



No.I20Z61029-WMD01



# TEST REPORT

No.I20Z61029-WMD01

for

**Ericsson AB Radio 4478 B26 KRC 161 884/1**

**Remote Radio Unit**

**FCC ID: TA8AKRC161884-1**

**In accordance with FCC CFR 47 Part 90**

**Issued Date: 2020-07-10**

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**REPORT HISTORY**

| Report Number   | Revision | Description             | Issue Date |
|-----------------|----------|-------------------------|------------|
| I20Z61029-WMD01 | Rev.0    | 1 <sup>st</sup> edition | 2020-07-10 |

Note: the latest revision of the test report supersedes all previous version.

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## **1. Test Laboratory**

### **1.1. Introduction & Accreditation**

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2005 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (ISED#: 24849). The detail accreditation scope can be found on NVLAP website.

### **1.2. Testing Location**

Location 1: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,  
P. R. China 100191

Location 4: CTTL(BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology  
Development Area, Beijing, P. R. China 100176

**1.3. Project date**

Testing Start Date: 2020-06-15

Testing End Date: 2020-07-02

**1.4. Signature**

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Dong Yuan

(Prepared this test report)



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Zhou Yu

(Reviewed this test report)



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Liu Baodian

(Approved this test report)

## **2. Client Information**

### **2.1. Applicant Information**

Company Name: Ericsson (China) Communications Company Ltd.  
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100102, P.R.China  
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### **2.2. Manufacturer Information**

Company Name: Ericsson AB  
Address /Post: Isafjordsgatan 10, 164 80 Stockholm  
Sweden  
Contact: /  
Email: /  
Telephone: /

### 3. Equipment Under Test (EUT)

#### 3.1. About EUT

|                                               |                                                                                                                                              |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Description                                   | Remote Radio Unit                                                                                                                            |
| Product Name                                  | Radio 4478 B26                                                                                                                               |
| Product Number                                | KRC 161 884/1                                                                                                                                |
| FCC ID                                        | TA8AKRC161884-1                                                                                                                              |
| Antenna                                       | N/A                                                                                                                                          |
| Output power                                  | Maximum 46.02dBm (40W) per port for all modes.<br>Maximum 43.01dBm (20W) per carrier per port for LTE less than 5MHz and NB-IoT stand alone. |
| Power source                                  | -48V DC                                                                                                                                      |
| Serial Number                                 | D829740620                                                                                                                                   |
| Hardware Version                              | R5A                                                                                                                                          |
| Software Version                              | Radio SW: CXP9017316_7-R82KM                                                                                                                 |
| Frequency range                               | RX: 814MHz-849MHz, TX: 859MHz-894MHz (LTE and NR)<br>RX: 824-849MHz, TX: 869-894MHz (WCDMA)                                                  |
| Number of Antenna ports                       | 4TX /4 RX                                                                                                                                    |
| Maximum RF bandwidth (IBW)                    | 35MHz (for LTE BW less than 5MHz and NB-IoT standalone, IBW should be 20MHz)<br>25MHz (for WCDMA)                                            |
| Maximum Number of supported carriers per port | 6 carriers (2 for NB-IoT stand alone)                                                                                                        |
| Supported modulations                         | WCDMA: QPSK, 16QAM and 64QAM<br>LTE and NR: QPSK, 16QAM, 64QAM and 256QAM<br>NB-IoT: QPSK                                                    |
| Date of receipt                               | 2020-06-15                                                                                                                                   |

### 3.2. General Description

The Equipment Under Test (EUT) Radio 4478 B26 is an Ericsson Remote Radio Unit working in 859-894MHz band which provides communication connections to network. The Radio 4478 B26 operates from a -48V DC supply.

The EUT includes 4 TX/RX ports and it can be configured to transmit in MIMO mode for LTE and NR carriers, and MIMO mode was used for measurements as the worst configuration. The complete testing was performed with the EUT transmitting at maximum RF power unless otherwise stated.

A full technical description can be found in the Manufacturer's documentation.



### 3.3. Configuration Description

The following settings were used to represent all traffic scenarios. The output power was measured on the bottom, middle and top channel of all applicable antenna ports. By measuring the output power of QPSK, 16QAM, 64QAM and 256QAM for NR on one of the antenna ports, it was determined that QPSK was the worst case modulation scheme and was used for all testing.

Complete testing was carried out on the worst case antenna port which was established as being the highest output power from the applicable measured ports on worst case modulation scheme. This antenna port was port A for all mode.

The settings below were used for all measurements unless otherwise noted:

#### NR

| Configuration | Carrier    | NR Carrier Bandwidth | Carrier Frequency Configuration (MHz) |             |             |
|---------------|------------|----------------------|---------------------------------------|-------------|-------------|
|               |            |                      | Bottom                                | Middle      | Top         |
| NR-MIMO-1C    | 1 Carrier  | 5.0MHz               | 861.5                                 | 864.0       | 866.5       |
|               |            | 10.0MHz              | 864.0                                 | 864.0       | 864.0       |
| NR-MIMO-2C    | 2 Carriers | 5.0MHz               | -                                     | 861.5+866.5 | -           |
| NR-MIMO-1C-BE | 1 Carriers | 5.0MHz               | 861.5                                 | N/A         | 866.5       |
|               |            | 10.0MHz              | 864.0                                 | N/A         | 864.0       |
| NR-MIMO-2C-BE | 2 Carriers | 5.0MHz               | 861.5+866.5                           | N/A         | 861.5+866.5 |

#### LTE+NR

| Configuration       | Carrier | Carrier Bandwidth | Carrier Frequency Configuration (MHz) |                                |                    |
|---------------------|---------|-------------------|---------------------------------------|--------------------------------|--------------------|
|                     |         |                   | Bottom                                | Middle                         | Top                |
| LTE+NR-MIMO-MC-1    | 1L+1NR  | 1.4MHz+5.0 MHz    | -                                     | (NR)861.5+(L)868.3             | -                  |
|                     |         | 3.0MHz+5.0 MHz    | -                                     | (NR)861.5+(L)867.5             | -                  |
|                     |         | 5.0MHz+5.0 MHz    | -                                     | (NR)861.5+(L)866.5             | -                  |
| LTE+NR-MIMO-MC-2    | 2L+1NR  | 1.4MHz+5.0 MHz    | -                                     | (NR)861.5+(L)866.9+868.3       | -                  |
|                     |         | 3.0MHz+5.0 MHz    | -                                     | (NR)861.5+(L)864.5+867.5       | -                  |
| LTE+NR-MIMO-MC-4    | 3L+1NR  | 1.4MHz+5.0 MHz    | -                                     | (NR)861.5+(L)865.5+866.9+868.3 | -                  |
| LTE+NR-MIMO-MC-1-BE | 1L+1NR  | 1.4MHz+5.0 MHz    | (L)859.7+(NR)862.9                    | N/A                            | (NR)865.1+(L)868.3 |
|                     |         | 3.0MHz+5.0 MHz    | (L)860.5+(NR)864.5                    | N/A                            | (NR)863.5+(L)867.5 |
|                     |         | 5.0MHz+5.0 MHz    | (L)861.5+(NR)866.5                    | N/A                            | (NR)861.5+(L)866.5 |

| Configuration       | Carrier | Carrier Bandwidth | Carrier Frequency Configuration (MHz) |        |                          |
|---------------------|---------|-------------------|---------------------------------------|--------|--------------------------|
|                     |         |                   | Bottom                                | Middle | Top                      |
| LTE+NR-MIMO-MC-2-BE | 2L+1NR  | 1.4MHz+5.0 MHz    | (L)859.7+861.1+(NR)864.3              | N/A    | (NR)863.7+(L)866.9+868.3 |

### SA+NR

| Configuration     | Carrier  | NR Carrier Bandwidth | Carrier Frequency Configuration (MHz) |                           |                           |
|-------------------|----------|----------------------|---------------------------------------|---------------------------|---------------------------|
|                   |          |                      | Bottom                                | Middle                    | Top                       |
| NB-IoT+NR-MC-1    | 1SA+1 NR | 5.0MHz               | -                                     | (NR)861.5+(SA)868.8       | -                         |
| NB-IoT+NR-MC-2    | 2SA+1 NR | 5.0MHz               | -                                     | (NR)861.5+(SA)863.2+868.8 | -                         |
| NB-IoT+NR-MC-1-BE | 1SA+1 NR | 5.0MHz               | (SA)859.2+(NR)861.9                   | N/A                       | (NR)866.1+(SA)868.8       |
| NB-IoT+NR-MC-4-BE | 2SA+1 NR | 5.0MHz               | (SA)859.2+860.8+(NR)863.5             | N/A                       | (NR)864.5+(SA)867.2+868.8 |

### LTE+SA+NR

| Configuration         | Carrier    | Carrier Bandwidth | Carrier Frequency Configuration (MHz) |                                          |                                    |
|-----------------------|------------|-------------------|---------------------------------------|------------------------------------------|------------------------------------|
|                       |            |                   | Bottom                                | Middle                                   | Top                                |
| LTE+NB-IoT+NR-MC-1    | 1L+1SA+1NR | 1.4MHz+5.0 MHz    | -                                     | (NR)861.5+(L)867.9+(SA)868.8             | -                                  |
|                       |            | 3.0MHz+5.0 MHz    | -                                     | (NR)861.5+(L)867.1+(SA)868.8             | -                                  |
| LTE+NB-IoT+NR-MC-2    | 1L+2SA+1NR | 1.4MHz+5.0 MHz    | -                                     | (NR)861.5+(L)867.3+(SA)868.2+868.8       | -                                  |
|                       |            | 3.0MHz+5.0 MHz    | -                                     | (NR)861.5+(L)866.5+(SA)868.2+868.8       | -                                  |
| LTE+NB-IoT+NR-MC-4    | 2L+2SA+1NR | 1.4MHz+5.0 MHz    | -                                     | (NR)861.5+(L)865.9+867.3+(SA)868.2+868.8 | -                                  |
| LTE+NB-IoT+NR-MC-1-BE | 1L+1SA+1NR | 1.4MHz+5.0 MHz    | (SA)859.2+(L)860.1+(NR)863.3          | N/A                                      | (NR)864.7+(L)867.9+(SA)868.8       |
|                       |            | 3.0MHz+5.0 MHz    | (SA)859.2+(L)860.9+(NR)864.9          | N/A                                      | (NR)863.1+(L)867.1+(SA)868.8       |
| LTE+NB-IoT+NR-MC-2-BE | 1L+2SA+1NR | 1.4MHz+5.0 MHz    | (SA)859.2+860.8+(L)861.7+(NR)864.9    | N/A                                      | (NR)863.1+(L)866.3+(SA)867.2+868.8 |
|                       |            | 3.0MHz+5.0 MHz    | (SA)859.2+860.8+(L)862.5+(NR)866.5    | N/A                                      | (NR)861.5+(L)865.5+(SA)867.2+868.8 |

N/A – Not Applicable

## 4. Reference Documents

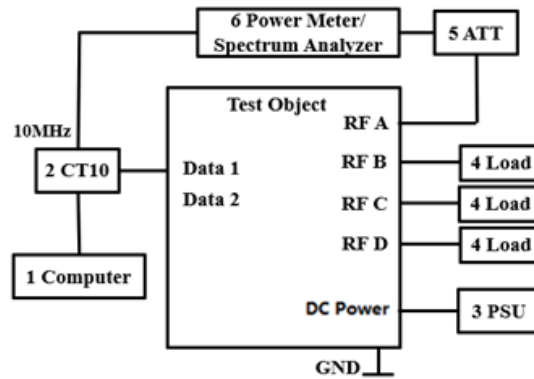
### 4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

| Reference      | Title                                                                                             | Version         |
|----------------|---------------------------------------------------------------------------------------------------|-----------------|
| FCC Part 90    | MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES                                                    | 10-1-19 Edition |
| FCC Part 2     | FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS                     | 10-1-19 Edition |
| ANSI 63.26     | American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services | 2015            |
| ANSI/TIA-603-E | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards               | 2016            |
| KDB 971168 D01 | MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS                           | v03r01          |
| KDB 662911 D01 | Emissions Testing of Transmitters with Multiple Outputs in the Same Band                          | v02r01          |

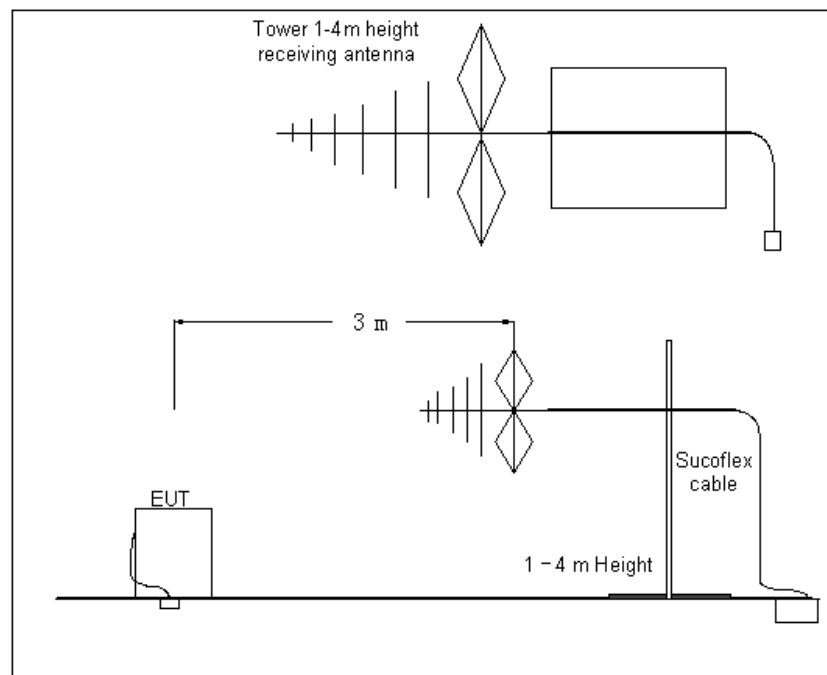
## 5. TEST SETUP

### Test Setup, Conducted Measurement:



| No. | Auxiliary Equipment | Model Type           | Version |
|-----|---------------------|----------------------|---------|
| 1   | Test Computer       | HP EliteBook 8540w   | -       |
| 2   | CT10                | LPC 102 487/1        | R1C     |
| 3   | Power supply unit   | -                    | -       |
| 4   | Load                | TF150                | -       |
| 5   | 40dB Attenuator     | Aeroflex / Weinschel | -       |

### Test Setup, Radiated Measurement:



## 6. LABORATORY ENVIRONMENT

**Control room / conducted chamber** did not exceed following limits along the EMC testing:

|                          |                            |
|--------------------------|----------------------------|
| Temperature              | Min. = 15 °C, Max. = 35 °C |
| Relative humidity        | Min. = 20 %, Max. = 80 %   |
| Shielding effectiveness  | > 110 dB                   |
| Electrical insulation    | > 2 MΩ                     |
| Ground system resistance | < 0.5 Ω                    |

**Semi-anechoic chamber**(10 meters×6.7 meters×6.15 meters) did not exceed following limits along the EMC testing:

|                                                 |                                         |
|-------------------------------------------------|-----------------------------------------|
| Temperature                                     | Min. = 15 °C, Max. = 30 °C              |
| Relative humidity                               | Min. = 35 %, Max. = 60 %                |
| Shielding effectiveness                         | > 100 dB                                |
| Electrical insulation                           | > 2 MΩ                                  |
| Ground system resistance                        | < 0.5 Ω                                 |
| Normalised site attenuation (NSA)               | < ± 3.5 dB, 3 m distance                |
| Site voltage standing-wave ratio ( $S_{VSWR}$ ) | Between 0 and 6 dB, from 1GHz to 18GHz  |
| Uniformity of field strength                    | Between 0 and 6 dB, from 80 to 3000 MHz |

## 7. SUMMARY OF TEST RESULTS

| Items | Test Name                                                               | Clause in FCC rules | Verdict |
|-------|-------------------------------------------------------------------------|---------------------|---------|
| 1     | Maximum Output Power and Peak to Average Power Ratio - EIRP calculation | 90.635,<br>2.1046   | Pass    |
| 2     | Occupied Bandwidth                                                      | 2.1049              | Pass    |
| 3     | Spurious Emissions at Band Edge                                         | 90.210,<br>2.1051   | Pass    |
| 4     | Conducted Spurious Emission                                             | 90.210,<br>2.1051   | Pass    |
| 5     | Radiated Spurious Emission                                              | 90.210<br>2.1051    | Pass    |
| 6     | Frequency Stability                                                     | 90.213,<br>2.1055   | Pass    |

## 8. Test Equipment Utilized

| NO. | Description       | TYPE            | series number | MANUFACTURE                | CAL DUE DATE |
|-----|-------------------|-----------------|---------------|----------------------------|--------------|
| 1   | AC Power Supply   | PAS20-18        | UH000694      | Kikusui                    | 2020-07-05   |
| 2   | 40dB Attenuator   | 66-40-33        | CD4019        | Aeroflex / Weinschel       | -            |
| 3   | 40dB Attenuator   | TSG150R-4-40N11 | 1511040001    | Nanjing Jiexi Technologies | -            |
| 4   | Spectrum Analyzer | N9030           | MY57142378    | Keysight                   | 2021-02-25   |
| 5   | Climate Chamber   | KTHG-415TBS     | 7353K         | QINGSHENG                  | 2020-08-07   |
| 6   | Antenna           | 3117            | 00139065      | ETS                        | 2020-11-10   |
| 7   | Power Amplifier   | MY39500449      | 83006A        | Agilent                    | -            |
| 8   | Antenna           | VULB9163        | 9163-482      | Schwarzbeck                | 2020-09-16   |
| 9   | Power Amplifier   | SCU18           | 102249        | R&S                        | -            |
| 10  | Test Receiver     | ESU26           | 100376        | R&S                        | 2020-10-30   |
| 11  | Test Receiver     | FSV40           | 101047        | R&S                        | 2021-05-18   |
| 12  | Power Amplifier   | SCU40           | 1707/1708     | R&S                        | -            |
| 13  | Antenna           | 3116            | 2661          | ETS                        | 2020-10-08   |
| 14  | Spectrum Analyzer | FSW             | 104038-dC     | R&S                        | 2021-07-01   |

## 9. MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

| Test Discipline                     | Measurement Uncertainty |
|-------------------------------------|-------------------------|
| Conducted Maximum Peak Output Power | 0.5dB                   |
| Occupied Bandwidth                  | 1.1Hz                   |
| Conducted Spurious Emissions        | 2.3dB                   |
| Band Edge                           | 2.3dB                   |
| Radiated Spurious Emissions         | 5.4dB                   |
| Frequency Stability                 | $<\pm 1 \times 10^{-7}$ |

## **ANNEX A: MEASUREMENT RESULTS**

### **A.1 Maximum Output Power and Peak to Average Power Ratio - EIRP calculation**

#### **A.1.1 Reference**

FCC CFR 47 Part 2, Clause 2.1046

FCC CFR 47 Part 90, Clause 90.635

#### **A.1.2 Method of Measurements**

During the process of testing, the EUT was configured to transmit on maximum power and proper modulation. The transmitter power shall be measured in terms of a root-mean-square (RMS) average value. In case of the EUT was configured to MIMO mode, since the EUT transmits on all antennas simultaneously in the same frequency range, using the Measure-and-Sum approach, the output power at all antennas were tested, and the total output power were then summed mathematically in linear power units according to FCC KDB 662911 D01.

A peak to average ratio measurement is performed at the conducted ports of the EUT for single carrier for single RAT mode. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) was used and 0.1% probability value recorded.

#### **A.1.3 Limit**

Output Power:

The effective radiated power and antenna height for base stations may not exceed 1 kilowatt and 305m. above average terrain, respectively, or the equivalent thereof as determined from the table. There are maximum values, and applicants will be required to justify power levels and antenna heights requested.

Peak to Average Ratio: 13 dB

### A.1.4 Measurement result

Configuration NR-MIMO-1C

Maximum Output Power 46.02dBm per port

| Antenna | Modulation/<br>Carrier Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |         |                    |                    |          |                    |                    |         |
|---------|-------------------------------------------|--------------------------------------------|--------------------|---------|--------------------|--------------------|----------|--------------------|--------------------|---------|
|         |                                           | Channel position B                         |                    |         | Channel position M |                    |          | Channel position T |                    |         |
|         |                                           | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR (db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR(db) |
| A       | QPSK/5.0                                  | 45.95                                      | 40.10              | 7.41    | 46.20              | 40.40              | 7.40     | 46.32              | 40.53              | 7.40    |
| B       |                                           | 45.71                                      | 39.81              | 7.41    | 45.96              | 40.14              | 7.40     | 46.09              | 40.16              | 7.41    |
| C       |                                           | 45.85                                      | 40.07              | 7.41    | 46.01              | 40.31              | 7.40     | 46.15              | 40.48              | 7.41    |
| D       |                                           | 45.60                                      | 39.76              | 7.40    | 45.80              | 40.13              | 7.40     | 45.98              | 40.15              | 7.41    |
| Total   |                                           | 51.80                                      | 45.96              | -       | 52.02              | 46.27              | -        | 52.16              | 46.35              | -       |

| Antenna | Modulation/<br>Carrier Bandwidth<br><br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |         |                    |                    |          |                    |                    |         |
|---------|-----------------------------------------------|--------------------------------------------|--------------------|---------|--------------------|--------------------|----------|--------------------|--------------------|---------|
|         |                                               | Channel position B                         |                    |         | Channel position M |                    |          | Channel position T |                    |         |
|         |                                               | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR (db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR(db) |
| A       | 16QAM/5.0                                     | -                                          | -                  | -       | 46.19              | 40.54              | 7.43     | -                  | -                  | -       |
| B       |                                               | -                                          | -                  | -       | 45.96              | 40.35              | 7.42     | -                  | -                  | -       |
| C       |                                               | -                                          | -                  | -       | 45.99              | 40.42              | 7.43     | -                  | -                  | -       |
| D       |                                               | -                                          | -                  | -       | 45.83              | 40.32              | 7.42     | -                  | -                  | -       |
| Total   |                                               | -                                          | -                  | -       | 52.02              | 46.43              | -        | -                  | -                  | -       |

| Antenna | Modulation/<br>Carrier Bandwidth<br><br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |         |                    |                    |             |                    |                    |         |
|---------|-----------------------------------------------|--------------------------------------------|--------------------|---------|--------------------|--------------------|-------------|--------------------|--------------------|---------|
|         |                                               | Channel position B                         |                    |         | Channel position M |                    |             | Channel position T |                    |         |
|         |                                               | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR(db) |
| A       | 64QAM/5.0                                     | -                                          | -                  | -       | 46.14              | 40.35              | 7.49        | -                  | -                  | -       |
| B       |                                               | -                                          | -                  | -       | 45.94              | 40.03              | 7.49        | -                  | -                  | -       |
| C       |                                               | -                                          | -                  | -       | 46.10              | 40.29              | 7.49        | -                  | -                  | -       |
| D       |                                               | -                                          | -                  | -       | 45.88              | 40.01              | 7.49        | -                  | -                  | -       |
| Total   |                                               | -                                          | -                  | -       | 52.04              | 46.19              | -           | -                  | -                  | -       |

| Antenna | Modulation/<br>Carrier Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |         |                    |                    |          |                    |                    |         |
|---------|-------------------------------------------|--------------------------------------------|--------------------|---------|--------------------|--------------------|----------|--------------------|--------------------|---------|
|         |                                           | Channel position B                         |                    |         | Channel position M |                    |          | Channel position T |                    |         |
|         |                                           | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR (db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR(db) |
| A       | 256QAM/5.0                                | -                                          | -                  | -       | 46.13              | 40.39              | 7.48     | -                  | -                  | -       |
| B       |                                           | -                                          | -                  | -       | 45.91              | 40.05              | 7.47     | -                  | -                  | -       |
| C       |                                           | -                                          | -                  | -       | 46.06              | 40.31              | 7.48     | -                  | -                  | -       |
| D       |                                           | -                                          | -                  | -       | 45.89              | 40.00              | 7.47     | -                  | -                  | -       |
| Total   |                                           | -                                          | -                  | -       | 52.02              | 46.21              | -        | -                  | -                  | -       |

| Antenna | Modulation/<br>Carrier Bandwidth<br><br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |         |                    |                    |          |                    |                    |         |
|---------|-----------------------------------------------|--------------------------------------------|--------------------|---------|--------------------|--------------------|----------|--------------------|--------------------|---------|
|         |                                               | Channel position B                         |                    |         | Channel position M |                    |          | Channel position T |                    |         |
|         |                                               | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR (db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR(db) |
| A       | QPSK/10.0                                     | -                                          | -                  | -       | 46.16              | 37.35              | 7.55     | -                  | -                  | -       |
| B       |                                               | -                                          | -                  | -       | 45.88              | 37.11              | 7.61     | -                  | -                  | -       |
| C       |                                               | -                                          | -                  | -       | 45.98              | 37.27              | 7.66     | -                  | -                  | -       |
| D       |                                               | -                                          | -                  | -       | 45.80              | 37.01              | 7.62     | -                  | -                  | -       |
| Total   |                                               | -                                          | -                  | -       | 51.98              | 43.21              | -        | -                  | -                  | -       |

| Antenna | Modulation/<br>Carrier Bandwidth<br><br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |         |                    |                    |          |                    |                    |         |
|---------|-----------------------------------------------|--------------------------------------------|--------------------|---------|--------------------|--------------------|----------|--------------------|--------------------|---------|
|         |                                               | Channel position B                         |                    |         | Channel position M |                    |          | Channel position T |                    |         |
|         |                                               | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR (db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR(db) |
| A       | 16QAM/10.0                                    | -                                          | -                  | -       | 46.18              | 37.87              | 7.52     | -                  | -                  | -       |
| B       |                                               | -                                          | -                  | -       | 45.88              | 37.53              | 7.54     | -                  | -                  | -       |
| C       |                                               | -                                          | -                  | -       | 45.99              | 37.67              | 7.59     | -                  | -                  | -       |
| D       |                                               | -                                          | -                  | -       | 45.82              | 37.50              | 7.56     | -                  | -                  | -       |
| Total   |                                               | -                                          | -                  | -       | 51.99              | 43.67              | -        | -                  | -                  | -       |

| Antenna | Modulation/<br>Carrier Bandwidth<br><br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |         |                    |                    |          |                    |                    |         |
|---------|-----------------------------------------------|--------------------------------------------|--------------------|---------|--------------------|--------------------|----------|--------------------|--------------------|---------|
|         |                                               | Channel position B                         |                    |         | Channel position M |                    |          | Channel position T |                    |         |
|         |                                               | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR (db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR(db) |
| A       | 64QAM/10.0                                    | -                                          | -                  | -       | 46.08              | 37.26              | 7.65     | -                  | -                  | -       |
| B       |                                               | -                                          | -                  | -       | 45.81              | 37.05              | 7.51     | -                  | -                  | -       |
| C       |                                               | -                                          | -                  | -       | 45.94              | 37.21              | 7.61     | -                  | -                  | -       |
| D       |                                               | -                                          | -                  | -       | 45.78              | 36.91              | 7.59     | -                  | -                  | -       |
| Total   |                                               | -                                          | -                  | -       | 51.92              | 43.13              | -        | -                  | -                  | -       |

| Antenna | Modulation/<br>Carrier Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |         |                    |                    |             |                    |                    |         |
|---------|-------------------------------------------|--------------------------------------------|--------------------|---------|--------------------|--------------------|-------------|--------------------|--------------------|---------|
|         |                                           | Channel position B                         |                    |         | Channel position M |                    |             | Channel position T |                    |         |
|         |                                           | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR(db) |
| A       | 256QAM/10.0                               | -                                          | -                  | -       | 46.12              | 37.33              | 7.62        | -                  | -                  | -       |
| B       |                                           | -                                          | -                  | -       | 45.83              | 36.98              | 7.60        | -                  | -                  | -       |
| C       |                                           | -                                          | -                  | -       | 45.99              | 37.19              | 7.69        | -                  | -                  | -       |
| D       |                                           | -                                          | -                  | -       | 45.86              | 37.02              | 7.59        | -                  | -                  | -       |
| Total   |                                           | -                                          | -                  | -       | 51.97              | 43.15              | -           | -                  | -                  | -       |

## Configuration NR-MIMO-2C

Maximum Output Power 46.02dBm per port

| Antenna | Modulation/<br>Carrier Bandwidth<br><br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                        |         |                    |                        |                 |                    |                        |         |
|---------|-----------------------------------------------|--------------------------------------------|------------------------|---------|--------------------|------------------------|-----------------|--------------------|------------------------|---------|
|         |                                               | Channel position B                         |                        |         | Channel position M |                        |                 | Channel position T |                        |         |
|         |                                               | POWER<br><br>(dBm)                         | POWER<br><br>(dBm/MHz) | PAR(db) | POWER<br><br>(dBm) | POWER<br><br>(dBm/MHz) | PAR<br><br>(db) | POWER<br><br>(dBm) | POWER<br><br>(dBm/MHz) | PAR(db) |
| A       | QPSK/5.0                                      | -                                          | -                      | -       | 45.95              | 37.34                  | -               | -                  | -                      | -       |
| B       |                                               | -                                          | -                      | -       | 45.71              | 37.03                  | -               | -                  | -                      | -       |
| C       |                                               | -                                          | -                      | -       | 45.82              | 37.16                  | -               | -                  | -                      | -       |
| D       |                                               | -                                          | -                      | -       | 45.65              | 36.89                  | -               | -                  | -                      | -       |
| Total   |                                               | -                                          | -                      | -       | 51.80              | 43.13                  | -               | -                  | -                      | -       |

| Antenna | Modulation/<br>Carrier Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |         |                    |                    |             |                    |                    |         |
|---------|-------------------------------------------|--------------------------------------------|--------------------|---------|--------------------|--------------------|-------------|--------------------|--------------------|---------|
|         |                                           | Channel position B                         |                    |         | Channel position M |                    |             | Channel position T |                    |         |
|         |                                           | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR(db) |
| A       | 16QAM/5.0                                 | -                                          | -                  | -       | 45.95              | 37.84              | -           | -                  | -                  | -       |
| B       |                                           | -                                          | -                  | -       | 45.70              | 37.40              | -           | -                  | -                  | -       |
| C       |                                           | -                                          | -                  | -       | 45.82              | 37.56              | -           | -                  | -                  | -       |
| D       |                                           | -                                          | -                  | -       | 45.66              | 37.34              | -           | -                  | -                  | -       |
| Total   |                                           | -                                          | -                  | -       | 51.80              | 43.56              | -           | -                  | -                  | -       |

| Antenna | Modulation/<br>Carrier Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |         |                    |                    |             |                    |                    |         |
|---------|-------------------------------------------|--------------------------------------------|--------------------|---------|--------------------|--------------------|-------------|--------------------|--------------------|---------|
|         |                                           | Channel position B                         |                    |         | Channel position M |                    |             | Channel position T |                    |         |
|         |                                           | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR(db) |
| A       | 64QAM/5.0                                 | -                                          | -                  | -       | 45.91              | 37.67              | -           | -                  | -                  | -       |
| B       |                                           | -                                          | -                  | -       | 45.63              | 37.17              | -           | -                  | -                  | -       |
| C       |                                           | -                                          | -                  | -       | 45.76              | 37.32              | -           | -                  | -                  | -       |
| D       |                                           | -                                          | -                  | -       | 45.54              | 37.02              | -           | -                  | -                  | -       |
| Total   |                                           | -                                          | -                  | -       | 51.73              | 43.32              | -           | -                  | -                  | -       |

| Antenna | Modulation/<br>Carrier Bandwidth<br><br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                        |         |                    |                        |                 |                    |                        |         |
|---------|-----------------------------------------------|--------------------------------------------|------------------------|---------|--------------------|------------------------|-----------------|--------------------|------------------------|---------|
|         |                                               | Channel position B                         |                        |         | Channel position M |                        |                 | Channel position T |                        |         |
|         |                                               | POWER<br><br>(dBm)                         | POWER<br><br>(dBm/MHz) | PAR(db) | POWER<br><br>(dBm) | POWER<br><br>(dBm/MHz) | PAR<br><br>(db) | POWER<br><br>(dBm) | POWER<br><br>(dBm/MHz) | PAR(db) |
| A       | 256QAM/5.0                                    | -                                          | -                      | -       | 45.93              | 37.31                  | -               | -                  | -                      | -       |
| B       |                                               | -                                          | -                      | -       | 45.67              | 37.10                  | -               | -                  | -                      | -       |
| C       |                                               | -                                          | -                      | -       | 45.80              | 37.26                  | -               | -                  | -                      | -       |
| D       |                                               | -                                          | -                      | -       | 45.56              | 37.01                  | -               | -                  | -                      | -       |
| Total   |                                               | -                                          | -                      | -       | 51.76              | 43.19                  | -               | -                  | -                      | -       |

### Configuration LTE+NR-MIMO-MC-1

Maximum Output Power 46.02dBm per port

| Antenna | LTE Mod./<br>NR Mod.<br>Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |             |                    |                    |             |                    |                    |             |
|---------|--------------------------------------------|--------------------------------------------|--------------------|-------------|--------------------|--------------------|-------------|--------------------|--------------------|-------------|
|         |                                            | Channel position B                         |                    |             | Channel position M |                    |             | Channel position T |                    |             |
|         |                                            | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) |
| A       | QPSK1.4/<br>QPSK 5.0                       | -                                          | -                  | -           | 46.97              | 42.64              | -           | -                  | -                  | -           |
| B       | QPSK1.4/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.73              | 42.23              | -           | -                  | -                  | -           |
| C       | QPSK1.4/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.86              | 42.33              | -           | -                  | -                  | -           |
| D       | QPSK1.4/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.64              | 42.08              | -           | -                  | -                  | -           |
| Total   |                                            | -                                          | -                  | -           | 52.11              | 48.35              | -           | -                  | -                  | -           |

| Antenna | LTE Mod./<br>NR Mod.<br>Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |             |                    |                    |             |                    |                    |             |
|---------|--------------------------------------------|--------------------------------------------|--------------------|-------------|--------------------|--------------------|-------------|--------------------|--------------------|-------------|
|         |                                            | Channel position B                         |                    |             | Channel position M |                    |             | Channel position T |                    |             |
|         |                                            | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) |
| A       | QPSK3.0/<br>QPSK 5.0                       | -                                          | -                  | -           | 46.01              | 39.46              | -           | -                  | -                  | -           |
| B       | QPSK3.0/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.74              | 39.06              | -           | -                  | -                  | -           |
| C       | QPSK3.0/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.86              | 39.20              | -           | -                  | -                  | -           |
| D       | QPSK3.0/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.63              | 39.04              | -           | -                  | -                  | -           |
| Total   |                                            | -                                          | -                  | -           | 51.83              | 45.21              | -           | -                  | -                  | -           |

| Antenna | LTE Mod./<br>NR Mod.<br>Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |             |                    |                    |             |                    |                    |             |
|---------|--------------------------------------------|--------------------------------------------|--------------------|-------------|--------------------|--------------------|-------------|--------------------|--------------------|-------------|
|         |                                            | Channel position B                         |                    |             | Channel position M |                    |             | Channel position T |                    |             |
|         |                                            | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) |
| A       | QPSK5.0/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.98              | 37.32              | -           | -                  | -                  | -           |
| B       | QPSK5.0/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.69              | 37.07              | -           | -                  | -                  | -           |
| C       | QPSK5.0/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.88              | 37.20              | -           | -                  | -                  | -           |
| D       | QPSK5.0/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.63              | 37.04              | -           | -                  | -                  | -           |
| Total   |                                            | -                                          | -                  | -           | 51.82              | 43.18              | -           | -                  | -                  | -           |

### Configuration LTE+NR-MIMO-MC-2 (2LTE +1NR)

Maximum Output Power 46.02dBm per port

| Antenna | LTE Mod./<br>NR Mod.<br>Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |             |                    |                    |             |                    |                    |             |
|---------|--------------------------------------------|--------------------------------------------|--------------------|-------------|--------------------|--------------------|-------------|--------------------|--------------------|-------------|
|         |                                            | Channel position B                         |                    |             | Channel position M |                    |             | Channel position T |                    |             |
|         |                                            | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) |
| A       | QPSK1.4/<br>QPSK 5.0                       | -                                          | -                  | -           | 46.02              | 40.79              | -           | -                  | -                  | -           |
| B       | QPSK1.4/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.73              | 40.40              | -           | -                  | -                  | -           |
| C       | QPSK1.4/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.91              | 40.67              | -           | -                  | -                  | -           |
| D       | QPSK1.4/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.66              | 40.24              | -           | -                  | -                  | -           |
| Total   |                                            | -                                          | -                  | -           | 51.85              | 46.55              | -           | -                  | -                  | -           |

| Antenna | LTE Mod./<br>NR Mod.<br>Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |             |                    |                    |             |                    |                    |             |
|---------|--------------------------------------------|--------------------------------------------|--------------------|-------------|--------------------|--------------------|-------------|--------------------|--------------------|-------------|
|         |                                            | Channel position B                         |                    |             | Channel position M |                    |             | Channel position T |                    |             |
|         |                                            | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) |
| A       | QPSK3.0/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.98              | 38.59              | -           | -                  | -                  | -           |
| B       | QPSK3.0/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.72              | 38.23              | -           | -                  | -                  | -           |
| C       | QPSK3.0/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.87              | 38.39              | -           | -                  | -                  | -           |
| D       | QPSK3.0/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.62              | 38.04              | -           | -                  | -                  | -           |
| Total   |                                            | -                                          | -                  | -           | 51.82              | 44.34              | -           | -                  | -                  | -           |

### Configuration LTE+NR-MIMO-MC-4 (3LTE +1NR )

Maximum Output Power 46.02dBm per port

| Antenna | LTE Mod./<br>NR Mod.<br>Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |             |                    |                    |             |                    |                    |             |
|---------|--------------------------------------------|--------------------------------------------|--------------------|-------------|--------------------|--------------------|-------------|--------------------|--------------------|-------------|
|         |                                            | Channel position B                         |                    |             | Channel position M |                    |             | Channel position T |                    |             |
|         |                                            | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) |
| A       | QPSK1.4/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.98              | 39.76              | -           | -                  | -                  | -           |
| B       | QPSK1.4/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.77              | 39.42              | -           | -                  | -                  | -           |
| C       | QPSK1.4/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.94              | 39.47              | -           | -                  | -                  | -           |
| D       | QPSK1.4/<br>QPSK 5.0                       | -                                          | -                  | -           | 45.70              | 39.26              | -           | -                  | -                  | -           |

|       |          |   |   |   |       |       |   |   |   |   |
|-------|----------|---|---|---|-------|-------|---|---|---|---|
|       | QPSK 5.0 |   |   |   |       |       |   |   |   |   |
| Total |          | - | - | - | 51.87 | 45.50 | - | - | - | - |

#### Configuration NB-IoT+NR-MC-1(1SA+1NR)

Maximum Output Power 46.02dBm per port

| Antenna | SA Mod./<br>NR Mod.<br>Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |             |                    |                    |             |                    |                    |             |
|---------|-------------------------------------------|--------------------------------------------|--------------------|-------------|--------------------|--------------------|-------------|--------------------|--------------------|-------------|
|         |                                           | Channel position B                         |                    |             | Channel position M |                    |             | Channel position T |                    |             |
|         |                                           | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) |
| A       | QPSK<br>/QPSK5.0                          | -                                          | -                  | -           | 45.81              | 42.86              | -           | -                  | -                  | -           |
| B       | QPSK<br>/QPSK5.0                          | -                                          | -                  | -           | 45.58              | 42.52              | -           | -                  | -                  | -           |
| C       | QPSK<br>/QPSK5.0                          | -                                          | -                  | -           | 45.79              | 42.75              | -           | -                  | -                  | -           |
| D       | QPSK<br>/QPSK5.0                          | -                                          | -                  | -           | 45.61              | 42.54              | -           | -                  | -                  | -           |
| Total   |                                           | -                                          | -                  | -           | 51.72              | 48.69              | -           | -                  | -                  | -           |

#### Configuration NB-IoT+NR-MC-2(2SA+1NR)

Maximum Output Power 46.02dBm per port

| Antenna | SA Mod./<br>NR Mod.<br>Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |             |                    |                    |             |                    |                    |             |
|---------|-------------------------------------------|--------------------------------------------|--------------------|-------------|--------------------|--------------------|-------------|--------------------|--------------------|-------------|
|         |                                           | Channel position B                         |                    |             | Channel position M |                    |             | Channel position T |                    |             |
|         |                                           | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) |
| A       | QPSK<br>/QPSK5.0                          | -                                          | -                  | -           | 45.40              | 41.72              | -           | -                  | -                  | -           |
| B       | QPSK<br>/QPSK5.0                          | -                                          | -                  | -           | 45.11              | 41.26              | -           | -                  | -                  | -           |
| C       | QPSK<br>/QPSK5.0                          | -                                          | -                  | -           | 45.39              | 41.61              | -           | -                  | -                  | -           |
| D       | QPSK<br>/QPSK5.0                          | -                                          | -                  | -           | 45.05              | 41.11              | -           | -                  | -                  | -           |
| Total   |                                           | -                                          | -                  | -           | 51.26              | 47.45              | -           | -                  | -                  | -           |

Configuration LTE+NB-IoT+NR-MC-1(1LTE +1SA+1NR )

Maximum Output Power 46.02dBm per port

| Antenna | LTE Mod./<br>SA Mod. /<br>NR Mod.<br>Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |             |                    |                    |             |                    |                    |             |
|---------|---------------------------------------------------------|--------------------------------------------|--------------------|-------------|--------------------|--------------------|-------------|--------------------|--------------------|-------------|
|         |                                                         | Channel position B                         |                    |             | Channel position M |                    |             | Channel position T |                    |             |
|         |                                                         | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) |
| A       | QPSK 1.4<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.88              | 42.57              | -           | -                  | -                  | -           |
| B       | QPSK 1.4<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.61              | 42.18              | -           | -                  | -                  | -           |
| C       | QPSK 1.4<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.81              | 42.42              | -           | -                  | -                  | -           |
| D       | QPSK 1.4<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.64              | 42.20              | -           | -                  | -                  | -           |
| Total   |                                                         | -                                          | -                  | -           | 51.76              | 48.37              | -           | -                  | -                  | -           |

| Antenna | LTE Mod./<br>SA Mod. /<br>NR Mod.<br>Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |             |                    |                    |             |                    |                    |             |
|---------|---------------------------------------------------------|--------------------------------------------|--------------------|-------------|--------------------|--------------------|-------------|--------------------|--------------------|-------------|
|         |                                                         | Channel position B                         |                    |             | Channel position M |                    |             | Channel position T |                    |             |
|         |                                                         | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) |
| A       | QPSK 3.0<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.93              | 41.69              | -           | -                  | -                  | -           |
| B       | QPSK 3.0<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.64              | 41.36              | -           | -                  | -                  | -           |
| C       | QPSK 3.0<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.76              | 41.49              | -           | -                  | -                  | -           |
| D       | QPSK 3.0<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.64              | 41.37              | -           | -                  | -                  | -           |
| Total   |                                                         | -                                          | -                  | -           | 51.76              | 47.50              | -           | -                  | -                  | -           |

## Configuration LTE+NB-IoT+NR-MC-2(1LTE+2SA+1NR)

Maximum Output Power 46.02dBm per port

| Antenna | LTE Mod./<br>SA Mod. /<br>NR Mod.<br>Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |             |                    |                    |             |                    |                    |             |
|---------|---------------------------------------------------------|--------------------------------------------|--------------------|-------------|--------------------|--------------------|-------------|--------------------|--------------------|-------------|
|         |                                                         | Channel position B                         |                    |             | Channel position M |                    |             | Channel position T |                    |             |
|         |                                                         | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) |
| A       | QPSK 1.4<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.64              | 41.69              | -           | -                  | -                  | -           |
| B       | QPSK 1.4<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.37              | 41.22              | -           | -                  | -                  | -           |
| C       | QPSK 1.4<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.53              | 41.62              | -           | -                  | -                  | -           |
| D       | QPSK 1.4<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.32              | 41.10              | -           | -                  | -                  | -           |
| Total   |                                                         | -                                          | -                  | -           | 51.49              | 47.44              | -           | -                  | -                  | -           |

| Antenna | LTE Mod./<br>SA Mod. /<br>NR Mod.<br>Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |             |                    |                    |             |                    |                    |             |
|---------|---------------------------------------------------------|--------------------------------------------|--------------------|-------------|--------------------|--------------------|-------------|--------------------|--------------------|-------------|
|         |                                                         | Channel position B                         |                    |             | Channel position M |                    |             | Channel position T |                    |             |
|         |                                                         | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) |
| A       | QPSK 3.0<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.61              | 41.48              | -           | -                  | -                  | -           |
| B       | QPSK 3.0<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.32              | 41.09              | -           | -                  | -                  | -           |
| C       | QPSK 3.0<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.44              | 41.36              | -           | -                  | -                  | -           |
| D       | QPSK 3.0<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.32              | 41.12              | -           | -                  | -                  | -           |
| Total   |                                                         | -                                          | -                  | -           | 51.44              | 47.29              | -           | -                  | -                  | -           |

Configuration LTE+NB-IoT+NR-MC-4(2LTE+2SA+1NR)

Maximum Output Power 46.02dBm per port

| Antenna | LTE Mod./<br>SA Mod. /<br>NR Mod.<br>Bandwidth<br>(MHz) | Output Power / Peak to Average Ratio (PAR) |                    |             |                    |                    |             |                    |                    |             |
|---------|---------------------------------------------------------|--------------------------------------------|--------------------|-------------|--------------------|--------------------|-------------|--------------------|--------------------|-------------|
|         |                                                         | Channel position B                         |                    |             | Channel position M |                    |             | Channel position T |                    |             |
|         |                                                         | POWER<br>(dBm)                             | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) | POWER<br>(dBm)     | POWER<br>(dBm/MHz) | PAR<br>(db) |
| A       | QPSK 1.4<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.63              | 40.79              | -           | -                  | -                  | -           |
| B       | QPSK 1.4<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.39              | 40.31              | -           | -                  | -                  | -           |
| C       | QPSK 1.4<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.54              | 40.50              | -           | -                  | -                  | -           |
| D       | QPSK 1.4<br>/QPSK/QP<br>SK5.0                           | -                                          | -                  | -           | 45.34              | 40.29              | -           | -                  | -                  | -           |
| Total   |                                                         | -                                          | -                  | -           | 51.50              | 46.50              | -           | -                  | -                  | -           |

**NOTE:**

The DUT is tested without antenna. ERP/EIRP compliance is addressed at the time of licensing, as required by the responsible FCC/ISED Bureau(s). Licensee's are required to take into account maximum allowed antenna gain used in combination with above power settings to prevent the radiated output power to exceed the limits.

## **A.2 Occupied Bandwidth**

### **A.2.1 Reference**

FCC CFR 47 Part 2, Clause 2.1049

### **A.2.2 Method of Measurements**

The EUT was set to transmit at maximum power and testing was carried out on bottom, middle and top channels. Using the Occupied Bandwidth measurement function in the spectrum analyzer, the 26dB bandwidth was measured in accordance with FCC KDB 971168 D01 Clause 4.2.

The measurement method is from ANSI C63.26:

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
- c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least  $10\log(\text{OBW} / \text{RBW})$  below the reference level.
- d) Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

### A.2.3 Measurement result

Configuration NR-MIMO-1C

-26dBc Occupied Bandwidth

| Modulation/<br>Bandwidth | Occupied Bandwidth (MHz) |                    |                    |
|--------------------------|--------------------------|--------------------|--------------------|
|                          | Channel position B       | Channel position M | Channel position T |
| QPSK/<br>5.0MHz          | 4.747                    | 4.765              | 4.763              |
| QPSK/<br>10.0MHz         | -                        | 9.670              | -                  |

-26dBc Occupied Bandwidth

| Bandwidth | Occupied Bandwidth (MHz)                |                                         |                                          |
|-----------|-----------------------------------------|-----------------------------------------|------------------------------------------|
|           | Modulation 16QAM/<br>Channel position M | Modulation 64QAM/<br>Channel position M | Modulation 256QAM/<br>Channel position M |
| 5.0MHz    | 4.718                                   | 4.753                                   | 4.715                                    |
| 10.0MHz   | 9.631                                   | 9.657                                   | 9.668                                    |

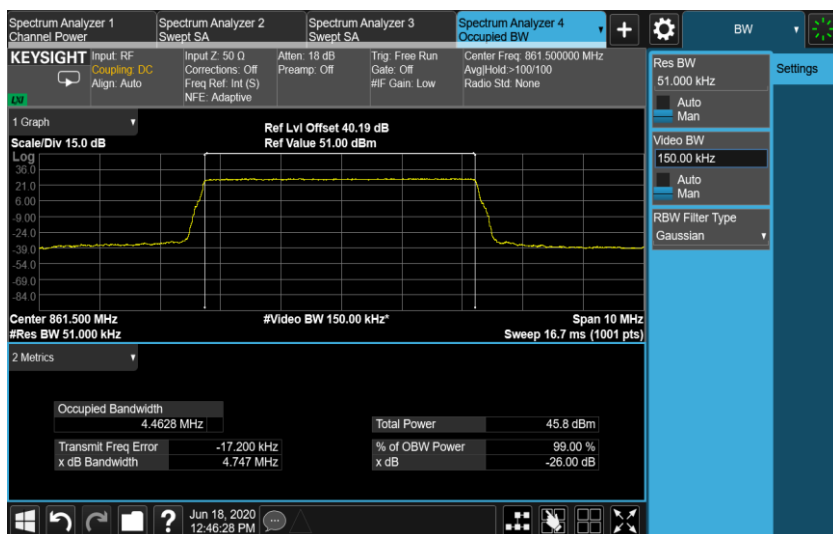
99% Occupied Bandwidth

| Modulation/<br>Bandwidth | Occupied Bandwidth (MHz) |                    |                    |
|--------------------------|--------------------------|--------------------|--------------------|
|                          | Channel position B       | Channel position M | Channel position T |
| QPSK/<br>5.0MHz          | 4.4628                   | 4.4636             | 4.4638             |
| QPSK/<br>10.0MHz         | -                        | 9.2712             | -                  |

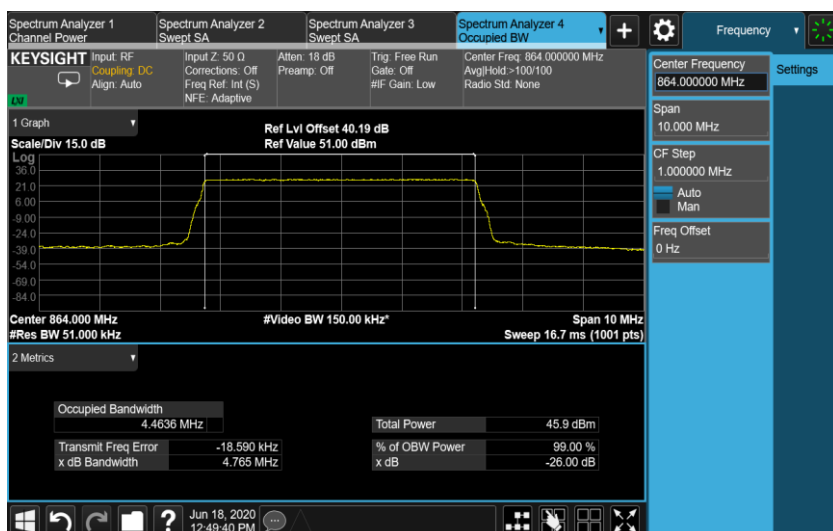
99% Occupied Bandwidth

| Bandwidth | Occupied Bandwidth (MHz)                |                                         |                                          |
|-----------|-----------------------------------------|-----------------------------------------|------------------------------------------|
|           | Modulation 16QAM/<br>Channel position M | Modulation 64QAM/<br>Channel position M | Modulation 256QAM/<br>Channel position M |
| 5.0MHz    | 4.4568                                  | 4.4644                                  | 4.4597                                   |
| 10.0MHz   | 9.1839                                  | 9.2765                                  | 9.2826                                   |

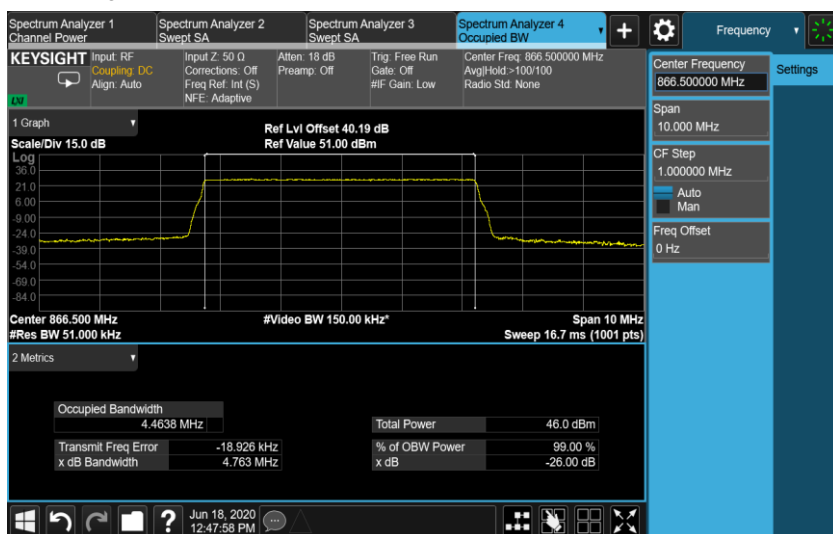
### Port A, QPSK/5.0MHz Channel Position B



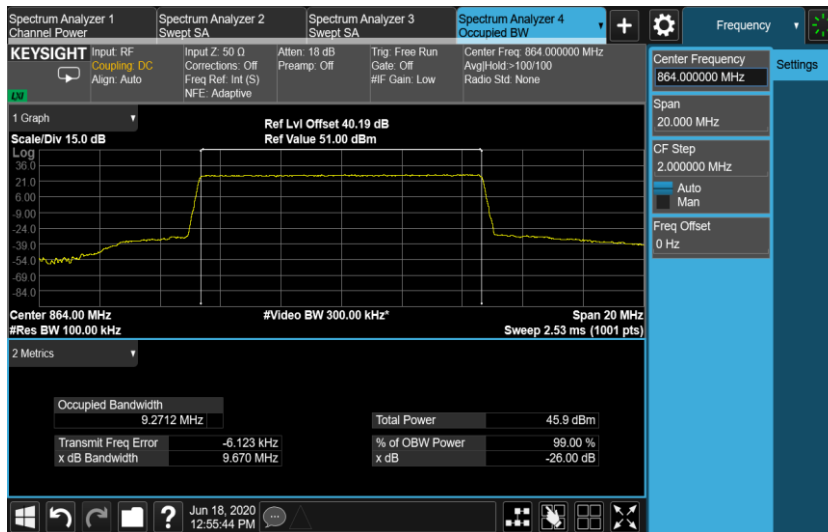
### Port A, QPSK/5.0MHz Channel Position M



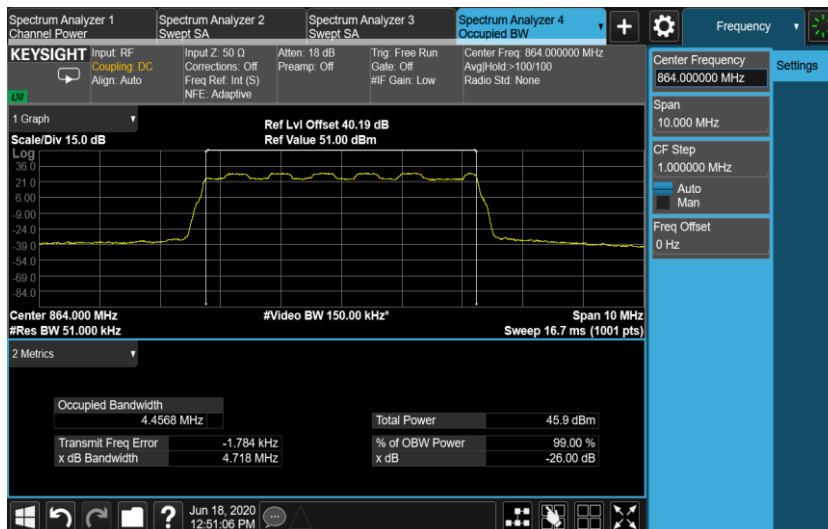
### Port A, QPSK/5.0MHz Channel Position T



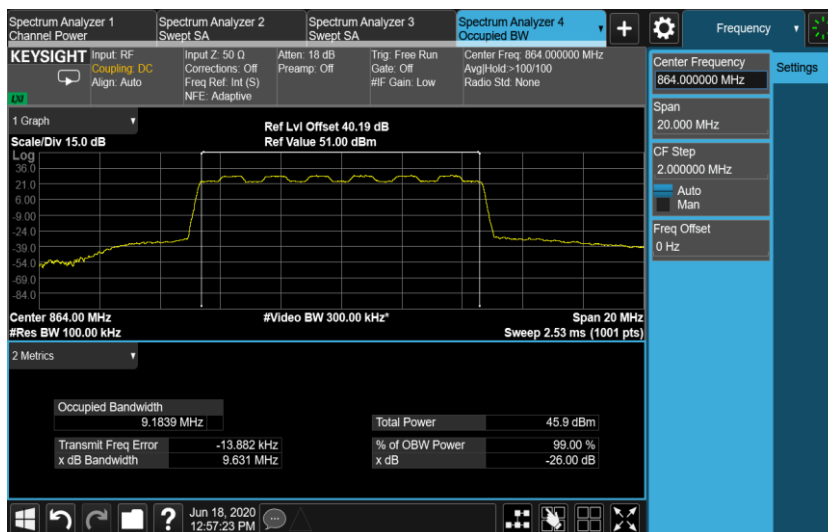
## Port A, QPSK/10.0MHz Channel Position M



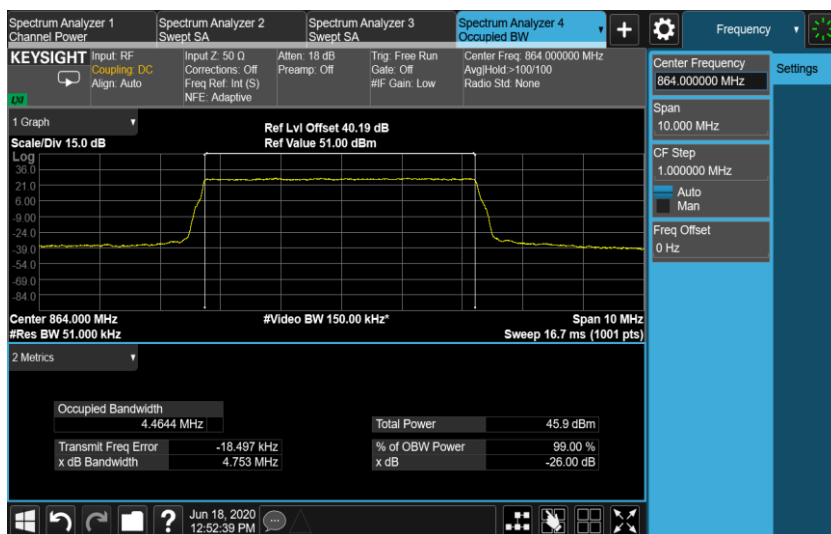
## Port A, 16QAM/5.0MHz Channel Position M



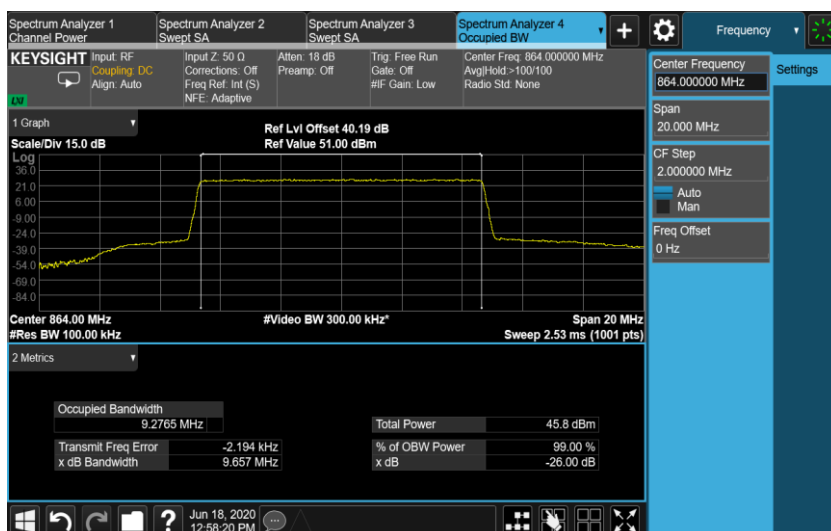
## Port A, 16QAM/10.0MHz Channel Position M



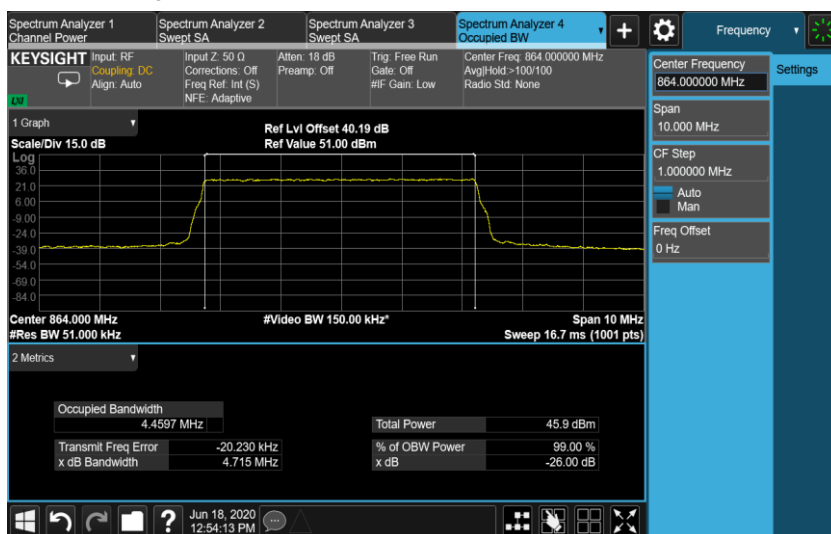
## Port A, 64QAM/5.0MHz Channel Position M



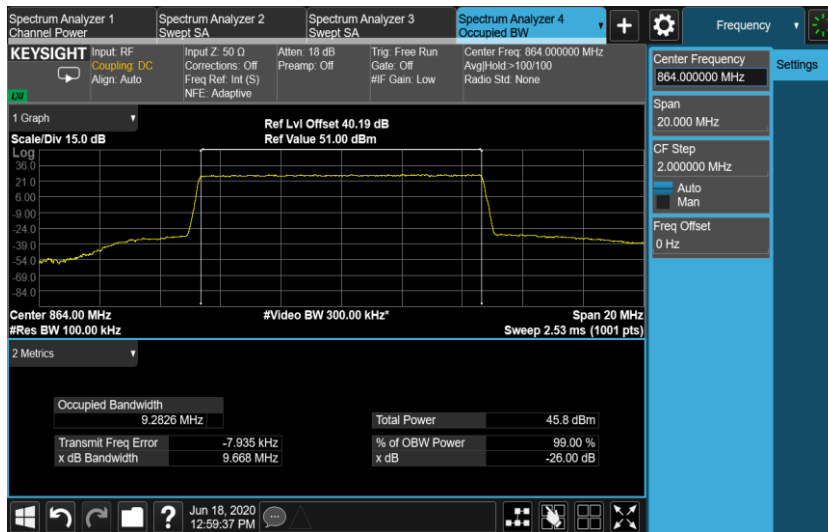
## Port A, 64QAM/10.0MHz Channel Position M



## Port A, 256QAM/5.0MHz Channel Position M



## Port A, 256QAM/10.0MHz Channel Position M



### **A.3 Spurious Emissions at Band Edge**

#### **A.3.1 Reference**

FCC CFR 47 Part 2, Clause 2.1051

FCC CFR 47 Part 90, Clause 90.210

#### **A.3.2 Method of measurement**

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.

For MIMO mode configurations, the limit was adjusted with a correction of -6.02dB  $[10\log(1/4)]$  by using the Measure and Add  $10\log(N)$  dB technique according to KDB 662911 D01 Multiple Transmitter Output accounting for simultaneous transmission from antenna ports . Then the limit was adjusted to -19.02dBm.

In the 1 MHz 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 and a RBW of 1MHz for measurements of emissions > 1MHz away from the band edges.

The limit was adjusted with -13.01dB  $[10\log(50/1000)]$  to compensate for the reduced measurement bandwidth 50KHz for emission more than 1MHz away from the band edges. For MIMO mode, the limit of -32.03dBm was used.

Spectrum analyzer detector was set as RMS.

#### **A.3.3 Measurement limit**

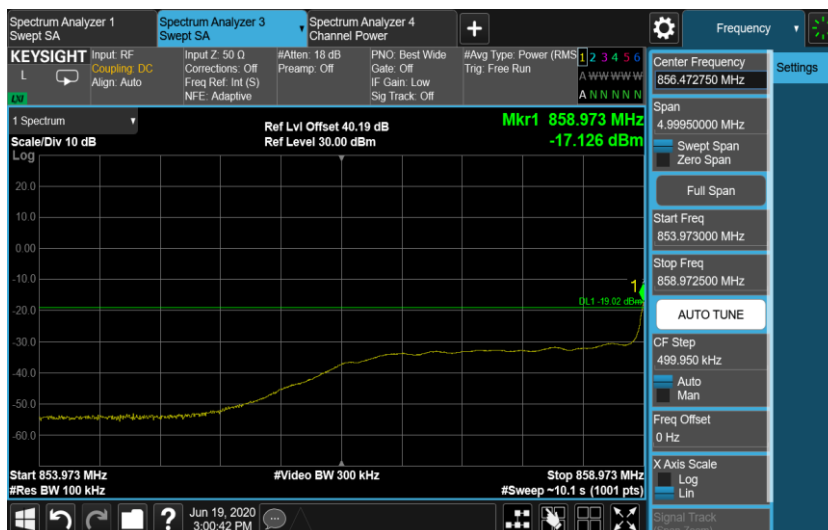
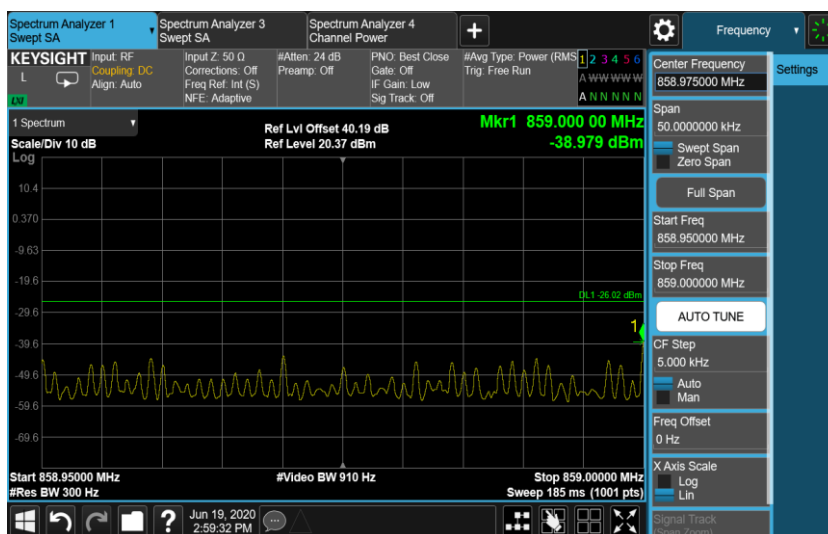
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10\log(P)$  dB.

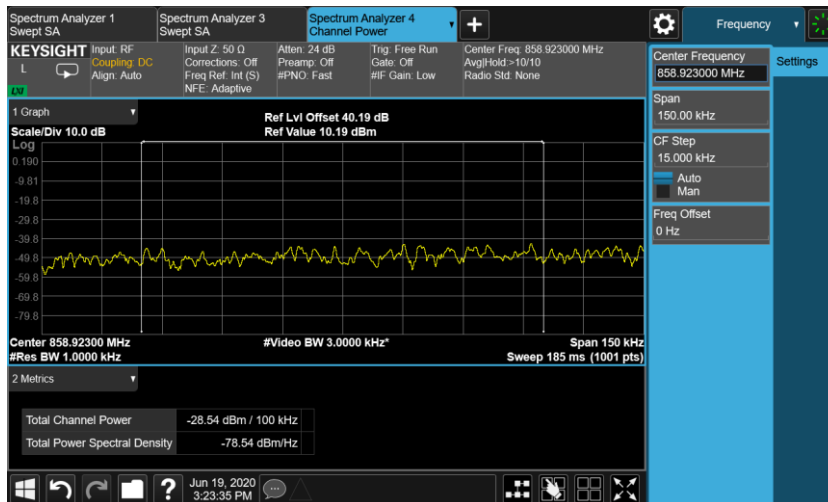
### A.3.4 Measurement result

#### Configuration NR-MIMO-1C

| Band Edge Frequency | Channel Bandwidth | RBW(KHz) | Limit(dBm) |
|---------------------|-------------------|----------|------------|
| Channel Position B  | 5.0 MHz           | 0.3      | -26.02     |
|                     | 10.0 MHz          | 0.3      | -26.02     |
| Channel Position T  | 5.0 MHz           | 0.3      | -26.02     |
|                     | 10.0 MHz          | 0.3      | -26.02     |

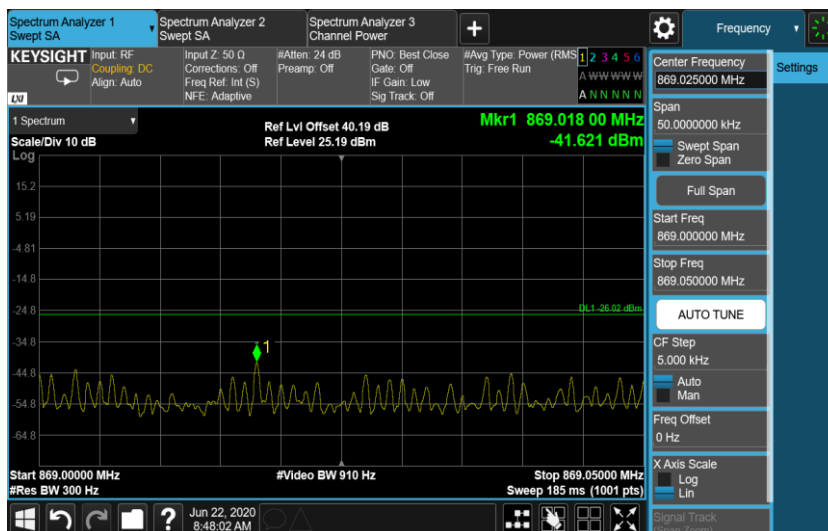
#### Port A, Channel Position B, 5.0MHz



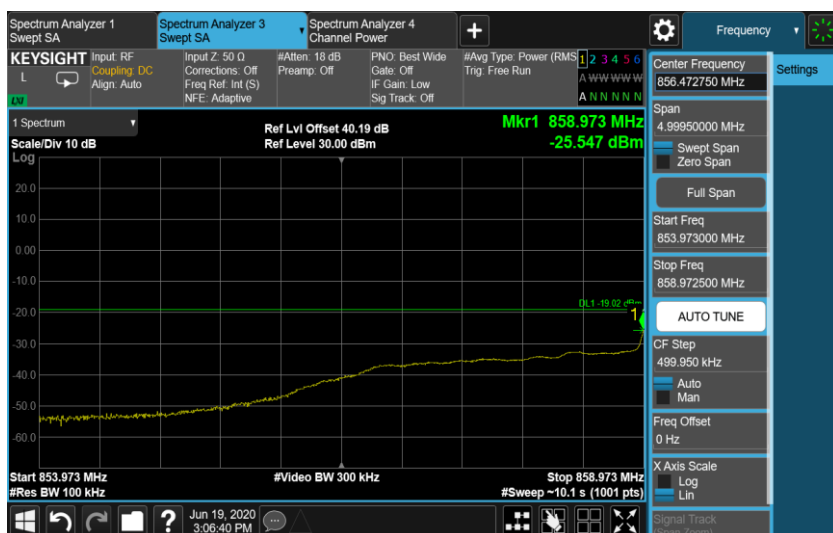
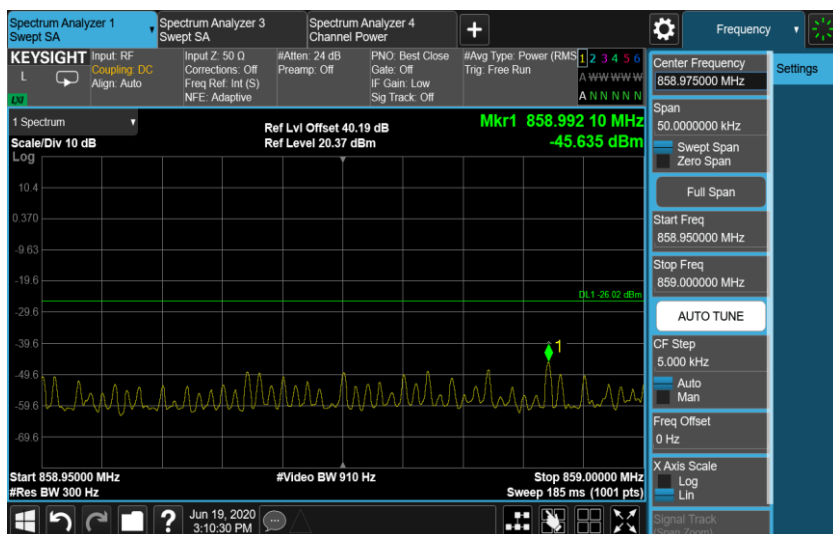


The channel power of 100KHz for 858.923MHz is -28.54dBm, which is within the limit of -19.02dBm.

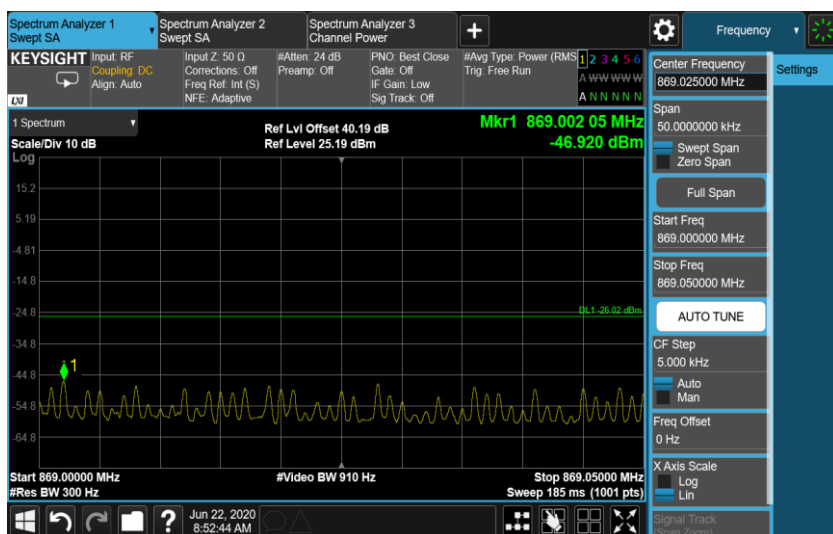
Port A, Channel Position T, 5.0MHz

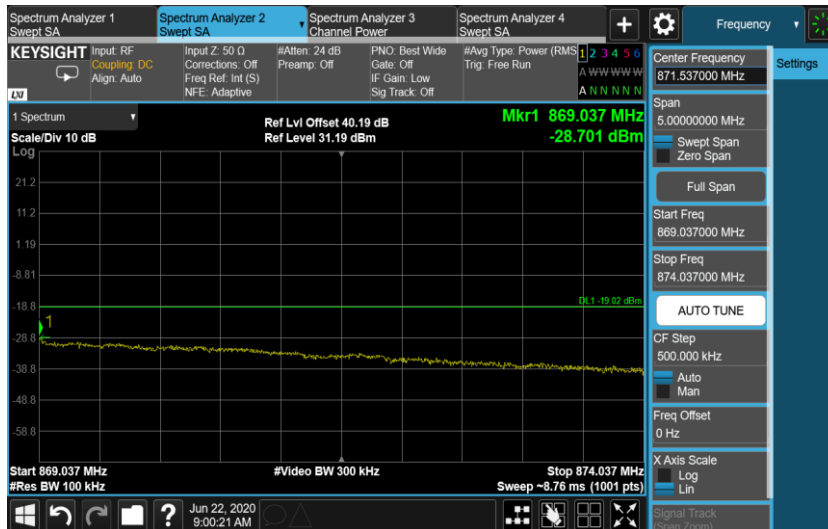


Port A, Channel Position B, 10.0MHz



Port A, Channel Position T, 10.0MHz

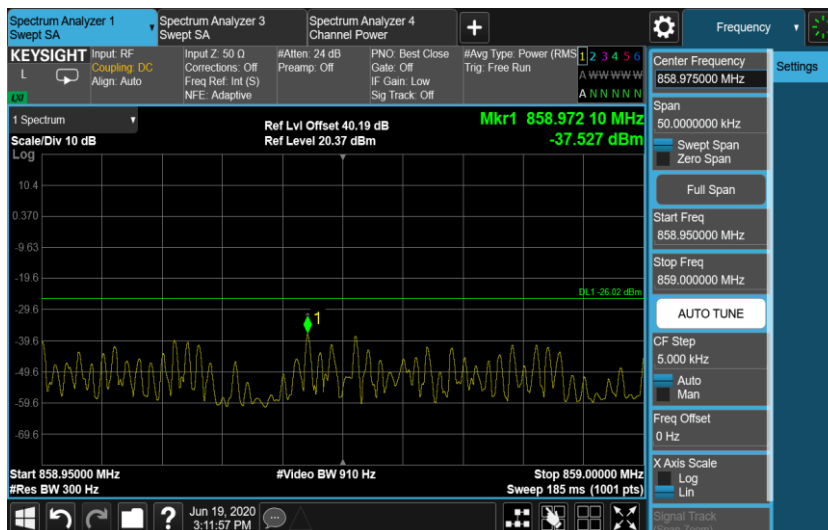


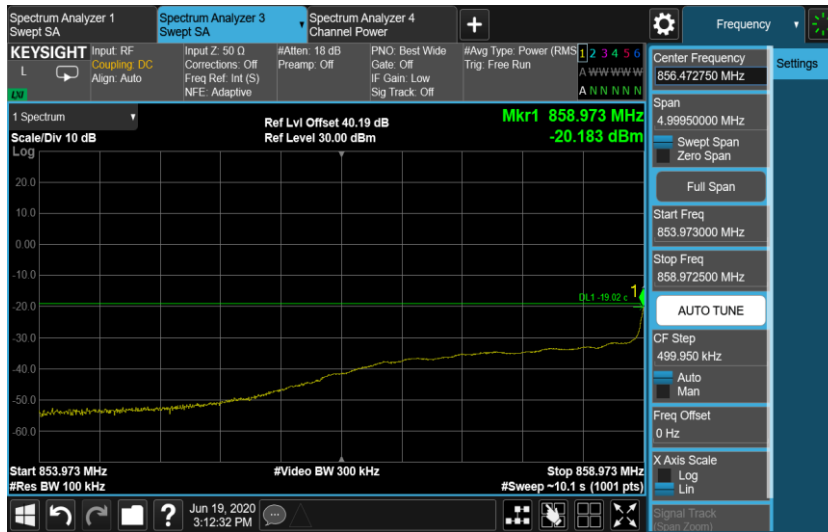


Configuration NR-MIMO-2C-BE

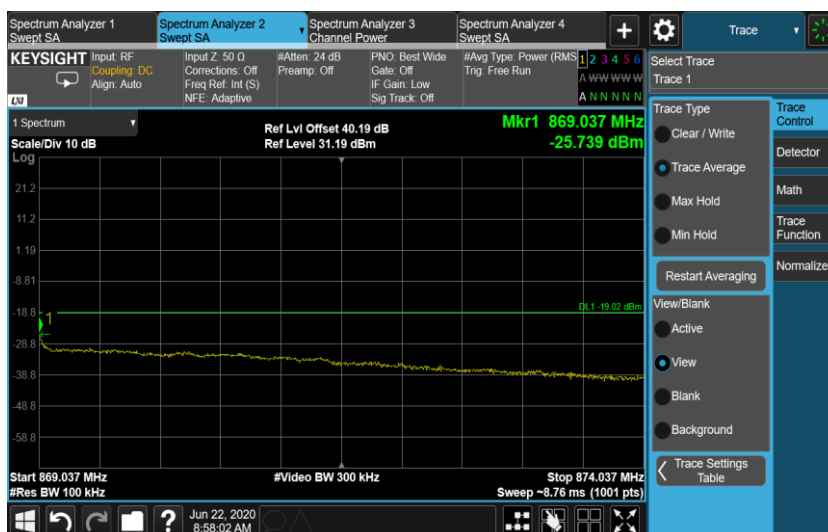
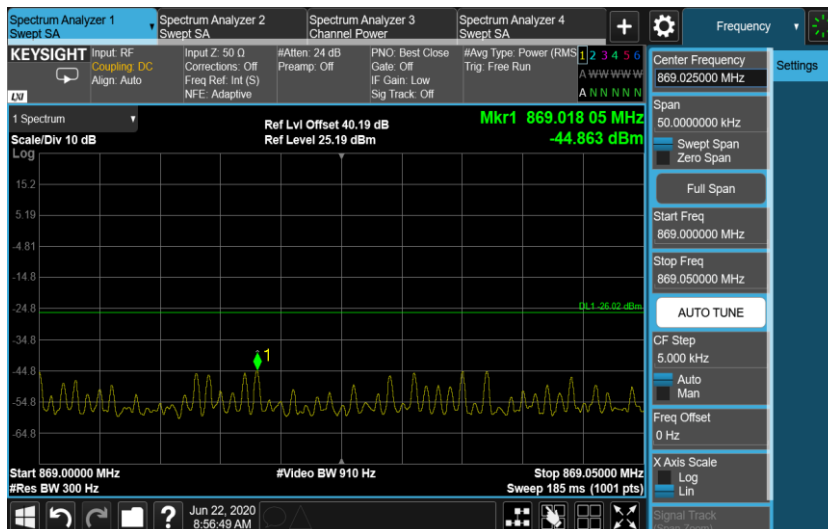
| Band Edge Frequency | Channel Bandwidth | RBW(KHz) | Limit(dBm) |
|---------------------|-------------------|----------|------------|
| Channel Position B  | 5.0 MHz           | 0.3      | -26.02     |
| Channel Position T  | 5.0 MHz           | 0.3      | -26.02     |

Port A, Channel Position B, 5.0MHz





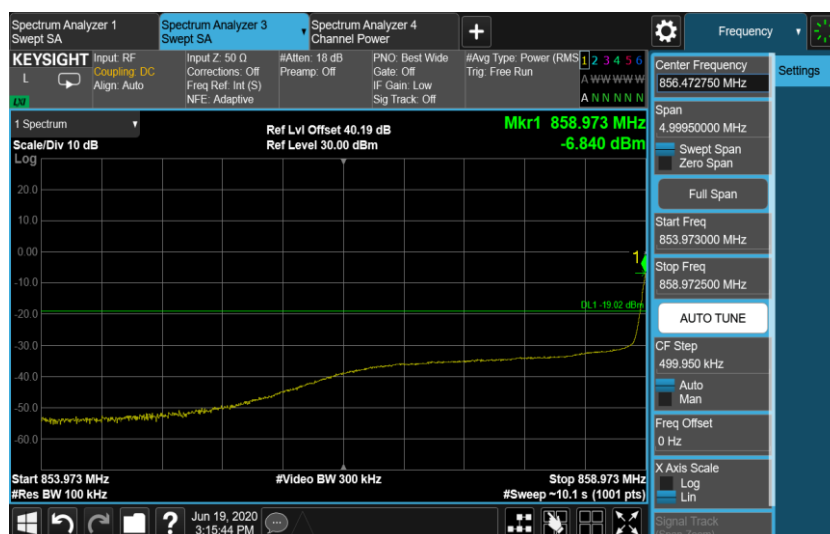
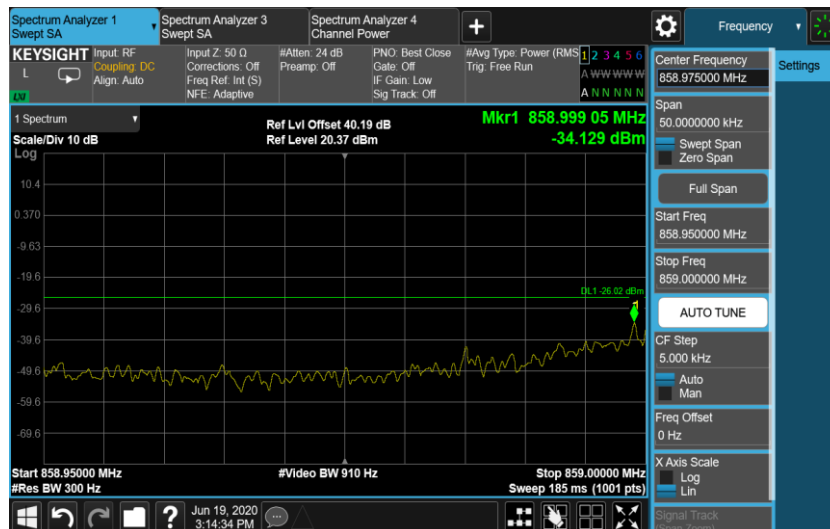
Port A, Channel Position T, 5.0MHz

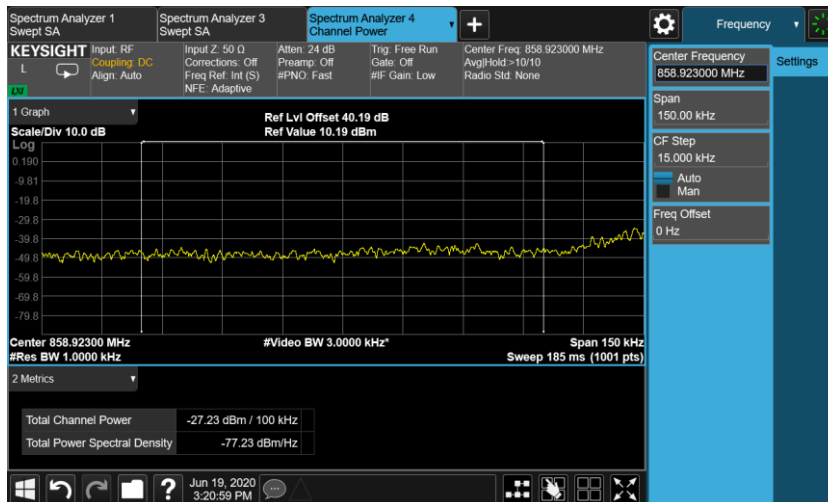


## Configuration LTE+NR-MIMO-MC-1-BE (1LTE+1NR)

| Band Edge Frequency | Channel Bandwidth        | RBW (KHz) | Limit (dBm) |
|---------------------|--------------------------|-----------|-------------|
| Channel Position B  | (L) 1.4MHz, (NR) 5.0 MHz | 0.3       | -26.02      |
|                     | (L) 3.0MHz, (NR) 5.0 MHz | 0.3       | -26.02      |
|                     | (L) 5.0MHz, (NR) 5.0 MHz | 0.3       | -26.02      |
| Channel Position T  | (L) 1.4MHz, (NR) 5.0 MHz | 0.3       | -26.02      |
|                     | (L) 3.0MHz, (NR) 5.0 MHz | 0.3       | -26.02      |
|                     | (L) 5.0MHz, (NR) 5.0 MHz | 0.3       | -26.02      |

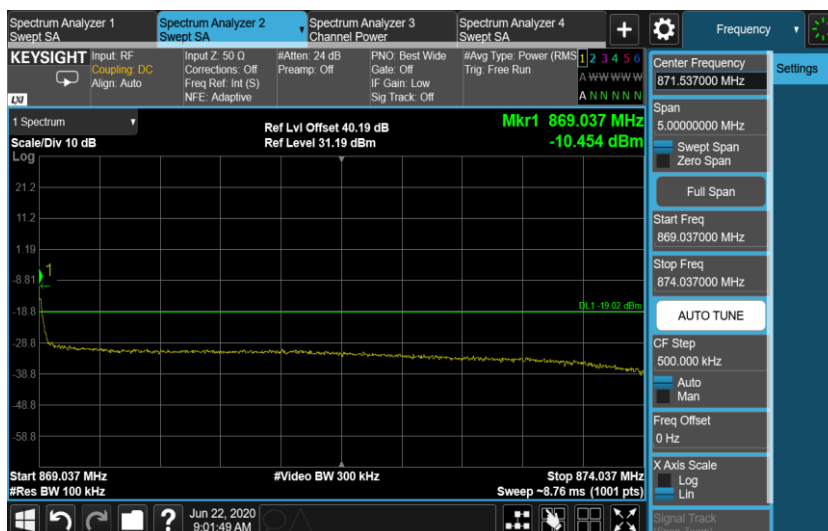
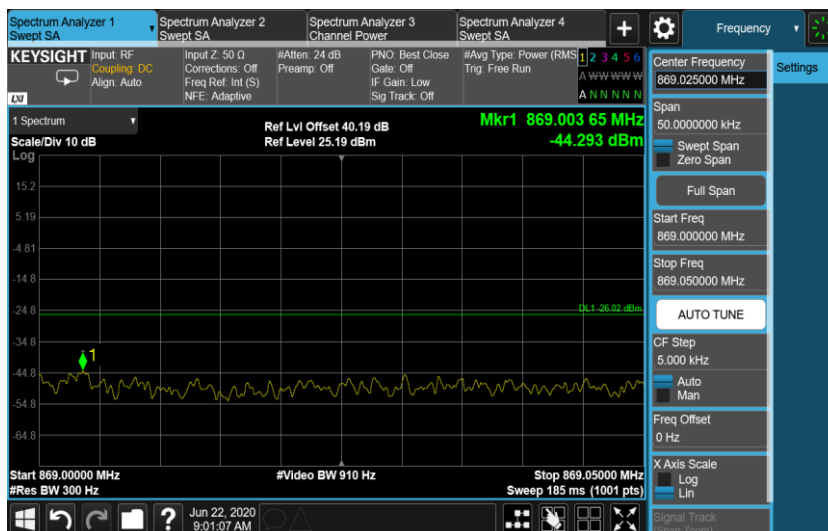
## Port A, Channel Position B, LTE 1.4MHz, NR 5.0 MHz

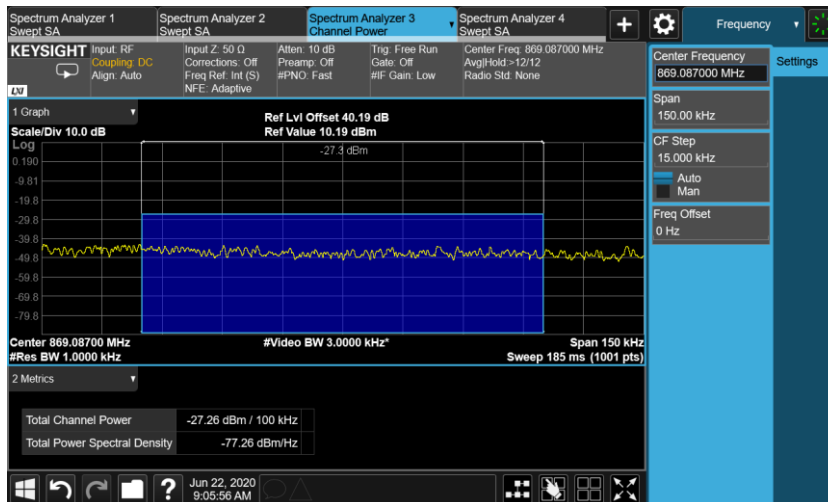




The channel power of 100KHz for 858.923MHz is -27.23dBm, which is within the limit of -19.02dBm.

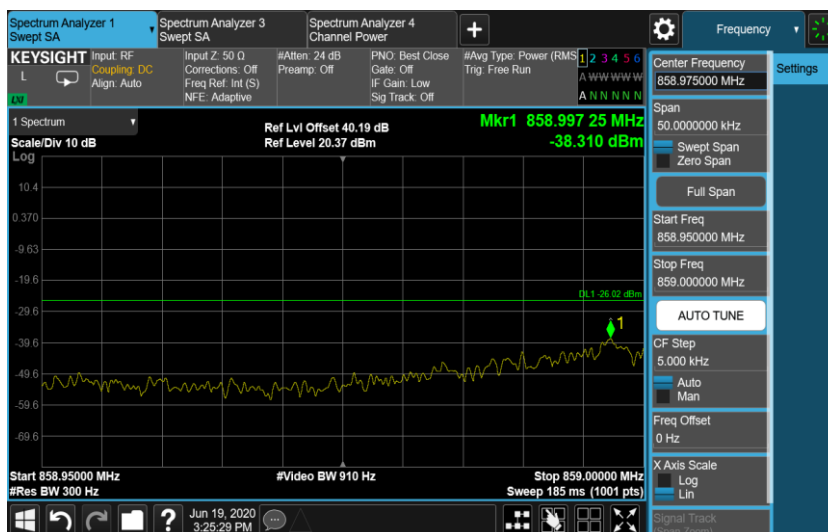
Port A, Channel Position T, LTE 1.4MHz, NR 5.0 MHz

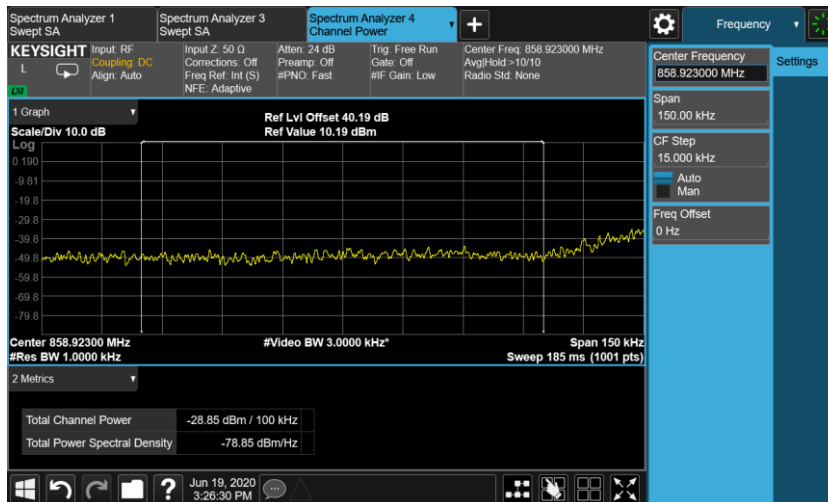




The channel power of 100KHz for 869.087MHz is -27.26dBm, which is within the limit of -19.02dBm.

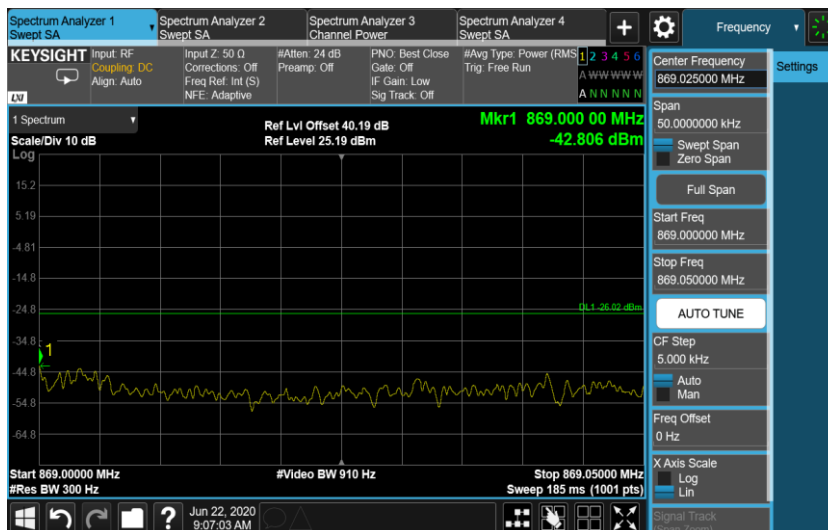
Port A, Channel Position B, LTE 3.0MHz, NR 5.0 MHz

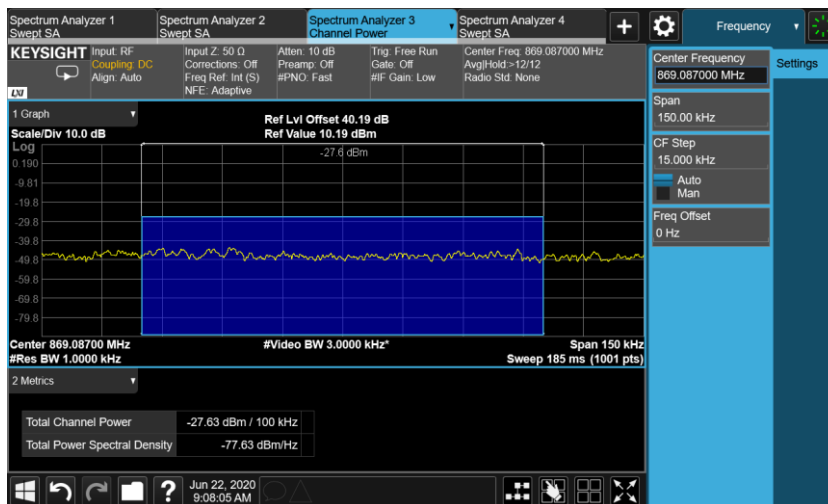




The channel power of 100KHz for 858.923MHz is -28.85dBm, which is within the limit of -19.02dBm.

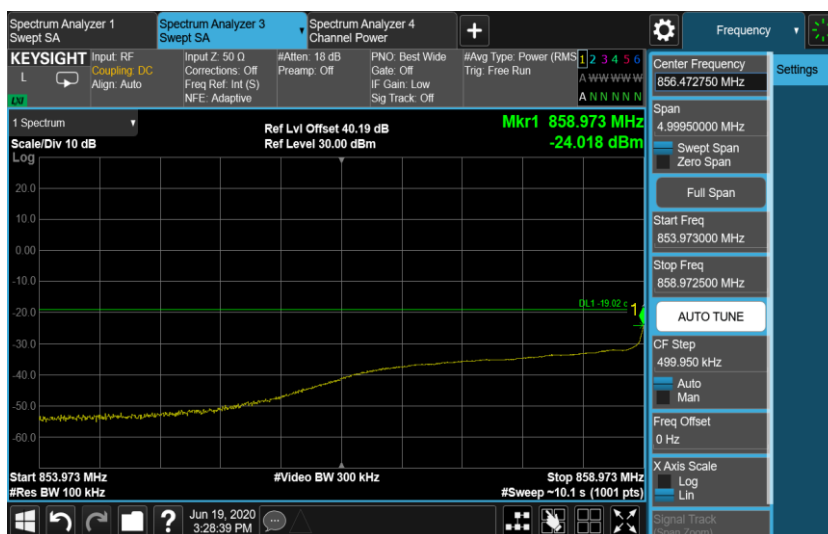
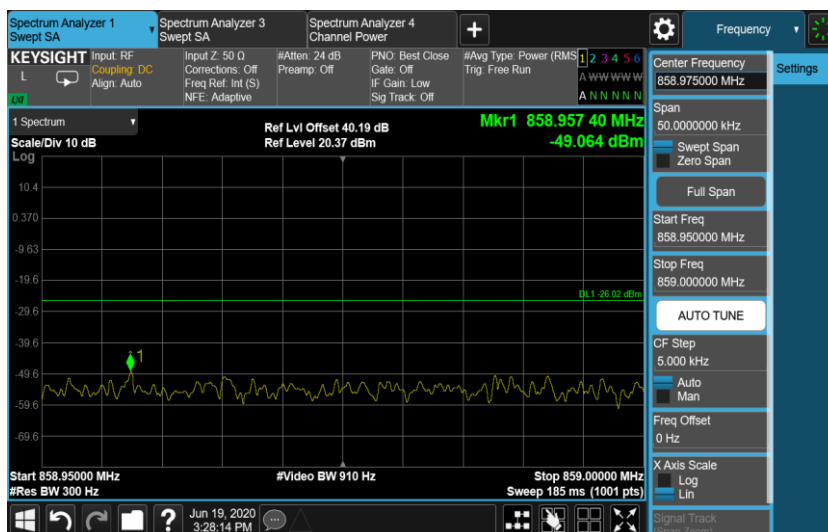
Port A, Channel Position T, LTE 3.0MHz, NR 5.0 MHz



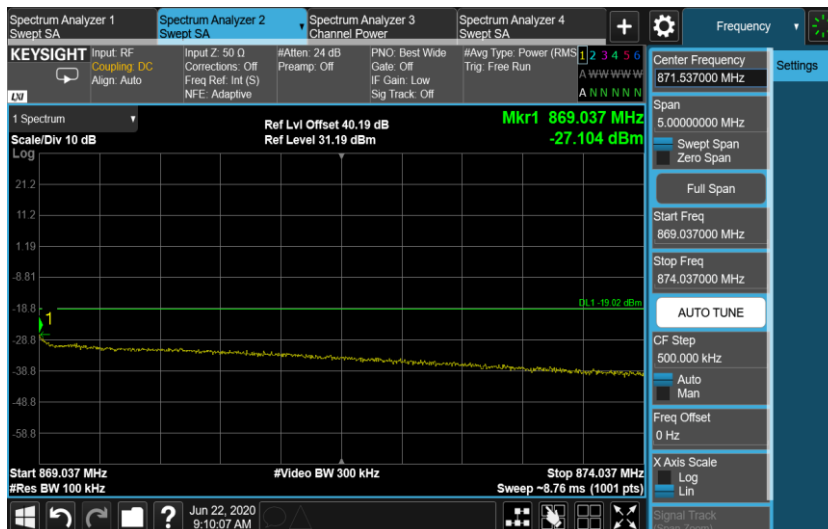
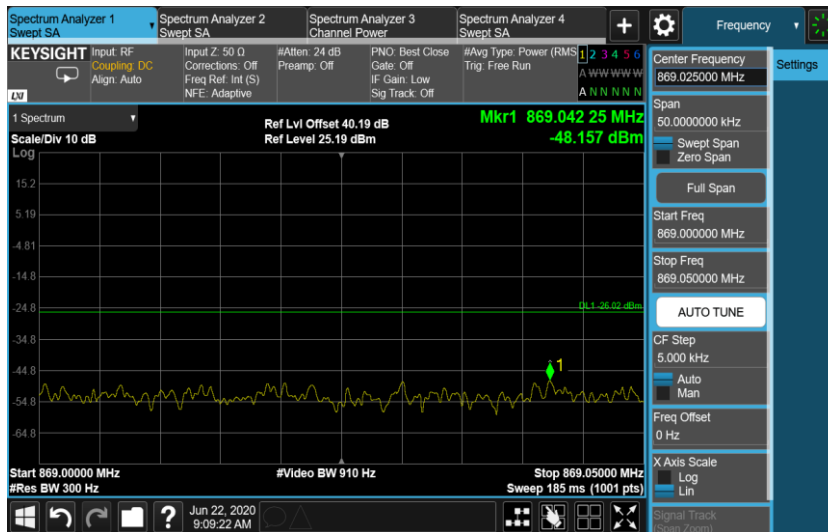


The channel power of 100KHz for 869.087MHz is -27.63dBm, which is within the limit of -19.02dBm.

Port A, Channel Position B, LTE 5.0MHz, NR 5.0 MHz



Port A, Channel Position T, LTE 5.0MHz, NR 5.0 MHz



Configuration LTE+NR-MIMO-MC-2-BE (2LTE+1NR)

| Band Edge Frequency | Channel Bandwidth        | RBW(KHz) | Limit(dBm) |
|---------------------|--------------------------|----------|------------|
| Channel Position B  | (L) 1.4MHz, (NR) 5.0 MHz | 0.3      | -26.02     |
| Channel Position T  | (L) 1.4MHz, (NR) 5.0 MHz | 0.3      | -26.02     |