



# FCC Test Report

APPLICANT : Bullitt Group  
EQUIPMENT : Rugged Smart Phone  
BRAND NAME : CAT  
MODEL NAME : S42  
FCC ID : ZL5S42E  
STANDARD : 47 CFR Part 15 Subpart B  
CLASSIFICATION : Certification

The product was received on Dec. 23, 2019 and testing was completed on Feb. 16, 2020. We, Sporton International (Shenzhen) 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 (Shenzhen) Inc., the test report shall not be reproduced except in full.

Reviewed by: Derreck Chen / Supervisor

Approved by: Eric Shih / Manager



**Sporton International (ShenZhen) Inc.**

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People's Republic of China



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## REVISION HISTORY

| REPORT NO.  | VERSION | DESCRIPTION             | ISSUED DATE   |
|-------------|---------|-------------------------|---------------|
| FC9D2309-01 | Rev. 01 | Initial issue of report | Apr. 30, 2020 |
|             |         |                         |               |
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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<br>3.83 dB at<br>0.500 MHz                     |
| 3.2            | 15.109   | Radiated Emission     | < 15.109 limits | PASS   | Under limit<br>3.30 dB at<br>256.010 MHz<br>for Quasi-Peak |

**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

**Bullitt Group**

One Valpy, Valpy Street, Reading, Berkshire, England RG1 1AR

### 1.2. Manufacturer

**Bullitt Group**

One Valpy, Valpy Street, Reading, Berkshire, England RG1 1AR

### 1.3. Product Feature of Equipment Under Test

| Product Feature                 |                                                                                                                                                                        |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Equipment                       | Rugged Smart Phone                                                                                                                                                     |
| Brand Name                      | CAT                                                                                                                                                                    |
| Model Name                      | S42                                                                                                                                                                    |
| FCC ID                          | ZL5S42E                                                                                                                                                                |
| EUT supports Radios application | GSM/WCDMA/LTE/NFC<br>WLAN 2.4GHz 802.11b/g/n HT20<br>WLAN 5GHz 802.11a/n HT20/HT40<br>WLAN 5GHz 802.11ac VHT20/VHT40/VHT80<br>Bluetooth BR/EDR/LE<br>GNSS/ FM Receiver |
| IMEI Code                       | Conduction: 354401110003003/354401110010008<br>Radiation: 354401110002591/354401110009596                                                                              |
| 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. There are two type of EUT, the difference is the SIM slot, the others are the same, so we choose the dual sim slots for full test.

## 1.4. Product Specification of Equipment Under Test

| Standards-related Product Specification |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Tx Frequency</b>                     | 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>802.11b/g/n: 2412 MHz ~ 2462 MHz<br>802.11a/n/ac: 5180 MHz ~ 5240 MHz;<br>5260 MHz ~ 5320 MHz;<br>5500 MHz ~ 5700 MHz<br>5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 MHz<br>NFC : 13.56 MHz                                                         |
| <b>Rx Frequency</b>                     | 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>802.11b/g/n: 2412 MHz ~ 2462 MHz<br>802.11a/n/ac: 5180 MHz ~ 5240 MHz;<br>5260 MHz ~ 5320 MHz;<br>5500 MHz ~ 5700 MHz<br>5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 MHz<br>GNSS : 1559 MHz ~ 1610 MHz<br>NFC : 13.56 MHz<br>FM : 88 MHz ~ 108 MHz |
| <b>Antenna Type</b>                     | WWAN : LDS Antenna<br>WLAN : IFA Antenna<br>Bluetooth : IFA Antenna<br>GNSS: IFA Antenna<br>NFC : LOOP Antenna<br>FM : External Earphone Antenna                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Type of Modulation</b>               | GSM: GMSK<br>GPRS: GMSK<br>EDGE(MCS 0-4): GMSK / (MCS 5-9): 8PSK<br>WCDMA : BPSK<br>HSDPA/DC-HSDPA : QPSK<br>HSUPA : QPSK<br>HSPA+ : 16QAM<br>DC-HSDPA : 64QAM<br>LTE: QPSK / 16QAM / 64QAM<br>802.11b : DSSS (DBPSK / DQPSK / CCK)                                                                                                                                                                                                                                                                                                                                                                                     |

|  |                                                                                                                                                                                                                          |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 802.11a/g/n/ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)<br>Bluetooth LE : GFSK<br>Bluetooth (1Mbps) : GFSK<br>Bluetooth (2Mbps) : $\pi/4$ -DQPSK<br>Bluetooth (3Mbps) : 8-DPSK<br>GNSS : BPSK<br>NFC: ASK<br>FM: FM |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 1.5. Modification of EUT

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

## 1.6. Test Location

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

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

|                           |                                                                                                                                                              |                            |                                       |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------------------------|
| <b>Test Firm</b>          | Sporton International (Shenzhen) Inc.                                                                                                                        |                            |                                       |
| <b>Test Site Location</b> | No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse,<br>Nanshan Shenzhen, 518055 People's Republic of China<br>TEL: +86-755-33202398 |                            |                                       |
| <b>Test Site No.</b>      | <b>Sporton Site No.</b>                                                                                                                                      | <b>FCC Designation No.</b> | <b>FCC Test Firm Registration No.</b> |
|                           | 03CH01-SZ                                                                                                                                                    | CN1256                     | 421272                                |

## 1.7. Test Software

| Item | Site      | Manufacture | Name | Version     |
|------|-----------|-------------|------|-------------|
| 1.   | 03CH01-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

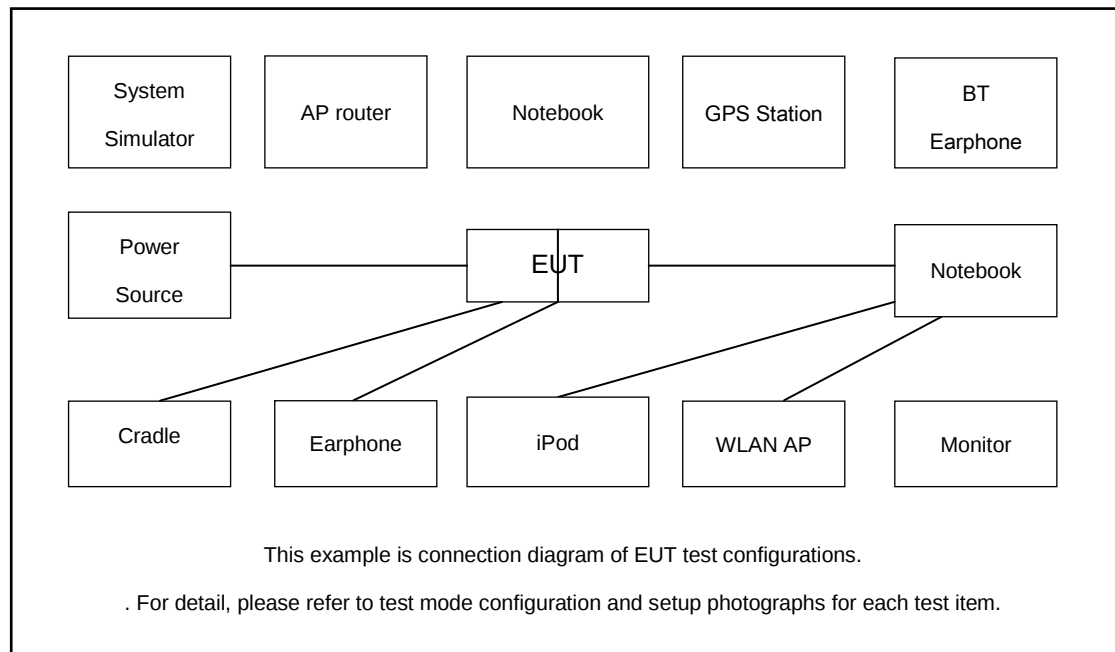
The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (30MHz to the 5th harmonic of the highest fundamental 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) + Earphone 1 + Battery + BT Idle + WLAN Idle(2.4G) + Camera(Rear) + SD Card Load for SIM 1         |
|                       | Mode 2: GSM 1900 Idle(Middle CH) + USB Cable 1(Charging from Adapter) + Earphone 1 + Battery + BT Idle + WLAN Idle(5G) + Camera(Front) + SD Card Load for SIM 2         |
|                       | Mode 3: WCDMA Band II Idle(Low CH) + USB Cable 1(Charging from Adapter) + Earphone 1 + Battery + BT Idle + WLAN Idle(2.4G) + MPEG4(Colour bar) + SD Card Link for SIM 1 |
|                       | Mode 4: WCDMA Band IV Idle(Low CH) + USB Cable 1(Charging from Adapter) + Earphone 1 + Battery + BT Idle + WLAN Idle(5G) + NFC On + SD Card Load for SIM 2              |
|                       | Mode 5: LTE Band 2 Idle(High CH) + USB Cable 1(Charging from Adapter) + Earphone 1 + Battery + BT Idle + WLAN Idle(2.4G) + GNSS RX + SD Card Load for SIM 1             |
|                       | Mode 6: LTE Band 4 Idle(Middle CH) + USB Cable 1(Charging from Adapter) + Earphone 1 + Battery + BT Idle + WLAN Idle(5G) + H-Pattern + SD Card Load for SIM 2           |
|                       | Mode 7: LTE Band 5 Idle(High CH) + USB Cable 1(Charging from Adapter) + Earphone 1 + Battery + BT Idle + WLAN Idle(5G) + FM Rx(98MHz) + SD Card Load for SIM 1          |
|                       | Mode 8: LTE Band 7 Idle(Low CH) + USB Cable 1(Charging from Adapter) + Earphone 2 + Battery + BT Idle + WLAN Idle(5G) + FM Rx(98MHz) + SD Card Load for SIM 2           |
|                       | Mode 9: WCDMA Band IV Idle(Low CH) + USB Cable 1(Charging from Adapter) + Earphone 1 + Battery + BT Idle + WLAN Idle(5G) + NFC On + SD Card Load for SIM 1              |
|                       | Mode 10 : GSM 850 Idle(Middle CH) + USB Cable 1(Data Link with Notebook) + Earphone 1 + Battery + BT Idle + WLAN Idle(2.4G) + SD Card Link for SIM 1                    |
|                       | Mode 11 : GSM 850 Idle(Middle CH) + USB Cable 2(Data Link with Notebook) + Earphone 1 + Battery + BT Idle + WLAN Idle(2.4G) + SD Card Link for SIM 1                    |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Radiated Emissions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p>Mode 1 : GSM 850 Idle(Middle CH) + USB Cable 1(Charging from Adapter) + Earphone 1 + Battery + BT Idle + WLAN Idle(2.4G) + Camera(Rear) + SD Card Load for SIM 1</p> <p>Mode 2 : GSM 1900 Idle(Middle CH) + USB Cable 1(Charging from Adapter) + Earphone 1 + Battery + BT Idle + WLAN Idle(5G) + Camera(Front) + SD Card Load for SIM 2</p> <p>Mode 3 : WCDMA Band II Idle(Low CH) + USB Cable 1(Charging from Adapter) + Earphone 1 + Battery + BT Idle + WLAN Idle(2.4G) + MPEG4(Colur bar) + SD Card Link for SIM 1</p> <p>Mode 4 : WCDMA Band IV Idle(Low CH) + USB Cable 1(Charging from Adapter) + Earphone 1 + Battery + BT Idle + WLAN Idle(5G) + NFC On + SD Card Load for SIM 2</p> <p>Mode 5 : LTE Band 2 Idle(High CH) + USB Cable 1(Charging from Adapter) + Earphone 1 + Battery + BT Idle + WLAN Idle(2.4G) + GNSS RX + SD Card Load for SIM 1</p> <p>Mode 6 : LTE Band 4 Idle(Middle CH) + USB Cable 1(Charging from Adapter) + Earphone 1 + Battery + BT Idle + WLAN Idle(5G) + H-Pattern + SD Card Load for SIM 2</p> <p>Mode 7 : LTE Band 5 Idle(High CH) + USB Cable 1(Charging from Adapter) + Earphone 1 + Battery + BT Idle + WLAN Idle(5G) + FM Rx(98MHz) + SD Card Load for SIM 1</p> <p>Mode 8 : LTE Band 7 Idle(Low CH) + USB Cable 1(Charging from Adapter) + Earphone 2 + Battery + BT Idle + WLAN Idle(5G) + FM Rx(98MHz) + SD Card Load for SIM 2</p> <p>Mode 9 : LTE Band 5 Idle(High CH) + USB Cable 2(Charging from Adapter) + Earphone 1 + Battery + BT Idle + WLAN Idle(5G) + NFC On + SD Card Load for SIM 1</p> <p>Mode 10 : GSM 850 Idle(Middle CH) + USB Cable 1(Data Link with Notebook) + Earphone 1 + Battery + BT Idle + WLAN Idle(2.4G) + SD Card Link for SIM 1</p> <p>Mode 11 : GSM 850 Idle(Middle CH) + USB Cable 2(Data Link with Notebook) + Earphone 1 + Battery + BT Idle + WLAN Idle(2.4G) + SD Card Link for SIM 1</p> |
| <b>Remark:</b> <ol style="list-style-type: none"> <li>1. The worst case of AC is mode 4; only the test data of this mode is reported.</li> <li>2. The worst case of RE is mode 11; only the test data of this mode is reported.</li> <li>3. Data Link with Notebook means data application transferred mode between EUT and Notebook.</li> <li>4. Pre-scanned Low/Middle/High channel for GSM 850/1900/WCDMA Band II/IV/LTE Band 2/4/5/7 and FM Rx, the worst channel was recorded in this report.</li> </ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## 2.2.Connection Diagram of Test System



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         | Anritsu    | MT8820C        | N/A                  | N/A            | Shielded, 1.5m                                             |
| 2.   | LABSAT GPS Simulator | RACELOGIC  | RLLS03-2P      | N/A                  | N/A            | Unshielded,1.8m                                            |
| 3.   | Labsat               | RACELOGIC  | 18645          | N/A                  | N/A            | Unshielded,1.8m                                            |
| 4.   | Bluetooth Earphone   | Samsung    | EO-MG900       | N/A                  | N/A            | N/A                                                        |
| 5.   | WLAN AP              | D-Link     | DIR-820L       | KA2IR820LA1          | N/A            | Unshielded,1.8m                                            |
| 6.   | FM Station           | R&S        | SMB100A        | N/A                  | N/A            | Unshielded,1.8m                                            |
| 7.   | WLAN AP              | ASUSTek    | RT-AC66U       | MSQ-RTAC66U          | N/A            | Unshielded,2.7m with Core                                  |
| 8.   | Notebook             | Lenovo     | E540           | Fcc DoC              | N/A            | shielded cable DC O/P 1.8m<br>Unshielded AC I/P cable 1.8m |
| 9.   | iPod                 | apple      | MC69029/A      | Fcc DoC              | Shielded, 1.0m | N/A                                                        |
| 10.  | Earphone             | apple      |                | DCAY1V-A9007ZJW3-000 | N/A            | N/A                                                        |
| 11.  | SD Card              | N/A        | MicroSD HC     | FCC DoC              | N/A            | N/A                                                        |
| 12.  | SD Card              | Kingston   | 3300-10000-078 | Fcc DoC              | N/A            | SD Card                                                    |



## **2.4. EUT Operation Test Setup**

The EUT was in GSM or CDMA 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 GNSS function to make the EUT receive continuous signals from GNSS station.
3. Turn on camera to capture images.
4. Turn on MPEG4 function.
5. Turn on FM function.
6. Turn on 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.

<Class B Limit>

| Frequency of emission<br>(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.

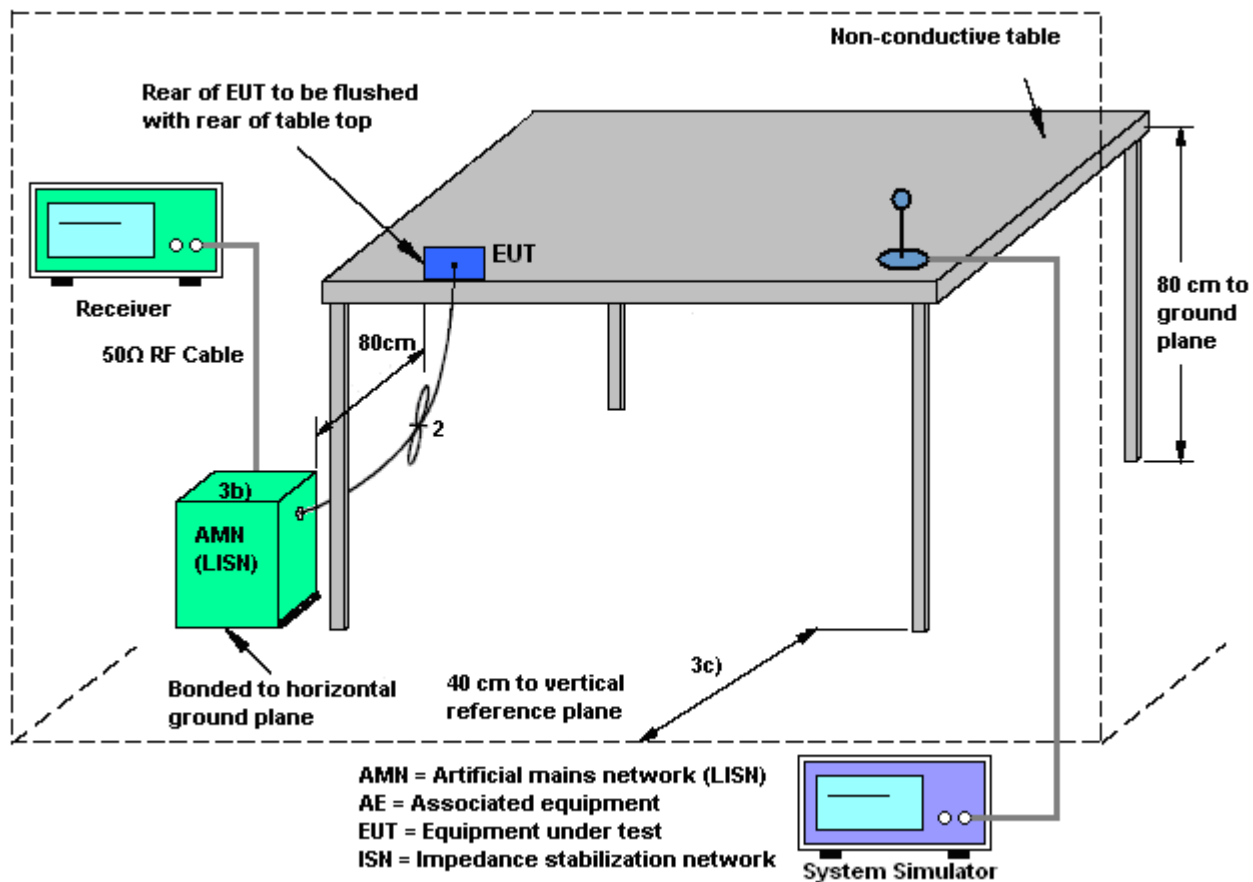
##### 3.1.2 Measuring Instruments

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.

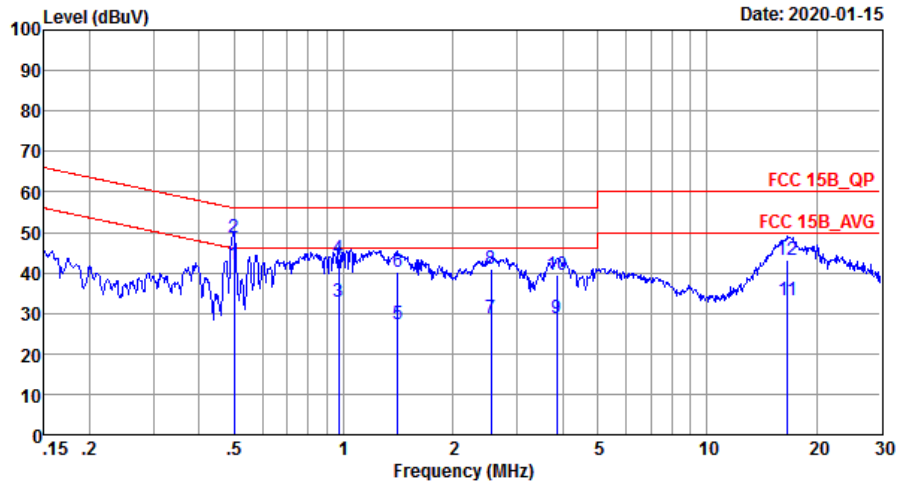
### 3.1.4 Test Setup





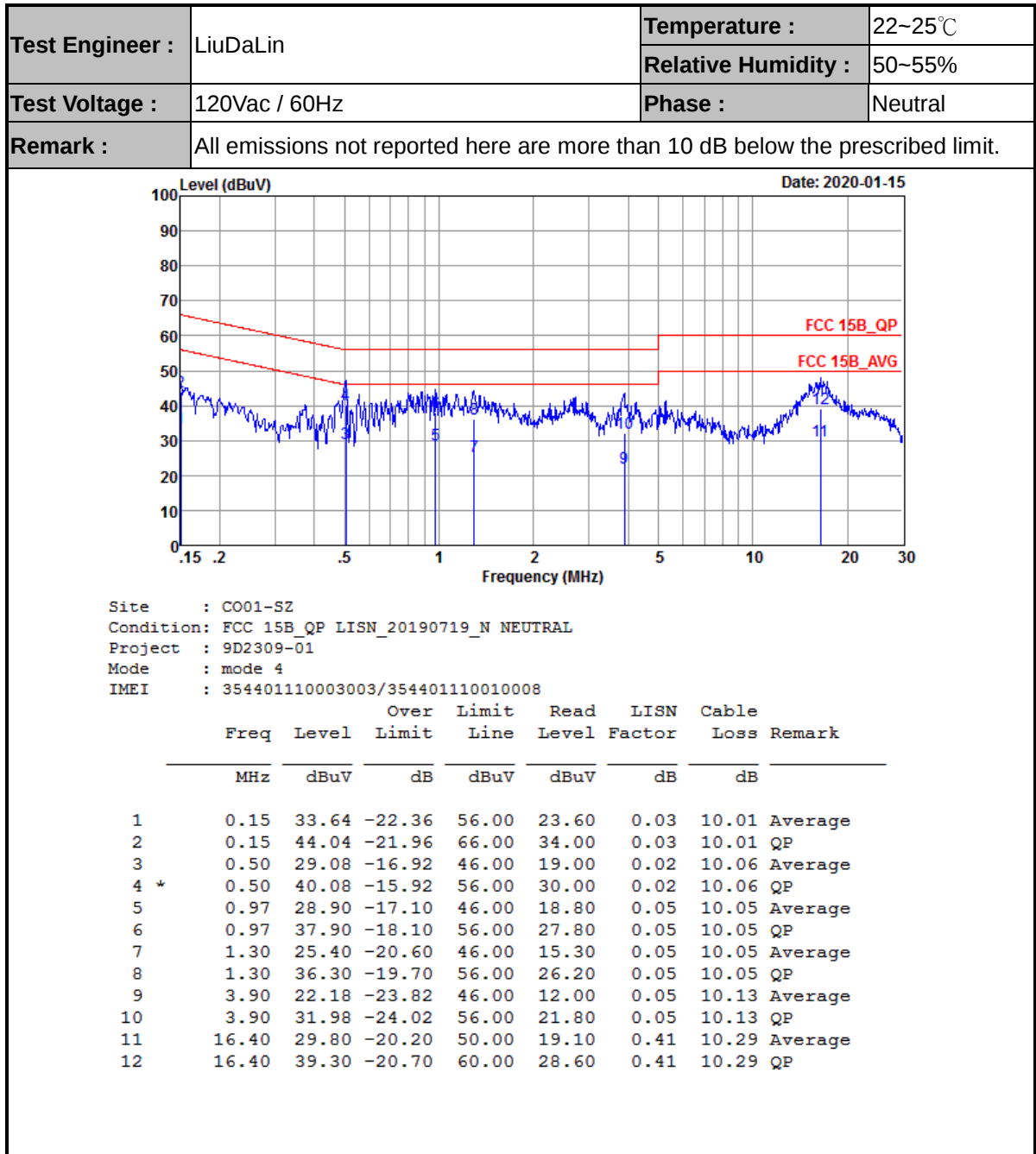
## 3.1.5 Test Result of AC Conducted Emission

|                 |                                                                                 |                     |        |
|-----------------|---------------------------------------------------------------------------------|---------------------|--------|
| Test Engineer : | LiuDaLin                                                                        | 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\_20190719\_L LINE  
Project : 9D2309-01  
Mode : mode 4  
IMEI : 354401110003003/354401110010008

|     | Freq  | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark  |
|-----|-------|-------|------------|------------|------------|-------------|------------|---------|
|     | MHz   | dBuV  | dB         | dBuV       | dBuV       | dB          | dB         |         |
| 1 * | 0.50  | 42.18 | -3.83      | 46.01      | 32.10      | 0.02        | 10.06      | Average |
| 2   | 0.50  | 48.88 | -7.13      | 56.01      | 38.80      | 0.02        | 10.06      | QP      |
| 3   | 0.97  | 32.82 | -13.18     | 46.00      | 22.70      | 0.07        | 10.05      | Average |
| 4   | 0.97  | 43.62 | -12.38     | 56.00      | 33.50      | 0.07        | 10.05      | QP      |
| 5   | 1.41  | 27.14 | -18.86     | 46.00      | 17.00      | 0.09        | 10.05      | Average |
| 6   | 1.41  | 40.14 | -15.86     | 56.00      | 30.00      | 0.09        | 10.05      | QP      |
| 7   | 2.54  | 28.81 | -17.19     | 46.00      | 18.60      | 0.14        | 10.07      | Average |
| 8   | 2.54  | 41.01 | -14.99     | 56.00      | 30.80      | 0.14        | 10.07      | QP      |
| 9   | 3.86  | 28.80 | -17.20     | 46.00      | 18.51      | 0.17        | 10.12      | Average |
| 10  | 3.86  | 39.30 | -16.70     | 56.00      | 29.01      | 0.17        | 10.12      | QP      |
| 11  | 16.66 | 33.27 | -16.73     | 50.00      | 22.20      | 0.78        | 10.29      | Average |
| 12  | 16.66 | 43.17 | -16.83     | 60.00      | 32.10      | 0.78        | 10.29      | 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<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(meters) |
|--------------------|--------------------------------------|----------------------------------|
| 30 – 88            | 100                                  | 3                                |
| 88 – 216           | 150                                  | 3                                |
| 216 - 960          | 200                                  | 3                                |
| Above 960          | 500                                  | 3                                |

### 3.2.2. Measuring Instruments

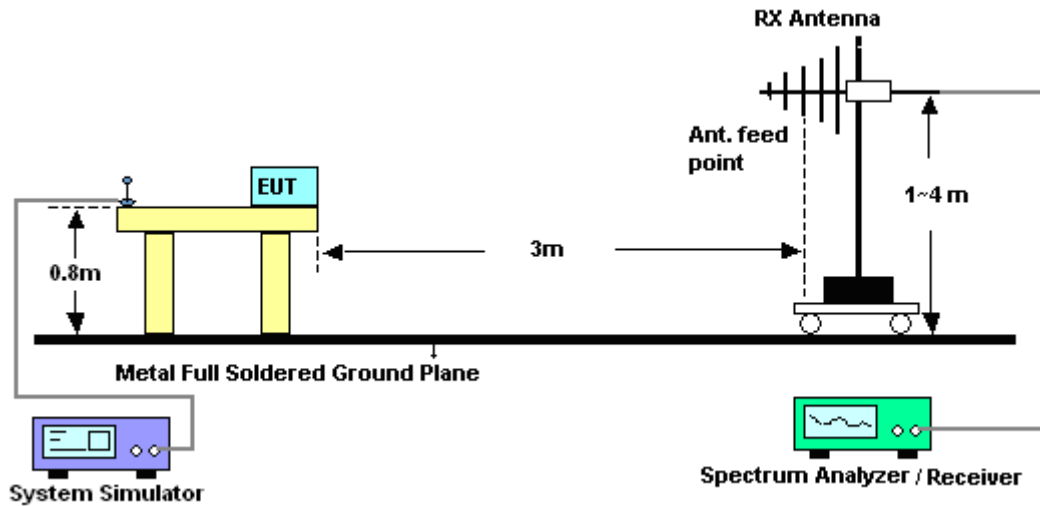
The measuring equipment is listed in the section 4 of this test report.

### 3.2.3. Test Procedures

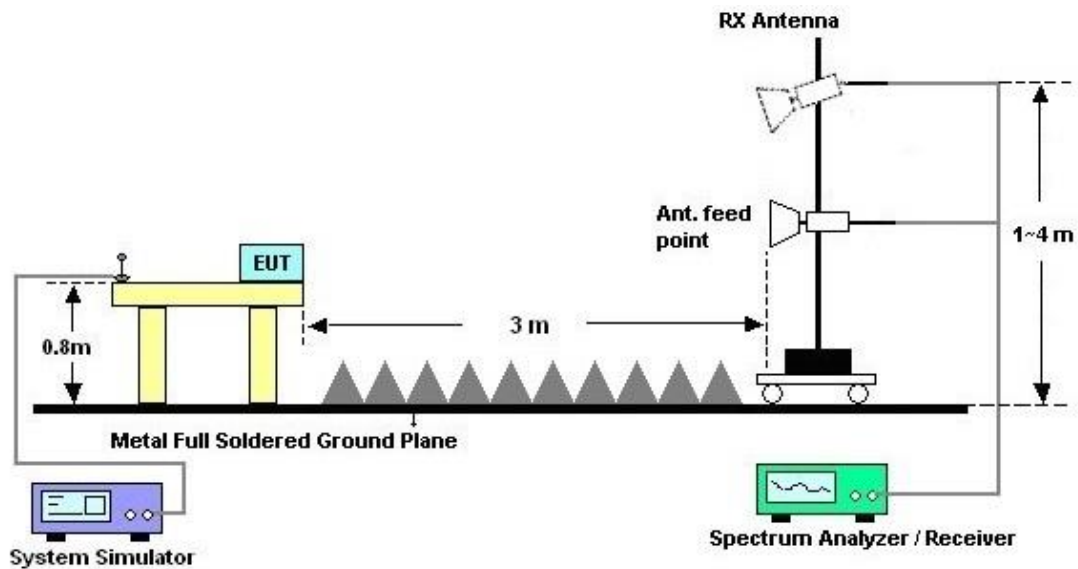
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna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

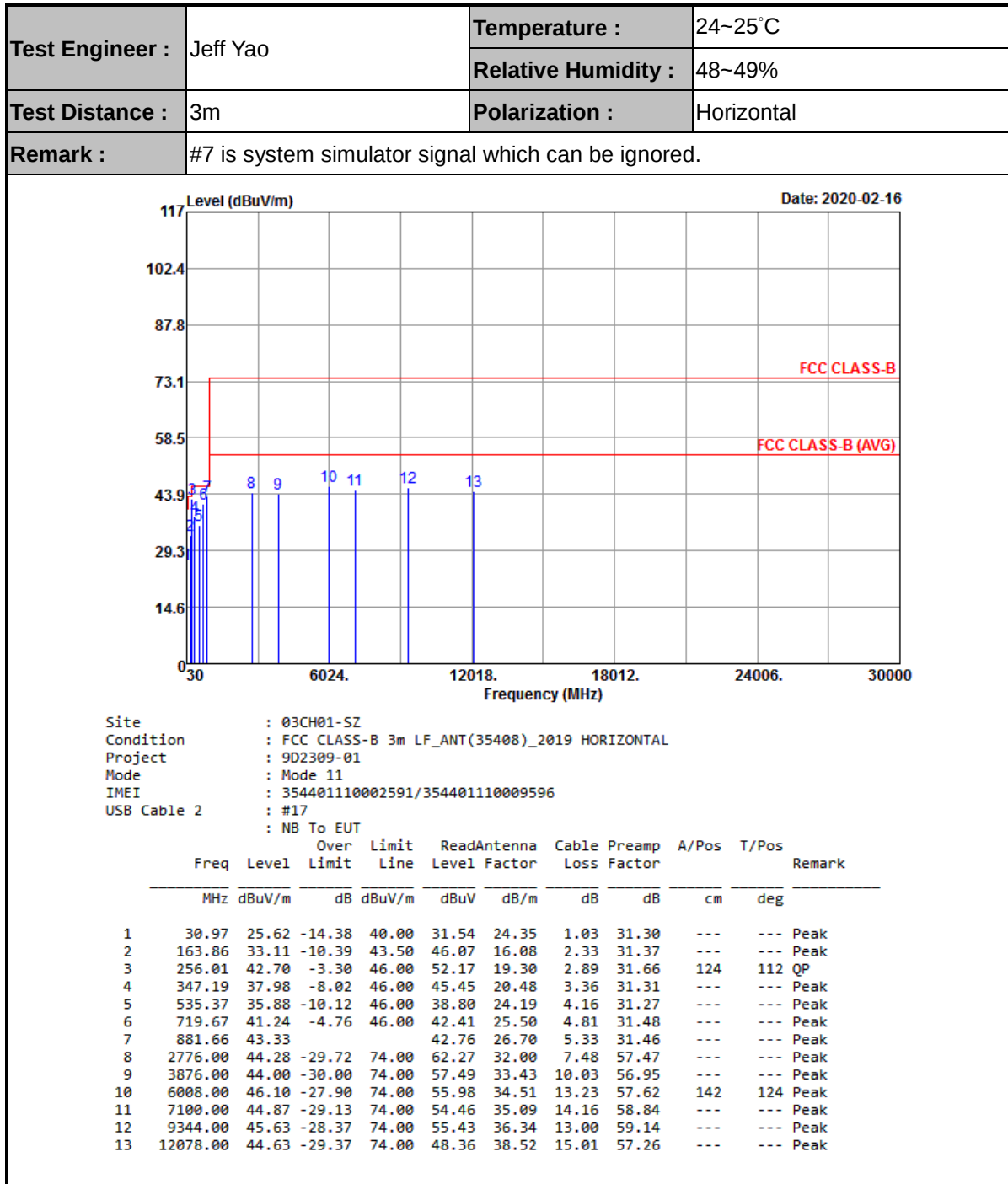
For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz

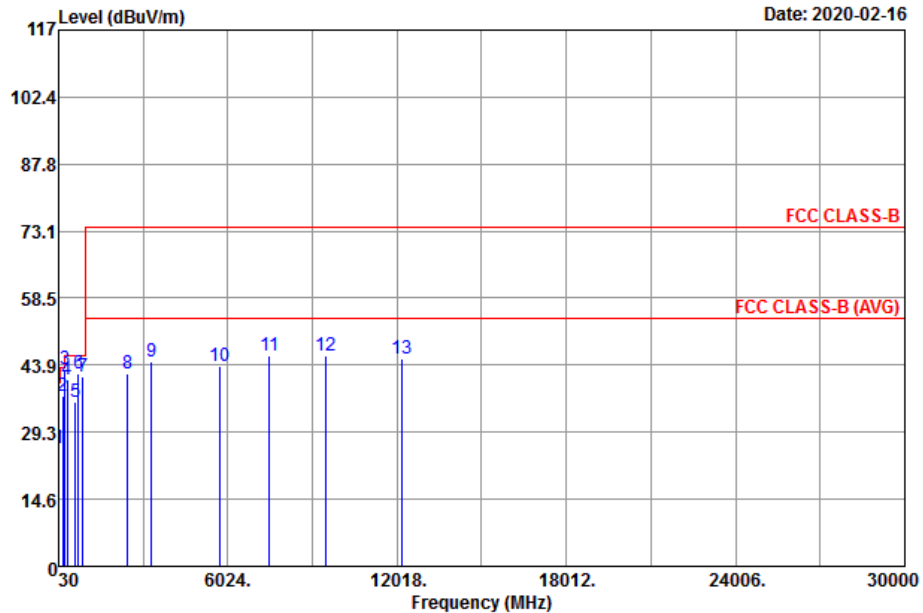


### 3.2.5. Test Result of Radiated Emission





|                 |                                                     |                     |          |
|-----------------|-----------------------------------------------------|---------------------|----------|
| Test Engineer : | Jeff Yao                                            | Temperature :       | 24~25°C  |
|                 |                                                     | Relative Humidity : | 48~49%   |
| Test Distance : | 3m                                                  | Polarization :      | Vertical |
| Remark :        | #7 is system simulator signal which can be ignored. |                     |          |



Site : 03CH01-SZ  
 Condition : FCC CLASS-B 3m LF\_ANT(35408)\_2019 VERTICAL  
 Project : 9D2309-01  
 Mode : Mode 11  
 IMEI : 354401110002591/354401110009596  
 USB Cable 2 : #17  
 : NB To EUT

|    | Freq     | Level  | Over   | Limit | Read  | Antenna | Cable | Preamp | A/Pos | T/Pos | Remark |
|----|----------|--------|--------|-------|-------|---------|-------|--------|-------|-------|--------|
|    | MHz      | dBuV/m | Limit  | Line  | Level | Factor  | Loss  | Factor | cm    | deg   |        |
| 1  | 30.00    | 25.75  | -14.25 | 40.00 | 31.14 | 24.90   | 1.01  | 31.30  | ---   | ---   | Peak   |
| 2  | 163.86   | 37.18  | -6.32  | 43.50 | 50.14 | 16.08   | 2.33  | 31.37  | ---   | ---   | Peak   |
| 3  | 257.95   | 42.97  | -3.03  | 46.00 | 52.22 | 19.50   | 2.90  | 31.65  | ---   | ---   | Peak   |
| 4  | 346.22   | 40.67  | -5.33  | 46.00 | 48.19 | 20.44   | 3.35  | 31.31  | ---   | ---   | Peak   |
| 5  | 627.52   | 35.97  | -10.03 | 46.00 | 37.67 | 25.27   | 4.52  | 31.49  | ---   | ---   | Peak   |
| 6  | 719.67   | 42.11  | -3.89  | 46.00 | 43.28 | 25.50   | 4.81  | 31.48  | 263   | 315   | QP     |
| 7  | 881.66   | 41.38  |        |       | 40.81 | 26.70   | 5.33  | 31.46  | ---   | ---   | Peak   |
| 8  | 2478.00  | 41.91  | -32.09 | 74.00 | 60.81 | 31.86   | 6.91  | 57.67  | ---   | ---   | Peak   |
| 9  | 3312.00  | 44.61  | -29.39 | 74.00 | 59.77 | 32.84   | 9.18  | 57.18  | ---   | ---   | Peak   |
| 10 | 5752.00  | 43.59  | -30.41 | 74.00 | 54.09 | 34.45   | 12.65 | 57.60  | ---   | ---   | Peak   |
| 11 | 7504.00  | 46.05  | -27.95 | 74.00 | 56.32 | 35.80   | 12.93 | 59.00  | 100   | 142   | Peak   |
| 12 | 9510.00  | 45.89  | -28.11 | 74.00 | 55.63 | 36.41   | 13.06 | 59.21  | ---   | ---   | Peak   |
| 13 | 12184.00 | 45.41  | -28.59 | 74.00 | 49.17 | 38.54   | 15.03 | 57.33  | ---   | ---   | Peak   |

Note:

- Level(dBμV/m) = Read Level(dBμV) + Antenna Factor(dB/m) + Cable Loss(dB) - Preamp Factor(dB)
- 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;      | Dec. 26, 2019    | Jan. 15, 2020 | Dec. 25, 2020 | Conduction (CO01-SZ)  |
| AC LISN                              | EMCO         | 3816/2SH                     | 00103912         | 9kHz~30MHz      | Oct. 17, 2019    | Jan. 15, 2020 | Oct. 16, 2020 | Conduction (CO01-SZ)  |
| AC LISN<br>(for auxiliary equipment) | EMCO         | 3816/2SH                     | 00103892         | 9kHz~30MHz      | Dec. 26, 2019    | Jan. 15, 2020 | Dec. 25, 2020 | Conduction (CO01-SZ)  |
| AC Power Source                      | Chroma       | 61602                        | 61602000089<br>1 | 100Vac~250Vac   | Jul. 23, 2019    | Jan. 15, 2020 | Jul. 22, 2020 | Conduction (CO01-SZ)  |
| EMI Test Receiver&SA                 | Agilent      | N9038A                       | MY52260185       | 20Hz~26.5GHz    | Jul. 22, 2019    | Feb. 16, 2020 | Jul. 21, 2020 | Radiation (03CH01-SZ) |
| EXA Spectrum Analyzer                | KEYSIGHT     | N9010A                       | MY55150213       | 10Hz~44GHz      | Apr. 18, 2019    | Feb. 16, 2020 | Apr. 17, 2020 | Radiation (03CH01-SZ) |
| HF Amplifier                         | KEYSIGHT     | 83017A                       | MY53270104       | 0.5GHz~26.5GHz  | Dec. 27, 2019    | Feb. 16, 2020 | Dec. 26, 2020 | Radiation (03CH01-SZ) |
| Bilog Antenna                        | TeseQ        | CBL6112D                     | 35407            | 30MHz~2GHz      | Jul. 19, 2019    | Feb. 16, 2020 | Jul. 18, 2020 | Radiation (03CH01-SZ) |
| Double Ridge Horn Antenna            | ETS-Lindgren | 3117                         | 00119436         | 1GHz~18GHz      | Aug. 27, 2019    | Feb. 16, 2020 | Aug. 26, 2020 | Radiation (03CH01-SZ) |
| LF Amplifier                         | Burgeon      | BPA-530                      | 102209           | 0.01~3000Mhz    | Apr. 19, 2019    | Feb. 16, 2020 | Apr. 18, 2020 | Radiation (03CH01-SZ) |
| HF Amplifier                         | MITEQ        | AMF-7D-0010<br>1800-30-10P-R | 1943528          | 1GHz~18GHz      | Oct. 18, 2019    | Feb. 16, 2020 | Oct. 17, 2020 | Radiation (03CH01-SZ) |
| HF Amplifier                         | MITEQ        | TTA1840-35-H<br>G            | 1871923          | 18GHz~40GHz     | Jul. 22, 2019    | Feb. 16, 2020 | Jul. 21, 2020 | Radiation (03CH01-SZ) |
| SHF-EHF Horn                         | com-power    | AH-840                       | 101071           | 18Ghz~40GHz     | Apr. 18, 2019    | Feb. 16, 2020 | Apr. 17, 2020 | Radiation (03CH01-SZ) |
| AC Power Source                      | Chroma       | 61601                        | 61601000198<br>5 | N/A             | NCR              | Feb. 16, 2020 | NCR           | Radiation (03CH01-SZ) |
| Turn Table                           | EM           | EM1000                       | N/A              | 0~360 degree    | NCR              | Feb. 16, 2020 | NCR           | Radiation (03CH01-SZ) |
| Antenna Mast                         | EM           | EM1000                       | N/A              | 1 m~4 m         | NCR              | Feb. 16, 2020 | NCR           | Radiation (03CH01-SZ) |

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% ( $U = 2Uc(y)$ ) | 2.8dB |
|-------------------------------------------------------------------------|-------|

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

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

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

|                                                                         |       |
|-------------------------------------------------------------------------|-------|
| Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ ) | 5.0dB |
|-------------------------------------------------------------------------|-------|

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

|                                                                         |       |
|-------------------------------------------------------------------------|-------|
| Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ ) | 4.3dB |
|-------------------------------------------------------------------------|-------|