



## TEST REPORT

### PART 27, 90 MEASUREMENT REPORT

**Applicant Name:**  
 Samsung Electronics Co., Ltd.  
 129, Samsung-ro,  
 Yeongtong-gu, Suwon-si  
 Gyeonggi-do, 16677, Korea

**Date of Testing:**  
 10/14/2022 - 10/18/2022  
**Test Site/Location:**  
 Element Lab., Suwon,  
 Yongin-si, Gyeonggi-do, Korea  
**Test Report Serial No.:**  
 8K22101401-00-R1.A3L

|                   |                                      |
|-------------------|--------------------------------------|
| <b>FCC ID:</b>    | <b>A3LRF4450T-71A</b>                |
| <b>APPLICANT:</b> | <b>Samsung Electronics Co., Ltd.</b> |

**Application Type:** Certification  
**Model:** RF4450t-71A  
**EUT Type:** RRU(RF4450t)  
**FCC Classification:** Licensed Non-Broadcast Station Transmitter  
**FCC Rule Part(s):** §27, §90(S)  
**Test Procedure(s):** ANSI C63.26-2015, KDB 971168 D01 v03r01, KDB 662911 D01 v02r01

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.



I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.




Prepared by Jonathan Jang  
 Test Engineer





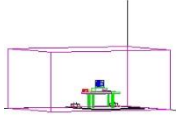
Reviewed by Charles.Shin  
 Technical Manager

|   |   |   |   |  |
|---|---|---|---|--|
| FCC ID: A3LRF4450T-71A                          |  | <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K22101401-00-R1.A3L | <b>Test Dates:</b><br>10/14/2022 - 10/18/2022                                       | <b>EUT Type:</b><br>RRU(RF4450t)              | Page 1 of 78  |  |

## TABLE OF CONTENTS

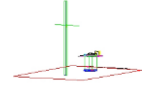
|      |  |    |
|------|--|----|
| 1.0  | REVISION RECORD .....  | 4  |
| 2.0  | INTRODUCTION .....   | 5  |
| 2.1  | Scope .....  | 5  |
| 2.2  | Element Test Location.....   | 5  |
| 2.3  | Test Facility / Accreditation .....                                | 5  |
| 3.0  | PRODUCT INFORMATION.....   | 6  |
| 3.1  | Equipment Description .....  | 6  |
| 3.2  | Device Capabilities.....   | 6  |
| 3.3  | Test Configuration .....   | 7  |
| 3.4  | EMI Suppression Device(s)/Modifications .....                      | 7  |
| 4.0  | DESCRIPTION OF TESTS .....   | 8  |
| 4.1  | Measurement Procedure.....   | 8  |
| 4.2  | Measurement Software .....   | 8  |
| 5.0  | MEASUREMENT UNCERTAINTY .....                                      | 9  |
| 6.0  | TEST EQUIPMENT CALIBRATION DATA .....                              | 10 |
| 7.0  | SAMPLE CALCULATIONS .....  | 11 |
| 8.0  | TEST RESULTS .....   | 12 |
| 8.1  | Summary .....  | 12 |
| 8.2  | Occupied Bandwidth .....   | 14 |
| 8.3  | Equivalent Isotropic Radiated Power (Power Spectral Density) ..... | 20 |
| 8.4  | Peak To Average Power Ratio .....                                  | 29 |
| 8.5  | Band Edge Emissions and Emission Mask at Antenna Terminal .....    | 33 |
| 8.6  | Spurious and Harmonic Emissions at Antenna Terminal .....          | 40 |
| 8.7  | Frequency Stability.....   | 56 |
| 8.8  | Radiated spurious emission .....                                   | 60 |
| 9.0  | CONCLUSION.....  | 73 |
| 10.0 | APPENDIX. A .....  | 74 |
| 10.1 | Conducted Average Output Power.....                                | 74 |

|  |   |   |   |                                   |
|--|---|---|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)                     | Page 2 of 78  |                                   |



## MEASUREMENT REPORT

### FCC Part 27 and 90



| Mode        | Tx Frequency (MHz) | Total Conducted output power |                | Max Emission Designator | Modulation |
|-------------|--------------------|------------------------------|----------------|-------------------------|------------|
|             |                    | Max. Power (dBm)             | Max. Power (W) |                         |            |
| NR_1C_5M    | 718 to 728         | 48.73                        | 74.59          | 4M47G7D                 | QPSK       |
|             |                    | 48.68                        | 73.79          | 4M49W7D                 | QAM        |
| NR_2C_5M+5M |                    | 51.60                        | 144.67         | 9M41G7D                 | QPSK       |
|             |                    | 51.70                        | 147.84         | 9M45W7D                 | QAM        |

#### 5G NR n29 EUT Overview

| Mode      | Tx Frequency (MHz) | Total Conducted output power |                | Max Emission Designator | Modulation |
|-----------|--------------------|------------------------------|----------------|-------------------------|------------|
|           |                    | Max. Power (dBm)             | Max. Power (W) |                         |            |
| NR_1C_5M  | 617 to 652         | 48.67                        | 73.68          | 4M49G7D                 | QPSK       |
|           |                    | 48.68                        | 73.83          | 4M50W7D                 | QAM        |
| NR_1C_10M |                    | 51.62                        | 145.30         | 9M30G7D                 | QPSK       |
|           |                    | 51.68                        | 147.31         | 9M31W7D                 | QAM        |
| NR_1C_20M |                    | 53.37                        | 217.25         | 19M0G7D                 | QPSK       |
|           |                    | 53.48                        | 223.08         | 19M0W7D                 | QAM        |



#### 5G NR n71 EUT Overview

| Mode     | Tx Frequency (MHz) | Total Conducted output power |                | Max Emission Designator | Modulation |
|----------|--------------------|------------------------------|----------------|-------------------------|------------|
|          |                    | Max. Power (dBm)             | Max. Power (W) |                         |            |
| NR_1C_5M | 864 to 869         | 45.48                        | 35.31          | 4M46G7D                 | QPSK       |
|          |                    | 45.62                        | 36.51          | 4M48W7D                 | QAM        |

#### 5G NR n26 EUT Overview

**Notes:**

Total Power shown in the table above are the full conducted average output power that will appear on the Grant of Authorization.

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |   | Page 3 of 78                      |

## 1.0 REVISION RECORD

| Issue Number         | Issued Date | Revision History                   |
|----------------------|-------------|------------------------------------|
| 8K22101401-00.A3L    | 10/19/2022  | Initial Issue                      |
| 8K22101401-00-R1.A3L | 10/20/2022  | Revision due to updated test plot. |

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |   | Page 4 of 78                      |

## 2.0 INTRODUCTION

### 2.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

### 2.2 Element Test Location

These measurement tests were conducted at the Element Materials Technology Suwon. Ltd. facility located at (#1407) 13, Heungdeok 1-ro, Giheung-gu, Yongin-si, Gyeonggi-do 16954, Korea.

### 2.3 Test Facility / Accreditation

Measurements were performed at Element Materials Technology Suwon Lab located in Yongin-si, Gyeonggi, Korea.

- Element Materials Technology Suwon is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation(A2LA) with Certificate number 2041.04 for Specific Absorption Rate (SAR), where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- Element Materials Technology Suwon facility is accredited, designated, and recognized in accordance with the provision of Radio Wave Act and International Standard ISO/IEC 17025:2017 under the National Radio Research Agency.
  - Designation Number / CABID: KR0169
  - Test Firm Registration Number of FCC: 417945
  - Test Firm Registration Number of IC: 26168

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             | Page 5 of 78  |                                   |

## 3.0 PRODUCT INFORMATION

### 3.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung RRU(RF4450t) FCC ID: A3LRF4450T-71A**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 27 and 90.

### 3.2 Device Capabilities

This device supports the following conditional features and filter information:

|   |   |                    |                    |
|---|---|--------------------|--------------------|
| EUT Type  | RRU (RF4450t)   |                    |                    |
| Model Name  | RF4450t-71A   |                    |                    |
| Test Device Serial No                                     | S618614983  |                    |                    |
| Device Capabilities:                                      | 5G NR   |                    |                    |
| Operating Band/Frequency Range:                           | Band  | Tx (Downlink)      | Rx (Uplink)        |
|   | n26:  | 864 MHz to 869 MHz | 819 MHz to 824 MHz |
|   | n29:  | 718 MHz to 728 MHz | N/A                |
|   | n71:  | 617 MHz to 652 MHz | 663 MHz to 698 MHz |
| Supported Modulation                                      | 5G NR : QPSK, 16QAM, 64QAM, 256QAM  |                    |                    |
| n26<br>Supported Number of Carriers and Channel Bandwidth | 5 MHz bandwidth 1CC mode for 5G NR Band n26   |                    |                    |
| n29<br>Supported Number of Carriers and Channel Bandwidth | 5 MHz bandwidth 1CC mode for 5G NR Band n29<br>5 MHz +5 MHz bandwidth 2CC mode for 5G NR Band n29 |                    |                    |
| n71<br>Supported Number of Carriers and Channel Bandwidth | 5/10/20 MHz bandwidth 1CC mode for 5G NR Band n71   |                    |                    |
| Maximum Output Power                                      | n26   | Total 40 W         |                    |
|   | n29   | Total 160 W        |                    |
|   | n71   | Total 240 W        |                    |
| Number of Antenna ports                                   | 4TX Configuration   |                    |                    |
| Supported Configurations                                  | Single carrier, Multi-carriers  |                    |                    |
| Input Voltage:  | -48 VDC   |                    |                    |
| Antenna:  | Antenna is not provided by manufacture  |                    |                    |

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             | Page 6 of 78  |                                   |

### 3.3 Test Configuration

The setup is as follows:

- The EUT (“RRU(RF4450t)”) and a Cabinet Digital Unit (CDU) are each powered by -48V DC power supply.
- The CDU is connected to a test laptop via an ethernet cable acting as backhaul.
- CDU connects to the EUT through a fiber optic cable.
- An RF cable connects the signal analyzer and the EUT Ports for respective measurement.

The Cabinet Digital Unit (CDU) authorized under SDoC.

The EUT was tested per the guidance of ANSI C63.26-2015 and KDB 971168 D01 v03r01. See Section 8.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

The n29 duplex mode is SDL (Supplemental Downlink ) designed exclusively for downlink. It cannot operate n29 alone, and operate with uplink of other bands.

The following information is about configurations of carrier frequency and output power per port declared by the manufacturer.


| n29<br>Single Carrier<br>Configuration | No. of<br>Carriers | Total<br>Carrier<br>Bandwidth<br>(MHz) | Carrier Frequency Configuration (MHz) |         | Rated Power<br>(W/path) |
|--|--------------------|--|---------------------------------------|---------|-------------------------|
|  |                    |  | Lowest                                | Highest |                         |
| NR_1C_5M                               | 1                  | 5                                      | 720.5                                 | 725.5   | 20                      |
| NR_2C_5M+5M                            | 2                  | 10<br>(5+5)                            | 723.0                                 |         | 40<br>(20+20)           |

| n71<br>Single Carrier<br>Configuration | No. of<br>Carriers | Total<br>Carrier<br>Bandwidth<br>(MHz) | Carrier Frequency Configuration (MHz) |        |         | Rated Power<br>(W/path) |
|--|--------------------|--|---------------------------------------|--------|---------|-------------------------|
|  |                    |  | Lowest                                | Middle | Highest |                         |
| NR_1C_5M                               | 1                  | 5                                      | 619.5                                 | 634.5  | 649.5   | 20                      |
| NR_1C_10M                              | 1                  | 10                                     | 622.0                                 | 634.5  | 647.0   | 40                      |
| NR_1C_20M                              | 1                  | 20                                     | 627.0                                 | 634.5  | 642.0   | 60                      |

| n26<br>Single Carrier<br>Configuration | No. of<br>Carriers | Total<br>Carrier<br>Bandwidth<br>(MHz) | Carrier Frequency Configuration (MHz) |  | Rated Power<br>(W/path) |
|--|--------------------|--|---------------------------------------|--|-------------------------|
|  |                    |  | Middle                                |  |                         |
| NR_1C_5M                               | 1                  | 5                                      | 866.5                                 |  | 10                      |

### 3.4 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             | Page 7 of 78  |                                   |

## 4.0 DESCRIPTION OF TESTS

### 4.1 Measurement Procedure

The measurement procedures described in the document titled “American National Standard for Compliance Testing of Transmitter Used in Licensed Radio Service” (ANSI C63.26-2015) and the guidance provided in KDB 842590 D01 v01r01 were used in the measurement of the EUT.

Occupied Bandwidth:

KDB 971168 D01 v03r01 – Section 4.3  
ANSI C63.26-2015 – Section 5.4.4

Conducted Power Measurement and EIRP and PSD

KDB 971168 D01 v03r01 – Section 5.3  
KDB 971168 D01 v03r01 – Section 5.4  
KDB 662911 D01 v02r01 – Section E)1) In-Band Power Measurements  
ANSI C63.26-2015 – Section 5.2.5  
ANSI C63.26-2015 – Section 5.2.4

Peak-to-Average Power Ratio:

KDB 971168 D01 v03r01 – Section 5.7  
ANSI C63.26-2015 – Section 5.2.3.4

Channel Edge Emissions at Antenna Terminal

KDB 971168 D01 v03r01 – Section 6  
KDB 662911 D01 v02r01 – Section E)3) Out-of-Band and Spurious Emission Measurements  
a) Absolute Emission Limits  
iii) Measure and add  $10 \log(N_{ANT})$  dB  
ANSI C63.26-2015 – Section 5.7

Spurious and Harmonic Emissions at Antenna Terminal

KDB 971168 D01 v03r01 – Section 6  
KDB 662911 D01 v02r01 – Section E)3) Out-of-Band and Spurious Emission Measurements  
a) Absolute Emission Limits  
iii) Measure and add  $10 \log(N_{ANT})$  dB  
ANSI C63.26-2015 – Section 5.7

Radiated unwanted emission



KDB 971168 D01 v03r01 – Section 7  
ANSI C63.26-2015 – Section 5.8

Frequency Stability / Temperature Variation

KDB 971168 D01 v03r01 – Section 9  
ANSI C63.26-2015 – Section 5.6

### 4.2 Measurement Software

| Test item             | Name              | Version |
|-----------------------|-------------------|---------|
| Conducted Measurement | Node B automation | 1.0     |



|   |   |   |   |  |
|---|---|---|---|--|
| FCC ID: A3LRF4450T-71A                          |  | <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K22101401-00-R1.A3L | <b>Test Dates:</b><br>10/14/2022 - 10/18/2022                                       | <b>EUT Type:</b><br>RRU(RF4450t)              | Page 8 of 78  |  |



## 5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of  $k = 2$  to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the  $U_{\text{CISPR}}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

| Contribution                     | Expanded Uncertainty ( $\pm$ dB) |
|----------------------------------|----------------------------------|
| Conducted Bench Top Measurements | 1.37                             |
| Radiated Disturbance (<1GHz)     | 3.94                             |
| Radiated Disturbance (>1GHz)     | 4.75                             |
| Radiated Disturbance (>18GHz)    | 4.84                             |

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |   | Page 9 of 78                      |

## 6.0 TEST EQUIPMENT CALIBRATION DATA


Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurement antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

| Manufacture       | Model        | Description              | Cal Date   | Cal interval | Cal Due    | Serial Number |
|-------------------|--------------|--------------------------|------------|--------------|------------|---------------|
| Rohde & Schwarz   | FSW43        | Signal Analyzer          | 07/05/2022 | Annual       | 07/04/2023 | 101250        |
| KEYSIGHT          | N9030B       | PXA Signal Analyzer      | 05/09/2022 | Annual       | 05/08/2023 | MY57142018    |
| Rohde & Schwarz   | ESW          | EMI Test Receiver        | 07/04/2022 | Annual       | 07/03/2023 | 101761        |
| AC POWER KOREA    | ACPD-60150   | DC Power Supply          | 01/18/2022 | Annual       | 01/17/2023 | DC-1          |
| SUKSAN TECHNOLOGY | SE-CT-10     | Temperature Chamber      | 07/05/2022 | Annual       | 07/04/2023 | 191021        |
| Rohde & Schwarz   | TS-SFUNIT-Rx | Shielded Filter Unit     | 03/02/2022 | Annual       | 03/01/2023 | 102131        |
| Schwarzbeck       | VULB9162     | Broadband TRILOG Antenna | 07/13/2021 | Biennial     | 07/12/2023 | 9162-217      |
| Sunol sciences    | DRH-118      | Horn Antenna             | 07/14/2021 | Biennial     | 07/13/2023 | A102416-1     |
| Schwarzbeck       | BBHA 9170    | Horn Antenna             | 01/27/2022 | Biennial     | 01/26/2024 | 1037          |
| Reachline         | 250W18NN-40  | Attenuator               | 01/19/2022 | Annual       | 01/18/2023 | PK0289        |
| Reachline         | 250W18NN-40  | Attenuator               | 01/19/2022 | Annual       | 01/18/2023 | PK0290        |
| Reachline         | 250W18NN-40  | Attenuator               | 01/19/2022 | Annual       | 01/18/2023 | PK0292        |
| Reachline         | 250W18NN-40  | Attenuator               | 01/19/2022 | Annual       | 01/18/2023 | PK0293        |

**Table 6-1. Test Equipment**

### Notes:

1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.
2. All testing was performed before the calibration due date.

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |   | Page 10 of 78                     |

## 7.0 SAMPLE CALCULATIONS

### Emission Designator

#### QPSK Modulation

**Emission Designator = 4M47G7D**

Occupied Bandwidth = 4.47 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

#### QAM Modulation



**Emission Designator = 4M49W7D**

Occupied Bandwidth = 4.49 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             | Page 11 of 78   |                                   |


## 8.0 TEST RESULTS

### 8.1 Summary

Company Name: SAMSUNG Electronics Co., Ltd.  
 FCC ID: A3LRF4450T-71A  
 FCC Classification: Licensed Non-Broadcast Station Transmitter  
 Mode(s): 5G NR

| FCC Part Section(s)  | Test Description   | Limit  | Test Condition | Test Result | Reference            |
|----------------------|--|--|----------------|-------------|----------------------|
| § 2.1046             | Conducted Average Output Power                               | N/A  | CONDUCTED      | PASS        | Annex 1              |
| § 2.1049             | Occupied Bandwidth   | N/A  |                | PASS        | Section 8.2          |
| § 2.1046, § 27.50(c) | Equivalent Isotropic Radiated Power (Power Spectral Density) | < 1000 W/MHz   |                | PASS        | Section 8.3 (Note 4) |
| § 2.1046,            | Peak-to-average ratio  | N/A  |                | PASS        | Section 8.4          |
| § 2.1051, § 27.53(g) | Band Edge Emissions and Emission Mask at Antenna Terminal    | > 43 + log <sub>10</sub> (P[Watts]) at Band Edge and all out-of-band emissions |                | PASS        | Section 8.5          |
| § 2.1051, § 27.53(g) | Spurious and Harmonic Emissions at Antenna Terminal          |  |                | PASS        | Section 8.6          |
| § 2.1055 § 27.54     | Frequency Stability  | Fundamental emissions stay within authorized frequency block                   |                | PASS        | Section 8.7          |
| § 2.1055, § 27.53(g) | Radiated unwanted emission                                   | > 43 + log <sub>10</sub> (P[Watts]) at Band Edge and all out-of-band emissions | RADIATED       | PASS        | Section 8.8          |

**Table 8-1. Summary of Rule part 27 Test Results**



|  |   |                                    |   |                                   |
|--|---|------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT (CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)          | Page 12 of 78   |                                   |

| FCC Part Section(s)      | Test Description   | Limit   | Test Condition | Test Result | Reference            |
|--------------------------|--|---|----------------|-------------|----------------------|
| § 2.1046                 | Conducted Average Output Power                               | N/A   | CONDUCTED      | PASS        | Annex 1              |
| § 2.1049                 | Occupied Bandwidth   | N/A   |                | PASS        | Section 8.2          |
| § 2.1046, § 90.635       | Equivalent Isotropic Radiated Power (Power Spectral Density) | < 100 W   |                | PASS        | Section 8.3 (Note 4) |
| § 2.1046,                | Peak-to-average ratio  | N/A   |                | PASS        | Section 8.4          |
| § 2.1051, § 90(S).691(a) | Band Edge Emissions and Emission Mask at Antenna Terminal    | > 43 + log <sub>10</sub> (P[Watts]) at Band Edge and all out-of-band emissions except > 50 + log <sub>10</sub> (P[Watts]) at Band Edge and all out-of-band emissions within 37.5kHz of Block Edge |                | PASS        | Section 8.5          |
| § 2.1051, § 90(S).691(a) | Spurious and Harmonic Emissions at Antenna Terminal          |   |                | PASS        | Section 8.6          |
| § 2.1055 § 90.213        | Frequency Stability  | < 1.5 ppm   |                | PASS        | Section 8.7          |
| § 2.1055, § 90(S).691(a) | Radiated unwanted emission                                   | > 43 + log <sub>10</sub> (P[Watts]) at Band Edge and all out-of-band emissions  | RADIATED       | PASS        | Section 8.8          |

**Table 8-2. Summary of Rule part 90 Test Results**

**Notes:**

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots were all taken with a correction table loaded into the analyzer.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.
- 4) The maximum antenna gain is determined at the time of licensing depending on the geographical location of the base station

|  |   |                                    |   |                                   |
|--|---|------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT (CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)          |   | Page 13 of 78                     |

## 8.2 Occupied Bandwidth

### Test Overview

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

### Test Procedures Used

KDB 971168 D01 v03r01 – Section 4.3

ANSI C63.26-2015 – Section 5.4.4

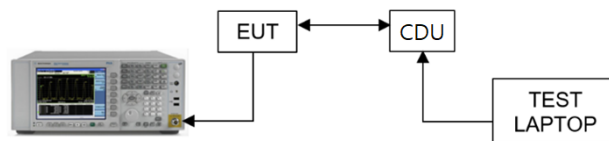
### Test Setting

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer settings were as follows:

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW  $\geq$  3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

### Test Setup



The EUT and measurement equipment were set up as shown in the diagram below.



**Figure 8-1. Test Instrument & Measurement Setup**

### Test Notes

None



|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |   | Page 14 of 78                     |

| Channel | Port | OBW (MHz)   |             |       |        |
|---------|------|-------------|-------------|-------|--------|
|         |      | QPSK        | 16QAM       | 64QAM | 256QAM |
| Low     | 0    | <b>4.47</b> | <b>4.49</b> | 4.48  | 4.48   |
|         | 1    | 4.47        | 4.48        | 4.47  | 4.47   |
|         | 2    | 4.47        | 4.49        | 4.47  | 4.48   |
|         | 3    | 4.47        | 4.49        | 4.47  | 4.47   |
| High    | 0    | 4.47        | 4.48        | 4.47  | 4.47   |
|         | 1    | 4.47        | 4.49        | 4.46  | 4.48   |
|         | 2    | 4.47        | 4.48        | 4.48  | 4.47   |
|         | 3    | 4.47        | 4.48        | 4.48  | 4.47   |

**Table 8-3. Occupied Bandwidth Summary Data (NR\_n29\_1C\_5M)**

| Channel | Port | OBW (MHz)   |             |       |        |
|---------|------|-------------|-------------|-------|--------|
|         |      | QPSK        | 16QAM       | 64QAM | 256QAM |
| Middle  | 0    | <b>9.41</b> | <b>9.45</b> | 9.41  | 9.42   |
|         | 1    | 9.41        | 9.43        | 9.40  | 9.41   |
|         | 2    | 9.41        | 9.44        | 9.41  | 9.40   |
|         | 3    | 9.41        | 9.43        | 9.40  | 9.41   |

**Table 8-4. Occupied Bandwidth Summary Data (NR\_n29\_2C\_5M+5M)**



|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |   | Page 15 of 78                     |

| Channel | Port | OBW (MHz)   |             |       |        |
|---------|------|-------------|-------------|-------|--------|
|         |      | QPSK        | 16QAM       | 64QAM | 256QAM |
| Low     | 0    | 4.48        | 4.49        | 4.49  | 4.47   |
|         | 1    | 4.48        | 4.49        | 4.49  | 4.48   |
|         | 2    | 4.48        | <b>4.50</b> | 4.49  | 4.48   |
|         | 3    | 4.47        | 4.49        | 4.49  | 4.47   |
| Middle  | 0    | <b>4.49</b> | 4.49        | 4.48  | 4.48   |
|         | 1    | 4.49        | 4.49        | 4.47  | 4.48   |
|         | 2    | 4.48        | 4.49        | 4.47  | 4.48   |
|         | 3    | 4.49        | 4.49        | 4.48  | 4.48   |
| High    | 0    | 4.48        | 4.47        | 4.48  | 4.47   |
|         | 1    | 4.48        | 4.48        | 4.49  | 4.47   |
|         | 2    | 4.47        | 4.49        | 4.49  | 4.47   |
|         | 3    | 4.48        | 4.48        | 4.48  | 4.47   |

**Table 8-5. Occupied Bandwidth Summary Data (NR\_n71\_1C\_5M)**

| Channel | Port | OBW (MHz)   |       |             |        |
|---------|------|-------------|-------|-------------|--------|
|         |      | QPSK        | 16QAM | 64QAM       | 256QAM |
| Low     | 0    | <b>9.30</b> | 9.25  | 9.30        | 9.28   |
|         | 1    | 9.30        | 9.23  | 9.29        | 9.29   |
|         | 2    | 9.30        | 9.23  | 9.29        | 9.29   |
|         | 3    | 9.28        | 9.26  | 9.30        | 9.29   |
| Middle  | 0    | 9.29        | 9.24  | <b>9.31</b> | 9.28   |
|         | 1    | 9.30        | 9.23  | 9.29        | 9.30   |
|         | 2    | 9.29        | 9.25  | 9.30        | 9.28   |
|         | 3    | 9.30        | 9.24  | 9.29        | 9.29   |
| High    | 0    | 9.29        | 9.22  | 9.30        | 9.28   |
|         | 1    | 9.29        | 9.22  | 9.29        | 9.29   |
|         | 2    | 9.29        | 9.24  | 9.30        | 9.29   |
|         | 3    | 9.28        | 9.23  | 9.30        | 9.28   |

**Table 8-6. Occupied Bandwidth Summary Data (NR\_n71\_1C\_10M)**

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |   | Page 16 of 78                     |



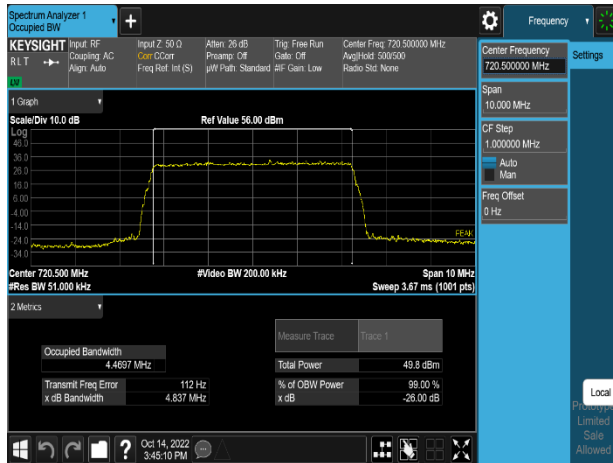
| Channel | Port | OBW (MHz)    |              |       |        |
|---------|------|--------------|--------------|-------|--------|
|         |      | QPSK         | 16QAM        | 64QAM | 256QAM |
| Low     | 0    | 18.91        | <b>19.00</b> | 18.92 | 18.92  |
|         | 1    | 18.91        | 18.96        | 18.93 | 18.93  |
|         | 2    | <b>18.95</b> | 18.93        | 18.93 | 18.91  |
|         | 3    | 18.91        | 18.97        | 18.94 | 18.93  |
| Middle  | 0    | 18.94        | 18.96        | 18.94 | 18.92  |
|         | 1    | 18.89        | 18.98        | 18.96 | 18.93  |
|         | 2    | 18.92        | 18.99        | 18.95 | 18.94  |
|         | 3    | 18.93        | 18.98        | 18.92 | 18.93  |
| High    | 0    | 18.90        | 18.98        | 18.96 | 18.91  |
|         | 1    | 18.94        | 18.97        | 18.90 | 18.93  |
|         | 2    | 18.89        | 18.98        | 18.90 | 18.92  |
|         | 3    | 18.92        | 19.00        | 18.92 | 18.91  |

**Table 8-7. Occupied Bandwidth Summary Data (NR\_n71\_1C\_20M)**

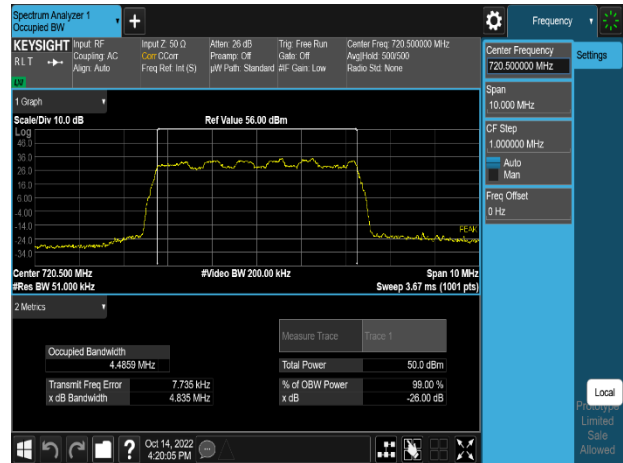
| Channel | Port | OBW (MHz)   |             |       |        |
|---------|------|-------------|-------------|-------|--------|
|         |      | QPSK        | 16QAM       | 64QAM | 256QAM |
| Middle  | 0    | <b>4.46</b> | 4.46        | 4.46  | 4.46   |
|         | 1    | 4.46        | <b>4.48</b> | 4.47  | 4.45   |
|         | 2    | 4.46        | 4.47        | 4.46  | 4.47   |
|         | 3    | 4.46        | 4.47        | 4.46  | 4.46   |

**Table 8-8. Occupied Bandwidth Summary Data (NR\_n26\_1C\_5M)**

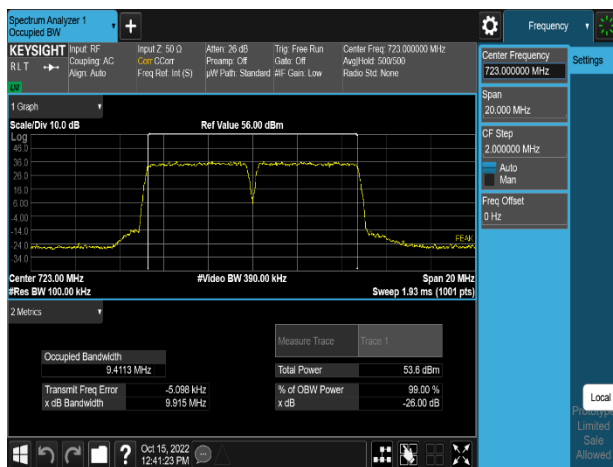
|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             | Page 17 of 78   |                                   |



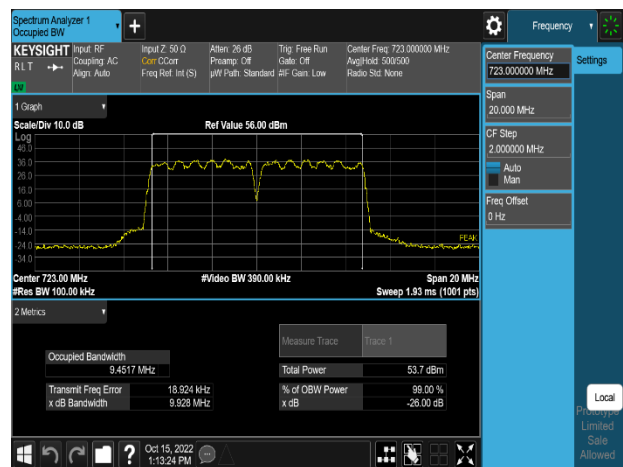
Plot 8-1. Occupied Bandwidth Plot  
(n29\_1C\_5M\_QPSK - Low Channel, Port 0)



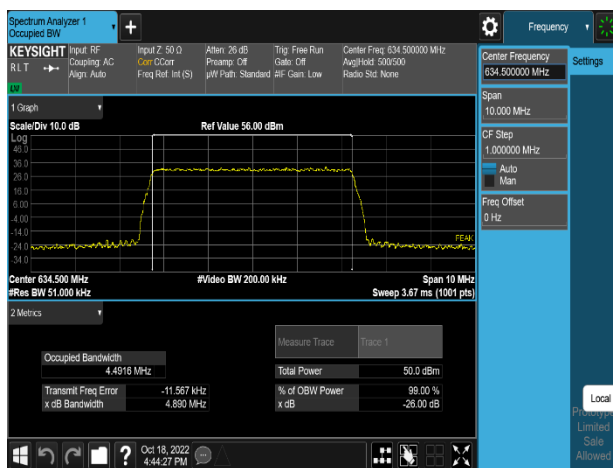
Plot 8-2. Occupied Bandwidth Plot  
(n29\_1C\_5M\_16QAM - Low Channel, Port 0)



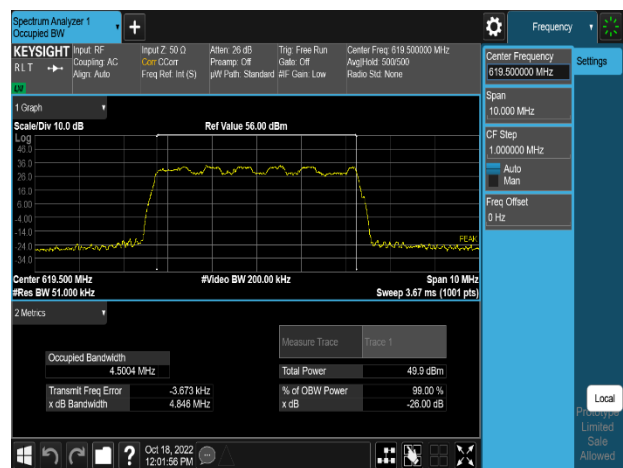
Plot 8-3. Occupied Bandwidth Plot  
(n29\_2C\_5M+5M\_QPSK - Mid Channel, Port 0)



Plot 8-4. Occupied Bandwidth Plot  
(n29\_2C\_5M+5M\_16QAM - Mid Channel, Port 0)

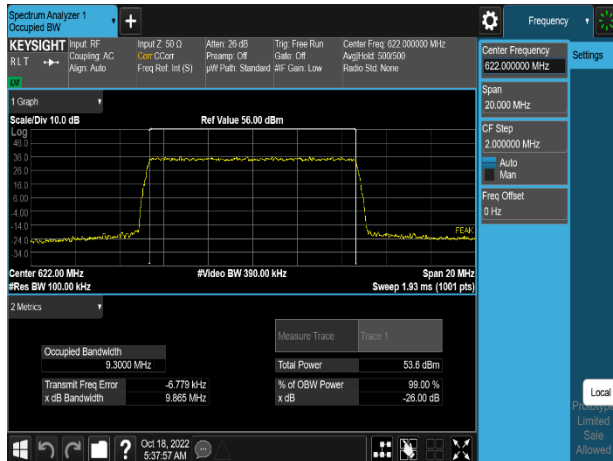


Plot 8-5. Occupied Bandwidth Plot  
(n71\_1C\_5M\_QPSK - Mid Channel, Port 0)

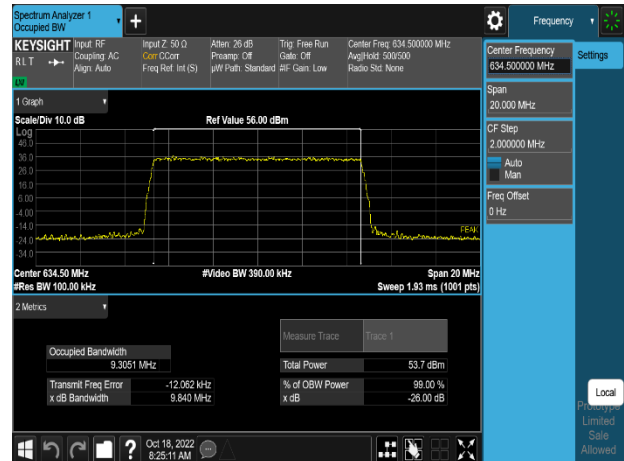


Plot 8-6. Occupied Bandwidth Plot  
(n71\_1C\_5M\_16QAM - Low Channel, Port 2)

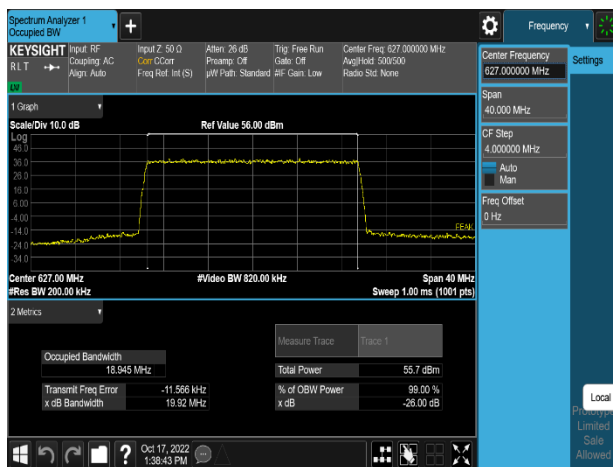
|   |   |   |  |  |
|---|---|---|--|--|
| FCC ID: A3LRF4450T-71A                          |   | <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K22101401-00-R1.A3L | <b>Test Dates:</b><br>10/14/2022 - 10/18/2022 | <b>EUT Type:</b><br>RRU(RF4450t)              |  | Page 18 of 78                            |



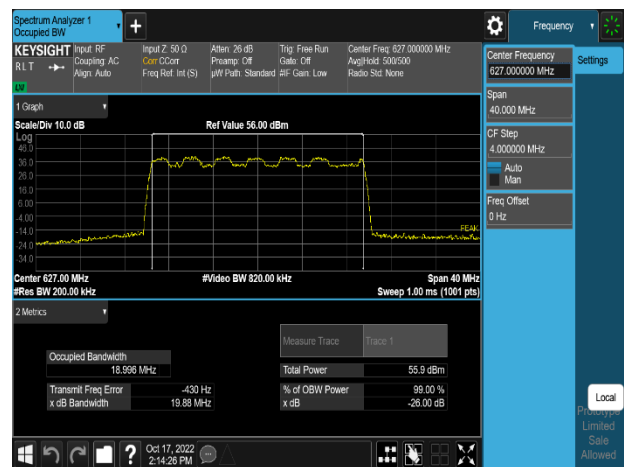
Plot 8-7. Occupied Bandwidth Plot  
(n71\_1C\_10M\_QPSK - Low Channel, Port 0)



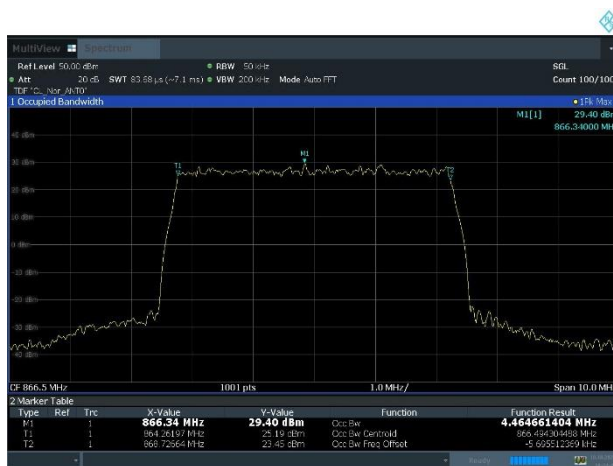
Plot 8-8. Occupied Bandwidth Plot  
(n71\_1C\_10M\_64QAM - Mid Channel, Port 0)



Plot 8-9. Occupied Bandwidth Plot  
(n71\_1C\_20M\_QPSK - Low Channel, Port 2)



Plot 8-10. Occupied Bandwidth Plot  
(n71\_1C\_20M\_16QAM - Low Channel, Port 0)



Plot 8-11. Occupied Bandwidth Plot  
(n26\_1C\_5M\_QPSK - Mid Channel, Port 0)



Plot 8-12. Occupied Bandwidth Plot  
(n26\_1C\_5M\_16QAM - Mid Channel, Port 1)

|  |  |                                       |  |                                   |
|--|--|---------------------------------------|--|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022 | EUT Type:<br>RRU(RF4450t)             |  | Page 19 of 78                     |

### 8.3 Equivalent Isotropic Radiated Power (Power Spectral Density)

#### Test Overview

A transmitter port of EUT is connected to the input of a signal analyzer. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

#### Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.2  
 KDB 662911 D01 v02r01 – Section E)1) In-Band Power Measurements  
 ANSI C63.26-2015 – Section 5.2.4

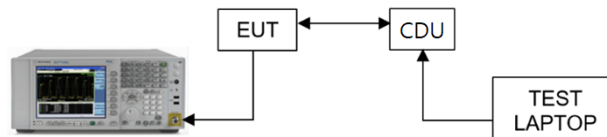
#### Test Setting

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer settings were as follows:

1. Conducted average output power measurements are performed using the signal analyzer’s “channel power mode” measurement capability for signals with continuous operation.
2. Set span to 2 × to 3 × the OBW.
3. Set RBW = set to reference bandwidth specified by the applicable regulatory requirement
4. Set VBW ≥ 3 × RBW.
5. Set number of measurement points in sweep ≥ 2 × span / RBW.
6. Sweep time: auto-couple
7. Detector = power averaging (rms).
8. Set sweep trigger to “free run.”
9. The integration bandwidth was set equal to transmission bandwidth i.e. 20MHz for 2CC and 40MHz for 1CC measurements.
10. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.
11. Compute the power by integrating the spectrum across the OBW of the signal using the instrument’s band or channel power measurement function, with the band/channel limits set equal to the OBW band edges.

#### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



**Figure 8-2. Test Instrument & Measurement Setup**

#### Limit


N/A

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |   | Page 20 of 78                     |

**Test Notes**

1. Consider the following factors for MIMO:  
The output power per each port is measured as dBm/MHz or dBm, the output powers are summed up in linear using the measure-and-sum technique defined in KDB 971168 D01 v03r01 - Section E) 2).
2. The EIRP Limit is determined at the time of licensing depending on the geographical location of the base station.
3. The output power per port (dBm/MHz or dBm) is converted to a linear value (mW). A summation of linear powers for all ports gives us the total MIMO Conducted Power (mW). We convert this back to logarithmic scale for further output power calculations.
4. All transmit signals from different antennas are completely uncorrelated with each other. So the maximum output power shall be calculated based on the aggregate power conducted across all antennas.
5. Sample Calculation:  
Let us assume the following numbers:
  - a) Total MIMO Conducted Power as 20089.61 milliWatts
  - b)

|  | Factors                    | Value    | Unit    |
|--|----------------------------|----------|---------|
| Summed MIMO Conducted Power (linear sum) |                            | 20089.61 | mW/MHz  |
| Summed MIMO Conducted Power (dBm)        | $= 10 * \log (20089.61) =$ | 43.03    | dBm/MHz |



|   |   |   |   |  |
|---|---|---|---|--|
| FCC ID: A3LRF4450T-71A                          |  | <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K22101401-00-R1.A3L | <b>Test Dates:</b><br>10/14/2022 - 10/18/2022                                       | <b>EUT Type:</b><br>RRU(RF4450t)              | Page 21 of 78   |  |

| Channel                        | Port | PSD Power (dBm/MHz) |                 |          |          |
|--------------------------------|------|---------------------|-----------------|----------|----------|
|                                |      | QPSK                | 16QAM           | 64QAM    | 256QAM   |
| Low                            | 0    | 36.86               | <b>37.03</b>    | 36.85    | 37.16    |
|                                | 1    | 36.94               | <b>37.19</b>    | 37.06    | 37.20    |
|                                | 2    | 36.64               | <b>36.84</b>    | 36.70    | 36.72    |
|                                | 3    | 36.82               | <b>36.97</b>    | 36.78    | 36.98    |
| Total MIMO PSD Power (mW/MHz)  |      | 19207.54            | <b>20089.61</b> | 19358.11 | 20134.58 |
| Total MIMO PSD Power (dBm/MHz) |      | 42.83               | <b>43.03</b>    | 42.87    | 43.04    |
| Channel                        | Port | QPSK                | 16QAM           | 64QAM    | 256QAM   |
| High                           | 0    | 36.75               | 37.02           | 36.67    | 36.71    |
|                                | 1    | 37.02               | 37.19           | 36.89    | 36.90    |
|                                | 2    | 36.64               | 36.81           | 36.66    | 36.64    |
|                                | 3    | 36.87               | 36.98           | 36.73    | 36.78    |
| Total MIMO PSD Power (mW/MHz)  |      | 19244.99            | 20065.26        | 18878.04 | 18972.15 |
| Total MIMO PSD Power (dBm/MHz) |      | 42.84               | 43.02           | 42.76    | 42.78    |

**Table 8-9. Peak Power Spectral Density Table (NR\_n29\_1C\_5M)**

| Channel                    | Port | PSD Power (dBm/MHz) |          |          |                 |
|----------------------------|------|---------------------|----------|----------|-----------------|
|                            |      | QPSK                | 16QAM    | 64QAM    | 256QAM          |
| Middle                     | 0    | 36.75               | 37.00    | 37.10    | <b>37.14</b>    |
|                            | 1    | 36.79               | 36.96    | 36.98    | <b>37.10</b>    |
|                            | 2    | 36.68               | 36.79    | 36.54    | <b>36.76</b>    |
|                            | 3    | 36.75               | 37.00    | 36.75    | <b>36.84</b>    |
| Total MIMO PSD Power (mW)  |      | 18885.53            | 19755.94 | 19351.20 | <b>19861.69</b> |
| Total MIMO PSD Power (dBm) |      | 42.76               | 42.96    | 42.87    | <b>42.98</b>    |

**Table 8-10. Peak Power Spectral Density Table (NR\_n29\_2C\_5M+5M)**



|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             | Page 22 of 78   |                                   |

| Channel                        | Port | PSD Power (dBm/MHz) |                 |          |          |
|--------------------------------|------|---------------------|-----------------|----------|----------|
|                                |      | QPSK                | 16QAM           | 64QAM    | 256QAM   |
| Low                            | 0    | 36.79               | <b>37.01</b>    | 36.72    | 36.69    |
|                                | 1    | 37.06               | <b>37.08</b>    | 36.88    | 36.96    |
|                                | 2    | 36.52               | <b>36.83</b>    | 36.49    | 36.62    |
|                                | 3    | 36.61               | <b>36.73</b>    | 36.66    | 36.72    |
| Total MIMO PSD Power (mW/MHz)  |      | 18912.99            | <b>19656.38</b> | 18670.80 | 18929.72 |
| Total MIMO PSD Power (dBm/MHz) |      | 42.77               | <b>42.94</b>    | 42.71    | 42.77    |
| Channel                        | Port | QPSK                | 16QAM           | 64QAM    | 256QAM   |
| Middle                         | 0    | 36.70               | 36.85           | 36.53    | 36.63    |
|                                | 1    | 37.00               | 37.16           | 37.03    | 36.93    |
|                                | 2    | 36.55               | 36.84           | 36.59    | 36.56    |
|                                | 3    | 36.58               | 36.74           | 36.51    | 36.52    |
| Total MIMO PSD Power (mW/MHz)  |      | 18754.73            | 19588.12        | 18586.19 | 18540.06 |
| Total MIMO PSD Power (dBm/MHz) |      | 42.73               | 42.92           | 42.69    | 42.68    |
| Channel                        | Port | QPSK                | 16QAM           | 64QAM    | 256QAM   |
| High                           | 0    | 36.61               | 36.70           | 36.48    | 36.61    |
|                                | 1    | 36.81               | 37.01           | 36.84    | 36.86    |
|                                | 2    | 36.34               | 36.60           | 36.28    | 36.40    |
|                                | 3    | 36.36               | 36.56           | 36.28    | 36.35    |
| Total MIMO PSD Power (mW/MHz)  |      | 18004.45            | 18806.07        | 17760.50 | 18107.39 |
| Total MIMO PSD Power (dBm/MHz) |      | 42.55               | 42.74           | 42.49    | 42.58    |

**Table 8-11. Peak Power Spectral Density Table (NR\_n71\_1C\_5M)**

| Channel                        | Port | PSD Power (dBm/MHz) |                 |          |          |
|--------------------------------|------|---------------------|-----------------|----------|----------|
|                                |      | QPSK                | 16QAM           | 64QAM    | 256QAM   |
| Low                            | 0    | 36.31               | 37.51           | 36.69    | 36.63    |
|                                | 1    | 36.60               | 37.53           | 36.72    | 36.74    |
|                                | 2    | 36.27               | 37.12           | 36.37    | 36.45    |
|                                | 3    | 36.30               | 37.08           | 36.42    | 36.40    |
| Total MIMO PSD Power (mW/MHz)  |      | 17338.11            | 21548.49        | 18083.06 | 18104.48 |
| Total MIMO PSD Power (dBm/MHz) |      | 42.39               | 43.33           | 42.57    | 42.58    |
| Channel                        | Port | QPSK                | 16QAM           | 64QAM    | 256QAM   |
| Middle                         | 0    | 36.48               | <b>37.34</b>    | 36.52    | 36.56    |
|                                | 1    | 36.71               | <b>37.63</b>    | 36.87    | 36.89    |
|                                | 2    | 36.48               | <b>37.31</b>    | 36.49    | 36.52    |
|                                | 3    | 36.36               | <b>37.26</b>    | 36.34    | 36.41    |
| Total MIMO PSD Power (mW/MHz)  |      | 17900.40            | <b>21906.46</b> | 18119.06 | 18278.74 |
| Total MIMO PSD Power (dBm/MHz) |      | 42.53               | <b>43.41</b>    | 42.58    | 42.62    |
| Channel                        | Port | QPSK                | 16QAM           | 64QAM    | 256QAM   |
| High                           | 0    | 36.63               | 37.35           | 36.49    | 36.44    |
|                                | 1    | 36.80               | 37.43           | 36.75    | 36.76    |
|                                | 2    | 36.39               | 37.24           | 36.47    | 36.45    |
|                                | 3    | 36.45               | 37.15           | 36.38    | 36.45    |
| Total MIMO PSD Power (mW/MHz)  |      | 18161.94            | 21449.19        | 17966.97 | 17975.95 |
| Total MIMO PSD Power (dBm/MHz) |      | 42.59               | 43.31           | 42.54    | 42.55    |

**Table 8-12. Peak Power Spectral Density Table (NR\_n71\_1C\_10M)**



|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |   | Page 23 of 78                     |

| Channel                        | Port | PSD Power (dBm/MHz) |                 |          |          |
|--------------------------------|------|---------------------|-----------------|----------|----------|
|                                |      | QPSK                | 16QAM           | 64QAM    | 256QAM   |
| Low                            | 0    | 35.13               | 37.07           | 35.33    | 35.43    |
|                                | 1    | 35.20               | 36.81           | 35.20    | 35.17    |
|                                | 2    | 35.21               | 36.70           | 35.10    | 35.08    |
|                                | 3    | 35.02               | 36.83           | 35.09    | 35.02    |
| Total MIMO PSD Power (mW/MHz)  |      | 13067.61            | 19396.46        | 13188.60 | 13177.67 |
| Total MIMO PSD Power (dBm/MHz) |      | 41.16               | 42.88           | 41.20    | 41.20    |
| Channel                        | Port | QPSK                | 16QAM           | 64QAM    | 256QAM   |
| Middle                         | 0    | 35.49               | 36.95           | 35.32    | 35.31    |
|                                | 1    | 35.29               | 36.85           | 35.28    | 35.29    |
|                                | 2    | 35.12               | 36.89           | 35.33    | 35.20    |
|                                | 3    | 35.11               | 36.72           | 35.09    | 35.10    |
| Total MIMO PSD Power (mW/MHz)  |      | 13414.31            | 19373.87        | 13419.08 | 13319.57 |
| Total MIMO PSD Power (dBm/MHz) |      | 41.28               | 42.87           | 41.28    | 41.24    |
| Channel                        | Port | QPSK                | 16QAM           | 64QAM    | 256QAM   |
| High                           | 0    | 35.56               | <b>37.22</b>    | 35.43    | 35.52    |
|                                | 1    | 35.42               | <b>37.17</b>    | 35.54    | 35.39    |
|                                | 2    | 35.31               | <b>36.90</b>    | 35.38    | 35.29    |
|                                | 3    | 35.18               | <b>36.81</b>    | 35.18    | 35.26    |
| Total MIMO PSD Power (mW/MHz)  |      | 13767.87            | <b>20182.02</b> | 13816.98 | 13761.30 |
| Total MIMO PSD Power (dBm/MHz) |      | 41.39               | <b>43.05</b>    | 41.40    | 41.39    |

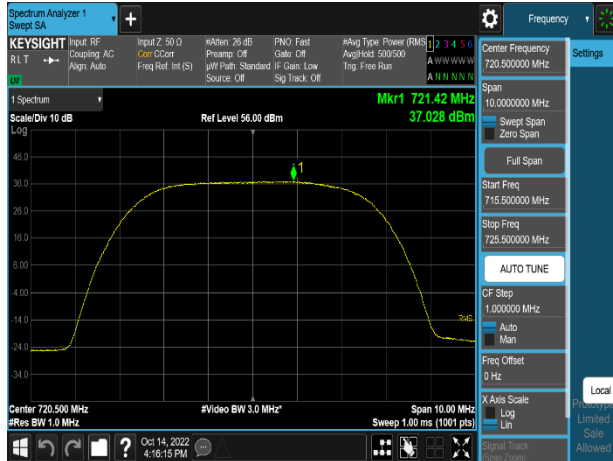
**Table 8-13. Peak Power Spectral Density Table (NR\_n71\_1C\_20M)**

| Channel                    | Port | PSD Power (dBm/MHz) |                 |          |          |
|----------------------------|------|---------------------|-----------------|----------|----------|
|                            |      | QPSK                | 16QAM           | 64QAM    | 256QAM   |
| Middle                     | 0    | 34.13               | <b>34.20</b>    | 33.97    | 34.16    |
|                            | 1    | 33.97               | <b>34.59</b>    | 34.03    | 34.26    |
|                            | 2    | 34.07               | <b>34.22</b>    | 34.20    | 34.39    |
|                            | 3    | 34.11               | <b>34.37</b>    | 34.23    | 34.30    |
| Total MIMO PSD Power (mW)  |      | 10211.83            | <b>10885.34</b> | 10302.66 | 10712.44 |
| Total MIMO PSD Power (dBm) |      | 40.09               | <b>40.37</b>    | 40.13    | 40.30    |

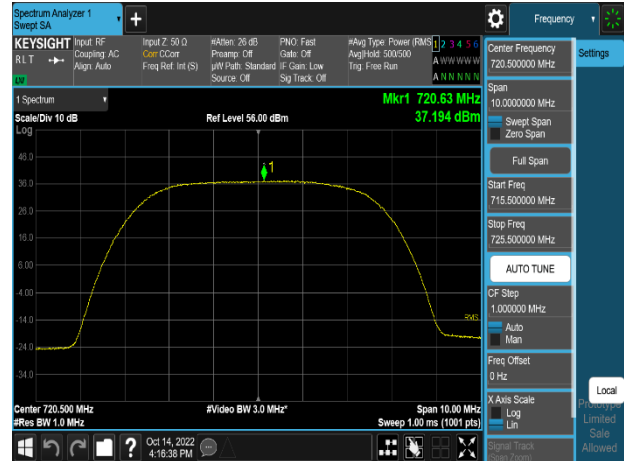
**Table 8-14. Peak Power Spectral Density Table (NR\_n26\_1C\_5M)**

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |   | Page 24 of 78                     |

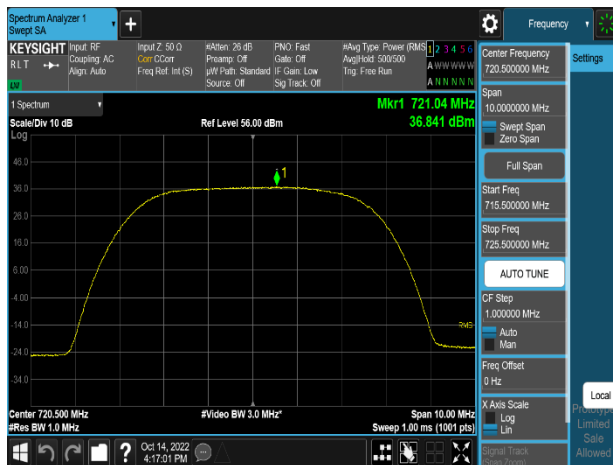




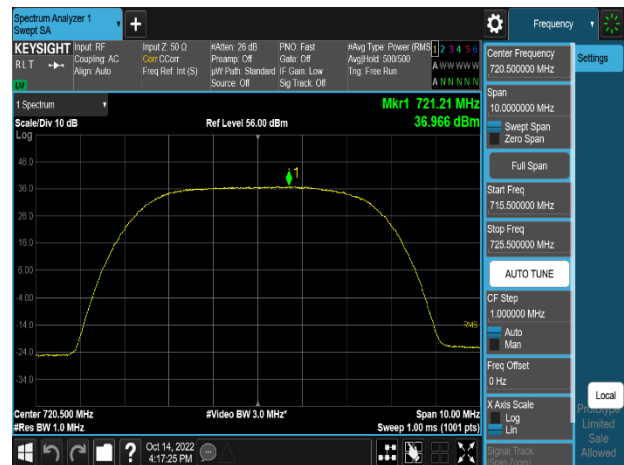
Plot 8-13. Power Spectral Density Plot (n29\_1C\_5M\_16QAM - Low Channel, Port 0)



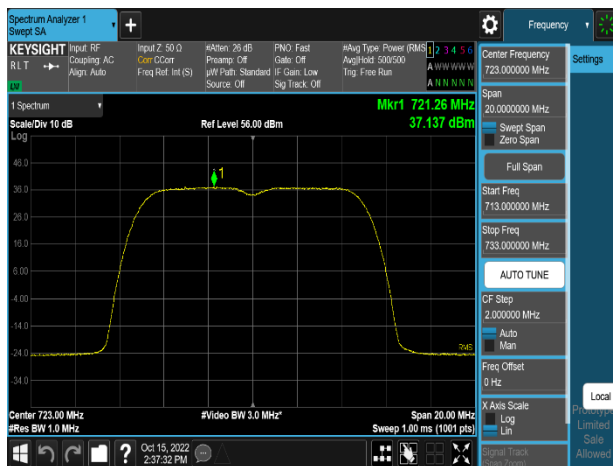
Plot 8-14. Power Spectral Density Plot (n29\_1C\_5M\_16QAM - Low Channel, Port 1)



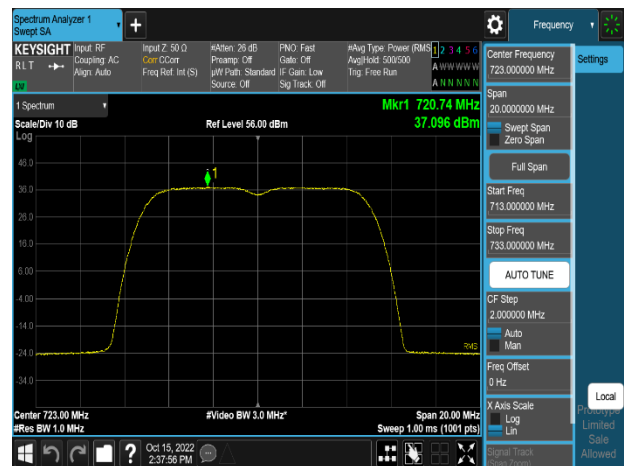
Plot 8-15. Power Spectral Density Plot (n29\_1C\_5M\_16QAM - Low Channel, Port 2)



Plot 8-16. Power Spectral Density Plot (n29\_1C\_5M\_16QAM - Low Channel, Port 3)

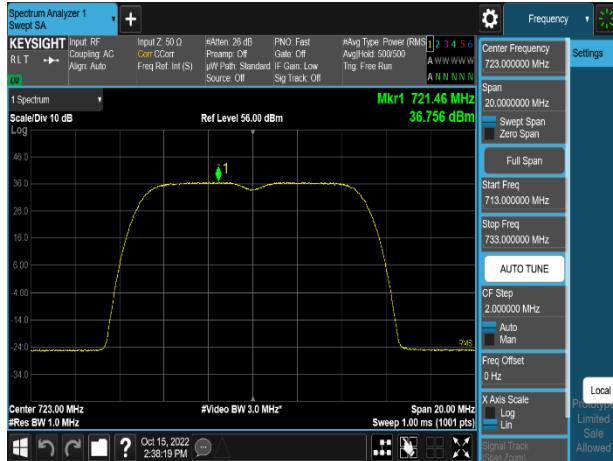


Plot 8-17. Power Spectral Density Plot (n29\_2C\_5M+5M\_256QAM - Mid Channel, Port 0)

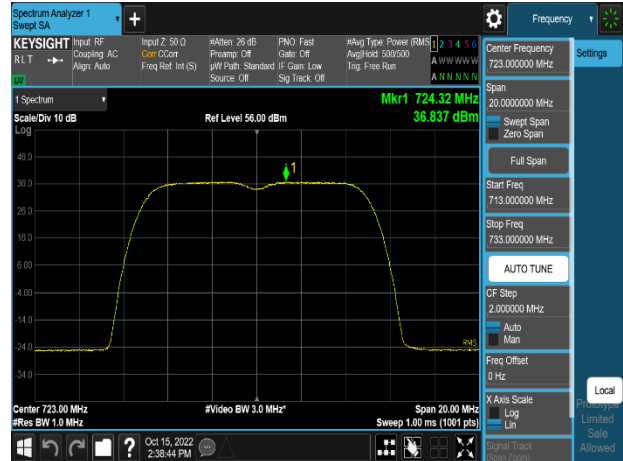


Plot 8-18. Power Spectral Density Plot (n29\_2C\_5M+5M\_256QAM - Mid Channel, Port 1)

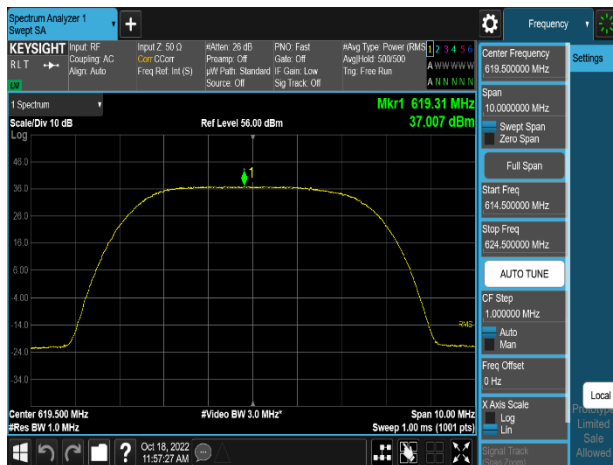
|   |   |   |  |  |
|---|---|---|--|--|
| FCC ID: A3LRF4450T-71A                          |   | <b>MEASUREMENT REPORT (CERTIFICATION)</b> |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K22101401-00-R1.A3L | <b>Test Dates:</b><br>10/14/2022 - 10/18/2022 | <b>EUT Type:</b><br>RRU(RF4450t)          |  | Page 25 of 78                            |



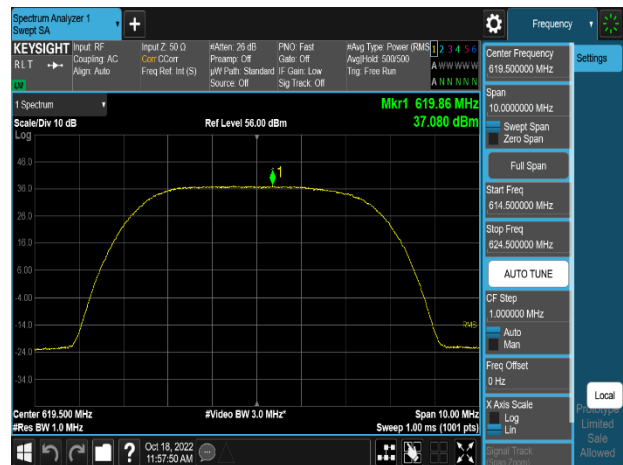
Plot 8-19. Power Spectral Density Plot  
(n29\_2C\_5M+5M\_256QAM - Mid Channel, Port 2)



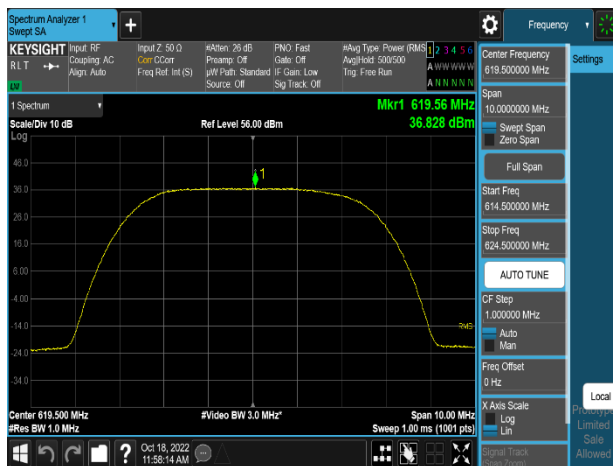
Plot 8-20. Power Spectral Density Plot  
(n29\_2C\_5M+5M\_256QAM - Mid Channel, Port 3)



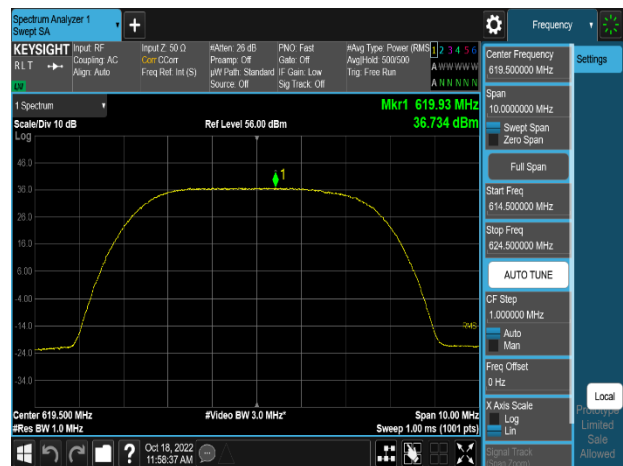
Plot 8-21. Power Spectral Density Plot  
(n71\_1C\_5M\_16QAM - Low Channel, Port 0)



Plot 8-22. Power Spectral Density Plot  
(n71\_1C\_5M\_16QAM - Low Channel, Port 1)

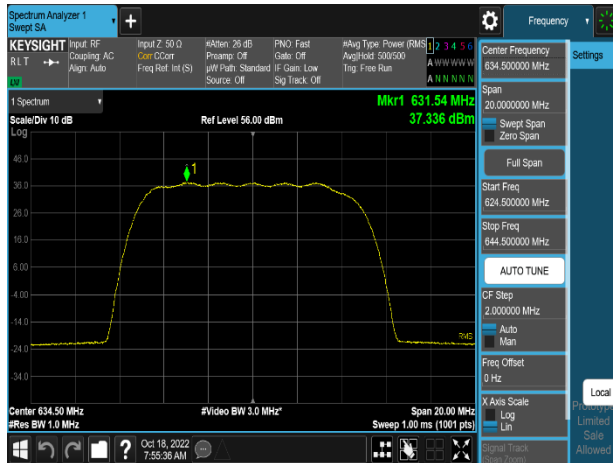


Plot 8-23. Power Spectral Density Plot  
(n71\_1C\_5M\_16QAM - Low Channel, Port 2)

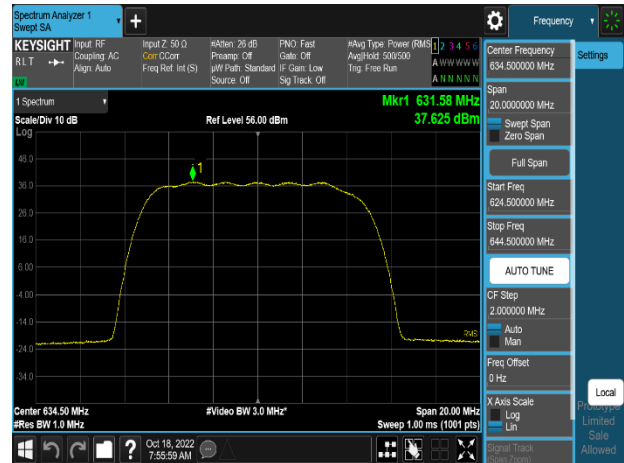


Plot 8-24. Power Spectral Density Plot  
(n71\_1C\_5M\_16QAM - Low Channel, Port 3)

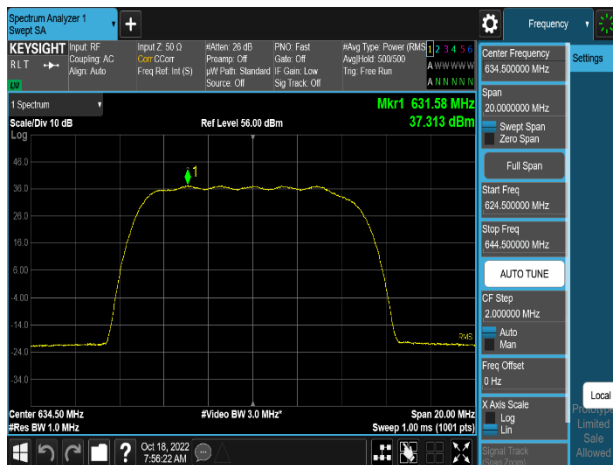
|  |  |                                       |  |                                   |
|--|--|---------------------------------------|--|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022 | EUT Type:<br>RRU(RF4450t)             |  | Page 26 of 78                     |



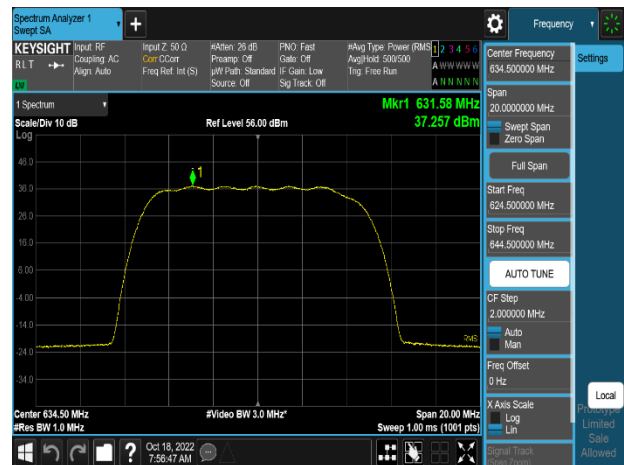
Plot 8-25. Power Spectral Density Plot  
(n71\_1C\_10M\_16QAM - Mid Channel, Port 0)



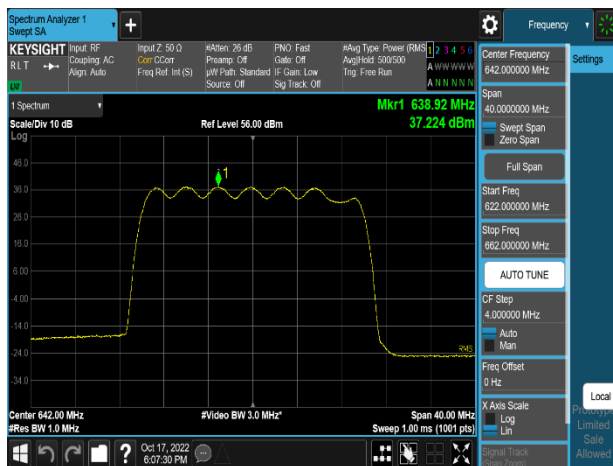
Plot 8-26. Power Spectral Density Plot  
(n71\_1C\_10M\_16QAM - Mid Channel, Port 1)



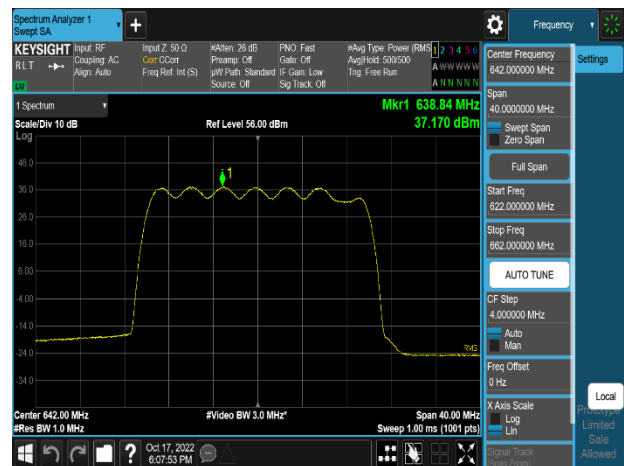
Plot 8-27. Power Spectral Density Plot  
(n71\_1C\_10M\_16QAM - Mid Channel, Port 2)



Plot 8-28. Power Spectral Density Plot  
(n71\_1C\_10M\_16QAM - Mid Channel, Port 3)

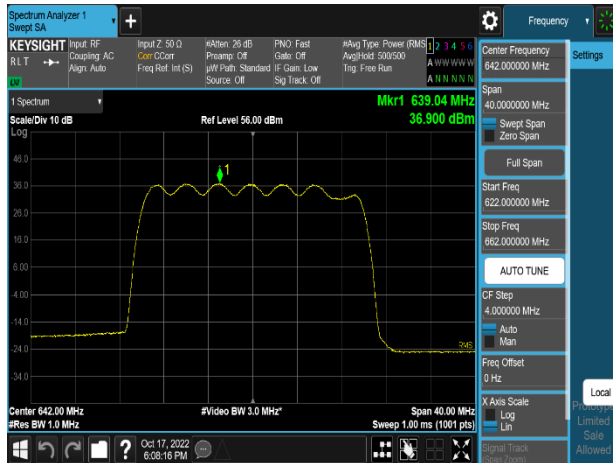


Plot 8-29. Power Spectral Density Plot  
(n71\_1C\_20M\_16QAM - High Channel, Port 0)

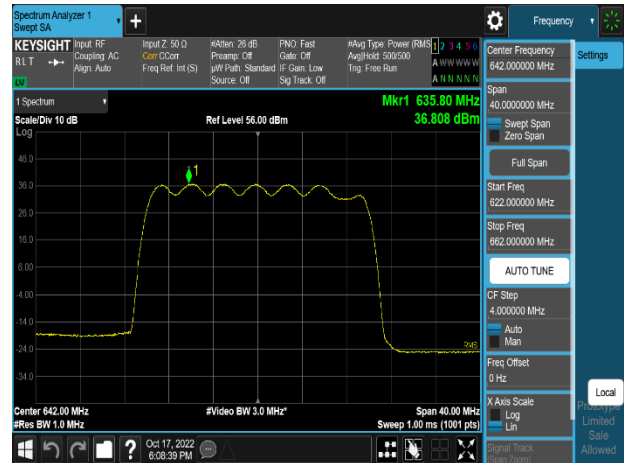


Plot 8-30. Power Spectral Density Plot  
(n71\_1C\_20M\_16QAM - High Channel, Port 1)

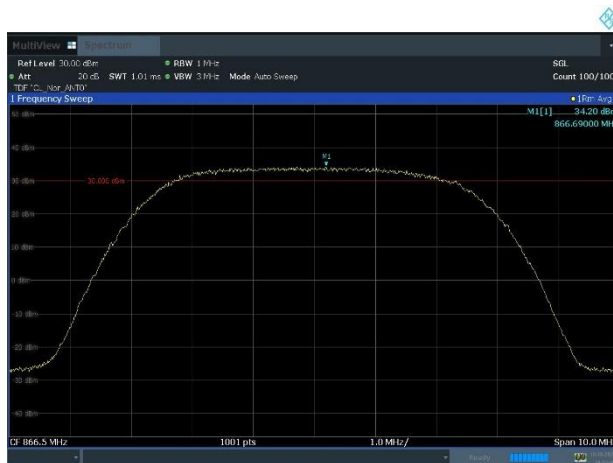
|   |   |   |  |  |
|---|---|---|--|--|
| FCC ID: A3LRF4450T-71A                          |   | <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K22101401-00-R1.A3L | <b>Test Dates:</b><br>10/14/2022 - 10/18/2022 | <b>EUT Type:</b><br>RRU(RF4450t)              |  | Page 27 of 78                            |



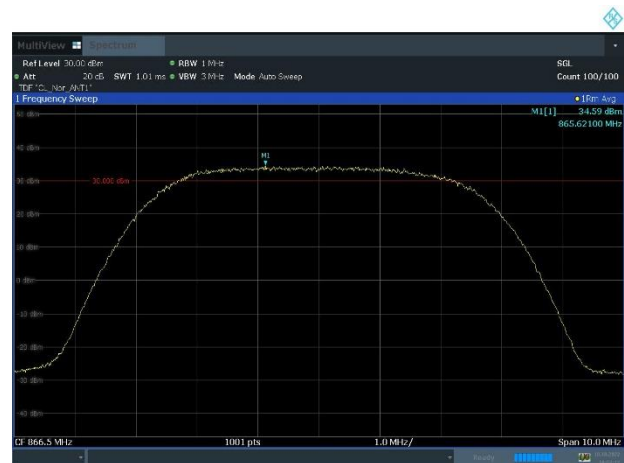
Plot 8-31. Power Spectral Density Plot  
(n71\_1C\_20M\_16QAM - High Channel, Port 2)



Plot 8-32. Power Spectral Density Plot  
(n71\_1C\_20M\_16QAM - High Channel, Port 3)



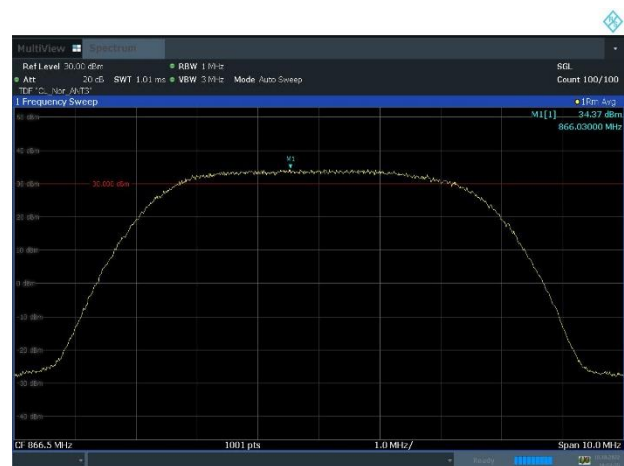
Plot 8-33. Power Spectral Density Plot  
(n26\_1C\_5M\_16QAM - Mid Channel, Port 0)



Plot 8-34. Power Spectral Density Plot  
(n26\_1C\_5M\_16QAM - Mid Channel, Port 1)



Plot 8-35. Power Spectral Density Plot  
(n26\_1C\_5M\_16QAM - Mid Channel, Port 2)



Plot 8-36. Power Spectral Density Plot  
(n26\_1C\_5M\_16QAM - Mid Channel, Port 3)

|   |   |   |  |  |
|---|---|---|--|--|
| FCC ID: A3LRF4450T-71A                          |   | <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K22101401-00-R1.A3L | <b>Test Dates:</b><br>10/14/2022 - 10/18/2022 | <b>EUT Type:</b><br>RRU(RF4450t)              |  | Page 28 of 78                            |

## 8.4 Peak To Average Power Ratio

### Test Overview

The peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

### Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7

ANSI C63.26-2015 – Section 5.2.3.4

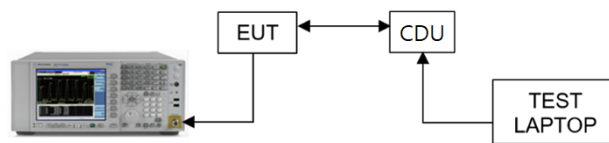
### Test Setting

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer settings were as follows:

1. The signal analyzer's CCDF function is enabled.
2. Frequency = carrier center frequency
3. Measurement BW  $\geq$  OBW or specified reference bandwidth
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.

### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



**Figure 8-3. Test Instrument & Measurement Setup**

### Limit

N/A

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |   | Page 29 of 78                     |

| Channel | Port | PAPR (dB) |             |       |        | Limit (dB) |
|---------|------|-----------|-------------|-------|--------|------------|
|         |      | QPSK      | 16QAM       | 64QAM | 256QAM |            |
| Low     | 0    | 8.32      | 8.39        | 8.22  | 8.23   | N/A        |
|         | 1    | 8.31      | 8.40        | 8.23  | 8.25   |            |
|         | 2    | 8.32      | 8.41        | 8.24  | 8.23   |            |
|         | 3    | 8.31      | 8.40        | 8.23  | 8.24   |            |
| High    | 0    | 8.30      | <b>8.45</b> | 8.23  | 8.22   |            |
|         | 1    | 8.29      | 8.42        | 8.25  | 8.21   |            |
|         | 2    | 8.31      | 8.43        | 8.26  | 8.23   |            |
|         | 3    | 8.31      | 8.45        | 8.25  | 8.23   |            |



**Table 8-15. Peak To Average Power Ratio Summary Data (NR\_n29\_1C\_5M)**

| Channel | Port | PAPR (dB) |             |       |        | Limit (dB) |
|---------|------|-----------|-------------|-------|--------|------------|
|         |      | QPSK      | 16QAM       | 64QAM | 256QAM |            |
| Middle  | 0    | 8.29      | 8.35        | 8.30  | 8.26   | N/A        |
|         | 1    | 8.32      | 8.37        | 8.31  | 8.27   |            |
|         | 2    | 8.32      | 8.38        | 8.33  | 8.28   |            |
|         | 3    | 8.33      | <b>8.39</b> | 8.32  | 8.30   |            |

**Table 8-16. Peak To Average Power Ratio Summary Data (NR\_n29\_2C\_5M+5M)**

| Channel | Port | PAPR (dB) |             |       |        | Limit (dB) |
|---------|------|-----------|-------------|-------|--------|------------|
|         |      | QPSK      | 16QAM       | 64QAM | 256QAM |            |
| Low     | 0    | 8.28      | <b>8.38</b> | 8.26  | 8.27   | N/A        |
|         | 1    | 8.28      | 8.37        | 8.27  | 8.28   |            |
|         | 2    | 8.28      | 8.37        | 8.25  | 8.27   |            |
|         | 3    | 8.26      | 8.36        | 8.25  | 8.28   |            |
| Middle  | 0    | 8.26      | 8.35        | 8.26  | 8.28   |            |
|         | 1    | 8.27      | 8.36        | 8.26  | 8.28   |            |
|         | 2    | 8.26      | 8.37        | 8.25  | 8.26   |            |
|         | 3    | 8.25      | 8.36        | 8.25  | 8.28   |            |
| High    | 0    | 8.28      | 8.37        | 8.28  | 8.25   |            |
|         | 1    | 8.28      | 8.38        | 8.28  | 8.26   |            |
|         | 2    | 8.28      | 8.38        | 8.29  | 8.27   |            |
|         | 3    | 8.27      | 8.38        | 8.26  | 8.24   |            |

**Table 8-17. Peak To Average Power Ratio Summary Data (NR\_n71\_1C\_5M)**

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |   | Page 30 of 78                     |

| Channel | Port | PAPR (dB) |       |       |             | Limit (dB) |
|---------|------|-----------|-------|-------|-------------|------------|
|         |      | QPSK      | 16QAM | 64QAM | 256QAM      |            |
| Low     | 0    | 8.38      | 8.37  | 8.31  | 8.38        | N/A        |
|         | 1    | 8.39      | 8.37  | 8.31  | <b>8.40</b> |            |
|         | 2    | 8.38      | 8.39  | 8.32  | 8.38        |            |
|         | 3    | 8.38      | 8.36  | 8.31  | 8.38        |            |
| Middle  | 0    | 8.37      | 8.37  | 8.32  | 8.38        |            |
|         | 1    | 8.37      | 8.37  | 8.31  | 8.39        |            |
|         | 2    | 8.38      | 8.37  | 8.32  | 8.38        |            |
|         | 3    | 8.38      | 8.37  | 8.31  | 8.36        |            |
| High    | 0    | 8.36      | 8.34  | 8.30  | 8.38        |            |
|         | 1    | 8.37      | 8.35  | 8.31  | 8.38        |            |
|         | 2    | 8.36      | 8.34  | 8.30  | 8.39        |            |
|         | 3    | 8.36      | 8.35  | 8.30  | 8.37        |            |



**Table 8-18. Peak To Average Power Ratio Summary Data (NR\_n71\_1C\_10M)**

| Channel | Port | PAPR (dB)   |       |       |        | Limit (dB) |
|---------|------|-------------|-------|-------|--------|------------|
|         |      | QPSK        | 16QAM | 64QAM | 256QAM |            |
| Low     | 0    | 8.02        | 8.05  | 8.03  | 8.06   | N/A        |
|         | 1    | 8.03        | 8.04  | 8.04  | 8.07   |            |
|         | 2    | 8.02        | 8.02  | 8.04  | 8.06   |            |
|         | 3    | 8.03        | 8.03  | 8.04  | 8.07   |            |
| Middle  | 0    | 7.99        | 7.99  | 8.00  | 8.03   |            |
|         | 1    | 7.99        | 7.99  | 8.00  | 8.03   |            |
|         | 2    | 8.00        | 8.00  | 7.99  | 8.03   |            |
|         | 3    | 8.00        | 7.99  | 8.00  | 8.03   |            |
| High    | 0    | <b>8.17</b> | 8.14  | 8.17  | 8.15   |            |
|         | 1    | 8.14        | 8.11  | 8.13  | 8.14   |            |
|         | 2    | 8.16        | 8.13  | 8.16  | 8.15   |            |
|         | 3    | 8.16        | 8.12  | 8.15  | 8.16   |            |

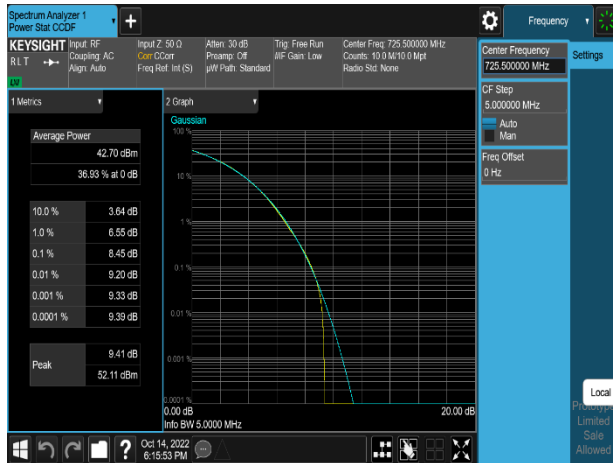
**Table 8-19. Peak To Average Power Ratio Summary Data (NR\_n71\_1C\_20M)**

| Channel | Port | PAPR (dB)   |       |       |        | Limit (dB) |
|---------|------|-------------|-------|-------|--------|------------|
|         |      | QPSK        | 16QAM | 64QAM | 256QAM |            |
| Middle  | 0    | 7.78        | 7.76  | 7.80  | 7.78   | N/A        |
|         | 1    | 7.78        | 7.78  | 7.80  | 7.78   |            |
|         | 2    | 7.76        | 7.78  | 7.78  | 7.78   |            |
|         | 3    | <b>7.80</b> | 7.78  | 7.80  | 7.80   |            |

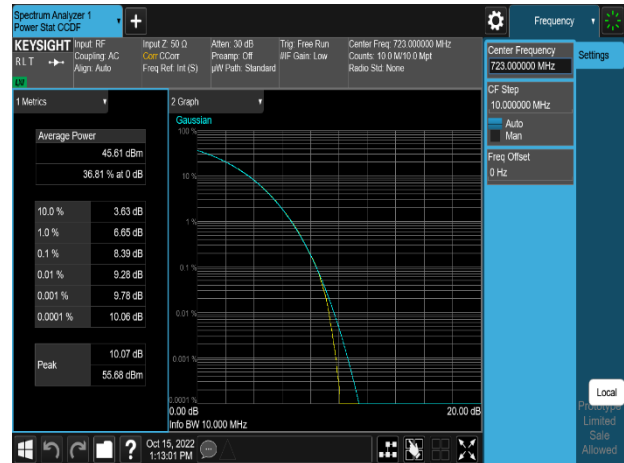
**Table 8-20. Peak To Average Power Ratio Summary Data (NR\_n26\_1C\_5M)**

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |   | Page 31 of 78                     |

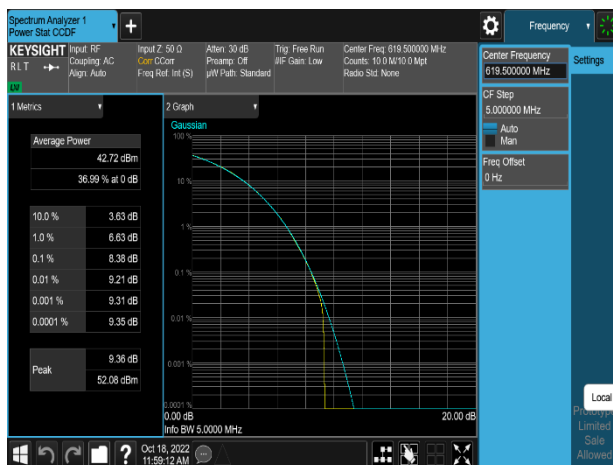




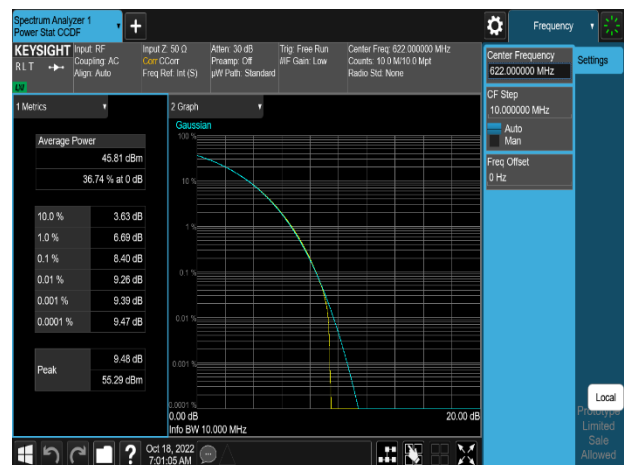
Plot 8-37. Peak To Average Power Ratio Plot (n29\_1C\_5M\_16QAM - High Channel, Port 0)



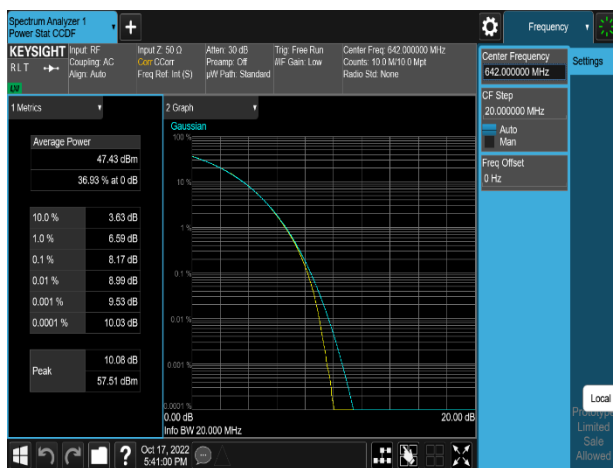
Plot 8-38. Peak To Average Power Ratio Plot (n29\_2C\_5M+5M\_16QAM - Mid Channel, Port 3)



Plot 8-39. Peak To Average Power Ratio Plot (n71\_1C\_5M\_16QAM - Low Channel, Port 0)



Plot 8-40. Peak To Average Power Ratio Plot (n71\_1C\_10M\_256QAM - Low Channel, Port 1)



Plot 8-41. Peak To Average Power Ratio Plot (n71\_1C\_20M\_QPSK - High Channel, Port 0)



Plot 8-42. Peak To Average Power Ratio Plot (n26\_1C\_5M\_QPSK Mid Channel, Port 3)

|   |   |   |  |  |
|---|---|---|--|--|
| FCC ID: A3LRF4450T-71A                          |   | <b>MEASUREMENT REPORT (CERTIFICATION)</b> |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K22101401-00-R1.A3L | <b>Test Dates:</b><br>10/14/2022 - 10/18/2022 | <b>EUT Type:</b><br>RRU(RF4450t)          |  | Page 32 of 78                            |



## 8.5 Band Edge Emissions and Emission Mask at Antenna Terminal

### Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

### Test Procedure Used

KDB 971168 D01 v03r01 – Section 6

KDB 662911 D01 v02r01 – Section E)3) Out-of-Band and Spurious Emission Measurements

a) Absolute Emission Limits

iii) Measure and add  $10 \log(N_{ANT})$  dB

ANSI C63.26-2015 – Section 5.7.3

### Test Setting

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW: Please see test notes below.
4. VBW  $\geq 3 \times$  RBW
5. Detector = RMS
6. Number of sweep points  $\geq 2 \times$  Span/RBW
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

### Limit



#### **NR n29 and n71 operation under Part 27.53**

The minimum permissible attenuation level of any spurious emission is  $43 + \log_{10}(P_{[Watts]})$ , where P is the transmitter power in Watts.

#### **NR n26 operation under Part 90.691**

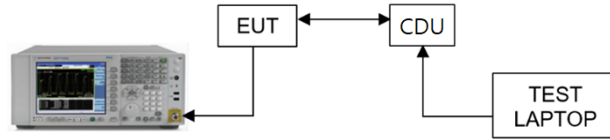
For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \log_{10}(f/6.1)$  decibels or  $50 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |   | Page 33 of 78                     |

### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



**Figure 8-4. Test Instrument & Measurement Setup**

### Test Notes



1. Per Part 27.53(g), Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least 30 kilohertz may be employed.
2. Per Part 90.691, the frequency block by up to and including 37.5 kHz range complies with  $50 + 10 \text{Log}_{10}(P)$  decibels and frequency block greater than 37.5 kHz range complies with  $43 + 10\text{Log}_{10}(P)$  decibels limit.
3. All the measurement has been tested but test plots are referred from the highest of value of each of modulation of each antenna ports.
4. When the channel edge detect with a margin of under 1dB to Limit, That used to integration method was performed using the spectrum analyzer's band power functions according to ANSI C63.26-2015 – Section 5.7. The spectrum analyzer marker was placed at one-half of the RBW away from the band edge. The integration value was set to a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter.
5. The limits were adjusted by a factor of  $[-10 \cdot \log(4)]$  dB to account for the device operation as a 4 port MIMO transmitter, as per FCC KDB 622911. MIMO Factor calculation as below:  
 $\text{MIMO Factor} = 10 \cdot \log(4) = 6.02 \text{ dB}$

| Frequency range                            | Basic Limit (dBm) | 4Tx MIMO Factor (dB) | RBW Factor (dB) | Adjusted limit (dBm) |
|--|-------------------|----------------------|-----------------|----------------------|
| Low Frequency block lower than 37.5 kHz    | -13               | 6.02                 | 0               | -19.02               |
| Low Frequency block – 37.5kHz              | -20               | 6.02                 | 0               | -26.02               |
| High Frequency block + 37.5kHz             | -20               | 6.02                 | 0               | -26.02               |
| High Frequency block greater than 37.5 kHz | -13               | 6.02                 | 0               | -19.02               |

Note: Adjusted limit (dBm) = Basic limit (dBm) - MIMO Factor - RBW Factor

| Frequency range               | Basic Limit (dBm) | 4Tx MIMO Factor (dB) | RBW Factor (dB) | Adjusted limit (dBm) |
|-------------------------------|-------------------|----------------------|-----------------|----------------------|
| Low Frequency block – 100kHz  | -13               | 6.02                 | 0               | -19.02               |
| High Frequency block + 100kHz | -13               | 6.02                 | 0               | -19.02               |

Note: Adjusted limit (dBm) = Basic limit (dBm) - MIMO Factor - RBW Factor



|   |   |   |   |  |
|---|---|---|---|--|
| FCC ID: A3LRF4450T-71A                          |  | <b>MEASUREMENT REPORT (CERTIFICATION)</b> |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K22101401-00-R1.A3L | <b>Test Dates:</b><br>10/14/2022 - 10/18/2022                                       | <b>EUT Type:</b><br>RRU(RF4450t)          | Page 34 of 78   |  |

| Channel | Port | Measured Range (MHz) | Max. Value (dBm) |               |        |        | Limit (dBm) |
|---------|------|----------------------|------------------|---------------|--------|--------|-------------|
|         |      |                      | QPSK             | 16QAM         | 64QAM  | 256QAM |             |
| Low     | 0    | 717.9 to 718         | -25.37           | -25.03        | -25.69 | -24.86 | -19.02      |
|         | 1    | 717.9 to 718         | -25.40           | <b>-23.56</b> | -24.46 | -25.56 |             |
|         | 2    | 717.9 to 718         | -25.16           | -24.84        | -25.62 | -24.65 |             |
|         | 3    | 717.9 to 718         | -24.91           | -24.32        | -25.78 | -24.70 |             |
| High    | 0    | 728 to 728.1         | -23.94           | <b>-23.03</b> | -23.48 | -23.42 |             |
|         | 1    | 728 to 728.1         | -23.71           | -24.25        | -23.73 | -24.30 |             |
|         | 2    | 728 to 728.1         | -23.82           | -23.50        | -24.18 | -24.57 |             |
|         | 3    | 728 to 728.1         | -22.87           | -23.69        | -23.64 | -23.29 |             |

**Table 8-21. Band Edge Emission Summary Data (NR\_n29\_1C\_5M)**

| Channel | Port | Measured Range (MHz) | Max. Value (dBm) |               |        |               | Limit (dBm) |
|---------|------|----------------------|------------------|---------------|--------|---------------|-------------|
|         |      |                      | QPSK             | 16QAM         | 64QAM  | 256QAM        |             |
| Low     | 0    | 717.9 to 718         | -23.89           | <b>-22.67</b> | -23.07 | -23.74        | -19.02      |
|         | 1    | 717.9 to 718         | -23.96           | -23.46        | -23.29 | <b>-23.06</b> |             |
|         | 2    | 717.9 to 718         | -24.30           | -23.88        | -24.37 | -24.27        |             |
|         | 3    | 717.9 to 718         | -25.51           | -24.16        | -25.24 | -24.66        |             |
| High    | 0    | 728 to 728.1         | -23.03           | <b>-22.96</b> | -23.84 | -23.63        |             |
|         | 1    | 728 to 728.1         | -24.55           | -24.13        | -25.61 | -23.55        |             |
|         | 2    | 728 to 728.1         | -24.00           | -24.50        | -24.50 | -25.45        |             |
|         | 3    | 728 to 728.1         | -23.94           | -22.42        | -23.97 | -23.88        |             |

**Table 8-22. Band Edge Emission Summary Data (NR\_n29\_2C\_5M+5M)**

|  |   |                                       |  |   |                                   |
|--|---|---------------------------------------|--|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |  | Page 35 of 78   |                                   |

| Channel | Port | Measured Range (MHz) | Max. Value (dBm) |        |               |        | Limit (dBm) |
|---------|------|----------------------|------------------|--------|---------------|--------|-------------|
|         |      |                      | QPSK             | 16QAM  | 64QAM         | 256QAM |             |
| Low     | 0    | 616.9 to 617         | -23.60           | -22.79 | -22.90        | -23.87 | -19.02      |
|         | 1    | 616.9 to 617         | -22.45           | -22.47 | -22.90        | -22.97 |             |
|         | 2    | 616.9 to 617         | -23.16           | -23.62 | -22.69        | -23.51 |             |
|         | 3    | 616.9 to 617         | -23.26           | -23.00 | <b>-22.22</b> | -24.44 |             |
| High    | 0    | 652 to 652.1         | -23.90           | -24.66 | -23.54        | -23.86 |             |
|         | 1    | 652 to 652.1         | -22.74           | -22.52 | -23.73        | -23.05 |             |
|         | 2    | 652 to 652.1         | -24.21           | -23.79 | <b>-22.25</b> | -22.76 |             |
|         | 3    | 652 to 652.1         | -24.14           | -23.59 | -23.80        | -23.94 |             |



**Table 8-23. Band Edge Emission Summary Data (NR\_n71\_1C\_5M)**

| Channel | Port | Measured Range (MHz) | Max. Value (dBm) |               |               |        | Limit (dBm) |
|---------|------|----------------------|------------------|---------------|---------------|--------|-------------|
|         |      |                      | QPSK             | 16QAM         | 64QAM         | 256QAM |             |
| Low     | 0    | 616.9 to 617         | -23.26           | -22.77        | -23.76        | -23.95 | -19.02      |
|         | 1    | 616.9 to 617         | -22.42           | <b>-22.15</b> | -22.75        | -22.96 |             |
|         | 2    | 616.9 to 617         | -22.78           | -24.22        | -23.81        | -22.54 |             |
|         | 3    | 616.9 to 617         | -22.19           | -22.93        | -23.80        | -23.84 |             |
| High    | 0    | 652 to 652.1         | -24.14           | -25.94        | -23.35        | -24.01 |             |
|         | 1    | 652 to 652.1         | -22.78           | -25.42        | <b>-22.74</b> | -22.96 |             |
|         | 2    | 652 to 652.1         | -23.66           | -26.34        | -23.66        | -24.78 |             |
|         | 3    | 652 to 652.1         | -23.95           | -25.73        | -23.63        | -23.68 |             |

**Table 8-24. Band Edge Emission Summary Data (NR\_n71\_1C\_10M)**

| Channel | Port | Measured Range (MHz) | Max. Value (dBm) |               |               |        | Limit (dBm) |
|---------|------|----------------------|------------------|---------------|---------------|--------|-------------|
|         |      |                      | QPSK             | 16QAM         | 64QAM         | 256QAM |             |
| Low     | 0    | 616.9 to 617         | -24.06           | <b>-22.08</b> | -23.91        | -24.98 | -19.02      |
|         | 1    | 616.9 to 617         | -23.85           | -22.63        | -24.23        | -24.14 |             |
|         | 2    | 616.9 to 617         | -22.60           | -22.69        | -23.14        | -24.37 |             |
|         | 3    | 616.9 to 617         | -24.85           | -22.92        | -24.49        | -25.09 |             |
| High    | 0    | 652 to 652.1         | -24.54           | -24.29        | -24.69        | -23.33 |             |
|         | 1    | 652 to 652.1         | -24.39           | -24.40        | -24.50        | -23.65 |             |
|         | 2    | 652 to 652.1         | -25.30           | -24.17        | <b>-23.30</b> | -23.84 |             |
|         | 3    | 652 to 652.1         | -25.18           | -24.93        | -23.99        | -23.90 |             |

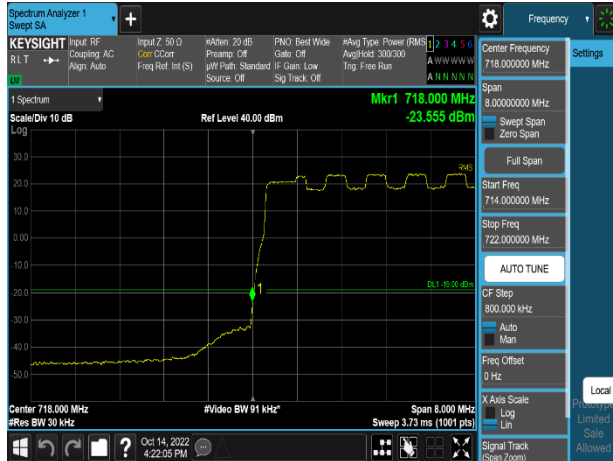
**Table 8-25. Band Edge Emission Summary Data (NR\_n71\_1C\_20M)**

|  |   |                                       |  |   |                                   |
|--|---|---------------------------------------|--|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |  | Page 36 of 78   |                                   |

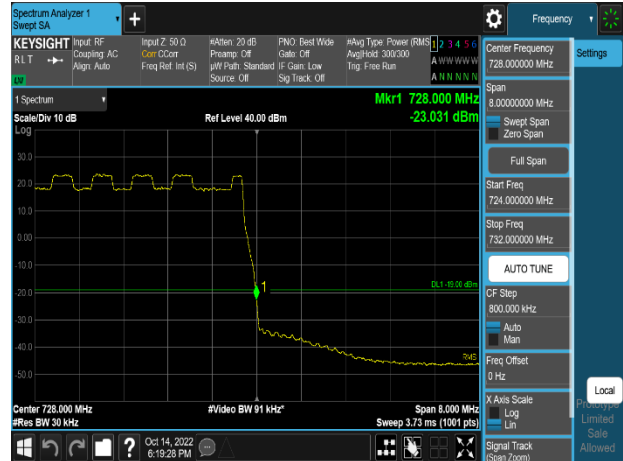
| Channel | Port | Measured Range (MHz) | Max. Value (dBm) |        |               |        | Limit (dBm) |
|---------|------|----------------------|------------------|--------|---------------|--------|-------------|
|         |      |                      | QPSK             | 16QAM  | 64QAM         | 256QAM |             |
| Middle  | 0    | 863.8625 to 863.9625 | -26.45           | -25.69 | -25.74        | -24.29 | -19.02      |
|         | 0    | 863.9625 to 864      | -32.04           | -31.24 | -30.80        | -31.11 | -26.02      |
|         | 0    | 869 to 869.0375      | -32.04           | -32.08 | -32.13        | -32.18 |             |
|         | 0    | 869.0375 to 869.1375 | -27.73           | -25.86 | -27.48        | -25.85 | -19.02      |
|         | 1    | 863.8625 to 863.9625 | -26.79           | -27.71 | -25.93        | -25.56 | -19.02      |
|         | 1    | 863.9625 to 864      | -32.04           | -31.19 | -30.77        | -31.19 | -26.02      |
|         | 1    | 869 to 869.0375      | -32.45           | -32.52 | -32.50        | -32.95 |             |
|         | 1    | 869.0375 to 869.1375 | -28.48           | -27.92 | -29.33        | -28.42 | -19.02      |
|         | 2    | 863.8625 to 863.9625 | -25.99           | -25.67 | -25.80        | -24.66 | -19.02      |
|         | 2    | 863.9625 to 864      | -31.83           | -31.19 | <b>-30.51</b> | -30.82 | -26.02      |
|         | 2    | 869 to 869.0375      | -32.05           | -32.10 | -32.19        | -32.42 |             |
|         | 2    | 869.0375 to 869.1375 | -28.32           | -28.89 | -28.16        | -26.86 | -19.02      |
|         | 3    | 863.8625 to 863.9625 | -26.67           | -27.13 | -25.49        | -26.94 | -19.02      |
|         | 3    | 863.9625 to 864      | -32.31           | -30.97 | -30.92        | -31.14 | -26.02      |
|         | 3    | 869 to 869.0375      | <b>-31.95</b>    | -32.10 | -32.04        | -32.40 |             |
|         | 3    | 869.0375 to 869.1375 | -26.15           | -28.50 | -27.23        | -28.08 | -19.02      |

**Table 8-26. Emission Mask Summary Data (NR\_n26\_1C\_5M)**

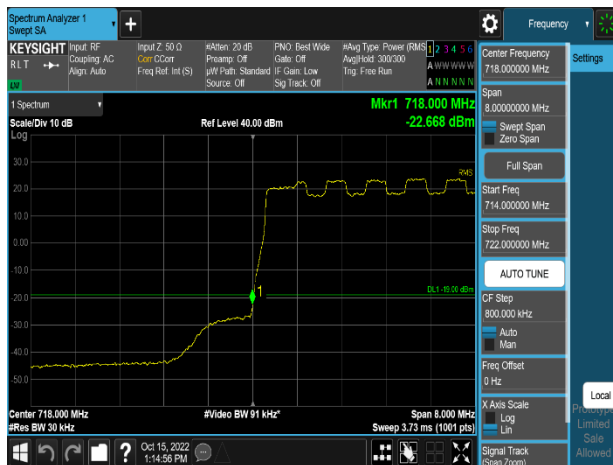
|   |   |   |   |  |
|---|---|---|---|--|
| FCC ID: A3LRF4450T-71A                          |  | <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K22101401-00-R1.A3L | <b>Test Dates:</b><br>10/14/2022 - 10/18/2022                                       | <b>EUT Type:</b><br>RRU(RF4450t)              | Page 37 of 78   |  |



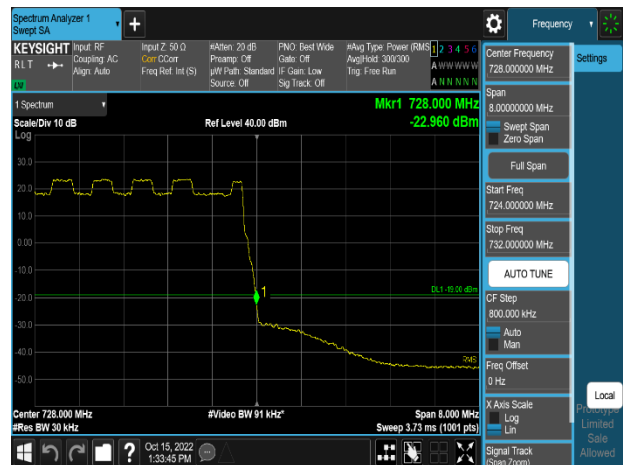
Plot 8 1. Band Edge Emission Plot  
(n29\_1C\_5M\_16QAM - Low Channel, Port 1)



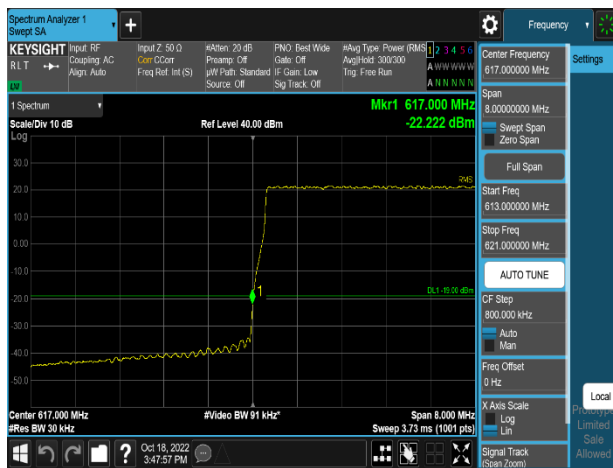
Plot 8 1. Band Edge Emission Plot  
(n29\_1C\_5M\_16QAM - High Channel, Port 0)



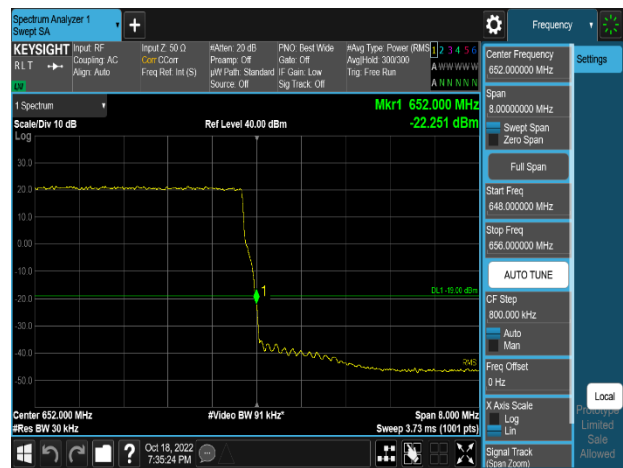
Plot 8 1. Band Edge Emission Plot  
(n29\_2C\_5M+5M\_16QAM - Low Channel, Port 0)



Plot 8 1. Band Edge Emission Plot  
(n29\_2C\_5M+5M\_16QAM - High Channel, Port 0)

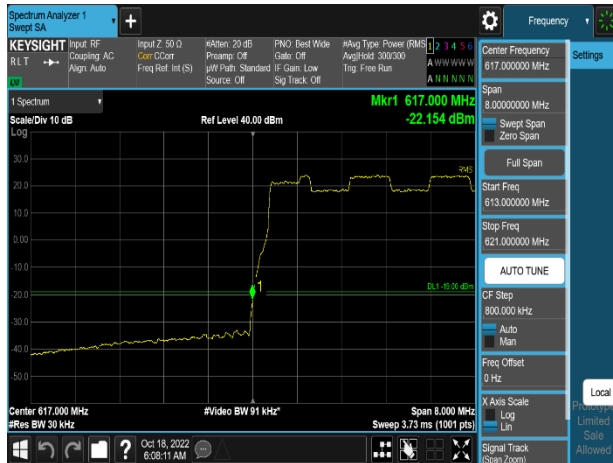


Plot 8 1. Band Edge Emission Plot  
(n71\_1C\_5M\_64QAM - Low Channel, Port 3)

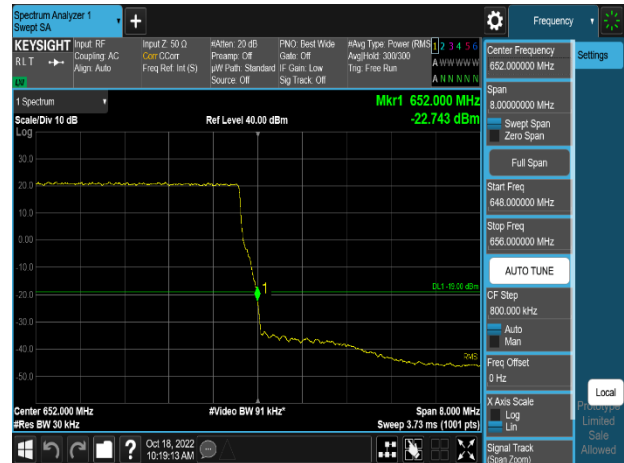


Plot 8 1. Band Edge Emission Plot  
(n71\_1C\_5M\_64QAM - High Channel, Port 2)

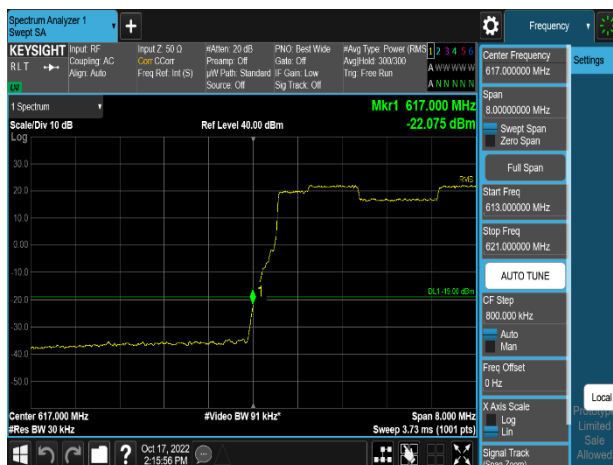
|   |   |   |  |  |
|---|---|---|--|--|
| FCC ID: A3LRF4450T-71A                          |   | <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K22101401-00-R1.A3L | <b>Test Dates:</b><br>10/14/2022 - 10/18/2022 | <b>EUT Type:</b><br>RRU(RF4450t)              |  | Page 38 of 78                            |



Plot 8 1. Band Edge Emission Plot  
(n71\_1C\_10M\_16QAM - Low Channel, Port 1)



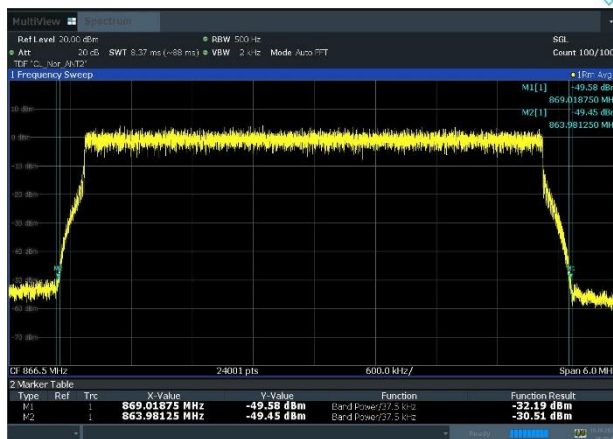
Plot 8 1. Band Edge Emission Plot  
(n71\_1C\_10M\_64QAM - High Channel, Port 1)



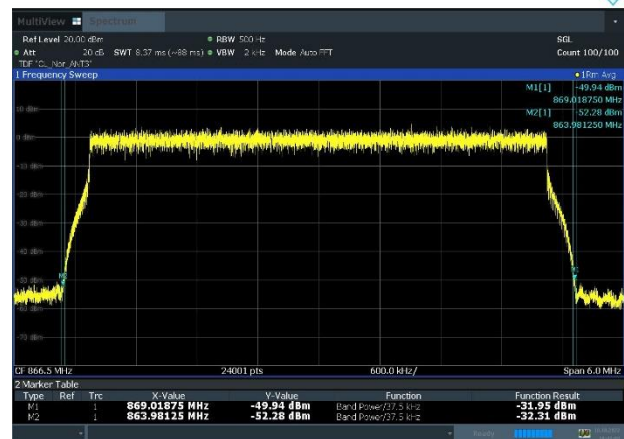
Plot 8 1. Band Edge Emission Plot  
(n71\_1C\_20M\_16QAM - Low Channel, Port 0)



Plot 8 1. Band Edge Emission Plot  
(n71\_1C\_20M\_64QAM - High Channel, Port 2)



Plot 8-43. Channel Edge Emission Plot  
(n26\_1C\_5M\_64QAM - Low Frequency block - 37.5kHz, Port 2)



Plot 8-44. Channel Edge Emission Plot  
(n26\_1C\_5M\_QPSK - High Frequency block + 37.5kHz, Port 3)

|  |  |                                       |  |                                   |
|--|--|---------------------------------------|--|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022 | EUT Type:<br>RRU(RF4450t)             |  | Page 39 of 78                     |



## 8.6 Spurious and Harmonic Emissions at Antenna Terminal

### Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10<sup>th</sup> harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

### Test Procedure Used

KDB 971168 D01 v03r01 – Section 6

KDB 662911 D01 v02r01 – Section E)3) Out-of-Band and Spurious Emission Measurements

a) Absolute Emission Limits

iii) Measure and add  $10 \log(N_{ANT})$  dB

ANSI C63.26-2015 – Section 5.7

### Test Setting

1. Start frequency was set to 9 kHz and stop frequency was set to at least  $10 \times$  the fundamental frequency excluding the frequency range of the band edge measurement.
2. RBW: Please see test notes below.
3. VBW  $\geq 3 \times$  RBW
4. Detector = RMS
5. Number of sweep points  $\geq 2 \times$  Span/RBW
6. Trace mode = trace average
7. Sweep time = auto couple
8. The trace was allowed to stabilize

### Limit

#### NR n29 and n71 operation under Part 27.53

The minimum permissible attenuation level of any spurious emission is  $43 + \log_{10}(P_{[Watts]})$ , where P is the transmitter power in Watts.

#### NR n26 operation under Part 90.691

For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \log_{10}(f/6.1)$  decibels or  $50 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

|  |   |                                       |   |                                   |
|--|---|---------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             | Page 40 of 78   |                                   |



## Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

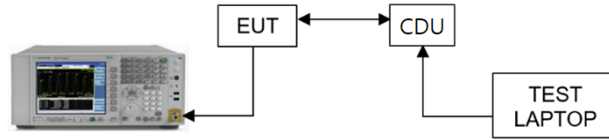




Figure 8-5. Test Instrument & Measurement Setup

## Test Notes

- Per Part 27.53(g), Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least 30 kilohertz may be employed.
- Per Part 90.691, the frequency block by up to and including 37.5 kHz range complies with  $50 + 10 \text{Log}_{10}(P)$  decibels and frequency block greater than 37.5 kHz range complies with  $43 + 10\text{Log}_{10}(P)$  decibels limit.
- The n29 is an SDL( Supplemental Downlink ) designed exclusively for downlink. Therefore, the n29 cannot operate alone, it was tested by simultaneously operating n29 and n71.
- All the measurement has been tested but test plots are referred from the highest of value of each of modulation of each antenna ports.
- The limits were adjusted by a factor of  $[-10 * \log(4)]$  dB to account for the device operation as a 4 port MIMO transmitter, as per FCC KDB 622911. MIMO Factor calculation as below:  
MIMO Factor =  $10 * \log(4) = 6.02$  dB
- Narrower RBW parameter is applied according to Section 5.7 of ANSI C63.26-2015 for some edge channels due to improving measurement accuracy. RBW Factor calculation as below:
  - RBW Factor =  $10 * \log(1/0.01) = 20$  dB for the measurement range from 9 kHz to 150 kHz.
  - RBW Factor =  $10 * \log(1/0.1) = 10$  dB for the measurement range from 150 kHz to 30 MHz.

| Frequency range   | Basic Limit (dBm)     | 4 TX MIMO Factor (dB) | RBW Factor (dB) | Adjusted limit (dBm) |
|-------------------|-----------------------|-----------------------|-----------------|----------------------|
| 9 kHz to 150 kHz  | -13                   | 6.02                  | 20              | -39.02               |
| 150 kHz to 30 MHz | -13                   | 6.02                  | 10              | -29.02               |
| 30 MHz to 1 GHz   | -13                   | 6.02                  | 0               | -19.02               |
| Frequency range   | Basic Limit (dBm/MHz) | 4 TX MIMO Factor (dB) | RBW Factor (dB) | Adjusted limit (dBm) |
| 1 GHz to 9 GHz    | -13                   | 6.02                  | 0               | -19.02               |

Note: Adjusted limit (dBm) = Basic limit (dBm) - MIMO Factor - RBW Factor  
Adjusted limit (dBm/MHz) = Basic limit (dBm/MHz) - MIMO Factor - RBW Factor



|  |   |                                    |   |                                   |
|--|---|------------------------------------|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT (CERTIFICATION) |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)          |   | Page 41 of 78                     |

| Channel              | Port | Measurement Range    | Level (dBm) |        |        |        | Limit (dBm) | Margin (dB) |
|----------------------|------|----------------------|-------------|--------|--------|--------|-------------|-------------|
|                      |      |                      | QPSK        | 16QAM  | 64QAM  | 256QAM |             |             |
| Low                  | 0    | 9 kHz to 150 kHz     | -46.05      | -45.93 | -46.07 | -46.15 | -39.02      | -6.91       |
|                      |      | 150 kHz to 30 MHz    | -33.18      | -33.79 | -33.60 | -34.34 | -29.02      | -4.16       |
|                      |      | 30 MHz to 700 MHz    | -35.69      | -35.67 | -35.54 | -35.47 | -19.02      | -16.45      |
|                      |      | 700 MHz to 717.9 GHz | -28.60      | -26.89 | -28.32 | -28.25 | -19.02      | -7.87       |
|                      |      | 728.1 MHz to 800 MHz | -36.73      | -35.73 | -36.86 | -37.04 | -19.02      | -16.71      |
|                      |      | 800 MHz to 1 GHz     | -38.62      | -39.11 | -38.87 | -38.77 | -19.02      | -19.60      |
|                      |      | 1 GHz to 3 GHz       | -24.82      | -24.95 | -25.19 | -25.04 | -19.02      | -5.80       |
|                      |      | 3 GHz to 8 GHz       | -29.16      | -28.93 | -28.78 | -29.10 | -19.02      | -9.76       |
|                      | 1    | 9 kHz to 150 kHz     | -47.02      | -46.15 | -46.27 | -47.34 | -39.02      | -7.13       |
|                      |      | 150 kHz to 30 MHz    | -34.50      | -34.58 | -34.31 | -33.61 | -29.02      | -4.59       |
|                      |      | 30 MHz to 700 MHz    | -35.03      | -35.22 | -34.85 | -35.29 | -19.02      | -15.83      |
|                      |      | 700 MHz to 717.9 GHz | -27.20      | -27.09 | -27.18 | -27.09 | -19.02      | -8.07       |
|                      |      | 728.1 MHz to 800 MHz | -35.91      | -34.71 | -36.16 | -36.52 | -19.02      | -15.69      |
|                      |      | 800 MHz to 1 GHz     | -38.79      | -38.94 | -38.68 | -38.71 | -19.02      | -19.66      |
|                      |      | 1 GHz to 3 GHz       | -25.06      | -24.99 | -25.04 | -25.00 | -19.02      | -5.97       |
|                      |      | 3 GHz to 8 GHz       | -28.81      | -28.88 | -28.39 | -28.74 | -19.02      | -9.37       |
|                      | 2    | 9 kHz to 150 kHz     | -46.91      | -46.74 | -46.70 | -47.29 | -39.02      | -7.68       |
|                      |      | 150 kHz to 30 MHz    | -33.43      | -34.41 | -34.46 | -34.38 | -29.02      | -4.41       |
|                      |      | 30 MHz to 700 MHz    | -35.88      | -35.89 | -35.55 | -35.96 | -19.02      | -16.53      |
|                      |      | 700 MHz to 717.9 GHz | -30.53      | -30.23 | -30.22 | -30.45 | -19.02      | -11.20      |
|                      |      | 728.1 MHz to 800 MHz | -36.63      | -36.37 | -37.39 | -37.27 | -19.02      | -17.35      |
|                      |      | 800 MHz to 1 GHz     | -38.76      | -38.72 | -38.53 | -38.86 | -19.02      | -19.51      |
|                      |      | 1 GHz to 3 GHz       | -24.25      | -24.25 | -23.96 | -24.29 | -19.02      | -4.94       |
|                      |      | 3 GHz to 8 GHz       | -27.00      | -27.09 | -27.13 | -27.08 | -19.02      | -7.98       |
|                      | 3    | 9 kHz to 150 kHz     | -46.73      | -47.18 | -46.17 | -46.54 | -39.02      | -7.15       |
|                      |      | 150 kHz to 30 MHz    | -33.47      | -34.78 | -33.90 | -33.80 | -29.02      | -4.45       |
|                      |      | 30 MHz to 700 MHz    | -35.42      | -35.55 | -35.33 | -35.51 | -19.02      | -16.31      |
|                      |      | 700 MHz to 717.9 GHz | -29.21      | -28.40 | -30.09 | -30.18 | -19.02      | -9.38       |
| 728.1 MHz to 800 MHz |      | -36.95               | -36.25      | -36.74 | -36.26 | -19.02 | -17.23      |             |
| 800 MHz to 1 GHz     |      | -38.81               | -38.88      | -38.74 | -38.57 | -19.02 | -19.55      |             |
| 1 GHz to 3 GHz       |      | -24.50               | -24.40      | -24.23 | -24.23 | -19.02 | -5.21       |             |
| 3 GHz to 8 GHz       |      | -27.20               | -27.50      | -27.22 | -27.26 | -19.02 | -8.18       |             |
| High                 | 0    | 9 kHz to 150 kHz     | -46.32      | -46.78 | -47.05 | -45.75 | -39.02      | -6.73       |
|                      |      | 150 kHz to 30 MHz    | -34.55      | -32.92 | -33.71 | -34.74 | -29.02      | -3.90       |
|                      |      | 30 MHz to 700 MHz    | -35.73      | -35.66 | -35.55 | -35.70 | -19.02      | -16.53      |
|                      |      | 700 MHz to 717.9 GHz | -37.64      | -37.81 | -37.59 | -38.19 | -19.02      | -18.57      |
|                      |      | 728.1 MHz to 800 MHz | -25.30      | -23.69 | -23.86 | -23.77 | -19.02      | -4.67       |
|                      |      | 800 MHz to 1 GHz     | -39.14      | -39.03 | -38.94 | -38.91 | -19.02      | -19.89      |
|                      |      | 1 GHz to 3 GHz       | -25.12      | -24.90 | -25.34 | -25.02 | -19.02      | -5.88       |
|                      |      | 3 GHz to 8 GHz       | -29.18      | -29.01 | -29.13 | -29.03 | -19.02      | -9.99       |
|                      | 1    | 9 kHz to 150 kHz     | -46.04      | -45.94 | -46.61 | -46.25 | -39.02      | -6.92       |
|                      |      | 150 kHz to 30 MHz    | -33.00      | -34.70 | -32.81 | -33.81 | -29.02      | -3.79       |
|                      |      | 30 MHz to 700 MHz    | -35.28      | -35.35 | -35.50 | -35.46 | -19.02      | -16.26      |
|                      |      | 700 MHz to 717.9 GHz | -36.77      | -35.44 | -36.38 | -36.69 | -19.02      | -16.42      |
|                      |      | 728.1 MHz to 800 MHz | -24.37      | -21.94 | -23.01 | -24.44 | -19.02      | -2.92       |
|                      |      | 800 MHz to 1 GHz     | -38.69      | -38.73 | -38.78 | -38.78 | -19.02      | -19.67      |
|                      |      | 1 GHz to 3 GHz       | -24.82      | -25.00 | -25.11 | -25.16 | -19.02      | -5.80       |
|                      |      | 3 GHz to 8 GHz       | -28.85      | -28.77 | -28.82 | -28.82 | -19.02      | -9.75       |

|   |   |   |   |  |
|---|---|---|---|--|
| FCC ID: A3LRF4450T-71A                          |  | <b>MEASUREMENT REPORT (CERTIFICATION)</b> |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K22101401-00-R1.A3L | <b>Test Dates:</b><br>10/14/2022 - 10/18/2022                                       | <b>EUT Type:</b><br>RRU(RF4450t)          | Page 42 of 78   |  |



|  |   |                      |        |        |        |        |        |        |
|--|---|----------------------|--------|--------|--------|--------|--------|--------|
|  | 2 | 9 kHz to 150 kHz     | -46.32 | -46.20 | -46.09 | -46.81 | -39.02 | -7.07  |
|  |   | 150 kHz to 30 MHz    | -34.20 | -35.09 | -32.82 | -32.64 | -29.02 | -3.62  |
|  |   | 30 MHz to 700 MHz    | -35.86 | -35.52 | -36.00 | -35.74 | -19.02 | -16.50 |
|  |   | 700 MHz to 717.9 GHz | -38.04 | -37.28 | -38.44 | -38.09 | -19.02 | -18.26 |
|  |   | 728.1 MHz to 800 MHz | -24.32 | -24.78 | -25.98 | -26.32 | -19.02 | -5.30  |
|  |   | 800 MHz to 1 GHz     | -38.77 | -38.79 | -38.76 | -38.66 | -19.02 | -19.64 |
|  |   | 1 GHz to 3 GHz       | -24.38 | -23.92 | -24.13 | -24.31 | -19.02 | -4.90  |
|  |   | 3 GHz to 8 GHz       | -27.22 | -27.29 | -27.22 | -27.07 | -19.02 | -8.05  |
|  | 3 | 9 kHz to 150 kHz     | -46.44 | -46.98 | -46.89 | -46.02 | -39.02 | -7.00  |
|  |   | 150 kHz to 30 MHz    | -33.60 | -32.42 | -34.85 | -34.38 | -29.02 | -3.40  |
|  |   | 30 MHz to 700 MHz    | -35.63 | -35.54 | -35.33 | -35.66 | -19.02 | -16.31 |
|  |   | 700 MHz to 717.9 GHz | -37.24 | -36.43 | -37.47 | -36.53 | -19.02 | -17.41 |
|  |   | 728.1 MHz to 800 MHz | -23.44 | -24.06 | -21.73 | -24.19 | -19.02 | -2.71  |
|  |   | 800 MHz to 1 GHz     | -38.82 | -38.57 | -38.85 | -38.68 | -19.02 | -19.55 |
|  |   | 1 GHz to 3 GHz       | -24.35 | -24.42 | -24.32 | -24.38 | -19.02 | -5.30  |
|  |   | 3 GHz to 8 GHz       | -27.37 | -27.23 | -27.45 | -27.30 | -19.02 | -8.21  |

**Table 8-27. Conducted Spurious Emission Summary Data (n29\_1C\_5M)**

|   |   |   |   |  |
|---|---|---|---|--|
| FCC ID: A3LRF4450T-71A                          |  | <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K22101401-00-R1.A3L | <b>Test Dates:</b><br>10/14/2022 - 10/18/2022                                       | <b>EUT Type:</b><br>RRU(RF4450t)              | Page 43 of 78   |  |

| Channel              | Port | Measurement Range    | Level (dBm) |        |        |               | Limit (dBm) | Margin (dB)  |
|----------------------|------|----------------------|-------------|--------|--------|---------------|-------------|--------------|
|                      |      |                      | QPSK        | 16QAM  | 64QAM  | 256QAM        |             |              |
| Middle               | 0    | 9 kHz to 150 kHz     | -46.83      | -46.68 | -45.97 | <b>-46.13</b> | -39.02      | -6.95        |
|                      |      | 150 kHz to 30 MHz    | -33.82      | -33.58 | -34.22 | <b>-35.04</b> | -29.02      | -4.56        |
|                      |      | 30 MHz to 700 MHz    | -35.53      | -35.30 | -34.99 | <b>-35.11</b> | -19.02      | -15.97       |
|                      |      | 700 MHz to 717.9 GHz | -23.12      | -21.38 | -21.47 | <b>-21.09</b> | -19.02      | <b>-2.07</b> |
|                      |      | 728.1 MHz to 800 MHz | -22.30      | -22.68 | -22.14 | <b>-22.18</b> | -19.02      | -3.12        |
|                      |      | 800 MHz to 1 GHz     | -38.83      | -38.98 | -38.89 | <b>-38.80</b> | -19.02      | -19.78       |
|                      |      | 1 GHz to 3 GHz       | -25.06      | -25.07 | -25.19 | <b>-25.26</b> | -19.02      | -6.04        |
|                      |      | 3 GHz to 8 GHz       | -29.24      | -28.97 | -29.11 | <b>-29.11</b> | -19.02      | -9.95        |
|                      | 1    | 9 kHz to 150 kHz     | -47.05      | -46.29 | -45.85 | -46.50        | -39.02      | -6.83        |
|                      |      | 150 kHz to 30 MHz    | -33.55      | -34.30 | -33.13 | -33.54        | -29.02      | -4.11        |
|                      |      | 30 MHz to 700 MHz    | -35.31      | -35.04 | -35.21 | -35.13        | -19.02      | -16.02       |
|                      |      | 700 MHz to 717.9 GHz | -23.50      | -23.44 | -22.85 | -21.96        | -19.02      | -2.94        |
|                      |      | 728.1 MHz to 800 MHz | -22.68      | -21.93 | -23.57 | -22.81        | -19.02      | -2.91        |
|                      |      | 800 MHz to 1 GHz     | -38.75      | -38.74 | -38.90 | -38.71        | -19.02      | -19.69       |
|                      |      | 1 GHz to 3 GHz       | -25.15      | -25.19 | -25.06 | -24.98        | -19.02      | -5.96        |
|                      |      | 3 GHz to 8 GHz       | -28.69      | -29.02 | -28.77 | -28.84        | -19.02      | -9.67        |
|                      | 2    | 9 kHz to 150 kHz     | -47.47      | -46.63 | -46.38 | -46.55        | -39.02      | -7.36        |
|                      |      | 150 kHz to 30 MHz    | -33.14      | -34.88 | -34.46 | -34.04        | -29.02      | -4.12        |
|                      |      | 30 MHz to 700 MHz    | -35.70      | -35.51 | -35.50 | -35.22        | -19.02      | -16.20       |
|                      |      | 700 MHz to 717.9 GHz | -26.41      | -24.59 | -25.07 | -23.92        | -19.02      | -4.90        |
|                      |      | 728.1 MHz to 800 MHz | -23.88      | -22.71 | -24.11 | -23.70        | -19.02      | -3.69        |
|                      |      | 800 MHz to 1 GHz     | -38.79      | -38.58 | -38.60 | -38.62        | -19.02      | -19.56       |
|                      |      | 1 GHz to 3 GHz       | -24.16      | -24.26 | -24.26 | -23.99        | -19.02      | -4.97        |
|                      |      | 3 GHz to 8 GHz       | -27.10      | -27.28 | -26.98 | -27.24        | -19.02      | -7.96        |
|                      | 3    | 9 kHz to 150 kHz     | -46.91      | -46.55 | -46.87 | -47.00        | -39.02      | -7.53        |
|                      |      | 150 kHz to 30 MHz    | -34.38      | -34.68 | -34.17 | -33.90        | -29.02      | -4.88        |
|                      |      | 30 MHz to 700 MHz    | -35.46      | -35.29 | -35.24 | -35.23        | -19.02      | -16.21       |
|                      |      | 700 MHz to 717.9 GHz | -26.18      | -26.07 | -25.17 | -25.22        | -19.02      | -6.15        |
| 728.1 MHz to 800 MHz |      | -23.67               | -23.67      | -24.25 | -24.40 | -19.02        | -4.65       |              |
| 800 MHz to 1 GHz     |      | -38.59               | -38.70      | -38.88 | -38.58 | -19.02        | -19.56      |              |
| 1 GHz to 3 GHz       |      | -24.15               | -24.34      | -24.22 | -24.45 | -19.02        | -5.13       |              |
| 3 GHz to 8 GHz       |      | -27.28               | -27.11      | -27.53 | -27.32 | -19.02        | -8.09       |              |

**Table 8-28. Conducted Spurious Emission Summary Data (n29\_2C\_5M+5M)**

|  |   |                                       |  |   |                                   |
|--|---|---------------------------------------|--|---|-----------------------------------|
| FCC ID: A3LRF4450T-71A                   |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  |  | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K22101401-00-R1.A3L | Test Dates:<br>10/14/2022 - 10/18/2022  | EUT Type:<br>RRU(RF4450t)             |  | Page 44 of 78   |                                   |

| Channel              | Port | Measurement Range    | Level (dBm) |        |        |        | Limit (dBm) | Margin (dB) |
|----------------------|------|----------------------|-------------|--------|--------|--------|-------------|-------------|
|                      |      |                      | QPSK        | 16QAM  | 64QAM  | 256QAM |             |             |
| Low                  | 0    | 9 kHz to 150 kHz     | -46.01      | -46.03 | -46.30 | -46.03 | -39.02      | -6.99       |
|                      |      | 150 kHz to 30 MHz    | -33.67      | -33.62 | -33.38 | -34.01 | -29.02      | -4.36       |
|                      |      | 30 MHz to 600 MHz    | -39.54      | -39.64 | -39.62 | -39.82 | -19.02      | -20.52      |
|                      |      | 600 MHz to 616.9 GHz | -28.92      | -27.46 | -29.20 | -27.61 | -19.02      | -8.44       |
|                      |      | 652.1 MHz to 700 MHz | -37.95      | -37.23 | -37.15 | -37.50 | -19.02      | -18.13      |
|                      |      | 700 MHz to 1 GHz     | -38.47      | -38.43 | -38.10 | -38.26 | -19.02      | -19.08      |
|                      |      | 1 GHz to 3 GHz       | -24.89      | -25.21 | -24.95 | -25.07 | -19.02      | -5.87       |
|                      |      | 3 GHz to 8 GHz       | -28.87      | -29.05 | -28.89 | -28.99 | -19.02      | -9.85       |
|                      | 1    | 9 kHz to 150 kHz     | -46.84      | -46.31 | -45.69 | -47.04 | -39.02      | -6.67       |
|                      |      | 150 kHz to 30 MHz    | -34.41      | -34.78 | -34.48 | -33.93 | -29.02      | -4.91       |
|                      |      | 30 MHz to 600 MHz    | -39.40      | -39.25 | -39.04 | -39.15 | -19.02      | -20.02      |
|                      |      | 600 MHz to 616.9 GHz | -28.97      | -28.49 | -29.66 | -30.99 | -19.02      | -9.47       |
|                      |      | 652.1 MHz to 700 MHz | -37.46      | -36.86 | -37.07 | -36.51 | -19.02      | -17.49      |
|                      |      | 700 MHz to 1 GHz     | -38.36      | -37.76 | -37.85 | -37.61 | -19.02      | -18.59      |
|                      |      | 1 GHz to 3 GHz       | -25.01      | -24.70 | -24.86 | -24.82 | -19.02      | -5.68       |
|                      |      | 3 GHz to 8 GHz       | -28.64      | -28.45 | -28.52 | -28.67 | -19.02      | -9.43       |
|                      | 2    | 9 kHz to 150 kHz     | -46.48      | -46.36 | -46.12 | -45.90 | -39.02      | -6.88       |
|                      |      | 150 kHz to 30 MHz    | -33.57      | -33.29 | -35.13 | -33.65 | -29.02      | -4.27       |
|                      |      | 30 MHz to 600 MHz    | -39.64      | -39.74 | -39.82 | -39.76 | -19.02      | -20.62      |
|                      |      | 600 MHz to 616.9 GHz | -28.01      | -29.42 | -29.28 | -29.85 | -19.02      | -8.99       |
|                      |      | 652.1 MHz to 700 MHz | -38.31      | -37.76 | -37.16 | -37.61 | -19.02      | -18.14      |
|                      |      | 700 MHz to 1 GHz     | -38.44      | -38.52 | -38.38 | -38.57 | -19.02      | -19.36      |
|                      |      | 1 GHz to 3 GHz       | -24.12      | -24.05 | -24.21 | -24.04 | -19.02      | -5.02       |
|                      |      | 3 GHz to 8 GHz       | -27.09      | -27.08 | -27.08 | -26.74 | -19.02      | -7.72       |
|                      | 3    | 9 kHz to 150 kHz     | -47.09      | -46.01 | -47.41 | -46.49 | -39.02      | -6.99       |
|                      |      | 150 kHz to 30 MHz    | -35.08      | -34.06 | -34.90 | -33.84 | -29.02      | -4.82       |
|                      |      | 30 MHz to 600 MHz    | -39.93      | -39.98 | -40.02 | -40.17 | -19.02      | -20.91      |
|                      |      | 600 MHz to 616.9 GHz | -28.09      | -27.84 | -28.31 | -29.16 | -19.02      | -8.82       |
| 652.1 MHz to 700 MHz |      | -38.04               | -37.79      | -37.31 | -37.71 | -19.02 | -18.29      |             |
| 700 MHz to 1 GHz     |      | -38.69               | -38.32      | -38.35 | -38.17 | -19.02 | -19.15      |             |
| 1 GHz to 3 GHz       |      | -24.17               | -24.09      | -24.14 | -24.29 | -19.02 | -5.07       |             |
| 3 GHz to 8 GHz       |      | -27.19               | -27.20      | -27.03 | -27.21 | -19.02 | -8.01       |             |
| Middle               | 0    | 9 kHz to 150 kHz     | -46.79      | -46.20 | -45.30 | -45.74 | -39.02      | -6.28       |
|                      |      | 150 kHz to 30 MHz    | -33.80      | -32.69 | -33.41 | -32.47 | -29.02      | -3.45       |
|                      |      | 30 MHz to 600 MHz    | -39.54      | -39.68 | -39.71 | -39.68 | -19.02      | -20.52      |
|                      |      | 600 MHz to 616.9 GHz | -37.19      | -37.02 | -37.20 | -37.57 | -19.02      | -18.00      |
|                      |      | 652.1 MHz to 700 MHz | -37.91      | -37.39 | -37.57 | -37.72 | -19.02      | -18.37      |
|                      |      | 700 MHz to 1 GHz     | -38.11      | -38.17 | -38.42 | -38.26 | -19.02      | -19.09      |
|                      |      | 1 GHz to 3 GHz       | -24.96      | -25.07 | -24.97 | -24.63 | -19.02      | -5.61       |
|                      |      | 3 GHz to 8 GHz       | -28.89      | -28.97 | -29.02 | -29.08 | -19.02      | -9.87       |
|                      | 1    | 9 kHz to 150 kHz     | -45.97      | -46.05 | -46.47 | -45.69 | -39.02      | -6.67       |
|                      |      | 150 kHz to 30 MHz    | -33.24      | -33.62 | -35.11 | -34.38 | -29.02      | -4.22       |
|                      |      | 30 MHz to 600 MHz    | -39.12      | -39.18 | -39.30 | -39.46 | -19.02      | -20.10      |
|                      |      | 600 MHz to 616.9 GHz | -36.80      | -37.35 | -37.10 | -36.91 | -19.02      | -17.78      |
|                      |      | 652.1 MHz to 700 MHz | -37.20      | -36.74 | -37.32 | -37.18 | -19.02      | -17.72      |
|                      |      | 700 MHz to 1 GHz     | -38.13      | -37.77 | -38.10 | -37.99 | -19.02      | -18.75      |
|                      |      | 1 GHz to 3 GHz       | -24.88      | -24.65 | -24.97 | -24.49 | -19.02      | -5.47       |
|                      |      | 3 GHz to 8 GHz       | -28.72      | -28.74 | -28.52 | -28.75 | -19.02      | -9.50       |

|   |   |   |   |  |
|---|---|---|---|--|
| FCC ID: A3LRF4450T-71A                          |  | <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K22101401-00-R1.A3L | <b>Test Dates:</b><br>10/14/2022 - 10/18/2022                                       | <b>EUT Type:</b><br>RRU(RF4450t)              | Page 45 of 78   |  |