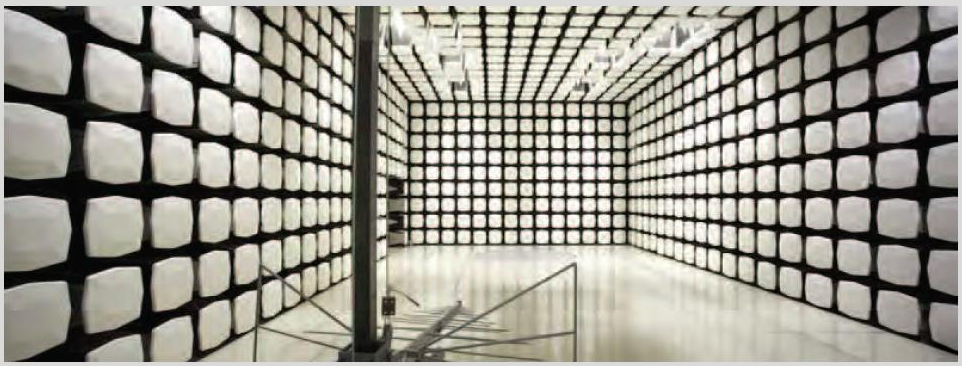
# Radio Test Report
## Application for a Permissive Change of Equipment Authorization
## FCC Part 24 and IC RSS-133
## [1930MHz – 1990MHz]

## FCC Part 27 and IC RSS-139
## [2110MHz – 2170MHz]

**FCC ID: VBNAHFII-01**
**IC ID: 661W-AHFII**

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

**Report: NOKI0040, Issue Date: June 7, 2022**



ACCREDITED
CERT #3310.03

# CERTIFICATE OF TEST

**Last Date of Test: May 16, 2022**
**Nokia Solutions and Networks**
**EUT: AirScale Base Transceiver Station Remote Radio Head Model AHFII**

## Radio Equipment Testing

### Standards

| Specification | Method |
|---|---|
| Code of Federal Regulations (CFR) Title 47 Part 2<br>(Radio Standards Specification) RSS-Gen Issue 5<br>CFR Title 47 Part 24 Subpart E – Broadband PCS<br>RSS-133 Issue 6 - January 18, 2018 – 2GHz Personal Communications Services<br>CFR Title 47 Part 27<br>RSS-139 Issue 3 - July 16, 2015 – Advanced Wireless Services (AWS) | ANSI C63.26-2015 with<br>FCC KDB 971168 D01 v03r01<br>FCC KDB 971168 D03 v01<br>FCC KDB 662911D01 v02r01 |

### Results

| Test Description | Result | Comments |
|---|---|---|
| Power Spectral Density | Pass | |
| Conducted Output Power | Pass | |
| Frequency Stability | N/A | Not required when using a pre-certified module. |
| Occupied Bandwidth | Pass | |
| Peak to Average Power (PAPR)CCDF | Pass | |
| Band Edge Compliance | Pass | |
| Spurious Emissions at the Antenna Terminals | Pass | |
| Spurious Radiated Emissions | N/A | Not required when using a pre-certified module. |

### 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

element
2021.09.01

## 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

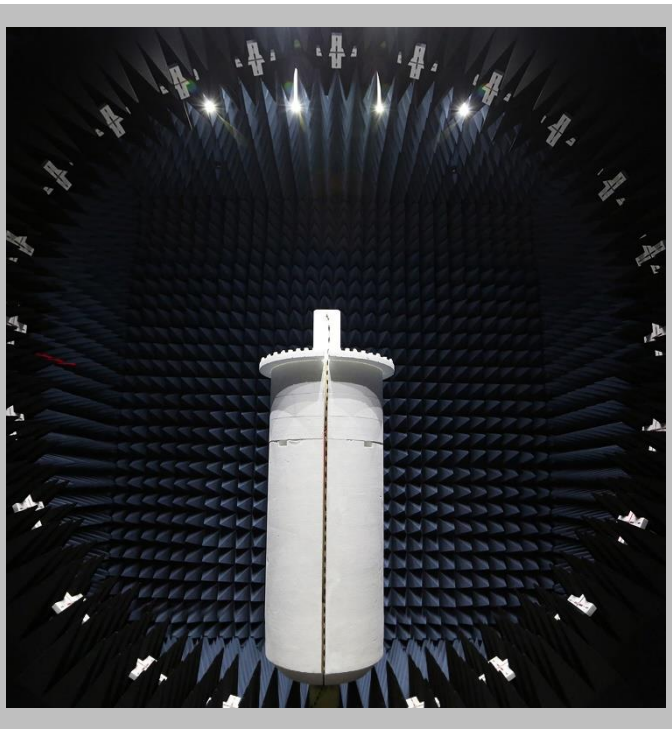
For details on the Scopes of our Accreditations, please visit:

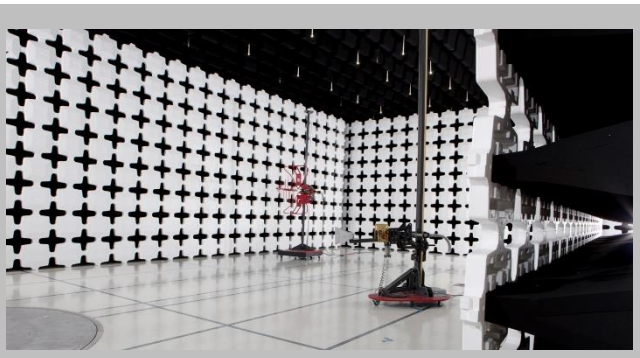
California Minnesota Oregon Texas Washington

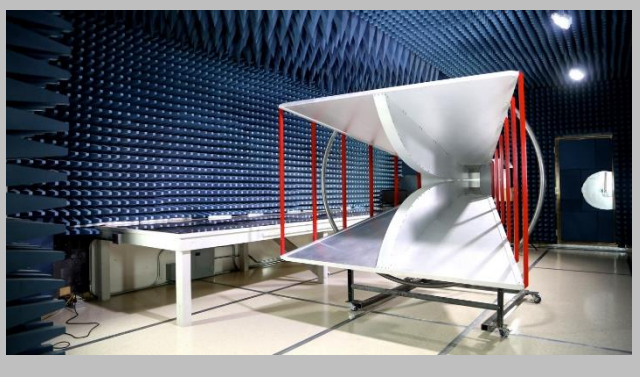
# FACILITIES

element
2020.12.15

| 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

element
TMU.2015.07.10

## 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 | + 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 |

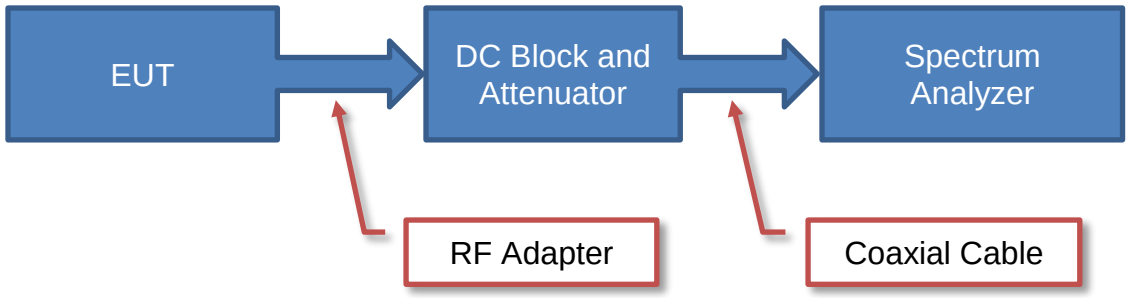
# TEST SETUP BLOCK DIAGRAMS

## 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.*

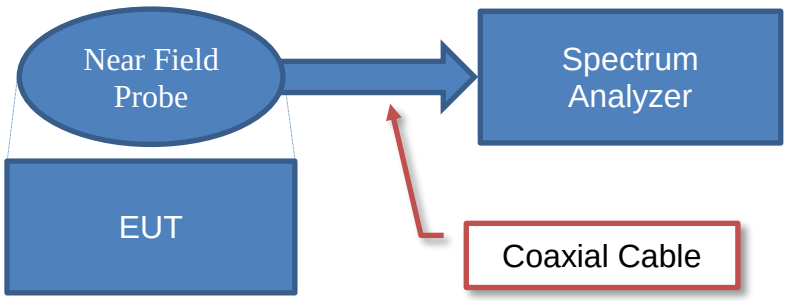
## Antenna Port Conducted Measurements




### Sample Calculation (logarithmic units)

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

## Near Field Test Fixture Measurements

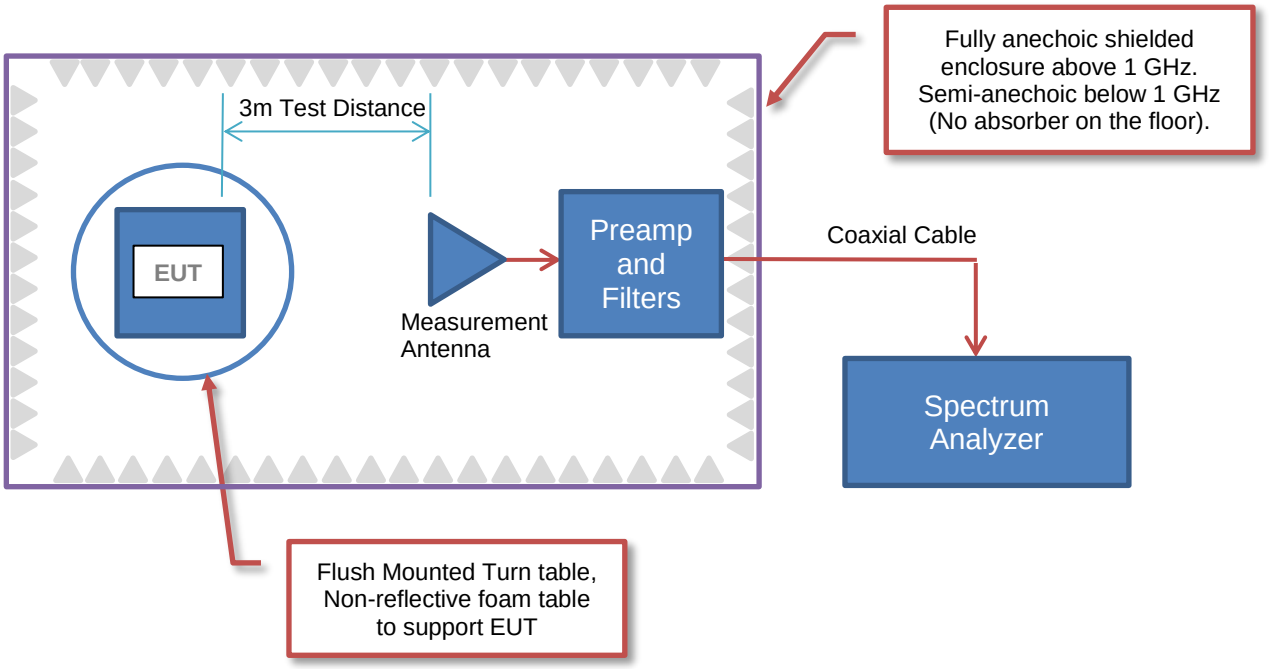



### Sample Calculation (logarithmic units)

| 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** |

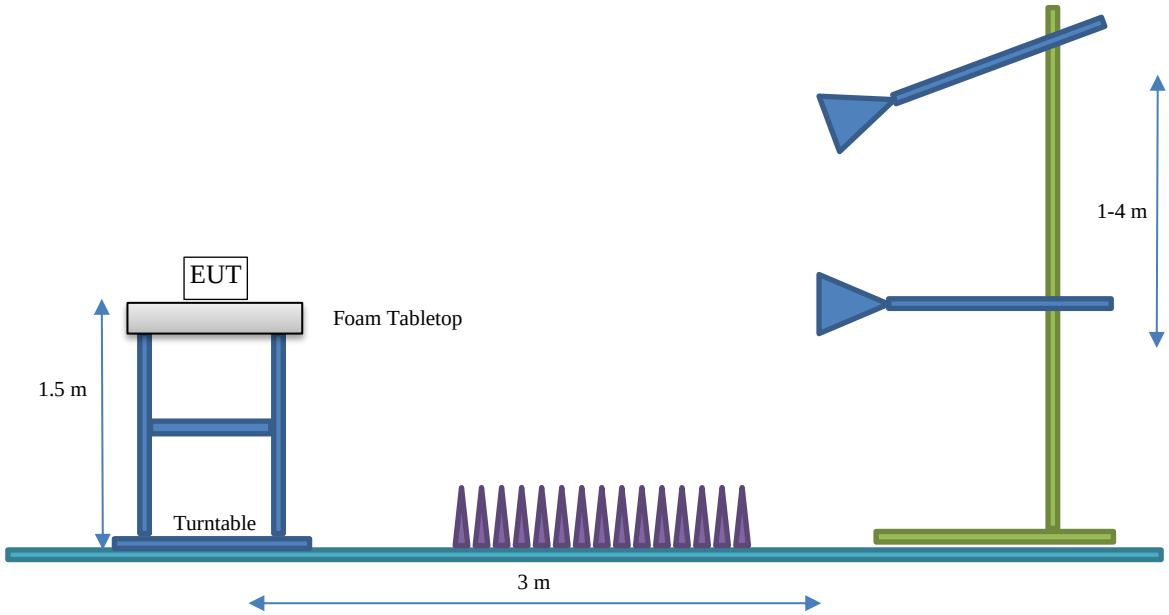
### Radiated Power (ERP/EIRP):

| 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 AHFII |
| **First Date of Test:** | May 13, 2022 |
| **Last Date of Test:** | May 16, 2022 |
| **Receipt Date of Samples:** | May 13, 2022 |
| **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 3G WCDMA carriers to the AirScale Base Transceiver Station Remote Radio Head Model AHFII FCC and ISED radio certifications. The original test effort includes testing for 4G LTE technologies. 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 3G WCDMA 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 (AHFII) as the original certification test. The base station and remote radio head software for this testing is an updated release that includes 3G WCDMA 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 AHFII is being developed under this effort. The AHFII remote radio head is a multi-standard multi-carrier radio module designed to support GSM/EDGE, WCDMA, LTE, LTE Narrow Band Internet of Things (NB IoT) operations (in-band, guard band, standalone), 5G NR and DSS (Dynamic Spectrum Sharing). The scope of testing in this effort is for 3G WCDMA FDD operations.

The AHFII RRH has four transmit/four receive antenna ports (4TX/4RX for Band II and 4TX/4RX for Band X). Each antenna port supports 3GPP frequency band II (BTS Rx: 1850 to 1910 MHz/BTS TX: 1930 to 1990 MHz) and 3GPP frequency band X (BTS Rx: 1710 to 1770 MHz/BTS TX: 2110 to 2170 MHz). The maximum RF output power of the RRH is 480 Watts (120 watts per port x 4 ports). The maximum power per band (Band II or Band X) is 80 watts. The maximum single WCDMA carrier power level is 30 watts. The TX and RX instantaneous bandwidth cover the full operational RRH bandwidth. Multi-carrier operation is supported.

The RRH can be operated as a 2x2 MIMO or as non-MIMO for 3G WCDMA FDD. The RRH supports three WCDMA downlink modulation types (QPSK, 16QAM, and 64QAM). The WCDMA modulation types are setup according to 3GPP TS 25.141 UTRA Test Models (TM) as follows TM 1: QPSK, TM 5: 16QAM and TM 6: 64QAM.

Single WCDMA carriers are tested at the bottom, middle and top channels provided in PCS and AWS frequency channel tables. Multicarrier testing is performed at maximum port/carrier power per KDB 971168 D03v01 guidance.

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 WCDMA channel bandwidth is 5MHz. The channel spacing is 200 kHz between channel numbers. The PCS Band WCDMA downlink channel numbers are provided in below.

| | Downlink UARFCN UTRA Band II | Downlink Frequency (MHz) | WCDMA Channel |
|---|---|---|---|
| PCS Band_ AHFII Antennas 1, 2, 3, 4 | 9660 | 1930.0 | Band edge |
| | …… | | |
| | 9662 | 1932.4 | Bottom Channel |
| | 9663 | 1932.6 | Bottom Channel + 1 |
| | …… | | |
| | 9800 | 1960.0 | Middle Channel |
| | …… | | |
| | 9937 | 1987.4 | Top Channel - 1 |
| | 9938 | 1987.6 | Top Channel |
| | …… | | |
| | 9940 | 1990.0 | Band edge |

AHFII Downlink Band Edge 3G WCDMA PCS Band Frequency Channels

*PCS Multicarrier Multiband Test Case:* In the PCS band _Three WCDMA carriers using two carriers (with minimum spacing between carrier frequencies) at the lower band edge (1932.4 & 1937.4MHz) and a third carrier with maximum spacing between the other two carrier frequencies (1987.6MHz) at the upper band edge. In the AWS band _ Two WCDMA carriers at the band middle (2137.5 & 2142.5MHz). The carriers are operated at maximum power (~26.6W/PCS carrier and 20W/AWS carrier) with a total port power of 120 watts (80W for PCS band carriers + 40W for AWS band carriers).

The AWS Band WCDMA channel bandwidth is 5MHz. The channel spacing is 200 kHz between channel numbers. The AWS Band WCDMA downlink channel numbers are provided in below.

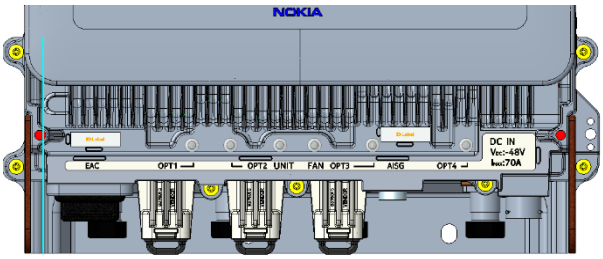
| | Downlink UARFCN UTRA Band X | Downlink Frequency (MHz) | WCDMA Channel |
|---|---|---|---|
| AWS Band_ AHFII Antennas 1, 2, 3, 4 | 3100 | 2110.0 | Band edge |
| | …… | | |
| | 3112 | 2112.4 | Bottom Channel |
| | 3113 | 2112.6 | Bottom Channel + 1 |
| | …… | | |
| | 3250 | 2140.0 | Middle Channel |
| | …… | | |
| | 3387 | 2167.4 | Top Channel - 1 |
| | 3388 | 2167.6 | Top Channel |
| | …… | | |
| | 3400 | 2170.0 | Band edge |

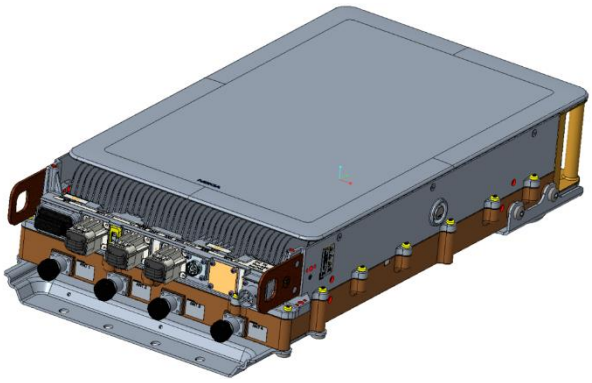
AHFII Downlink Band Edge 3G WCDMA AWS Band Frequency Channels

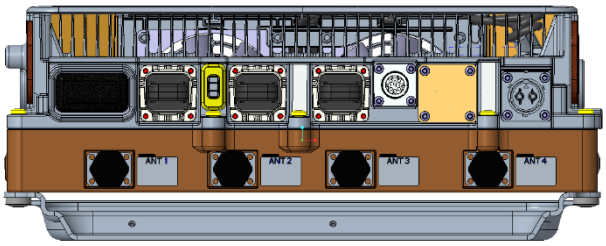
*AWS Multicarrier Multiband Test Case*: In the AWS band _Three WCDMA carriers using two carriers (with minimum spacing between carrier frequencies) at the lower band edge (2112.4 & 2117.4MHz) and a third carrier with maximum spacing between the other two carrier frequencies (2167.6MHz) at the upper band edge. In the PCS band: Two WCDMA carriers at band middle (1957.5 & 1962.5MHz). The carriers are operated at maximum power (~26.6W/AWS carrier and 20W/PCS carrier) with a total port power of 120 watts (80W for AWS band carriers + 40W for PCS band carriers).

# PRODUCT DESCRIPTION

AHFII Connector Layout






| Name | Qty | Connector Type | Purpose (and Description) |
|---|---|---|---|
| DC In | 1 | APPG Amphenol | 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 |
| OPT | 3 | SFP | Optical Interfaces |
| RET | 1 | 8-pin circular connector | AISG 3.0 to external devices_ RET RS-485 |

**EUT External Interfaces**

**Testing Objective:**

A permissive change on the original filing is being pursued to add 3G WCDMA carrier operations to the Nokia Solutions and Networks AirScale Base Transceiver Station (BTS) Remote Radio Head (RRH) model AHFII FCC and ISED radio certifications.

# CONFIGURATIONS

## Configuration NOKI0040- 1

| Software/Firmware Running during test | |
|---|---|
| **Description** | **Version** |
| 3G BTS Software Version (22R3) | SBTS22R3_ENB_9900_220421_000002 |
| 3G RF_SW | RF.FRM6.trunk.20220419.013 |

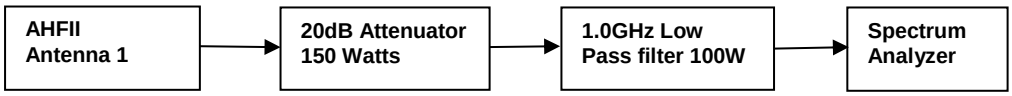
| Equipment being tested (include Peripherals) | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| AMIA (BTS Cabinet) | Nokia Solutions and Networks | 473098A.203 | RK182307104 |
| ASIA (3G BTS System Module) | Nokia Solutions and Networks | 473095A.203 | AH173111443 |
| ABIA (3G BTS Baseband Module) | Nokia Solutions and Networks | 473096A.102 | L1164121378 |
| AHFII (Radio Remote Head) | Nokia Solutions and Networks | 475656A.101 | YK214000036 |
| Low Pass Filter 1.4GHz/100W | Microwave Circuits,Inc. | L1G006G1 | SN3972-01-DC0430 |
| Attenuator 150W/20dB | Weinschel Corp | 66-20-33 | BZ1165 |
| SFP+ 9.8G,300M,850NM | Nokia | 474900A.101 | VF2023004CK |
| SFP+ 9.8G,300M,850NM | Nokia | 474900A.101 | VF2023000RM |
| Lenovo T490 | HP | T490 | PF26RVZ0 |
| Keysight N8757- DC System power supply | Keysight | N8757A | US21D4054S |
| FPAC (DC-pwr supply) | Nokia | 472438A.101 | G7111007170 |
| 2 Meter RF cable (Load Cable) | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297385 |
| 2 Meter RF cable (Load Cable) | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297387 |
| 2 Meter RF cable (Load Cable) | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297384 |
| 250W -50ohm -Terminating Load | API Weinschel | 1433-3-LIM | TC865 |
| 250W -50ohm -Terminating Load | API Weinschel | 1433-3-LIM | TC867 |
| 250W -50ohm -Terminating Load | API Weinschel | 1433-3-LIM | TC866 |
| Cat-5e cable | CSA | LL73189 | E151955 |
| 6 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN528836/6 |
| 1 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_104 | SN551432/4 |
| Fiber Optic cable 2m | Amphenol Fiber Optic | VZ1701 | 995741A |

# CONFIGURATIONS

| Cables (Peripheral) | | | | | |
|---|---|---|---|---|---|
| **Description** | **Shield (Y/N)** | **Length (m)** | **Ferrite (Y/N)** | **Connection 1** | **Connection 2** |
| Fiber Optic Cable | N | 2 meters | N | ABIA | AHFII |
| Cat-5e Cable | Y | 7 meters | N | ASIA | WebEM- PC |
| HS-SUCOFLEX_106 – RF CABLE | Y | 2 meters | N | EUT [AHFII] Ant 2-4 | 250W -50ohm - Load |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Description** | **Shield (Y/N)** | **Length (m)** | **Ferrite (Y/N)** | **Connection 1** | **Connection 2** |
| HS-SUCOFLEX_106 1.5dB cable attenuator | Y | 6 meters | N | EUT [AHFII] Ant port #1 | Attenuator 150W/20dB |
| Attenuator 150W/20dB | N | N/A | N | RF cable HS-SUCOFLEX_106 | 1.0GHz Low Pass filter 100W |
| 1.0GHz Low Pass filter 100W | N | N/A | N | Attenuator 150W/20dB | RF cable HS-SUCOFLEX_104 |
| HS-SUCOFLEX_104 | Y | 1 meter | N | 1.0GHz Low Pass filter 100W | Analyzer |

**RF Test Setup Diagram:**



# CONFIGURATIONS

## Configuration NOKI0040- 2

| Software/Firmware Running during test | |
|---|---|
| **Description** | **Version** |
| 3G BTS Software Version (22R3) | SBTS22R3_ENB_9900_220421_000002 |
| 3G RF_SW | RF.FRM6.trunk.20220419.013 |

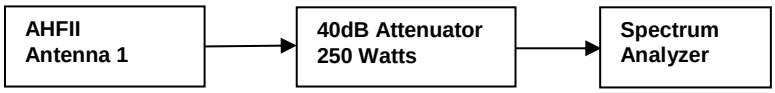
| Equipment being tested (include Peripherals) | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| AMIA (BTS Cabinet) | Nokia Solutions and Networks | 473098A.203 | RK182307104 |
| ASIA (3G BTS System Module) | Nokia Solutions and Networks | 473095A.203 | AH173111443 |
| ABIA (3G BTS Baseband Module) | Nokia Solutions and Networks | 473096A.102 | L1164121378 |
| AHFII (Radio Remote Head) | Nokia Solutions and Networks | 475656A.101 | YK214000036 |
| Attenuator 40dB/250W | API Weinschel | 58-40-43-LIM | TC909 |
| SFP+ 9.8G,300M,850NM | Nokia | 474900A.101 | VF2023004CK |
| SFP+ 9.8G,300M,850NM | Nokia | 474900A.101 | VF2023000RM |
| Lenovo T490 | HP | T490 | PF26RVZ0 |
| Keysight N8757- DC System power supply | Keysight | N8757A | US21D4054S |
| FPAC (DC-pwr supply) | Nokia | 472438A.101 | G7111007170 |
| 2 Meter RF cable (Load Cable) | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297385 |
| 2 Meter RF cable (Load Cable) | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297387 |
| 2 Meter RF cable (Load Cable) | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297384 |
| 250W -50ohm -Terminating Load | API Weinschel | 1433-3-LIM | TC865 |
| 250W -50ohm -Terminating Load | API Weinschel | 1433-3-LIM | TC867 |
| 250W -50ohm -Terminating Load | API Weinschel | 1433-3-LIM | TC866 |
| Cat-5e cable | CSA | LL73189 | E151955 |
| 6 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN528836/6 |
| 1 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_104 | SN551432/4 |
| Fiber Optic cable 2m | Amphenol Fiber Optic | VZ1701 | 995741A |

# CONFIGURATIONS

| Cables (Peripheral) | | | | | |
|---|---|---|---|---|---|
| **Description** | **Shield (Y/N)** | **Length (m)** | **Ferrite (Y/N)** | **Connection 1** | **Connection 2** |
| Fiber Optic Cable | N | 2 meters | N | ABIA | AHFII |
| Cat-5e Cable | Y | 7 meters | N | ASIA | WebEM- PC |
| HS-SUCOFLEX_106 – RF CABLE | Y | 2 meters | N | EUT [AHFII] Ant 2-4 | 250W -50ohm - Load |

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

**RF Test Setup Diagram:**



# CONFIGURATIONS

## Configuration NOKI0040- 3

| Software/Firmware Running during test | |
|---|---|
| **Description** | **Version** |
| 3G BTS Software Version (22R3) | SBTS22R3_ENB_9900_220421_000002 |
| 3G RF_SW | RF.FRM6.trunk.20220419.013 |

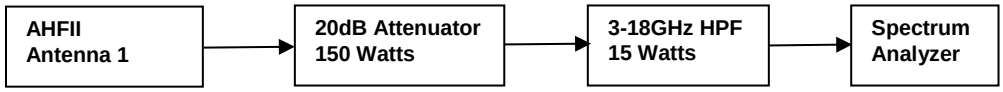
| Equipment being tested (include Peripherals) | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| AMIA (BTS Cabinet) | Nokia Solutions and Networks | 473098A.203 | RK182307104 |
| ASIA (3G BTS System Module) | Nokia Solutions and Networks | 473095A.203 | AH173111443 |
| ABIA (3G BTS Baseband Module) | Nokia Solutions and Networks | 473096A.102 | L1164121378 |
| AHFII (Radio Remote Head) | Nokia Solutions and Networks | 475656A.101 | YK214000036 |
| High Pass Filter 3-18GHz/15W | RLC Electronics | F-100-3500-5-R | 0011 |
| Attenuator 150W/20dB | Aeroflex Weinschel | 66-20-33 | BZ2075 |
| SFP+ 9.8G,300M,850NM | Nokia | 474900A.101 | VF2023004CK |
| SFP+ 9.8G,300M,850NM | Nokia | 474900A.101 | VF2023000RM |
| Lenovo T490 | HP | T490 | PF26RVZ0 |
| Keysight N8757- DC System power supply | Keysight | N8757A | US21D4054S |
| FPAC (DC-pwr supply) | Nokia | 472438A.101 | G7111007170 |
| 2 Meter RF cable (Load Cable) | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297385 |
| 2 Meter RF cable (Load Cable) | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297387 |
| 2 Meter RF cable (Load Cable) | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297384 |
| 250W -50ohm -Terminating Load | API Weinschel | 1433-3-LIM | TC865 |
| 250W -50ohm -Terminating Load | API Weinschel | 1433-3-LIM | TC867 |
| 250W -50ohm -Terminating Load | API Weinschel | 1433-3-LIM | TC866 |
| Cat-5e cable | CSA | LL73189 | E151955 |
| 6 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN528836/6 |
| 1 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_104 | SN551432/4 |
| Fiber Optic cable 2m | Amphenol Fiber Optic | VZ1701 | 995741A |

# CONFIGURATIONS

| Cables (Peripheral) | | | | | |
|---|---|---|---|---|---|
| **Description** | **Shield (Y/N)** | **Length (m)** | **Ferrite (Y/N)** | **Connection 1** | **Connection 2** |
| Fiber Optic Cable | N | 2 meters | N | ABIA | AHFII |
| Cat-5e Cable | Y | 7 meters | N | ASIA | WebEM- PC |
| HS-SUCOFLEX_106 – RF CABLE | Y | 2 meters | N | EUT [AHFII] Ant 2-4 | 250W -50ohm - Load |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Description** | **Shield (Y/N)** | **Length (m)** | **Ferrite (Y/N)** | **Connection 1** | **Connection 2** |
| HS-SUCOFLEX_106 | Y | 6 meters | N | EUT [AHFII] Ant port #1 | Attenuator 150W/20dB |
| Attenuator 150W/20dB | N | NA | N | RF cable HS-SUCOFLEX_106 | High Pass Filter 3-18GHz/15W |
| High Pass Filter 3-18GHz/15W | N | NA | N | Attenuator 150W/20dB | RF cable HS-SUCOFLEX_104 |
| HS-SUCOFLEX_104 | Y | 1 meter | N | High Pass Filter 3-18GHz/15W | Analyzer |

**RF Test Setup Diagram:**



# CONFIGURATIONS

## Configuration NOKI0040- 4

| Software/Firmware Running during test | |
|---|---|
| **Description** | **Version** |
| 3G BTS Software Version (22R3) | SBTS22R3_ENB_9900_220421_000002 |
| 3G RF_SW | RF.FRM6.trunk.20220419.013 |

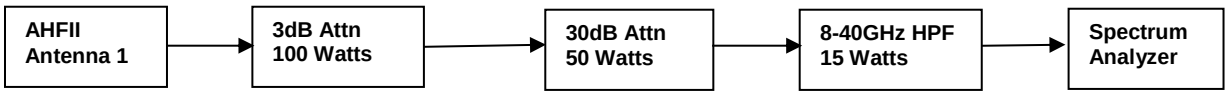
| Equipment being tested (include Peripherals) | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| AMIA (BTS Cabinet) | Nokia Solutions and Networks | 473098A.203 | RK182307104 |
| ASIA (3G BTS System Module) | Nokia Solutions and Networks | 473095A.203 | AH173111443 |
| ABIA (3G BTS Baseband Module) | Nokia Solutions and Networks | 473096A.102 | L1164121378 |
| AHFII (Radio Remote Head) | Nokia Solutions and Networks | 475656A.101 | YK214000036 |
| Attenuator 100W/3dB | API Weinschel | 47-3-33 | CC7387 |
| Attenuator 50W/30dB | Narda | 776B | 30 |
| High Pass Filter 8-40GHz/15W | RF-Lambda | RHPF23G08G40 | 17102700014 |
| SFP+ 9.8G,300M,850NM | Nokia | 474900A.101 | VF2023004CK |
| SFP+ 9.8G,300M,850NM | Nokia | 474900A.101 | VF2023000RM |
| Lenovo T490 | HP | T490 | PF26RVZ0 |
| Keysight N8757- DC System power supply | Keysight | N8757A | US21D4054S |
| FPAC (DC-pwr supply) | Nokia | 472438A.101 | G7111007170 |
| 2 Meter RF cable (Load Cable) | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297385 |
| 2 Meter RF cable (Load Cable) | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297387 |
| 2 Meter RF cable (Load Cable) | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN297384 |
| 250W -50ohm -Terminating Load | API Weinschel | 1433-3-LIM | TC865 |
| 250W -50ohm -Terminating Load | API Weinschel | 1433-3-LIM | TC867 |
| 250W -50ohm -Terminating Load | API Weinschel | 1433-3-LIM | TC866 |
| Cat-5e cable | CSA | LL73189 | E151955 |
| 6 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_106 | SN528836/6 |
| 1 Meter RF cable | Huber + Suhner, Inc. | HS-SUCOFLEX_104 | SN551432/4 |
| Fiber Optic cable 2m | Amphenol Fiber Optic | VZ1701 | 995741A |

# CONFIGURATIONS

| Cables (Peripheral) | | | | | |
|---|---|---|---|---|---|
| **Description** | **Shield (Y/N)** | **Length (m)** | **Ferrite (Y/N)** | **Connection 1** | **Connection 2** |
| Fiber Optic Cable | N | 2 meters | N | ABIA | AHFII |
| Cat-5e Cable | Y | 7 meters | N | ASIA | WebEM- PC |
| HS-SUCOFLEX_106 – RF CABLE | Y | 2 meters | N | EUT [AHFII] Ant 2-4 | 250W -50ohm - Load |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Description** | **Shield (Y/N)** | **Length (m)** | **Ferrite (Y/N)** | **Connection 1** | **Connection 2** |
| HS-SUCOFLEX_106 | Y | 6 meters | N | EUT [AHFII] 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/15W |
| HS-SUCOFLEX_104 | Y | 1 meter | N | Attenuator 250W/40dB | Analyzer |

**RF Test Setup Diagram:**



# MODIFICATIONS

## Equipment Modifications

| Item | Date | Test | Modification | Note | Disposition of EUT |
|---|---|---|---|---|---|
| 1 | 2022-05-13 | 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 | 2022-05-13 | 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 | 2022-05-13 | 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. |
| 4 | 2022-05-16 | 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. |
| 5 | 2022-05-16 | Conducted Output 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. |
| 6 | 2022-05-16 | Spurious Emissions at the Antenna Terminals | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | Scheduled testing was completed. |

# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS AWS

XMit 2022.02.07.0

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3239 | ANC | 2022-03-02 | 2023-03-02 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |
| 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.

The RF conducted emission testing was performed on one port. The AHFII antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the “Output Power - All Ports” report section) 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 two port MIMO base station.

The AWS Band EIRP requirements are specified in FCC Part 27.50d and ISED RSS-139 section 6.5/SRSP-513 section 5.1.1.

The EIRP requirements for PCS and AWS bands for channel bandwidths greater than 1MHz are in general a maximum of 3280 watts/MHz for rural (low population density) areas and 1640 watts/MHz for urban (high population density) areas.

# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS AWS

element

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | AHFII (FCC/ISED C2PC) | | | **Work Order:** | NOKI0040 |
| **Serial Number:** | YK214000036 | | | **Date:** | 13-May-22 |
| **Customer:** | Nokia Solutions and Networks | | | **Temperature:** | 21.9 °C |
| **Attendees:** | David Le, John Rattanavong | | | **Humidity:** | 50.8% RH |
| **Project:** | None | | | **Barometric Pres.:** | 1014 mbar |
| **Tested by:** | Brandon Hobbs | **Power:** | 54 VDC | **Job Site:** | TX05 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 27:2022 | ANSI C63.26:2015 |
| RSS-139 Issue 3:2015 | RSS-139 Issue 3:2015 |

**COMMENTS**

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. The PSD was measured while transmitting one carrier on Port 1. The total PSD for multiport (2x2 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)].

**DEVIATIONS FROM TEST STANDARD**

None

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

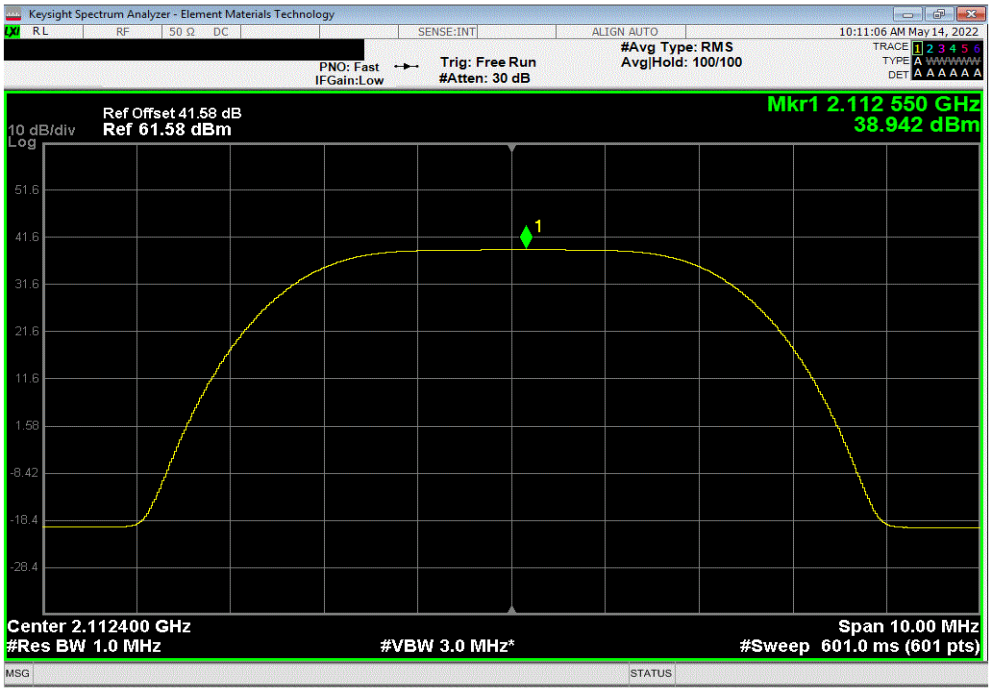
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD |
|---|---|---|---|---|
| AWS BAND X, 2110 MHz - 2170 MHz | | | | |
| Port 1 | | | | |
| 5 MHz Bandwdith | | | | |
| QPSK Modulation | | | | |
| Low Channel, 2112.4 MHz | 38.942 | 0 | 38.9 | 41.9 |
| Mid Channel, 2140 MHz | 38.978 | 0 | 39.0 | 42.0 |
| High Channel, 2167.6 MHz | 38.796 | 0 | 38.8 | 41.8 |
| 16-QAM Modulation | | | | |
| Low Channel, 2112.4 MHz | 38.830 | 0 | 38.8 | 41.8 |
| Mid Channel, 2140 MHz | 38.840 | 0 | 38.8 | 41.8 |
| High Channel, 2167.6 MHz | 38.687 | 0 | 38.7 | 41.7 |
| 64-QAM Modulation | | | | |
| Low Channel, 2112.4 MHz | 38.845 | 0 | 38.8 | 41.8 |
| Mid Channel, 2140 MHz | 38.880 | 0 | 38.9 | 41.9 |
| High Channel, 2167.6 MHz | 38.697 | 0 | 38.7 | 41.7 |

# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS
# AWS

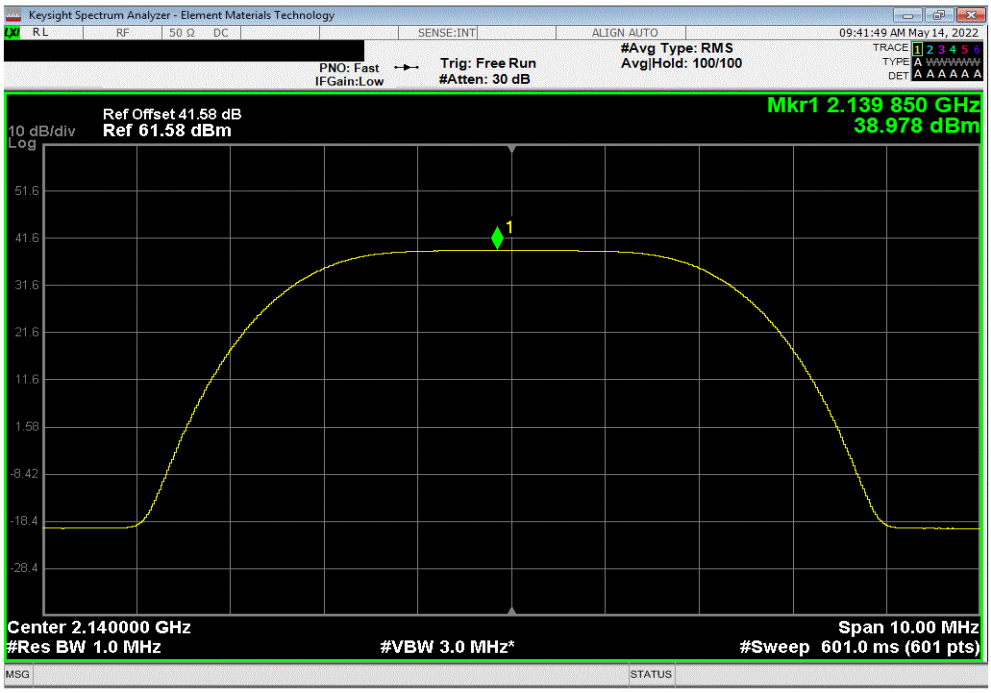
element

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Low Channel, 2112.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 38.942 | 0 | 38.9 | 41.9 | | |



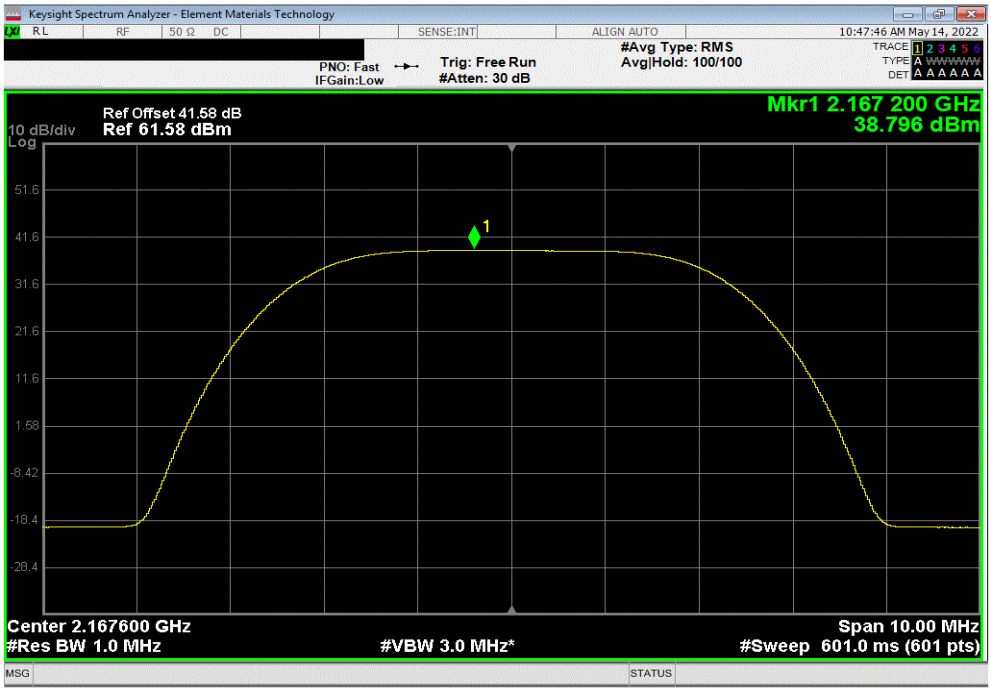

| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 2140 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 38.978 | 0 | 39.0 | 42.0 | | |



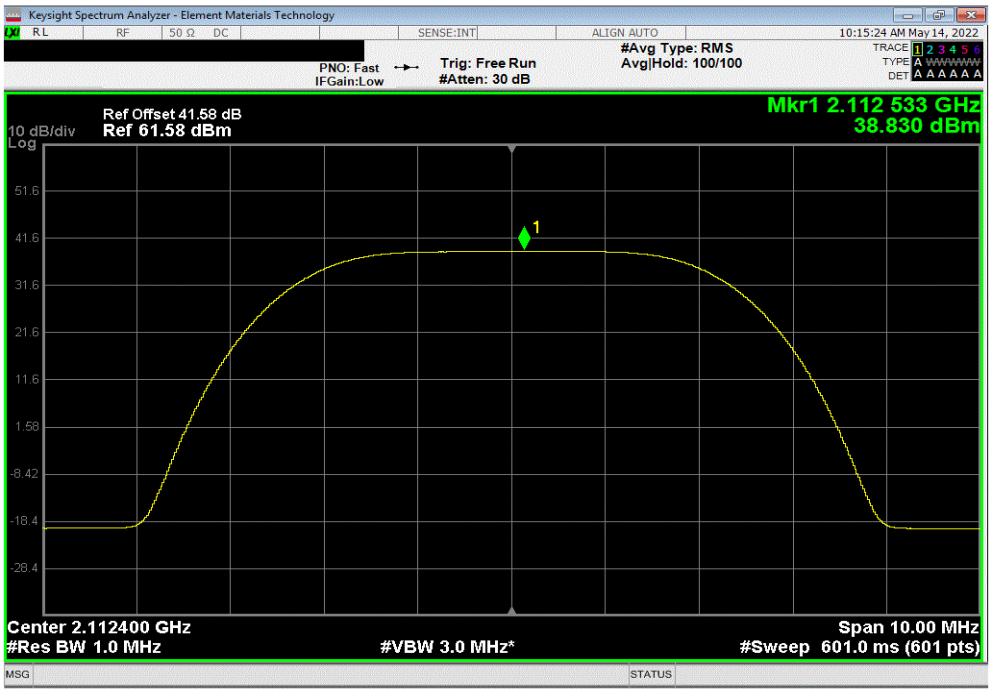
# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS
# AWS



| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , High Channel, 2167.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 38.796 | 0 | 38.8 | 41.8 | | |



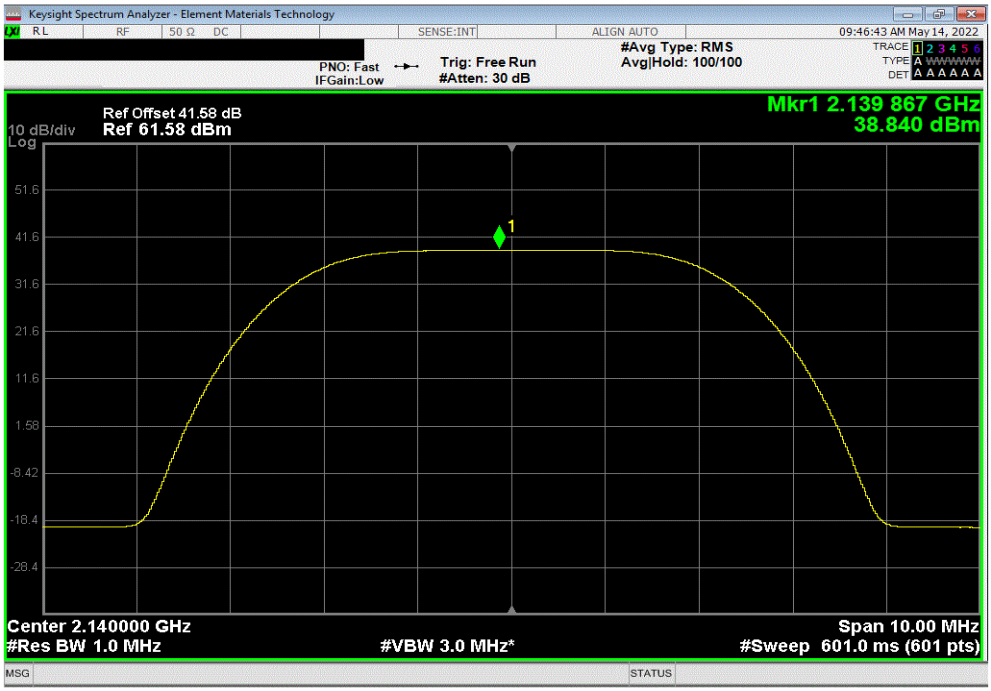

| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Low Channel, 2112.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 38.83 | 0 | 38.8 | 41.8 | | |



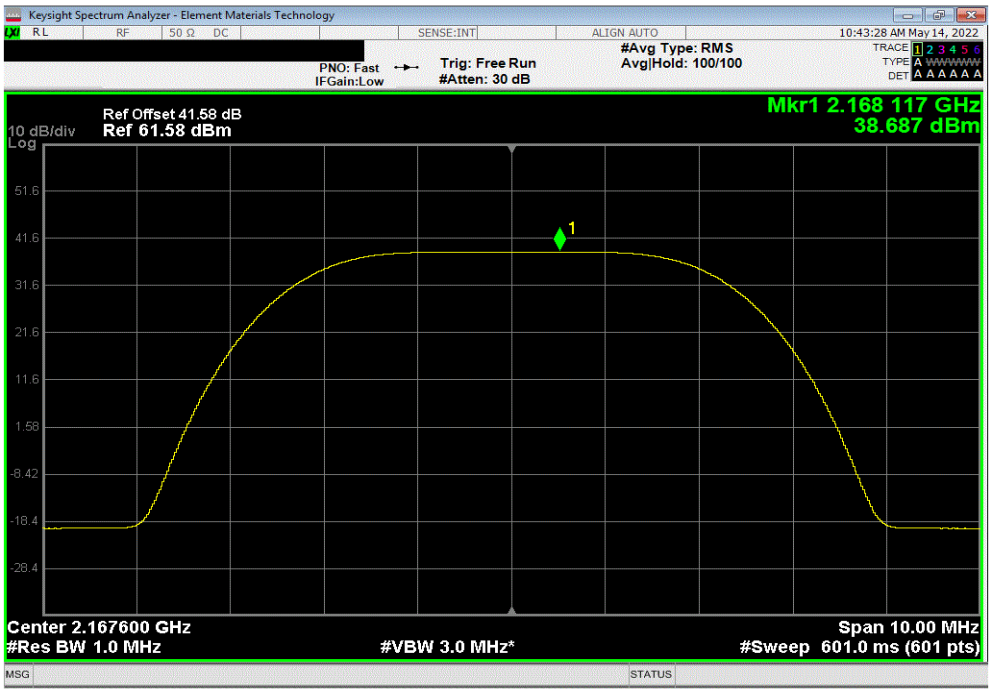
# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS
# AWS



| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 2140 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 38.84 | 0 | 38.8 | 41.8 | | |



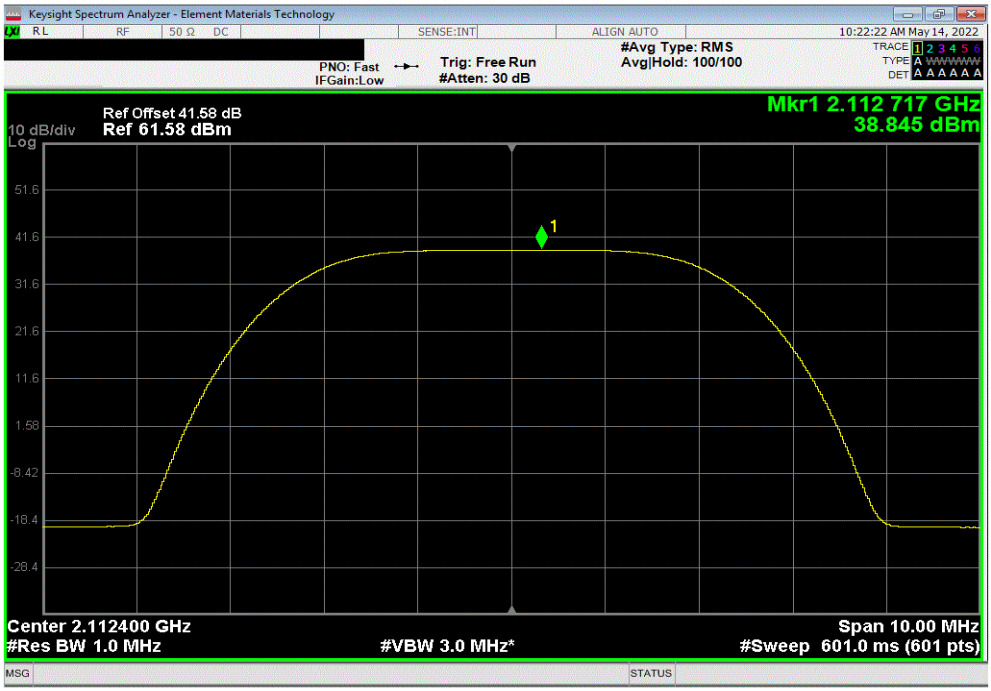

| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, High Channel, 2167.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 38.687 | 0 | 38.7 | 41.7 | | |



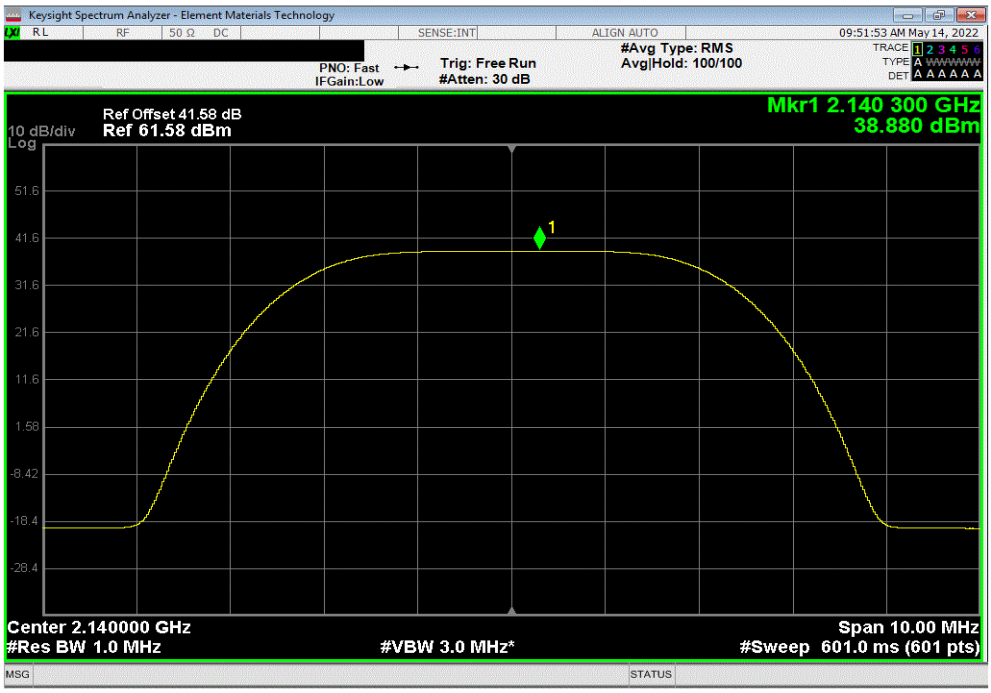
# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS
# AWS



| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Low Channel, 2112.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 38.845 | 0 | 38.8 | 41.8 | | |



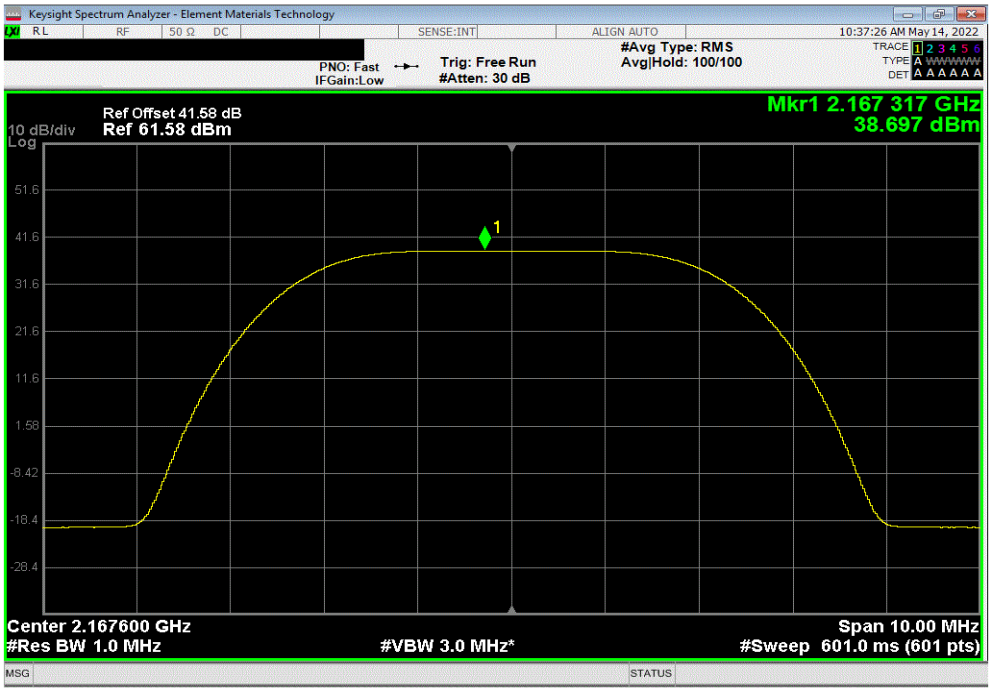

| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 2140 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 38.88 | 0 | 38.9 | 41.9 | | |



# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS
# AWS



| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, High Channel, 2167.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 38.697 | 0 | 38.7 | 41.7 | | |




| | | |
|---|---|---|
| 0 | 0.0 | 3.0 |

**EIRP Calculations for Two Port MIMO Operations for Band X Single WCDMA 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 X gain (18.2dBi) for this antenna was used for the EIRP calculation.

Equivalent Isotropically Radiated Power (EIRP) is calculated (as specified in ANSI C63.26-2015 section 6.4 for two port MIMO) from the results of power measurements (highest measured PSD for each channel bandwidth type). The total worst case PSD for two port MIMO is calculated as the worst case PSD for a single port + 3dB [10log (2)] based upon ANSI C63.26 clause 6.4.3.2.4 (10 Log $N_{out}$). 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 two port MIMO are as follows:

| Parameter | 5 MHz Channel Bandwidth |
|---|---|
| Worst Case PSD/Antenna Port | 39.0 dBm/MHz |
| Total PSD for Two Port MIMO 10Log 2 = + 3dB | 42.0 dBm/MHz |
| Cable Loss (site dependent) | 0 dB |
| Maximum Antenna Gain | 18.2 dBi |
| Worst Case Two Port MIMO EIRP Total | 60.2 dBm/MHz |

**Calculation Summary**

The worst case AHFII WCDMA two port MIMO AWS Band EIRP levels using antenna assembly model "80011867" are less than the FCC and ISED EIRP Regulatory Limits.

# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS PCS

XMit 2022.02.07.0

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3239 | ANC | 2022-03-02 | 2023-03-02 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |
| 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.

The RF conducted emission testing was performed on one port. The AHFII antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the “Output Power - All Ports” report section) 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 two port MIMO base station.

The PCS Band EIRP requirements are specified in FCC Part 24.232 and ISED RSS-133 section 6.4/SRSP-510 section 5.1.1.

The EIRP requirements for PCS and AWS bands for channel bandwidths greater than 1MHz are in general a maximum of 3280 watts/MHz for rural (low population density) areas and 1640 watts/MHz for urban (high population density) areas.

# POWER SPECTRAL DENSITY AND EIRP CALCULATIONS PCS

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | AHFII (FCC/ISED C2PC) | | | **Work Order:** | NOKI0040 |
| **Serial Number:** | YK214000036 | | | **Date:** | 13-May-22 |
| **Customer:** | Nokia Solutions and Networks | | | **Temperature:** | 22.7 °C |
| **Attendees:** | David Le, John Rattanavong | | | **Humidity:** | 49.5% RH |
| **Project:** | None | | | **Barometric Pres.:** | 1013 mbar |
| **Tested by:** | Brandon Hobbs | **Power:** | 54 VDC | **Job Site:** | TX05 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 24E:2022 | ANSI C63.26:2015 |
| RSS-133 Issue 6:2013+A1:2018 | RSS-133 Issue 6:2013+A1:2018 |

**COMMENTS**

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. The PSD was measured while transmitting one carrier on Port 1. The total PSD for multiport (2x2 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)].

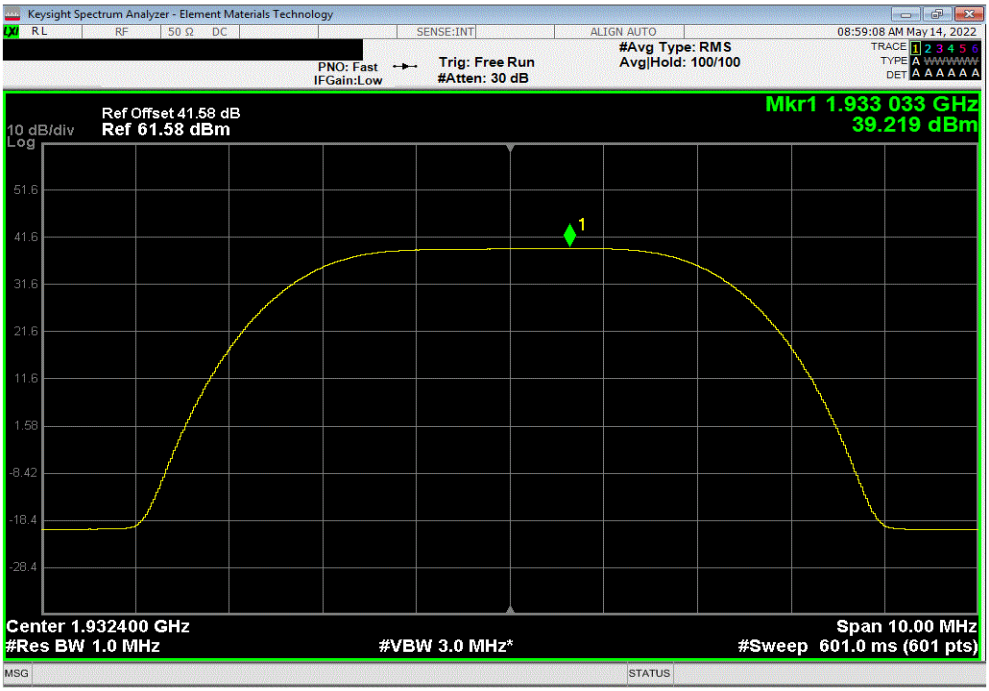
**DEVIATIONS FROM TEST STANDARD**

None

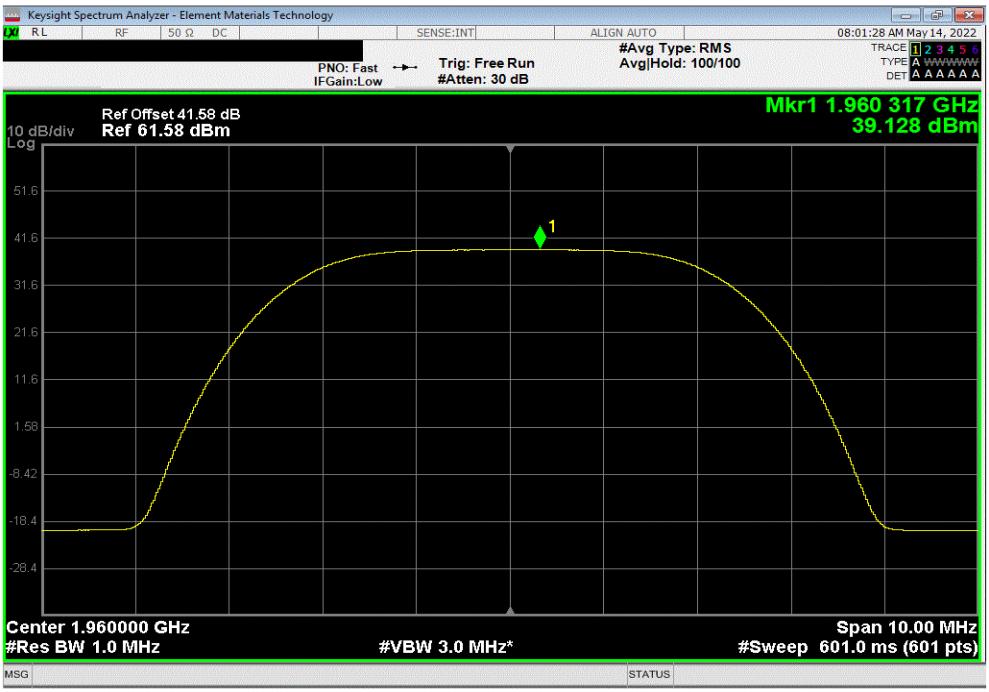
| Configuration # | 2 | Signature |
|---|---|---|

| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD |
|---|---|---|---|---|
| PCS BAND II, 1930 MHz - 1990 MHz | | | | |
| Port 1 | | | | |
| 5 MHz Bandwdith | | | | |
| QPSK Modulation | | | | |
| Low Channel, 1932.4 MHz | 39.219 | 0 | 39.2 | 42.2 |
| Mid Channel, 1960 MHz | 39.128 | 0 | 39.1 | 42.1 |
| High Channel, 1987.6 MHz | 39.117 | 0 | 39.1 | 42.1 |
| 16-QAM Modulation | | | | |
| Low Channel, 1932.4 MHz | 39.127 | 0 | 39.1 | 42.1 |
| Mid Channel, 1960 MHz | 39.079 | 0 | 39.1 | 42.1 |
| High Channel, 1987.6 MHz | 39.058 | 0 | 39.1 | 42.1 |
| 64-QAM Modulation | | | | |
| Low Channel, 1932.4 MHz | 39.087 | 0 | 39.1 | 42.1 |
| Mid Channel, 1960 MHz | 39.020 | 0 | 39.0 | 42.0 |
| High Channel, 1987.6 MHz | 38.961 | 0 | 39.0 | 42.0 |

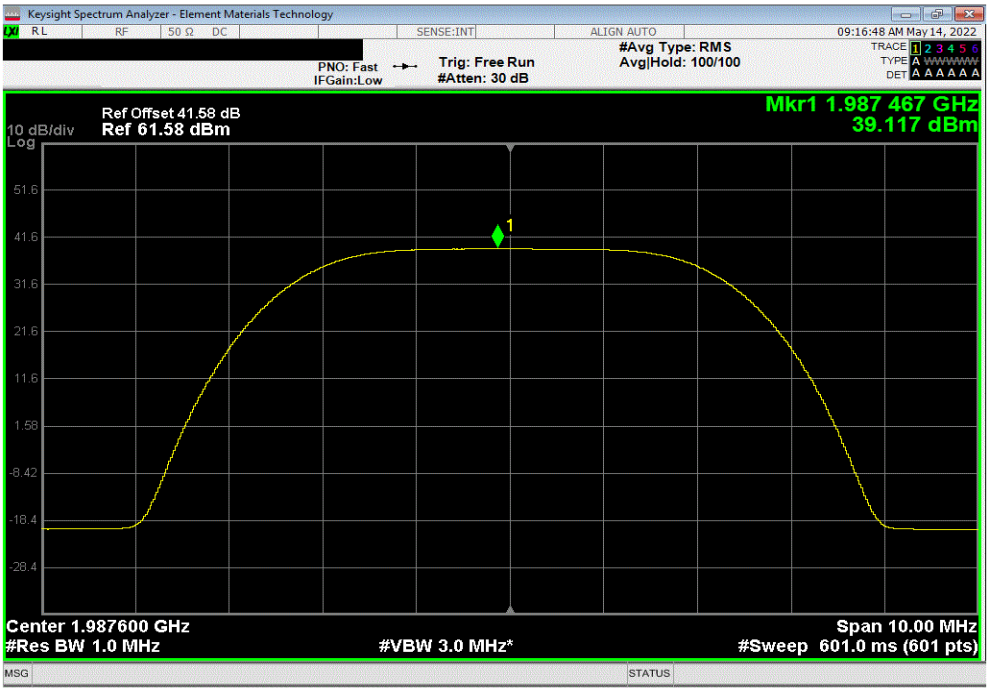
| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Low Channel, 1932.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 39.219 | 0 | 39.2 | 42.2 | | |



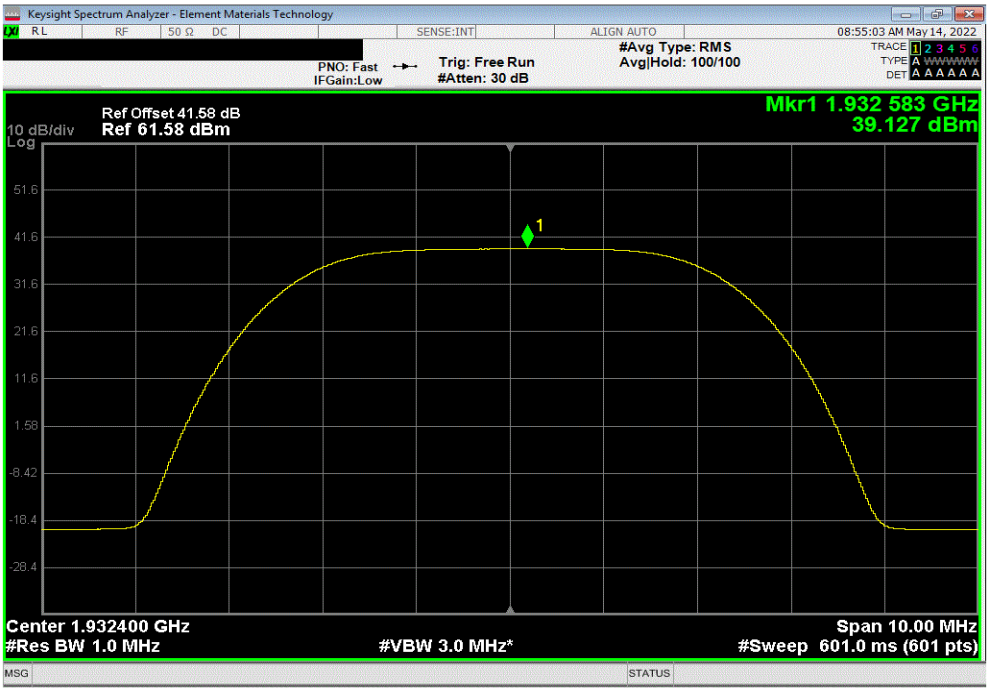

| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 1960 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 39.128 | 0 | 39.128 | 42.128 | | |



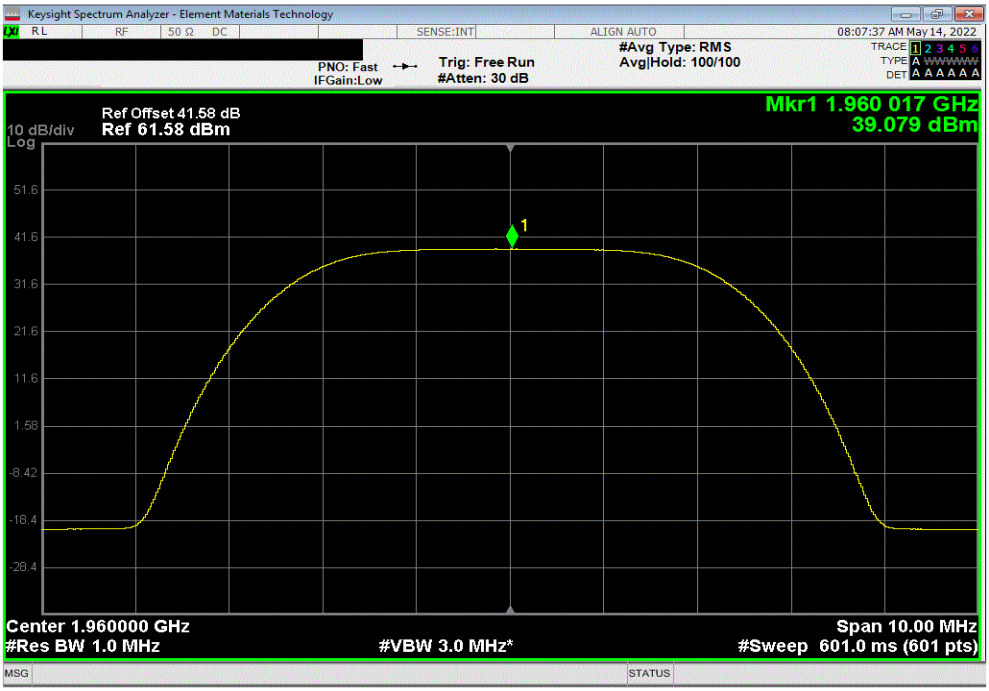
| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , High Channel, 1987.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 39.117 | 0 | 39.1 | 42.1 | | |



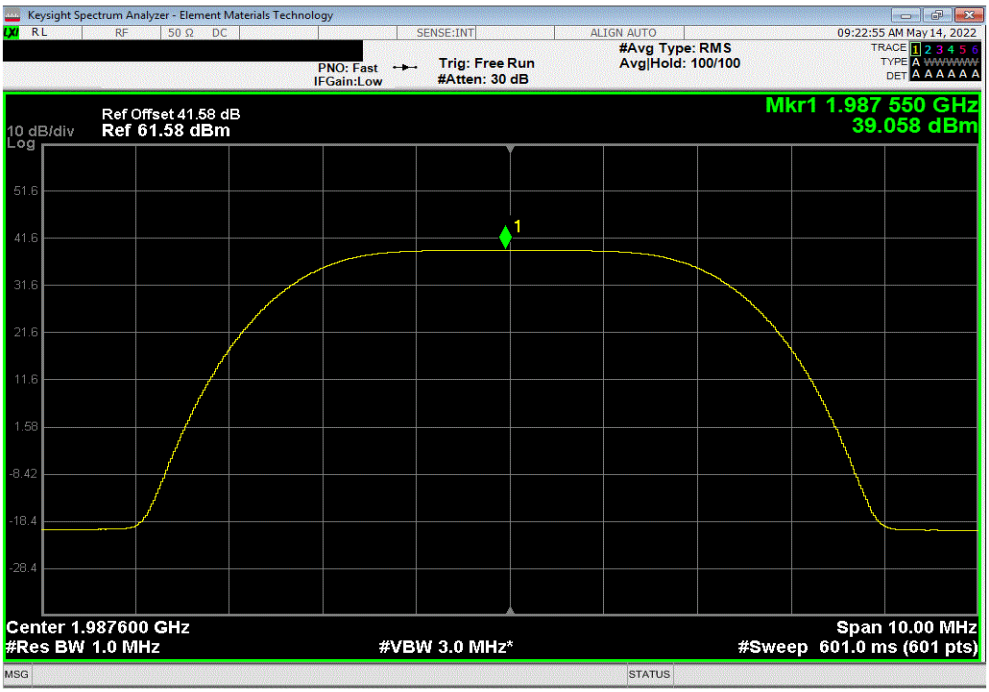

| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Low Channel, 1932.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 39.127 | 0 | 39.127 | 42.127 | | |



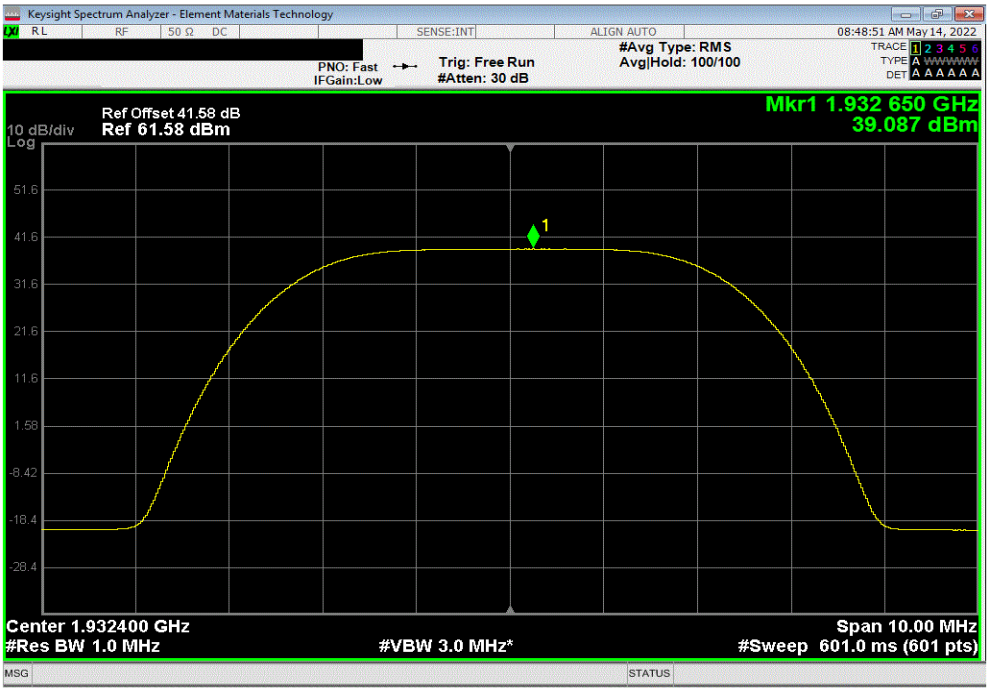
| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 1960 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 39.079 | 0 | 39.1 | 42.1 | | |



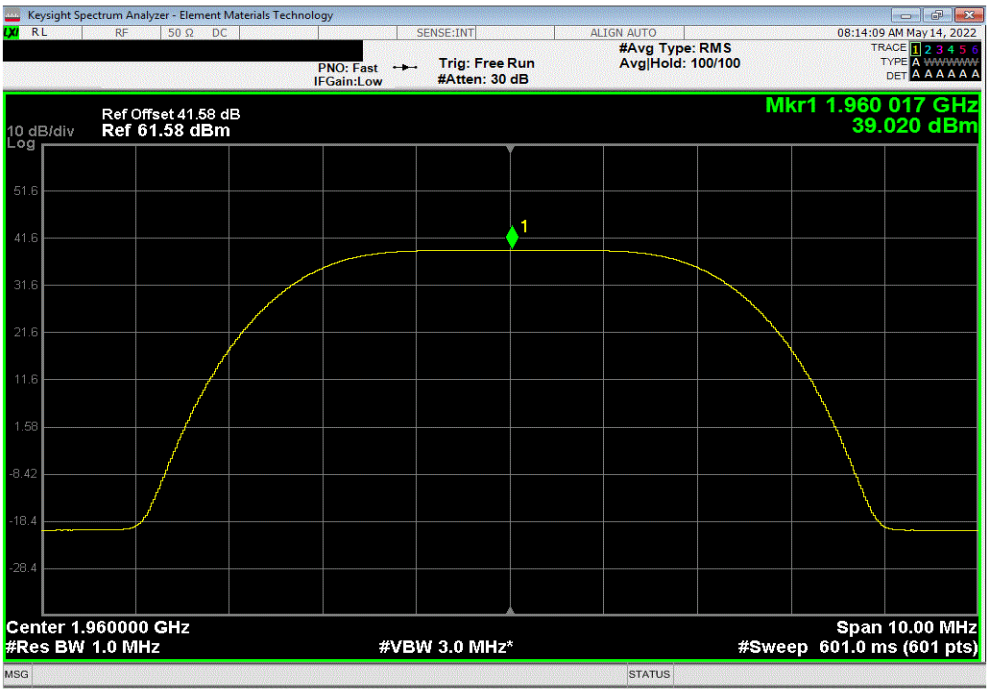

| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, High Channel, 1987.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 39.058 | 0 | 39.058 | 42.058 | | |



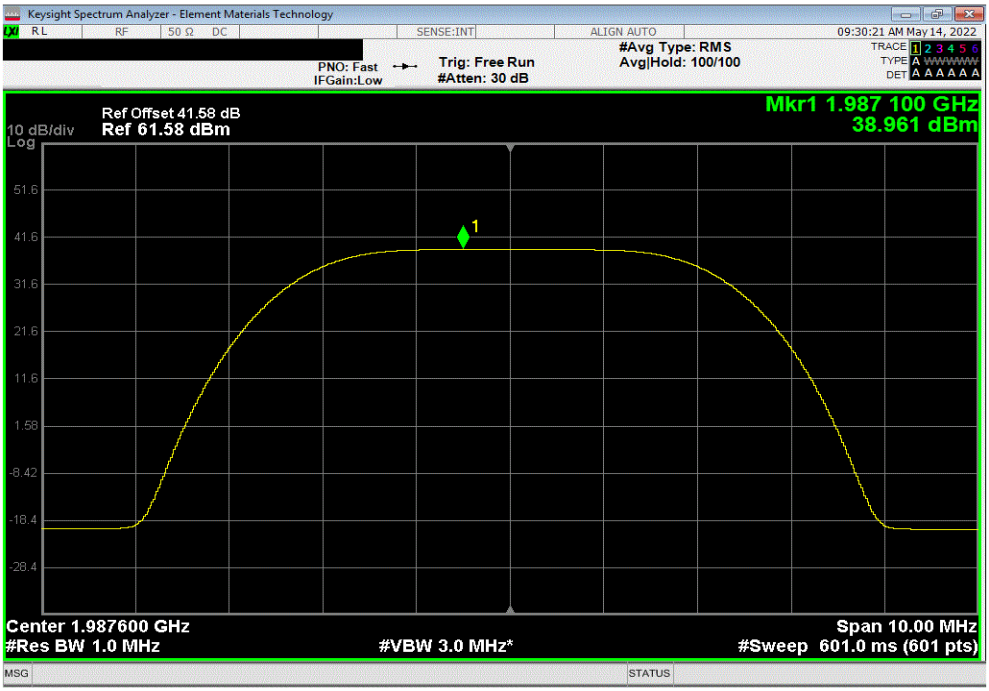
| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Low Channel, 1932.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 39.087 | 0 | 39.1 | 42.1 | | |




| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 1960 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 39.02 | 0 | 39.02 | 42.02 | | |



| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, High Channel, 1987.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/MHz == PSD | Two Port (2x2 MIMO) dBm/MHz == PSD | | |
| | 38.961 | 0 | 39.0 | 42.0 | | |




0 0 3

**EIRP Calculations for Two Port MIMO Operations for Band II Single WCDMA 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 II gain (17.9dBi) for this antenna was used for the EIRP calculation.

Equivalent Isotropically Radiated Power (EIRP) is calculated (as specified in ANSI C63.26-2015 section 6.4 for two port MIMO) from the results of power measurements (highest measured PSD for each channel bandwidth type). The total worst case PSD for two port MIMO is calculated as the worst case PSD for a single port + 3dB [10log (2)] based upon ANSI C63.26 clause 6.4.3.2.4 (10 Log $N_{out}$). 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 two port MIMO are as follows:

| Parameter | 5 MHz Channel Bandwidth |
|---|---|
| Worst Case PSD/Antenna Port | 39.2 dBm/MHz |
| Total PSD for Two Port MIMO 10Log 2 = + 3dB | 42.2 dBm/MHz |
| Cable Loss (site dependent) | 0 dB |
| Maximum Antenna Gain | 17.9 dBi |
| Worst Case Two Port MIMO EIRP Total | 60.1 dBm/MHz |

**Calculation Summary**

The worst case AHFII WCDMA two port MIMO PCS Band EIRP levels using antenna assembly model "80011867" are less than the FCC and ISED EIRP Regulatory Limits.

# CONDUCTED OUTPUT POWER - ALL PORTS

XMit 2022.02.07.0

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3239 | ANC | 2022-03-02 | 2023-03-02 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |
| 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 measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times.

RF conducted emissions testing was performed on all ports at 5 MHz middle channel in order to prove the AHFII antenna ports are essentially electrically identical. 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.

# CONDUCTED OUTPUT POWER - ALL PORTS

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | **AHFII (FCC/ISED C2PC)** | | | **Work Order:** | **NOKI0040** |
| **Serial Number:** | **YK214000036** | | | **Date:** | **13-May-22** |
| **Customer:** | **Nokia Solutions and Networks** | | | **Temperature:** | **23.6 °C** |
| **Attendees:** | **David Le, John Rattanavong** | | | **Humidity:** | **47.9% RH** |
| **Project:** | **None** | | | **Barometric Pres.:** | **1014 mbar** |
| **Tested by:** | **Brandon Hobbs** | **Power:** | **54 VDC** | **Job Site:** | **TX05** |

| **TEST SPECIFICATIONS** | **Test Method** |
|---|---|
| **FCC 24E:2022** | ANSI C63.26:2015 |
| **RSS-133 Issue 6:2013+A1:2018** | RSS-133 Issue 6:2013+A1:2018 |
| **FCC 27:2022** | ANSI C63.26:2015 |
| **RSS-139 Issue 3:2015** | RSS-139 Issue 3:2015 |

**COMMENTS**

**All losses in the measurement path were accounted for: attenuators, cables, DC block and filter when in use. PCS Band II / AWS Band X carriers were enabled at maximum power (30 watts/carrier).**

**DEVIATIONS FROM TEST STANDARD**

**None**

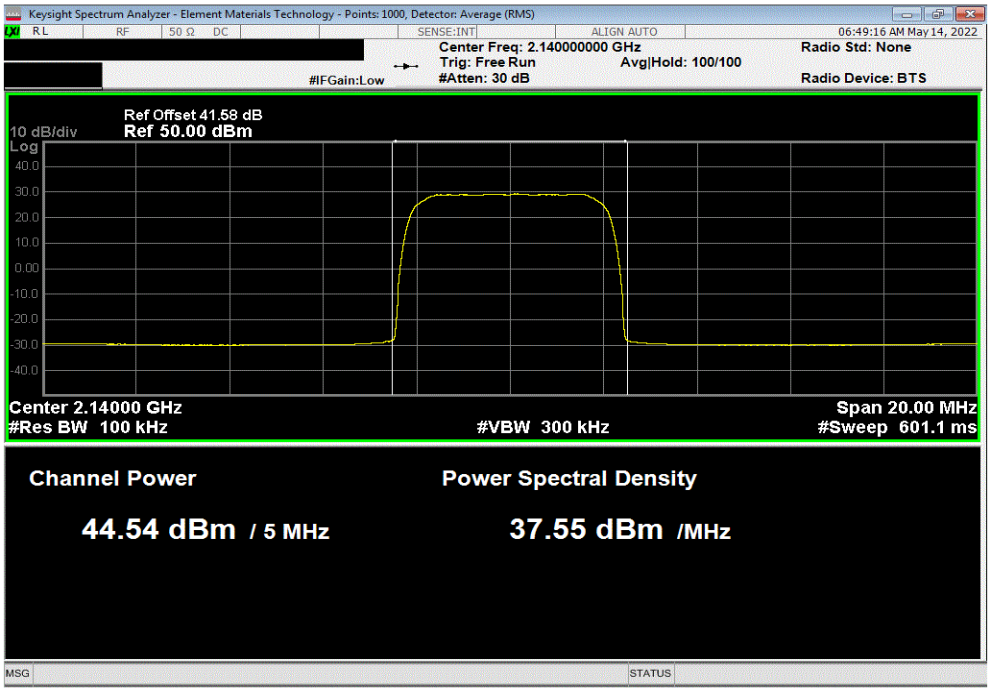
| **Configuration #** | **2** | *Signature* |
|---|---|---|

| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Value (dBm) | All Ports Value (dBm) | Limit | Results |
|---|---|---|---|---|---|---|
| AWS AND PCS BANDS | | | | | | |
| Port 1 | | | | | | |
| 5 MHz Bandwdith | | | | | | |
| 64-QAM Modulation | | | | | | |
| AWS Mid Channel, 2140 MHz | 44.544 | 0 | 44.5 | N/A | Within Tolerance | N/A |
| PCS Mid Channel, 1960 MHz | 44.530 | 0 | 44.5 | N/A | Within Tolerance | N/A |
| Port 2 | | | | | | |
| 5 MHz Bandwdith | | | | | | |
| 64-QAM Modulation | | | | | | |
| AWS Mid Channel, 2140 MHz | 44.501 | 0 | 44.5 | N/A | Within Tolerance | N/A |
| PCS Mid Channel, 1960 MHz | 44.548 | 0 | 44.5 | N/A | Within Tolerance | N/A |
| Port 3 | | | | | | |
| 5 MHz Bandwdith | | | | | | |
| 64-QAM Modulation | | | | | | |
| AWS Mid Channel, 2140 MHz | 44.599 | 0 | 44.6 | N/A | Within Tolerance | N/A |
| PCS Mid Channel, 1960 MHz | 44.502 | 0 | 44.5 | N/A | Within Tolerance | N/A |
| Port 4 | | | | | | |
| 5 MHz Bandwdith | | | | | | |
| 64-QAM Modulation | | | | | | |
| AWS Mid Channel, 2140 MHz | 44.426 | 0 | 44.4 | N/A | Within Tolerance | N/A |
| PCS Mid Channel, 1960 MHz | 44.445 | 0 | 44.4 | N/A | Within Tolerance | N/A |
| All Ports | | | | | | |
| 5 MHz Bandwdith | | | | | | |
| 64-QAM Modulation | | | | | | |
| AWS Mid Channel, 2140 MHz | N/A | 0 | N/A | 50.5 | N/A | N/A |
| PCS Mid Channel, 1960 MHz | N/A | 0 | N/A | 50.5 | N/A | N/A |

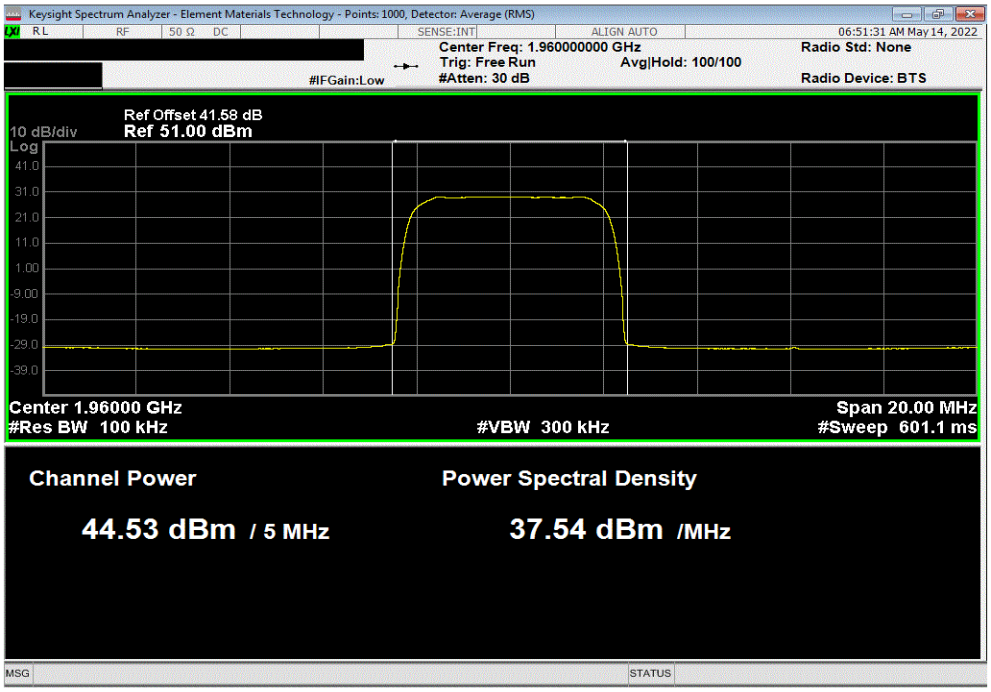
# CONDUCTED OUTPUT POWER - ALL PORTS



| AWS AND PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, AWS Mid Channel, 2140 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Value (dBm) | All Ports Value (dBm) | Limit | Results |
| | 44.544 | 0 | 44.5 | N/A | Within Tolerance | N/A |



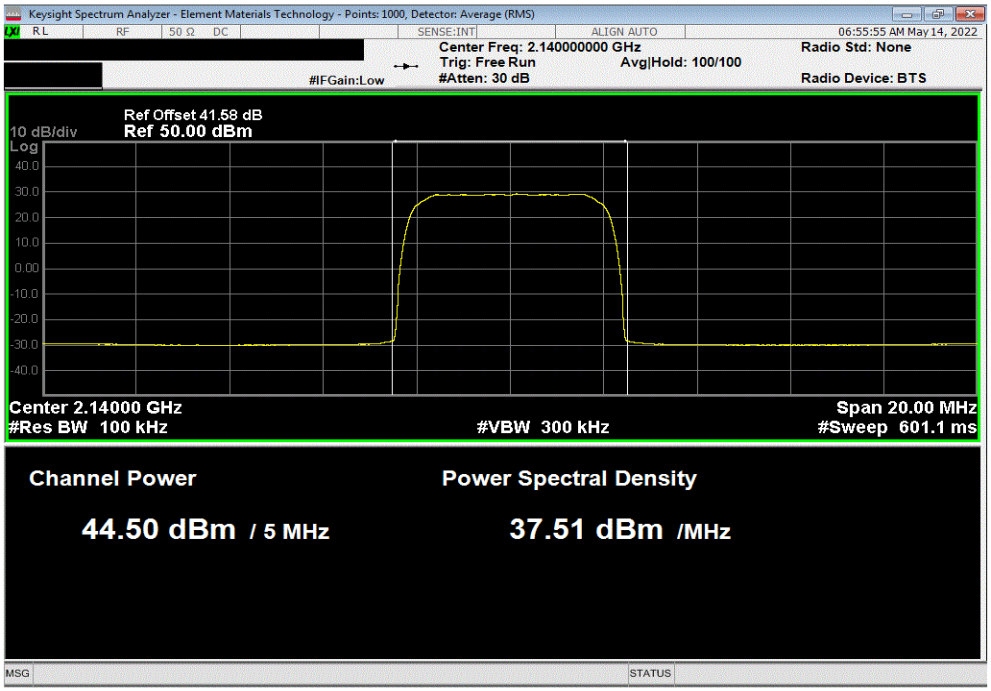

| AWS AND PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, PCS Mid Channel, 1960 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Value (dBm) | All Ports Value (dBm) | Limit | Results |
| | 44.53 | 0 | 44.5 | N/A | Within Tolerance | N/A |



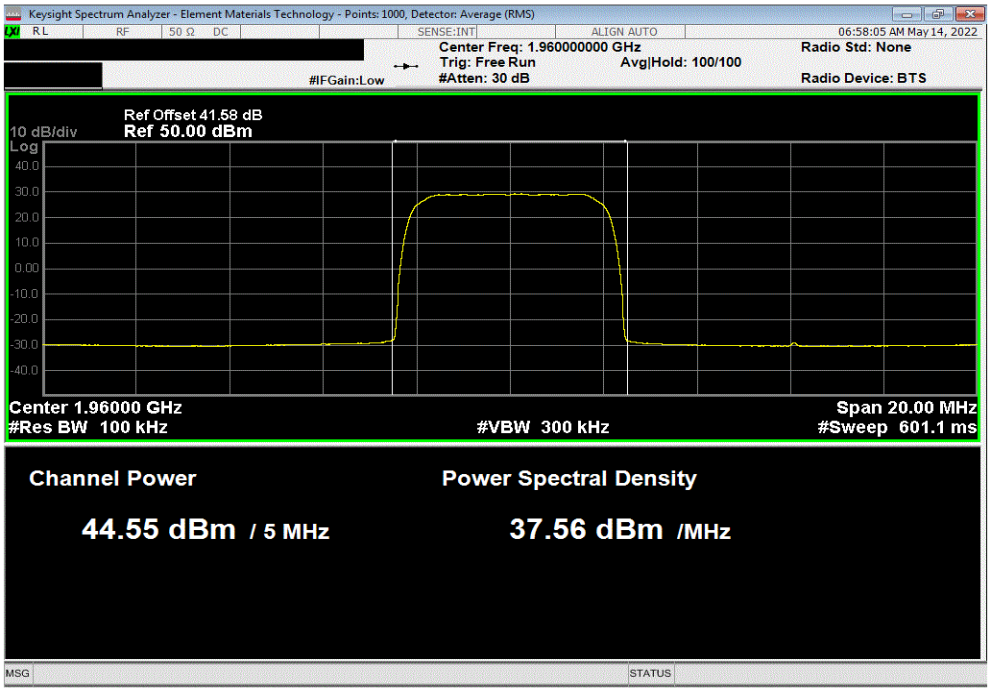
# CONDUCTED OUTPUT POWER - ALL PORTS



| AWS AND PCS BANDS, Port 2, 5 MHz Bandwdith, 64-QAM Modulation, AWS Mid Channel, 2140 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Value (dBm) | All Ports Value (dBm) | Limit | Results |
| | 44.501 | 0 | 44.5 | N/A | Within Tolerance | N/A |



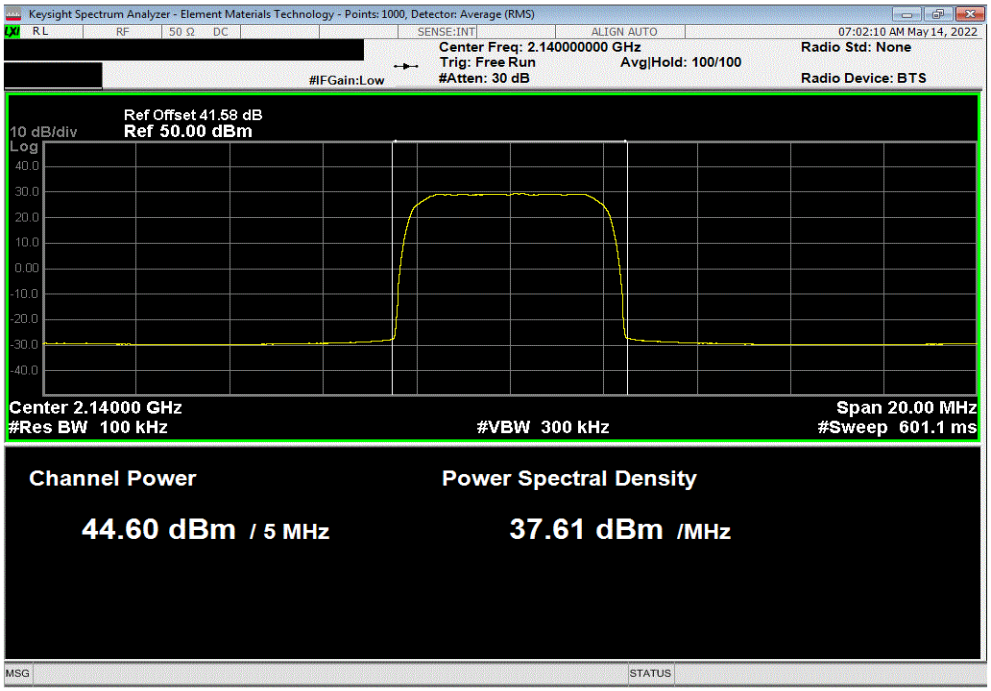

| AWS AND PCS BANDS, Port 2, 5 MHz Bandwdith, 64-QAM Modulation, PCS Mid Channel, 1960 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Value (dBm) | All Ports Value (dBm) | Limit | Results |
| | 44.548 | 0 | 44.5 | N/A | Within Tolerance | N/A |



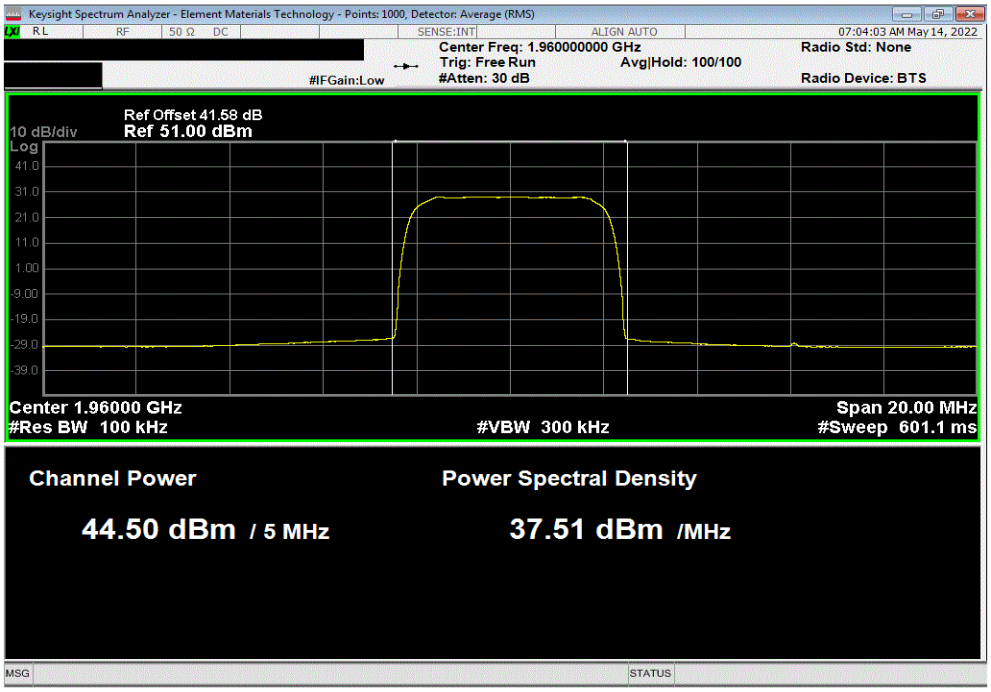
# CONDUCTED OUTPUT POWER - ALL PORTS



| AWS AND PCS BANDS, Port 3, 5 MHz Bandwdith, 64-QAM Modulation, AWS Mid Channel, 2140 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Value (dBm) | All Ports Value (dBm) | Limit | Results |
| | 44.599 | 0 | 44.6 | N/A | Within Tolerance | N/A |



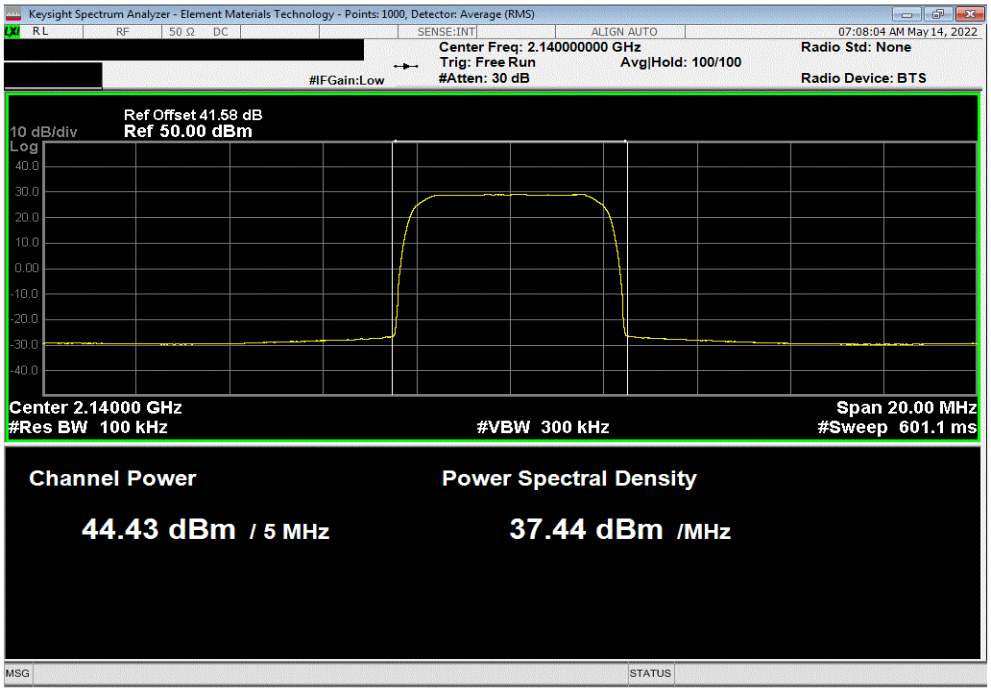

| AWS AND PCS BANDS, Port 3, 5 MHz Bandwdith, 64-QAM Modulation, PCS Mid Channel, 1960 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Value (dBm) | All Ports Value (dBm) | Limit | Results |
| | 44.502 | 0 | 44.5 | N/A | Within Tolerance | N/A |



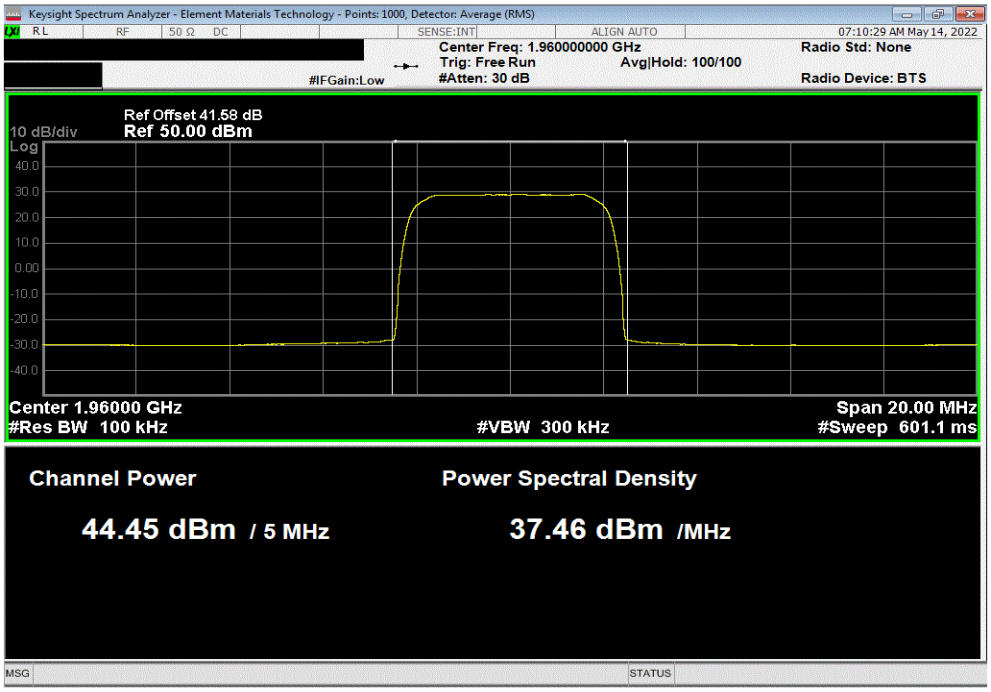
# CONDUCTED OUTPUT POWER - ALL PORTS



| AWS AND PCS BANDS, Port 4, 5 MHz Bandwdith, 64-QAM Modulation, AWS Mid Channel, 2140 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Value (dBm) | All Ports Value (dBm) | Limit | Results |
| | 44.426 | 0 | 44.4 | N/A | Within Tolerance | N/A |




| AWS AND PCS BANDS, Port 4, 5 MHz Bandwdith, 64-QAM Modulation, PCS Mid Channel, 1960 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Value (dBm) | All Ports Value (dBm) | Limit | Results |
| | 44.445 | 0 | 44.4 | N/A | Within Tolerance | N/A |



# CONDUCTED OUTPUT POWER - ALL PORTS

element

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| AWS AND PCS BANDS, All Ports, 5 MHz Bandwdith, 64-QAM Modulation, AWS Mid Channel, 2140 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Value (dBm) | All Ports Value (dBm) | Limit | Results |
| | N/A | 0 | N/A | 50.5 | N/A | N/A |

| AVERAGE POWER PORT SUMMING | | | | | |
|---|---|---|---|---|---|
| | PORT 1 | PORT 2 | PORT 3 | PORT 4 | SUM TOTAL |
| INITIAL VALUE (dBm) | 44.5 | 44.5 | 44.6 | 44.4 | N/A |
| INITIAL VALUE (Watts) | 28.2 | 28.2 | 28.8 | 27.5 | 112.7 |
| TOTAL VALUE (dBm) | N/A | N/A | N/A | N/A | 50.5 |

| AWS AND PCS BANDS, All Ports, 5 MHz Bandwdith, 64-QAM Modulation, PCS Mid Channel, 1960 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Avg Cond Pwr (dBm) | Duty Cycle Factor (dB) | Value (dBm) | All Ports Value (dBm) | Limit | Results |
| | N/A | 0 | N/A | 50.5 | N/A | N/A |

| AVERAGE POWER PORT SUMMING | | | | | |
|---|---|---|---|---|---|
| | PORT 1 | PORT 2 | PORT 3 | PORT 4 | SUM TOTAL |
| INITIAL VALUE (dBm) | 44.5 | 44.5 | 44.5 | 44.4 | N/A |
| INITIAL VALUE (Watts) | 28.2 | 28.2 | 28.2 | 27.5 | 112.1 |
| TOTAL VALUE (dBm) | N/A | N/A | N/A | N/A | 50.5 |

# CONDUCTED OUTPUT POWER AWS

XMit 2022.02.07.0

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3239 | ANC | 2022-03-02 | 2023-03-02 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |
| 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 measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHFII) as the original certification test. The AHFII antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this 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 average transmit power of all antenna ports was determined per ANSI C63.26-2105 paragraph 6.4.3.1.

# CONDUCTED OUTPUT POWER AWS

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | AHFII (FCC/ISED C2PC) | | | **Work Order:** | NOKI0040 |
| **Serial Number:** | YK214000036 | | | **Date:** | 13-May-22 |
| **Customer:** | Nokia Solutions and Networks | | | **Temperature:** | 22.4 °C |
| **Attendees:** | David Le, John Rattanavong | | | **Humidity:** | 49% RH |
| **Project:** | None | | | **Barometric Pres.:** | 1014 mbar |
| **Tested by:** | Brandon Hobbs | **Power:** | 54 VDC | **Job Site:** | TX05 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 27:2022 | ANSI C63.26:2015 |
| RSS-139 Issue 3:2015 | RSS-139 Issue 3:2015 |

**COMMENTS**

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. AWS band X carriers are enabled at maximum power (30 watts/carrier). The following is the output power measurements at the radio output ports. The output power was measured for a single carrier over the carrier channel bandwidth on port 1. The total output power for multiport (2x2 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)].

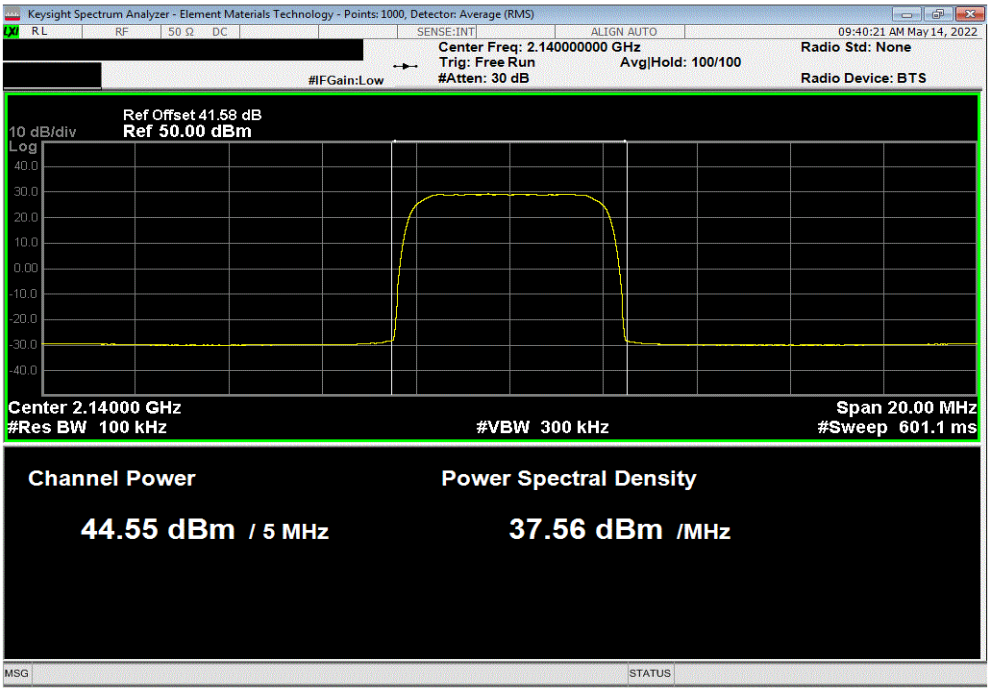
**DEVIATIONS FROM TEST STANDARD**

None

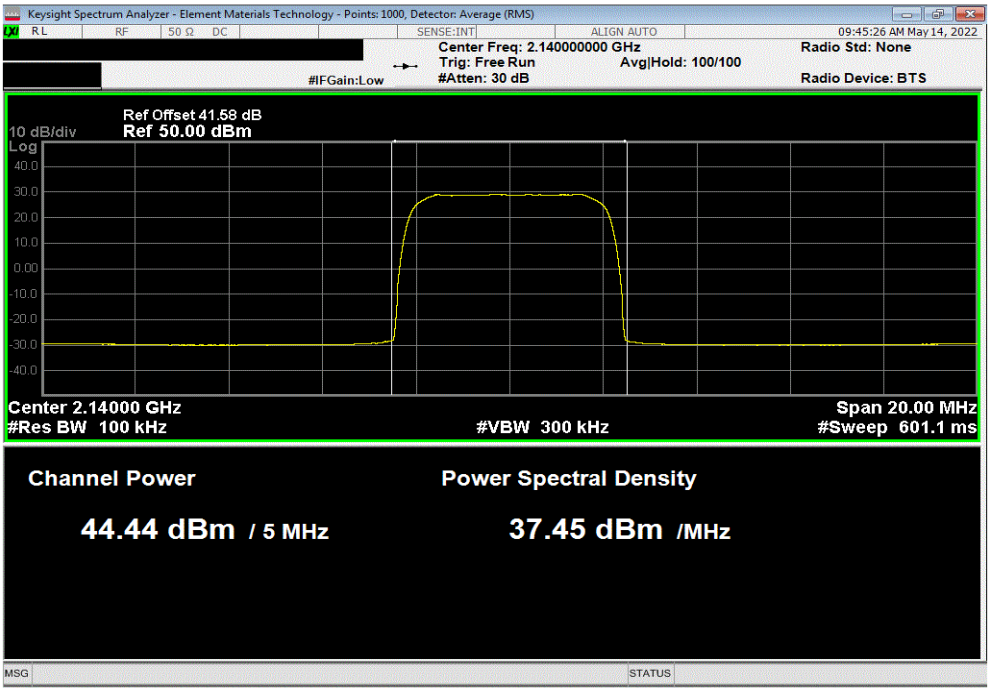
| Configuration # | 2 | Signature |
|---|---|---|

| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW |
|---|---|---|---|---|
| AWS BAND X, 2110 MHz - 2170 MHz | | | | |
| Port 1 | | | | |
| 5 MHz Bandwdith | | | | |
| QPSK Modulation | | | | |
| Mid Channel, 2140 MHz | 44.551 | 0 | 44.6 | 47.6 |
| 16-QAM Modulation | | | | |
| Mid Channel, 2140 MHz | 44.442 | 0 | 44.4 | 47.4 |
| 64-QAM Modulation | | | | |
| Low Channel, 2112.4 MHz | 44.410 | 0 | 44.4 | 47.4 |
| Mid Channel, 2140 MHz | 44.431 | 0 | 44.4 | 47.4 |
| High Channel, 2167.6 MHz | 44.343 | 0 | 44.3 | 47.3 |

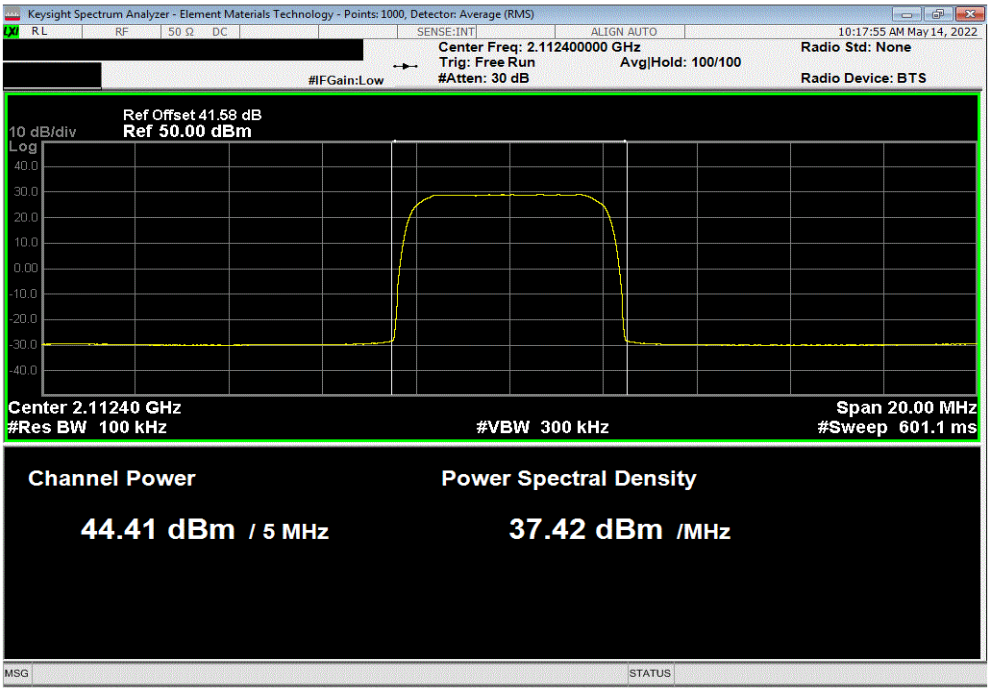
| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 2140 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | | |
| | 44.551 | 0 | 44.6 | 47.6 | | |



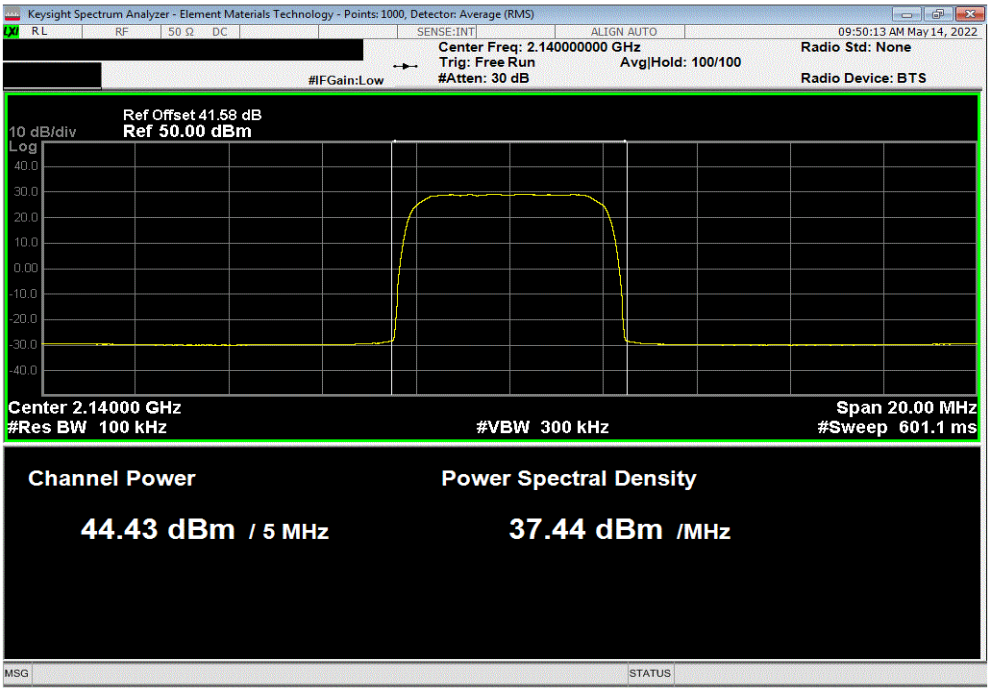

| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 2140 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | | |
| | 44.442 | 0 | 44.4 | 47.4 | | |



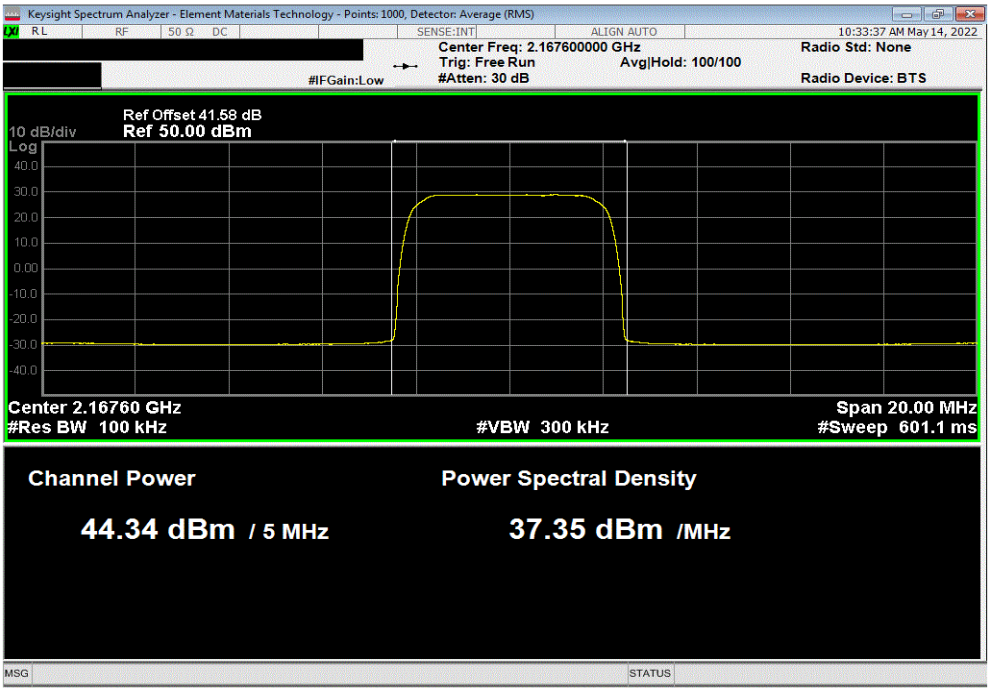
| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Low Channel, 2112.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | | |
| | 44.41 | 0 | 44.4 | 47.4 | | |




| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 2140 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | | |
| | 44.431 | 0 | 44.4 | 47.4 | | |



| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, High Channel, 2167.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | | |
| | 44.343 | 0 | 44.3 | 47.3 | | |



# CONDUCTED OUTPUT POWER PCS

XMit 2022.02.07.0

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |
| Block - DC | Fairview Microwave | SD3239 | ANC | 2022-03-02 | 2023-03-02 |
| 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 measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHFII) as the original certification test. The AHFII antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this 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 average transmit power of all antenna ports was determined per ANSI C63.26-2105 paragraph 6.4.3.1

# CONDUCTED OUTPUT POWER PCS

element

TbtTx 2022.05.02.0 XMII 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | **AHFII (FCC/ISED C2PC)** | | | **Work Order:** | **NOKI0040** |
| **Serial Number:** | **YK214000036** | | | **Date:** | **13-May-22** |
| **Customer:** | **Nokia Solutions and Networks** | | | **Temperature:** | **22.5 °C** |
| **Attendees:** | **David Le, John Rattanavong** | | | **Humidity:** | **49.9% RH** |
| **Project:** | **None** | | | **Barometric Pres.:** | **1013 mbar** |
| **Tested by:** | **Brandon Hobbs** | **Power:** | **54 VDC** | **Job Site:** | **TX05** |

| **TEST SPECIFICATIONS** | **Test Method** |
|---|---|
| **FCC 24E:2022** | ANSI C63.26:2015 |
| **RSS-133 Issue 6:2013+A1:2018** | RSS-133 Issue 6:2013+A1:2018 |

**COMMENTS**

**All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. PCS Band II carriers are enabled at maximum power (30 watts/carrier). The following is the output power measurements at the radio output ports. The output power was measured for a single carrier over the carrier channel bandwidth on port 1. The total output power for multiport (2x2 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)].**

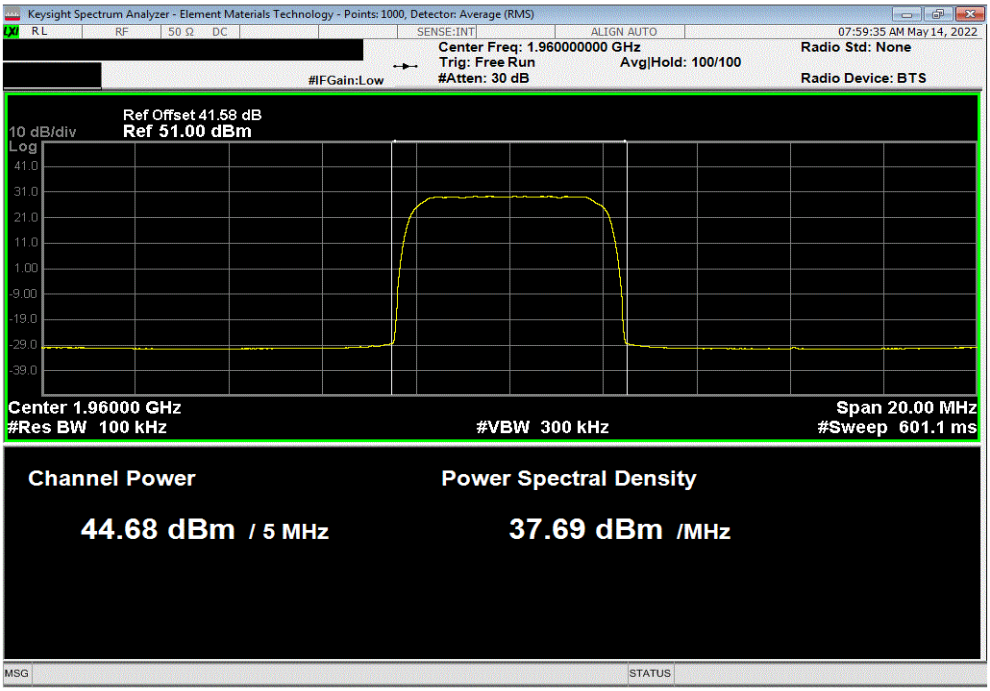
**DEVIATIONS FROM TEST STANDARD**

**None**

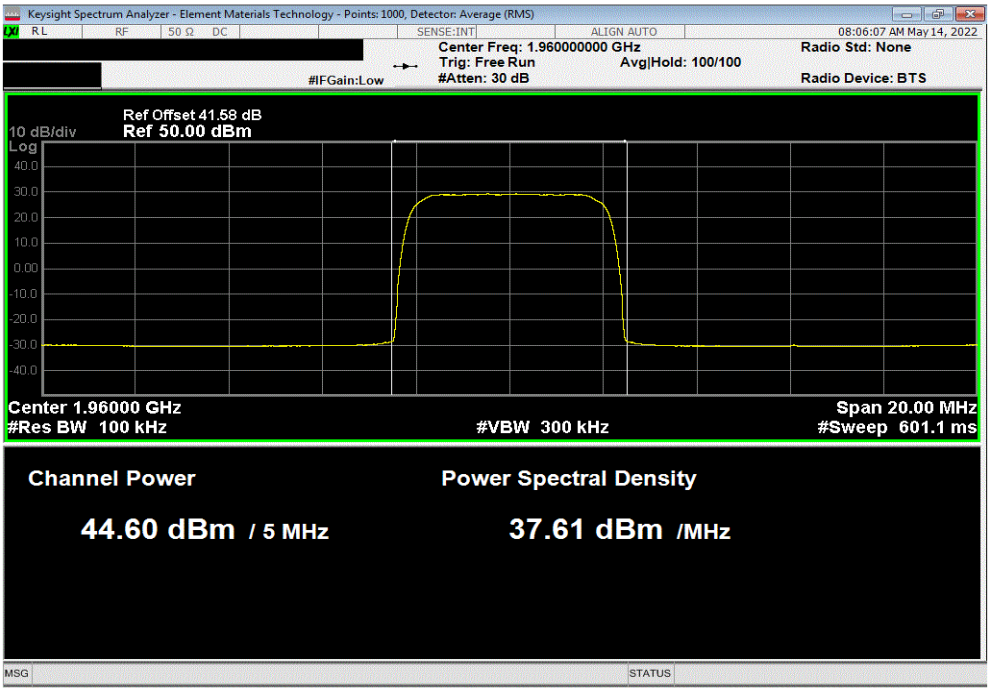
| **Configuration #** | **2** | *Signature* |
|---|---|---|

| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW |
|---|---|---|---|---|
| PCS BAND II, 1930 MHz - 1990 MHz | | | | |
| Port 1 | | | | |
| 5 MHz Bandwdith | | | | |
| QPSK Modulation | | | | |
| Mid Channel, 1960 MHz | 44.680 | 0 | 44.7 | 47.7 |
| 16-QAM Modulation | | | | |
| Mid Channel, 1960 MHz | 44.601 | 0 | 44.6 | 47.6 |
| 64-QAM Modulation | | | | |
| Low Channel, 1932.4 MHz | 44.644 | 0 | 44.6 | 47.6 |
| Mid Channel, 1960 MHz | 44.611 | 0 | 44.6 | 47.6 |
| High Channel, 1987.6 MHz | 44.580 | 0 | 44.6 | 47.6 |

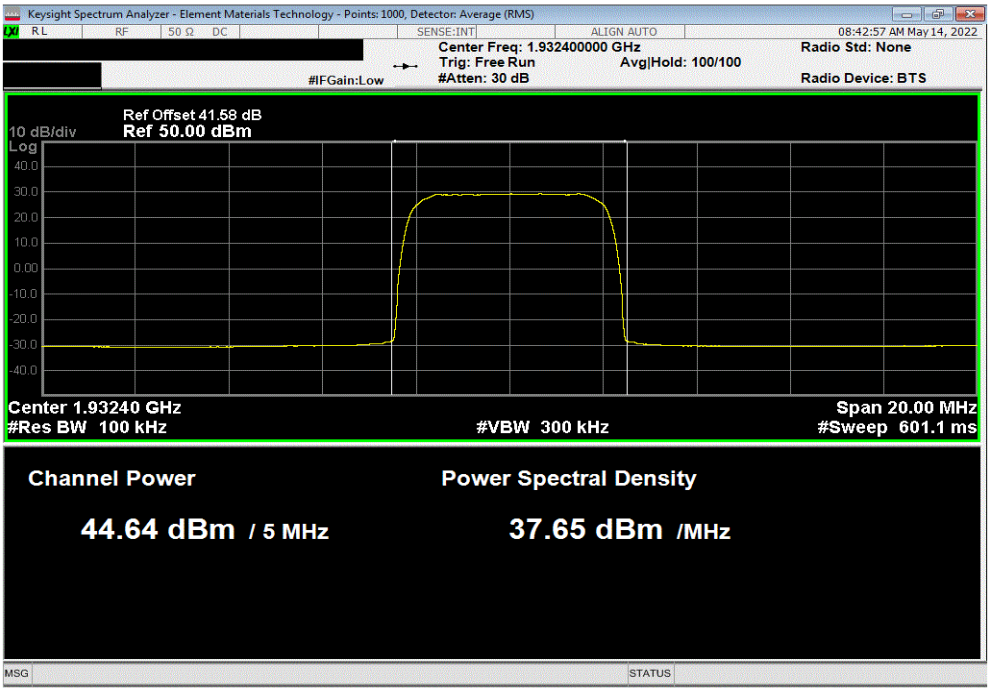
| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 1960 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | | |
| | 44.68 | 0 | 44.7 | 47.7 | | |



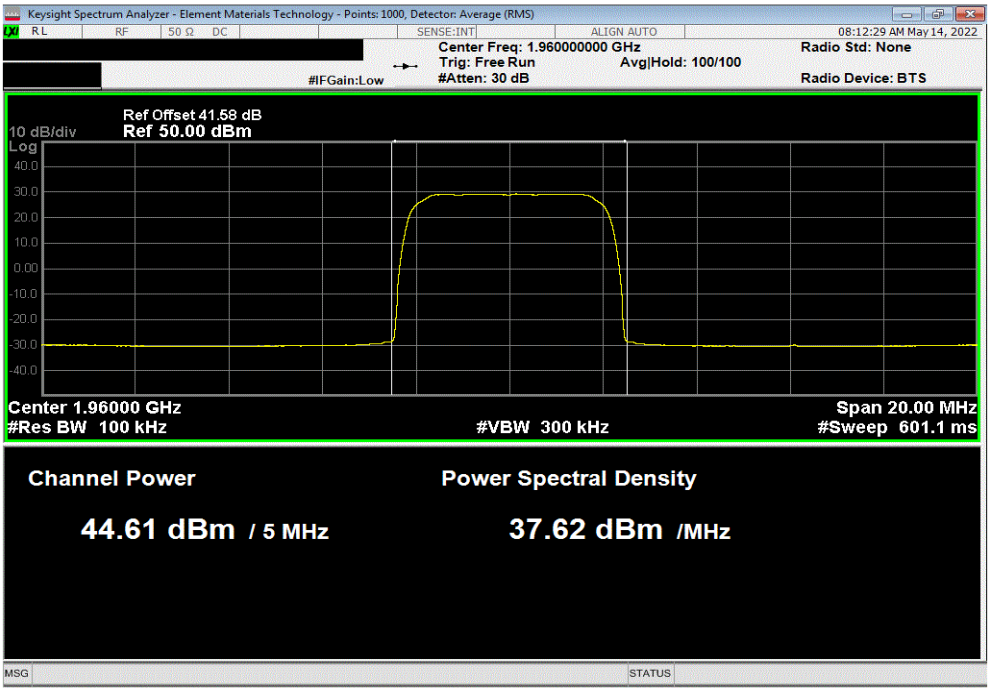

| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 1960 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | | |
| | 44.601 | 0 | 44.6 | 47.6 | | |



| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Low Channel, 1932.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | | |
| | 44.644 | 0 | 44.6 | 47.6 | | |

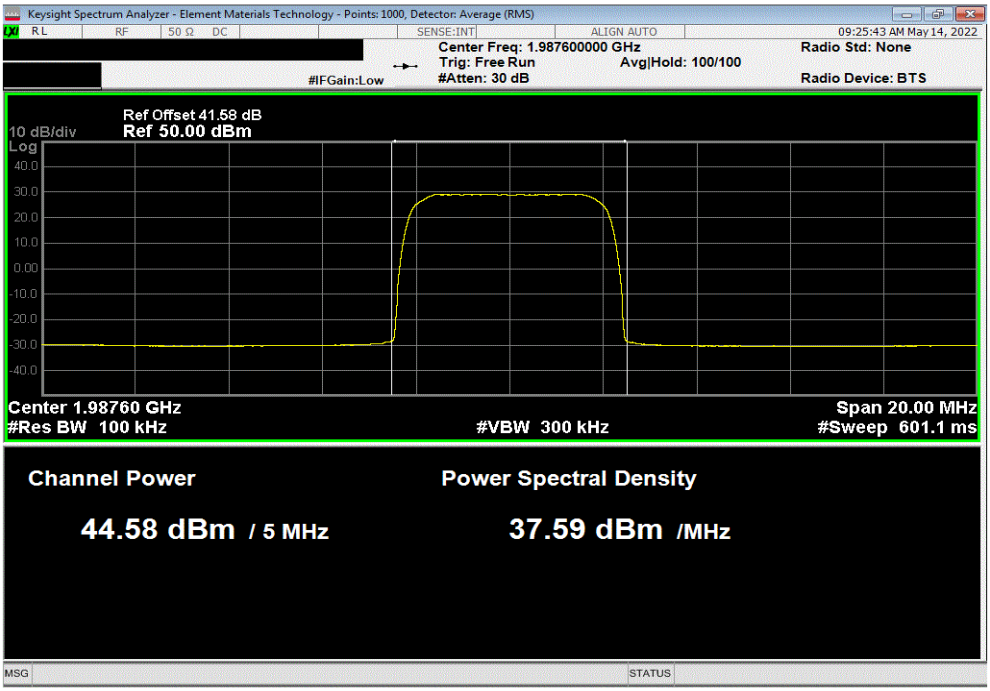



| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 1960 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | | |
| | 44.611 | 0 | 44.6 | 47.6 | | |



PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, High Channel, 1987.6 MHz

| | Initial Value dBm/MHz | Duty Cycle Factor (dB) | Single Port dBm/Carrier BW | Two Port (2x2 MIMO) dBm/Carrier BW | | |
|---|---|---|---|---|---|---|
| | 44.58 | 0 | 44.6 | 47.6 | | |




0.0 3.0

# CONDUCTED OUTPUT POWER - MULTIBAND

XMit 2022.02.07.0

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |
| Block - DC | Fairview Microwave | SD3239 | ANC | 2022-03-02 | 2023-03-02 |
| 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 follwoing data sheets. The transmit power was set to its default maximum.

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

RF conducted emissions testing was performed only on one port. The AHFII antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown during 4 port output power testing) and antenna port 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.

Multicarrier test cases have been developed and tested as shown below:

a) *PCS Multicarrier Multiband Test Case:* In the PCS band _Three WCDMA carriers using two carriers (with minimum spacing between carrier frequencies) at the lower band edge (1932.4 & 1937.4MHz) and a third carrier with maximum spacing between the other two carrier frequencies (1987.6MHz) at the upper band edge. In the AWS band _ Two WCDMA carriers at the band middle (2137.5 & 2142.5MHz). The carriers are operated at maximum power (~26.6W/PCS carrier and 20W/AWS carrier) with a total port power of 120 watts (80W for PCS band carriers + 40W for AWS band carriers).

b) *AWS Multicarrier Multiband Test Case*: In the AWS band _Three WCDMA carriers using two carriers (with minimum spacing between carrier frequencies) at the lower band edge (2112.4 & 2117.4MHz) and a third carrier with maximum spacing between the other two carrier frequencies (2167.6MHz) at the upper band edge. In the PCS band: Two WCDMA carriers at band middle (1957.5 & 1962.5MHz). The carriers are operated at maximum power (~26.6W/AWS carrier and 20W/PCS carrier) with a total port power of 120 watts (80W for AWS band carriers + 40W for PCS band carriers).

# CONDUCTED OUTPUT POWER - MULTIBAND

element

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | AHFII (FCC/ISED C2PC) | | | **Work Order:** | NOKI0040 |
| **Serial Number:** | YK214000036 | | | **Date:** | 16-May-22 |
| **Customer:** | Nokia Solutions and Networks | | | **Temperature:** | 23.5 °C |
| **Attendees:** | David Le, John Rattanavong | | | **Humidity:** | 47.5% RH |
| **Project:** | None | | | **Barometric Pres.:** | 1019 mbar |
| **Tested by:** | Brandon Hobbs | **Power:** | 54 VDC | **Job Site:** | TX05 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 24E:2022 | ANSI C63.26:2015 |
| RSS-133 Issue 6:2013+A1:2018 | RSS-133 Issue 6:2013+A1:2018 |
| FCC 27:2022 | ANSI C63.26:2015 |
| RSS-139 Issue 3:2015 | RSS-139 Issue 3:2015 |

**COMMENTS**

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. PCS Band II / AWS Band X carriers are enabled at maximum power (30 watts/carrier, 80 watts/band and 120 watts/port). The following is the output power measurements at the radio's output port. The multiband output power was measured by single carrier, band and total port power on port 1.

**DEVIATIONS FROM TEST STANDARD**

None

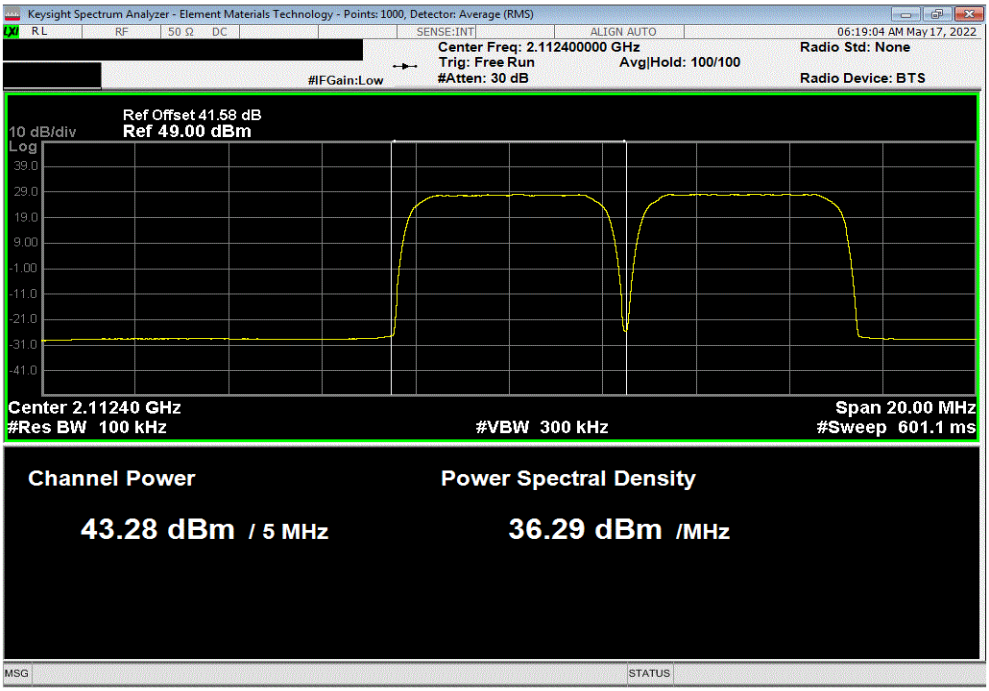
| Configuration # | 2 | Signature |
|---|---|---|

| | Avg Cond Initial Pwr (dBm) | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
|---|---|---|---|---|---|---|---|
| AWS BAND X, 2110 MHz - 2170 MHz | | | | | | | |
| Port 1 | | | | | | | |
| 5 MHz Bandwdith | | | | | | | |
| 64-QAM Modulation | | | | | | | |
| Low Channel, 2112.4 MHz | 43.284 | 0 | 43.3 | N/A | N/A | Within Tolerance | Pass |
| Low Inner Channel, 2117.4 MHz | 43.440 | 0 | 43.4 | N/A | N/A | Within Tolerance | Pass |
| Mid Left Channel, 2137.5 MHz | 42.791 | 0 | 42.8 | N/A | N/A | Within Tolerance | Pass |
| Mid Right Channel, 2142.5 MHz | 42.795 | 0 | 42.8 | N/A | N/A | Within Tolerance | Pass |
| High Channel, 2167.6 MHz | 44.155 | 0 | 44.2 | N/A | N/A | Within Tolerance | Pass |
| PCS BAND II, 1930 MHz - 1990 MHz | | | | | | | |
| Port 1 | | | | | | | |
| 5 MHz Bandwdith | | | | | | | |
| 64-QAM Modulation | | | | | | | |
| Low Channel, 1932.4 MHz | 43.302 | 0 | 43.3 | N/A | N/A | Within Tolerance | Pass |
| Low Inner Channal, 1937.4 MHz | 43.606 | 0 | 43.6 | N/A | N/A | Within Tolerance | Pass |
| Mid Left Channel, 1957.5 MHz | 42.694 | 0 | 42.7 | N/A | N/A | Within Tolerance | Pass |
| Mid Right Channel, 1962.5 MHz | 42.718 | 0 | 42.7 | N/A | N/A | Within Tolerance | Pass |
| High Channel, 1987.6 MHz | 44.223 | 0 | 44.2 | N/A | N/A | Within Tolerance | Pass |
| AWS and PCS BANDS | | | | | | | |
| Port 1 | | | | | | | |
| 5 MHz Bandwdith | | | | | | | |
| 64-QAM Modulation | | | | | | | |
| Multicarrier Multiband Test Case 1 | N/A | 0 | N/A | View Table | View Table | Within Tolerance | Pass |
| Multicarrier Multiband Test Case 2 | N/A | 0 | N/A | View Table | View Table | Within Tolerance | Pass |

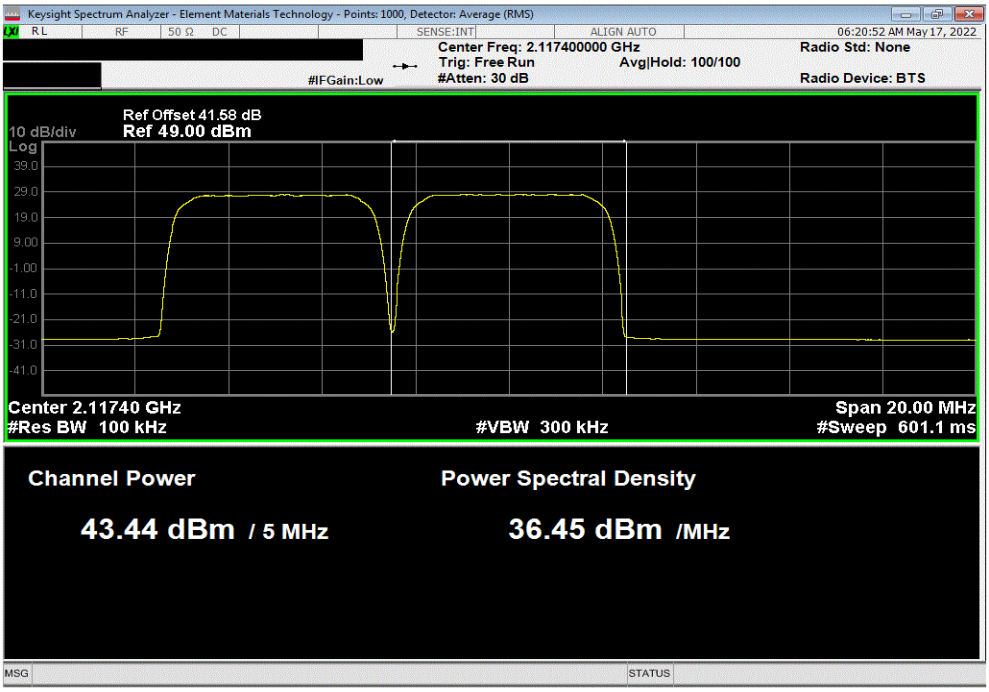
# CONDUCTED OUTPUT POWER - MULTIBAND



| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Low Channel, 2112.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 43.284 | 0 | 43.3 | N/A | N/A | Within Tolerance | Pass |



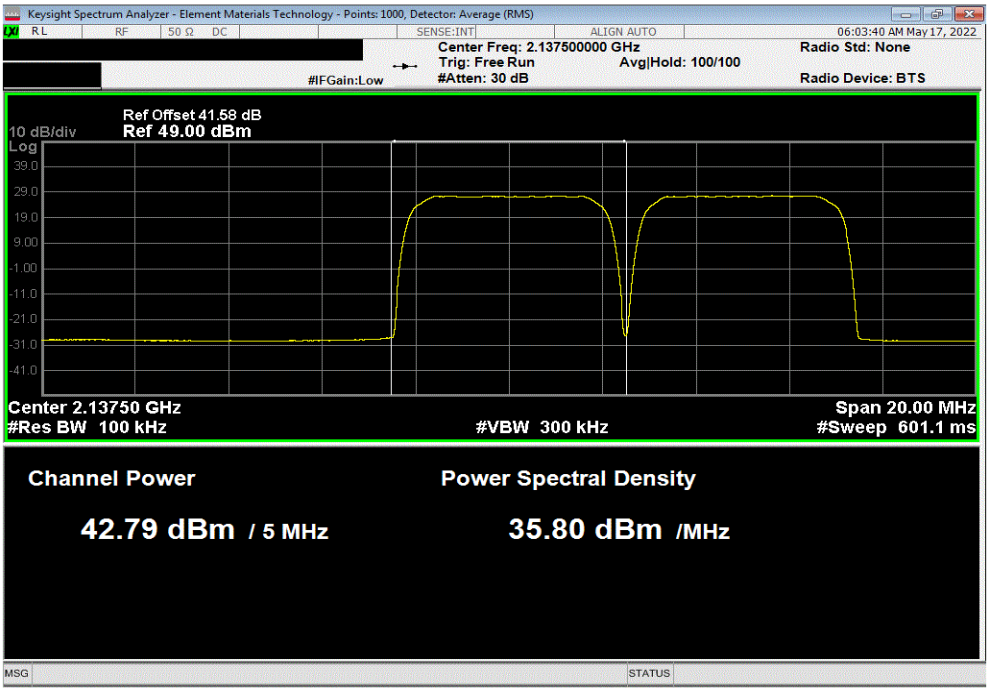

| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Low Inner Channel, 2117.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 43.44 | 0 | 43.4 | N/A | N/A | Within Tolerance | Pass |



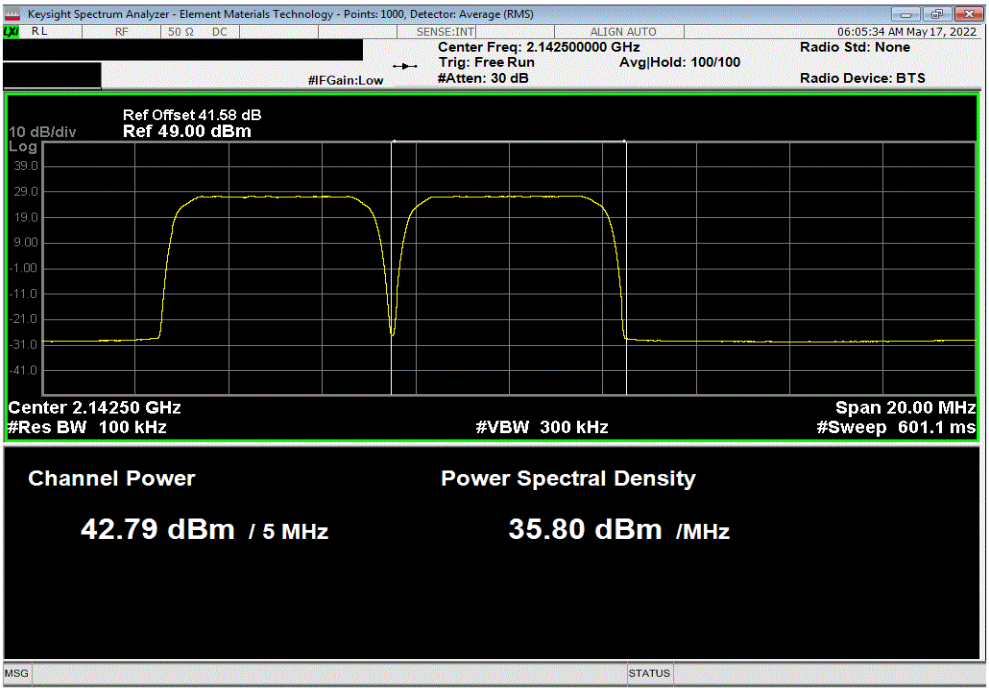
# CONDUCTED OUTPUT POWER - MULTIBAND



| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Left Channel, 2137.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 42.791 | 0 | 42.8 | N/A | N/A | Within Tolerance | Pass |



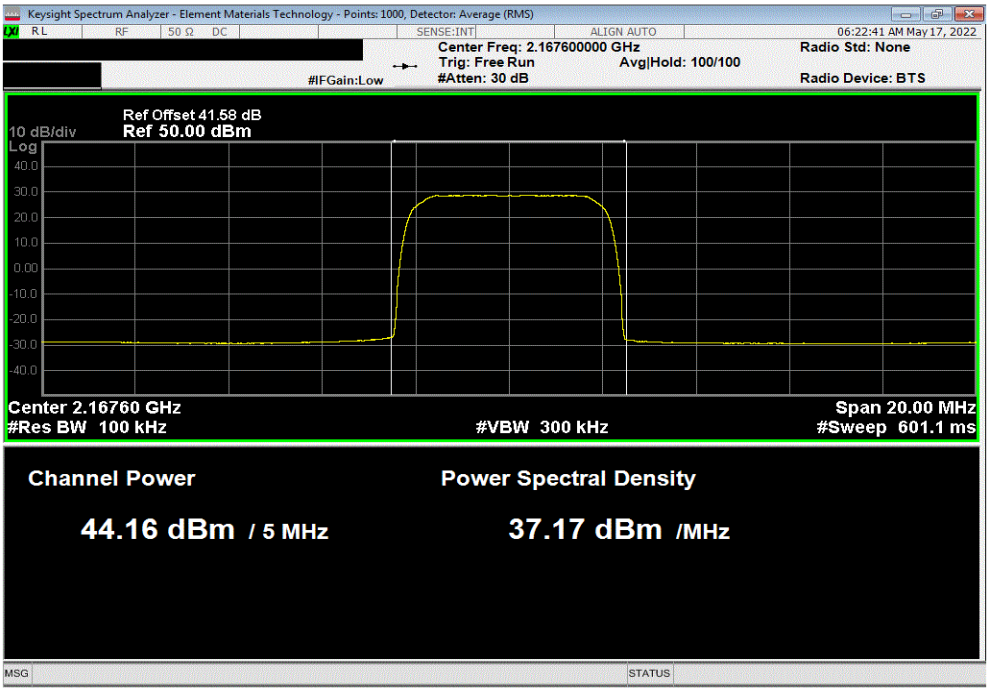

| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Right Channel, 2142.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 42.795 | 0 | 42.795 | N/A | N/A | Within Tolerance | Pass |



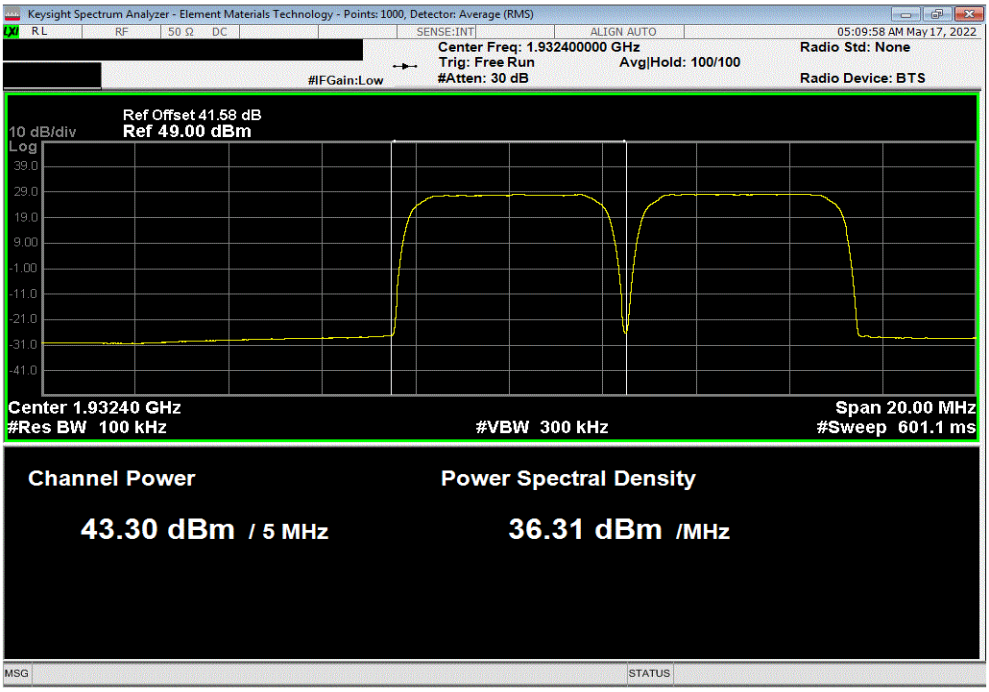
# CONDUCTED OUTPUT POWER - MULTIBAND



| AWS BAND X, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, High Channel, 2167.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 44.155 | 0 | 44.2 | N/A | N/A | Within Tolerance | Pass |



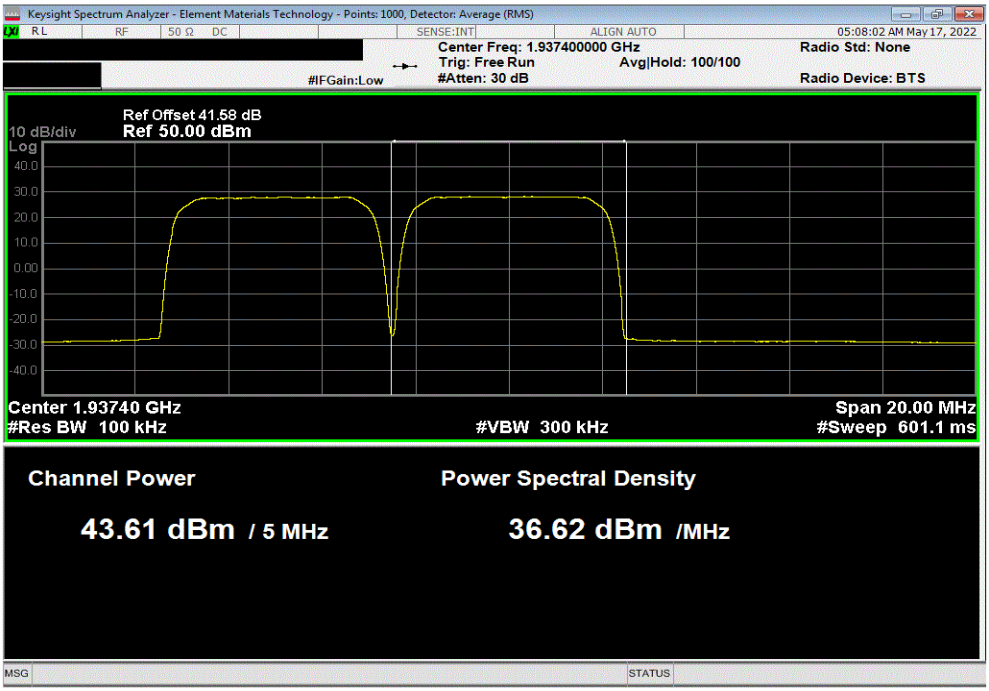

| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Low Channel, 1932.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 43.302 | 0 | 43.3 | N/A | N/A | Within Tolerance | Pass |



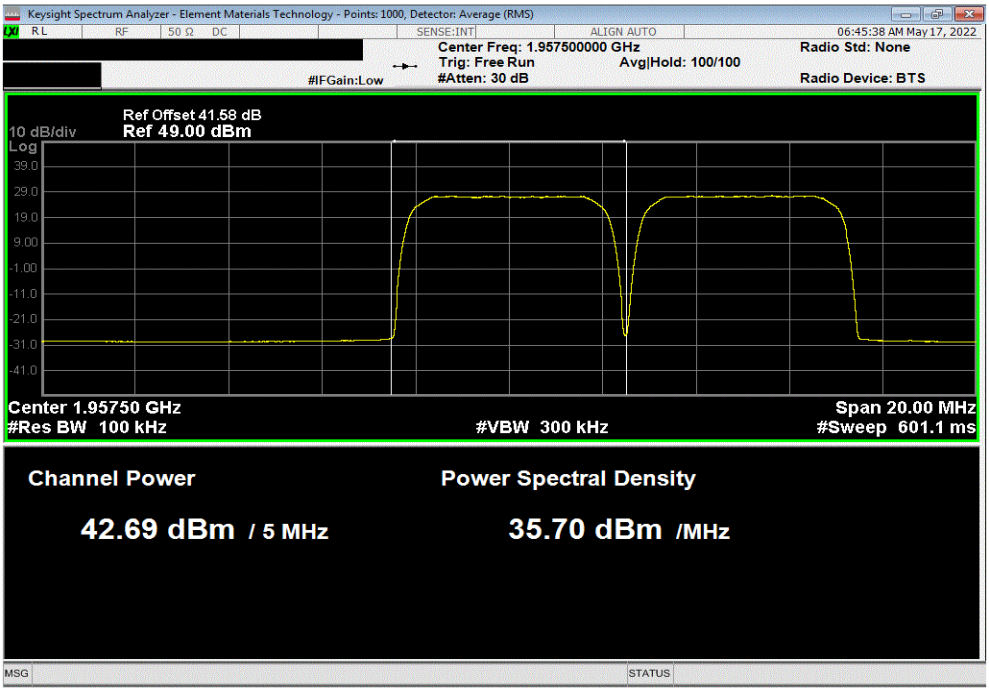
# CONDUCTED OUTPUT POWER - MULTIBAND



| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Low Inner Channal, 1937.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 43.606 | 0 | 43.6 | N/A | N/A | Within Tolerance | Pass |



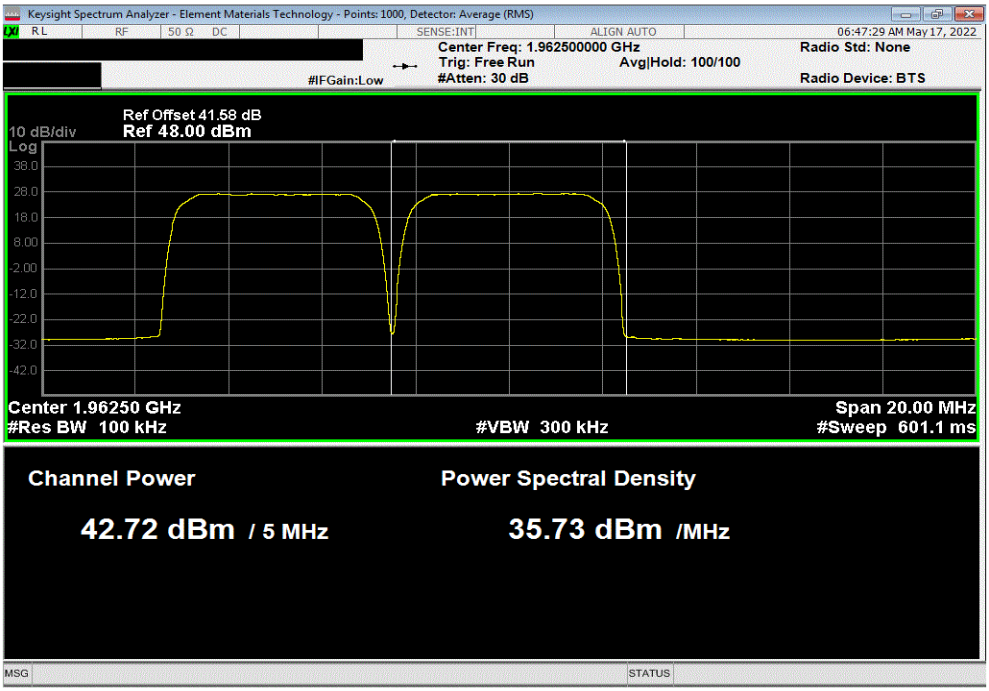

| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Left Channel, 1957.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 42.694 | 0 | 42.7 | N/A | N/A | Within Tolerance | Pass |



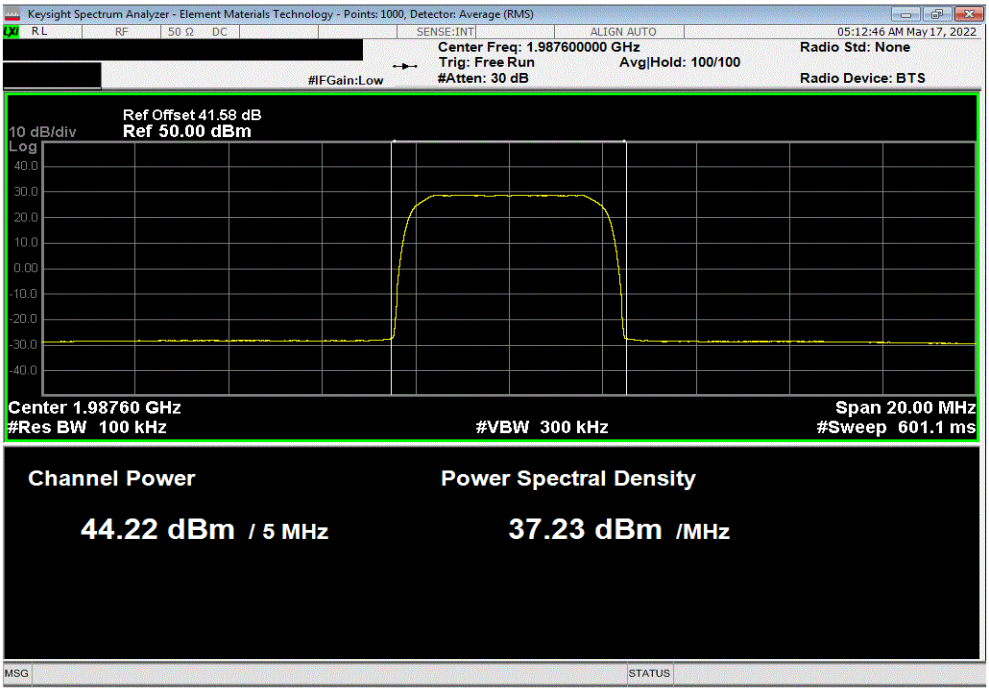
# CONDUCTED OUTPUT POWER - MULTIBAND



| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Right Channel, 1962.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 42.718 | 0 | 42.7 | N/A | N/A | Within Tolerance | Pass |




| PCS BAND II, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, High Channel, 1987.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Avg Cond Initial Pwr (dBm | Duty Cycle Factor (dB) | Avg Cond Carrier Pwr (dBm) | Avg Cond Band Pwr (dBm) | Avg Cond Port Pwr (dBm) | Limit (dBm) | Results |
| 44.223 | 0 | 44.2 | N/A | N/A | Within Tolerance | Pass |



# CONDUCTED OUTPUT POWER - MULTIBAND

element

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| AWS and PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Multicarrier Multband Test Case 1 | | | | | | |
|---|---|---|---|---|---|---|
| **Avg Cond Initial Pwr (dBm)** | **Duty Cycle Factor (dB)** | **Avg Cond Carrier Pwr (dBm)** | **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 Freqencies | Carrier Power (dBm) | Carrier Power (Watts) | Band Total Pwr (Watts) | Band Total Pwr (dBm) | Port Total Pwr (dBm) | Port Total Pwr (Watts) |
|---|---|---|---|---|---|---|---|
| PCS | Low 1932.4 MHz | **43.3** | 21.4 | N/A | N/A | N/A | N/A |
| PCS | Low 1937.4 MHz | **43.6** | 22.9 | N/A | N/A | N/A | N/A |
| PCS | High 1987.6 MHz | **44.2** | 26.3 | N/A | N/A | N/A | N/A |
| PCS | N/A | N/A | N/A | 70.6 | **48.5** | N/A | N/A |
| AWS | Mid 2137.5 MHz | **42.8** | 19.1 | N/A | N/A | N/A | N/A |
| AWS | Mid 2142.5 MHz | **42.8** | 19.1 | N/A | N/A | N/A | N/A |
| AWS | N/A | N/A | N/A | 38.1 | **45.8** | N/A | N/A |
| PCS and AWS | N/A | N/A | N/A | N/A | N/A | **50.4** | **110** |

| AWS and PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Multicarrier Multband Test Case 2 | | | | | | |
|---|---|---|---|---|---|---|
| **Avg Cond Initial Pwr (dBm)** | **Duty Cycle Factor (dB)** | **Avg Cond Carrier Pwr (dBm)** | **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 Freqencies | Carrier Power (dBm) | Carrier Power (Watts) | Band Total Pwr (Watts) | Band Total Pwr (dBm) | Port Total Pwr (dBm) | Port Total Pwr (Watts) |
|---|---|---|---|---|---|---|---|
| AWS | Low 2112.4 MHz | **43.3** | 21.4 | N/A | N/A | N/A | N/A |
| AWS | Low 2117.4 MHz | **43.4** | 21.9 | N/A | N/A | N/A | N/A |
| AWS | High 2167.6 MHz | **44.2** | 26.3 | N/A | N/A | N/A | N/A |
| AWS | N/A | N/A | N/A | 69.6 | **48.4** | N/A | N/A |
| PCS | Mid 1957.5 MHz | **42.7** | 18.6 | N/A | N/A | N/A | N/A |
| PCS | Mid 1962.5 MHz | **42.7** | 18.6 | N/A | N/A | N/A | N/A |
| PCS | N/A | N/A | N/A | 37.2 | **45.7** | N/A | N/A |
| PCS and AWS | N/A | N/A | N/A | N/A | N/A | **50.3** | **107** |