00 | 16.65 | 1.69 | 31.58 | 100 | 0 | QP |
| 3 | | 305.48 | 39.67 | -6.33 | 46.00 | 50.45 | 18.39 | 1.92 | 31.09 | --- | --- | Peak |
| 4 | | 480.08 | 39.09 | -6.91 | 46.00 | 43.57 | 23.62 | 2.30 | 30.40 | --- | --- | Peak |
| 5 | | 798.24 | 31.61 | -14.39 | 46.00 | 30.78 | 26.51 | 2.65 | 28.33 | --- | --- | Peak |
| 6 | | 947.62 | 33.88 | -12.12 | 46.00 | 29.37 | 28.46 | 3.20 | 27.15 | --- | --- | Peak |
| 7 | | 1616.00 | 42.44 | -31.56 | 74.00 | 44.65 | 29.00 | 4.23 | 35.44 | --- | --- | Peak |
| 8 | | 2198.00 | 43.81 | -30.19 | 74.00 | 41.62 | 30.94 | 4.94 | 33.69 | --- | --- | Peak |
| 9 | | 2980.00 | 44.35 | -29.65 | 74.00 | 34.74 | 32.50 | 5.94 | 28.83 | --- | --- | Peak |
| 10 | | 3315.00 | 44.32 | -29.68 | 74.00 | 35.24 | 33.26 | 6.25 | 30.43 | --- | --- | Peak |
| 11 | | 3798.00 | 44.96 | -29.04 | 74.00 | 33.77 | 34.78 | 6.63 | 30.22 | --- | --- | Peak |
| 12 | | 4578.00 | 45.55 | -28.45 | 74.00 | 33.86 | 35.85 | 7.58 | 31.74 | --- | --- | Peak |

| Test Mode : | Mode 5 | Temperature : | 21~22°C |
|---|---|---|---|
| Test Engineer : | Carl Ni | Relative Humidity : | 41~42% |
| Test Distance : | 3m | Polarization : | Vertical |
| Function Type : | LTE Band4 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable 2(Data Link with Notebook) + GNSS RX + SIM2 | | |




Site : 03CH02-KS
Condition : FCC CLASS-B 3m 02 LF ANT VERTICAL
Project : (FR)792101-01
Mode : 5
IMEI : 001080001912428 001080001912436 #7

| | | 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 | | 51.34 | 30.16 | -9.84 | 40.00 | 46.43 | 15.10 | 0.73 | 32.10 | --- | --- | Peak |
| 2 | | 181.32 | 35.33 | -8.17 | 43.50 | 49.27 | 16.41 | 1.38 | 31.73 | --- | --- | Peak |
| 3 | | 242.43 | 36.36 | -9.64 | 46.00 | 49.50 | 16.73 | 1.70 | 31.57 | --- | --- | Peak |
| 4 | | 304.51 | 36.62 | -9.38 | 46.00 | 47.47 | 18.33 | 1.92 | 31.10 | --- | --- | Peak |
| 5 | ! | 480.08 | 40.13 | -5.87 | 46.00 | 44.61 | 23.62 | 2.30 | 30.40 | 100 | 0 | Peak |
| 6 | | 597.45 | 33.95 | -12.05 | 46.00 | 36.41 | 24.60 | 2.62 | 29.68 | --- | --- | Peak |
| 7 | | 1954.00 | 44.07 | -29.93 | 74.00 | 42.58 | 29.96 | 4.59 | 33.06 | --- | --- | Peak |
| 8 | | 2258.00 | 44.87 | -29.13 | 74.00 | 41.77 | 31.08 | 4.99 | 32.97 | --- | --- | Peak |
| 9 | | 2996.00 | 44.28 | -29.72 | 74.00 | 34.61 | 32.55 | 5.95 | 28.83 | --- | --- | Peak |
| 10 | | 3108.00 | 46.11 | -27.89 | 74.00 | 37.16 | 32.87 | 6.10 | 30.02 | --- | --- | Peak |
| 11 | | 3918.00 | 45.69 | -28.31 | 74.00 | 34.46 | 34.98 | 6.68 | 30.43 | --- | --- | Peak |
| 12 | | 4782.00 | 45.96 | -28.04 | 74.00 | 35.20 | 35.69 | 7.70 | 32.63 | --- | --- | Peak |

# 4. List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| EMI Receiver | R&S | ESCI7 | 100768 | 9kHz~7GHz; | Apr. 20, 2017 | Oct. 16, 2017 | Apr. 19, 2018 | Conduction (CO01-KS) |
| AC LISN | MessTec | AN3016 | 060103 | 9kHz~30MHz | Oct. 13, 2017 | Oct. 16, 2017 | Oct. 12, 2018 | Conduction (CO01-KS) |
| AC LISN (for auxiliary equipment) | MessTec | AN3016 | 060105 | 9kHz~30MHz | Oct. 13, 2017 | Oct. 16, 2017 | Oct. 12, 2018 | Conduction (CO01-KS) |
| AC Power Source | Chroma | 61602 | ABP000000811 | AC 0V~300V, 45Hz~1000Hz | Oct. 12, 2017 | Oct. 16, 2017 | Oct. 11, 2018 | Conduction (CO01-KS) |
| EMI Test Receiver | R&S | ESR7 | 101403 | 9kHz~7GHz; Max 30dBm | Aug. 08, 2017 | Nov. 24, 2017 | Aug. 07, 2018 | Radiation (03CH02-KS) |
| EXA Spectrum Analyzer | Keysight | N9010A | MY55150208 | 10Hz~44GHz, MAX 30dB | Apr. 18, 2017 | Nov. 24, 2017 | Apr. 17, 2018 | Radiation (03CH02-KS) |
| Bilog Antenna | TeseQ | CBL6112D | 23182 | 30MHz~2GHz | Jan. 22, 2017 | Nov. 24, 2017 | Jan. 21, 2018 | Radiation (03CH02-KS) |
| Double Ridge Horn Antenna | ETS-Lindgren | 3117 | 75957 | 1GHz~18GHz | Oct. 21, 2017 | Nov. 24, 2017 | Oct. 20, 2018 | Radiation (03CH02-KS) |
| SHF-EHF Horn | Schwarzbeck | BBHA 9170 | BBHA170249 | 15GHz~40GHz | Feb. 15, 2017 | Nov. 24, 2017 | Feb. 14, 2018 | Radiation (03CH02-KS) |
| Amplifier | SONOMA | 310N | 187289 | 9kHz~1GHz | Aug. 07, 2017 | Nov. 24, 2017 | Aug. 06, 2018 | Radiation (03CH02-KS) |
| Amplifier | Agilent | 8449B | 3008A02384 | 1GHz~26.5GHz | Oct. 12, 2017 | Nov. 24, 2017 | Oct. 11, 2018 | Radiation (03CH02-KS) |
| Amplifier | MITEQ | TTA1840-35-HG | 1887435 | 18GHz~40GHz | Oct. 12, 2017 | Nov. 24, 2017 | Oct. 11, 2018 | Radiation (03CH02-KS) |
| AC Power Source | Chroma | 61601 | 616010002473 | N/A | NCR | Nov. 24, 2017 | NCR | Radiation (03CH02-KS) |
| Turn Table | MF | MF7802 | N/A | 0~360 degree | NCR | Nov. 24, 2017 | NCR | Radiation (03CH02-KS) |
| Antenna Mast | MF | MF7802 | N/A | 1 m~4 m | NCR | Nov. 24, 2017 | NCR | Radiation (03CH02-KS) |

NCR: No Calibration Required

# 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)) | 2.3dB |

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

| | |
|---|---|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 5.2dB |

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

| | |
|---|---|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 4.7dB |

**Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)**

| | |
|---|---|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 5.3dB |