



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

FCC Part 27
[2110MHz – 2200MHz]

FCC ID: VBNAHFIG-01

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

Report: NOKI0016, Issue Date: July 7, 2020



NVLAP LAB CODE: 201049-0

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CERTIFICATE OF TEST



Last Date of Test: June 24, 2020

Nokia Solutions and Networks

EUT: Aircscale Base Transceiver Station Remote Radio Head Model AHFIG

Radio Equipment Testing

Standards

Specification	Method
Code of Federal Regulations (CFR) Title 47 Part 2 CFR Title 47 Part 24 Subpart E – Broadband PCS CFR Title 47 Part 27 Subpart C & L	ANSI C63.26-2015 with FCC KDB 971168 D01 v03r01 FCC KDB 662911D01 v02r01

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	N/A	Not available, antenna gain not provided
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:

Kyle Holgate, 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 - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

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 – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

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

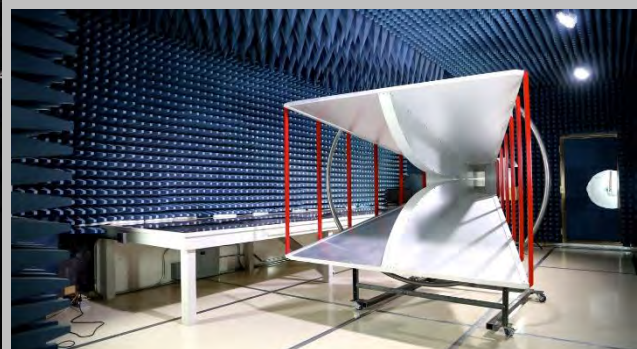
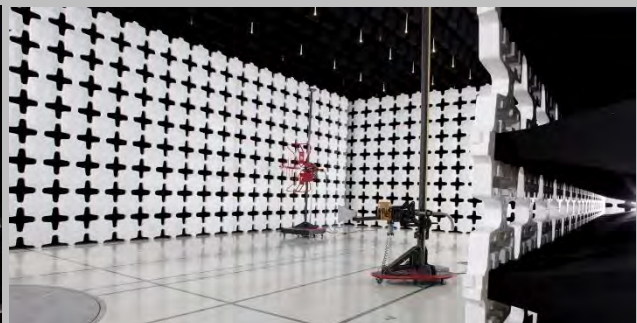
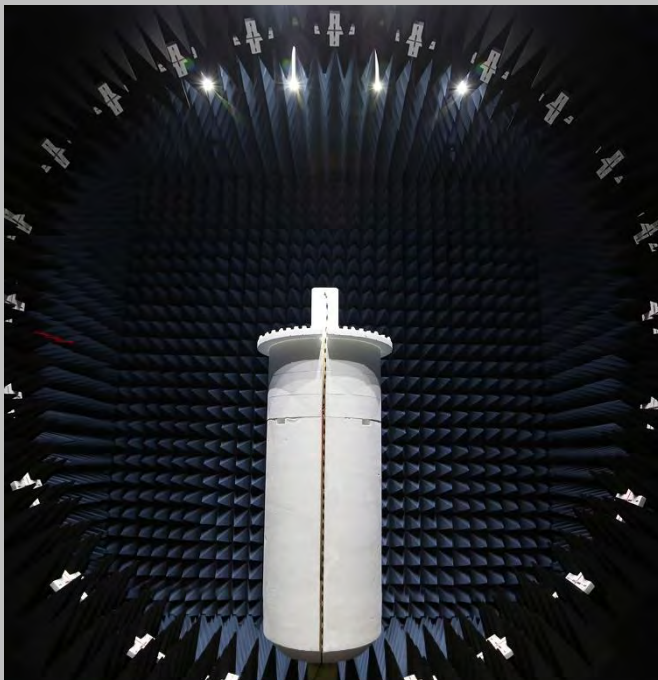
For details on the Scopes of our Accreditations, please visit:

<https://www.nwemc.com/emc-testing-accreditations>

FACILITIES



California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP				
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
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



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.

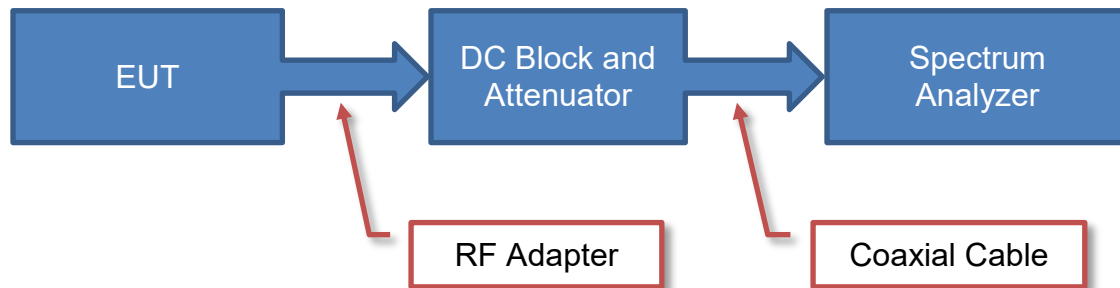
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. 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.

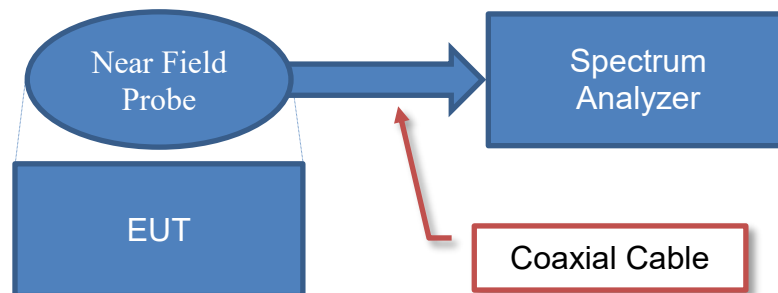
Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.1 dB	-5.1 dB
AC Powerline Conducted Emissions (dB)	2.6 dB	-2.6 dB

Test Setup Block Diagrams

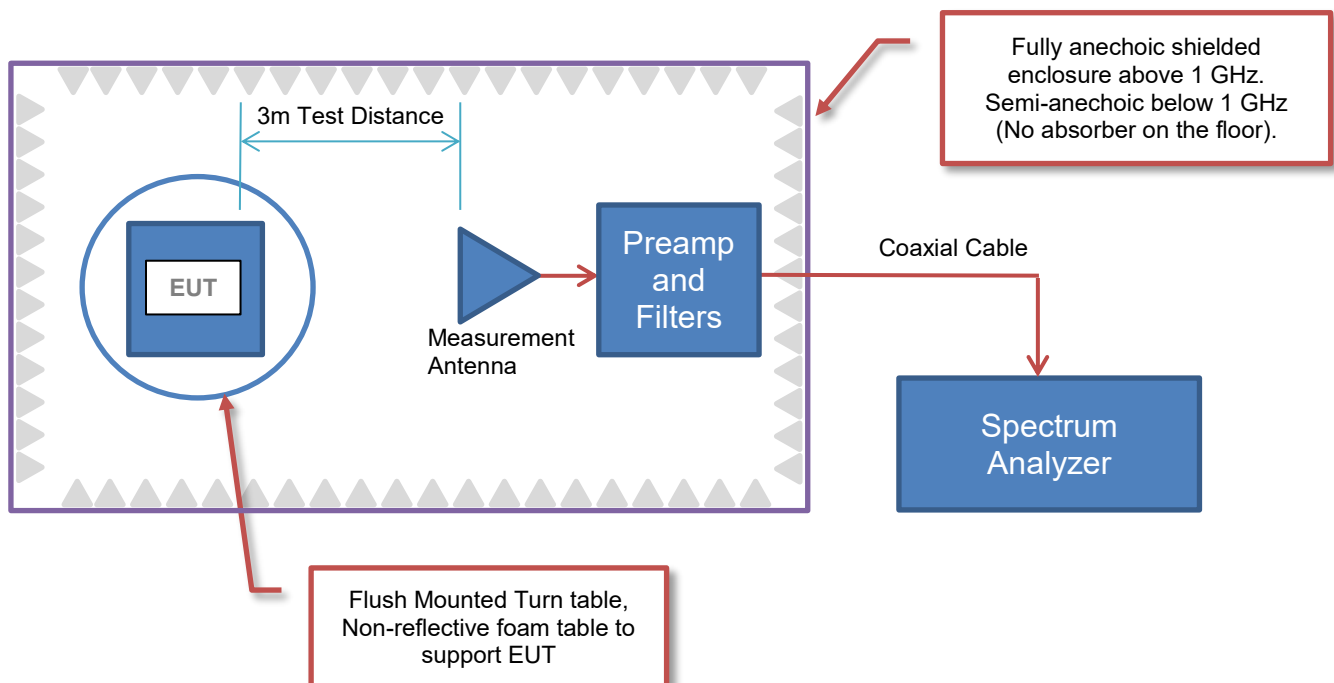
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



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 Remote Radio Head Model AHFIG
First Date of Test:	June 18, 2020
Last Date of Test:	June 24, 2020
Receipt Date of Samples:	June 17, 2020
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 4G LTE Narrow Band IoT Guard Band carriers and 5G NR (new radio) carriers to the Airscale BTS RRH model AHFIG FCC radio certifications. The original FCC certification submittal (FCC ID: VBNAHFIG-01) was NTS Report PR098373 Rev 2 dated 7/8/2019. The original test effort includes testing for LTE, WCDMA, and GSM/EDGE 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 NB IoT GB carriers for this class II permissive change per correspondence/guidance from Nemko TCB. Carrier bandwidths of 10, 15 & 20MHz were verified using NB IoT GB carriers under this effort. The same test methodology used in the original certification testing was used in this class II permissive change test effort. Tests performed under the class II change effort include RF power, peak to average power ratio, emission bandwidth (99% and 26 dB down), band edge spurious emissions, and conducted spurious emissions. The LTE modulation type for this testing was setup according to 3GPP TS 36.141 E-UTRA Test Models and is "E-TM 1.1 (QPSK modulation type) with N-TM (narrow band IoT)".

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, peak to average power ratio, 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 (AHFIG) as the original certification test. The base station and remote radio head software for this testing is an updated release that includes 4G LTE NB IoT GB carrier support and 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 (BTS) Remote Radio Head (RRH) module, model AHFIG. The AHFIG remote radio head is a multi-standard multi-carrier radio module designed to support GSM/EDGE, WCDMA, LTE, narrow band IoT (internet of things) operations (in-band, guard band, standalone) and 5G NR. **The scope of testing in this effort is for 4G LTE Narrow Band IoT Guard Band operations and 5G NR operations.**

The AHFIG RRH has four transmit/four receive antenna ports (4TX/4RX for Band 25 (n25) and 4TX/4RX for Band 66 (n66)). Each antenna port supports 3GPP frequency band 25 (BTS Rx: 1850 to 1915 MHz/BTS TX: 1930 to 1995 MHz) and 3GPP frequency band 66 (BTS Rx: 1710 to 1780 MHz/BTS TX: 2110 to 2200 MHz). The maximum RF output power

PRODUCT DESCRIPTION

of the RRH is 480 Watts (80 watts per carrier and 80 per port for band 25 (n25) operations; 40 watts per carrier and 40 per port for band 66 (n66) operations). The TX and RX instantaneous bandwidth cover the full operational RRH bandwidth.

The RRH can be operated as a 4x4 MIMO, 2x2 MIMO or as non-MIMO for 4G LTE and 5G NR . The RRH supports 1.4, 3, 5, 10, 15, and 20MHz LTE bandwidths. The NB IoT GB operations are supported for 10, 15 and 20MHz LTE bandwidths. The RRH supports 5, 10, 15, and 20MHz 5G NR bandwidths. The RRH supports four LTE and 5G NR downlink modulation types (QPSK, 16QAM, 64QAM and 256QAM). The RRH LTE and 5G NR downlink bands are supported over 3GPP frequency band 25 (n25) and band 66 (n66) frequency ranges [band 25 (n25) - BTS TX: 1930 to 1995 MHz & band 66 (n66) - BTS TX: 2110 to 2200 MHz].

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

The AHFIG downlink channel numbers and frequencies for 4G LTE and 5G NR operations are as follows:

The PCS Band LTE channel bandwidths are 1.4, 3, 5, 10, 15 and 20MHz. The downlink channel numbers are provided below. The NB IoT GB operations are supported for 10, 15 and 20MHz LTE bandwidths.

PRODUCT DESCRIPTION

	Downlink 4G LTE EARFCN	Downlink Frequency (MHz)	4G LTE Channel Bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
AHFIG 4G LTE Band 25 (Ant 1, 2, 3, 4)	8040	1930.0	Band Edge	Band Edge	Band Edge	Band Edge	Band Edge	Band Edge
								
	8047	1930.7	Bottom Ch					
								
	8055	1931.5		Bottom Ch				
								
	8065	1932.5			Bottom Ch			
								
	8090	1935.0				Bottom Ch		
								
	8115	1937.5					Bottom Ch	
								
	8140	1940.0						Bottom Ch
								
	8365	1962.5	Middle Ch	Middle Ch	Middle Ch	Middle Ch	Middle Ch	Middle Ch
								
	8590	1985.0						Top Ch
								
	8615	1987.5					Top Ch	
								
	8625	1988.5		Top Ch				
								
	8633	1989.3	Top Ch					
								
	8640	1990.0	Band Edge	Band Edge		Top Ch		
								
	8665	1992.5			Top Ch			
								
	8690	1995.0			Band Edge	Band Edge	Band Edge	Band Edge

AHFIG Downlink Band Edge 4G LTE Band 25 Frequency Channels

PRODUCT DESCRIPTION

The PCS Band 5G NR channel bandwidths are 5, 10, 15 and 20MHz. The downlink channel numbers are provided below.

	Downlink 5G NR NR- ARFCN	Downlink Frequency (MHz)	5G NR Channel Bandwidth			
			5 MHz	10 MHz	15 MHz	20 MHz
AHFIG Band n25 (Ant 1, 2, 3, 4)	386000	1930.0	Band Edge	Band Edge	Band Edge	Band Edge
	386500	1932.5	Bottom Ch			
	387000	1935.0		Bottom Ch		
	387500	1937.5			Bottom Ch	
	388000	1940.0				Bottom Ch
	392500	1962.5	Middle Ch	Middle Ch	Middle Ch	Middle Ch
	397000	1985.0				Top Channel
	397500	1987.5			Top Channel	
	398000	1990.0		Top Channel		
	398500	1992.5	Top Channel			
	399000	1995.0	Band Edge	Band Edge	Band Edge	Band Edge

AHFIG Downlink Band Edge 5G NR Band n25 Frequency Channels

PRODUCT DESCRIPTION

The AWS Band 4G LTE channel bandwidths are 1.4, 3, 5, 10, 15 and 20MHz. The downlink channel numbers are provided below. The NB IoT GB operations are supported for 10, 15 and 20MHz LTE bandwidths.

	Downlink 4G LTE EARFCN	Downlink Frequency (MHz)	4G LTE Channel Bandwidth					
			1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
AHFIG 4G LTE Band 66 (Ant 1, 2, 3, 4)	66436	2110.0	Band Edge	Band Edge	Band Edge	Band Edge	Band Edge	Band Edge
								
	66443	2110.7	Bottom Ch					
								
	66451	2111.5		Bottom Ch				
								
	66461	2112.5			Bottom Ch			
								
	66486	2115.0				Bottom Ch		
								
	66511	2117.5					Bottom Ch	
								
	66536	2120.0						Bottom Ch
								
	66886	2155.0	Middle Ch	Middle Ch	Middle Ch	Middle Ch	Middle Ch	Middle Ch
								
	67236	2190.0						Top Channel
								
	67261	2192.5					Top Channel	
								
	67286	2195.0				Top Channel		
								
	67311	2197.5			Top Channel			
								
	67321	2198.5		Top Channel				
								
	67329	2199.3	Top Channel					
								
	67336	2200.0	Band Edge	Band Edge	Band Edge	Band Edge	Band Edge	Band Edge

AHFIG Downlink Band Edge 4G LTE Band 66 Frequency Channels

PRODUCT DESCRIPTION

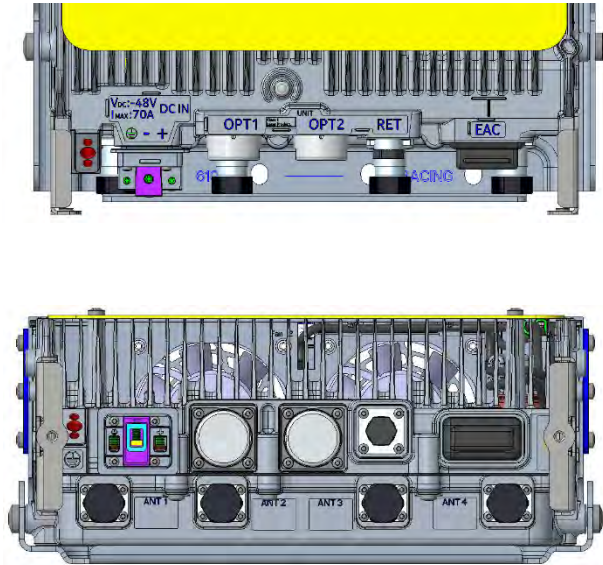
The AWS Band 5G NR channel bandwidths are 5, 10, 15 and 20MHz. The downlink channel numbers are provided below.

	Downlink 5G NR NR- ARFCN	Downlink Frequency (MHz)	5G NR Channel Bandwidth			
			5 MHz	10 MHz	15 MHz	20 MHz
AHFIG 5G NR Band n66 (Ant 1, 2, 3, 4)	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

AHFIG Downlink Band Edge 5G NR Band n66 Frequency Channels

PRODUCT DESCRIPTION

AHFIG Connector Layout:



EUT External Interfaces

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

Testing Objective:

A class II permissive change on the original filing is being pursued to add 4G LTE Narrow Band IoT Guard Band operations and 5G NR (new radio) operations to the Aircscale BTS RRH model AHFIG FCC radio certifications.

CONFIGURATIONS

Configuration NOKI0016- 1

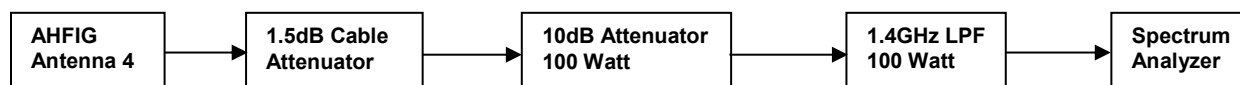
Software/Firmware Running during test	
Description	Version
4G BTS Software Version	SBTS20C ENB 9999 200603 000009
5G BTS Software Version	5G20A_GNB 0000 000840 001078 / FRM50.05.R18

Equipment being tested (include Peripherals)			
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	RK182307104
ASIA (4G BTS System Module)	Nokia Solutions and Networks	473095A.203	AH173111443
ABIA (4G BTS Baseband Module)	Nokia Solutions and Networks	473096A.103	AH173006372
ASIK (5G BTS System Module)	Nokia Solutions and Networks	474021A.101	L1183529610
ABIL (5G BTS Baseband Module)	Nokia Solutions and Networks	474020A.102	L1183605740
AHFIG (Radio Module Model)	Nokia Solutions and Networks	475125A.101	K9191322351
Low Pass Filter 1.4GHz/100W	Microwave Circuits, Inc.	L13502G1	SN2454-01
Attenuator 100W/10dB	AeroflexWeinschel	58-10-43-LIM	TD446
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	KR16090020030
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	MA17331610207
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP
HP- DC System power supply	HP	6032A	3440A-10308
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00005TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00006TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00002TMC
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable	BELKIN	#R7J304	E178882
CAT5e data cable	LEONI L	64867m	146180
CAT5e data cable	LEONI L	64867m	146180
FYGB GPS receiver	Nokia	472748A	71231431
Cat-5e cable	CSA	LL73189	E151955
6 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297370...
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551123/4

Cables (Peripheral)					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1	Connection 2
Fiber Optic cable	N	25 meters	N	ASIK	AHFIG
Cat-5e cable (CSA)	Y	25 meters	N	ASIK	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIK	WebEM- PC
Times Microwave Systems	Y	2 meters	N	EUT [RRH] Ant ports 1, 2, 3	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 [AHFIG] Ant port #4	Attenuator 100W/10dB
Attenuator 100W/10dB	N	NA	N	RF cable HS-SUCOFLEX_106	Low Pass filter 1.4G/100W
Low Pass Filter 1.4G/100W	N	NA	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 NOKI0016- 2

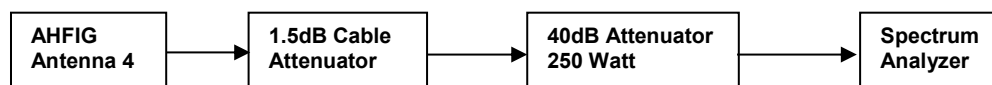
Software/Firmware Running during test	
Description	Version
4G BTS Software Version	SBTS20C ENB 9999 200603 000009
5G BTS Software Version	5G20A_GNB 0000 000840 001078 / FRM50.05.R18

Equipment being tested (include Peripherals)			
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	RK182307104
ASIA (4G BTS System Module)	Nokia Solutions and Networks	473095A.203	AH173111443
ABIA (4G BTS Baseband Module)	Nokia Solutions and Networks	473096A.103	AH173006372
ASIK (5G BTS System Module)	Nokia Solutions and Networks	474021A.101	L1183529610
ABIL (5G BTS Baseband Module)	Nokia Solutions and Networks	474020A.102	L1183605740
AHFIG (Radio Module Model)	Nokia Solutions and Networks	475125A.101	K9191322351
Attenuator 250W/40dB	AeroflexWeinschel	58-40-43-LIM	TC909
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	KR16090020030
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	MA17331610207
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP
HP- DC System power supply	HP	6032A	3440A-10308
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00005TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00006TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00002TMC
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable	BELKIN	#R7J304	E178882
CAT5e data cable	LEONI L	64867m	146180
CAT5e data cable	LEONI L	64867m	146180
FYGB GPS receiver	Nokia	472748A	71231431
Cat-5e cable	CSA	LL73189	E151955
6 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297370...
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551123/4

Cables (Peripheral)					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1	Connection 2
Fiber Optic cable	N	25 meters	N	ASIK	AHFIG
Cat-5e cable (CSA)	Y	25 meters	N	ASIK	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIK	WebEM- PC
Times Microwave Systems	Y	2 meters	N	EUT [RRH] Ant ports 1, 2, 3	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 [AHFIG] Ant port #4	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 NOKI0016- 3

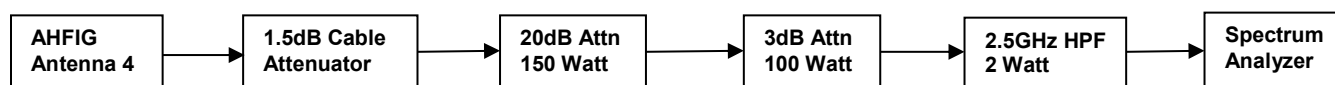
Software/Firmware Running during test	
Description	Version
4G BTS Software Version	SBTS20C ENB 9999 200603 000009
5G BTS Software Version	5G20A_GNB 0000 000840 001078 / FRM50.05.R18

Equipment being tested (include Peripherals)			
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	RK182307104
ASIA (4G BTS System Module)	Nokia Solutions and Networks	473095A.203	AH173111443
ABIA (4G BTS Baseband Module)	Nokia Solutions and Networks	473096A.103	AH173006372
ASIK (5G BTS System Module)	Nokia Solutions and Networks	474021A.101	L1183529610
ABIL (5G BTS Baseband Module)	Nokia Solutions and Networks	474020A.102	L1183605740
AHFIG (Radio Module Model)	Nokia Solutions and Networks	475125A.101	K9191322351
Attenuator 150W/20dB	AeroflexWeinschel	66-20-33	BZ2075
Attenuator 100W/3dB	AeroflexWeinschel	47-3-33	CG5493
High Pass Filter 2.5GHz/2W	RLC Electronics	F-100-3000-5-R	0028
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	KR16090020030
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	MA17331610207
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP
HP- DC System power supply	HP	6032A	3440A-10308
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00005TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00006TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00002TMC
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870
Fiber Optic cable 25m	Ocxfiber.com	BX002DAIS	334280
CAT5e data cable	BELKIN	#R7J304	E178882
CAT5e data cable	LEONI L	64867m	146180
CAT5e data cable	LEONI L	64867m	146180
FYGB GPS receiver	Nokia	472748A	71231431
Cat-5e cable	CSA	LL73189	E151955
6 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297370....
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551123/4

Cables (Peripheral)					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1	Connection 2
Fiber Optic cable	N	25 meters	N	ASIK	AHFIG
Cat-5e cable (CSA)	Y	25 meters	N	ASIK	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIK	WebEM- PC
Times Microwave Systems	Y	2 meters	N	EUT [RRH] Ant ports 1, 2, 3	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 [AHFIG] RF port #4	Attenuator 150W/20dB
Attenuator 150W/20dB	N	NA	N	RF cable HS-SUCOFLEX_106	Attenuator 100W/3dB
Attenuator 100W/3dB	N	NA	N	Attenuator 150W/20dB	High Pass Filter 2.5GHz
High Pass Filter 2.5GHz/2W	N	NA	N	Attenuator 100W/3dB	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	High Pass Filter 2.5GHz/2W	Analyzer

RF Test Setup Diagram:



CONFIGURATIONS



Configuration NOKI0016- 4

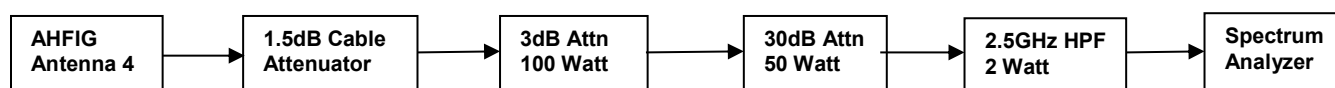
Software/Firmware Running during test	
Description	Version
4G BTS Software Version	SBTS20C ENB_9999_200603_000009
5G BTS Software Version	5G20A_GNB_0000_000840_001078 / FRM50.05.R18

Equipment being tested (include Peripherals)			
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	RK182307104
ASIA (4G BTS System Module)	Nokia Solutions and Networks	473095A.203	AH173111443
ABIA (4G BTS Baseband Module)	Nokia Solutions and Networks	473096A.103	AH173006372
ASIK (5G BTS System Module)	Nokia Solutions and Networks	474021A.101	L1183529610
ABIL (5G BTS Baseband Module)	Nokia Solutions and Networks	474020A.102	L1183605740
AHFIG (Radio Module Model)	Nokia Solutions and Networks	475125A.101	K9191322351
Attenuator 100W/3dB	AeroflexWeinschel	47-3-33	CG5493
Attenuator 50W/3dB	Narda	7768-30	1
High Pass Filter 2.5GHz/2W	RLC Electronics	F-100-3000-5-R	0028
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	KR16090020030
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	MA17331610207
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP
HP- DC System power supply	HP	6032A	3440A-10308
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00005TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00006TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00002TMC
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable	BELKIN	#R7J304	E178882
CAT5e data cable	LEONI L	64867m	146180
CAT5e data cable	LEONI L	64867m	146180
FYGB GPS receiver	Nokia	472748A	71231431
Cat-5e cable	CSA	LL73189	E151955
6 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297372
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551123/4

Cables (Peripheral)					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1	Connection 2
Fiber Optic cable	N	25 meters	N	ASIK	AHFIG
Cat-5e cable (CSA)	Y	25 meters	N	ASIK	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIK	WebEM- PC
Times Microwave Systems	Y	2 meters	N	EUT [RRH] Ant ports 1, 2, 3	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 [AHFIG] Ant port #4	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 2.5GHz
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:



CONFIGURATIONS

Configuration NOKI0016 - 5

Software/Firmware Running during test	
Description	Version
4G BTS Software Version	SBTS20C_ENB_9999_200603_000009

Equipment being tested (include Peripherals)			
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	RK182307104
ASIA (4G BTS System Module)	Nokia Solutions and Networks	473095A.203	AH173111443
ABIA (4G BTS Baseband Module)	Nokia Solutions and Networks	473096A.103	AH173006372
AHFIG (Radio Module Model)	Nokia Solutions and Networks	475125A.101	K9191322351
Low Pass Filter 1.4GHz/100W	Microwave Circuits, Inc.	L13502G1	SN2454-01
Attenuator 100W/10dB	AeroflexWeinschel	58-10-43-LIM	TD446
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	KR16090020030
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	MA17331610207
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP
HP- DC System power supply	HP	6032A	3440A-10308
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00005TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00006TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00002TMC
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable	BELKIN	#R7J304	E178882
CAT5e data cable	LEONI L	64867m	146180
CAT5e data cable	LEONI L	64867m	146180
FYGB GPS receiver	Nokia	472748A	71231431
Cat-5e cable	CSA	LL73189	E151955
6 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX 106	SN297370...
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX 104	SN551123/4

Cables (Peripheral)					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1	Connection 2
Fiber Optic cable	N	25 meters	N	ASIK	AHFIG
Cat-5e cable (CSA)	Y	25 meters	N	ASIK	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIK	WebEM- PC
Times Microwave Systems	Y	2 meters	N	EUT [RRH] Ant ports 1, 2, 3	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 [AHFIG] Ant port #4	Attenuator 100W/10dB
Attenuator 100W/10dB	N	NA	N	RF cable HS-SUCOFLEX 106	Low Pass filter 1.4G/100W
Low Pass Filter 1.4G/100W	N	NA	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 NOKI0016 - 6

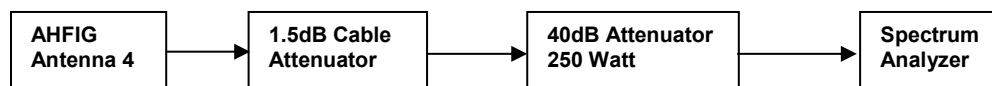
Software/Firmware Running during test	
Description	Version
4G BTS Software Version	SBTS20C_ENB_9999_200603_000009

Equipment being tested (include Peripherals)			
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	RK182307104
ASIA (4G BTS System Module)	Nokia Solutions and Networks	473095A.203	AH173111443
ABIA (4G BTS Baseband Module)	Nokia Solutions and Networks	473096A.103	AH173006372
AHFIG (Radio Module Model)	Nokia Solutions and Networks	475125A.101	K9191322351
Attenuator 250W/40dB	AeroflexWeinschel	58-40-43-LIM	TC909
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	KR16090020030
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	MA17331610207
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP
HP- DC System power supply	HP	6032A	3440A-10308
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00005TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00006TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00002TMC
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable	BELKIN	#R7J304	E178882
CAT5e data cable	LEONI L	64867m	146180
CAT5e data cable	LEONI L	64867m	146180
FYGB GPS receiver	Nokia	472748A	71231431
Cat-5e cable	CSA	LL73189	E151955
6 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297370...
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551123/4

Cables (Peripheral)					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1	Connection 2
Fiber Optic cable	N	25 meters	N	ASIK	AHFIG
Cat-5e cable (CSA)	Y	25 meters	N	ASIK	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIK	WebEM- PC
Times Microwave Systems	Y	2 meters	N	EUT [RRH] Ant ports 1, 2, 3	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 [AHFIG] Ant port #4	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 NOKI0016 - 7

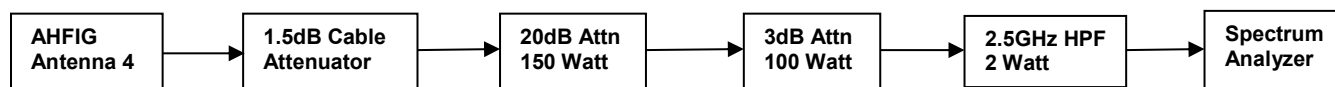
Software/Firmware Running during test	
Description	Version
4G BTS Software Version	SBTS20C_ENB_9999_200603_000009

Equipment being tested (include Peripherals)			
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	RK182307104
ASIA (4G BTS System Module)	Nokia Solutions and Networks	473095A.203	AH173111443
ABIA (4G BTS Baseband Module)	Nokia Solutions and Networks	473096A.103	AH173006372
AHFIG (Radio Module Model)	Nokia Solutions and Networks	475125A.101	K9191322351
Attenuator 150W/20dB	AeroflexWeinschel	66-20-33	BZ2075
Attenuator 100W/3dB	AeroflexWeinschel	47-3-33	CG5493
High Pass Filter 2.5GHz/2W	RLC Electronics	F-100-3000-5-R	0028
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	KR16090020030
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	MA17331610207
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP
HP- DC System power supply	HP	6032A	3440A-10308
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00005TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00006TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00002TMC
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable	BELKIN	#R7J304	E178882
CAT5e data cable	LEONI L	64867m	146180
CAT5e data cable	LEONI L	64867m	146180
FYGB GPS receiver	Nokia	472748A	71231431
Cat-5e cable	CSA	LL73189	E151955
6 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297370....
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551123/4

Cables (Peripheral)					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1	Connection 2
Fiber Optic cable	N	25 meters	N	ASIK	AHFIG
Cat-5e cable (CSA)	Y	25 meters	N	ASIK	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIK	WebEM- PC
Times Microwave Systems	Y	2 meters	N	EUT [RRH] Ant ports 1, 2, 3	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 [AHFIG] RF port #4	Attenuator 150W/20dB
Attenuator 150W/20dB	N	NA	N	RF cable HS-SUCOFLEX_106	Attenuator 100W/3dB
Attenuator 100W/3dB	N	NA	N	Attenuator 150W/20dB	High Pass Filter 2.5GHz
High Pass Filter 2.5GHz/2W	N	NA	N	Attenuator 100W/3dB	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	High Pass Filter 2.5GHz/2W	Analyzer

RF Test Setup Diagram:



CONFIGURATIONS



Configuration NOKI0016 - 8

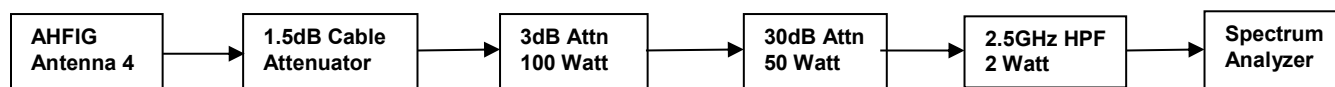
Software/Firmware Running during test	
Description	Version
4G BTS Software Version	SBTS20C_ENB_9999_200603_000009

Equipment being tested (include Peripherals)			
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	RK182307104
ASIA (4G BTS System Module)	Nokia Solutions and Networks	473095A.203	AH173111443
ABIA (4G BTS Baseband Module)	Nokia Solutions and Networks	473096A.103	AH173006372
AHFIG (Radio Module Model)	Nokia Solutions and Networks	475125A.101	K9191322351
Attenuator 100W/3dB	AeroflexWeinschel	47-3-33	CG5493
Attenuator 50W/30dB	Narda	7768-30	1
High Pass Filter 2.5GHz/2W	RLC Electronics	F-100-3000-5-R	0028
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	KR16090020030
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	MA17331610207
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP
HP- DC System power supply	HP	6032A	3440A-10308
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00005TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00006TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR2.0M	463559-00002TMC
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable	BELKIN	#R7J304	E178882
CAT5e data cable	LEONI L	64867m	146180
CAT5e data cable	LEONI L	64867m	146180
FYGB GPS receiver	Nokia	472748A	71231431
Cat-5e cable	CSA	LL73189	E151955
6 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297372
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551123/4

Cables (Peripheral)					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1	Connection 2
Fiber Optic cable	N	25 meters	N	ASIK	AHFIG
Cat-5e cable (CSA)	Y	25 meters	N	ASIK	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIK	WebEM- PC
Times Microwave Systems	Y	2 meters	N	EUT [RRH] Ant ports 1, 2, 3	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 [AHFIG] Ant port #4	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 2.5GHz
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	2020-06-18	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.
2	2020-06-23	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	2020-06-23	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.
4	2020-06-23	Spurious Conducted Emissions	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	2020-06-24	Peak to Average Power (PAPR)/CCDF	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

OCCUPIED BANDWIDTH - BAND 25



XMIT 2020.03.25.0

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	27-Feb-20	27-Feb-21
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21

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 $\geq 3\times$ the RBW
- Peak Detector was used
- Trace max hold was used

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHFIG) as the original certification test. The AHFIG antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the original certification testing) and antenna port 4 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraph 5.7.2i.

Carrier bandwidths of 10, 15, & 20MHz were verified using NB IoT GB carriers under this effort. The LTE modulation type for this testing was set up according to 3GPP TS 36.141 E-UTRA Test Models and is "E-TM 1.1 (QPSK modulation type) with N-TM (narrow band IoT)".

The occupied bandwidth was measured with the EUT configured in the modes called out in the data sheets. FCC 24.238(b) defines the 26dB emission bandwidth requirement. RSS GEN Section 6.7 defines the 99% emission bandwidth requirement.

Band 25 Emissions Designators:

Band 25 (1930MHz to 1995MHz) Emission Designators			
Channel Bandwidth	Radio Channel	NB-IoT: QPSK	
		FCC	IC
10 MHz	Low	9M93F9W	9M50F9W
	Mid	9M92F9W	9M51F9W
	High	9M91F9W	9M50F9W
15 MHz	Low	14M77F9W	14M12F9W
	Mid	14M78F9W	14M13F9W
	High	14M77F9W	14M12F9W
20 MHz	Low	19M69F9W	18M60F9W
	Mid	19M65F9W	18M63F9W
	High	19M69F9W	18M64F9W
Note: FCC based on 26db emission bandwidth; IC based on 99% emission bandwidth			

OCCUPIED BANDWIDTH - BAND 25



TstTx 2020.06.06.0 BETA XMR 2020.03.25.0

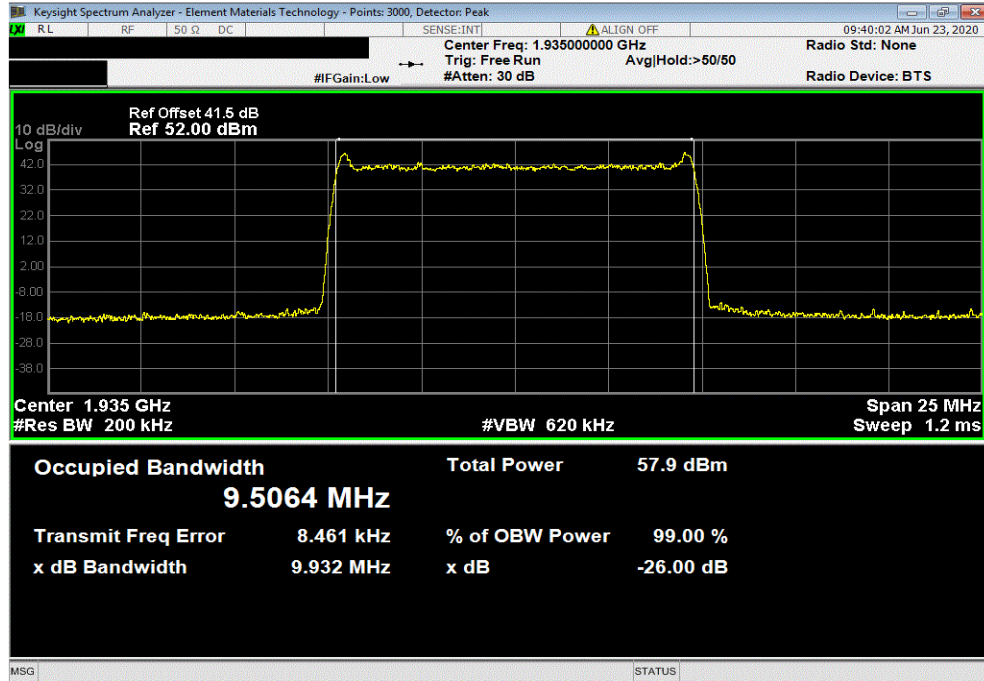
EUT: AHFIG		Work Order: NOKI0016	
Serial Number: K9191322351		Date: 23-Jun-20	
Customer: Nokia Solutions and Networks		Temperature: 22.5 °C	
Attendees: Mitchell Hill, John Rattanaovong		Humidity: 52.1% RH	
Project: None		Barometric Pres.: 1016 mbar	
Tested by: Brandon Hobbs		Power: 54 VDC	
Job Site: TX05			
TEST SPECIFICATIONS		Test Method	
FCC 24E:2020		ANSI C63.26:2015	
COMMENTS			
All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. The carrier was set to maximum for all testing.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	6	Signature	
		Value 99%	Value 26dB
		Limit	Result
Port 4, Band 25 NB IoT, 1930 MHz - 1995 MHz			
10 MHz Bandwidth			
QPSK Modulation			
	Low Channel 1935 MHz	9.506 MHz	9.932 MHz
	Mid Channel 1962.5 MHz	9.507 MHz	9.918 MHz
	High Channel 1990 MHz	9.496 MHz	9.905 MHz
		Within Band	Pass
		Within Band	Pass
		Within Band	Pass
15 MHz Bandwidth			
QPSK Modulation			
	Low Channel 1937.5 MHz	14.121 MHz	14.766 MHz
	Mid Channel 1962.5 MHz	14.126 MHz	14.776 MHz
	High Channel 1987.5 MHz	14.122 MHz	14.766 MHz
		Within Band	Pass
		Within Band	Pass
		Within Band	Pass
20 MHz Bandwidth			
QPSK Modulation			
	Low Channel 1940 MHz	18.601 MHz	19.685 MHz
	Mid Channel 1962.5 MHz	18.63 MHz	19.65 MHz
	High Channel 1985 MHz	18.636 MHz	19.692 MHz
		Within Band	Pass
		Within Band	Pass
		Within Band	Pass

OCCUPIED BANDWIDTH - BAND 25

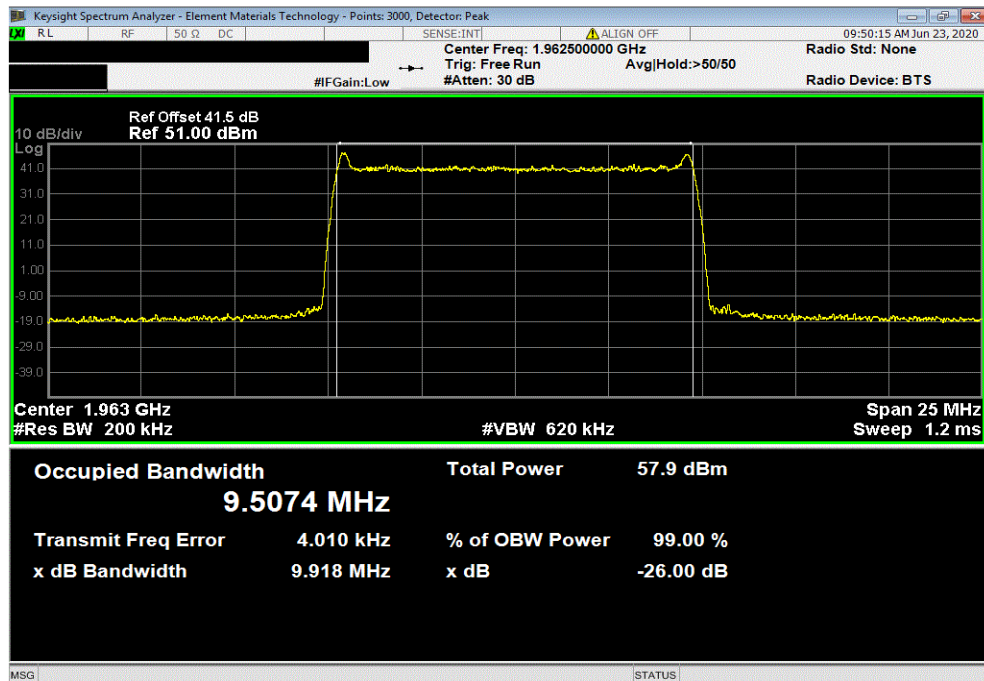


TMTx 2020.06.08.0 BETA XMI 2020.03.25.0

Port 4, Band 25 NB IoT, 1930 MHz - 1995 MHz, 10 MHz Bandwidth, QPSK Modulation, Low Channel 1935 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			9.506 MHz	9.932 MHz	Within Band	Pass	



Port 4, Band 25 NB IoT, 1930 MHz - 1995 MHz, 10 MHz Bandwidth, QPSK Modulation, Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			9.507 MHz	9.918 MHz	Within Band	Pass	

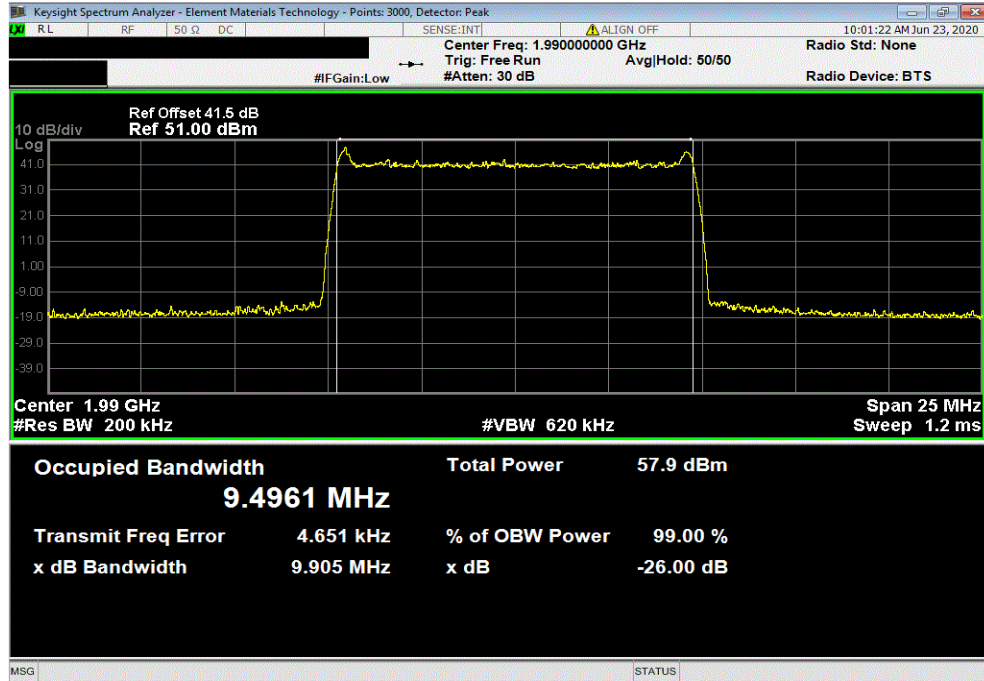


OCCUPIED BANDWIDTH - BAND 25

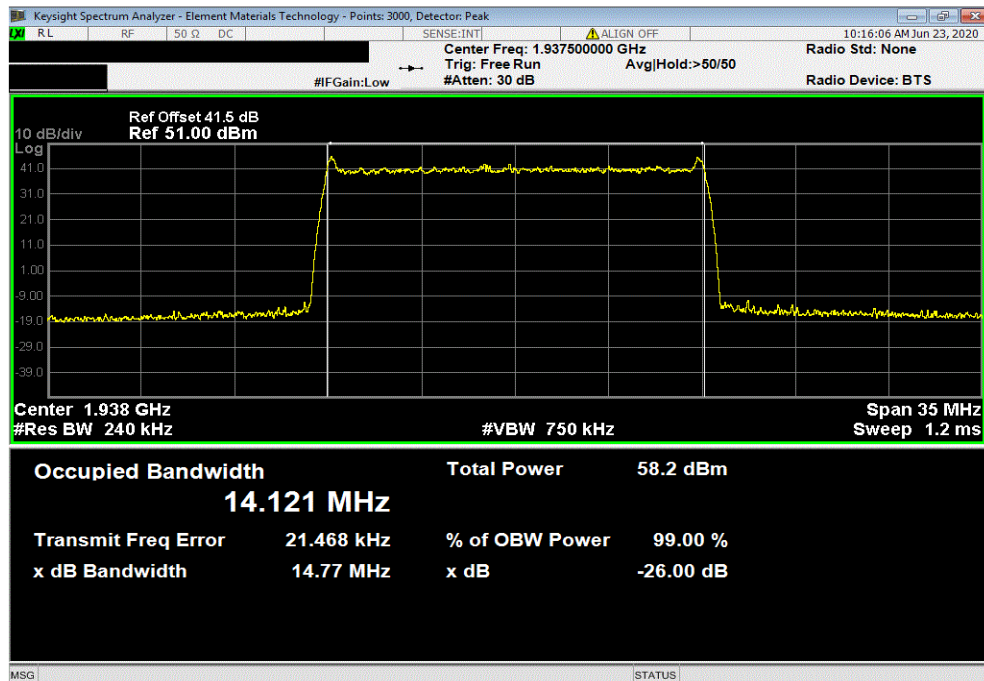


TbTx 2020.06.08.0 BETA XMI 2020.03.25.0

Port 4, Band 25 NB IoT, 1930 MHz - 1995 MHz, 10 MHz Bandwidth, QPSK Modulation, High Channel 1990 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			9.496 MHz	9.905 MHz	Within Band	Pass	



Port 4, Band 25 NB IoT, 1930 MHz - 1995 MHz, 15 MHz Bandwidth, QPSK Modulation, Low Channel 1937.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			14.121 MHz	14.766 MHz	Within Band	Pass	

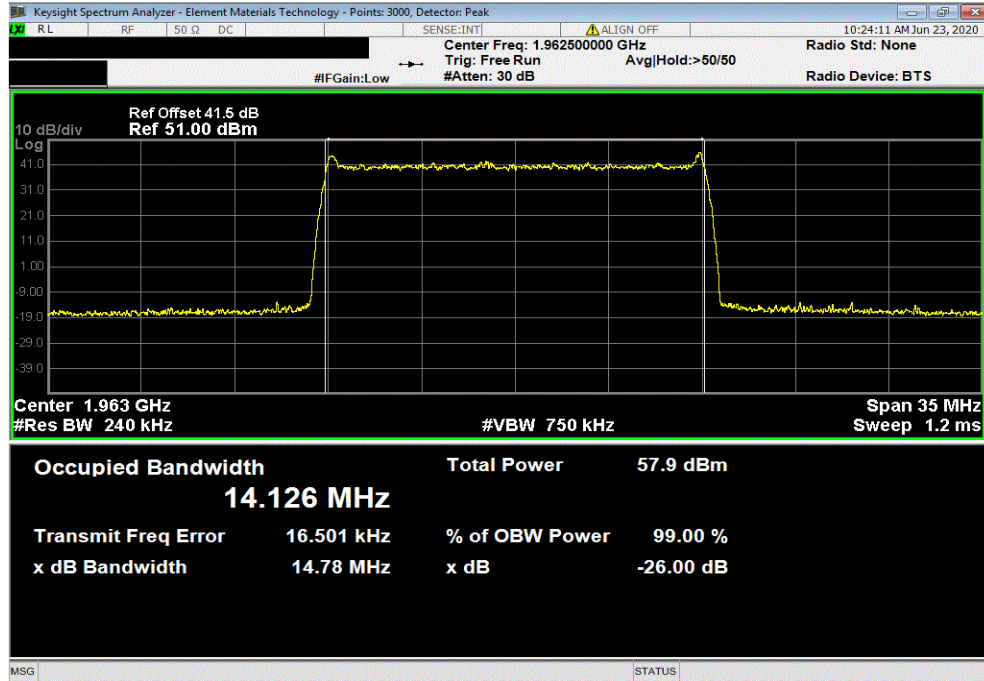


OCCUPIED BANDWIDTH - BAND 25

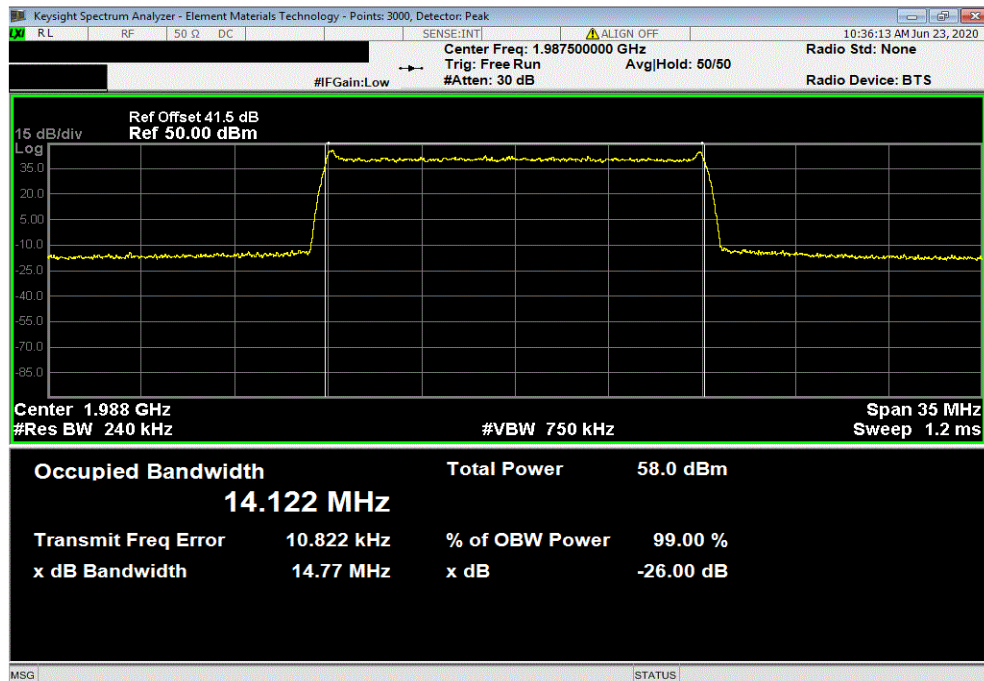


TMTx 2020.06.08.0 BETA XMI 2020.03.25.0

Port 4, Band 25 NB IoT, 1930 MHz - 1995 MHz, 15 MHz Bandwidth, QPSK Modulation, Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			14.126 MHz	14.776 MHz	Within Band	Pass	



Port 4, Band 25 NB IoT, 1930 MHz - 1995 MHz, 15 MHz Bandwidth, QPSK Modulation, High Channel 1987.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			14.122 MHz	14.766 MHz	Within Band	Pass	

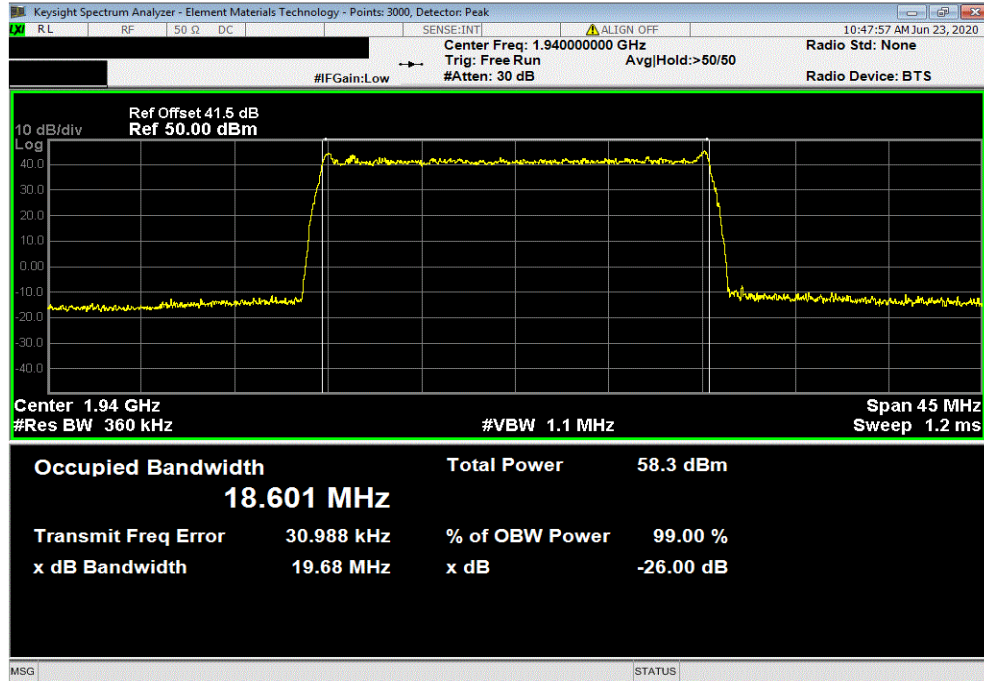


OCCUPIED BANDWIDTH - BAND 25

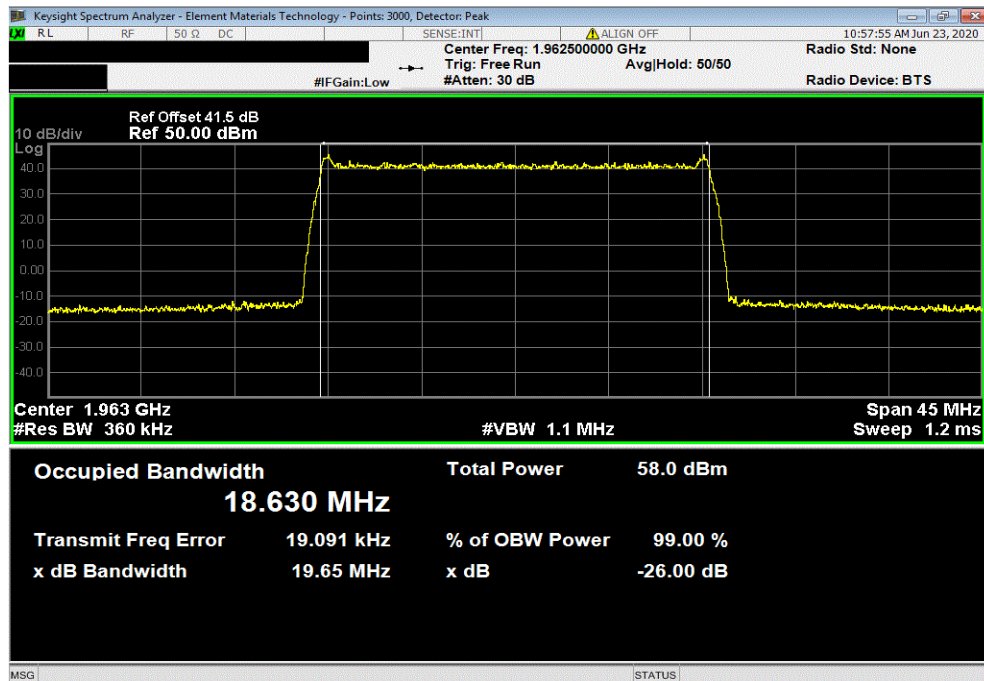


TMTx 2020.06.08.0 BETA XMit 2020.03.25.0

Port 4, Band 25 NB IoT, 1930 MHz - 1995 MHz, 20 MHz Bandwidth, QPSK Modulation, Low Channel 1940 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			18.601 MHz	19.685 MHz	Within Band	Pass	



Port 4, Band 25 NB IoT, 1930 MHz - 1995 MHz, 20 MHz Bandwidth, QPSK Modulation, Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			18.63 MHz	19.65 MHz	Within Band	Pass	

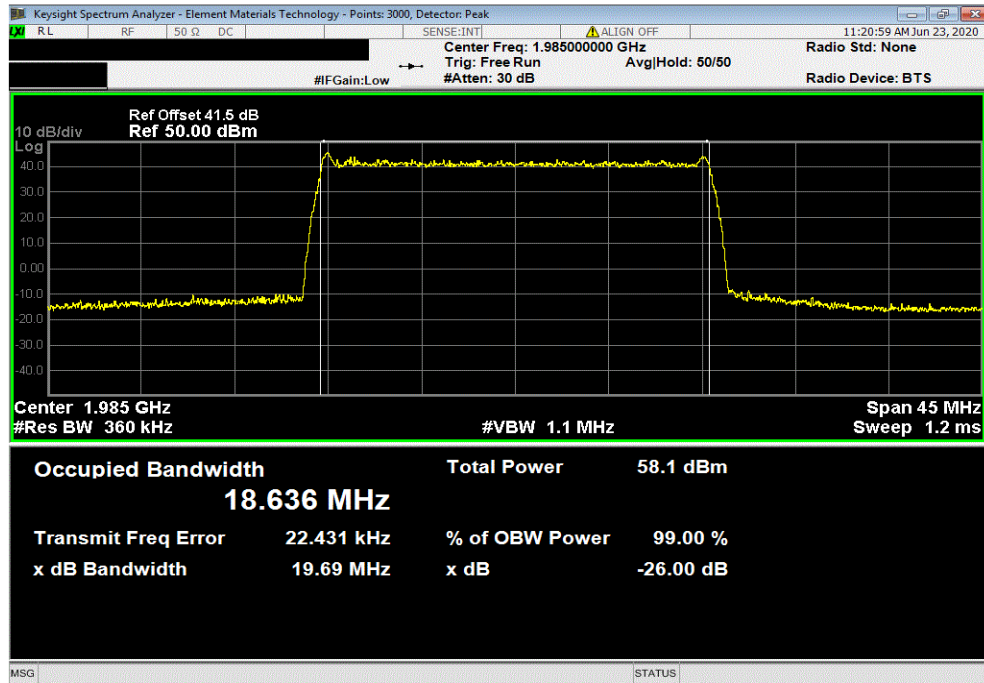


OCCUPIED BANDWIDTH - BAND 25



TMTx 2020.06.08.0 BETA XMit 2020.03.25.0

Port 4, Band 25 NB IoT, 1930 MHz - 1995 MHz, 20 MHz Bandwidth, QPSK Modulation, High Channel 1985 MHz							
		Value		Value		Limit	Result
		99%		26dB			
		18.636 MHz		19.692 MHz		Within Band	Pass



Within Band

OCCUPIED BANDWIDTH - BAND 66



XMIT 2020.03.25.0

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	27-Feb-20	27-Feb-21
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21

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 $\geq 3x$ the RBW
- Peak Detector was used
- Trace max hold was used

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHFIG) as the original certification test. The AHFIG antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the original certification testing) and antenna port 4 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraph 5.7.2i.

Carrier bandwidths of 10, 15, & 20MHz were verified using NB IoT GB carriers under this effort. The LTE modulation type for this testing was set up according to 3GPP TS 36.141 E-UTRA Test Models and is "E-TM 1.1 (QPSK modulation type) with N-TM (narrow band IoT)".

The occupied bandwidth was measured with the EUT configured in the modes called out in the data sheets. FCC 27.53(h)(3) defines the 26dB emission bandwidth requirement. RSS GEN Section 6.7 defines the 99% emission bandwidth requirement.

Band 66 (2110MHz to 2200MHz) Emission Designators			
Channel Bandwidth	Radio Channel	NB-IoT: QPSK	
		FCC	IC
10 MHz	Low	9M93F9W	9M51F9W
	Mid	9M91F9W	9M51F9W
	High	9M91F9W	9M50F9W
15 MHz	Low	14M79F9W	14M12F9W
	Mid	14M78F9W	14M13F9W
	High	14M74F9W	14M12F9W
20 MHz	Low	19M68F9W	18M60F9W
	Mid	19M70F9W	18M63F9W
	High	19M72F9W	18M64F9W

Note: FCC based on 26db emission bandwidth; IC based on 99% emission bandwidth

OCCUPIED BANDWIDTH - BAND 66



TstTx 2020.06.06.0 BETA XMR 2020.03.25.0

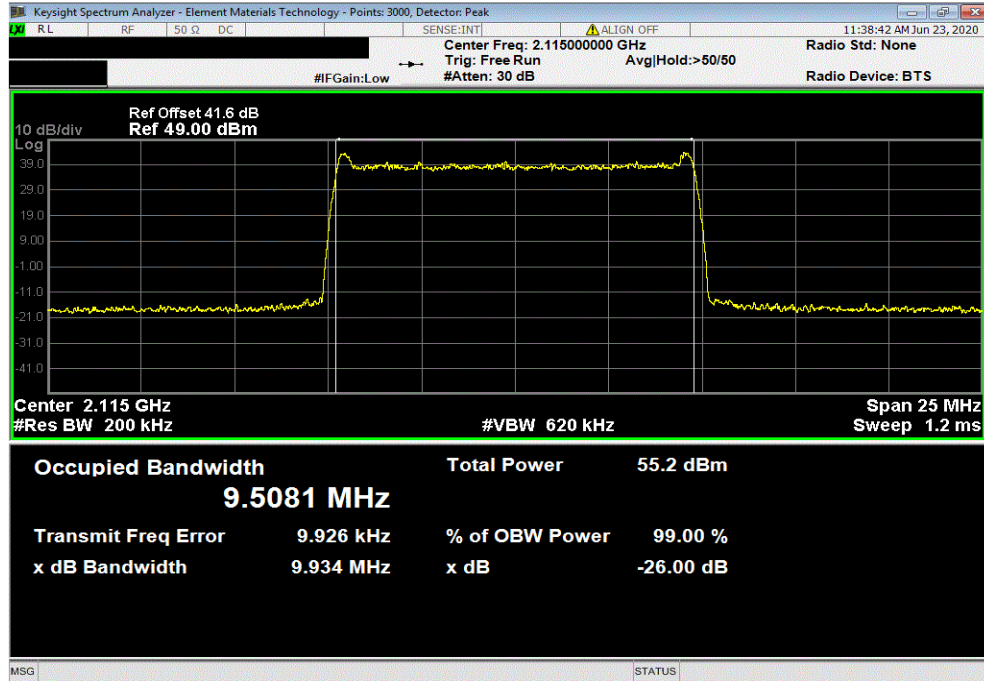
EUT: AHFIG		Work Order: NOKI0016	
Serial Number: K9191322351		Date: 23-Jun-20	
Customer: Nokia Solutions and Networks		Temperature: 22.4 °C	
Attendees: Mitchell Hill, John Rattanaovong		Humidity: 55.7% RH	
Project: None		Barometric Pres.: 1012 mbar	
Tested by: Brandon Hobbs	Power: 54 VDC	Job Site: TX05	
TEST SPECIFICATIONS		Test Method	
FCC 27:2020		ANSI C63.26:2015	
COMMENTS			
All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. The carrier was set to maximum for all testing.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	6	Signature	
		Value 99%	Value 26dB
		Limit	Result
Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz			
10 MHz Bandwidth			
QPSK Modulation			
	Low Channel 2115 MHz	9.508 MHz	9.934 MHz
	Mid Channel 2155 MHz	9.501 MHz	9.913 MHz
	High Channel 2195 MHz	9.505 MHz	9.912 MHz
15 MHz Bandwidth			
QPSK Modulation			
	Low Channel 2117.5 MHz	14.116 MHz	14.794 MHz
	Mid Channel 2155 MHz	14.11 MHz	14.777 MHz
	High Channel 2192.5 MHz	14.121 MHz	14.743 MHz
20 MHz Bandwidth			
QPSK Modulation			
	Low Channel 2120 MHz	18.622 MHz	19.677 MHz
	Mid Channel 2155 MHz	18.632 MHz	19.697 MHz
	High Channel 2190 MHz	18.614 MHz	19.716 MHz

OCCUPIED BANDWIDTH - BAND 66

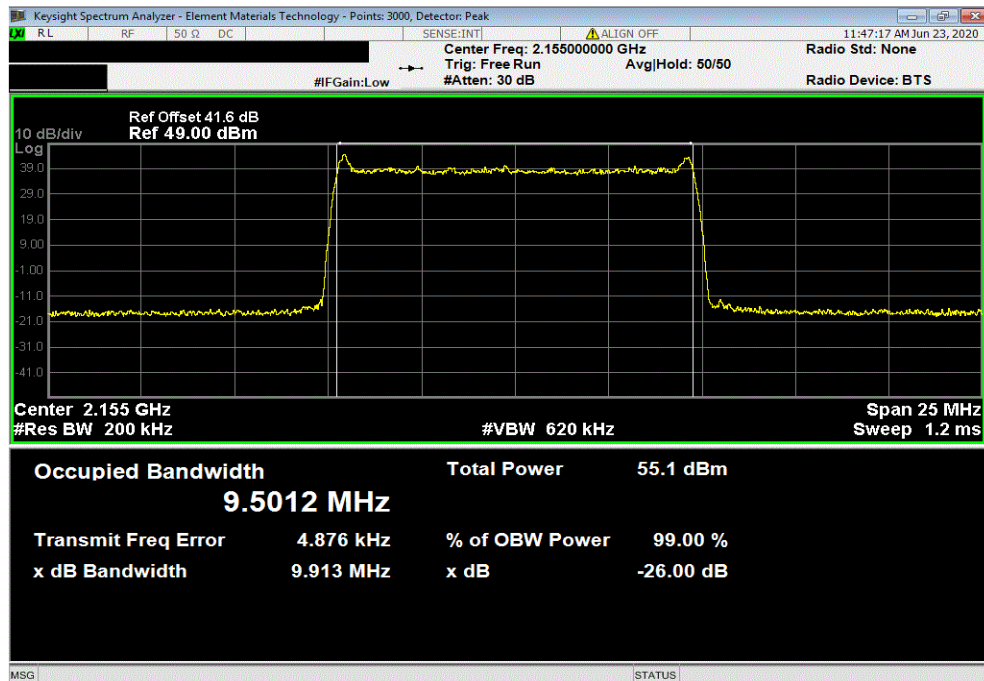


TbTx 2020.06.08.0 BETA XMI 2020.03.25.0

Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 10 MHz Bandwidth, QPSK Modulation, Low Channel 2115 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			9.508 MHz	9.934 MHz	Within Band	Pass	



Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 10 MHz Bandwidth, QPSK Modulation, Mid Channel 2155 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			9.501 MHz	9.913 MHz	Within Band	Pass	

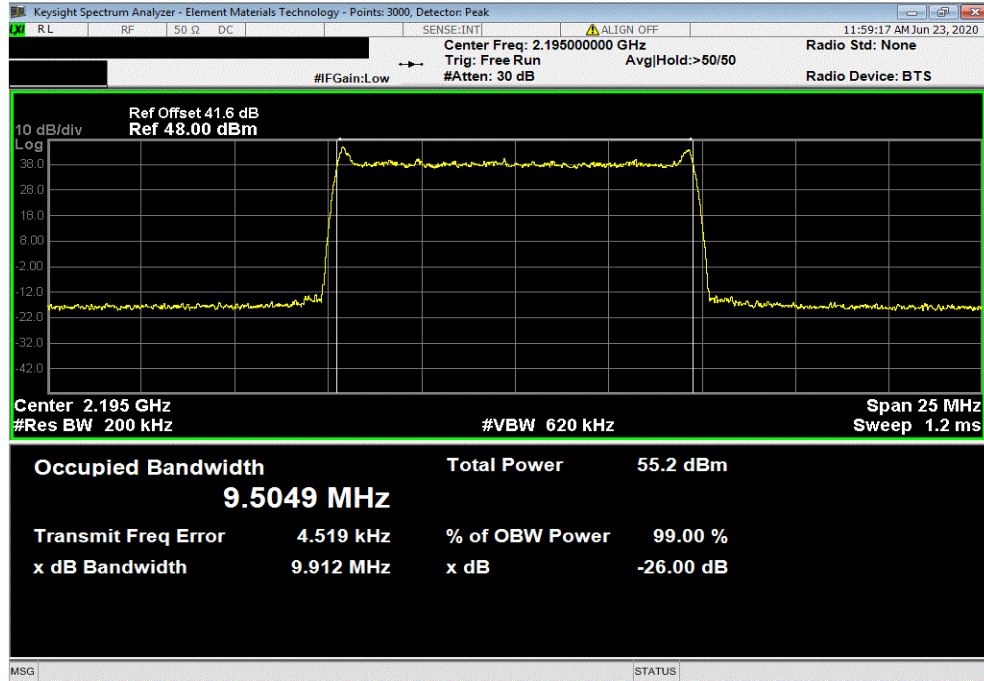


OCCUPIED BANDWIDTH - BAND 66

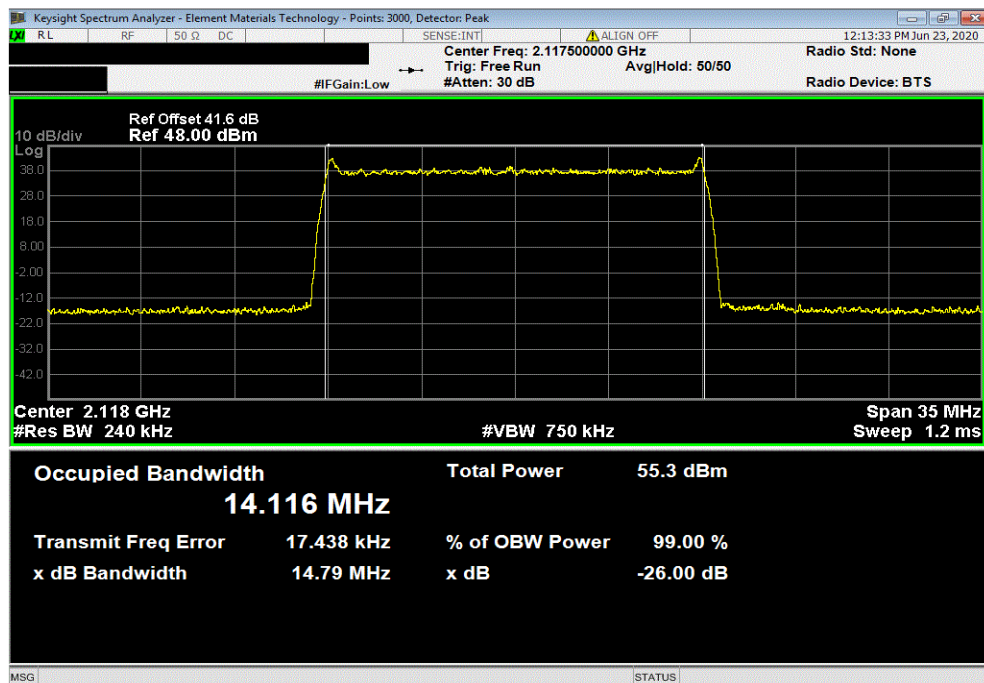


TbTx 2020.06.08.0 BETA XMI 2020.03.25.0

Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 10 MHz Bandwidth, QPSK Modulation, High Channel 2195 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			9.505 MHz	9.912 MHz	Within Band	Pass	



Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 15 MHz Bandwidth, QPSK Modulation, Low Channel 2117.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			14.116 MHz	14.794 MHz	Within Band	Pass	

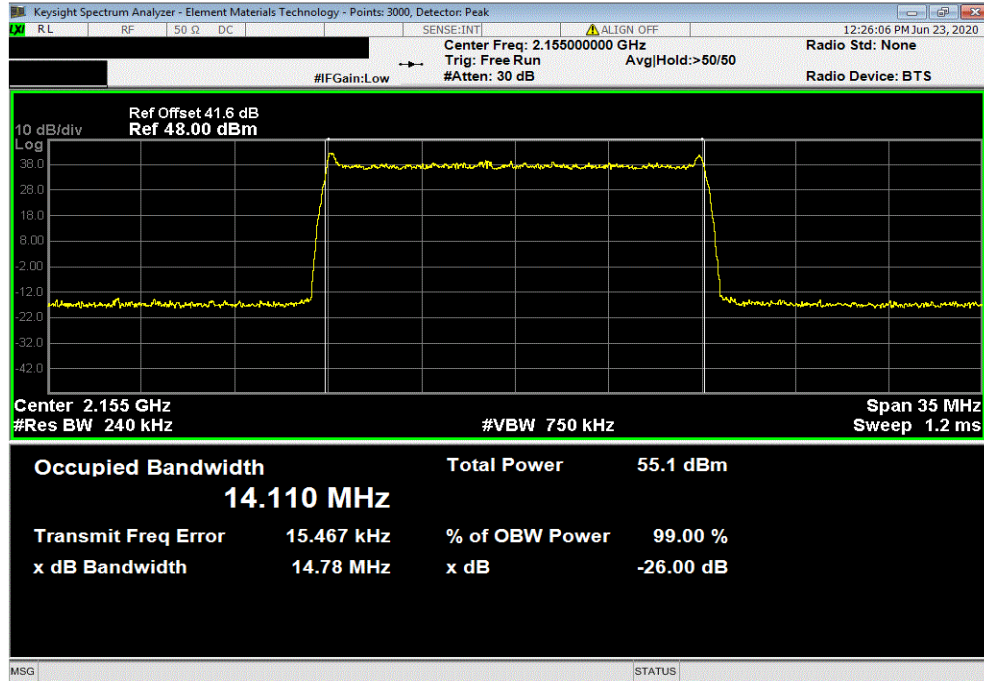


OCCUPIED BANDWIDTH - BAND 66

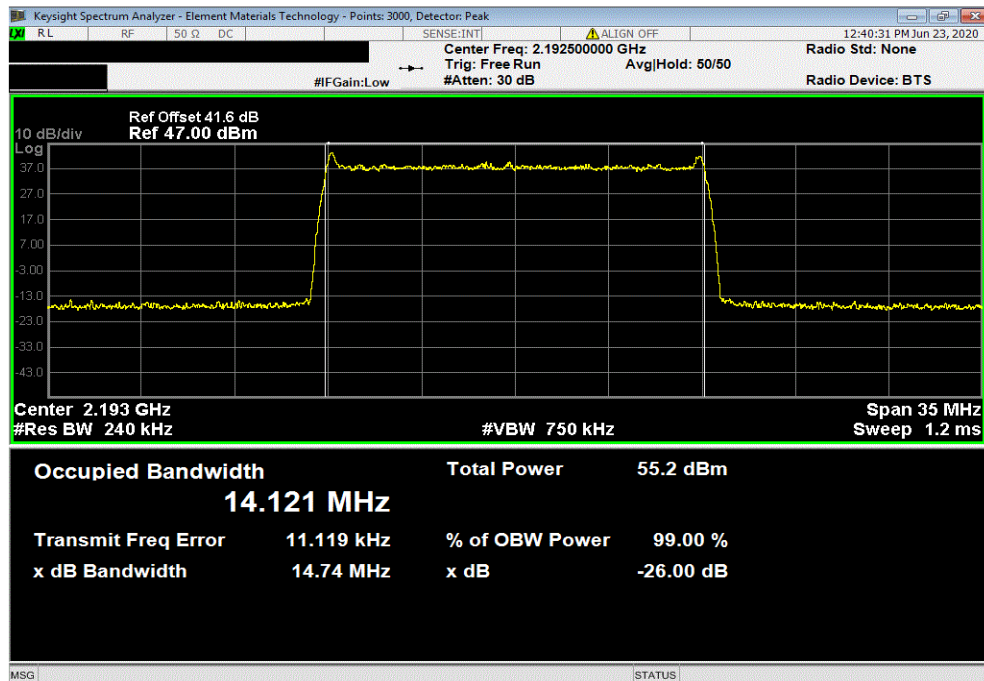


TbTx 2020.06.08.0 BETA XMI 2020.03.25.0

Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 15 MHz Bandwidth, QPSK Modulation, Mid Channel 2155 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			14.11 MHz	14.777 MHz	Within Band	Pass	



Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 15 MHz Bandwidth, QPSK Modulation, High Channel 2192.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			14.121 MHz	14.743 MHz	Within Band	Pass	

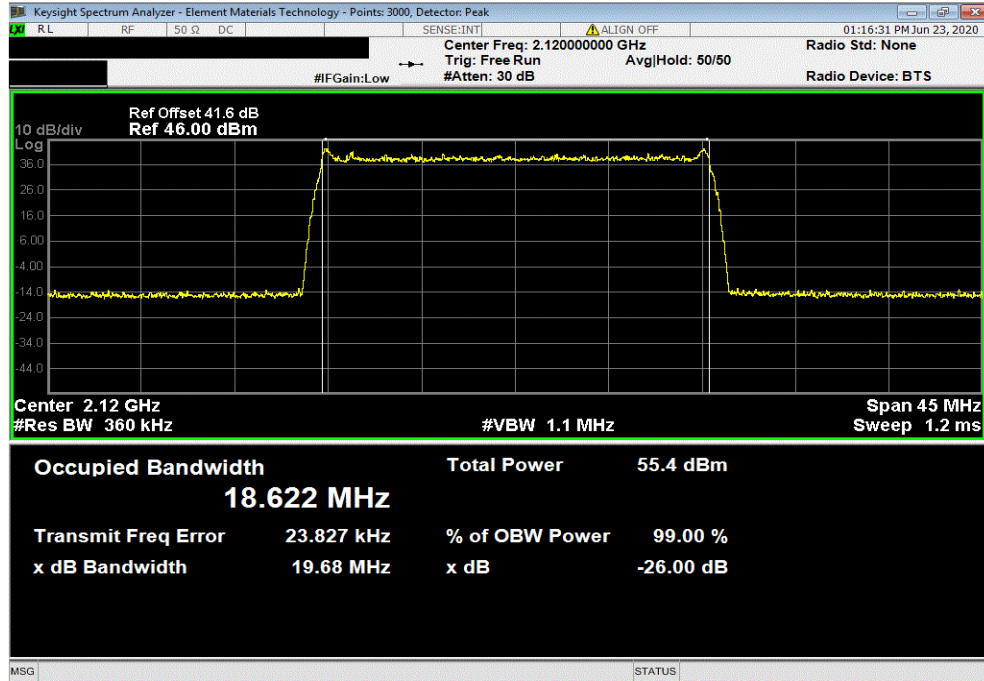


OCCUPIED BANDWIDTH - BAND 66

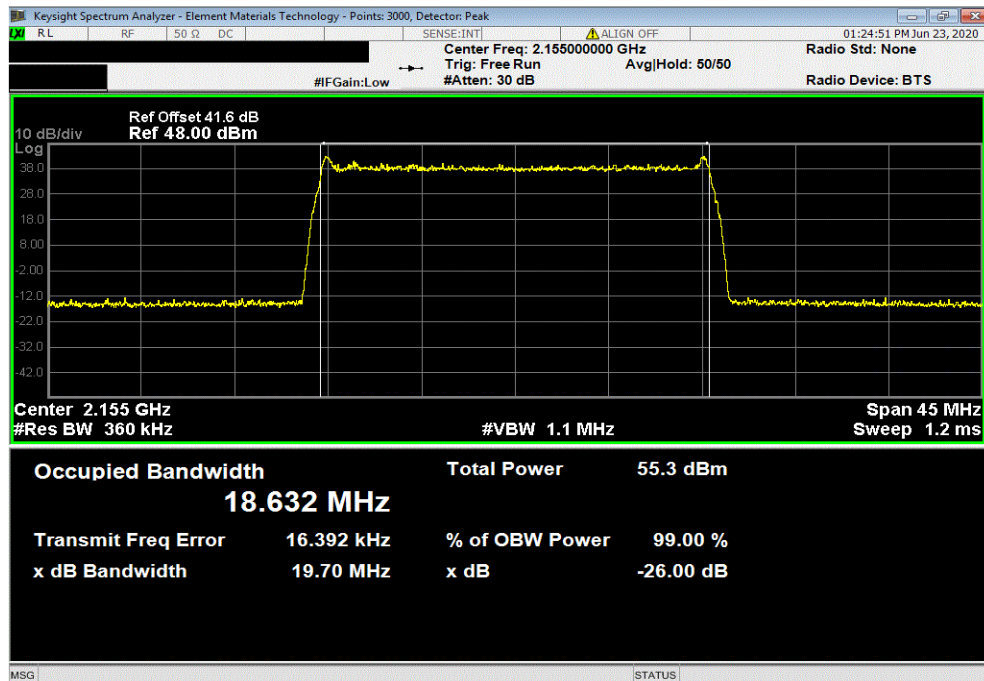


TbTx 2020.06.08.0 BETA XMit 2020.03.25.0

Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, QPSK Modulation, Low Channel 2120 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			18.622 MHz	19.677 MHz	Within Band	Pass	



Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, QPSK Modulation, Mid Channel 2155 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			18.632 MHz	19.697 MHz	Within Band	Pass	

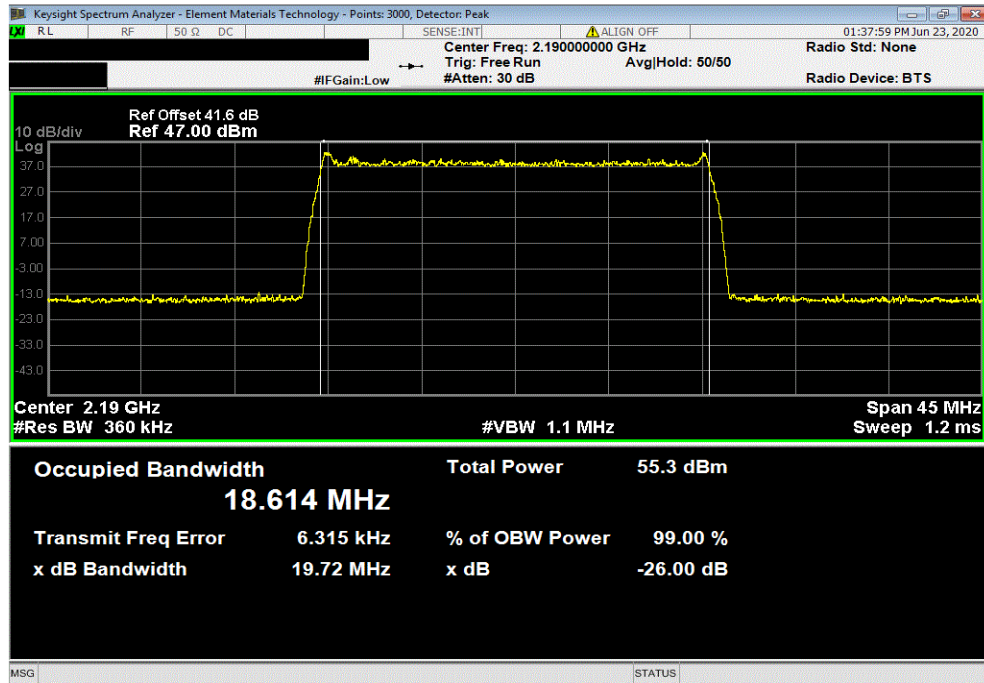


OCCUPIED BANDWIDTH - BAND 66



TMTx 2020.06.08.0 BETA XMit 2020.03.25.0

Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, QPSK Modulation, High Channel 2190 MHz							
		Value		Value		Limit	Result
		99%		26dB			
		18.614 MHz		19.716 MHz		Within Band	Pass



OCCUPIED BANDWIDTH - BAND n25

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	27-Feb-20	27-Feb-21
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21

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 $\geq 3x$ the RBW
- Peak Detector was used
- Trace max hold was used

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHFIG) as the original certification test. The AHFIG antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the original certification testing) and antenna port 4 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraph 5.7.2i.

5G NR carrier bandwidths of 5MHz, 10MHz, 15MHz, and 20MHz with QPSK, 16QAM, 64QAM and 256QAM modulation types were verified under this effort. The 5G NR carriers/modulation types for this testing are set up according to 3GPP TS 38.141-1 Test Models and are NR-FR1-TM 1.1 (QPSK modulation type), NR-FR1-TM 3.1 (16QAM modulation type), NR-FR1-TM 3.1 (64QAM modulation type), and NR-FR1-TM 3.1a (256QAM modulation type).

The occupied bandwidth was measured with the EUT configured in the modes called out in the data sheets. FCC 24.238(b) defines the 26dB emission bandwidth requirement. RSS GEN Section 6.7 defines the 99% emission bandwidth requirement.

Band n25 Emissions Designators:

Band n25 (1930MHz to 1995MHz) Emission Designators									
Channel Bandwidth	Radio Channel	5G-NR: QPSK		5G-NR: 16-QAM		5G-NR: 64-QAM		5G-NR: 256-QAM	
		FCC	IC	FCC	IC	FCC	IC	FCC	IC
5 MHz	Mid	4M86G7W	4M51G7W	4M86G7W	4M52G7W	4M84G7W	4M49G7W	4M84G7W	4M48G7W
10 MHz	Mid	9M87G7W	9M32G7W	9M81G7W	9M23G7W	9M89G7W	9M32G7W	9M88G7W	9M28G7W
15 MHz	Mid	14M90G7W	14M11G7W	14M82G7W	14M16G7W	14M84G7W	14M12G7W	14M81G7W	14M11G7W
20 MHz	Mid	19M93G7W	18M93G7W	19M90G7W	19M02G7W	19M94G7W	18M94G7W	19M98G7W	18M96G7W

Note: FCC based on 26db emission bandwidth; IC based on 99% emission bandwidth

OCCUPIED BANDWIDTH - BAND n25



TS4Tx 2020.06.06.0 BETA XMIR 2020.03.25.0

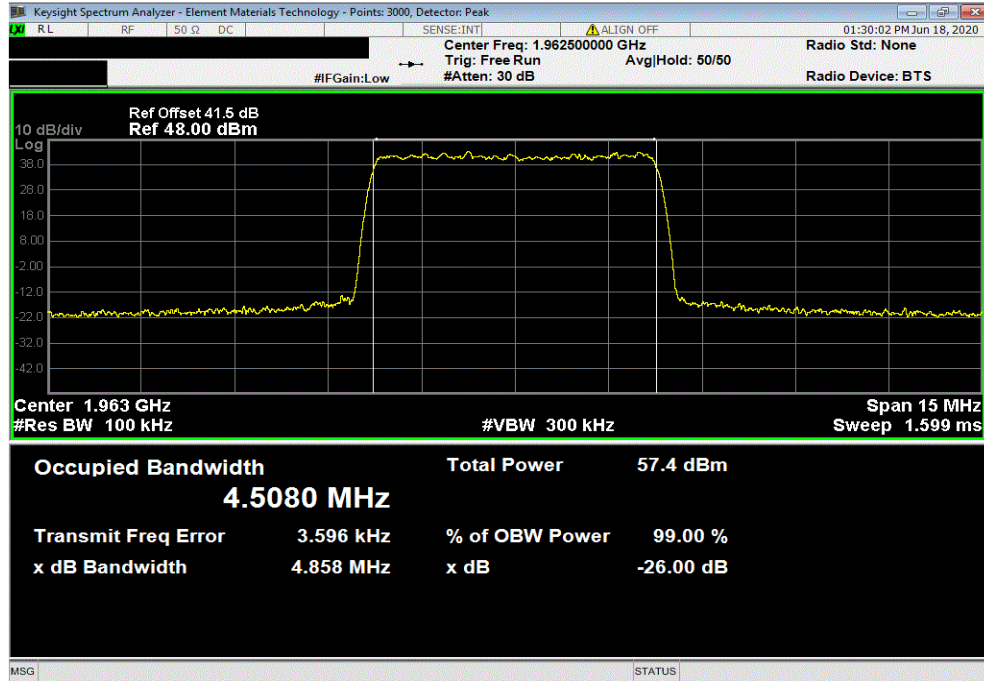
EUT: AHFIG		Work Order: NOKI0016			
Serial Number: K9191322351		Date: 19-Jun-20			
Customer: Nokia Solutions and Networks		Temperature: 22.3 °C			
Attendees: Mitchell Hill, John Rattanaovong		Humidity: 51.9% RH			
Project: None		Barometric Pres.: 1015 mbar			
Tested by: Brandon Hobbs		Power: 54 VDC	Job Site: TX05		
TEST SPECIFICATIONS		Test Method			
FCC 24E:2020		ANSI C63.26:2015			
COMMENTS					
All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. The carrier was set to maximum for all testing.					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	2	Signature 			
		Value 99%	Value 26dB	Limit	Result
Port 4, Band n25, 1930 MHz - 1995 MHz					
5 MHz Bandwidth					
QPSK Modulation					
Mid Channel 1962.5 MHz		4.508 MHz	4.858 MHz	Within Band	Pass
16-QAM Modulation					
Mid Channel 1962.5 MHz		4.523 MHz	4.856 MHz	Within Band	Pass
64-QAM Modulation					
Mid Channel 1962.5 MHz		4.494 MHz	4.84 MHz	Within Band	Pass
256-QAM Modulation					
Mid Channel 1962.5 MHz		4.477 MHz	4.841 MHz	Within Band	Pass
10 MHz Bandwidth					
QPSK Modulation					
Mid Channel 1962.5 MHz		9.316 MHz	9.865 MHz	Within Band	Pass
16-QAM Modulation					
Mid Channel 1962.5 MHz		9.228 MHz	9.808 MHz	Within Band	Pass
64-QAM Modulation					
Mid Channel 1962.5 MHz		9.319 MHz	9.887 MHz	Within Band	Pass
256-QAM Modulation					
Mid Channel 1962.5 MHz		9.28 MHz	9.88 MHz	Within Band	Pass
15 MHz Bandwidth					
QPSK Modulation					
Mid Channel 1962.5 MHz		14.105 MHz	14.897 MHz	Within Band	Pass
16-QAM Modulation					
Mid Channel 1962.5 MHz		14.161 MHz	14.818 MHz	Within Band	Pass
64-QAM Modulation					
Mid Channel 1962.5 MHz		14.121 MHz	14.837 MHz	Within Band	Pass
256-QAM Modulation					
Mid Channel 1962.5 MHz		14.112 MHz	14.811 MHz	Within Band	Pass
20 MHz Bandwidth					
QPSK Modulation					
Mid Channel 1962.5 MHz		18.926 MHz	19.928 MHz	Within Band	Pass
16-QAM Modulation					
Mid Channel 1962.5 MHz		19.022 MHz	19.896 MHz	Within Band	Pass
64-QAM Modulation					
Mid Channel 1962.5 MHz		18.942 MHz	19.943 MHz	Within Band	Pass
256-QAM Modulation					
Mid Channel 1962.5 MHz		18.956 MHz	19.983 MHz	Within Band	Pass

OCCUPIED BANDWIDTH - BAND n25

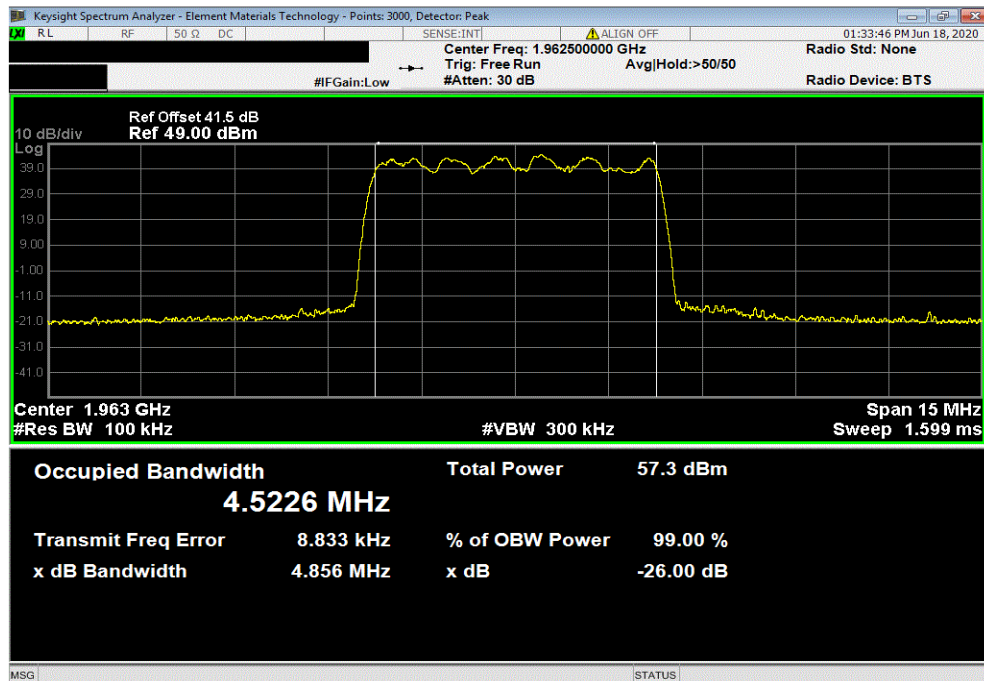


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Port 4, Band n25, 1930 MHz - 1995 MHz , 5 MHz Bandwidth, QPSK Modulation, Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			4.508 MHz	4.858 MHz	Within Band	Pass	



Port 4, Band n25, 1930 MHz - 1995 MHz , 5 MHz Bandwidth, 16-QAM Modulation , Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			4.523 MHz	4.856 MHz	Within Band	Pass	

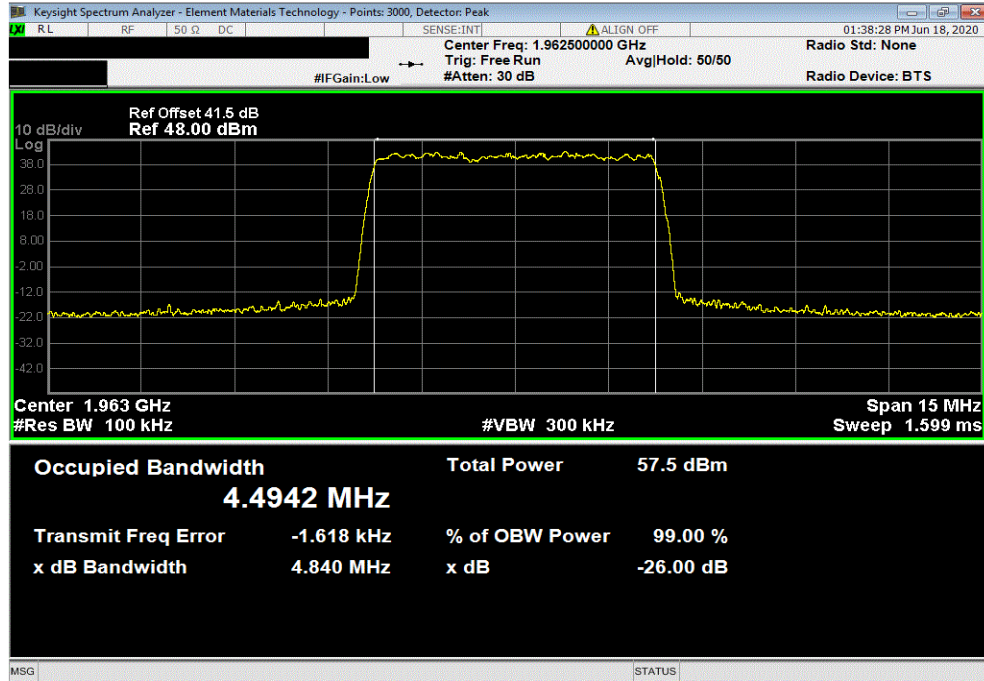


OCCUPIED BANDWIDTH - BAND n25

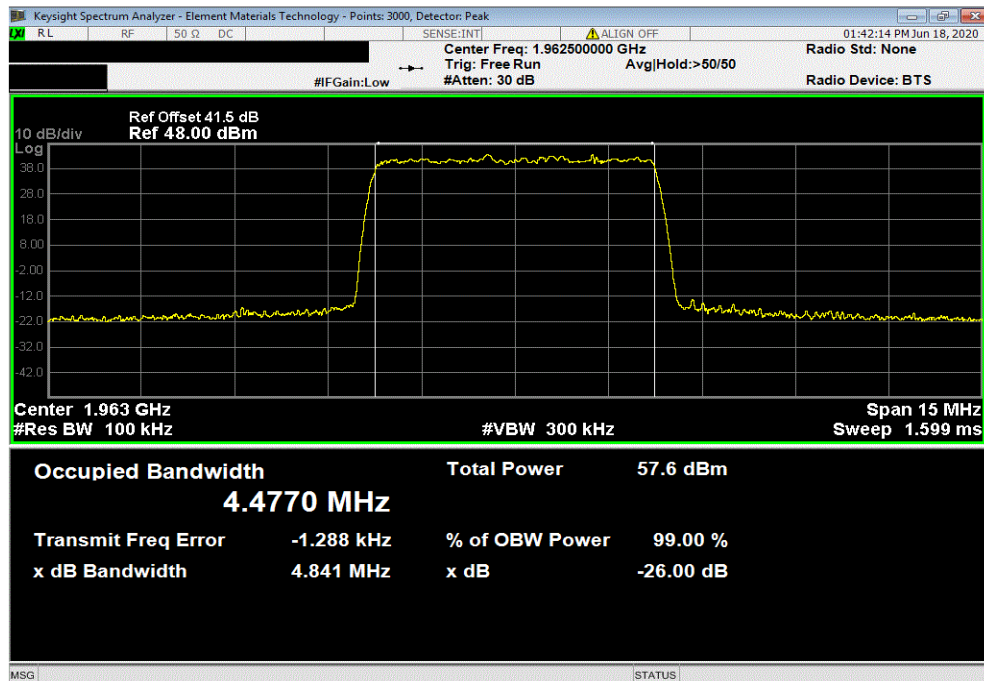


TbTx 2020.06.08.0 BETA XMit 2020.03.25.0

Port 4, Band n25, 1930 MHz - 1995 MHz , 5 MHz Bandwidth, 64-QAM Modulation, Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			4.494 MHz	4.84 MHz	Within Band	Pass	



Port 4, Band n25, 1930 MHz - 1995 MHz , 5 MHz Bandwidth, 256-QAM Modulation, Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			4.477 MHz	4.841 MHz	Within Band	Pass	

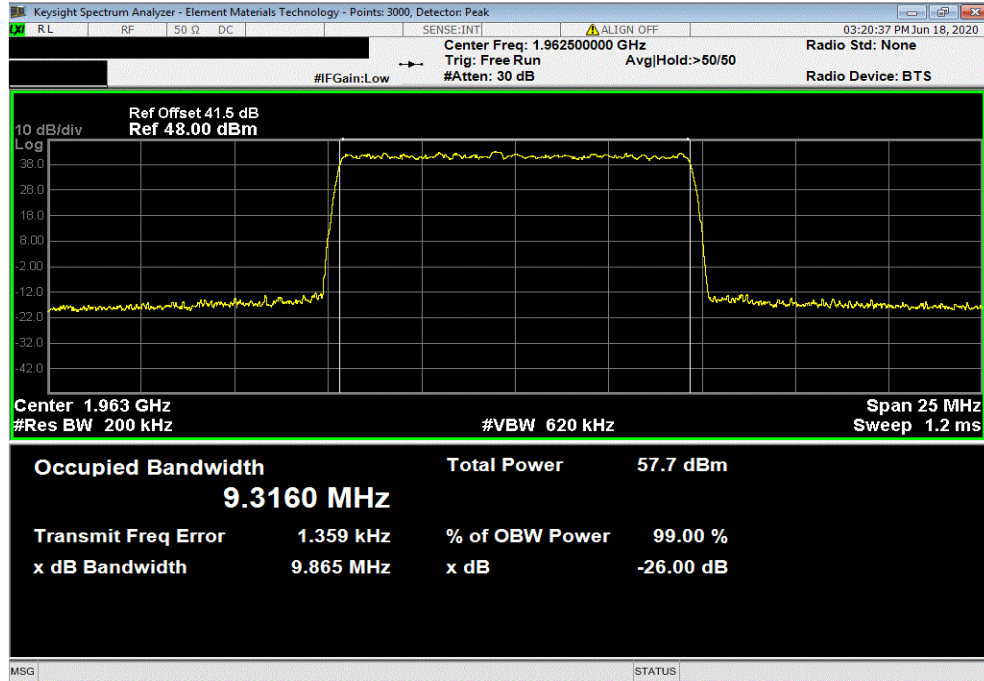


OCCUPIED BANDWIDTH - BAND n25

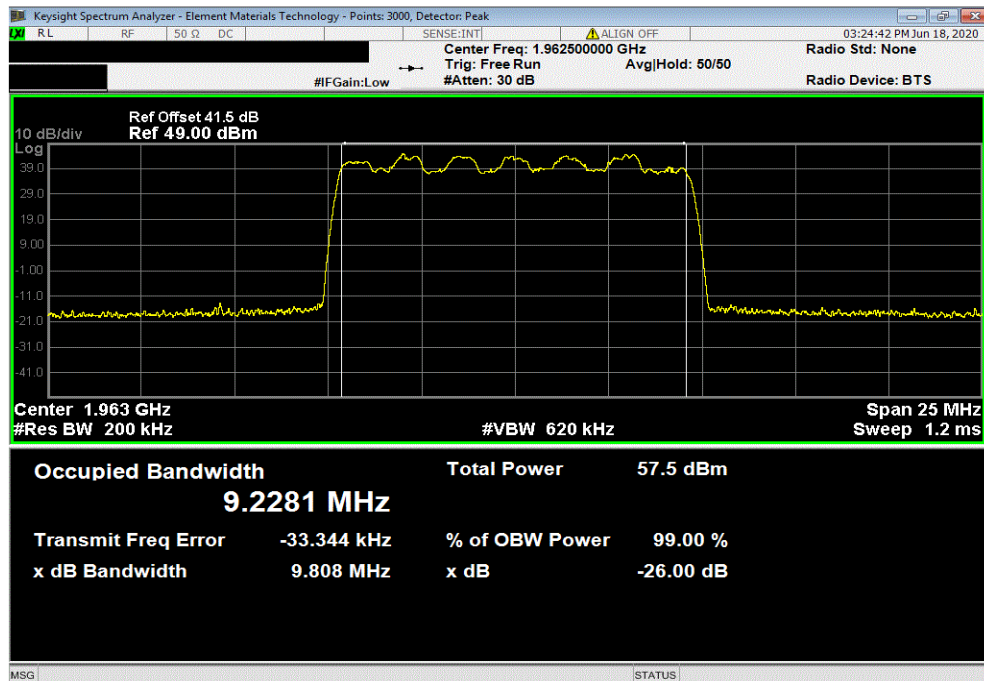


TMTx 2020.06.08.0 BETA XMI 2020.03.25.0

Port 4, Band n25, 1930 MHz - 1995 MHz , 10 MHz Bandwidth, QPSK Modulation, Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			9.316 MHz	9.865 MHz	Within Band	Pass	



Port 4, Band n25, 1930 MHz - 1995 MHz , 10 MHz Bandwidth, 16-QAM Modulation , Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			9.228 MHz	9.808 MHz	Within Band	Pass	

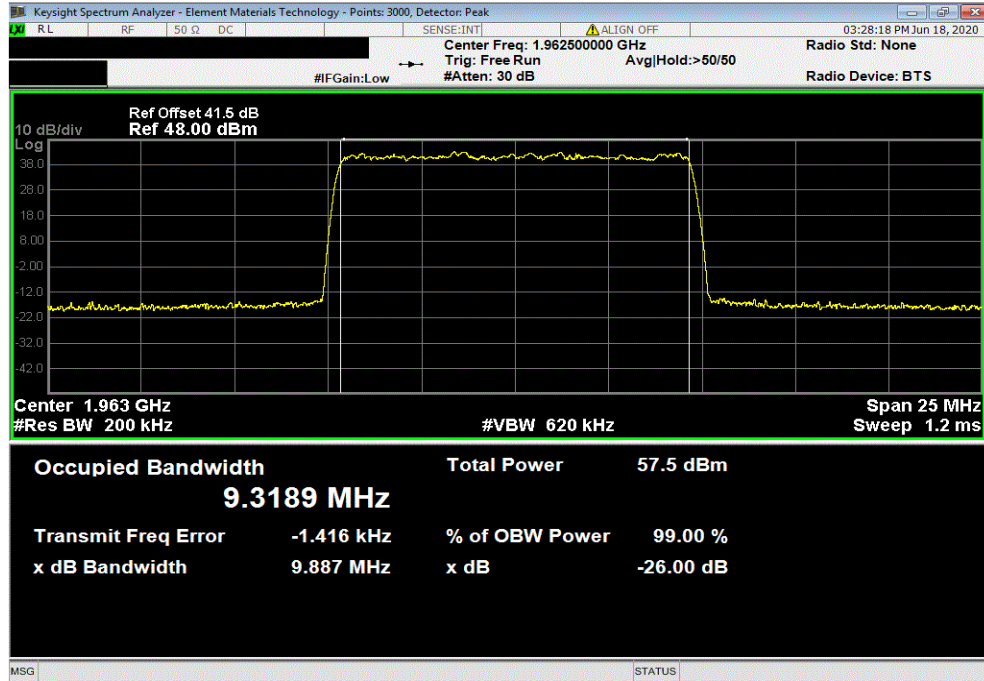


OCCUPIED BANDWIDTH - BAND n25

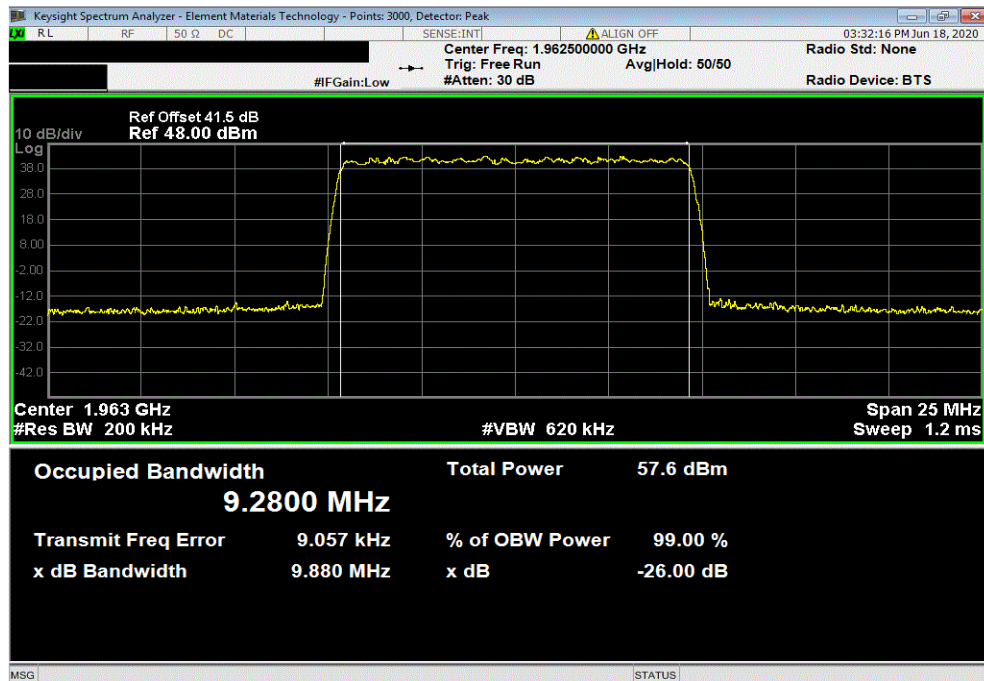


TMTx 2020.06.08.0 BETA XMit 2020.03.25.0

Port 4, Band n25, 1930 MHz - 1995 MHz, 10 MHz Bandwidth, 64-QAM Modulation, Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			9.319 MHz	9.887 MHz	Within Band	Pass	



Port 4, Band n25, 1930 MHz - 1995 MHz, 10 MHz Bandwidth, 256-QAM Modulation, Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			9.28 MHz	9.88 MHz	Within Band	Pass	

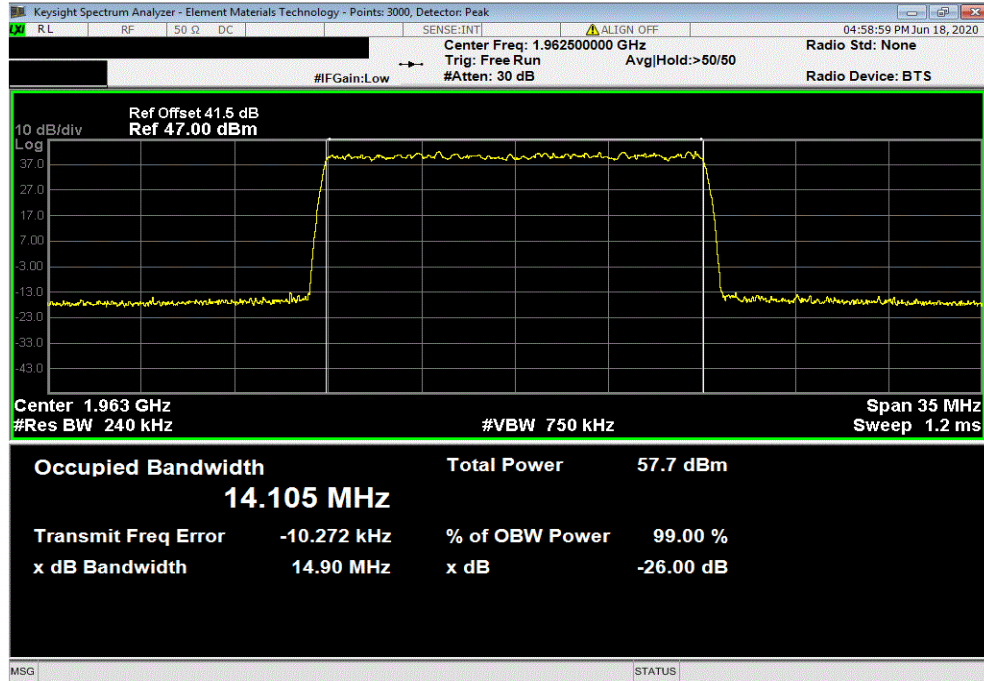


OCCUPIED BANDWIDTH - BAND n25

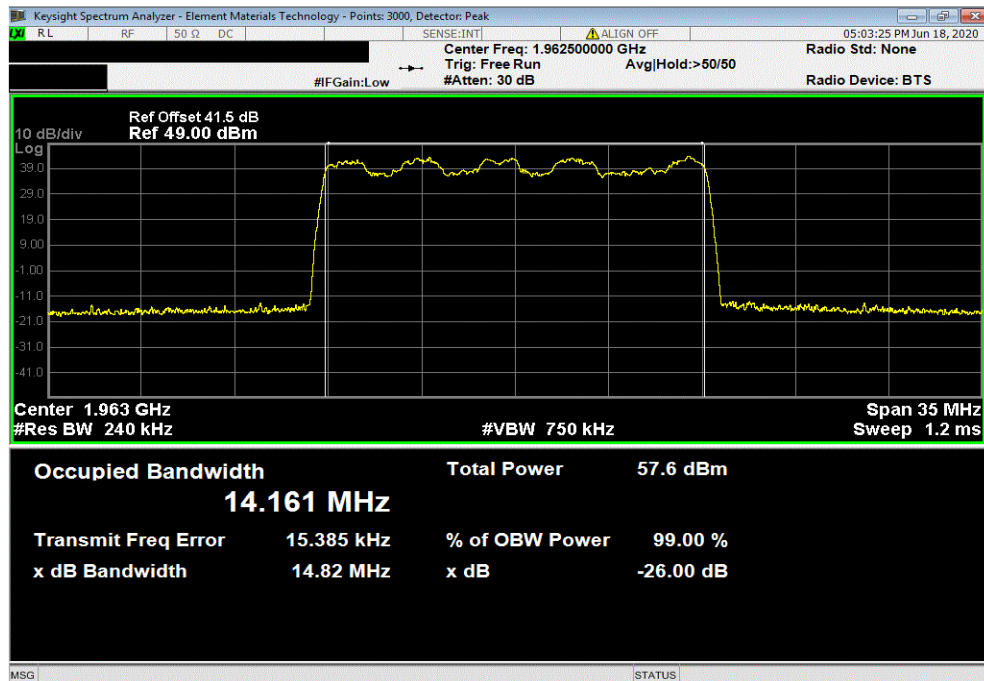


TbTx 2020.06.08.0 BETA XMit 2020.03.25.0

Port 4, Band n25, 1930 MHz - 1995 MHz , 15 MHz Bandwidth, QPSK Modulation, Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			14.105 MHz	14.897 MHz	Within Band	Pass	



Port 4, Band n25, 1930 MHz - 1995 MHz , 15 MHz Bandwidth, 16-QAM Modulation , Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			14.161 MHz	14.818 MHz	Within Band	Pass	

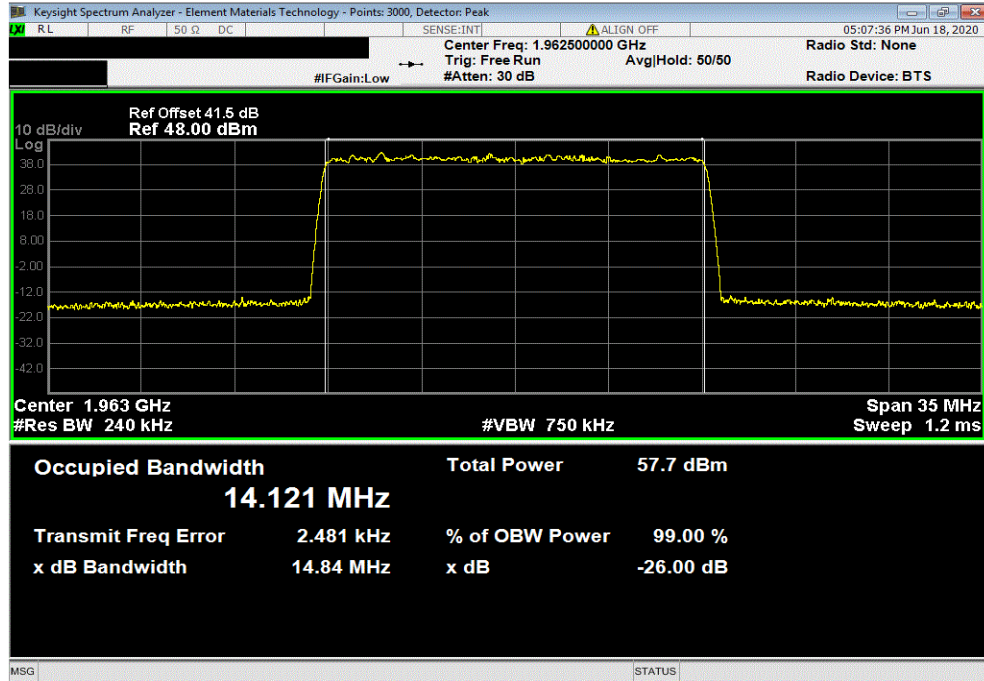


OCCUPIED BANDWIDTH - BAND n25

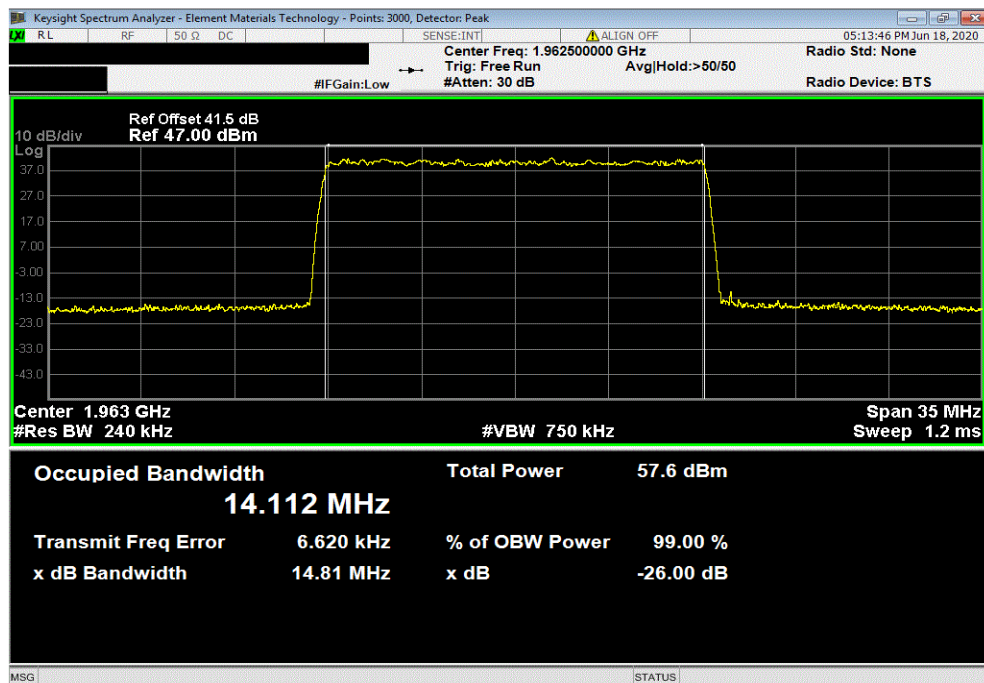


TbTx 2020.06.08.0 BETA XMI 2020.03.25.0

Port 4, Band n25, 1930 MHz - 1995 MHz, 15 MHz Bandwidth, 64-QAM Modulation, Mid Channel 1962.5 MHz							
		Value	Value	Limit	Result		
		99%	26dB				
		14.121 MHz	14.837 MHz	Within Band	Pass		



Port 4, Band n25, 1930 MHz - 1995 MHz, 15 MHz Bandwidth, 256-QAM Modulation, Mid Channel 1962.5 MHz							
		Value	Value	Limit	Result		
		99%	26dB				
		14.112 MHz	14.811 MHz	Within Band	Pass		

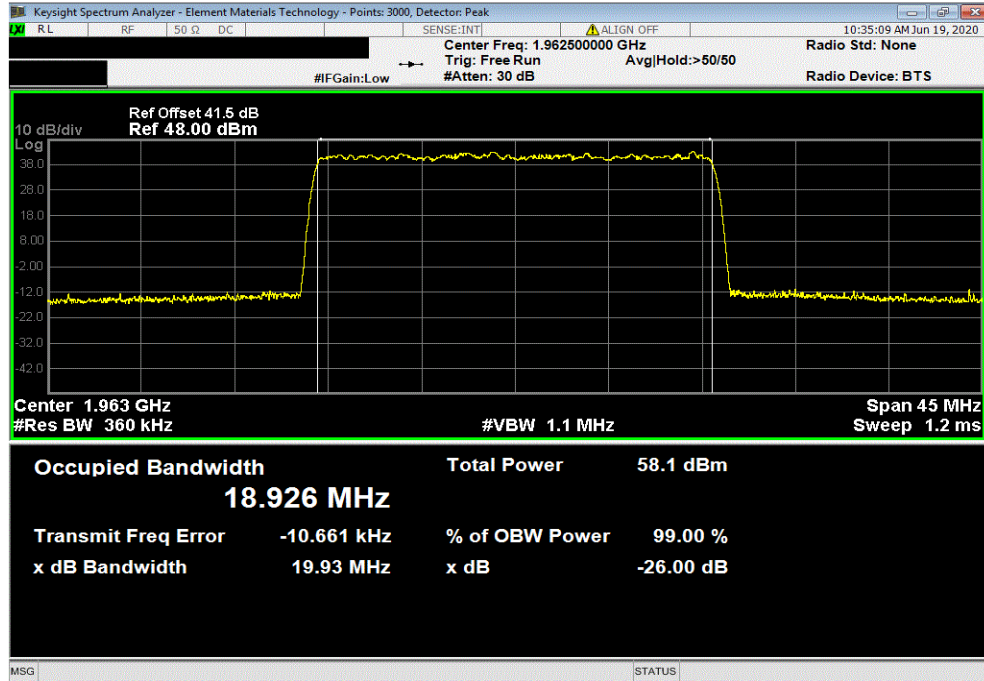


OCCUPIED BANDWIDTH - BAND n25

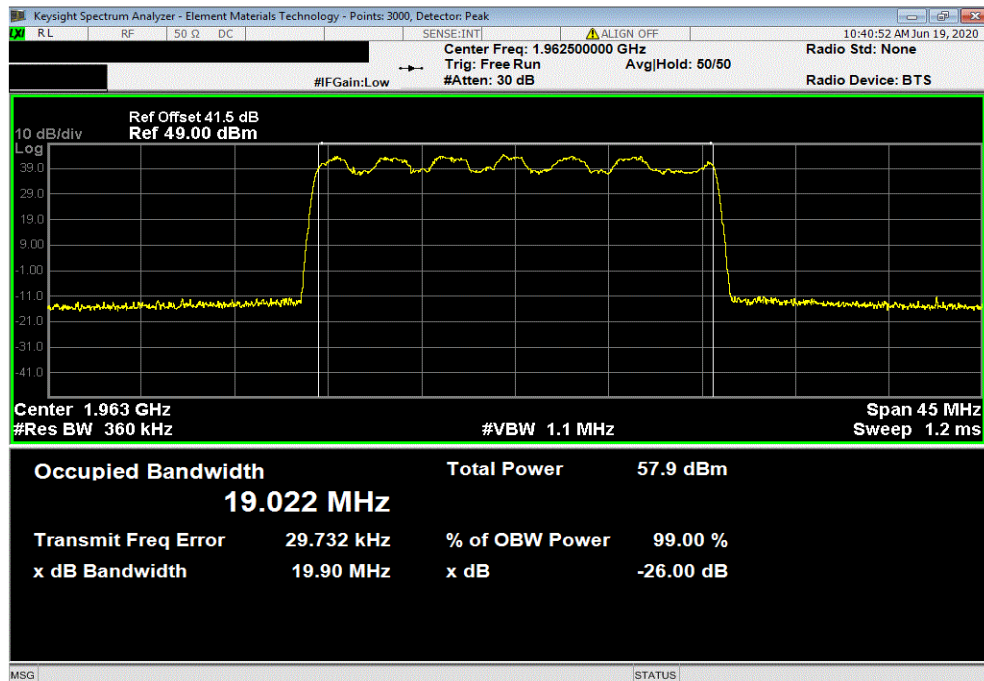


TbTx 2020.06.08.0 BETA XMI 2020.03.25.0

Port 4, Band n25, 1930 MHz - 1995 MHz , 20 MHz Bandwidth, QPSK Modulation, Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			18.926 MHz	19.928 MHz	Within Band	Pass	



Port 4, Band n25, 1930 MHz - 1995 MHz , 20 MHz Bandwidth, 16-QAM Modulation , Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			19.022 MHz	19.896 MHz	Within Band	Pass	

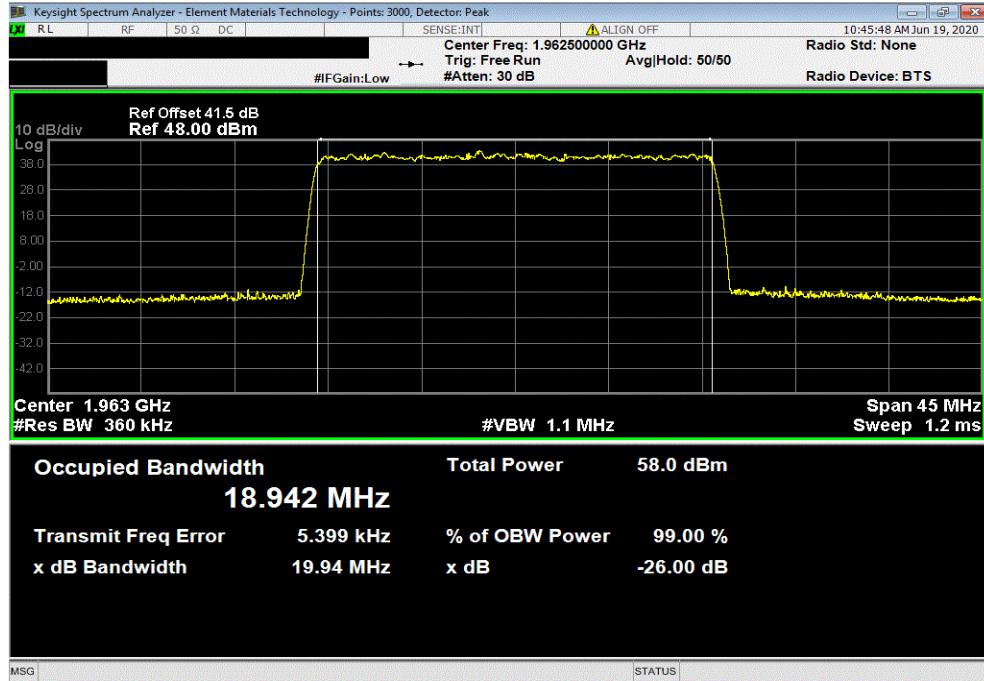


OCCUPIED BANDWIDTH - BAND n25



TbTx 2020.06.08.0 BETA XMt 2020.03.25.0

Port 4, Band n25, 1930 MHz - 1995 MHz, 20 MHz Bandwidth, 64-QAM Modulation, Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			18.942 MHz	19.943 MHz	Within Band	Pass	



Port 4, Band n25, 1930 MHz - 1995 MHz, 20 MHz Bandwidth, 256-QAM Modulation, Mid Channel 1962.5 MHz							
			Value	Value	Limit	Result	
			99%	26dB			
			18.956 MHz	19.983 MHz	Within Band	Pass	

