# FCC RADIO TEST REPORT

| | | |
|---|---|---|
| **FCC ID** | : | **XMR2023RM520NGLT** |
| **Equipment** | : | **5G Sub-6 GHz M.2 Module** |
| **Brand Name** | | **Quectel** |
| **Model Name** | : | **RM520N-GL** |
| **Applicant** | : | **Quectal Wireless Solutions Co., Ltd.**<br>**Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233** |
| **Manufacturer** | | **LCFC (HeFei) Electronics Technology Co., Ltd.**<br>**No. 3188-1, Yungu Road (Hefei Export Processing Zone), Hefei Economics & Technology Development Area, Anhui, CHINA** |
| **Standard** | : | **FCC 47 CFR Part 2, 96** |

**Equipment: Quectel RM520N-GL tested inside of Lenovo Notebook Computer.**

**The product was received on Nov. 13, 2023 and testing was performed from Nov. 30, 2023 to Dec. 22, 2023. We, Sporton International Inc. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.**

**The test results in this partial report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.**

Louis Wu

**Approved by: Louis Wu**

***Sporton International Inc. EMC & Wireless Communications Laboratory***

# Table of Contents

# History of this test report

| Report No. | Version | Description | Issue Date |
|---|---|---|---|
| FG3N1058E | 01 | Initial issue of report | Jan. 25, 2024 |
| FG3N1058E | 02 | Revise Antenna Information<br>This report is an updated version, replacing the report issued on Jan. 25, 2024. | Feb. 15, 2024 |
| FG3N1058E | 03 | Add Antenna Information Remark 2 and Test Mode Remark 3<br>This report is an updated version, replacing the report issued on Feb. 15, 2024. | Feb. 19, 2024 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---|---|---|---|---|
| 3.2 | §2.1046 | Conducted Output Power | Reporting only | - |
| - | §96.41 | Peak-to-Average Ratio | - | See Note |
| 3.3 | §96.41 | Effective Isotropic Radiated Power and EIRP PSD | Pass | - |
| - | §2.1049<br>§96.41 | Occupied Bandwidth | - | See Note |
| - | §2.1051<br>§96.41 | Conducted Band Edge Measurement | - | See Note |
| - | §2.1051<br>§96.41 | Conducted Spurious Emission | - | See Note |
| - | §2.1055 | Frequency Stability for Temperature & Voltage | - | See Note |
| 4.4 | §2.1051<br>§96.41 | Radiated Spurious Emission | Pass | 1.15 dB under the limit at 11043.00 MHz |

**Remark:**
1. For host device, Radiated Spurious Emission and Equivalent Isotropic Radiated Power are verified and complies with the limit in this test report.
2. For host device, the Conducted Output Power is no difference after compared to module (Model: RM520N-GL)

**Conformity Assessment Condition:**

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”.

**Disclaimer:**

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

**Reviewed by: Sheng Kuo**

**Report Producer: Rachel Hsieh**

# 1 General Description

## 1.1 Product Feature of Equipment Under Test

| Product Feature | |
|---|---|
| **Equipment** | 5G Sub-6 GHz M.2 Module |
| **Brand Name** | Quectel |
| **Model Name** | RM520N-GL |
| **FCC ID** | XMR2023RM520NGLT |
| **Sample 1** | EUT with Host 1 |
| **Sample 2** | EUT with Host 2 |
| **EUT supports Radios application** | WCDMA/HSPA/LTE/5G NR/GNSS |
| **EUT Stage** | Production Unit |

**Remark:**

1. The above EUT's information was declared by manufacturer.
2. Equipment: Quectel RM520N-GL tested inside of Lenovo Notebook Computer.

The product was installed into Notebook Computer (Brand Name: Lenovo, Model Name: TP00159A, TP00159B) during test, and the host information was recorded in the following table.

| Host Information | |
|---|---|
| **Host 1** | Host with Amphenol Taiwan Corporation Antenna |
| **Host 2** | Host with AWAN Antenna |

| Support band and evaluated information | |
|---|---|
| **Supported band** | n48 |
| **Evaluated and Tested band** | n48 |
| **MIMO2 Antenna** | n48 |

| WWAN Antenna Information for Host | | | | |
|---|---|---|---|---|
| **Main Antenna** | **Manufacturer** | Amphenol Taiwan Corporation | **Peak gain (dBi)** | 5GNR n48 : 0.98 |
| | **Part number** | DC330022K00<br>DC330022K70 | **Type** | PIFA |
| | **Manufacturer** | AWAN | **Peak gain (dBi)** | 5GNR n48 : 0.98 |
| | **Part number** | DC330022H00<br>DC330022H70 | **Type** | PIFA |
| **MIMO 2 Antenna** | **Manufacturer** | Amphenol Taiwan Corporation | **Peak gain (dBi)** | 5GNR n48 : 0.36 |
| | **Part number** | DC330022K10 | **Type** | PIFA |
| | **Manufacturer** | AWAN | **Peak gain (dBi)** | 5GNR n48 : 0.36 |
| | **Part number** | DC330022H10 | **Type** | PIFA |

**Remark:**

1. The above EUT's information was declared by manufacturer. Please refer to Disclaimer in report summary.
2. SA mode only perform in MIMO2 Tx Antenna.

## 1.2 Product Specification of Equipment Under Test

| Product Specification is subject to this standard | |
|---|---|
| **Tx Frequency** | 3552.5 MHz ~ 3697.5 MHz |
| **Rx Frequency** | 3552.5 MHz ~ 3697.5 MHz |
| **Bandwidth** | 10 MHz / 20 MHz / 30 MHz / 40 MHz |
| **Maximum Output Power to Antenna** | **<SISO Mode>:** 20.65 dBm<br>**<MIMO Mode>:** 19.67 dBm |
| **Type of Modulation** | PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM |

## 1.3 Modification of EUT

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

## 1.4 Testing Location

| | |
|---|---|
| **Test Site** | Sporton International Inc. EMC & Wireless Communications Laboratory |
| **Test Site Location** | No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333 |
| **Test Site No.** | **Sporton Site No.** |
| | TH03-HY |
| **Test Engineer** | George Chenh |
| **Temperature (℃)** | 20~24 |
| **Relative Humidity (%)** | 50~58 |

| | |
|---|---|
| **Test Site** | Sporton International Inc. Wensan Laboratory. |
| **Test Site Location** | No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist.,<br>Taoyuan City 333010 |
| **Test Site No.** | **Sporton Site No.** |
| | 03CH22HY (TAF Code: 3786) |
| **Test Engineer** | LU WEN-KAI, Karl Hou and Bank LIN |
| **Temperature (℃)** | 18.9~24.8 |
| **Relative Humidity (%)** | 61.3~70.4 |
| **Remark** | The Radiated Spurious Emission test item subcontracted to Sporton International Inc. Wensan Laboratory. |

**Note:** The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No.: TW1190 and TW3786

## 1.5 Applied Standards

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

- ANSI C63.26-2015
- ANSI / TIA-603-E
- FCC 47 CFR Part 2, 96
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 940660 D01 Part 96 CBRS Eqpt v03
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- FCC KDB 414788 D01 Radiated Test Site v01r01
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.

# 2 Test Configuration of Equipment Under Test

## 2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

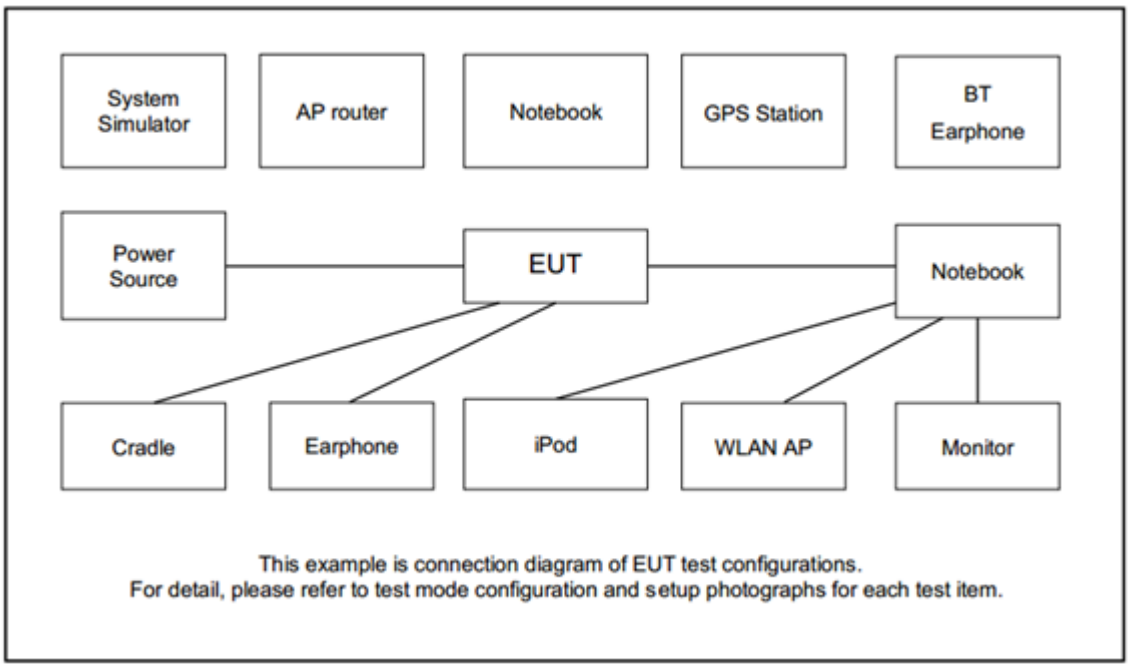
| Modulation Type | Modulation | Modulation Type | Modulation |
|---|---|---|---|
| A | DFT-s-OFDM pi/2 BPSK | N/A | N/A |
| B | DFT-s-OFDM QPSK | F | CP-OFDM QPSK |
| C | DFT-s-OFDM 16QAM | G | CP-OFDM 16QAM |
| D | DFT-s-OFDM 64QAM | H | CP-OFDM 64QAM |
| E | DFT-s-OFDM 256QAM | I | CP-OFDM 256QAM |

| Test Item | Modulation Type | Bandwidth | RB Size | Channel |
|---|---|---|---|---|
| Conducted Power (for n48) | A, B, C, F, G | All | 1RB | L, M, H |
| EIRP (for n48) | A, B, C, F, G | All | 1RB | L, M, H |
| RSE | A | 20 MHz or less | Inner_1RB | L, M, H |

**Remark:**

1. Evaluated all the transmitter signal and reporting worst-case configuration among all modulation types.
2. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst-case emissions are reported.
3. For modulation of Pi/2 BPSK & QPSK & 16QAM, the maximum power of Pi/2 BPSK & QPSK & 16QAM is higher than other modulation(64QAM/256QAM), therefore, according to engineering evaluation , we choose higher power (Pi/2 BPSK & QPSK & 16QAM) to perform tests and show in the report.
4. During the RSE preliminary test, the standalone mode and charging modes were verified. It is determined that the charging modes is the worst case for the official test.
5. All the radiated test cases were performed with Sample 1.

## 2.2 Connection Diagram of Test System




## 2.3 Support Unit used in test configuration

| Item | Equipment | Brand Name | Model No. | FCC ID | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| 1. | System Simulator | Anritsu | MT8000A | N/A | N/A | Unshielded, 1.8 m |
| 2. | iPod Earphone | Apple | N/A | Verification | Unshielded, 1.0 m | N/A |

## 2.4 Frequency List of Low/Middle/High Channels

| NR Band n48 Channel and Frequency List | | | | |
|---|---|---|---|---|
| **BW [MHz]** | **Channel/Frequency(MHz)** | **Lowest** | **Middle** | **Highest** |
| 40 | Channel | 638000 | 641666 | 645332 |
| | Frequency | 3570.0 | 3624.99 | 3679.98 |
| 30 | Channel | 637668 | 641666 | 645666 |
| | Frequency | 3565.02 | 3624.99 | 3684.99 |
| 20 | Channel | 637334 | 641666 | 646000 |
| | Frequency | 3560.01 | 3624.99 | 3690.0 |
| 10 | Channel | 637000 | 641666 | 646332 |
| | Frequency | 3555.0 | 3624.99 | 3694.98 |

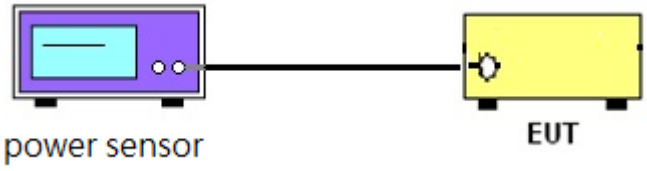
# 3 Conducted Test Items

## 3.1 Measuring Instruments

See list of measuring instruments of this test report.

### 3.1.1 Test Setup

### 3.1.2 Conducted Output Power




### 3.1.3 Test Result of Conducted Test

Please refer to Appendix A.

## 3.2 Conducted Output Power

### 3.2.1 Description of the Conducted Output Power Measurement

A power sensor was used to establish communication with the EUT. Its parameters were set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

### 3.2.2 Test Procedures

1. The transmitter output port was connected to the power sensor.
2. Set EUT at maximum power.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the power sensor
5. The measure-and-sum technique is used for measuring in-band transmit power of a device. Total power is the sum of the conducted power levels measured at the various output ports.

# 3.3 EIRP

## 3.3.1 Description of the EIRP Measurement

The EIRP of category A CBSD must not exceed 30 dBm / 10 megahertz.

The EIRP PSD of category A CBSD must not exceed 20 dBm / 1 megahertz.

The testing follows ANSI C63.26-2015 Section 5.2.5.5

According to KDB 412172 D01 Power Approach,

EIRP = PT + GT – LC, where

$P_T$ = transmitter output power in dBm

$G_T$ = gain of the transmitting antenna in dBi

$L_C$ = signal attenuation in the connecting cable between the transmitter and antenna in dB

| Device | Maximum EIRP (dBm/10 MHz) | Maximum PSD (dBm/MHz) |
|---|---|---|
| **Category A CBSD** | 30 | 20 |

## 3.3.2 Test Procedures

1. The testing follows procedure in Section 5.2 of ANSI C63.26-2015 and KDB 940660 D01 Part 96 CBRS Eqpt v03 Section 3.2(b)(2) and 3.2(b)(3)
2. Determine the EIRP by adding the effective antenna gain to the measured average conducted power level.
3. For MIMO measurement, the KDB 662911 E)2)c) is used as following:
   Measure and add 10 log(NANT) dB, where NANT is the number of outputs. With this technique, spectrum measurements are performed at each output of the device, but rather than summing the spectra or the spectral peaks across the outputs, the quantity 10 log(NANT) dB is added to each spectrum value before comparing to the emission limit.

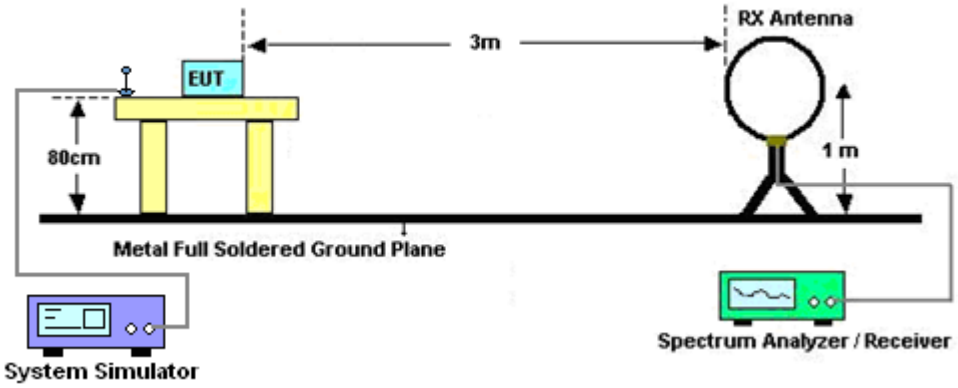
# 4 Radiated Test Items

## 4.1 Measuring Instruments

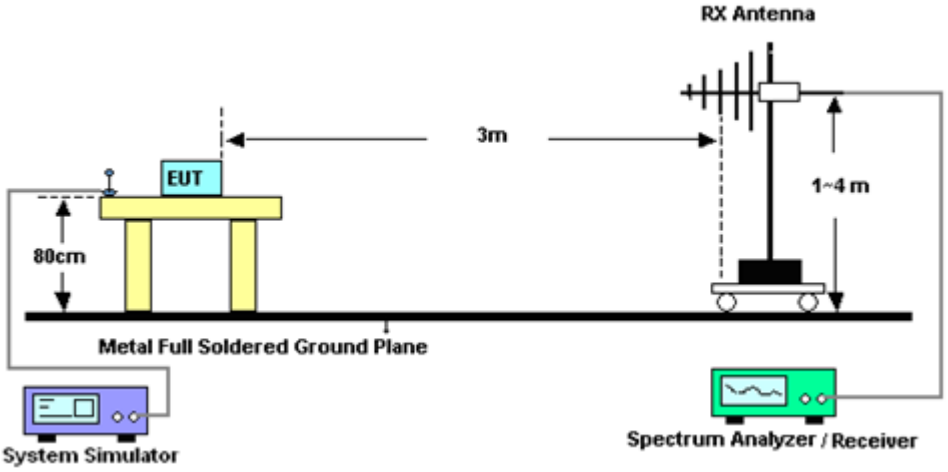
See list of measuring instruments of this test report.

## 4.2 Test Setup

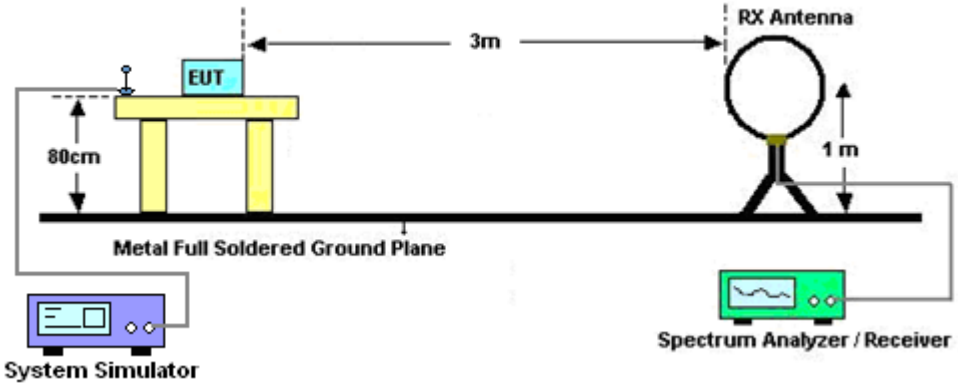
**For radiated emissions below 30MHz**



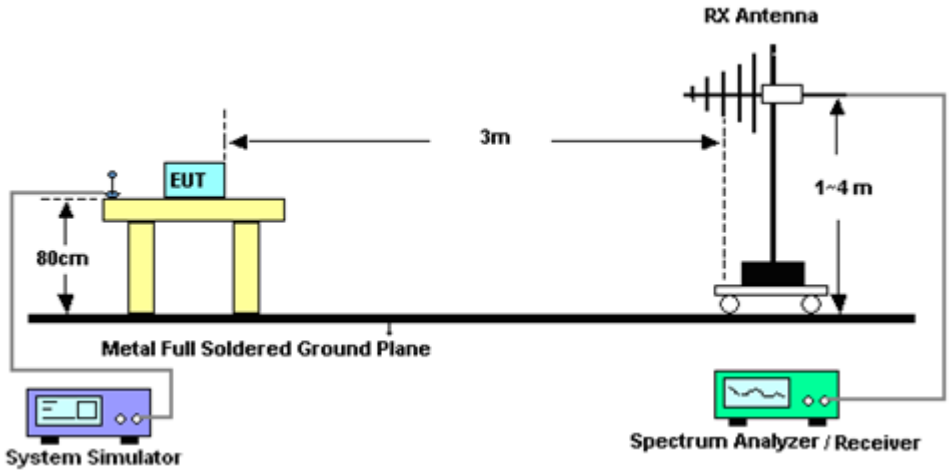

**For radiated emissions from 30MHz to 1GHz**



**For radiated emissions from 1GHz to 18GHz**




**For radiated emissions above 18GHz**




## 4.3 Test Result of Radiated Test

Please refer to Appendix B.

**Note:**

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

# 4.4 Radiated Spurious Emission

## 4.4.1 Description of Radiated Spurious Emission Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least -40dBm / MHz .

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

## 4.4.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 7 and ANSI C63.26-2015 section 5.5.4 Radiated measurement using the field strength method

1. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
5. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
6. To convert spectrum reading E(dBuV/m) to EIRP(dBm)
   EIRP(dBm) = Level (dBuV/m) + 20log(d) -104.77, where d is the distance at which filed strength limit is specified in the rules.
7. Field Strength Level (dBm) = Spectrum Reading (dBm) + Antenna Factor + Cable Loss + Read Level - Preamp Factor.
8. ERP (dBm) = EIRP (dBm) - 2.15
9. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

# 5 List of Measuring Equipment

| Instrument | Brand Name | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| Base Station (Measure) | Anritsu | MT8821C | 6262116730 | LTE | Jun. 10, 2023 | Nov. 30, 2023~ Dec. 08, 2023 | Jun. 09, 2024 | Conducted (TH03-HY) |
| Base Station (Measure) | Anritsu | MT8000A | 6262134933 | FR1 | Jun. 10, 2023 | Nov. 30, 2023~ Dec. 08, 2023 | Jun. 09, 2024 | Conducted (TH03-HY) |
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 100488 | 9 kHz~30 MHz | Sep. 12, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | Sep. 11, 2024 | Radiation (03CH22-HY) |
| Bilog Antenna | TESEQ | CBL 6111D & 00802N1D-06 | 63304 & 002 | 30MHz~1GHz | Oct. 15, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | Oct. 14, 2024 | Radiation (03CH22-HY) |
| Amplifier | SONOMA | 310N | 421581 | N/A | Jul. 15, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | Jul. 14, 2024 | Radiation (03CH22-HY) |
| Double Ridged Guide Horn Antenna | RFSPIN | DRH18-E | LE2C04A18EN | 1GHz~18GHz | Jul. 12, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | Jul. 11, 2024 | Radiation (03CH22-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK | BBHA 9170 | 1224 | 18GHz-40GHz | Jul, 10, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | Jul, 09, 2024 | Radiation (03CH22-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK | BBHA 9170 | 1223 | 18GHz-40GHz | Jul, 10, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | Jul, 09, 2024 | Radiation (03CH22-HY) |
| Amplifier | EMEC | EM01G18GA | 060877 | N/A | Sep. 28, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | Sep. 27, 2024 | Radiation (03CH22-HY) |
| Preamplifier | EMEC | EM18G40G | 060872 | 18-40GHz | Sep. 06, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | Sep. 05, 2024 | Radiation (03CH22-HY) |
| Signal Analyzer | Keysight | N9010B | MY62170278 | 10Hz~44GHz | Aug. 31, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | Aug. 30, 2024 | Radiation (03CH22-HY) |
| Hygrometer | TECPEL | DTM-303A | TP211568 | N/A | Oct. 30, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | Oct. 29, 2024 | Radiation (03CH22-HY) |
| Controller | EMEC | EM1000 | N/A | Control Turn table & Ant Mast | N/A | Dec. 12, 2023~ Dec. 22, 2023 | N/A | Radiation (03CH22-HY) |
| Antenna Mast | ChainTek | MBS-520-1 | N/A | 1m~4m | N/A | Dec. 12, 2023~ Dec. 22, 2023 | N/A | Radiation (03CH22-HY) |
| Turn Table | ChainTek | T-200-S-1 | N/A | 0~360 Degree | N/A | Dec. 12, 2023~ Dec. 22, 2023 | N/A | Radiation (03CH22-HY) |
| Software | Audix | E3 6.09824_2019122 | RK-002347 | N/A | N/A | Dec. 12, 2023~ Dec. 22, 2023 | N/A | Radiation (03CH22-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | 803951/2 | 9kHz~30MHz | Mar. 07, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | Mar. 06, 2024 | Radiation (03CH22-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | 804390/2,804611/2,804615/2 | N/A | Oct. 24, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | Oct. 23, 2024 | Radiation (03CH22-HY) |
| Filter | Wainwright | WLK4-1000-1530-8000-40SS | SN29 | 1.53GHz Low Pass Filter | May 23, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | May 22, 2024 | Radiation (03CH22-HY) |
| Filter | Wainwright | WHKX12-2700-3000-18000-60ST | SN7 | N/A | Dec. 01, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | Nov. 30, 2024 | Radiation (03CH22-HY) |
| Filter | Wainwright | WHKX8-5872.5-6750-18000-40ST | SN25 | 6.75GHz High Pass Filter | Nov. 13, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | Nov. 12, 2024 | Radiation (03CH22-HY) |
| Filter | Wainwright | WHKX12-900-1000-15000-60SS | SN8 | 1GHz High Pass Filter | Nov. 02, 2023 | Dec. 12, 2023~ Dec. 22, 2023 | Nov. 01, 2024 | Radiation (03CH22-HY) |

# 6 Measurement Uncertainty

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

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **3.03 dB** |

**Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **3.42 dB** |

**Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **3.91 dB** |

# Appendix A. Test Results of Conducted Test

## Conducted Output Power(Average power) and EIRP

| NR n48 Maximum Average Power [dBm] (GT - LC = 0.36 dB) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |
| 10 | 1 | 1 | PI/2 BPSK | 20.28 | 20.19 | 19.69 | 20.67 | 0.1167 |
| 10 | 1 | 1 | QPSK | 20.31 | 20.20 | 19.72 | | |
| 10 | 1 | 1 | 16-QAM | 19.82 | 19.96 | 19.88 | 20.32 | 0.1076 |
| Limit | EIRP < 23dBm/10MHz | | | Result | | | Pass | |

Total EIRP power is less than partial EIRP limit 23 dBm/10MHz.

| NR n48 Maximum Average Power [dBm] (GT - LC = 0.36 dB) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |
| 20 | 1 | 1 | PI/2 BPSK | 20.48 | 20.35 | 20.05 | 20.84 | 0.1213 |
| 20 | 1 | 1 | QPSK | 20.45 | 20.37 | 19.95 | | |
| 20 | 1 | 1 | 16-QAM | 20.08 | 20.17 | 19.77 | 20.53 | 0.1130 |
| Limit | EIRP < 23dBm/10MHz | | | Result | | | Pass | |

Total EIRP power is less than partial EIRP limit 23 dBm/10MHz.

| NR n48 Maximum Average Power [dBm] (GT - LC = 0.36 dB) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |
| 30 | 1 | 1 | PI/2 BPSK | 20.53 | 20.49 | 20.19 | 20.96 | 0.1247 |
| 30 | 1 | 1 | QPSK | 20.55 | 20.60 | 20.23 | | |
| 30 | 1 | 1 | 16-QAM | 20.10 | 20.05 | 19.68 | 20.46 | 0.1112 |
| Limit | EIRP < 23dBm/10MHz | | | Result | | | Pass | |

Total EIRP power is less than partial EIRP limit 23 dBm/10MHz.

| NR n48 Maximum Average Power [dBm] (GT - LC = 0.36 dB) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |
| 40 | 1 | 1 | PI/2 BPSK | 20.62 | 20.58 | 20.23 | 21.01 | 0.1262 |
| 40 | 1 | 1 | QPSK | 20.63 | 20.65 | 20.28 | | |
| 40 | 1 | 1 | 16-QAM | 19.86 | 19.88 | 19.96 | 20.32 | 0.1076 |
| Limit | EIRP < 23dBm/10MHz | | | Result | | | Pass | |

Total EIRP power is less than partial EIRP limit 23 dBm/10MHz.

**<MIMO Mode>**

| Part96 NR n48 Maximum Average Power [dBm], DG = 0.98 dBi | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BW | RB | RB | Mod | Antenna 2 | | | Antenna 0 | | | Combine | | | EIRP | EIRP |
| (MHz) | Size | Offset | | Lowest | Middle | Highest | Lowest | Middle | Highest | Lowest | Middle | Highest | (dBm) | (W) |
| 10 | 1 | 1 | QPSK | 16.16 | 16.05 | 16.02 | 15.95 | 15.83 | 15.60 | 19.07 | 18.95 | 18.83 | 20.05 | 0.1012 |
| 10 | 1 | 1 | 16-QAM | 15.52 | 15.41 | 15.38 | 15.36 | 15.23 | 14.93 | 18.45 | 18.33 | 18.17 | 19.43 | 0.0877 |
| Limit | EIRP < 23dBm/10MHz | | | Result | | | | | | | | | Pass | |

| Part96 NR n48 Maximum Average Power [dBm], DG = 0.98 dBi | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BW | RB | RB | Mod | Antenna 2 | | | Antenna 0 | | | Combine | | | EIRP | EIRP |
| (MHz) | Size | Offset | | Lowest | Middle | Highest | Lowest | Middle | Highest | Lowest | Middle | Highest | (dBm) | (W) |
| 20 | 1 | 1 | QPSK | 16.69 | 16.62 | 16.39 | 16.46 | 16.34 | 16.29 | 19.59 | 19.49 | 19.35 | 20.57 | 0.114 |
| 20 | 1 | 1 | 16-QAM | 16.04 | 15.87 | 15.78 | 16.06 | 15.80 | 15.66 | 19.06 | 18.85 | 18.73 | 20.04 | 0.1009 |
| Limit | EIRP < 23dBm/10MHz | | | Result | | | | | | | | | Pass | |

| Part96 NR n48 Maximum Average Power [dBm], DG = 0.98 dBi | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BW | RB | RB | Mod | Antenna 2 | | | Antenna 0 | | | Combine | | | EIRP | EIRP |
| (MHz) | Size | Offset | | Lowest | Middle | Highest | Lowest | Middle | Highest | Lowest | Middle | Highest | (dBm) | (W) |
| 30 | 1 | 1 | QPSK | 16.73 | 16.72 | 16.58 | 16.58 | 16.46 | 16.55 | 19.67 | 19.60 | 19.58 | 20.65 | 0.1161 |
| 30 | 1 | 1 | 16-QAM | 16.05 | 15.98 | 15.92 | 15.94 | 16.09 | 15.78 | 19.01 | 19.05 | 18.86 | 20.03 | 0.1007 |
| Limit | EIRP < 23dBm/10MHz | | | Result | | | | | | | | | Pass | |

| Part96 NR n48 Maximum Average Power [dBm], DG = 0.98 dBi | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BW | RB | RB | Mod | Antenna 2 | | | Antenna 0 | | | Combine | | | EIRP | EIRP |
| (MHz) | Size | Offset | | Lowest | Middle | Highest | Lowest | Middle | Highest | Lowest | Middle | Highest | (dBm) | (W) |
| 40 | 1 | 1 | QPSK | 16.64 | 16.66 | 16.51 | 16.45 | 16.52 | 16.32 | 19.56 | 19.60 | 19.43 | 20.58 | 0.1143 |
| 40 | 1 | 1 | 16-QAM | 16.10 | 16.10 | 16.05 | 15.87 | 15.84 | 15.76 | 19.00 | 18.98 | 18.92 | 19.98 | 0.0995 |
| Limit | EIRP < 23dBm/10MHz | | | Result | | | | | | | | | Pass | |

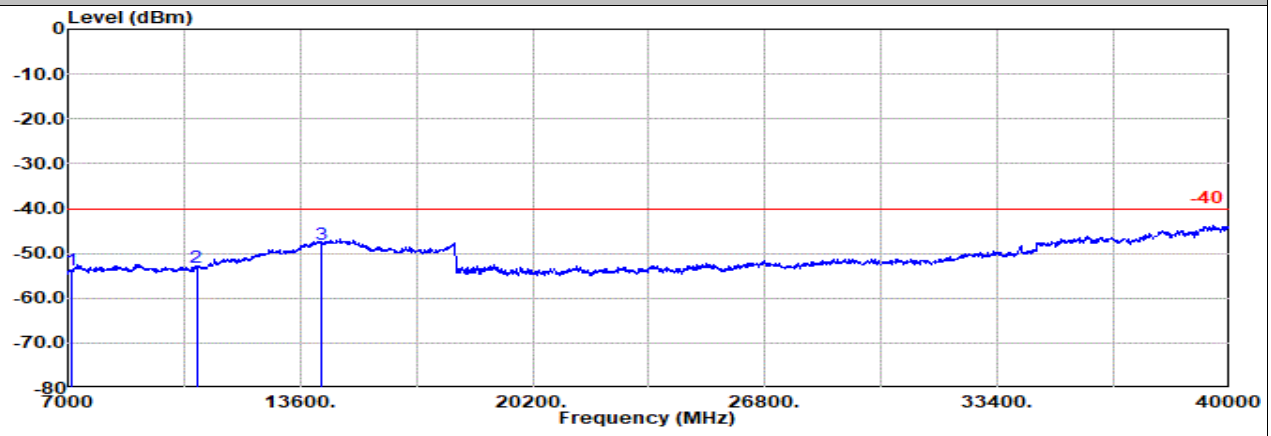
# Appendix B. Test Results of Radiated Test

## B1. Summary of each worse mode

| Mode | Part | Band | Ch | Freq (MHz) | Level (dBm) | Det | Ant Factor (dB) | Amp\Cbl (dB) | Filter (dB) | EIRPCF (dB) | Reading (dBuV) | Limit (dBm) | Margin (dB) | Pol | Ant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Part 96 | 5G NR n48 | H | 11043 | -41.15 | RMS | 38.07 | -20.49 | 0.53 | -95.23 | 35.97 | -40.00 | -1.15 | V | MIMO2 |

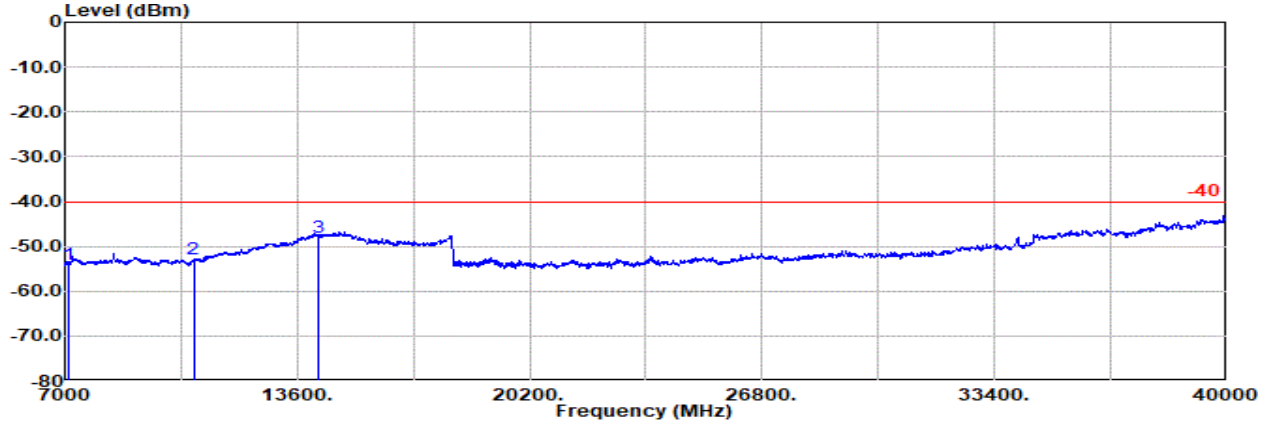
**MIMO2**

| Part 96 Mode 1 |
|---|
| 5G NR n48 20M Ch637334 1RB0 BPSK |
| L |




Site : 03CH22-HY
Condition: -40 3m DRH18-E_LE2C04A18EN Horizontal
: NR SA n48 20M Ch637334 1RB1 BPSK

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 7102.00 | -53.73 | RMS | 36.80 | -20.57 | 1.10 | -95.23 | 24.17 | -40.00 | -13.73 | Horizontal |
| 2 | 10653.84 | -53.14 | RMS | 37.50 | -20.63 | 0.51 | -95.23 | 24.71 | -40.00 | -13.14 | Horizontal |
| 3 | 14205.12 | -47.99 | RMS | 42.19 | -20.69 | 0.46 | -95.23 | 25.28 | -40.00 | -7.99 | Horizontal |

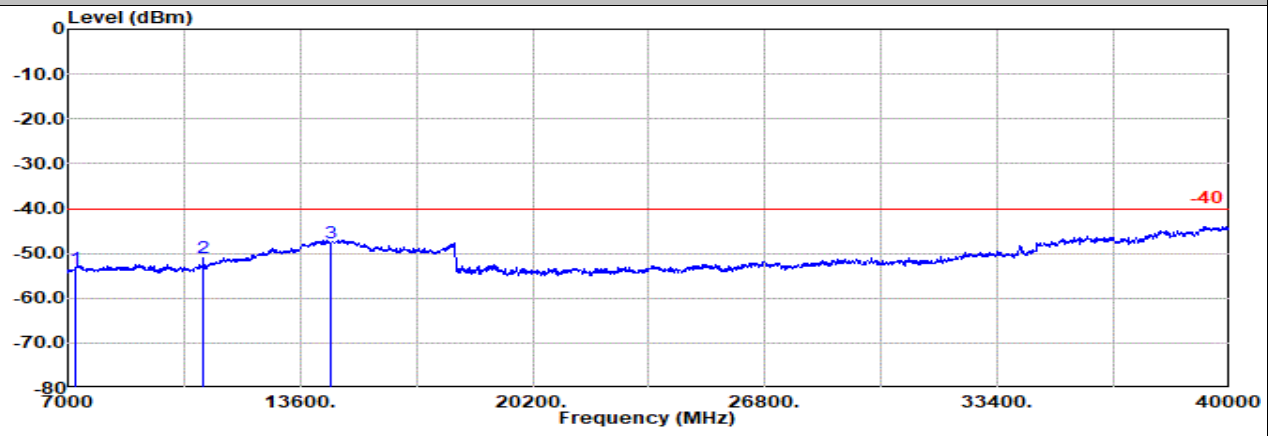



Site : 03CH22-HY
Condition: -40 3m DRH18-E_LE2C04A18EN Vertical
: NR SA n48 20M Ch637334 1RB1 BPSK

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 7102.00 | -53.90 | RMS | 36.80 | -20.57 | 1.10 | -95.23 | 24.00 | -40.00 | -13.90 | Vertical |
| 2 | 10653.84 | -52.88 | RMS | 37.50 | -20.63 | 0.51 | -95.23 | 24.97 | -40.00 | -12.88 | Vertical |
| 3 | 14205.12 | -48.04 | RMS | 42.19 | -20.69 | 0.46 | -95.23 | 25.23 | -40.00 | -8.04 | Vertical |

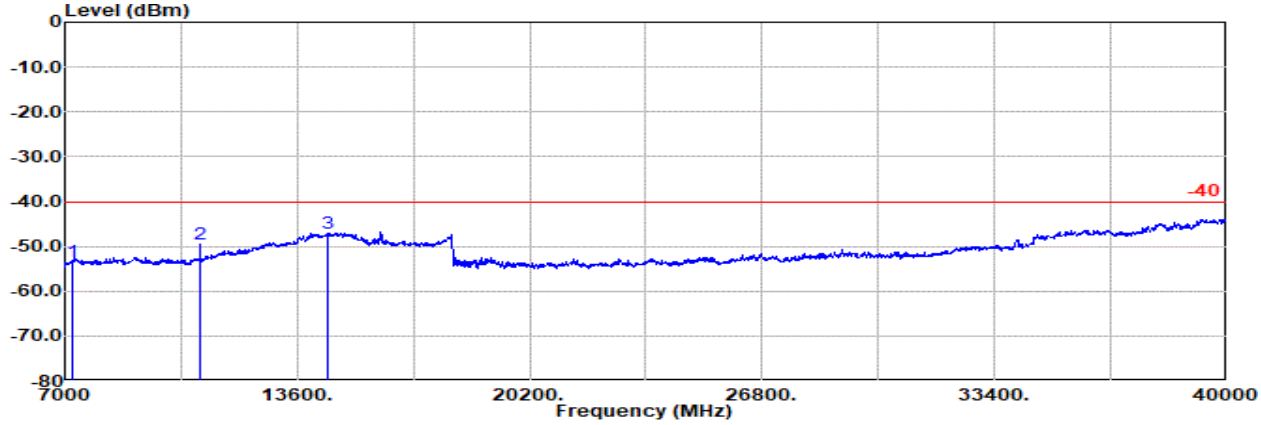
**MIMO 2**

| Part 96 Mode 1 |
|---|
| 5G NR n48 20M Ch641666 1RB0 BPSK |
| M |




Site : 03CH22-HY
Condition: -40 3m DRH18-E_LE2C04A18EN Horizontal
: NR SA n48 20M Ch641666 1RB1 BPSK

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 7232.00 | -53.46 | RMS | 37.36 | -20.52 | 0.98 | -95.23 | 23.95 | -40.00 | -13.46 | Horizontal |
| 2 | 10848.00 | -51.00 | RMS | 37.60 | -20.56 | 0.52 | -95.23 | 26.67 | -40.00 | -11.00 | Horizontal |
| 3 | 14464.00 | -47.72 | RMS | 42.23 | -20.91 | 0.48 | -95.23 | 25.71 | -40.00 | -7.72 | Horizontal |




Site : 03CH22-HY
Condition: -40 3m DRH18-E_LE2C04A18EN Vertical
: NR SA n48 20M Ch641666 1RB1 BPSK

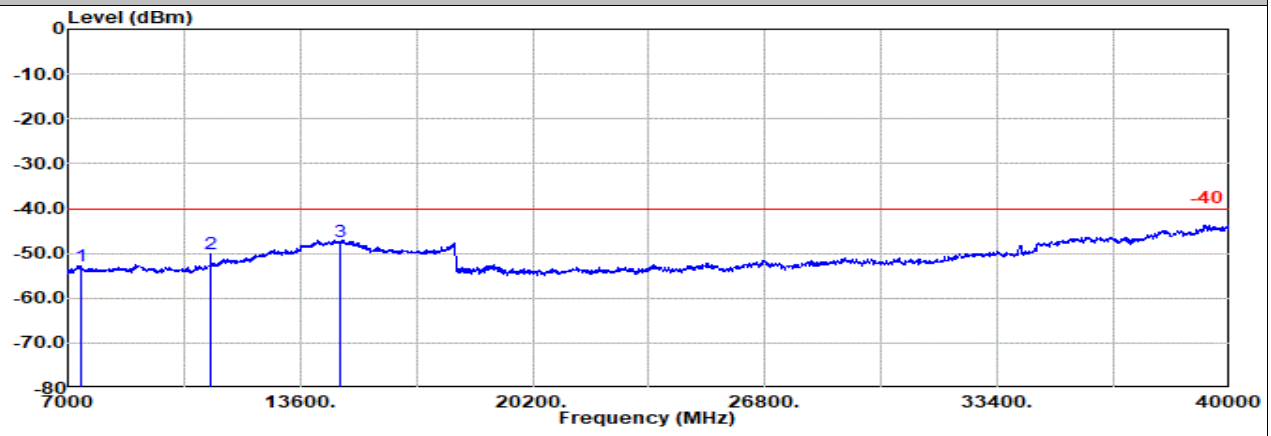
| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 7232.00 | -53.45 | RMS | 37.36 | -20.52 | 0.98 | -95.23 | 23.96 | -40.00 | -13.45 | Vertical |
| 2 | 10848.00 | -49.38 | RMS | 37.60 | -20.56 | 0.52 | -95.23 | 28.29 | -40.00 | -9.38 | Vertical |
| 3 | 14464.00 | -47.21 | RMS | 42.23 | -20.91 | 0.48 | -95.23 | 26.22 | -40.00 | -7.21 | Vertical |

**MIMO 2**

**Part 96 Mode 1**

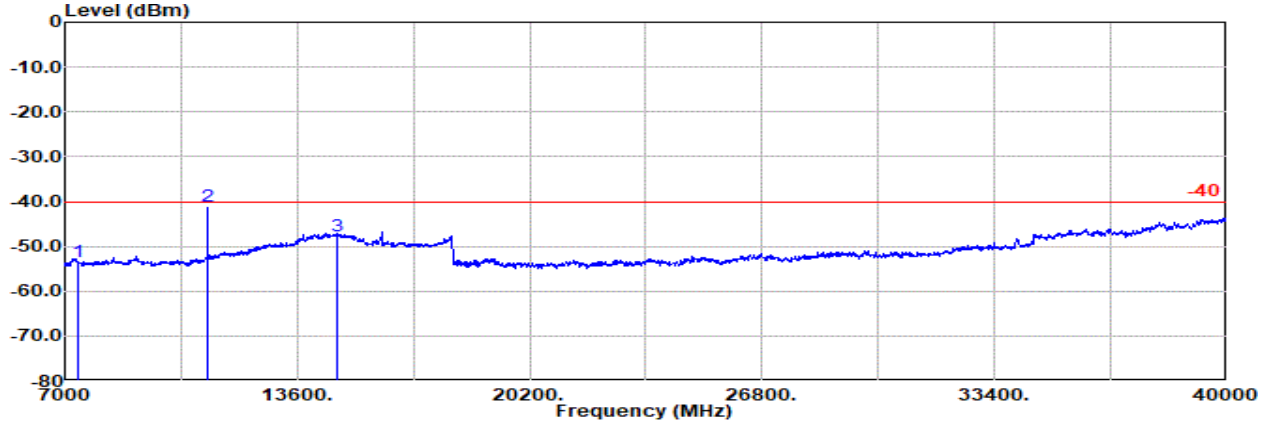
**5G NR n48 20M Ch646000 1RB0 BPSK**

**H**




Site : 03CH22-HY
Condition: -40 3m DRH18-E_LE2C04A18EN Horizontal
: NR SA n48 20M Ch646000 1RB1 BPSK

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 7362.00 | -52.90 | RMS | 37.48 | -20.45 | 0.93 | -95.23 | 24.37 | -40.00 | -12.90 | Horizontal |
| 2 | 11043.00 | -50.18 | RMS | 38.07 | -20.49 | 0.53 | -95.23 | 26.94 | -40.00 | -10.18 | Horizontal |
| 3 | 14725.00 | -47.48 | RMS | 42.70 | -21.09 | 0.50 | -95.23 | 25.64 | -40.00 | -7.48 | Horizontal |

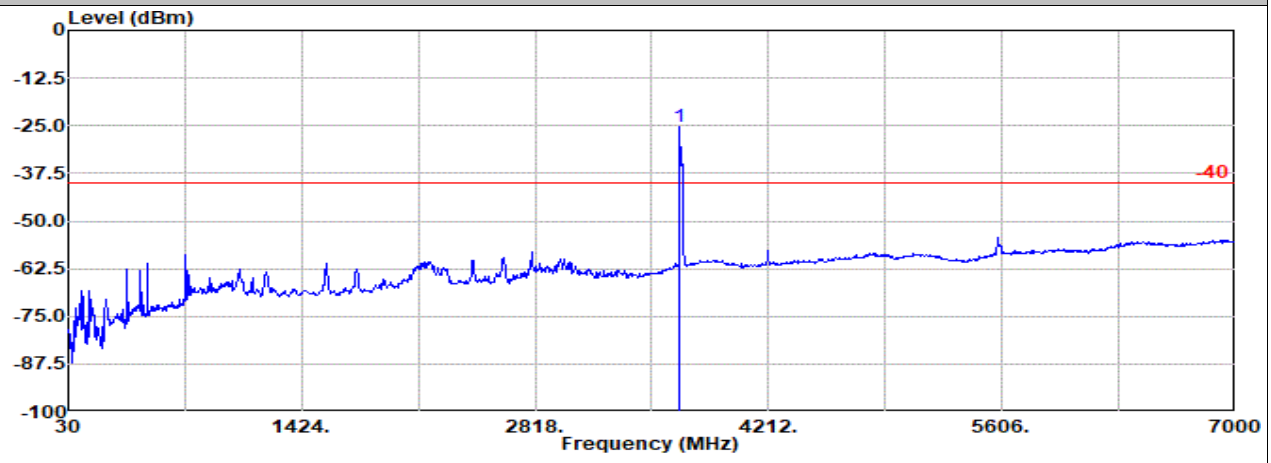



Site : 03CH22-HY
Condition: -40 3m DRH18-E_LE2C04A18EN Vertical
: NR SA n48 20M Ch646000 1RB1 BPSK

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 7362.00 | -53.57 | RMS | 37.48 | -20.45 | 0.93 | -95.23 | 23.70 | -40.00 | -13.57 | Vertical |
| 2 | 11043.00 | -41.15 | RMS | 38.07 | -20.49 | 0.53 | -95.23 | 35.97 | -40.00 | -1.15 | Vertical |
| 3 | 14725.00 | -47.82 | RMS | 42.70 | -21.09 | 0.50 | -95.23 | 25.30 | -40.00 | -7.82 | Vertical |

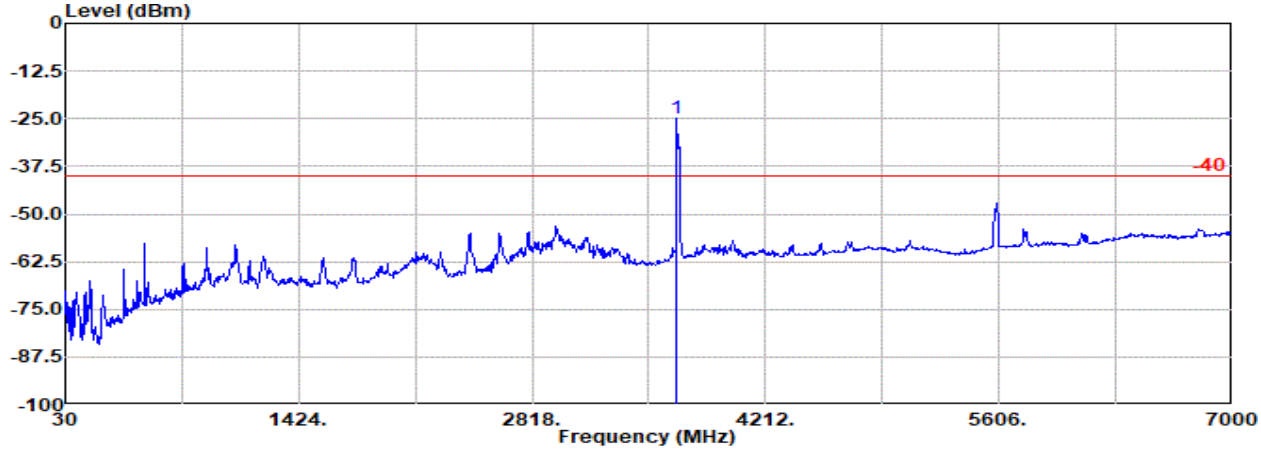
**MIMO 2**

| Part 96 Mode 1 |
|---|
| 5G NR n48 20M Ch646000 1RB0 BPSK |
| H |




Site : 03CH22-HY
Condition: -40 3m Bilog_63304_231015 Horizontal
: NR SA n48 20M Ch646000 1RB1 BPSK

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 3682.00 | -25.45 | RMS | 29.80 | -22.51 | 0.22 | -95.23 | 62.27 | -40.00 | 14.55 | Horizontal |




Site : 03CH22-HY
Condition: -40 3m Bilog_63304_231015 Vertical
: NR SA n48 20M Ch646000 1RB1 BPSK

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 3682.00 | -24.91 | RMS | 29.80 | -22.51 | 0.22 | -95.23 | 62.81 | -40.00 | 15.09 | Vertical |

**Remark:** #1 is fundamental signal which can be ignored.