# Report On

FCC Testing of the
Ericsson Remote Radio Unit LTE, NB-IoT, NR, LTE + NR, KRC 161 879/1, LPRU 4410 B5 B12A (700 MHz and 850 MHz), with compatible Main Unit in a Base Station configuration in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 22, and FCC CFR Part 27

COMMERCIAL-IN-CONFIDENCE

FCC: TA8AKRC161879-1

| PREPARED BY | APPROVED BY | DATED |
|---|---|---|
|  |  | May 11, 2020 |
| Glen Westwell<br>Senior Test Engineer | Scott Drysdale<br>Authorized Signatory | |

**CONTENTS**

**Section** **Page No**

## SECTION 1

## REPORT INFORMATION

## 1.1 REPORT DETAILS

| | |
|---|---|
| Manufacturer | Ericsson |
| Address | Torshamnsgatan 23<br>Kista<br>SE-16480<br>Stockholm<br>Sweden |
| Product Name & Product Number | LPRU 4410 B5 B12A & KRC 161 879/1 |
| Serial Number(s): TD3F063153 | |
| Software Version: CXP 901 3268/17 Revision: R82GS | |
| Hardware Version: R1B | |
| Test Specification/Issue/Date | FCC CFR 47 Part 2: 2019<br>FCC CFR 47 Part 22: 2019<br>FCC CFR 47 Part 27: 2019 |
| Test Plan | LPRU 4410 B5B12A_RA_testplan_NR_LTE (TUV SUD) |
| Product Name & Product Number | LPRU 4410 B5 B13 & KRC 161 887/1 |
| Start of Test | 21 April 2020 |
| Finish of Test | 24 April 2020 |
| Name of Engineer(s) | Glen Westwell |
| Related Document(s) | KDB 971168 D01 v02r02<br>KDB 662911 D01 v02r01 |

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate compliance with FCC CFR 47 Part 22& 27. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

Glen Westwell

## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results for each configuration, in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 22and FCC CFR 47 Part 27 are shown below.

| Section | Specification Clause | | Test Description | Result |
|---|---|---|---|---|
| | FCC CFR 47 Part 2 | FCC CFR 47 Part 22 | | |
| 2.1 | 2.1046 | 22.913 (a) | Maximum Peak Output Power and Peak to Average Ratio - Conducted | Pass* |
| 2.2 | 2.1049 | 22.917 (b) | Occupied Bandwidth | Pass* |
| 2.3 | 2.1051 | 22.917 | Band Edge | Pass* |
| 2.4 | 2.1051 | 22.917 | Transmitter Spurious Emissions | Pass* |
| 2.5 | 2.1055 | - | Frequency Stability | Pass* |

*Testing for B5 FCC Part 22 has not been perfomed on the LPRU 4410 B5 B12A, this B5 testing is being reused from Report 75947902 Report 01 which was performed on the LPRU 4410 B5 B13.

| Section | Specification Clause | | Test Description | Result |
|---|---|---|---|---|
| | FCC CFR 47 Part 2 | FCC CFR 47 Part 27 | | |
| 2.1 | 2.1046 | 27.50 | Maximum Peak Output Power and Peak to Average Ratio - Conducted | Pass |
| 2.2 | 2.1049 | 27.53 | Occupied Bandwidth | Pass |
| 2.3 | 2.1051 | 27.53 (g) | Band Edge | Pass |
| 2.4 | 2.1051 | 27.53 (g) | Transmitter Spurious Emissions | Pass |
| 2.5 | 2.1055 | 27.54 | Frequency Stability | Pass |

Measurement Uncertainty Decision Statement

Determination of conformity with the specification limits is based on the results of the compliance measurement and does not take into account measurement instrumentation uncertainty as defined in ANSI C63.26:2015 Clause 1.3.

## 1.3 CONFIGURATION DESCRIPTION

| Configuration | RAT | No. Of carriers | Carrier Bandwidth | Carrier Frequency Configuration (MHz) | | |
|---|---|---|---|---|---|---|
| | | | | Bottom | Middle | Top |
| A | LTE | 1 | 5 MHz | 731.5 | 737.0 | 742.5 |
| | | | 10 MHz | 734.0 | 737.0 | 740.0 |
| | NR | | 5 MHz – SCS 15kHz | 731.5 | 737.0 | 742.5 |
| | | | 10 MHz – SCS 15kHz | 734.0 | 737.0 | 740.0 |
| | | | 15 MHz – SCS 15kHz | 736.5 | - | 737.5 |
| B | LTE | 2 | 5 MHz | 731.5+736.5 | - | 737.5+742.5 |
| | | | | | | ‘- |
| | NR | | 5 MHz – SCS 15kHz | 731.5+736.5 | - | 737.5+742.5 |
| | | | | | | ‘- |
| | NR + LTE | | 10 MHz + 5 MHz – SCS 15kHz | 734.0+741.5 | - | 736.5+737.5 |
| C | LTE | 3 | 5 MHz | 731.5+736.5+742.5 | - | 732.5+737.5+742.5 |
| | | | | | | - |
| | NR | | 5 MHz – SCS 15kHz | 731.5+736.5+741.5 | - | 732.5+737.5+742.5 |
| | NR + LTE | | 5 MHz + 5 MHz – SCS 15kHz | 731.5+736.5+741.5 | - | 732.5+737.5+742.5 |

## 1.4 DECLARATION OF BUILD STATUS

| MAIN EUT | |
|---|---|
| **MANUFACTURING DESCRIPTION** | LPRU 4410 B5B12A |
| **MANUFACTURER** | Ericsson |
| **TYPE** | Remote Radio Base Station |
| **PART NUMBER** | KRC 161 879/1 |
| **SERIAL NUMBER** | TD3F063153 |
| **HARDWARE VERSION** | R1B |
| **SOFTWARE VERSION** | CXP9013268%17_R82GS |
| **TRANSMITTER OPERATING RANGE** | B5: 869-894 MHz, B13: 729-745MHz |
| **RECEIVER OPERATING RANGE** | B5: 824-849 MHz, B13: 699-715MHz |
| **COUNTRY OF ORIGIN** | China |
| **INTERMEDIATE FREQUENCIES** | None |
| **EMISSION DESIGNATOR(S): (i.e. G1D, GXW)** | B5 and B12A LTE:<br>5M00W7D, 10M0W7D<br><br>B5 and B12A NBIoT Guardband:<br>10M0W7D<br><br>B5 NR:<br>5M00F9W, 10M0F9W, 15M0F9W, 20M0F9W<br><br>B12A NR:<br>5M00F9W, 10M0F9W, 15M0F9W |
| **MODULATION TYPES:**<br>**(i.e. GMSK, QPSK)** | LTE: QPSK, 16QAM, 64QAM, 256QAM<br>NR: QPSK, 16QAM, 64QAM, 256QAM |
| **HIGHEST INTERNALLY GENERATED FREQUENCY** | 0.894 GHz |
| **OUTPUT POWER (W or dBm)** | B5: 4 x 0.05W (17dBm)<br>B12A: 4 x 0.05W (17dBm) |
| **FCC ID** | TA8AKRC161879-1 |
| **INDUSTRY CANADA ID** | |
| **TECHNICAL DESCRIPTION (a brief description of the intended use and operation)** | LPRU 4410 B5B12A (KRC 161 879/1) is a Remote Radio Unit forming part of the Ericsson Radio Base Station (RBS) equipment. The LPRU provides radio access for mobile and fixed devices and is intended for the indoor environment. The radio operates over 8 Transmit ports in MRO (LTE, NBIoT, and NR);Single, and Multi-Carrier transmission with a maximum rated RF Output of 0.05W per port over an operational temperature of 0°C to +50°C. The unit is designed to be rack mounted. . |

**Signature:** 

**……**

**Denis Lalonde**

**Date: 5 May 2020**

**Declaration of Build Status Serial Number:** TD3F063153

No responsibility will be accepted by TÜV SÜD UK Limited as to the accuracy of the information declared in this document by the manufacturer.

## 1.5 PRODUCT INFORMATION

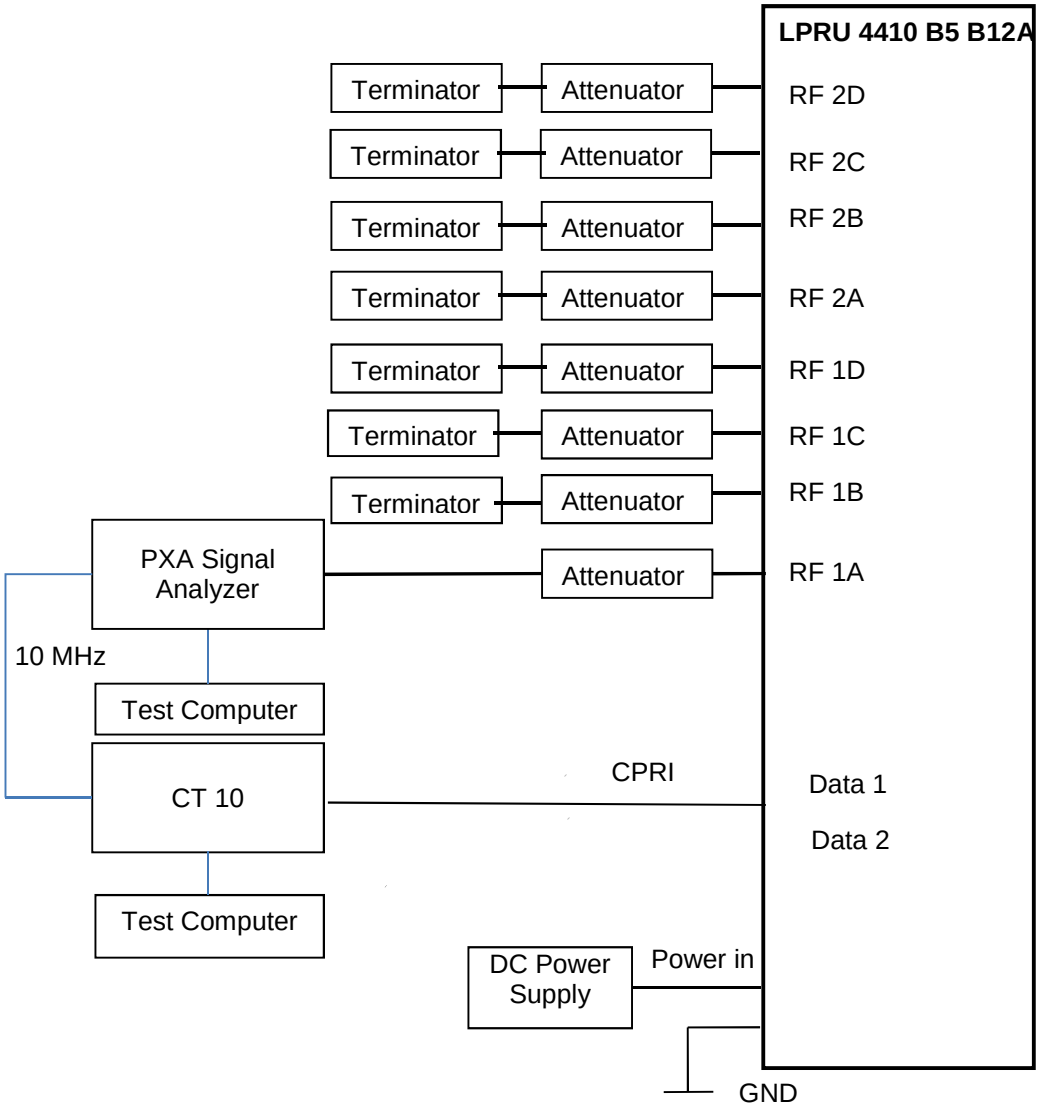
### 1.5.1 Technical Description

The Equipment Under Test (EUT) LPRU 4410 B5 B12A is an Ericsson AB Radio Unit working in the public mobile service (700 and 850 MHz) bands which provides communication connections to (700 and 850 MHz) network. The LPRU 4410 B5 B12A operates from a -48V DC supply.

The Equipment Under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturer's documentation.

Equipment Under Test

## 1.6 TEST SETUP



## 1.7 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated as described in the Test Method for each Test.

The EUT was powered from a -48V DC supply.

FCC Measurement Facility Registration Number: CA4810

## 1.8 DEVIATION FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

## 1.9 MODIFICATION RECORD

No modifications were made to the EUT during testing.

## SECTION 2

## TEST DETAILS

## 2.1 MAXIMUM PEAK OUTPUT POWER AND PEAK TO AVERAGE RATIO - CONDUCTED

### 2.1.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.50
FCC CFR 47 Part 2, Clause 2.1046

### 2.1.2 Date of Test and Modification State

21 April 2020 - Modification State 0

### 2.1.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.1.4 Environmental Conditions

| | |
|---|---|
| Ambient Temperature | 23.5°C |
| Relative Humidity | 31.3% |

### 2.1.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01, clause 5.2.1 and summed in accordance with FCC KDB 662911 D01.

### 2.1.6 Test Results

**Configuration A**

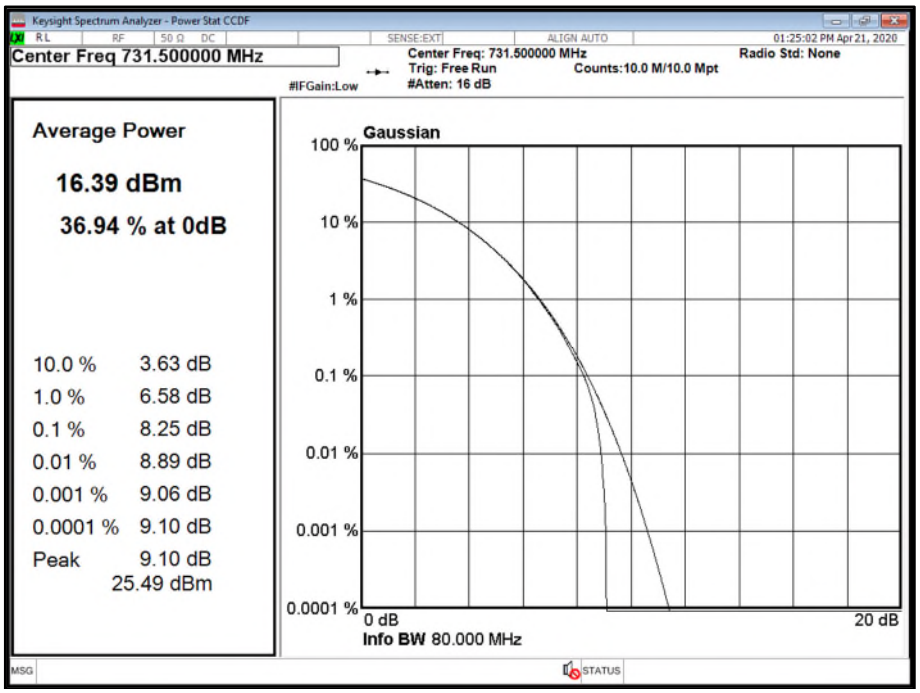
Maximum Output Power: 17.00 dBm per port.

| Antenna | Modulation | Carrier Bandwidth | Peak to Average Ratio (PAR) / Output Power | | |
|---|---|---|---|---|---|
| | | | Channel Position B | | |
| | | | PAR (dB) | Average Power | |
| | | | | dBm | dBm/MHz |
| A | LTE: QPSK | 5.0 MHz | 8.89 | 16.39 | 10.65 |
| B | LTE: QPSK | 5.0 MHz | 8.95 | 16.26 | 10.47 |
| C | LTE: QPSK | 5.0 MHz | 8.95 | 16.26 | 10.47 |
| D | LTE: QPSK | 5.0 MHz | 8.98 | 16.36 | 10.65 |
| Total | | | - | 22.34 | 16.58 |
| A | LTE: QPSK | 10.0 MHz | 9.05 | 15.89 | 7.64 |
| B | LTE: QPSK | 10.0 MHz | 9.03 | 16.27 | 7.63 |
| C | LTE: QPSK | 10.0 MHz | 8.97 | 15.96 | 7.47 |
| D | LTE: QPSK | 10.0 MHz | 8.96 | 16.34 | 7.77 |
| Total | | | - | 22.14 | 13.65 |
| A | NR: QPSK | 5.0 MHz | 8.93 | 16.46 | 10.81 |
| B | NR: QPSK | 5.0 MHz | 8.93 | 16.56 | 10.89 |
| C | NR: QPSK | 5.0 MHz | 8.99 | 16.44 | 10.91 |
| D | NR: QPSK | 5.0 MHz | 8.95 | 16.53 | 10.96 |
| Total | | | - | 22.52 | 16.91 |
| A | NR: QPSK | 10.0 MHz | 9.24 | 16.17 | 7.84 |
| B | NR: QPSK | 10.0 MHz | 8.96 | 16.27 | 7.88 |
| C | NR: QPSK | 10.0 MHz | 9.06 | 16.24 | 8.01 |
| D | NR: QPSK | 10.0 MHz | 8.98 | 16.35 | 7.77 |
| Total | | | - | 22.28 | 13.90 |
| A | NR: QPSK | 15.0 MHz | 9.27 | 16.68 | 6.30 |
| B | NR: QPSK | 15.0 MHz | 9.09 | 16.17 | 5.91 |
| C | NR: QPSK | 15.0 MHz | 9.11 | 16.10 | 5.64 |
| D | NR: QPSK | 15.0 MHz | 9.05 | 16.08 | 5.77 |
| Total | | | - | 22.29 | 11.93 |

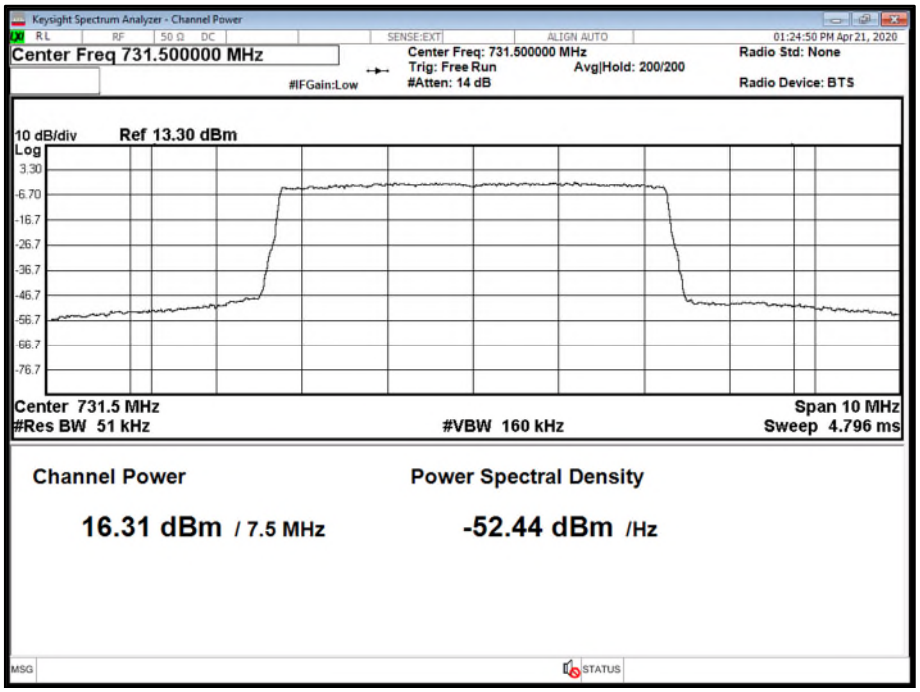
Remarks

All transmitter antenna port performance is presented. The plot results are presented for regulatory performance reference. Plot data performance for all transmitter ports are on file and available on request.

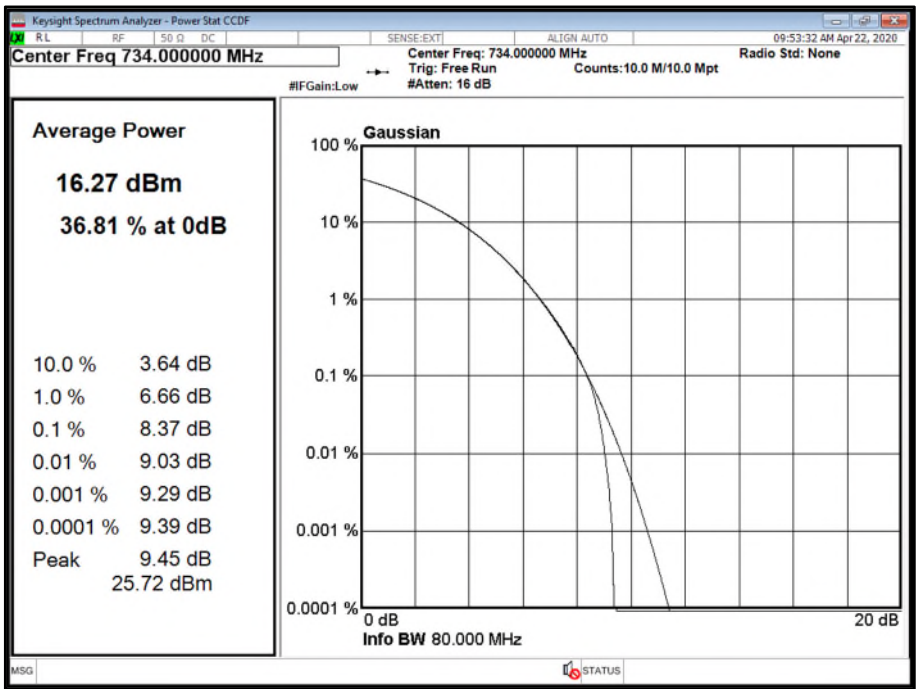
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position B



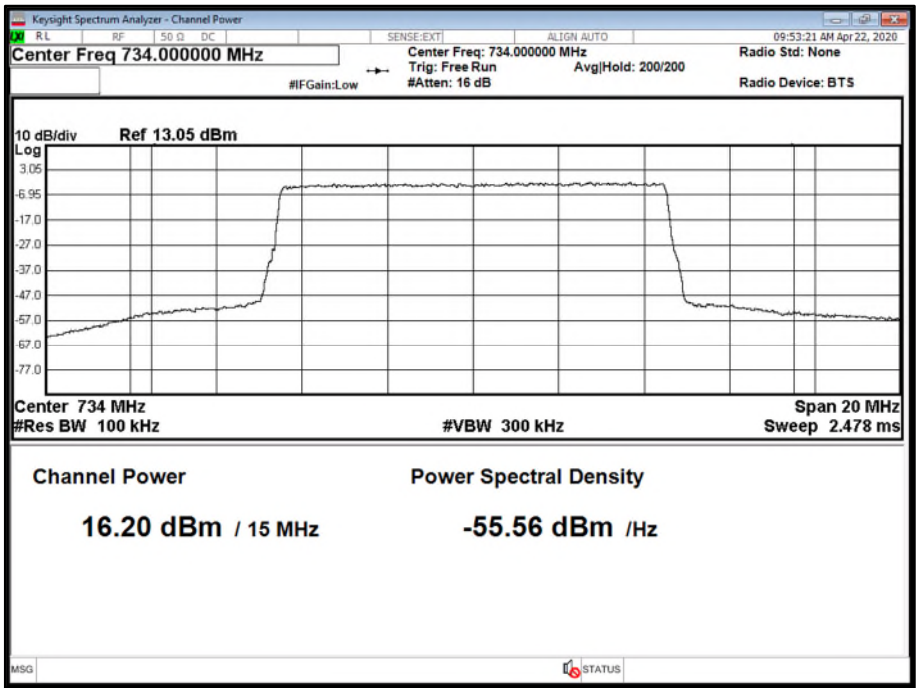

Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position B



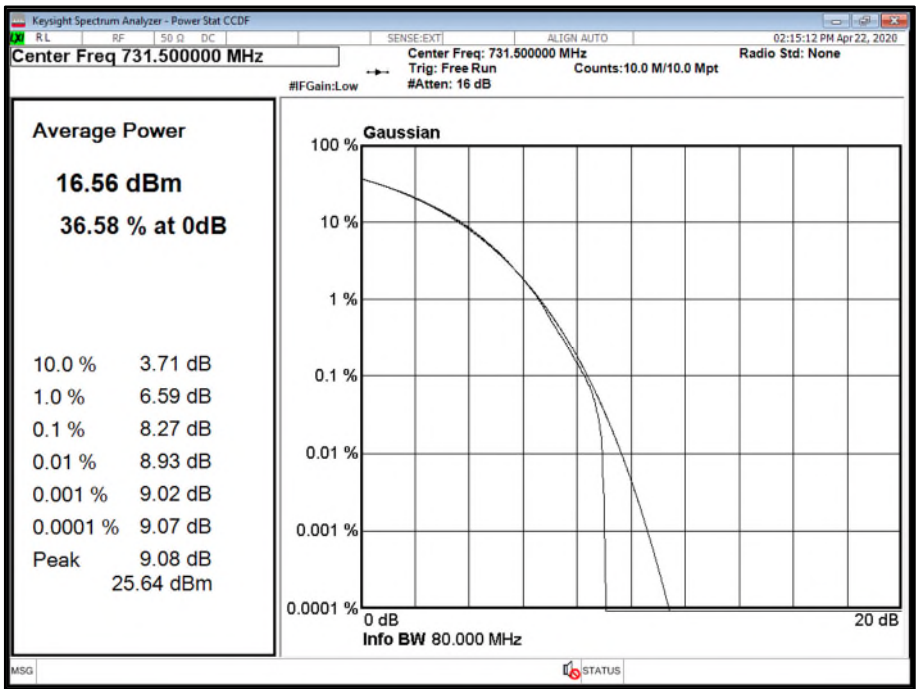
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position B



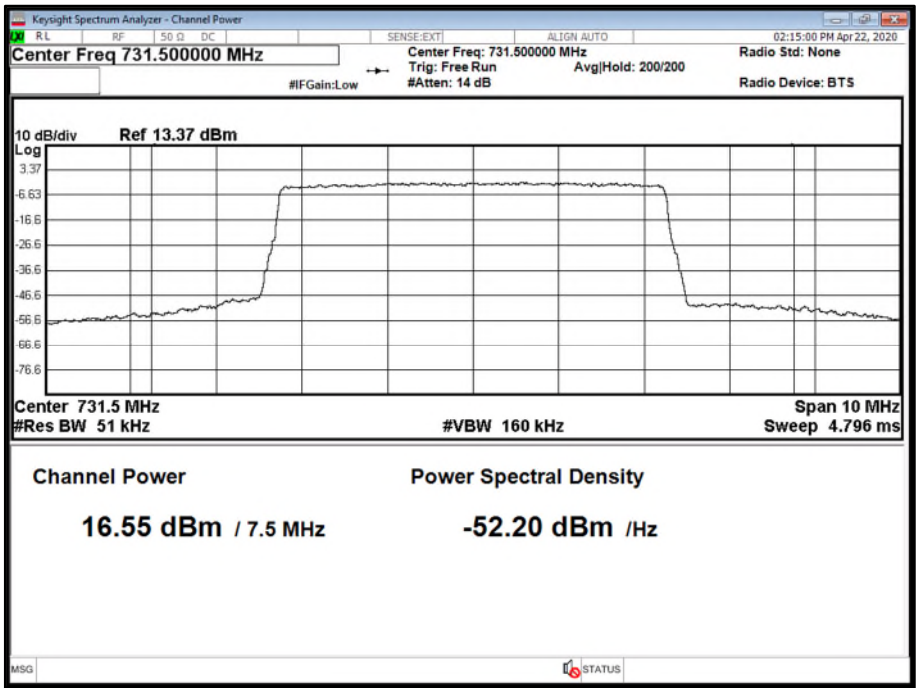

Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position B



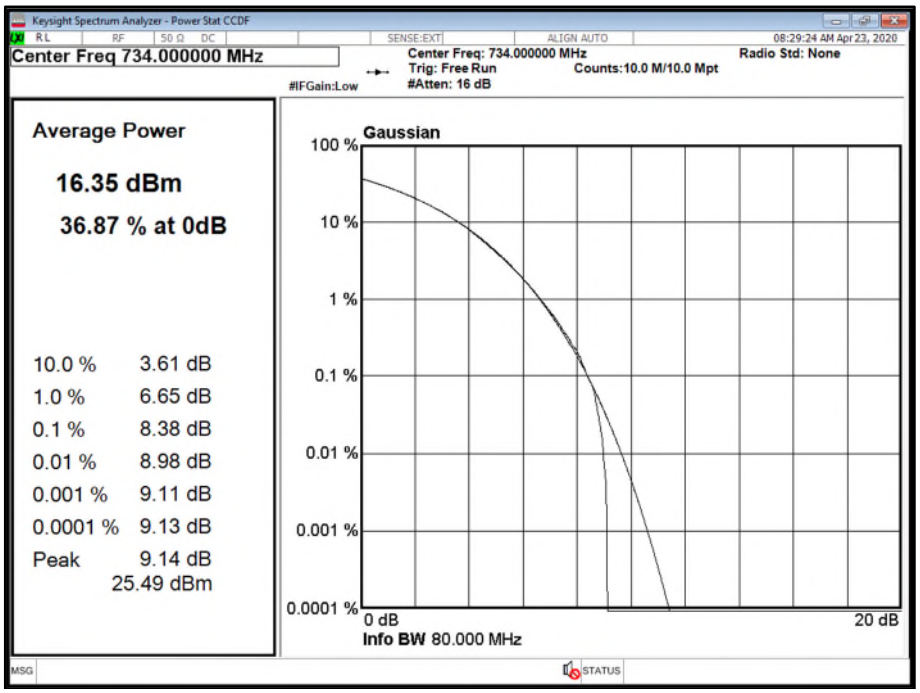
Antenna A - Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position B



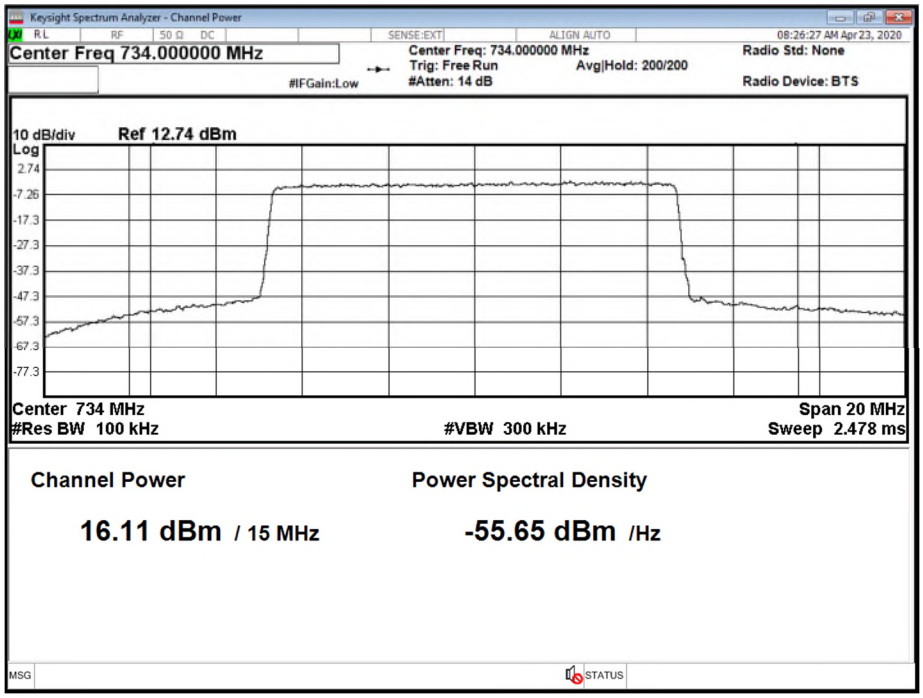

Antenna A - Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position B



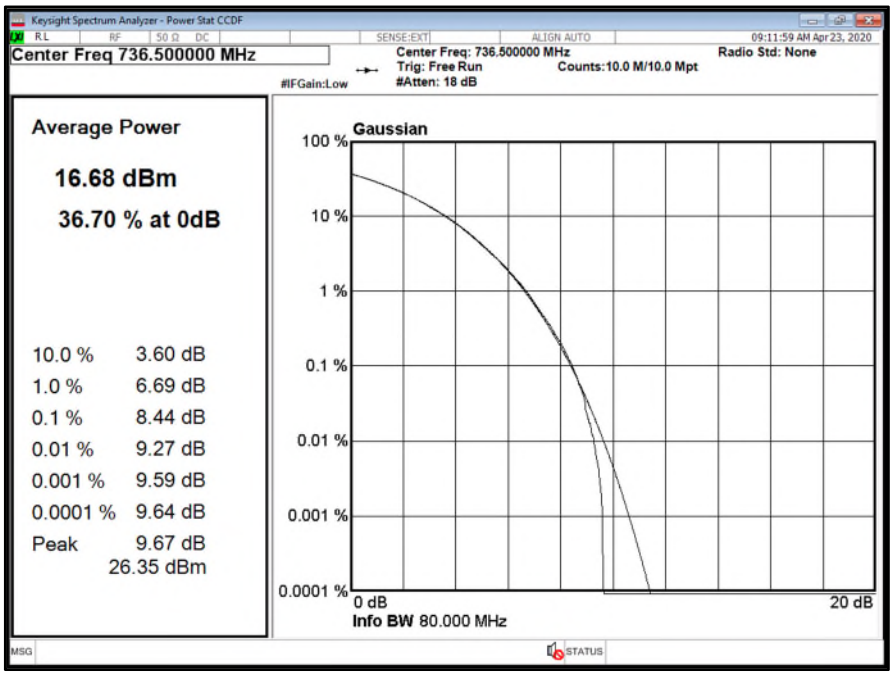
Antenna A - Modulation NR: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position B



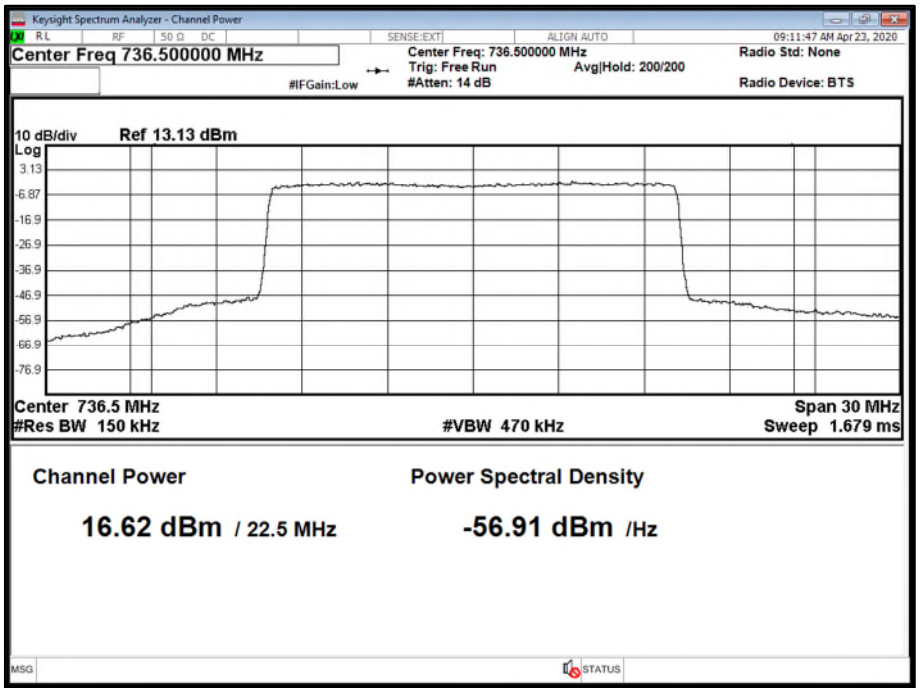

Antenna A - Modulation NR: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position B



Antenna A - Modulation NR: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position B




Antenna A - Modulation NR: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position B



**Configuration A**

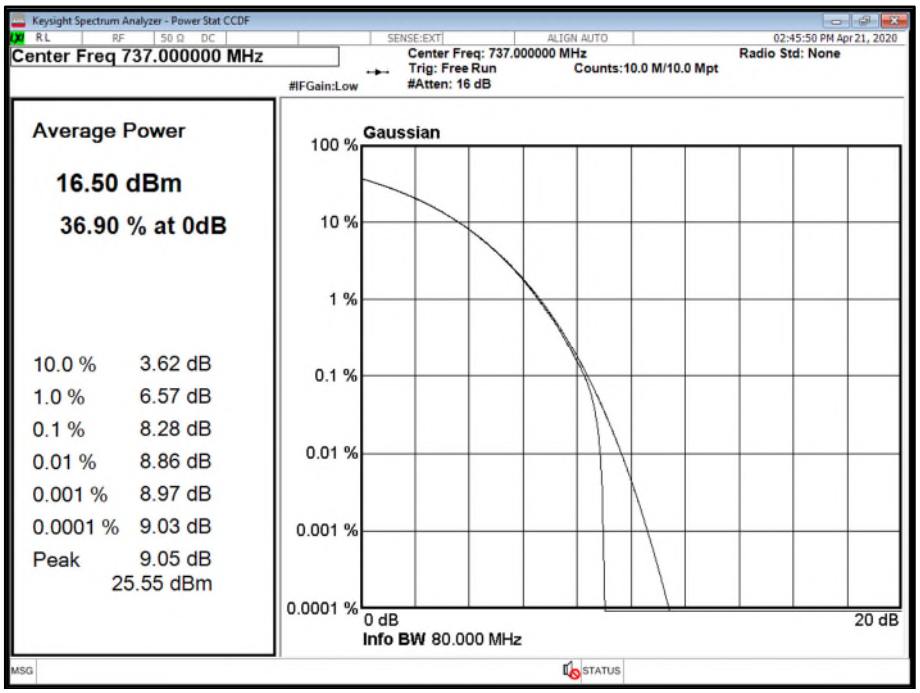
Maximum Output Power: 17.00 dBm per port.

| Antenna | Modulation | Carrier Bandwidth | Peak to Average Ratio (PAR) / Output Power | | |
|---|---|---|---|---|---|
| | | | Channel Position M | | |
| | | | PAR (dB) | Average Power | |
| | | | | dBm | dBm/MHz |
| A | LTE: QPSK | 5.0 MHz | 8.86 | 16.50 | 10.74 |
| B | LTE: QPSK | 5.0 MHz | 8.97 | 16.44 | 10.75 |
| C | LTE: QPSK | 5.0 MHz | 8.90 | 16.35 | 10.51 |
| D | LTE: QPSK | 5.0 MHz | 8.94 | 16.44 | 10.77 |
| Total | | | - | 22.45 | 16.71 |
| A | LTE: QPSK | 10.0 MHz | 8.92 | 16.39 | 7.76 |
| B | LTE: QPSK | 10.0 MHz | 8.95 | 16.18 | 7.80 |
| C | LTE: QPSK | 10.0 MHz | 8.90 | 16.50 | 7.92 |
| D | LTE: QPSK | 10.0 MHz | 9.00 | 15.96 | 7.32 |
| Total | | | - | 22.28 | 13.73 |
| A | NR: QPSK | 5.0 MHz | 8.89 | 16.50 | 10.96 |
| B | NR: QPSK | 5.0 MHz | 8.94 | 16.47 | 10.86 |
| C | NR: QPSK | 5.0 MHz | 8.88 | 16.37 | 10.91 |
| D | NR: QPSK | 5.0 MHz | 8.88 | 16.49 | 10.83 |
| Total | | | - | 22.48 | 16.91 |
| A | NR: QPSK | 10.0 MHz | 8.96 | 16.53 | 8.09 |
| B | NR: QPSK | 10.0 MHz | 8.95 | 16.20 | 7.72 |
| C | NR: QPSK | 10.0 MHz | 8.95 | 16.14 | 7.59 |
| D | NR: QPSK | 10.0 MHz | 9.07 | 15.98 | 7.46 |
| Total | | | - | 22.24 | 13.74 |

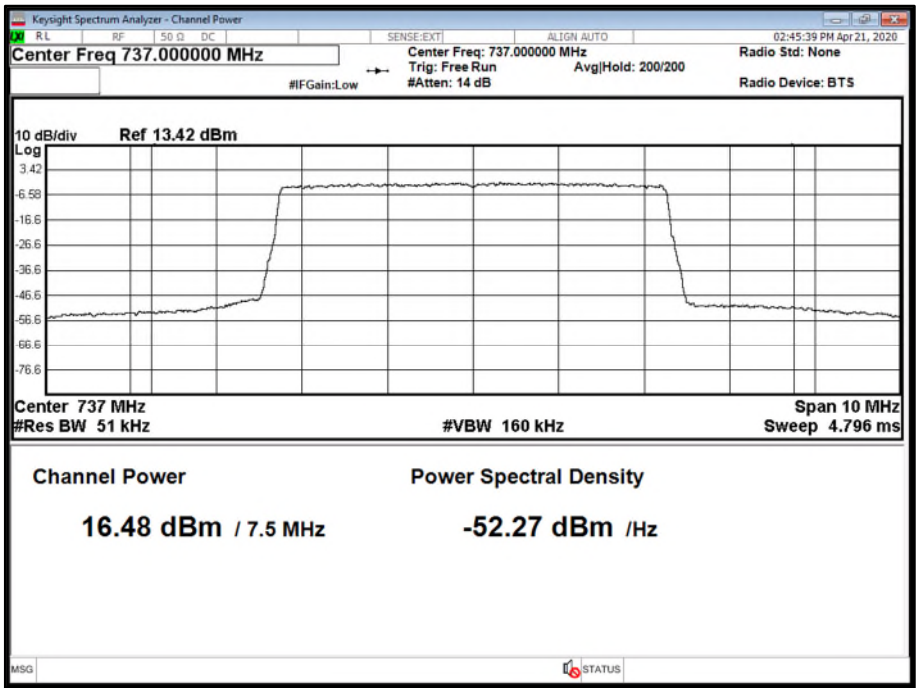
Remarks

All transmitter antenna port performance is presented. The plot results are presented for regulatory performance reference. Plot data performance for all transmitter ports are on file and available on request. Note: 15MHz Ch. Have test results for bottom and top channels only due to spectrum restrictions of 16 MHz.

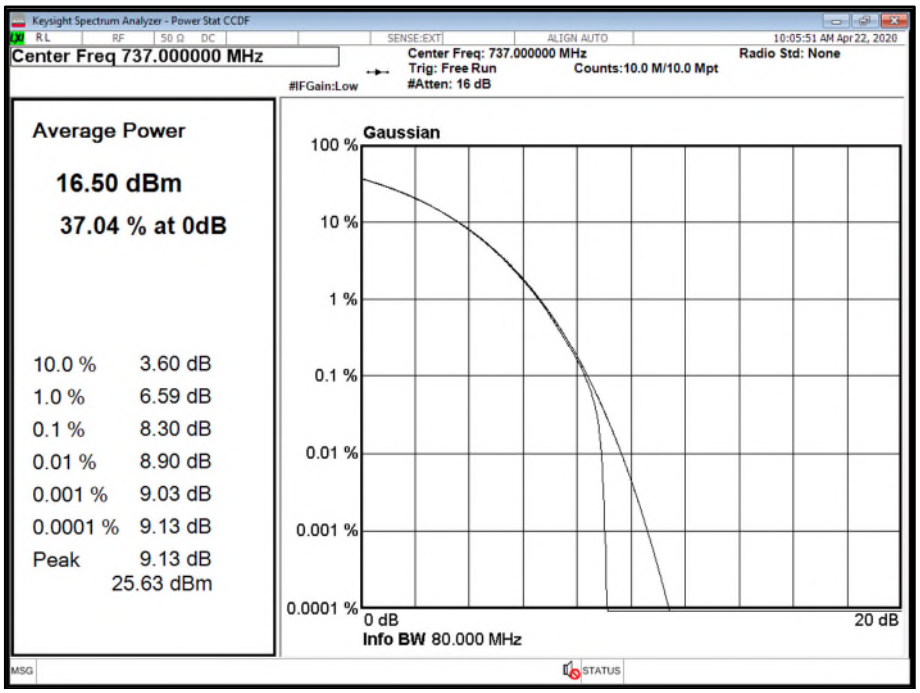
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M



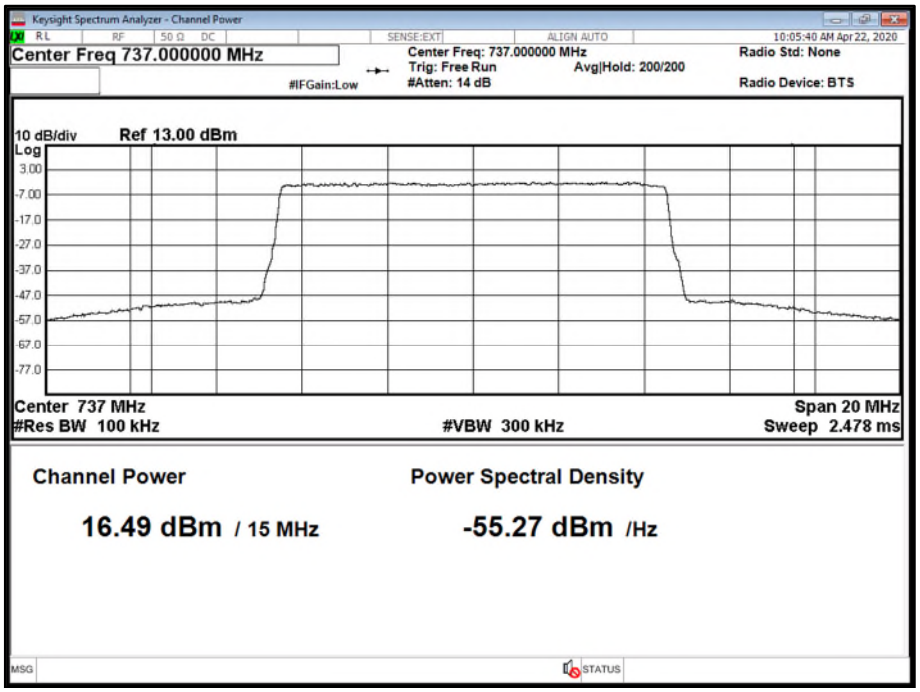

Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M



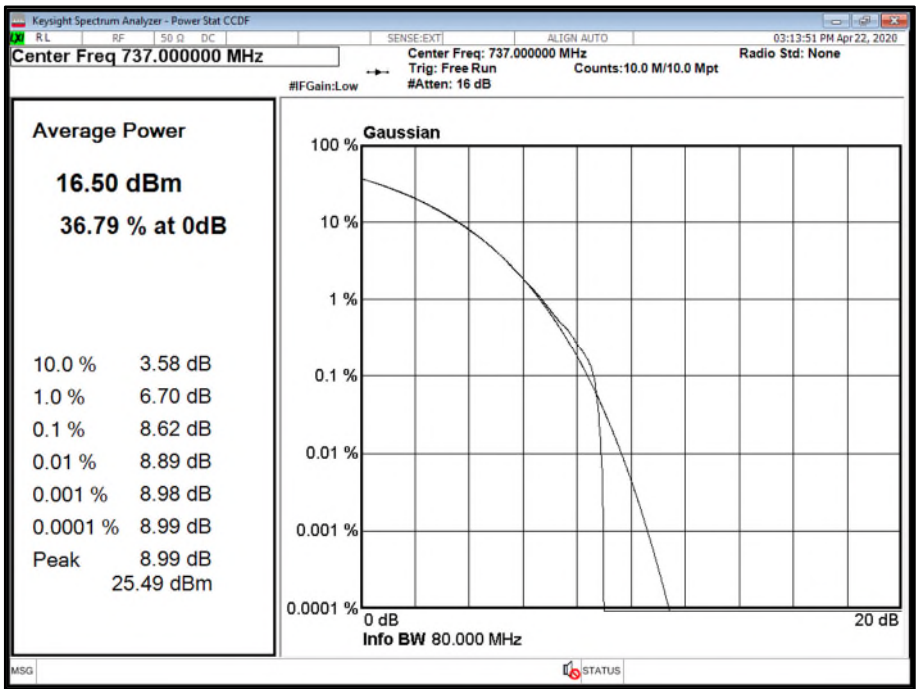
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position M



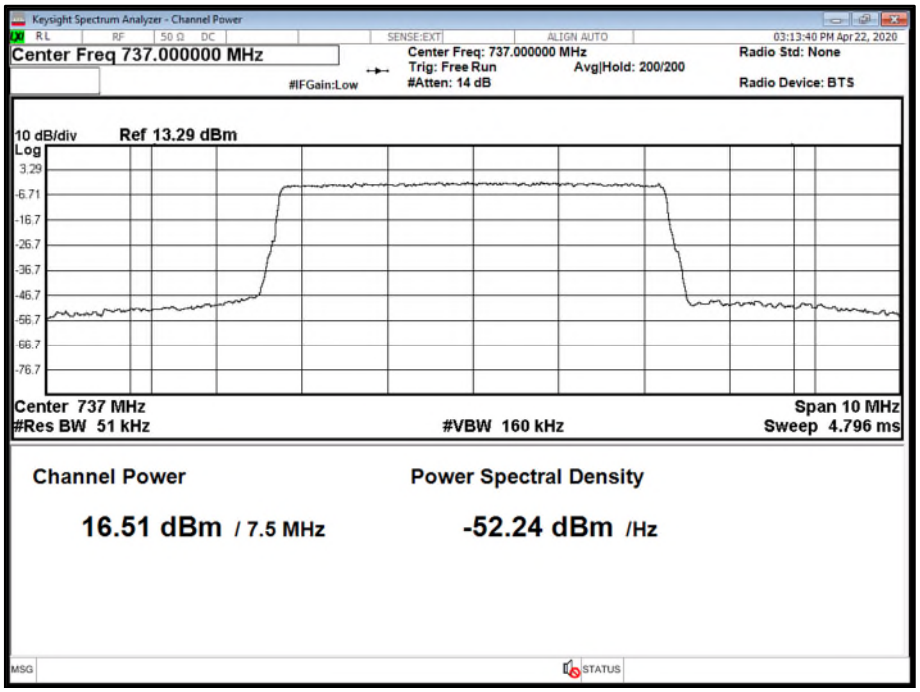

Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position M



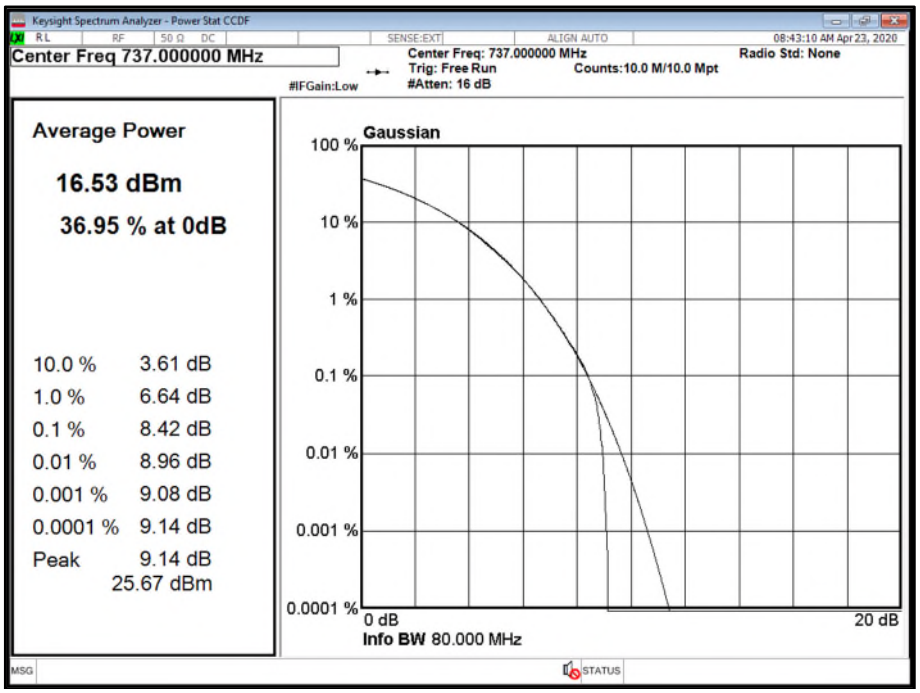
Antenna A - Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M



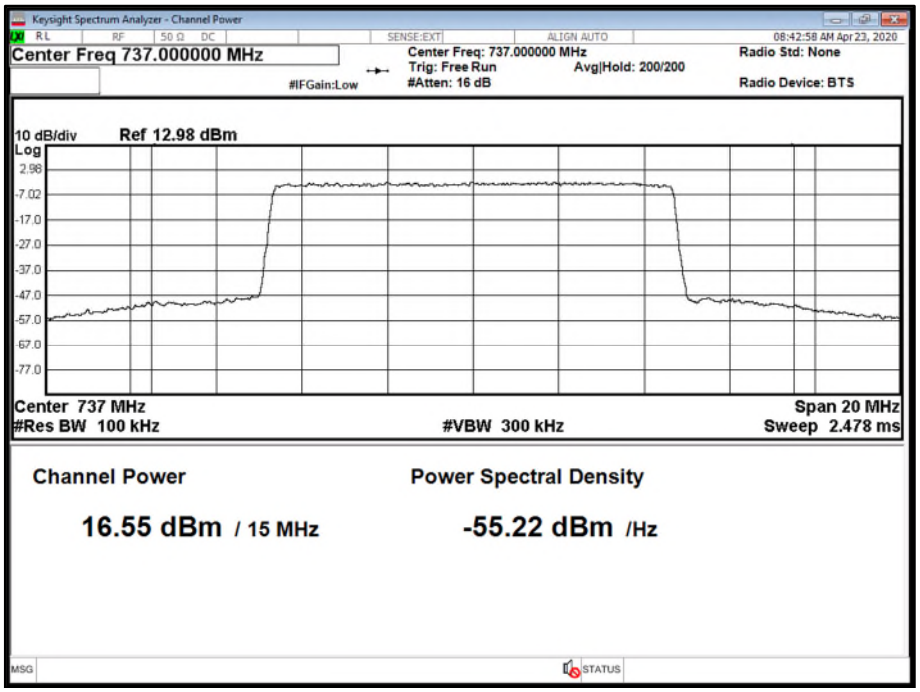

Antenna A - Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M



Antenna A - Modulation NR: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position M




Antenna A - Modulation NR: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position M



**Configuration A**

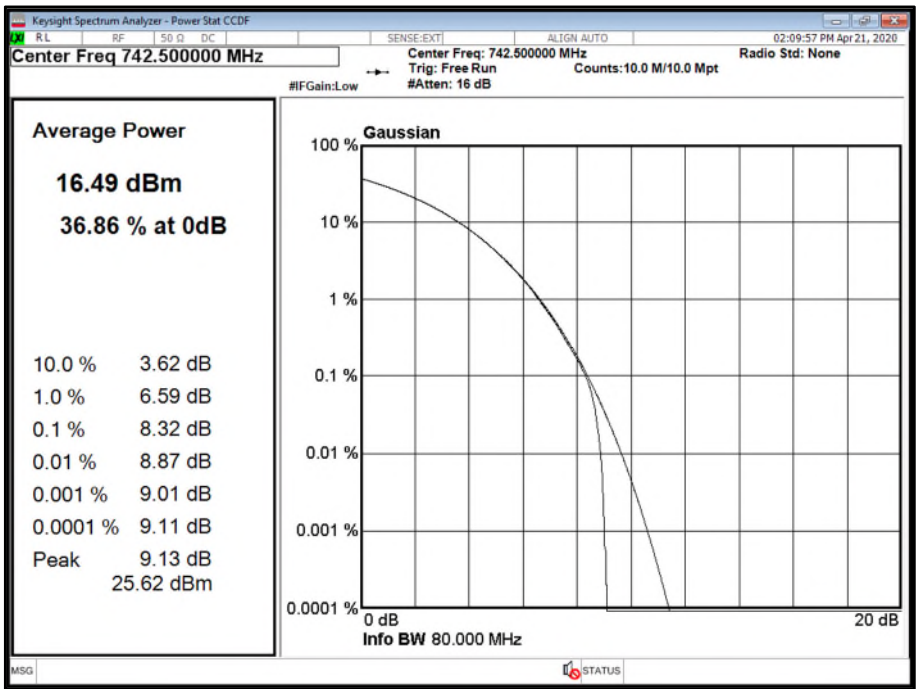
Maximum Output Power: 17.00 dBm per port.

| Antenna | Modulation | Carrier Bandwidth | Peak to Average Ratio (PAR) / Output Power | | |
|---|---|---|---|---|---|
| | | | Channel Position T | | |
| | | | PAR (dB) | Average Power | |
| | | | | dBm | dBm/MHz |
| A | LTE: QPSK | 5.0 MHz | 8.87 | 16.49 | 10.77 |
| B | LTE: QPSK | 5.0 MHz | 9.01 | 16.73 | 11.10 |
| C | LTE: QPSK | 5.0 MHz | 8.94 | 16.58 | 10.80 |
| D | LTE: QPSK | 5.0 MHz | 8.93 | 16.14 | 10.35 |
| Total | | | - | 22.51 | 16.78 |
| A | LTE: QPSK | 10.0 MHz | 8.89 | 16.28 | 7.88 |
| B | LTE: QPSK | 10.0 MHz | 8.97 | 16.21 | 7.89 |
| C | LTE: QPSK | 10.0 MHz | 8.91 | 16.11 | 7.70 |
| D | LTE: QPSK | 10.0 MHz | 9.02 | 15.97 | 7.70 |
| Total | | | - | 22.16 | 13.81 |
| A | NR: QPSK | 5.0 MHz | 8.91 | 16.53 | 10.95 |
| B | NR: QPSK | 5.0 MHz | 8.93 | 16.49 | 11.07 |
| C | NR: QPSK | 5.0 MHz | 8.91 | 16.58 | 11.01 |
| D | NR: QPSK | 5.0 MHz | 8.95 | 16.33 | 10.67 |
| Total | | | - | 22.50 | 16.95 |
| A | NR: QPSK | 10.0 MHz | 8.90 | 16.32 | 7.86 |
| B | NR: QPSK | 10.0 MHz | 8.96 | 16.23 | 7.59 |
| C | NR: QPSK | 10.0 MHz | 8.86 | 16.14 | 7.49 |
| D | NR: QPSK | 10.0 MHz | 8.96 | 16.00 | 7.57 |
| Total | | | - | 22.19 | 13.65 |
| A | NR: QPSK | 15.0 MHz | 9.13 | 16.67 | 6.29 |
| B | NR: QPSK | 15.0 MHz | 9.02 | 15.93 | 5.74 |
| C | NR: QPSK | 15.0 MHz | 9.06 | 16.12 | 5.86 |
| D | NR: QPSK | 15.0 MHz | 9.04 | 15.85 | 5.33 |
| Total | | | - | 22.18 | 11.84 |

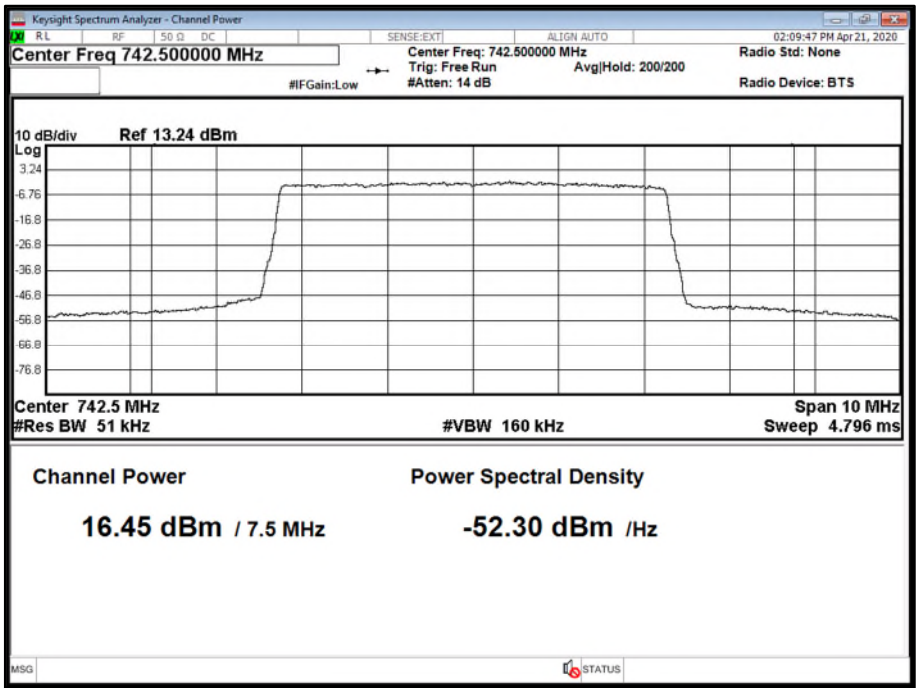
Remarks

All transmitter antenna port performance is presented. The plot results are presented for regulatory performance reference. Plot data performance for all transmitter ports are on file and available on request.

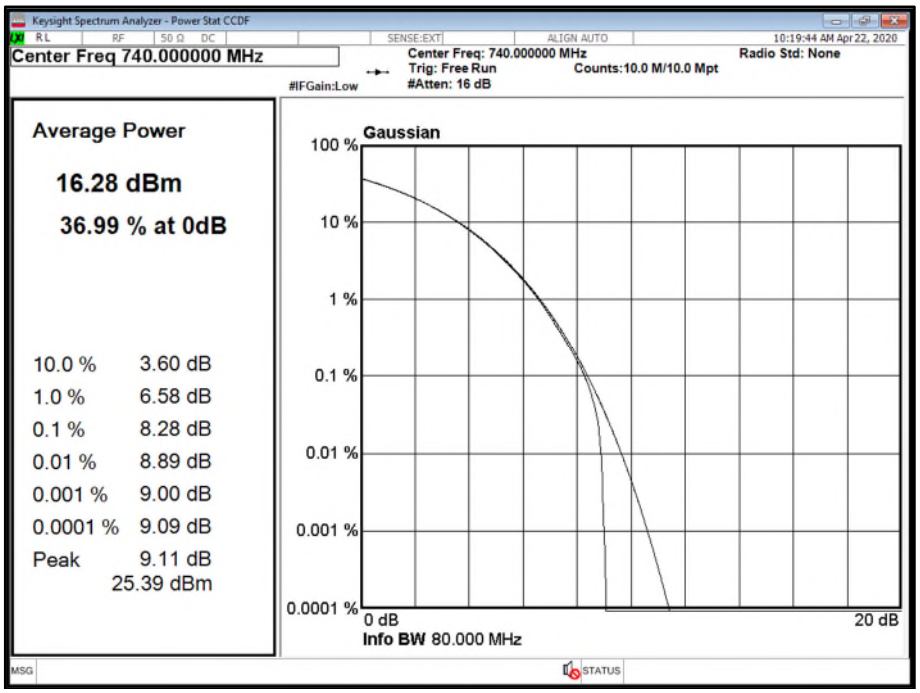
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position T



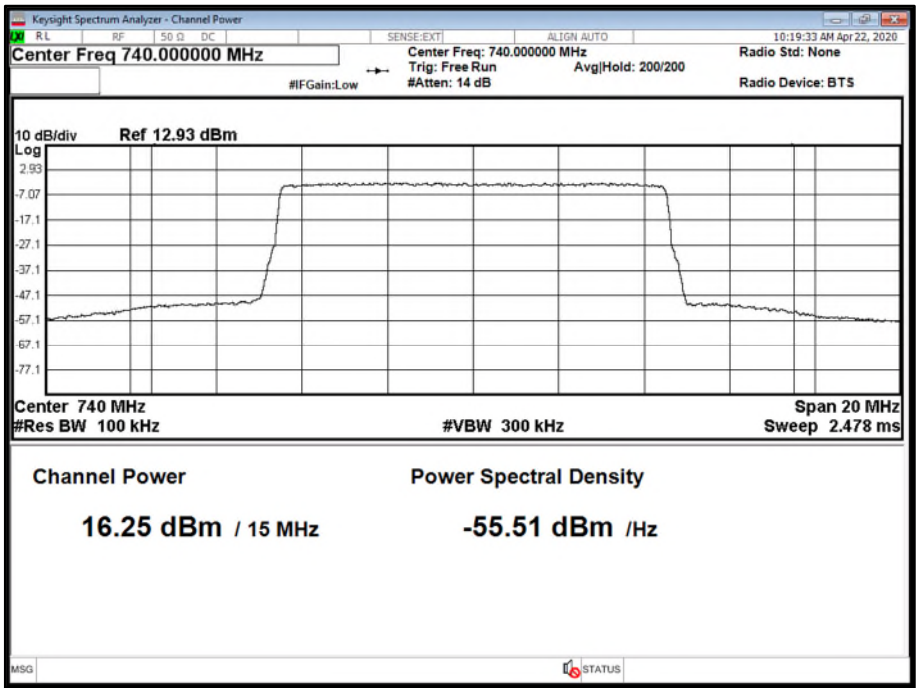

Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position T



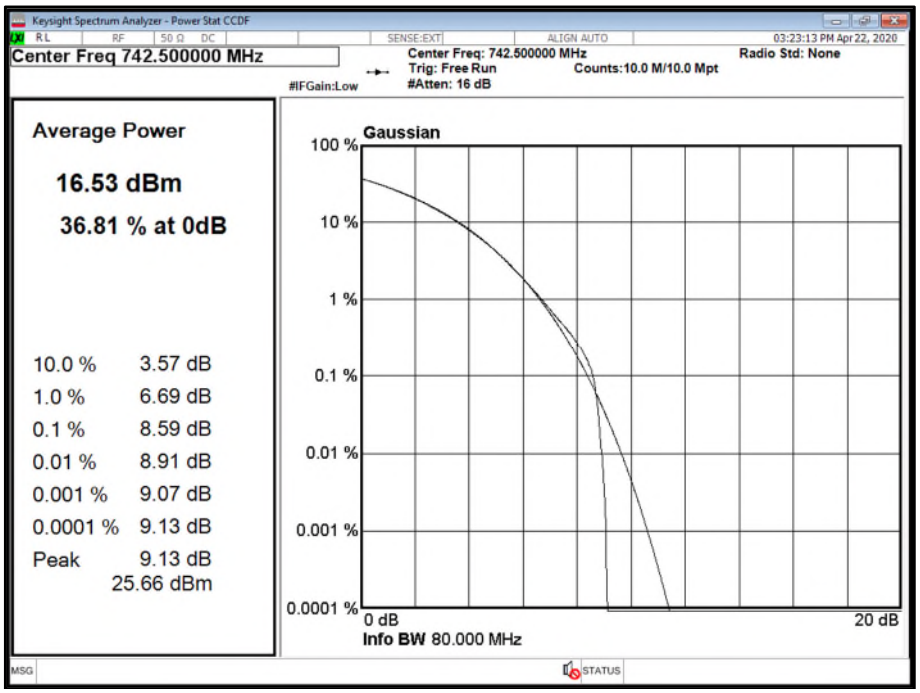
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position T



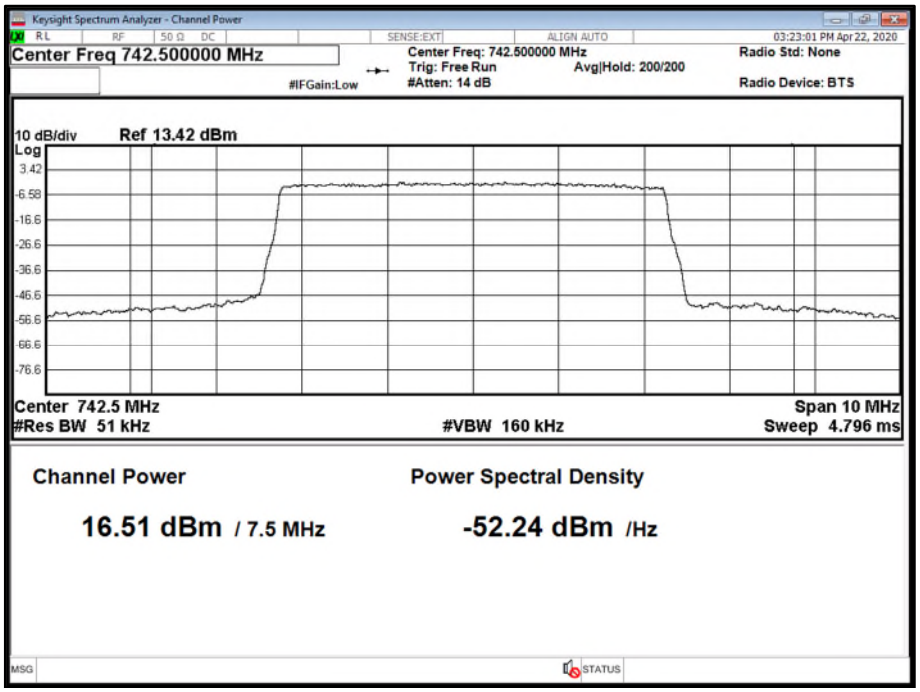

Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position T



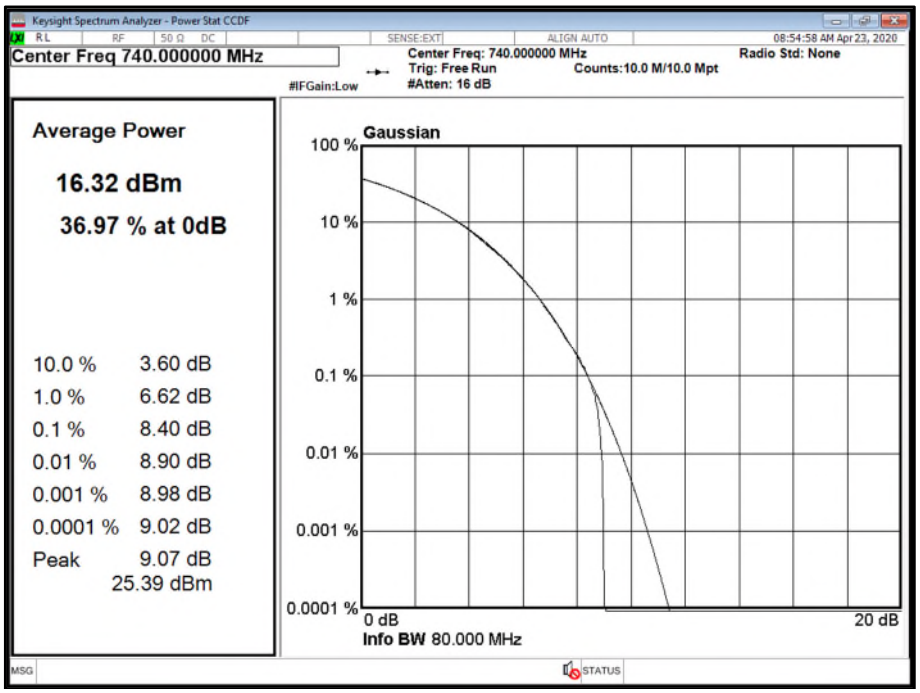
Antenna A - Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position T



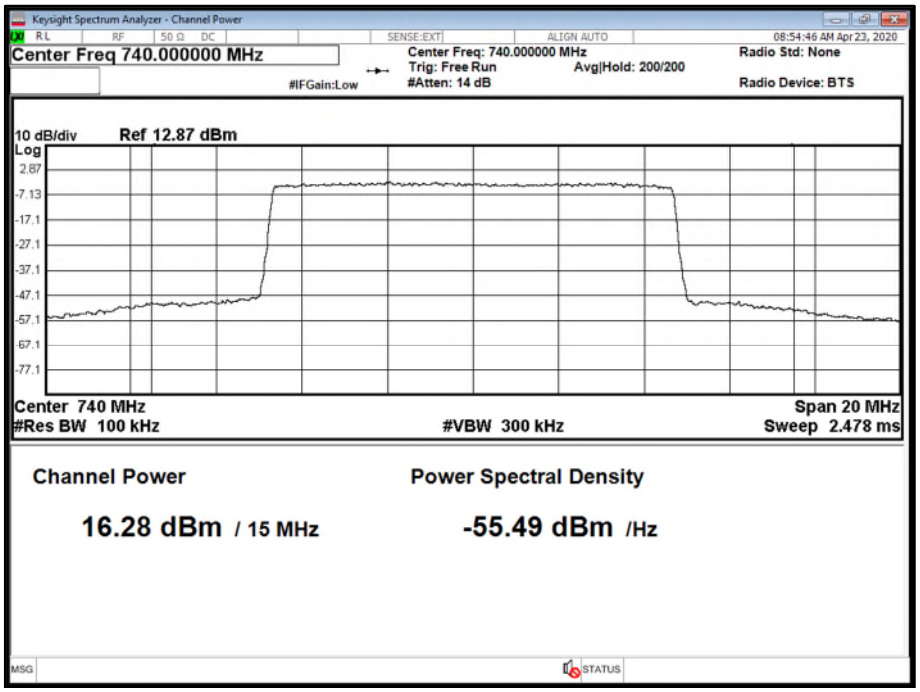

Antenna A - Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position T



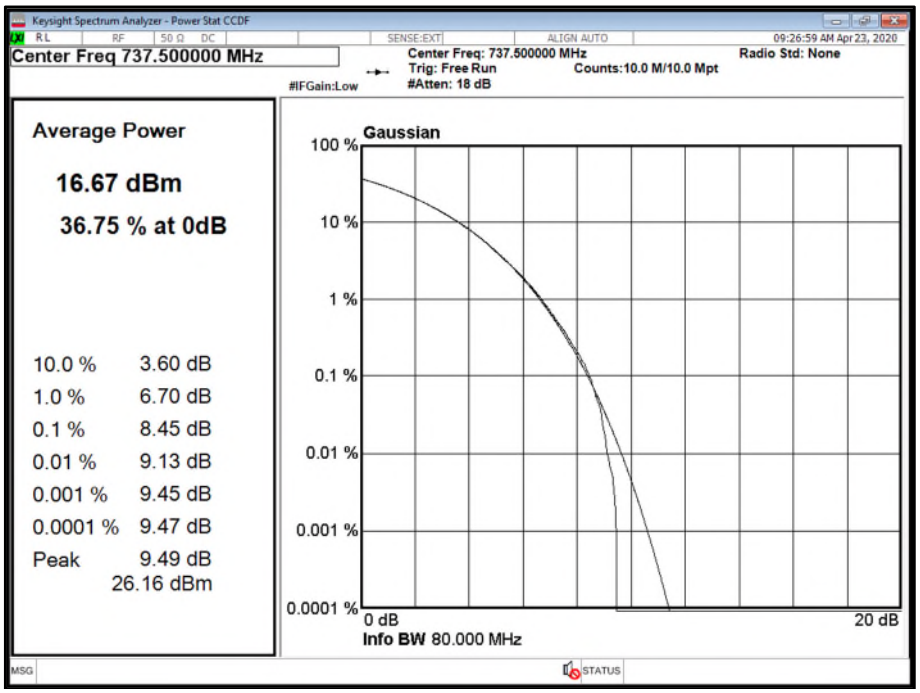
Antenna A - Modulation NR: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position T



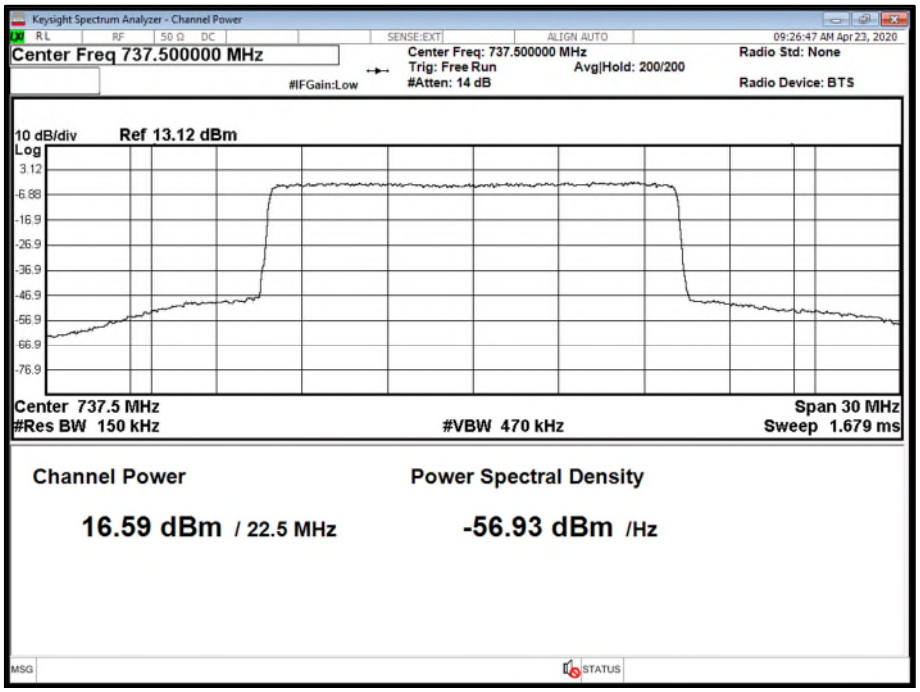

Antenna A - Modulation NR: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position T



Antenna A - Modulation NR: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position T




Antenna A - Modulation NR: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position T



**Configuration B**

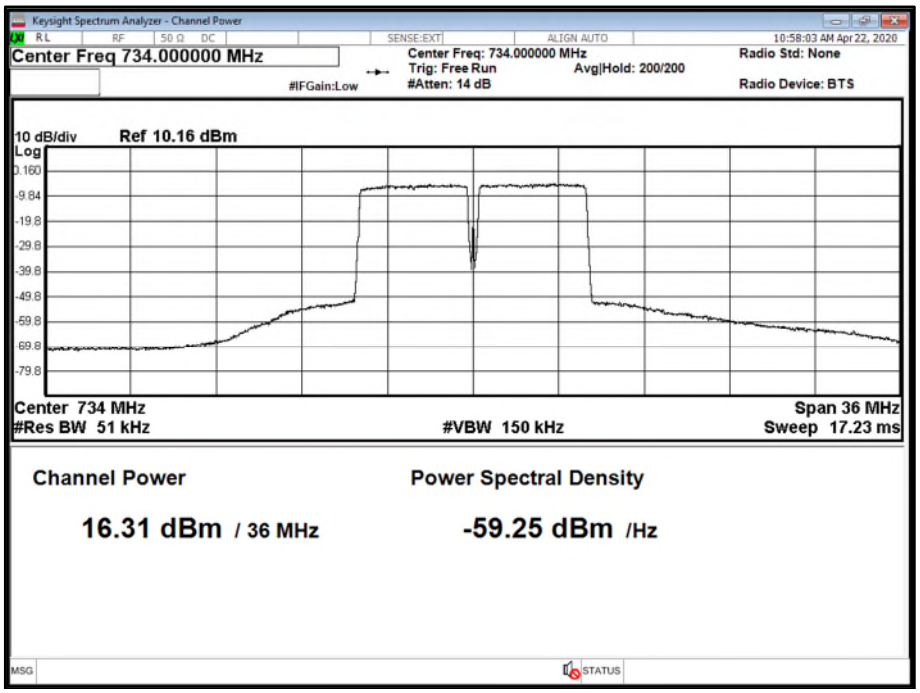
Maximum Output Power: 17.00 dBm per port.

| Antenna | Modulation | Carrier Bandwidth | Peak to Average Ratio (PAR) / Output Power | | |
|---|---|---|---|---|---|
| | | | Channel Position B | | |
| | | | PAR (dB) | Average Power | |
| | | | | dBm | dBm/MHz |
| A | LTE: QPSK | 5.0+5.0 MHz | - | 16.31 | - |
| B | LTE: QPSK | 5.0+5.0 MHz | - | 16.24 | - |
| C | LTE: QPSK | 5.0+5.0 MHz | - | 16.24 | - |
| D | LTE: QPSK | 5.0+5.0 MHz | - | 16.21 | - |
| Total | | | - | 22.27 | - |
| A | NR: QPSK | 5.0+5.0 MHz | - | 16.21 | - |
| B | NR: QPSK | 5.0+5.0 MHz | - | 16.27 | - |
| C | NR: QPSK | 5.0+5.0 MHz | - | 16.21 | - |
| D | NR: QPSK | 5.0+5.0 MHz | - | 16.80 | - |
| Total | | | - | 22.40 | - |
| A | LTE + NR: QPSK | L10 + NR5.0 MHz | - | 16.18 | - |
| B | LTE + NR: QPSK | L10 + NR5.0 MHz | - | 15.82 | - |
| C | LTE + NR: QPSK | L10 + NR5.0 MHz | - | 15.98 | - |
| D | LTE + NR: QPSK | L10 + NR5.0 MHz | - | 15.70 | - |
| Total | | | - | 21.94 | - |

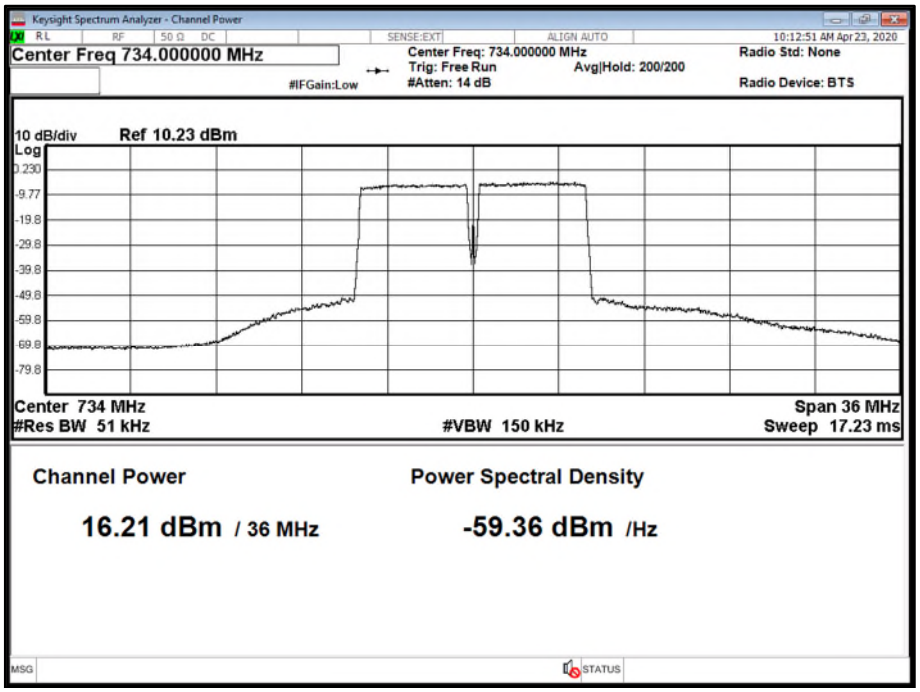
Remarks

10 MHz LTE has NB-IoT GB x2. Two carrier transmitter performance is presented. The plot results represent typical radio performace. Plot data performance for all transmitter ports and channels are on file and available on request.

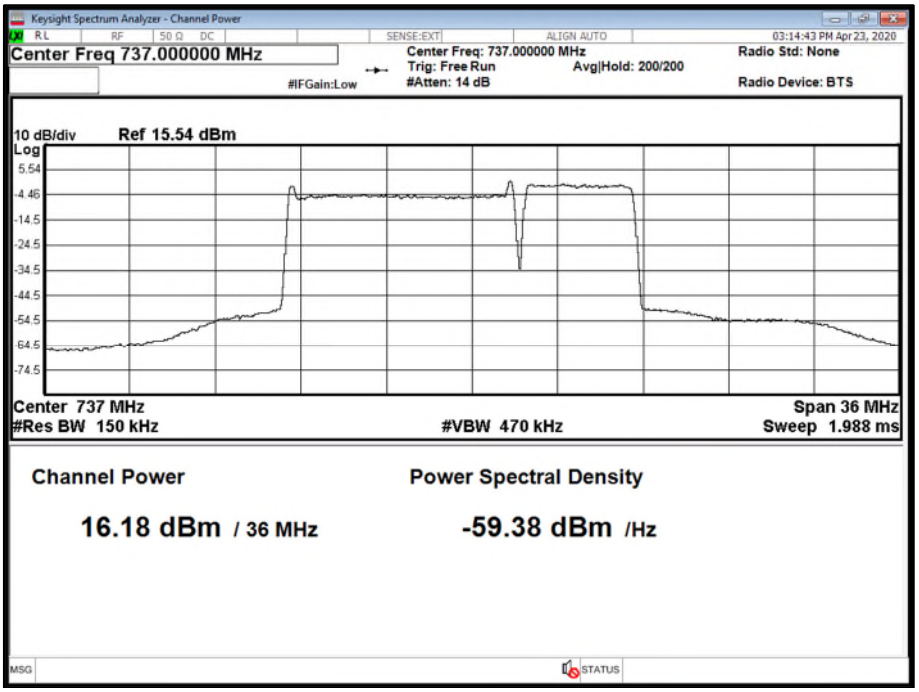
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 5.0 +5.0 MHz - Channel Position B




Antenna A - Modulation NR: QPSK - Carrier Bandwidth 5.0 +5.0 MHz - Channel Position B



Antenna A - Modulation LTE + NR: QPSK - Carrier Bandwidth L10 + NR5 MHz - Channel Position B



**Configuration C**

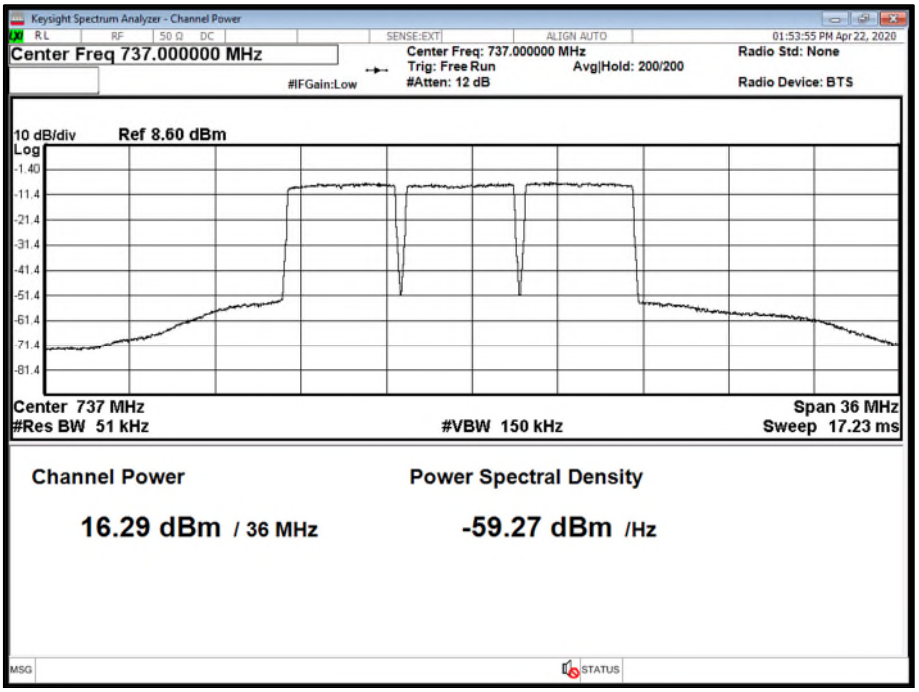
Maximum Output Power: 17.00 dBm per port.

| Antenna | Modulation | Carrier Bandwidth | Peak to Average Ratio (PAR) / Output Power | | |
|---|---|---|---|---|---|
| | | | Channel Position B | | |
| | | | PAR (dB) | Average Power | |
| | | | | dBm | dBm/MHz |
| A | LTE: QPSK | 5.0+5.0+5.0 MHz | - | 16.29 | - |
| B | LTE: QPSK | 5.0+5.0+5.0 MHz | - | 15.84 | - |
| C | LTE: QPSK | 5.0+5.0+5.0 MHz | - | 16.01 | - |
| D | LTE: QPSK | 5.0+5.0+5.0 MHz | - | 15.75 | - |
| Total | | | - | 22.00 | - |
| A | NR: QPSK | 5.0+5.0+5.0 MHz | - | 16.36 | - |
| B | NR: QPSK | 5.0+5.0+5.0 MHz | - | 16.15 | - |
| C | NR: QPSK | 5.0+5.0+5.0 MHz | - | 15.82 | - |
| D | NR: QPSK | 5.0+5.0+5.0 MHz | - | 15.83 | - |
| Total | | | - | 22.07 | - |
| A | LTE + NR: QPSK | L5 + 2NR5.0 MHz | - | 16.33 | - |
| B | LTE + NR: QPSK | L5 + 2NR5.0 MHz | - | 16.14 | - |
| C | LTE + NR: QPSK | L5 + 2NR5.0 MHz | - | 16.07 | - |
| D | LTE + NR: QPSK | L5 + 2NR5.0 MHz | - | 15.85 | - |
| Total | | | - | 22.12 | - |

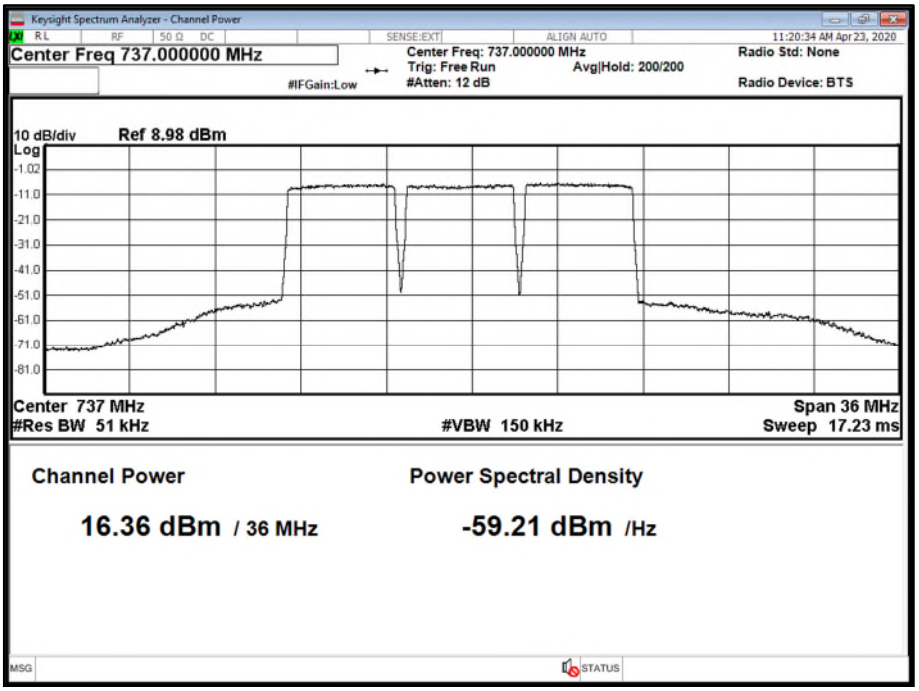
Remarks

Three carrier transmitter performance is presented. The plot results represent typical radio performace. Plot data performance for all transmitter ports and channels are on file and available on request.

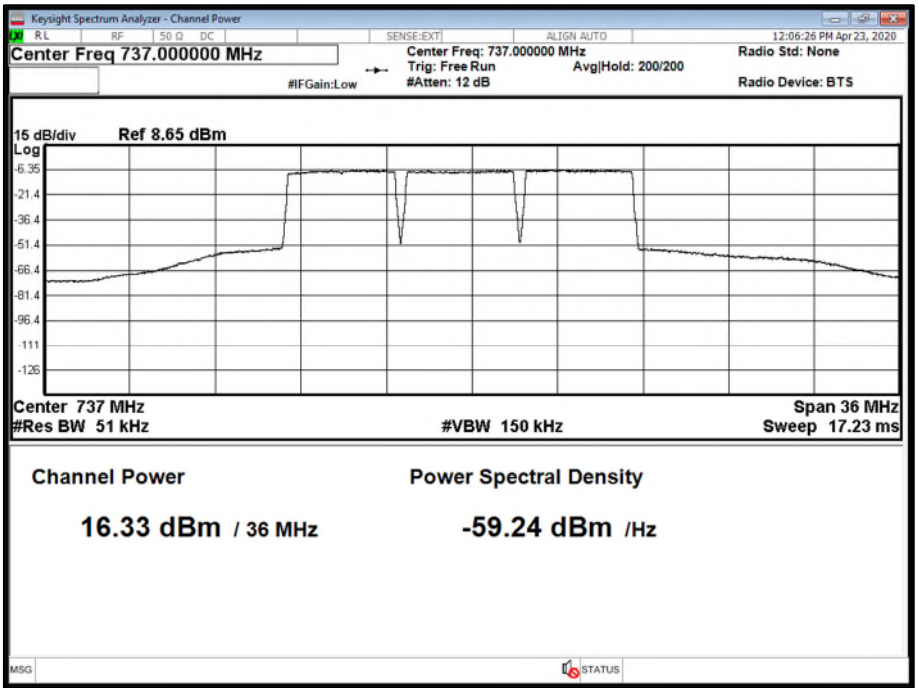
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 5.0 +5.0 + 5.0 MHz - Channel Position B




Antenna A - Modulation NR: QPSK - Carrier Bandwidth 5.0 +5.0 + 5.0 MHz - Channel Position B



Antenna A - Modulation LTE + NR: QPSK - Carrier Bandwidth L5 + 2NR5.0 MHz - Channel Position B




| Limit | |
|---|---|
| Peak Power | ≤ 1000 W/MHz or ≤+60.0 dBm |
| Peak to Average Ratio | 13 dB |

## 2.2 OCCUPIED BANDWIDTH

### 2.2.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.53
FCC CFR 47 Part 2, Clause 2.1049

### 2.2.2 Date of Test and Modification State

21 April - Modification State 0

### 2.2.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.2.4 Environmental Conditions

| | |
|---|---|
| Ambient Temperature | 23.5°C |
| Relative Humidity | 31.3% |

### 2.2.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01.

### 2.2.6 Test Results

**Configuration A**

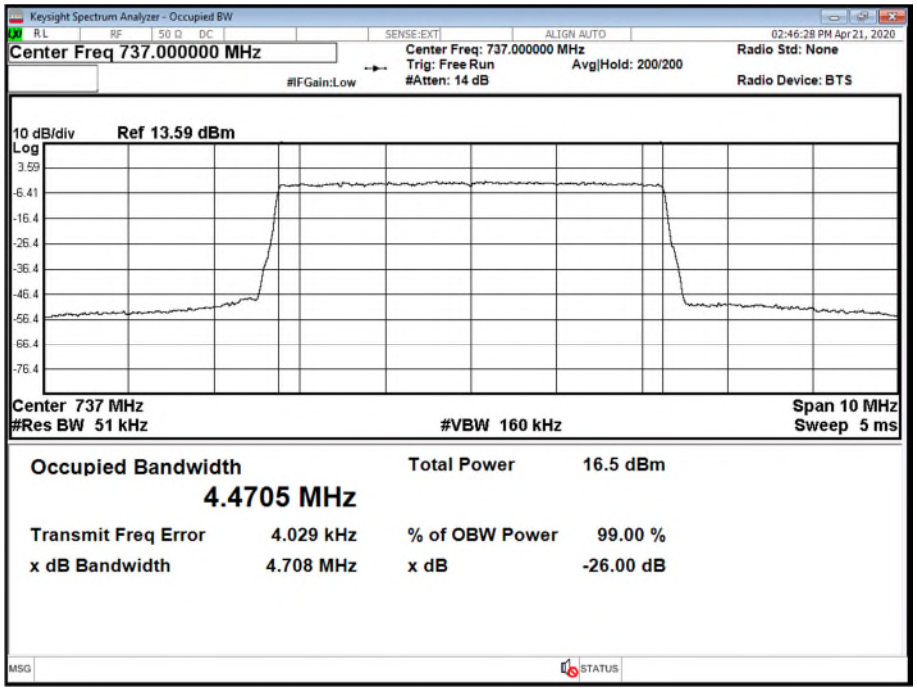
Maximum Output Power: 17.00 dBm per port.

| Modulation | Carrier Bandwidth | Result (MHz) | |
|---|---|---|---|
| | | Channel Bandwidth | |
| | | Occupied Bandwidth | -26 dB Bandwidth |
| LTE: QPSK | LTE: 5.0 MHz | 4.47 | 4.71 |
| LTE: QPSK | LTE: 10.0 MHz | 8.93 | 9.32 |
| NR: QPSK | NR: 5.0 MHz | 4.45 | 4.72 |
| NR: QPSK | NR: 10.0 MHz | 9.25 | 9.63 |
| NR: QPSK | NR: 15.0 MHz | 14.10 | 14.59 |

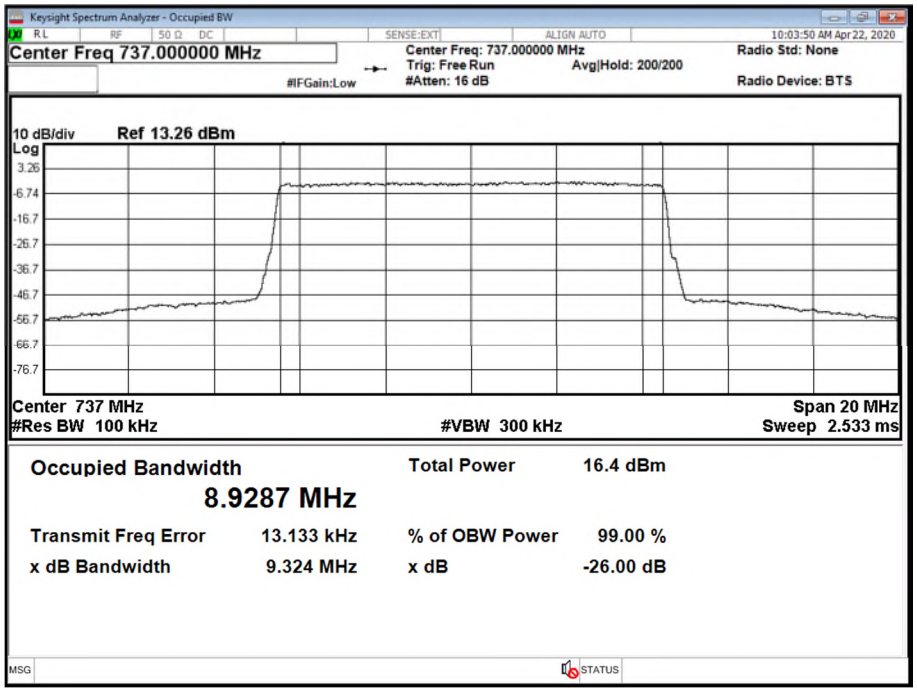
Remarks

Representative occupied banwitdth performance results presented. Plot data performance for all transmitter ports and channel positions are on file and available on request.

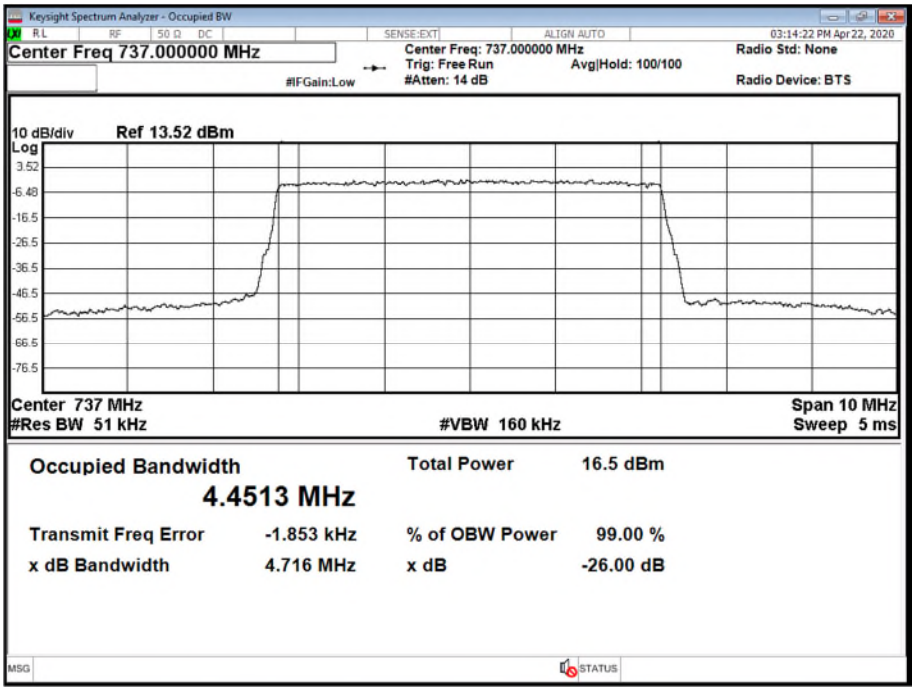
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M



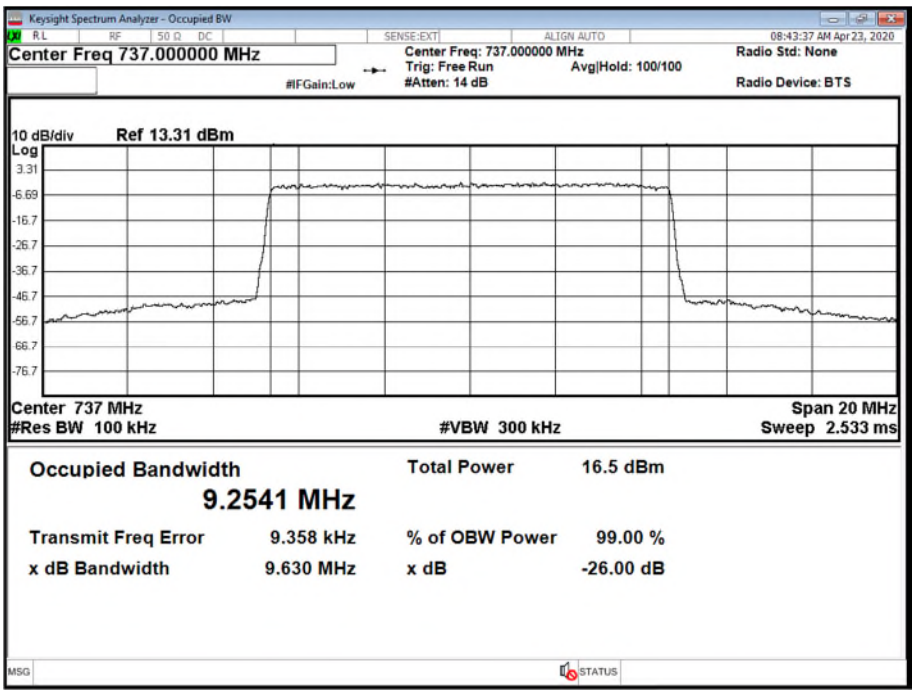

Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



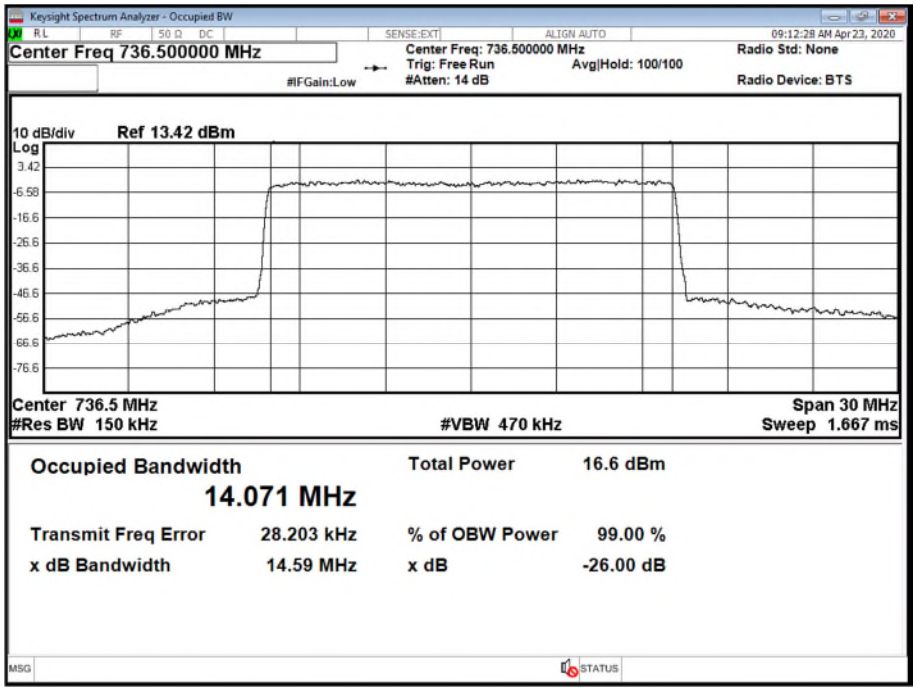
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz- SCS 15 kHz - Channel Position M




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz- SCS 15 kHz - Channel Position M



Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 15.0 MHz- SCS 15 kHz - Channel Position B



## 2.3 BAND EDGE

### 2.3.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.53 (g)
FCC CFR 47 Part 2, Clause 2.1051

### 2.3.2 Date of Test and Modification State

20 April 2020 - Modification State 0

### 2.3.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.3.4 Environmental Conditions

| | |
|---|---|
| Ambient Temperature | 23.5°C |
| Relative Humidity | 31.3% |

### 2.3.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01.

Each of the 2 bands of the EUT has 4 transmit ports, therefore, the test limits used were calculated on a worst-case basis accounting for an effective 4 port MIMO configuration. Testing was performed on this port with a test limit of
43+10log(P) - 10log(4) = -19 dBm

### 2.3.6 Test Results

**Configuration A**

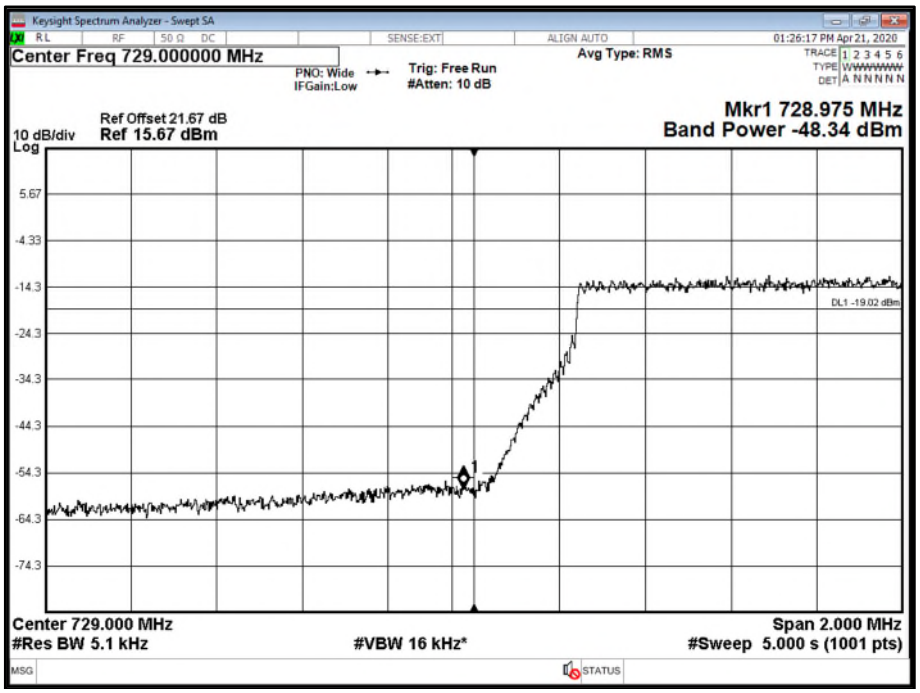
Maximum Output Power: 17.00 dBm per port.

| Modulation | Carrier Bandwidth | Band Edge (MHz) | |
|---|---|---|---|
| | | Channel Position B | Channel Position T |
| LTE: QPSK | LTE: 5.0 MHz | 731.5 | 742.5 |
| LTE: QPSK | LTE: 10.0 MHz | 734.0 | 740.0 |
| NR: QPSK | NR: 5.0 MHz | 731.5 | 742.5 |
| NR: QPSK | NR: 10.0 MHz | 734.0 | 740.0 |
| NR: QPSK | NR: 15.0 MHz | 736.5 | 737.5 |

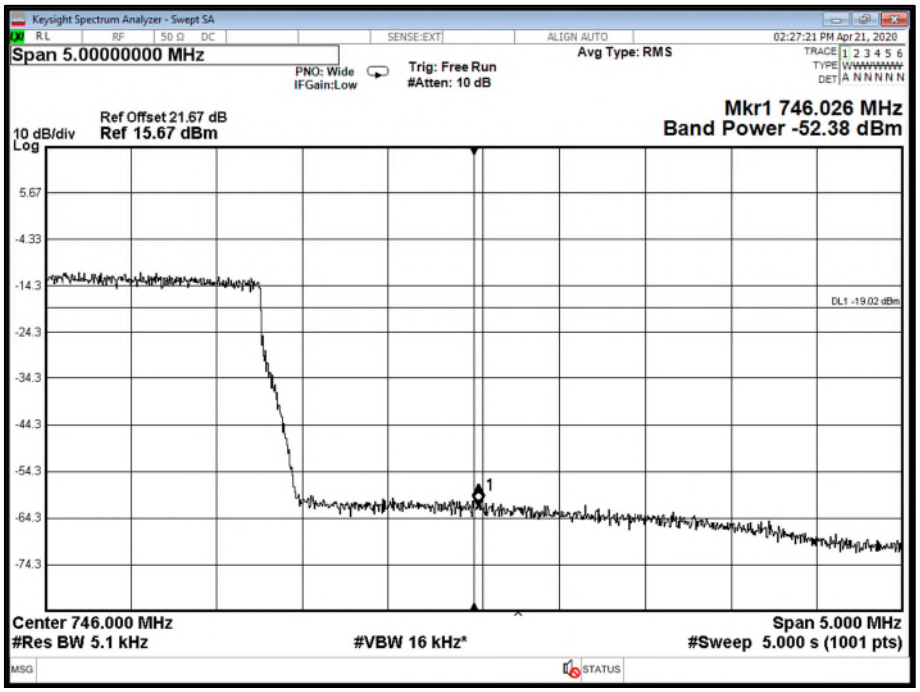
Remarks

Worst case bandedge data presented. Plot data performance for all transmitter ports and channel positions are on file and available on request.

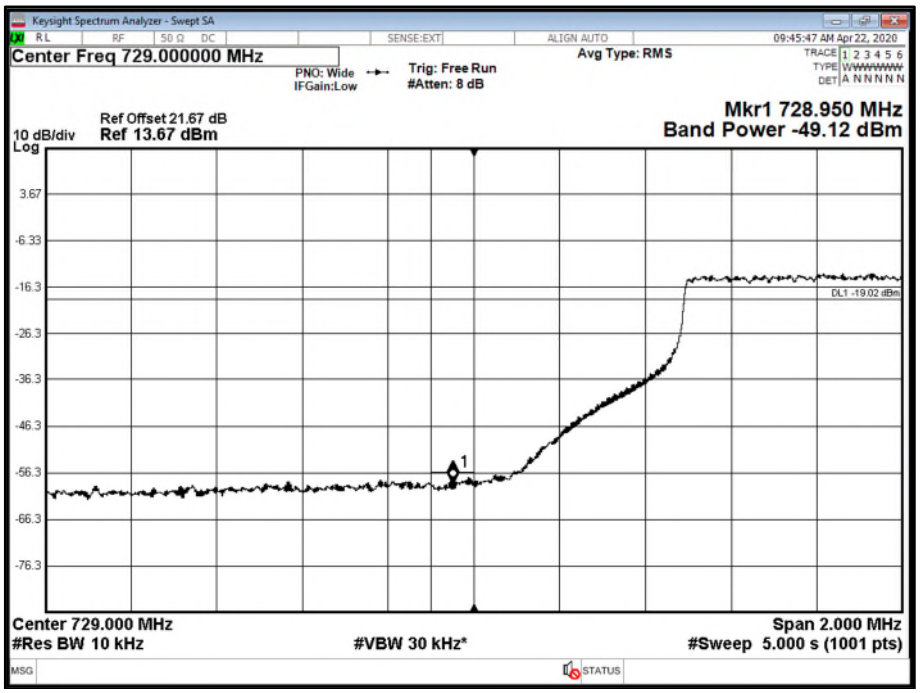
Modulation LTE: QPSK - Carrier Bandwidth LTE: 5.0 MHz - Channel Position B



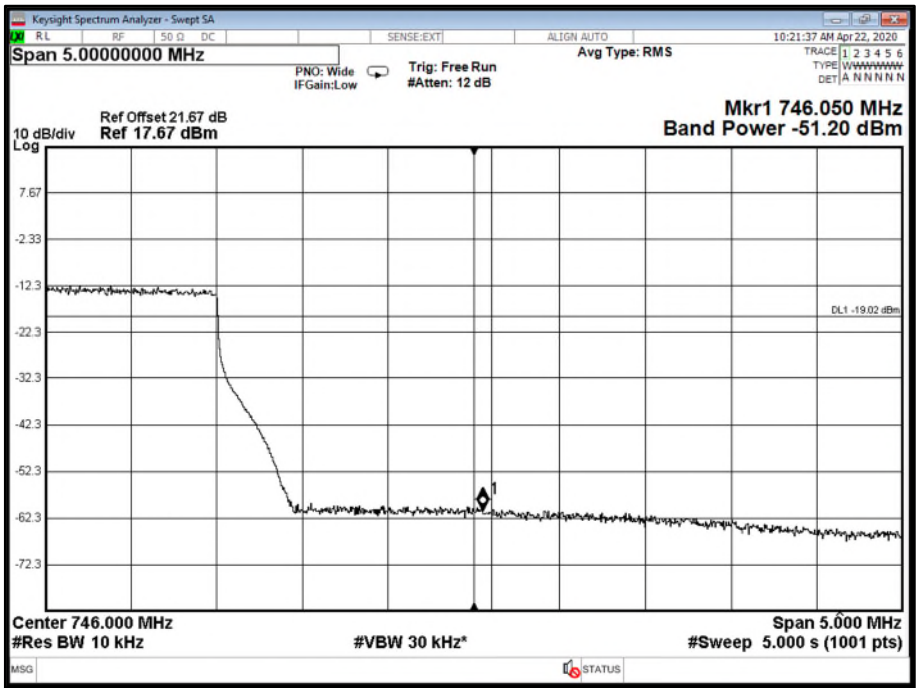

Modulation LTE: QPSK - Carrier Bandwidth LTE: 5.0 MHz - Channel Position T



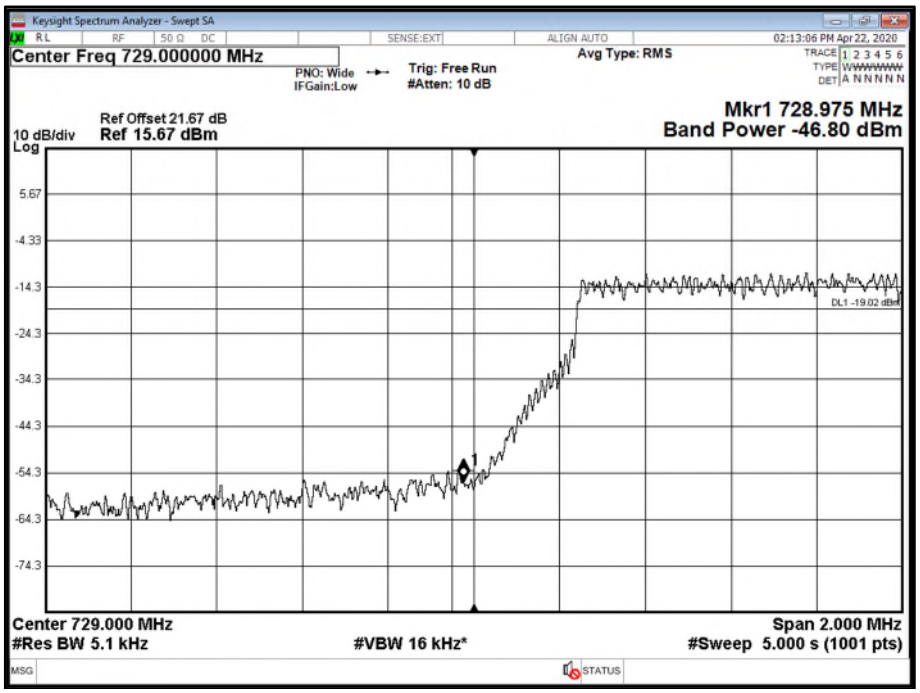
Modulation LTE: QPSK - Carrier Bandwidth LTE: 10.0 MHz - Channel Position B



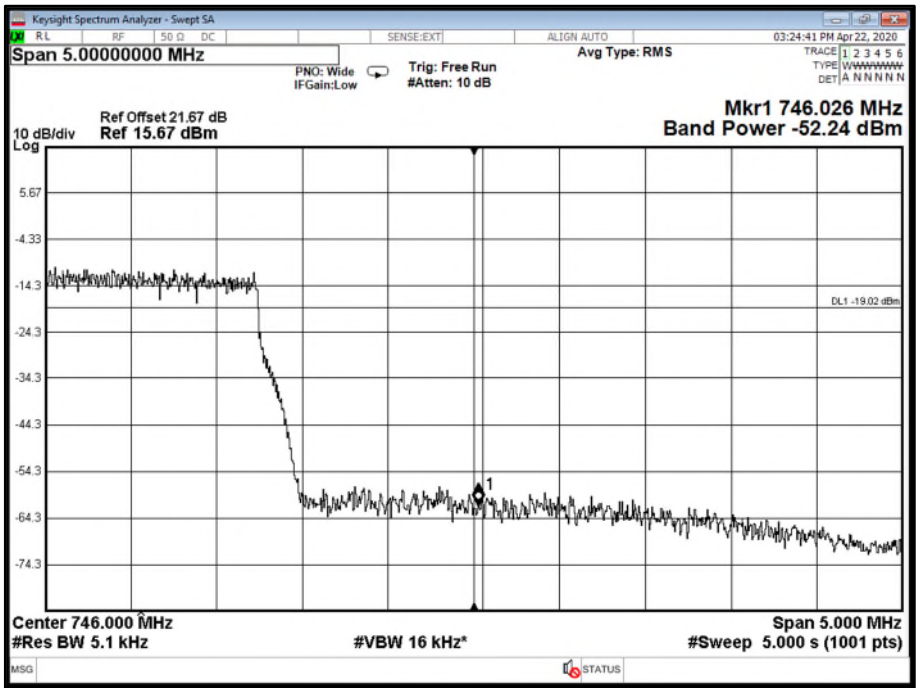

Modulation LTE: QPSK - Carrier Bandwidth LTE: 10.0 MHz - Channel Position T



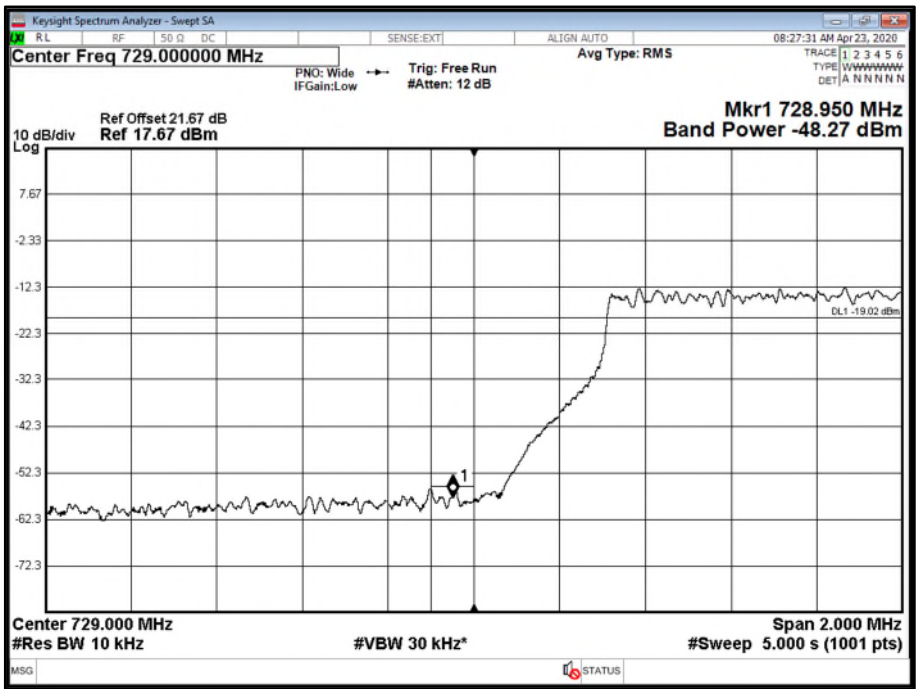
Modulation NR: QPSK - Carrier Bandwidth NR: 5.0 MHz - Channel Position B



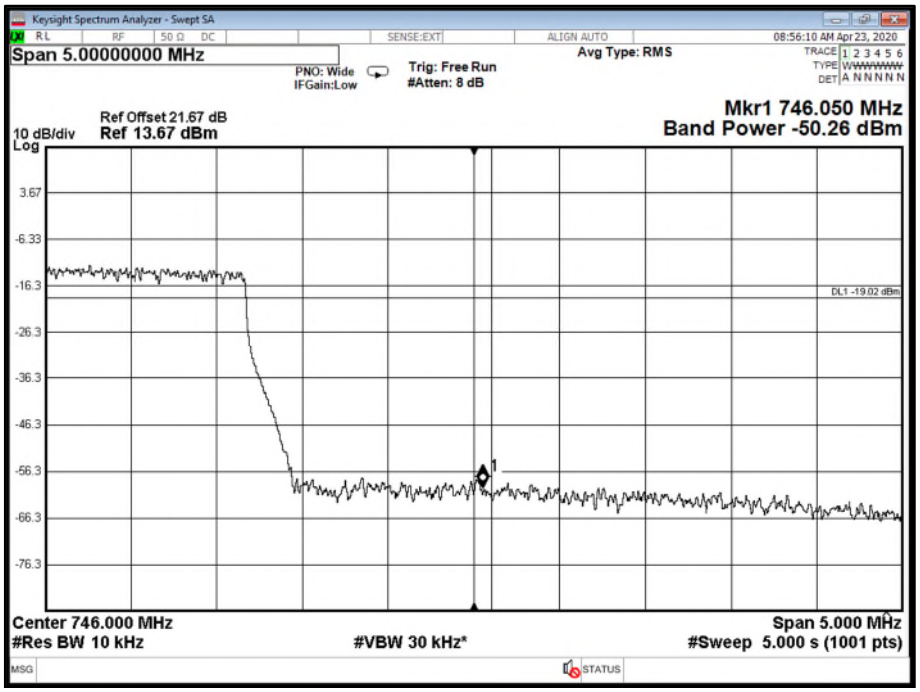

Modulation NR: QPSK - Carrier Bandwidth NR: 5.0 MHz - Channel Position T



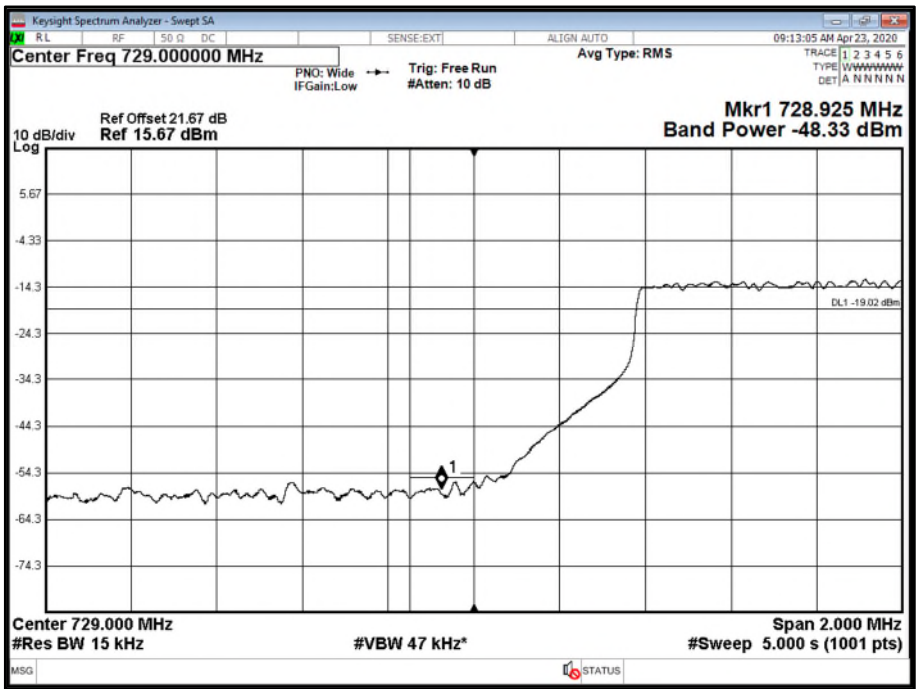
Modulation NR: QPSK - Carrier Bandwidth NR: 10.0 MHz - Channel Position B



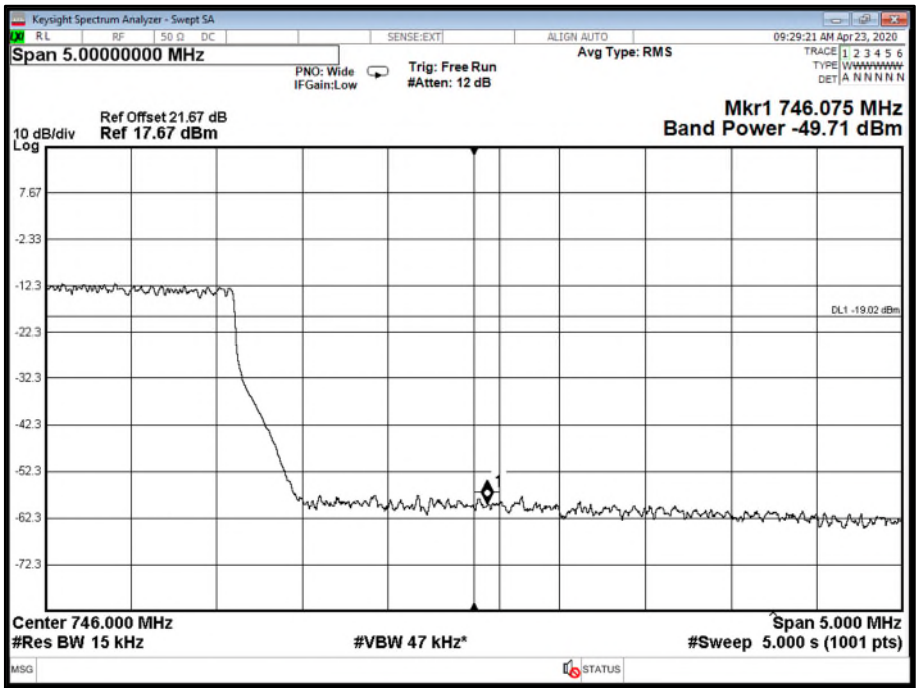

Modulation NR: QPSK - Carrier Bandwidth NR: 10.0 MHz - Channel Position T



Modulation NR: QPSK - Carrier Bandwidth NR: 15.0 MHz - Channel Position B




Modulation NR: QPSK - Carrier Bandwidth NR: 15.0 MHz - Channel Position T



**Configuration B**

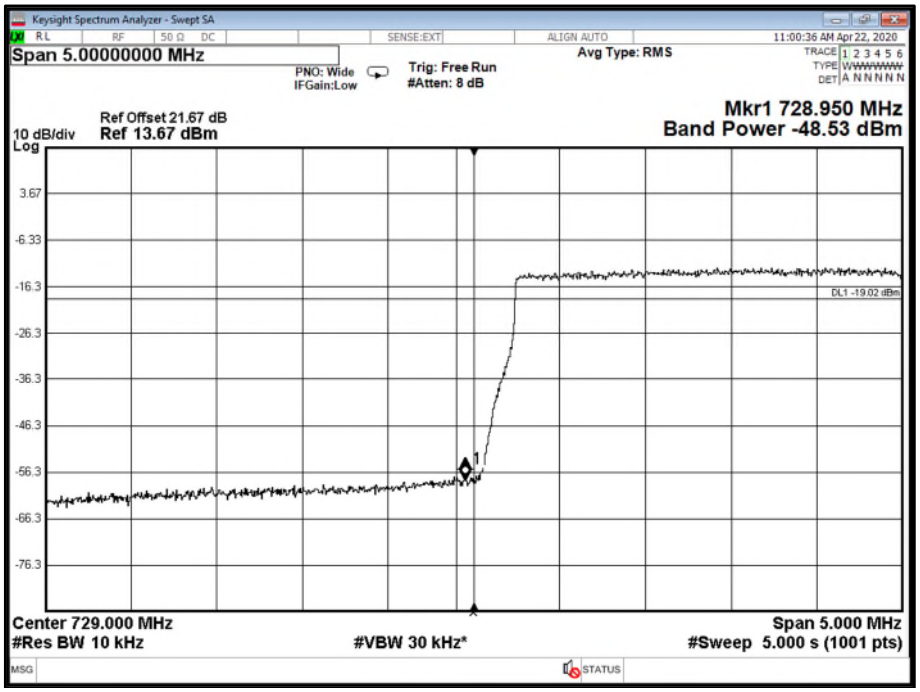
Maximum Output Power: 17.00 dBm per port.

| Antenna | LTE Modulation | Carrier Bandwidth | Band Edge (MHz) | |
|---|---|---|---|---|
| | | | Channel Position B | Channel Position T |
| A | LTE: QPSK | 5.0 + 5.0 MHz | 731.5+736.5 | 742.5+737.5 |
| A | NR: QPSK | 5.0 + 5.0 MHz | 731.5+736.5 | 742.5+737.5 |
| A | LTE + NR QPSK | L10 + NR5.0 MHz | 734.0+741.5 | 742.5+735.0 |

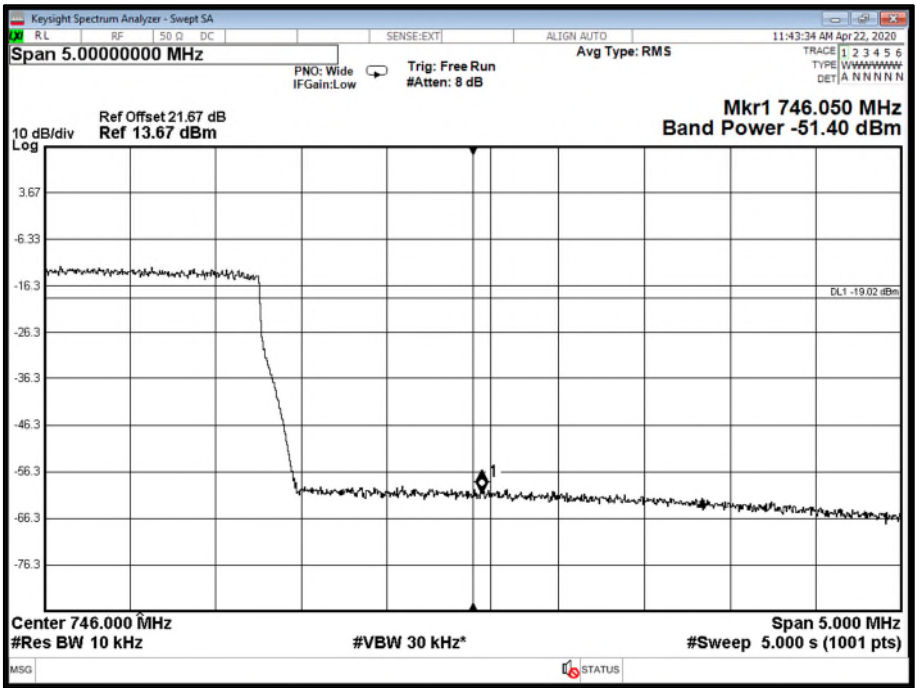
Remarks

10 MHz LTE has NB-IoT GB x2. Two carrier transmitter performance is presented. The plot results represent typical radio performace. Plot data performance for all transmitter ports and channels are on file and available on request.

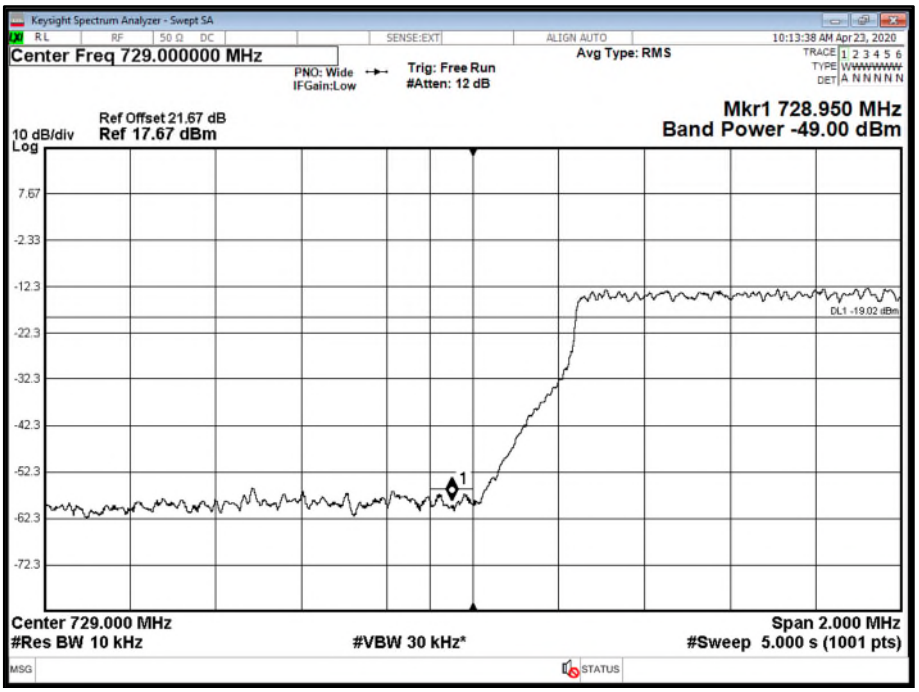
Antenna A - LTE Modulation LTE: QPSK - Carrier Bandwidth 5.0 + 5.0 MHz - Channel Position B



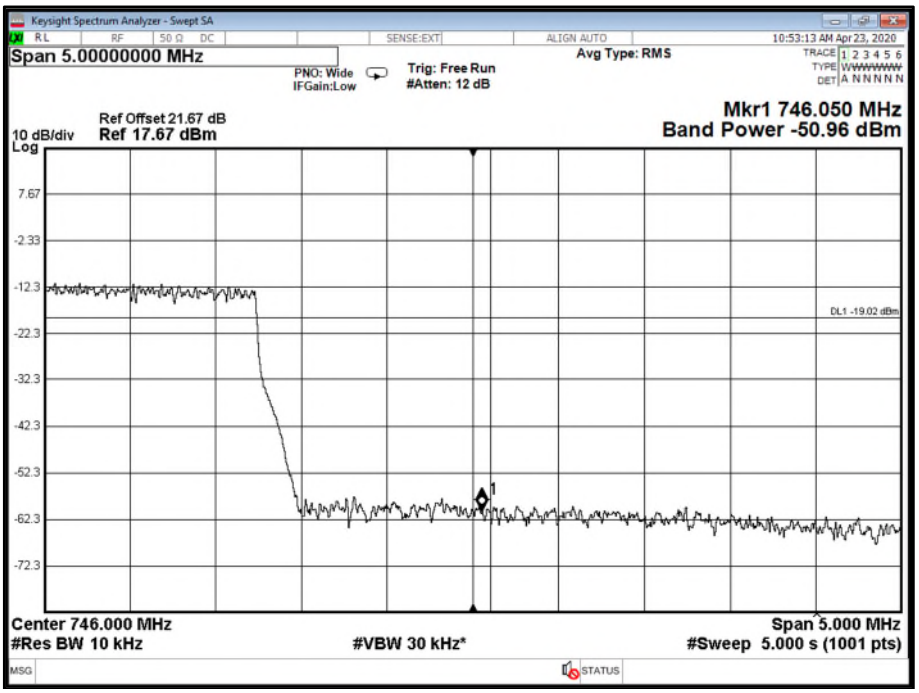
Antenna A - LTE Modulation LTE: QPSK - Carrier Bandwidth 5.0 + 5.0 MHz - Channel Position T



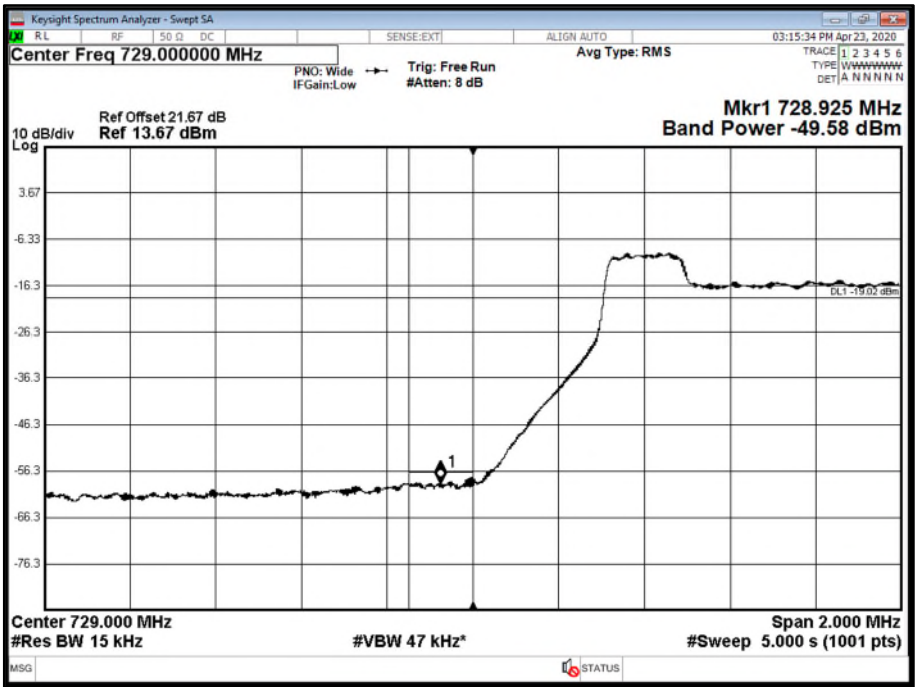

Antenna A - Modulation NR: QPSK - Carrier Bandwidth 5.0 + 5.0 MHz - Channel Position B



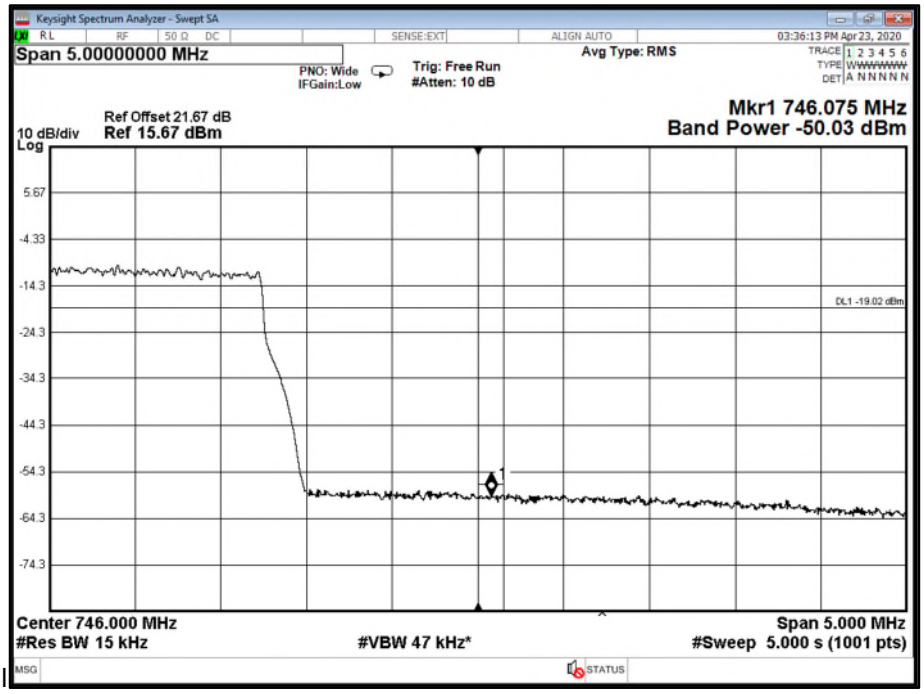
Antenna A - Modulation NR: QPSK - Carrier Bandwidth 5.0 + 5.0 MHz - Channel Position T




Antenna A - Modulation LTE + NR QPSK - Carrier Bandwidth L10 + NR5.0 MHz - Channel Position B



Antenna A - Modulation LTE + NR QPSK - Carrier Bandwidth L10 + NR5.0 MHz - Channel Position T




;.I

**Configuration C**

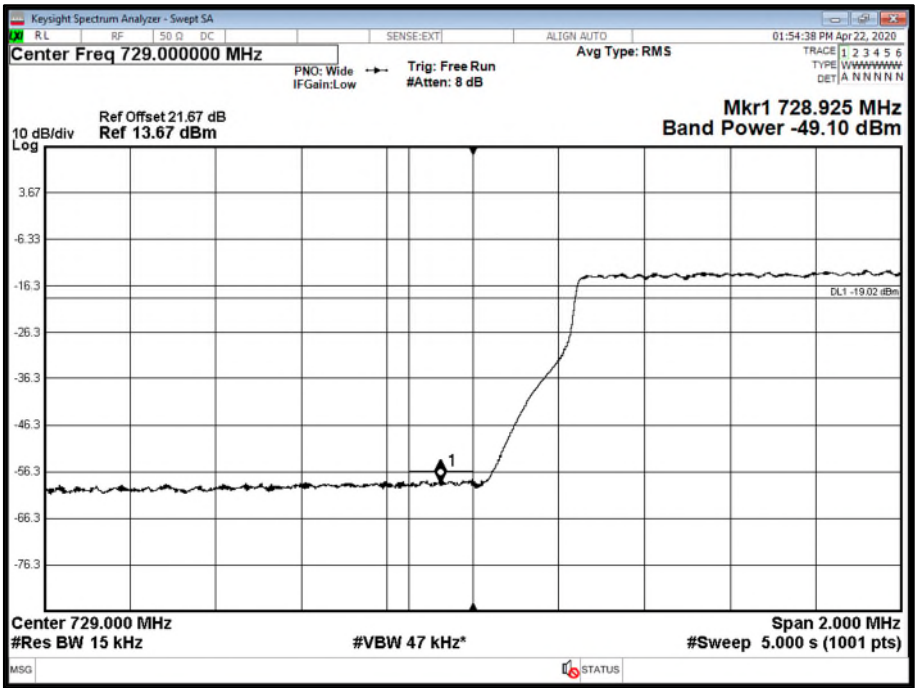
Maximum Output Power: 17.00 dBm per port.

| Antenna | LTE Modulation | Carrier Bandwidth | Band Edge (MHz) | |
|---|---|---|---|---|
| | | | Channel Position B | Channel Position T |
| A | LTE: QPSK | 5.0+5.0+5.0 MHz | 731.5+736.5+741.5 | 742.5+737.5+732.5 |
| A | NR: QPSK | 5.0+5.0+5.0 MHz | 731.5+736.5+741.5 | 742.5+737.5+732.5 |
| A | LTE + NR QPSK | L5 + 2NR5.0 MHz | 731.5+736.5+741.5 | 742.5+737.5+732.5 |

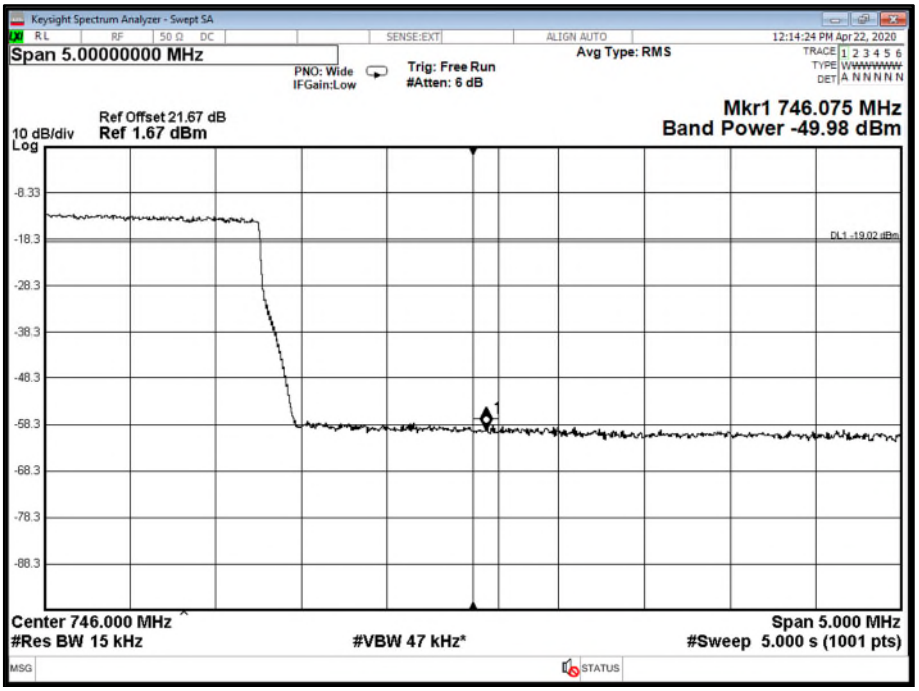
Remarks

Three carrier transmitter performance is presented. The plot results represent typical radio performace. Plot data performance for all transmitter ports and channels are on file and available on request.

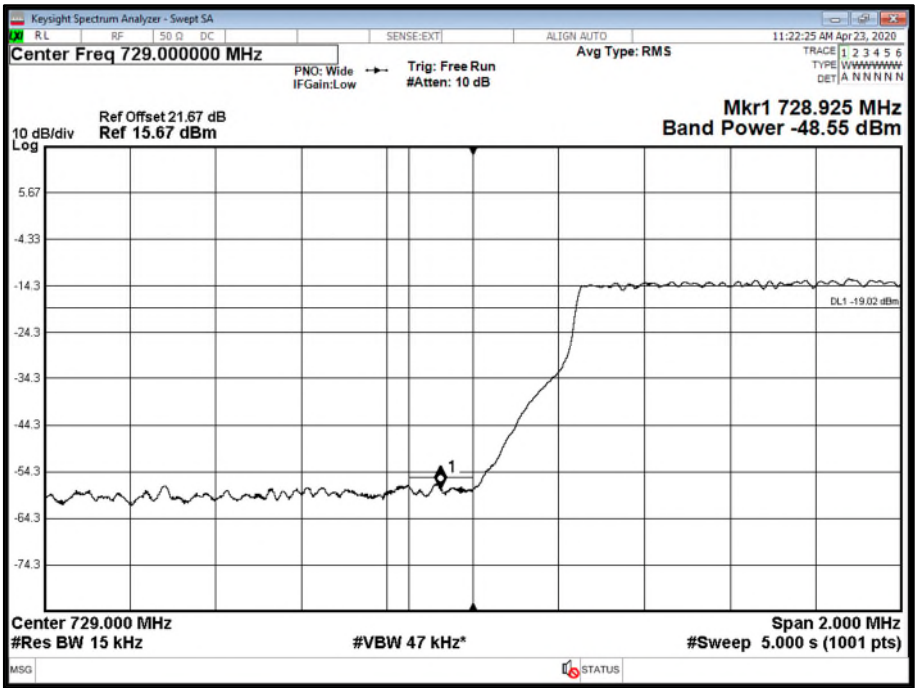
Antenna A - LTE Modulation LTE: QPSK - LTE Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position B



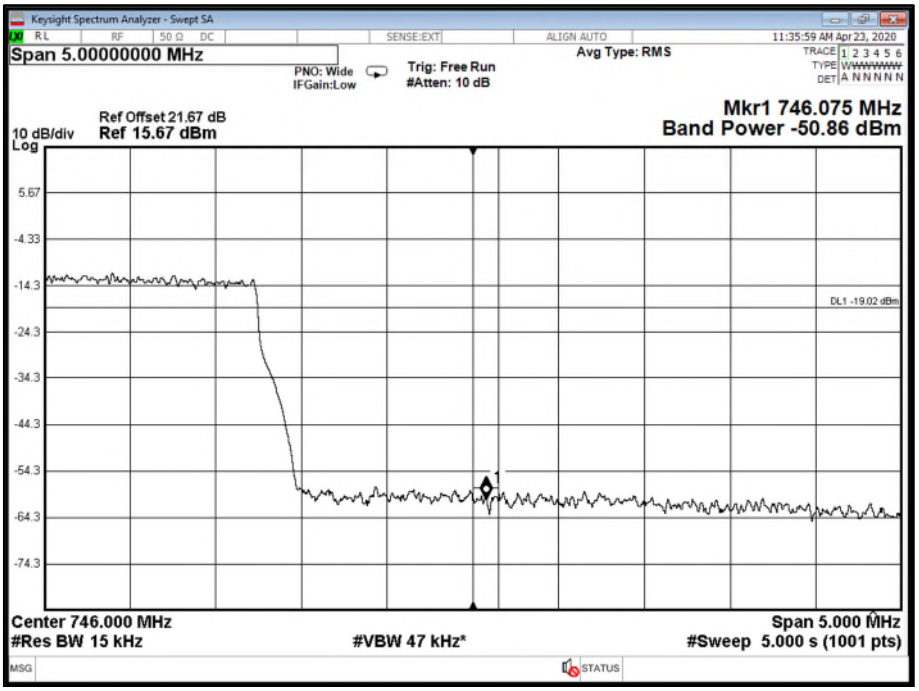

Antenna A - LTE Modulation LTE: QPSK - LTE Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position T



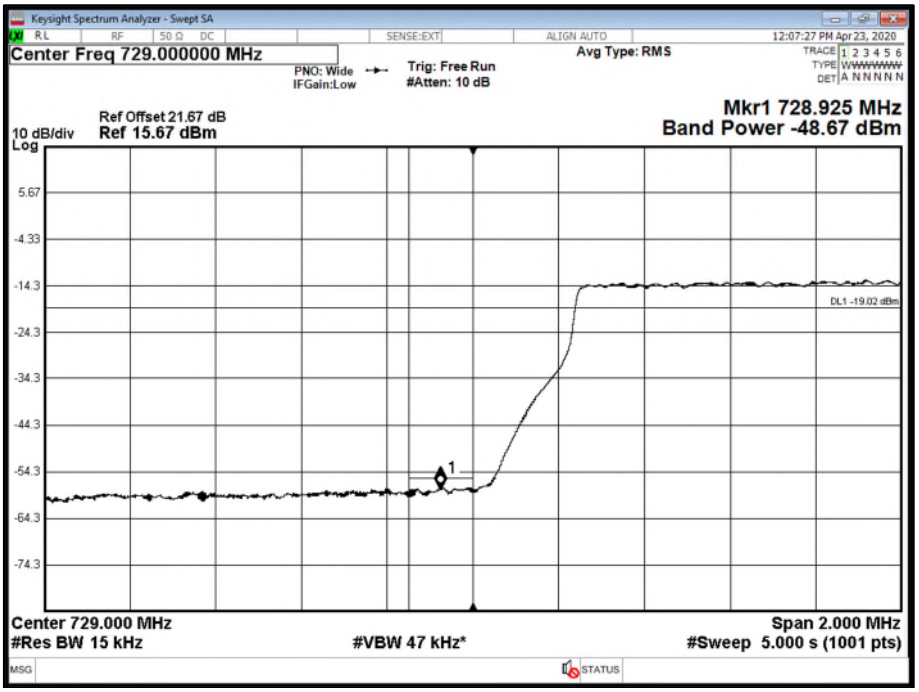
Antenna A - Modulation NR: QPSK - NR Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position B



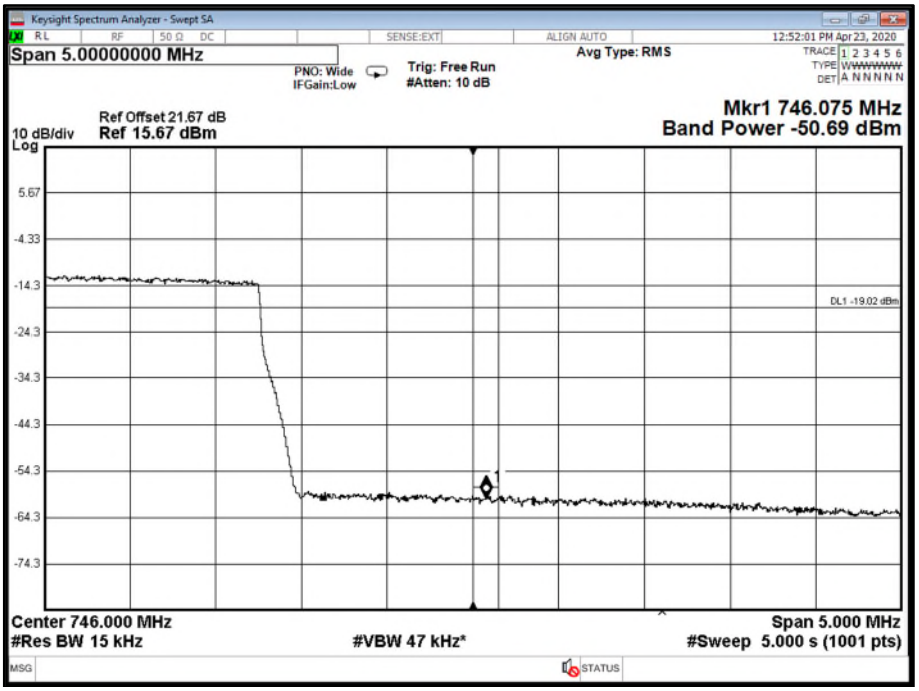

Antenna A - NR Modulation NR: QPSK - NR Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position T



Antenna A - Modulation LTE + NR QPSK - Carrier Bandwidth L5 + 2NR5.0 MHz - Channel Position B




Antenna A - Modulation LTE + NR QPSK - Carrier Bandwidth L5 + 2NR5.0 MHz - Channel Position T




| | |
|---|---|
| Limit | -19 dBm |

## 2.4 TRANSMITTER SPURIOUS EMISSIONS

### 2.4.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.53 (g)
FCC CFR 47 Part 2, Clause 2.1051

### 2.4.2 Date of Test and Modification State

20 April 2020 - Modification State 0

### 2.4.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.4.4 Environmental Conditions

| | |
|---|---|
| Ambient Temperature | 23.5°C |
| Relative Humidity | 31.3% |

### 2.4.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01.

Each of the 2 bands of the EUT has 4 transmit ports, therefore, the test limits used were calculated on a worst-case basis accounting for an effective 4 port MIMO configuration. Testing was performed on this port with a test limit of
43+10log(P) - 10log(4) = -19 dBm

### 2.4.6 Test Results

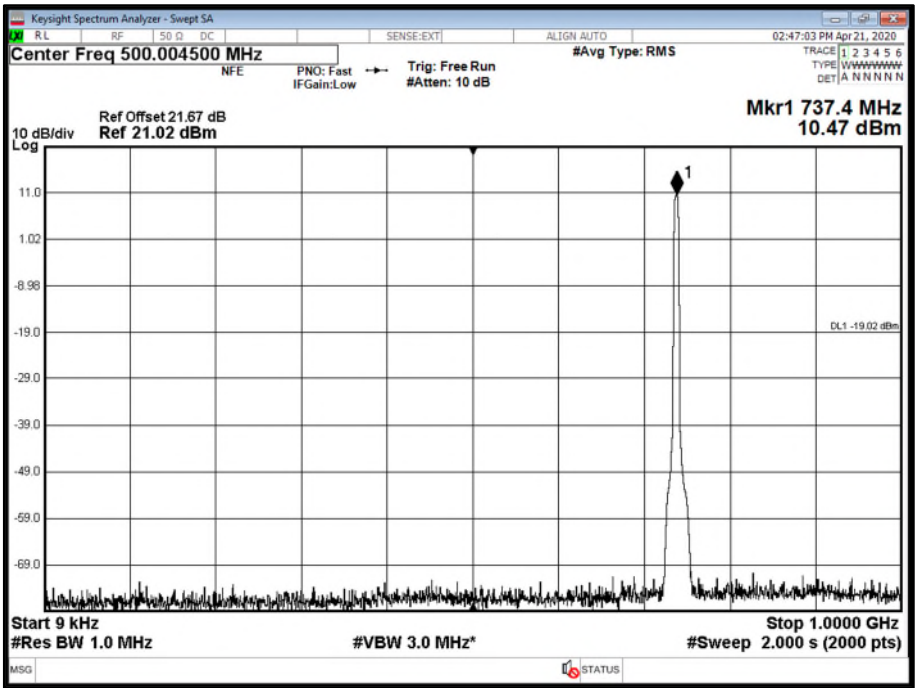
**Configuration A**

Maximum Output Power: 17.00 dBm per port.

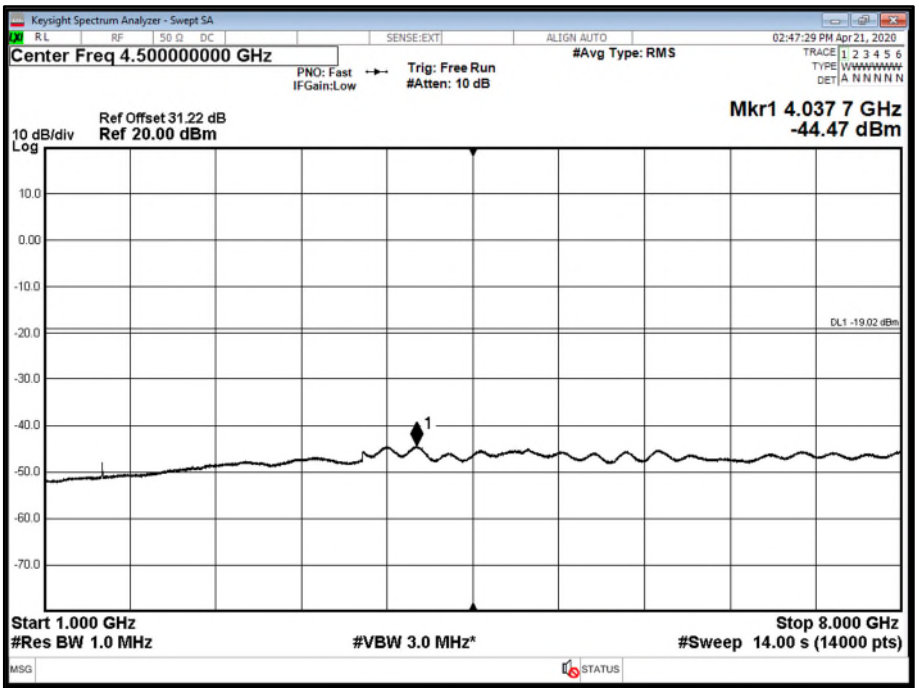
Remarks

Spurious emssions have been searched for all channel bandwidths and antenna ports. Representavie spurious emissions performance has been presented for LTE and NR modulations. Plot data performance for all transmitter ports, channel bandwidths, and channel positions are on file and available on request.

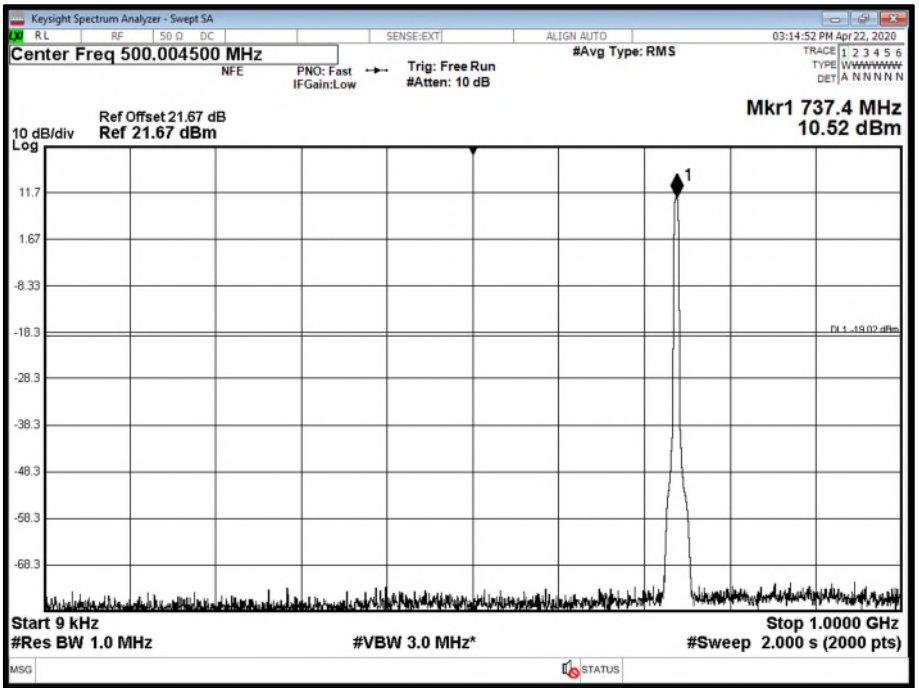
LTE Modulation LTE: QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M - Band 1.00 - Range 0.009 to 1000 MHz



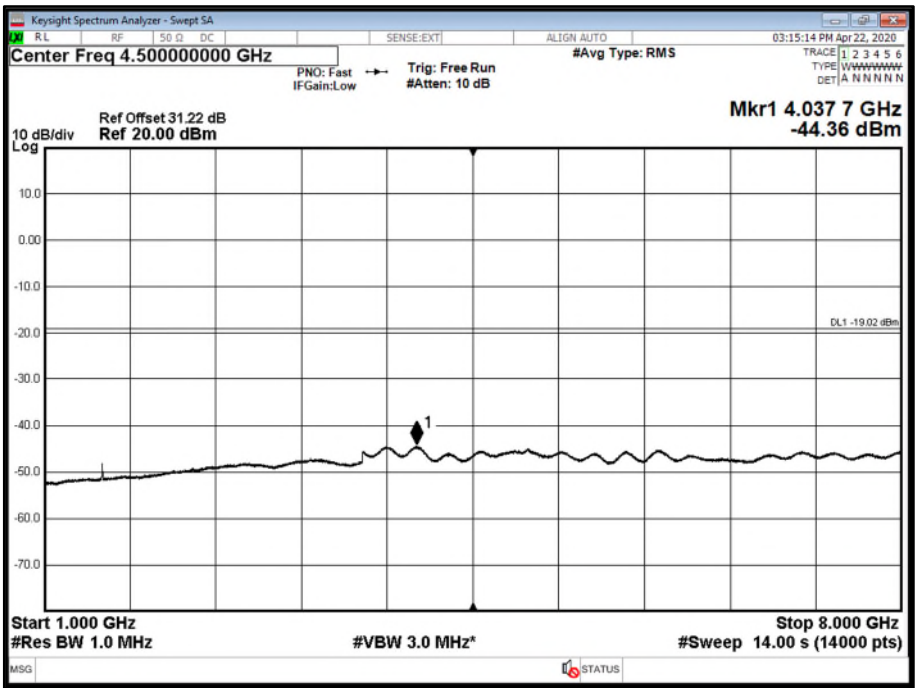

LTE Modulation LTE: QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M - Band 2.00 - Range 1000 to 8000 MHz



Modulation NR: QPSK - NR Carrier Bandwidth 5.0 MHz - Channel Position M - Band 1.00 - Range 0.009 to 1000 MHz




Modulation NR: QPSK - NR Carrier Bandwidth 5.0 MHz - Channel Position M - Band 2.00 - Range 1000 to 8000 MHz



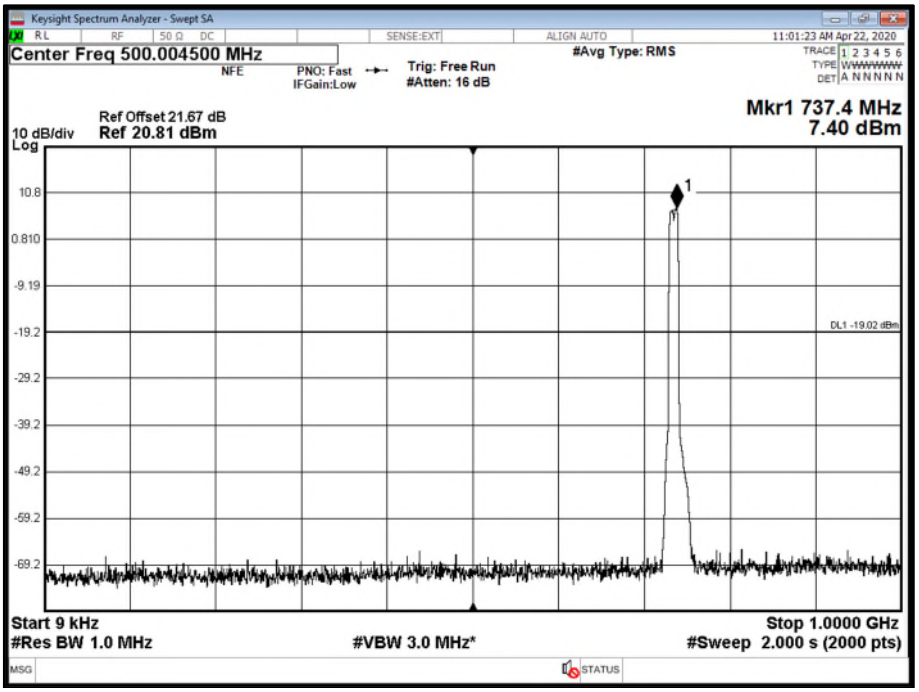
**Configuration B**

Maximum Output Power: 17.00 dBm per port.

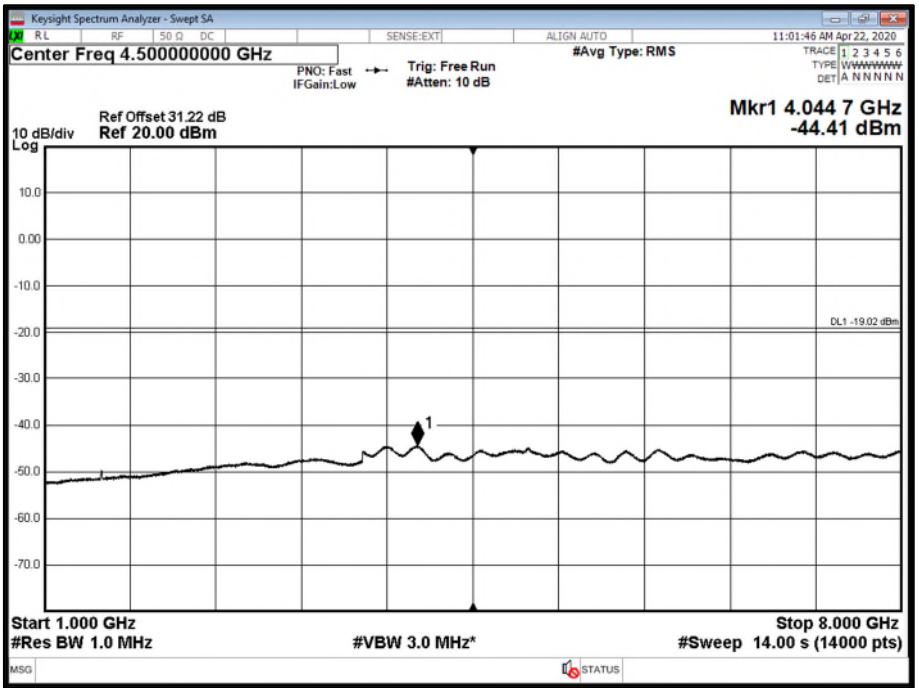
Remarks

10 MHz LTE has NB-IoT GB x2. Two carrier transmitter performance is presented. The plot results represent typical radio performace. Plot data performance for all transmitter ports and channels are on file and available on request.

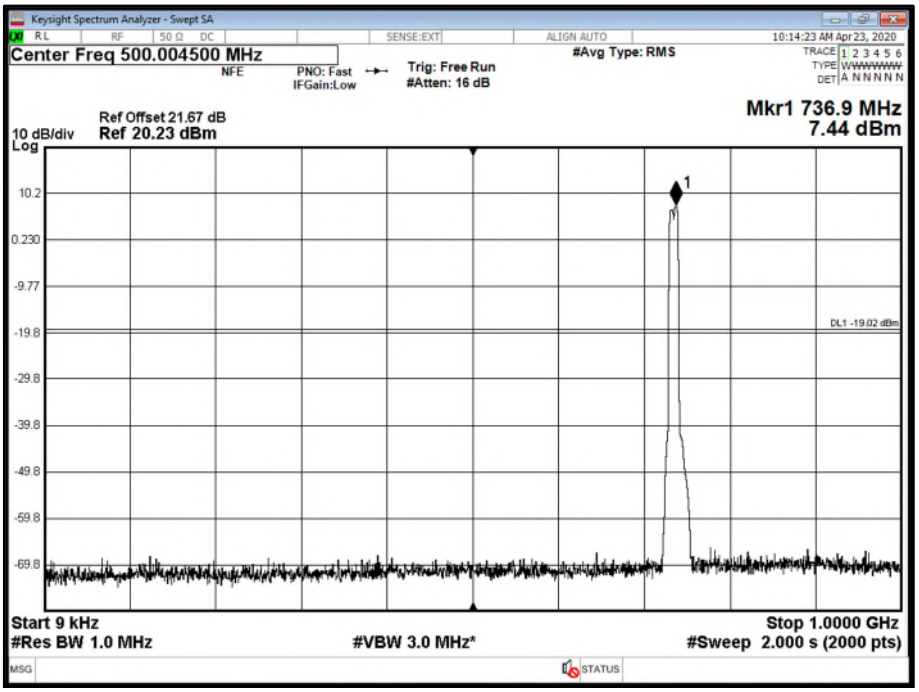
LTE Modulation LTE: QPSK - LTE Carrier Bandwidth 5.0 + 5.0 MHz - Channel Position B - Band 1.00 - Range 0.009 to 1000 MHz



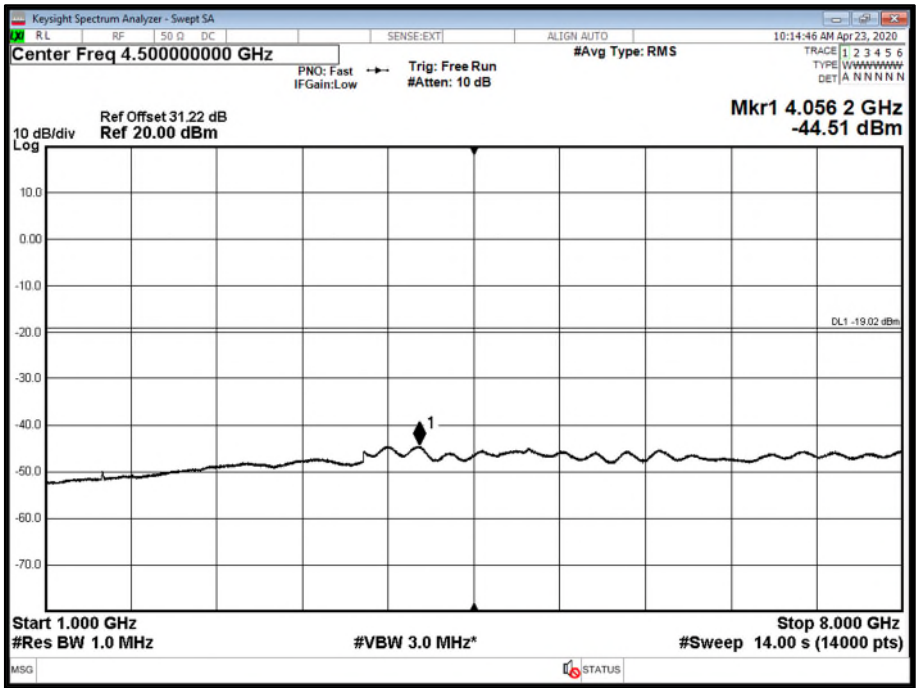
LTE Modulation LTE: QPSK - LTE Carrier Bandwidth 5.0 + 5.0 MHz - Channel Position B - Band 2.00 - Range 1000 to 8000 MHz



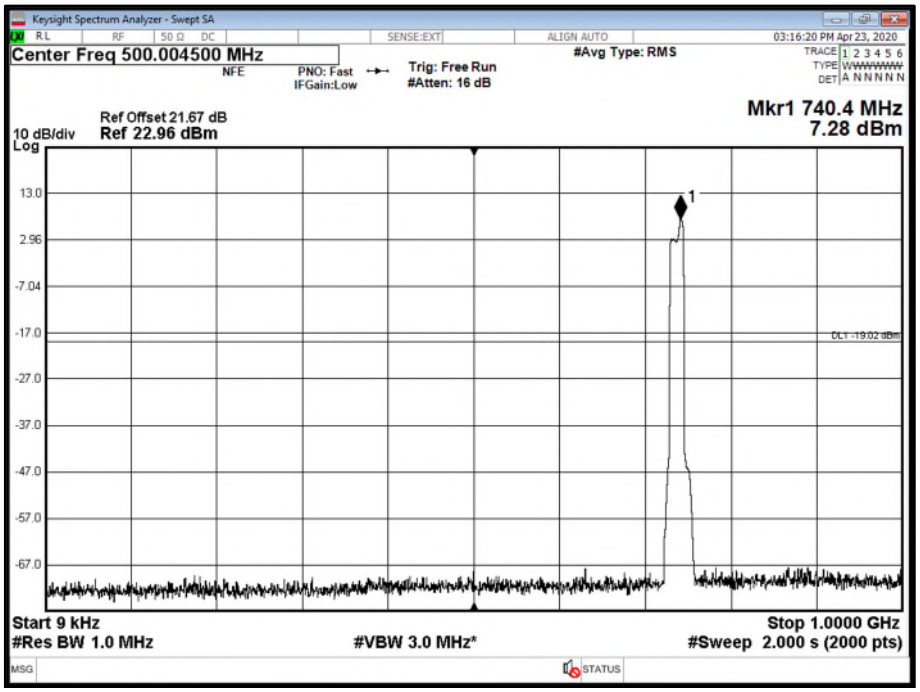

Modulation NR: QPSK - NR Carrier Bandwidth 5.0 + 5.0 MHz - Channel Position B - Band 1.00 - Range 0.009 to 1000 MHz



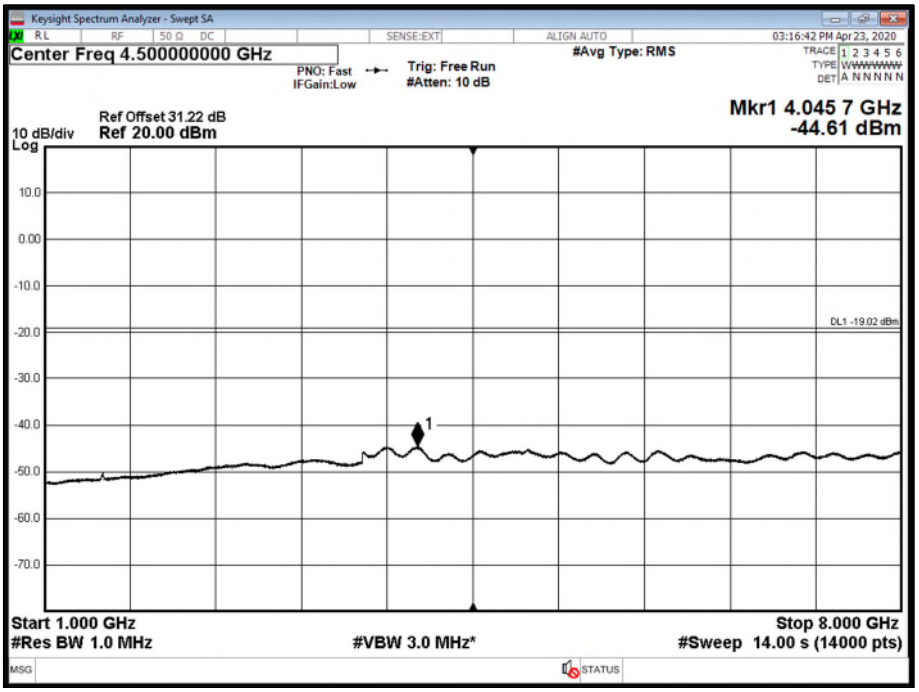
Modulation NR: QPSK - NR Carrier Bandwidth 5.0 + 5.0 MHz - Channel Position B - Band 2.00 - Range 1000 to 8000 MHz




Modulation LTE + NR QPSK - Carrier Bandwidth L10 + NR5.0 MHz - Channel Position B - Band 1.00 - Range 0.009 to 1000 MHz



Modulation LTE + NR QPSK - Carrier Bandwidth L10 + NR5.0 MHz - Channel Position B - Band 2.00 - Range 1000 to 8000 MHz



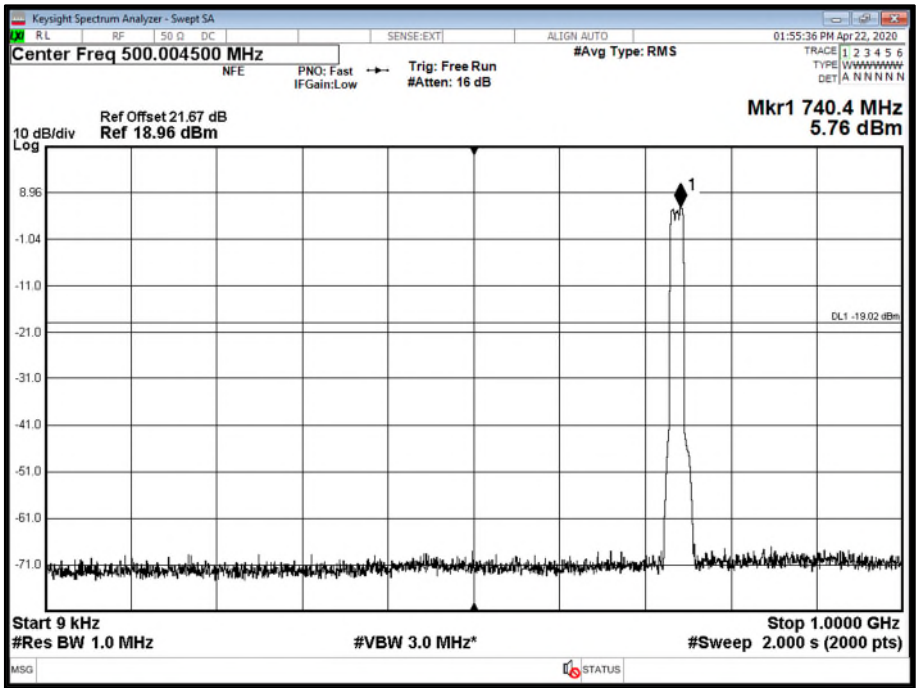
**Configuration C**

Maximum Output Power: 17.00 dBm per port.

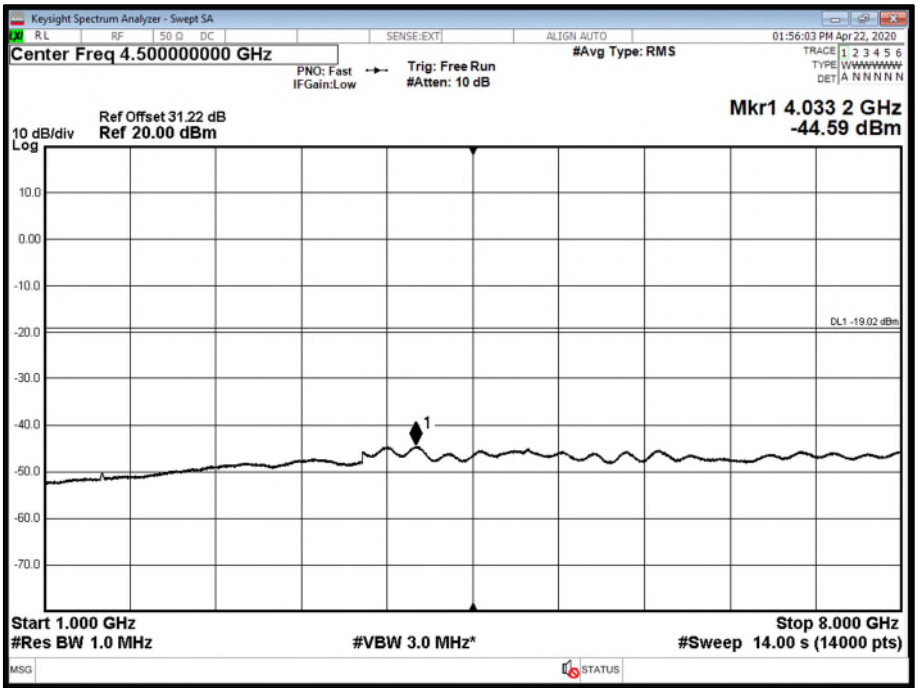
Remarks

Three carrier transmitter performance is presented. The plot results represent typical radio performace. Plot data performance for all transmitter ports and channels are on file and available on request.

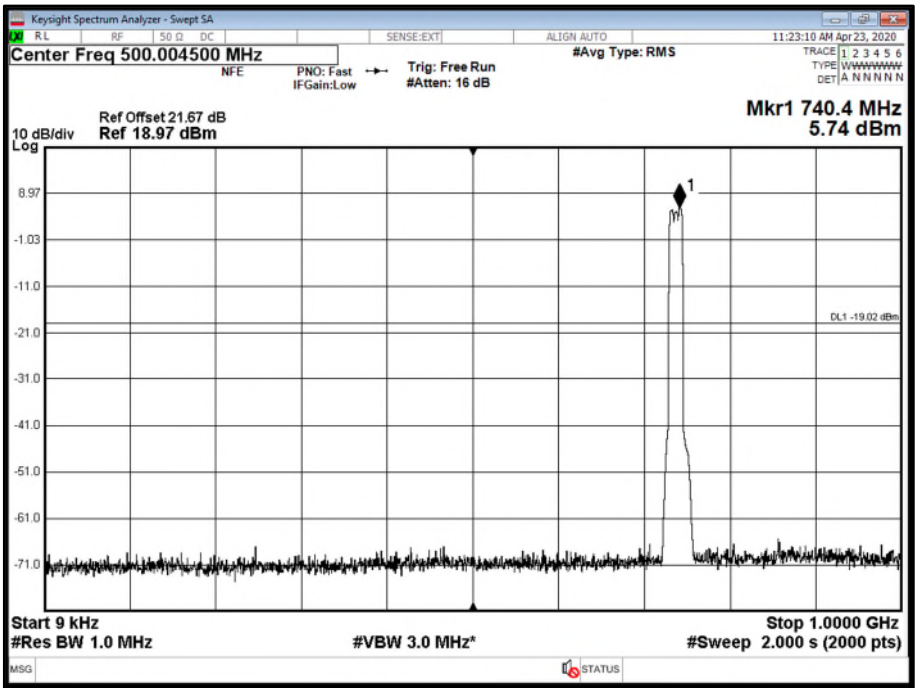
LTE Modulation LTE: QPSK - LTE Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position B - Band 1.00 - Range 0.009 to 1000 MHz



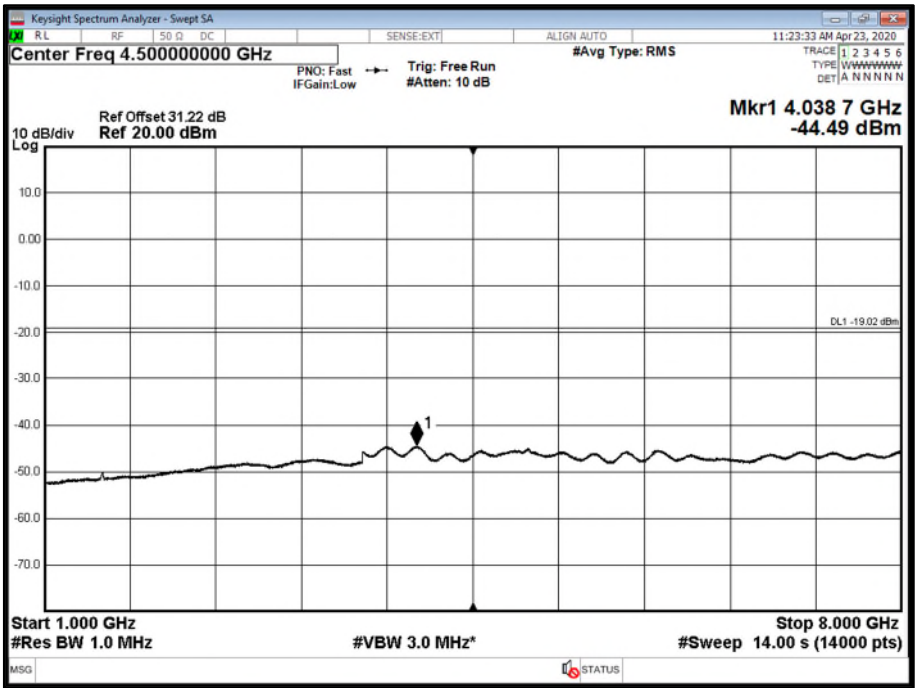
LTE Modulation LTE: QPSK - LTE Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position B - Band 2.00 - Range 1000 to 8000 MHz



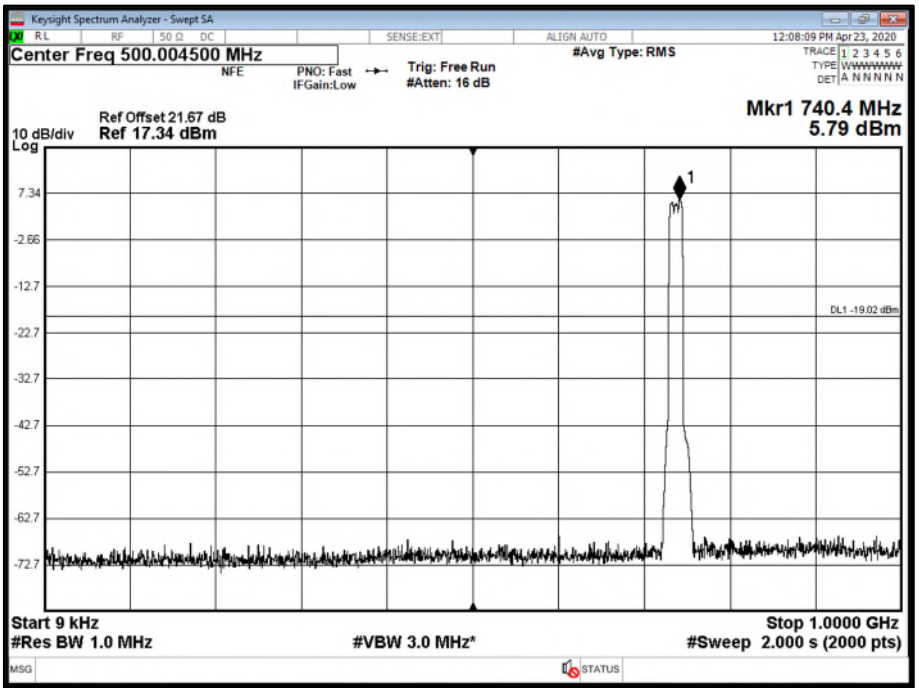

Modulation NR: QPSK - NR Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position B - Band 1.00 - Range 0.009 to 1000 MHz



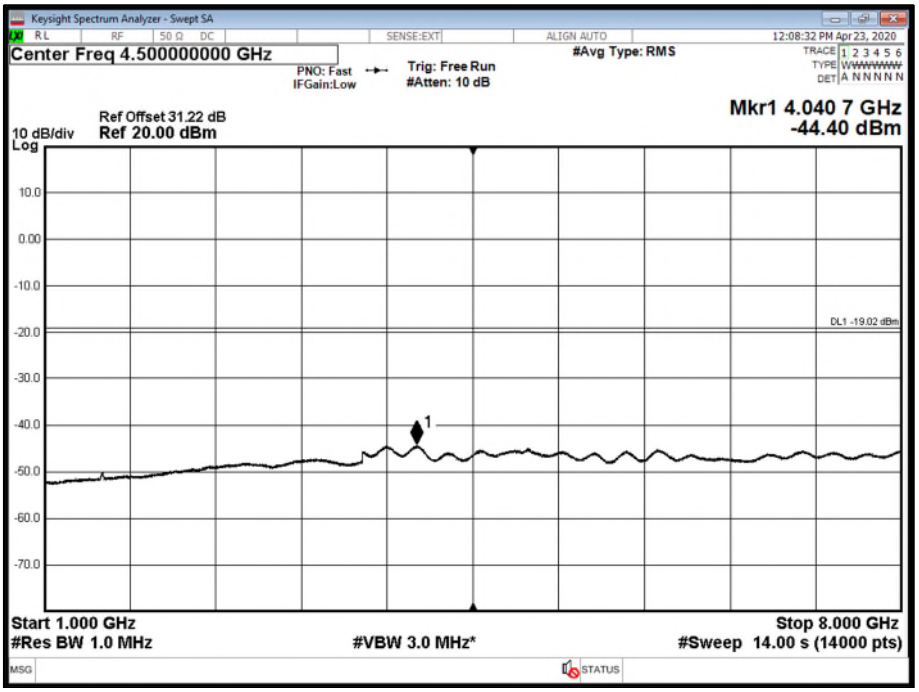
Modulation NR: QPSK - NR Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position B - Band 2.00 - Range 1000 to 8000 MHz




Modulation LTE + NR QPSK - Carrier Bandwidth L5 + 2NR5.0 MHz - Channel Position B - Band 1.00 - Range 0.009 to 1000 MHz



Modulation LTE + NR QPSK - Carrier Bandwidth L5 + 2NR5.0 MHz - Channel Position B - Band 2.00 - Range 1000 to 8000 MHz




| | |
|---|---|
| Limit | -19dBm |

## 2.5 FREQUENCY STABILITY

### 2.5.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.54
FCC CFR 47 Part 2, Clause 2.1055

### 2.5.2 Date of Test and Modification State

20 April 2020 - Modification State 0

### 2.5.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.5.4 Environmental Conditions

| | |
|---|---|
| Ambient Temperature | 26.7°C |
| Relative Humidity | 32.2% |

### 2.5.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01.

### 2.5.6 Test Results

Configuration A

Maximum Output Power 17.00 dBm

| Temperature | Voltage | Frequency Error (Hz) |
|---|---|---|
| | | Channel Position M |
| -30°C | -48.0 V DC | N/A |
| -20°C | -48.0 V DC | N/A |
| -10°C | -48.0 V DC | 1.20 |
| 0°C | -48.0 V DC | 1.50 |
| +10°C | -48.0 V DC | 1.10 |
| +20°C | -40.5 V DC | 1.10 |
| +20°C | -48.0 V DC | -1.10 |
| +20°C | -57.5 V DC | -1.20 |
| +30°C | -48.0 V DC | 1.10 |
| +40°C | -48.0 V DC | 1.10 |
| +50°C | -48.0 V DC | 1.20 |

| | |
|---|---|
| Limit | ±1.5 ppm or ±1.093 kHz |

## SECTION 3

## TEST EQUIPMENT USED

## 3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

| Instrument | Manufacturer | Type No. | TE No. | Cal.Cycle (Months) | Calibration Due |
|---|---|---|---|---|---|
| Spectrum Analyzer | Keysight | PXA N9030A | MY55410202 | 24 | 13-Sep-2020 |
| Signal Generator | R&S | SMB 100A | SSG013949 | 24 | 01-Apr-2021 |
| Digital Multimeter | Fluke | 115 | SSG013271 | 24 | 10-Sep-2020 |
| Temp. / Humidity Meter | Omega | OM-CP-PRHTEMP2000 | P44878 | 24 | 22-Oct-2020 |
| PSU | Xantrex | XKW60-50 | E00109862 | - | O/P Mon |
| Attenuator (10dB) | Mini-Circuits | BW-K10-2W44+ | - | - | O/P Mon |
| RF Switch Unit | Ericsson | RARSFW 4x1 | 1 | - | O/P Mon |
| Switching Control Unit | H.P. | 11713A | 3748A060876 | - | O/P Mon |

N/A – Not Applicable
O/P Mon – Output Monitored with Calibrated Equipment

## 3.2 MEASUREMENT UNCERTAINTY

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

| Test Discipline | Frequency / Parameter | | MU |
|---|---|---|---|
| Conducted Maximum Peak Output Power | 30 MHz to 20 GHz Amplitude | | ± 0.7 dB |
| Conducted Emissions | 30 MHz to 20 GHz Amplitude | | ± 2.1 dB |
| Frequency Stability | 30 MHz to 2 GHz | | ± 5.0 Hz |
| Occupied Bandwidth | Up to 20 MHz Bandwidth | 5 MHz Bandwidth | ± 11547 Hz |
| | | 10 MHz Bandwidth | ± 23094 Hz |
| | | 15 MHz Bandwidth | ± 34641 Hz |
| | | 20 MHz Bandwidth | ± 46188 Hz |
| Band Edge | 30 MHz to 20 GHz Amplitude | | ±0.8 dB |

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2007, clause 4.4.3 and 4.5.1.

## SECTION 5

## ACCREDITATION, DISCLAIMERS AND COPYRIGHT

## 4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

Testing Laboratory
Certificate #2955.19

This report relates only to the actual item/items tested.

This report does not imply product endorsement by any government, accreditation agency, or TÜV SÜD Canada Inc.

Opinions or interpretations expressed in this report, if any, are outside the scope of TÜV SÜD Canada Inc. accreditations. Any opinions expressed do not necessarily reflect the opinions of TÜV SÜD Canada Inc., unless otherwise stated.

**ANNEX A**

**MODULE LIST**

| Configuration | | | |
|---|---|---|---|
| Product | Product No. | R-State | Serial No. |
| CT11 | LPC 102 494/1 | R2A | T01G495060 |
| LPRU 4410 B5B12A | KRC 161 879/1 | R1B | TD3F0631533 |
| | | | |
| | | | |
| Software Version: | CXP 901 3268/17 | Revision: R82GS | |