# FCC Test Report

| | | |
|---|---|---|
| APPLICANT | : | OnePlus Technology (Shenzhen) Co.,Ltd. |
| EQUIPMENT | : | Mobile Phone |
| BRAND NAME | : | ONEPLUS |
| MODEL NAME | : | CPH2419, CPH2417 |
| FCC ID | : | 2ABZ2-AA497 |
| STANDARD | : | 47 CFR Part 15 Subpart B |
| CLASSIFICATION | : | Certification |
| TEST DATE(S) | : | May 31, 2022 ~ Jun. 06, 2022 |

**We, Sporton International Inc. (ShenZhen), 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 Inc. (ShenZhen), the test report shall not be reproduced except in full.**

Jason Jia

**Approved by: Jason Jia**

ACCREDITED Cert #5145.01

***Sporton International Inc. (ShenZhen)***

***1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055***

***People's Republic of China***

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**APPENDIX A. SETUP PHOTOGRAPHS**

# REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|---|
| FC251121 | Rev. 01 | Initial issue of report | Jul. 08, 2022 |
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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 10.62 dB at 1.50 MHz |
| 3.2 | 15.109 | Radiated Emission | < 15.109 limits | PASS | Under limit 9.68 dB at 312.27 MHz |

| **Declaration of Conformity:** |
|---|
| The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. |
| **Comments and Explanations:** |
| The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification. |

# 1. General Description

## 1.1. Applicant

**OnePlus Technology (Shenzhen) Co.,Ltd.**
18C02, 18C03, 18C04, 18C05, Shum Yip Terra Building, Binhe Avenue North, Futian District, Shenzhen, Guangdong, China.

## 1.2. Manufacturer

**OnePlus Technology (Shenzhen) Co.,Ltd.**
18C02, 18C03, 18C04, 18C05, Shum Yip Terra Building, Binhe Avenue North, Futian District, Shenzhen, Guangdong, China.

## 1.3. Product Feature of Equipment Under Test

| Product Feature | |
|---|---|
| **Equipment** | Mobile Phone |
| **Brand Name** | ONEPLUS |
| **Model Name** | CPH2419, CPH2417 |
| **FCC ID** | 2ABZ2-AA497 |
| **EUT supports Radios application** | GSM/WCDMA/LTE/5G NR<br>WLAN 2.4GHz 802.11b/g/n HT20/HT40<br>WLAN 2.4GHz 802.11ac/ax VHT20/VHT40/HE20/HE40<br>WLAN 5GHz 802.11a/n HT20/HT40<br>WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/VHT160<br>WLAN 5GHz 802.11ax HE20/HE40/HE80/HE160<br>Bluetooth BR/EDR/LE<br>NFC<br>GNSS |
| **IMEI Code** | Conduction: 861677060027524<br>Radiation: 861677060027938 |
| **HW Version** | 2AA495-0 |
| **SW Version** | CPH2419_11_A.03 |
| **EUT Stage** | Production Unit |

**Remark:**

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. The different model name is for different market purpose.

## 1.4. Product Specification of Equipment Under Test

| Standards-related Product Specification | |
|---|---|
| **Tx Frequency** | GSM850: 824 MHz ~ 849 MHz<br>GSM1900: 1850MHz ~ 1910MHz<br>WCDMA Band II: 1850 MHz ~ 1910 MHz<br>WCDMA Band IV : 1710 MHz ~ 1755 MHz<br>WCDMA Band V: 824 MHz ~ 849 MHz<br>LTE Band 2 : 1850 MHz ~ 1910 MHz<br>LTE Band 4 : 1710 MHz ~ 1755 MHz<br>LTE Band 5 : 824 MHz ~ 849 MHz<br>LTE Band 7 : 2500 MHz ~ 2570 MHz<br>LTE Band 12 : 699 MHz ~ 716 MHz<br>LTE Band 13 : 777 MHz ~ 787 MHz<br>LTE Band 17 : 704 MHz ~ 716 MHz<br>LTE Band 25 : 1850 MHz ~ 1915 MHz<br>LTE Band 26 : 814 MHz ~ 849 MHz<br>LTE Band 30 : 2305 MHz ~ 2315 MHz<br>LTE Band 38 : 2570 MHz ~ 2620 MHz<br>LTE Band 41 : 2496 MHz ~ 2690 MHz<br>LTE Band 48 : 3550 MHz ~ 3700 MHz<br>LTE Band 66 : 1710 MHz ~ 1780 MHz<br>LTE Band 71: 663 MHz ~ 698 MHz<br>5G NR n2 : 1850 MHz ~ 1910 MHz<br>5G NR n5 : 824 MHz ~ 849 MHz<br>5G NR n7 : 2500 MHz ~ 2570 MHz<br>5G NR n25 : 1850 MHz ~ 1915 MHz<br>5G NR n30 : 2305 MHz ~ 2315 MHz<br>5G NR n38 : 2570 MHz ~ 2620 MHz<br>5G NR n41 : 2496 MHz ~ 2690 MHz<br>5G NR n66 : 1710 MHz ~ 1780 MHz<br>5G NR n71: 663 MHz ~ 698 MHz<br>5G NR n77: 3450 MHz ~ 3550 MHz; 3700 MHz ~ 3980 MHz<br>802.11b/g/n/ac/ax: 2400 MHz ~ 2483.5 MHz<br>802.11a/n/ac/ax: 5150 MHz ~ 5250 MHz;<br>5250 MHz ~ 5350 MHz;<br>5470 MHz ~ 5725 MHz<br>5725 MHz ~ 5850 MHz<br>Bluetooth: 2400 MHz ~ 2483.5 MHz<br>NFC : 13.56 MHz |
| **Rx Frequency** | GSM850: 869 MHz ~ 894 MHz<br>GSM1900: 1930 MHz ~ 1990 MHz<br>WCDMA Band II: 1930 MHz ~ 1990 MHz<br>WCDMA Band IV : 2110 MHz ~ 2155 MHz<br>WCDMA Band V: 869 MHz ~ 894 MHz<br>LTE Band 2 : 1930 MHz ~ 1990 MHz<br>LTE Band 4 : 2110 MHz ~ 2155 MHz<br>LTE Band 5 : 869 MHz ~ 894 MHz<br>LTE Band 7 : 2620 MHz ~ 2690 MHz<br>LTE Band 12 : 729 MHz ~ 746 MHz<br>LTE Band 13 : 746 MHz ~ 756 MHz<br>LTE Band 17 : 734 MHz ~ 746 MHz<br>LTE Band 25 : 1930 MHz ~ 1995 MHz<br>LTE Band 26 : 859 MHz ~ 894 MHz |

| | |
|---|---|
| | LTE Band 30 : 2350 MHz ~ 2360 MHz<br>LTE Band 38: 2570 MHz ~ 2620 MHz<br>LTE Band 41 : 2496 MHz ~ 2690 MHz<br>LTE Band 46 : 5150 MHz ~ 5925 MHz<br>LTE Band 48 : 3550 MHz ~ 3700 MHz<br>LTE Band 66 : 2110 MHz~ 2200 MHz<br>LTE Band 71: 617 MHz ~ 652 MHz<br>5G NR n2 : 1930 MHz ~ 1990 MHz<br>5G NR n5 : 869 MHz ~ 894 MHz<br>5G NR n7 : 2620 MHz ~ 2690 MHz<br>5G NR n25 : 1930 MHz ~ 1995 MHz<br>5G NR n30 : 2350 MHz ~ 2360 MHz<br>5G NR n38: 2570 MHz ~ 2620 MHz<br>5G NR n41 : 2496 MHz ~ 2690 MHz<br>5G NR n66 : 2110 MHz~ 2200 MHz<br>5G NR n71: 617 MHz ~ 652 MHz<br>5G NR n77: 3450 MHz ~ 3550 MHz; 3700 MHz ~ 3980 MHz<br>802.11b/g/n/ac/ac: 2400 MHz ~ 2483.5 MHz<br>802.11a/n/ac/ax: 5150 MHz ~ 5250 MHz;<br>5250 MHz ~ 5350 MHz;<br>5470 MHz ~ 5725 MHz<br>5725 MHz ~ 5850 MHz<br>Bluetooth: 2400 MHz ~ 2483.5 MHz<br>NFC : 13.56 MHz<br>GNSS : 1559 MHz ~ 1610 MHz |
| **Antenna Type** | WWAN : Fixed Internal Antenna<br>WLAN : Fixed Internal Antenna<br>Bluetooth : Fixed Internal Antenna<br>GNSS: Fixed Internal Antenna<br>NFC: Fixed Internal Antenna |
| **Type of Modulation** | GSM/GPRS: GMSK<br>EDGE(MCS 0-4): GMSK / (MCS 5-9): 8PSK<br>DTM:<br>WCDMA : BPSK<br>HSPA : QPSK<br>HSPA+ : 16QAM<br>DC-HSDPA : 64QAM<br>LTE: QPSK / 16QAM / 64QAM / 256QAM<br>5G NR:<br>DFT-s-OFDM (PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM)<br>CP-OFDM (QPSK / 16QAM / 64QAM / 256QAM)<br>802.11b : DSSS (DBPSK / DQPSK / CCK)<br>802.11a/g/n/ac/ax : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM / 4096QAM)<br>Bluetooth LE : GFSK<br>Bluetooth (1Mbps) : GFSK<br>Bluetooth (2Mbps) :π/4-DQPSK<br>Bluetooth (3Mbps) : 8-DPSK<br>GNSS : BPSK<br>NFC: ASK |

## 1.5. Modification of EUT

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

## 1.6. Test Location

Sporton International Inc. (Shenzhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

| | | | |
|---|---|---|---|
| **Test Firm** | Sporton International Inc. (Shenzhen) | | |
| **Test Site Location** | 1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China<br>TEL: +86-755-86379589<br>FAX: +86-755-86379595 | | |
| **Test Site No.** | **Sporton Site No.** | **FCC Designation No.** | **FCC Test Firm Registration No.** |
| | CO01-SZ | CN1256 | 421272 |

| | | | |
|---|---|---|---|
| **Test Firm** | Sporton International Inc. (Shenzhen) | | |
| **Test Site Location** | 101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103<br>TEL: +86-755-33202398 | | |
| **Test Site No.** | **Sporton Site No.** | **FCC Designation No.** | **FCC Test Firm Registration No.** |
| | 03CH04-SZ | CN1256 | 421272 |

## 1.7. Test Software

| Item | Site | Manufacturer | Name | Version |
|---|---|---|---|---|
| 1. | 03CH04-SZ | AUDIX | E3 | 6.2009-8-24 |
| 2. | CO01-SZ | AUDIX | E3 | 6.120613b |

## 1.8. Applicable Standards

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

- 47 CFR 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 frequency or to 40 GHz, whichever is lower).

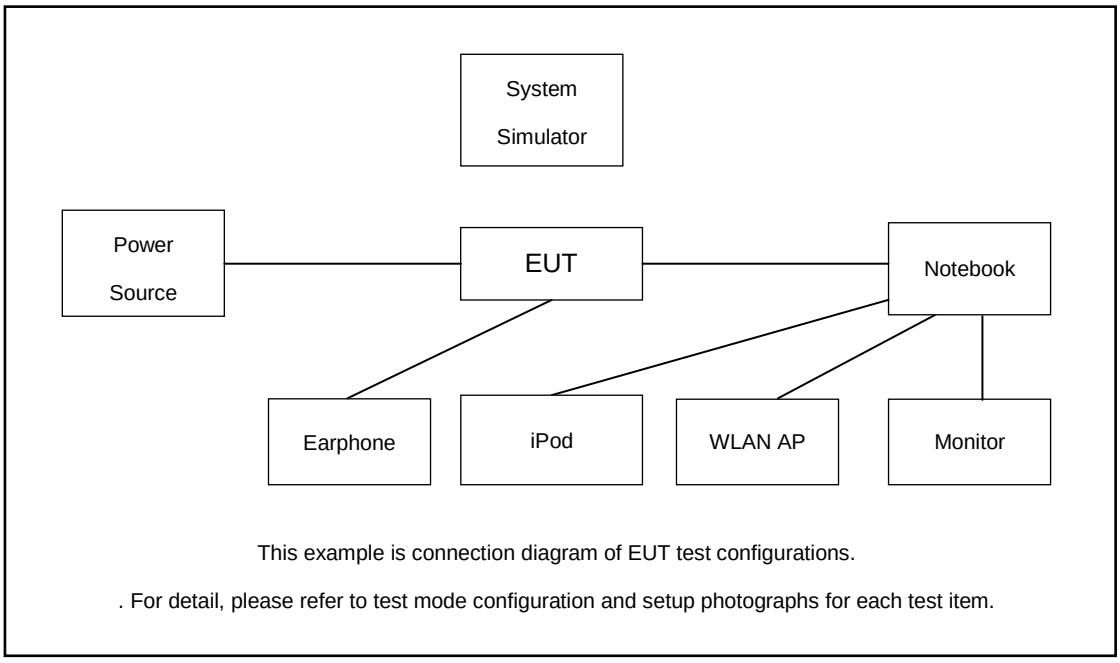
| Test Items | Function Type |
|---|---|
| AC Conducted Emission | Mode 1: GSM 850 Idle(Middle CH) + USB Cable 1(Charging from Adapter 1) + Battery 1+ Camera(Rear) + SIM 1 |
| | Mode 2: WCDMA Band 5 Idle(Low CH) + USB Cable 1(Charging from Adapter 1) + Battery 1 + Camera(Front) + SIM 1 |
| | Mode 3: LTE Band 12 Idle(Middle CH) + USB Cable 1(Charging from Adapter 1) + Battery 1 + MPEG4(Colur bar) + SIM 1 |
| | Mode 4: SA:N71 Idle(High CH) + USB Cable 1(Charging from Adapter 1) + Battery 1 + MPEG4(Colur bar) + SIM 1 |
| | Mode 5: GSM 850 Idle(Middle CH) + USB Cable 1(Charging from Adapter 1) + Battery 1 + Camera(Rear) + SIM 1 |
| | Mode 6: WCDMA Band 5 Idle(Low CH) + USB Cable 1(Charging from Adapter 1) + Battery 1 + Camera(Front) + SIM 1 |
| | Mode 7: LTE Band 12 Idle(Middle CH) + USB Cable 1(Charging from Adapter 1) + Battery 1 + MPEG4(Colur bar) + SIM 1 |
| | Mode 8: SA:N71 Idle(High CH) + USB Cable 1(Charging from Adapter 1) + Battery 1 + MPEG4(Colur bar) + SIM 1 |
| | Mode 9: NSA :ENDC_2A_n5A Idle(Low CH) + USB Cable 1 (Data Link with Notebook) + Battery 1 + H-Pattern + SIM 1 |

| | |
|---|---|
| Radiated Emissions | Mode 1: GSM 850 Idle(Middle CH) + USB Cable 1(Charging from Adapter 1) + Battery 1 + Camera(Rear) + SIM 1<br>Mode 2: WCDMA Band 5 Idle(Low CH) + USB Cable 1(Charging from Adapter 1) + Battery 1 + Camera(Front) + SIM 1<br>Mode 3: LTE Band 12 Idle(Middle CH) + USB Cable 1(Charging from Adapter 1) + Battery 1 + MPEG4(Colur bar) + SIM 1<br>Mode 4: SA:N71 Idle(High CH) + USB Cable 1(Charging from Adapter 1) + Battery 1 + MPEG4(Colur bar) + SIM 1<br>Mode 5: NSA :ENDC_2A_n5A Idle(Low CH) + USB Cable 1 (Data Link with Notebook) + Battery 1 + H-Pattern + SIM 1<br>Mode 6: GSM 850 Idle(Middle CH) + Earphone + Battery 1 + MP3 + SIM 1 |

**Remark:**

1. For AC conduction item, Mode 1~4 are tested as soon as the EUT powered on (cold status), Mode 5~8 are tested after EUT charged for five minutes (warm status).
2. The worst case of AC is mode 9; only the test data of this mode is reported.
3. The worst case of RE is mode 5; only the test data of this mode is reported.
4. Data Link with Notebook means data application transferred mode between EUT and Notebook.
5. Pre-scanned Low/Middle/High channel for all frequency bands which operate within the frequency range of 30MHz ~ 960MHz, only the worst channel was recorded in this report.

## 2.2. Connection Diagram of Test System




This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

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

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

| Item | Equipment | Trade Name | Model Name | FCC ID | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| 1. | Base Station(5G) | Anritsu | MT8000A | N/A | N/A | Unshielded,1.8m |
| 2. | Base Station(LTE) | Anritsu | MT8820C | N/A | N/A | Unshielded,1.8m |
| 3. | Base Station | Anritsu | MT8821C | N/A | N/A | Unshielded,1.8m |
| 4. | WLAN AP | Dlink | DIR-820L | KA2IR820LA1 | N/A | Unshielded,1.8m |
| 5. | WLAN AP | ASUSTek | RT-AC66U | MSQ-RTAC66U | N/A | Unshielded,2.7m with Core |
| 6. | Notebook | DELL | Inspiron 15-7570 | Fcc DoC | N/A | shielded cable DC O/P 1.8m<br>Unshielded AC I/P cable 1.8m |
| 7. | NOTE BOOK | Lenovo | E540 | FCC DoC | N/A | AC I/P：Unshielded, 1.2m<br>DC O/P：Shielded, 1.8m |
| 8. | IPod | Apple | MC525 ZP/A | Fcc DoC | Shielded, 1.0m | N/A |
| 9. | IPod | apple | MC69029/A | N/A | N/A | N/A |

## 2.4. EUT Operation Test Setup

The EUT was in GSM or WCDMA or LTE or 5G NR 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 notebook and EUT via USB cable.
2. Turn on camera to capture images.
3. Turn on MPEG4 function.
4. Execute "Music Player" to play MP3 file.
5. Execute "H Pattern" to show H Pattern via USB Cable on the Notebook.

# 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.

**<Class B Limit>**

| 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.

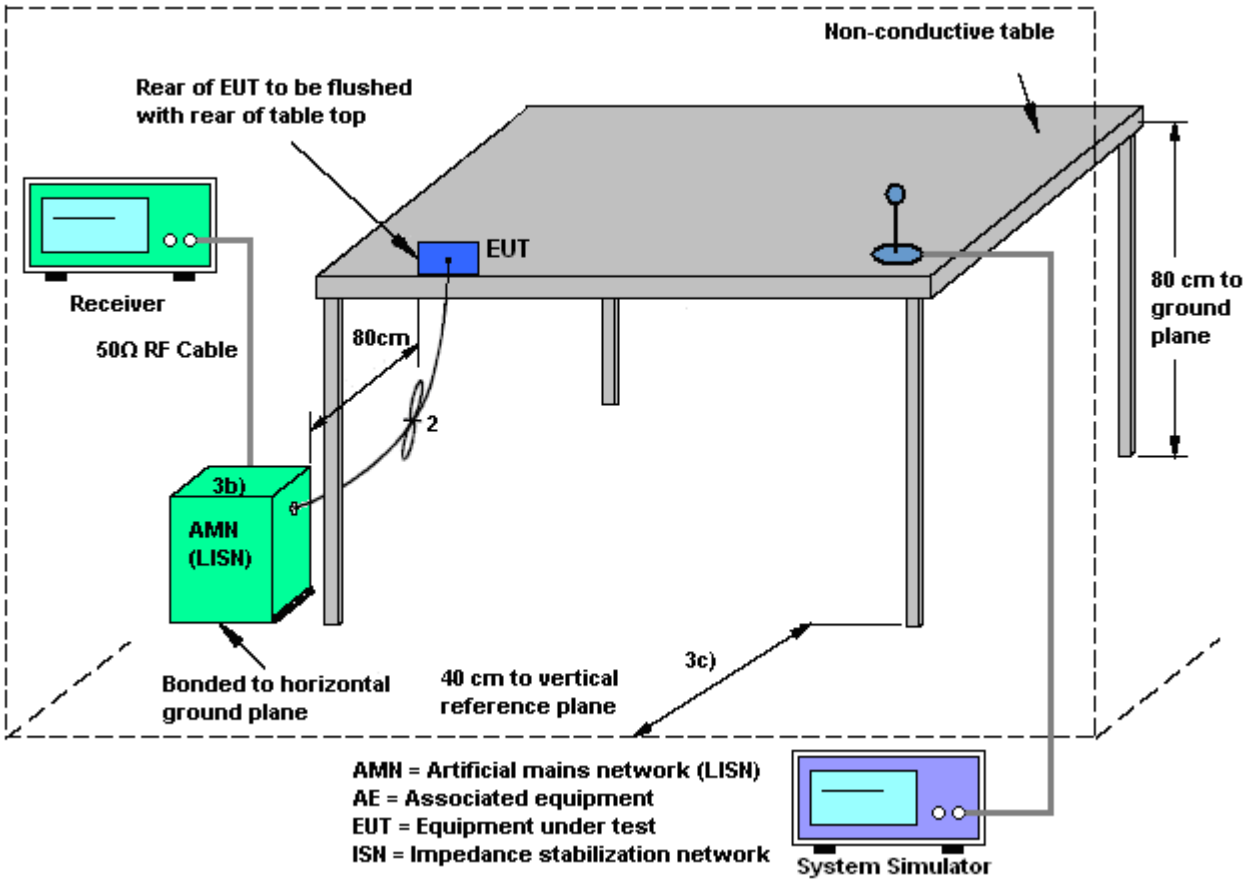
### 3.1.2 Measuring Instruments

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

### 3.1.3 Test Procedure

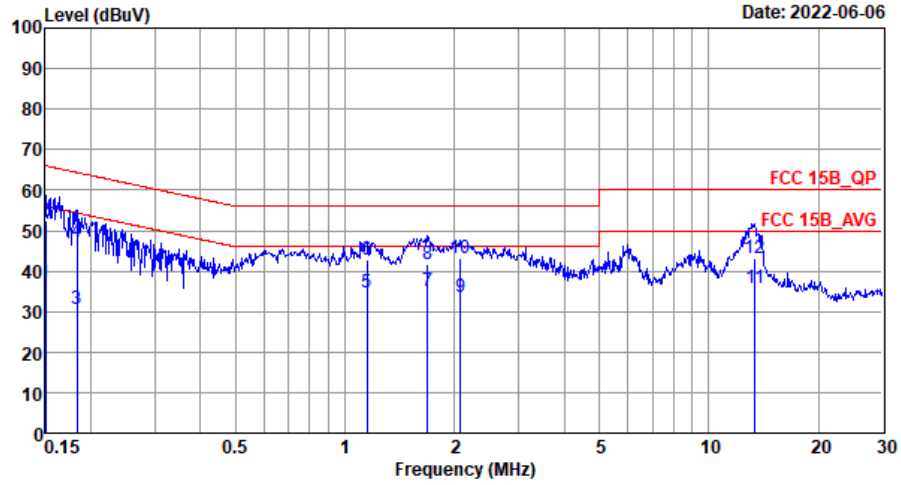
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.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

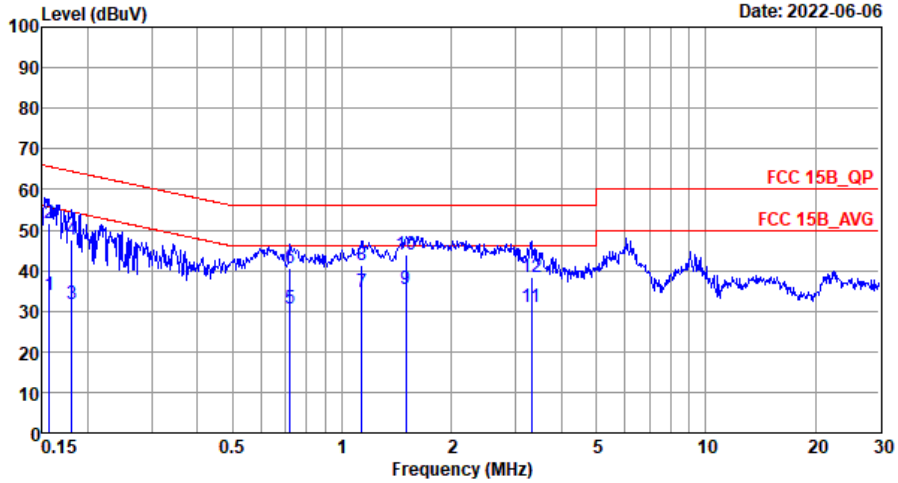
| | | | |
|---|---|---|---|
| **Test Engineer :** | Lily Li | **Temperature :** | 22~25℃ |
| | | **Relative Humidity :** | 50~55% |
| **Test Voltage :** | 120Vac / 60Hz | **Phase :** | Line |
| **Remark :** | All emissions not reported here are more than 10 dB below the prescribed limit. | | |




Site : CO01-SZ
Condition: FCC 15B QP LISN 20210901_L LINE

| | | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | | 0.15 | 37.35 | -18.65 | 56.00 | 16.30 | 10.20 | 10.85 | Average |
| 2 | | 0.15 | 52.55 | -13.45 | 66.00 | 31.50 | 10.20 | 10.85 | QP |
| 3 | | 0.18 | 30.65 | -23.68 | 54.33 | 10.10 | 10.20 | 10.35 | Average |
| 4 | | 0.18 | 47.05 | -17.28 | 64.33 | 26.50 | 10.20 | 10.35 | QP |
| 5 | | 1.15 | 34.87 | -11.13 | 46.00 | 14.50 | 10.14 | 10.23 | Average |
| 6 | | 1.15 | 42.67 | -13.33 | 56.00 | 22.30 | 10.14 | 10.23 | QP |
| 7 | * | 1.69 | 35.24 | -10.76 | 46.00 | 14.90 | 10.10 | 10.24 | Average |
| 8 | | 1.69 | 41.64 | -14.36 | 56.00 | 21.30 | 10.10 | 10.24 | QP |
| 9 | | 2.08 | 33.60 | -12.40 | 46.00 | 13.30 | 10.06 | 10.24 | Average |
| 10 | | 2.08 | 43.10 | -12.90 | 56.00 | 22.80 | 10.06 | 10.24 | QP |
| 11 | | 13.41 | 35.78 | -14.22 | 50.00 | 15.59 | 9.86 | 10.33 | Average |
| 12 | | 13.41 | 43.28 | -16.72 | 60.00 | 23.09 | 9.86 | 10.33 | QP |

| | | | |
|---|---|---|---|
| **Test Engineer :** | Lily Li | **Temperature :** | 22~25℃ |
| | | **Relative Humidity :** | 50~55% |
| **Test Voltage :** | 120Vac / 60Hz | **Phase :** | Neutral |
| **Remark :** | All emissions not reported here are more than 10 dB below the prescribed limit. | | |




Site : CO01-SZ
Condition: FCC 15B_QP LISN_20210901_N NEUTRAL

| | | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | | 0.16 | 33.86 | -21.79 | 55.65 | 12.80 | 10.31 | 10.75 | Average |
| 2 | | 0.16 | 51.56 | -14.09 | 65.65 | 30.50 | 10.31 | 10.75 | QP |
| 3 | | 0.18 | 31.78 | -22.68 | 54.46 | 11.10 | 10.29 | 10.39 | Average |
| 4 | | 0.18 | 47.48 | -16.98 | 64.46 | 26.80 | 10.29 | 10.39 | QP |
| 5 | | 0.72 | 30.53 | -15.47 | 46.00 | 9.30 | 10.22 | 11.01 | Average |
| 6 | | 0.72 | 40.53 | -15.47 | 56.00 | 19.30 | 10.22 | 11.01 | QP |
| 7 | | 1.14 | 34.57 | -11.43 | 46.00 | 14.10 | 10.24 | 10.23 | Average |
| 8 | | 1.14 | 41.37 | -14.63 | 56.00 | 20.90 | 10.24 | 10.23 | QP |
| 9 | * | 1.50 | 35.38 | -10.62 | 46.00 | 14.90 | 10.24 | 10.24 | Average |
| 10 | | 1.50 | 43.78 | -12.22 | 56.00 | 23.30 | 10.24 | 10.24 | QP |
| 11 | | 3.31 | 30.88 | -15.12 | 46.00 | 10.50 | 10.14 | 10.24 | Average |
| 12 | | 3.31 | 38.28 | -17.72 | 56.00 | 17.90 | 10.14 | 10.24 | QP |

Note:

1. Level(dBμV) = Read Level(dBμV) + LISN Factor(dB) + Cable Loss(dB)
2. Over Limit(dB) = Level(dBμV) – Limit Line(dBμV)

# 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:

**<Class B Limit>**

| 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

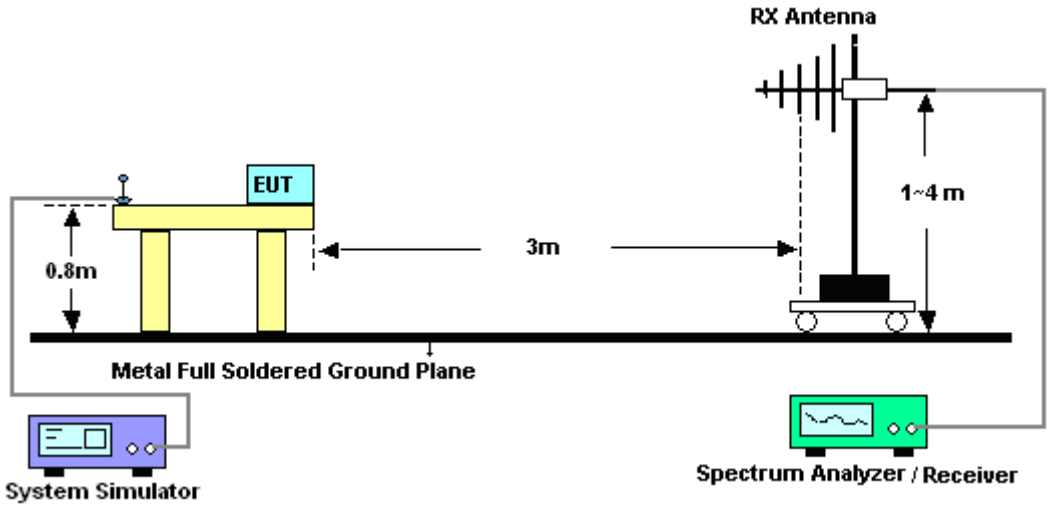
The measuring equipment is listed in the section 4 of this test report.

### 3.2.3. Test Procedures

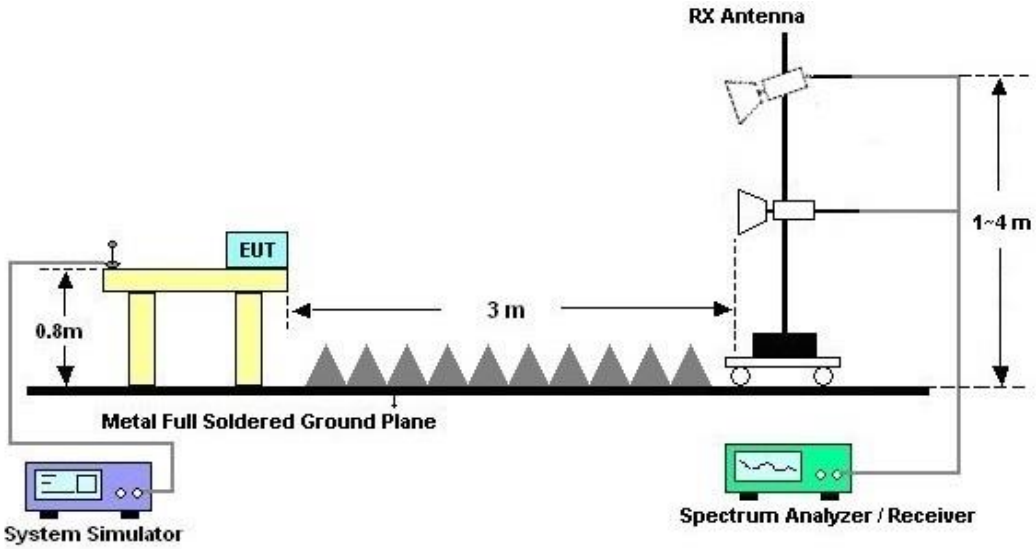
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna 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
10. Exploratory radiated emissions testing of handheld and/or body-worn devices shall include rotation of the EUT through three orthogonal axes (X/Y/Z Plane) to determine the orientation (attitude) that maximizes the emissions.

## 3.2.4. Test Setup of Radiated Emission

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

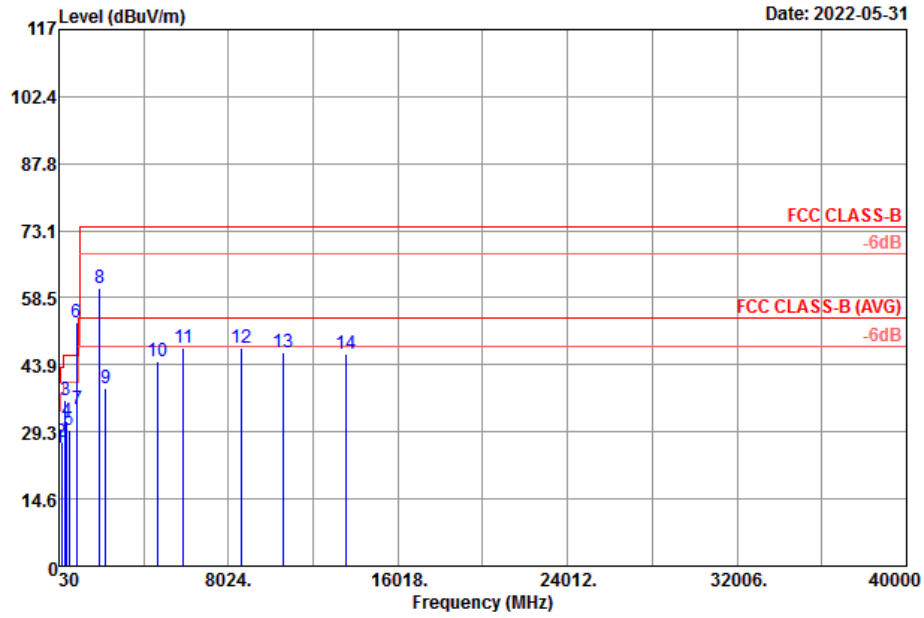



**For radiated emissions above 1GHz**



## 3.2.5. Test Result of Radiated Emission

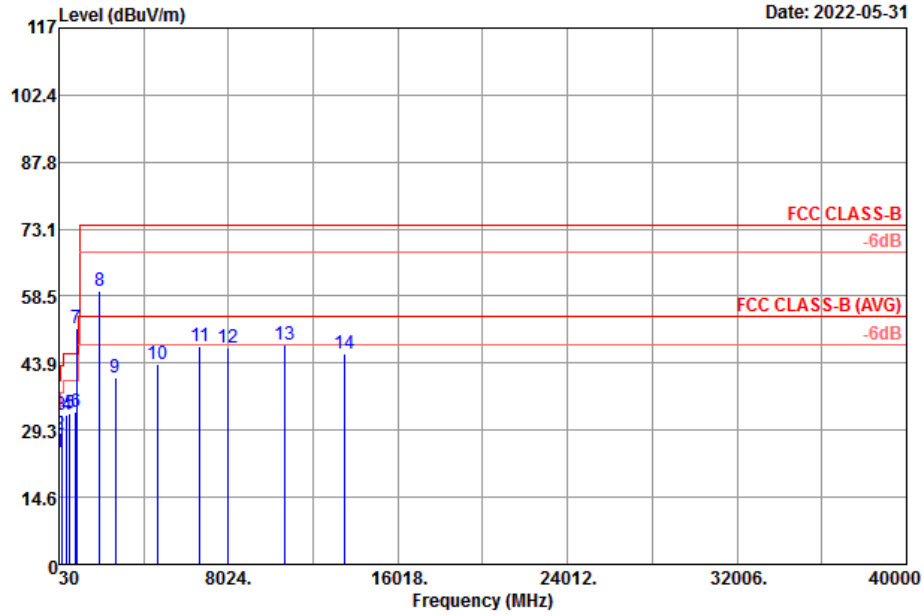
| | | | |
|---|---|---|---|
| **Test Engineer :** | Kuang Jia | **Temperature :** | 24~25°C |
| | | **Relative Humidity :** | 48~49% |
| **Test Distance :** | 3m | **Polarization :** | Horizontal |
| **Remark :** | #6 & #8 are ENDC RF signal which can be ignored. | | |




Site : 03CH04-SZ
Condition : FCC CLASS-B 3m LF_ANT_41909_22 HORIZONTAL

| | | 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 | | 30.97 | 25.70 | -14.30 | 40.00 | 32.27 | 25.29 | 0.54 | 32.40 | --- | --- | Peak |
| 2 | | 165.80 | 27.09 | -16.41 | 43.50 | 41.50 | 16.44 | 1.31 | 32.16 | --- | --- | Peak |
| 3 | | 312.27 | 36.32 | -9.68 | 46.00 | 46.07 | 20.10 | 1.85 | 31.70 | --- | --- | Peak |
| 4 | | 394.72 | 31.73 | -14.27 | 46.00 | 39.15 | 21.93 | 2.09 | 31.44 | --- | --- | Peak |
| 5 | | 499.48 | 29.54 | -16.46 | 46.00 | 34.23 | 24.18 | 2.33 | 31.20 | --- | --- | Peak |
| 6 | * | 874.00 | 52.99 | | | 52.28 | 29.06 | 3.10 | 31.45 | --- | --- | Peak |
| 7 | | 895.24 | 34.14 | -11.86 | 46.00 | 33.19 | 29.29 | 3.15 | 31.49 | --- | --- | Peak |
| 8 | | 1935.00 | 60.71 | | | 63.73 | 26.50 | 4.80 | 34.32 | --- | --- | Peak |
| 9 | | 2244.00 | 38.81 | -35.19 | 74.00 | 40.65 | 26.89 | 5.24 | 33.97 | --- | --- | Peak |
| 10 | | 4664.00 | 44.55 | -29.45 | 74.00 | 38.12 | 30.75 | 8.36 | 32.68 | --- | --- | Peak |
| 11 | | 5906.00 | 47.53 | -26.47 | 74.00 | 37.59 | 32.65 | 10.42 | 33.13 | --- | --- | Peak |
| 12 | | 8632.00 | 47.59 | -26.41 | 74.00 | 33.54 | 37.39 | 10.88 | 34.22 | --- | --- | Peak |
| 13 | | 10612.00 | 46.46 | -27.54 | 74.00 | 29.88 | 39.29 | 12.23 | 34.94 | --- | --- | Peak |
| 14 | | 13547.00 | 46.16 | -27.84 | 74.00 | 25.84 | 40.52 | 13.73 | 33.93 | --- | --- | Peak |

| | | | |
|---|---|---|---|
| **Test Engineer :** | Kuang Jia | **Temperature :** | 24~25°C |
| | | **Relative Humidity :** | 48~49% |
| **Test Distance :** | 3m | **Polarization :** | Vertical |
| **Remark :** | #7 & #8 are ENDC RF signal which can be ignored. | | |




Site : 03CH04-SZ
Condition : FCC CLASS-B 3m LF_ANT_41909_22 VERTICAL

| | | 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 | | 30.00 | 24.60 | -15.40 | 40.00 | 30.61 | 25.86 | 0.53 | 32.40 | --- | --- | Peak |
| 2 | | 64.92 | 28.43 | -11.57 | 40.00 | 47.73 | 12.29 | 0.81 | 32.40 | --- | --- | Peak |
| 3 | | 166.77 | 32.50 | -11.00 | 43.50 | 46.94 | 16.40 | 1.32 | 32.16 | --- | --- | Peak |
| 4 | | 403.45 | 32.52 | -13.48 | 46.00 | 39.64 | 22.16 | 2.11 | 31.39 | --- | --- | Peak |
| 5 | | 551.86 | 32.80 | -13.20 | 46.00 | 35.25 | 25.98 | 2.46 | 30.89 | --- | --- | Peak |
| 6 | | 831.22 | 33.09 | -12.91 | 46.00 | 32.61 | 28.83 | 3.01 | 31.36 | --- | --- | Peak |
| 7 | * | 874.00 | 51.39 | | | 50.68 | 29.06 | 3.10 | 31.45 | --- | --- | Peak |
| 8 | | 1935.00 | 59.63 | | | 62.65 | 26.50 | 4.80 | 34.32 | --- | --- | Peak |
| 9 | | 2688.00 | 40.77 | -33.23 | 74.00 | 41.09 | 27.58 | 5.65 | 33.55 | --- | --- | Peak |
| 10 | | 4694.00 | 43.76 | -30.24 | 74.00 | 37.09 | 30.81 | 8.58 | 32.72 | --- | --- | Peak |
| 11 | | 6664.00 | 47.54 | -26.46 | 74.00 | 35.81 | 34.80 | 10.96 | 34.03 | --- | --- | Peak |
| 12 | | 7990.00 | 47.36 | -26.64 | 74.00 | 33.43 | 37.19 | 11.15 | 34.41 | --- | --- | Peak |
| 13 | | 10650.00 | 47.89 | -26.11 | 74.00 | 31.23 | 39.33 | 12.26 | 34.93 | --- | --- | Peak |
| 14 | | 13499.00 | 46.05 | -27.95 | 74.00 | 25.84 | 40.44 | 13.71 | 33.94 | --- | --- | Peak |

Note:

1. Level(dBμV/m) = Read Level(dBμV) + Antenna Factor(dB/m) + Cable Loss(dB) - Preamp Factor(dB)
2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

# 4. List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| EMI Receiver | R&S | ESR7 | 101630 | 9kHz~7GHz; | Sep. 01, 2021 | Jun. 06, 2022 | Aug. 31, 2022 | Conduction (CO01-SZ) |
| AC LISN | R&S | ENV216 | 100063 | 9kHz~30MHz | Sep. 01, 2021 | Jun. 06, 2022 | Aug. 31, 2022 | Conduction (CO01-SZ) |
| AC LISN (for auxiliary equipment) | EMCO | 3816/2SH | 00103892 | 9kHz~30MHz | Oct. 29, 2021 | Jun. 06, 2022 | Oct. 28, 2022 | Conduction (CO01-SZ) |
| AC Power Source | Chroma | 61602 | 616020000891 | 100Vac~250Vac | Jul. 14, 2021 | Jun. 06, 2022 | Jul. 13, 2022 | Conduction (CO01-SZ) |
| EMI Test Receiver | R&S | ESR7 | 101404 | 9kHz~7GHz | Oct. 22,2021 | May 31, 2022 | Oct. 21, 2022 | Radiation (03CH04-SZ) |
| EXA Spectrum Analyzer | KEYSIGHT | N9010A | MY55150213 | 10Hz~44GHz | Jul. 20, 2021 | May 31, 2022 | Jul. 19, 2022 | Radiation (03CH04-SZ) |
| Bilog Antenna | TeseQ | CBL6111D | 41909 | 30MHz~1GHz | Oct. 22, 2021 | May 31, 2022 | Oct. 21, 2022 | Radiation (03CH04-SZ) |
| LF Amplifier | Burgeon | BPA-530 | 102211 | 0.01Hz ~3000MHz | Oct. 22, 2021 | May 31, 2022 | Oct. 21, 2022 | Radiation (03CH04-SZ) |
| Double Ridge Horn Antenna | SCHWARZBECK | BBHA9120D | 9120D-1474 | 1GHz~18GHz | Jul. 15, 2021 | May 31, 2022 | Jul. 14, 2022 | Radiation (03CH04-SZ) |
| Horn Antenna | SCHWARZBECK | BBHA9170 | 9170#679 | 15GHz~40GHz | Jul. 25, 2021 | May 31, 2022 | Jul. 24, 2022 | Radiation (03CH04-SZ) |
| Amplifier | Burgeon | BPA-530 | 102211 | 0.01Hz ~3000MHz | Oct. 22,2021 | May 31, 2022 | Oct. 21,2022 | Radiation (03CH04-SZ) |
| HF Amplifier | MITEQ | AMF-7D-00101800-30-10P-R | 1943528 | 1GHz~18GHz | Oct. 22, 2021 | May 31, 2022 | Oct. 21, 2022 | Radiation (03CH04-SZ) |
| Amplifier | Agilent Technologies | 83017A | MY53270156 | 500MHz~26.5GHz | Oct. 22,2021 | May 31, 2022 | Oct. 21,2022 | Radiation (03CH04-SZ) |
| HF Amplifier | MITEQ | TTA1840-35-HG | 1871923 | 18GHz~40GHz | Jul. 20, 2021 | May 31, 2022 | Jul. 19, 2022 | Radiation (03CH04-SZ) |
| AC Power Source | Chroma | 61601 | N/A | N/A | NCR | May 31, 2022 | NCR | Radiation (03CH04-SZ) |
| Turn Table | EM | EM1000 | N/A | 0~360 degree | NCR | May 31, 2022 | NCR | Radiation (03CH04-SZ) |
| Antenna Mast | EM | EM1000 | N/A | 1 m~4 m | NCR | May 31, 2022 | NCR | Radiation (03CH04-SZ) |

# 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))** | **2.2 dB** |

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

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **5.1 dB** |

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

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **4.8 dB** |

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

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **5.1 dB** |