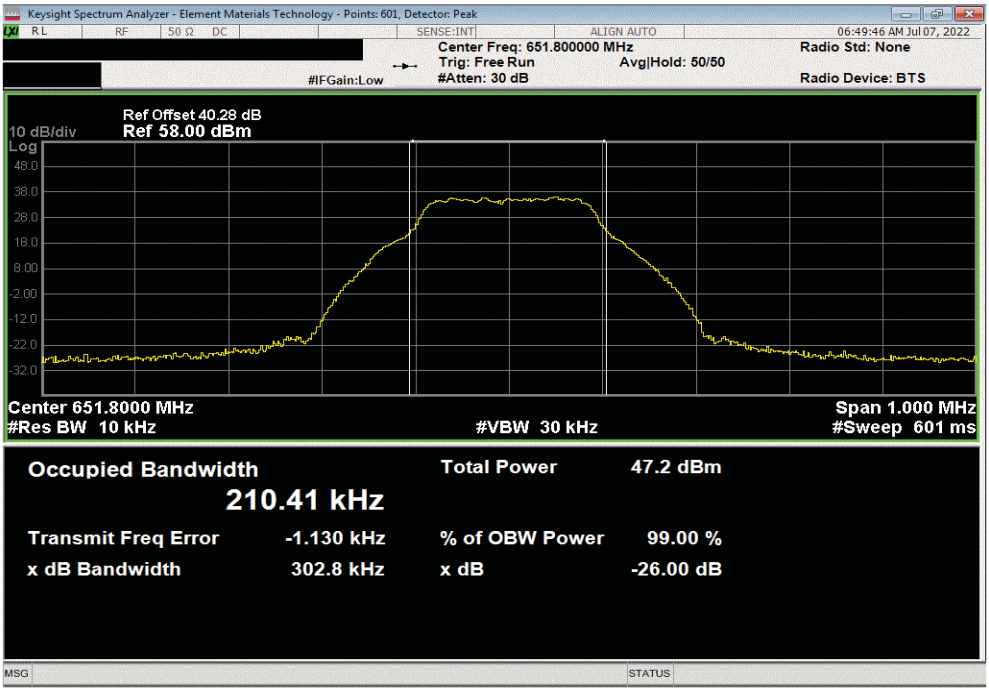
| Port 2, LTE, Band 71, 617 MHz - 652 MHz, 200 kHz Bandwidth, Standalone NB-IoT Modulation, High Ch. 651.8 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 210.407 kHz | 302.775 kHz | Outside Band | Pass |



# OCCUPIED BANDWIDTH - Band 85 NB IoT SA

XMit 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3239 | ANE | 2022-03-02 | 2023-03-02 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |

**TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The method in section 5.4 of ANSI C63.26 was used to make this measurement. The spectrum analyzer settings were as follows:

- RBW is 1% - 5% of the occupied bandwidth
- VBW is ≥ 3x the RBW
- Peak Detector was used
- Trace max hold was used

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHLOB) as the original certification test. The AHLOB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 2 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i, and 6.4.

The occupied bandwidth was measured with the EUT configured in the modes called out in the data sheets.
FCC 27.53 defines the 26dB emission bandwidth requirement.
RSS GEN Section 6.7 defines the 99% emission bandwidth requirement.

| FCC and ISED Emission Designators for Band 85 (728MHz to 746MHz) Narrow-Band IoT Stand Alone | | | |
|---|---|---|---|
| Ch BW | Radio Channel | 4G-LTE: N-TM | |
| | | FCC | ISED |
| 200kHz | Low | 291KG7D | 203KG7D |
| | Mid | 291KG7D | 204KG7D |
| | High | 290KG7D | 204KG7D |
| Note: FCC emission designators are based on 26dB emission bandwidth. ISED emission designators are based on 99% emission bandwidth. | | | |

# OCCUPIED BANDWIDTH - Band 85 NB IoT SA

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | AHLOB | | | Work Order: | NOKI0043 |
| Serial Number: | YK220900029 | | | Date: | 13-Jul-22 |
| Customer: | Nokia Solutions and Networks | | | Temperature: | 20.6 °C |
| Attendees: | Mitchell Hill, John Rattanavong | | | Humidity: | 53.5% RH |
| Project: | None | | | Barometric Pres.: | 1017 mbar |
| Tested by: | Marty Martin | Power: | 54 VDC | Job Site: | TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| RSS-130 Issue 2 | ANSI C63.26:2015 |
| FCC 27:2022 | ANSI C63.26:2015 |

**COMMENTS**

All losses in the measurement path were accounted for: attenuators, cables, DC block and filter when in use. The carriers were enabled at maximum power.

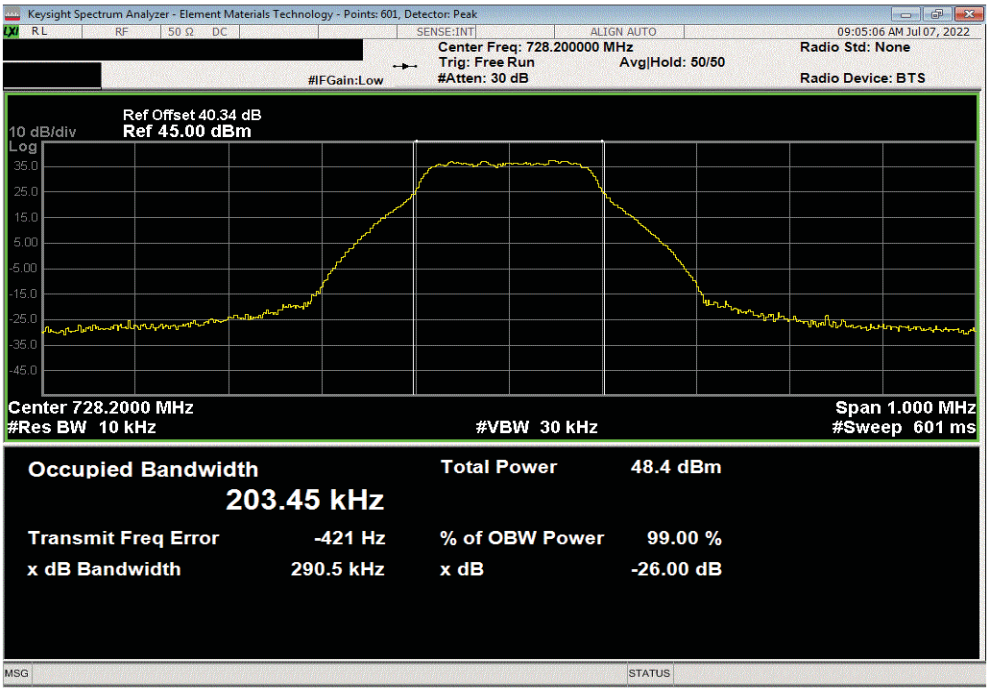
**DEVIATIONS FROM TEST STANDARD**

None

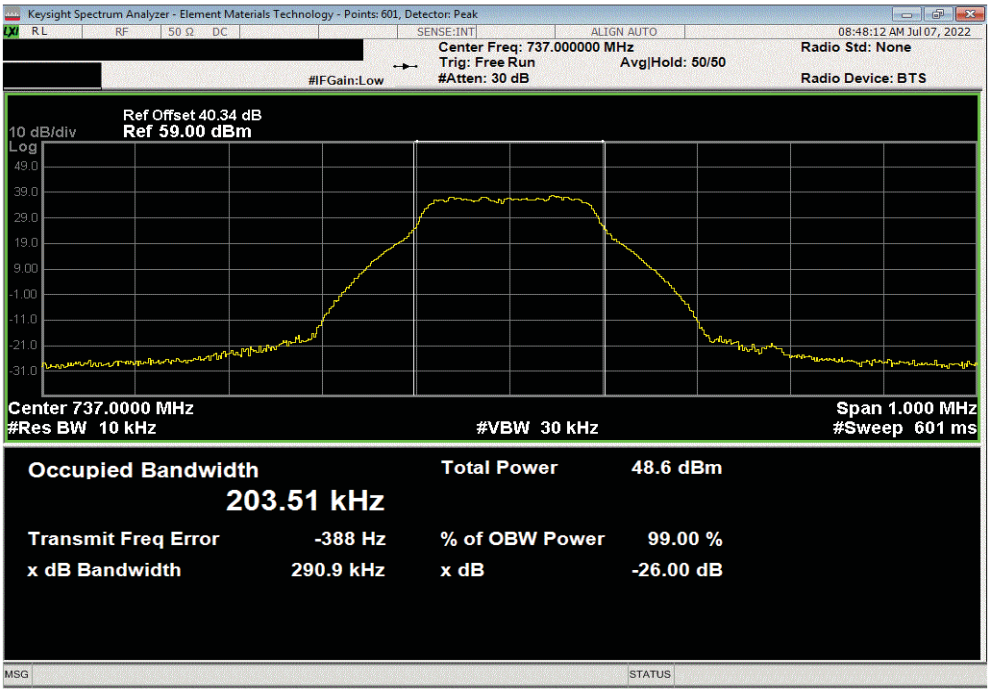
| Configuration # | 2 | Signature |
|---|---|---|

| | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
|---|---|---|---|---|
| Port 2, LTE, Band 85, 728 MHz - 746 MHz | | | | |
| 200 kHz Bandwidth | | | | |
| Standalone NB-IoT | | | | |
| Low Ch. 728.2 MHz | 203.449 kHz | 290.513 kHz | Outside Band | Pass |
| Mid Ch. 737 MHz | 203.509 kHz | 290.892 kHz | Outside Band | Pass |
| High Ch. 745.8 MHz | 203.806 kHz | 289.943 kHz | Outside Band | Pass |

| Port 2, LTE, Band 85, 728 MHz - 746 MHz, 200 kHz Bandwidth, Standalone NB-IoT Modulation, Low Ch. 728.2 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 203.449 kHz | 290.513 kHz | Outside Band | Pass |



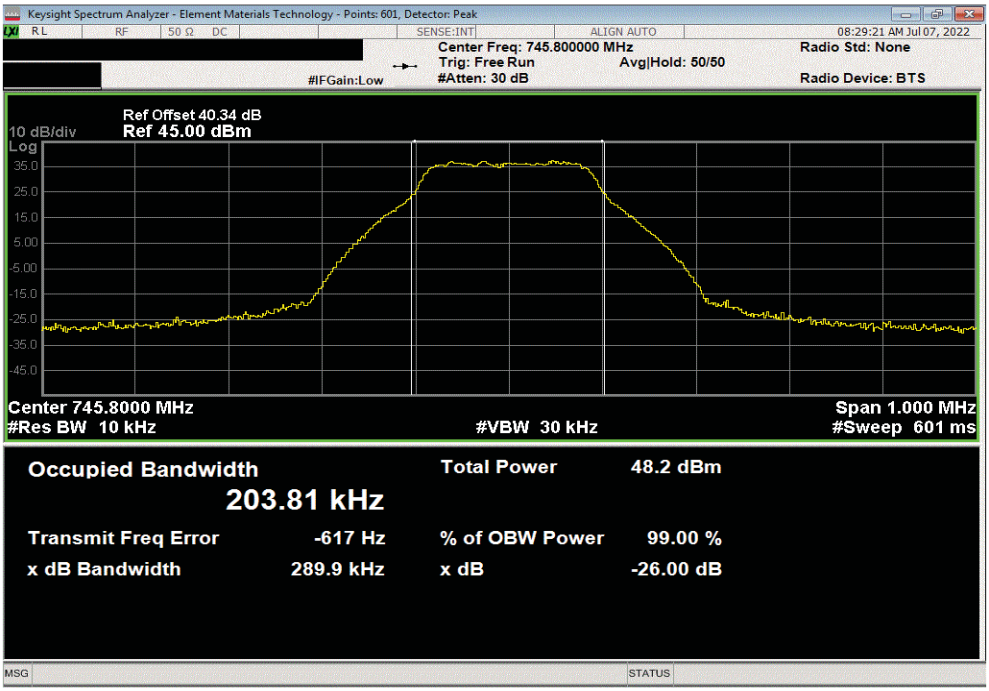

| Port 2, LTE, Band 85, 728 MHz - 746 MHz, 200 kHz Bandwidth, Standalone NB-IoT Modulation, Mid Ch. 737 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 203.509 kHz | 290.892 kHz | Outside Band | Pass |



# OCCUPIED BANDWIDTH - Band 85 NB IoT SA



| Port 2, LTE, Band 85, 728 MHz - 746 MHz, 200 kHz Bandwidth, Standalone NB-IoT Modulation, High Ch. 745.8 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 203.806 kHz | 289.943 kHz | Outside Band | Pass |



# OUTPUT POWER - ALL PORTS Band 71 LTE

XMit 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3239 | ANE | 2022-03-02 | 2023-03-02 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |

**TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times.

RF conducted emissions testing was performed on all ports at 15 MHz middle channel in order to prove the AHLOB antenna ports are essentially electrically identical. Antenna port 2 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i and 6.4.

# OUTPUT POWER - ALL PORTS Band 71 LTE

TbtTx 2022.06.03.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | AHLOB | | | Work Order: | NOKI0043 |
| Serial Number: | YK220900029 | | | Date: | 11-Jul-22 |
| Customer: | Nokia Solutions and Networks | | | Temperature: | 20.8 °C |
| Attendees: | Mitchell Hill, John Rattanavong | | | Humidity: | 59.1% RH |
| Project: | None | | | Barometric Pres.: | 1016 mbar |
| Tested by: | Marty Martin | Power: | 54 VDC | Job Site: | TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 27:2022 | ANSI C63.26:2015 |
| RSS-130 Issue 2:2019 | ANSI C63.26:2015 |

**COMMENTS**

All losses in the measurement path were accounted for: attenuators, cables, DC Block and filter when in use.

**DEVIATIONS FROM TEST STANDARD**

None

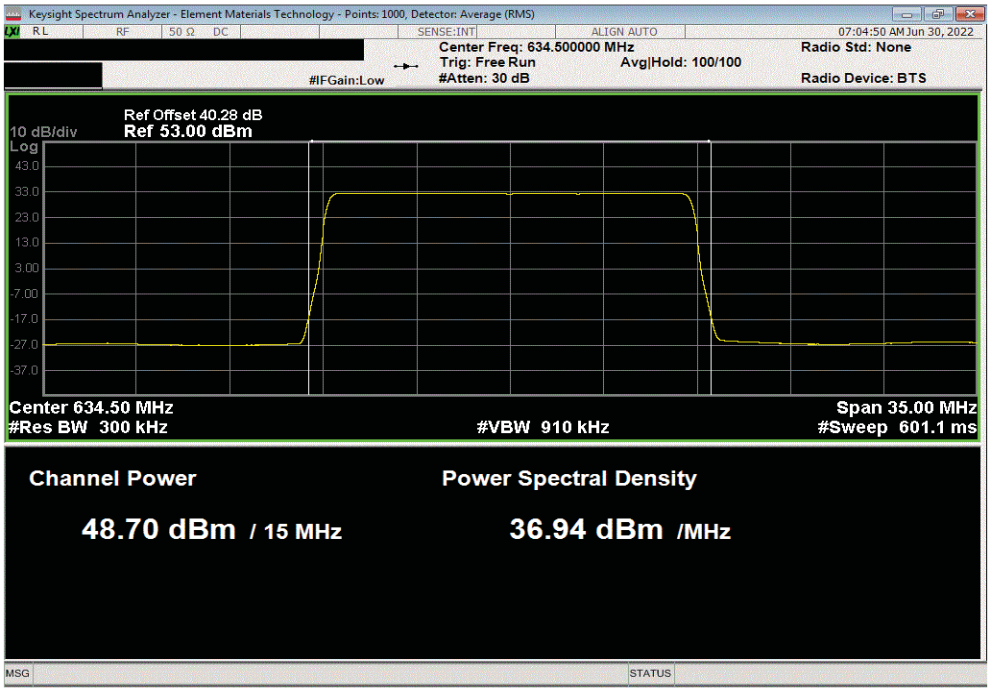
| Configuration # | 2 | Signature |
|---|---|---|

| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | All Ports Value (dBm) | Value (dBm) | Limit | Results |
|---|---|---|---|---|---|---|
| LTE, Band 71, 617 MHz - 652 MHz | | | | | | |
| Port 1 | | | | | | |
| 15 MHz Bandwidth | | | | | | |
| 256-QAM Modulation | | | | | | |
| Mid Ch. 634.5 MHz | 48.697 | 0 | N/A | 48.7 | Within Tolerance | N/A |
| Port 2 | | | | | | |
| 15 MHz Bandwidth | | | | | | |
| 256-QAM Modulation | | | | | | |
| Mid Ch. 634.5 MHz | 48.583 | 0 | N/A | 48.6 | Within Tolerance | N/A |
| Port 3 | | | | | | |
| 15 MHz Bandwidth | | | | | | |
| 256-QAM Modulation | | | | | | |
| Mid Ch. 634.5 MHz | 48.61 | 0 | N/A | 48.6 | Within Tolerance | N/A |
| Port 4 | | | | | | |
| 15 MHz Bandwidth | | | | | | |
| 256-QAM Modulation | | | | | | |
| Mid Ch. 634.5 MHz | 48.758 | 0 | N/A | 48.8 | Within Tolerance | N/A |
| Radio Power All Ports | | | | | | |
| 15 MHz BW | | | | | | |
| 256QAM | | | | | | |
| Mid Ch. 634.5 Mhz | N/A | 0 | 54.7 | N/A | N/A | N/A |

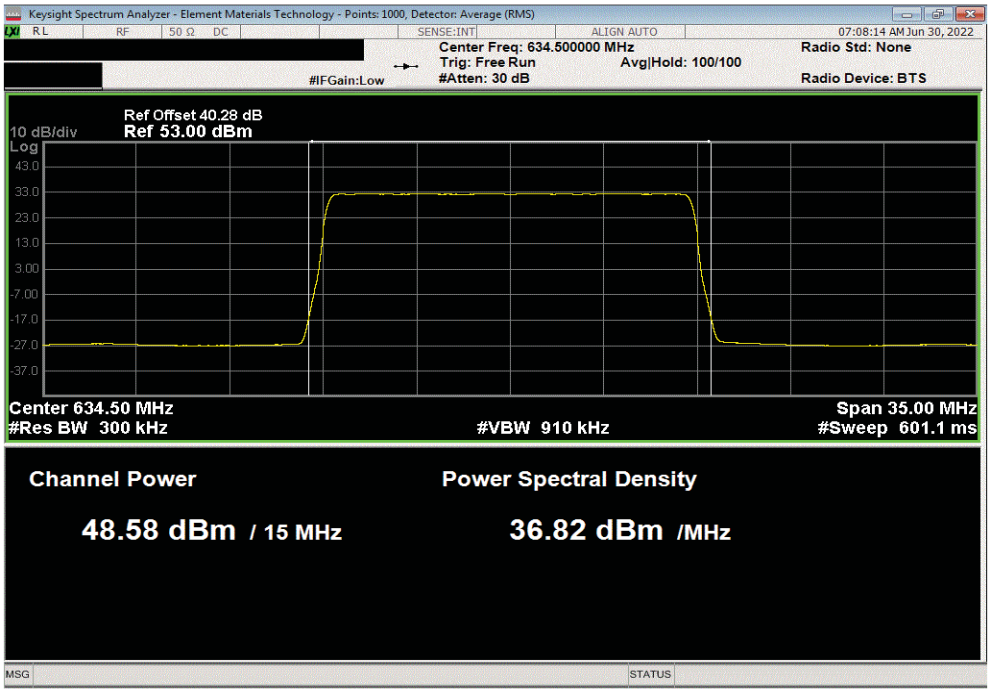
# OUTPUT POWER - ALL PORTS Band 71 LTE



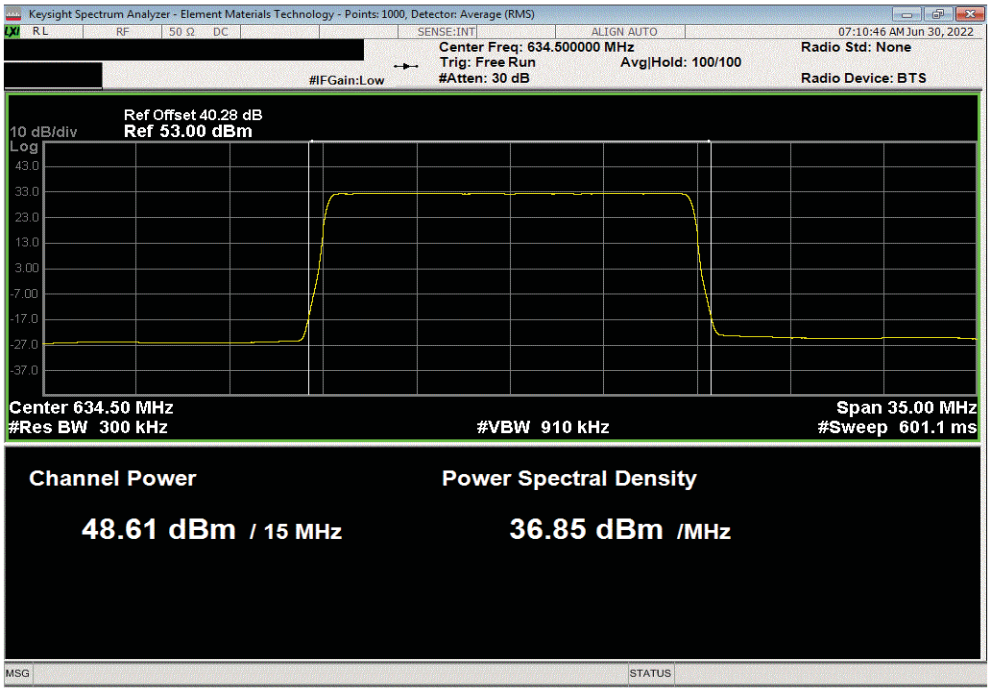
| LTE, Band 71, 617 MHz - 652 MHz, Port 1, 15 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | All Ports Value (dBm) | Value (dBm) | Limit | Results |
| | 48.697 | 0 | N/A | 48.7 | Within Tolerance | N/A |



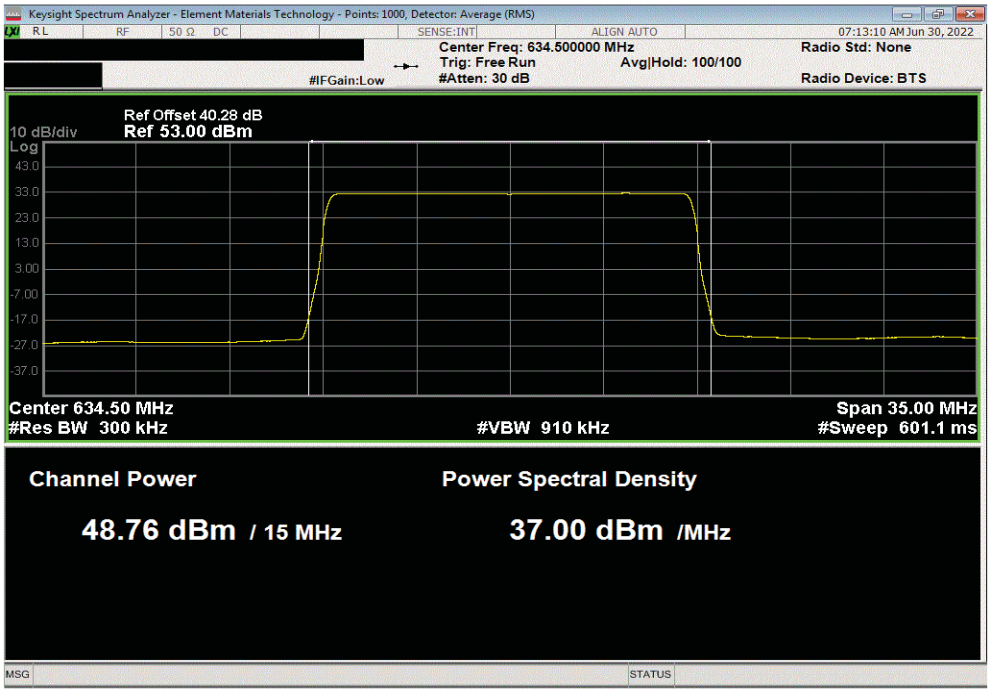

| LTE, Band 71, 617 MHz - 652 MHz, Port 2, 15 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | All Ports Value (dBm) | Value (dBm) | Limit | Results |
| | 48.583 | 0 | N/A | 48.6 | Within Tolerance | N/A |



| LTE, Band 71, 617 MHz - 652 MHz, Port 3, 15 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | All Ports Value (dBm) | Value (dBm) | Limit | Results |
| | 48.61 | 0 | N/A | 48.6 | Within Tolerance | N/A |




| LTE, Band 71, 617 MHz - 652 MHz, Port 4, 15 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | All Ports Value (dBm) | Value (dBm) | Limit | Results |
| | 48.758 | 0 | N/A | 48.8 | Within Tolerance | N/A |



# OUTPUT POWER - ALL PORTS Band 71 LTE



| 5G NR, Band n71, 617 MHz - 652 MHz, All Ports, 15 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Value (dBm) | All Ports Value (dBm) | Limit | Results |
| | N/A | 0 | N/A | 54.7 | N/A | N/A |

| AVERAGE POWER PORT SUMMING | | | | | |
|---|---|---|---|---|---|
| | PORT 1 | PORT 2 | PORT 3 | PORT 4 | SUM TOTAL |
| INITIAL VALUE (dBm) | 48.7 | 48.6 | 48.6 | 48.8 | N/A |
| INITIAL VALUE (Watts) | 74.1 | 72.4 | 72.4 | 75.9 | 294.9 |
| TOTAL VALUE (dBm) | N/A | N/A | N/A | N/A | 54.7 |

# OUTPUT POWER - ALL PORTS - Band 85 LTE

XMit 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3239 | ANE | 2022-03-02 | 2023-03-02 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |

**TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to the default maximum,

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)}, where D is the duty cycle in decimal, to the measurement power to compute the average power during the actual transmission times.

RF conducted emissions testing performed on all ports at 15 MHz middle channel in order to prove the AHLOB antenna ports are essentially electrically identical. Antenna port 2 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i and 6.4.

# OUTPUT POWER - ALL PORTS - Band 85 LTE

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | AHLOB | | | Work Order: | NOKI0043 |
| Serial Number: | YK220900029 | | | Date: | 11-Jul-22 |
| Customer: | Nokia Solutions and Networks | | | Temperature: | 21 °C |
| Attendees: | Mitchell Hill, John Rattanavong | | | Humidity: | 56.3% RH |
| Project: | None | | | Barometric Pres.: | 1014 mbar |
| Tested by: | Marty Martin | Power: | 54 VDC | Job Site: | TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 27:2022 | ANSI C63.26:2015 |
| RSS-130 Issue 2:2019 | ANSI C63.26:2015 |

**COMMENTS**

All loses in the measurment path were accounted for: attenuators, cables, DC block and filter when in use.

**DEVIATIONS FROM TEST STANDARD**

None

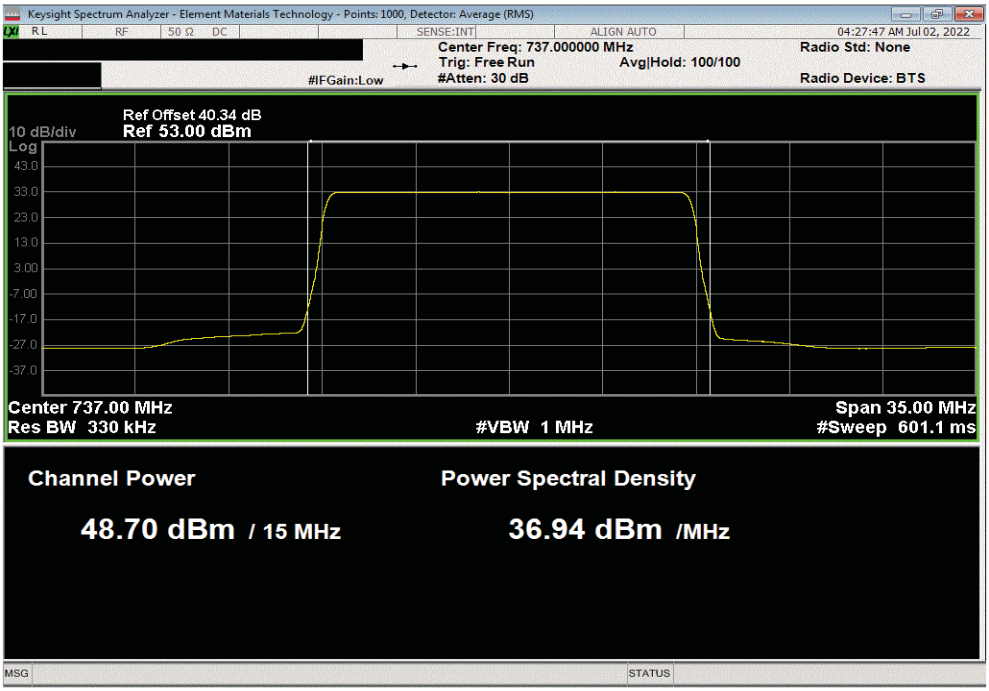
| Configuration # | 2 | Signature |
|---|---|---|

| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | All Ports Value (dBm) | Value (dBm) | Limit (dBm) | Results |
|---|---|---|---|---|---|---|
| LTE, Band 85, 728 MHz - 746 MHz | | | | | | |
| Port 1 | | | | | | |
| 15 MHz Bandwidth | | | | | | |
| 256-QAM Modulation | | | | | | |
| Mid Ch. 737 MHz | 48.703 | 0 | N/A | 48.7 | Within Tolerance | N/A |
| Port 2 | | | | | | |
| 15 MHz Bandwidth | | | | | | |
| 256-QAM Modulation | | | | | | |
| Mid Ch. 737 MHz | 48.626 | 0 | N/A | 48.6 | Within Tolerance | N/A |
| Port 3 | | | | | | |
| 15 MHz Bandwidth | | | | | | |
| 256-QAM Modulation | | | | | | |
| Mid Ch. 737 MHz | 48.538 | 0 | N/A | 48.5 | Within Tolerance | N/A |
| Port 4 | | | | | | |
| 15 MHz Bandwidth | | | | | | |
| 256-QAM Modulation | | | | | | |
| Mid Ch. 737 MHz | 48.768 | 0 | N/A | 48.8 | Within Tolerance | N/A |
| Radio Power All Ports | | | | | | |
| 15 MHz BW | | | | | | |
| 256QAM | | | | | | |
| Mid Ch. 737 Mhz | N/A | 0 | 54.7 | N/A | N/A | N/A |

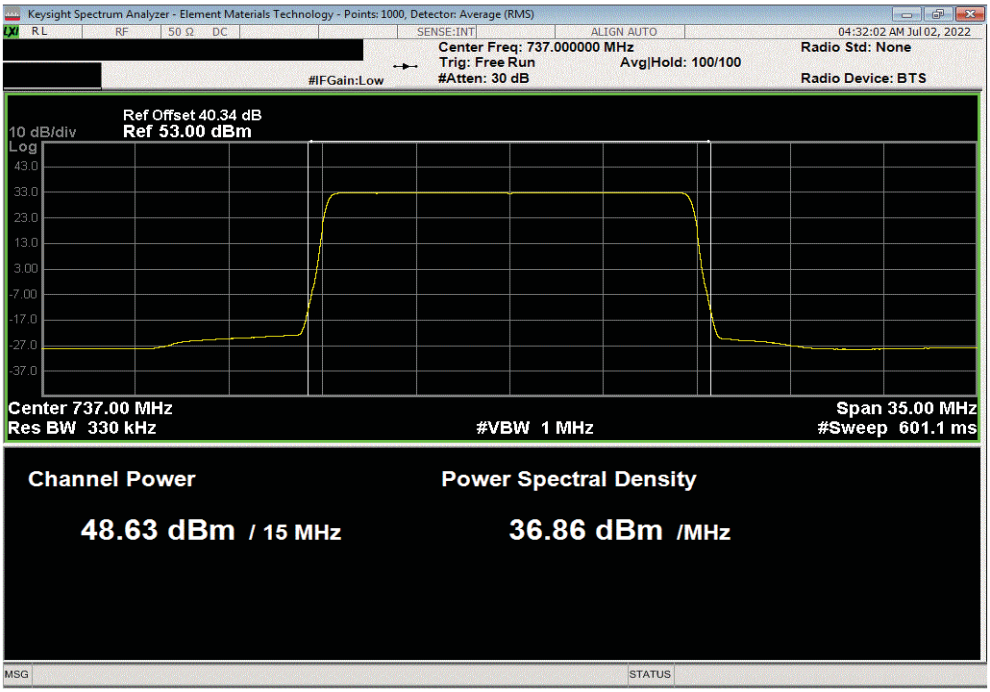
# OUTPUT POWER - ALL PORTS - Band 85 LTE



| LTE, Band 85, 728 MHz - 746 MHz, Port 1, 15 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 737 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Ports Value (dE | Value (dBm) | Limit (dBm) | Results |
| | 48.703 | 0 | | 48.7 | Within Tolerance | N/A |



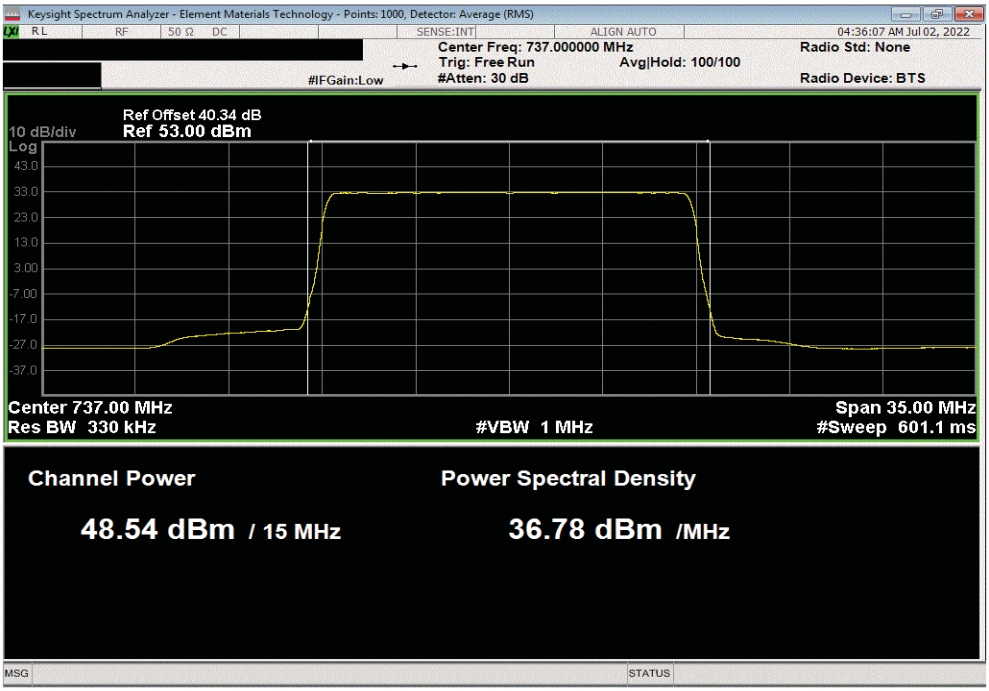

| LTE, Band 85, 728 MHz - 746 MHz, Port 2, 15 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 737 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Ports Value (dE | Value (dBm) | Limit (dBm) | Results |
| | 48.626 | 0 | | 48.6 | Within Tolerance | N/A |



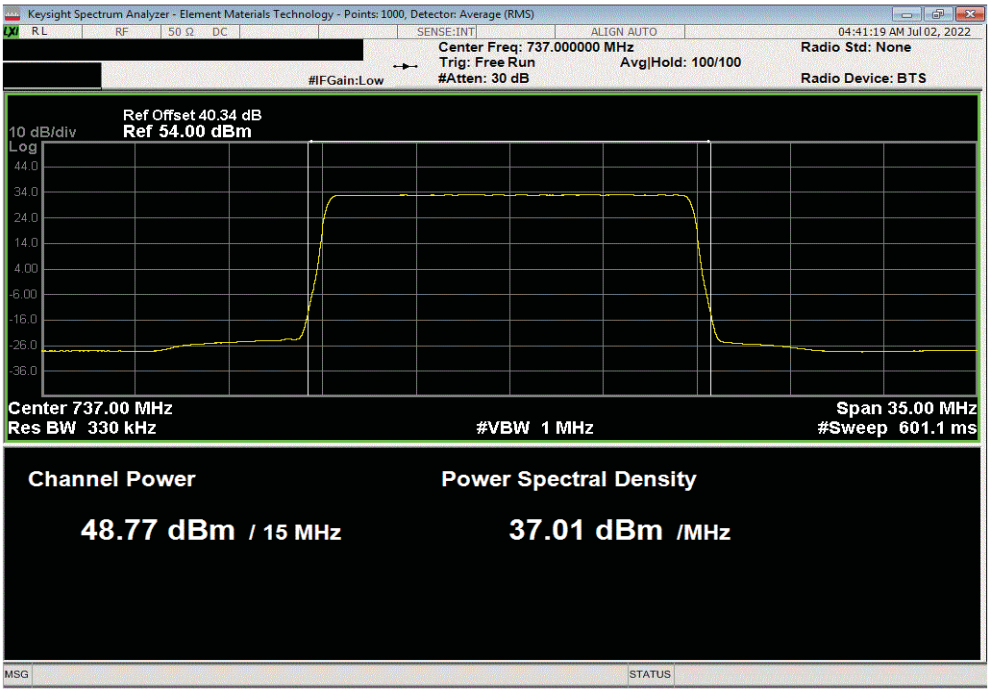
# OUTPUT POWER - ALL PORTS - Band 85 LTE



| LTE, Band 85, 728 MHz - 746 MHz, Port 3, 15 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 737 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Ports Value (dE | Value (dBm) | Limit (dBm) | Results |
| | 48.538 | 0 | | 48.5 | Within Tolerance | N/A |




| LTE, Band 85, 728 MHz - 746 MHz, Port 4, 15 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 737 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Ports Value (dE | Value (dBm) | Limit (dBm) | Results |
| | 48.768 | 0 | | 48.8 | Within Tolerance | N/A |



# OUTPUT POWER - ALL PORTS - Band 85 LTE



| LTE, Band n85, 728 MHz - 746 MHz, 15 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 737 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Value (dBm) | All Ports Value (dBm) | Limit | Results |
| | N/A | 0 | N/A | 54.7 | N/A | N/A |

| AVERAGE POWER PORT SUMMING | | | | | |
|---|---|---|---|---|---|
| | PORT 1 | PORT 2 | PORT 3 | PORT 4 | SUM TOTAL |
| INITIAL VALUE (dBm) | 48.7 | 48.6 | 48.5 | 48.8 | N/A |
| INITIAL VALUE (Watts) | 74.1 | 72.4 | 70.8 | 75.9 | 293.2 |
| TOTAL VALUE (dBm) | N/A | N/A | N/A | N/A | 54.7 |

# OUTPUT POWER - Band 71 LTE

XMit 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3239 | ANE | 2022-03-02 | 2023-03-02 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |

**TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHLOB) as the original certification test. The AHLOB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 2 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i and 6.4.

The total average transmit power of all antenna ports was determined per ANSI C63.26-2105 paragraph 6.4.3.1

# OUTPUT POWER - Band 71 LTE

element

TbtTx 2022.06.03.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | AHLOB | | | Work Order: | NOKI0043 |
| Serial Number: | YK220900029 | | | Date: | 11-Jul-22 |
| Customer: | Nokia Solutions and Networks | | | Temperature: | 21.3 °C |
| Attendees: | Mitchell Hill, John Rattanavong | | | Humidity: | 58% RH |
| Project: | None | | | Barometric Pres.: | 1015 mbar |
| Tested by: | Marty Martin | Power: | 54 VDC | Job Site: | TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 27:2022 | ANSI C63.26:2015 |
| RSS-130 Issue 2:2019 | ANSI C63.26:2015 |

**COMMENTS**

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. The following is the output power measurements at the radio output ports. The output power was measured for a single carrier over the carrier channel bandwidth on port 2. The total output power for multiport (2x2, 4x4 MIMO) operation was determined based upon ANSI 63.26 clauses 6.4.3.1 and 6.4.3.2.4 [10 log(Nout)]. The total output power for two port operation is single port power + 3dB [i.e. 10log(2)] and the total output power for a four port operation is single port power + 6dB [i.e. 10log(4)].

**DEVIATIONS FROM TEST STANDARD**

None

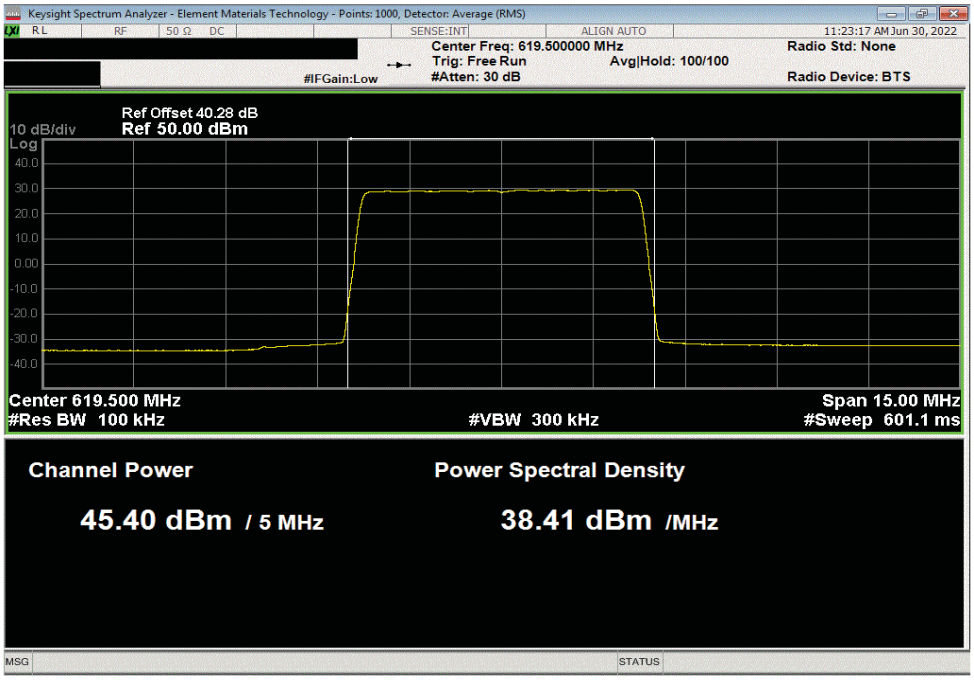
| Configuration # | 2 | Signature |
|---|---|---|

| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW |
|---|---|---|---|---|---|
| Port 2, LTE, Band 71, 617 MHz - 652 MHz | | | | | |
| 5 MHz Bandwidth | | | | | |
| 256-QAM Modulation | | | | | |
| Low Ch. 619.5 MHz | 45.401 | 0 | 45.4 | 48.4 | 51.4 |
| Mid Ch. 634.5 MHz | 45.748 | 0 | 45.7 | 48.7 | 51.7 |
| High Ch. 649.5 MHz | 45.654 | 0 | 45.7 | 48.7 | 51.7 |
| 10 MHz Bandwidth | | | | | |
| 256-QAM Modulation | | | | | |
| Low Ch. 622 MHz | 47.587 | 0 | 47.6 | 50.6 | 53.6 |
| Mid Ch. 634.5 MHz | 47.32 | 0 | 47.3 | 50.3 | 53.3 |
| High Ch. 647 MHz | 47.531 | 0 | 47.5 | 50.5 | 53.5 |
| 15 MHz Bandwidth | | | | | |
| QPSK Modulation | | | | | |
| Mid Ch. 634.5 MHz | 48.313 | 0 | 48.3 | 51.3 | 54.3 |
| 16-QAM Modulation | | | | | |
| Mid Ch. 634.5 MHz | 48.387 | 0 | 48.4 | 51.4 | 54.3 |
| 64-QAM Modulation | | | | | |
| Mid Ch. 634.5 MHz | 48.382 | 0 | 48.4 | 51.4 | 54.3 |
| 256-QAM Modulation | | | | | |
| Low Ch. 624.5 MHz | 48.795 | 0 | 48.8 | 51.8 | 54.8 |
| Mid Ch. 634.5 MHz | 48.399 | 0 | 48.4 | 51.4 | 54.4 |
| High Ch. 644.5 MHz | 48.412 | 0 | 48.4 | 51.4 | 54.4 |
| 20 MHz Bandwidth | | | | | |
| 256-QAM Modulation | | | | | |
| Low Ch. 627 MHz | 48.52 | 0 | 48.5 | 51.5 | 54.5 |
| Mid Ch. 634.5 MHz | 48.331 | 0 | 48.3 | 51.3 | 54.3 |
| High Ch. 642 MHz | 48.523 | 0 | 48.5 | 51.5 | 54.5 |

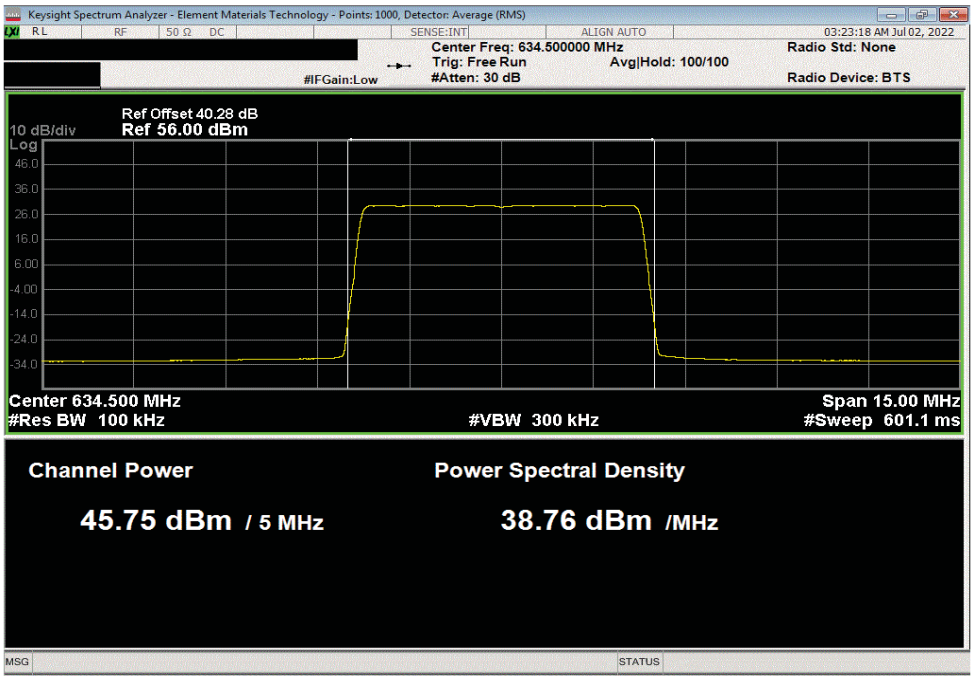
# OUTPUT POWER - Band 71 LTE



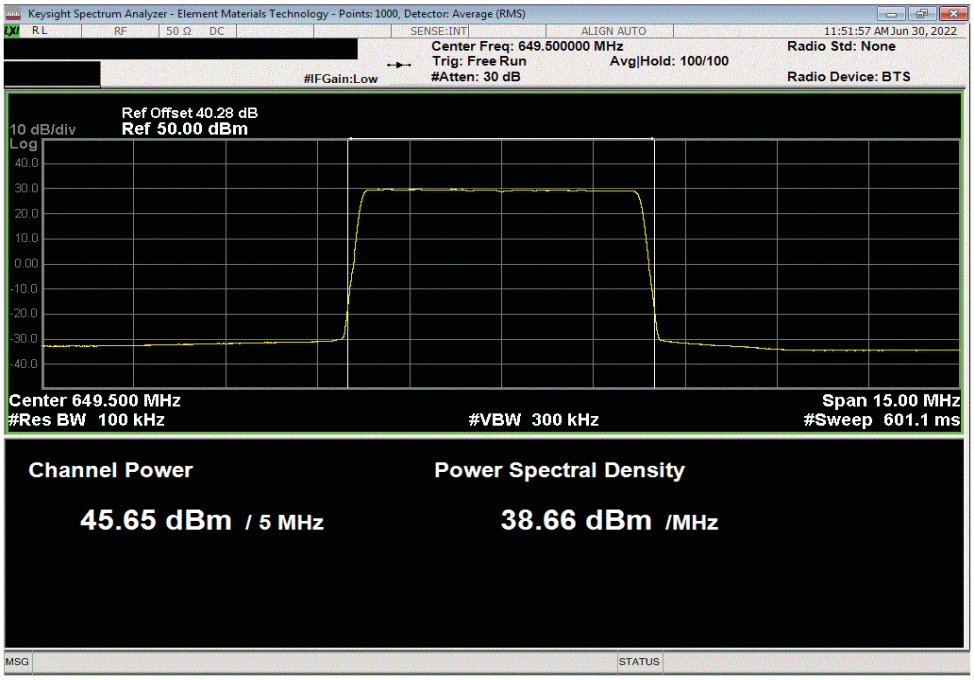
| Port 2, LTE, Band n71, 617 MHz - 652 MHz, 5 MHz Bandwidth, 256-QAM Modulation, Low Ch. 619.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 45.401 | 0 | 45.4 | 48.4 | 51.4 | |



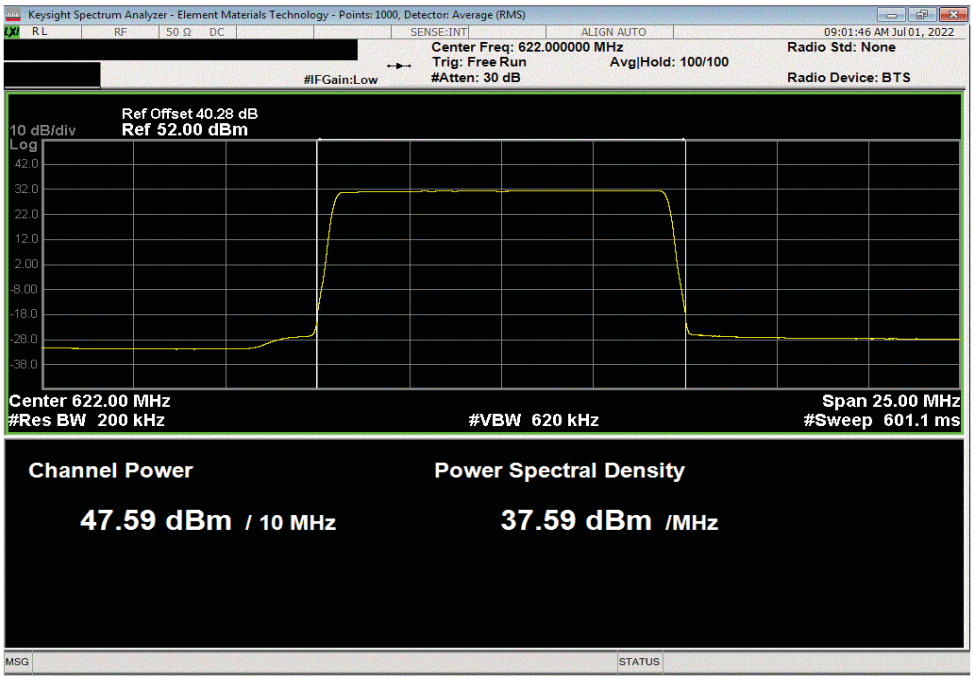

| Port 2, LTE, Band n71, 617 MHz - 652 MHz, 5 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 45.748 | 0 | 45.7 | 48.7 | 51.7 | |



| Port 2, LTE, Band n71, 617 MHz - 652 MHz, 5 MHz Bandwidth, 256-QAM Modulation, High Ch. 649.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 45.654 | 0 | 45.7 | 48.7 | 51.7 | |



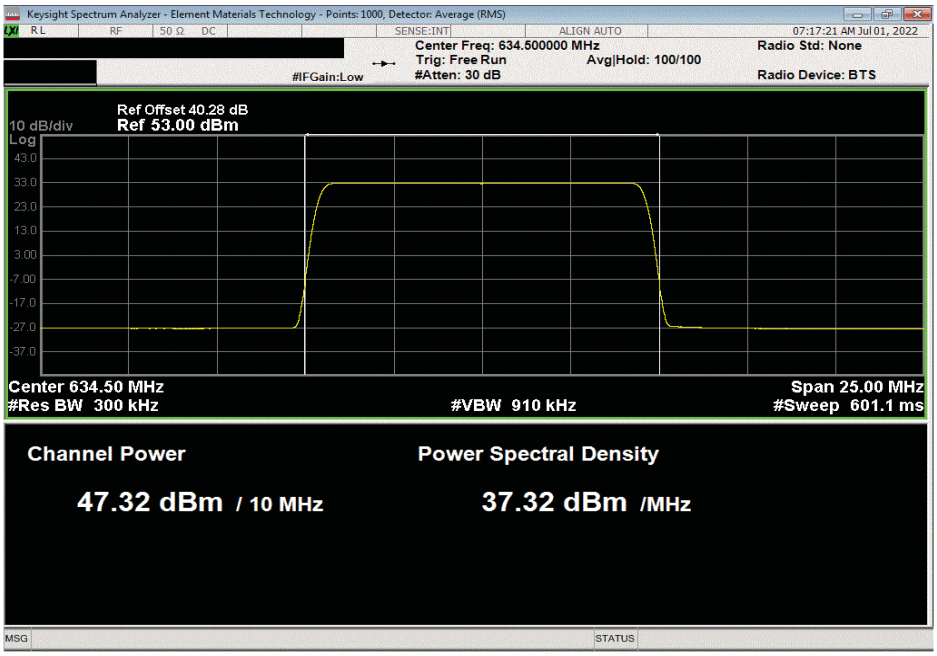

| Port 2, LTE, Band n71, 617 MHz - 652 MHz, 10 MHz Bandwidth, 256-QAM Modulation, Low Ch. 622 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 47.587 | 0 | 47.6 | 50.6 | 53.6 | |



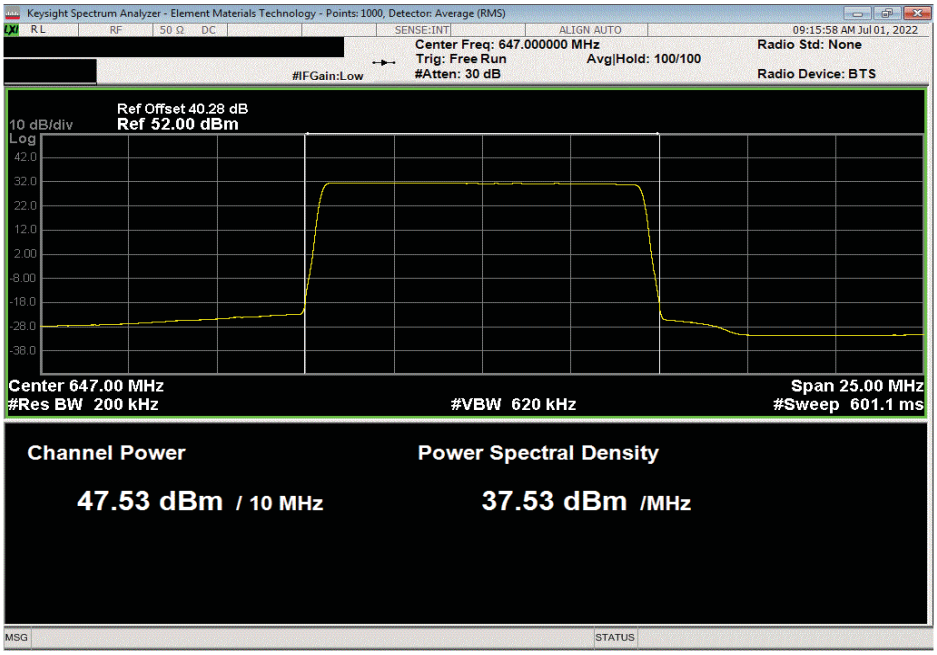
# OUTPUT POWER - Band 71 LTE



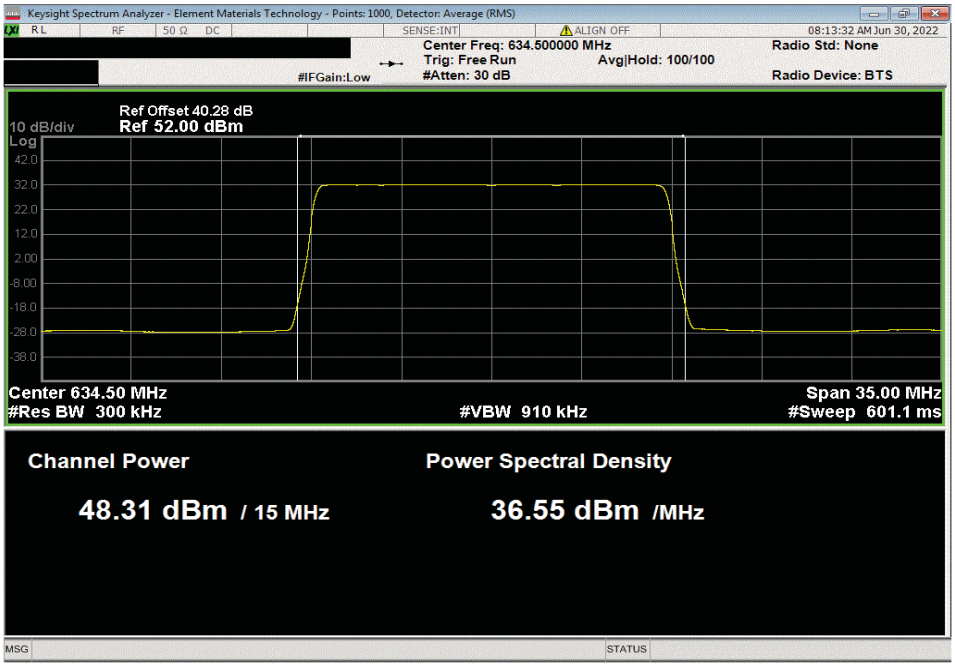
| Port 2, LTE, Band n71, 617 MHz - 652 MHz, 10 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 47.32 | 0 | 47.3 | 50.3 | 53.3 | |



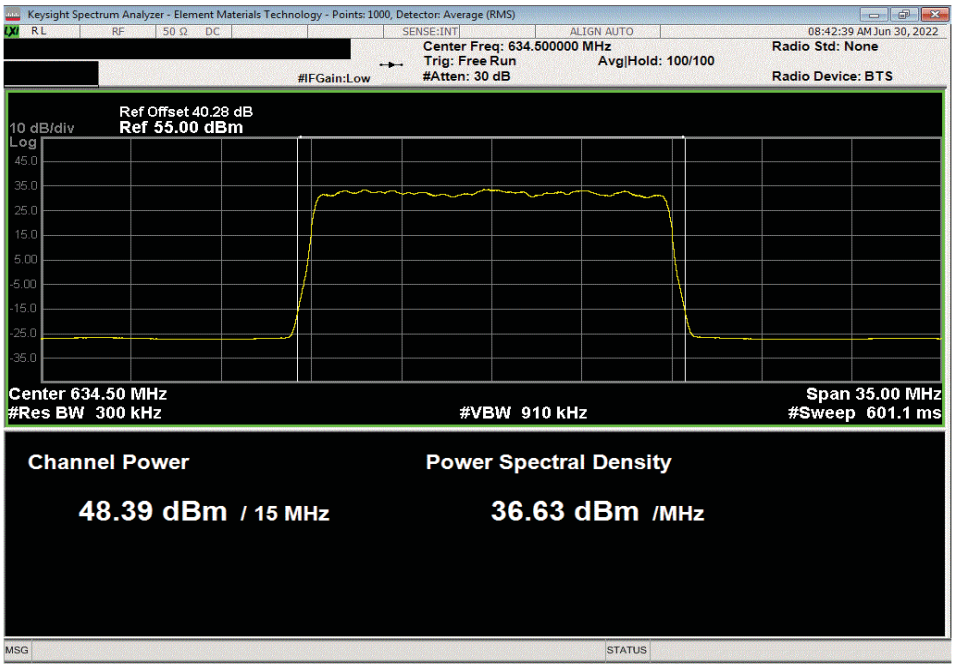

| Port 2, LTE, Band n71, 617 MHz - 652 MHz, 10 MHz Bandwidth, 256-QAM Modulation, High Ch. 647 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 47.531 | 0 | 47.5 | 50.5 | 53.5 | |



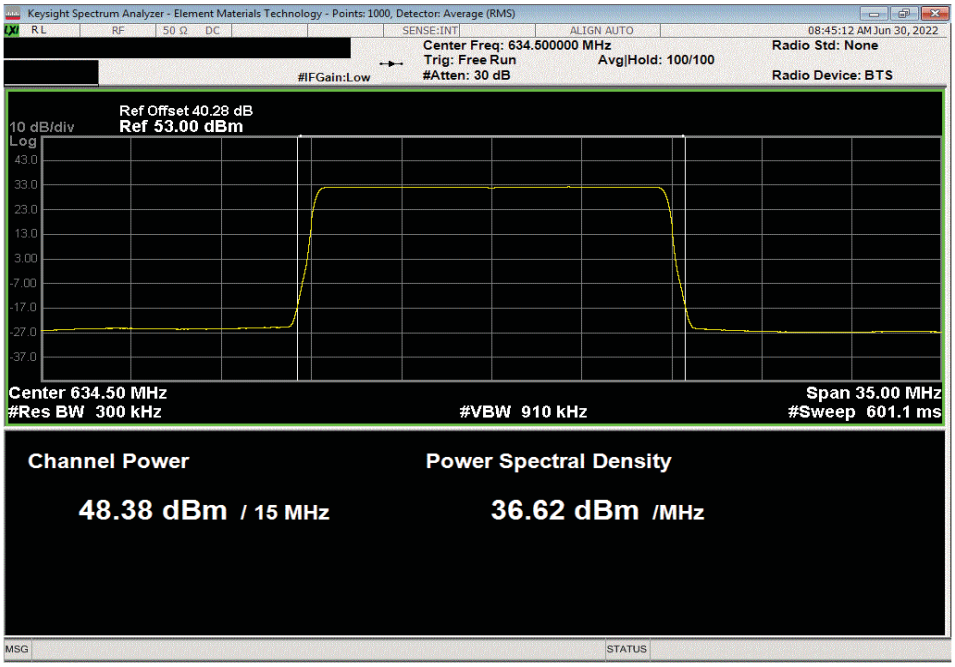
| Port 2, LTE, Band n71, 617 MHz - 652 MHz, 15 MHz Bandwidth, QPSK Modulation, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.313 | 0 | 48.3 | 51.3 | 54.3 | |



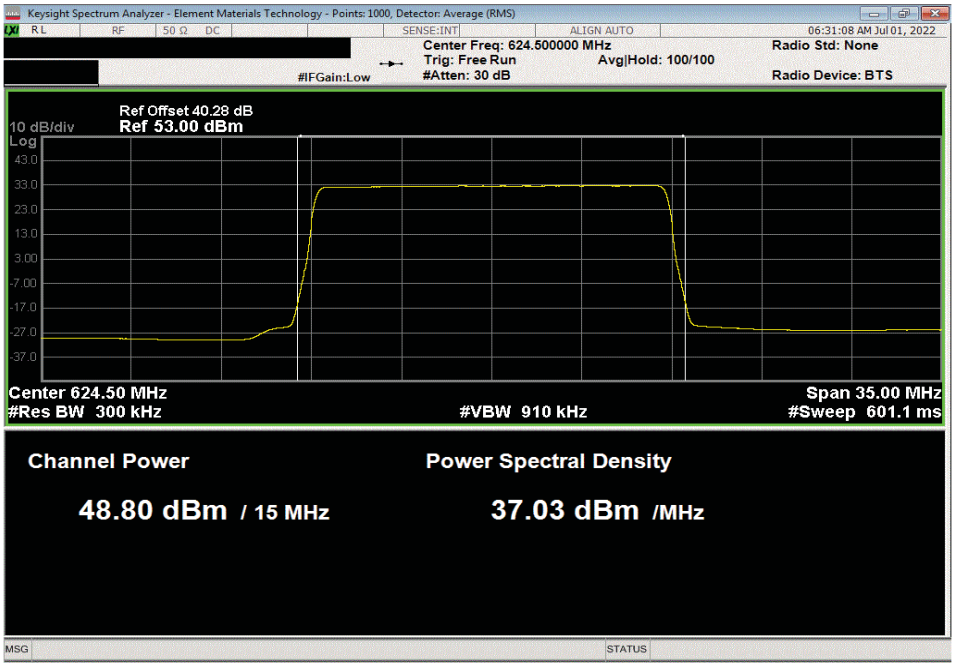

| Port 2, LTE, Band n71, 617 MHz - 652 MHz, 15 MHz Bandwidth, 16-QAM Modulation, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.387 | 0 | 48.3 | 51.3 | 54.3 | |



| Port 2, LTE, Band n71, 617 MHz - 652 MHz, 15 MHz Bandwidth, 64-QAM Modulation, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.382 | 0 | 48.4 | 51.4 | 54.4 | |

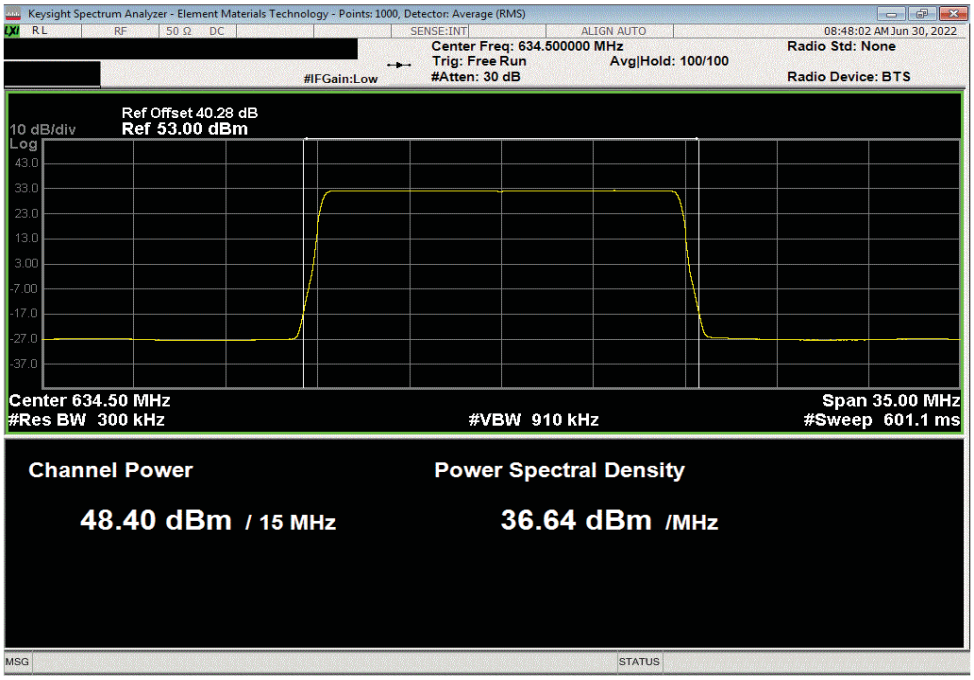



| Port 2, LTE, Band n71, 617 MHz - 652 MHz, 15 MHz Bandwidth, 256-QAM Modulation, Low Ch. 624.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.795 | 0 | 48.8 | 51.8 | 54.8 | |

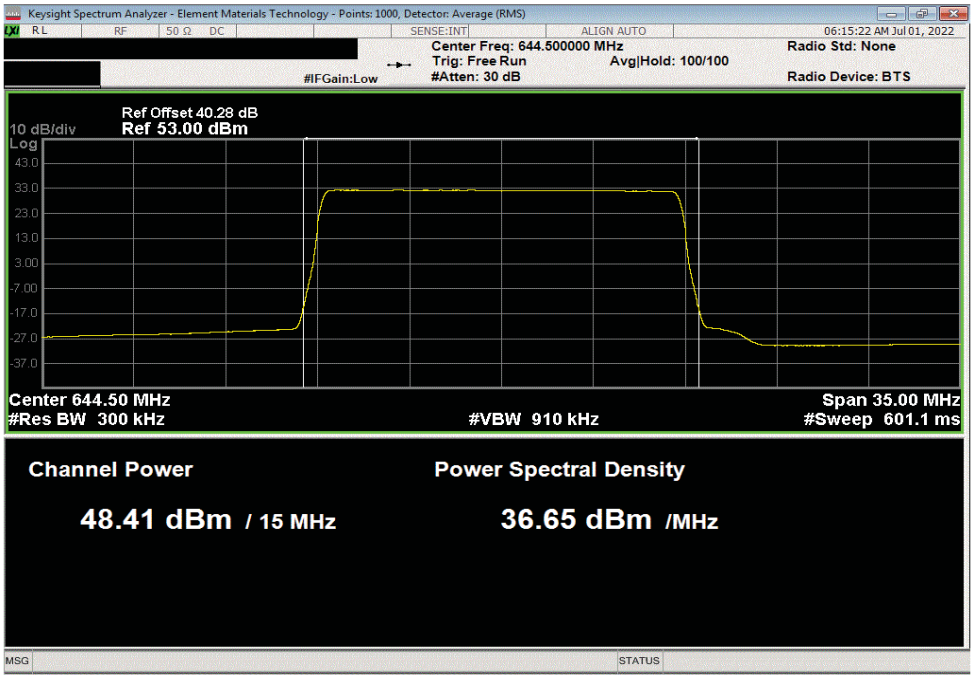


# OUTPUT POWER - Band 71 LTE

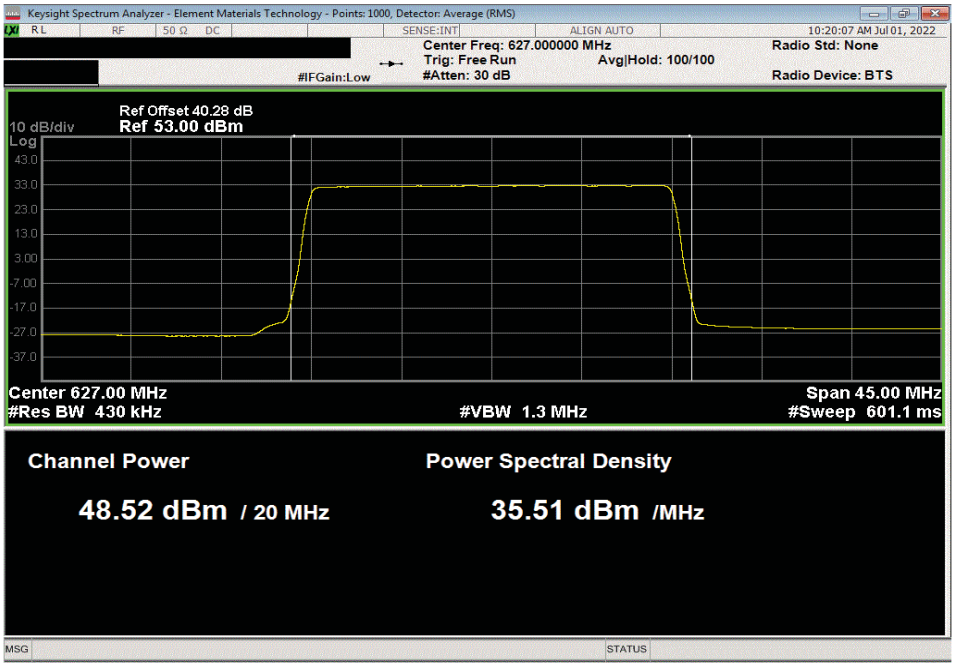
| Port 2, LTE, Band n71, 617 MHz - 652 MHz, 15 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.399 | 0 | 48.4 | 51.4 | 54.4 | |



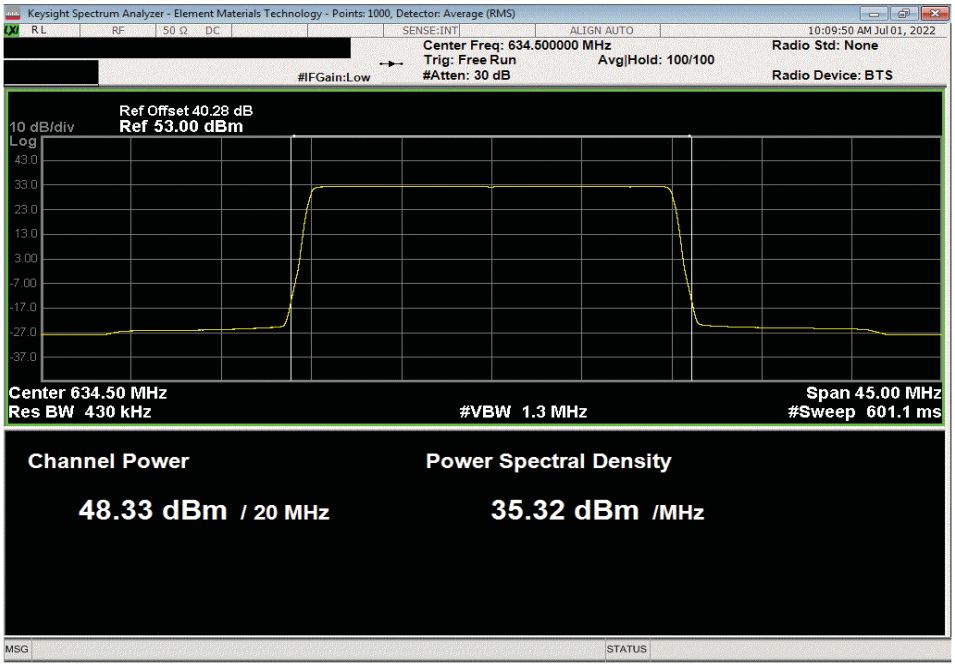

| Port 2, LTE, Band n71, 617 MHz - 652 MHz, 15 MHz Bandwidth, 256-QAM Modulation, High Ch. 644.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.412 | 0 | 48.4 | 51.4 | 54.4 | |



| Port 2, LTE, Band n71, 617 MHz - 652 MHz, 20 MHz Bandwidth, 256-QAM Modulation, Low Ch. 627 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.52 | 0 | 48.5 | 51.5 | 54.5 | |



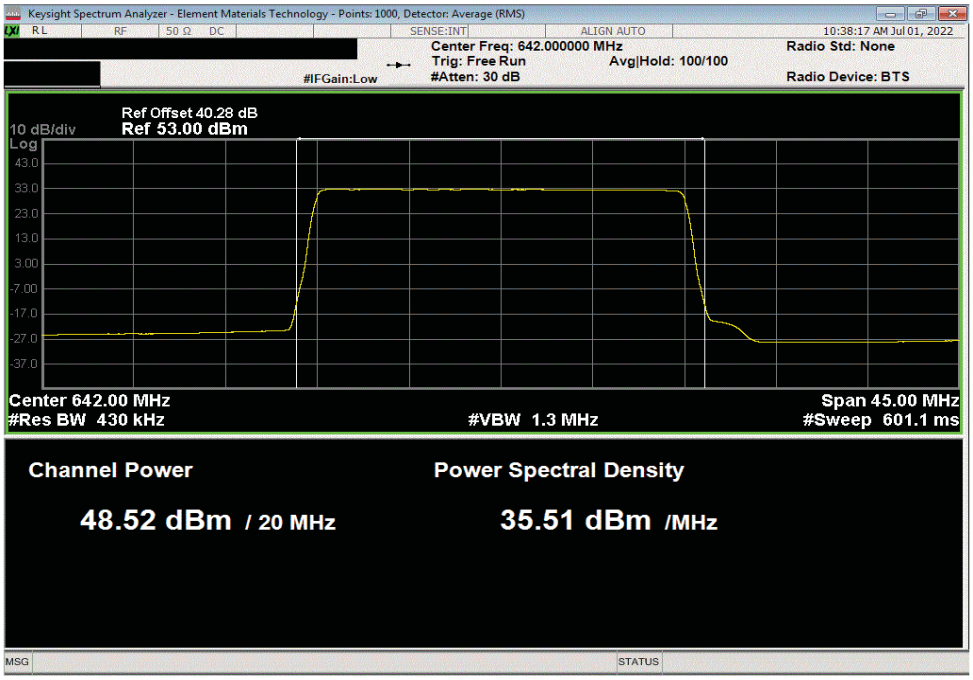

| Port 2, LTE, Band n71, 617 MHz - 652 MHz, 20 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.331 | 0 | 48.3 | 51.3 | 54.3 | |



# OUTPUT POWER - Band 71 LTE



| Port 2, LTE, Band n71, 617 MHz - 652 MHz, 20 MHz Bandwidth, 256-QAM Modulation, High Ch. 642 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.523 | 0 | 48.5 | 51.5 | 54.5 | |



# OUTPUT POWER - Band 85 LTE

XMit 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3239 | ANE | 2022-03-02 | 2023-03-02 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |

**TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times.

RF conducted emissions testing was performed only on one port. The AHLOB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 2 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i and 6.4. The total average transmit power of all antenna ports was determined per ANSI C63.26-2105 paragraph 6.4.3.1

# OUTPUT POWER - Band 85 LTE

element

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | AHLOB | | | Work Order: | NOKI0043 |
| Serial Number: | YK220900029 | | | Date: | 13-Jul-22 |
| Customer: | Nokia Solutions and Networks | | | Temperature: | 21.5 °C |
| Attendees: | Mitchell Hill, John Rattanavong | | | Humidity: | 53.6% RH |
| Project: | None | | | Barometric Pres.: | 1018 mbar |
| Tested by: | Marty Martin | Power: | 54 VDC | Job Site: | TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 27:2022 | ANSI C63.26:2015 |
| RSS-130 Issue 2:2019 | ANSI C63.26:2015 |

**COMMENTS**

All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. The following is the output power measurements at the radio output ports. The output power was measured for a single carrier over the carrier channel bandwidth on port 2. The total output power for multiport (2x2, 4x4 MIMO) operation was determined based upon ANSI 63.26 clauses 6.4.3.1 and 6.4.3.2.4 (10 log Nout). The total output power for two port operation is single port power + 3dB [i.e. 10log(2)] and the total output power for a four port operation is single port power + 6dB [i.e. 10log(4)].

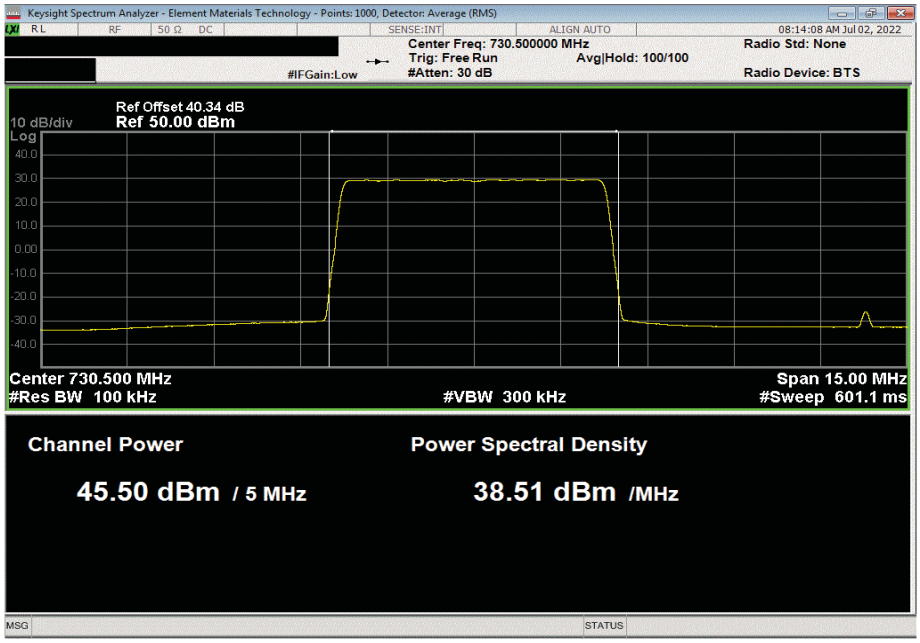
**DEVIATIONS FROM TEST STANDARD**

None

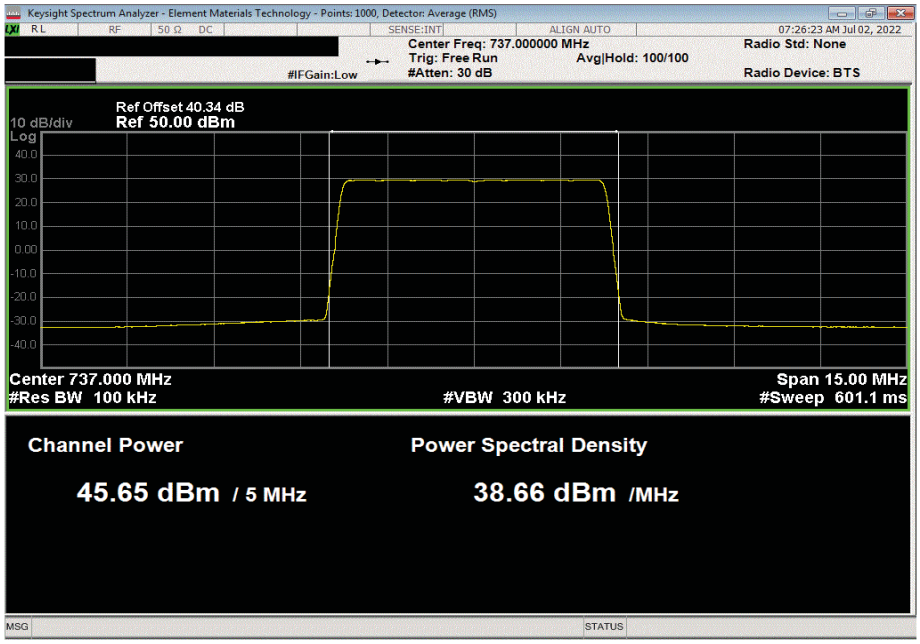
| Configuration # | 2 | Signature |
|---|---|---|

| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW |
|---|---|---|---|---|---|
| Port 2, LTE, Band 85, 728 MHz - 746 MHz | | | | | |
| 5 MHz Bandwidth | | | | | |
| 256-QAM Modulation | | | | | |
| Low Ch. 730.5 MHz | 45.5 | 0 | 45.5 | 48.5 | 51.5 |
| Mid Ch. 737.0 MHz | 45.653 | 0 | 45.7 | 48.7 | 51.7 |
| High Ch. 743.5 MHz | 45.47 | 0 | 45.5 | 48.5 | 51.5 |
| 10 MHz Bandwidth | | | | | |
| 256-QAM Modulation | | | | | |
| Low Ch. 733 MHz | 47.352 | 0 | 47.4 | 50.4 | 53.4 |
| Mid Ch. 737.0 MHz | 47.163 | 0 | 47.2 | 50.2 | 53.2 |
| High Ch. 741 MHz | 47.339 | 0 | 47.3 | 50.3 | 53.3 |
| 15 MHz Bandwidth | | | | | |
| QPSK Modulation | | | | | |
| Mid Ch. 737.0 MHz | 48.296 | 0 | 48.3 | 51.3 | 54.3 |
| 16-QAM Modulation | | | | | |
| Mid Ch. 737.0 MHz | 48.319 | 0 | 48.3 | 51.3 | 54.3 |
| 64-QAM Modulation | | | | | |
| Mid Ch. 737.0 MHz | 48.381 | 0 | 48.4 | 51.4 | 54.4 |
| 256-QAM Modulation | | | | | |
| Low Ch. 735.5 MHz | 48.281 | 0 | 48.3 | 51.3 | 54.3 |
| Mid Ch. 737.0 MHz | 48.503 | 0 | 48.5 | 51.5 | 54.5 |
| High Ch. 738.5 MHz | 48.423 | 0 | 48.4 | 51.4 | 54.4 |

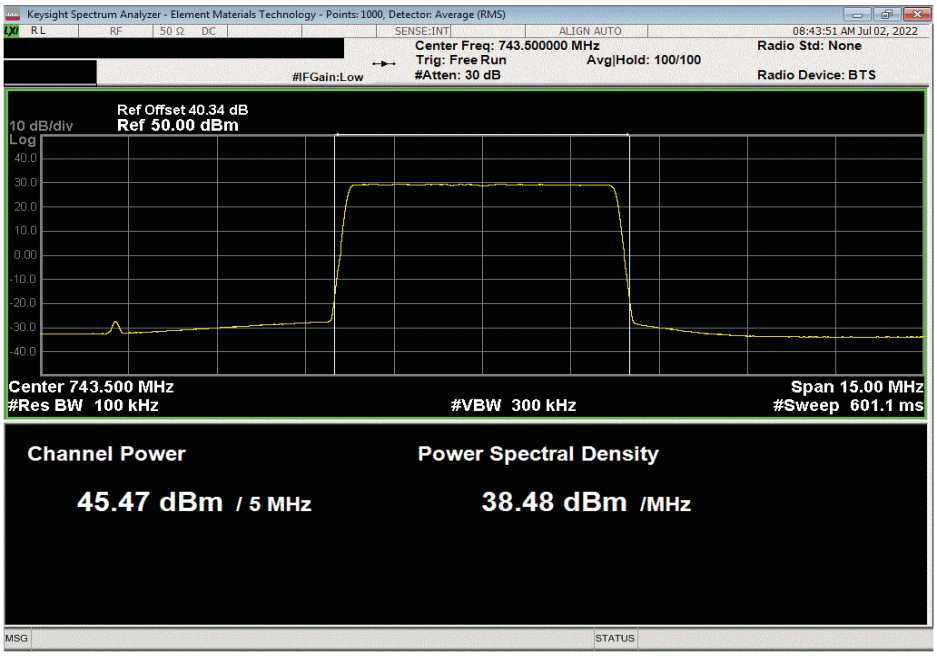
| Port 2, LTE, Band n85, 728 MHz - 746 MHz, 5 MHz Bandwidth, 256-QAM Modulation, Low Ch. 730.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 45.5 | 0 | 45.5 | 48.5 | 51.5 | |



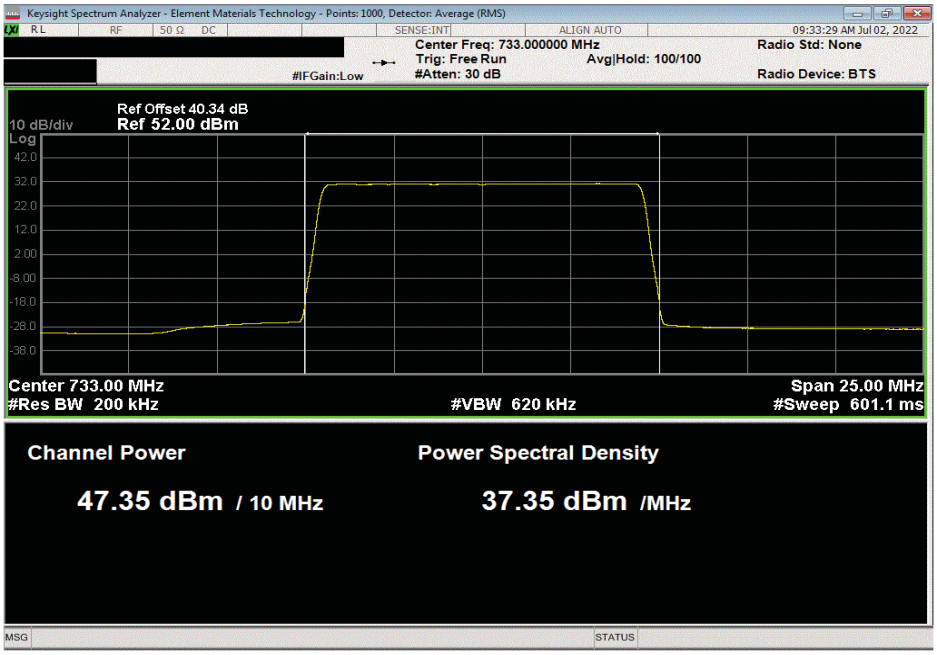

| Port 2, LTE, Band n85, 728 MHz - 746 MHz, 5 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 737.0 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 45.653 | 0 | 45.7 | 48.7 | 51.7 | |



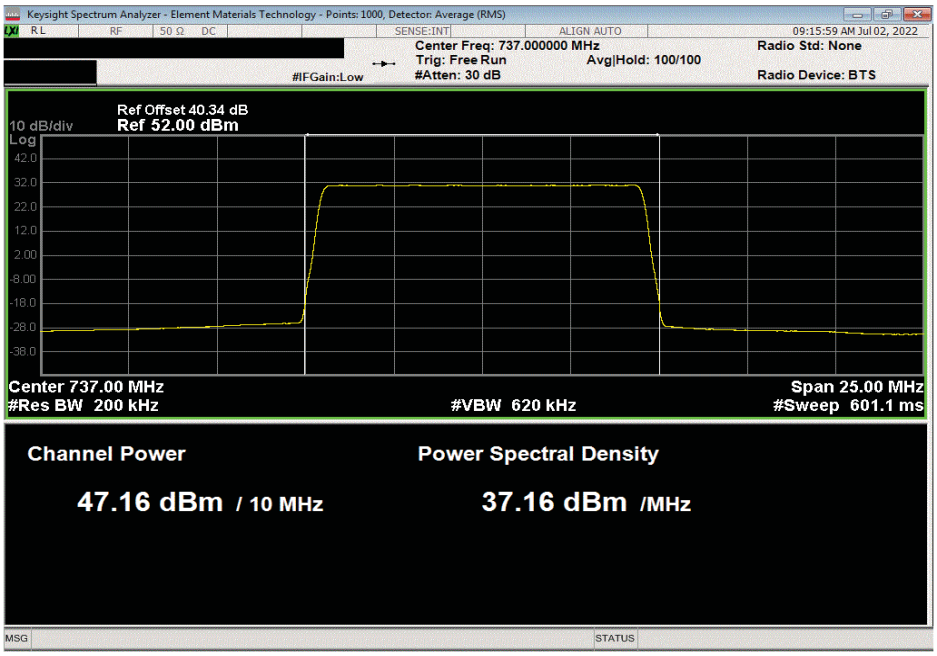
| Port 2, LTE, Band n85, 728 MHz - 746 MHz, 5 MHz Bandwidth, 256-QAM Modulation, High Ch. 743.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 45.47 | 0 | 45.5 | 48.5 | 51.5 | |



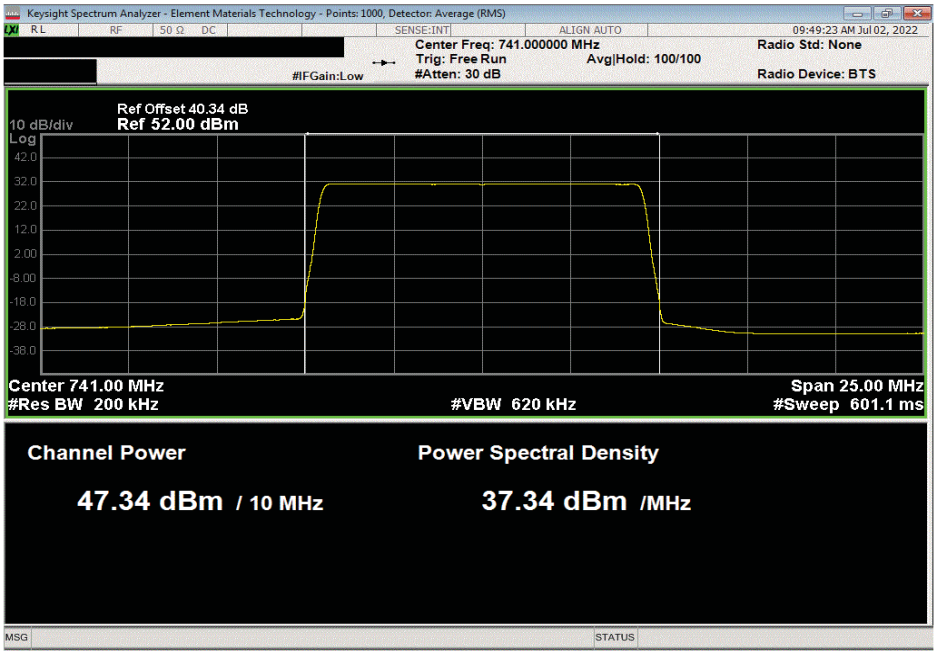

| Port 2, LTE, Band n85, 728 MHz - 746 MHz, 10 MHz Bandwidth, 256-QAM Modulation, Low Ch. 733 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 47.352 | 0 | 47.4 | 50.4 | 53.4 | |



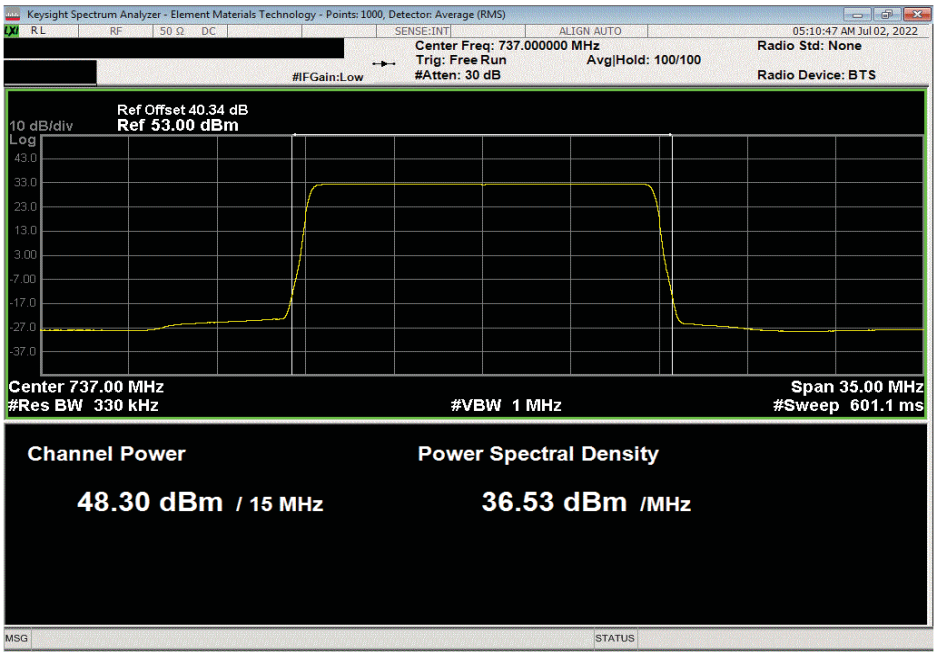
| Port 2, LTE, Band n85,, 728 MHz - 746 MHz, 10 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 737.0 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 47.163 | 0 | 47.2 | 50.2 | 53.2 | |



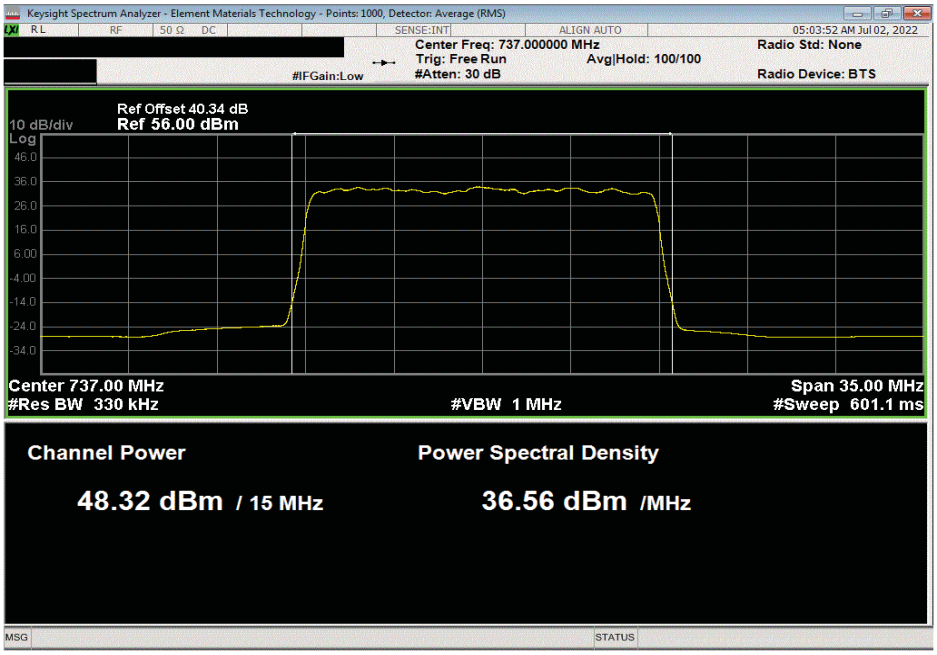

| Port 2, LTE, Band n85, 728 MHz - 746 MHz, 10 MHz Bandwidth, 256-QAM Modulation, High Ch. 741 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 47.339 | 0 | 47.3 | 50.3 | 53.3 | |



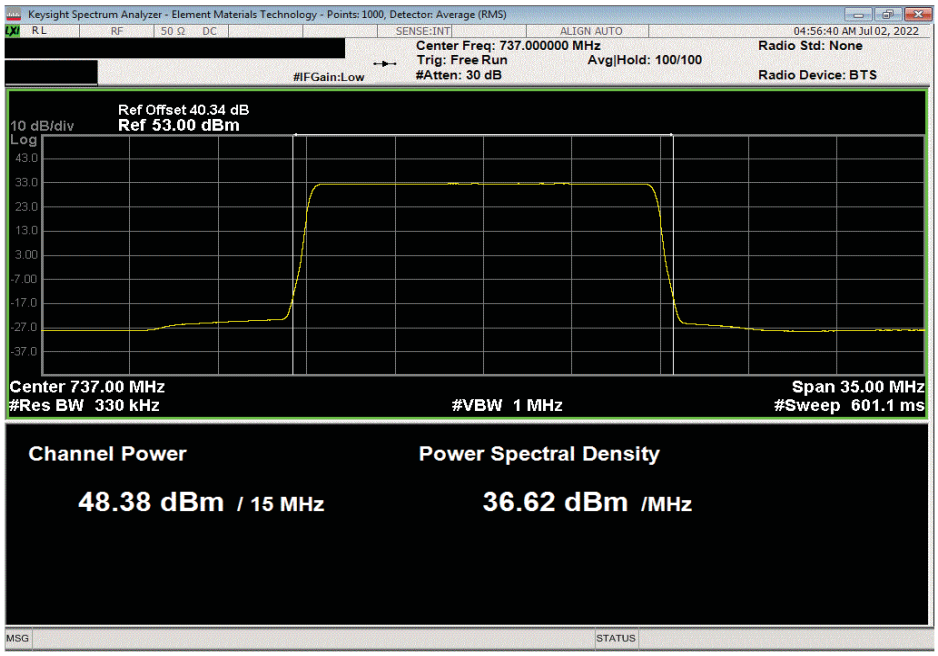
| Port 2, LTE, Band n85, 728 MHz - 746 MHz, 15 MHz Bandwidth, QPSK Modulation, Mid Ch. 737.0 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.296 | 0 | 48.3 | 51.3 | 54.3 | |



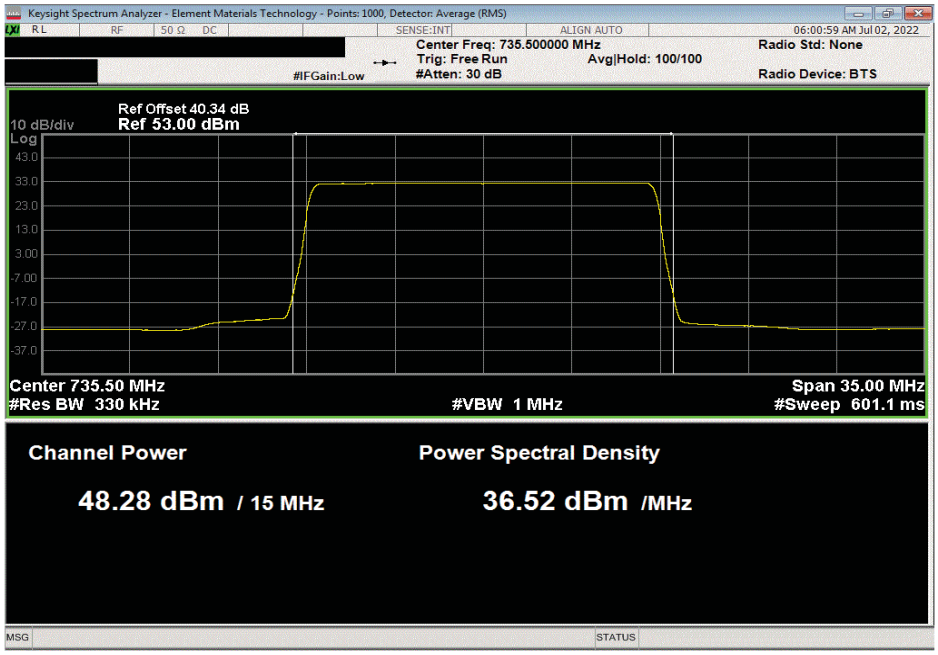

| Port 2, LTE, Band n85, 728 MHz - 746 MHz, 15 MHz Bandwidth, 16-QAM Modulation, Mid Ch. 737.0 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.319 | 0 | 48.3 | 51.3 | 54.3 | |



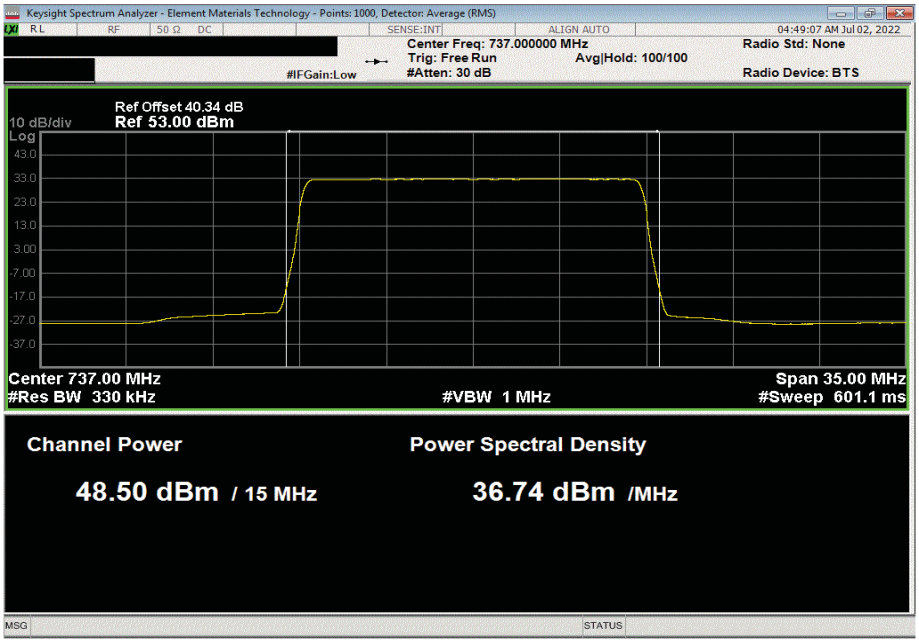
| Port 2, LTE, Band n85, 728 MHz - 746 MHz, 15 MHz Bandwidth, 64-QAM Modulation, Mid Ch. 737.0 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.381 | 0 | 48.4 | 51.4 | 54.4 | |



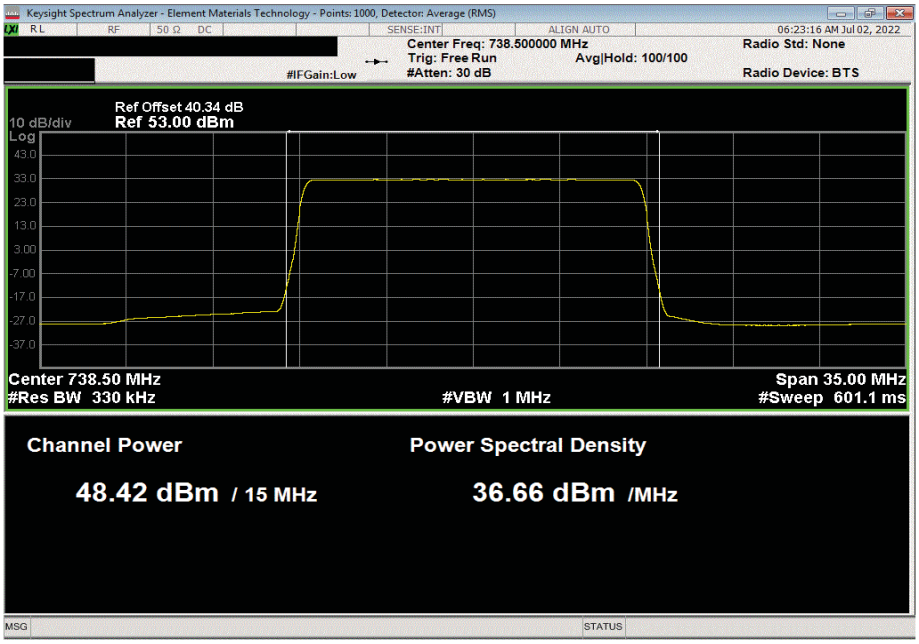

| Port 2, LTE, Band n85, 728 MHz - 746 MHz, 15 MHz Bandwidth, 256-QAM Modulation, Low Ch. 735.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.281 | 0 | 48.3 | 51.3 | 54.3 | |



| Port 2, LTE, Band n85, 728 MHz - 746 MHz, 15 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 737.0 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.503 | 0 | 48.5 | 51.5 | 54.5 | |




| Port 2, LTE, Band n85, 728 MHz - 746 MHz, 15 MHz Bandwidth, 256-QAM Modulation, High Ch. 738.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.423 | 0 | 48.4 | 51.4 | 54.4 | |



# OUTPUT POWER - Band 71 NB IoT GB

XMit 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3239 | ANE | 2022-03-02 | 2023-03-02 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |

**TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times

RF conducted emissions testing was performed only on one port. The AHLOB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 2 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i and 6.4.

The total average transmit power of all antenna ports was determined per ANSI C63.26-2105 paragraph 6.4.3.1

# OUTPUT POWER - Band 71 NB IoT GB

element

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | AHLOB | | | Work Order: | NOKI0043 |
| Serial Number: | YK220900029 | | | Date: | 13-Jul-22 |
| Customer: | Nokia Solutions and Networks | | | Temperature: | 21.2 °C |
| Attendees: | Mitchell Hill, John Rattanavong | | | Humidity: | 53.9% RH |
| Project: | None | | | Barometric Pres.: | 1018 mbar |
| Tested by: | Marty Martin | Power: | 54 VDC | Job Site: | TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 27:2022 | ANSI C63.26:2015 |
| RSS-130 Issue 2:2019 | ANSI C63.26:2015 |

**COMMENTS**

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. The following is the output power measurements at the radio output ports. The output power was measured for a single carrier over the carrier channel bandwidth on port 2. The total output power for multiport (2x2, 4x4 MIMO) operation was determined based upon ANSI 63.26 clauses 6.4.3.1 and 6.4.3.2.4 (10 log Nout). The total output power for two port operation is single port power + 3dB [i.e. 10log(2)] and the total output power for a four port operation is single port power + 6dB [i.e. 10log(4)].

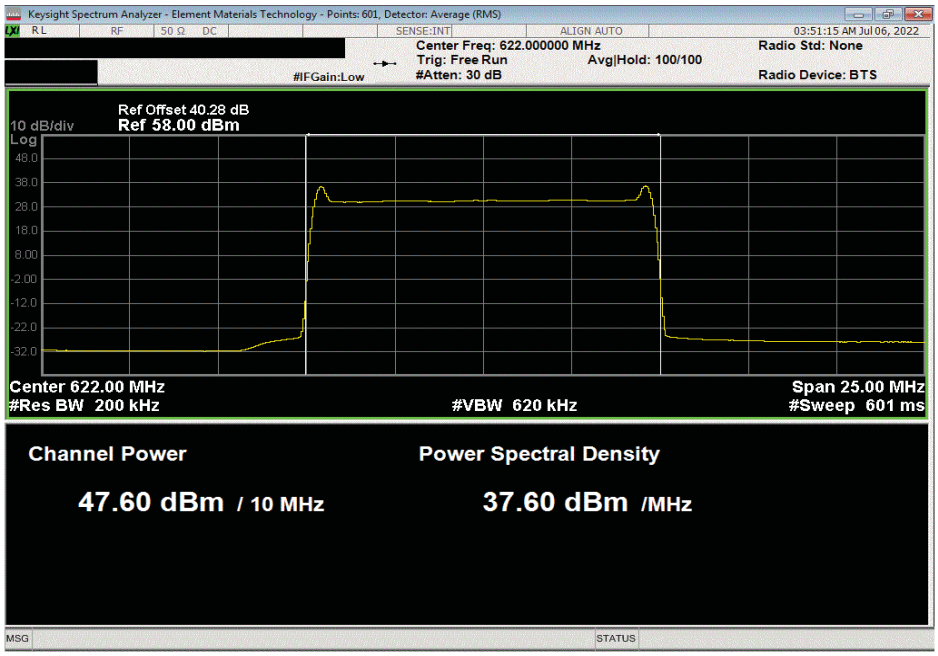
**DEVIATIONS FROM TEST STANDARD**

None

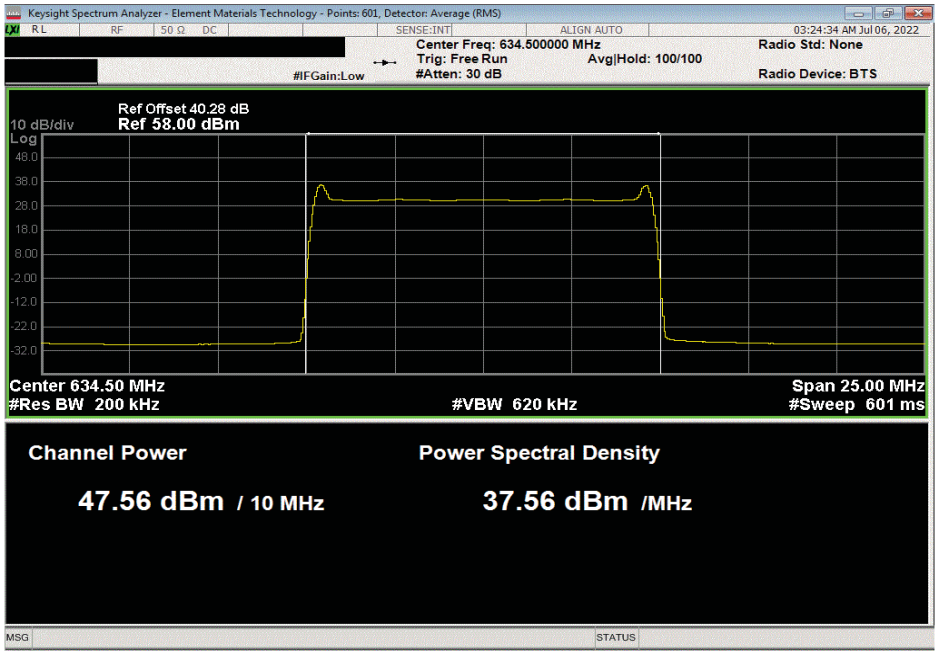
| Configuration # | 2 | Signature |
|---|---|---|

| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Two Port (4x4 MIMO) dBm/Carrier BW |
|---|---|---|---|---|---|---|
| Port 2, LTE, Band 71, 617 MHz - 652 MHz | | | | | | |
| 10 MHz Bandwidth | | | | | | |
| NB IoT GB | | | | | | |
| | Low Ch. 622 MHz | 47.604 | 0 | 47.6 | 50.6 | 53.6 |
| | Mid Ch. 634.5 MHz | 47.562 | 0 | 47.6 | 50.6 | 53.6 |
| | High Ch. 647 MHz | 47.493 | 0 | 47.5 | 50.5 | 53.5 |
| 15 MHz Bandwidth | | | | | | |
| NB IoT GB | | | | | | |
| | Low Ch. 624.5 MHz | 48.971 | 0 | 49 | 52 | 55 |
| | Mid Ch. 634.5 MHz | 48.849 | 0 | 48.8 | 51.8 | 54.8 |
| | High Ch. 644.5 MHz | 48.921 | 0 | 48.9 | 51.9 | 54.9 |
| 20 MHz Bandwidth | | | | | | |
| NB IoT GB | | | | | | |
| | Low Ch. 627 MHz | 48.691 | 0 | 48.7 | 51.7 | 54.7 |
| | Mid Ch. 634.5 MHz | 48.57 | 0 | 48.6 | 51.6 | 54.6 |
| | High Ch. 642 MHz | 48.677 | 0 | 48.7 | 51.7 | 54.6 |

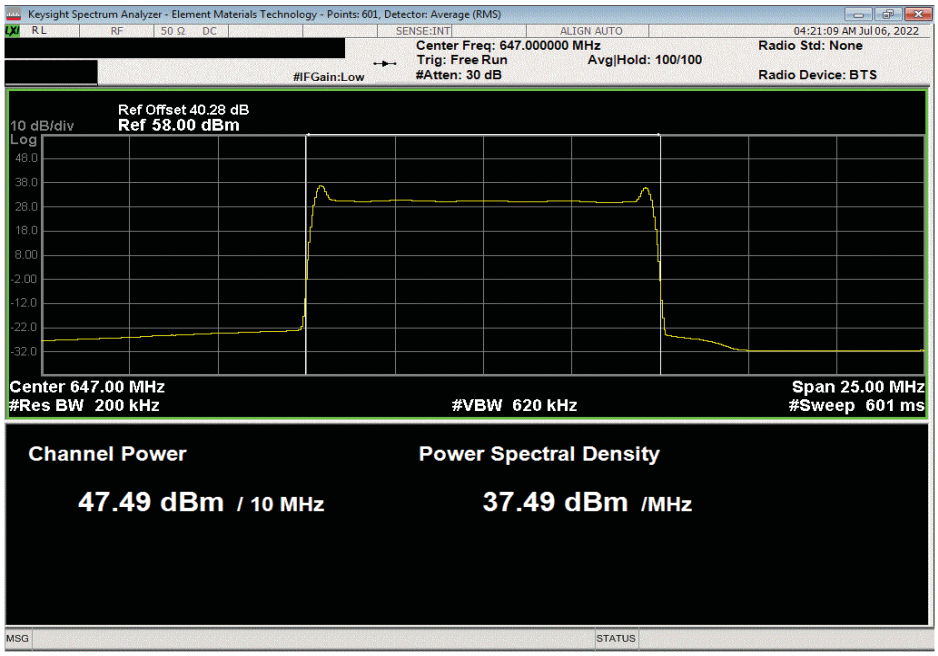
| Port 2, LTE, Band 71, 617 MHz - 652 MHz, 10 MHz Bandwidth, NB IoT GB Modulation, Low Ch. 622 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Two Port (4x4 MIMO) dBm/Carrier BW | |
| | 47.604 | 0 | 47.6 | 50.6 | 53.6 | |



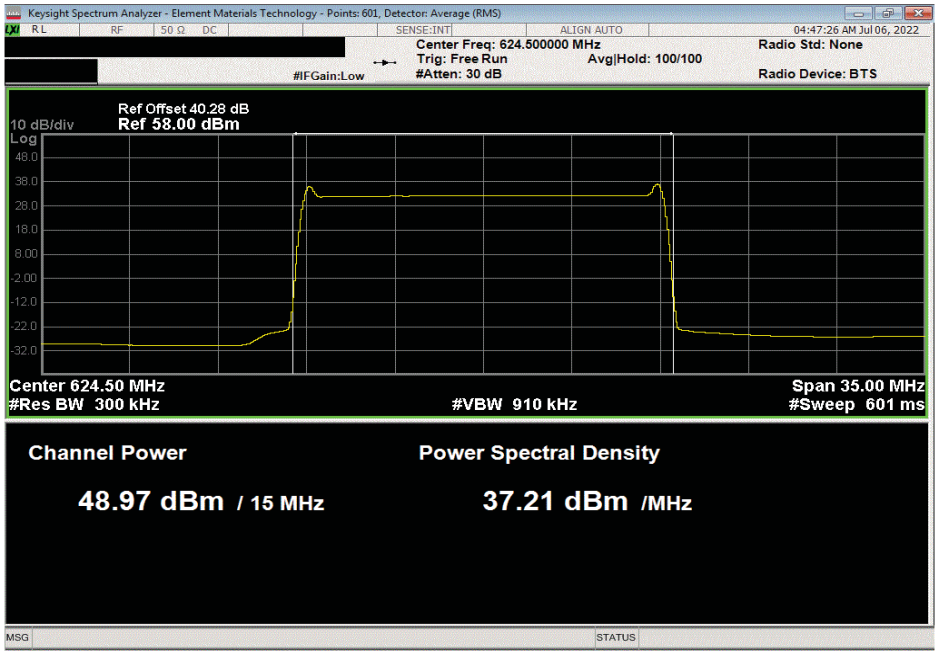

| Port 2, LTE, Band 71, 617 MHz - 652 MHz, 10 MHz Bandwidth, NB IoT GB Modulation, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Two Port (4x4 MIMO) dBm/Carrier BW | |
| | 47.562 | 0 | 47.6 | 50.6 | 53.6 | |



| Port 2, LTE, Band 71, 617 MHz - 652 MHz, 10 MHz Bandwidth, NB IoT GB Modulation, High Ch. 647 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Two Port (4x4 MIMO) dBm/Carrier BW | |
| | 47.493 | 0 | 47.5 | 50.5 | 53.5 | |

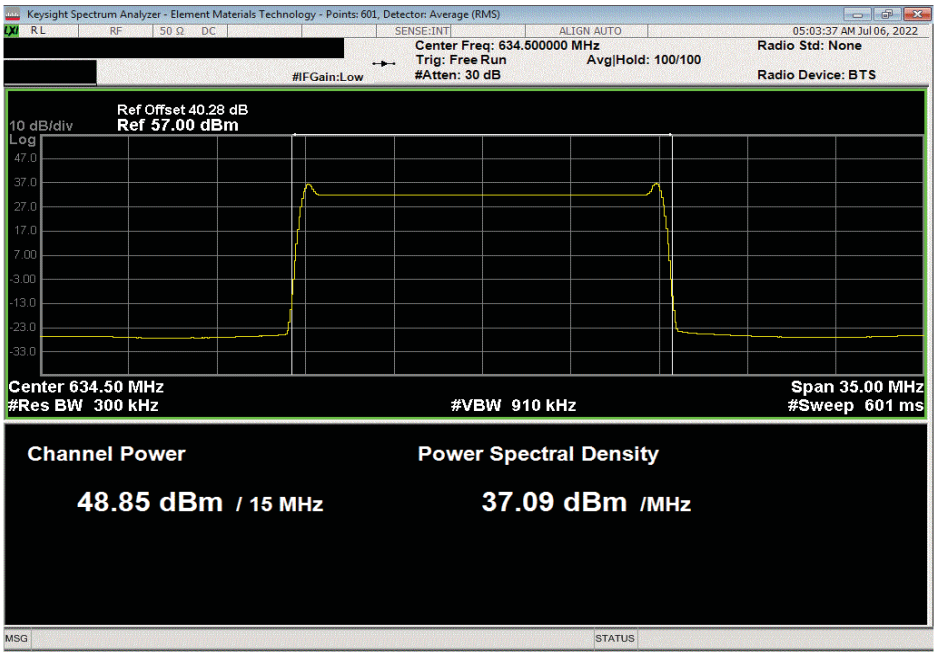



| Port 2, LTE, Band 71, 617 MHz - 652 MHz, 15 MHz Bandwidth, NB IoT GB Modulation, Low Ch. 624.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Two Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.971 | 0 | 49 | 52 | 55 | |

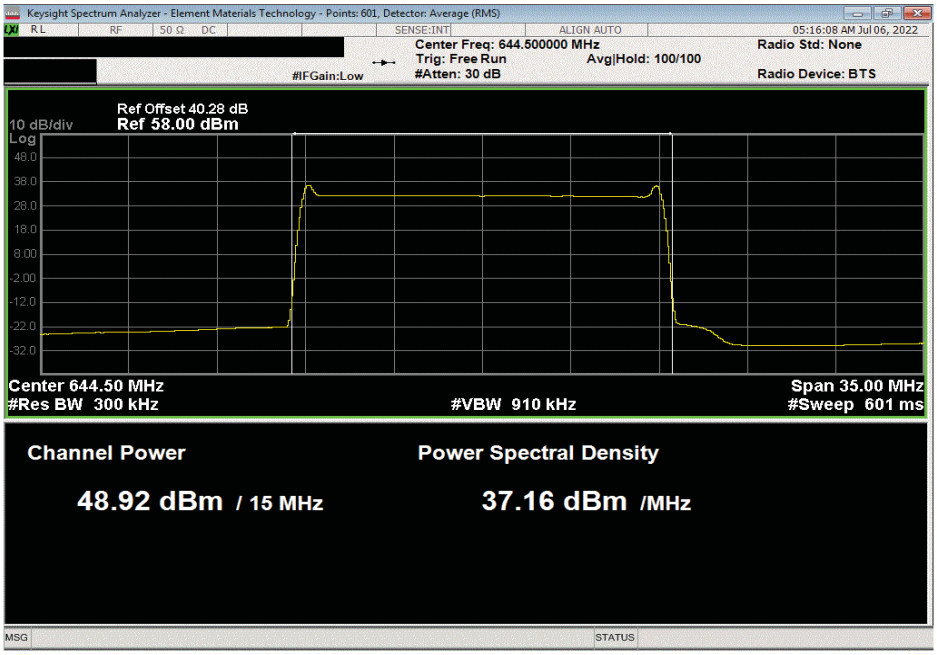


# OUTPUT POWER - Band 71 NB IoT GB

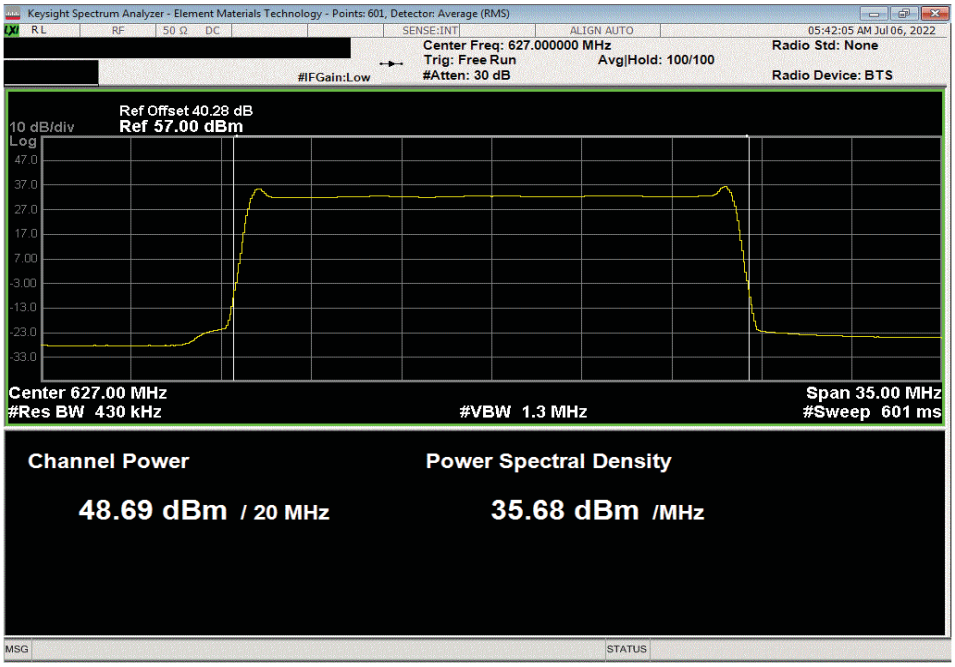
| Port 2, LTE, Band 71, 617 MHz - 652 MHz, 15 MHz Bandwidth, NB IoT GB Modulation, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Two Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.849 | 0 | 48.8 | 51.8 | 54.8 | |



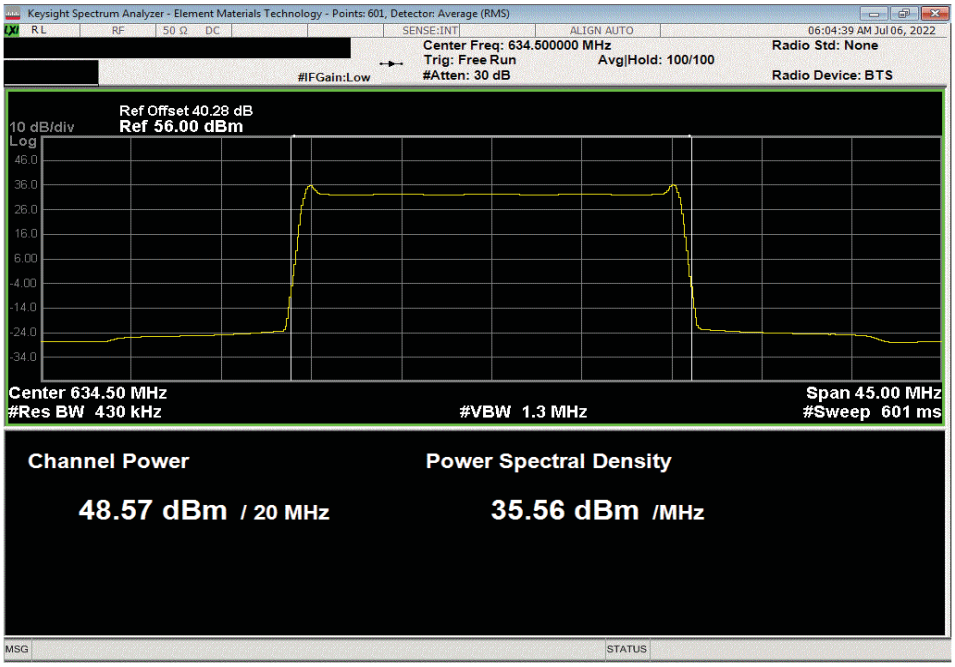

| Port 2, LTE, Band 71, 617 MHz - 652 MHz, 15 MHz Bandwidth, NB IoT GB Modulation, High Ch. 644.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Two Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.921 | 0 | 49 | 52 | 55 | |



| Port 2, LTE, Band 71, 617 MHz - 652 MHz, 20 MHz Bandwidth, NB IoT GB Modulation, Low Ch. 627 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Two Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.691 | 0 | 48.7 | 51.7 | 54.7 | |



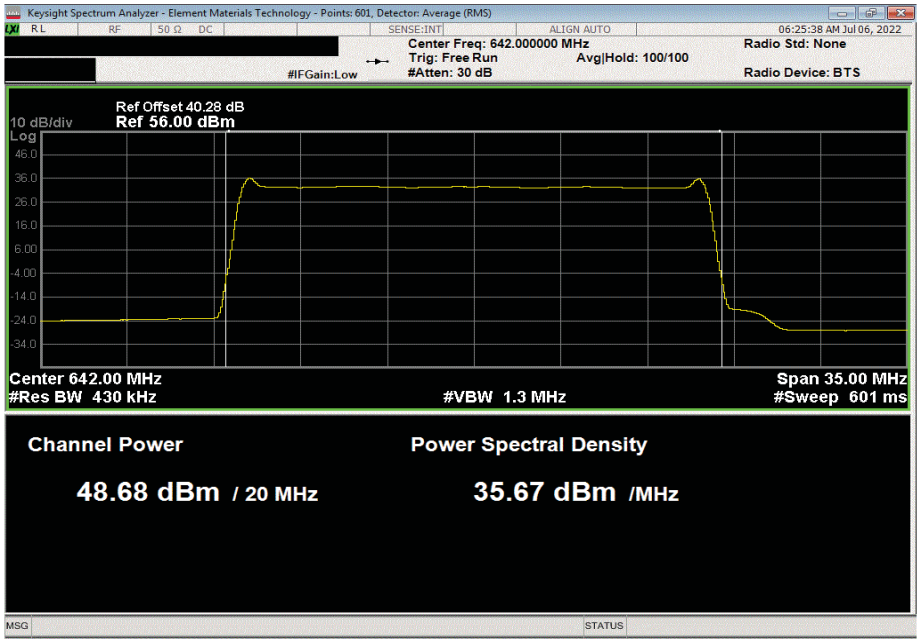

| Port 2, LTE, Band 71, 617 MHz - 652 MHz, 20 MHz Bandwidth, NB IoT GB Modulation, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Two Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.57 | 0 | 48.6 | 51.6 | 54.6 | |



# OUTPUT POWER - Band 71 NB IoT GB



| Port 2, LTE, Band 71, 617 MHz - 652 MHz, 20 MHz Bandwidth, NB IoT GB Modulation, High Ch. 642 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Two Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.677 | 0 | 48.7 | 51.7 | 54.7 | |



# OUTPUT POWER - Band 85 NB IoT GB

XMit 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3239 | ANE | 2022-03-02 | 2023-03-02 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |

**TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times

RF conducted emissions testing was performed only on one port. The AHLOB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 2 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i and 6.4.

The total average transmit power of all antenna ports was determined per ANSI C63.26-2105 paragraph 6.4.3.1

# OUTPUT POWER - Band 85 NB IoT GB

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | AHLOB | | | Work Order: | NOKI0043 |
| Serial Number: | YK220900029 | | | Date: | 13-Jul-22 |
| Customer: | Nokia Solutions and Networks | | | Temperature: | 20.9 °C |
| Attendees: | Mitchell Hill, John Rattanavong | | | Humidity: | 54.2% RH |
| Project: | None | | | Barometric Pres.: | 1018 mbar |
| Tested by: | Marty Martin | Power: | 54 VDC | Job Site: | TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 27:2022 | ANSI C63.26:2015 |
| RSS-130 Issue 2:2019 | ANSI C63.26:2015 |

**COMMENTS**

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. The following is the output power measurements at the radio output ports. The output power was measured for a single carrier over the carrier channel bandwidth on port 1. The total output power for multiport (2x2, 4x4 MIMO) operation was determined based upon ANSI 63.26 clauses 6.4.3.1 and 6.4.3.2.4 [10 log(Nout)]. The total output power for two port operation is single port power + 3dB [i.e. 10log(2)] and the total output power for a four port operation is single port power + 6dB [i.e. 10log(4)].

**DEVIATIONS FROM TEST STANDARD**

None

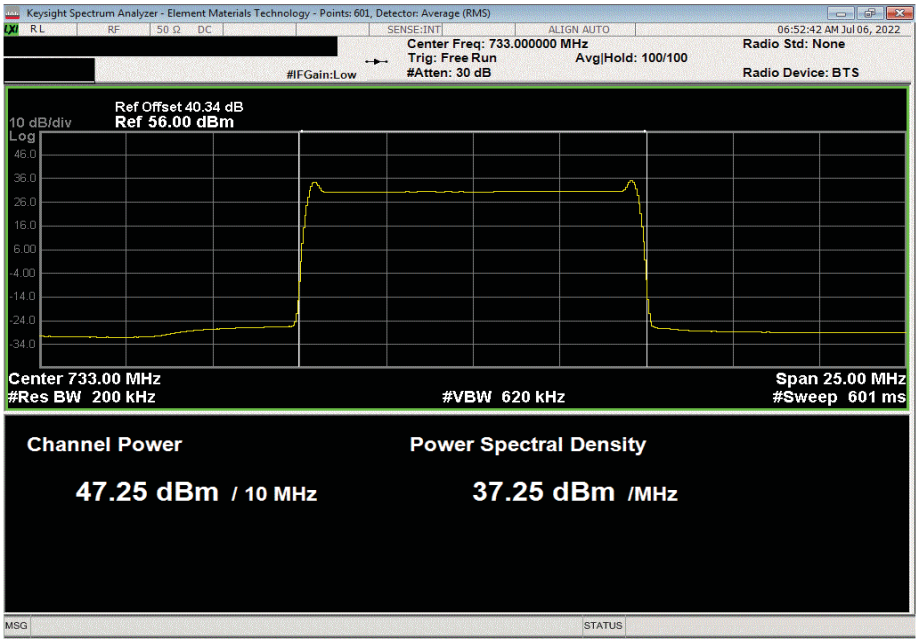
| Configuration # | 2 | Signature |
|---|---|---|

| | | Intial value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/carrier BW | Two Port (2x2 MIMO dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW |
|---|---|---|---|---|---|---|
| Port 2, LTE, Band 85, 728 MHz - 746 MHz | | | | | | |
| 10 MHz Bandwidth | | | | | | |
| NB IoT GB | | | | | | |
| | Low Ch. 733 MHz | 47.249 | 0 | 47.2 | 50.2 | 53.2 |
| | Mid Ch. 737 MHz | 47.628 | 0 | 47.6 | 50.6 | 53.6 |
| | High Ch. 741 MHz | 47.589 | 0 | 47.6 | 50.6 | 53.6 |
| Port 2, LTE, Band 85, 728 MHz - 746 MHz | | | | | | |
| 15 MHz Bandwidth | | | | | | |
| NB IoT GB | | | | | | |
| | Low Ch. 735.5 MHz | 48.82 | 0 | 48.8 | 51.8 | 54.8 |
| | Mid Ch. 737 MHz | 48.731 | 0 | 48.7 | 51.7 | 54.7 |
| | High Ch. 738.5 MHz | 48.833 | 0 | 48.8 | 51.8 | 54.8 |

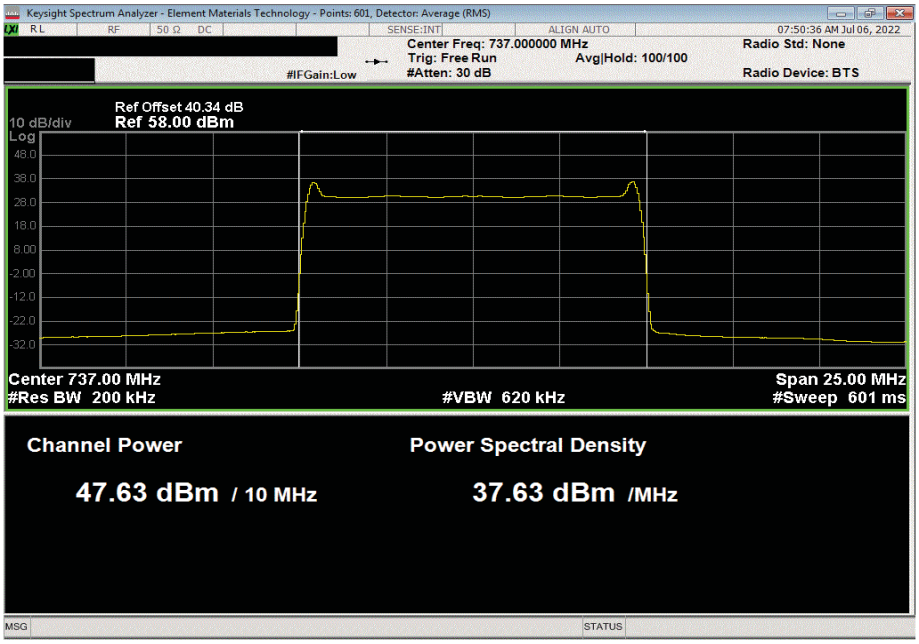
# OUTPUT POWER - Band 85 NB IoT GB



| Port 2, LTE, Band 85, 728 MHz - 746 MHz, 10 MHz Bandwidth, NB IoT GB, Low Ch. 733 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 47.249 | 0 | 47.2 | 50.2 | 53.2 | |



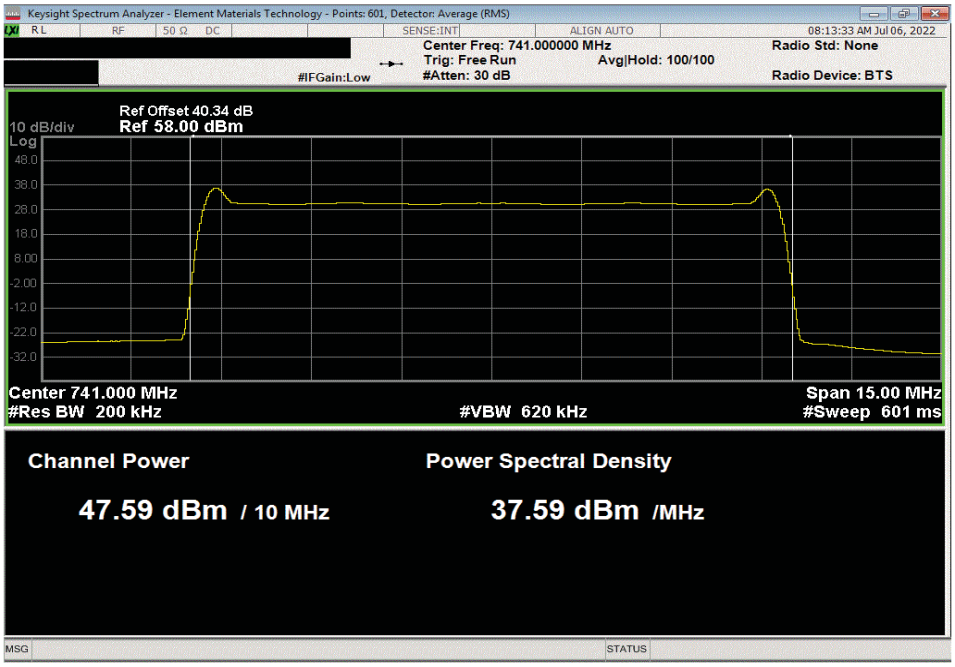

| Port 2, LTE, Band 85, 728 MHz - 746 MHz, 10MHz Bandwidth, NB IoT GB, Mid Ch. 737 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 47.628 | 0 | 47.6 | 50.6 | 53.6 | |



# OUTPUT POWER - Band 85 NB IoT GB



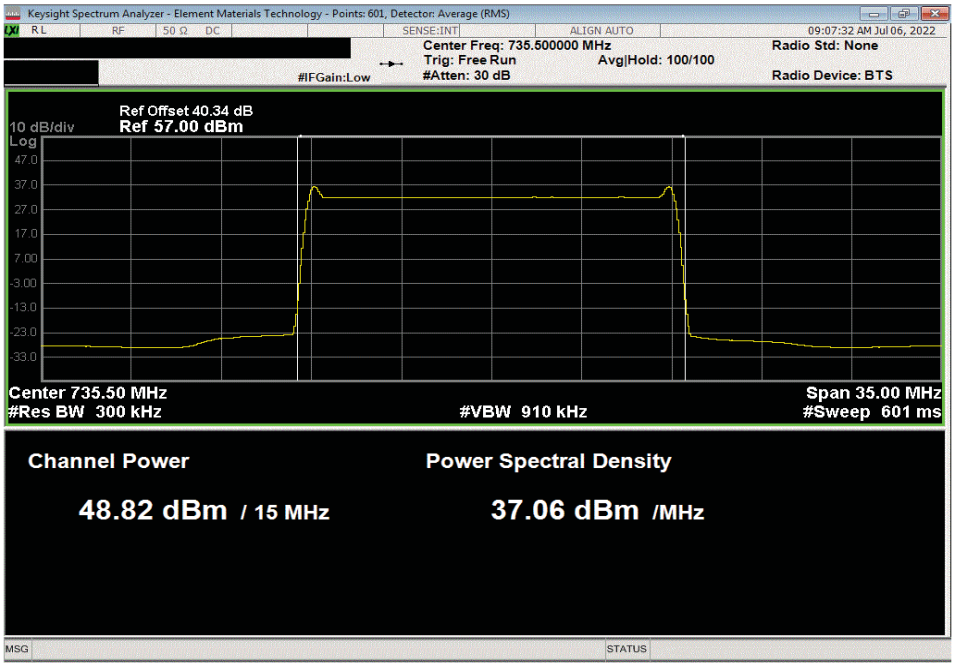
| Port 2, LTE, Band 85, 728 MHz - 746 MHz, 10MHz Bandwidth, NB IoT GB, High Ch. 741 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 47.589 | 0 | 47.6 | 50.6 | 53.6 | |



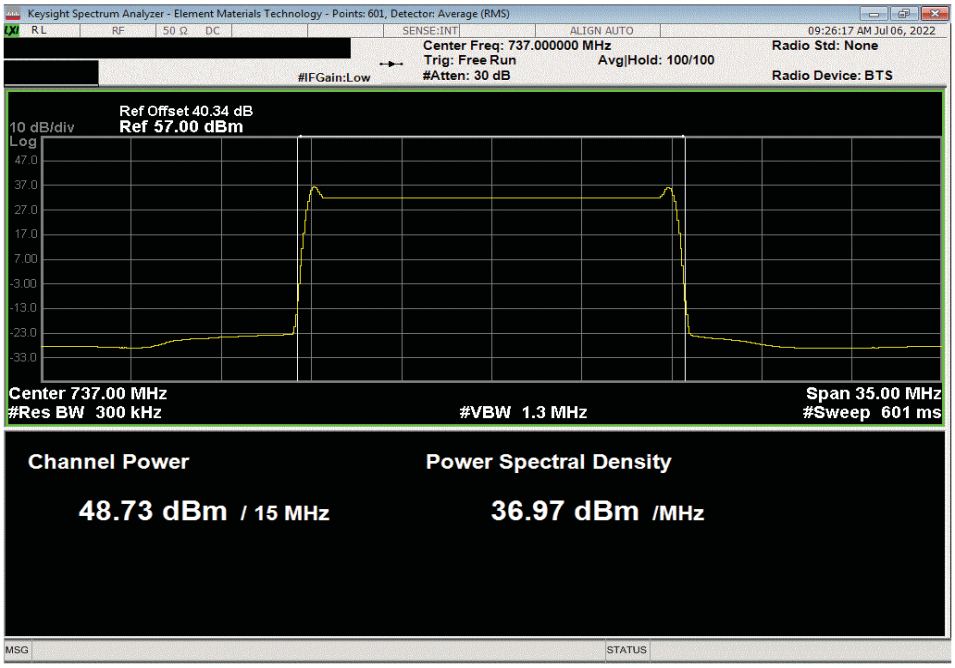
# OUTPUT POWER - Band 85 NB IoT GB



| Port 2, LTE, Band 85, 728 MHz - 746 MHz, 15MHz Bandwidth, NB IoT GB, Low Ch. 735.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.82 | 0 | 48.8 | 51.8 | 54.8 | |



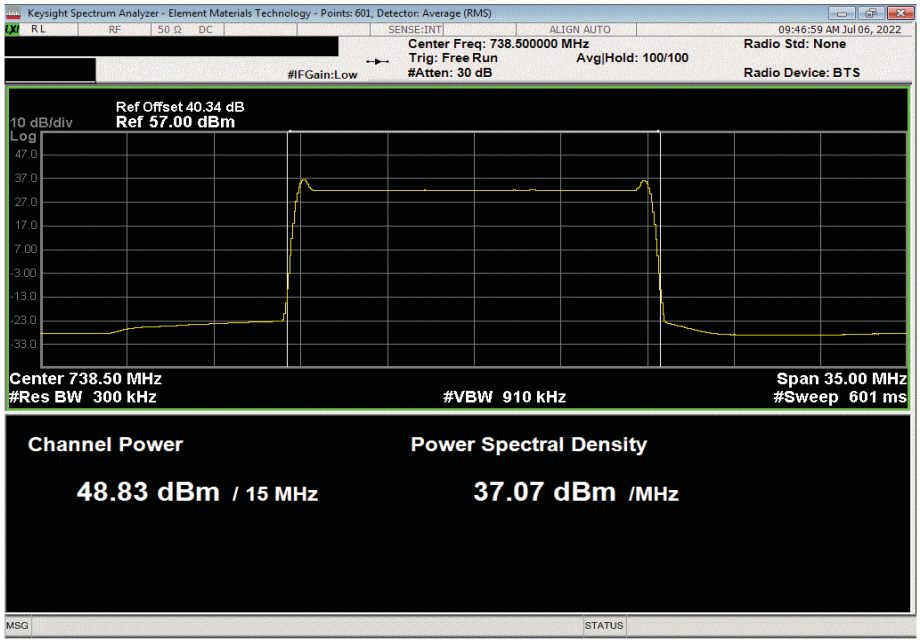

| Port 2, LTE, Band 85, 728 MHz - 746 MHz, 15MHz Bandwidth, NB IoT GB, Mid Ch. 737 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.731 | 0 | 48.7 | 51.7 | 54.7 | |



# OUTPUT POWER - Band 85 NB IoT GB



| Port 2, LTE, Band 85, 728 MHz - 746 MHz, 15MHz Bandwidth, NB IoT GB, High Ch. 738.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Intial value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.833 | 0 | 48.8 | 51.8 | 54.8 | |



# OUTPUT POWER - Band 71 NB IoT SA

XMit 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3239 | ANE | 2022-03-02 | 2023-03-02 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |

**TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times

RF conducted emissions testing was performed only on one port. The AHLOB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 2 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i and 6.4.

The total average transmit power of all antenna ports was determined per ANSI C63.26-2105 paragraph 6.4.3.1

# OUTPUT POWER - Band 71 NB IoT SA

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | AHLOB | | | Work Order: | NOKI0043 |
| Serial Number: | YK220900029 | | | Date: | 19-Aug-22 |
| Customer: | Nokia Solutions and Networks | | | Temperature: | 20.9 °C |
| Attendees: | Mitchell Hill, John Rattanavong | | | Humidity: | 54.5% RH |
| Project: | None | | | Barometric Pres.: | 1013 mbar |
| Tested by: | Marty Martin | Power: | 54 VDC | Job Site: | TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 27:2022 | ANSI C63.26:2015 |
| RSS-130 Issue 2:2019 | ANSI C63.26:2015 |

**COMMENTS**

All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. The following is the output power measurements at the radio output ports. The output power was measured for a single carrier over the carrier channel bandwidth on port 2. The total output power for multiport (2x2, 4x4 MIMO) operation was determined based upon ANSI 63.26 clauses 6.4.3.1 and 6.4.3.2.4 (10 log Nout). The total output power for two port operation is single port power + 3dB [i.e. 10log(2)] and the total output power for a four port operation is single port power + 6dB [i.e. 10log(4)].

**DEVIATIONS FROM TEST STANDARD**

None

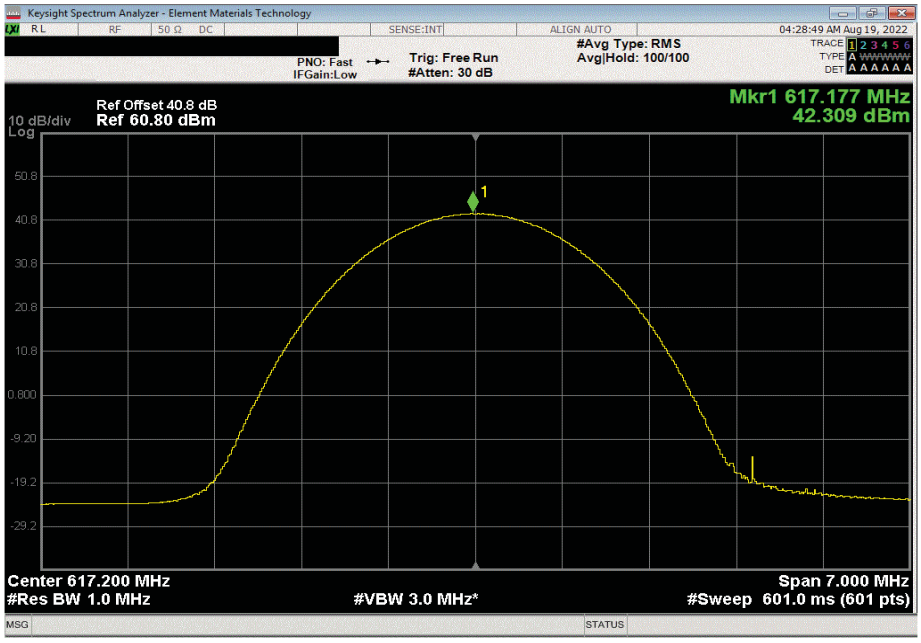
| Configuration # | 2 | Signature |
|---|---|---|

| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW |
|---|---|---|---|---|---|
| Port 2, LTE, Band 71, 617 MHz - 652 MHz | | | | | |
| 200 kHz Bandwidth | | | | | |
| Standalone NB-IoT | | | | | |
| Low Ch. 617.2 MHz | 42.309 | 0 | 42.3 | 45.3 | 48.3 |
| Mid Ch. 634.5 MHz | 42.882 | 0 | 42.9 | 45.9 | 48.9 |
| High Ch. 651.8 MHz | 42.312 | 0 | 42.3 | 45.3 | 48.3 |

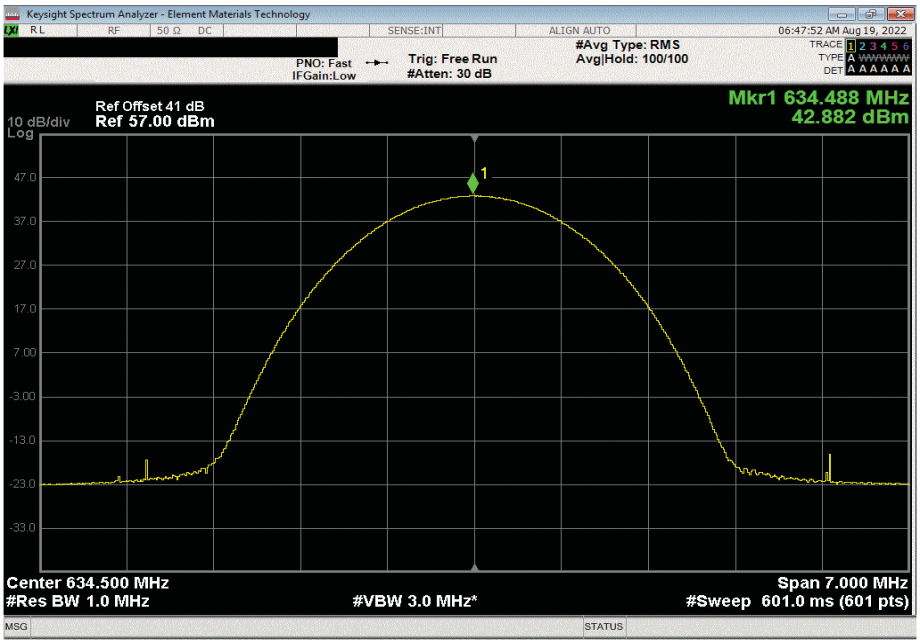
# OUTPUT POWER - Band 71 NB IoT SA



| Port 2, LTE, Band 71, 617 MHz - 652 MHz, 200 kHz Bandwidth, Standalone NB-IoT, Low Ch. 617.2 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW |
| | 42.309 | 0 | | 42.3 | 45.3 | 48.3 |



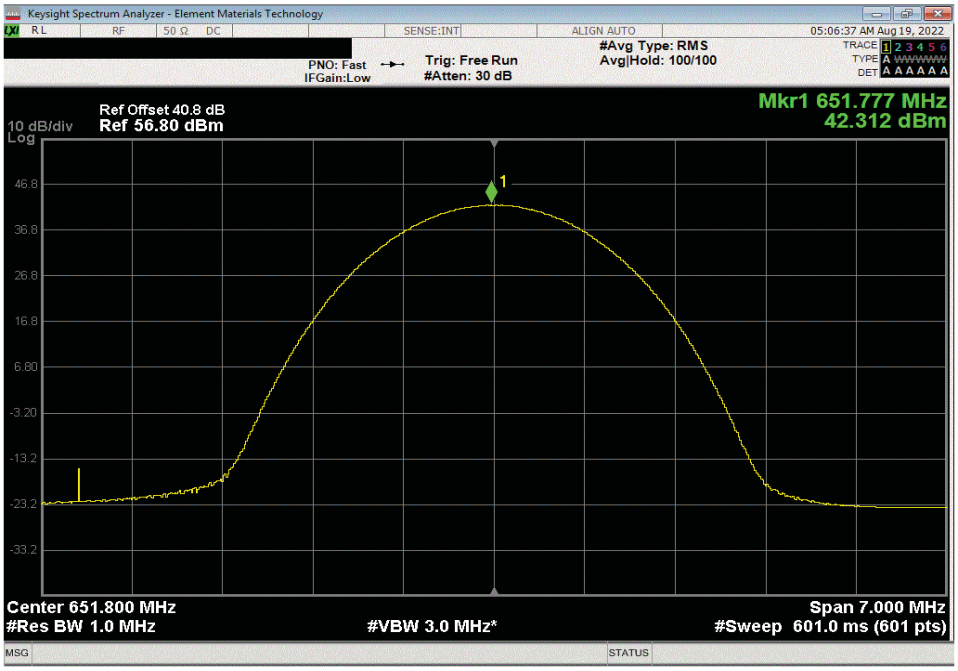

| Port 2, LTE, Band 71, 617 MHz - 652 MHz, 200 kHz Bandwidth, Standalone NB-IoT, Mid Ch. 634.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW |
| | 42.882 | 0 | | 42.9 | 45.9 | 48.9 |



# OUTPUT POWER - Band 71 NB IoT SA



| Port 2, LTE, Band 71, 617 MHz - 652 MHz, 200 kHz Bandwidth, Standalone NB-IoT, High Ch. 651.8 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW |
| | 42.312 | 0 | | 42.3 | 45.3 | 48.3 |



# OUTPUT POWER - Band 85 NB IoT SA

XMit 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3239 | ANE | 2022-03-02 | 2023-03-02 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |

**TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times

RF conducted emissions testing was performed only on one port. The AHLOB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 2 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i and 6.4.

The total average transmit power of all antenna ports was determined per ANSI C63.26-2105 paragraph 6.4.3.1

# OUTPUT POWER - Band 85 NB IoT SA

element

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | AHLOB | | | Work Order: | NOKI0043 |
| Serial Number: | YK220900029 | | | Date: | 19-Aug-22 |
| Customer: | Nokia Solutions and Networks | | | Temperature: | 20.6 °C |
| Attendees: | Mitchell Hill, John Rattanavong | | | Humidity: | 53.2% RH |
| Project: | None | | | Barometric Pres.: | 1016 mbar |
| Tested by: | Marty Martin | Power: | 54 VDC | Job Site: | TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 27:2022 | ANSI C63.26:2015 |
| RSS-130 Issue 2:2019 | ANSI C63.26:2015 |

**COMMENTS**

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. The following is the output power measurements at the radio output ports. The output power was measured for a single carrier over the carrier channel bandwidth on port 2. The total output power for multiport (2x2, 4x4 MIMO) operation was determined based upon ANSI 63.26 clauses 6.4.3.1 and 6.4.3.2.4 (10 log Nout). The total output power for two port operation is single port power + 3dB [i.e. 10log(2)] and the total output power for a four port operation is single port power + 6dB [i.e. 10log(4)].

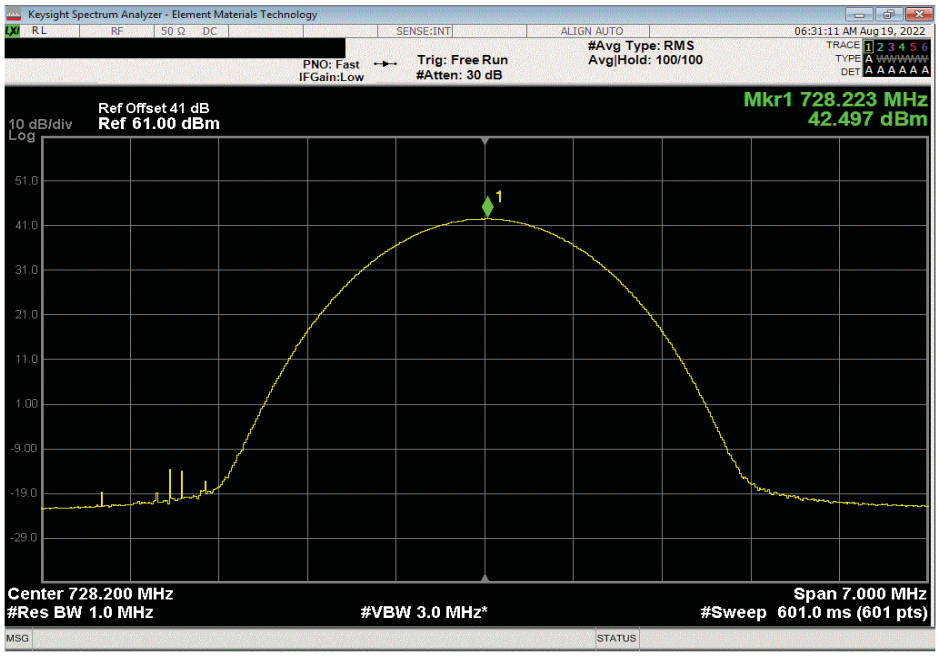
**DEVIATIONS FROM TEST STANDARD**

None

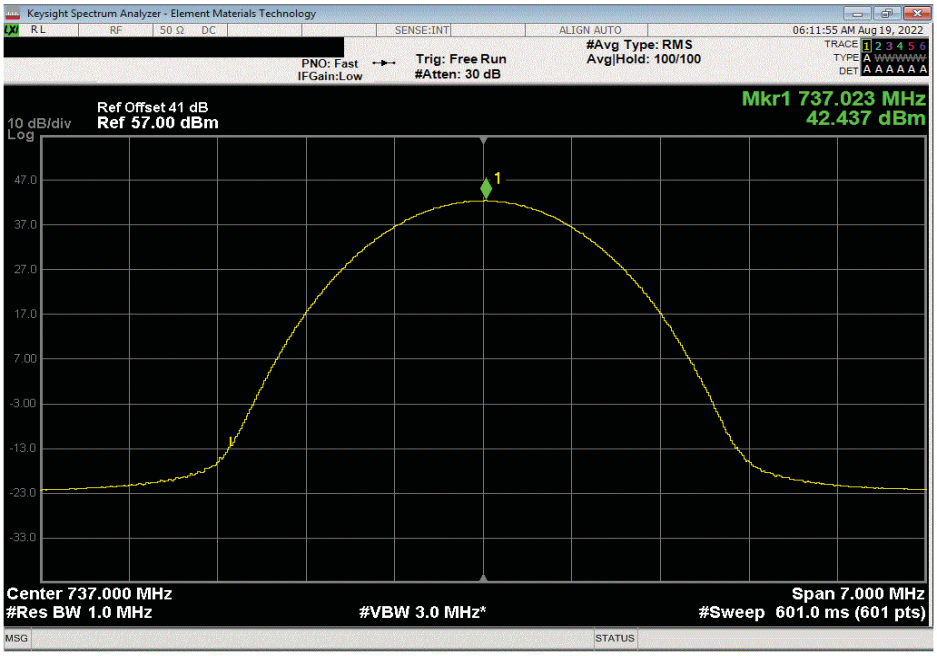
| Configuration # | 2 | Signature | Marty Martin |
|---|---|---|---|

| | Initial value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW |
|---|---|---|---|---|---|
| Port 2, LTE, Band 85, 728 MHz - 746 MHz | | | | | |
| 200 kHz Bandwidth | | | | | |
| Standalone NB-IoT | | | | | |
| Low Ch. 728.2 MHz | 42.497 | 0 | 42.5 | 45.5 | 48.5 |
| Mid Ch. 737 MHz | 42.437 | 0 | 42.4 | 45.4 | 48.4 |
| High Ch. 745.8 MHz | 42.231 | 0 | 42.2 | 45.2 | 48.2 |

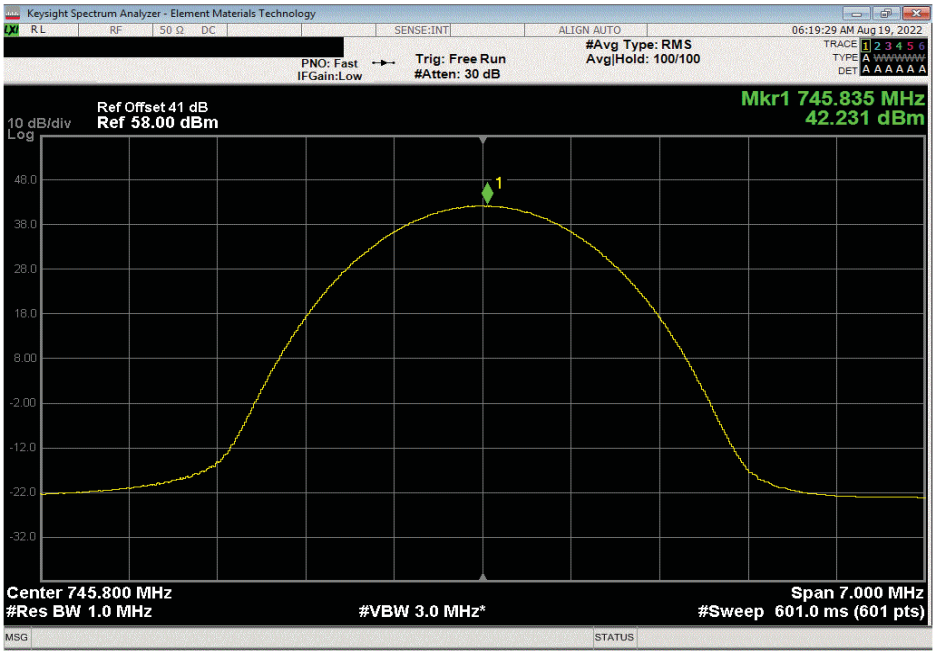
| Port 2, LTE, Band 85, 728 MHz - 746 MHz, 200 kHz Bandwidth, Standalone NB-IoT, Low Ch. 728.2 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 42.497 | 0 | 42.5 | 45.5 | 48.5 | |




| Port 2, LTE, Band 85, 728 MHz - 746 MHz, 200 kHz Bandwidth, Standalone NB-IoT, Mid Ch. 737 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 42.437 | 0 | 42.4 | 45.4 | 48.4 | |



| Port 2, LTE, Band 85, 728 MHz - 746 MHz, 200 kHz Bandwidth, Standalone NB-IoT, High Ch. 745.8 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 42.231 | 0 | 42.2 | 45.2 | 48.2 | |



# OUTPUT POWER - MULTIBAND MULTICARRIER

XMit 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3239 | ANE | 2022-03-02 | 2023-03-02 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |

**TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times.

RF conducted emissions testing was performed only on one port. The AHLOB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown during 4 port output power testing) and antenna port 2 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i and 6.4.

Multicarrier test cases have been developed as shown below:

Multi-Carrier Test Case 1: 3GPP Band 71 Multicarriers _Three LTE5 carriers using two carriers (with minimum spacing between carrier frequencies) at the lower band edge (619.5 & 624.5MHz) and a third carrier with maximum spacing between the other two carrier frequencies (649.5MHz) at the upper band edge. The LTE5 channel bandwidth was selected to maximize carrier power spectral density. The carriers are operated at maximum power for a total port power of 80 watts (~26.6W/Band 71 carriers). 3GPP Band 85 carrier is not enabled.

Multi-Carrier Test Case 2: 3GPP Band 71 Multicarriers_ One LTE 20MHz carrier (627.0 MHz) and one LTE 15MHz carrier (644.5MHz) cover all of the Band 71 bandwidth. The largest channel bandwidth is selected to maximize carrier OBW. The carriers are operated at maximum power for a total port power of 80 watts (~40W/Band 71 carriers). 3GPP Band 85 carrier is not enabled.

Multi-Carrier Test Case 3: 3GPP Band 85 Multicarrier_Two LTE5 carriers using two carriers (with maximum spacing between carrier frequencies) at the lower band edge (730.5MHz) and at the upper band edge (743.5MHz). The LTE5 channel bandwidth was selected to maximize carrier power spectral density. The carriers are operated at maximum power for a total port power of 80 watts (~40W/Band 85 carrier). 3GPP Band 71 carrier is not enabled.

Multi-Carrier Test Case 4: 3GPP Band 71 and Band 85 Multicarrier Multiband: Three LTE 5MHz carriers using two carriers (with minimum spacing between carrier frequencies) at the Band 71 lower band edge (619.5 & 624.5MHz) and a third carrier with maximum spacing between the other two carrier frequencies (743.5MHz) at the Band 85 upper band edge. The smallest channel bandwidth was selected to maximize carrier power spectral density. The carriers were operated at maximum power (~26.6W/ Band 71 carrier and ~26.6W Band 85 carrier) for a total port power of 80 watts.

# OUTPUT POWER - MULTIBAND MULTICARRIER

element

TNTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | AHLOB | | | Work Order: | NOKI0043 |
| Serial Number: | YK220900029 | | | Date: | 11-Jul-22 |
| Customer: | Nokia Solutions and Networks | | | Temperature: | 20.8 °C |
| Attendees: | Mitchell Hill, John Rattanavong | | | Humidity: | 53.9% RH |
| Project: | None | | | Barometric Pres.: | 1013 mbar |
| Tested by: | Marty Martin | Power: | 54 VDC | Job Site: | TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 27:2022 | ANSI C63.26:2015 |
| RSS-130 Issue 2:2019 | ANSI C63.26:2015 |

**COMMENTS**

All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. Band 71 / Band 85 carriers were operating at maximum power in each applicable test case to achieve a total port power of 80 watts. The following is the output power measurements at a single output port.

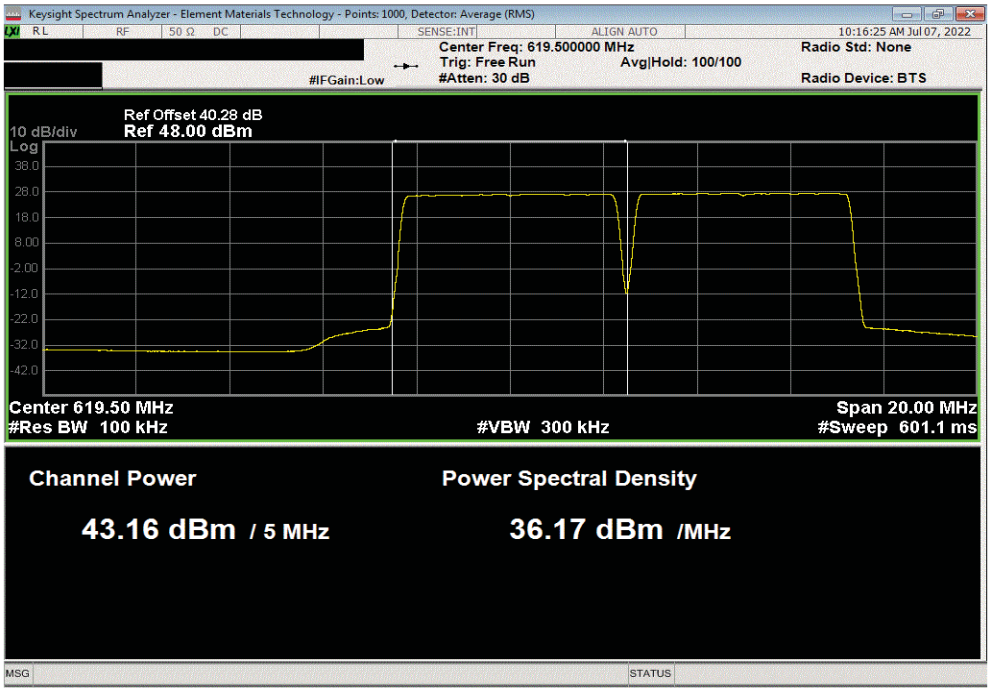
**DEVIATIONS FROM TEST STANDARD**

None

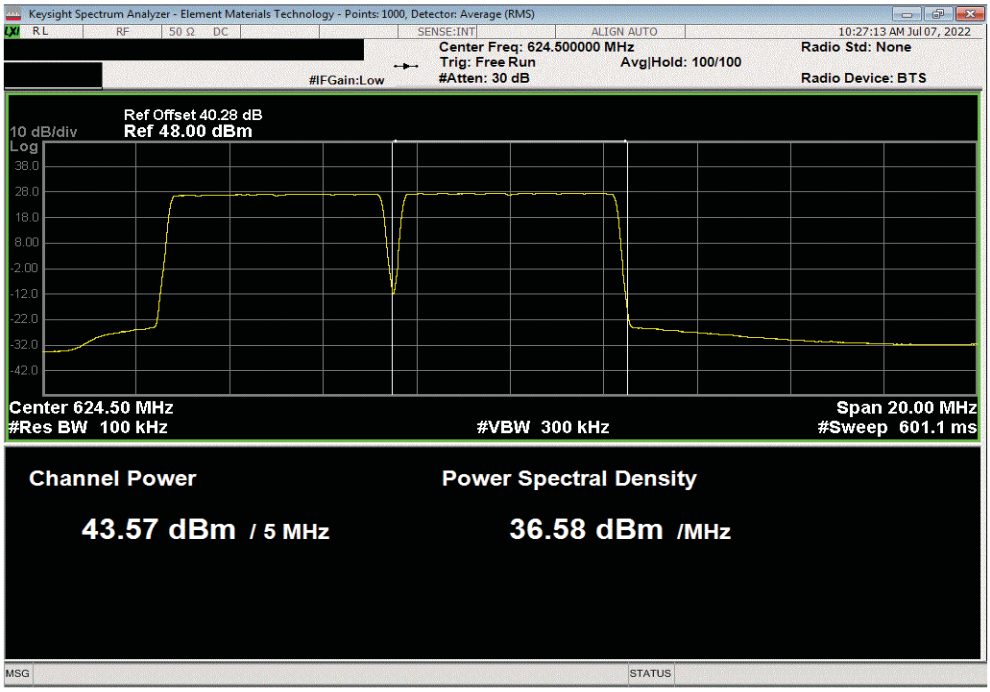
| Configuration # | 2 | Signature |
|---|---|---|

| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Limit (dBm) | Results |
|---|---|---|---|---|---|---|
| LTE Multicarrier Multiband | | | | | | |
| Port 2 | | | | | | |
| QPSK Modulation | | | | | | |
| Test Case 1, LTE5 Carrier 1, 619.5 MHz | 43.162 | 0 | 43.2 | N/A | Within Tolerance | Pass |
| Test Case 1, LTE5 Carrier 2, 624.5 MHz | 43.574 | 0 | 43.6 | N/A | Within Tolerance | Pass |
| Test Case 1, LTE5 Carrier 3, 649.5 MHz | 43.424 | 0 | 43.4 | N/A | Within Tolerance | Pass |
| Test Case 2, LTE20 Carrier 1, 627 MHz | 45.346 | 0 | 45.3 | N/A | Within Tolerance | Pass |
| Test Case 2, LTE15 Carrier 2, 644.5 MHz | 45.406 | 0 | 45.4 | N/A | Within Tolerance | Pass |
| Test Case 3, LTE5 Carrier 1, 730.5 MHz | 45.492 | 0 | 45.5 | N/A | Within Tolerance | Pass |
| Test Case 3, LTE5 Carrier 2, 743.5 MHz | 45.372 | 0 | 45.4 | N/A | Within Tolerance | Pass |
| Test Case 4, LTE5 Band 85 Carrier 1, 743.5 MHz | 43.663 | 0 | 43.7 | N/A | Within Tolerance | Pass |
| Test Case 4, LTE5 Band 71 Carrier 1, 619.5 MHz | 43.266 | 0 | 43.3 | N/A | Within Tolerance | Pass |
| Test Case 4, LTE5 Band 71 Carrier 2, 624.5 MHz | 43.543 | 0 | 43.5 | N/A | Within Tolerance | Pass |

| LTE Multicarrier Multiband, Port 2, QPSK Modulation, Test Case 1, LTE5 Carrier 1, 619.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Limit (dBm) | Results |
| | 43.162 | 0 | 43.2 | N/A | Within Tolerance | Pass |

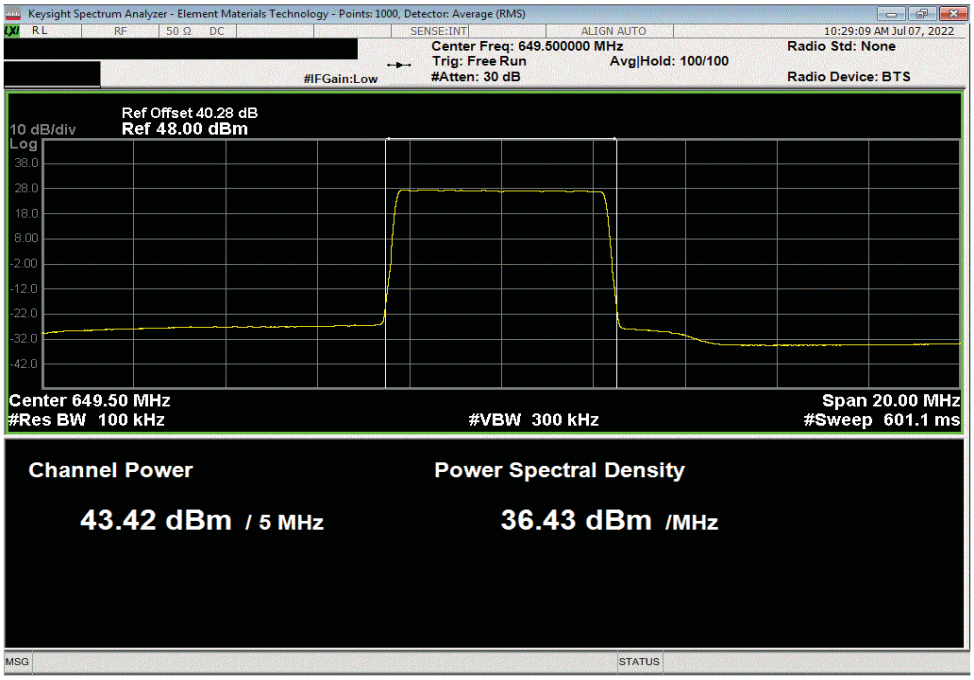



| LTE Multicarrier Multiband, Port 2, QPSK Modulation, Test Case 1, LTE5 Carrier 2, 624.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Limit (dBm) | Results |
| | 43.574 | 0 | 43.6 | N/A | Within Tolerance | Pass |

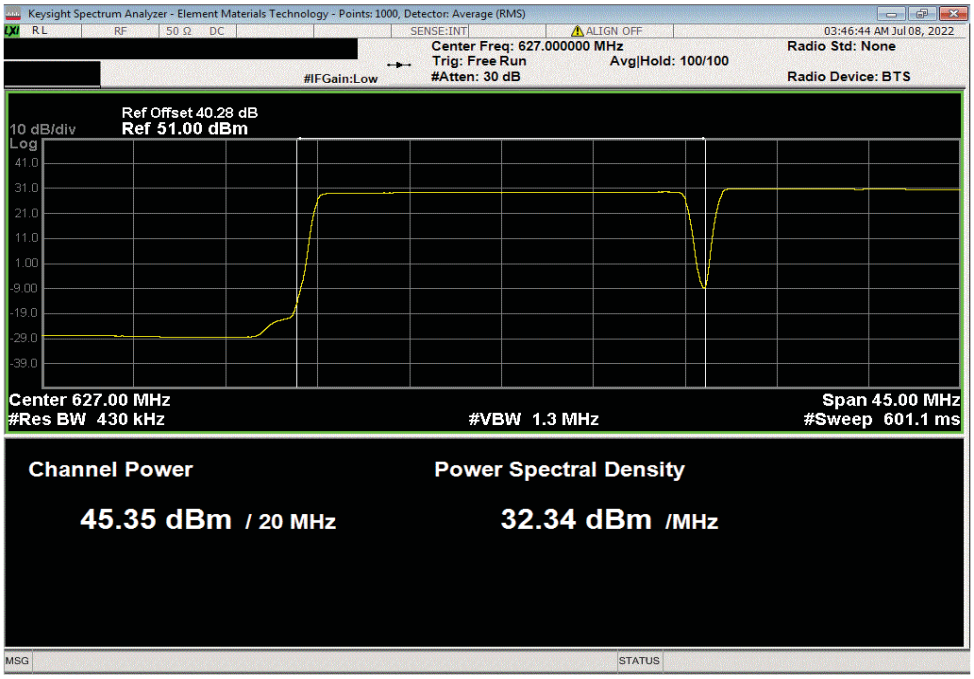


# OUTPUT POWER - MULTIBAND MULTICARRIER

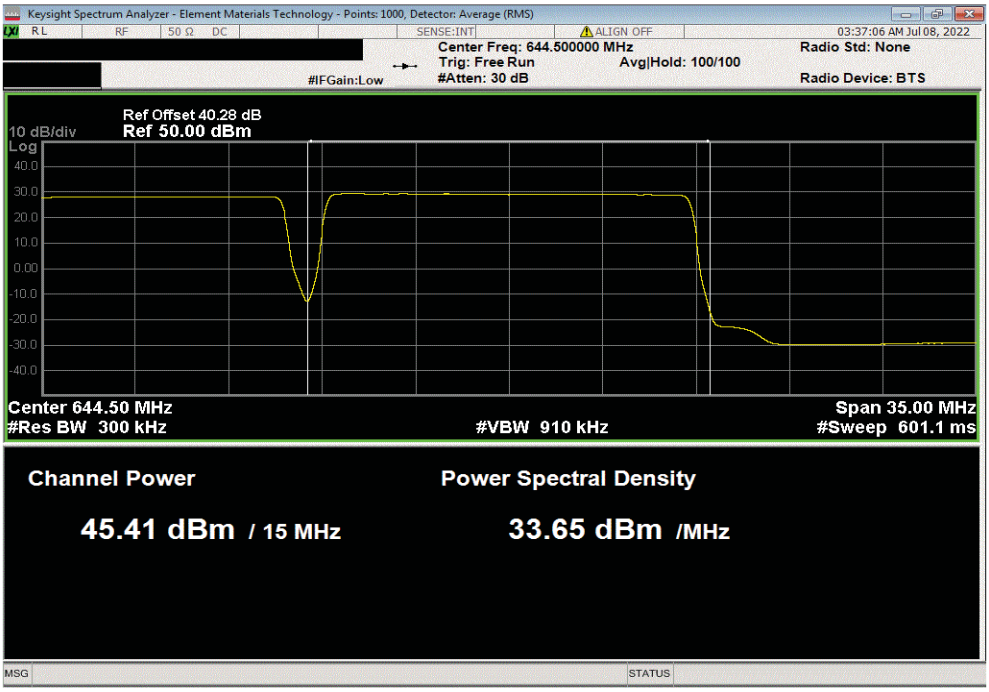
| LTE Multicarrier Multiband, Port 2, QPSK Modulation, Test Case 1, LTE5 Carrier 3, 649.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Limit (dBm) | Results |
| | 43.424 | 0 | 43.4 | N/A | Within Tolerance | Pass |



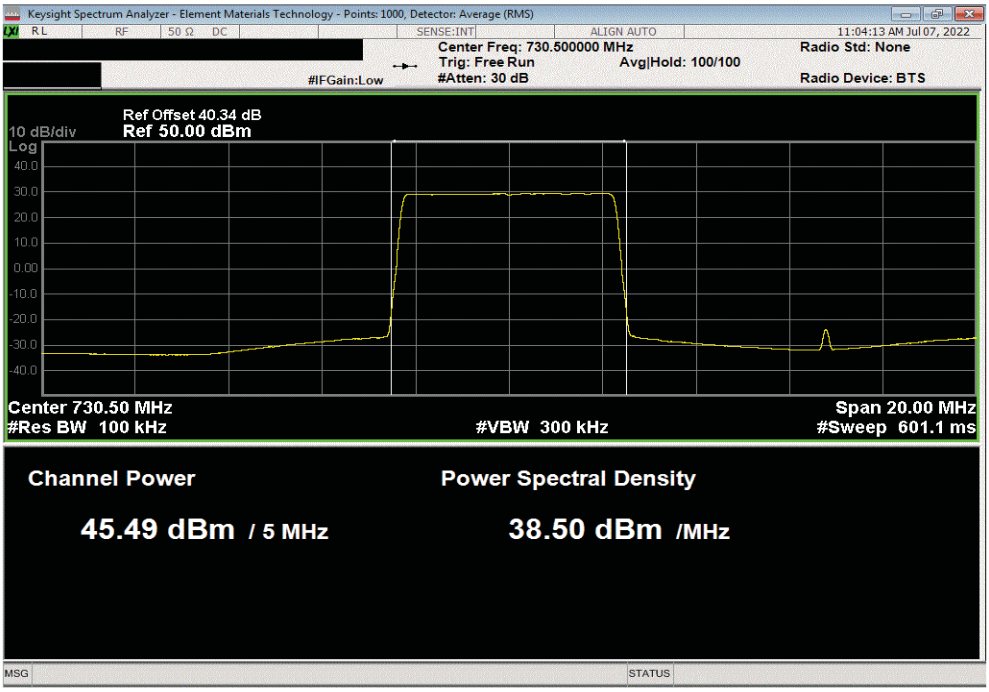

| LTE Multicarrier Multiband, Port 2, QPSK Modulation, Test Case 2, LTE20 Carrier 1, 627 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Limit (dBm) | Results |
| | 45.346 | 0 | 45.3 | N/A | Within Tolerance | Pass |



| LTE Multicarrier Multiband, Port 2, QPSK Modulation, Test Case 2, LTE15 Carrier 2, 644.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Limit (dBm) | Results |
| | 45.406 | 0 | 45.4 | N/A | Within Tolerance | Pass |

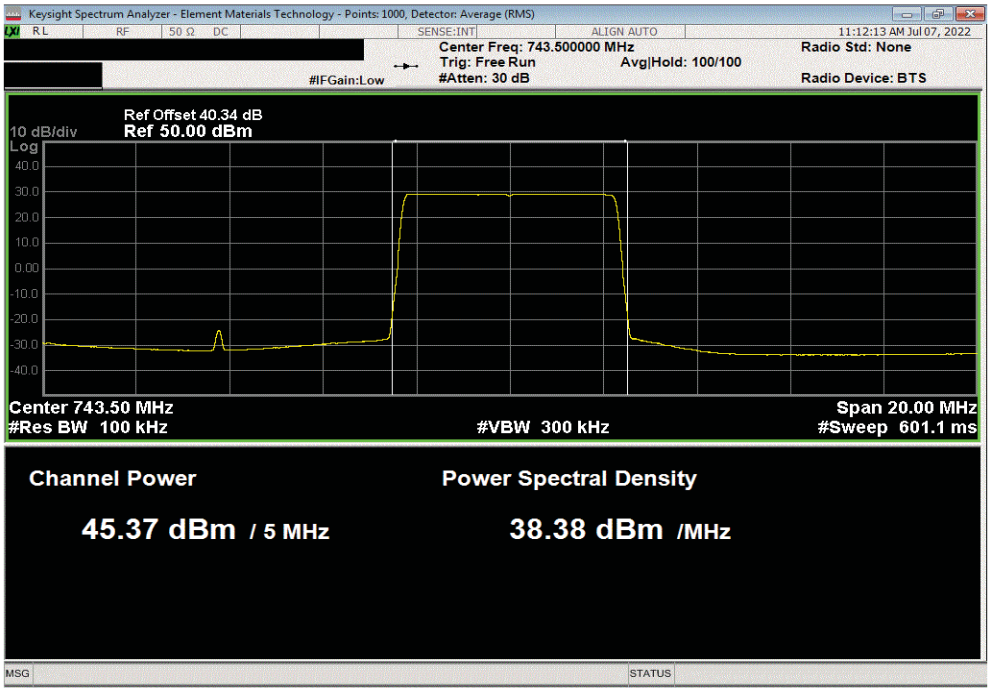



| LTE Multicarrier Multiband, Port 2, QPSK Modulation, Test Case 3, LTE5 Carrier 1, 730.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Limit (dBm) | Results |
| | 45.492 | 0 | 45.5 | N/A | Within Tolerance | Pass |



# OUTPUT POWER - MULTIBAND MULTICARRIER

| LTE Multicarrier Multiband, Port 2, QPSK Modulation, Test Case 3, LTE5 Carrier 2, 743.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Limit (dBm) | Results |
| | 45.372 | 0 | 45.4 | N/A | Within Tolerance | Pass |




| LTE Multicarrier Multiband, Port 2, QPSK Modulation, Test Case 4, LTE5 n85 Carrier 1, 743.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Limit (dBm) | Results |
| | 43.663 | 0 | 43.7 | N/A | Within Tolerance | Pass |