

FCC RF Test Report

(LTE)

Report No.: JYTSZ-R12-2301655

Applicant: RuxTek Co., Ltd

Address of Applicant: 4F., No. 61, Sanfu St., Shulin Dist., New Taipei City 238035 , Taiwan

Equipment Under Test (EUT)

Product Name: RuxTek 4G Portable Router

Model No.: RTM-103

Trade Mark: RuxTek

FCC ID: 2BDRQRTM-103

Applicable Standards: FCC CFR Title 47 Part 2, 27L

Date of Sample Receipt: 24 Nov., 2023

Date of Test: 25 Nov., to 19 Dec., 2023

Date of Report Issued: 20 Dec., 2023

Test Result: PASS

Tested by: Liu Jun Li

Date: 20 Dec., 2023

Reviewed by: Project Engineer

Date: 20 Dec., 2023

Approved by: James Wei

Date: 20 Dec., 2023

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in above the application standard version. Test results reported herein relate only to the item(s) tested.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

1 Version

| Version No. | Date | Description |
|-------------|---------------|-------------|
| 00 | 20 Dec., 2023 | Original |
| | | |
| | | |
| | | |
| | | |

2 Contents

| | Page |
|--|-----------|
| Cover Page | 1 |
| 1 Version..... | 2 |
| 2 Contents..... | 3 |
| 3 General Information | 4 |
| 3.1 Client Information | 4 |
| 3.2 General Description of E.U.T. | 4 |
| 3.3 Test Mode and Environment | 5 |
| 3.4 Description of Test Auxiliary Equipment | 5 |
| 3.5 Measurement Uncertainty | 5 |
| 3.6 Additions to, Deviations, or Exclusions from the Method..... | 5 |
| 3.7 Laboratory Facility | 6 |
| 3.8 Laboratory Location..... | 6 |
| 3.9 Test Instruments List | 7 |
| 4 Measurement Setup and Procedure | 9 |
| 4.1 Test Channel..... | 9 |
| 4.2 Test Setup | 10 |
| 4.3 Test Procedure..... | 11 |
| 5 Test Results..... | 12 |
| 5.1 Summary | 12 |
| 5.1.1 Clause and Data Summary..... | 12 |
| 5.1.2 Test Limit..... | 13 |
| 5.2 Field Strength of Spurious Radiation Measurement | 14 |

3 General Information

3.1 Client Information

| | |
|---------------|---|
| Applicant: | RuxTek Co., Ltd |
| Address: | 4F., No. 61, Sanfu St., Shulin Dist., New Taipei City 238035 , Taiwan |
| Manufacturer: | RuxTek Co., Ltd |
| Address: | 4F., No. 61, Sanfu St., Shulin Dist., New Taipei City 238035 , Taiwan |

3.2 General Description of E.U.T.

| | | | | | |
|----------------------------|---|---|--|--|--|
| Product Name: | RuxTek 4G Portable Router | | | | |
| Model No.: | RTM-103 | | | | |
| Operation Frequency Range: | LTE band 4: | Tx: 1710 MHz - 1755 MHz | Rx: 2110 MHz - 2155 MHz | | |
| Modulation Type: | <input checked="" type="checkbox"/> QPSK | <input checked="" type="checkbox"/> 16QAM | <input type="checkbox"/> 64QAM(only supports downlink) | | |
| Antenna Type: | Internal Antenna | | | | |
| Antenna Gain: | LTE band 4: | 1.6 dBi (declare by Applicant) | | | |
| Power Supply: | Rechargeable Li-ion Battery DC3.8V, 2100mAh | | | | |
| Test Sample Condition: | The test samples were provided in good working order with no visible defects. | | | | |

3.3 Test Mode and Environment

| Test Mode: | |
|---|---|
| QPSK mode: | Keep the EUT communication with simulated station in QPSK mode |
| 16QAM mode: | Keep the EUT communication with simulated station in 16QAM mode |
| Remark: The EUT has been tested under continuous transmitting mode. Channel Low, Mid and High for each type band with rated data rate were chosen for full testing. The field strength of spurious radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for these modes. Just the worst case position (H mode) shown in report. | |
| Operating Environment: | |
| Temperature: | Normal: 15°C ~ 35°C, Extreme: -30°C ~ +50°C |
| Humidity: | 20 % ~ 75 % RH |
| Atmospheric Pressure: | 1008 mbar |
| Voltage: | Nominal: 3.80 Vdc, Extreme: Low 3.23 Vdc, High 4.35 Vdc |
| Test Engineer: | Logan (Conducted measurement) Kiran (Radiated measurement) |

3.4 Description of Test Auxiliary Equipment

| Test Equipment | Manufacturer | Model No. | Serial No. |
|-------------------|--------------|-----------|------------|
| Simulated Station | Anritsu | MT8820C | 6201026545 |

3.5 Measurement Uncertainty

| Parameter | Expanded Uncertainty (Confidence of 95%(U = 2Uc(y))) |
|---|---|
| Radiated Emission (30MHz ~ 200MHz) (3m SAC) | 4.6 dB |
| Radiated Emission (200MHz ~ 1000MHz) (3m SAC) | 5.8 dB |
| Radiated Emission (1GHz ~ 6GHz) (3m SAC) | 4.5 dB |
| Radiated Emission (6GHz ~ 18GHz) (3m SAC) | 4.7 dB |
| Radiated Emission (18GHz ~ 40GHz) (3m SAC) | 5.34 dB |
| Radiated Emission (30MHz ~ 1GHz) (3m FAR) | 3.43 dB |
| Radiated Emission (1GHz ~ 6GHz) (3m FAR) | 4.95 dB |
| Radiated Emission (6GHz ~ 18GHz) (3m FAR) | 5.23 dB |
| Radiated Emission (18GHz ~ 40GHz) (3m FAR) | 5.32 dB |

Note: All the measurement uncertainty value were shown with a coverage $k=2$ to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

3.6 Additions to, Deviations, or Exclusions from the Method

| |
|----|
| No |
|----|

3.7 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC - Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

● **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

● **CNAS - Registration No.: CNAS L15527**

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

● **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/4346-01.pdf>

3.8 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.

Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.

Tel: +86-755-23118282, Fax: +86-755-23116366

Email: info-JYTee@lets.com, Website: <http://jyt.lets.com>

3.9 Test Instruments List

| Radiated Emission(3m SAC): | | | | | |
|------------------------------|-----------------|-----------------|------------------|----------------------|--------------------------|
| Test Equipment | Manufacturer | Model No. | Manage No. | Cal. Date (mm-dd-yy) | Cal. Due date (mm-dd-yy) |
| 3m SAC | ETS | 9m*6m*6m | WXJ001-1 | 04-14-2021 | 04-13-2024 |
| BiConiLog Antenna | Schwarzbeck | VULB9163 | WXJ002 | 02-09-2023 | 02-08-2024 |
| Horn Antenna | Schwarzbeck | BBHA9120D | WXJ002-2 | 02-09-2023 | 02-08-2024 |
| Pre-amplifier (30MHz ~ 1GHz) | Schwarzbeck | BBV9743B | WXJ001-2 | 01-10-2023 | 01-09-2024 |
| Pre-amplifier (1GHz ~ 18GHz) | SKET | LNPA_0118G-50 | WXJ001-3 | 01-10-2023 | 01-09-2024 |
| EMI Test Receiver | Rohde & Schwarz | ESRP7 | WXJ003-1 | 01-11-2023 | 01-10-2024 |
| Spectrum Analyzer | Rohde & Schwarz | FSP 30 | WXJ004 | 01-10-2023 | 01-09-2024 |
| Coaxial Cable (30MHz ~ 1GHz) | JYTSZ | JYT3M-1G-NN-8M | WXG001-4 | 01-18-2023 | 01-17-2024 |
| Coaxial Cable (1GHz ~ 18GHz) | JYTSZ | JYT3M-18G-NN-8M | WXG001-5 | 01-18-2023 | 01-17-2024 |
| Band Reject Filter Group | Tonscend | JS0806-F | WXJ089 | N/A | |
| Test Software | Tonscend | TS+ | Version: 3.0.0.1 | | |

| Radiated Emission(3m FAR): | | | | | |
|-------------------------------|-----------------|-----------------|----------------|----------------------|--------------------------|
| Test Equipment | Manufacturer | Model No. | Manage No. | Cal. Date (mm-dd-yy) | Cal. Due date (mm-dd-yy) |
| 3m FAR | YUNYI | 9m*6m*6m | WXJ097 | 06-15-2023 | 06-14-2028 |
| BiConiLog Antenna | Schwarzbeck | VULB9163 | WXJ097-2 | 07-13-2023 | 07-12-2024 |
| Biconical Antenna | Schwarzbeck | VUBA9117 | WXJ002-1 | 07-02-2021 | 07-01-2024 |
| Horn Antenna | Schwarzbeck | BBHA9120D | WXJ097-3 | 07-14-2023 | 07-13-2024 |
| Horn Antenna | Schwarzbeck | BBHA9120D | WXJ002-3 | 01-09-2023 | 01-08-2024 |
| Horn Antenna | Schwarzbeck | BBHA9170 | WXJ002-5 | 01-09-2023 | 01-08-2024 |
| Horn Antenna | Schwarzbeck | BBHA9170 | WXJ002-6 | 01-09-2023 | 01-08-2024 |
| Pre-amplifier (30MHz ~ 1GHz) | YUNYI | PAM-310N | WXJ097-5 | 05-14-2023 | 05-13-2024 |
| Pre-amplifier (1GHz ~ 18GHz) | YUNYI | PAM-118N | WXJ097-6 | 05-14-2023 | 05-13-2024 |
| Pre-amplifier (18GHz ~ 40GHz) | RF System | TRLA-180400G45B | WXJ002-7 | 01-11-2023 | 01-10-2024 |
| EMI Test Receiver | Rohde & Schwarz | ESCI3 | WXJ003 | 01-10-2023 | 01-09-2024 |
| Spectrum Analyzer | Rohde & Schwarz | FSP 30 | WXJ004 | 01-10-2023 | 01-09-2024 |
| Spectrum Analyzer | KEYSIGHT | N9010B | WXJ081-1 | 06-13-2023 | 06-12-2024 |
| Coaxial Cable (30MHz ~ 1GHz) | JYTSZ | JYT3M-1G-NN-13M | WXG097-1 | 08-01-2023 | 07-31-2024 |
| Coaxial Cable (1GHz ~ 18GHz) | JYTSZ | JYT3M-18G-NN-8M | WXG097-2 | 08-01-2023 | 07-31-2024 |
| Coaxial Cable (18GHz ~ 40GHz) | JYTSZ | JYT3M-40G-SS-8M | WXG097-3 | 08-01-2023 | 07-31-2024 |
| High Band Reject Filter Group | Tonscend | JS0806-F | WXJ089 | N/A | |
| Low Band Reject Filter Group | Tonscend | JS0806-F | WXJ097-4 | N/A | |
| Test Software | Tonscend | TS+ | Version: 5.0.0 | | |

Conducted Method:

| Test Equipment | Manufacturer | Model No. | Manage No. | Cal. Date (mm-dd-yy) | Cal. Due date (mm-dd-yy) |
|------------------------------|---------------------|------------------|---------------------|-----------------------------|---------------------------------|
| Spectrum Analyzer | Keysight | N9020A | WXJ094 | 09-25-2023 | 09-24-2024 |
| Simulated Station | Rohde & Schwarz | CMW500 | WXJ081 | 06-13-2023 | 06-12-2024 |
| Temperature Humidity Chamber | ZHONG ZHI | CZ-A-80D | WXJ032-3 | 01-09-2023 | 01-08-2025 |
| DC Power Supply | Keysight | E3642A | WXJ025-2 | N/A | |
| RF Control Unit | Tonscend | JS0806-1 | WXG010 | N/A | |
| Band Reject Filter Group | Tonscend | JS0806-F | WXG010-1 | N/A | |
| Test Software | Tonscend | TS+ | Version: 2.6.9.0526 | | |

4 Measurement Setup and Procedure

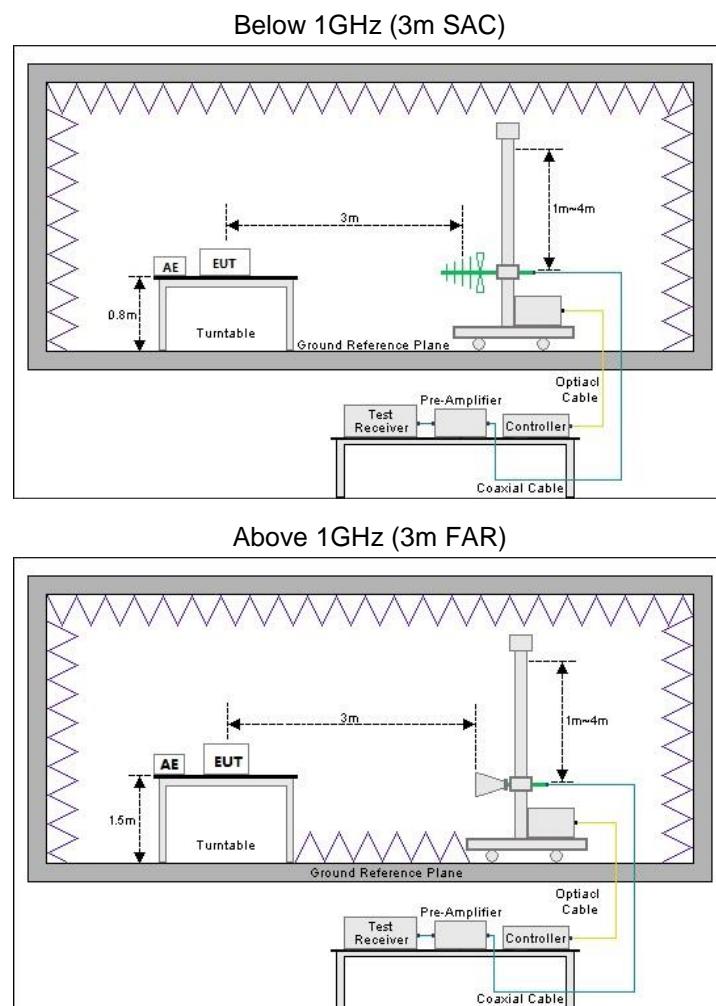
4.1 Test Channel

According to ANSI C63.26-2015 chapter 5.1.2.1 Table 2 requirement, select lowest channel, middle channel, and highest channel in the frequency range in which device operates for testing. The detailed frequency points are as follows:

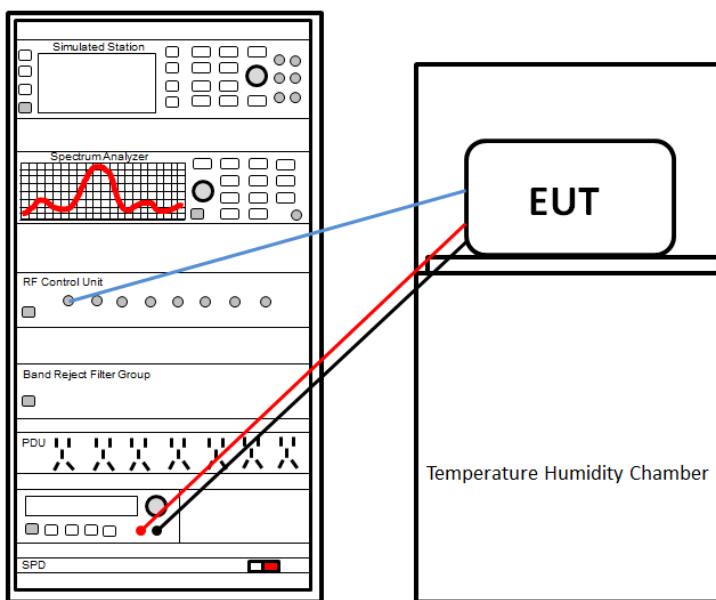
| LTE band 4 | | | | | |
|-----------------|-------|-----------------|-----------------|-------|-----------------|
| Channels | | Frequency (MHz) | Channels | | Frequency (MHz) |
| 1.4 MHz | | | 3 MHz | | |
| Lowest channel | 19957 | 1710.7 | Lowest channel | 19965 | 1711.5 |
| Middle channel | 20175 | 1732.5 | Middle channel | 20175 | 1732.5 |
| Highest channel | 20393 | 1754.3 | Highest channel | 20385 | 1753.5 |
| 5 MHz | | | 10 MHz | | |
| Lowest channel | 19975 | 1712.5 | Lowest channel | 20000 | 1715.0 |
| Middle channel | 20175 | 1732.5 | Middle channel | 20175 | 1732.5 |
| Highest channel | 20375 | 1752.5 | Highest channel | 20350 | 1750.0 |
| 15 MHz | | | 20 MHz | | |
| Lowest channel | 20025 | 1717.5 | Lowest channel | 20050 | 1720.0 |
| Middle channel | 20175 | 1732.5 | Middle channel | 20175 | 1732.5 |
| Highest channel | 20325 | 1747.5 | Highest channel | 20300 | 1745.0 |

4.2 Test Setup

1) Radiated emission measurement:



2) Conducted test method



4.3 Test Procedure

| Test method | Test step |
|-----------------------|---|
| Radiated emission | <p>For below 1GHz:</p> <ol style="list-style-type: none"> 1. The EUT was placed on the table top of a rotating table 0.8 m the ground at a 3 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m. 2. EUT works in each mode of operation that needs to be tested , and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data. <p>For above 1GHz:</p> <ol style="list-style-type: none"> 1. The EUT was placed on the table top of a rotating table 1.5 m the ground at a 3 m fully anechoic room. The measurement distance from the EUT to the receiving antenna is 3 m. 2. EUT works in each mode of operation that needs to be tested , and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data. |
| Conducted test method | <ol style="list-style-type: none"> 1. The LTE antenna port of EUT was connected to the test port of the test system through an RF cable. 2. The EUT is keeping in continuous transmission mode and tested in all modulation modes. 3. Open the test software, prepare a test plan, and control the system through the software. After the test is completed, the test report is exported through the test software. |

5 Test Results

5.1 Summary

5.1.1 Clause and Data Summary

| Test items | Standard clause | Test data | Result |
|---|---|-----------------|--------|
| RF Exposure (SAR) | Part 1.1307 Part 2.1093 | See SAR Report | Pass |
| RF Output Power | Part 2.1046 Part 27.50 (d)(4) | Appendix – LTE | Pass |
| Peak-to-Average Power Ratio | Part 24.232 (d) Part 27.50 (d)(5) | Appendix – LTE | Pass |
| Modulation Characteristics | Part 2.1047 | Appendix – LTE | Pass |
| 26dB Emission Bandwidth 99% Occupied Bandwidth | Part 2.1049 | Appendix – LTE | Pass |
| Out of Band Emission at Antenna Terminals | Part 2.1051 Part 27.53 (h) | Appendix – LTE | Pass |
| Field Strength of Spurious Radiation | Part 2.1053 Part 27.53 (h) | See Section 5.2 | Pass |
| Frequency Stability vs. Temperature | Part 2.1055 (a)(1)(b) Part 22.355 Part 24.235 Part 27.54 | Appendix – LTE | Pass |
| Frequency Stability vs. Voltage | Part 2.1055 (d)(2) Part 22.355 Part 24.235 Part 27.54 | Appendix – LTE | Pass |
| Remark: | | | |
| 1. Pass: The EUT complies with the essential requirements in the standard. | | | |
| 2. The cable insertion loss used by "RF Output Power" and other conduction measurement items is 0.5dB (Fundamental Frequency below 1GHz)/1.0dB (Fundamental Frequency above 1GHz) (provided by the customer). | | | |
| Test Method: | ANSI/TIA-603-E-2016 ANSI C63.26-2015 | | |

5.1.2 Test Limit

| Test items | Limit |
|---|--|
| RF Output Power | LTE band 4: 1W EIRP |
| Peak-to-Average Power Ratio | LTE band 4: The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB Other bands: N/A report only |
| Modulation Characteristics | N/A |
| 26dB Emission Bandwidth 99% Occupied Bandwidth | N/A |
| Out of Band Emission at Antenna Terminals | LTE band 4: The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. |
| Field Strength of Spurious Radiation | |
| Frequency Stability vs. Temperature | LTE band 4: The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation. |
| Frequency Stability vs. Voltage | |

5.2 Field Strength of Spurious Radiation Measurement

Note: All bandwidths, modulation types and RB configurations were pretested, and it was found that minimum bandwidths, QPSK modulation and 1RB0 were the worst modes, and only the worst modes were reflected in the report.

| LTE band 4 – 1.4 MHz bandwidth | | | | | | |
|--|---------------------|-------------|-------------|-------------|-------------|--------------|
| Lowest channel | | | | | | |
| Frequency (MHz) | Reading Level (dBm) | Factor (dB) | Level (dBm) | Limit (dBm) | Margin (dB) | Polarization |
| 3421.40 | -45.29 | -1.85 | -47.14 | -13.00 | 34.14 | Vertical |
| 5132.10 | -56.76 | 4.23 | -52.53 | -13.00 | 39.53 | Vertical |
| 6842.80 | -55.95 | 7.50 | -48.45 | -13.00 | 35.45 | Vertical |
| 3421.40 | -56.57 | -1.85 | -58.42 | -13.00 | 45.42 | Horizontal |
| 5132.10 | -56.76 | 4.23 | -52.53 | -13.00 | 39.53 | Horizontal |
| 6842.80 | -57.16 | 7.50 | -49.66 | -13.00 | 36.66 | Horizontal |
| Middle channel | | | | | | |
| Frequency (MHz) | Reading Level (dBm) | Factor (dB) | Level (dBm) | Limit (dBm) | Margin (dB) | Polarization |
| 3465.00 | -45.30 | -1.03 | -46.33 | -13.00 | 33.33 | Vertical |
| 5197.50 | -56.99 | 3.68 | -53.31 | -13.00 | 40.31 | Vertical |
| 6930.00 | -56.09 | 6.95 | -49.14 | -13.00 | 36.14 | Vertical |
| 3465.00 | -56.97 | -1.03 | -58.00 | -13.00 | 45.00 | Horizontal |
| 5197.50 | -57.11 | 3.68 | -53.43 | -13.00 | 40.43 | Horizontal |
| 6930.00 | -56.71 | 6.95 | -49.76 | -13.00 | 36.76 | Horizontal |
| Highest channel | | | | | | |
| Frequency (MHz) | Reading Level (dBm) | Factor (dB) | Level (dBm) | Limit (dBm) | Margin (dB) | Polarization |
| 3508.60 | -45.46 | -0.67 | -46.13 | -13.00 | 33.13 | Vertical |
| 5262.90 | -56.82 | 3.45 | -53.37 | -13.00 | 40.37 | Vertical |
| 7017.20 | -56.30 | 7.55 | -48.75 | -13.00 | 35.75 | Vertical |
| 3508.60 | -57.06 | -0.67 | -57.73 | -13.00 | 44.73 | Horizontal |
| 5262.90 | -57.33 | 3.45 | -53.88 | -13.00 | 40.88 | Horizontal |
| 7017.20 | -57.07 | 7.55 | -49.52 | -13.00 | 36.52 | Horizontal |
| Remark: | | | | | | |
| 1. The emission levels of below 1 GHz are lower than the limit 10dB, so not show in test report. | | | | | | |

-----End of report-----