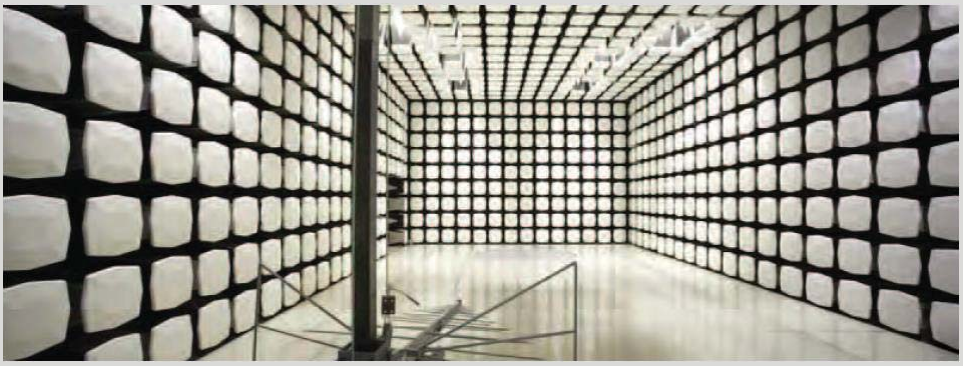
# Radio Test Report
## Application for a Permissive Change of Equipment Authorization
## FCC Part 24
## [1930MHz – 1995MHz]

## FCC Part 27
## [2110MHz – 2200MHz]

**FCC ID: VBNAHFIG-01**

**Nokia Solutions and Networks**
**Airscale Base Transceiver Station Remote Radio Head**
**Model: AHFIG**

**Report: NOKI0053.0 Rev. 0, Issue Date: July 21, 2023**



ACCREDITED
CERT #3310.03

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element
2023.04.17

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# CERTIFICATE OF TEST

**Last Date of Test: June 14, 2023**
**Nokia Solutions and Networks**
**EUT: AirScale Base Transceiver Station Remote Radio Head Model AHFIG**

## Radio Equipment Testing

### Standards

| Specification | Method |
|---|---|
| Code of Federal Regulations (CFR) Title 47 Part 2<br>CFR Title 47 Part 24 Subpart E – Broadband PCS<br>CFR Title 47 Part 27 | ANSI C63.26-2015 with<br>FCC KDB 971168 D01 v03r01<br>FCC KDB 971168 D03 v01<br>FCC KDB 662911D01 v02r01<br>FCC KDB 662911D02 v01 |

### Results

| Test Description | Result | Comments |
|---|---|---|
| Duty Cycle | N/A | Not requested. |
| Occupied Bandwidth | Pass | |
| Average Power | Pass | |
| Power Spectral Density | Pass | |
| Peak to Average Power (PAPR)CCDF | Pass | |
| Band Edge Compliance | Pass | |
| Spurious Conducted Emissions | Pass | |
| Spurious Radiated Emissions | N/A | Not requested. |

### Deviations From Test Standards

None

### Approved By:

*Adam Bruno, Operations Manager*

***Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.***

# REVISION HISTORY

| Revision Number | Description | Date (yyyy-mm-dd) | Page Number |
|---|---|---|---|
| 00 | None | | |

# ACCREDITATIONS AND AUTHORIZATIONS

## United States

**FCC** - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

**A2LA** - Each laboratory is accredited by A2LA to ISO / IEC 17025, and as a product certifier to ISO / IEC 17065 which allows Element to certify transmitters to FCC and IC specifications.

## Canada

**ISED** - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

## European Union

**European Commission** – Recognized as an EU Notified Body validated for the EMCD and RED Directives.

## United Kingdom

**BEIS** – Recognized by the UK as an Approved Body under the UK Radio Equipment and UK EMC Regulations.

## Australia/New Zealand

**ACMA** - Recognized by ACMA as a CAB for the acceptance of test data.

## Korea

**MSIT / RRA** - Recognized by KCC's RRA as a CAB for the acceptance of test data.

## Japan

**VCCI** - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

## Taiwan

**BSMI** – Recognized by BSMI as a CAB for the acceptance of test data.

**NCC** - Recognized by NCC as a CAB for the acceptance of test data.

## Singapore

**IDA** – Recognized by IDA as a CAB for the acceptance of test data.

## Israel

**MOC** – Recognized by MOC as a CAB for the acceptance of test data.

## Hong Kong

**OFCA** – Recognized by OFCA as a CAB for the acceptance of test data.

## Vietnam

**MIC** – Recognized by MIC as a CAB for the acceptance of test data.

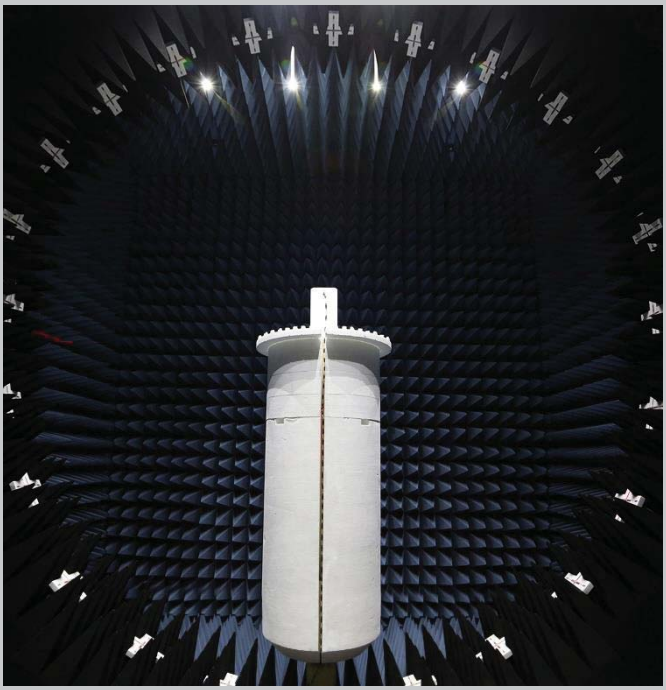
## SCOPE

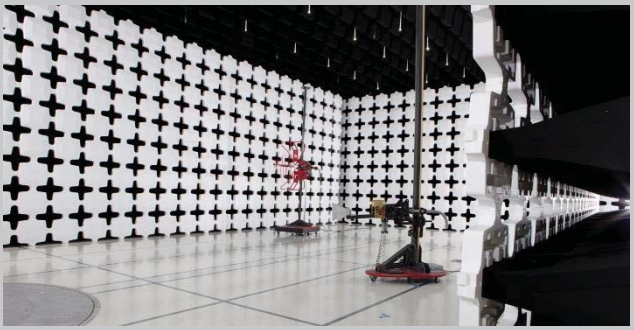
For details on the Scopes of our Accreditations, please visit:

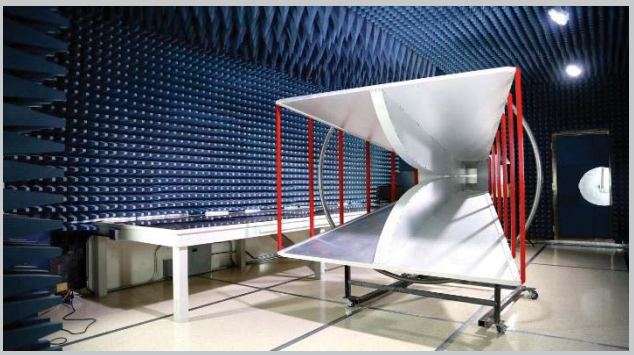
California Minnesota Oregon Texas Washington

# FACILITIES

| California | Minnesota | Oregon | Texas | Washington |
|---|---|---|---|---|
| Labs OC01-17<br>41 Tesla<br>Irvine, CA 92618<br>(949) 861-8918 | Labs MN01-11<br>9349 W Broadway Ave.<br>Brooklyn Park, MN 55445<br>(612) 638-5136 | Labs EV01-12<br>6775 NE Evergreen Pkwy #400<br>Hillsboro, OR 97124<br>(503) 844-4066 | Labs TX01-09<br>3801 E Plano Pkwy<br>Plano, TX 75074<br>(469) 304-5255 | Labs NC01-05<br>19201 120th Ave NE<br>Bothell, WA 98011<br>(425) 984-6600 |
| **A2LA** | | | | |
| Lab Code: 3310.04 | Lab Code: 3310.05 | Lab Code: 3310.02 | Lab Code: 3310.03 | Lab Code: 3310.06 |
| **Innovation, Science and Economic Development Canada** | | | | |
| 2834B-1, 2834B-3 | 2834E-1, 2834E-3 | 2834D-1 | 2834G-1 | 2834F-1 |
| **BSMI** | | | | |
| SL2-IN-E-1154R | SL2-IN-E-1152R | SL2-IN-E-1017 | SL2-IN-E-1158R | SL2-IN-E-1153R |
| **VCCI** | | | | |
| A-0029 | A-0109 | A-0108 | A-0201 | A-0110 |
| **Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA** | | | | |
| US0158 | US0175 | US0017 | US0191 | US0157 |







# MEASUREMENT UNCERTAINTY

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## Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (k=2) can be found in the table below. A lab specific value may also be found in the applicable test description section. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

Test Location: Texas

| Test | + MU | - MU |
|---|---|---|
| Frequency Accuracy | 0.0007% | -0.0007% |
| Amplitude Accuracy (dB) | 1.2 dB | -1.2 dB |
| Conducted Power (dB) | 1.2 dB | -1.2 dB |
| Radiated Power via Substitution (dB) | 0.7 dB | -0.7 dB |
| Temperature (degrees C) | 0.7°C | -0.7°C |
| Humidity (% RH) | 2.5% RH | -2.5% RH |
| Voltage (AC) | 1.0% | -1.0% |
| Voltage (DC) | 0.7% | -0.7% |
| Field Strength (dB) | 5.1 dB | -5.1 dB |
| AC Powerline Conducted Emissions (dB) | 3.1 dB | -3.1 dB |

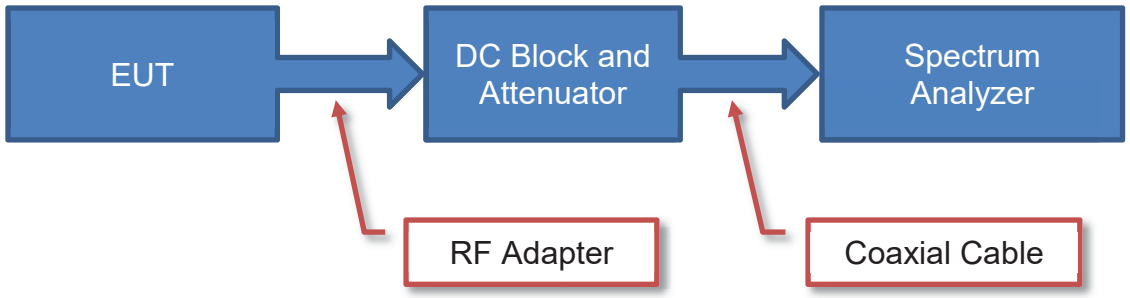
# TEST SETUP BLOCK DIAGRAMS

## Measurement Bandwidths

| Frequency Range (MHz) | Peak Data (kHz) | Quasi-Peak Data (kHz) | Average Data (kHz) |
|---|---|---|---|
| 0.01 - 0.15 | 1.0 | 0.2 | 0.2 |
| 0.15 - 30.0 | 10.0 | 9.0 | 9.0 |
| 30.0 - 1000 | 100.0 | 120.0 | 120.0 |
| Above 1000 | 1000.0 | N/A | 1000.0 |

*Unless otherwise stated, measurements were made using the bandwidths and detectors specified. No video filter was used.*

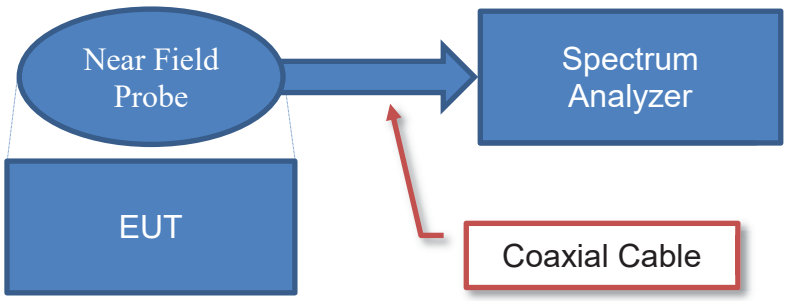
## Antenna Port Conducted Measurements




### Sample Calculation (logarithmic units)

| Measured Value | | Measured Level | | Reference Level Offset |
|---|---|---|---|---|
| **71.2** | = | 42.6 | + | 28.6 |

## Near Field Test Fixture Measurements

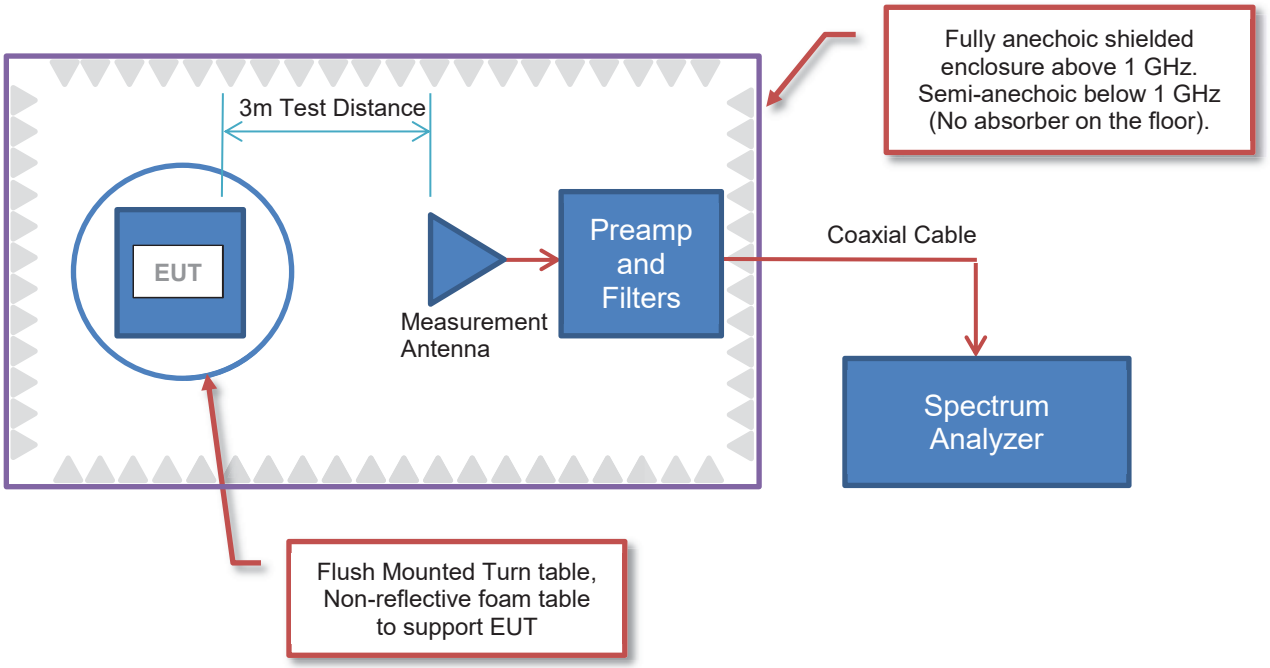



### Sample Calculation (logarithmic units)

| Measured Value | | Measured Level | | Reference Level Offset |
|---|---|---|---|---|
| **71.2** | = | 42.6 | + | 28.6 |

# TEST SETUP BLOCK DIAGRAMS

## Emissions Measurements




## Sample Calculation (logarithmic units)

### Radiated Emissions:

| Measured Level (Amplitude) | | Factor: Antenna Factor | | Factor: Cable Factor | | Factor: Amplifier Gain | | Distance Adjustment Factor | | External Attenuation | | Field Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42.6 | + | 28.6 | + | 3.1 | - | 40.8 | + | 0.0 | + | 0.0 | = | **33.5** |

### Conducted Emissions:

| Measured Level (Amplitude) | | Factor: Transducer Factor | | Factor: Cable Factor | | External Attenuation | | Adjusted Level |
|---|---|---|---|---|---|---|---|---|
| 26.7 | + | 0.3 | + | 0.1 | + | 20.0 | = | **47.1** |

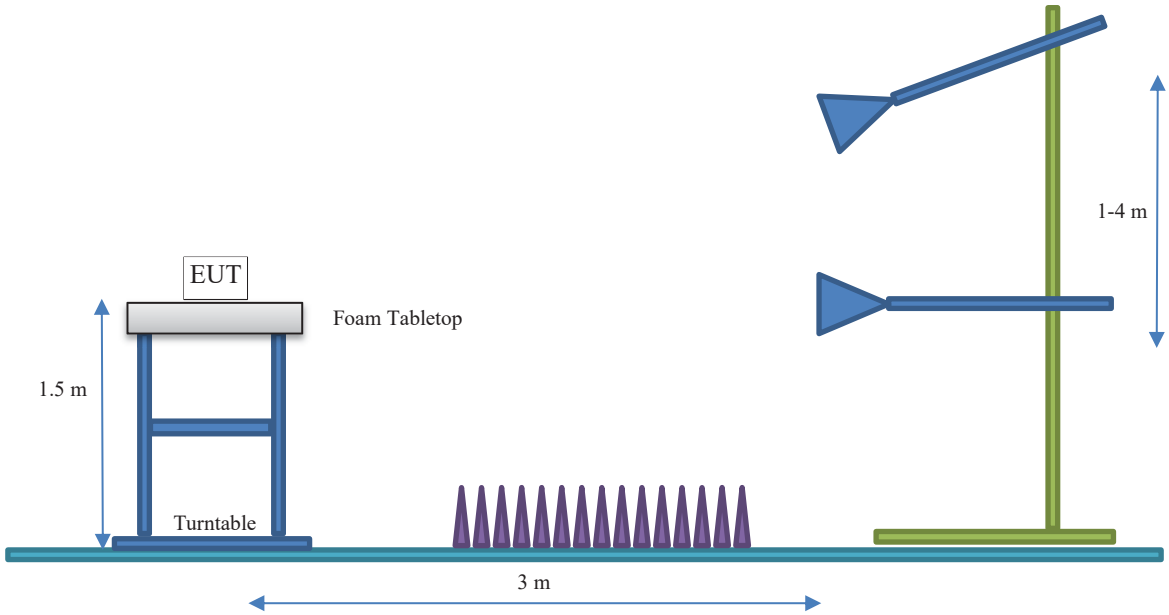
### Radiated Power (ERP/EIRP) – Substitution Method:

| Measured Level into Substitution Antenna (Amplitude dBm) | | Substitution Antenna Factor (dBi) | | EIRP to ERP (if applicable) | | Measured power (dBm ERP/EIRP) |
|---|---|---|---|---|---|---|
| 10.0 | + | 6.0 | - | 2.15 | = | **13.9/16.0** |

# TEST SETUP BLOCK DIAGRAMS

## Bore Sighting (>1GHz)

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.



# PRODUCT DESCRIPTION

## Client and Equipment under Test (EUT) Information

| | |
|---|---|
| **Company Name:** | Nokia Solutions and Networks |
| **Address:** | 3201 Olympus Blvd |
| **City, State, Zip:** | Dallas, TX 75019 |
| **Test Requested By:** | Steve Mitchell |
| **EUT:** | AirScale Base Transceiver Station Remote Radio Head Model AHFIG |
| **First Date of Test:** | June 13, 2023 |
| **Last Date of Test:** | June 14, 2023 |
| **Receipt Date of Samples:** | June 13, 2023 |
| **Equipment Design Stage:** | Production |
| **Equipment Condition:** | No Damage |
| **Purchase Authorization:** | Verified |

## Information Provided by the Party Requesting the Test

**Functional Description of the EUT:**

A permissive change on the original filing is being pursued to add 5G NR (new radio) 25MHz and 30MHz channel bandwidths carriers along with 5G NR multicarrier operation to the AirScale Base Transceiver Station Remote Radio Head Model AHFIG FCC radio certifications. Please refer to the test report on the original certification for details on all required testing.

All conducted RF testing performed for the original certification testing has been repeated using 5G NR 25MHz and 30MHz channel bandwidth carriers for this permissive change per correspondence/guidance from Nemko TCB. The same test methodology used in the original certification testing was used in this permissive change test effort. Tests performed under the change effort include RF power, PSD, CCDF, emission bandwidth (99% and 26 dB down), band edge spurious emissions, and conducted spurious emissions.

The testing was performed on the same hardware version (AHFIG) as the original certification test. The base station and remote radio head software for this testing is an updated release that includes 5G NR 25MHz and 30MHz channel bandwidth carrier support.

The radiated emissions and frequency stability measurements performed in the original certification were not repeated under this effort per TCB guidance. The radiated emission and frequency stability/accuracy results from the original certification had enough margin to preclude requiring additional testing. The same frequency stability/accuracy radio design is the same for all radio technologies/modulation types.

Nokia Solutions and Networks AirScale Base Transceiver Station (BTS) Remote Radio Head (RRH) module, model AHFIG is being developed under this effort. The AHFIG remote radio head is a multi-standard multi-carrier radio module designed to support GSM/EDGE, LTE, LTE Narrow Band Internet of Things (NB IoT) operations (in-band, guard band, standalone) and 5G NR. The scope of testing in this effort is for the addition of 25MHz and 30MHz bandwidths along with 5GNR multicarrier configurations.

The AHFIG RRH has four transmit/four receive antenna ports (4TX/4RX for Band n25 and 4TX/4RX for Band n66). Each antenna port supports 3GPP frequency band n25 (BTS Rx: 1850 to 1915 MHz/BTS TX: 1930 to 1995 MHz) and 3GPP frequency band n66 (BTS Rx: 1710 to 1780 MHz/BTS TX: 2110 to 2200 MHz). The maximum RF output power of the RRH is 480 Watts (80 per port for Band n25 operations and 40 per port for Band n66 operations). The maximum power per single carrier in Band n25 is 80 watts. The maximum power per single carrier in Band n66 is 40 watts. The maximum power per port is 120 watts combined. The TX and RX instantaneous bandwidth cover the full operational RRH bandwidth. Multi-carrier operation is supported.

The RRH can be operated as a 4x4 MIMO, 2x2 MIMO or as non-MIMO for 5G NR FDD. The RRH supports 5, 10, 15, 20, 25 and 30MHz 5G NR bandwidths. The RRH supports four 5G NR downlink modulation types

(QPSK, 16QAM, 64QAM and 256QAM). The 5G NR carriers/modulation types for this testing are setup according to 3GPP TS 38.141-1 Test Models and are NR-FR1-TM 1.1 (QPSK modulation type), NR-FR1-TM 3.2 (16QAM modulation type), NR-FR1-TM 3.1 (64QAM modulation type), and NR-FR1-TM 3.1a (256QAM modulation type).

The RRH has external interfaces including DC power (DC In), ground, transmit/receive (ANT), external alarm (EAC), optical (OPT) and remote electrical tilt (RET). The RRH with applicable installation kit may be pole or wall mounted.

The PCS Band 5G NR channel bandwidths are 5, 10, 15, 20, 25 and 30MHz. The downlink channel numbers are provided below. The 25MHz and 30MHz carrier bandwidths are tested under this effort; the other carrier bandwidths were verified under previous efforts and are provided for thoroughness.

| | Downlink 5G NR NR-ARFCN | Downlink Frequency (MHz) | 5G NR Channel Bandwidth | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz |
| AHFIG Band n25 (Ant 1 through 4) | 386000 | 1930.0 | Band Edge | Band Edge | Band Edge | Band Edge | Band Edge | Band Edge |
| | | | | | | | | |
| | 386500 | 1932.5 | Bottom Ch | | | | | |
| | | | | | | | | |
| | 387000 | 1935.0 | | Bottom Ch | | | | |
| | | | | | | | | |
| | 387500 | 1937.5 | | | Bottom Ch | | | |
| | | | | | | | | |
| | 388000 | 1940.0 | | | | Bottom Ch | | |
| | | | | | | | | |
| | 388500 | 1942.5 | | | | | Bottom Ch | |
| | | | | | | | | |
| | 389000 | 1945.0 | | | | | | Bottom Ch |
| | | | | | | | | |
| | 392500 | 1962.5 | Middle Ch | Middle Ch | Middle Ch | Middle Ch | Middle Ch | Middle Ch |
| | | | | | | | | |
| | 396000 | 1980.0 | | | | | | Top Channel |
| | | | | | | | | |
| | 396500 | 1982.5 | | | | | Top Channel | |
| | | | | | | | | |
| | 397000 | 1985.0 | | | | Top Channel | | |
| | | | | | | | | |
| | 397500 | 1987.5 | | | Top Channel | | | |
| | | | | | | | | |
| | 398000 | 1990.0 | | Top Channel | | | | |
| | | | | | | | | |
| | 398500 | 1992.5 | Top Channel | | | | | |
| | | | | | | | | |
| | 399000 | 1995.0 | Band Edge | Band Edge | Band Edge | Band Edge | Band Edge | Band Edge |

AHFIG Downlink Band Edge 5G NR Band n25 Frequency Channels

The AWS Band 5G NR channel bandwidths are 5, 10, 15, 20, 25 and 30MHz. The downlink channel numbers are provided below. The 25MHz and 30MHz carrier bandwidths are tested under this effort; the other carrier bandwidths were verified under previous efforts and are provided for thoroughness.

| | Downlink 5G NR NR-ARFCN | Downlink Frequency (MHz) | 5G NR Channel Bandwidth | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz |
| AHFIG 5G NR Band n66 (Ant 1 through 4) | 422000 | 2110.0 | Band Edge | Band Edge | Band Edge | Band Edge | Band Edge | Band Edge |
| | | | | | | | | |
| | 422500 | 2112.5 | Bottom Ch | | | | | |
| | | | | | | | | |
| | 423000 | 2115.0 | | Bottom Ch | | | | |
| | | | | | | | | |
| | 423500 | 2117.5 | | | Bottom Ch | | | |
| | | | | | | | | |
| | 424000 | 2120.0 | | | | Bottom Ch | | |
| | | | | | | | | |
| | 424500 | 2122.5 | | | | | Bottom Ch | |
| | | | | | | | | |
| | 425000 | 2125.0 | | | | | | Bottom Ch |
| | | | | | | | | |
| | 431000 | 2155.0 | Middle Ch | Middle Ch | Middle Ch | Middle Ch | Middle Ch | Middle Ch |
| | | | | | | | | |
| | 437000 | 2185.0 | | | | | | Top Channel |
| | | | | | | | | |
| | 437500 | 2187.5 | | | | | Top Channel | |
| | | | | | | | | |
| | 438000 | 2190.0 | | | | Top Channel | | |
| | | | | | | | | |
| | 438500 | 2192.5 | | | Top Channel | | | |
| | | | | | | | | |
| | 439000 | 2195.0 | | Top Channel | | | | |
| | | | | | | | | |
| | 439500 | 2197.5 | Top Channel | | | | | |
| | | | | | | | | |
| | 440000 | 2200.0 | Band Edge | Band Edge | Band Edge | Band Edge | Band Edge | Band Edge |

AHFIG Downlink Band Edge 5G NR Band n66 Frequency Channels

# PRODUCT DESCRIPTION

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2018-07-17

**AHFIG Connector Layout**


**EUT External Interfaces**

| Name | Qty | Connector Type | Purpose (and Description) |
|---|---|---|---|
| DC In | 1 | Screw Terminal | 2-pole Power Input Terminal |
| GND | 1 | Screw lug (2xM5/1xM8) | Ground |
| ANT | 4 | 4.3-10 | RF signal for Transmitter/Receiver (50 Ohm) |
| Unit | 1 | LED | Unit Status LED |
| EAC | 1 | MDR26 | External Alarm Interface (4 alarms) |
| OPT | 2 | SFP+ cage | Optical CPRI Interface up to 10 Gps. |
| RET | 1 | 8-pin circular connector conforming to IEC 60130-9 – Ed.3.0 | AISG 2.0 to external devices |
| Fan | 1 | Molex Microfit | Power for RRH Fan. Located on the side of RRH. |

**Testing Objective:**

A permissive change on the original filing is being pursued to add 5G NR (new radio) 25MHz and 30MHz channel bandwidth carrier operations along with 5GNR multicarrier functionality to the Nokia Solutions and Networks AirScale Base Transceiver Station (BTS) Remote Radio Head (RRH) model AHFIG FCC radio certifications.

# CONFIGURATIONS

## Configuration NOKI0053-1

| Software/Firmware Running during test | |
|---|---|
| **Description** | **Version** |
| Radio Module Software | RF.FRM5.TRUNK.20230523.022 |
| BTS Software Version: 23r3 | SBTS23R3_ENB_9999_230525_000008 |

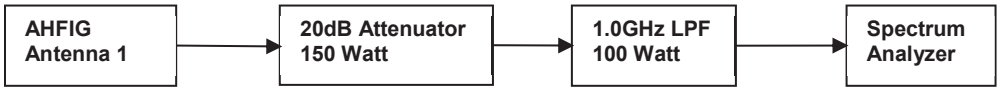
| Equipment being tested (include Peripherals) | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| AMIA (BTS System Module) | Nokia Solutions and Networks | 473098.204 | UK222201001 |
| ASIB (BTS System Module) | Nokia Solutions and Networks | 473764A.102 | L1224802943 |
| ABIO (BTS System Module) | Nokia Solutions and Networks | 475266A.103 | L1220100015 |
| ABIO (BTS System Module) | Nokia Solutions and Networks | 475266A.103 | L1205105881 |
| AHFIG (Radio Module Model) | Nokia Solutions and Networks | 475125A.101 | K9191322351 |
| Low Pass Filter 1.0GHz/100W | Microwave Circuits,Inc. | L1G006G1 | SN3971-01 |
| Attenuator 150W/20dB | AeroflexWeinschel | 66-20-33 | BZ1162 |
| SFP+ 9.8G,300M,850NM | WTD | RTXM228-610 | FR164007485 |
| SFP+ 9.8G,300M,850NM | JDSU | JSH-62S1DA1-100 | CE25LA01M |
| SFP+ 9.8G,300M,850NM | WTD | RTXM228-610 | FR162704823 |
| SFP+ 9.8G,300M,850NM | JDSU | JSH-62S1DA1-100 | CE50LC1ZH |
| HP ProBook T490 | HP | 20N3 | PF26RVZ0 |
| Keysight- DC System power supply | HP | N8757A | US21D5054S |
| FPAC (DC-pwr supply) | Nokia | 472438A.101 | G7111007146 |
| 1 Meter RF cable | Huber+suhner | SUCOFLEX 104 | SN 551432 /4 |
| 6 Meter RF cable | Huber+suhner | SUCOFLEX 106 | SN 528836 /6 |
| 250W -50ohm -Terminating Load | API Weinschel inc | 1433-3-LIM | TC863 |
| 250W -50ohm -Terminating Load | API Weinschel inc | 1433-3-LIM | TC864 |
| 250W -50ohm -Terminating Load | API Weinschel inc | 1433-3-LIM | TC865 |
| Fiber Optic cable 25m | Occfiber.com | BX002DAIS | 334280 |
| CAT5e data cable | BELKIN | #R7J304 | E178882 |
| CAT5e data cable | LEONI L | 64867m | 146180 |
| FYGB GPS receiver | Nokia | 472748A | 71231431 |
| Cat-5e cable | CSA | LL73189 | E151955 |
| 2 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297387 |
| 2 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297386 |
| 2 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297388 |

| Cables (Peripheral) | | | | | |
|---|---|---|---|---|---|
| **Description** | **Shield (Y/N)** | **Length (m)** | **Ferrite (Y/N)** | **Connection 1** | **Connection 2** |
| Fiber Optic cable 2 pc | N | 2 meters | N | ASIB | AHFIG |
| Cat-5e cable (CSA) | Y | 100 meters | N | ASIB | FYGB GPS receiver |
| Cat-5e cable | Y | 25 meters | N | ASIB | WebEM- PC |
| Times Microwave Systems | Y | 2 meters | N | EUT [RRH] Ant ports 2, 3, 4 | 40MHz/ 250W - 50ohm -Load |

# CONFIGURATIONS

| Cables | | | | | |
|---|---|---|---|---|---|
| **Description** | **Shield (Y/N)** | **Length (m)** | **Ferrite (Y/N)** | **Connection 1** | **Connection 2** |
| HS-SUCOFLEX_106 | Y | 6 meters | N | EUT [AHFIG] Ant port #1 | Attenuator 150W/20dB [BZ1165] |
| Attenuator 150W/20dB [BZ1165] | N | NA | N | RF cable HS-SUCOFLEX_106 | LowPass filter 1.0GHz/100W |
| Low Pass Filter 1.0G/100W | N | NA | N | Attenuator 150W/20dB [BZ21165] | RF cable HS-SUCOFLEX_104 |
| HS-SUCOFLEX_104 | Y | 1 meter | N | Low Pass Filter 1.0GHz/100W | Analyzer |

**RF Test Setup Diagram:**



# CONFIGURATIONS

## Configuration NOKI0053-2

| Software/Firmware Running during test | |
|---|---|
| **Description** | **Version** |
| Radio Module Software | RF.FRM5.TRUNK.20230523.022 |
| BTS Software Version: 23r3 | SBTS23R3_ENB_9999_230525_000008 |

| Equipment being tested (include Peripherals) | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| AMIA (BTS System Module) | Nokia Solutions and Networks | 473098.204 | UK222201001 |
| ASIB (BTS System Module) | Nokia Solutions and Networks | 473764A.102 | L1224802943 |
| ABIO (BTS System Module) | Nokia Solutions and Networks | 475266A.103 | L1220100015 |
| ABIO (BTS System Module) | Nokia Solutions and Networks | 475266A.103 | L1205105881 |
| Attenuator 250W/40dB | AeroflexWeinschel | 58-40-43 | UN619 |
| SFP+ 9.8G,300M,850NM | WTD | RTXM228-610 | FR164007485 |
| SFP+ 9.8G,300M,850NM | JDSU | JSH-62S1DA1-100 | CE25LA01M |
| SFP+ 9.8G,300M,850NM | WTD | RTXM228-610 | FR162704823 |
| SFP+ 9.8G,300M,850NM | JDSU | JSH-62S1DA1-100 | CE50LC1ZH |
| HP ProBook T490 | HP | 20N3 | PF26RVZ0 |
| Keysight- DC System power supply | HP | N8757A | US21D5054S |
| FPAC (DC-pwr supply) | Nokia | 472438A.101 | G7111007146 |
| 1 Meter RF cable | Huber+suhner | SUCOFLEX 104 | SN 551432 /4 |
| 6 Meter RF cable | Huber+suhner | SUCOFLEX 106 | SN 528836 /6 |
| 250W -50ohm -Terminating Load | API Weinschel inc | 1433-3-LIM | TC863 |
| 250W -50ohm -Terminating Load | API Weinschel inc | 1433-3-LIM | TC864 |
| 250W -50ohm -Terminating Load | API Weinschel inc | 1433-3-LIM | TC865 |
| Fiber Optic cable 25m | Occfiber.com | BX002DAIS | 334280 |
| CAT5e data cable | BELKIN | #R7J304 | E178882 |
| CAT5e data cable | LEONI L | 64867m | 146180 |
| FYGB GPS receiver | Nokia | 472748A | 71231431 |
| Cat-5e cable | CSA | LL73189 | E151955 |
| 2 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297387 |
| 2 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297386 |
| 2 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297388 |

| Cables (Peripheral) | | | | | |
|---|---|---|---|---|---|
| **Description** | **Shield (Y/N)** | **Length (m)** | **Ferrite (Y/N)** | **Connection 1** | **Connection 2** |
| Fiber Optic cable 2 pc | N | 25 meters | N | ASIB | AHFIG |
| Cat-5e cable (CSA) | Y | 100 meters | N | ASIB | FYGB GPS receiver |
| Cat-5e cable | Y | 25 meters | N | ASIB | WebEM- PC |
| Times Microwave Systems | Y | 2 meters | N | EUT [RRH] Ant ports 2, 3, 4 | 250W -50ohm - Load |

# CONFIGURATIONS

| Cables | | | | | |
|---|---|---|---|---|---|
| **Description** | **Shield (Y/N)** | **Length (m)** | **Ferrite (Y/N)** | **Connection 1** | **Connection 2** |
| HS-SUCOFLEX_106 | Y | 6 meters | N | EUT [AHFIG] Ant port #1 | Attenuator 250W/40dB [UN619] |
| Attenuator 250W/40dB [UN619] | N | NA | N | RF cable HS-SUCOFLEX_106 | HS-SUCOFLEX_104 |
| HS-SUCOFLEX_104 | Y | 1 meter | N | Attenuator 250W/40dB [UN619] | Analyzer |

**RF Test Setup Diagram:**

# CONFIGURATIONS

## Configuration NOKI0053-3

| Software/Firmware Running during test | |
|---|---|
| **Description** | **Version** |
| Radio Module Software | RF.FRM5.TRUNK.20230523.022 |
| BTS Software Version: 23r3 | SBTS23R3_ENB_9999_230525_000008 |

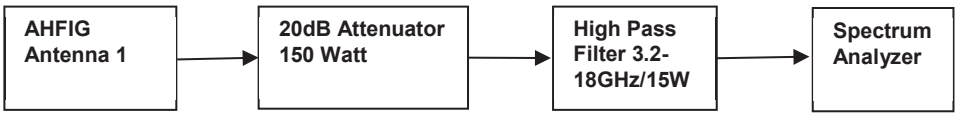
| Equipment being tested (include Peripherals) | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| AMIA (BTS System Module) | Nokia Solutions and Networks | 473098.204 | UK222201001 |
| ASIB (BTS System Module) | Nokia Solutions and Networks | 473764A.102 | L1224802943 |
| ABIO (BTS System Module) | Nokia Solutions and Networks | 475266A.103 | L1220100015 |
| ABIO (BTS System Module) | Nokia Solutions and Networks | 475266A.103 | L1205105881 |
| High Pass Filter 3.2-18GHz/15W | RF Lambda | RHPF23G03G18 | 20121400045 |
| Attenuator 150W/20dB | AeroflexWeinschel | 66-20-33 | BZ2075 |
| SFP+ 9.8G,300M,850NM | WTD | RTXM228-610 | FR164007485 |
| SFP+ 9.8G,300M,850NM | JDSU | JSH-62S1DA1-100 | CE25LA01M |
| SFP+ 9.8G,300M,850NM | WTD | RTXM228-610 | FR162704823 |
| SFP+ 9.8G,300M,850NM | JDSU | JSH-62S1DA1-100 | CE50LC1ZH |
| HP ProBook T490 | HP | 20N3 | PF26RVZ0 |
| Keysight- DC System power supply | HP | N8757A | US21D5054S |
| FPAC (DC-pwr supply) | Nokia | 472438A.101 | G7111007146 |
| 1 Meter RF cable | Huber+suhner | SUCOFLEX 104 | SN 551432 /4 |
| 6 Meter RF cable | Huber+suhner | SUCOFLEX 106 | SN 528836 /6 |
| 250W -50ohm -Terminating Load | API Weinschel inc | 1433-3-LIM | TC863 |
| 250W -50ohm -Terminating Load | API Weinschel inc | 1433-3-LIM | TC864 |
| 250W -50ohm -Terminating Load | API Weinschel inc | 1433-3-LIM | TC865 |
| Fiber Optic cable 25m | Occfiber.com | BX002DAIS | 334280 |
| CAT5e data cable | BELKIN | #R7J304 | E178882 |
| CAT5e data cable | LEONI L | 64867m | 146180 |
| FYGB GPS receiver | Nokia | 472748A | 71231431 |
| Cat-5e cable | CSA | LL73189 | E151955 |
| 2 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297387 |
| 2 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297386 |
| 2 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297388 |

| Cables (Peripheral) | | | | | |
|---|---|---|---|---|---|
| **Description** | **Shield (Y/N)** | **Length (m)** | **Ferrite (Y/N)** | **Connection 1** | **Connection 2** |
| Fiber Optic cable 2 pc | N | 25 meters | N | ASIB | AHFIG |
| Cat-5e cable (CSA) | Y | 100 meters | N | ASIB | FYGB GPS receiver |
| Cat-5e cable | Y | 25 meters | N | ASIB | WebEM- PC |
| Times Microwave Systems | Y | 2 meters | N | EUT [RRH] Ant ports 2, 3, 4 | 250W -50ohm - Load |

# CONFIGURATIONS

| Cables | | | | | |
|---|---|---|---|---|---|
| **Description** | **Shield (Y/N)** | **Length (m)** | **Ferrite (Y/N)** | **Connection 1** | **Connection 2** |
| HS-SUCOFLEX_106 | Y | 6 meters | N | EUT [RRH] RF port #1 | Attenuator 150W/20dB [BZ2075] |
| Attenuator 150W/20dB [BZ2075] | N | NA | N | HS-SUCOFLEX_106 | High Pass Filter 3.2-18GHz/15W |
| High Pass Filter 3.2-18GHz/15W | N | NA | N | Attenuator 150W/20dB [BZ1165] | RF cable HS-SUCOFLEX_104 |
| HS-SUCOFLEX_104 | Y | 1 meter | N | High Pass Filter 3.2-18GHz/15W | Analyzer |

**RF Test Setup Diagram:**



# CONFIGURATIONS

## Configuration NOKI0053-4

| Software/Firmware Running during test | |
|---|---|
| **Description** | **Version** |
| Radio Module Software | RF.FRM5.TRUNK.20230523.022 |
| BTS Software Version: 23r3 | SBTS23R3_ENB_9999_230525_000008 |

| Equipment being tested (include Peripherals) | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| AMIA (BTS System Module) | Nokia Solutions and Networks | 473098.204 | UK222201001 |
| ASIB (BTS System Module) | Nokia Solutions and Networks | 473764A.102 | L1224802943 |
| ABIO (BTS System Module) | Nokia Solutions and Networks | 475266A.103 | L1220100015 |
| ABIO (BTS System Module) | Nokia Solutions and Networks | 475266A.103 | L1205105881 |
| High Pass Filter 8-40GHz/15Watt | RF-Lambada | RHPF23G08G40 | 1710200018 |
| Attenuator 50W/30dB | Narda | 776B-30 | 776B-30 |
| Attenuator 100W/3dB | AeroflexWeinschel | 47-3-33 | CG5493 |
| SFP+ 9.8G,300M,850NM | WTD | RTXM228-610 | FR164007485 |
| SFP+ 9.8G,300M,850NM | JDSU | JSH-62S1DA1-100 | CE25LA01M |
| SFP+ 9.8G,300M,850NM | WTD | RTXM228-610 | FR162704823 |
| SFP+ 9.8G,300M,850NM | JDSU | JSH-62S1DA1-100 | CE50LC1ZH |
| HP ProBook T490 | HP | 20N3 | PF26RVZ0 |
| Keysight- DC System power supply | HP | N8757A | US21D5054S |
| FPAC (DC-pwr supply) | Nokia | 472438A.101 | G7111007146 |
| 1 Meter RF cable | Huber+suhner | SUCOFLEX 104 | SN 551432 /4 |
| 6 Meter RF cable | Huber+suhner | SUCOFLEX 106 | SN 528836 /6 |
| 250W -50ohm -Terminating Load | API Weinschel inc | 1433-3-LIM | TC863 |
| 250W -50ohm -Terminating Load | API Weinschel inc | 1433-3-LIM | TC864 |
| 250W -50ohm -Terminating Load | API Weinschel inc | 1433-3-LIM | TC865 |
| Fiber Optic cable 25m | Occfiber.com | BX002DAIS | 334280 |
| CAT5e data cable | BELKIN | #R7J304 | E178882 |
| CAT5e data cable | LEONI L | 64867m | 146180 |
| FYGB GPS receiver | Nokia | 472748A | 71231431 |
| Cat-5e cable | CSA | LL73189 | E151955 |
| 2 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297387 |
| 2 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297386 |
| 2 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297388 |

| Cables (Peripheral) | | | | | |
|---|---|---|---|---|---|
| **Description** | **Shield (Y/N)** | **Length (m)** | **Ferrite (Y/N)** | **Connection 1** | **Connection 2** |
| Fiber Optic cable 2 pc | N | 25 meters | N | ASIB | AHFIG |
| Cat-5e cable (CSA) | Y | 100 meters | N | ASIB | FYGB GPS receiver |
| Cat-5e cable | Y | 25 meters | N | ASIB | WebEM- PC |
| Times Microwave Systems | Y | 2 meters | N | EUT [RRH] Ant ports 2, 3, 4 | 250W -50ohm - Load |

# CONFIGURATIONS

| Cables | | | | | |
|---|---|---|---|---|---|
| **Description** | **Shield (Y/N)** | **Length (m)** | **Ferrite (Y/N)** | **Connection 1** | **Connection 2** |
| HS-SUCOFLEX_106 | Y | 6 meters | N | EUT [AHFIG] Ant port #1 | Attenuator 100W/3dB |
| Attenuator 100W/3dB | N | NA | N | RF cable HS-SUCOFLEX_106 | Attenuator 50W/30dB |
| Attenuator 50W/30dB | N | NA | N | Attenuator 100W/3dB | High Pass Filter 8-40GHz |
| High Pass Filter 8-40GHz/15W | N | NA | N | Attenuator 50W/30dB | RF cable HS-SUCOFLEX_104 |
| HS-SUCOFLEX_104 | Y | 1 meter | N | High Pass Filter 8-40GHz/15W | Analyzer |

**RF Test Setup Diagram:**

# MODIFICATIONS

## Equipment Modifications

| Item | Date | Test | Modification | Note | Disposition of EUT |
|---|---|---|---|---|---|
| 1 | 2023-06-13 | Occupied Bandwidth | Tested as delivered to test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Element following the test. |
| 2 | 2023-06-13 | Power Spectral Density | Tested as delivered to test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Element following the test. |
| 3 | 2023-06-14 | Band Edge Compliance | Tested as delivered to test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Element following the test. |
| 4 | 2023-06-14 | Average Power | Tested as delivered to test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Element following the test. |
| 5 | 2023-06-14 | Peak to Average Power (PAPR)CCDF | Tested as delivered to test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Element following the test. |
| 6 | 2023-06-14 | Spurious Conducted Emissions | Tested as delivered to test Station. | No EMI suppression devices were added or modified during this test. | Scheduled testing was completed. |

# OCCUPIED BANDWIDTH - n25

element

XMit 2023.02.14.0

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 |
|---|---|---|---|---|---|
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2023-02-09 | 2024-02-09 |
| Block - DC | Fairview Microwave | SD3235-2148 | ANF | 2023-05-24 | 2024-05-24 |

**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 Dectector was used
- Trace max hold was used

RF conducted emissions was performed only on one port. The testing was performed on the same version of hardware (AHFIG) as the original certification test. The AHFIG antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in original certification testing) and antenna port 1 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 24.238(b) defines the 26dB emission bandwidth requirement.

RSS GEN Section 6.6 defines the 99% emission bandwidth requirement

PCS (n25) Band for NR25 Bandwidth

| FCC Emission Designators for Band n25 (1930MHz to 1995MHz) | | | | | |
|---|---|---|---|---|---|
| Ch BW | Radio Channel | 5G-NR: QPSK | 5G-NR: 16QAM | 5G-NR: 64QAM | 5G-NR: 256QAM |
| | | FCC | FCC | FCC | FCC |
| 25MHz | Low | | | | 24M9G7W |
| | Mid | 24M9G7W | 24M9G7W | 24M9G7W | 24M8G7W |
| | High | | | | 24M9G7W |
| Note: FCC emission designators are based on 26dB emission bandwidth. | | | | | |

PCS (n25) Band for NR30 Bandwidth

| FCC Emission Designators for Band n25 (1930MHz to 1995MHz) | | | | | |
|---|---|---|---|---|---|
| Ch BW | Radio Channel | 5G-NR: QPSK | 5G-NR: 16QAM | 5G-NR: 64QAM | 5G-NR: 256QAM |
| | | FCC | FCC | FCC | FCC |
| 30MHz | Low | | | | 29M9G7W |
| | Mid | 29M9G7W | 29M9G7W | 29M9G7W | 29M9G7W |
| | High | | | | 29M9G7W |
| Note: FCC emission designators are based on 26dB emission bandwidth. | | | | | |

# OCCUPIED BANDWIDTH - n25

TbiTx 2022.05.02.0 XMit 2023.02.14.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | AHFIG (FCC C2PC) | | | Work Order: | NOKI0053 |
| Serial Number: | See Configuration | | | Date: | 06/13/2023 |
| Customer: | Nokia Solutions and Networks | | | Temperature: | 22.1°C |
| Attendees: | John Rattanavong, Mitchell Hill | | | Humidity: | 56.8% |
| Project: | None | | | Barometric Pres.: | 1010 mbar |
| Tested by: | Brandon Hobbs | Power: | 54 VDC | Job Site: | TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 24E:2023 | ANSI C63.26:2015 |
| | |

**COMMENTS**

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. Band n25 carriers are enabled at maximum power (80 watts/carrier).

**DEVIATIONS FROM TEST STANDARD**

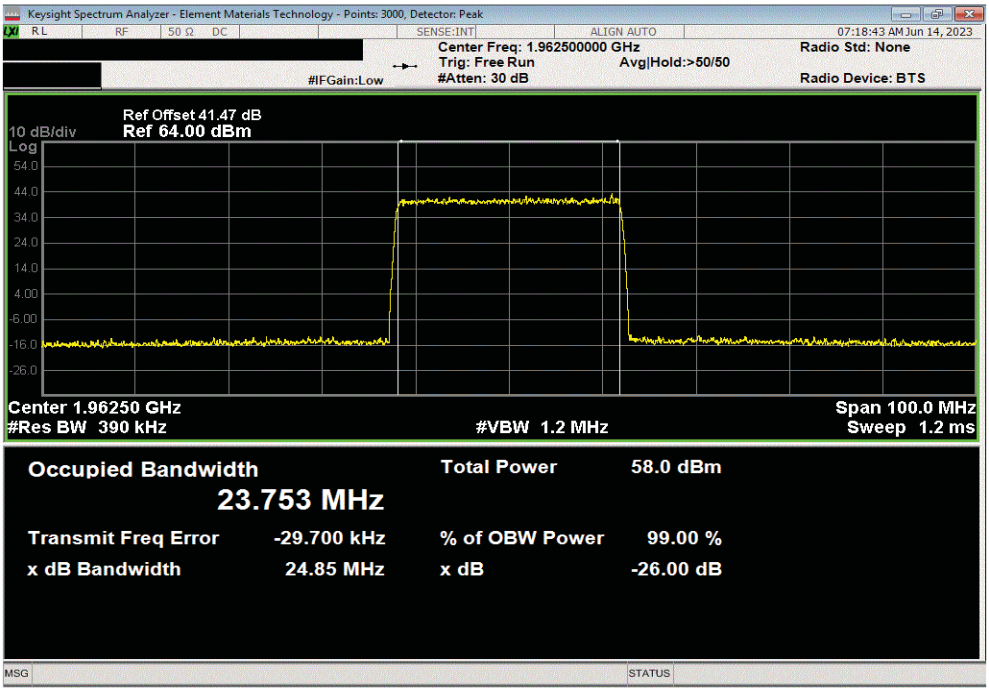
None

| Configuration # | NOKI0053-2 | Signature |
|---|---|---|

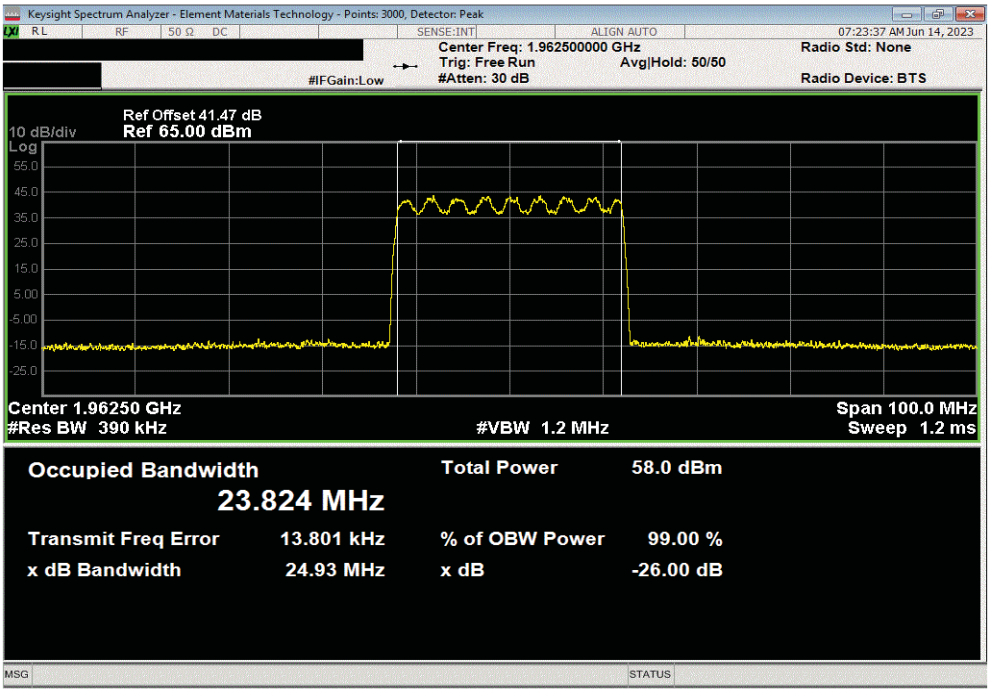
| | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
|---|---|---|---|---|
| Band n25 1930 MHz - 1995 MHz, 5G NR | | | | |
| Port 1 | | | | |
| 25 MHz Bandwidth | | | | |
| QPSK Modulation | | | | |
| Mid Channel 1962.5 MHz | 23.8 | 24.9 | Within Band | Pass |
| 16-QAM Modulation | | | | |
| Mid Channel 1962.5 MHz | 23.8 | 24.9 | Within Band | Pass |
| 64-QAM Modulation | | | | |
| Mid Channel 1962.5 MHz | 23.8 | 24.9 | Within Band | Pass |
| 256-QAM Modulation | | | | |
| Low Channel 1942.5 MHz | 23.8 | 24.9 | Within Band | Pass |
| Mid Channel 1962.5 MHz | 23.7 | 24.8 | Within Band | Pass |
| High Channel 1982.5 MHz | 23.8 | 24.9 | Within Band | Pass |
| 30 MHz Bandwidth | | | | |
| QPSK Modulation | | | | |
| Mid Channel 1962.5 MHz | 28.6 | 29.9 | Within Band | Pass |
| 16-QAM Modulation | | | | |
| Mid Channel 1962.5 MHz | 28.5 | 29.9 | Within Band | Pass |
| 64-QAM Modulation | | | | |
| Mid Channel 1962.5 MHz | 28.5 | 29.9 | Within Band | Pass |
| 256-QAM Modulation | | | | |
| Low Channel 1945.0 MHz | 28.6 | 29.9 | Within Band | Pass |
| Mid Channel 1962.5 MHz | 28.6 | 29.9 | Within Band | Pass |
| High Channel 1980.0 MHz | 28.6 | 29.9 | Within Band | Pass |

# OCCUPIED BANDWIDTH - n25

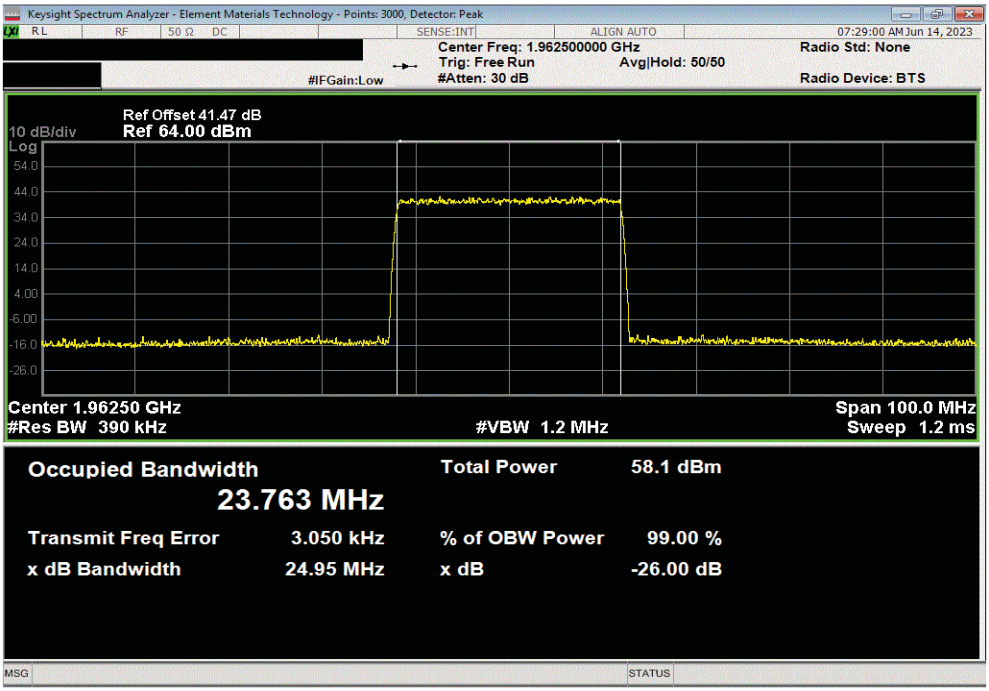
| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, QPSK Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 23.753 | 24.855 | Within Band | Pass |



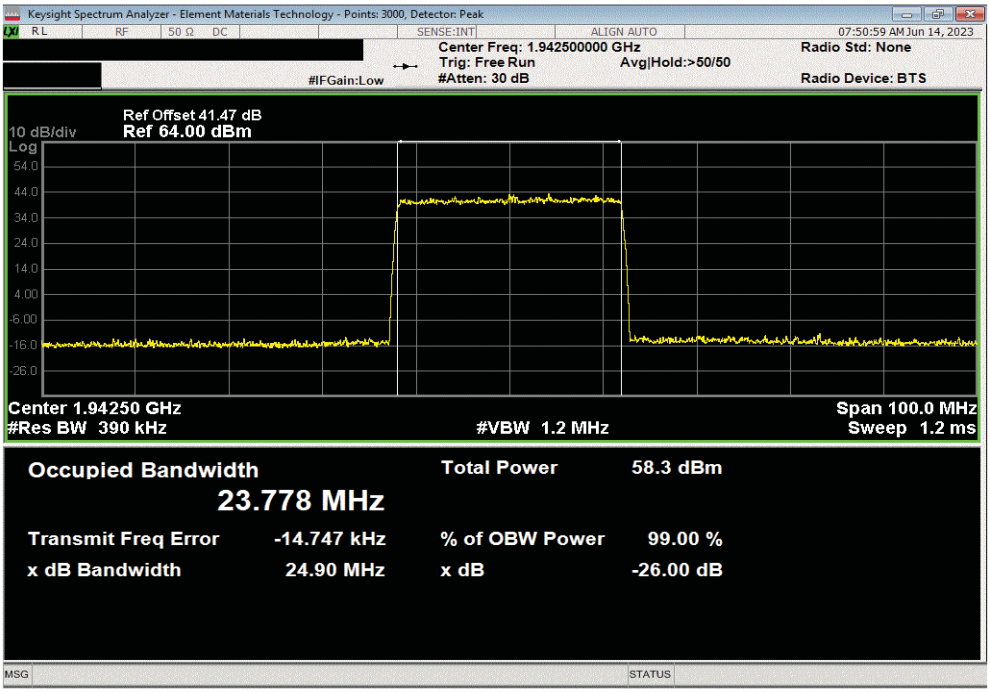

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 16-QAM Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 23.824 | 24.935 | Within Band | Pass |



| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 64-QAM Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 23.763 | 24.946 | Within Band | Pass |



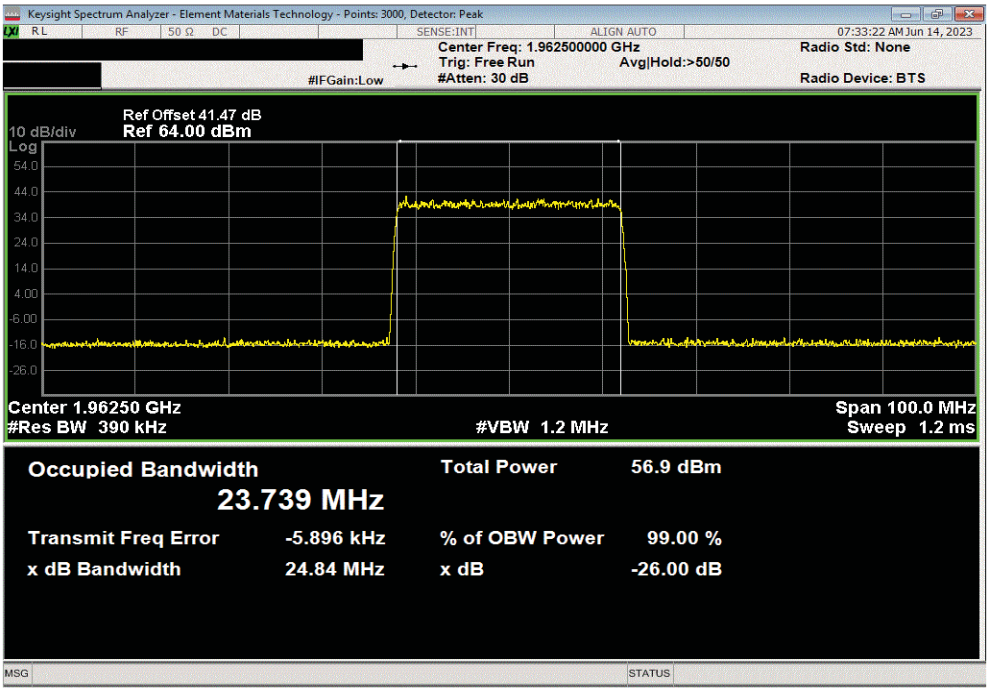

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, Low Channel 1942.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 23.778 | 24.899 | Within Band | Pass |



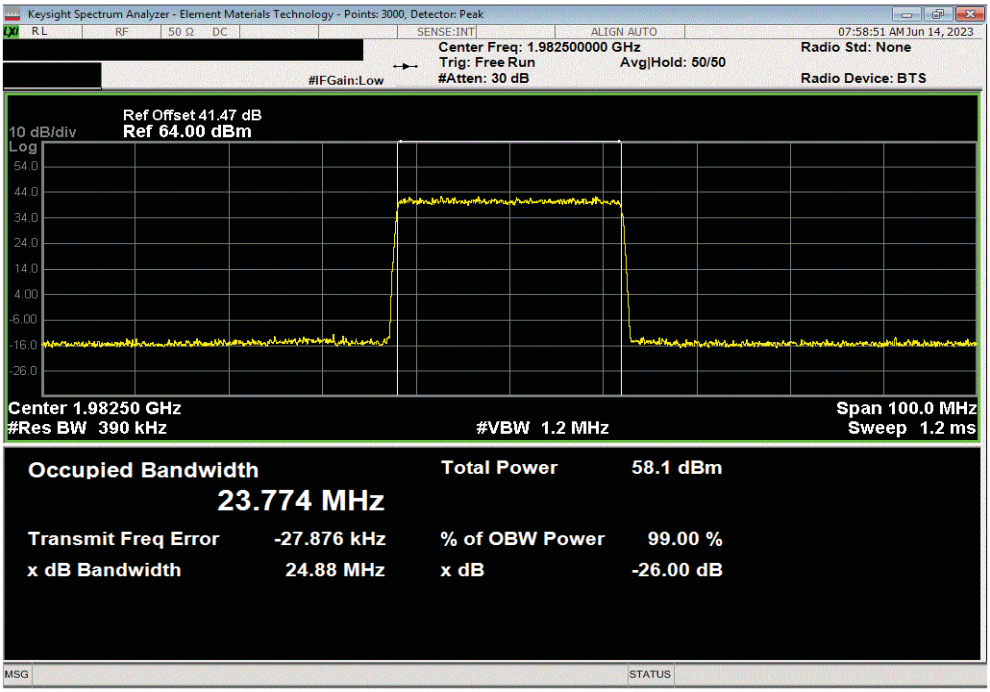
# OCCUPIED BANDWIDTH - n25



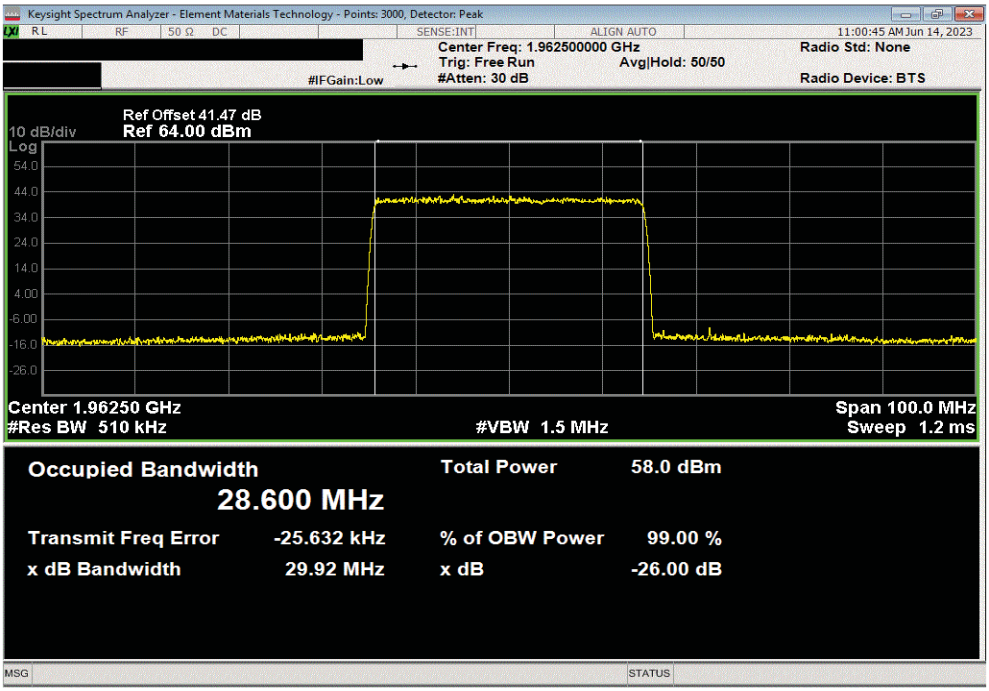
| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 23.739 | 24.841 | Within Band | Pass |



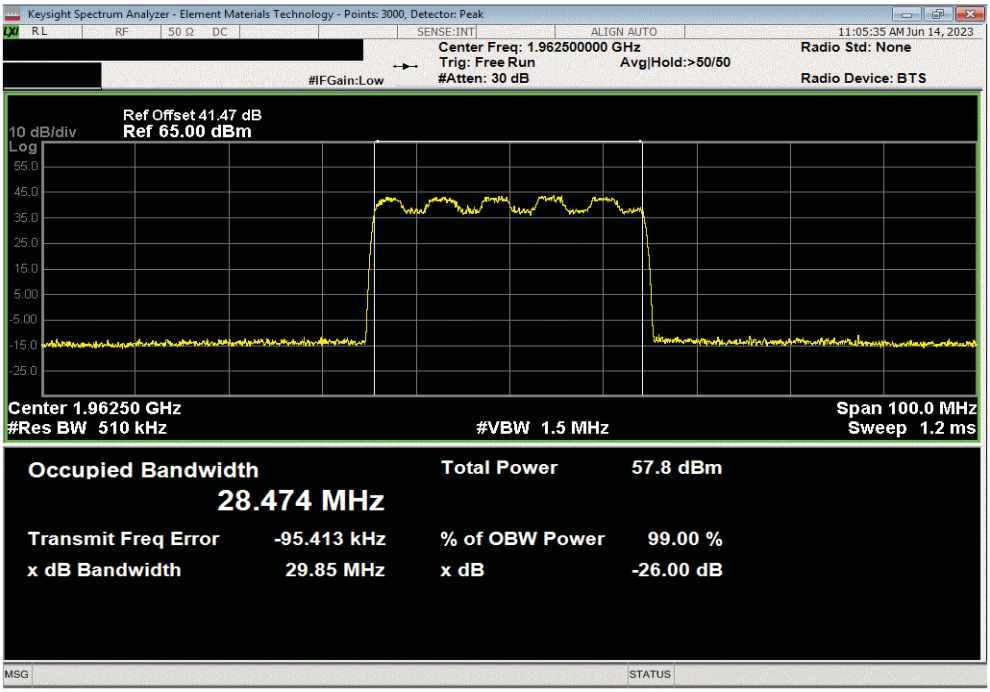

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, High Channel 1982.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 23.774 | 24.881 | Within Band | Pass |



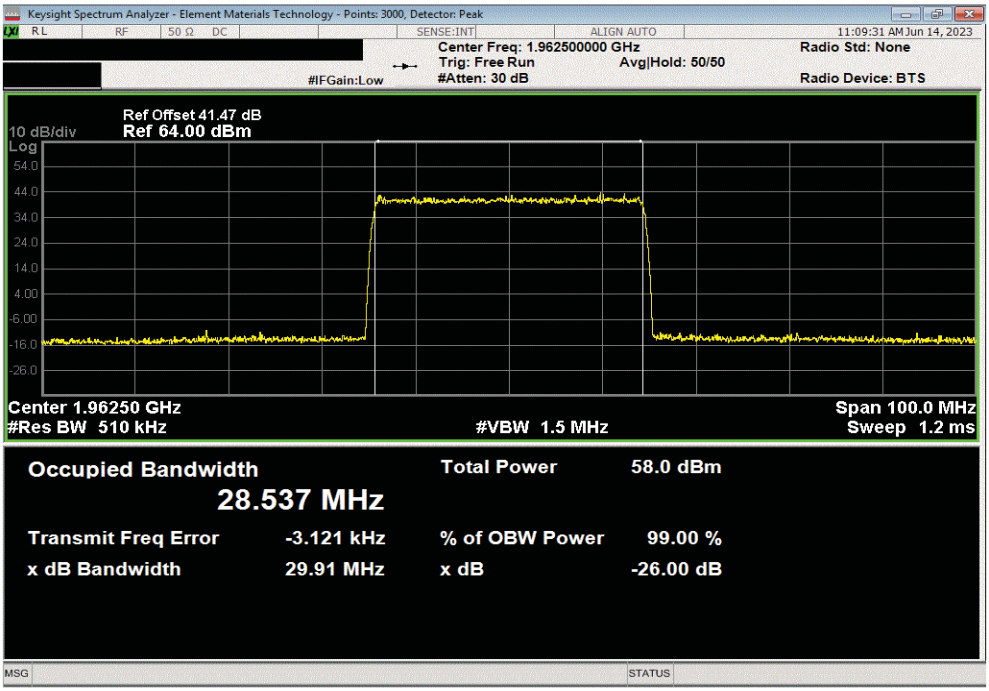
| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, QPSK Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 28.6 | 29.924 | Within Band | Pass |



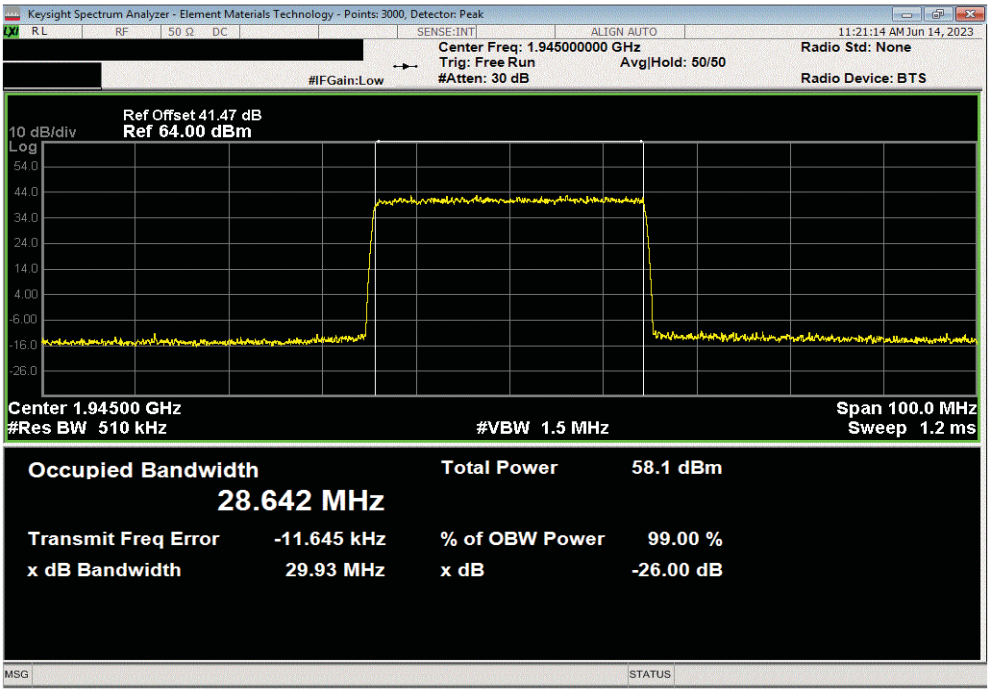

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 16-QAM Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 28.474 | 29.852 | Within Band | Pass |



| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 64-QAM Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 28.537 | 29.909 | Within Band | Pass |



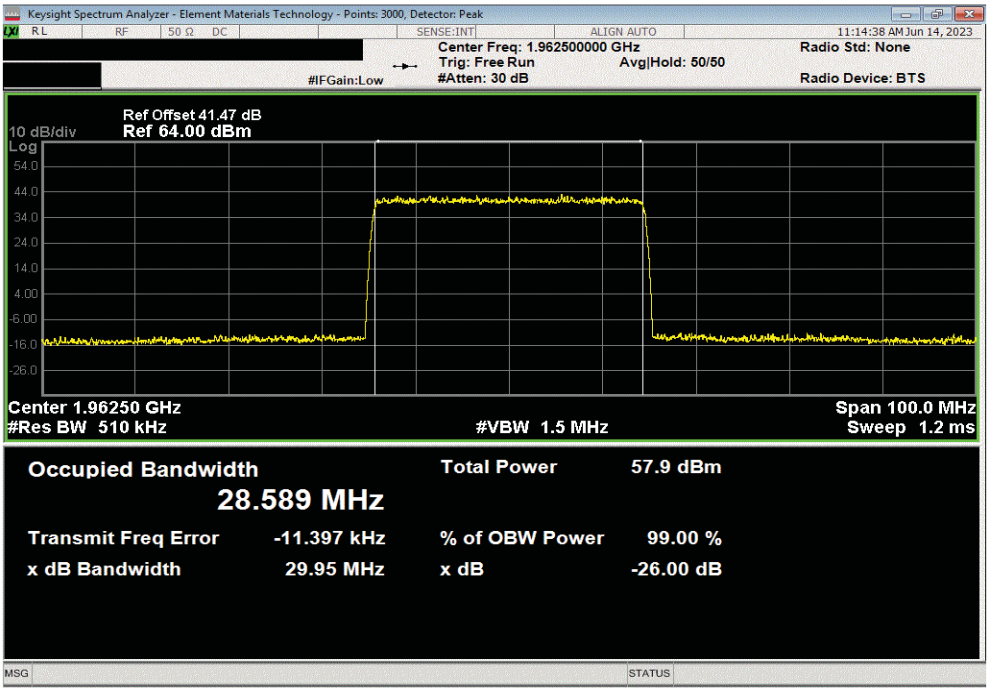

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, Low Channel 1945.0 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 28.642 | 29.927 | Within Band | Pass |



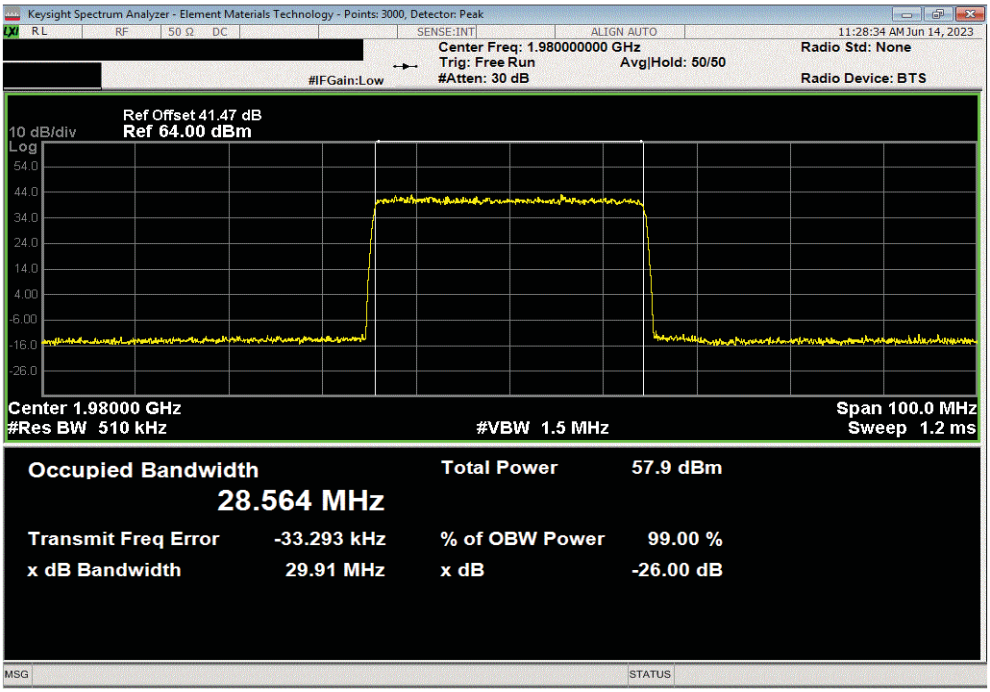
# OCCUPIED BANDWIDTH - n25



| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 28.589 | 29.947 | Within Band | Pass |




| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, High Channel 1980.0 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 28.564 | 29.912 | Within Band | Pass |



# OCCUPIED BANDWIDTH - n66

XMit 2023.02.14.0

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 |
|---|---|---|---|---|---|
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2023-02-09 | 2024-02-09 |
| Block - DC | Fairview Microwave | SD3235-2148 | ANF | 2023-05-24 | 2024-05-24 |

**TEST DESCRIPTION**

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

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

RF conducted emissions was performed only on one port. The testing was performed on the same version of hardware (AHFIG) as the original certification test. The AHFIG antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in original certification testing) and antenna port 1 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(h)(3) defines he 26dB emission bandwidth requirement.

RSS GEN Section 6.6 defines the 99% emission bandwidth requirement

AWS (n66) Band for NR25 Bandwidth

| FCC Emission Designators for Band n66 (2110MHz to 2200MHz) | | | | | |
|---|---|---|---|---|---|
| Ch BW | Radio Channel | 5G-NR: QPSK | 5G-NR: 16QAM | 5G-NR: 64QAM | 5G-NR: 256QAM |
| | | FCC | FCC | FCC | FCC |
| 25MHz | Low | | | | 24M9G7W |
| | Mid | 24M9G7W | 24M9G7W | 24M9G7W | 24M9G7W |
| | High | | | | 24M9G7W |
| Note: FCC emission designators are based on 26dB emission bandwidth. | | | | | |

AWS (n66) Band for NR30 Bandwidth

| FCC Emission Designators for Band n66 (2110MHz to 2200MHz) | | | | | |
|---|---|---|---|---|---|
| Ch BW | Radio Channel | 5G-NR: QPSK | 5G-NR: 16QAM | 5G-NR: 64QAM | 5G-NR: 256QAM |
| | | FCC | FCC | FCC | FCC |
| 30MHz | Low | | | | 30M0G7W |
| | Mid | 29M9G7W | 29M8G7W | 29M9G7W | 30M0G7W |
| | High | | | | 29M9G7W |
| Note: FCC emission designators are based on 26dB emission bandwidth. | | | | | |

# OCCUPIED BANDWIDTH - n66

TbtTx 2022.05.02.0 XMit 2023.02.14.0

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | AHFIG (FCC C2PC) | | | **Work Order:** | NOKI0053 |
| **Serial Number:** | See Configuration | | | **Date:** | 06/13/2023 |
| **Customer:** | Nokia Solutions and Networks | | | **Temperature:** | 20.8°C |
| **Attendees:** | John Rattanavong, Mitchell Hill | | | **Humidity:** | 62% |
| **Project:** | None | | | **Barometric Pres.:** | 1010 mbar |
| **Tested by:** | Brandon Hobbs | **Power:** | 54 VDC | **Job Site:** | TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 27:2023 | ANSI C63.26:2015 |

**COMMENTS**

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. Band n66 carriers are enabled at maximum power (40 watts/carrier).

**DEVIATIONS FROM TEST STANDARD**

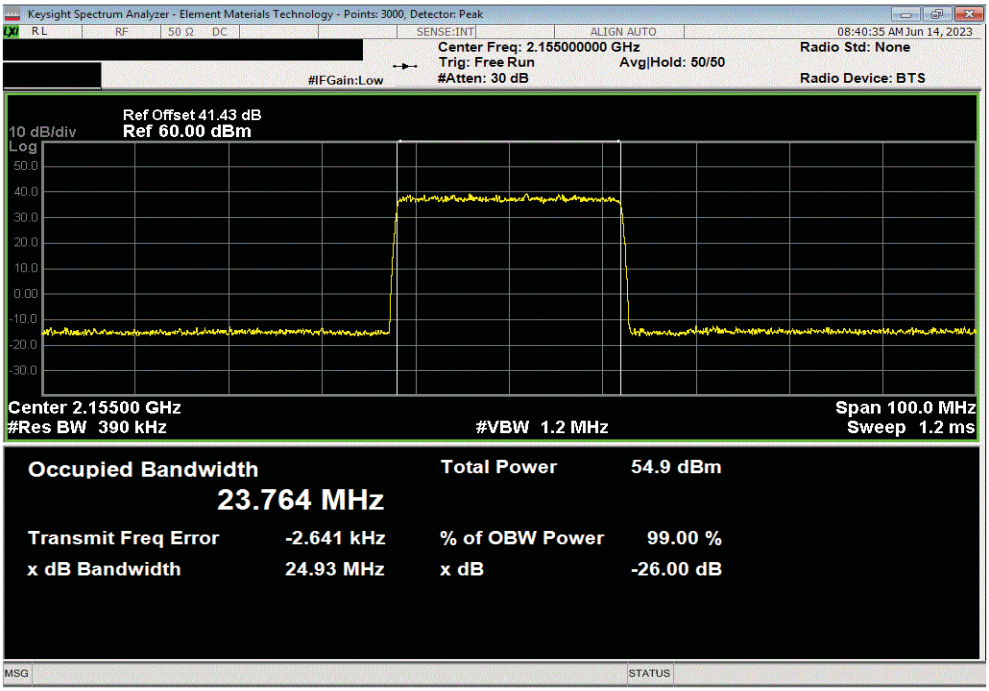
None

| Configuration # | NOKI0053-2 | Signature |
|---|---|---|

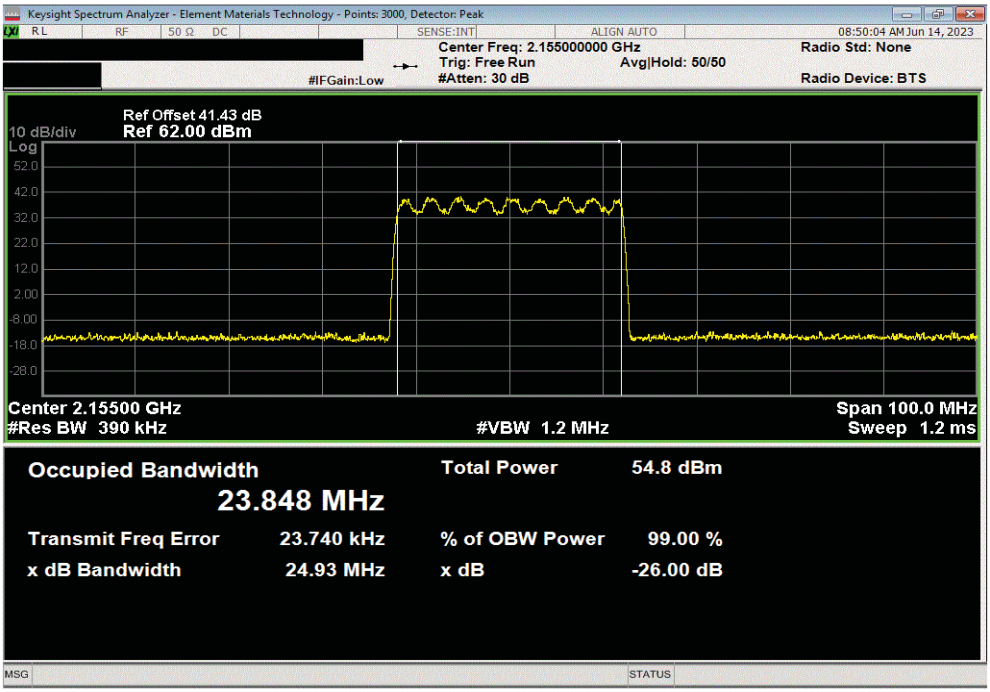
| | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
|---|---|---|---|---|
| Band n66 2110 MHz - 2200 MHz, 5G NR | | | | |
| Port 1 | | | | |
| 25 MHz Bandwidth | | | | |
| QPSK Modulation | | | | |
| Mid Channel 2155 MHz | 23.8 | 24.9 | Within Band | Pass |
| 16-QAM Modulation | | | | |
| Mid Channel 2155 MHz | 23.8 | 24.9 | Within Band | Pass |
| 64-QAM Modulation | | | | |
| Mid Channel 2155 MHz | 23.8 | 24.9 | Within Band | Pass |
| 256-QAM Modulation | | | | |
| Low Channel 2122.5 MHz | 23.9 | 24.9 | Within Band | Pass |
| Mid Channel 2155 MHz | 23.8 | 24.9 | Within Band | Pass |
| High Channel 2187.5 MHz | 23.8 | 24.9 | Within Band | Pass |
| 30 MHz Bandwidth | | | | |
| QPSK Modulation | | | | |
| Mid Channel 2155 MHz | 28.6 | 29.9 | Within Band | Pass |
| 16-QAM Modulation | | | | |
| Mid Channel 2155 MHz | 28.4 | 29.8 | Within Band | Pass |
| 64-QAM Modulation | | | | |
| Mid Channel 2155 MHz | 28.6 | 29.9 | Within Band | Pass |
| 256-QAM Modulation | | | | |
| Low Channel 2125 MHz | 28.6 | 30.0 | Within Band | Pass |
| Mid Channel 2155 MHz | 28.6 | 30.0 | Within Band | Pass |
| High Channel 2185 MHz | 28.6 | 29.9 | Within Band | Pass |

# OCCUPIED BANDWIDTH - n66

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, QPSK Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 23.764 | 24.927 | Within Band | Pass |

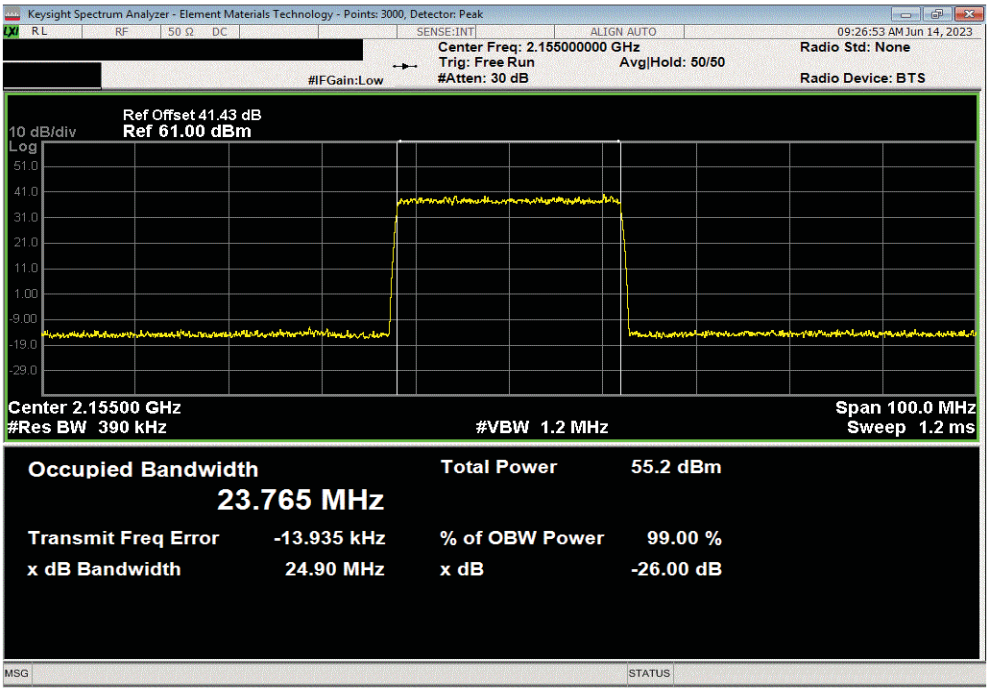



| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 16-QAM Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 23.848 | 24.935 | Within Band | Pass |



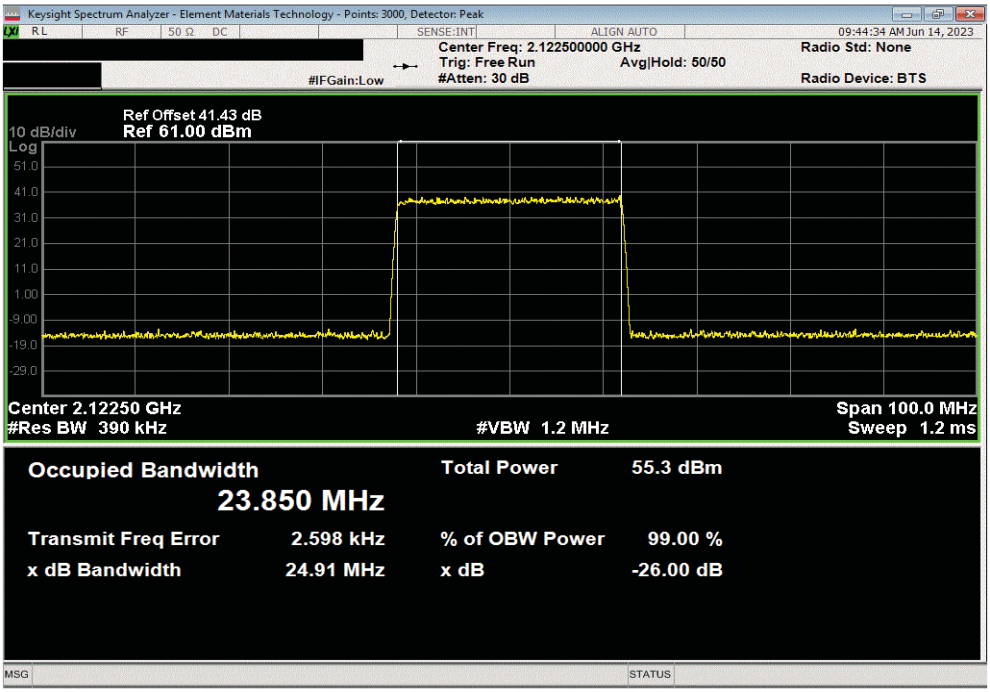
Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 64-QAM Modulation, Mid Channel 2155 MHz

| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
|---|---|---|---|---|---|---|
| | | | 23.765 | 24.897 | Within Band | Pass |



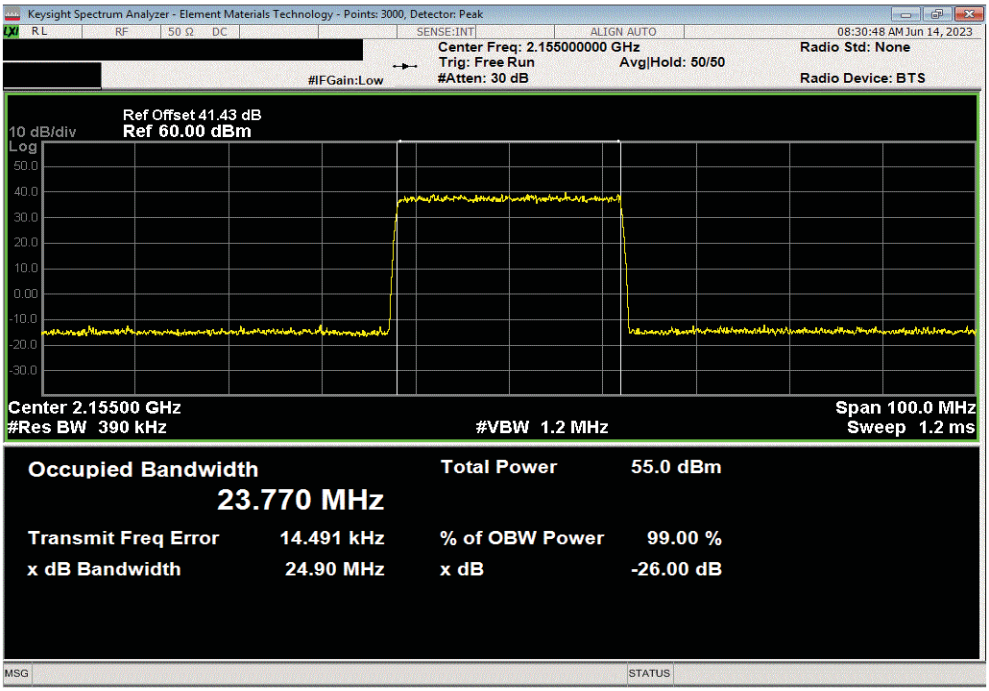

Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, Low Channel 2122.5 MHz

| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
|---|---|---|---|---|---|---|
| | | | 23.85 | 24.907 | Within Band | Pass |

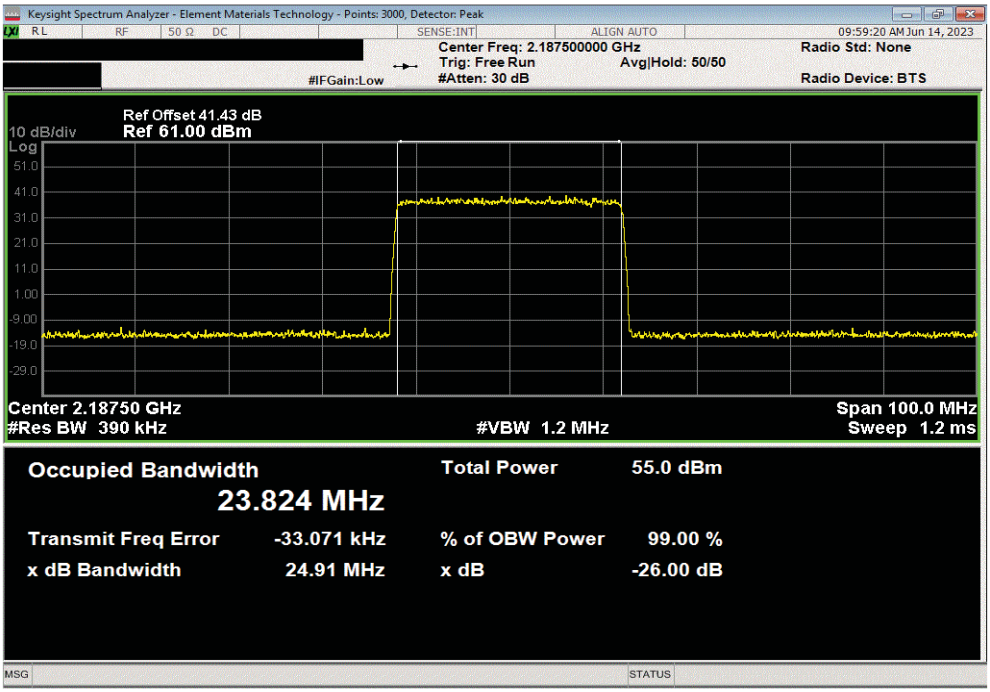


# OCCUPIED BANDWIDTH - n66

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 23.77 | 24.903 | Within Band | Pass |



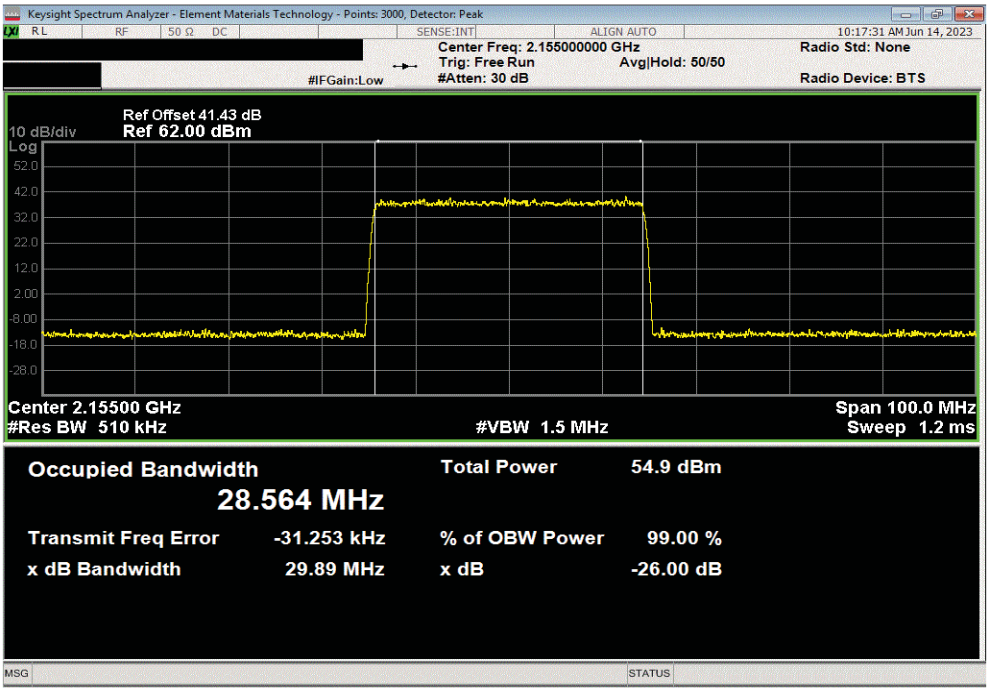

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, High Channel 2187.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 23.824 | 24.915 | Within Band | Pass |



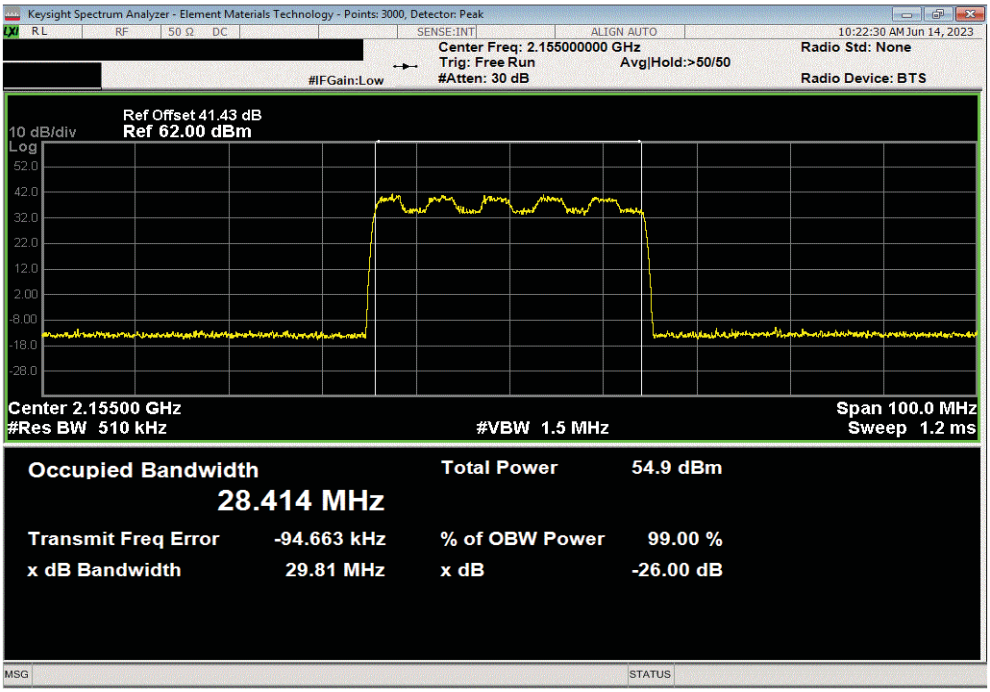
# OCCUPIED BANDWIDTH - n66



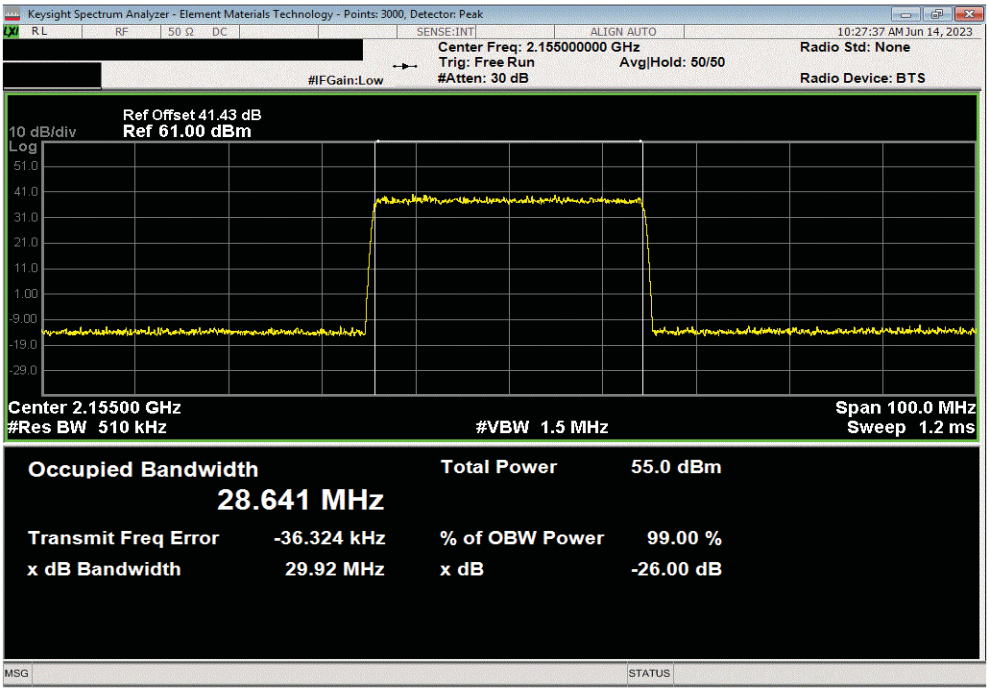
| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, QPSK Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 28.564 | 29.893 | Within Band | Pass |



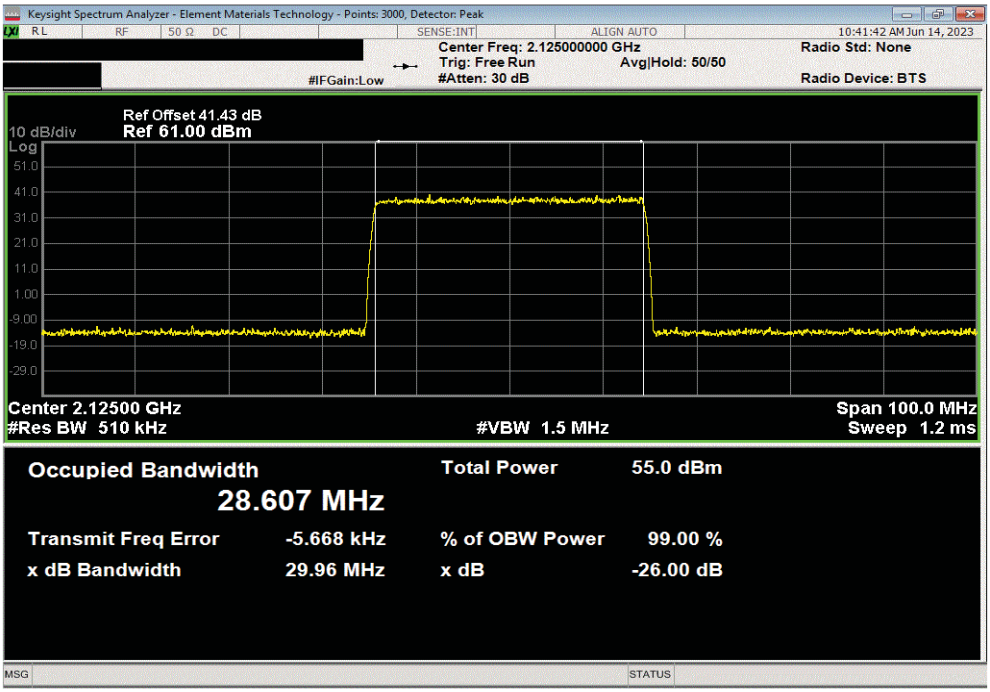

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 16-QAM Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 28.414 | 29.807 | Within Band | Pass |



| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 64-QAM Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 28.641 | 29.916 | Within Band | Pass |

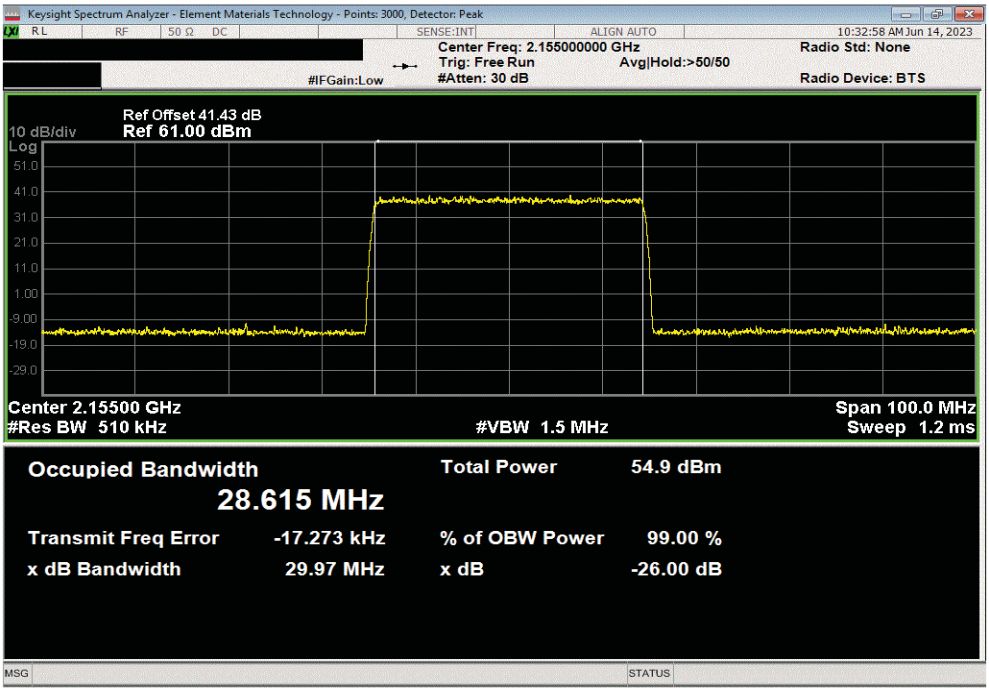



| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, Low Channel 2125 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 28.607 | 29.958 | Within Band | Pass |

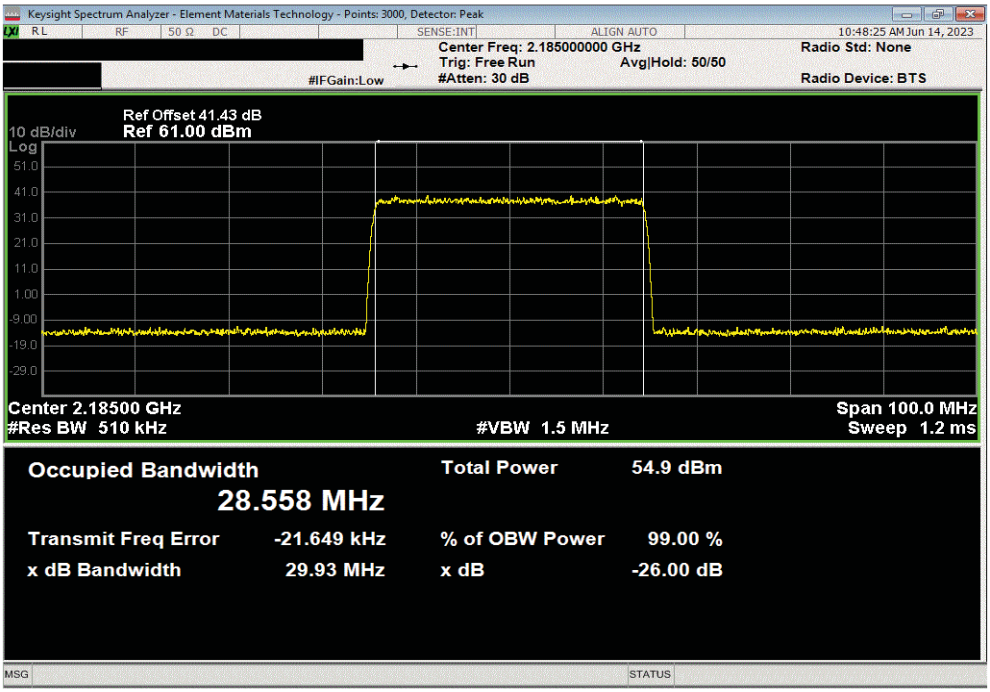


# OCCUPIED BANDWIDTH - n66

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 28.615 | 29.973 | Within Band | Pass |




| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, High Channel 2185 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | Value 99% (MHz) | Value 26dB (MHz) | Limit | Result |
| | | | 28.558 | 29.934 | Within Band | Pass |



# AVERAGE POWER - MULTICARRIER

XMit 2023.02.14.0

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 | SD3235-2148 | ANF | 2023-05-24 | 2024-05-24 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2023-02-09 | 2024-02-09 |

**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

Multicarrier test cases have been developed as shown below:
Notes: Max port power (120 watts is shared between Bands n25/n66)

Multicarrier Test Case 1 (PCS Multicarrier LBE): In the PCS band _Two NR 30MHz carriers (with minimum spacing between carrier frequencies) at the lower band edge (1945 & 1975MHz). In AWS band NR 5MHz carrier is enable at middle channel (2155.0MHz) at full power (40W). The largest channel bandwidth is selected to maximize carrier OBW. The carriers are operated at maximum power (~40W/PCS carrier and 40W/AWS carrier) with a total port power of 120 watts.

Multicarrier Test Case 2 (PCS Multicarrier UBE): In the PCS band _Two NR 30MHz carriers (with minimum spacing between carrier frequencies) at the upper band edge (1950 & 1980MHz). In AWS band NR 5MHz carrier is enable at middle channel (2155.0MHz) at full power (40W). The largest channel bandwidth is selected to maximize carrier OBW. The carriers are operated at maximum power (~40W/PCS carrier and 40W/AWS carrier) with a total port power of 120 watts.

Multicarrier Test Case 3 (AWS Multicarrier LBE): In the AWS band _Two NR 30MHz carriers (with minimum spacing between carrier frequencies) at the lower band edge (2125 & 2155MHz). In PCS band NR 5MHz carrier is enable at middle channel (1962.5MHz) at full power (80W). The largest channel bandwidth is selected to maximize carrier OBW. The carriers are operated at maximum power (~20W/AWS carrier and 80W/PCS carrier) with a total port power of 120 watts.

Multicarrier Test Case 4 (AWS Multicarrier UBE): In the AWS band _Two NR 30MHz carriers (with minimum spacing between carrier frequencies) at the upper band edge (2185 & 2155MHz). In PCS band NR 5MHz carrier is enable at middle channel (1962.5MHz) at full power (80W). The largest channel bandwidth is selected to maximize carrier OBW. The carriers are operated at maximum power (~20W/AWS carrier and 80W/PCS carrier) with a total port power of 120 watts.

Multicarrier Multiband Test Case 5: In the PCS band _Three NR 5MHz carriers with Two NR 5MHz (minimum spacing between carrier frequencies) at the lower band edge (1932.5 & 1937.5 MHz) and one NR 5MHz carrier (maximum spacing with other two) at the upper band edge (1992.5 MHz). In AWS band_ Three NR 5MHz carriers with Two NR 5MHz (minimum spacing between carrier frequencies) at the lower band edge (2112.5 & 2117.5 MHz) and one NR 5MHz carrier (maximum spacing with other two) at the upper band edge (2197.5 MHz). The smallest channel bandwidth was selected to maximize carrier power spectral density. The carriers are operated at maximum power (~13.3W/AWS carrier and ~26.6W/PCS carrier) with a total port power of 120 watts.

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHFIG) as the original certification test. The AHFIG antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the original certification testing) and antenna port 1 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.

# AVERAGE POWER - MULTICARRIER

element

TbiTx 2022.05.02.0 XMit 2023.02.14.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | AHFIG (FCC C2PC) | | | Work Order: | NOKI0053 |
| Serial Number: | See Configuration | | | Date: | 06/14/2023 |
| Customer: | Nokia Solutions and Networks | | | Temperature: | 20.8°C |
| Attendees: | John Rattanavong, Mitchell Hill | | | Humidity: | 61.7% |
| Project: | None | | | Barometric Pres.: | 1007 mbar |
| Tested by: | Brandon Hobbs | Power: | 54 VDC | Job Site: | TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 24E:2023 | ANSI C63.26:2015 |
| FCC 27:2023 | ANSI C63.26:2015 |

**COMMENTS**

All losses in the measurement path were accounted for: attenuators, cables, DC block and filter when in use. Bands n25/n66 carriers were operating at maximum power in each applicable test case to achieve a total port power of 120 watts. The following is the output power measurements at the radio's single output port.

**DEVIATIONS FROM TEST STANDARD**

None

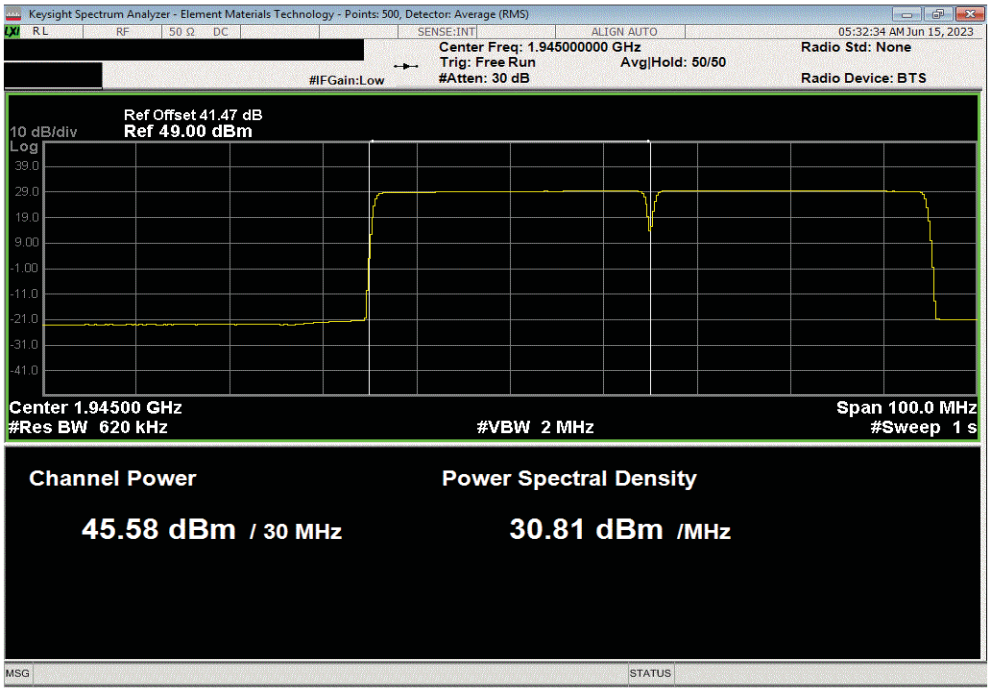
| Configuration # | NOKI0053-2 | Signature |
|---|---|---|

| | Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
|---|---|---|---|---|---|---|---|
| Port 1, NR, PCS Band and AWS Band, MultiCarrier | | | | | | | |
| QPSK Modulation | | | | | | | |
| MulitCarrier Test Case 1 | | | | | | | |
| Low 1945 MHz n25 NR30 40W (PCS) | 45.581 | 0 | 45.6 | N/A | N/A | Within Tolerance | Pass |
| Mid 2155 MHz n66 NR5 40W (AWS) | 45.735 | 0 | 45.7 | N/A | N/A | Within Tolerance | Pass |
| High 1975 MHz n25 NR30 40W (PCS) | 45.906 | 0 | 45.9 | N/A | N/A | Within Tolerance | Pass |
| MulitCarrier Test Case 2 | | | | | | | |
| Mid 2155 MHz n66 NR5 40W (AWS) | 45.837 | 0 | 45.8 | N/A | N/A | Within Tolerance | Pass |
| Low 1950 MHz n25 NR30 40W (PCS) | 45.746 | 0 | 45.7 | N/A | N/A | Within Tolerance | Pass |
| High 1980 MHz n25 NR30 40W (PCS) | 45.933 | 0 | 45.9 | N/A | N/A | Within Tolerance | Pass |
| MulitCarrier Test Case 3 | | | | | | | |
| Low 2125 MHz n66 NR30 20W (AWS) | 42.505 | 0 | 42.5 | N/A | N/A | Within Tolerance | Pass |
| Mid 1962.5 MHz n25 NR5 80W (PCS) | 49.012 | 0 | 49.0 | N/A | N/A | Within Tolerance | Pass |
| High 2155 MHz n66 NR30 20W (AWS) | 42.657 | 0 | 42.7 | N/A | N/A | Within Tolerance | Pass |
| MulitCarrier Test Case 4 | | | | | | | |
| Mid 1962.5 MHz n25 NR5 80W (PCS) | 49.029 | 0 | 49.0 | N/A | N/A | Within Tolerance | Pass |
| Low 2155 MHz n66 NR30 20W (AWS) | 42.737 | 0 | 42.7 | N/A | N/A | Within Tolerance | Pass |
| High 2185 MHz n66 NR30 20W (AWS) | 42.644 | 0 | 42.6 | N/A | N/A | Within Tolerance | Pass |
| MulitCarrier Test Case 5 | | | | | | | |
| Low 1932.5 MHz n25 NR5 26.6W (PCS) | 43.805 | 0 | 43.8 | N/A | N/A | Within Tolerance | Pass |
| Mid 1937.5 MHz n25 NR5 26.6W (PCS) | 44.022 | 0 | 44.0 | N/A | N/A | Within Tolerance | Pass |
| High 1992.5 MHz n25 NR5 26.6W (PCS) | 44.182 | 0 | 44.2 | N/A | N/A | Within Tolerance | Pass |
| Low 2112.5 MHz n66 NR5 13.3W (AWS) | 41.018 | 0 | 41.0 | N/A | N/A | Within Tolerance | Pass |
| Mid 2117.5 MHz n66 NR5 13.3W (AWS) | 41.197 | 0 | 41.2 | N/A | N/A | Within Tolerance | Pass |
| High 2197.5 MHz n66 NR5 13.3W (AWS) | 41.185 | 0 | 41.2 | N/A | N/A | Within Tolerance | Pass |
| Port 1, NR, PCS Band and AWS Band, MultiCarrier | | | | | | | |
| QPSK Modulation | | | | | | | |
| MulitCarrier Test Case 1 | N/A | 0 | N/A | View Table | View Table | Within Tolerance | Pass |
| MulitCarrier Test Case 2 | N/A | 0 | N/A | View Table | View Table | Within Tolerance | Pass |
| MulitCarrier Test Case 3 | N/A | 0 | N/A | View Table | View Table | Within Tolerance | Pass |
| MulitCarrier Test Case 4 | N/A | 0 | N/A | View Table | View Table | Within Tolerance | Pass |
| MulitCarrier Test Case 5 | N/A | 0 | N/A | View Table | View Table | Within Tolerance | Pass |

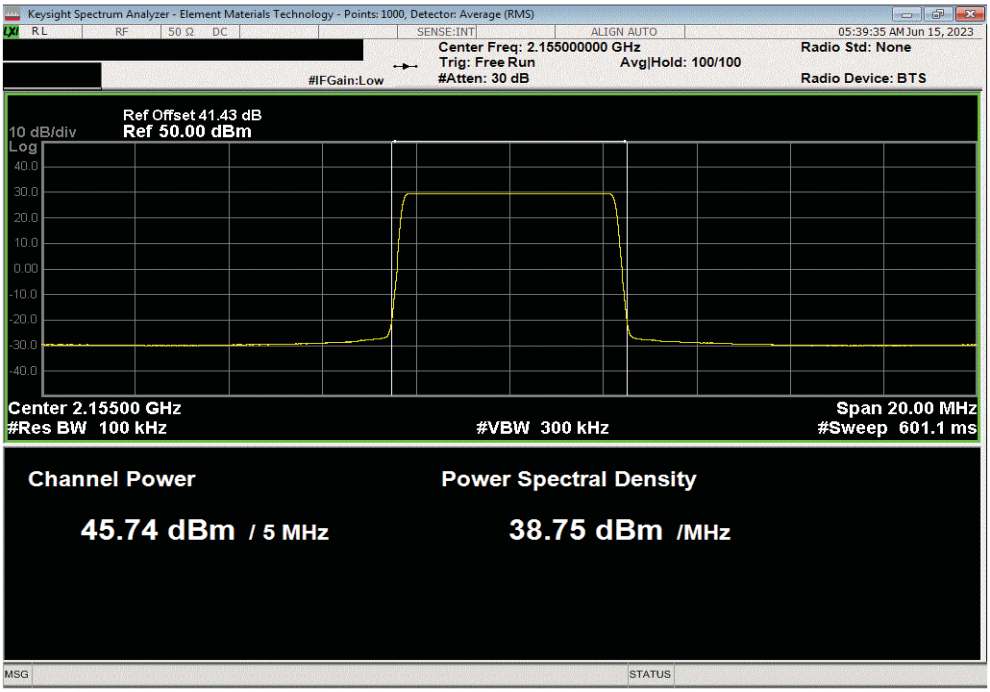
# AVERAGE POWER - MULTICARRIER



| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 1, Low 1945 MHz n25 NR30 40W (PCS) | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 45.581 | 0 | 45.6 | N/A | N/A | Within Tolerance | Pass |




| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 1, Mid 2155 MHz n66 NR5 40W (AWS) | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 45.735 | 0 | 45.7 | N/A | N/A | Within Tolerance | Pass |

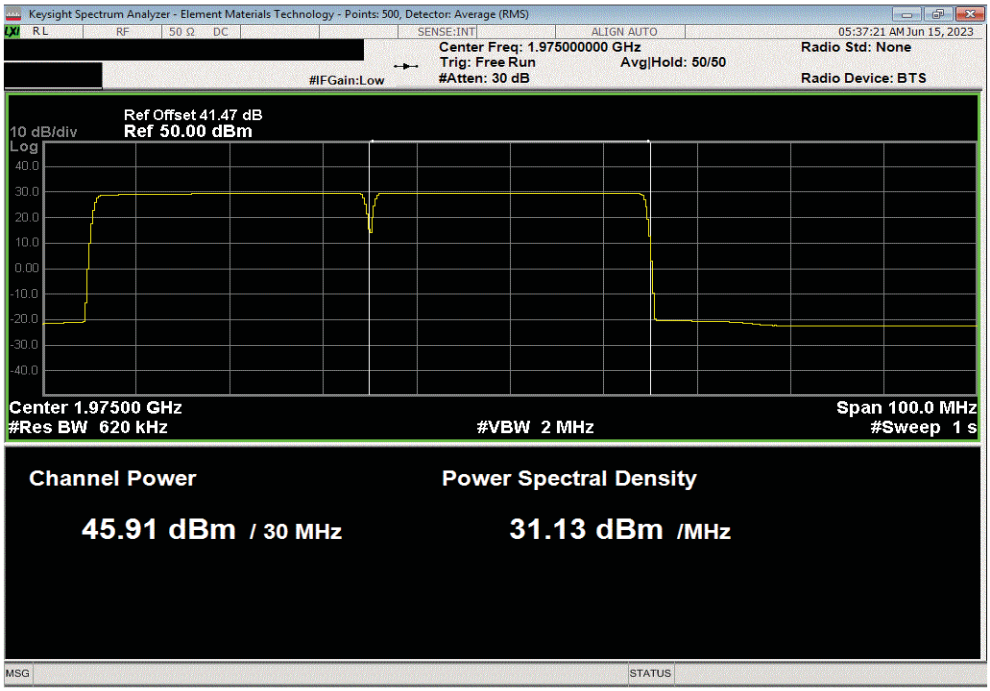


# AVERAGE POWER - MULTICARRIER



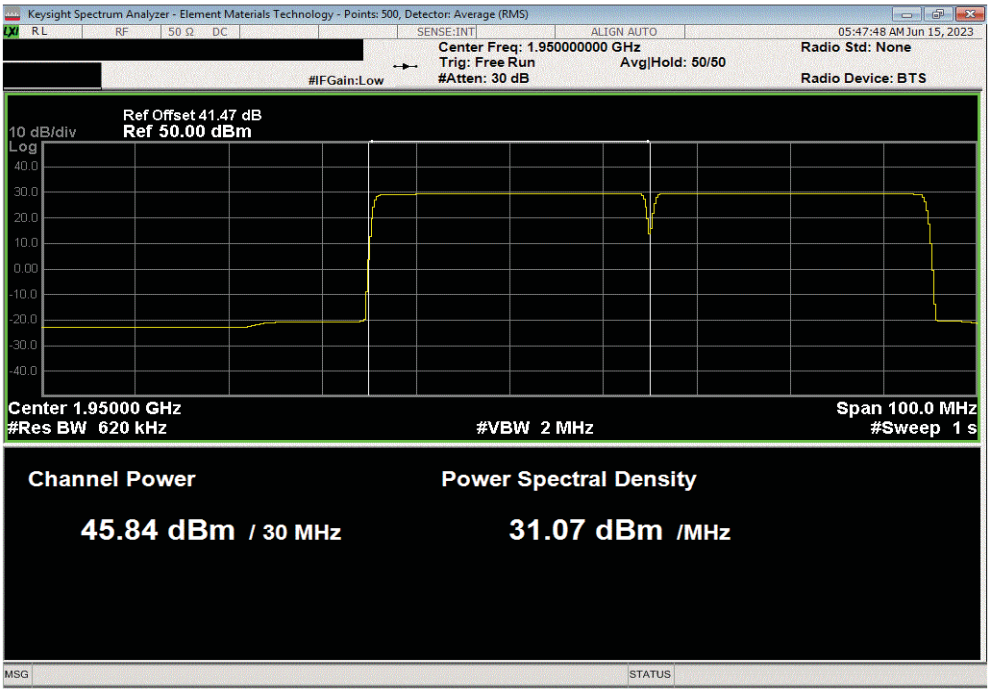
Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 1, High 1975 MHz n25 NR30 40W (PCS)

| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
|---|---|---|---|---|---|---|
| 45.906 | 0 | 45.9 | N/A | N/A | Within Tolerance | Pass |




Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 2, Low 1950 MHz n25 NR30 40W (PCS)

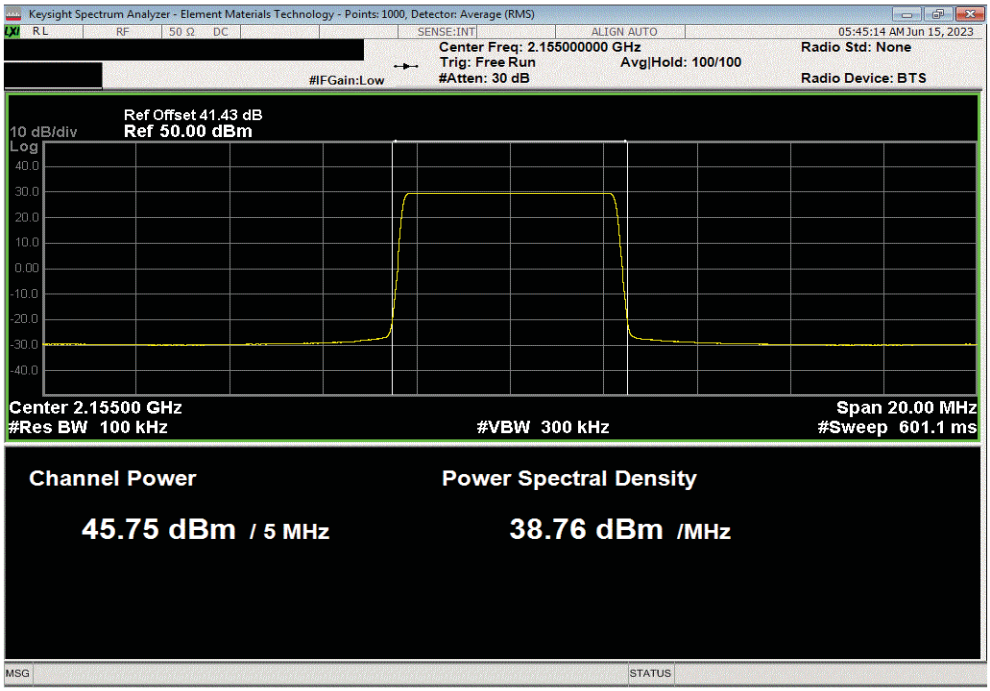
| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
|---|---|---|---|---|---|---|
| 45.837 | 0 | 45.8 | N/A | N/A | Within Tolerance | Pass |



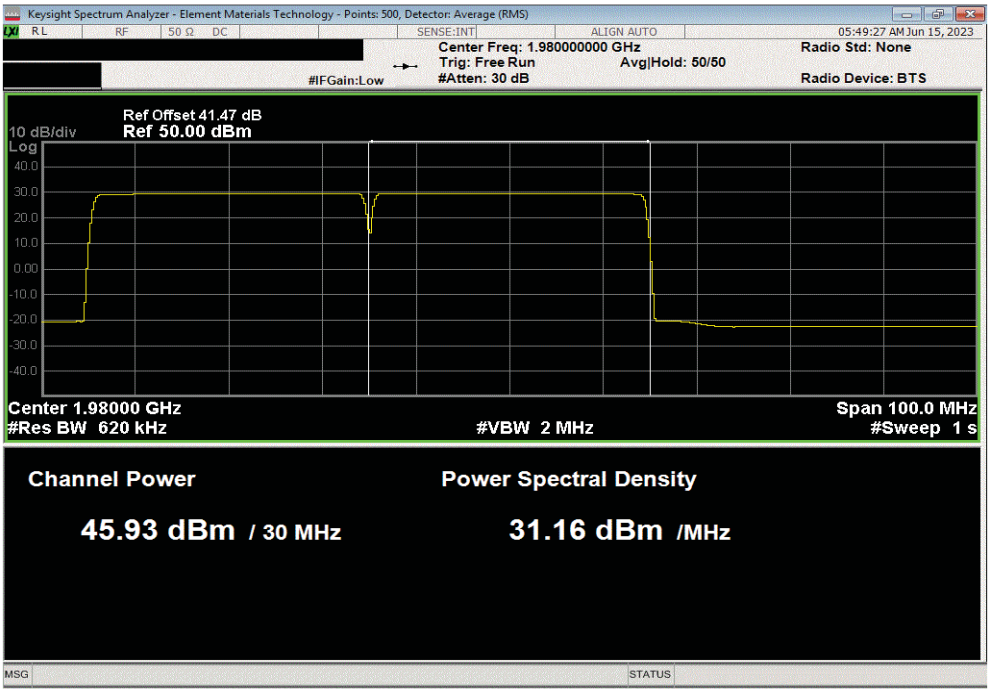
# AVERAGE POWER - MULTICARRIER



| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 2, Mid 2155 MHz n66 NR5 40W (AWS) | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 45.746 | 0 | 45.7 | N/A | N/A | Within Tolerance | Pass |



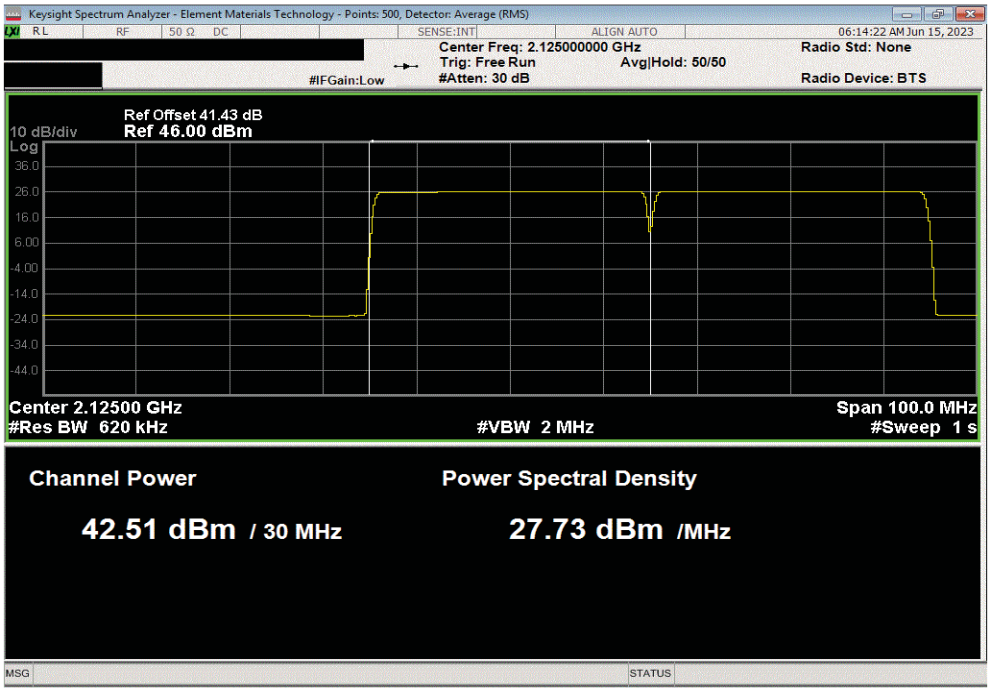

| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 2, High 1980 MHz n25 NR30 40W (PCS) | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 45.933 | 0 | 45.9 | N/A | N/A | Within Tolerance | Pass |



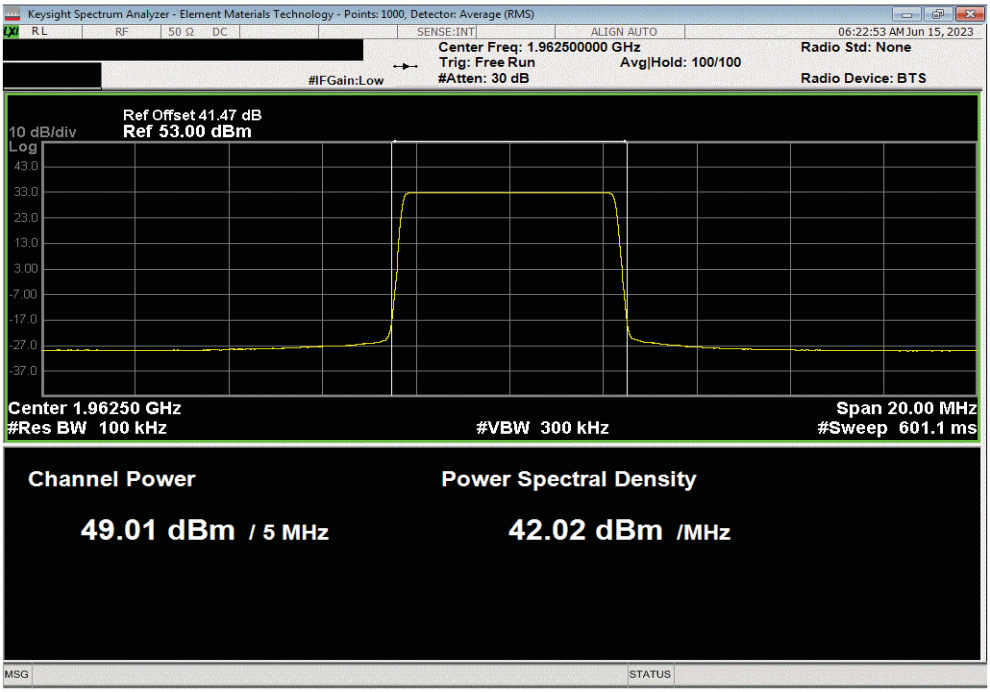
# AVERAGE POWER - MULTICARRIER



| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 3, Low 2125 MHz n66 NR30 20W (AWS) | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 42.505 | 0 | 42.5 | N/A | N/A | Within Tolerance | Pass |



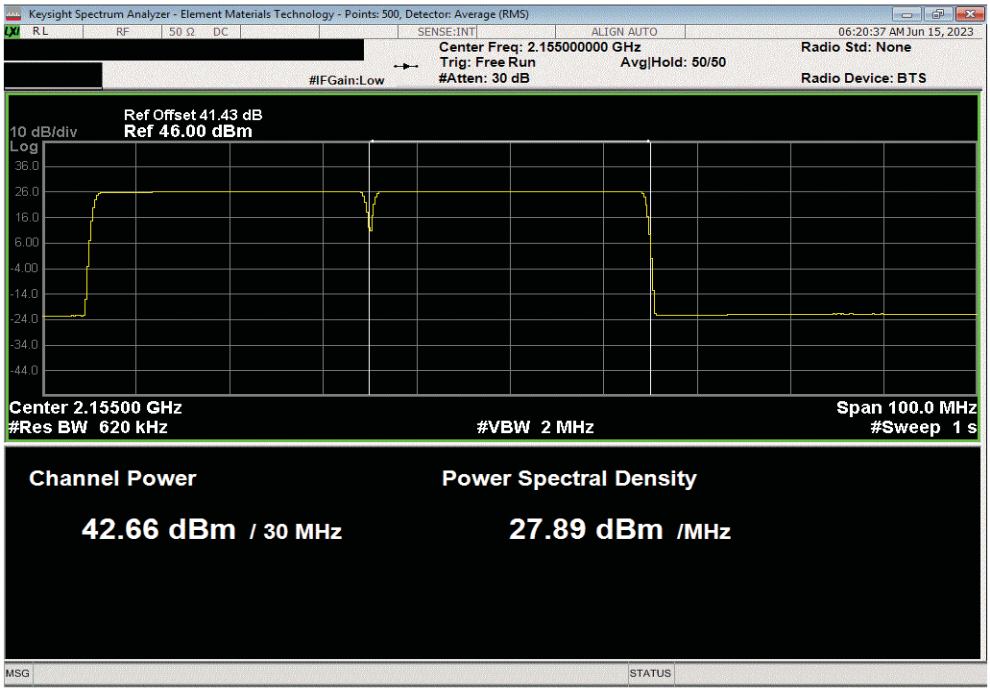

| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 3, Mid 1962.5 MHz n25 NR5 80W (PCS) | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 49.012 | 0 | 49 | N/A | N/A | Within Tolerance | Pass |



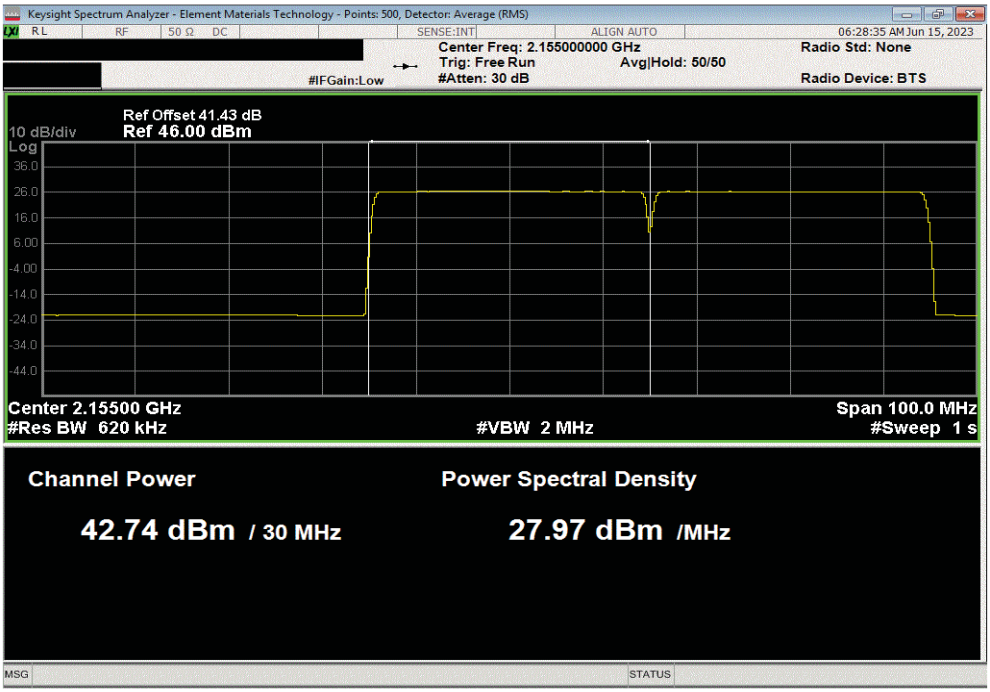
# AVERAGE POWER - MULTICARRIER



| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 3, High 2155 MHz n66 NR30 20W (AWS) | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 42.657 | 0 | 42.7 | N/A | N/A | Within Tolerance | Pass |



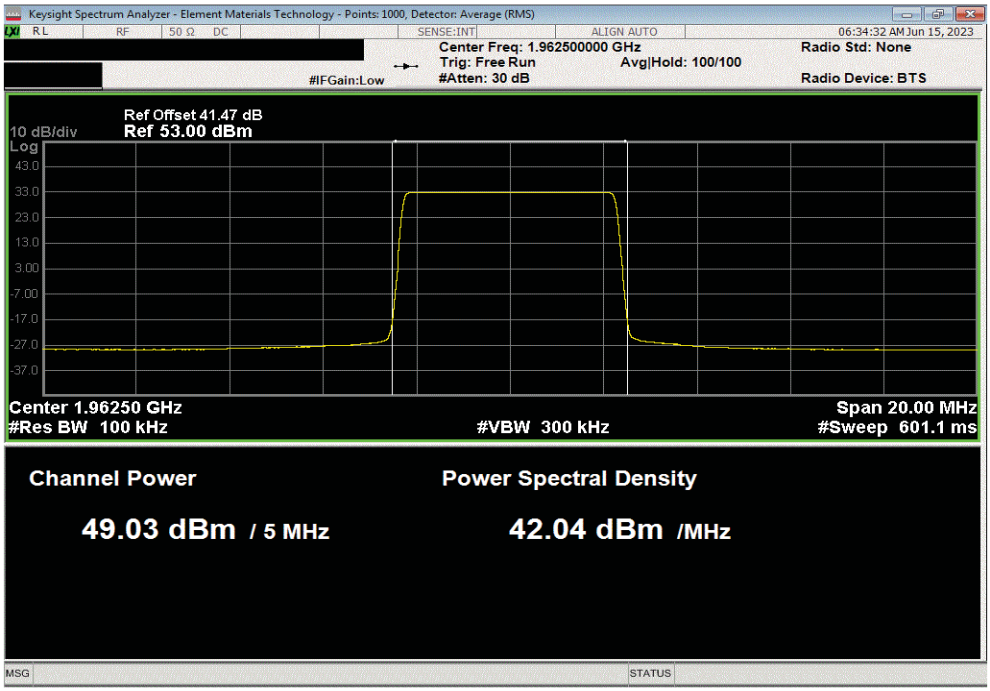

| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 4, Low 2155 MHz n66 NR30 20W (AWS) | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 42.737 | 0 | 42.7 | N/A | N/A | Within Tolerance | Pass |



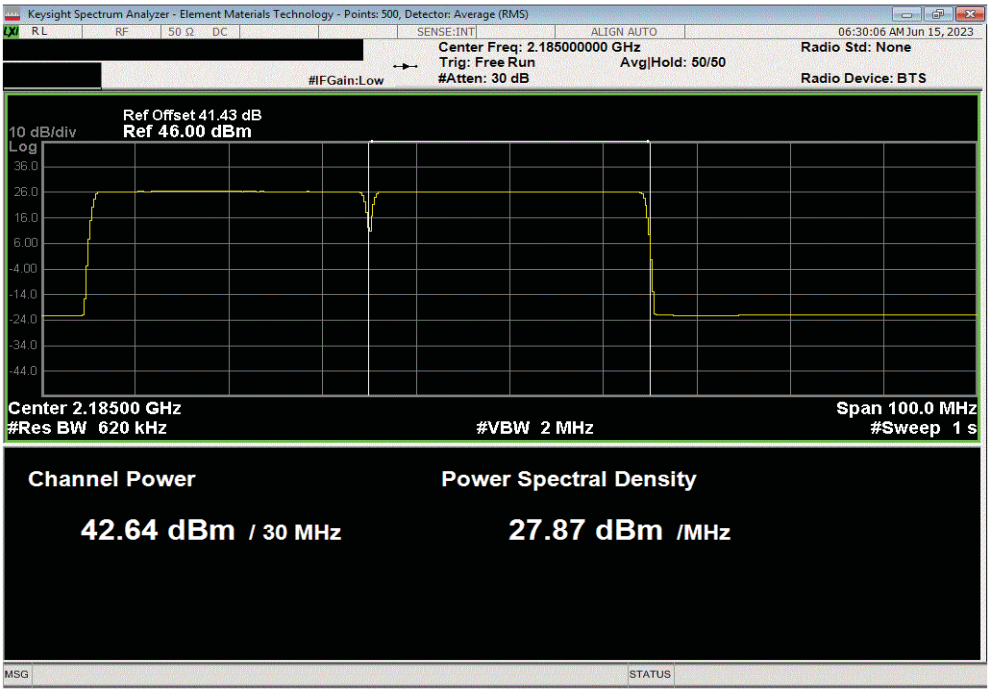
# AVERAGE POWER - MULTICARRIER



| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 4, Mid 1962.5 MHz n25 NR5 80W (PCS) | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 49.029 | 0 | 49 | N/A | N/A | Within Tolerance | Pass |



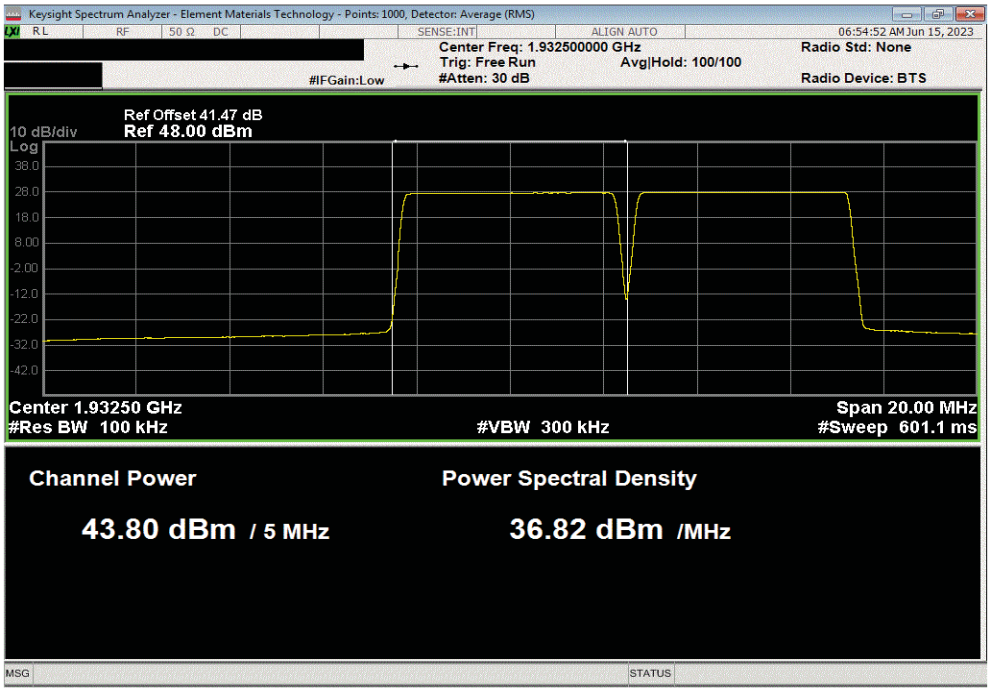

| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 4, High 2185 MHz n66 NR30 20W (AWS) | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 42.644 | 0 | 42.6 | N/A | N/A | Within Tolerance | Pass |



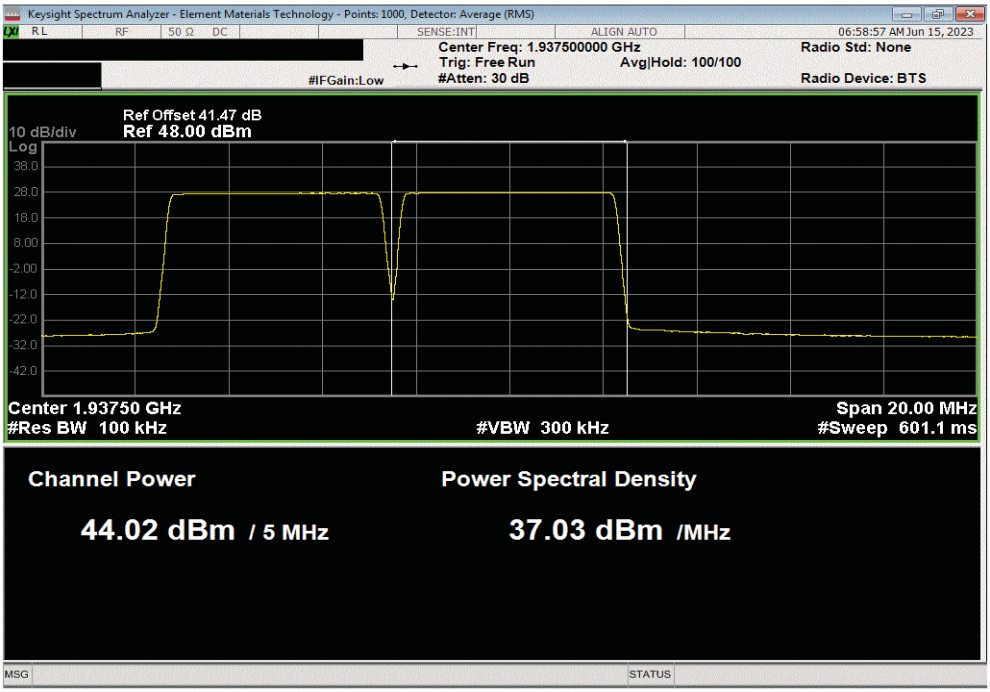
# AVERAGE POWER - MULTICARRIER



| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 5, Low 1932.5 MHz n25 NR5 26.6W (PCS) | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 43.805 | 0 | 43.8 | N/A | N/A | Within Tolerance | Pass |




| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 5, Mid 1937.5 MHz n25 NR5 26.6W (PCS) | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 44.022 | 0 | 44 | N/A | N/A | Within Tolerance | Pass |

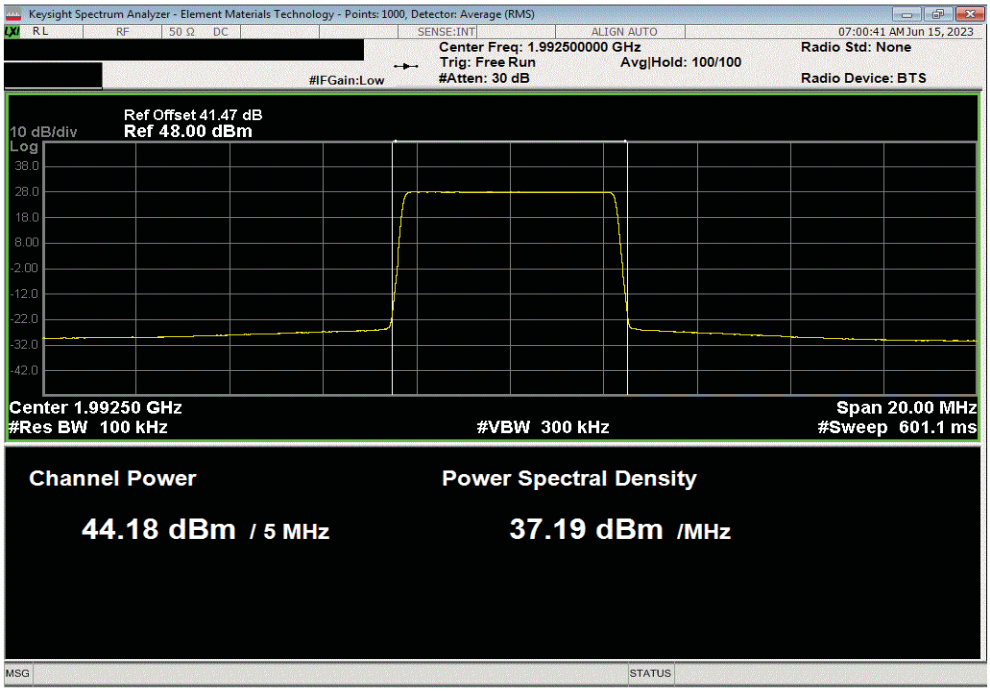


# AVERAGE POWER - MULTICARRIER



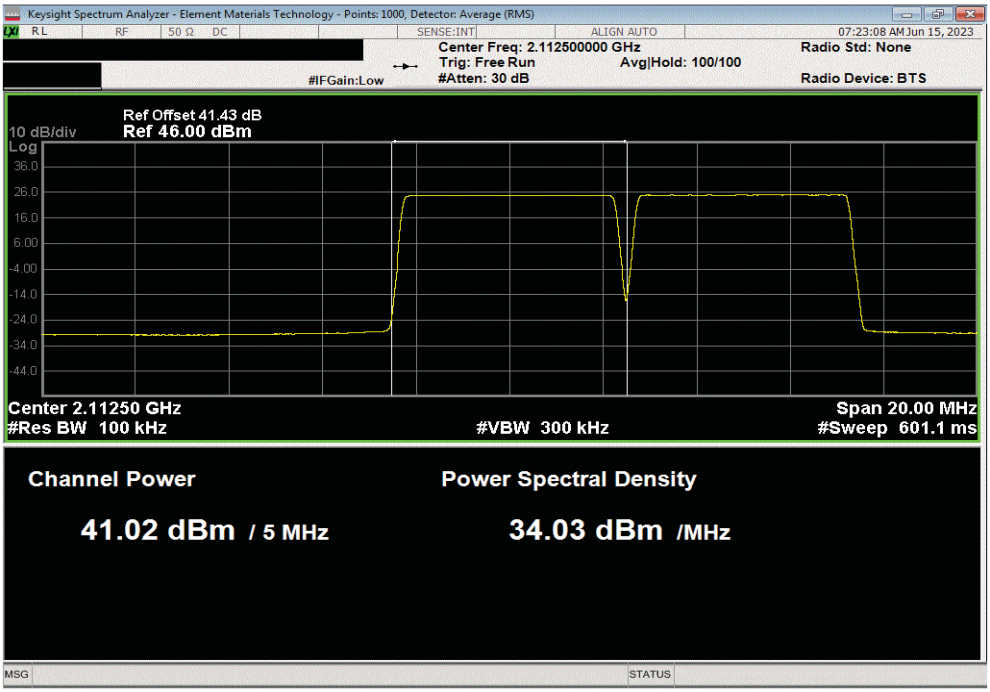
Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 5, High 1992.5 MHz n25 NR5 26.6W (PCS)

| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
|---|---|---|---|---|---|---|
| 44.182 | 0 | 44.2 | N/A | N/A | Within Tolerance | Pass |




Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 5, Low 2112.5 MHz n66 NR5 13.3W (AWS)

| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
|---|---|---|---|---|---|---|
| 41.018 | 0 | 41 | N/A | N/A | Within Tolerance | Pass |

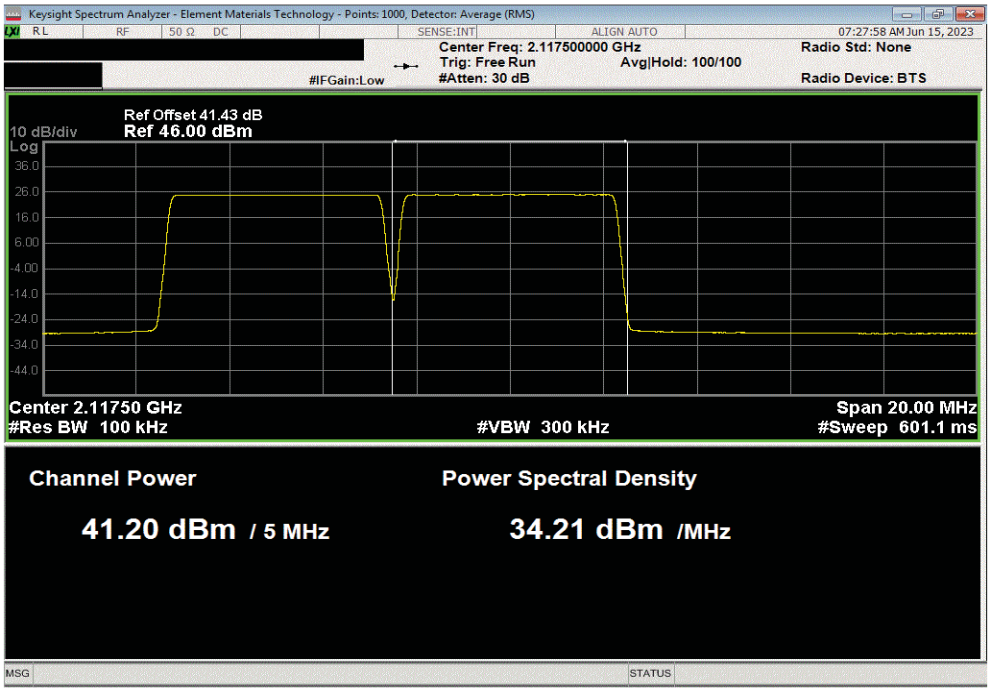


# AVERAGE POWER - MULTICARRIER



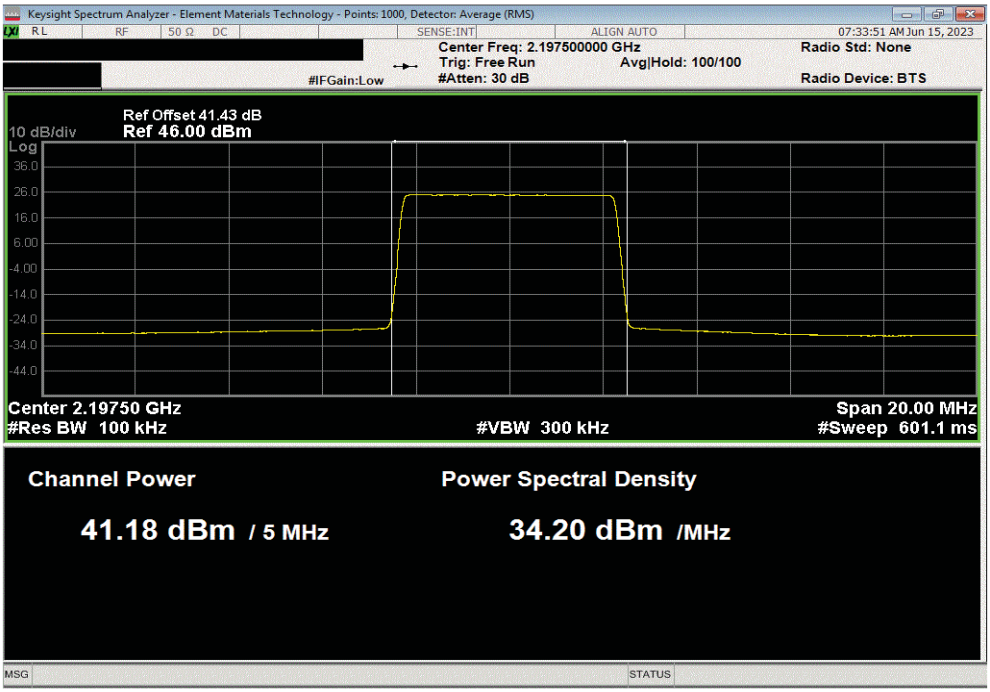
Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 5, Mid 2117.5 MHz n66 NR5 13.3W (AWS)

| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
|---|---|---|---|---|---|---|
| 41.197 | 0 | 41.2 | N/A | N/A | Within Tolerance | Pass |




Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 5, High 2197.5 MHz n66 NR5 13.3W (AWS)

| Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dBm) | Avg Cond Carrier Pwr (dB) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
|---|---|---|---|---|---|---|
| 41.185 | 0 | 41.2 | N/A | N/A | Within Tolerance | Pass |



# AVERAGE POWER - MULTICARRIER

element

TxtTx 2022.05.02.0 XMit 2023.02.14.0

| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 1 | | | | | | |
|---|---|---|---|---|---|---|
| **Avg Cond Initial Pwr (dBm)** | **Duty Cycle Factor (dBm)** | **Avg Cond Carrier Pwr (dB)** | **Avg Cond Band Pwr (dBm)** | **Avg Cond Port Pwr (dBm)** | **Limit (dBm)** | **Results** |
| N/A | 0 | N/A | View Table | View Table | Within Tolerance | Pass |

| Carrier Band | Carrier Frequencies | Carrier Power (dBm) | Carrier Power (Watts) | Band Total Pwr (Watts) | Band Total Pwr (dBm) | Port Total Pwr (Watts) | Port Total Pwr (dBm) |
|---|---|---|---|---|---|---|---|
| n25, NR30 | 1945 MHz | **45.6** | 36.1 | N/A | N/A | N/A | N/A |
| n25, NR30 | 1975 MHz | **45.9** | 39.0 | N/A | N/A | N/A | N/A |
| n25, NR30 | N/A | N/A | N/A | 75.1 | **48.8** | N/A | N/A |
| n66, NR5 | 2155 MHz | **45.7** | 37.5 | N/A | N/A | N/A | N/A |
| n66, NR5 | N/A | N/A | N/A | 37.5 | **45.7** | N/A | N/A |
| n25 and n66 | N/A | N/A | N/A | N/A | N/A | **112.6** | **50.5** |

| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 2 | | | | | | |
|---|---|---|---|---|---|---|
| **Avg Cond Initial Pwr (dBm)** | **Duty Cycle Factor (dBm)** | **Avg Cond Carrier Pwr (dB)** | **Avg Cond Band Pwr (dBm)** | **Avg Cond Port Pwr (dBm)** | **Limit (dBm)** | **Results** |
| N/A | 0 | N/A | View Table | View Table | Within Tolerance | Pass |

| Carrier Band | Carrier Frequencies | Carrier Power (dBm) | Carrier Power (Watts) | Band Total Pwr (Watts) | Band Total Pwr (dBm) | Port Total Pwr (Watts) | Port Total Pwr (dBm) |
|---|---|---|---|---|---|---|---|
| n25, NR30 | 1950 MHz | **45.7** | 37.5 | N/A | N/A | N/A | N/A |
| n25, NR30 | 1980 MHz | **45.9** | 39.2 | N/A | N/A | N/A | N/A |
| n25, NR30 | N/A | N/A | N/A | 76.8 | **48.9** | N/A | N/A |
| n66, NR5 | 2155 MHz | **45.8** | 38.3 | N/A | N/A | N/A | N/A |
| n66, NR5 | N/A | N/A | N/A | 38.3 | **45.8** | N/A | N/A |
| n25 and n66 | N/A | N/A | N/A | N/A | N/A | **115.1** | **50.6** |

# AVERAGE POWER - MULTICARRIER



| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 3 | | | | | | |
|---|---|---|---|---|---|---|
| **Avg Cond Initial Pwr (dBm)** | **Duty Cycle Factor (dBm)** | **Avg Cond Carrier Pwr (dB)** | **Avg Cond Band Pwr (dBm)** | **Avg Cond Port Pwr (dBm)** | **Limit (dBm)** | **Results** |
| N/A | 0 | N/A | View Table | View Table | Within Tolerance | Pass |

| Carrier Band | Carrier Frequencies | Carrier Power (dBm) | Carrier Power (Watts) | Band Total Pwr (Watts) | Band Total Pwr (dBm) | Port Total Pwr (Watts) | Port Total Pwr (dBm) |
|---|---|---|---|---|---|---|---|
| n66, NR30 | 2185 MHz | **42.5** | 17.8 | N/A | N/A | N/A | N/A |
| n66, NR30 | 2155 MHz | **42.7** | 18.4 | N/A | N/A | N/A | N/A |
| n66, NR30 | N/A | N/A | N/A | 36.2 | **45.6** | N/A | N/A |
| n25, NR5 | 1962.5 MHz | **49.0** | 79.7 | N/A | N/A | N/A | N/A |
| n25, NR5 | N/A | N/A | N/A | 79.7 | **49.0** | N/A | N/A |
| n25 and n66 | N/A | N/A | N/A | N/A | N/A | **115.9** | **50.6** |

| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 4 | | | | | | |
|---|---|---|---|---|---|---|
| **Avg Cond Initial Pwr (dBm)** | **Duty Cycle Factor (dBm)** | **Avg Cond Carrier Pwr (dB)** | **Avg Cond Band Pwr (dBm)** | **Avg Cond Port Pwr (dBm)** | **Limit (dBm)** | **Results** |
| N/A | 0 | N/A | View Table | View Table | Within Tolerance | Pass |

| Carrier Band | Carrier Frequencies | Carrier Power (dBm) | Carrier Power (Watts) | Band Total Pwr (Watts) | Band Total Pwr (dBm) | Port Total Pwr (Watts) | Port Total Pwr (dBm) |
|---|---|---|---|---|---|---|---|
| n66, NR30 | 2185 MHz | **42.6** | 18.4 | N/A | N/A | N/A | N/A |
| n66, NR30 | 2155 MHz | **42.7** | 18.8 | N/A | N/A | N/A | N/A |
| n66, NR30 | N/A | N/A | N/A | 37.2 | **45.7** | N/A | N/A |
| n25, NR5 | 1962.5 MHz | **49.0** | 80.0 | N/A | N/A | N/A | N/A |
| n25, NR5 | N/A | N/A | N/A | 80.0 | **49.0** | N/A | N/A |
| n25 and n66 | N/A | N/A | N/A | N/A | N/A | **117.1** | **50.7** |

# AVERAGE POWER - MULTICARRIER



| Port 1, NR, PCS Band and AWS Band, MultiCarrier, QPSK Modulation, MulitCarrier Test Case 5 | | | | | | |
|---|---|---|---|---|---|---|
| **Avg Cond Initial Pwr (dBm)** | **Duty Cycle Factor (dBm)** | **Avg Cond Carrier Pwr (dB)** | **Avg Cond Band Pwr (dBm)** | **Avg Cond Port Pwr (dBm)** | **Limit (dBm)** | **Results** |
| N/A | 0 | N/A | View Table | View Table | Within Tolerance | Pass |

| Carrier Band | Carrier Frequencies | Carrier Power (dBm) | Carrier Power (Watts) | Band Total Pwr (Watts) | Band Total Pwr (dBm) | Port Total Pwr (Watts) | Port Total Pwr (dBm) |
|---|---|---|---|---|---|---|---|
| n25, NR5 | 1932.5 MHz | **43.8** | 24.0 | N/A | N/A | N/A | N/A |
| n25, NR5 | 1937.5 MHz | **44.0** | 25.2 | N/A | N/A | N/A | N/A |
| n25, NR5 | 1992.5 MHz | **44.2** | 26.2 | N/A | N/A | N/A | N/A |
| n25, NR5 | N/A | N/A | N/A | 75.5 | **48.8** | N/A | N/A |
| n66, NR5 | 2112.5 MHz | **41.0** | 12.6 | N/A | N/A | N/A | N/A |
| n66, NR5 | 2117.5 MHz | **41.2** | 13.2 | N/A | N/A | N/A | N/A |
| n66, NR5 | 2197.5 MHz | **41.2** | 13.1 | N/A | N/A | N/A | N/A |
| n66, NR5 | N/A | N/A | N/A | 39.0 | **45.9** | N/A | N/A |
| n25 and n66, NR5 | N/A | N/A | N/A | N/A | N/A | **114.5** | **50.6** |

# AVERAGE POWER - n25

XMit 2023.02.14.0

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 |
|---|---|---|---|---|---|
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2023-02-09 | 2024-02-09 |
| Block - DC | Fairview Microwave | SD3235-2148 | ANF | 2023-05-24 | 2024-05-24 |

**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 was performed only on one port. The testing was performed on the same version of hardware (AHFIG) as the original certification test. The AHFIG antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in original certification testing) and antenna port 1 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.

# AVERAGE POWER - n25

element

TbtTx 2022.05.02.0 XMit 2023.02.14.0

| | | | |
|---|---|---|---|
| EUT: | AHFIG (FCC C2PC) | Work Order: | NOKI0053 |
| Serial Number: | See Configuration | Date: | 06/13/2023 |
| Customer: | Nokia Solutions and Networks | Temperature: | 21.5°C |
| Attendees: | John Rattanavong, Mitchell Hill | Humidity: | 57.7% |
| Project: | None | Barometric Pres.: | 1010 mbar |
| Tested by: | Brandon Hobbs | Power: 54 VDC | Job Site: TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 24E:2023 | ANSI C63.26:2015 |

**COMMENTS**

The total output power for multiport (2x2 MIMO, 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)]. The total output power for four port operation is single port + 6db [i.e. 10log(4)]. All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. Band n25 carriers are enabled at maximum power (80 watts).

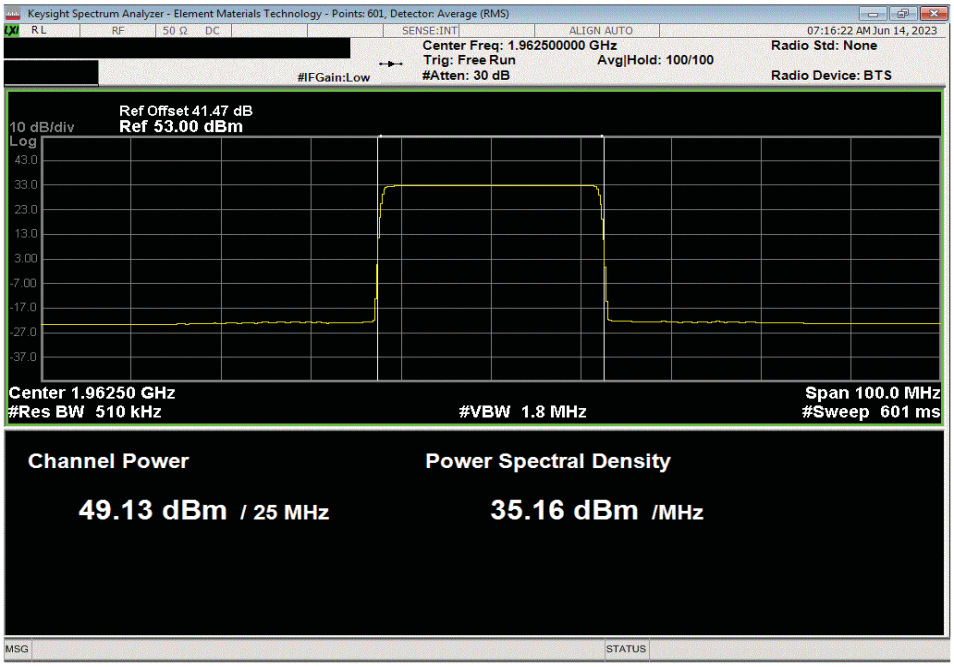
**DEVIATIONS FROM TEST STANDARD**

None

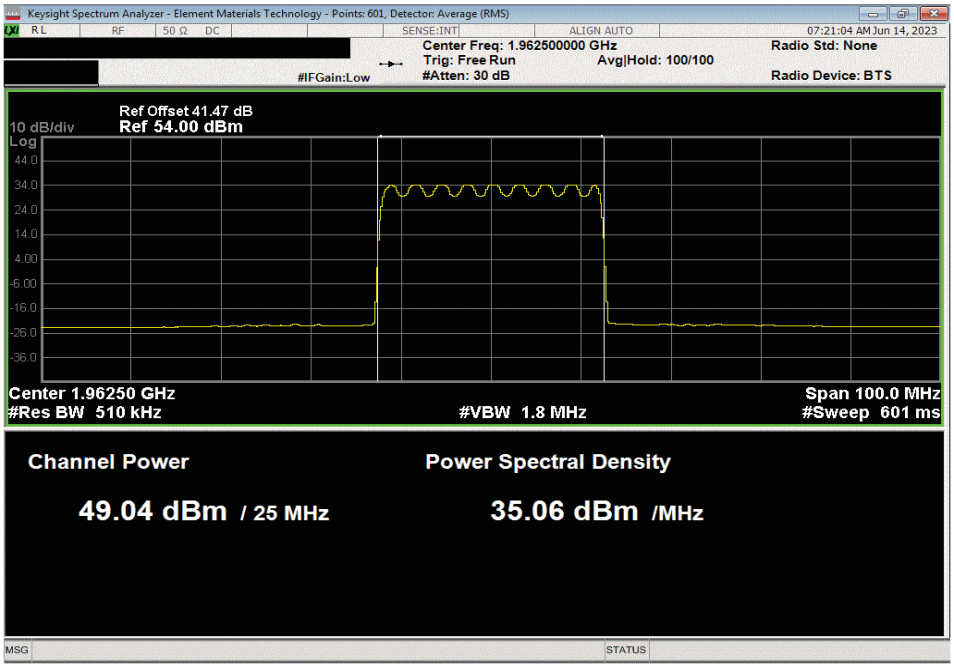
| Configuration # | NOKI0053-2 | Signature |
|---|---|---|

| | 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 |
|---|---|---|---|---|---|
| Band n25 1930 MHz - 1995 MHz, 5G NR | | | | | |
| Port 1 | | | | | |
| 25 MHz Bandwidth | | | | | |
| QPSK Modulation | | | | | |
| Mid Channel 1962.5 MHz | 49.135 | 0 | 49.1 | 52.1 | 55.1 |
| 16-QAM Modulation | | | | | |
| Mid Channel 1962.5 MHz | 49.040 | 0 | 49.0 | 52.0 | 55.0 |
| 64-QAM Modulation | | | | | |
| Mid Channel 1962.5 MHz | 49.089 | 0 | 49.1 | 52.1 | 55.1 |
| 256-QAM Modulation | | | | | |
| Low Channel 1942.5 MHz | 49.252 | 0 | 49.3 | 52.3 | 55.3 |
| Mid Channel 1962.5 MHz | 49.123 | 0 | 49.1 | 52.1 | 55.1 |
| High Channel 1982.5 MHz | 49.066 | 0 | 49.1 | 52.1 | 55.1 |
| 30 MHz Bandwidth | | | | | |
| QPSK Modulation | | | | | |
| Mid Channel 1962.5 MHz | 48.985 | 0 | 49.0 | 52.0 | 55.0 |
| 16-QAM Modulation | | | | | |
| Mid Channel 1962.5 MHz | 48.868 | 0 | 48.9 | 51.9 | 54.9 |
| 64-QAM Modulation | | | | | |
| Mid Channel 1962.5 MHz | 48.919 | 0 | 48.9 | 51.9 | 54.9 |
| 256-QAM Modulation | | | | | |
| Low Channel 1945.0 MHz | 48.966 | 0 | 49.0 | 52.0 | 55.0 |
| Mid Channel 1962.5 MHz | 48.937 | 0 | 48.9 | 51.9 | 54.9 |
| High Channel 1980.0 MHz | 48.827 | 0 | 48.8 | 51.8 | 54.8 |

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, QPSK Modulation, Mid Channel 1962.5 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 | |
| | 49.135 | 0 | 49.1 | 52.1 | 55.1 | |

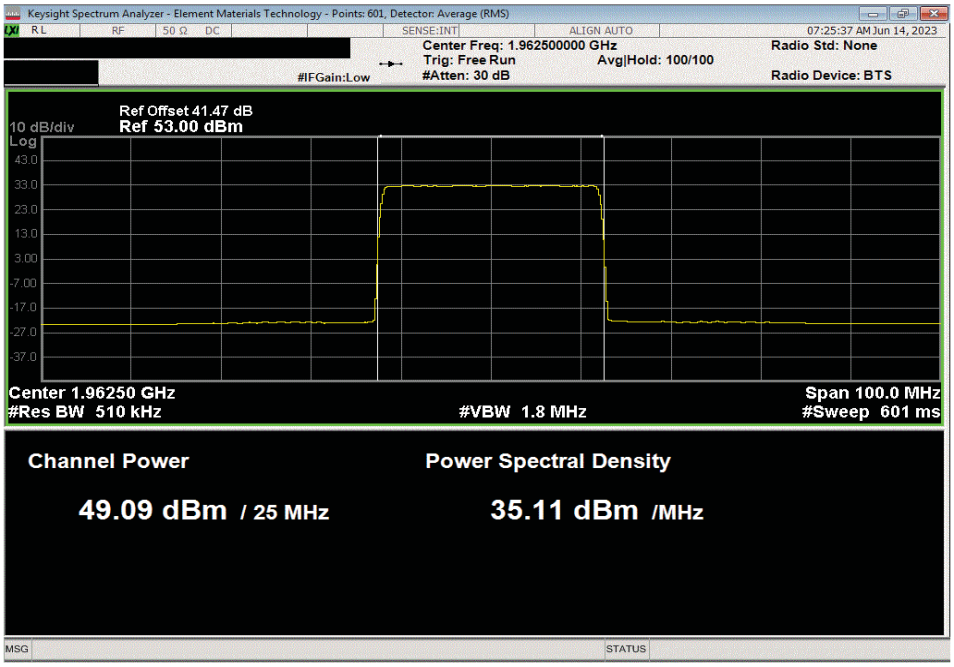



| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 16-QAM Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value (dBm/MHz) | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) (dBm/Carrier BW) | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 49.04 | 0 | 49 | 52 | 55 | |

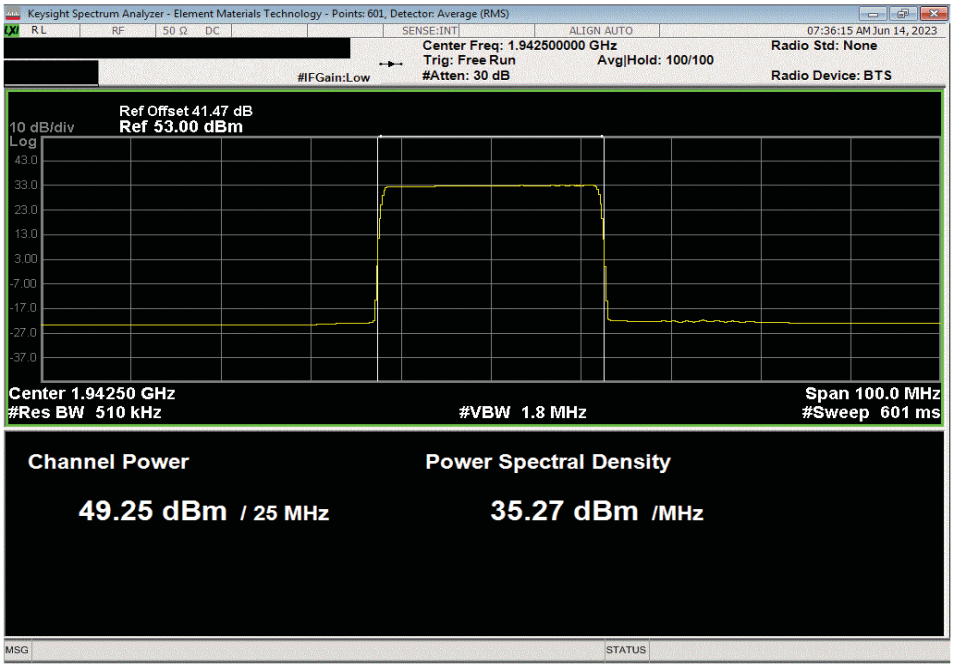


# AVERAGE POWER - n25

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 64-QAM Modulation, Mid Channel 1962.5 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 | |
| | 49.089 | 0 | 49.1 | 52.1 | 55.1 | |



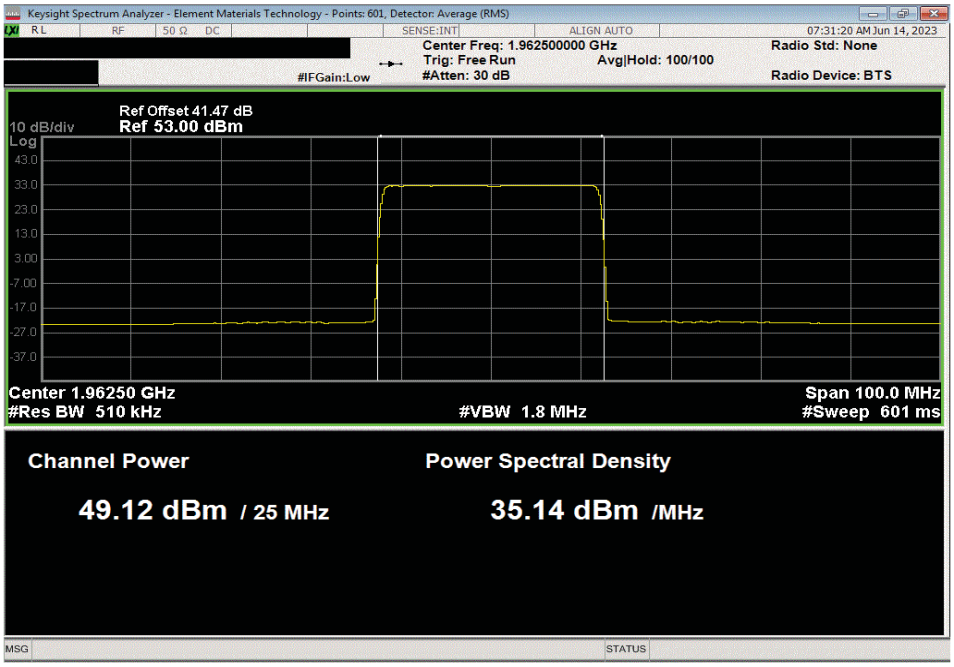

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, Low Channel 1942.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value (dBm/MHz) | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) (dBm/Carrier BW) | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 49.252 | 0 | 49.3 | 52.3 | 55.3 | |



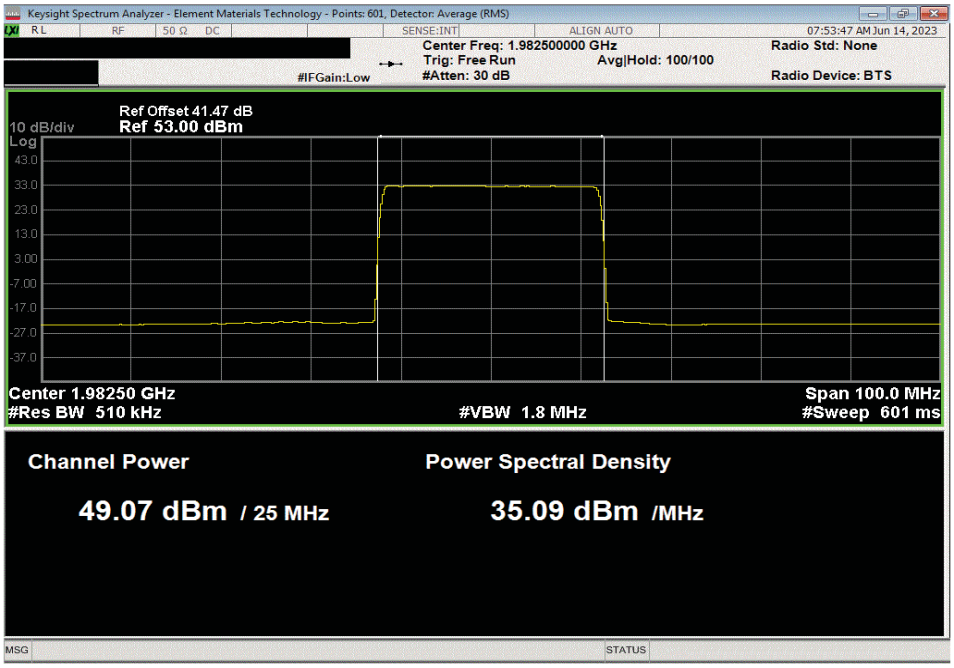
# AVERAGE POWER - n25



| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, Mid Channel 1962.5 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 | |
| | 49.123 | 0 | 49.1 | 52.1 | 55.1 | |



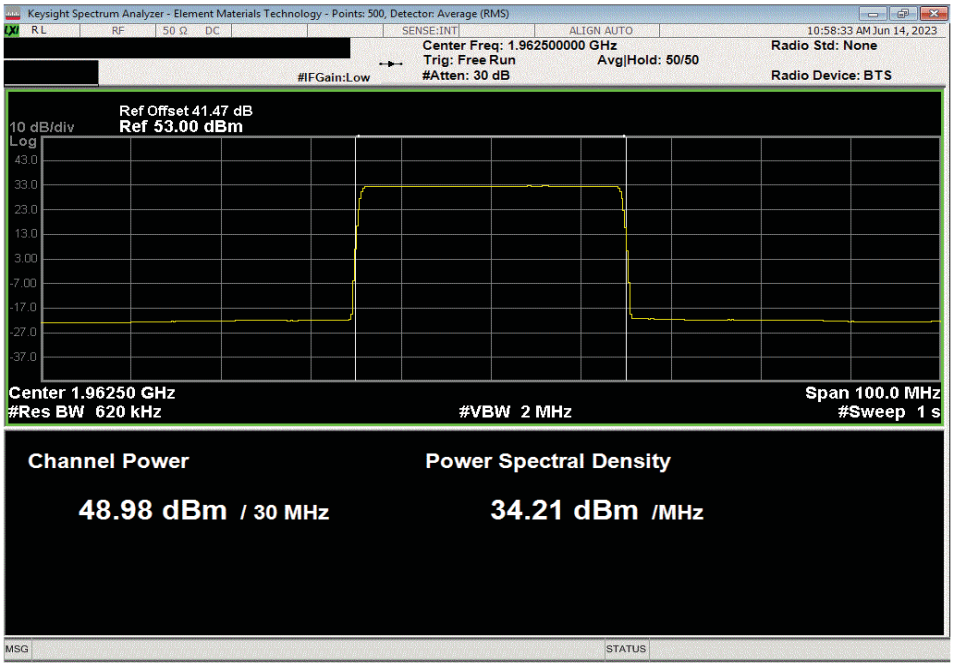

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, High Channel 1982.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value (dBm/MHz) | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) (dBm/Carrier BW) | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 49.066 | 0 | 49.1 | 52.1 | 55.1 | |



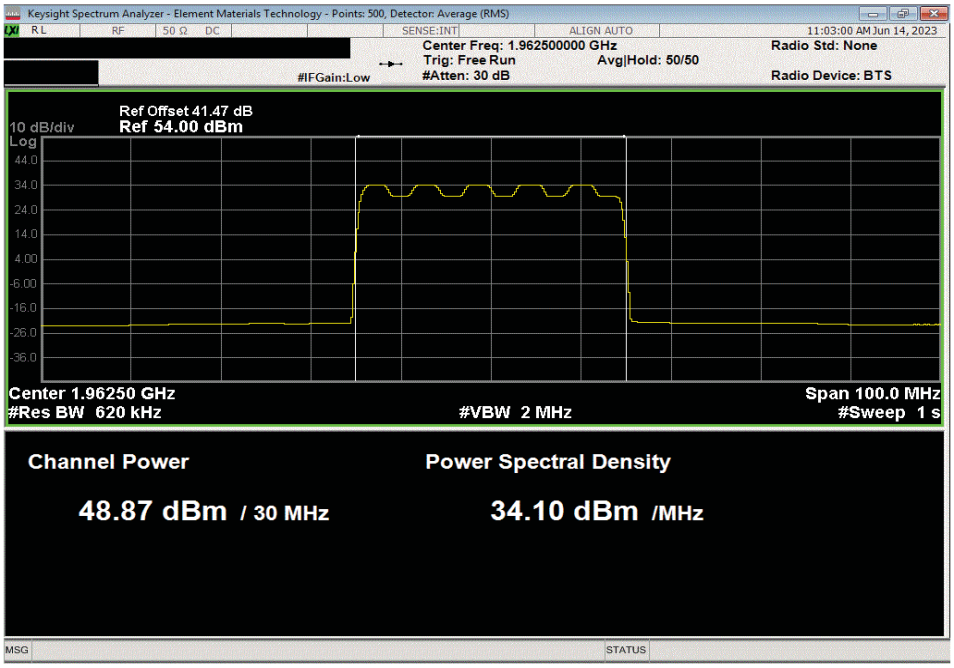
# AVERAGE POWER - n25



| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, QPSK Modulation, Mid Channel 1962.5 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 | |
| | 48.985 | 0 | 49 | 52 | 55 | |

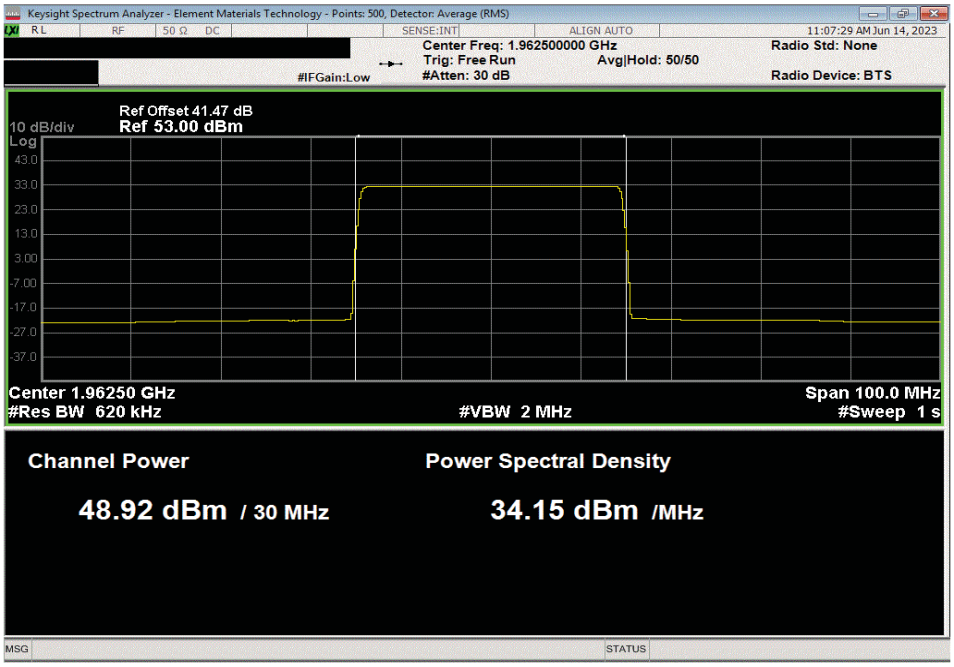



| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 16-QAM Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value (dBm/MHz) | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) (dBm/Carrier BW) | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.868 | 0 | 48.9 | 51.9 | 54.9 | |

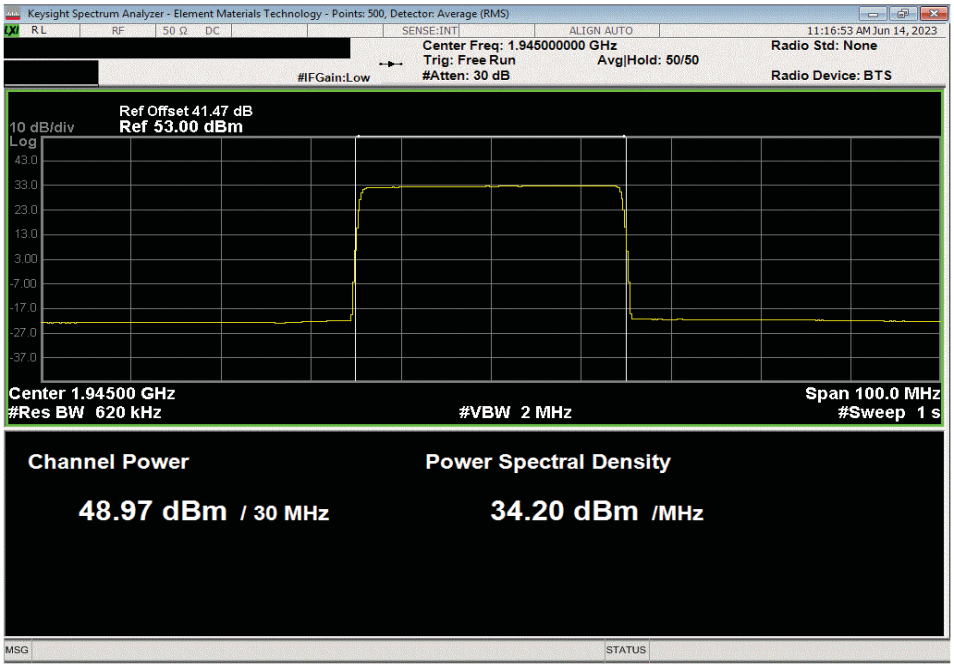


# AVERAGE POWER - n25

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 64-QAM Modulation, Mid Channel 1962.5 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 | |
| | 48.919 | 0 | 48.9 | 51.9 | 54.9 | |

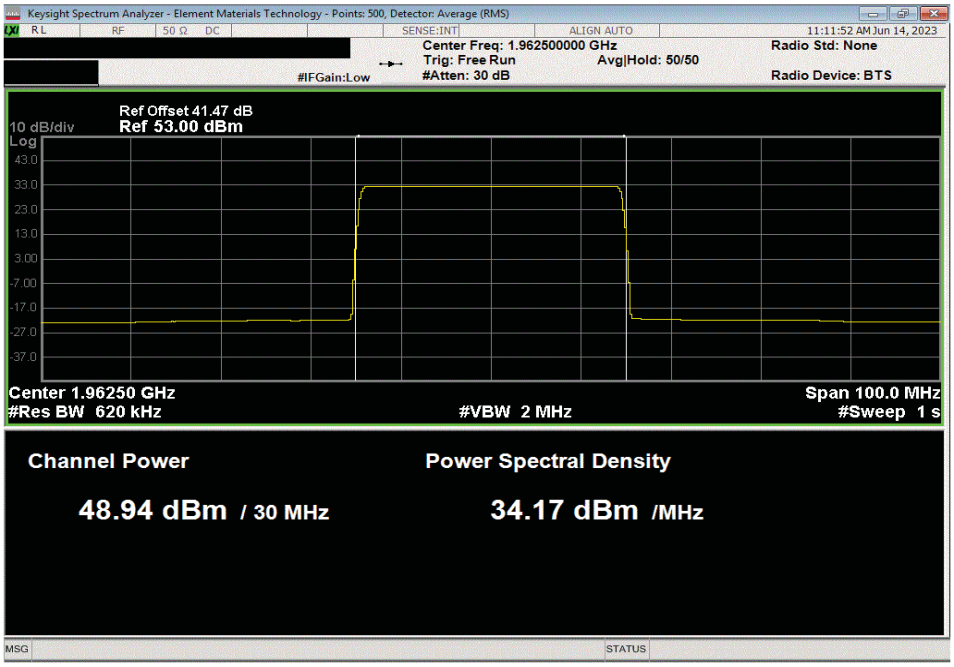



| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, Low Channel 1945.0 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value (dBm/MHz) | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) (dBm/Carrier BW) | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 48.966 | 0 | 49 | 52 | 55 | |

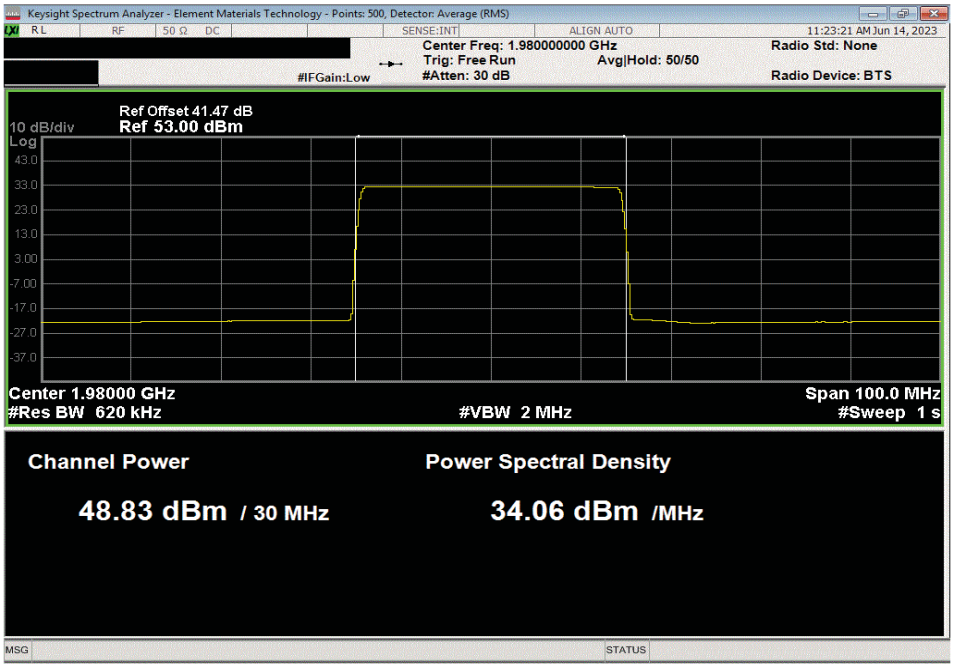


# AVERAGE POWER - n25

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, Mid Channel 1962.5 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 | |
| | 48.937 | 0 | 48.9 | 51.9 | 54.9 | |




| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, High Channel 1980.0 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 | |
| | 48.827 | 0 | 48.8 | 51.8 | 54.8 | |



# AVERAGE POWER - n66

XMit 2023.02.14.0

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 |
|---|---|---|---|---|---|
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2023-02-09 | 2024-02-09 |
| Block - DC | Fairview Microwave | SD3235-2148 | ANF | 2023-05-24 | 2024-05-24 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |

**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 measurement. This method uses trace averaging across 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, to the measured power to compute the average power during the actual transmission times.

RF conducted emissions was performed only on one port. The testing was performed on the same version of hardware (AHFIG) as the original certification test. The AHFIG antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in original certification testing) and antenna port 1 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.

# AVERAGE POWER - n66

TbtTx 2022.05.02.0 XMit 2023.02.14.0

| | | | |
|---|---|---|---|
| EUT: | AHFIG (FCC C2PC) | Work Order: | NOKI0053 |
| Serial Number: | See Configuration | Date: | 06/13/2023 |
| Customer: | Nokia Solutions and Networks | Temperature: | 20.8°C |
| Attendees: | John Rattanavong, Mitchell Hill | Humidity: | 60.4% |
| Project: | None | Barometric Pres.: | 1010 mbar |
| Tested by: | Brandon Hobbs | Power: 54 VDC | Job Site: TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 27:2023 | ANSI C63.26:2015 |

**COMMENTS**

The total output power for multiport (2x2 MIMO, 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)]. The total output power for four port operation is single port + 6db [i.e. 10log(4)]. All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. Band n66 carriers are enabled at maximum power (40 watts).

**DEVIATIONS FROM TEST STANDARD**

None

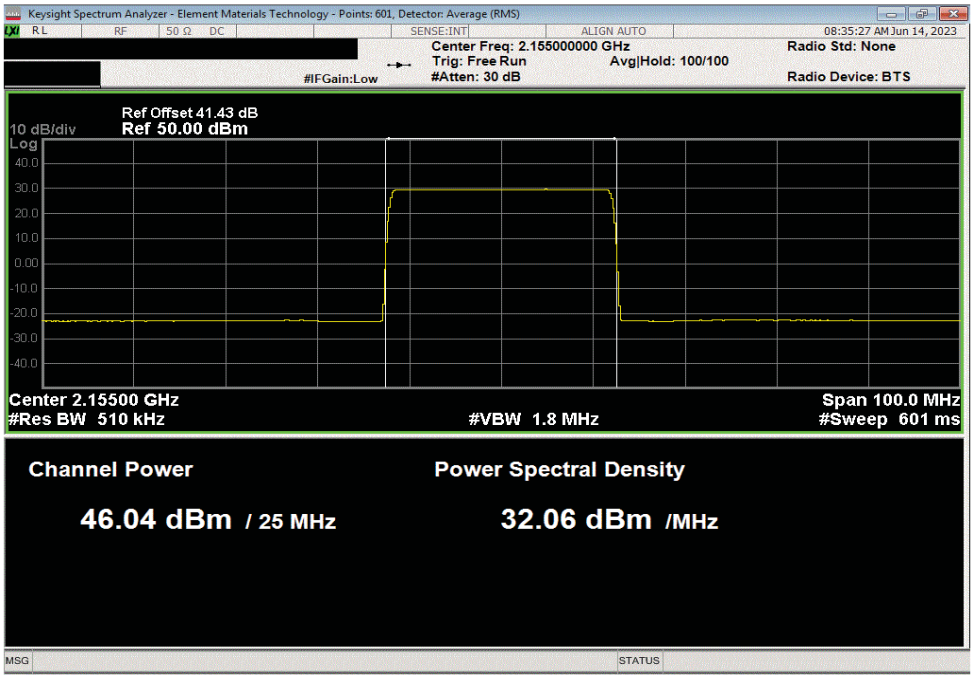
| Configuration # | NOKI0053-2 | Signature |
|---|---|---|

| | Initial Power (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 |
|---|---|---|---|---|---|
| Band n66 2110 MHz - 2200 MHz, 5G NR | | | | | |
| Port 1 | | | | | |
| 25 MHz Bandwidth | | | | | |
| QPSK Modulation | | | | | |
| Mid Channel 2155 MHz | 46.035 | 0 | 46.0 | 49.0 | 52.0 |
| 16-QAM Modulation | | | | | |
| Mid Channel 2155 MHz | 45.910 | 0 | 45.9 | 48.9 | 51.9 |
| 64-QAM Modulation | | | | | |
| Mid Channel 2155 MHz | 46.199 | 0 | 46.2 | 49.2 | 52.2 |
| 256-QAM Modulation | | | | | |
| Low Channel 2122.5 MHz | 46.322 | 0 | 46.3 | 49.3 | 52.3 |
| Mid Channel 2155 MHz | 45.990 | 0 | 46.0 | 49.0 | 52.0 |
| High Channel 2187.5 MH: | 46.140 | 0 | 46.1 | 49.1 | 52.1 |
| 30 MHz Bandwidth | | | | | |
| QPSK Modulation | | | | | |
| Mid Channel 2155 MHz | 45.831 | 0 | 45.8 | 48.8 | 51.8 |
| 16-QAM Modulation | | | | | |
| Mid Channel 2155 MHz | 45.810 | 0 | 45.8 | 48.8 | 51.8 |
| 64-QAM Modulation | | | | | |
| Mid Channel 2155 MHz | 45.855 | 0 | 45.9 | 48.9 | 51.9 |
| 256-QAM Modulation | | | | | |
| Low Channel 2125 MHz | 45.981 | 0 | 46.0 | 49.0 | 52.0 |
| Mid Channel 2155 MHz | 45.845 | 0 | 45.8 | 48.8 | 51.8 |
| High Channel 2185 MHz | 45.774 | 0 | 45.8 | 48.8 | 51.8 |

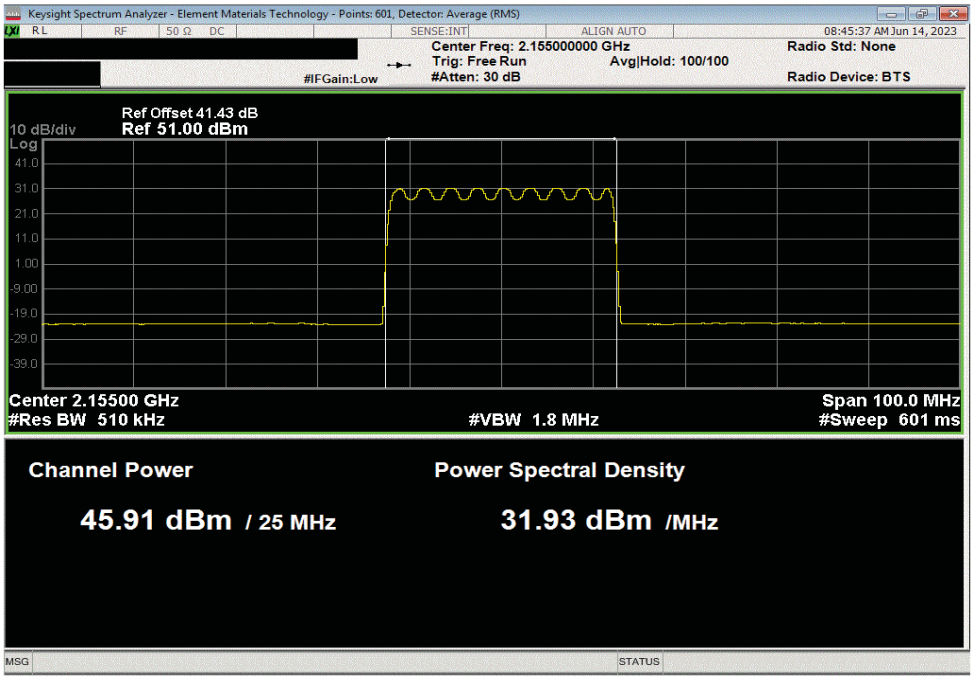
# AVERAGE POWER - n66



| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, QPSK Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Power (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 | |
| | 46.035 | 0 | 46 | 49 | 52 | |



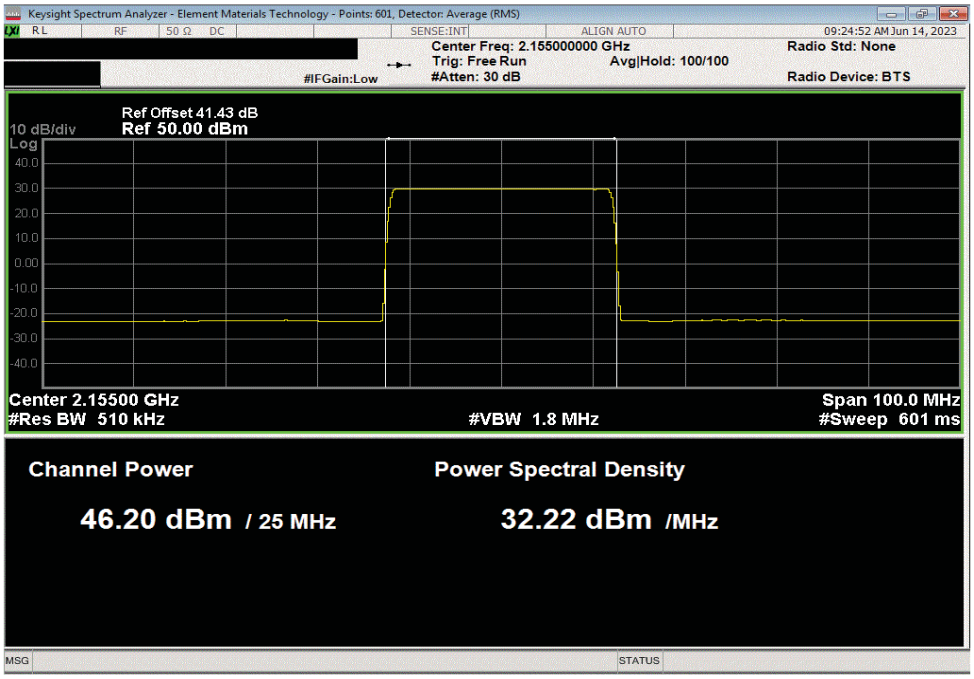

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 16-QAM Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Power (dBm/MHz) | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 45.91 | 0 | 45.9 | 48.9 | 51.9 | |



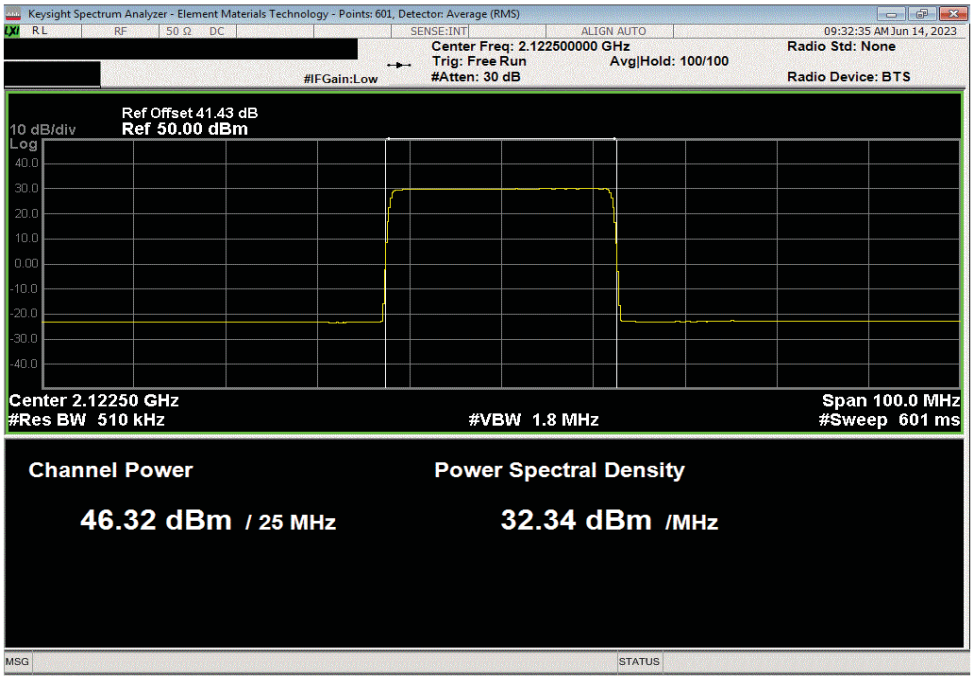
# AVERAGE POWER - n66



| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 64-QAM Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Power (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 | |
| | 46.199 | 0 | 46.2 | 49.2 | 52.2 | |



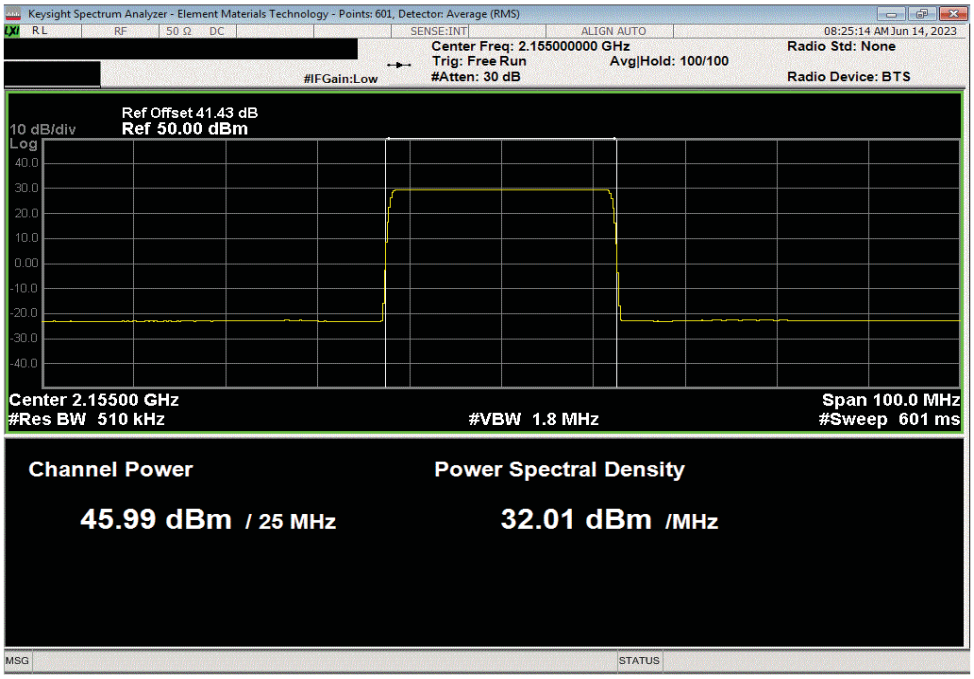

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, Low Channel 2122.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Power (dBm/MHz) | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 46.322 | 0 | 46.3 | 49.3 | 52.3 | |



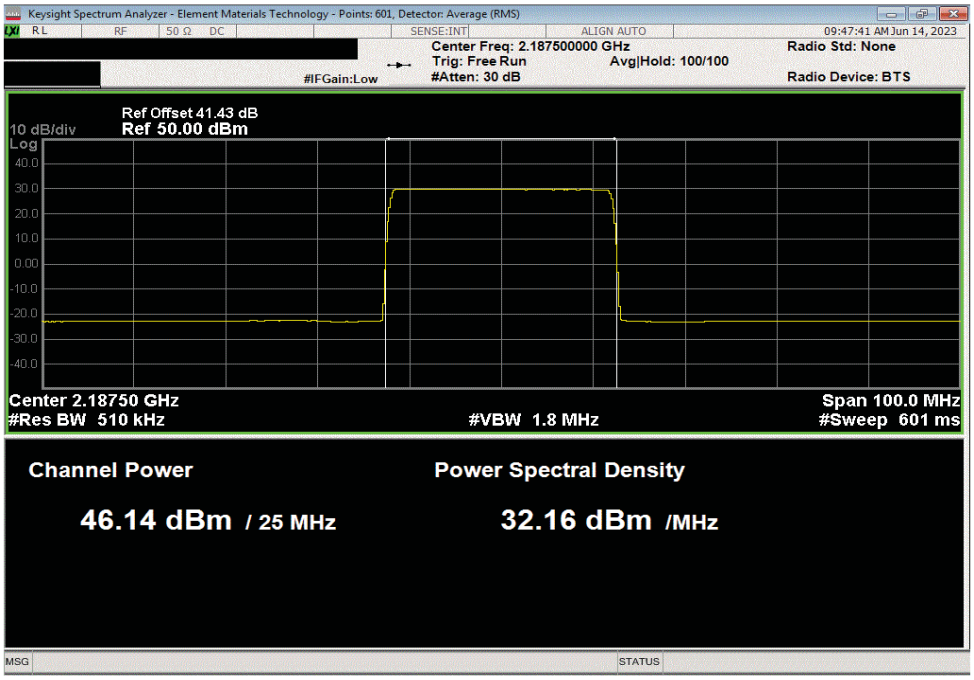
# AVERAGE POWER - n66



| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Power (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 | |
| | 45.99 | 0 | 46 | 49 | 52 | |



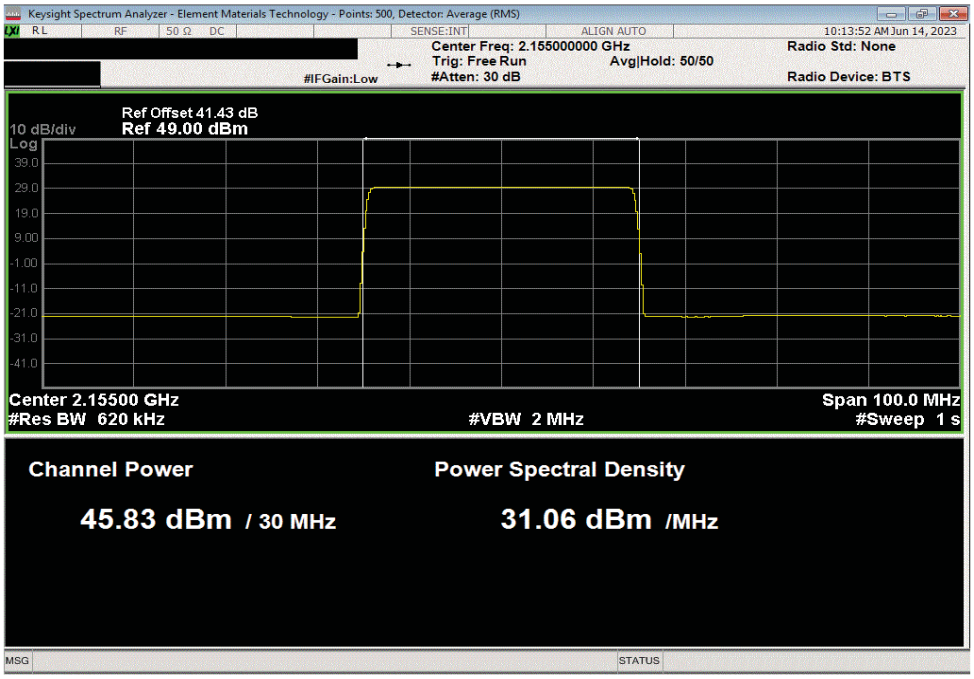

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, High Channel 2187.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Power (dBm/MHz) | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 46.14 | 0 | 46.1 | 49.1 | 52.1 | |



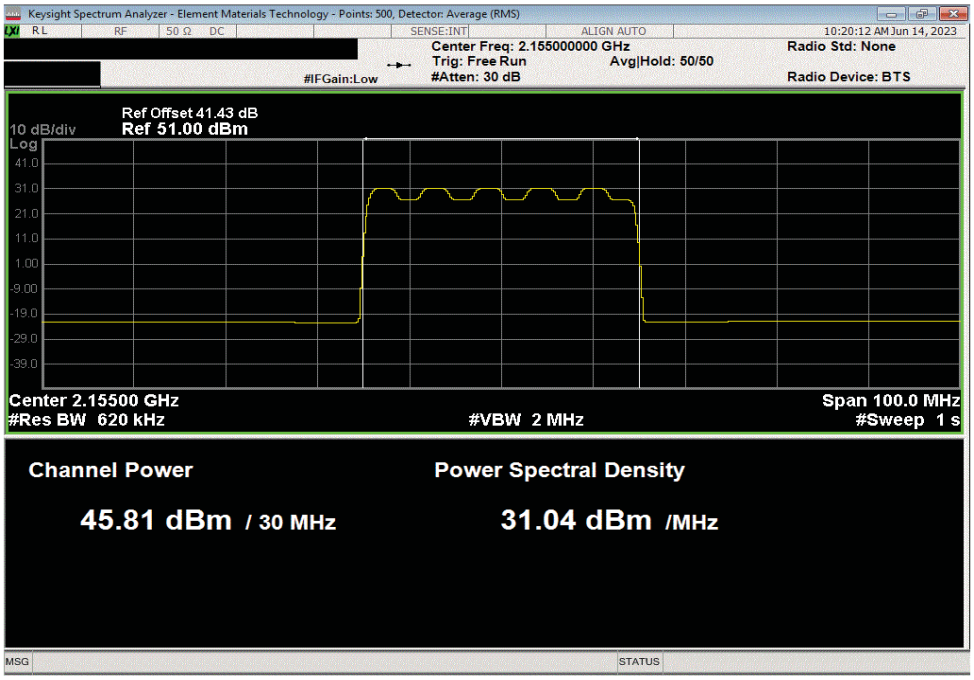
# AVERAGE POWER - n66



| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, QPSK Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Power (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 | |
| | 45.831 | 0 | 45.8 | 48.8 | 51.8 | |

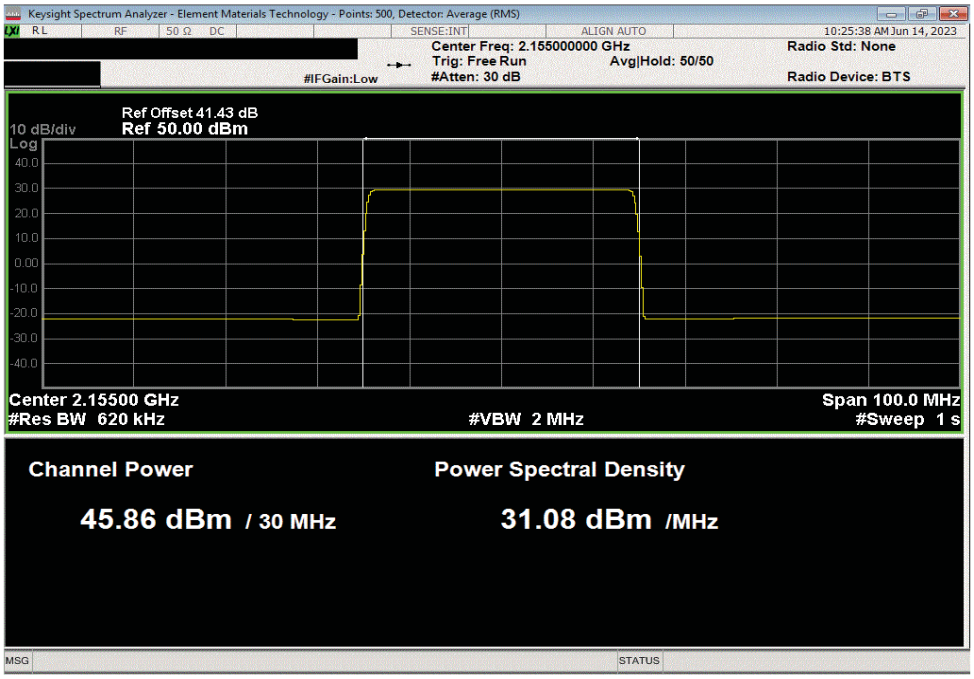



| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 16-QAM Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Power (dBm/MHz) | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 45.81 | 0 | 45.8 | 48.8 | 51.8 | |

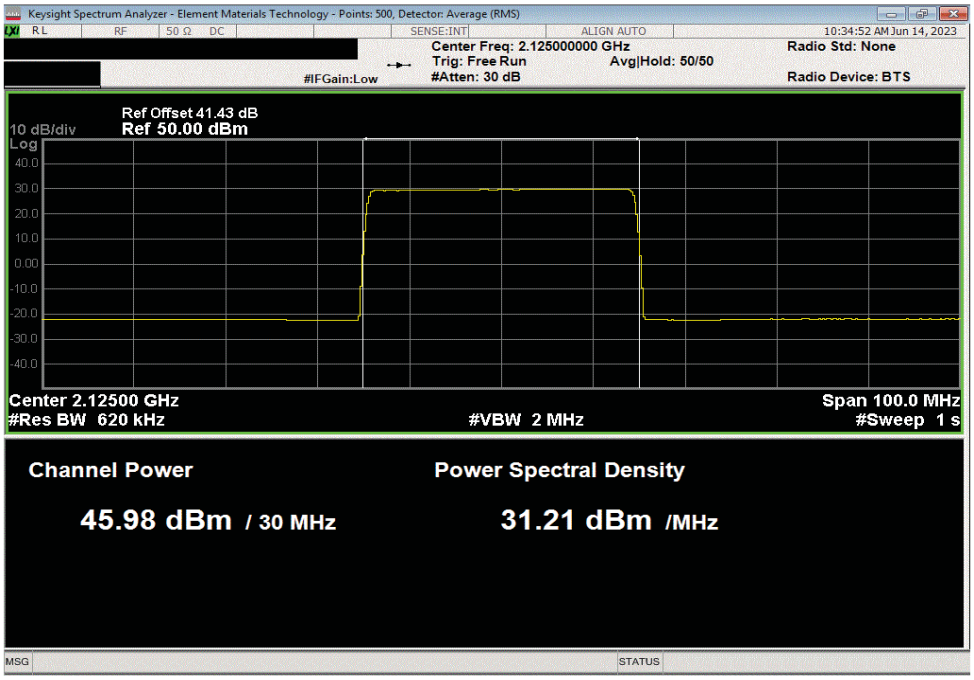


# AVERAGE POWER - n66

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 64-QAM Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Power (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 | |
| | 45.855 | 0 | 45.9 | 48.9 | 51.9 | |



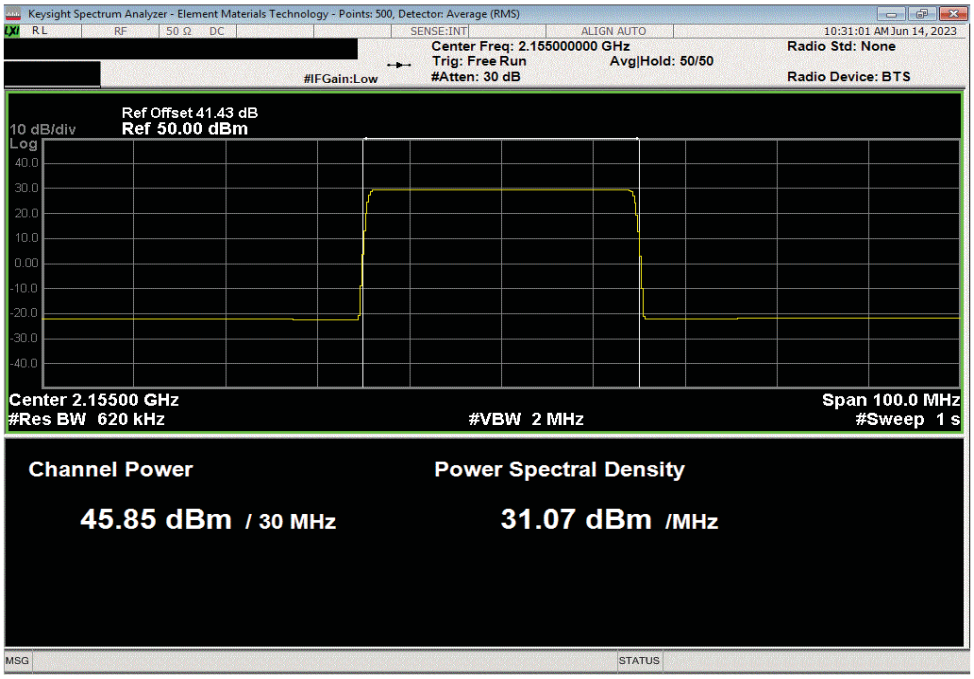

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, Low Channel 2125 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Power (dBm/MHz) | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | Four Port (4x4 MIMO) dBm/Carrier BW | |
| | 45.981 | 0 | 46 | 49 | 52 | |



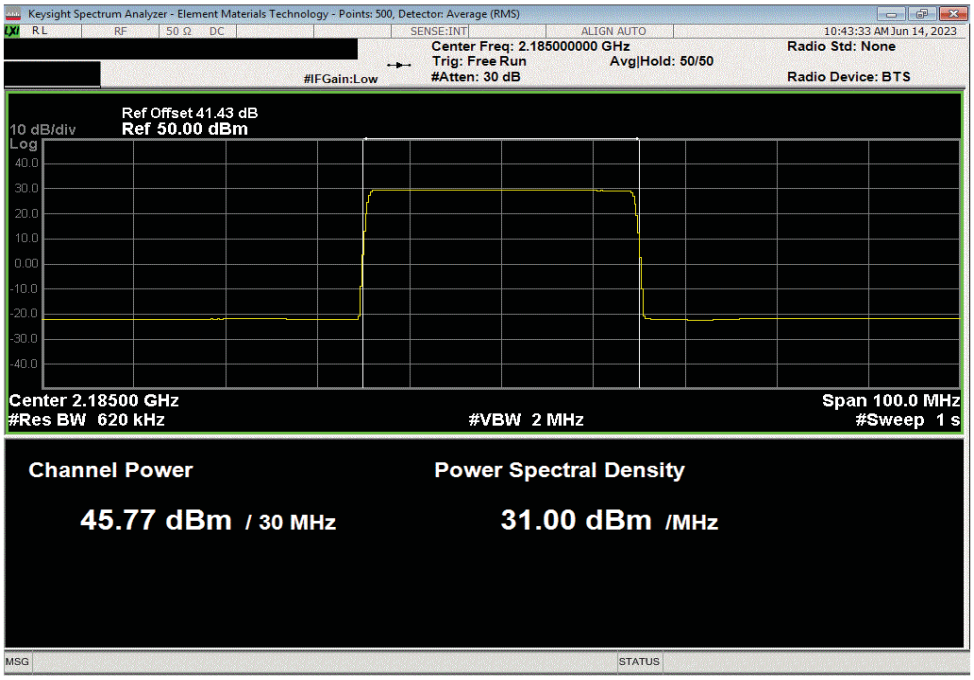
# AVERAGE POWER - n66



| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Power (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 | |
| | 45.845 | 0 | 45.8 | 48.8 | 51.8 | |




| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, High Channel 2185 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Power (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 | |
| | 45.774 | 0 | 45.8 | 48.8 | 51.8 | |



# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n25

XMit 2023.02.14.0

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 | SD3235-2148 | ANF | 2023-05-24 | 2024-05-24 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2023-02-09 | 2024-02-09 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |

**TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission power spectral density was measured using the channels and modes as called out on the following data sheets.

The method of ANSI C63.26-2015 section 5.2.4.5 was used to make this measurement.

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHFIG) as the original certification test. The AHFIG antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the original certification testing) and antenna port 1 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 PSD for all antenna ports (at the radio output) were determined per ANSI C63.26-2015 paragraph 6.4.3.2.4. The EIRP calculations are based upon ANSI C63.26-2015 paragraphs 6.4 for a four port MIMO base station.

EIRP Requirements:

FCC Requirements: Part 24.232 Power and antenna height limits.
(a)(2) Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below. a)(3) Base station antenna heights may exceed 300 meters HAAT with a corresponding reduction in power; see Tables 1 and 2 of this section.

b)(2) Base stations that are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census, with an emission bandwidth greater than 1 MHz are limited to 3280 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.

# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n25

TbiTx 2022.05.02.0 XMit 2023.02.14.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | AHFIG (FCC C2PC) | | | Work Order: | NOKI0053 |
| Serial Number: | See Configuration | | | Date: | 06/13/2023 |
| Customer: | Nokia Solutions and Networks | | | Temperature: | 21.4°C |
| Attendees: | John Rattanavong, Mitchell Hill | | | Humidity: | 58% |
| Project: | None | | | Barometric Pres.: | 1010 mbar |
| Tested by: | Brandon Hobbs | Power: | 54 VDC | Job Site: | TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 24E:2023 | ANSI C63.26:2015 |
| | |

**COMMENTS**

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. Band 25 carriers are enabled at maximum power (80 watts/carrier). The PSD was measured while transmitting one carrier on Port 1. The total PSD for multiport (2x2 MIMO, 4x4 MIMO) operation was determinded based upon ANSI 63.26 clause 6.4.3.2.4 (10 Log Nout). The total PSD for two port operation is single port PSD +3dB [i.e. 10 Log(2)]. The total PSD for four port operation is single port PSD +6dB [i.e. 10 Log(4)].

**DEVIATIONS FROM TEST STANDARD**

None

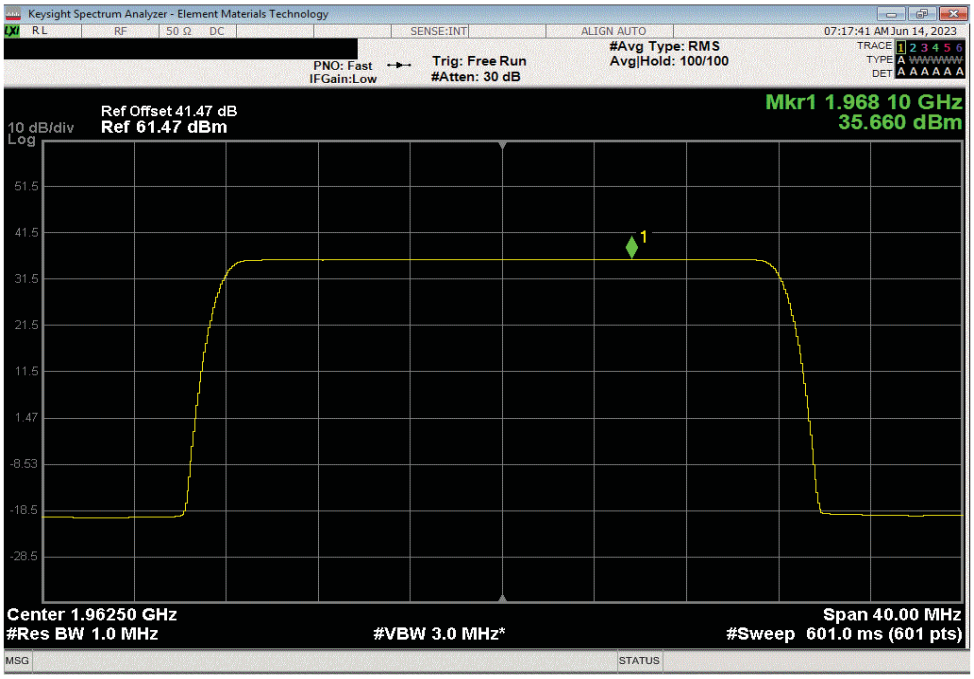
| Configuration # | NOKI0053-2 | Signature |
|---|---|---|

| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
|---|---|---|---|---|---|
| Band n25 1930 MHz - 1995 MHz, 5G NR | | | | | |
| Port 1 | | | | | |
| 25 MHz Bandwidth | | | | | |
| QPSK Modulation | | | | | |
| Mid Channel 1962.5 MHz | 35.660 | 0 | 35.7 | 38.7 | 41.7 |
| 16-QAM Modulation | | | | | |
| Mid Channel 1962.5 MHz | 37.003 | 0 | 37.0 | 40.0 | 43.0 |
| 64-QAM Modulation | | | | | |
| Mid Channel 1962.5 MHz | 35.668 | 0 | 35.7 | 38.7 | 41.7 |
| 256-QAM Modulation | | | | | |
| Low Channel 1942.5 MHz | 35.996 | 0 | 36.0 | 39.0 | 42.0 |
| Mid Channel 1962.5 MHz | 35.648 | 0 | 35.6 | 38.6 | 41.6 |
| High Channel 1982.5 MHz | 35.669 | 0 | 35.7 | 38.7 | 41.7 |
| 30 MHz Bandwidth | | | | | |
| QPSK Modulation | | | | | |
| Mid Channel 1962.5 MHz | 34.684 | 0 | 34.7 | 37.7 | 40.7 |
| 16-QAM Modulation | | | | | |
| Mid Channel 1962.5 MHz | 36.373 | 0 | 36.4 | 39.4 | 42.4 |
| 64-QAM Modulation | | | | | |
| Mid Channel 1962.5 MHz | 34.675 | 0 | 34.7 | 37.7 | 40.7 |
| 256-QAM Modulation | | | | | |
| Low Channel 1945.0 MHz | 34.916 | 0 | 34.9 | 37.9 | 40.9 |
| Mid Channel 1962.5 MHz | 34.678 | 0 | 34.7 | 37.7 | 40.7 |
| High Channel 1980.0 MHz | 34.608 | 0 | 34.6 | 37.6 | 40.6 |

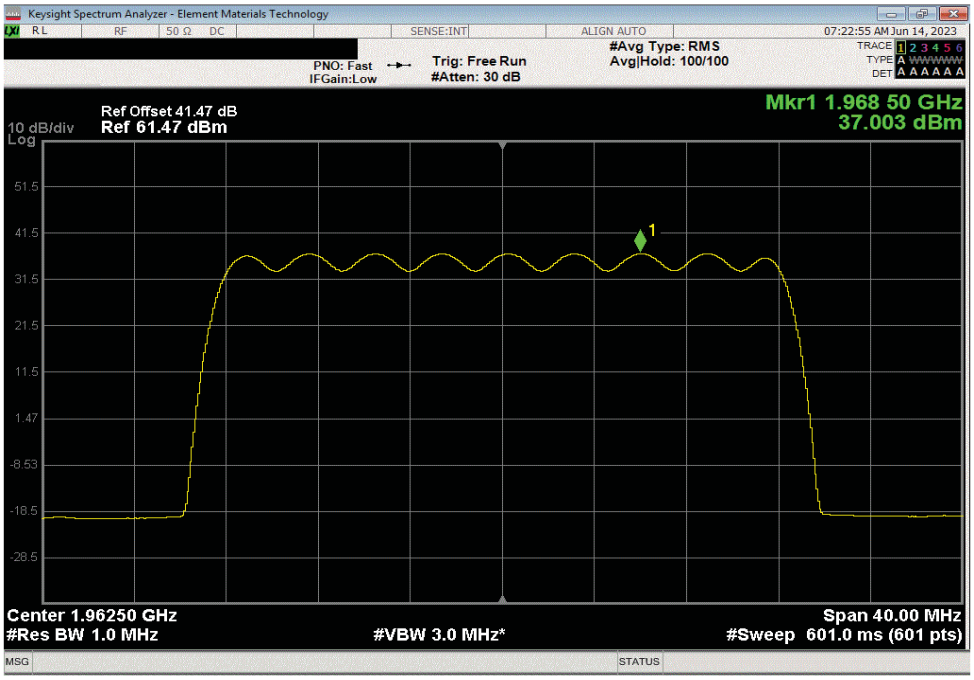
# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n25



| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, QPSK Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 35.66 | 0 | 35.7 | 38.7 | 41.7 |



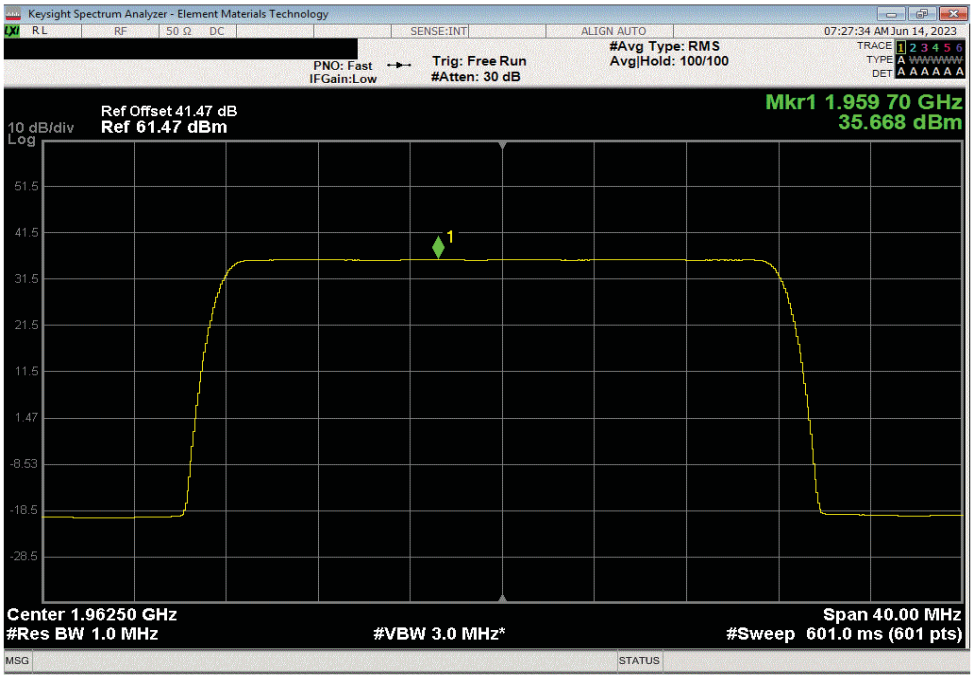

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 16-QAM Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 37.003 | 0 | 37.0 | 40.0 | 43.0 |



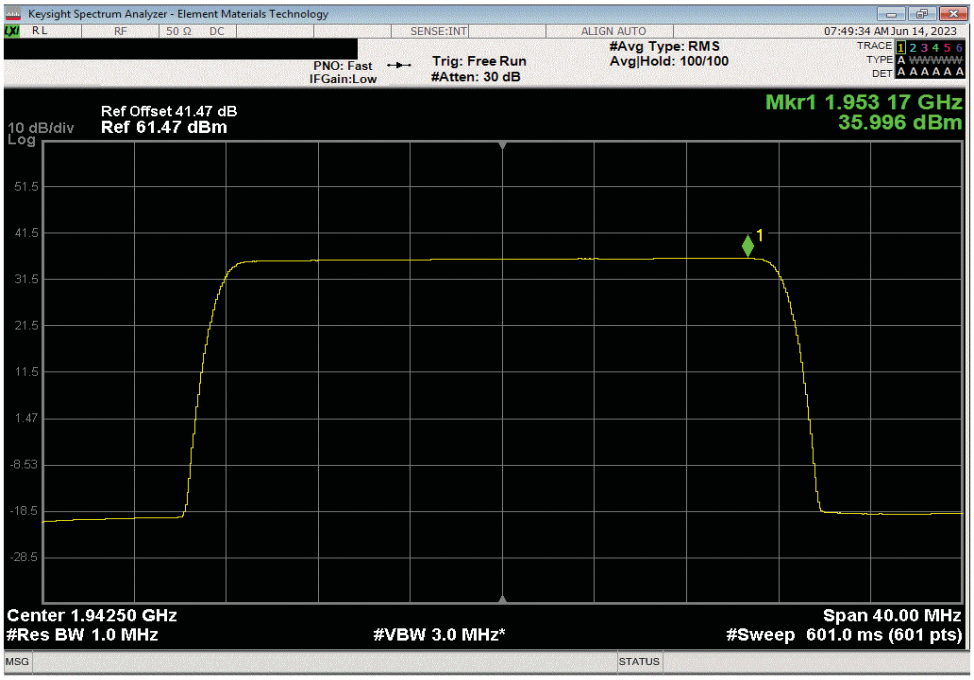
# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n25



| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 64-QAM Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 35.668 | 0 | 35.7 | 38.7 | 41.7 |



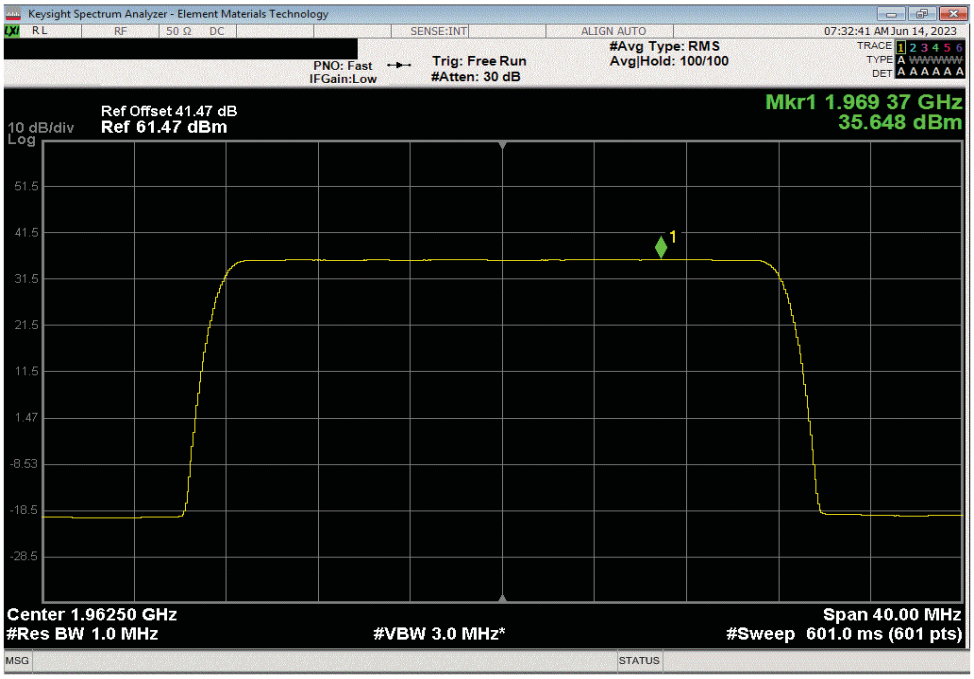

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, Low Channel 1942.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 35.996 | 0 | 36.0 | 39.0 | 42.0 |



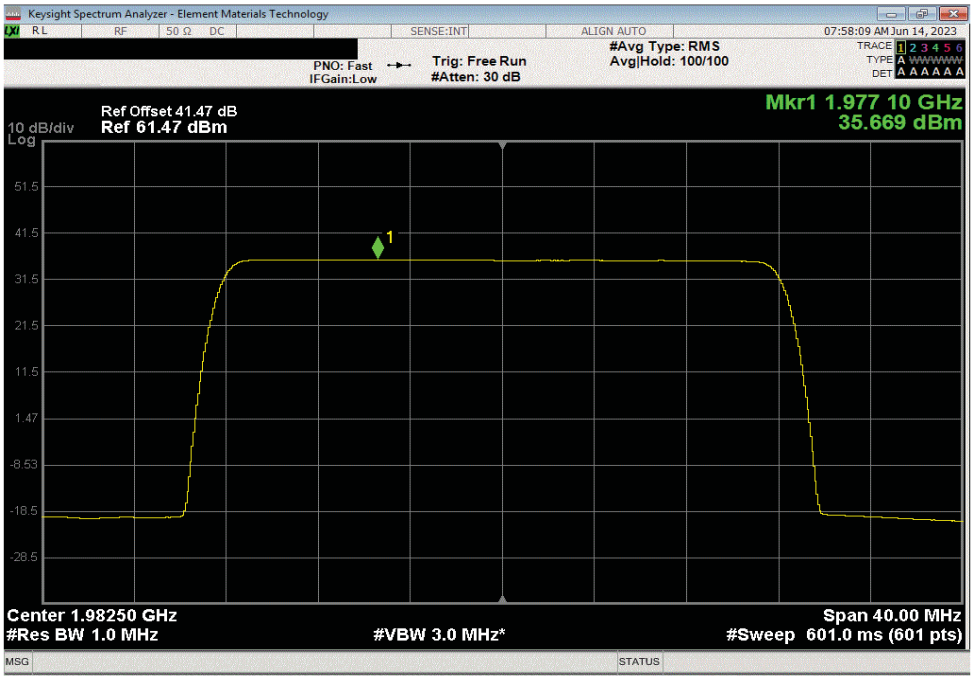
# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n25



| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 35.648 | 0 | 35.6 | 38.6 | 41.6 |



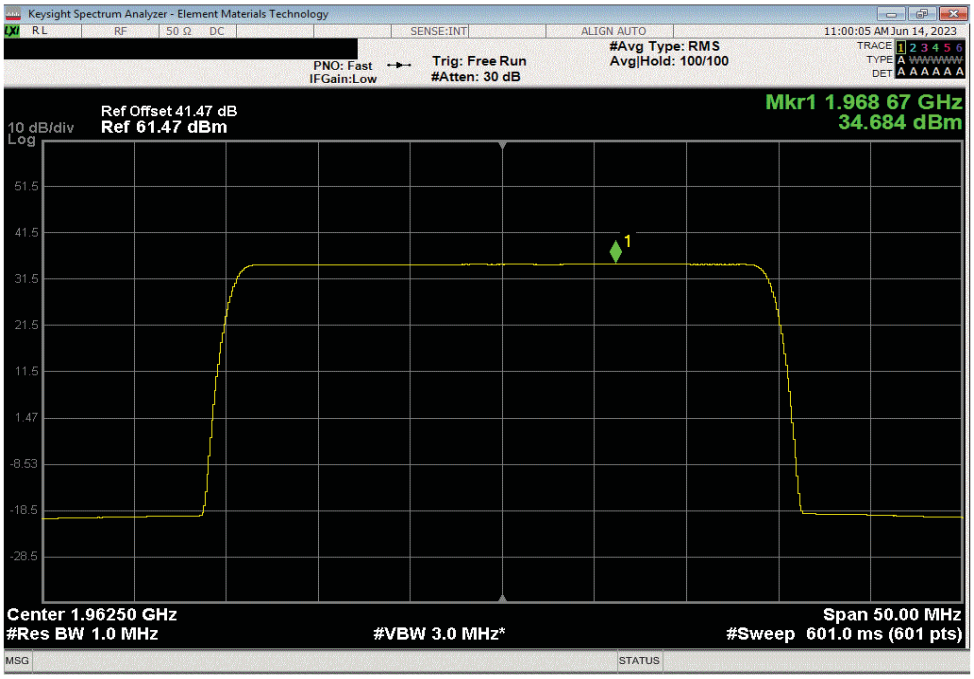

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, High Channel 1982.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 35.669 | 0 | 35.7 | 38.7 | 41.7 |



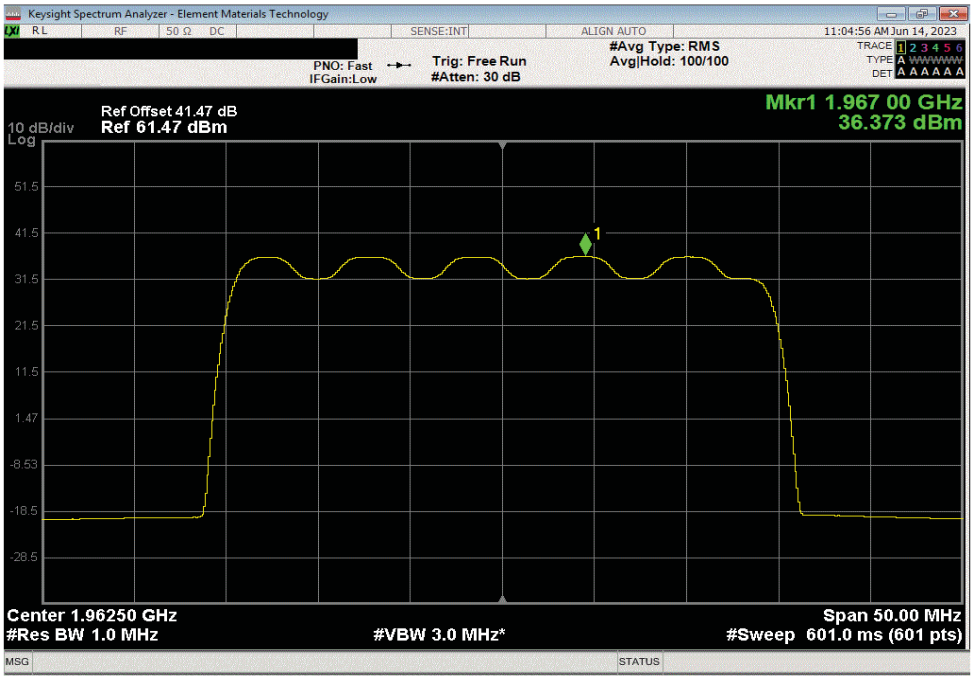
# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n25



| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, QPSK Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 34.684 | 0 | 34.7 | 37.7 | 40.7 |



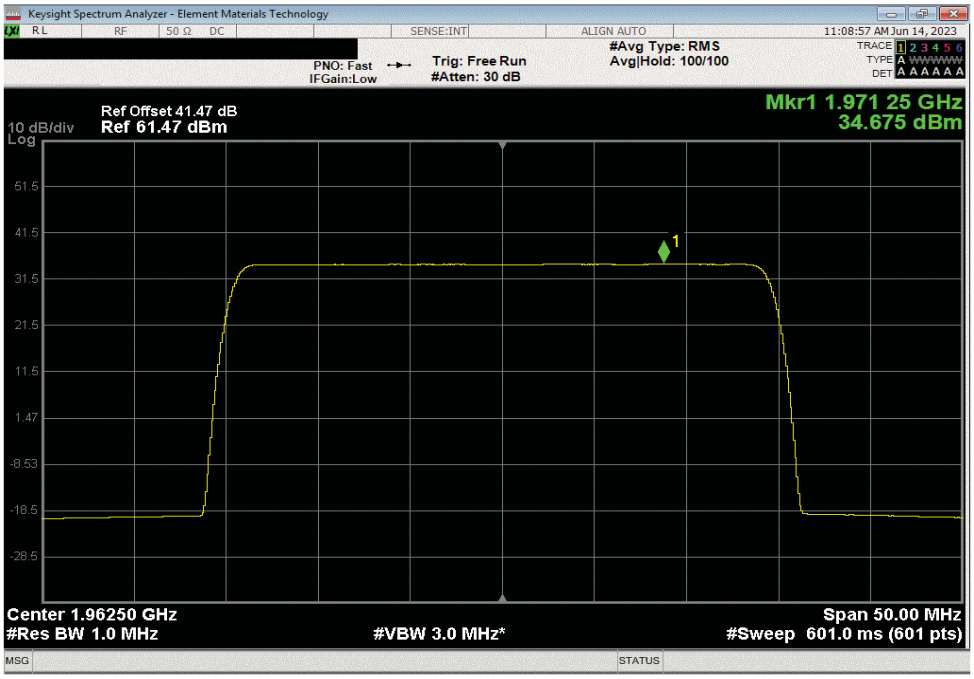

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 16-QAM Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 36.373 | 0 | 36.4 | 39.4 | 42.4 |



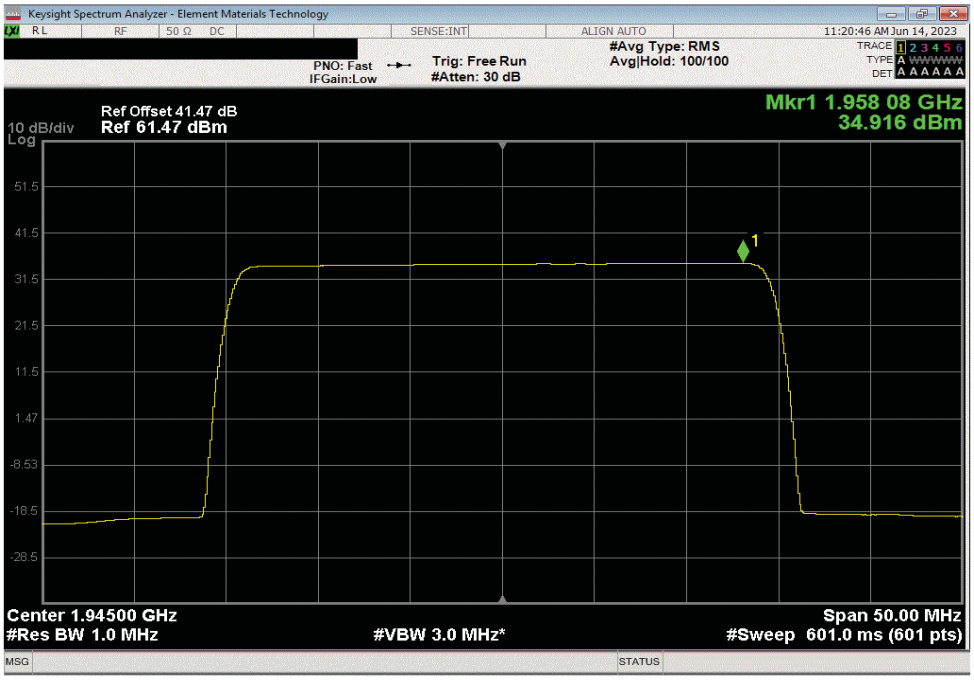
# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n25



| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 64-QAM Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 34.675 | 0 | 34.7 | 37.7 | 40.7 |



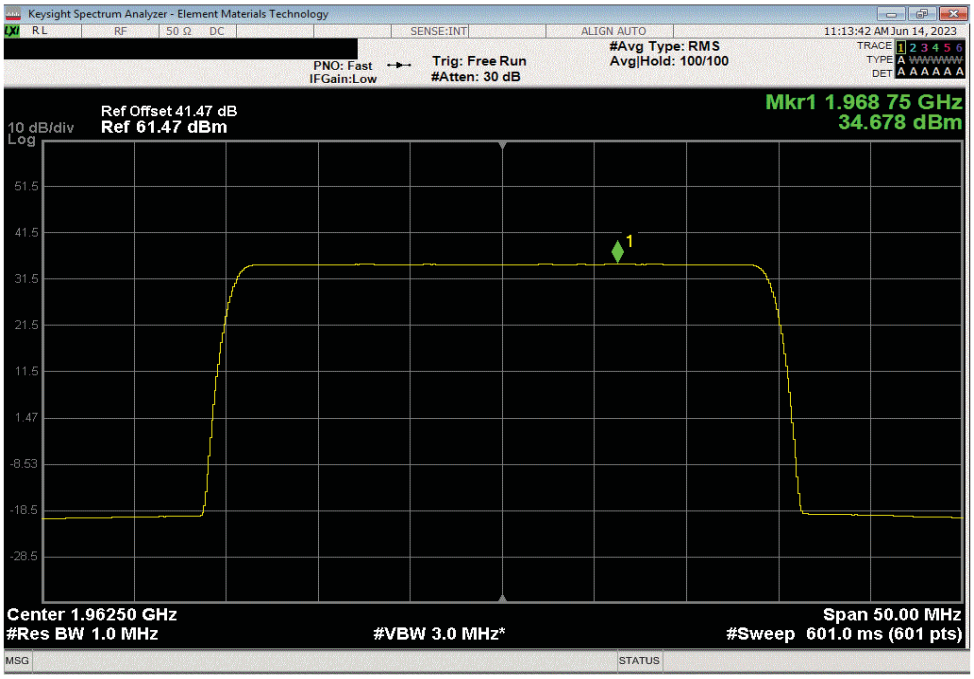

| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, Low Channel 1945.0 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 34.916 | 0 | 34.9 | 37.9 | 40.9 |



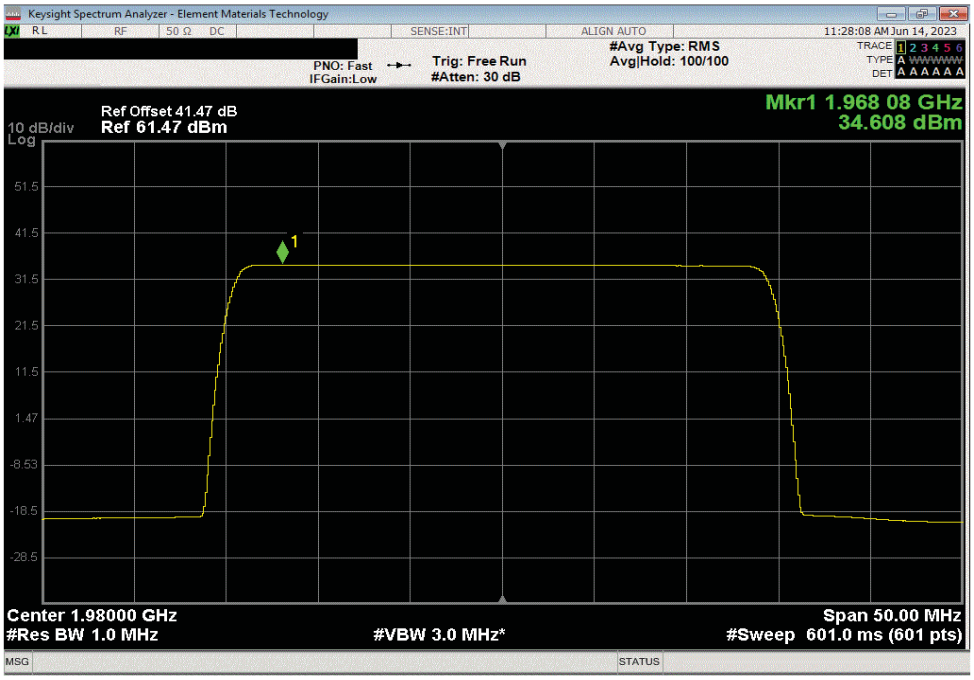
# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n25



| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, Mid Channel 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 34.678 | 0 | 34.7 | 37.7 | 40.7 |




| Band n25 1930 MHz - 1995 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, High Channel 1980.0 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 34.608 | 0 | 34.6 | 37.6 | 40.6 |



**EIRP Calculations for Four Port MIMO Operations for Band n25 Single NR Carriers**

EIRP calculations are needed at each transmitter location to optimize base station operational performance while meeting regulatory requirements. Each cell site installation needs to consider the power measurements in the radio certification report as well as site specific regulatory requirements (such as antenna height, population density, etc.), site installation parameters (line loss between antenna and radio, antenna parameters, etc.) and base station operational parameters (MIMO operational setup, carrier power level, channel bandwidth, modulation type, etc.) to optimize performance. Transmitter output power may be reduced (from maximum) by base station setup parameters. Base station antennas are selected by the customer.

The base station antenna is selected by the customer and this EIRP calculation is based upon a sample worst case antenna. The EIRP calculation is based upon Kathrein antenna assembly model "80011867". The maximum Band n25 gain (17.9dBi) for this antenna was used for the EIRP calculation. This antenna assembly has a pair of ±45° cross-polarized radiators used for Band n25. The four antenna RF inputs (used for Band n25) on the antenna assembly are as follows: Y1+ L5 (+45°), Y1- L6 (-45°), Y2+ R7 (+45°) and Y2- R8 (-45°). Four AHFII transmitter outputs are connected to the antenna assembly RF inputs.

Equivalent Isotropically Radiated Power (EIRP) is calculated (as specified in ANSI C63.26-2015 section 6.4 for uncorrelated output signals) from the results of power measurements (highest measured PSD for each channel bandwidth type). The maximum antenna gain was used for this calculation. The cable loss between the antenna and transmitter is site dependent (will not be 0 dB) but for this worst case EIRP calculation 0 dB was used. Calculations of worst-case EIRP for four port MIMO are as follows:

| Parameter | 25 MHz Ch BW | 30MHz Ch BW |
|---|---|---|
| Worst Case PSD/Antenna Port | 37.0 dBm/MHz | 36.4 dBm/MHz |
| Number of Ant Ports per Polarization | 2 | 2 |
| Total PSD per Polarization 10*Log (2) = +3 | 40 | 39.4 |
| Cable Loss (site dependent) | 0 dB | 0 dB |
| Dir Gain = Maximum Antenna Gain (GAnt) See Note 1 | 17.9 dBi | 17.9 dBi |
| EIRP per Polarization | 57.9dBm/MHz | 57.3dBm/MHz |
| Number of Polarizations | 2 | 2 |
| EIRP Total = Y1 ±45°and Y2 ±45° See Note 2 | 57.9dBm/MHz | 57.3dBm/MHz |
| Passing FCC EIRP Limits | 62.15 & 65.16 dBm/MHz | 62.15 & 65.16 dBm/MHz |

**Note 1**: The directional gain is equal to antenna gain since the transmit signals are completely uncorrelated. See ANSI C63.26 sections 6.4.5.2.3b) and 6.4.5.3.1b) for guidance.

**Note 2**: The EIRP per antenna polarity is required to be below the regulatory limit as described in ANSI C63.26-2015 section 6.4.6.3 b)2) and KDB 662911 D02v01 page 3 example (2) since the two transmitter outputs to each antenna are 90 degree-phase shifted relative to each other (cross-polarized radiators).

**EIRP Calculation Summary**

The worst case AHFIG four port MIMO Band n25 EIRP levels using antenna assembly model "80011867" are:
Less than the FCC (3280 W/MHz or 65.16 dBm/MHz) EIRP Regulatory Limits for 25MHz and 30MHz channel bandwidths.
Less than the FCC (1640 W/MHz or 62.15 dBm/MHz) EIRP Regulatory Limits for 25MHz and 30MHz channel bandwidths.

# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n66

XMit 2023.02.14.0

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 |
|---|---|---|---|---|---|
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |
| Block - DC | Fairview Microwave | SD3235-2148 | ANF | 2023-05-24 | 2024-05-24 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2023-02-09 | 2024-02-09 |

**TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission power spectral density was measured using the channels and modes as called out on the following data sheets.

The method of ANSI C63.26-2015 section 5.2.4.5 was used to make this measurement.

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHFIG) as the original certification test. The AHFIG antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the original certification testing) and antenna port 1 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 PSD for all antenna ports (at the radio output) were determined per ANSI C63.26-2015 paragraph 6.4.3.2.4. The EIRP calculations are based upon ANSI C63.26-2015 paragraphs 6.4 for a four port MIMO base station.

EIRP Requirements:

FCC Requirements:
Part 27.50(d) The following power and antenna height requirements apply to stations transmitting in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz and 2180- 2200 MHz bands: (1) The power of each fixed or base station transmitting in the 1995-2000 MHz, 2110-2155 MHz, 2155-2180 MHz or 2180- 2200 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to: (ii) An EIRP of 3280 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz. (2) The power of each fixed or base station transmitting in the 1995-2000 MHz, the 2110-2155 MHz 2155-2180 MHz band, or 2180-2200 MHz band and situated in any geographic location other than that described in paragraph (d)(1) of this section is limited to: (ii) An EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n66

TbtTx 2022.05.02.0 XMit 2023.02.14.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | AHFIG (FCC C2PC) | | | Work Order: | NOKI0053 |
| Serial Number: | See Configuration | | | Date: | 06/13/2023 |
| Customer: | Nokia Solutions and Networks | | | Temperature: | 20.9°C |
| Attendees: | John Rattanavong, Mitchell Hill | | | Humidity: | 60% |
| Project: | None | | | Barometric Pres.: | 1010 mbar |
| Tested by: | Brandon Hobbs | Power: | 54 VDC | Job Site: | TX07 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 27:2023 | ANSI C63.26:2015 |
| | |

**COMMENTS**

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. Band n66 carriers are enabled at maximum power (40 watts/carrier).The PSD was measured while transmitting one carrier on Port 1. The total PSD for multiport (2x2 MIMO and 4x4 MIMO) operation was determinded based upon ANSI 63.26 clause 6.4.3.2.4 (10 Log Nout). The total PSD for two port operation is single port PSD +3dB [i.e. 10 Log(2)]. The total PSD for four port operation is single port PSD +6dB [i.e. 10 Log(4)].

**DEVIATIONS FROM TEST STANDARD**

None

| Configuration # | NOKI0053-2 | Signature |
|---|---|---|

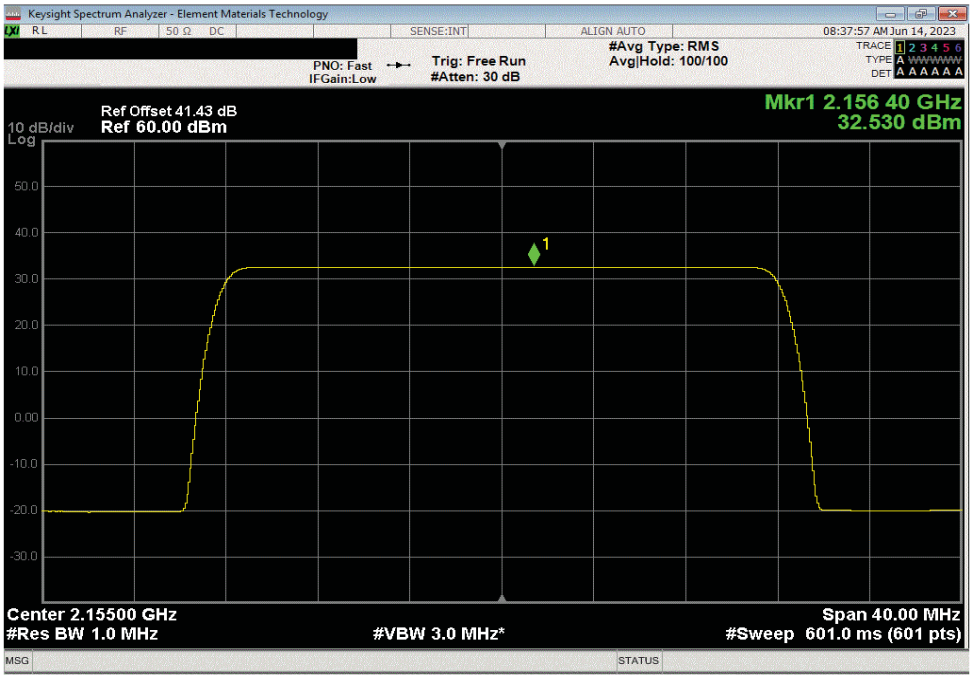
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
|---|---|---|---|---|---|
| Band n66 2110 MHz - 2200 MHz, 5G NR | | | | | |
| Port 1 | | | | | |
| 25 MHz Bandwidth | | | | | |
| QPSK Modulation | | | | | |
| Mid Channel 2155 MHz | 32.530 | 0 | 32.5 | 35.5 | 38.5 |
| 16-QAM Modulation | | | | | |
| Mid Channel 2155 MHz | 33.805 | 0 | 33.8 | 36.8 | 39.8 |
| 64-QAM Modulation | | | | | |
| Mid Channel 2155 MHz | 32.757 | 0 | 32.8 | 35.8 | 38.8 |
| 256-QAM Modulation | | | | | |
| Low Channel 2122.5 MHz | 32.905 | 0 | 32.9 | 35.9 | 38.9 |
| Mid Channel 2155 MHz | 32.519 | 0 | 32.5 | 35.5 | 38.5 |
| High Channel 2187.5 MHz | 32.654 | 0 | 32.7 | 35.7 | 38.7 |
| 30 MHz Bandwidth | | | | | |
| QPSK Modulation | | | | | |
| Mid Channel 2155 MHz | 31.626 | 0 | 31.6 | 34.6 | 37.6 |
| 16-QAM Modulation | | | | | |
| Mid Channel 2155 MHz | 33.261 | 0 | 33.3 | 36.3 | 39.3 |
| 64-QAM Modulation | | | | | |
| Mid Channel 2155 MHz | 31.558 | 0 | 31.6 | 34.6 | 37.6 |
| 256-QAM Modulation | | | | | |
| Low Channel 2125 MHz | 31.791 | 0 | 31.8 | 34.8 | 37.8 |
| Mid Channel 2155 MHz | 31.602 | 0 | 31.6 | 34.6 | 37.6 |
| High Channel 2185 MHz | 31.570 | 0 | 31.6 | 34.6 | 37.6 |

# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n66

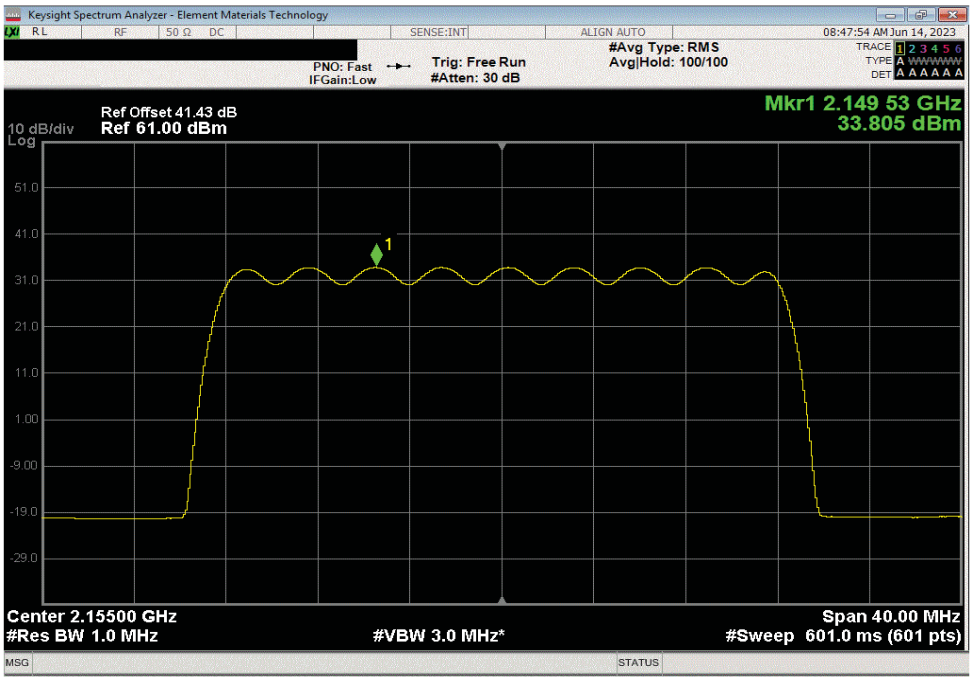
element

TbtTx 2022.05.02.0 XMit 2023.02.14.0

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, QPSK Modulation, Mid Channel 2155 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD | |
| | | 32.53 | 0 | 32.5 | 35.5 | 38.5 | |



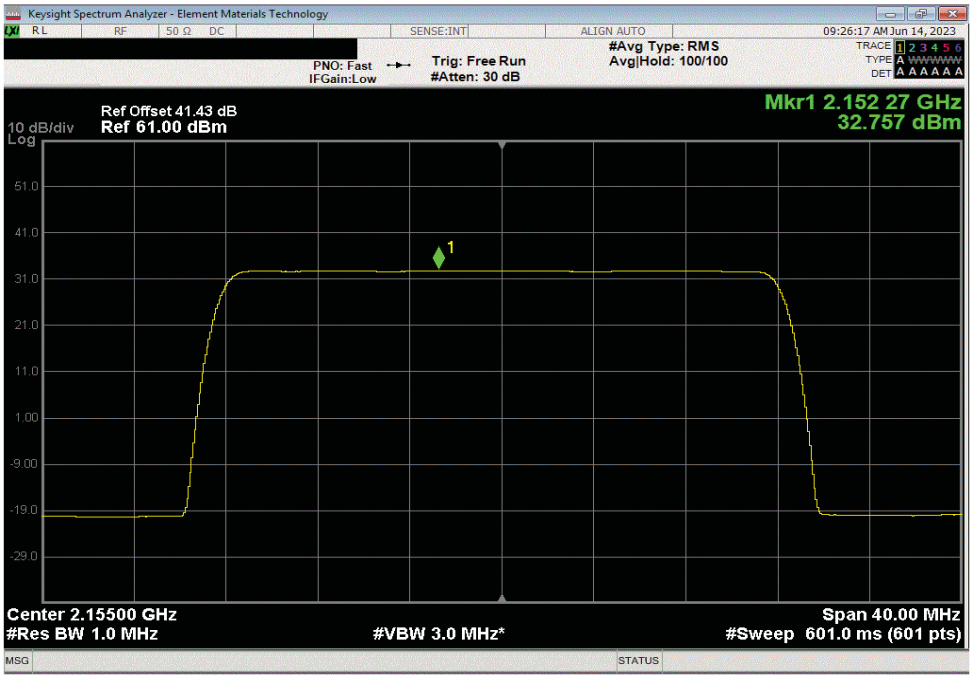

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 16-QAM Modulation, Mid Channel 2155 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD | |
| | | 33.805 | 0 | 33.8 | 36.8 | 39.8 | |



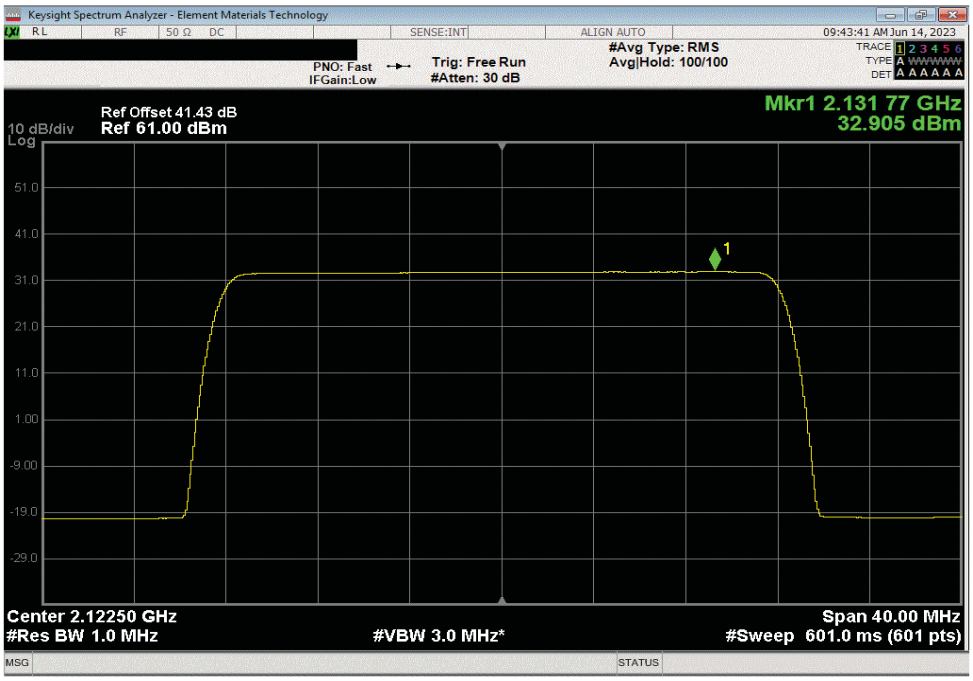
# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n66



| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 64-QAM Modulation, Mid Channel 2155 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD | |
| | | 32.757 | 0 | 32.8 | 35.8 | 38.8 | |



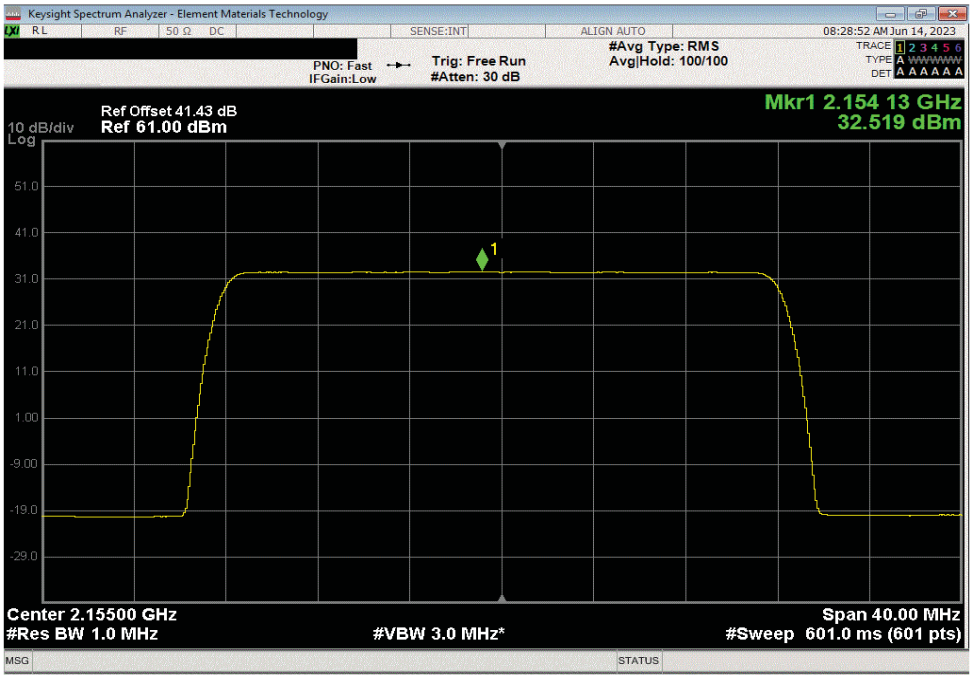

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, Low Channel 2122.5 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD | |
| | | 32.905 | 0 | 32.9 | 35.9 | 38.9 | |



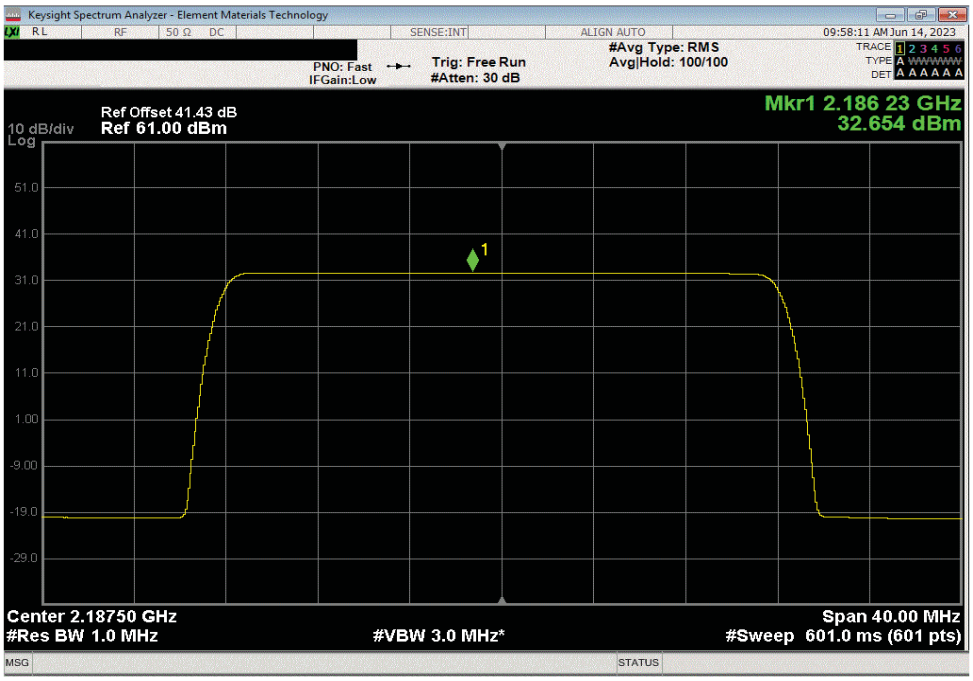
# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n66



| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, Mid Channel 2155 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD | |
| | | 32.519 | 0 | 32.5 | 35.5 | 38.5 | |



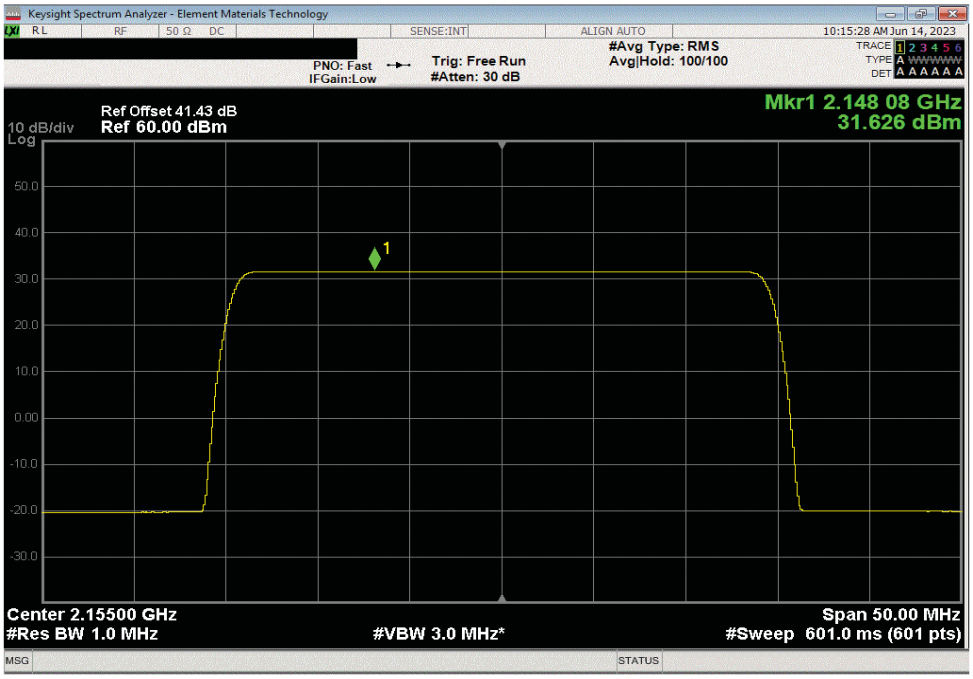

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 25 MHz Bandwidth, 256-QAM Modulation, High Channel 2187.5 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD | |
| | | 32.654 | 0 | 32.7 | 35.7 | 38.7 | |



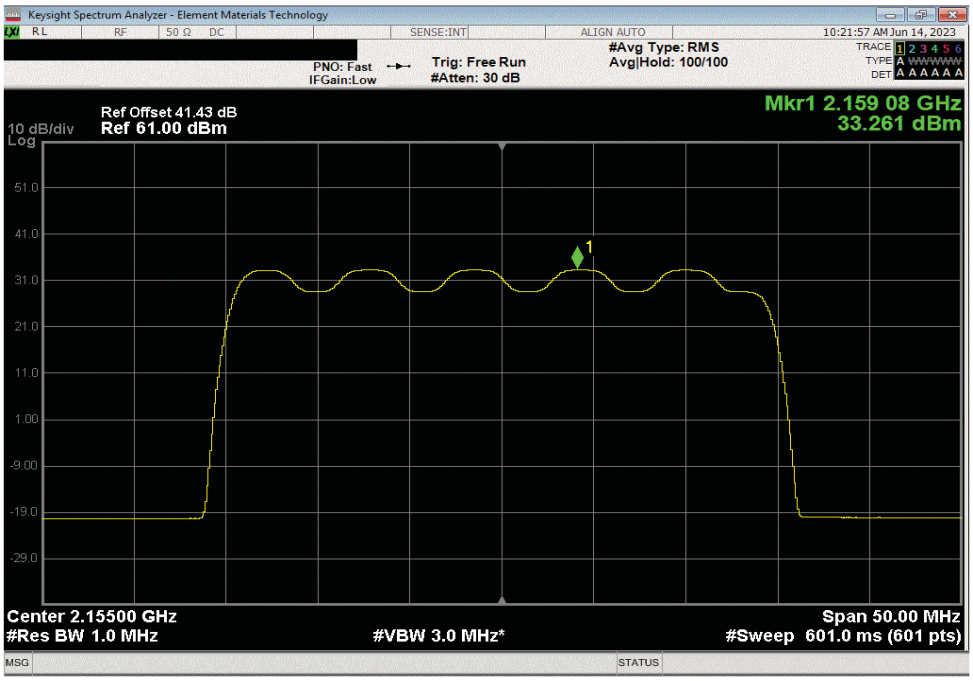
# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n66

TbtTx 2022.05.02.0 XMit 2023.02.14.0

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, QPSK Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 31.626 | 0 | 31.6 | 34.6 | 37.6 |



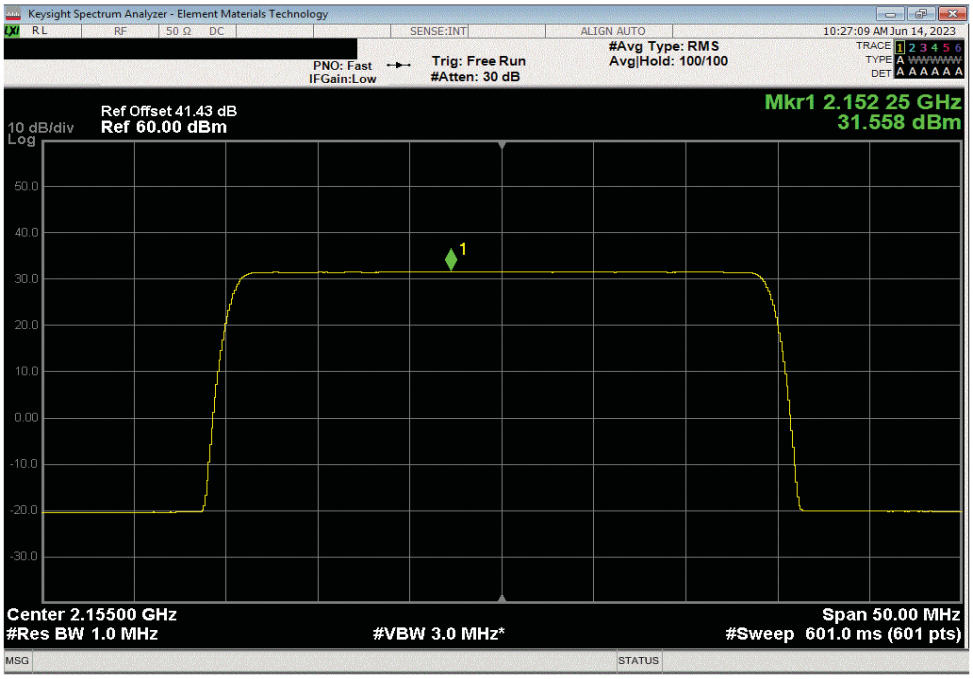

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 16-QAM Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 33.261 | 0 | 33.3 | 36.3 | 39.3 |



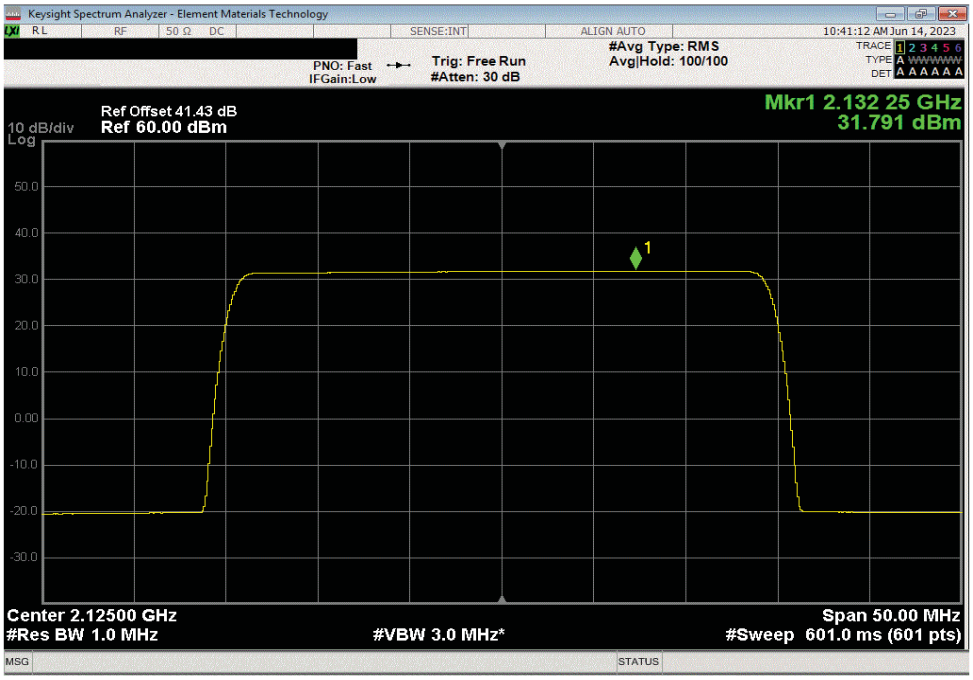
# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n66



| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 64-QAM Modulation, Mid Channel 2155 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD | |
| | | 31.558 | 0 | 31.6 | 34.6 | 37.6 | |



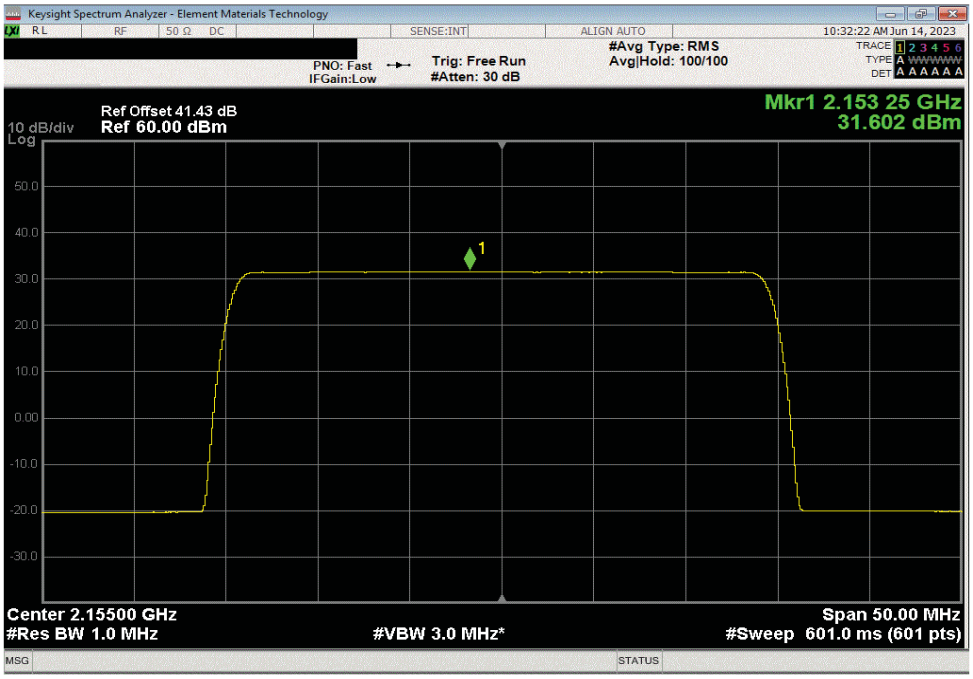

| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, Low Channel 2125 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD | |
| | | 31.791 | 0 | 31.8 | 34.8 | 37.8 | |



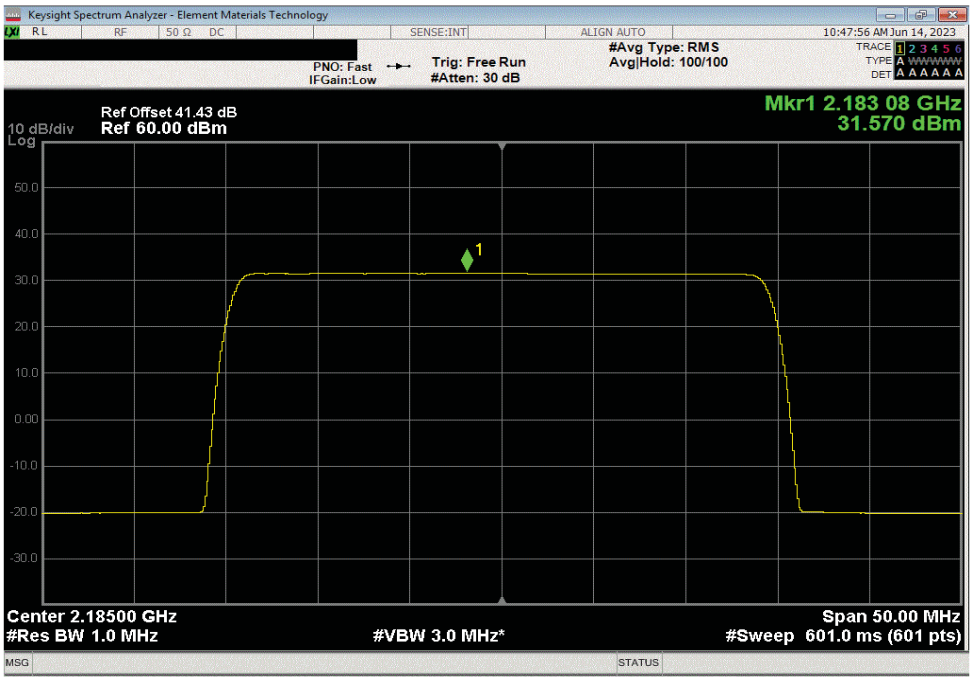
# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS- BAND n66



| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, Mid Channel 2155 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 31.602 | 0 | 31.6 | 34.6 | 37.6 |




| Band n66 2110 MHz - 2200 MHz, 5G NR , Port 1, 30 MHz Bandwidth, 256-QAM Modulation, High Channel 2185 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz = PSD | Two Port (2x2 MIMO) dBm/MHz = PSD | Four Port (4x4 MIMO) dBm/MHz = PSD |
| | | 31.57 | 0 | 31.6 | 34.6 | 37.6 |



**EIRP Calculations for Four Port MIMO Operations for Band n66 Single NR Carriers**

EIRP calculations are needed at each transmitter location to optimize base station operational performance while meeting regulatory requirements. Each cell site installation needs to consider the power measurements in the radio certification report as well as site specific regulatory requirements (such as antenna height, population density, etc.), site installation parameters (line loss between antenna and radio, antenna parameters, etc.) and base stationoperational parameters (MIMO operational setup, carrier power level, channel bandwidth, modulation type, etc.) to optimize performance. Transmitter output power may be reduced (from maximum) by base station setup parameters. Base station antennas are selected by the customer.

The base station antenna is selected by the customer and this EIRP calculation is based upon a sample worst case antenna. TheEIRP calculation is based upon Kathrein antenna assembly model "80011867". The maximum Band n66 gain (18.2dBi) for this antenna was used for the EIRP calculation.This antenna assembly has a pair of ±45° cross-polarized radiators used for Band n66. The four antenna RF inputs (used for Band n66) on the antenna assembly are as follows: Y1+ L5 (+45°), Y1- L6 (-45°), Y2+ R7 (+45°) and Y2- R8 (-45°). Four AHFII transmitter outputs are connected to the antenna assembly RF inputs.

Equivalent Isotropically Radiated Power (EIRP) is calculated (as specified in ANSI C63.26-2015 section 6.4 for uncorrelated output signals) from the results of power measurements (highest measured PSD for each channel bandwidth type). The maximum antenna gain was used for this calculation.The cable loss between the antenna and transmitter is site dependent (will not be 0 dB) but for this worst case EIRP calculation 0 dB was used. Calculations of worst-case EIRP for four port MIMO are as follows:

| Parameter | 25 MHz Ch BW | 30 MHz Ch BW |
|---|---|---|
| Worst Case PSD/Antenna Port | 33.8 dBm/MHz | 33.3 dBm/MHz |
| Number of Ant Ports per Polarization | 2 | 2 |
| Total PSD per Polarization 10*log(2) = +3 | 36.8 | 36.3 |
| Cable Loss (site dependent) | 0 dB | 0 dB |
| Dir Gain = Maximum Antenna Gain (GAnt) See Note 1 | 18.2 dBi | 18.2 dBi |
| EIRP per Polarization | 55.0 dBm/MHz | 54.5 dBm/MHz |
| Number of Polarizations | 2 | 2 |
| EIRP Total = Y1 ±45°and Y2 +45° See Note 2 | 55.0 dBm/MHz | 54.5 dBm/MHz |
| Passing FCC EIRP Limits | 62.15 & 65.16 dBm/MHz | 62.15 & 65.16 dBm/MHz |

**Note 1**: The directional gain is equal to antenna gain since the transmit signals are completely uncorrelated. See ANSI C63.26 sections 6.4.5.2.3b) and 6.4.5.3.1b) for guidance.
**Note 2**: The EIRP per antenna polarity is required to be below the regulatory limit as described in ANSI C63.26-2015 section 6.4.6.3 b)2) and KDB 662911 D02v01 page 3 example (2) since the two transmitter outputs to each antenna are 90 degree-phase shifted relative to each other (cross-polarized radiators).

**EIRP Calculation Summary**

The worst case AHFIG four port MIMO Band n66 EIRP levels using antenna assembly model "80011867" are:

Less than the FCC (65.16 dBm/MHz) EIRP Regulatory Limits for 25 MHz and 30MHz channel bandwidths.
Less than the FCC (62.15 dBm/MHz) EIRP Regulatory Limits for 25 MHz and 30MHz channel bandwidths.