Radio Test Report
Application for a Class II Permissive Change of Equipment Authorization

FCC Part 27, IC RSS-139, and RSS-170
[2110MHz – 2200MHz]

FCC ID: VBNAAIB-01
IC ID: 661W-AAIB

Nokia Solutions and Networks
Airscale Base Transceiver Station Radio Module
Model: AAIB

Report: NOKI0030, Issue Date: August 11, 2021

ACCREDITED
CERT #3310.03

CERTIFICATE OF TEST

Last Date of Test: July 22, 2021
Nokia Solutions and Networks
EUT: Airscale Base Transceiver Station Radio Module Model AAIB

Radio Equipment Testing

Standards

Specification	Method
Code of Federal Regulations (CFR) Title 47 Part 2 (Radio Standards Specification) RSS-Gen Issue 5: 2019 CFR Title 47 Part 27 Subpart C RSS-139 Issue 3 - July 16, 2015 – Advanced Wireless Services (AWS) RSS-170 Issue 3- July 9, 2015	ANSI C63.26-2015 with FCC KDB 971168 D01 v03r01 FCC KDB 662911D01 v02r01 FCC KDB 662911D02 v01

Results

Test Description	Applied	Results	Comments
Duty Cycle	No	N/A	Not requested.
Occupied Bandwidth	Yes	Pass	
Frequency Stability	No	N/A	Not requested.
Output Power	Yes	Pass	
Power Spectral Density	Yes	Pass	
Peak to Average Power (PAPR)CCDF	Yes	Pass	
Band Edge Compliance	Yes	Pass	
Spurious Conducted Emissions	Yes	Pass	
Spurious Radiated Emissions	No	N/A	Not requested.

Deviations From Test Standards

None

Approved By:

Adam Bruno, Operations Manager

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

REVISION HISTORY

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

ACCREDITATIONS AND AUTHORIZATIONS

United States

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

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

Canada

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

European Union

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

United Kingdom

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

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

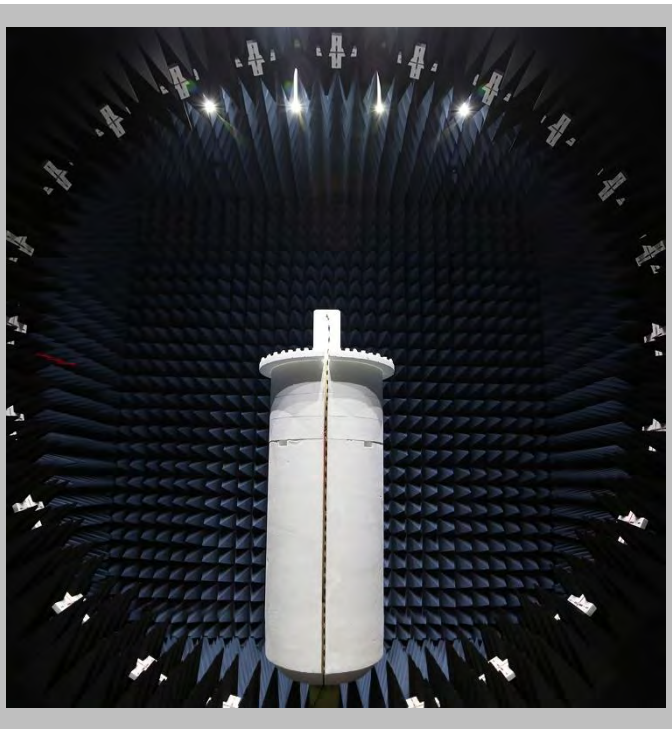
SCOPE

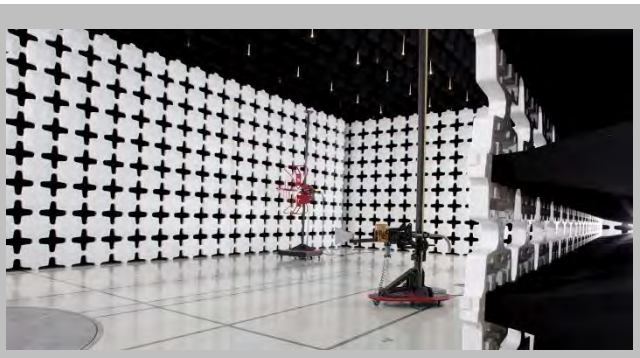
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

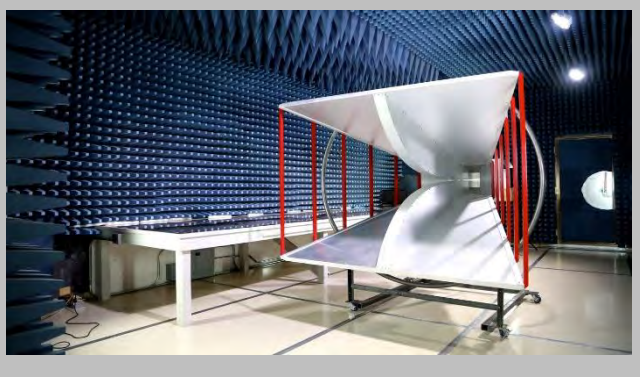
FACILITIES

element
2020.12.15

California	Minnesota	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-11 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (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.

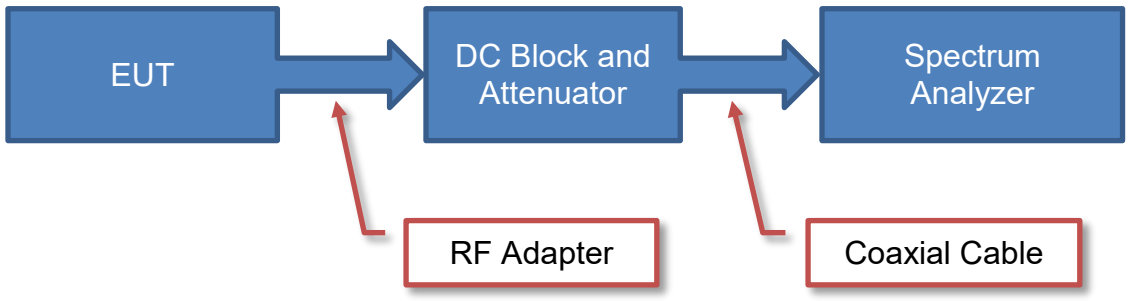
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found in the table below. A lab specific 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)	2.6 dB	-2.6 dB

TEST SETUP BLOCK DIAGRAMS

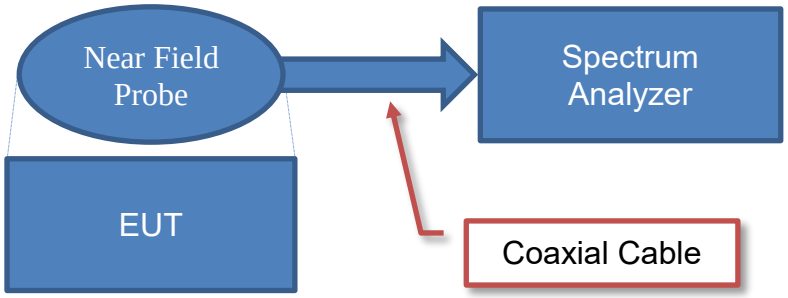
Antenna Port Conducted Measurements



Sample Calculation

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

Near Field Test Fixture Measurements

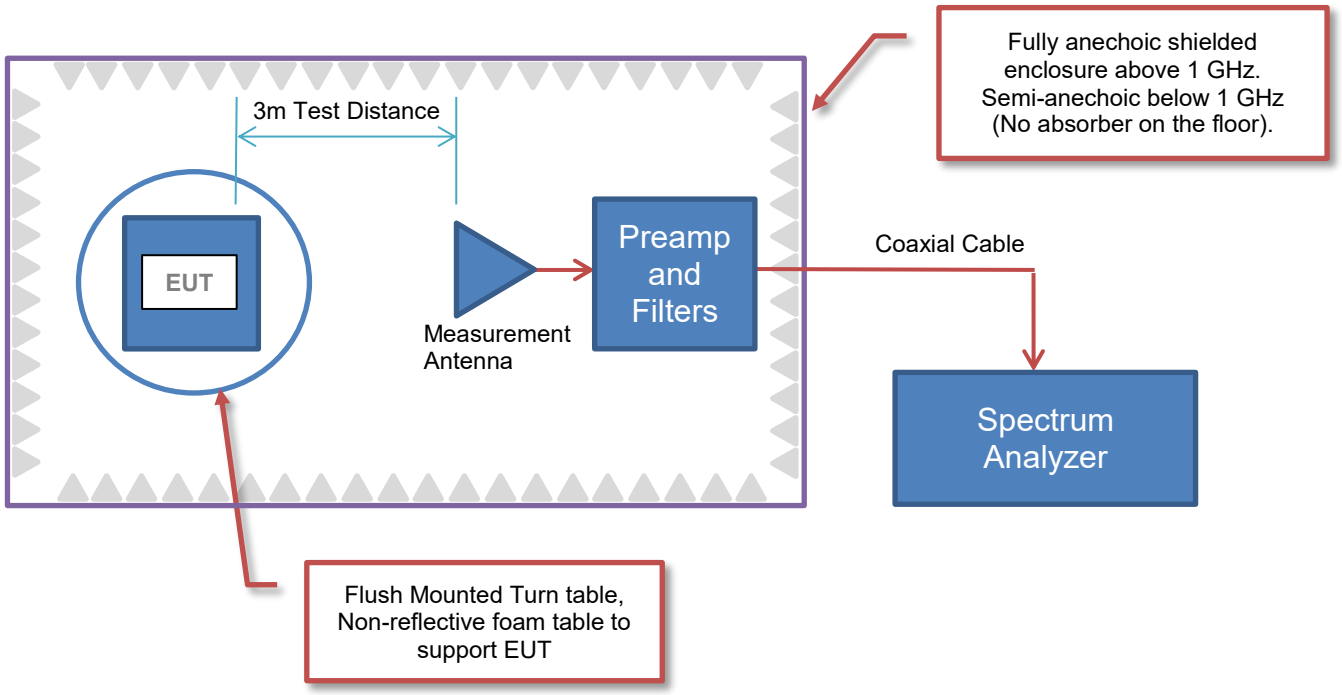


Sample Calculation

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

TEST SETUP BLOCK DIAGRAMS

Spurious Radiated Emissions



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 Radio Module Model AAIB
First Date of Test:	July 19, 2021
Last Date of Test:	July 22, 2021
Receipt Date of Samples:	July 19, 2021
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 class II permissive change on the original filing is being pursued to add 5G NR (new radio) carriers to the Airscale Base Transceiver Station Radio Module Model AAIB FCC and ISED radio certifications. The original certification effort included testing for LTE technologies. Please refer to the test report on the original certification (FCC ID: VBNAAIB-01/IC ID: 661W-AAIB) for details on all required testing. All conducted RF testing performed for the original certification testing has been repeated using 5G NR carriers for this class II permissive change per correspondence/guidance from Nemko TCB. The same test methodology used in the original certification testing was used in this class II permissive change test effort. 5G NR carrier bandwidths of 5MHz, 10MHz, 15MHz and 20MHz with QPSK, 16QAM, 64QAM and 256QAM modulation types were verified under this effort. Tests performed under the class II change effort include RF power, PSD, CCDF, emission bandwidth (99% and 26 dB down), band edge spurious emissions, and conducted spurious emissions. The 5G NR carriers/modulation types for this testing are setup according to 3GPP TS 38.141-1 Test Models and are NR-FR1-TM 1.1 (QPSK modulation type), NR-FR1-TM 3.2 (16QAM modulation type), NR-FR1-TM 3.1 (64QAM modulation type), and NR-FR1-TM 3.1a (256QAM modulation type).
The testing was performed on the same hardware version (AAIB) as the original certification test. The base station and remote radio head software for this testing is an updated release that includes 5G NR 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.
The equipment under test (EUT) is a Nokia Solutions and Networks Airscale Base Transceiver Station Radio Module Model AAIB. The AAIB radio module is a multi-standard multi-carrier radio module designed to support 4G LTE-FDD and 5G NR-FDD operations. **The scope of testing in this effort is for 5G NR Single Carrier operations.**
The AAIB radio module is a subassembly of the massive MIMO adaptive antenna (MMAA) assembly. The MMAA integrates radio module variants with the 8 column antenna into one assembly. The MMAA assembly/antenna is not directly used/part of this radio approval test effort (i.e.: The AAIB radio module is tested under this effort. The antenna assembly is not part of the test under this effort). The MMAA AAFIA assembly also contains the AAFB radio module whose certification/testing are

documented elsewhere. The MMAA AAFIA Dual 16T16R 100W +100W (8 column antenna) contains the AAIB and AAFB radio modules.

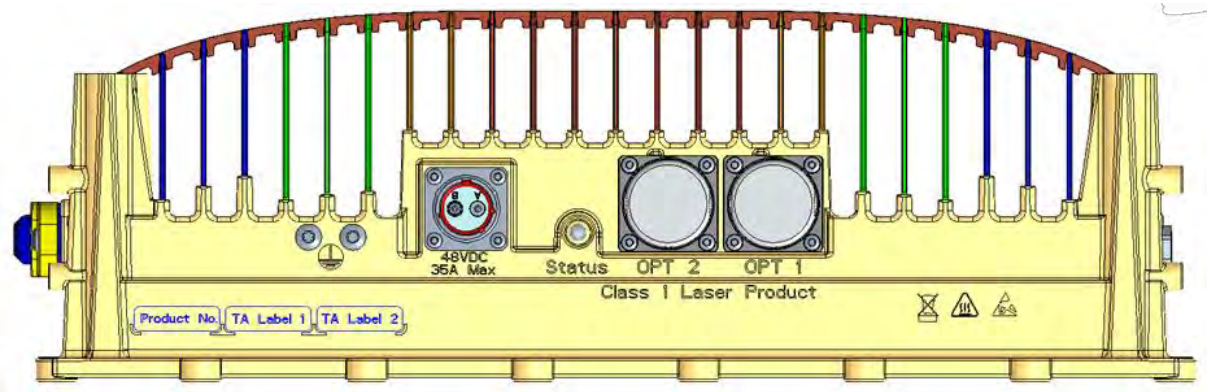
The AAIB RRH has 16 transmit/receive antenna ports (16TX/16RX) that supports 3GPP frequency band n66 operations (BTS RX: 1710 to 1780 MHz/BTS TX: 2110 to 2200 MHz). The maximum RF output power of the radio module antenna port is 6.25 watts. The total RF output power for the AAIB radio module is 100 watts (16 x 6.25 watts). The TX and RX instantaneous bandwidth cover the full AAIB operational bandwidth (Band n66). The AAIB supports 5, 10, 15 and 20MHz 5G NR bandwidths. The AAIB supports four 5G NR downlink modulation types (QPSK, 16QAM, 64QAM and 256QAM).

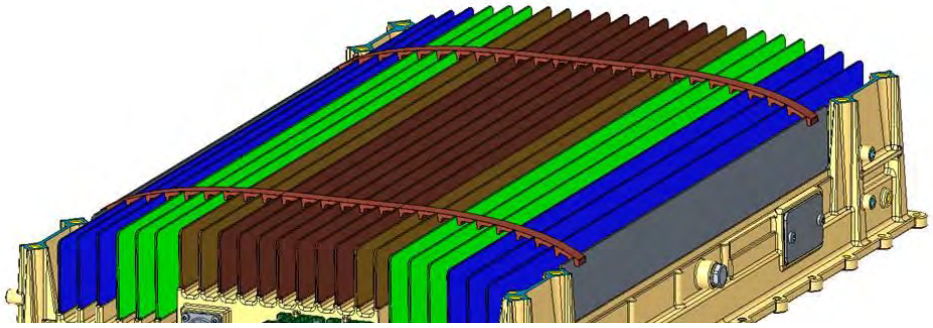
The radio module has external interfaces including DC power (DC In), ground, transmit/receive (ANT), and optical (OPT). The massive MIMO adaptive antenna assembly (configured with AAFB and AAIB radios) may be pole or wall mounted.
The AAIB 3GPP Band n66 or AWS band 1+3+4 5G NR channel bandwidths are 5, 10, 15 and 20MHz. The downlink channel numbers and frequencies are provided below.

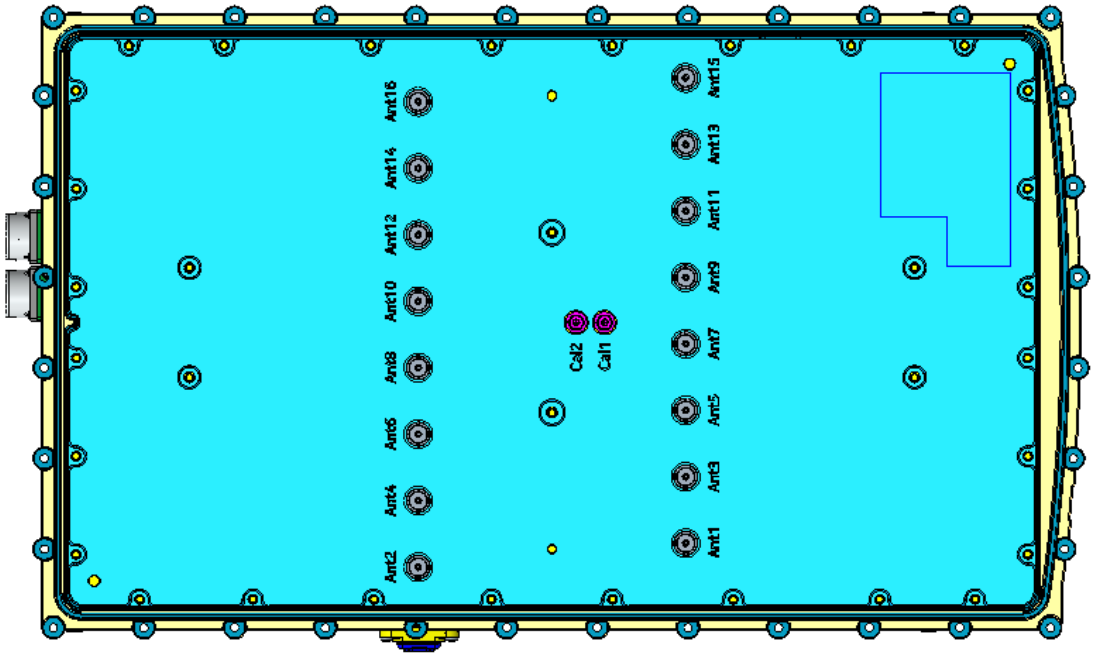
	Downlink 5G NR NR-ARFCN	Downlink Frequency (MHz)	5G NR Channel Bandwidth			
			5 MHz	10 MHz	15 MHz	20 MHz
AAIB 5G NR Band n66 (Ant 1 through 16)	422000	2110.0	Band Edge	Band Edge	Band Edge	Band Edge
	422500	2112.5	Bottom Ch			
	423000	2115.0		Bottom Ch		
	423500	2117.5			Bottom Ch	
	424000	2120.0				Bottom Ch
	431000	2155.0	Middle Ch	Middle Ch	Middle Ch	Middle Ch
	438000	2190.0				Top Channel
	438500	2192.5			Top Channel	
	439000	2195.0		Top Channel		
	439500	2197.5	Top Channel			
	440000	2200.0	Band Edge	Band Edge	Band Edge	Band Edge

AAIB Downlink Band Edge 5G NR Band n66 Frequency Channels

AAIB Connector Layout







PRODUCT DESCRIPTION

EUT External Interfaces

Name	Qty	Connector Type	Purpose (and Description)
DC In	1	Quick Disconnect	2-pole Power Circular Connector
GND	1	Screw lug (2xM5/1xM8)	Ground
ANT	16	4.3-10 Blind Mate/Quick Disconnect	RF signal for Transmitter/Receiver (50 Ohm)
Unit	1	LED	Unit Status LED
OPT	2	SFP+ cage	Optical Interface
Fan	1	Microfit	Power for fan on the side of radio module.

Testing Objective:

A class II permissive change on the original filing is being pursued to add 5G NR (new radio) carriers to the Airscale BTS Radio Module AAIB Federal Communication Commission and Industry Canada certifications.

CONFIGURATIONS

Configuration NOKI0030- 1

Software/Firmware Running during test	
Description	**Version**
5G BTS Software Version	SBTS00_ENB_9900_210629_000001
5G RF_SW	SRM51.06.R04

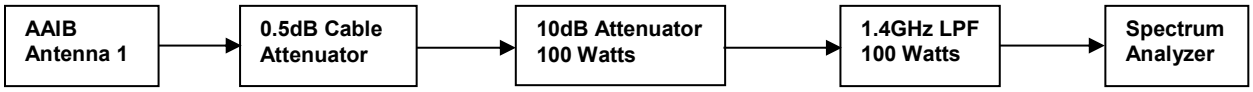
Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	J8181470035
ASIK (5G BTS System Module)	Nokia Solutions and Networks	474021A.101	L1184301617
ABIL (5G BTS Baseband Module)	Nokia Solutions and Networks	474020A.102	L1183605740
AAIB (Radio Module Model)	Nokia Solutions and Networks	090147A.104	BL2032123Y0
Low Pass Filter 1.4GHz/100W	Microwave Circuits,Inc.	L13502G1	SN2454-01
Attenuator 100W/10dB	Weinschel Corp	48-10-43-LIM	BJ1771
AOMC SFP28+ 9.8G,70M,850NM (Radio)	Nokia	474900A.101	VF20230058S
AOMC SFP28+ 9.8G,70M,850NM (BS)	Nokia	474900A.101	VF20230008Y
ThinkPad T490 (WebEM- PC)	Lenovo	20N3S88012	PF26RVZ0
DC System power supply (Radio)	KEYSIGHT	N8757A	US21D4053S
FPAC (DC-PWR supply-BS)	Nokia	472438A.101	G711007170
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-11
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-14
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-10
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-20
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-04
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-05
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-17
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-29
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-30
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-08
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-27
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-24
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-01
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-15
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-28
Antenna Load 1	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 2	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 3	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 4	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 5	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 6	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 7	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 8	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 9	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 10	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 11	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 12	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 13	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 14	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 15	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Fiber Optic cable 10m	Amphenol Fiber Optic	E201648	995109C-180512
GPS Receiver Cable	Nokia	995426C	CA2029
Cat-5e cable	CSA	E151955	LL79189
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297374
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551432/4

CONFIGURATIONS

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1 (5G)**	**Connection 2**
Fiber Optic Cable	N	10 meters	N	ABIL	AAIB
GPS Receiver Cable	Y	100 meters	N	ASIK	FYGB GPS receiver
Cat-5e Cable	Y	7 meters	N	ASIK	WebEM- PC
RD Microwave Systems – RF CABLE	Y	2 meters	N	EUT [AAIB] Ant ports 2-16	Antenna Load

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_106 0.5dB cable attenuator	Y	2 meters	N	EUT [AAIB] Ant port #1	Attenuator 100W/10dB
Attenuator 100W/10dB	N	N/A	N	RF cable HS-SUCOFLEX_106	Low Pass filter 1.4G/100W
Low Pass Filter 1.4G/100W	N	N/A	N	Attenuator 100W/10dB	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	Low Pass Filter 1.4G/100W	Analyzer

RF Test Setup Diagram:



CONFIGURATIONS

Configuration NOKI0030- 2

Software/Firmware Running during test	
Description	**Version**
5G BTS Software Version	SBTS00_ENB_9900_210629_000001
5G RF_SW	SRM51.06.R04

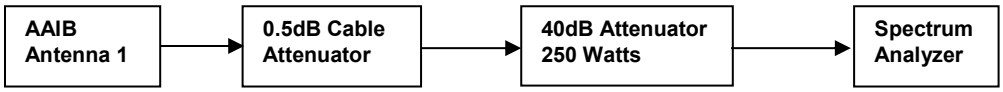
Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	J8181470035
ASIK (5G BTS System Module)	Nokia Solutions and Networks	474021A.101	L1184301617
ABIL (5G BTS Baseband Module)	Nokia Solutions and Networks	474020A.102	L1183605740
AAIB (Radio Module Model)	Nokia Solutions and Networks	090147A.104	BL2032123Y0
Attenuator 250W/40dB	API Weinschel	58-40-43-LIM	TC909
AOMC SFP28+ 9.8G,70M,850NM (Radio)	Nokia	474900A.101	VF20230058S
AOMC SFP28+ 9.8G,70M,850NM (BS)	Nokia	474900A.101	VF20230008Y
ThinkPad T490 (WebEM- PC)	Lenovo	20N3S88012	PF26RVZ0
DC System power supply (Radio)	KEYSIGHT	N8757A	US21D4053S
FPAC (DC-PWR supply-BS)	Nokia	472438A.101	G711007170
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-11
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-14
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-10
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-20
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-04
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-05
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-17
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-29
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-30
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-08
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-27
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-24
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-01
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-15
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-28
Antenna Load 1	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 2	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 3	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 4	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 5	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 6	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 7	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 8	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 9	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 10	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 11	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 12	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 13	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 14	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 15	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Fiber Optic cable 10m	Amphenol Fiber Optic	E201648	995109C-180512
GPS Receiver Cable	Nokia	995426C	CA2029
Cat-5e cable	CSA	E151955	LL79189
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297374
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551432/4

CONFIGURATIONS

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1 (5G)**	**Connection 2**
Fiber Optic Cable	N	10 meters	N	ABIL	AAIB
GPS Receiver Cable	Y	100 meters	N	ASIK	FYGB GPS receiver
Cat-5e Cable	Y	7 meters	N	ASIK	WebEM- PC
RD Microwave Systems – RF CABLE	Y	2 meters	N	EUT [AAIB] Ant ports 2-16	Antenna Load

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_106	Y	2 meters	N	EUT [AAIB] 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 NOKI0030- 3

Software/Firmware Running during test	
Description	**Version**
5G BTS Software Version	SBTS00_ENB_9900_210629_000001
5G RF_SW	SRM51.06.R04

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	J8181470035
ASIK (5G BTS System Module)	Nokia Solutions and Networks	474021A.101	L1184301617
ABIL (5G BTS Baseband Module)	Nokia Solutions and Networks	474020A.102	L1183605740
AAIB (Radio Module Model)	Nokia Solutions and Networks	090147A.104	BL2032123Y0
High Pass Filter 2.5GHz/2W	Microwave Circuits	F-100-3000-5-R	0028
Attenuator 50W/30dB	Narda	776B-30	N/A
AOMC SFP28+ 9.8G,70M,850NM (Radio)	Nokia	474900A.101	VF20230058S
AOMC SFP28+ 9.8G,70M,850NM (BS)	Nokia	474900A.101	VF20230008Y
ThinkPad T490 (WebEM- PC)	Lenovo	20N3S88012	PF26RVZ0
DC System power supply (Radio)	KEYSIGHT	N8757A	US21D4053S
FPAC (DC-PWR supply-BS)	Nokia	472438A.101	G711007170
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-11
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-14
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-10
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-20
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-04
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-05
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-17
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-29
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-30
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-08
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-27
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-24
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-01
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-15
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-28
Antenna Load 1	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 2	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 3	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 4	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 5	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 6	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 7	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 8	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 9	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 10	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 11	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 12	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 13	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 14	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 15	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Fiber Optic cable 10m	Amphenol Fiber Optic	E201648	995109C-180512
GPS Receiver Cable	Nokia	995426C	CA2029
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2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297374
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CONFIGURATIONS

Cables (Peripheral)					
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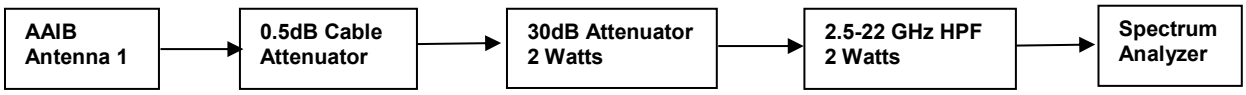
Fiber Optic Cable	N	10 meters	N	ABIL	AAIB
GPS Receiver Cable	Y	100 meters	N	ASIK	FYGB GPS receiver
Cat-5e Cable	Y	7 meters	N	ASIK	WebEM- PC
RD Microwave Systems – RF CABLE	Y	2 meters	N	EUT [AAIB] Ant ports 2-16	Antenna Load

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_106	Y	2 meters	N	EUT [AAIB] Ant port #1	Attenuator 50W/30dB
Attenuator 50W/30dB	N	NA	N	RF cable HS-SUCOFLEX_106	High Pass Filter 2.5GHz/2W
High Pass Filter 2.5GHz/2W	N	NA	N	Attenuator 50W/30dB	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	High Pass Filter 2.5GHz/2W	Analyzer

RF Test Setup Diagram:



MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2021-07-19	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.
2	2021-07-21	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.
3	2021-07-21	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.
4	2021-07-21	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.
5	2021-07-21	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.
6	2021-07-22	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

OCCUPIED BANDWIDTH

XMit 2020.12.30.0

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	Agilent	N9010A	AFL	2021-03-11	2022-03-11
Block - DC	Fairview Microwave	SD3379	AMM	2020-09-21	2021-09-21
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 the spectrum analyzer. The method in section 5.4 of ANSI C63.26 was used to make this measurement. The spectrum analyzer settings were as follows:

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

The occupied bandwidth was measured with the EUT configured in the modes called out in the data sheets.
FCC 27.53(h)(3) defines he 26dB emission bandwidth requirement.
RSS GEN Section 6.6 defines the 99% emission bandwidth requirement

RF conducted emissions testing was performed on one port. The AAIB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification report) and 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.

FCC and ISED Emission Designators for Band n66 (2110MHz to 2200MHz)									
Ch	Radio	5G-NR: QPSK		5G-NR: 16QAM		5G-NR: 64QAM		5G-NR: 256QAM	
BW	Channel	FCC	ISED	FCC	ISED	FCC	ISED	FCC	ISED
5MHz	Low							4M87G7W	4M48G7W
	Mid	4M86G7W	4M48G7W	4M83G7W	4M50G7W	4M86G7W	4M50G7W	4M83G7W	4M48G7W
	High							4M86G7W	4M48G7W
10MHz	Low							9M90G7W	9M28G7W
	Mid	9M89G7W	9M31G7W	9M86G7W	9M26G7W	9M87G7W	9M30G7W	9M88G7W	9M28G7W
	High							9M90G7W	9M28G7W
15MHz	Low							14M9G7W	14M1G7W
	Mid	15M0G7W	14M2G7W	14M9G7W	14M2G7W	15M0G7W	14M2G7W	14M9G7W	14M1G7W
	High							14M9G7W	14M1G7W
20MHz	Low							19M9G7W	18M9G7W
	Mid	20M0G7W	19M0G7W	19M9G7W	19M0G7W	20M0G7W	18M9G7W	19M9G7W	18M9G7W
	High							19M9G7W	18M9G7W

Note: FCC emission designators are based on 26dB emission bandwidth. ISED emission designators are based on 99% emission bandwidth.

OCCUPIED BANDWIDTH

element

TbtTx 2021.03.19.1 XMit 2020.12.30.0

EUT:	**AAIB (FCC/ISED C2PC)**			**Work Order:**	**NOKI0030**
Serial Number:	**BL2032123Y0**			**Date:**	**21-Jul-21**
Customer:	**Nokia Solutions and Networks**			**Temperature:**	**21.4 °C**
Attendees:	**David Le, Mitchell Hill**			**Humidity:**	**52.2% RH**
Project:	**None**			**Barometric Pres.:**	**1021 mbar**
Tested by:	**Brandon Hobbs**	**Power:**	**54 VDC**	**Job Site:**	**TX09**

TEST SPECIFICATIONS	**Test Method**
FCC 27:2021	ANSI C63.26:2015
RSS-139 Issue 3:2015, RSS-170 Issue 3:2015	RSS-139 Issue 3:2015, RSS-170 Issue 3:2015

COMMENTS

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. Band n66 carriers are enabled at maximum power (6.25 watts/carrier).

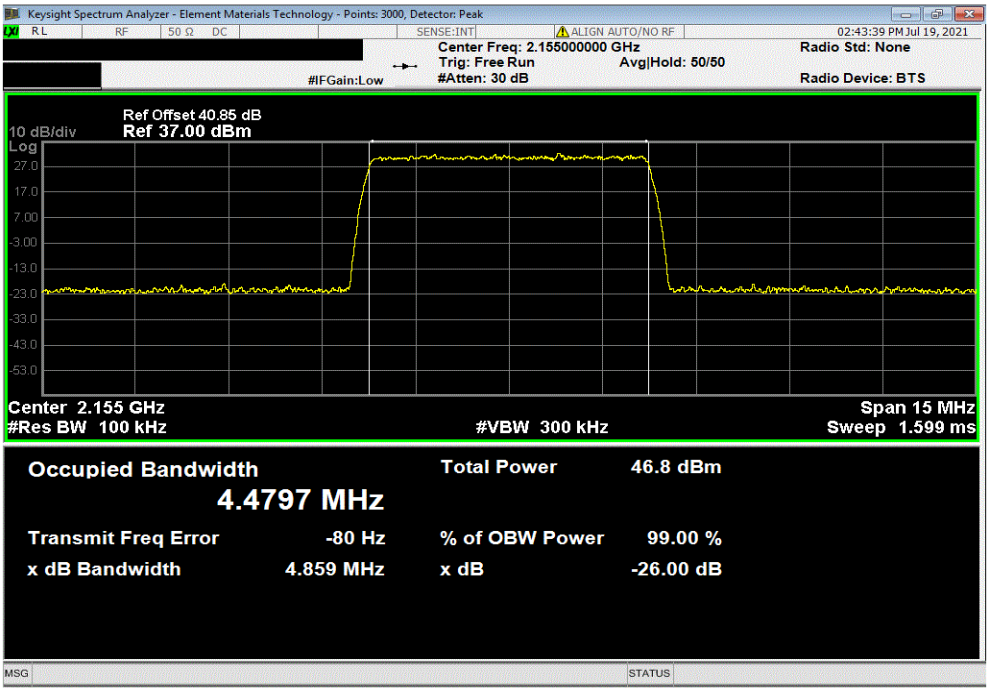
DEVIATIONS FROM TEST STANDARD

None

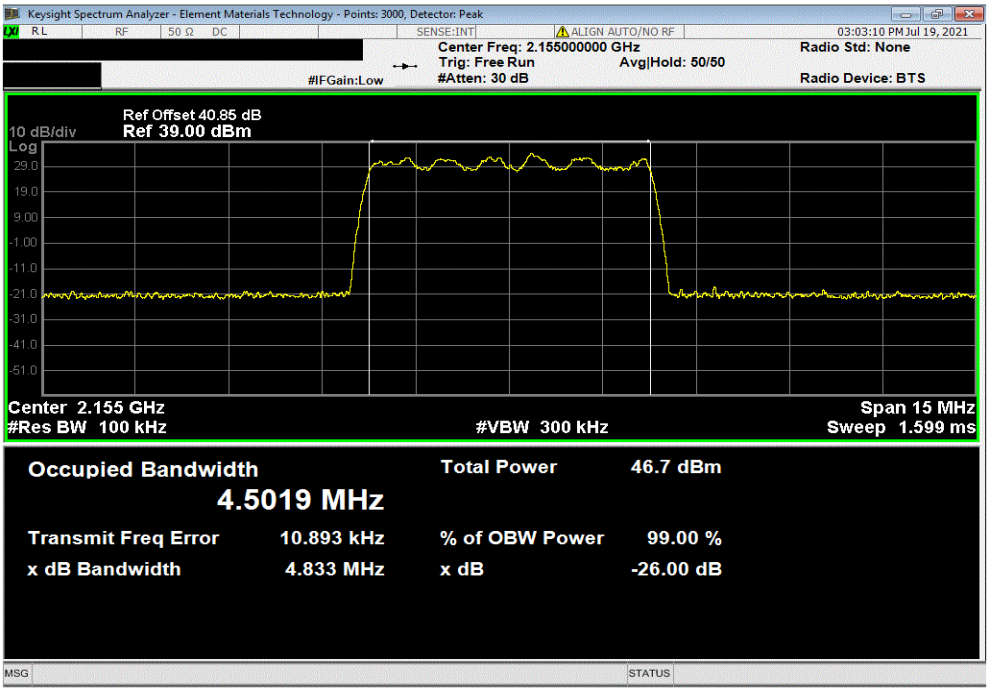
Configuration #	**2**	*Signature*

	Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
Port 1, Band n66, 2110 MHz - 2200 MHz				
5 MHz Bandwidth				
QPSK Modulation				
Mid Channel 2155 MHz	4.48	4.86	Within Band	Pass
16-QAM Modulation				
Mid Channel 2155 MHz	4.50	4.83	Within Band	Pass
64-QAM Modulation				
Mid Channel 2155 MHz	4.50	4.86	Within Band	Pass
256-QAM Modulation				
Low Channel 2112.5 MHz	4.48	4.87	Within Band	Pass
Mid Channel 2155 MHz	4.48	4.83	Within Band	Pass
High Channel 2197.5 MHz	4.48	4.86	Within Band	Pass
10 MHz Bandwidth				
QPSK Modulation				
Mid Channel 2155 MHz	9.31	9.89	Within Band	Pass
16-QAM Modulation				
Mid Channel 2155 MHz	9.26	9.86	Within Band	Pass
64-QAM Modulation				
Mid Channel 2155 MHz	9.30	9.87	Within Band	Pass
256-QAM Modulation				
Low Channel 2115 MHz	9.28	9.90	Within Band	Pass
Mid Channel 2155 MHz	9.28	9.88	Within Band	Pass
High Channel 2195 MHz	9.28	9.90	Within Band	Pass
15 MHz Bandwidth				
QPSK Modulation				
Mid Channel 2155 MHz	14.2	15.0	Within Band	Pass
16-QAM Modulation				
Mid Channel 2155 MHz	14.2	14.9	Within Band	Pass
64-QAM Modulation				
Mid Channel 2155 MHz	14.2	15.0	Within Band	Pass
256-QAM Modulation				
Low Channel 2117.5 MHz	14.1	14.9	Within Band	Pass
Mid Channel 2155 MHz	14.1	14.9	Within Band	Pass
High Channel 2192.5 MHz	14.1	14.9	Within Band	Pass
20 MHz Bandwidth				
QPSK Modulation				
Mid Channel 2155 MHz	19.0	20.0	Within Band	Pass
16-QAM Modulation				
Mid Channel 2155 MHz	19.0	19.9	Within Band	Pass
64-QAM Modulation				
Mid Channel 2155 MHz	18.9	20.0	Within Band	Pass
256-QAM Modulation				
Low Channel 2120 MHz	18.9	19.9	Within Band	Pass
Mid Channel 2155 MHz	18.9	19.9	Within Band	Pass
High Channel 2190 MHz	18.9	19.9	Within Band	Pass

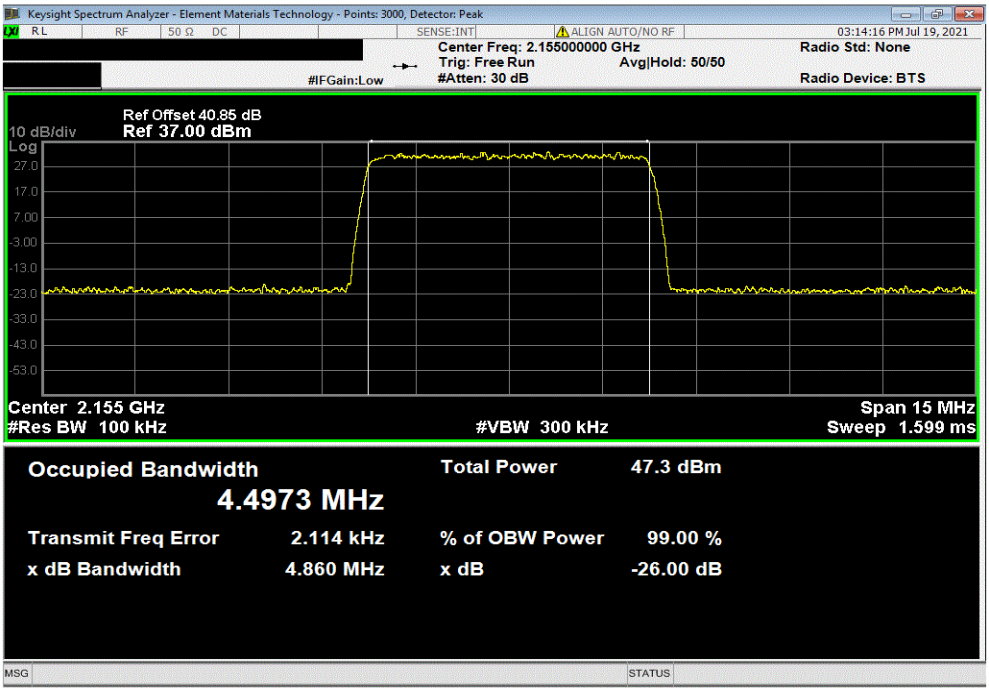
Port 1, Band n66, 2110 MHz - 2200 MHz, 5 MHz Bandwidth , QPSK Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.48	4.859	Within Band	Pass



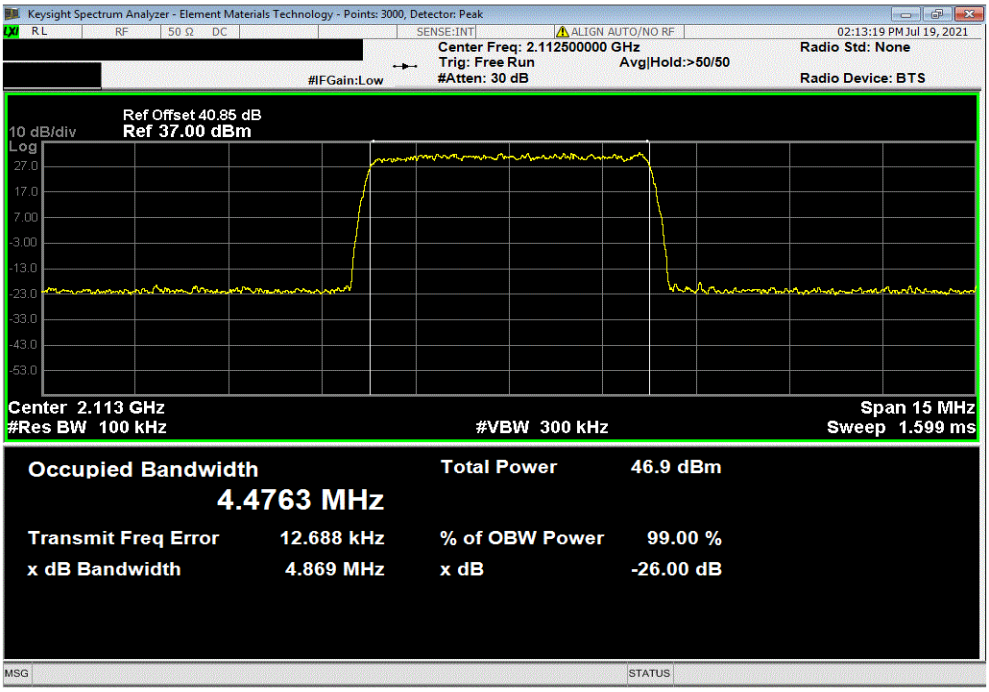
Port 1, Band n66, 2110 MHz - 2200 MHz, 5 MHz Bandwidth , 16-QAM Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.502	4.833	Within Band	Pass



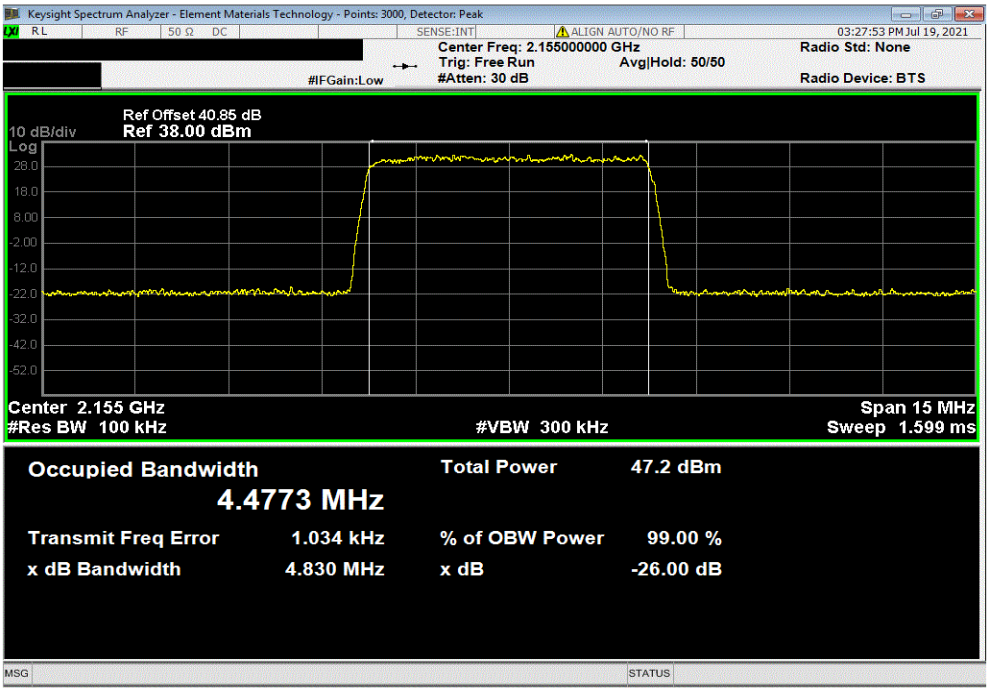
Port 1, Band n66, 2110 MHz - 2200 MHz, 5 MHz Bandwidth , 64-QAM Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.497	4.86	Within Band	Pass



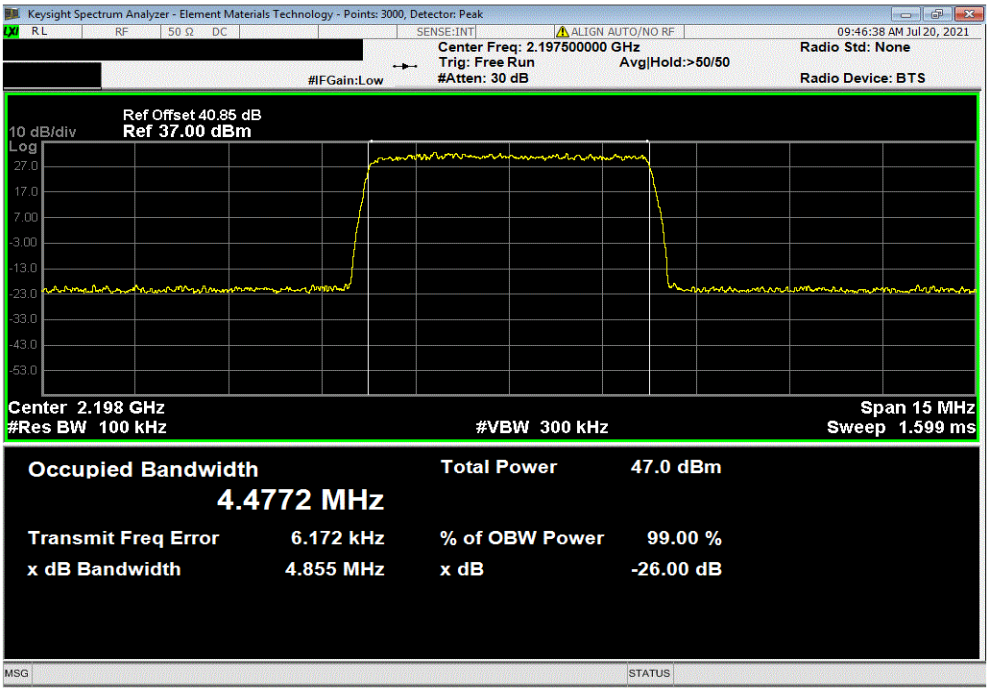
Port 1, Band n66, 2110 MHz - 2200 MHz, 5 MHz Bandwidth , 256-QAM Modulation, Low Channel 2112.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.476	4.869	Within Band	Pass



Port 1, Band n66, 2110 MHz - 2200 MHz, 5 MHz Bandwidth , 256-QAM Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.477	4.83	Within Band	Pass

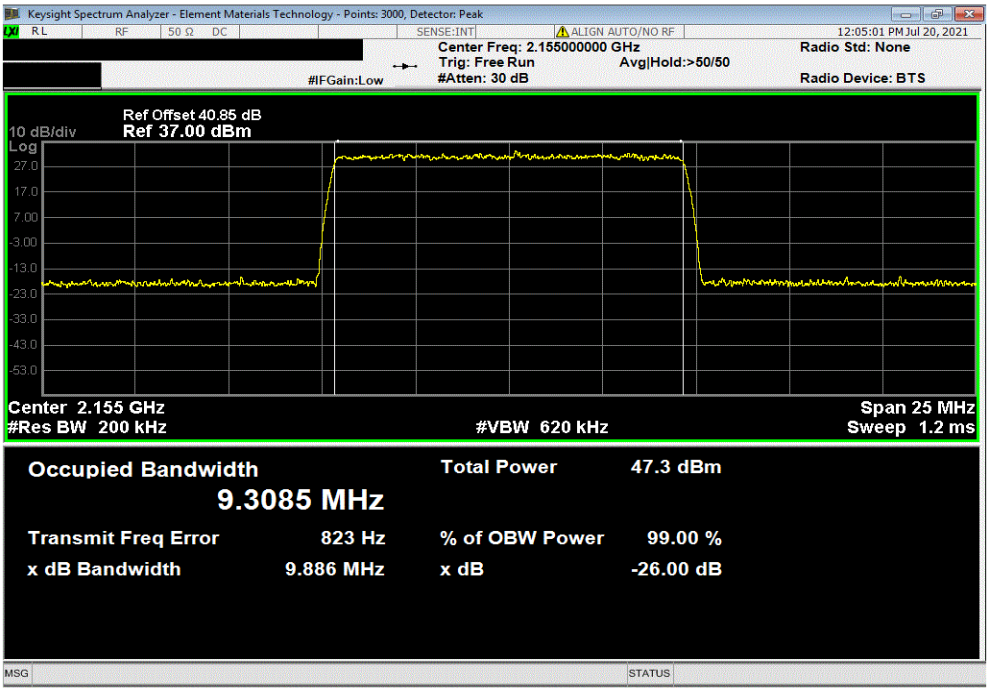


Port 1, Band n66, 2110 MHz - 2200 MHz, 5 MHz Bandwidth , 256-QAM Modulation, High Channel 2197.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.477	4.855	Within Band	Pass

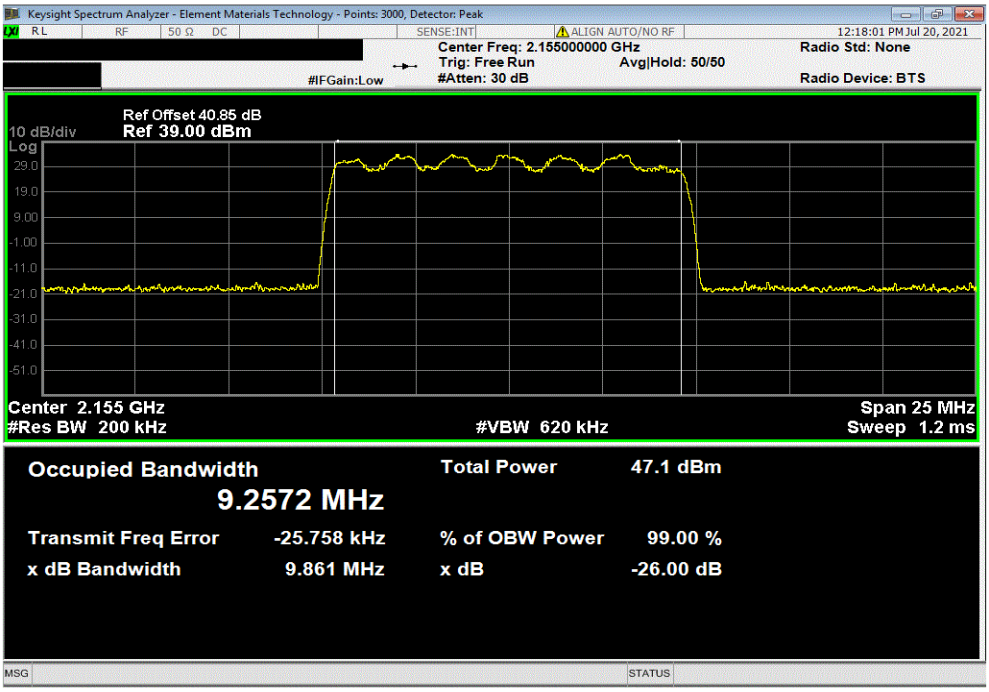


OCCUPIED BANDWIDTH

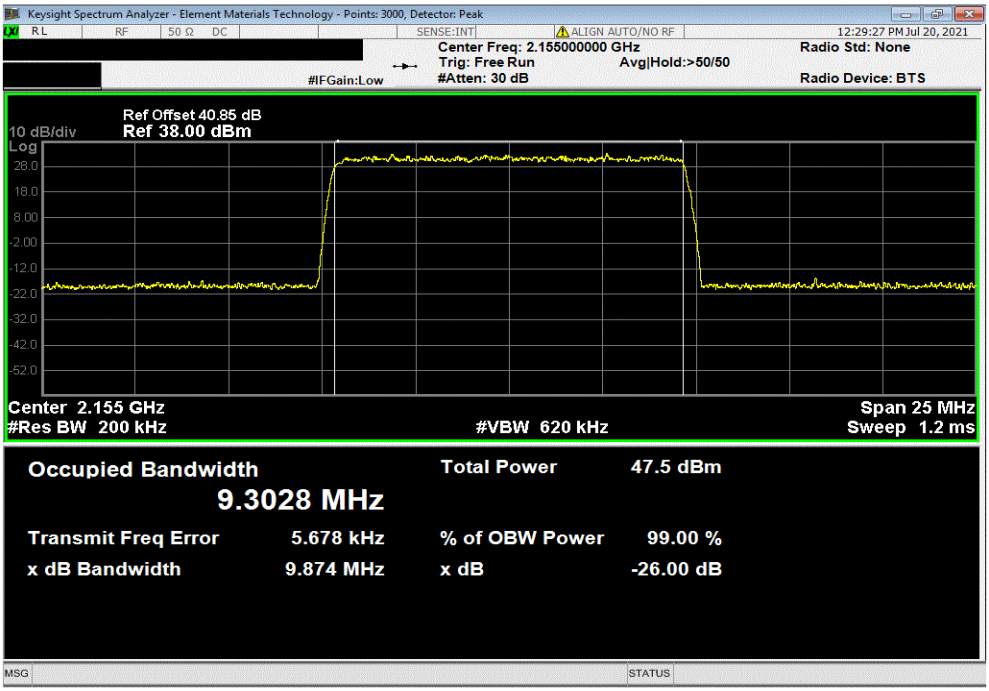
Port 1, Band n66, 2110 MHz - 2200 MHz, 10 MHz Bandwidth , QPSK Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.308	9.886	Within Band	Pass



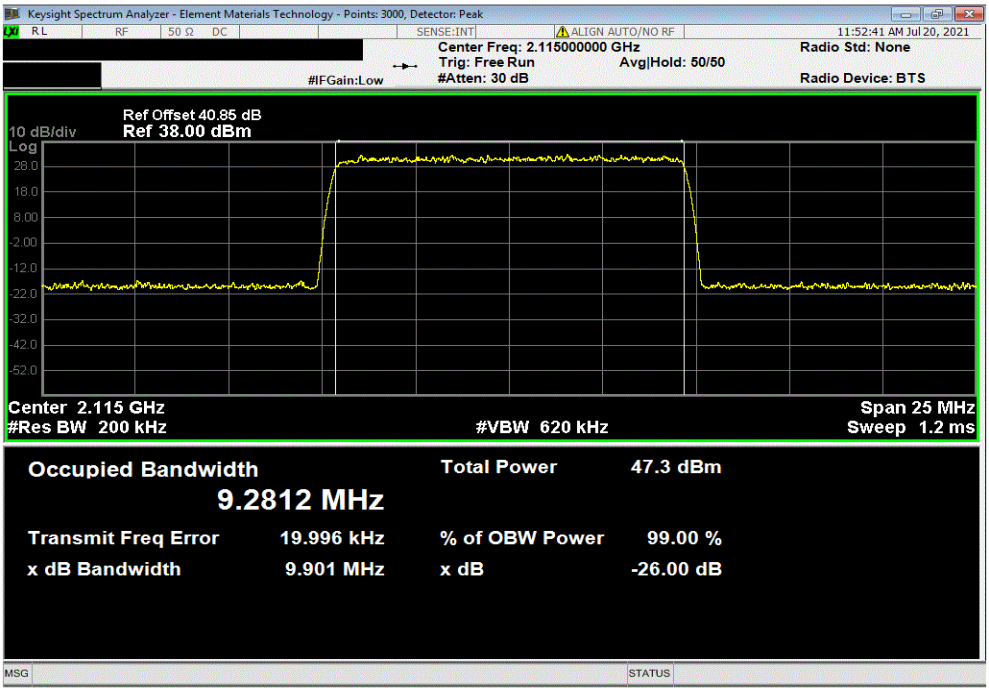
Port 1, Band n66, 2110 MHz - 2200 MHz, 10 MHz Bandwidth , 16-QAM Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.257	9.861	Within Band	Pass



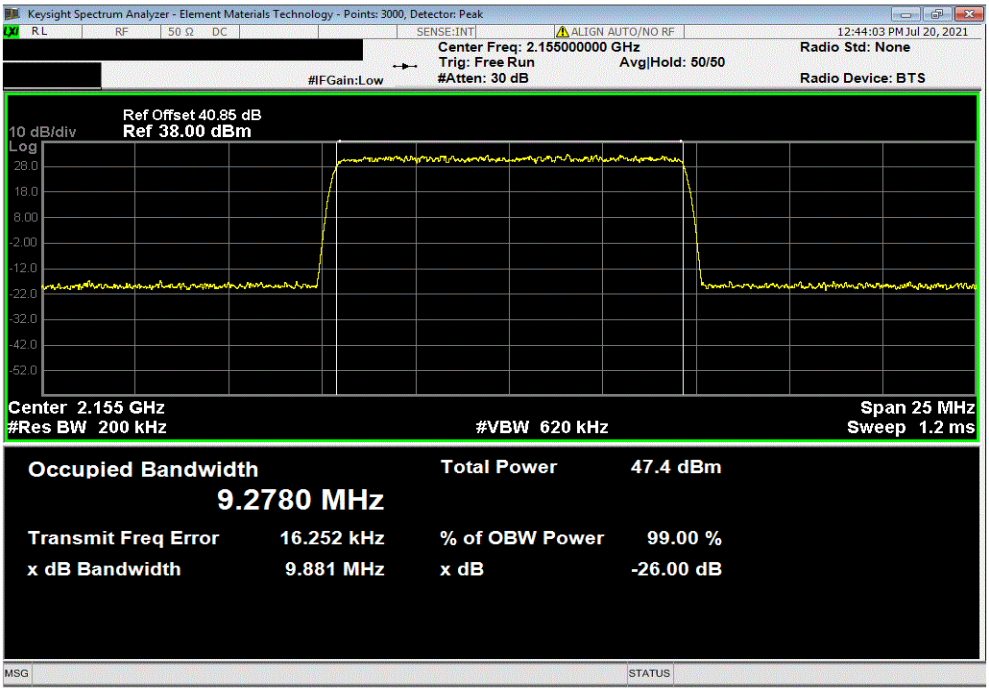
Port 1, Band n66, 2110 MHz - 2200 MHz, 10 MHz Bandwidth , 64-QAM Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.303	9.874	Within Band	Pass



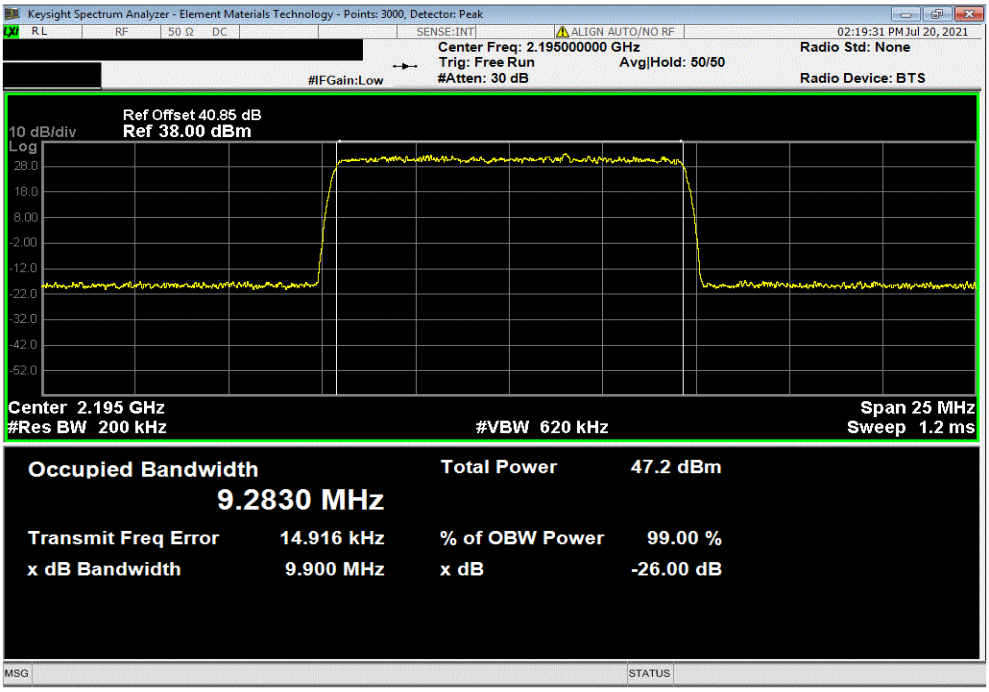
Port 1, Band n66, 2110 MHz - 2200 MHz, 10 MHz Bandwidth , 256-QAM Modulation, Low Channel 2115 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.281	9.901	Within Band	Pass



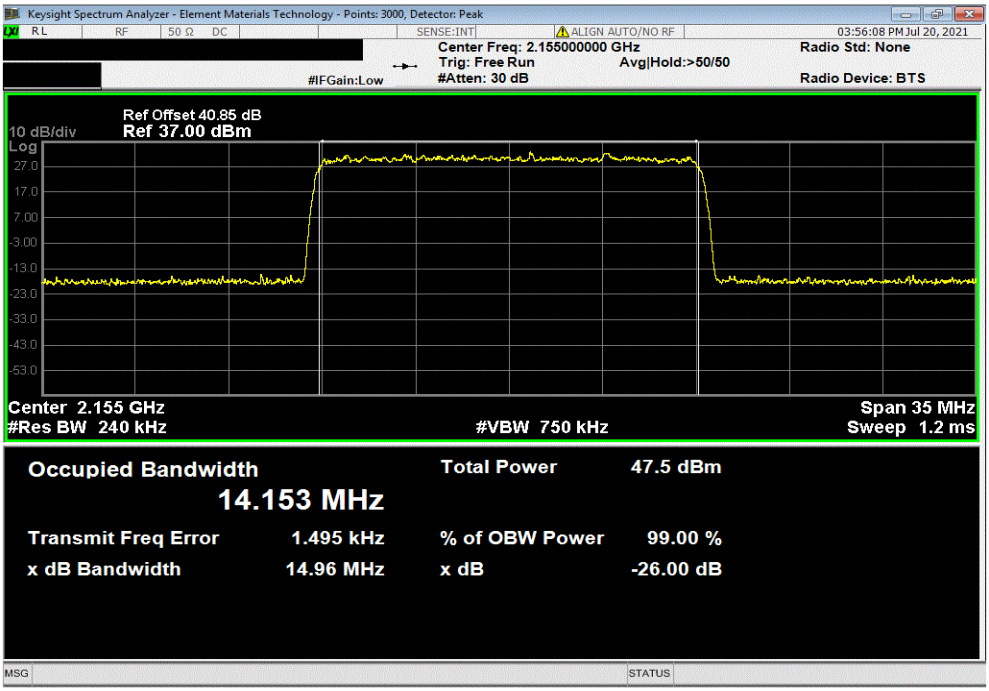
Port 1, Band n66, 2110 MHz - 2200 MHz, 10 MHz Bandwidth , 256-QAM Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.278	9.881	Within Band	Pass



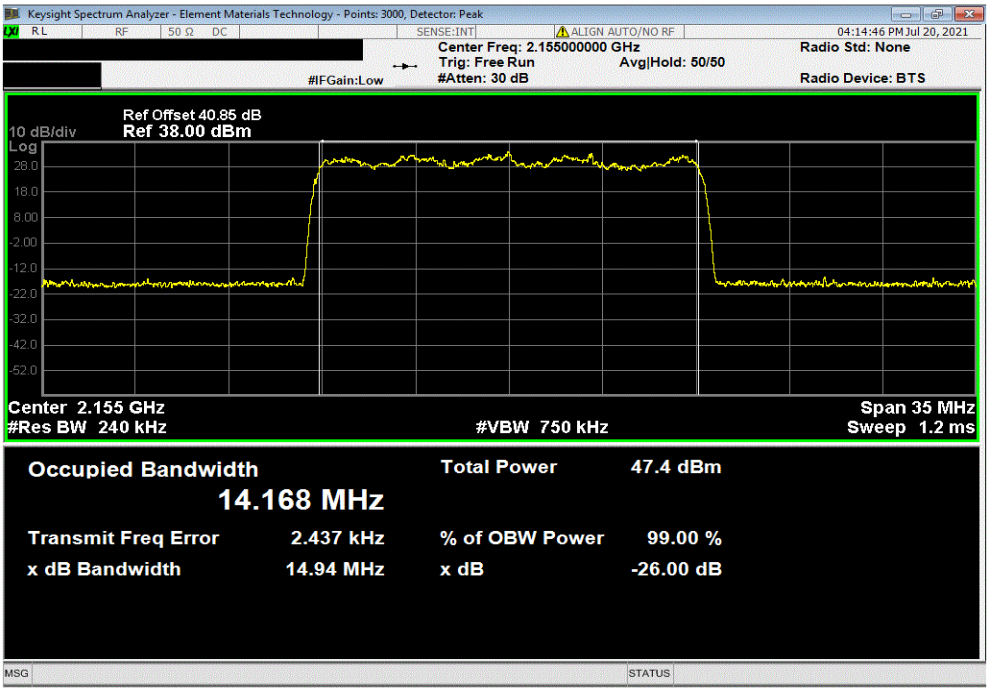
Port 1, Band n66, 2110 MHz - 2200 MHz, 10 MHz Bandwidth , 256-QAM Modulation, High Channel 2195 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.283	9.9	Within Band	Pass



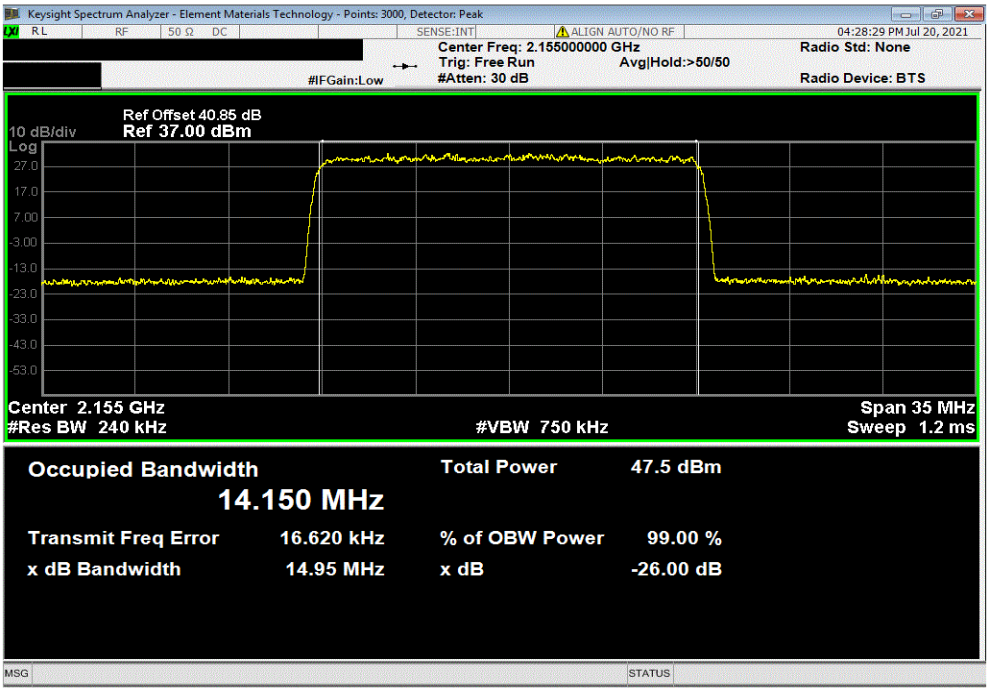
Port 1, Band n66, 2110 MHz - 2200 MHz, 15 MHz Bandwidth , QPSK Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.153	14.964	Within Band	Pass



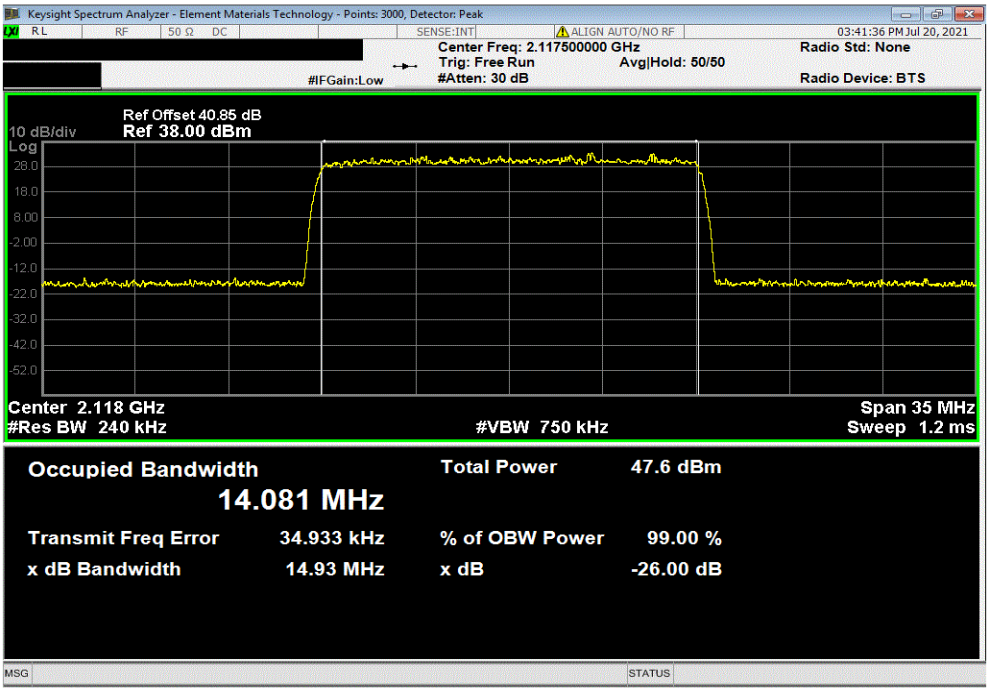
Port 1, Band n66, 2110 MHz - 2200 MHz, 15 MHz Bandwidth , 16-QAM Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.168	14.94	Within Band	Pass



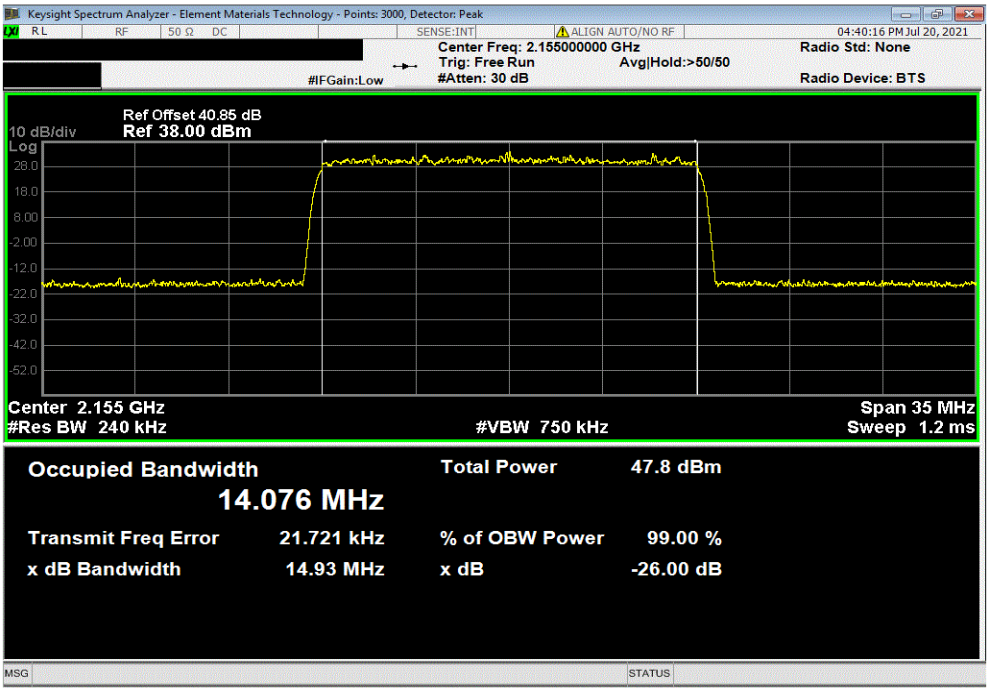
Port 1, Band n66, 2110 MHz - 2200 MHz, 15 MHz Bandwidth , 64-QAM Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.15	14.954	Within Band	Pass



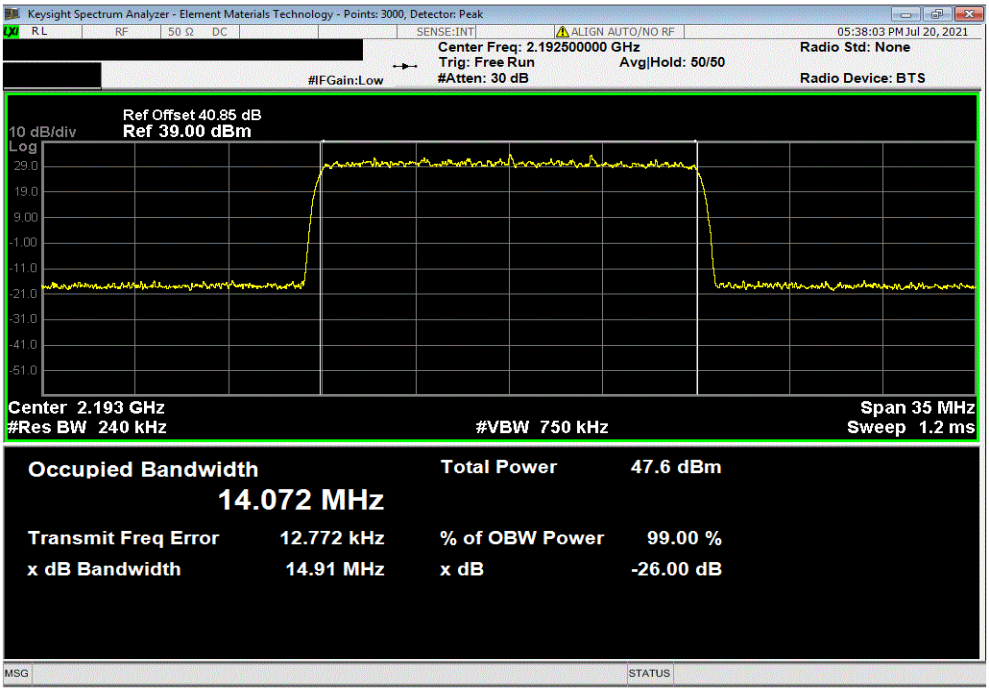
Port 1, Band n66, 2110 MHz - 2200 MHz, 15 MHz Bandwidth , 256-QAM Modulation, Low Channel 2117.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.081	14.928	Within Band	Pass



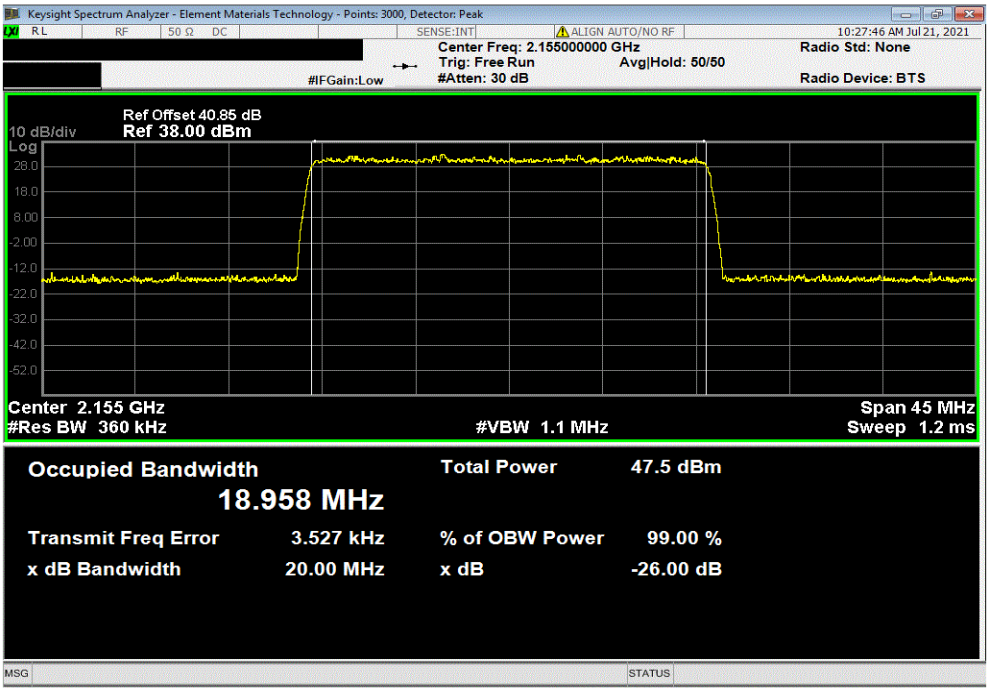
Port 1, Band n66, 2110 MHz - 2200 MHz, 15 MHz Bandwidth , 256-QAM Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.076	14.933	Within Band	Pass



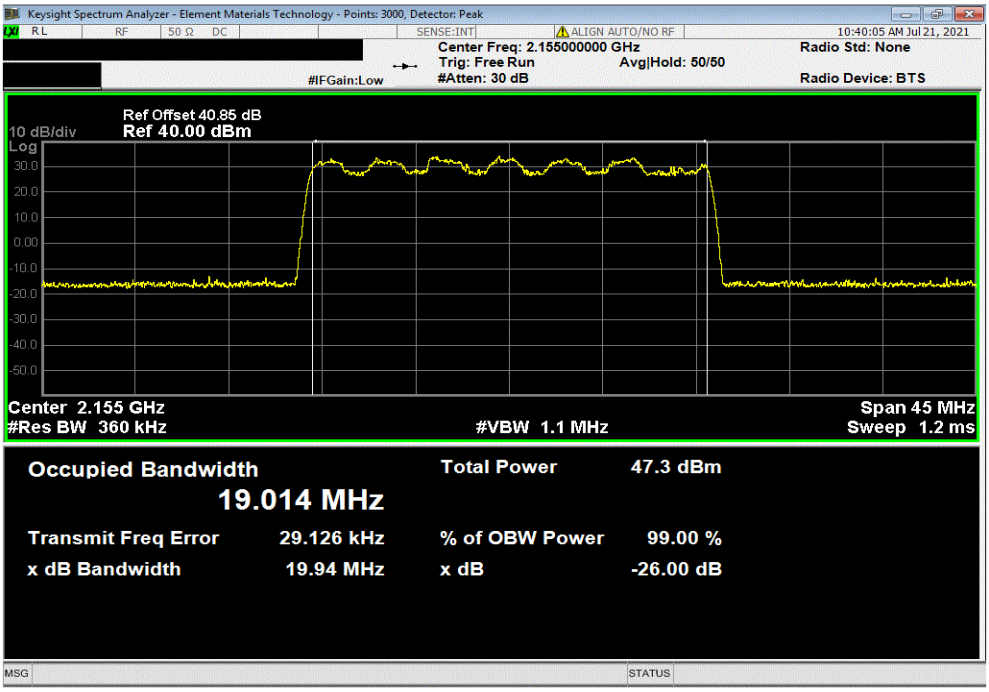
Port 1, Band n66, 2110 MHz - 2200 MHz, 15 MHz Bandwidth , 256-QAM Modulation, High Channel 2192.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.072	14.905	Within Band	Pass



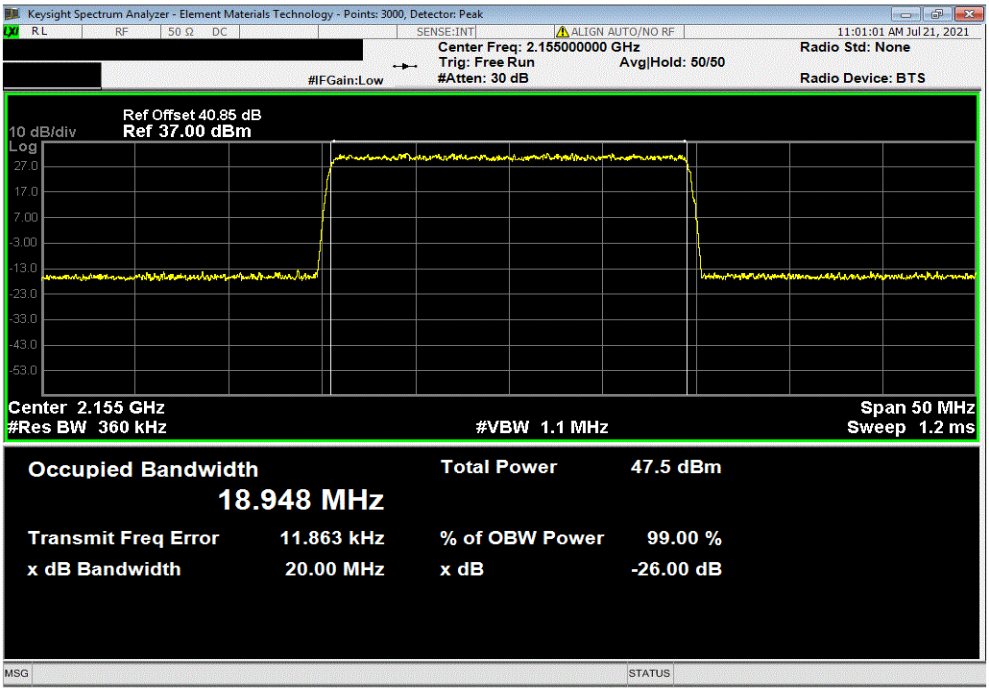
Port 1, Band n66, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, QPSK Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.958	20.005	Within Band	Pass



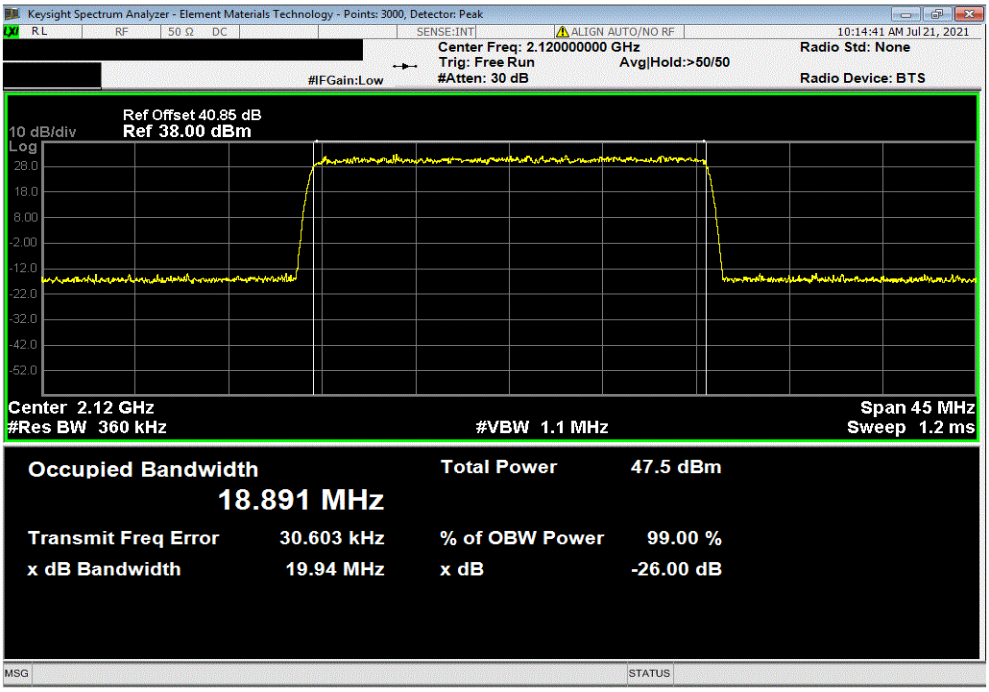
Port 1, Band n66, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, 16-QAM Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			19.014	19.942	Within Band	Pass



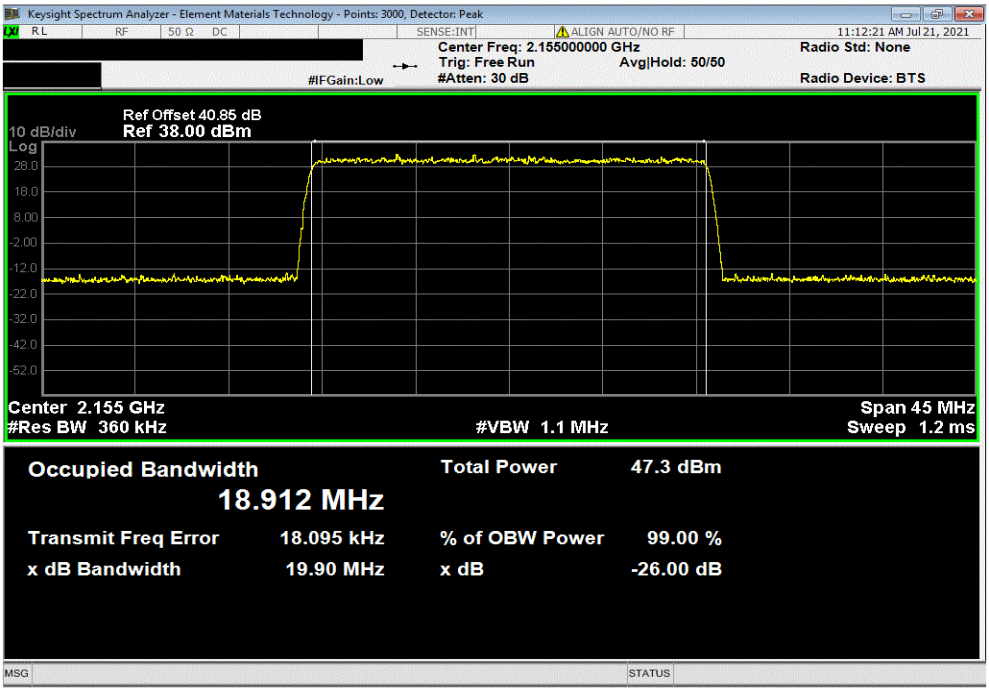
Port 1, Band n66, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, 64-QAM Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.948	20.001	Within Band	Pass



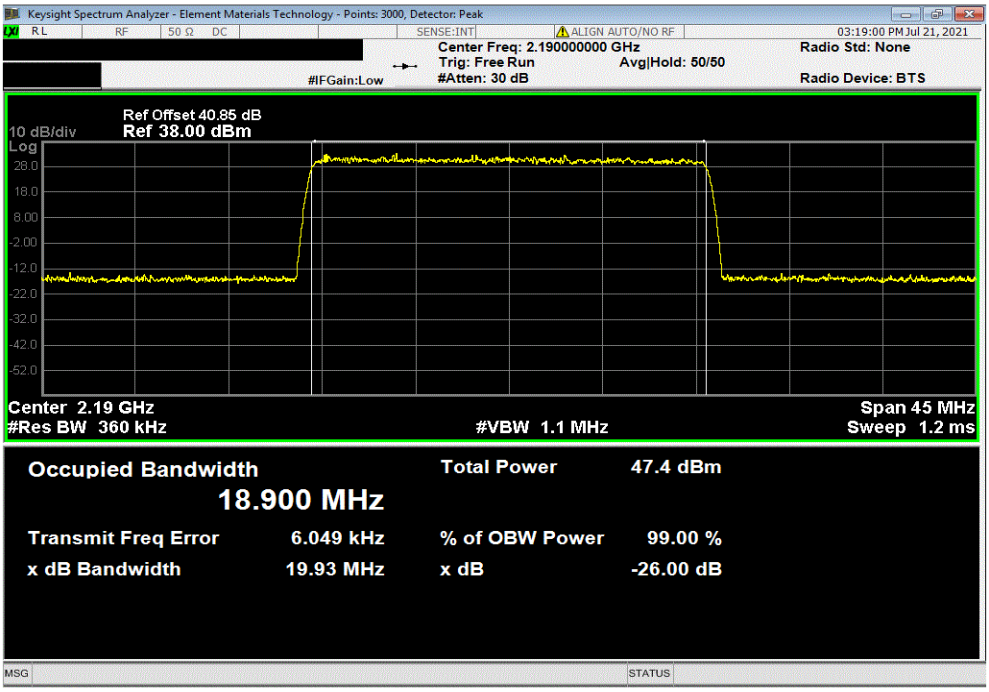
Port 1, Band n66, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, 256-QAM Modulation, Low Channel 2120 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.891	19.939	Within Band	Pass



Port 1, Band n66, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, 256-QAM Modulation, Mid Channel 2155 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.912	19.904	Within Band	Pass



Port 1, Band n66, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, 256-QAM Modulation, High Channel 2190 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.9	19.934	Within Band	Pass



OUTPUT POWER

XMit 2020.12.30.0

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	Agilent	N9010A	AFL	2021-03-11	2022-03-11
Block - DC	Fairview Microwave	SD3379	AMM	2020-09-21	2021-09-21
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17

TEST DESCRIPTION

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

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

RF conducted emissions testing was performed on one port. The AAIB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification report) and 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 C63.26-2015 paragraph 6.4.3.1.

OUTPUT POWER

element

TbtTx 2021.03.19.1 XMit 2020.12.30.0

EUT:	AAIB (FCC/ISED C2PC)			**Work Order:**	NOKI0030
Serial Number:	BL2032123Y0			**Date:**	21-Jul-21
Customer:	Nokia Solutions and Networks			**Temperature:**	21.6 °C
Attendees:	David Le, Mitchell Hill			**Humidity:**	51.5% RH
Project:	None			**Barometric Pres.:**	1021 mbar
Tested by:	Brandon Hobbs	**Power:**	54 VDC	**Job Site:**	TX09

TEST SPECIFICATIONS	Test Method
FCC 27:2021	ANSI C63.26:2015
RSS-139 Issue 3:2015, RSS-170 Issue 3:2015	RSS-139 Issue 3:2015, RSS-170 Issue 3:2015

COMMENTS

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks.). Band n66 carriers are enabled at maximum power (6.25 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, 4x4 MIMO, 8x8 MIMO & 16x16 MIMO) operation was determined based upon ANSI 63.26 clauses 6.4.3.1 and 6.4.3.2.4 (10 log Nout). The total output power for two port operation is single port power + 3dB [i.e. 10log(2)]. The total output power for four port operation is single port power + 6dB [i.e. 10log(4)]. The total output power for eight port operation is single port power + 9dB [i.e. 10log(8)]. The total output power for sixteen port operation is single port power + 12dB [i.e. 10log(16)].

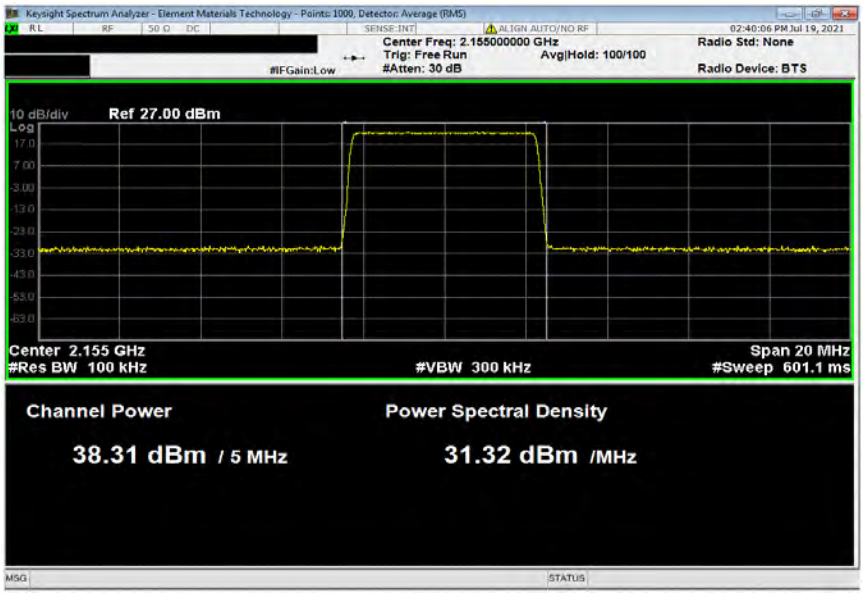
DEVIATIONS FROM TEST STANDARD

None

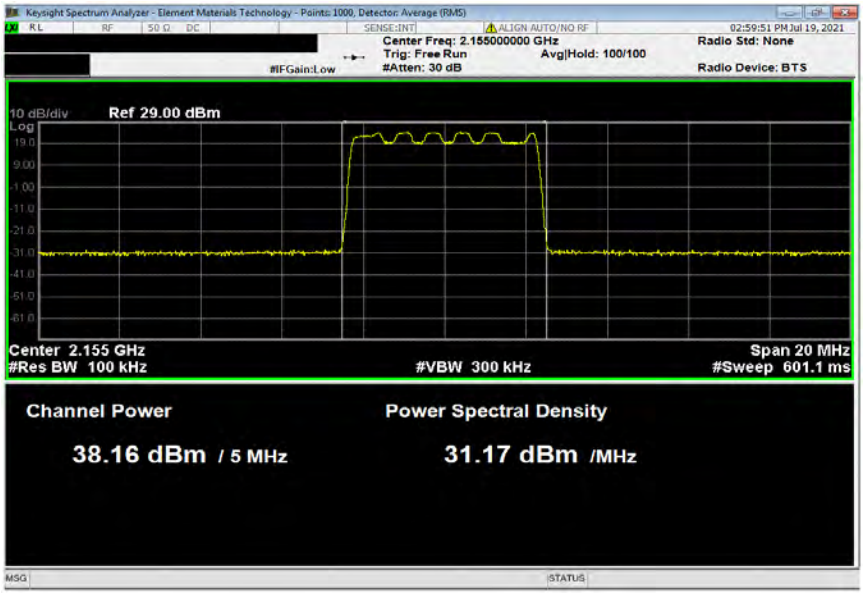
Configuration #	2	Signature

	Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
Port 1, Band n66, 2110 MHz - 2200 MHz							
5 MHz Bandwidth							
QPSK Modulation							
Mid Channel 2155 MHz	38.306	0	38.3	41.3	44.3	47.3	50.3
16-QAM Modulation							
Mid Channel 2155 MHz	38.164	0	38.2	41.2	44.2	47.2	50.2
64-QAM Modulation							
Mid Channel 2155 MHz	38.327	0	38.3	41.3	44.3	47.3	50.3
256-QAM Modulation							
Low Channel 2112.5 MHz	37.965	0	38.0	41.0	44.0	47.0	50.0
Mid Channel 2155 MHz	38.312	0	38.3	41.3	44.3	47.3	50.3
High Channel 2197.5 MHz	38.151	0	38.2	41.2	44.2	47.2	50.2
10 MHz Bandwidth							
256-QAM Modulation							
Low Channel 2115 MHz	38.269	0	38.3	41.3	44.3	47.3	50.3
Mid Channel 2155 MHz	38.409	0	38.4	41.4	44.4	47.4	50.4
High Channel 2195 MHz	38.3	0	38.3	41.3	44.3	47.3	50.3
15 MHz Bandwidth							
256-QAM Modulation							
Low Channel 2117.5 MHz	38.181	0	38.2	41.2	44.2	47.2	50.2
Mid Channel 2155 MHz	38.257	0	38.3	41.3	44.3	47.3	50.3
High Channel 2192.5 MHz	38.174	0	38.2	41.2	44.2	47.2	50.2
20 MHz Bandwidth							
256-QAM Modulation							
Low Channel 2120 MHz	38.36	0	38.4	41.4	44.4	47.4	50.4
Mid Channel 2155 MHz	38.381	0	38.4	41.4	44.4	47.4	50.4
High Channel 2190 MHz	38.324	0	38.3	41.3	44.3	47.3	50.3

Port 1, Band n66, 2110 MHz - 2200 MHz, 5 MHz Bandwidth , QPSK Modulation, Mid Channel 2155 MHz						
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
38.306	0	38.31	41.31	44.31	47.31	50.31



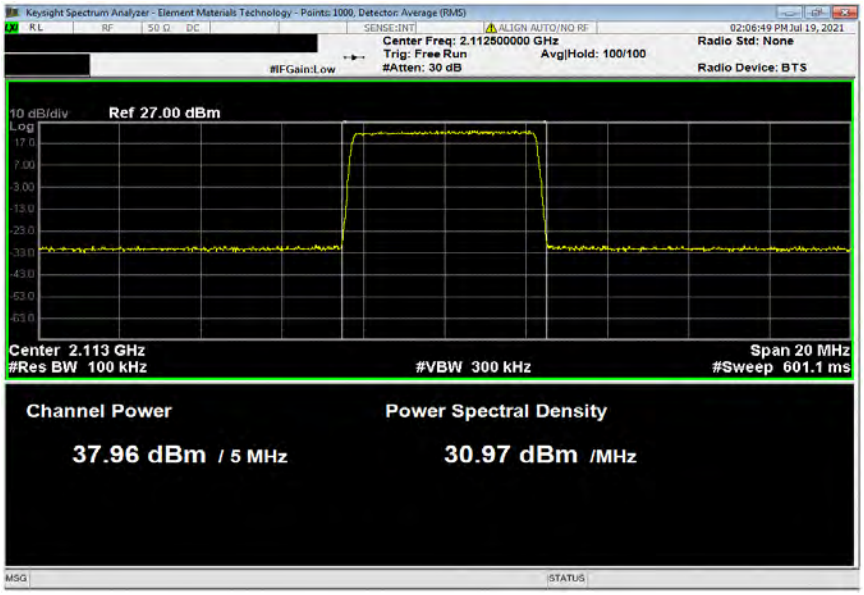
Port 1, Band n66, 2110 MHz - 2200 MHz, 5 MHz Bandwidth , 16-QAM Modulation, Mid Channel 2155 MHz						
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
38.164	0	38.16	41.164	44.16	47.16	50.16



OUTPUT POWER

Port 1, Band n66, 2110 MHz - 2200 MHz, 5 MHz Bandwidth , 64-QAM Modulation, Mid Channel 2155 MHz						
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
38.327	0	38.33	41.33	44.33	47.33	50.33

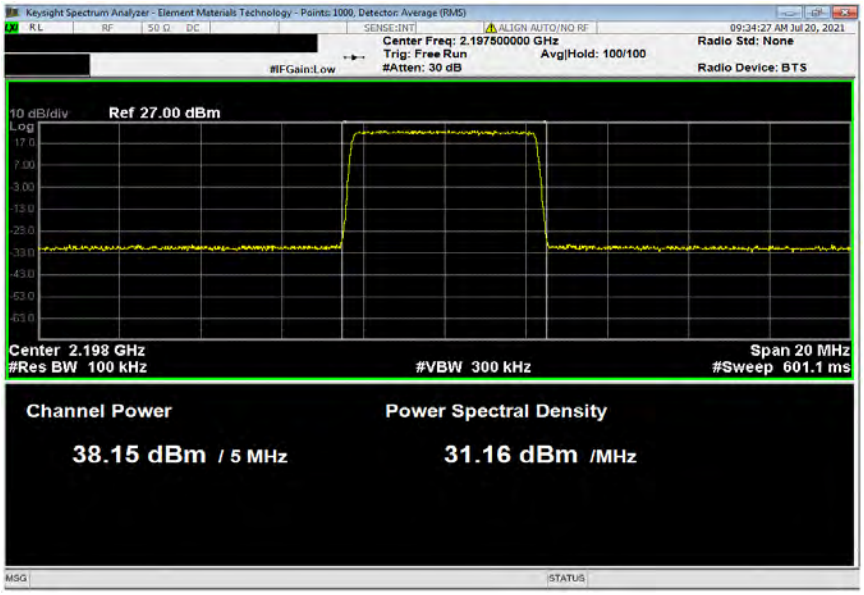
Port 1, Band n66, 2110 MHz - 2200 MHz, 5 MHz Bandwidth , 256-QAM Modulation, Low Channel 2112.5 MHz						
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
37.965	0	37.97	40.965	43.97	46.97	49.97



OUTPUT POWER

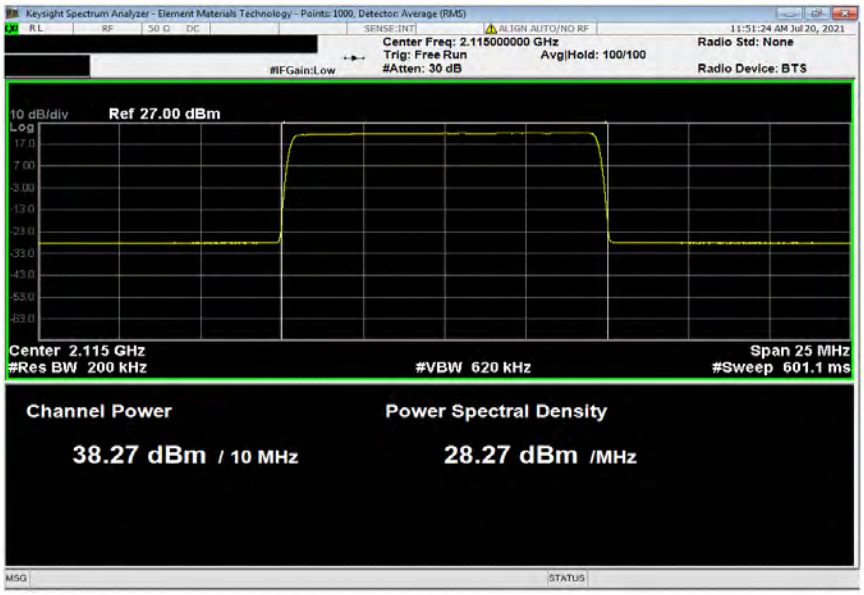
Port 1, Band n66, 2110 MHz - 2200 MHz, 5 MHz Bandwidth , 256-QAM Modulation, Mid Channel 2155 MHz						
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
38.312	0	38.31	41.31	44.31	47.31	50.31

Port 1, Band n66, 2110 MHz - 2200 MHz, 5 MHz Bandwidth , 256-QAM Modulation, High Channel 2197.5 MHz						
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
38.151	0	38.15	41.151	44.15	47.15	50.15



OUTPUT POWER

Port 1, Band n66, 2110 MHz - 2200 MHz, 10 MHz Bandwidth , 256-QAM Modulation, Low Channel 2115 MHz						
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
38.269	0	38.27	41.27	44.27	47.27	50.27



Port 1, Band n66, 2110 MHz - 2200 MHz, 10 MHz Bandwidth , 256-QAM Modulation, Mid Channel 2155 MHz						
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
38.409	0	38.41	41.409	44.41	47.41	50.41

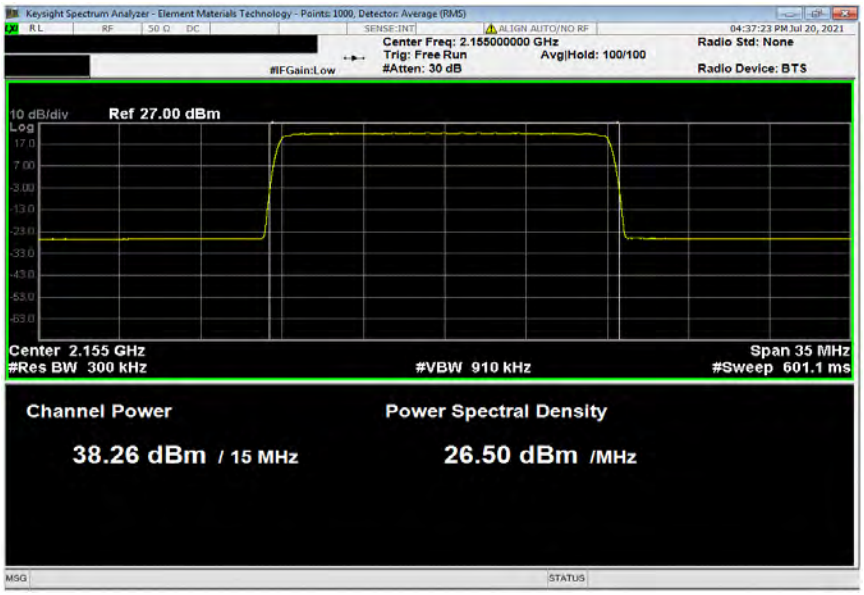
OUTPUT POWER

Port 1, Band n66, 2110 MHz - 2200 MHz, 10 MHz Bandwidth , 256-QAM Modulation, High Channel 2195 MHz						
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
38.3	0	38.30	41.30	44.30	47.30	50.30

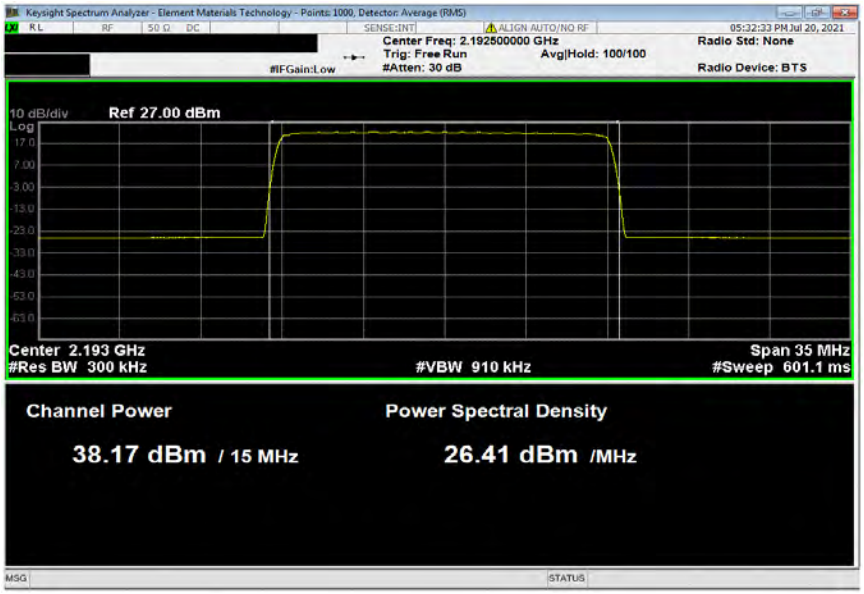
Port 1, Band n66, 2110 MHz - 2200 MHz, 15 MHz Bandwidth , 256-QAM Modulation, Low Channel 2117.5 MHz						
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
38.181	0	38.18	41.181	44.18	47.18	50.18

OUTPUT POWER

Port 1, Band n66, 2110 MHz - 2200 MHz, 15 MHz Bandwidth , 256-QAM Modulation, Mid Channel 2155 MHz						
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
38.257	0	38.26	41.26	44.26	47.26	50.26

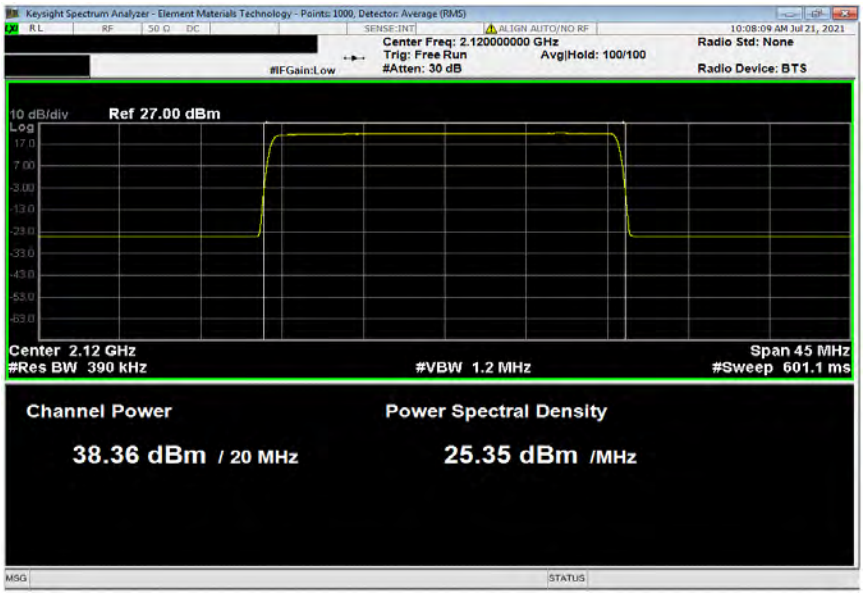


Port 1, Band n66, 2110 MHz - 2200 MHz, 15 MHz Bandwidth , 256-QAM Modulation, High Channel 2192.5 MHz						
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
38.174	0	38.17	41.174	44.17	47.17	50.17

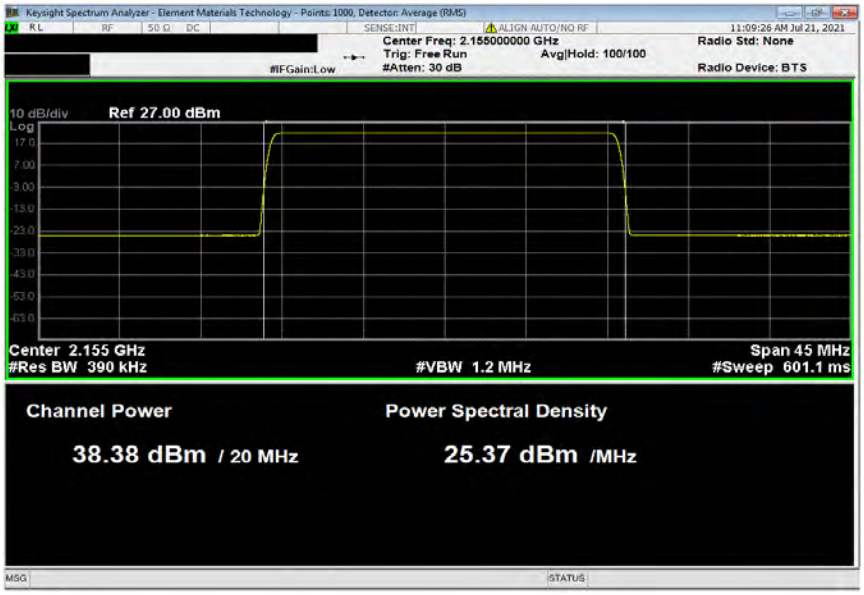


OUTPUT POWER

Port 1, Band n66, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, 256-QAM Modulation, Low Channel 2120 MHz						
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
38.36	0	38.36	41.36	44.36	47.36	50.36



Port 1, Band n66, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, 256-QAM Modulation, Mid Channel 2155 MHz						
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
38.381	0	38.38	41.381	44.38	47.38	50.38



OUTPUT POWER

Port 1, Band n66, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, 256-QAM Modulation, High Channel 2190 MHz						
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMO) dBm/Carrier BW
38.324	0	38.32	41.32	44.32	47.32	50.32