

# **TEST REPORT**

**Applicant:** Vantiva USA LLC

**EUT Description:** 5G Module

**Model:** FG180-NA

**Brand:** N/A

**FCC ID:** G95FG180NA

**Standards:** FCC CFR Title 47 Part 2  
FCC CFR Title 47 Part 22  
FCC CFR Title 47 Part 24  
FCC CFR Title 47 Part 27  
FCC CFR Title 47 Part 90  
FCC CFR Title 47 Part 96

**Date of Receipt:** 2024/09/05 (Original Report TCWA24080023402)  
2024/12/23 (Original Report TCWA24120038202)  
2025/05/07 (This Report TCWA25040028002)

**Date of Test:** 2024/09/05 to 2024/12/16 (Original Report TCWA24080023402)  
2024/12/23 to 2025/02/19 (Original Report TCWA24120038202)  
2025/05/07 to 2025/05/30 (This Report TCWA25040028002)

**Date of Issue:** 2025/06/03

TOWE. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

the results documented in this report apply only the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility assure that additional production units of the model are manufactured with identical electrical and mechanical components. All sample tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise. without written approval of TOWE, the test report shall not be reproduced except in full.



**Huangkun**  
**Approved By:**



**ChenChengfu**  
**Reviewed By:**

## Revision History

| Rev. | Issue Date | Description | Revised by   |
|------|------------|-------------|--------------|
| 01   | 2025/06/03 | Original    | Chen Chengfu |

## Reporting Declaration

Remark for report TCWA24120038202:

According to the declaration letter from client, this report all frequency bands have updated antenna gain, so the Field Strength of Spurious Radiation was retested and EIRP/ERP was recalculated. Due to some frequency bands needing to meet FCC limits and reducing power, so the power test data of NR Band n30/n48/n66/n70/n77/n78 were retested.

All the other data reflected in this report are based on the original report with report number TCWA24080023402 (FCC ID: ZMOFG180WNA).

Remark for report TCWA25040028002:

According to the declaration letter from client, this report the worst data of Field Strength of Spurious Radiation is spot checked.

All the other data reflected in this report are based on the original report with report number TCWA24120038202 (FCC ID: G95FG180NA).

## Summary of Test Results

| FCC Part                                                                                                                                                                         | Test Band                                                                                                                                                                                                                                                                                            | Test Item                              | Test Result |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------|
| §2.1046,<br>§22.913(a)(5)<br>§27.50(c)(10)<br>§90.542(a)<br>§27.50(b)(9)                                                                                                         | NR Band n5/ NR Band n26 (824~849 MHz)<br>NR Band n12/71<br>NR Band n14<br>NR Band n13                                                                                                                                                                                                                | Effective Radiated Power               | Pass        |
| §2.1046,<br>§27.50(h)(2)<br>§24.232(c)<br>§27.50(d)(4)<br>§27.50(k)(3)<br>§27.50(j)(3)                                                                                           | NR Band n7/ NR Band n38/ NR Band n41<br>NR Band n2/ NR Band n25<br>NR Band n66/70<br>NR Band n77/78(3450-3550MHz)<br>NR Band n77/78(3550-3980MHz)                                                                                                                                                    | Effective Isotropic Radiated Power     | Pass        |
| §27.50(a)(3)<br>§96.41                                                                                                                                                           | NR Band n30<br>NR Band n48                                                                                                                                                                                                                                                                           | Maximum EIRP and Maximum PSD           | Pass        |
| §2.1046,<br>§90.635(b)                                                                                                                                                           | NR Band n26(814~824 MHz)                                                                                                                                                                                                                                                                             | Transmitter Conducted Power Output     | Pass        |
| §22.913(d)<br>§24.232(d)<br>§27.50(d)(5)<br>§96.41                                                                                                                               | NR Band n5/ NR Band n26 (824~849 MHz)<br>NR Band n2/ NR Band n25<br>Others NR Band<br>NR Band n48                                                                                                                                                                                                    | Peak-Average Ratio                     | Pass        |
| §2.1049                                                                                                                                                                          | All NR Band                                                                                                                                                                                                                                                                                          | Occupied Bandwidth                     | Pass        |
| §2.1051<br>§90.210(b)<br>§ 90.691(a)                                                                                                                                             | NR Band n14<br>NR Band n26(814~824 MHz)                                                                                                                                                                                                                                                              | Emission Mask                          | Pass        |
| §2.1051<br>§22.917(a)<br>§27.53(m4)<br>§24.238(a)<br>§27.53(g)<br>§27.53(c)<br>§90.543(e)(2)(3)<br>§27.53(a)(4)<br>§27.53(h)<br>§27.50(n)(2)<br>§27.53(l)(2)<br>§96.41           | NR Band n5/ NR Band n26 (824~849 MHz)<br>NR Band n7/ NR Band n38/ NR Band n41<br>NR Band n2/ NR Band n25<br>NR Band n12/71<br>NR Band n13<br>NR Band n14<br>NR Band n30<br>NR Band n66/70<br>NR Band n77/78(3450-3550MHz)<br>NR Band n77/78(3550-3980MHz)<br>NR Band n48                             | Band Edge                              | Pass        |
| §2.1051<br>§22.917(a)<br>§27.53(m)<br>§24.238(a)<br>§27.53(g)<br>§27.53(c)(f)<br>§90.543(c)(f)<br>§90.691<br>§27.53(a)(4)<br>§27.53(h)<br>§27.50(n)(2)<br>§27.53(l)(2)<br>§96.41 | NR Band n5/ NR Band n26 (824~849 MHz)<br>NR Band n7/ NR Band n38/ NR Band n41<br>NR Band n2/ NR Band n25<br>NR Band n12/71<br>NR Band n13<br>NR Band n14<br>NR Band n26(814~824 MHz)<br>NR Band n30<br>NR Band n66/70<br>NR Band n77/78(3450-3550MHz)<br>NR Band n77/78(3550-3980MHz)<br>NR Band n48 | Spurious Emission at Antenna Terminals | Pass        |
| §2.1051<br>§22.917(a)<br>§27.53(m)<br>§24.238(a)<br>§27.53(g)<br>§27.53(c)(f)<br>§90.543(c)(f)<br>§90.691<br>§27.53(a)(4)                                                        | NR Band n5/ NR Band n26 (824~849 MHz)<br>NR Band n7/ NR Band n38/ NR Band n41<br>NR Band n2/ NR Band n25<br>NR Band n12/71<br>NR Band n13<br>NR Band n14<br>NR Band n26(814~824 MHz)<br>NR Band n30                                                                                                  | Field Strength of Spurious Radiation   | Pass        |

| FCC Part                                                     | Test Band                                                                                                                                 | Test Item                      | Test Result |
|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------|
| §27.53(h)<br>§27.50(n)(2)<br>§27.53(l)(2)<br>§96.41          | NR Band n66/70<br>NR Band n77/78(3450-3550MHz)<br>NR Band n77/78(3550-3980MHz)<br>NR Band n48                                             |                                |             |
| §2.1055<br>§22.355<br>§24.235<br>§27.54<br>§90.213<br>§96.41 | NR Band n5/ NR Band n26 (824~849 MHz)<br>NR Band n2/ NR Band n25<br>Others NR Band<br>NR Band n14/NR Band n26(814~824 MHz)<br>NR Band n48 | Frequency Stability            | Pass        |
| §96.41                                                       | NR Band n48                                                                                                                               | Adjacent Channel Leakage Ratio | Pass        |
| Remark:<br>Pass: Meet the requirement.                       |                                                                                                                                           |                                |             |

## Table of Contents

|          |                                                    |           |
|----------|----------------------------------------------------|-----------|
| <b>1</b> | <b>General Description .....</b>                   | <b>7</b>  |
| 1.1      | Lab Information.....                               | 7         |
| 1.1.1    | Testing Location .....                             | 7         |
| 1.1.2    | Test Facility / Accreditations .....               | 7         |
| 1.2      | Client Information .....                           | 7         |
| 1.2.1    | Applicant.....                                     | 7         |
| 1.2.2    | Manufacturer.....                                  | 7         |
| 1.3      | Product Information.....                           | 8         |
| <b>2</b> | <b>Test Configuration .....</b>                    | <b>11</b> |
| 2.1      | Test Channel .....                                 | 11        |
| 2.2      | Worst-case configuration and Mode .....            | 20        |
| 2.3      | Support Unit used in test .....                    | 20        |
| 2.4      | Test Environment.....                              | 20        |
| 2.5      | Test RF Cable .....                                | 20        |
| 2.6      | Modifications.....                                 | 20        |
| 2.7      | Test Setup Diagram .....                           | 21        |
| 2.7.1    | Conducted Configuration .....                      | 21        |
| 2.7.2    | Radiated Configuration .....                       | 22        |
| <b>3</b> | <b>Equipment and Measurement Uncertainty.....</b>  | <b>23</b> |
| 3.1      | Test Equipment List.....                           | 23        |
| 3.2      | Measurement Uncertainty .....                      | 25        |
| <b>4</b> | <b>Test Results.....</b>                           | <b>26</b> |
| 4.1      | Output Power(ERP / EIRP / Conducted Power) .....   | 26        |
| 4.2      | Maximum EIRP and Maximum PSD .....                 | 28        |
| 4.3      | Peak-Average Ratio .....                           | 30        |
| 4.4      | Occupied Bandwidth .....                           | 31        |
| 4.5      | Band Edge and Emission Mask .....                  | 32        |
| 4.6      | Spurious Emission at Antenna Terminals .....       | 34        |
| 4.7      | Field Strength of Spurious Radiation.....          | 36        |
| 4.8      | Frequency Stability V.S. Temperature, Voltage..... | 39        |
| <b>5</b> | <b>Test Setup Photos.....</b>                      | <b>40</b> |
|          | Appendix.....                                      | 41        |

# 1 General Description

## 1.1 Lab Information

### 1.1.1 Testing Location

These measurements tests were conducted at the Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. facility located at F401 and F101, Building E, Hongwei Industrial Zone, Liuxian 3rd Road, Bao'an District, Shenzhen, China. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014

Tel.: +86-755-27212361

Contact Email: info@towewireless.com

### 1.1.2 Test Facility / Accreditations

#### A2LA (Certificate Number: 7088.01)

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. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

#### FCC Designation No.: CN1353

Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. has been recognized as an accredited testing laboratory. Designation Number: CN1353.

#### ISED CAB identifier: CN0152

Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0152

Company Number: 31000

## 1.2 Client Information

### 1.2.1 Applicant

|            |                                                                    |
|------------|--------------------------------------------------------------------|
| Applicant: | Vantiva USA LLC                                                    |
| Address:   | 4855 Peachtree Industrial Blvd, Suite 200, Norcross, GA 30092, USA |

### 1.2.2 Manufacturer

|               |                                                                    |
|---------------|--------------------------------------------------------------------|
| Manufacturer: | Vantiva USA LLC                                                    |
| Address:      | 4855 Peachtree Industrial Blvd, Suite 200, Norcross, GA 30092, USA |

### 1.3 Product Information

|                            |                                                                                                                                                                                                                                                                                                                |                  |                  |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------|
| EUT Description:           | 5G Module                                                                                                                                                                                                                                                                                                      |                  |                  |
| Model:                     | FG180-NA                                                                                                                                                                                                                                                                                                       |                  |                  |
| Brand:                     | N/A                                                                                                                                                                                                                                                                                                            |                  |                  |
| Hardware Version:          | V1.3                                                                                                                                                                                                                                                                                                           |                  |                  |
| Software Version:          | 99111.1000.00.01.01.04                                                                                                                                                                                                                                                                                         |                  |                  |
| SN:                        | C7X2QQ002A (Original)                                                                                                                                                                                                                                                                                          |                  |                  |
| IMEI:                      | 353652770103860 (This)<br>353652770103803 (This)                                                                                                                                                                                                                                                               |                  |                  |
| Feature:                   | UL 2*2 MIMO:<br>NR Band n2; NR Band n25; NR Band n41; NR Band n48; NR Band n66;<br>NR Band n70; NR Band n71; NR Band n77; NR Band n78; NR Band n38;                                                                                                                                                            |                  |                  |
| Technical specification:   |                                                                                                                                                                                                                                                                                                                |                  |                  |
| Operation Frequency Range: | Band                                                                                                                                                                                                                                                                                                           | TX Frequency     | RX Frequency     |
|                            | NR Band n2                                                                                                                                                                                                                                                                                                     | 1850 to 1910 MHz | 1930 to 1990 MHz |
|                            | NR Band n5                                                                                                                                                                                                                                                                                                     | 824 to 849 MHz   | 869 to 894 MHz   |
|                            | NR Band n7                                                                                                                                                                                                                                                                                                     | 2500 to 2570 MHz | 2620 to 2690 MHz |
|                            | NR Band n12                                                                                                                                                                                                                                                                                                    | 699 to 716 MHz   | 729 to 746 MHz   |
|                            | NR Band n13                                                                                                                                                                                                                                                                                                    | 777 to 787 MHz   | 746 to 756 MHz   |
|                            | NR Band n14                                                                                                                                                                                                                                                                                                    | 788 to 798 MHz   | 758 to 768 MHz   |
|                            | NR Band n25                                                                                                                                                                                                                                                                                                    | 1850 to 1915MHz  | 1930 to 1995 MHz |
|                            | NR Band n26<br>(814 to 824 MHz)                                                                                                                                                                                                                                                                                | 814 to 824MHz    | 859 to 869 MHz   |
|                            | NR Band n26<br>(824 to 849 MHz)                                                                                                                                                                                                                                                                                | 824 to 849 MHz   | 869 to 894 MHz   |
|                            | NR Band n30                                                                                                                                                                                                                                                                                                    | 2305 to 2315 MHz | 2350 to 2360 MHz |
|                            | NR Band n38                                                                                                                                                                                                                                                                                                    | 2570 to 2620 MHz | 2570 to 2620 MHz |
|                            | NR Band n41                                                                                                                                                                                                                                                                                                    | 2496 to 2690 MHz | 2496 to 2690 MHz |
|                            | NR Band n48                                                                                                                                                                                                                                                                                                    | 3550 to 3700 MHz | 3550 to 3700 MHz |
|                            | NR Band n66                                                                                                                                                                                                                                                                                                    | 1710 to 1780 MHz | 2110 to 2200 MHz |
|                            | NR Band n70                                                                                                                                                                                                                                                                                                    | 1695 to 1710 MHz | 1995 to 2020 MHz |
|                            | NR Band n71                                                                                                                                                                                                                                                                                                    | 663 to 698 MHz   | 617 to 652 MHz   |
|                            | NR Band n77*                                                                                                                                                                                                                                                                                                   | 3450 to 3550 MHz | 3450 to 3550 MHz |
|                            |                                                                                                                                                                                                                                                                                                                | 3700 to 3980 MHz | 3700 to 3980 MHz |
|                            | NR Band n78*                                                                                                                                                                                                                                                                                                   | 3450 to 3550 MHz | 3450 to 3550 MHz |
|                            |                                                                                                                                                                                                                                                                                                                | 3700 to 3800 MHz | 3700 to 3800 MHz |
|                            | NSA:<br>DC 4A/5A/7A/12A/13A/14A/30A/48A/66A/71A _n2A<br>DC 2A/7A/12A/14A/30A/48A/66A/71A _n5A<br>DC 2A/4A/12A/13A/66A/71A _n7A<br>DC _2A/5A/7A/48A/66A/71A _n12A<br>DC 5A/7A/12A/13A/26A/66A/71A _n25A<br>DC 2A/5A/12A/14A/66A _n30A<br>DC 2A/4A/5A/12A/66A/71A _n38A<br>DC 2A/4A/5A/12A/25A/26A/66A/71A _n41A |                  |                  |

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |                 |    |                                          |    |          |    |    |    |    |    |    |    |    |     |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------------|----|------------------------------------------|----|----------|----|----|----|----|----|----|----|----|-----|
|                      | DC 2A/5A/7A/12A/13A/14A/30A/48A/71A _n66A<br>DC 2A/5A/7A/12A/13A/48A/66A _n71A<br>DC 2A/5A/7A/12A/13A/14A/25A/30A/41A/66A/71A _n77A<br>DC 2A/4A/5A/7A/12A/13A/25A/38A/41A/66A/71A _n78A<br><br>NR CA:<br>n12A-n77A; n13A-n77A; n14A-n77A; n25A-n38A<br>n25A-n41A; n25A-n48A; n25A-n78A; n26A-n66A<br>n26A-n70A; n2A-n41A; n2A-n48A; n2A-n77A<br>n2A-n78A; n38A-n66A; n41A-n66A; n41A-n71A<br>n48A-n66A; n48A-n70A; n48A-n71A; n5A-n48A<br>n5A-n77A; n5A-n78A; n66A-n71A; n66A-n78A<br>n70A-n71A; n71A-n78A; n7A-n77A; n7A-n78A<br>n25A-n77A; n30A-n77A; n66A-n77A; n71A-n77A;<br><br>Note*:<br>The frequency range of NR Band n77 covers the frequency range of NR Band n78,<br>so NR Band n77 was fully tested. |           |                 |    |                                          |    |          |    |    |    |    |    |    |    |    |     |
| Power Class:         | Class 2: NR Band n2; NR Band 25; NR Band 66; NR Band 70; NR Band 71 (with SA TXD /UL MIMO);<br>Class 2: NR Band n41; NR Band 77; NR Band 78 (for NSA)<br>Class 1.5: NR Band n41; NR Band 77; NR Band 78 (with SA TXD /UL MIMO);<br>Class 2: n25A-n77A; n30A-n77A; n66A-n77A; n71A-n77A;                                                                                                                                                                                                                                                                                                                                                                                                                          |           |                 |    |                                          |    |          |    |    |    |    |    |    |    |    |     |
| Type of Modulation:  | <input checked="" type="checkbox"/> DFT-s-OFDM:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |                 |    | Pi/2-BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM |    |          |    |    |    |    |    |    |    |    |     |
|                      | <input checked="" type="checkbox"/> CP-OFDM:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |           |                 |    | QPSK, 16-QAM, 64-QAM, 256-QAM            |    |          |    |    |    |    |    |    |    |    |     |
| Operation Bandwidth: | NR Band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | SCS (kHz) | Bandwidth (MHz) |    |                                          |    |          |    |    |    |    |    |    |    |    |     |
|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |           | 5               | 10 | 15                                       | 20 | 25       | 30 | 35 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|                      | n2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 15        | √               | √  | √                                        | √  | √        | √  | √  | √  | /  | /  | /  | /  | /  | /   |
|                      | n5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 15        | √               | √  | √                                        | √  | /        | /  | /  | /  | /  | /  | /  | /  | /  | /   |
|                      | n7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 15        | √               | √  | √                                        | √  | √        | √  | √  | √  | /  | /  | /  | /  | /  | /   |
|                      | n12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 15        | √               | √  | √                                        | /  | /        | /  | /  | /  | /  | /  | /  | /  | /  | /   |
|                      | n13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 15        | √               | √  | /                                        | /  | /        | /  | /  | /  | /  | /  | /  | /  | /  | /   |
|                      | n14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 15        | √               | √  | /                                        | /  | /        | /  | /  | /  | /  | /  | /  | /  | /  | /   |
|                      | n25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 15        | √               | √  | √                                        | √  | √        | √  | √  | √  | /  | /  | /  | /  | /  | /   |
|                      | n26                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 15        | √               | √  | √                                        | √  | /        | /  | /  | /  | /  | /  | /  | /  | /  | /   |
|                      | n30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 15        | √               | √  | /                                        | /  | /        | /  | /  | /  | /  | /  | /  | /  | /  | /   |
|                      | n38                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 30        | /               | √  | √                                        | √  | /        | √  | /  | √  | /  | /  | /  | /  | /  | /   |
|                      | n41                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 30        | /               | √  | √                                        | √  | /        | √  | /  | √  | √  | √  | √  | √  | √  | √   |
|                      | n48                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 30        | /               | √  | √                                        | √  | /        | √  | /  | √  | /  | /  | /  | /  | /  | /   |
|                      | n66                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 15        | √               | √  | √                                        | √  | √        | √  | √  | √  | /  | /  | /  | /  | /  | /   |
|                      | n70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 15        | √               | √  | √                                        | /  | /        | /  | /  | /  | /  | /  | /  | /  | /  | /   |
|                      | n71                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 15        | √               | √  | √                                        | √  | /        | /  | /  | /  | /  | /  | /  | /  | /  | /   |
|                      | n77                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 30        | /               | √  | √                                        | √  | √        | √  | /  | √  | √  | √  | √  | √  | √  | √   |
| n78                  | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | /         | √               | √  | √                                        | √  | √        | /  | √  | √  | √  | √  | √  | √  | √  |     |
| Antenna:             | Type:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                 |    |                                          |    | Dipole   |    |    |    |    |    |    |    |    |     |
|                      | Model:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |                 |    |                                          |    | GHT-019A |    |    |    |    |    |    |    |    |     |

|                                                                                                                                                 |                                        |           |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-----------|-----------|
|                                                                                                                                                 | Impedance                              | 50Ω       |           |
|                                                                                                                                                 | SN.:                                   | N/A       |           |
| Antenna Gain:                                                                                                                                   | Band                                   | Ant1(dBi) | Ant8(dBi) |
|                                                                                                                                                 | NR Band n2:                            | 2.5       | 4         |
|                                                                                                                                                 | NR Band n5:                            | /         | 1.5       |
|                                                                                                                                                 | NR Band n7:                            | 3.5       | /         |
|                                                                                                                                                 | NR Band n12:                           | /         | 1.7       |
|                                                                                                                                                 | NR Band n13:                           | /         | 1         |
|                                                                                                                                                 | NR Band n14:                           | /         | 1.2       |
|                                                                                                                                                 | NR Band n25:                           | 2.5       | 4         |
|                                                                                                                                                 | NR Band n26:                           | /         | 1.5       |
|                                                                                                                                                 | NR Band n30:                           | 3         | 3         |
|                                                                                                                                                 | NR Band n38:                           | 3.3       | 3.8       |
|                                                                                                                                                 | NR Band n41:                           | 4         | 3.8       |
|                                                                                                                                                 | NR Band n48:                           | 3.5       | 4.6       |
|                                                                                                                                                 | NR Band n66:                           | 2.5       | 3.5       |
|                                                                                                                                                 | NR Band n70:                           | 1.9       | 2.5       |
|                                                                                                                                                 | NR Band n71:                           | 1.2       | 1.2       |
|                                                                                                                                                 | NR Band n77/n78:<br>(3450 to 3550 MHz) | 3.5       | 4         |
|                                                                                                                                                 | NR Band n77/n78:<br>(3700 to 3980 MHz) | 3.2       | 4.5       |
| Remark: The above EUT's information was declared by applicant, please refer to the specifications or user manual for more detailed description. |                                        |           |           |

## 2 Test Configuration

### 2.1 Test Channel

| 5G NR Band n2 and SCS 15 kHz |              |                        |                      |              |                        |                      |
|------------------------------|--------------|------------------------|----------------------|--------------|------------------------|----------------------|
| Bandwidth                    | TX Frequency |                        |                      | RX Frequency |                        |                      |
|                              | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 5MHz                         | Low          | 370500                 | 1852.5               | Low          | 386500                 | 1932.5               |
|                              | Middle       | 376000                 | 1880                 | Middle       | 392000                 | 1960                 |
|                              | High         | 381500                 | 1907.5               | High         | 397500                 | 1987.5               |
| 10MHz                        | Low          | 371000                 | 1855                 | Low          | 387000                 | 1935                 |
|                              | Middle       | 376000                 | 1880                 | Middle       | 392000                 | 1960                 |
|                              | High         | 381000                 | 1905                 | High         | 397000                 | 1985                 |
| 15MHz                        | Low          | 371500                 | 1857.5               | Low          | 387500                 | 1937.5               |
|                              | Middle       | 376000                 | 1880                 | Middle       | 392000                 | 1960                 |
|                              | High         | 380500                 | 1902.5               | High         | 396500                 | 1982.5               |
| 20MHz                        | Low          | 372000                 | 1860                 | Low          | 388000                 | 1940                 |
|                              | Middle       | 376000                 | 1880                 | Middle       | 392000                 | 1960                 |
|                              | High         | 380000                 | 1900                 | High         | 396000                 | 1980                 |
| 25MHz                        | Low          | 372500                 | 1862.5               | Low          | 388500                 | 1942.5               |
|                              | Middle       | 376000                 | 1880                 | Middle       | 392000                 | 1960                 |
|                              | High         | 379500                 | 1897.5               | High         | 395500                 | 1977.5               |
| 30MHz                        | Low          | 373000                 | 1865                 | Low          | 389000                 | 1945                 |
|                              | Middle       | 376000                 | 1880                 | Middle       | 392000                 | 1960                 |
|                              | High         | 379000                 | 1895                 | High         | 395000                 | 1975                 |
| 35MHz                        | Low          | 373500                 | 1867.5               | Low          | 389500                 | 1947.5               |
|                              | Middle       | 376000                 | 1880                 | Middle       | 392000                 | 1960                 |
|                              | High         | 378500                 | 1892.5               | High         | 394500                 | 1972.5               |
| 40MHz                        | Low          | 374000                 | 1870                 | Low          | 390000                 | 1950                 |
|                              | Middle       | 376000                 | 1880                 | Middle       | 392000                 | 1960                 |
|                              | High         | 378000                 | 1890                 | High         | 394000                 | 1970                 |

| 5G NR Band n5 and SCS 15 kHz |              |                        |                      |              |                        |                      |
|------------------------------|--------------|------------------------|----------------------|--------------|------------------------|----------------------|
| Bandwidth                    | TX Frequency |                        |                      | RX Frequency |                        |                      |
|                              | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 5MHz                         | Low          | 165300                 | 826.5                | Low          | 174300                 | 871.5                |
|                              | Middle       | 167300                 | 836.5                | Middle       | 176300                 | 881.5                |
|                              | High         | 169300                 | 846.5                | High         | 178300                 | 891.5                |
| 10MHz                        | Low          | 165800                 | 829                  | Low          | 174800                 | 874                  |
|                              | Middle       | 167300                 | 836.5                | Middle       | 176300                 | 881.5                |
|                              | High         | 168800                 | 844                  | High         | 177800                 | 889                  |
| 15MHz                        | Low          | 166300                 | 831.5                | Low          | 175300                 | 876.5                |
|                              | Middle       | 167300                 | 836.5                | Middle       | 176300                 | 881.5                |
|                              | High         | 168300                 | 841.5                | High         | 177300                 | 886.5                |
| 20MHz                        | Low          | 166800                 | 834                  | Low          | 175800                 | 879                  |
|                              | Middle       | 167300                 | 836.5                | Middle       | 176300                 | 881.5                |
|                              | High         | 167800                 | 839                  | High         | 176800                 | 884                  |

| 5G NR Band n7 and SCS 15 kHz |              |                        |                      |              |                        |                      |
|------------------------------|--------------|------------------------|----------------------|--------------|------------------------|----------------------|
| Bandwidth                    | TX Frequency |                        |                      | RX Frequency |                        |                      |
|                              | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 5MHz                         | Low          | 500500                 | 2502.5               | Low          | 524500                 | 2622.5               |
|                              | Middle       | 507000                 | 2535                 | Middle       | 531000                 | 2655                 |
|                              | High         | 513500                 | 2567.5               | High         | 537500                 | 2687.5               |
| 10MHz                        | Low          | 501000                 | 2505                 | Low          | 525000                 | 2625                 |
|                              | Middle       | 507000                 | 2535                 | Middle       | 531000                 | 2655                 |
|                              | High         | 513000                 | 2565                 | High         | 537000                 | 2685                 |
| 15MHz                        | Low          | 501500                 | 2507.5               | Low          | 525500                 | 2627.5               |
|                              | Middle       | 507000                 | 2535                 | Middle       | 531000                 | 2655                 |
|                              | High         | 512500                 | 2562.5               | High         | 536500                 | 2682.5               |
| 20MHz                        | Low          | 502000                 | 2510                 | Low          | 526000                 | 2630                 |
|                              | Middle       | 507000                 | 2535                 | Middle       | 531000                 | 2655                 |
|                              | High         | 512000                 | 2560                 | High         | 536000                 | 2680                 |
| 25MHz                        | Low          | 502500                 | 2512.5               | Low          | 526500                 | 2632.5               |
|                              | Middle       | 507000                 | 2535                 | Middle       | 531000                 | 2655                 |
|                              | High         | 511500                 | 2557.5               | High         | 535500                 | 2677.5               |
| 30MHz                        | Low          | 503000                 | 2515                 | Low          | 527000                 | 2635                 |
|                              | Middle       | 507000                 | 2535                 | Middle       | 531000                 | 2655                 |
|                              | High         | 511000                 | 2555                 | High         | 535000                 | 2675                 |
| 35MHz                        | Low          | 503500                 | 2517.5               | Low          | 527500                 | 2637.5               |
|                              | Middle       | 507000                 | 2535                 | Middle       | 531000                 | 2655                 |
|                              | High         | 510500                 | 2552.5               | High         | 534500                 | 2672.5               |
| 40MHz                        | Low          | 504000                 | 2520                 | Low          | 528000                 | 2640                 |
|                              | Middle       | 507000                 | 2535                 | Middle       | 531000                 | 2655                 |
|                              | High         | 510000                 | 2550                 | High         | 534000                 | 2670                 |

| 5G NR Band n12 and SCS 15 kHz |              |                        |                      |              |                        |                      |
|-------------------------------|--------------|------------------------|----------------------|--------------|------------------------|----------------------|
| Bandwidth                     | TX Frequency |                        |                      | RX Frequency |                        |                      |
|                               | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 5MHz                          | Low          | 140300                 | 701.5                | Low          | 146300                 | 731.5                |
|                               | Middle       | 141500                 | 707.5                | Middle       | 147500                 | 737.5                |
|                               | High         | 142700                 | 713.5                | High         | 148700                 | 743.5                |
| 10MHz                         | Low          | 140800                 | 704                  | Low          | 146800                 | 734                  |
|                               | Middle       | 141500                 | 707.5                | Middle       | 147500                 | 737.5                |
|                               | High         | 142200                 | 711                  | High         | 148200                 | 741                  |
| 15MHz                         | Low          | 141300                 | 706.5                | Low          | 147300                 | 736.5                |
|                               | Middle       | 141500                 | 707.5                | Middle       | 147500                 | 737.5                |
|                               | High         | 141700                 | 708.5                | High         | 147700                 | 738.5                |

| 5G NR Band n13 and SCS 15 kHz |              |                        |                      |              |                        |                      |
|-------------------------------|--------------|------------------------|----------------------|--------------|------------------------|----------------------|
| Bandwidth                     | TX Frequency |                        |                      | RX Frequency |                        |                      |
|                               | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 5MHz                          | Low          | 155900                 | 779.5                | Low          | 149700                 | 748.5                |
|                               | Middle       | 156400                 | 782                  | Middle       | 150200                 | 751                  |
|                               | High         | 156900                 | 784.5                | High         | 150700                 | 753.5                |
| 10MHz                         | Low          | 156400                 | 782                  | Low          | 150200                 | 751                  |
|                               | Middle       |                        |                      | Middle       |                        |                      |
|                               | High         |                        |                      | High         |                        |                      |

| 5G NR Band n14 and SCS 15 kHz |              |                        |                      |              |                        |                      |
|-------------------------------|--------------|------------------------|----------------------|--------------|------------------------|----------------------|
| Bandwidth                     | TX Frequency |                        |                      | RX Frequency |                        |                      |
|                               | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 5MHz                          | Low          | 158100                 | 790.5                | Low          | 152100                 | 760.5                |
|                               | Middle       | 158600                 | 793                  | Middle       | 152600                 | 763                  |
|                               | High         | 159100                 | 795.5                | High         | 153100                 | 765.5                |
| 10MHz                         | Low          | 158600                 | 793                  | Low          | 152600                 | 763                  |
|                               | Middle       |                        |                      | Middle       |                        |                      |
|                               | High         |                        |                      | High         |                        |                      |

| 5G NR Band n25 and SCS 15 kHz |              |                        |                      |              |                        |                      |
|-------------------------------|--------------|------------------------|----------------------|--------------|------------------------|----------------------|
| Bandwidth                     | TX Frequency |                        |                      | RX Frequency |                        |                      |
|                               | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 5MHz                          | Low          | 370500                 | 1852.5               | Low          | 386500                 | 1932.5               |
|                               | Middle       | 376500                 | 1882.5               | Middle       | 392500                 | 1962.5               |
|                               | High         | 382500                 | 1912.5               | High         | 398500                 | 1992.5               |
| 10MHz                         | Low          | 371000                 | 1855                 | Low          | 387000                 | 1935                 |
|                               | Middle       | 376500                 | 1882.5               | Middle       | 392500                 | 1962.5               |
|                               | High         | 382000                 | 1910                 | High         | 398000                 | 1990                 |
| 15MHz                         | Low          | 371500                 | 1857.5               | Low          | 387500                 | 1937.5               |
|                               | Middle       | 376500                 | 1882.5               | Middle       | 392500                 | 1962.5               |
|                               | High         | 381500                 | 1907.5               | High         | 397500                 | 1987.5               |
| 20MHz                         | Low          | 372000                 | 1860                 | Low          | 388000                 | 1940                 |
|                               | Middle       | 376500                 | 1882.5               | Middle       | 392500                 | 1962.5               |
|                               | High         | 381000                 | 1905                 | High         | 397000                 | 1985                 |
| 25MHz                         | Low          | 372500                 | 1862.5               | Low          | 388500                 | 1942.5               |
|                               | Middle       | 376500                 | 1882.5               | Middle       | 392500                 | 1962.5               |
|                               | High         | 380500                 | 1902.5               | High         | 396500                 | 1982.5               |
| 30MHz                         | Low          | 373000                 | 1865                 | Low          | 389000                 | 1945                 |
|                               | Middle       | 376500                 | 1882.5               | Middle       | 392500                 | 1962.5               |
|                               | High         | 380000                 | 1900                 | High         | 396000                 | 1980                 |
| 35MHz                         | Low          | 373500                 | 1867.5               | Low          | 389500                 | 1947.5               |
|                               | Middle       | 376500                 | 1882.5               | Middle       | 392500                 | 1962.5               |
|                               | High         | 379500                 | 1897.5               | High         | 395500                 | 1977.5               |
| 40MHz                         | Low          | 374000                 | 1870                 | Low          | 390000                 | 1950                 |
|                               | Middle       | 376500                 | 1882.5               | Middle       | 392500                 | 1962.5               |
|                               | High         | 379000                 | 1895                 | High         | 395000                 | 1975                 |

| 5G NR Band n26(814~824MHz) and SCS 15 kHz |              |                        |                      |              |                        |                      |
|-------------------------------------------|--------------|------------------------|----------------------|--------------|------------------------|----------------------|
| Bandwidth                                 | TX Frequency |                        |                      | RX Frequency |                        |                      |
|                                           | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 5MHz                                      | Low          | 163300                 | 816.5                | Low          | 172300                 | 861.5                |
|                                           | Middle       | 163800                 | 819                  | Middle       | 172800                 | 864                  |
|                                           | High         | 164300                 | 821.5                | High         | 173300                 | 866.5                |
| 10MHz                                     | Low          | 163800                 | 819                  | Low          | 172800                 | 864                  |
|                                           | Middle       |                        |                      | Middle       |                        |                      |
|                                           | High         |                        |                      | High         |                        |                      |

| 5G NR Band n26(824~849MHz) and SCS 15 kHz |              |                        |                      |              |                        |                      |
|-------------------------------------------|--------------|------------------------|----------------------|--------------|------------------------|----------------------|
| Bandwidth                                 | TX Frequency |                        |                      | RX Frequency |                        |                      |
|                                           | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 5MHz                                      | Low          | 165300                 | 826.5                | Low          | 174300                 | 871.5                |
|                                           | Middle       | 167300                 | 836.5                | Middle       | 176300                 | 881.5                |
|                                           | High         | 169300                 | 846.5                | High         | 178300                 | 891.5                |
| 10MHz                                     | Low          | 165800                 | 829                  | Low          | 174800                 | 874                  |
|                                           | Middle       | 167300                 | 836.5                | Middle       | 176300                 | 881.5                |
|                                           | High         | 168800                 | 844                  | High         | 177800                 | 889                  |
| 15MHz                                     | Low          | 166300                 | 831.5                | Low          | 175300                 | 876.5                |
|                                           | Middle       | 167300                 | 836.5                | Middle       | 176300                 | 881.5                |
|                                           | High         | 168300                 | 841.5                | High         | 177300                 | 886.5                |
| 20MHz                                     | Low          | 166800                 | 834                  | Low          | 175800                 | 879                  |
|                                           | Middle       | 167300                 | 836.5                | Middle       | 176300                 | 881.5                |
|                                           | High         | 167800                 | 839                  | High         | 176800                 | 884                  |

| 5G NR Band n30 and SCS 15 kHz |              |                        |                      |              |                        |                      |
|-------------------------------|--------------|------------------------|----------------------|--------------|------------------------|----------------------|
| Bandwidth                     | TX Frequency |                        |                      | RX Frequency |                        |                      |
|                               | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 5MHz                          | Low          | 461500                 | 2307.5               | Low          | 470500                 | 2352.5               |
|                               | Middle       | 462000                 | 2310                 | Middle       | 471000                 | 2355                 |
|                               | High         | 462500                 | 2312.5               | High         | 471500                 | 2357.5               |
| 10MHz                         | Low          | 462000                 | 2310                 | Low          | 471000                 | 2355                 |
|                               | Middle       | 462000                 | 2310                 | Middle       | 471000                 | 2355                 |
|                               | High         | 462000                 | 2310                 | High         | 471000                 | 2355                 |

| 5G NR Band n38, SCS 30 kHz and $\Delta F_{\text{Raster}}$ 30 kHz |                   |                        |                      |
|------------------------------------------------------------------|-------------------|------------------------|----------------------|
| Bandwidth                                                        | TX & RX Frequency |                        |                      |
|                                                                  | Range             | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 10MHz                                                            | Low               | 515000                 | 2575                 |
|                                                                  | Middle            | 519000                 | 2595                 |
|                                                                  | High              | 523000                 | 2615                 |
| 15MHz                                                            | Low               | 515500                 | 2577.5               |
|                                                                  | Middle            | 519000                 | 2595                 |
|                                                                  | High              | 522500                 | 2612.5               |
| 20MHz                                                            | Low               | 516000                 | 2580                 |
|                                                                  | Middle            | 519000                 | 2595                 |
|                                                                  | High              | 522000                 | 2610                 |
| 30MHz                                                            | Low               | 517000                 | 2585                 |
|                                                                  | Middle            | 519000                 | 2595                 |
|                                                                  | High              | 521000                 | 2605                 |
| 40MHz                                                            | Low               | 518000                 | 2590                 |
|                                                                  | Middle            | 519000                 | 2595                 |
|                                                                  | High              | 520000                 | 2600                 |

| 5G NR Band n41, SCS 30 kHz and $\Delta F_{\text{Raster}}$ 30 kHz |                   |                        |                      |
|------------------------------------------------------------------|-------------------|------------------------|----------------------|
| Bandwidth                                                        | TX & RX Frequency |                        |                      |
|                                                                  | Range             | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 10MHz                                                            | Low               | 500202                 | 2501.01              |
|                                                                  | Middle            | 518598                 | 2592.99              |
|                                                                  | High              | 537000                 | 2685                 |
| 15MHz                                                            | Low               | 500700                 | 2503.5               |
|                                                                  | Middle            | 518598                 | 2592.99              |
|                                                                  | High              | 536496                 | 2682.48              |
| 20MHz                                                            | Low               | 501204                 | 2506.02              |
|                                                                  | Middle            | 518598                 | 2592.99              |
|                                                                  | High              | 535998                 | 2679.99              |
| 30MHz                                                            | Low               | 502200                 | 2511                 |
|                                                                  | Middle            | 518598                 | 2592.99              |
|                                                                  | High              | 534996                 | 2674.98              |
| 40MHz                                                            | Low               | 503202                 | 2516.01              |
|                                                                  | Middle            | 518598                 | 2592.99              |
|                                                                  | High              | 534000                 | 2670                 |
| 50MHz                                                            | Low               | 504204                 | 2521.02              |
|                                                                  | Middle            | 518598                 | 2592.99              |
|                                                                  | High              | 532998                 | 2664.99              |
| 60MHz                                                            | Low               | 505200                 | 2526                 |
|                                                                  | Middle            | 518598                 | 2592.99              |
|                                                                  | High              | 531996                 | 2659.98              |
| 70MHz                                                            | Low               | 506200                 | 2531                 |
|                                                                  | Middle            | 518598                 | 2592.29              |
|                                                                  | High              | 531000                 | 2655                 |
| 80MHz                                                            | Low               | 507204                 | 2536.02              |
|                                                                  | Middle            | 518598                 | 2592.99              |
|                                                                  | High              | 529998                 | 2649.99              |
| 90MHz                                                            | Low               | 508200                 | 2541                 |
|                                                                  | Middle            | 518598                 | 2592.99              |
|                                                                  | High              | 528996                 | 2644.98              |
| 100MHz                                                           | Low               | 509202                 | 2546.01              |
|                                                                  | Middle            | 518598                 | 2592.99              |
|                                                                  | High              | 528000                 | 2640                 |

| 5G NR Band n48, SCS 30 kHz and $\Delta F_{\text{Raster}}$ 30 kHz |                   |                        |                      |
|------------------------------------------------------------------|-------------------|------------------------|----------------------|
| Bandwidth                                                        | TX & RX Frequency |                        |                      |
|                                                                  | Range             | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 10MHz                                                            | Low               | 637000                 | 3555                 |
|                                                                  | Middle            | 641666                 | 3624.99              |
|                                                                  | High              | 646332                 | 3694.98              |
| 15MHz                                                            | Low               | 637168                 | 3557.52              |
|                                                                  | Middle            | 641666                 | 3624.99              |
|                                                                  | High              | 646166                 | 3692.49              |
| 20MHz                                                            | Low               | 637334                 | 3560.01              |
|                                                                  | Middle            | 641666                 | 3624.99              |
|                                                                  | High              | 646000                 | 3690                 |
| 30MHz                                                            | Low               | 637668                 | 3565.02              |
|                                                                  | Middle            | 641666                 | 3624.99              |
|                                                                  | High              | 645666                 | 3684.99              |
| 40MHz                                                            | Low               | 638000                 | 3570                 |
|                                                                  | Middle            | 641666                 | 3624.99              |
|                                                                  | High              | 645332                 | 3679.98              |

| 5G NR Band n66, SCS 15 kHz |              |                        |                      |              |                        |                      |
|----------------------------|--------------|------------------------|----------------------|--------------|------------------------|----------------------|
| Bandwidth                  | TX Frequency |                        |                      | RX Frequency |                        |                      |
|                            | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 5MHz                       | Low          | 435500                 | 1712.5               | Low          | 422500                 | 2112.5               |
|                            | Middle       | 342500                 | 1745                 | Middle       | 431000                 | 2155                 |
|                            | High         | 349000                 | 1777.5               | High         | 439500                 | 2197.5               |
| 10MHz                      | Low          | 343000                 | 1715                 | Low          | 423000                 | 2115                 |
|                            | Middle       | 349000                 | 1745                 | Middle       | 431000                 | 2155                 |
|                            | High         | 355000                 | 1775                 | High         | 439000                 | 2195                 |
| 15MHz                      | Low          | 343500                 | 1717.5               | Low          | 423500                 | 2117.5               |
|                            | Middle       | 349000                 | 1745                 | Middle       | 431000                 | 2155                 |
|                            | High         | 354500                 | 1772.5               | High         | 438500                 | 2192.5               |
| 20MHz                      | Low          | 344000                 | 1720                 | Low          | 424000                 | 2120                 |
|                            | Middle       | 349000                 | 1745                 | Middle       | 431000                 | 2155                 |
|                            | High         | 354000                 | 1770                 | High         | 438000                 | 2190                 |
| 25MHz                      | Low          | 344500                 | 1722.5               | Low          | 424500                 | 2122.5               |
|                            | Middle       | 349000                 | 1745                 | Middle       | 431000                 | 2155                 |
|                            | High         | 353500                 | 1767.5               | High         | 437500                 | 2187.5               |
| 30MHz                      | Low          | 345000                 | 1725                 | Low          | 425000                 | 2125                 |
|                            | Middle       | 349000                 | 1745                 | Middle       | 431000                 | 2155                 |
|                            | High         | 353000                 | 1765                 | High         | 437000                 | 2185                 |
| 35MHz                      | Low          | 345500                 | 1727.5               | Low          | 425500                 | 2127.5               |
|                            | Middle       | 349000                 | 1745                 | Middle       | 431000                 | 2155                 |
|                            | High         | 352500                 | 1762.5               | High         | 436500                 | 2182.5               |
| 40MHz                      | Low          | 346000                 | 1730                 | Low          | 426000                 | 2130                 |
|                            | Middle       | 349000                 | 1745                 | Middle       | 431000                 | 2155                 |
|                            | High         | 352000                 | 1760                 | High         | 436000                 | 2180                 |

| 5G NR Band n70, SCS 15 kHz |              |                        |                      |              |                        |                      |
|----------------------------|--------------|------------------------|----------------------|--------------|------------------------|----------------------|
| Bandwidth                  | TX Frequency |                        |                      | RX Frequency |                        |                      |
|                            | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 5MHz                       | Low          | 339500                 | 1697.5               | Low          | 399500                 | 1997.5               |
|                            | Middle       | 340500                 | 1702.5               | Middle       | 400500                 | 2002.5               |
|                            | High         | 341500                 | 1707.7               | High         | 401500                 | 2007.5               |
| 10MHz                      | Low          | 340000                 | 1700                 | Low          | 400000                 | 2000                 |
|                            | Middle       | 340500                 | 1702.5               | Middle       | 400500                 | 2002.5               |
|                            | High         | 341000                 | 1705                 | High         | 401000                 | 2005                 |
| 15MHz                      | Low          | /                      | /                    | Low          | /                      | /                    |
|                            | Middle       | 340500                 | 1702.5               | Middle       | 400500                 | 2002.5               |
|                            | High         | /                      | /                    | High         | /                      | /                    |

| 5G NR Band n71, SCS 15 kHz |              |                        |                      |              |                        |                      |
|----------------------------|--------------|------------------------|----------------------|--------------|------------------------|----------------------|
| Bandwidth                  | TX Frequency |                        |                      | RX Frequency |                        |                      |
|                            | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) | Range        | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 5MHz                       | Low          | 133100                 | 665.5                | Low          | 123900                 | 619.5                |
|                            | Middle       | 136100                 | 680.5                | Middle       | 126900                 | 634.5                |
|                            | High         | 139100                 | 695.5                | High         | 129900                 | 649.5                |
| 10MHz                      | Low          | 133600                 | 668                  | Low          | 124400                 | 622                  |
|                            | Middle       | 136100                 | 680.5                | Middle       | 126900                 | 634.5                |
|                            | High         | 138600                 | 693                  | High         | 129400                 | 647                  |
| 15MHz                      | Low          | 134100                 | 670.5                | Low          | 124900                 | 624.5                |
|                            | Middle       | 136100                 | 680.5                | Middle       | 126900                 | 634.5                |
|                            | High         | 138100                 | 690.5                | High         | 128900                 | 644.5                |
| 20MHz                      | Low          | 134600                 | 673                  | Low          | 125400                 | 627                  |
|                            | Middle       | 136100                 | 680.5                | Middle       | 126900                 | 634.5                |
|                            | High         | 137600                 | 688                  | High         | 128400                 | 642                  |

| 5G NR Band n77/n78(3450~3550MHz), SCS 30 kHz and $\Delta F_{\text{Raster}}$ 30 kHz |                   |                        |                      |
|------------------------------------------------------------------------------------|-------------------|------------------------|----------------------|
| Bandwidth                                                                          | TX & RX Frequency |                        |                      |
|                                                                                    | Range             | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 10MHz                                                                              | Low               | 630334                 | 3455.01              |
|                                                                                    | Middle            | 633334                 | 3500.01              |
|                                                                                    | High              | 636334                 | 3545.01              |
| 15MHz                                                                              | Low               | 630500                 | 3457.5               |
|                                                                                    | Middle            | 633334                 | 3500.01              |
|                                                                                    | High              | 636166                 | 3542.49              |
| 20MHz                                                                              | Low               | 630668                 | 3460.02              |
|                                                                                    | Middle            | 633334                 | 3500.01              |
|                                                                                    | High              | 636000                 | 3540                 |
| 25MHz                                                                              | Low               | 630835                 | 3462.52              |
|                                                                                    | Middle            | 633334                 | 3500.01              |
|                                                                                    | High              | 635833                 | 3537.50              |
| 30MHz                                                                              | Low               | 631000                 | 3465                 |
|                                                                                    | Middle            | 633334                 | 3500.01              |
|                                                                                    | High              | 635666                 | 3534.99              |
| 40MHz                                                                              | Low               | 631334                 | 3470.01              |
|                                                                                    | Middle            | 633334                 | 3500.01              |
|                                                                                    | High              | 635334                 | 3530.01              |
| 50MHz                                                                              | Low               | 631668                 | 3475.02              |
|                                                                                    | Middle            | 633334                 | 3500.01              |
|                                                                                    | High              | 635000                 | 3525                 |
| 60MHz                                                                              | Low               | 632000                 | 3480                 |
|                                                                                    | Middle            | 633334                 | 3500.01              |
|                                                                                    | High              | 634666                 | 3519.99              |
| 70MHz                                                                              | Low               | 632334                 | 3485.01              |
|                                                                                    | Middle            | 633334                 | 3500.01              |
|                                                                                    | High              | 634334                 | 3515.01              |
| 80MHz                                                                              | Low               | 632668                 | 3490.02              |
|                                                                                    | Middle            | 633334                 | 3500.01              |
|                                                                                    | High              | 634000                 | 3510                 |
| 90MHz                                                                              | Low               | 633000                 | 3495                 |
|                                                                                    | Middle            | 633334                 | 3500.01              |
|                                                                                    | High              | 633666                 | 3504.99              |
| 100MHz                                                                             | Low               | 633334                 | 3500.01              |
|                                                                                    | Middle            |                        |                      |
|                                                                                    | High              |                        |                      |

| 5G NR Band n77(3700~3980MHz), SCS 30 kHz and $\Delta F_{\text{Raster}}$ 30 kHz |                   |                        |                      |
|--------------------------------------------------------------------------------|-------------------|------------------------|----------------------|
| Bandwidth                                                                      | TX & RX Frequency |                        |                      |
|                                                                                | Range             | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 10MHz                                                                          | Low               | 647000                 | 3705                 |
|                                                                                | Middle            | 656000                 | 3840                 |
|                                                                                | High              | 665000                 | 3975                 |
| 15MHz                                                                          | Low               | 647168                 | 3707.52              |
|                                                                                | Middle            | 656000                 | 3840                 |
|                                                                                | High              | 664832                 | 3972.48              |
| 20MHz                                                                          | Low               | 647334                 | 3710.01              |
|                                                                                | Middle            | 656000                 | 3840                 |
|                                                                                | High              | 664666                 | 3969.99              |
| 25MHz                                                                          | Low               | 647501                 | 3712.515             |
|                                                                                | Middle            | 656000                 | 3840                 |
|                                                                                | High              | 664499                 | 3967.485             |
| 30MHz                                                                          | Low               | 647666                 | 3714.99              |
|                                                                                | Middle            | 656000                 | 3840                 |
|                                                                                | High              | 664334                 | 3965.01              |
| 40MHz                                                                          | Low               | 648000                 | 3720                 |
|                                                                                | Middle            | 656000                 | 3840                 |
|                                                                                | High              | 664000                 | 3960                 |
| 50MHz                                                                          | Low               | 648334                 | 3725.01              |
|                                                                                | Middle            | 656000                 | 3840                 |
|                                                                                | High              | 663666                 | 3954.99              |
| 60MHz                                                                          | Low               | 648668                 | 3730.02              |
|                                                                                | Middle            | 656000                 | 3840                 |
|                                                                                | High              | 663332                 | 3949.98              |
| 70MHz                                                                          | Low               | 649000                 | 3735                 |
|                                                                                | Middle            | 656000                 | 3840                 |
|                                                                                | High              | 663000                 | 3945                 |
| 80MHz                                                                          | Low               | 649334                 | 3740.01              |
|                                                                                | Middle            | 656000                 | 3840                 |
|                                                                                | High              | 662666                 | 3939.99              |
| 90MHz                                                                          | Low               | 649668                 | 3745.02              |
|                                                                                | Middle            | 656000                 | 3840                 |
|                                                                                | High              | 662332                 | 3934.98              |
| 100MHz                                                                         | Low               | 650000                 | 3750                 |
|                                                                                | Middle            | 656000                 | 3840                 |
|                                                                                | High              | 662000                 | 3930                 |

| 5G NR Band n78(3700~3800MHz), SCS 30 kHz and $\Delta F_{\text{Raster}}$ 30 kHz |                   |                        |                      |
|--------------------------------------------------------------------------------|-------------------|------------------------|----------------------|
| Bandwidth                                                                      | TX & RX Frequency |                        |                      |
|                                                                                | Range             | Carrier centre (ARFCN) | Carrier centre (MHz) |
| 10MHz                                                                          | Low               | 647000                 | 3705                 |
|                                                                                | Middle            | 650000                 | 3750                 |
|                                                                                | High              | 653000                 | 3795                 |
| 15MHz                                                                          | Low               | 647168                 | 3707.52              |
|                                                                                | Middle            | 650000                 | 3750                 |
|                                                                                | High              | 652832                 | 3792.48              |
| 20MHz                                                                          | Low               | 647334                 | 3710.01              |
|                                                                                | Middle            | 650000                 | 3750                 |
|                                                                                | High              | 652666                 | 3789.99              |
| 25MHz                                                                          | Low               | 647500                 | 3712.5               |
|                                                                                | Middle            | 650000                 | 3750                 |
|                                                                                | High              | 652500                 | 3787.5               |
| 30MHz                                                                          | Low               | 647668                 | 3715.02              |
|                                                                                | Middle            | 650000                 | 3750                 |
|                                                                                | High              | 652334                 | 3785.01              |
| 40MHz                                                                          | Low               | 648000                 | 3720                 |
|                                                                                | Middle            | 650000                 | 3750                 |
|                                                                                | High              | 652000                 | 3780                 |
| 50MHz                                                                          | Low               | 648334                 | 3725.01              |
|                                                                                | Middle            | 650000                 | 3750                 |
|                                                                                | High              | 651666                 | 3774.99              |
| 70MHz                                                                          | Low               | 649000                 | 3735                 |
|                                                                                | Middle            | 650000                 | 3750                 |
|                                                                                | High              | 651000                 | 3765                 |
| 60MHz                                                                          | Low               | 648668                 | 3730.02              |
|                                                                                | Middle            | 650000                 | 3750                 |
|                                                                                | High              | 651332                 | 3769.98              |
| 80MHz                                                                          | Low               | 649334                 | 3740.01              |
|                                                                                | Middle            | 650000                 | 3750                 |
|                                                                                | High              | 650666                 | 3759.99              |
| 90MHz                                                                          | Low               | 649668                 | 3745.02              |
|                                                                                | Middle            | 650000                 | 3750                 |
|                                                                                | High              | 650332                 | 3754.98              |
| 100MHz                                                                         | Low               | 650000                 | 3750                 |
|                                                                                | Middle            |                        |                      |
|                                                                                | High              |                        |                      |

## 2.2 Worst-case configuration and Mode

| Test Mode | Description                                                        |
|-----------|--------------------------------------------------------------------|
| TM 1      | EUT communication with simulated station in DFT-s-OFDM BPSK mode   |
| TM 2      | EUT communication with simulated station in DFT-s-OFDM QPSK mode   |
| TM 3      | EUT communication with simulated station in DFT-s-OFDM 16QAM mode  |
| TM 4      | EUT communication with simulated station in DFT-s-OFDM 64QAM mode  |
| TM 5      | EUT communication with simulated station in DFT-s-OFDM 256QAM mode |
| TM 6      | EUT communication with simulated station in CP QPSK mode           |
| TM 7      | EUT communication with simulated station in CP 16QAM mode          |
| TM 8      | EUT communication with simulated station in CP 64QAM mode          |
| TM 9      | EUT communication with simulated station in CP 256QAM mode         |

Note:

1. The maximum Conducted Power is calculated from max output power and max antenna gain, only the maximum Conducted Power is shown in the report.
2. NR n2/n25/n38/n41/n48/n66/n70/n71/n77/n78 support UL MIMO mode is correlated, the n2/ n25/ n38/ n41 / n48/ n66/ n70/ n71/ n77/ n78 MIMO antenna gain =  $10\log[(10^{G1/20}+10^{G2/20})^2/2]$ . The conducted BE/Spurious are tested at single antenna port and add  $10*\log(N_{ANT})$  according to KDB 662911 D01.
3. NR n2/n5/n7/n12/n25/n30/n38/n41/n66/n71/n77/n78 support SA and NSA mode. The whole testing has assessed SA mode by referring to the higher conducted power.
4. The device supports HPUE mode for NR n41/n77/n78 and PC1.5 for NR n41/n77/n78 UL MIMO.

## 2.3 Support Unit used in test

| Description         | Manufacturer | Model               | Serial Number |
|---------------------|--------------|---------------------|---------------|
| Development Board * | Fibocom      | ADP-FG190B-NA-21-00 | /             |

Remark: \* the information of table is provided by client.

## 2.4 Test Environment

|                   |                                                      |
|-------------------|------------------------------------------------------|
| Temperature:      | Normal: 15°C ~ 35°C, Extreme: -30°C ~ +50°C          |
| Relative Humidity | 45-56 % RH Ambient                                   |
| Voltage:          | Nominal: 3.8 Vdc, Extreme: Low 3.3 Vdc, High 4.4 Vdc |

## 2.5 Test RF Cable

**For all conducted test items:** The offset level is set spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

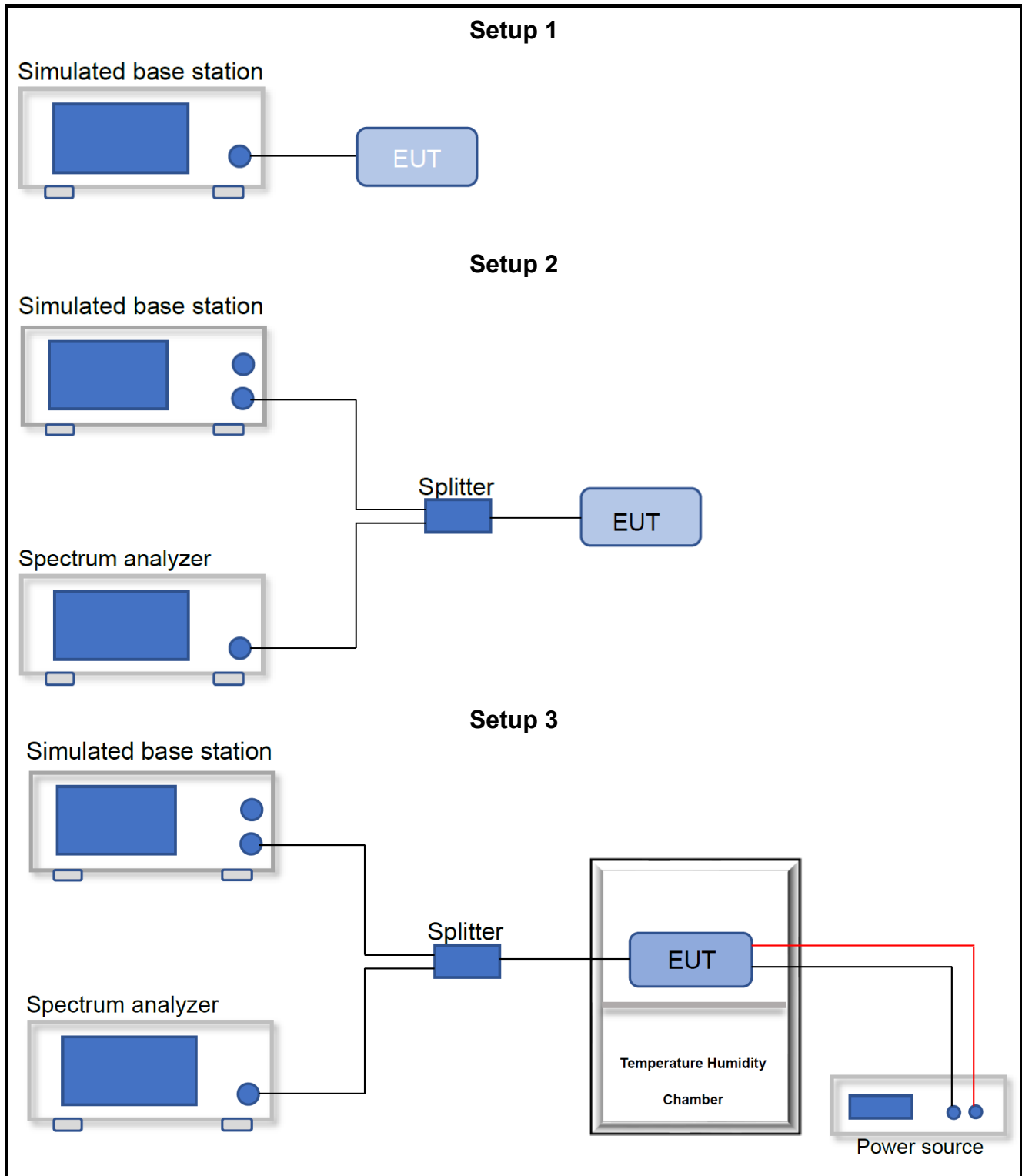
Offset = RF cable loss + attenuator factor.

## 2.6 Modifications

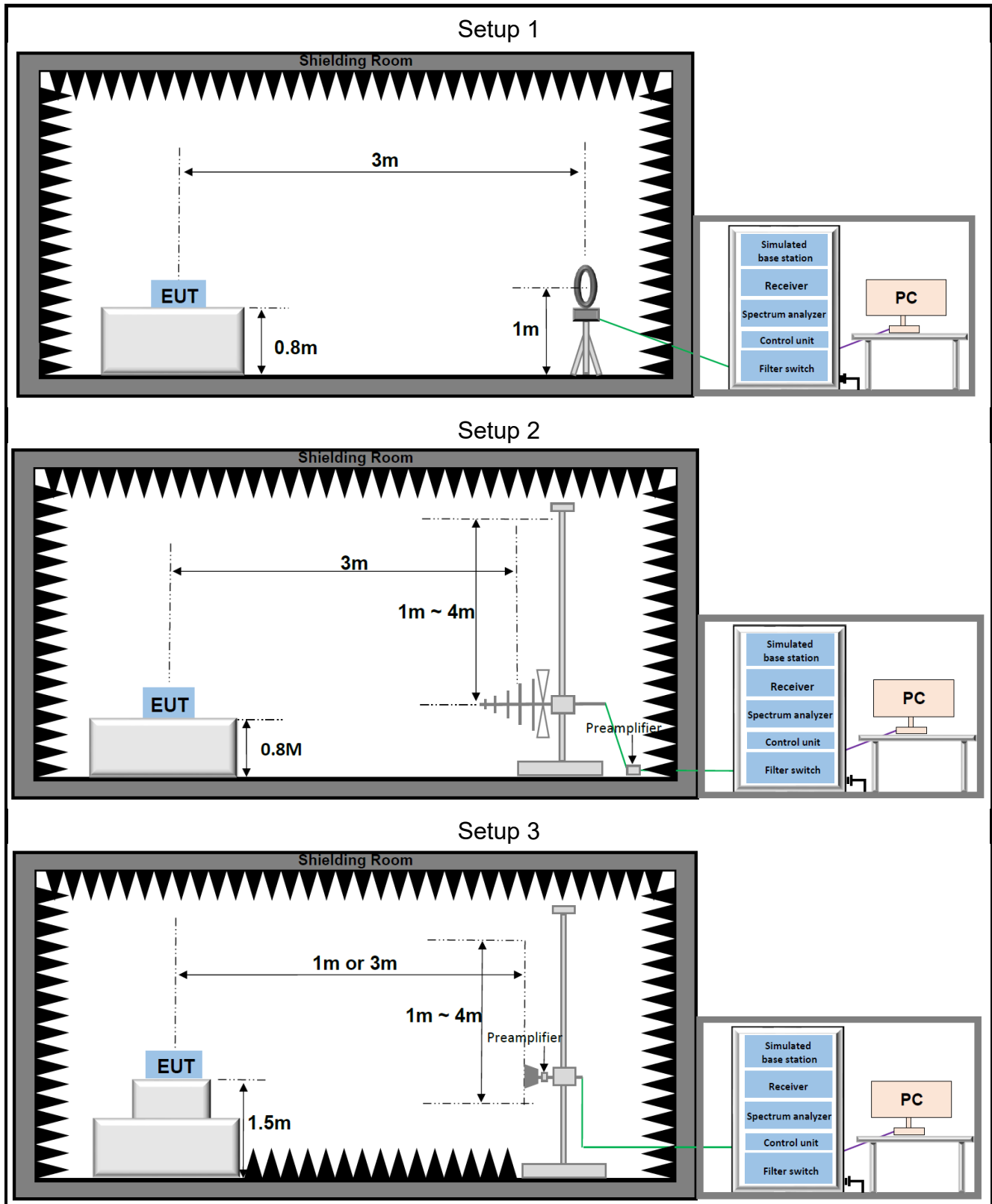
No modifications were made during testing.

## 2.7 Test Setup Diagram

### 2.7.1 Conducted Configuration



## 2.7.2 Radiated Configuration



### 3 Equipment and Measurement Uncertainty

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, whichever is less, and where applicable is traceable recognized national standards.

#### 3.1 Test Equipment List

Original:

| RF Conducted 07 (for report TCWA24080023402 & TCWA24120038202) |              |                |            |            |            |
|----------------------------------------------------------------|--------------|----------------|------------|------------|------------|
| Description                                                    | Manufacturer | Model          | SN         | Last Due   | Cal Due    |
| Radio Communication Test Station                               | Anritsu      | MT8000A        | 6262208297 | 2023/11/07 | 2024/11/06 |
|                                                                |              |                |            | 2024/11/04 | 2025/11/03 |
| Signal Analyzer                                                | Keysight     | N9020A         | MY53280106 | 2024/03/25 | 2025/03/24 |
| EXA Signal Analyzer, Multi-touch                               | Keysight     | N9010B         | MY63440541 | 2024/05/30 | 2025/05/29 |
| 5G NR Basestation                                              | StartPoint   | SP9500-CTS     | SP20676    | 2024/03/25 | 2025/03/24 |
| Measurement Software                                           | Tonscend     | TS1120 V3.1.46 | 10636      | N/A        | N/A        |

| Radiated Emission (for report TCWA24080023402 & TCWA24120038202) |              |             |              |            |            |
|------------------------------------------------------------------|--------------|-------------|--------------|------------|------------|
| Description                                                      | Manufacturer | Model       | SN           | Last Due   | Cal Due    |
| Biconic Logarithmic Periodic Antennas                            | Schwarzbeck  | VULB9163    | 1643         | 2023/06/25 | 2025/06/24 |
| Double-Ridged Horn Antennas                                      | Schwarzbeck  | BBHA 9120D  | 2809         | 2023/06/25 | 2025/06/24 |
| Broad-Band Horn Antenna                                          | Schwarzbeck  | BBHA 9170   | 1290         | 2023/06/25 | 2025/06/24 |
| Loop Antenna                                                     | Schwarzbeck  | FMZB 1519C  | 1519C-028    | 2023/06/29 | 2025/06/28 |
| Signal Analyzer                                                  | Keysight     | N9020A      | MY49100252   | 2024/03/25 | 2025/03/24 |
| EXA Signal Analyzer, Multi-touch                                 | Keysight     | N9010B      | MY63440541   | 2024/05/30 | 2025/05/29 |
| Wideband Radio Communication Tester                              | R&S          | CMW500      | 150645       | 2024/03/25 | 2025/03/24 |
| Low Noise Amplifier                                              | Tonscend     | TAP9K3G40   | AP23A8060273 | 2023/04/08 | 2025/04/07 |
| Low Noise Amplifier                                              | Tonscend     | TAP01018050 | AP22G806258  | 2023/04/08 | 2025/04/07 |
| Low Noise Amplifier                                              | Tonscend     | TAP18040048 | AP22G806247  | 2023/04/08 | 2025/04/07 |
| Hygrometer                                                       | BINGYU       | HTC-1       | N/A          | 2023/06/01 | 2025/05/31 |
| Test Software                                                    | Tonscend     | TS+ V5.0.0  | N/A          | N/A        | N/A        |

This:

| Radiated Emission (for report TCWA25040028002) |              |             |                |            |            |
|------------------------------------------------|--------------|-------------|----------------|------------|------------|
| Description                                    | Manufacturer | Model       | S.N.           | Last Due   | Cal Due    |
| Biconic Logarithmic Periodic Antennas          | Schwarzbeck  | VULB9163    | 1643           | 2023/06/25 | 2025/06/24 |
| Double-Ridged Horn Antennas                    | Schwarzbeck  | BBHA 9120D  | 2809           | 2023/06/25 | 2025/06/24 |
| Broad-Band Horn Antenna                        | Schwarzbeck  | BBHA 9170   | 1290           | 2023/06/25 | 2025/06/24 |
| Loop Antenna                                   | Schwarzbeck  | FMZB 1519C  | 1519C-028      | 2023/06/29 | 2025/06/28 |
| Signal Analyzer                                | Keysight     | N9020A      | MY49100252     | 2025/03/11 | 2026/03/10 |
| Wideband Radio Communication Tester            | R&S          | CMW500      | 150645         | 2025/03/11 | 2026/03/10 |
| Low Noise Amplifier                            | Tonscend     | TAP9K3G40   | AP23A8060273   | 2025/03/11 | 2027/03/10 |
| Low Noise Amplifier                            | Tonscend     | TAP01018050 | AP22G806258    | 2025/03/11 | 2027/03/10 |
| Low Noise Amplifier                            | Tonscend     | TAP18040048 | AP22G806247    | 2025/03/11 | 2027/03/10 |
| Hygrometer                                     | BINGYU       | HTC-1       | N/A            | 2023/06/01 | 2025/05/31 |
| Test Software                                  | Tonscend     | TS+         | Version: 5.0.0 | N/A        | N/A        |

### 3.2 Measurement Uncertainty

| Parameter                         | U <sub>lab</sub> |
|-----------------------------------|------------------|
| Frequency error                   | 50.30Hz          |
| Output power                      | 0.74dB           |
| Conducted spurious emissions      | 2.22dB           |
| Radiated Emissions(9kHz~30MHz)    | 2.40dB           |
| Radiated Emissions(30MHz~1000MHz) | 4.66dB           |
| Radiated Emissions(1GHz~18GHz)    | 5.42dB           |
| Radiated Emissions(18GHz~40GHz)   | 5.46dB           |

Uncertainty figures are valid to a confidence level of 95%

## 4 Test Results

### 4.1 Output Power(ERP / EIRP / Conducted Power)

#### Limits

| FCC Part      | Test Band                             | Limit                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| §22.913(a)(5) | NR Band n5/ NR Band n26 (824~849 MHz) | The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7watts.                                                                                                                                                                                                                                                                                                                                                                                          |
| §24.232(c)    | NR Band n2/ NR Band n25               | Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.                                                                                                                                                                                                                                                                                                       |
| §27.50(h)(2)  | NR Band n7/ NR Band n38/ NR Band n41  | Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power                                                                                                                                                                                                                                                                                                                              |
| §27.50(d)(4)  | NR Band n66/70                        | Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780MHz bands are limited to 1watt EIRP. Fixed stations operating in the 1710-1755MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications. |
| §27.50(c)(10) | NR Band n12/71                        | Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3watts ERP.                                                                                                                                                                                                                                                                                                  |
| §90.635(b)    | NR Band n26(814~824MHz)               | The maximum output power of the transmitter for mobile stations is 100 watts (20dBw).                                                                                                                                                                                                                                                                                                                                                                                           |
| §27.50(k)(3)  | 5G NR n77/78(3450-3550MHz)            | Mobile devices are limited to 1Watt (30 dBm) EIRP                                                                                                                                                                                                                                                                                                                                                                                                                               |
| §27.50(j)(3)  | 5G NR n77/78(3700-3980MHz)            | Mobile and portable stations are limited to 1 Watt EIRP                                                                                                                                                                                                                                                                                                                                                                                                                         |
| §27.50(b)(9)  | NR Band n13                           | Control stations and mobile stations transmitting in the 746~757 MHz, 776~788 MHz, and 805~806 MHz bands and fixed stations transmitting in the 787~788 MHz and 805~806 MHz bands are limited to 30 watts ERP.                                                                                                                                                                                                                                                                  |
| §90.542(a)    | NR Band n14                           | Portable stations (hand-held devices) transmitting in the 758-768 MHz band and the 788-798 MHz band are limited to 3 watts ERP.                                                                                                                                                                                                                                                                                                                                                 |

#### Test Procedure

FCC KDB 971168 D01 V03r01 Section 5.2.1, for Conducted Output Power;

FCC KDB 971168 D01 V03r01 Section 5.2, for 4.2 for Effective (Isotropic) Radiated Power

#### Test Settings

Conducted Output Power:

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to the simulated base station. The simulated station was set to force the EUT to its maximum power setting, Transmitter output power was read off in dBm, Read values have added cable loss and attenuation.

**Effective (Isotropic) Radiated Power(Conducted method):**

The formula for calculating ERP/EIRP based on conduction power is as follows:

$$\text{EIRP(dBm)} = \text{Conducted Power (dBm)} + \text{antenna gain (dBi)}$$

$$\text{ERP} = \text{EIRP} - 2.15\text{dB}$$

**Effective (Isotropic) Radiated Power(Radiated method):**

According to Appendix C of standard ANSI C63.26-2015:

$$\text{EIRP} = P_R + L_P$$

$$P_R = P_{\text{meas}} - G_R + L_C + L_{\text{atten}} - G_{\text{amp}}$$

$P_R$ : adjusted received power level, in dBW, dBm, or PSD;

$L_P$ : basic free-space propagation path loss, in dB.

$$P_R = P_{\text{meas}} - G_R + L_C + L_{\text{atten}} - G_{\text{amp}}$$

$P_{\text{meas}}$ : measured power level, in dBW, dBm or PSD

$G_R$ : gain of the receive (measurement) antenna, in dBi

$L_C$ : signal loss in the measurement cable. in dB

$L_{\text{atten}}$ : value of external attenuation (if used). in dB

$G_{\text{amp}}$ : value of external amplification (if used), in dB

**Test  $P_{\text{meas}}$  according to C63.26 standard Section 5.2.4**

1. Set span to  $2 \times$  to  $3 \times$  the OBW.
2. Set RBW = 1% to 5% of the OBW.
3. Set VBW  $\geq 3 \times$  RBW.
4. Set number of measurement points in sweep  $\geq 2 \times$  span / RBW.
5. Detector= power averaging (rms)
6. Set sweep trigger to "free run."
7. Trace mode = max hold
8. Allow trace to fully stabilize.
9. Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function with band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

**Test Setup**

Refer to section 2.7.1 Setup 1

**Measuring Instruments**

The measuring equipment is listed in the section 3.1 of this test report.

**Test Result**

The detailed test data see: **Appendix**.

## 4.2 Maximum EIRP and Maximum PSD

### Limits

| FCC Part     | Test Band   | Limit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                 |                       |
|--------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-----------------------|
| §27.50(a)(3) | NR Band n30 | For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. |                                 |                       |
| §96.41       | NR Band n48 | Device                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Maximum EIRP (dBm/10 megahertz) | Maximum PSD (dBm/MHz) |
|              |             | End User Device                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 23                              | n/a                   |
|              |             | Category A CBSD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 30                              | 20                    |
|              |             | Category B CBSD <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 47                              | 37                    |

### Test Procedure

KDB 971168 D01 V03r01 Section 5.4

### Test Settings

10. Set span to  $2 \times$  to  $3 \times$  the OBW.
11. Set RBW = 1% to 5% of the OBW.
12. Set VBW  $\geq 3 \times$  RBW.
13. Set number of measurement points in sweep  $\geq 2 \times$  span / RBW.
14. Sweep time:
  - a) Set = auto-couple, or
  - b) Set  $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$  for single sweep (automation-compatible) measurement.
15. Detector = power averaging (rms).
16. Set sweep trigger to "free run."
17. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.
18. Compute power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function with band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
19. Add  $10 \log (1/\text{duty cycle})$  to the measured power level to compute the average power during continuous transmission. For example, add  $[10 \log (1/0.25)] = 6 \text{ dB}$  if the duty cycle is a constant 25%.

### Test notes

1. When average PSD limits are specified, the same fundamental measurement condition applies as previously discussed (i.e., averaging is to be performed only over durations of active transmissions at maximum output power level). Thus, when performing this measurement, the EUT must either be configured to transmit continuously at full power while the compliance measurement is performed, or else the measurement instrumentation must be configured to acquire data only over durations when the EUT is actively transmitting at full power. In circumstances where neither of these conditions can be realized, then alternative procedures are provided for both constant duty cycle and non-constant duty cycle transmissions.

2. The PSD is measured following the same procedures described in 5.2.4.4 for measuring the total average power, but with the RBW set to the reference bandwidth specified by the applicable regulatory requirement, and by using the marker function to identify the maximum PSD instead of summing the power across the OBW. If the fundamental measurement condition cannot be realized, then one of the alternative procedures in 5.2.4.4.2 or 5.2.4.4.3 should be selected.

### **Test Setup**

Refer to section 2.7.1 Setup 2

### **Measuring Instruments**

The measuring equipment is listed in the section 3.1 of this test report.

### **Test Result**

The detailed test data see: **Appendix**.

### 4.3 Peak-Average Ratio

#### Limits

§22.913(d): The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

§24.232(d): The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

§27.50(d)(5): The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

§96.41: The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

#### Test Procedure

FCC KDB 971168 D01 V03r01 Section 5.7.1

#### Test Settings

The following guidelines are offered for performing a CCDF measurement.

20. Set resolution/measurement bandwidth  $\geq$  OBW or specified reference bandwidth.

21. Set the number of counts to a value that stabilizes the measured CCDF curve.

22. Set the measurement interval as follows:

- a) For continuous transmissions, set to the greater of  $[10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$  or 1 ms.
- b) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement interval to a time that is less than or equal to the burst duration.
- c) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.

23. Record the maximum PAPR level associated with a probability of 0.1%.

24. The peak power level is calculated from the sum of the PAPR value from step d) to the measured average power.

#### Test Setup

Refer to section 2.7.1 Setup 2

#### Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

#### Test Result

The detailed test data see: **Appendix**.

## 4.4 Occupied Bandwidth

### Limits

For Reporting Purposes only

### Test Procedure

FCC KDB 971168 D01 V03r01 Section 4.2 & 4.3

### Test Settings

1. The transmitter output was connected to a calibrated coaxial cable and coupler, The other end is connected to the spectrum analyzer and simulated station.
2. The signal analyzer automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by ant intermediate power nulls in the fundamental emission.
3. The simulated base station was set to force the EUT to its maximum power setting.
4. RBW = 1 - 5% of the expected OBW
5. VBW = 3 times the RBW
6. Sweep = Auto
7. Detector = Peak
8. Trace = Max hold
9. The trace was allowed to stabilize

### Test Setup

Refer to section 2.7.1 Setup 2

### Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

### Test Result

The detailed test data see: **Appendix**.

## 4.5 Band Edge and Emission Mask

### Limits

| Band                                                                                                                | Limit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NR Band n5/ NR Band n26 (824~849 MHz)<br>NR Band n2/ NR Band n25<br>NR Band n12/71<br>NR Band n13<br>NR Band n66/70 | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| NR Band n7/ NR Band n38/ NR Band n41                                                                                | For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log(P)$ dB on all frequencies between the channel edge and 5 MHz from the channel edge, $43 + 10 \log(P)$ dB on all frequencies between 5 MHz and X MHz from the channel edge, and $55 + 10 \log(P)$ dB on all frequencies more than X MHz from the channel edge, where X is the greater of 6 MHz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log(P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz.                                                                                                                                                                                                                                                                                                                                                                                                                  |
| NR Band n14/NR Band 26(814 ~ 824MHz)                                                                                | On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment for mobile and portable stations.<br>On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least $43 + 10 \log(P)$ dB.<br>In the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz be employed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| NR Band n30                                                                                                         | By a factor of not less than: $43 + 10 \log(P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log(P)$ dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than $61 + 10 \log(P)$ dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than $67 + 10 \log(P)$ dB on all frequencies between 2328 and 2337 MHz;<br>By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2300 and 2305 MHz, $55 + 10 \log(P)$ dB on all frequencies between 2296 and 2300 MHz, $61 + 10 \log(P)$ dB on all frequencies between 2292 and 2296 MHz, $67 + 10 \log(P)$ dB on all frequencies between 2288 and 2292 MHz, and $70 + 10 \log(P)$ dB below 2288 MHz;<br>By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2360 and 2365 MHz, and not less than $70 + 10 \log(P)$ dB above 2365 MHz. |
| NR Band n77/78(3450-3550MHz)                                                                                        | In the 1 MHz bands immediately outside and adjacent to the licensee's frequency block: $\leq -13$ dB/(1% EBW, but no exceed 200kHz).<br>In the bands between 1 and 5 MHz removed from the licensee's frequency block: $\leq -13$ dB/(500 kHz, or greater)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| NR Band n77/78(3550-3980MHz)                                                                                        | In the 1 MHz bands immediately outside and adjacent to the licensee's frequency block: $\leq -13$ dB/(1% EBW, or 350 kHz).<br>In the bands between 1 and 5 MHz removed from the licensee's frequency block: $\leq -13$ dB/(500 kHz, or greater)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|             |                                                                                                                                                                                                                                                                                                                                                       |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NR Band n48 | for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### **Test Procedure**

FCC KDB 971168 D01 V03r01 Section 6.0

### **Test Settings**

1. The transmitter output was connected to a calibrated coaxial cable and coupler, The other end is connected to the spectrum analyzer and simulated station.
2. The simulated base station was set to force the EUT to its maximum power setting.
3. Start and stop frequency were set such that the band edge would be placed in the center of the plot.
4. RBW  $\geq$  1% of the emission bandwidth
5. VBW  $\geq$  3 times the RBW
6. Detector = RMS
7. Number of sweep point  $\geq$  2 times Span/RBW
8. Sweep = Auto
9. Trace = Max hold
10. The trace was allowed to stabilize

### **Test Setup**

Refer to section 2.7.1. Setup 2

### **Test Notes**

| Transmit signals are correlated    |                    |                    |                           |
|------------------------------------|--------------------|--------------------|---------------------------|
| Band                               | ANT Gain1<br>(dBi) | ANT Gain8<br>(dBi) | Directional gain<br>(dBi) |
| NR Band n2:                        | 2.5                | 4                  | 6.29                      |
| NR Band n25:                       | 2.5                | 4                  | 6.29                      |
| NR Band n38:                       | 3.3                | 3.8                | 6.56                      |
| NR Band n41:                       | 4                  | 3.8                | 6.91                      |
| NR Band n48:                       | 3.5                | 4.6                | 7.08                      |
| NR Band n66:                       | 2.5                | 3.5                | 6.02                      |
| NR Band n70:                       | 1.9                | 2.5                | 5.22                      |
| NR Band n71:                       | 1.2                | 1.2                | 4.21                      |
| NR Band n77:<br>(3450 to 3550 MHz) | 3.5                | 3.5                | 6.51                      |
| NR Band n77:<br>(3700 to 3980 MHz) | 3                  | 4.3                | 6.68                      |
| NR Band n78:<br>(3450 to 3550 MHz) | 3.5                | 4                  | 6.76                      |
| NR Band n78:<br>(3700 to 3800 MHz) | 3.2                | 4.5                | 6.88                      |

The test results, combined with directional gain, still meet the limit requirements.

### **Measuring Instruments**

The measuring equipment is listed in the section 3.1 of this test report.

### **Test Result**

The detailed test data see: **Appendix.**

## 4.6 Spurious Emission at Antenna Terminals

### Limits

| Band                                                                                                                                                                                   | Limit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NR Band n5/ NR Band n26 (824~849 MHz)<br>NR Band n2/ NR Band n25<br>NR Band n66/70<br>NR Band n77/78(3450-3550MHz)<br>NR Band n77/78(3550-3980MHz)<br>NR Band n12/13/71<br>NR Band n14 | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| NR Band n7/ NR Band n38/ NR Band n41                                                                                                                                                   | All frequencies between 2490.5 MHz and 2496 MHz and $5 + 10 \log(P)$ dB at or below 2490.5 MHz.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| NR Band n26(814~824 MHz)                                                                                                                                                               | The power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log(P)$ decibels or 80 decibels, whichever is the lesser attenuation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| NR Band n30                                                                                                                                                                            | not less than $70 + 10 \log(P)$ dB below 2288 MHz and above 2365 MHz.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| NR Band n48                                                                                                                                                                            | for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed $-13$ dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed $-25$ dBm/MHz.<br><br>(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emission below 3530 MHz or above 3720 MHz shall not exceed $-40$ dBm/MHz. |

### Test Procedure

FCC KDB 971168 D01 V03r01 Section 6.0

### Test Settings

1. The transmitter output was connected to a calibrated coaxial cable and coupler, The other end is connected to the spectrum analyzer and simulated station.
2. The simulated base station was set to force the EUT to its maximum transmitting power.
3. Start frequency was set to 9kHz and stop frequency was set to 10th harmonic.
4. RBW and VBW (see test notes)
5. Detector = RMS
6. Sweep = Auto
7. Sweep point = below 30MHz(1001pts); 30MHz – 1GHz(2001pts); above 1GHz(40001pts)
8. Trace = trace average for continuous emissions, max hold for pulse emissions
9. Allow trace to fully stabilize

### Test Notes

1. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100kHz or greater for measurements below 1GHz. However, in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission is attenuated at least 26dB below the transmitter power

2. 9kHz – 150kHz: RBW=1kHz, VBW≥3 times the RBW
3. 150kHz – 30MHz: RBW=10kHz, VBW≥3 times the RBW
4. Directional gain:

| Transmit signals are correlated    |                    |                    |                           |
|------------------------------------|--------------------|--------------------|---------------------------|
| Band                               | ANT Gain1<br>(dBi) | ANT Gain8<br>(dBi) | Directional gain<br>(dBi) |
| NR Band n2:                        | 2.5                | 4                  | 6.29                      |
| NR Band n25:                       | 2.5                | 4                  | 6.29                      |
| NR Band n38:                       | 3.3                | 3.8                | 6.56                      |
| NR Band n41:                       | 4                  | 3.8                | 6.91                      |
| NR Band n48:                       | 3.5                | 4.6                | 7.08                      |
| NR Band n66:                       | 2.5                | 3.5                | 6.02                      |
| NR Band n70:                       | 1.9                | 2.5                | 5.22                      |
| NR Band n71:                       | 1.2                | 1.2                | 4.21                      |
| NR Band n77:<br>(3450 to 3550 MHz) | 3.5                | 3.5                | 6.51                      |
| NR Band n77:<br>(3700 to 3980 MHz) | 3                  | 4.3                | 6.68                      |
| NR Band n78:<br>(3450 to 3550 MHz) | 3.5                | 4                  | 6.76                      |
| NR Band n78:<br>(3700 to 3800 MHz) | 3.2                | 4.5                | 6.88                      |

The test results, combined with directional gain, still meet the limit requirements.

### Test Setup

Refer to section 2.7.1. Setup 2

### Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

### Test Result

The detailed test data see: **Appendix**.

## 4.7 Field Strength of Spurious Radiation

### Limits

| Band                                                                                                                                                                 | Limit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NR Band n5/ NR Band n26 (824~849 MHz)<br>NR Band n2/ NR Band n25<br>NR Band n12/71<br>NR Band n66/70<br>NR Band n77/78(3450-3550MHz)<br>NR Band n77/78(3550-3980MHz) | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| NR Band n13                                                                                                                                                          | On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;<br>For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.                                                                                                                                                                                                                                                                                                                                                                                                             |
| NR Band n14                                                                                                                                                          | least $43 + 10 \log(P)$ dB.<br>For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| NR Band n7/ NR Band n38/ NR Band n41                                                                                                                                 | All frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| NR Band n26(814~824 MHz)                                                                                                                                             | The power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log(P)$ decibels or 80 decibels, whichever is the lesser attenuation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| NR Band n30                                                                                                                                                          | By a factor of not less than: $43 + 10 \log(P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log(P)$ dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than $61 + 10 \log(P)$ dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than $67 + 10 \log(P)$ dB on all frequencies between 2328 and 2337 MHz;<br>By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2300 and 2305 MHz, $55 + 10 \log(P)$ dB on all frequencies between 2296 and 2300 MHz, $61 + 10 \log(P)$ dB on all frequencies between 2292 and 2296 MHz, $67 + 10 \log(P)$ dB on all frequencies between 2288 and 2292 MHz, and $70 + 10 \log(P)$ dB below 2288 MHz;<br>By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2360 and 2365 MHz, and not less than $70 + 10 \log(P)$ dB above 2365 MHz. |
| NR Band n48                                                                                                                                                          | for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

|  |                                                                                                                                                                                                                                                                                                   |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>SAS assigned channel edge, the conducted power of any emission shall not exceed -25 dBm/MHz.</p> <p>(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.</p> |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Test Procedure

FCC KDB 971168 D01 V03r01 Section 7

## Test Settings

- For radiated emissions measurements performed at frequencies less than or equal to 1GHz, the EUT shall be placed on a RF-transparent table or support at a nominal height of 80cm above the reference ground plane.
- For radiated emissions measurements performed at frequencies above 1GHz, the EUT shall be placed on a RF-transparent table or support at a nominal height of 80cm above the ground plane.
- Radiated measurements shall be made with the measurement antenna positioned in both horizontal and vertical polarization. The measurement antenna shall be varied from 1m to 4m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level (i.e, field strength or received power), when orienting the measurement antenna in vertical polarization, the minimum height of the lowest element of the antenna shall clear the site reference ground plane by at least 25cm.
- For each suspected emission, the EUT was ranged its worst case and then tune the antenna tower(from 1~4m) and turntable(from 0~360°) find the maximum reading. Preamplifier and a high pass filter are used for the test in order get better signal level comply with the guidelines.
- The simulated base station was set to force the EUT to its maximum transmitting power.
- spectrum analyzer setting:  
Measurements 9kHz ~150kHz: RBW = 300Hz; VBW ≥ 3 kHz; Detector = RMS  
Measurements 150kHz ~30MHz: RBW = 10kHz; VBW ≥ 30 kHz; Detector = RMS  
Measurements 30MHz~1000MHz: RBW = 100kHz or 1MHz; VBW ≥ 1MHz or 3MHz; Detector = RMS  
Measurements Above 1000MHz: RBW = 1 MHz; VBW ≥ 3 MHz; Detector = RMS
- The field strength is calculated by adding the Antenna Factor, Cable Factor. The basic equation with a sample calculation is as follows:  

$$E(\text{dB}\mu\text{V/m}) = \text{Measured amplitude level (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}.$$

$$E(\text{dB}\mu\text{V/m}) = \text{Measured amplitude level (dBm)} + 107 + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}.$$

$$E(\text{dB}\mu\text{V/m}) = \text{EIRP(dBm)} - 20\log(D) + 104.8; \text{ where } D \text{ is the measurement distance(in the far field region) in m.}$$

$$\text{EIRP(dBm)} = E(\text{dB}\mu\text{V/m}) + 20\log(D) - 104.8; \text{ where } D \text{ is the measurement distance(in the far field region) in m.}$$

*So, from d: The measuring distance is usually at 3m, then  $20 \cdot \log(3) = 9.5424$*   
*Then,  $\text{EIRP (dBm)} = E(\text{dB}\mu\text{V/m}) + 9.5424 - 104.8 = E(\text{dB}\mu\text{V/m}) - 95.2576$*
- Repeat above procedures until all frequencies measured was complete.
- Measure and record the results in the test report.

## Test notes

- The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst-case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- Emissions below 18GHz were measured at a 3-meter test distance while emissions above 18GHz were measured at a 1-meter test distance with the application of a distance correction factor.
- Radiated spurious emissions were investigated from 9kHz to 30MHz, 30MHz-1GHz and above 1GHz. the disturbance between 9kHz to 30MHz, 30MHz-1GHz and 18GHz to 40GHz was very low. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be recorded, so only the harmonics had been displayed.
- The "-" shown in the following RSE tables are used to denote a noise floor measurement.

### **Test Setup**

Refer to section 2.7.2 for details.

### **Measuring Instruments**

The measuring equipment is listed in the section 3.1 of this test report.

### **Test Result**

The detailed test data see: **Appendix**.

## 4.8 Frequency Stability V.S. Temperature, Voltage

### Limits

§22.355:

The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

§24.235 / §27.54 / §90.213 / §96.41:

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

### Test Procedure

FCC KDB 971168 D01 V03r01 Section 9

### Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

### Test Notes

- a.) Temperature:  
The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) Primary Supply Voltage:  
The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

### Test Setup

Refer to section 2.7.1 Setup 3

### Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

### Test Result

The detailed test data see: **Appendix**.

## 5 Test Setup Photos

The detailed test data see: **Test Setup Photos**

# Appendix

**Appendix List:**

|                                                    |
|----------------------------------------------------|
| Appendix-B NR Band n2                              |
| Appendix-B NR Band n5                              |
| Appendix-B NR Band n7                              |
| Appendix-B NR Band n12                             |
| Appendix-B NR Band n13                             |
| Appendix-B NR Band n14                             |
| Appendix-B NR Band n25                             |
| Appendix-B NR Band n26(814-824)                    |
| Appendix-B NR Band n26(824-849)                    |
| Appendix-B NR Band n30                             |
| Appendix-B NR Band n38                             |
| Appendix-B NR Band n41                             |
| Appendix-B NR Band n48                             |
| Appendix-B NR Band n66                             |
| Appendix-B NR Band n70                             |
| Appendix-B NR Band n71                             |
| Appendix-B NR Band n77(3450-3550)                  |
| Appendix-B NR Band n77(3700-3980)                  |
| Appendix-C Field Strength of Spurious Radiation-NR |

~The End~