REPORT No.: SZ20060021E01

# TEST REPORT

| | | |
|---|---|---|
| **APPLICANT** | : | Reliance Communications LLC |
| **PRODUCT NAME** | : | Orbic Speed X |
| **MODEL NAME** | : | RC400LX |
| **BRAND NAME** | : | Orbic, Kajeet |
| **FCC ID** | : | 2ABGH-RC400LX |
| **STANDARD(S)** | : | 47 CFR Part 15 Subpart B |
| **RECEIPT DATE** | : | 2020-04-16 |
| **TEST DATE** | : | 2020-04-20 to 2020-04-23 |
| **ISSUE DATE** | : | 2020-07-23 |

Edited by: He sinuo

He Sinuo(Rapporteur)

Approved by: Xiao Xiong

Xiao Xiong(Supervisor)

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MORLAB

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| Change History | | |
|---|---|---|
| **Issue** | **Date** | **Reason for Change** |
| 1.0 | 2020-07-13 | First edition |
| 2.0 | 2020-07-23 | Modify the EUT description information |
| | | |

# 1. Technical Information

**Note:** Provide by applicant.

## 1.1. Applicant and Manufacturer Information

| | |
|---|---|
| **Applicant:** | Reliance Communications LLC |
| **Applicant Address:** | 91 Colin Drive, Unit 1, HOLBROOK, New York 11741, United States |
| **Manufacturer:** | Unimaxcomm |
| **Manufacturer Address:** | Room 602, Floor 6th, Building B, Software Park T3,Hi-Tech Park South, Nanshan District, Shenzhen, P.R. China |

## 1.2. Equipment Under Test (EUT) Description

| | |
|---|---|
| **Product Name:** | Orbic Speed X |
| **Serial No.:** | (N/A, marked #1 by test site) |
| **Hardware Version:** | V1.1 |
| **Software Version:** | ORB400LX_V1.0.2_BVZNAKJ |
| **Tx Frequency:** | 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 14: 788 MHz ~ 798 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 41: 2496 MHz ~ 2690 MHz<br>LTE Band 66: 1710 MHz ~ 1780 MHz<br>LTE Band 71: 663 MHz ~ 698 MHz<br>802.11 b/g/n: 2.412 GHz ~ 2.462 GHz<br>802.11 n/ac: 5.180 GHz ~ 5.240 GHz; 5.745 GHz ~ 5.825 GHz |
| **Rx Frequency:** | WCDMA Band II: 1930 MHz ~ 1990 MHz<br>WCDMA Band IV: 2110 MHz ~ 2155 MHz<br>WCDMA Band V: 869 MHz ~ 894 MHz |

| | | |
|---|---|---|
| | 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 14: 758 MHz ~ 768 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<br>LTE Band 30: 2350 MHz ~ 2360 MHz<br>LTE Band 41: 2496 MHz ~ 2690 MHz<br>LTE Band 66: 2110 MHz ~ 2200 MHz<br>LTE Band 71: 617 MHz ~ 652 MHz<br>802.11 b/g/n: 2.412 GHz ~ 2.462 GHz<br>802.11 n/ac: 5.180 GHz ~ 5.240 GHz; 5.745 GHz ~ 5.825 GHz | |
| **Ancillary Equipment:** | **Battery** | |
| | Brand Name: | Orbic |
| | Model No.: | BTE-3003 |
| | Serial No.: | (N/A, marked #1 by test site) |
| | Capacity: | 3000mAh |
| | Rated Voltage: | 3.7V |
| | Charge Limit: | 4.2V |
| | Manufacturer: | Phenix New Energy(Huizhou) Co., Ltd. |
| | **AC Adapter** | |
| | Brand Name: | Orbic |
| | Model No.: | TPA-5950100UU |
| | Serial No.: | (N/A, marked #1 by test site) |
| | Rated Input: | 100-240V ～ 50/60Hz, 0.2A |
| | Rated Output: | 5.0V ⎓ 1.0A |
| | Manufacturer: | ShenZhen Kingfulin Technology Co., Ltd |

**Note:**

1. The Orbic Speed X supports WCDMA Band II, Band IV, Band V, HSDPA, HSUPA, HSPA+, DC-HSPA, LTE Band 2/4/5/7/12/14/17/25/26/30/41/66/71 and WIFI functions.

2. The EUT is equipped with single SIM card slots and a Type-C port.

3. This test report is updated from the original report (Report No.: SZ20040157E01, Model:

RC400L). According to the previous similarity, only modify the product name, model, software and hardware version; Add a brand; Add 3G/4G RF front end components (added UMTS Band 4 and LTE Band 7/12/14/17/25/26/30/41/71); Disable LTE Band 13 (Remove LTE Band 13 components); Disable WiFi MIMO function and change to SISO (Remove one WiFi connector and related components), the WiFi chip and circuit are the same as before. We evaluated and tested the above changes, which had no impact on the test results.

4. For a more detailed description, please refer to specification or user's manual supplied by the applicant and/or manufacturer.

# 2. Test Results

## 2.1. Applied Reference Documents

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart B:

| No. | Identity | Document Title |
|---|---|---|
| 1 | 47 CFR Part 15 | Radio Frequency Devices |

Test detailed items/section required by FCC rules and results are as below:

| No. | Section | Description | Test Date | Test Engineer | Result | Method Determination Remark |
|---|---|---|---|---|---|---|
| 1 | 15.107 | Conducted Emission | 2020.04.23 | Huang Zhiye | PASS[Note 2] | No deviation |
| 2 | 15.109 | Radiated Emission | 2020.04.20 | Yang Jie | PASS[Note 2] | No deviation |

**Note 1:** The tests were performed according to the method of measurements prescribed in ANSI C63.4-2014.

**Note 2:** The test results of these test items in this report refer to the test report (Report No.: SZ20040157E01).

**Note 3:** Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

## 2.2. EUT Setup and Operating Conditions

Note: All of the following test modes are tested in all the test items.

| **Test Mode** | |
|---|---|
| **Mode 1 :** | **EUT + Adapter + WCDMA/LTE Band Idle + WLAN Idle + Battery + Charging** |
| **Mode 2 :** | **EUT + WCDMA/LTE Band Idle + WLAN Idle + PC + Battery + Normal working** |
| **Remark:** The above test mode in boldface (Mode 2) was the worst cases of radiated emission test; only the test data of the mode was reported. The above test mode in boldface (Mode 1) was the worst cases of conducted emission test; only the test data of the mode was reported. | |

During the measurement, the environmental conditions were within the listed ranges:

| | |
|---|---|
| Temperature (°C): | 15 - 35 |
| Relative Humidity (%): | 30 - 60 |
| Atmospheric Pressure (kPa): | 86 - 106 |

# 3. 47 CFR Part 15B Requirements

## 3.1. Conducted Emission

### 3.1.1. Requirement

According to FCC section 15.107, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

| Frequency Range (MHz) | Conducted Limit (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 - 0.50 | 66 to 56 | 56 to 46 |
| 0.50 - 5 | 56 | 46 |
| 5 - 30 | 60 | 50 |

NOTE:

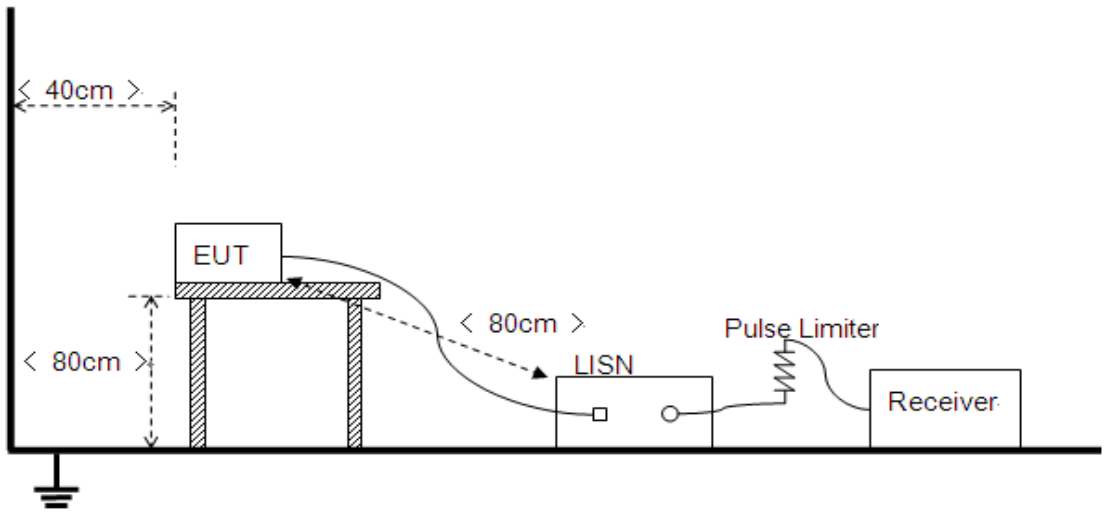
a) The limit subjects to the Class B digital device.

b) The lower limit shall apply at the band edges.

c) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

### 3.1.2. Test Setup

Please refer to Annex A for the photographs of the Test Configuration.



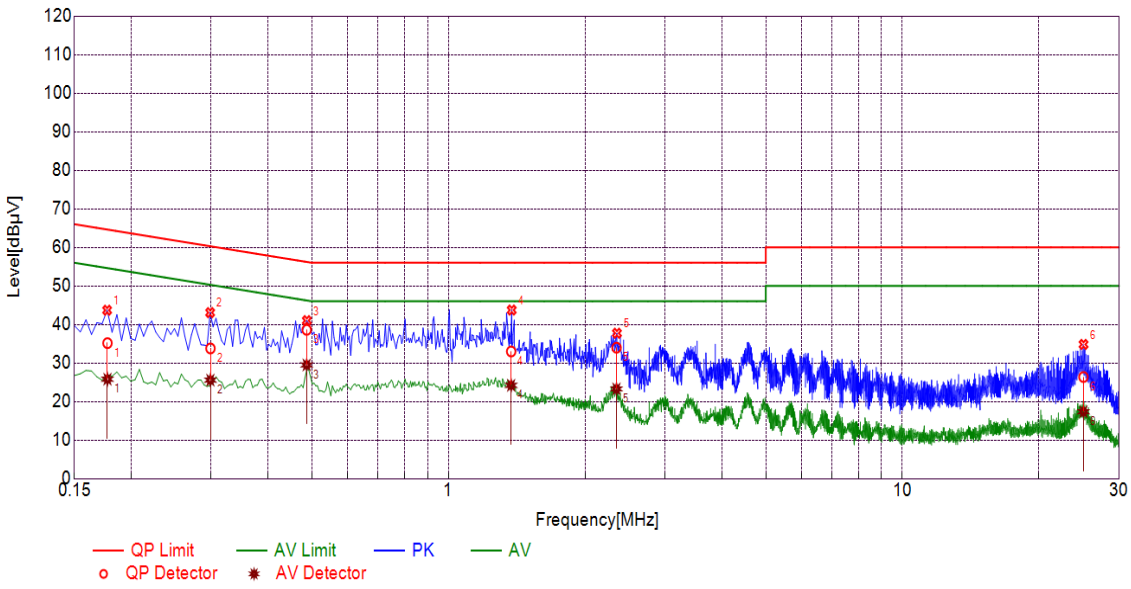
The EUT is placed on a 0.8m high insulating table, which stands on the grounded conducting floor, and keeps 0.4m away from the grounded conducting wall. The EUT is connected to the power mains through a LISN which provides 50Ω/50μH of coupling impedance for the measuring instrument. A Pulse Limiter is used to protect the measuring instrument. The factors of the whole test system are calibrated to correct the reading.

The power strip or extension cord has been investigated to make sure that the LISN integrity in maintained with respect to the impedance characteristics as prescribed in ANSI C63.4-2014 at Clause 4.3.

### 3.1.3. Test Result

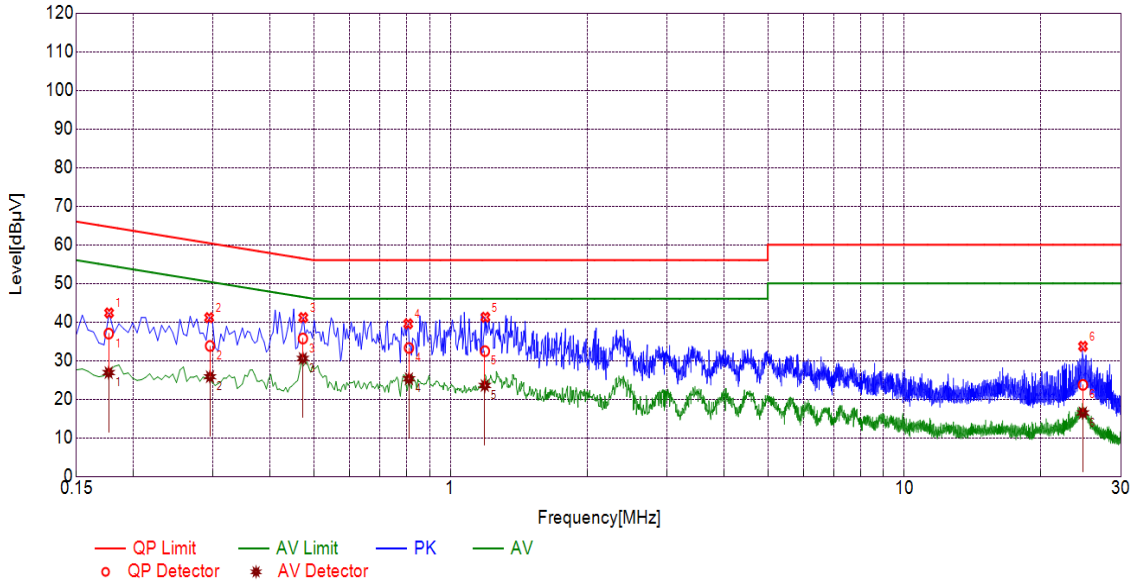
The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. All test modes are considered, refer to recorded points and plots below.

## A. Test Plot and Suspicious Points:




(Plot A:L Phase)

| NO. | Fre. (MHz) | Emission Level (dBµV) | | Limit (dBµV) | | Power-line | Verdict |
|---|---|---|---|---|---|---|---|
| | | Quai-peak | Average | Quai-peak | Average | | |
| 1 | 0.1773 | 35.16 | 25.80 | 64.61 | 54.61 | Line | PASS |
| 2 | 0.2989 | 33.78 | 25.56 | 60.27 | 50.27 | | PASS |
| 3 | 0.4871 | 38.60 | 29.50 | 56.22 | 46.22 | | PASS |
| 4 | 1.3742 | 32.99 | 24.20 | 56.00 | 46.00 | | PASS |
| 5 | 2.3449 | 33.97 | 23.27 | 56.00 | 46.00 | | PASS |
| 6 | 25.0565 | 26.37 | 17.36 | 60.00 | 50.00 | | PASS |




(Plot B: N Phase)

| NO. | Fre. (MHz) | Emission Level (dBµV) | | Limit (dBµV) | | Power-line | Verdict |
|---|---|---|---|---|---|---|---|
| | | Quai-peak | Average | Quai-peak | Average | | |
| 1 | 0.1766 | 37.00 | 26.89 | 64.64 | 54.64 | Neutral | PASS |
| 2 | 0.2953 | 33.80 | 25.82 | 60.37 | 50.37 | | PASS |
| 3 | 0.4729 | 35.73 | 30.56 | 56.46 | 46.46 | | PASS |
| 4 | 0.8100 | 33.27 | 25.29 | 56.00 | 46.00 | | PASS |
| 5 | 1.1904 | 32.45 | 23.55 | 56.00 | 46.00 | | PASS |
| 6 | 24.7376 | 23.72 | 16.46 | 60.00 | 50.00 | | PASS |

# 3.2. Radiated Emission

## 3.2.1. Requirement

According to FCC section 15.109 (a), the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

| Frequency Range (MHz) | Field Strength Limitation at 3m Measurement Dist | |
|---|---|---|
| | (μV/m) | (dBμV/m) |
| 30.0 - 88.0 | 100 | 20log 100 |
| 88.0 - 216.0 | 150 | 20log 150 |
| 216.0 - 960.0 | 200 | 20log 200 |
| Above 960.0 | 500 | 20log 500 |

As shown in FCC section 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

Note:

1) The tighter limit shall apply at the boundary between two frequency range.
2) Limitation expressed in dBμV/m is calculated by 20log Emission Level(μV/m).

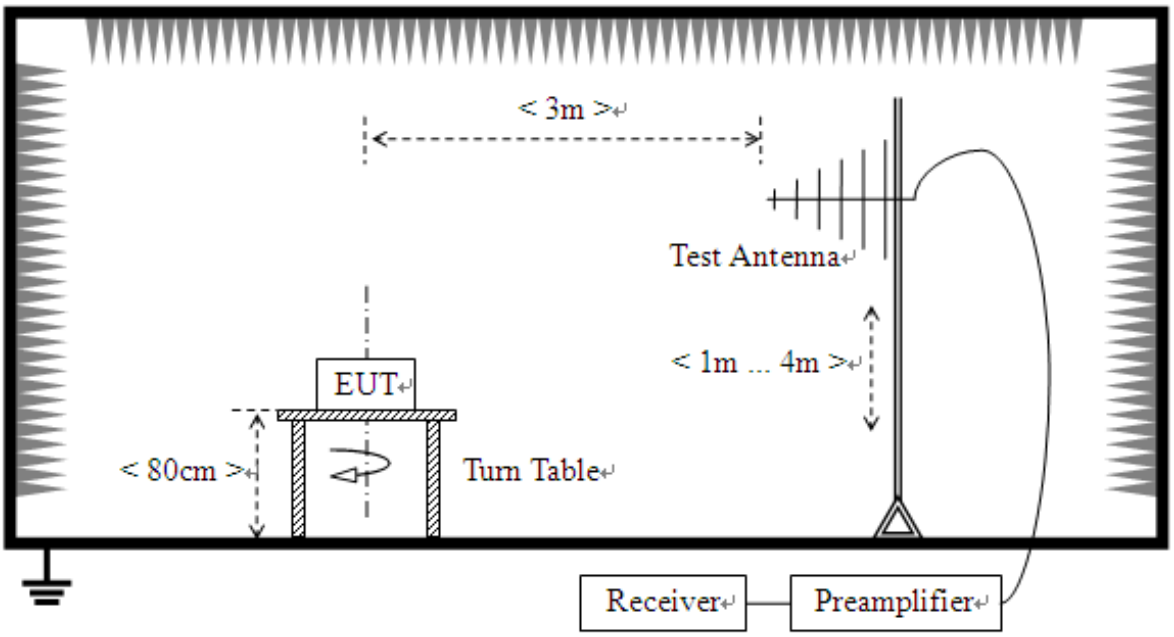
## 3.2.2. Frequency Range of Measurement

According to 15.33(b)(1), the frequency range of radiated measurement for the EUT is listed in the following table:

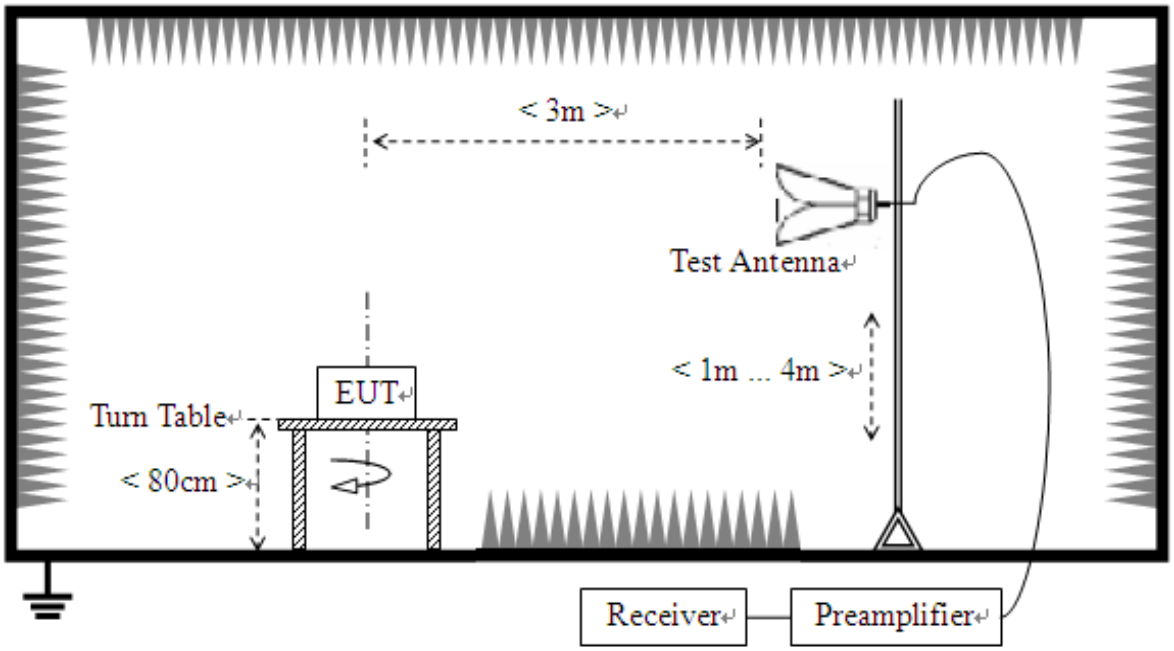
| Highest frequency generated or used in the device or on which the device operates or tunes (MHz) | Upper frequency of measurement range (MHz) |
|---|---|
| Below 1.705 | 30. |
| 1.705–108 | 1000. |
| 108–500 | 2000. |
| 500–1000 | 5000. |
| Above 1000 | 5th harmonic of the highest frequency or 40 GHz, whichever is lower. |

### 3.2.3. Test Setup

1) For radiated emissions from 30MHz to1GHz




2) For radiated emissions above 1GHz



The test is performed in a 3m Semi-Anechoic Chamber; the antenna factor, cable loss and so on of the site (factors) is calculated to correct the reading. The EUT is placed on a 0.8m high insulating Turn Table, and keeps 3m away from the Test Antenna, which is mounted on a variable-height antenna master tower.

For the test Antenna:

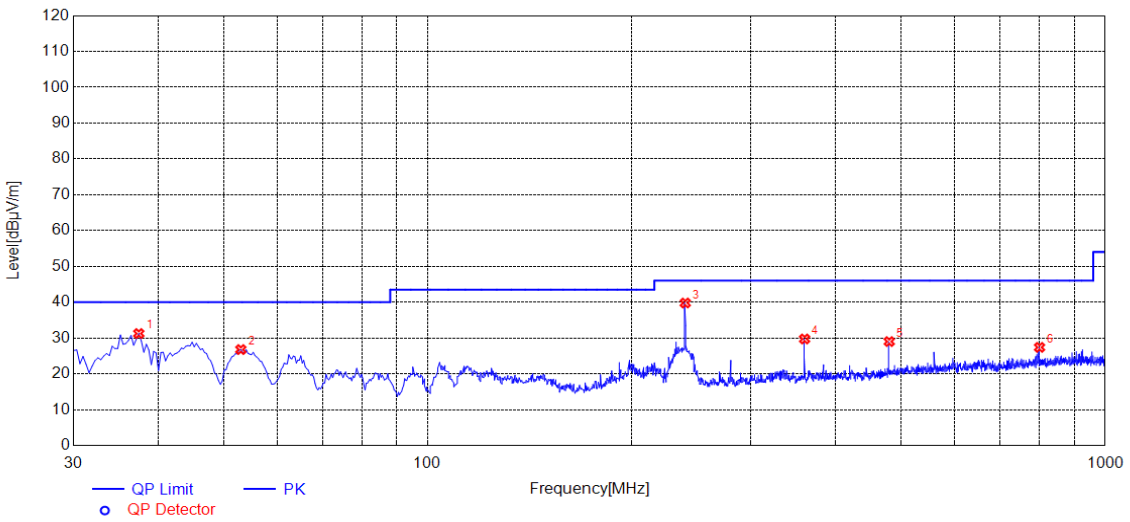
In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

### 3.2.4. Test Result

The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors. Both the vertical and the horizontal polarizations of the Test Antenna are considered to perform the tests. All test modes are considered, refer to recorded points and plots below.

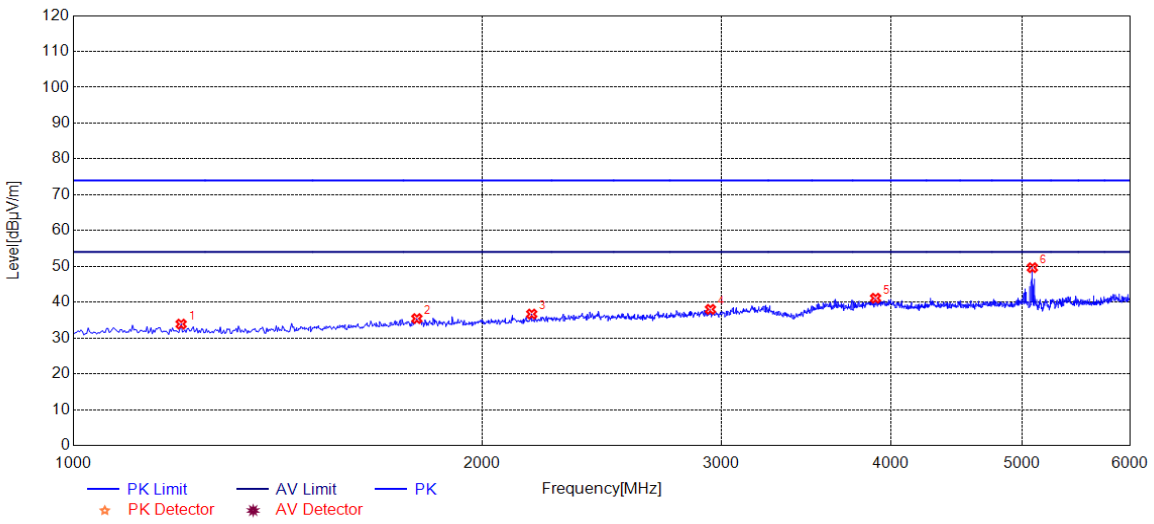
The amplitude of emissions (6GHz-30GHz) which are attenuated more than 20 dB below the permissible value need not be reported.

Note: All radiated emission tests were performed in X, Y, Z axis direction, and only the worst axis test condition was recorded in this test report.



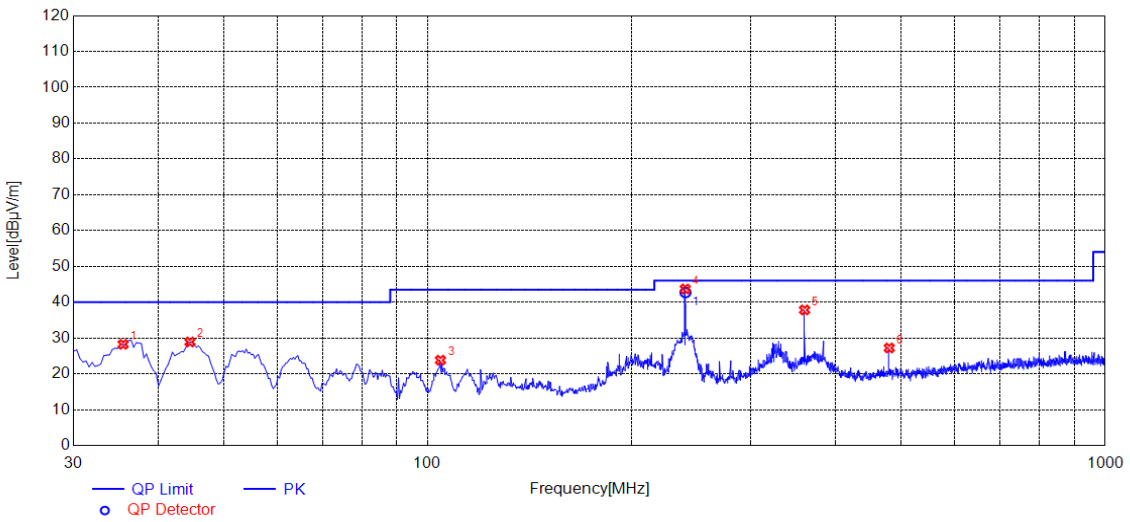

(Plot A: ANT-Vertical,30MHz - 1GHz)

| No. | Fre. MHz | PK dBµV/m | QP dBµV/m | AV dBµV/m | Limit-PK dBµV/m | Limit-QP dBµV/m | Limit-AV dBµV/m | ANT | Verdict |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 37.4391 | 31.25 | N.A | N.A | N.A | 40.00 | N.A | V | PASS |
| 2 | 52.9643 | 26.78 | N.A | N.A | N.A | 40.00 | N.A | V | PASS |
| 3 | 239.9133 | 39.78 | N.A | N.A | N.A | 46.00 | N.A | V | PASS |
| 4 | 359.9100 | 29.73 | N.A | N.A | N.A | 46.00 | N.A | V | PASS |
| 5 | 479.9066 | 29.01 | N.A | N.A | N.A | 46.00 | N.A | V | PASS |
| 6 | 799.7899 | 27.39 | N.A | N.A | N.A | 46.00 | N.A | V | PASS |



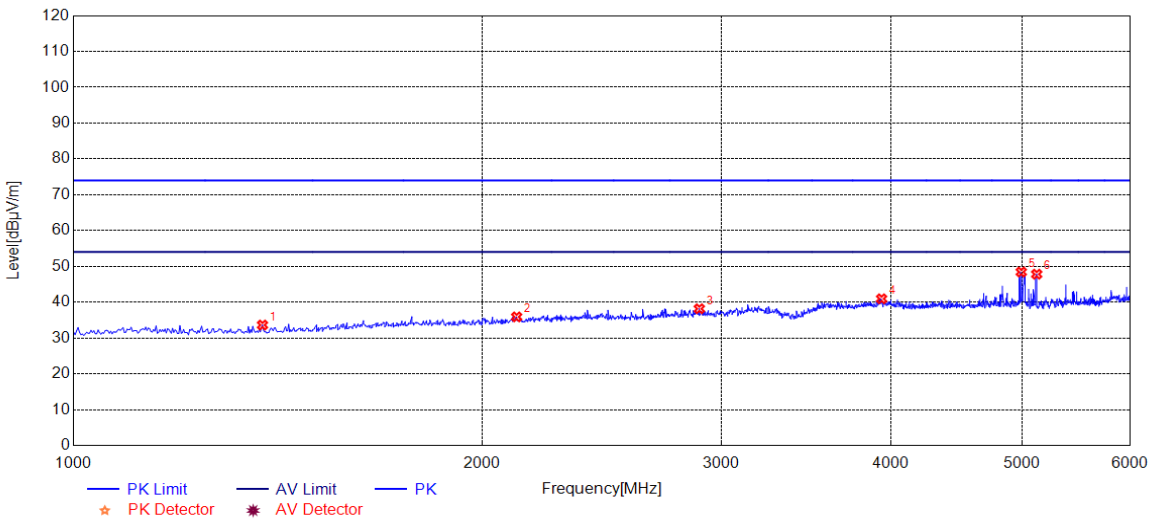

(Plot B: ANT-Vertical,1GHz - 6GHz)

| No. | Fre. MHz | PK dBµV/m | QP dBµV/m | AV dBµV/m | Limit-PK dBµV/m | Limit-QP dBµV/m | Limit-AV dBµV/m | ANT | Verdict |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1200.1001 | 33.89 | N.A | N.A | 74.00 | N.A | 54.00 | V | PASS |
| 2 | 1790.3952 | 35.42 | N.A | N.A | 74.00 | N.A | 54.00 | V | PASS |
| 3 | 2175.5878 | 36.69 | N.A | N.A | 74.00 | N.A | 54.00 | V | PASS |
| 4 | 2945.9730 | 38.01 | N.A | N.A | 74.00 | N.A | 54.00 | V | PASS |
| 5 | 3898.9495 | 41.11 | N.A | N.A | 74.00 | N.A | 54.00 | V | PASS |
| 6 | 5087.0435 | 49.64 | N.A | N.A | 74.00 | N.A | 54.00 | V | PASS |




(Plot C:ANT- Horizontal, 30MHz - 1GHz)

| No. | Fre. MHz | PK dBµV/m | QP dBµV/m | AV dBµV/m | Limit-PK dBµV/m | Limit-QP dBµV/m | Limit-AV dBµV/m | ANT | Verdict |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 35.4985 | 28.24 | N.A | N.A | N.A | 40.00 | N.A | H | PASS |
| 2 | 44.5549 | 28.90 | N.A | N.A | N.A | 40.00 | N.A | H | PASS |
| 3 | 104.3915 | 23.82 | N.A | N.A | N.A | 43.50 | N.A | H | PASS |
| 4 | 240.0001 | 43.70 | 42.70 | N.A | N.A | 46.00 | N.A | H | PASS |
| 5 | 359.9100 | 37.84 | N.A | N.A | N.A | 46.00 | N.A | H | PASS |
| 6 | 479.9066 | 27.22 | N.A | N.A | N.A | 46.00 | N.A | H | PASS |

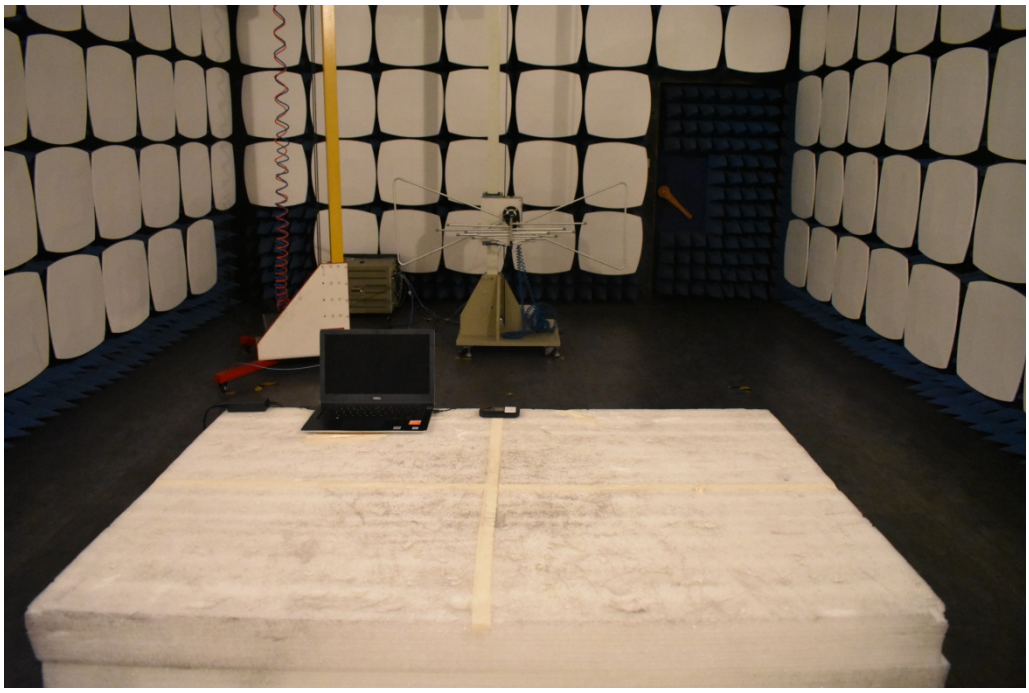



(Plot D:ANT- Horizontal, 1GHz - 6GHz)

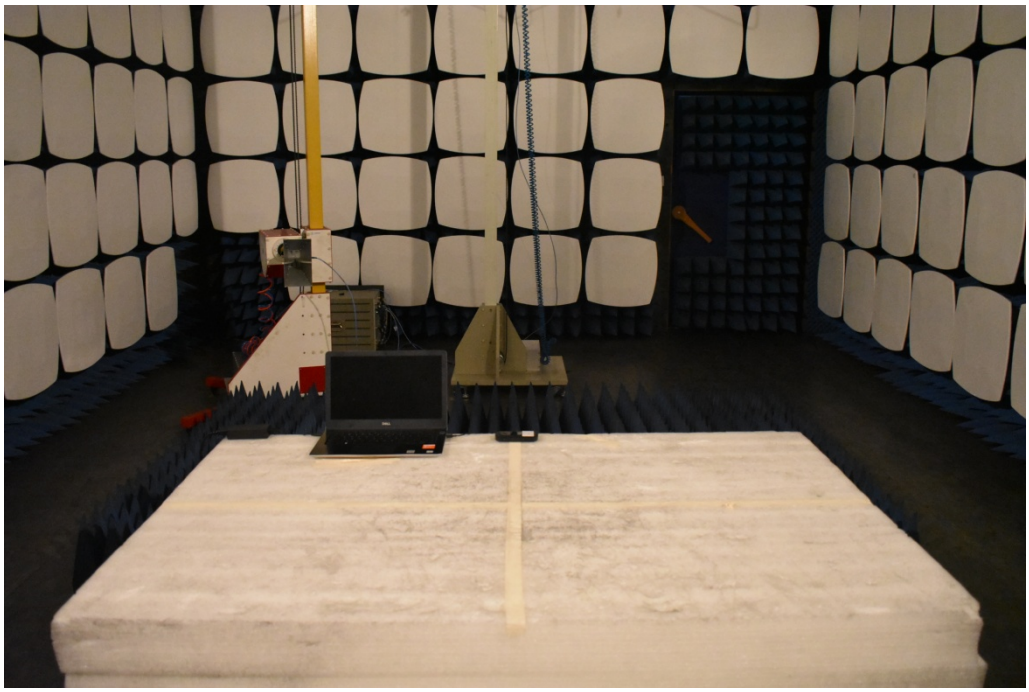
| No. | Fre. MHz | PK dBµV/m | QP dBµV/m | AV dBµV/m | Limit-PK dBµV/m | Limit-QP dBµV/m | Limit-AV dBµV/m | ANT | Verdict |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1377.6888 | 33.63 | N.A | N.A | 74.00 | N.A | 54.00 | H | PASS |
| 2 | 2120.5603 | 35.90 | N.A | N.A | 74.00 | N.A | 54.00 | H | PASS |
| 3 | 2890.9455 | 38.16 | N.A | N.A | 74.00 | N.A | 54.00 | H | PASS |
| 4 | 3938.9695 | 40.95 | N.A | N.A | 74.00 | N.A | 54.00 | H | PASS |
| 5 | 4991.9960 | 48.43 | N.A | N.A | 74.00 | N.A | 54.00 | H | PASS |
| 6 | 5124.5623 | 47.82 | N.A | N.A | 74.00 | N.A | 54.00 | H | PASS |

# Annex A Photographs of Test Setup

1. Radiated Emission(30MHz-1GHz)



2. Radiated Emission(Above 1GHz)



3. Conducted Emission





# Annex B Test Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Uncertainty of Conducted Emission Measurement

| | | |
|---|---|---|
| Measuring Uncertainty for a Level of Confidence of 95%(U=2Uc(y)) | 9kHz-150kHz | ±4.1dB |
| | 150kHz-30MHz | ±3.7dB |

Uncertainty of Radiated Emission Measurement

| | | |
|---|---|---|
| Measuring Uncertainty for a Level of Confidence of 95%(U=2Uc(y)) | 30MHz-200MHz | ±5.06dB |
| | 200MHz-1000MHz | ±5.24dB |
| | 1GHz-6GHz | ±5.18dB |
| | 6GHz-18GHz | ±5.48dB |

# Annex C Testing Laboratory Information

## 1. Identification of the Responsible Testing Laboratory

| | |
|---|---|
| **Laboratory Name:** | Shenzhen Morlab Communications Technology Co., Ltd.<br>Morlab Laboratory |
| **Laboratory Address:** | FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China |
| **Telephone:** | +86 755 36698555 |
| **Facsimile:** | +86 755 36698525 |

## 2. Identification of the Responsible Testing Location

| | |
|---|---|
| **Name:** | Shenzhen Morlab Communications Technology Co., Ltd.<br>Morlab Laboratory |
| **Address:** | FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China |

## 3. Accreditation Certificate

| | |
|---|---|
| **Accredited Testing Laboratory:** | The FCC designation number is CN1192.<br>Test firm registration number is 226174.<br>(Shenzhen Morlab Communications Technology Co., Ltd.) |

## 4. Test Software Utilized

| Model | Version Number | Producer |
|---|---|---|
| JS32-RE | Version 2.0.2.0 | Tonscend |
| TS+ -[ JS32-CE] | Version2.5.0.0 | Tonscend |

## 5. Test Equipments Utilized

| Description | Manufacturer | Model | Serial No. | Cal. Date | Due. Date |
|---|---|---|---|---|---|
| MXE EMI Receiver | Agilent | N9038A | MY54130016 | 2019.07.29 | 2020.07.28 |
| Test Receiver | R&S | ESPI | 101052 | 2019.07.29 | 2020.07.28 |
| LISN | Schwarzbeck | NSLK 8127 | 812744 | 2020.03.26 | 2021.03.25 |
| Pulse Limiter (20dB) | Schwarzbeck | VTSD 9561-F | VTSD 9561 F-B #206 | 2019.08.13 | 2020.08.12 |
| Test Antenna - Bi-Log | Schwarzbeck | VULB 9163 | 9163-519 | 2019.05.24 | 2022.05.23 |
| Test Antenna - Horn | Schwarzbeck | BBHA 9120D | 1774 | 2019.07.26 | 2022.07.25 |
| Test Antenna - Horn | Schwarzbeck | BBHA9170 | BBHA9170#774 | 2019.07.26 | 2022.07.25 |
| Radiated Disturbance Preamplifier | rflight | S020180L3203 | 61171/61172 | 2019.07.29 | 2020.07.28 |
| Radiated Disturbance Preamplifier | rflight | S10M100L3802 | 46732 | 2019.07.29 | 2020.07.28 |
| Semi-Anechoic Chamber | CRT | 9m*6m*6m | N/A | 2019.07.13 | 2022.07.12 |
| PC | DELL | VOSTRO 5370 | DF2DR A01 DPC | N/A | N/A |
| PC Adapter | DELL | LA45NM140 LPS | OKXTTW | N/A | N/A |

END OF REPORT