element

Radio Test Report
Application for a Class II Permissive Change of Equipment Authorization
FCC Part 27 and IC RSS-130
[617MHz – 652MHz]

FCC ID: VBNAHBOA-01
IC ID: 661W-AHBOA

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

Report: NOKI0017 Rev. 1, Issue Date: July 15, 2020

NVLAP TESTING

NVLAP LAB CODE: 201049-0

CERTIFICATE OF TEST

Last Date of Test: June 10, 2020
Nokia Solutions and Networks
EUT: Airscale Base Transceiver Station Remote Radio Head Model AHBOA

Radio Equipment Testing

Standards

Specification	Method
Code of Federal Regulations (CFR) Title 47 Part 2 (Radio Standards Specification) RSS-Gen Issue 6: 2019 CFR Title 47 Part 27 Subpart C RSS-130 Issue 2 - February 2019	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	
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
01	Changed the end of all the emission designators to “G7W” instead of “F9W”	2020-07-14	18

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

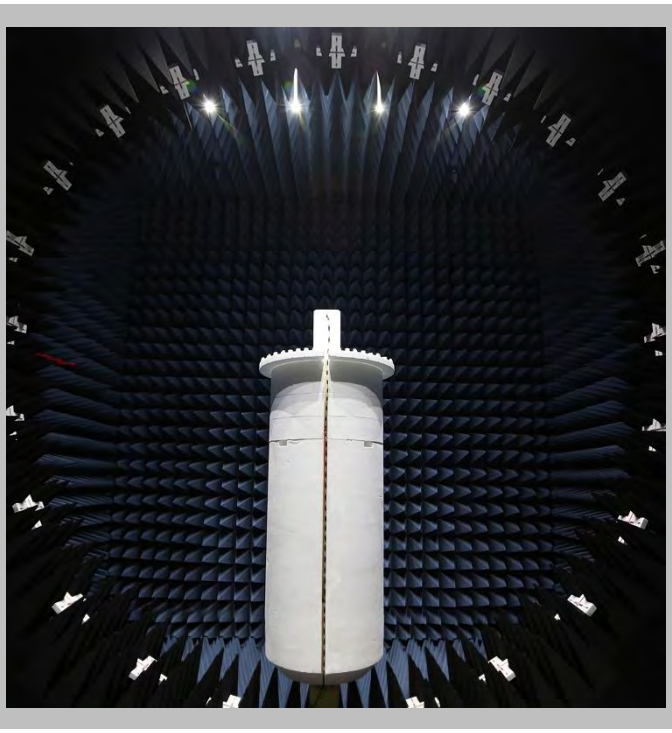
MIC – Recognized by MIC as a CAB for the acceptance of test data.

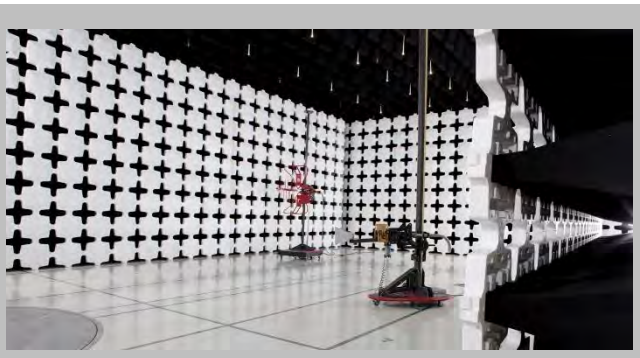
SCOPE

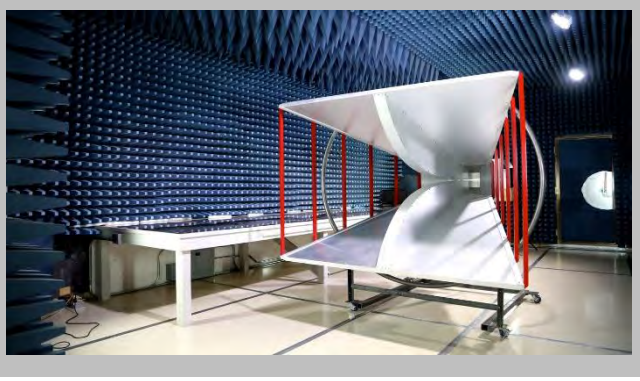
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

FACILITIES

California	Minnesota	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-10 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
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

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.

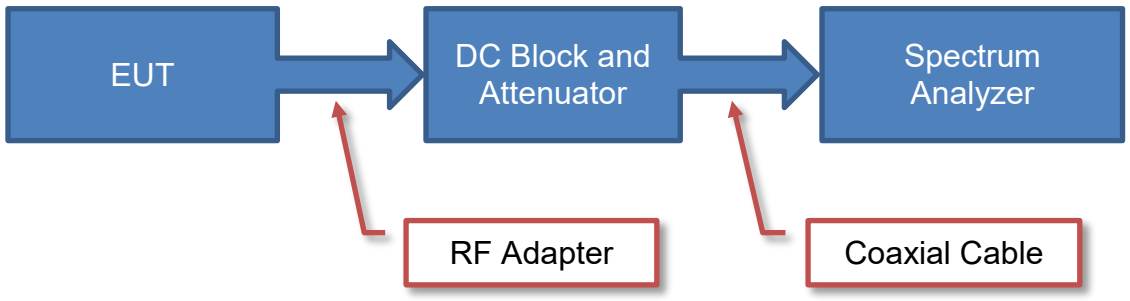
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable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

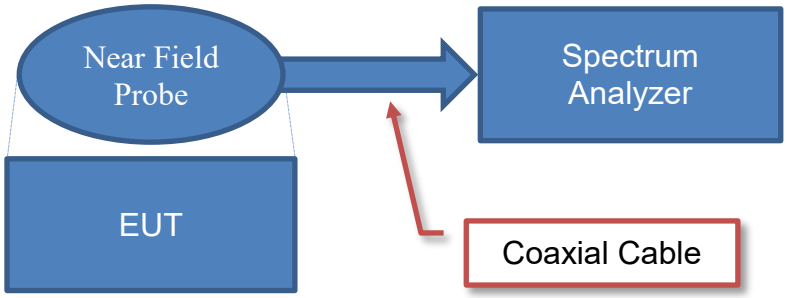
Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field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

Test Setup Block Diagrams

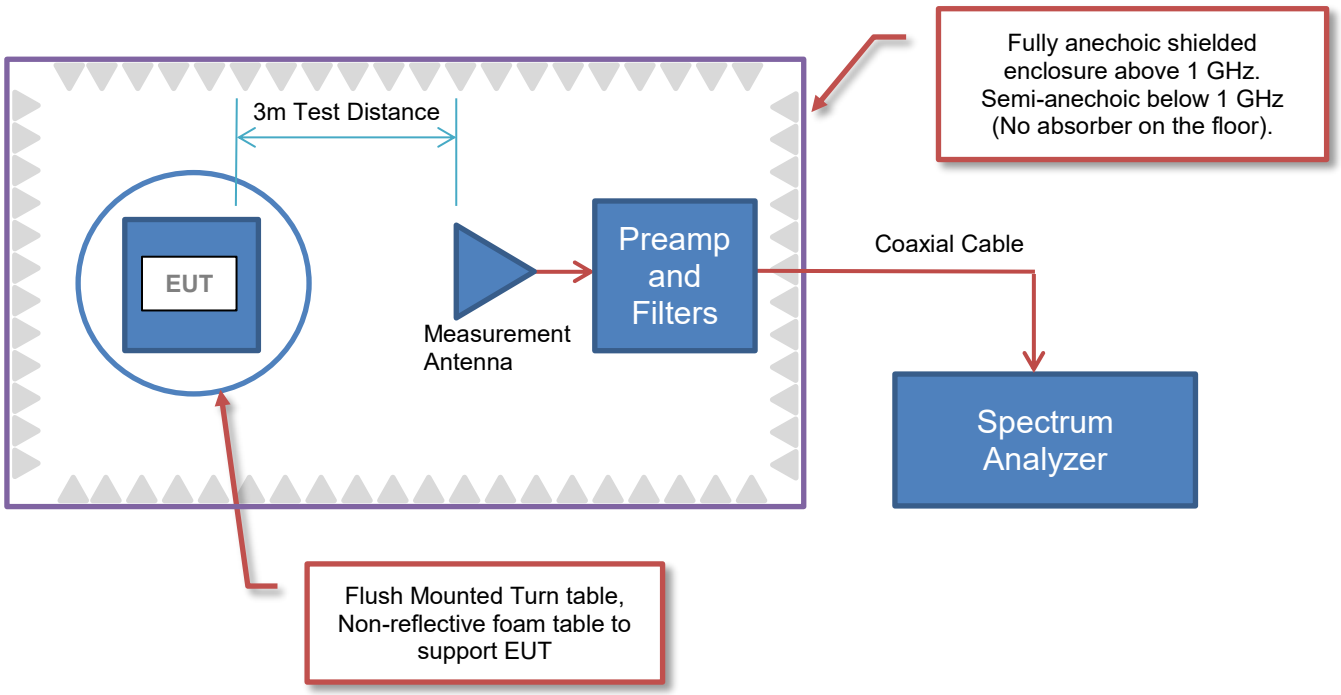
Antenna Port Conducted Measurements



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 AHBOA
First Date of Test:	June 9, 2020
Last Date of Test:	June 10, 2020
Receipt Date of Samples:	June 8, 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 5G NR (new radio) carriers to the Airscale BTS RRH model AHBOA FCC and ISED radio certifications. The original FCC certification submittal (FCC ID: VBNAHBOA-01) was Element Report Number NOKI0003.1 Revision 1 dated December 05, 2019. The original ISED certification submittal (IC ID: 661W-AHBOA) was Element Report Number NOKI0003.2 dated December 2019. The original test effort includes testing for LTE technologies. Please refer to the test reports on the original certifications 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, 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 based upon 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 (AHBOA) as the original certification test. The same AHBOA RF port (Ant 1) determined in the original certification testing to be the highest power port was used for all testing in this effort. 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 was 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 AHBOA. The AHBOA remote radio head is a multistandard multicarrier radio module designed to support 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 5G NR operations.

The AHBOA RRH has four transmit/four receive antenna ports (4TX/4RX for Band 71 and 4TX/4RX for Band 13). Each antenna port supports 3GPP frequency band 71 (BTS Rx: 663 to 698 MHz/BTS TX: 617 to 652 MHz) and 3GPP frequency band 13 (BTS Rx: 777 to 787 MHz/BTS TX: 746 to 756 MHz). The maximum RF output power of the RRH is 240 Watts (60 watts per carrier, 60 watts per antenna port). The RRH can be operated as a 4x4 MIMO, 2x2 MIMO or as non-MIMO. The TX and RX instantaneous bandwidth cover the full operational bandwidth. The RRH supports 5G NR channel bandwidths of 5MHz, 10MHz, 15MHz and 20MHz for 3GPP frequency band n71 operations. The RRH supports four 5G NR downlink modulation types (QPSK, 16QAM, 64QAM and 256QAM).

The RRH has external interfaces including DC power (DC In), ground, transmit/receive (ANT), external alarm

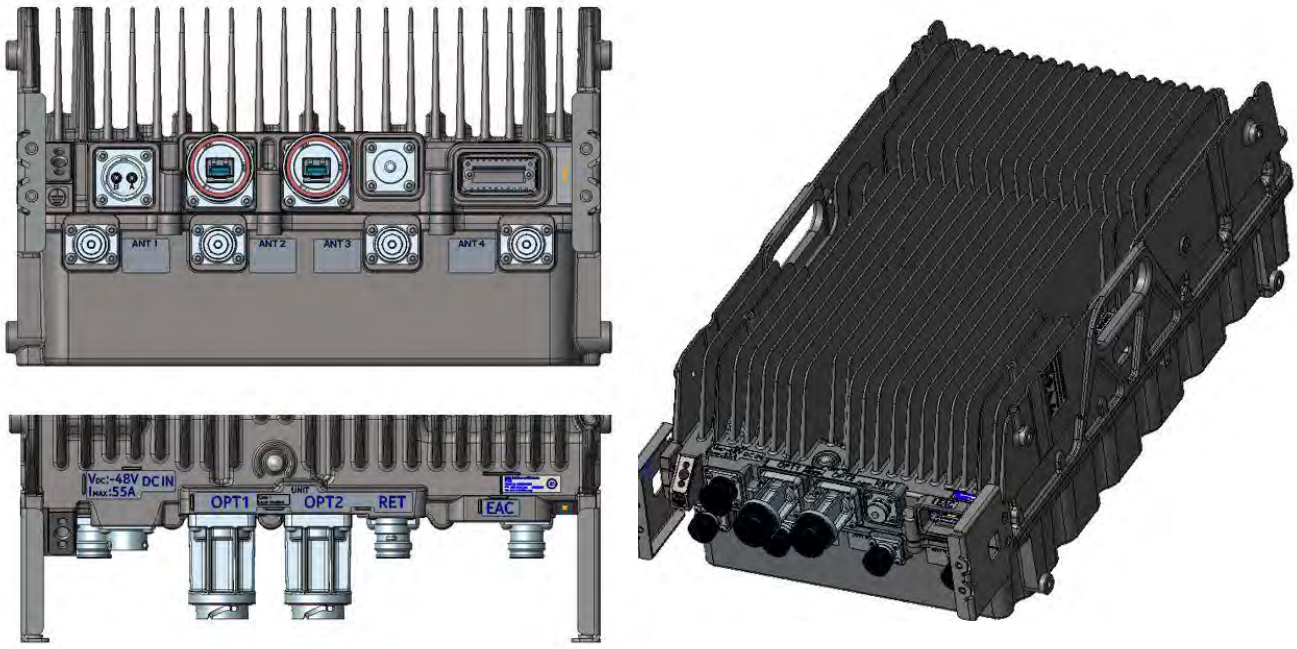
(EAC), optical CPRI (OPT) and remote electrical tilt (RET). The RRH with applicable installation kit may be pole or wall mounted. The RRH may be configured with optional cooling fan.
The AHBOA 5G NR channel bandwidths are 5, 10, 15 and 20MHz. The AHBOA 5G NR downlink channel numbers and frequencies for Band n71 are as follows:

	Downlink NR-ARFCN	Downlink Frequency (MHz)	5G NR Channel Bandwidth			
			5 MHz	10 MHz	15 MHz	20 MHz
AHBOA 5G NR Band n71 (Ant 1, 2, 3, 4)	123400	617.0	Band Edge	Band Edge	Band Edge	Band Edge
	……					
	123900	619.5	Bottom Ch			
	……					
	124400	622.0		Bottom Ch		
	……					
	124900	624.5			Bottom Ch	
	……					
	125400	627.0				Bottom Ch
	……					
	126900	634.5	Middle Ch	Middle Ch	Middle Ch	Middle Ch
	……					
	128400	642.0				Top Channel
	……					
	128900	644.5			Top Channel	
	……					
	129400	647.0		Top Channel		
	……					
	129900	649.5	Top Channel			
	……					
	130400	652.0	Band Edge	Band Edge	Band Edge	Band Edge

AHBOA Downlink Band Edge 5G NR Band n71 Frequency Channels

PRODUCT DESCRIPTION

AHBOA Connector Layout:



AHBOA 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	4	4.3-10	RF signal for Transmitter/Receiver (50 Ohm)
Unit	1	LED	Unit Status LED
EAC	1	MDR26	External Alarm Interface (4 alarms)
OPT	2	SFP+ cage	Optical CPRI Interface up to 10 Gps.
RET	1	8-pin circular connector conforming to IEC 60130-9 – Ed.3.0	AISG 2.0 to external devices
Fan	1	Molex Microfit	Power for RRH Fan. Located on the side of RRH.

Testing Objective:

A class II permissive change on the original filings are being pursued to add 5G NR (new radio) carriers to the Airscale BTS RRH model AHBOA FCC and ISED radio certifications.

CONFIGURATIONS

Configuration NOKI0017- 1

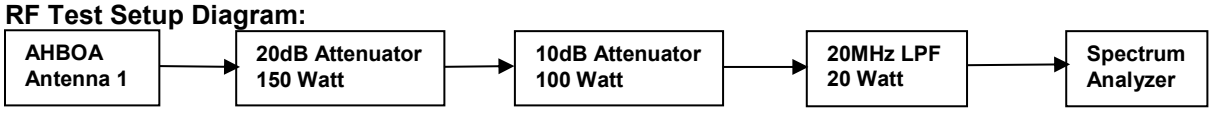
Software/Firmware Running during test	
Description	**Version**
Radio Module Software	FRM50.05.R18
BTS Software Version	5G20A_GNB_0009_001800_000189

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.101	J8173107703
ASIK (BTS System Module)	Nokia Solutions and Networks	474021A.101	EA194259377
ABIL (BTS System Module)	Nokia Solutions and Networks	47402A.102	L1183300437
AHBOA (Remote Radio Head)	Nokia Solutions and Networks	475250A.101	BL1943X1001
Low Pass Filter	Mini-Circuits	VLFX-80+	R UU95701952
Attenuator 150W/20dB	AeroflexWeinschel	66-20-33	BZ2075
Attenuator 100W/10dB	AeroflexWeinschel	48-10-34-LIM	BJ1771
SFP+ 9.8G,300M,850NM	Nokia	P306180	KR16180010036
SFP+ 9.8G,300M,850NM	Nokia	P306180	MA17331610207
WebEM-PC	HP (Lenovo)	20N3S88012	PF26RV20
HP- DC System power supply	HP	ADLX65YDCD2D	SA10R16871
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007170
2 Meter RF cable	Huber+Suhner,Inc.	SUCOFLEX_106	297384
2 Meter RF cable	Huber+Suhner,Inc.	SUCOFLEX_106	297386
2 Meter RF cable	Huber+Suhner,Inc.	SUCOFLEX_106	297388
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	CSA	E151955	LL79189
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297372
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551123/4

CONFIGURATIONS

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic cable 25m	N	25 meters	N	ABIL	AHBOA
Cat-5e cable	Y	33 meters	N	ASIK	WebEM- PC
2 Meter RF cable	Y	2 meters	N	EUT [RRH] Ant ports 2, 3 and 4	250W -50ohm –Load
HS-SUCOFLEX_106	Y	2 meters	N	EUT [AHBOA] Ant port #1	Attenuator 150W/20dB [BZ1165]
Attenuator 150W/20dB [BZ2075]	Y	NA	N	RF cable HS-SUCOFLEX_106	Attenuator 100W/10dB
Attenuator 100W/10dB	Y	NA	N	Attenuator 150W/20dB [BZ2075]	Low Pass Filter 3 Pieces 0.5W
Low Pass Filter	Y	NA	N	Attenuator 100W/10dB	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	Low Pass Filter 10W	Spectrum Analyzer

RF Test Setup Diagram:



CONFIGURATIONS

Configuration NOKI0017- 2

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	FRM50.05.R18
BTS Software Version	5G20A_GNB_0009_001800_000189

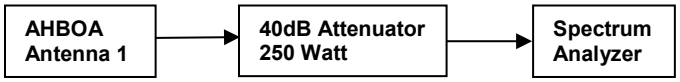
Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.101	RK182307104
ASIA (BTS System Module)	Nokia Solutions and Networks	474021A.102	L1164105428
ABIA (BTS System Module)	Nokia Solutions and Networks	474020A.102	L1164121378
AHBOA (Remote Radio Head)	Nokia Solutions and Networks	475250A.101	BL1943X1001
Attenuator 250W/40dB	Aeroflex Weinschel	58-40-53-LIM	TC909
SFP+ 9.8G,300M,850NM	Nokia	P306180	KR16180010036
SFP+ 9.8G,300M,850NM	Nokia	P306180	MA17331610207
WebEM-PC	HP (Lenovo)	20N3S88012	PF26RV20
HP- DC System power supply	HP	ADLX65YDCD2D	SA10R16871
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007170
2 Meter RF cable	Huber+Suhner,Inc.	SUCOFLEX_106	297384
2 Meter RF cable	Huber+Suhner,Inc.	SUCOFLEX_106	297386
2 Meter RF cable	Huber+Suhner,Inc.	SUCOFLEX_106	297388
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	CSA	E151955	LL79189
2 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**
Amphenol Fiber Optic cable	N	7 meters	N	ABIL	AHBOA
Cat-5e cable	Y	7 meters	N	ASIK	WebEM- PC
Times Microwave Systems	Y	2 meters	N	EUT [RRH] Ant ports 2, 3 and 4	250W -50ohm - Load

CONFIGURATIONS

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

RF Test Setup Diagram:



CONFIGURATIONS

Configuration NOKI0017- 3

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	FRM50.05.R18
BTS Software Version	5G20A_GNB_0009_001800_000189

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.101	RK182307104
ASIA (BTS System Module)	Nokia Solutions and Networks	474021A.102	L1164105428
ABIA (BTS System Module)	Nokia Solutions and Networks	474020A.102	L1164121378
AHBOA (Remote Radio Head)	Nokia Solutions and Networks	475250A.101	BL1943X1001
High Pass Filter 2W	RLC Electronics	F-14699	0050
Attenuator 150W/20dB	AeroflexWeinschel	66-20-33	BZ2075
Attenuator 100W/3dB	AeroflexWeinschel	47-3-33	CG5493
SFP+ 9.8G,300M,850NM	Nokia	P306180	KR16180010036
SFP+ 9.8G,300M,850NM	Nokia	P306180	MA17331610207
WebEM-PC	HP (Lenovo)	20N3S88012	PF26RV20
HP- DC System power supply	HP	ADLX65YDCD2D	SA10R16871
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007170
2 Meter RF cable	Huber+Suhner,Inc.	SUCOFLEX_106	297384
2 Meter RF cable	Huber+Suhner,Inc.	SUCOFLEX_106	297386
2 Meter RF cable	Huber+Suhner,Inc.	SUCOFLEX_106	297388
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	CSA	E151955	LL79189
2 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**
Amphenol Fiber Optic cable	N	25 meters	N	ABIL	AHBOA
Cat-5e cable	Y	33 meters	N	ASIK	WebEM- PC
Times Microwave Systems	Y	2 meters	N	EUT [RRH] Ant ports 2, 3 and 4	250W -50ohm - Load

CONFIGURATIONS

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_106	Y	2 meters	N	EUT [AHBOA] Ant port #1	Attenuator 150W/20dB [BZ1165]
Attenuator 150W/20dB [BZ2075]	Y	NA	N	RF cable HS-SUCOFLEX_106	Attenuator 100W/3dB
Attenuator 100W/3dB	Y	NA	N	Attenuator 150W/20dB [BZ2075]	High Pass Filter 2W
High Pass Filter 2W	Y	NA	N	Attenuator 100W/10dB	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	High Pass Filter 2W	Spectrum Analyzer

RF Test Setup Diagram:

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2020-06-09	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.
2	2020-06-09	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.
3	2020-06-10	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.
4	2020-06-10	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.
5	2020-06-10	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

OCCUPIED BANDWIDTH

element

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	Agilent	N5173B	TIW	5-Jul-17	5-Jul-20
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 ≥ 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 (AHBOA) as the original certification test. The AHBOA antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the original certification testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraph 5.7.2i.

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

Band 71 Emissions Designators:

Band 71 (617MHz to 652MHz) 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	4M48G7W	4M84G7W	4M50G7W	4M86G7W	4M49G7W	4M84G7W	4M48G7W
10 MHz	Mid	9M89G7W	9M31G7W	9M83G7W	9M23G7W	9M90G7W	9M32G7W	9M89G7W	9M27G7W
15 MHz	Mid	14M77G7W	14M09G7W	14M84G7W	14M16G7W	14M85G7W	14M12G7W	14M82G7W	14M11G7W
20 MHz	Mid	19M94G7W	18M92G7W	19M91G7W	19M02G7W	19M96G7W	18M93G7W	19M98G7W	18M94G7W
Note: FCC based on 26db emission bandwidth; IC based on 99% emission bandwidth									

OCCUPIED BANDWIDTH

element

TbtTx 2020.06.08.0 BETA XMit 2020.03.25.0

EUT:	Airscale Base Transceiver Station Remote Radio Head Model AHBOA			**Work Order:**	NOKI0017
Serial Number:	BL1943X1001			**Date:**	10-Jun-20
Customer:	Nokia Solutions and Networks			**Temperature:**	22.7 °C
Attendees:	Mitchell Hill, John Rattanavong			**Humidity:**	39.3% RH
Project:	None			**Barometric Pres.:**	1022 mbar
Tested by:	Brandon Hobbs	**Power:**	54 VDC	**Job Site:**	TX05

TEST SPECIFICATIONS	**Test Method**
FCC 27:2020	ANSI C63.26:2015
RSS-Gen:2019	RSS-Gen:2019

COMMENTS

All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. The carrier power was set to maximum for all testing.

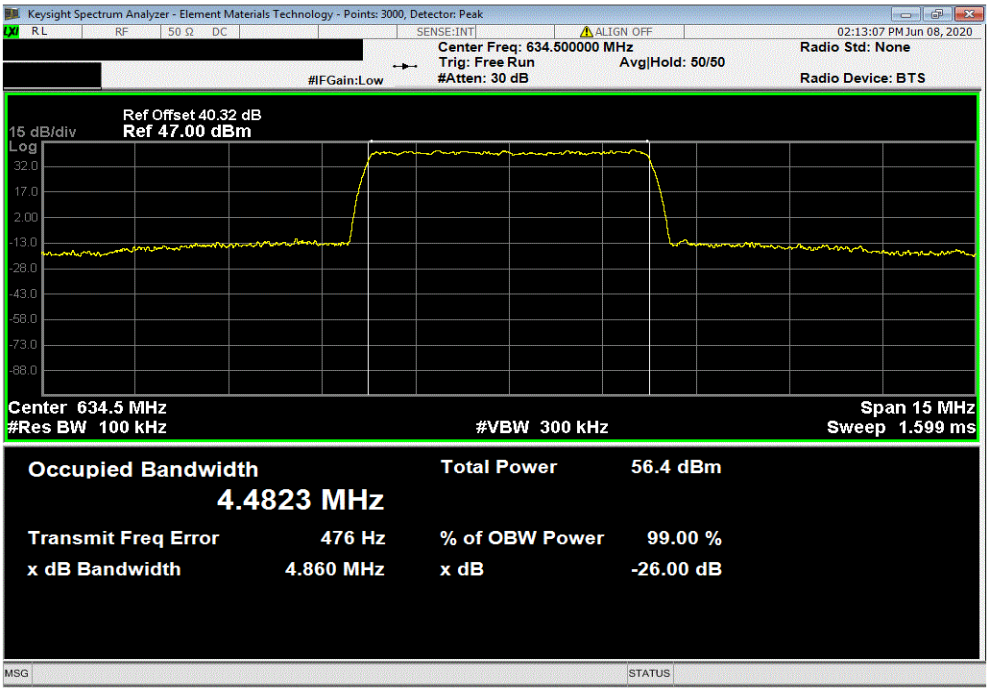
DEVIATIONS FROM TEST STANDARD

None

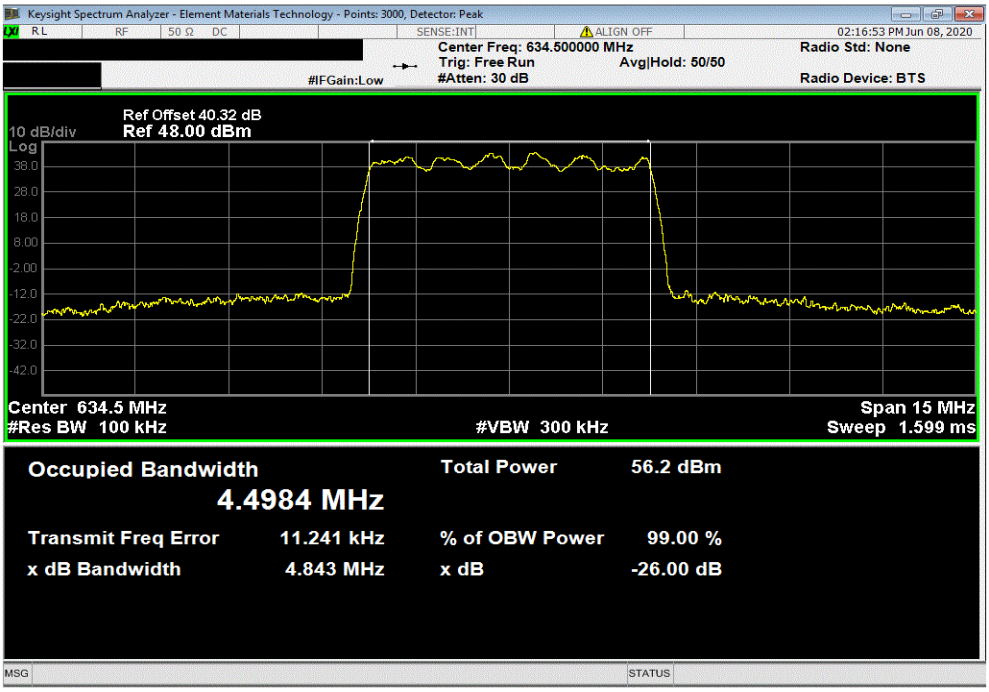
Configuration #	2	*Signature*

	Value 99%	Value 26dB	Limit	Result
Port 1, Band 71, 617 MHz - 652 MHz				
5 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 634.5 MHz	4.482 MHz	4.86 MHz	Within Band	Pass
16-QAM Modulation				
Mid Channel, 634.5 MHz	4.498 MHz	4.843 MHz	Within Band	Pass
64-QAM Modulation				
Mid Channel, 634.5 MHz	4.485 MHz	4.858 MHz	Within Band	Pass
256-QAM Modulation				
Mid Channel, 634.5 MHz	4.475 MHz	4.835 MHz	Within Band	Pass
10 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 634.4 MHz	9.313 MHz	9.889 MHz	Within Band	Pass
16-QAM Modulation				
Mid Channel, 634.4 MHz	9.227 MHz	9.831 MHz	Within Band	Pass
64-QAM Modulation				
Mid Channel, 634.4 MHz	9.324 MHz	9.896 MHz	Within Band	Pass
256-QAM Modulation				
Mid Channel, 634.4 MHz	9.272 MHz	9.888 MHz	Within Band	Pass
15 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 634.3 MHz	14.089 MHz	14.772 MHz	Within Band	Pass
16-QAM Modulation				
Mid Channel, 634.3 MHz	14.163 MHz	14.838 MHz	Within Band	Pass
64-QAM Modulation				
Mid Channel, 634.3 MHz	14.119 MHz	14.846 MHz	Within Band	Pass
256-QAM Modulation				
Mid Channel, 634.3 MHz	14.111 MHz	14.824 MHz	Within Band	Pass
20 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 634.2 MHz	18.916 MHz	19.941 MHz	Within Band	Pass
16-QAM Modulation				
Mid Channel, 634.2 MHz	19.021 MHz	19.905 MHz	Within Band	Pass
64-QAM Modulation				
Mid Channel, 634.2 MHz	18.933 MHz	19.963 MHz	Within Band	Pass
256-QAM Modulation				
Mid Channel, 634.2 MHz	18.944 MHz	19.98 MHz	Within Band	Pass

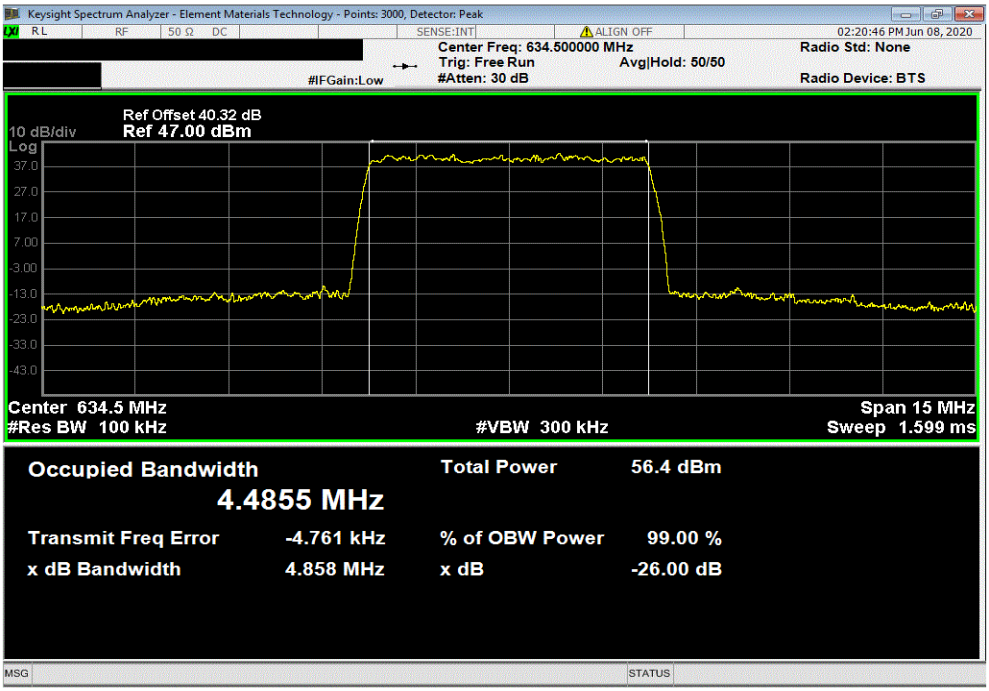
Port 1, Band 71, 617 MHz - 652 MHz, 5 MHz Bandwidth, QPSK Modulation, Mid Channel, 634.5 MHz						
			Value 0.99	Value 26dB	Limit	Result
			4.482 MHz	4.86 MHz	Within Band	Pass



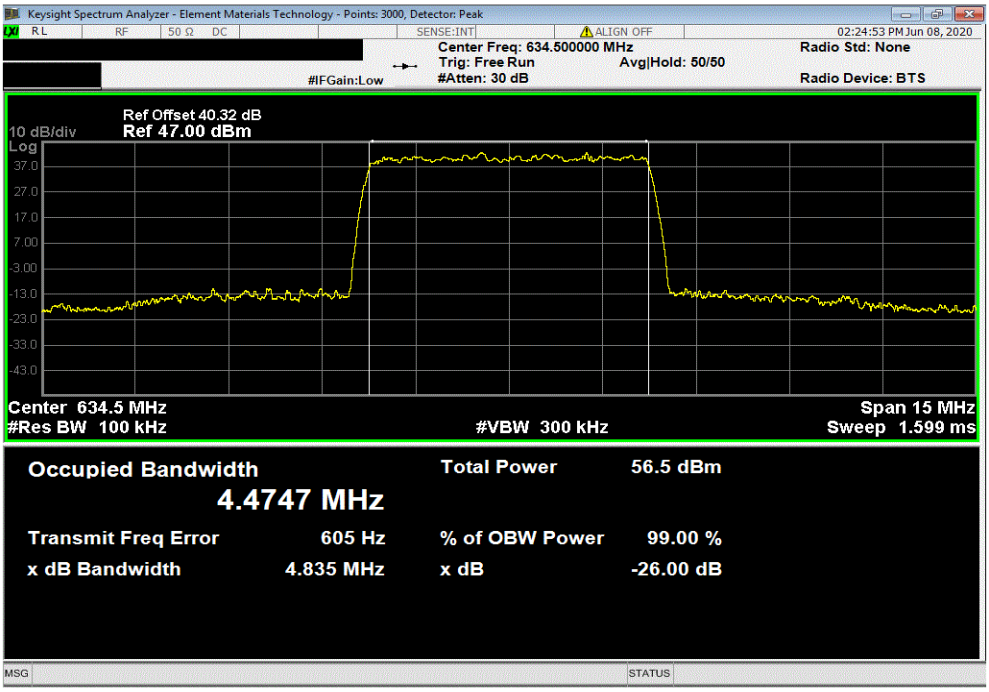
Port 1, Band 71, 617 MHz - 652 MHz, 5 MHz Bandwidth, 16-QAM Modulation, Mid Channel, 634.5 MHz						
			Value 0.99	Value 26dB	Limit	Result
			4.498 MHz	4.843 MHz	Within Band	Pass



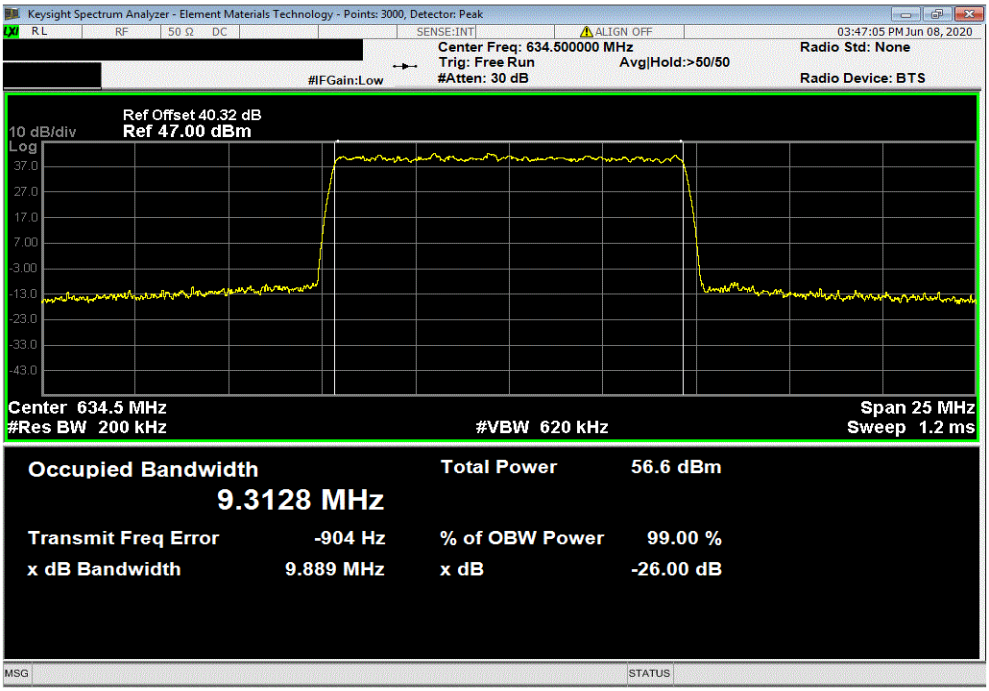
Port 1, Band 71, 617 MHz - 652 MHz, 5 MHz Bandwidth, 64-QAM Modulation, Mid Channel, 634.5 MHz						
			Value 0.99	Value 26dB	Limit	Result
			4.485 MHz	4.858 MHz	Within Band	Pass



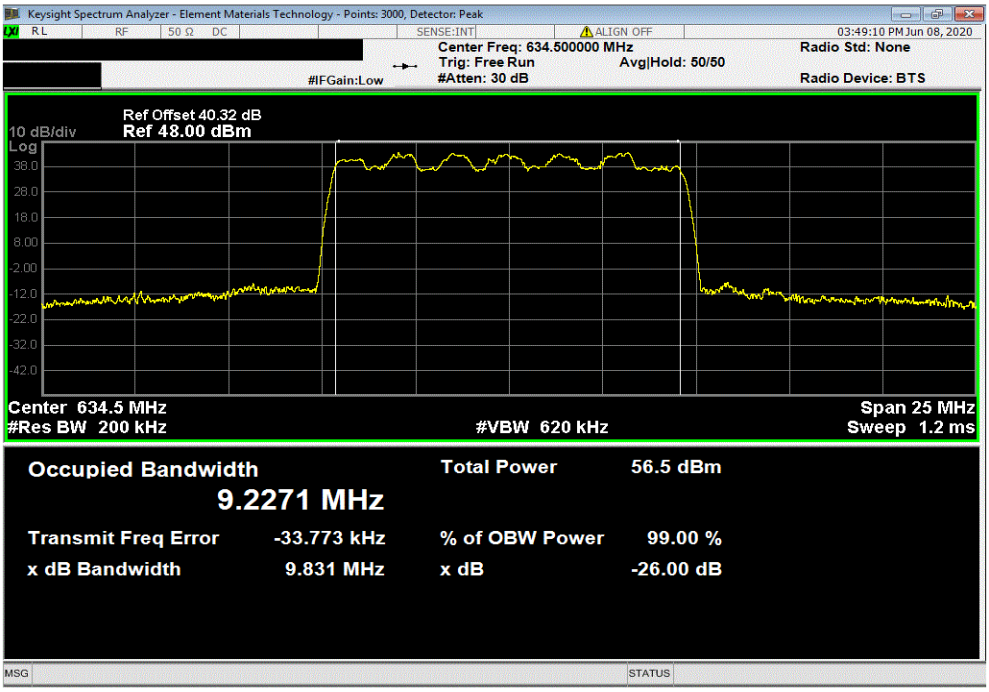
Port 1, Band 71, 617 MHz - 652 MHz, 5 MHz Bandwidth, 256-QAM Modulation, Mid Channel, 634.5 MHz						
			Value 0.99	Value 26dB	Limit	Result
			4.475 MHz	4.835 MHz	Within Band	Pass



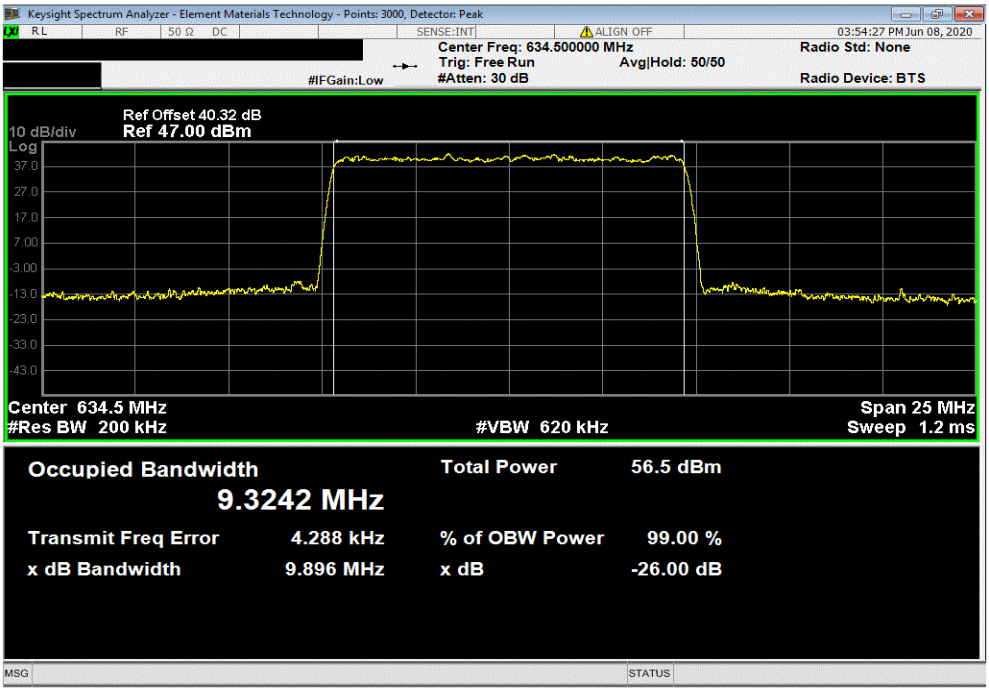
Port 1, Band 71, 617 MHz - 652 MHz, 10 MHz Bandwidth, QPSK Modulation, Mid Channel, 634.4 MHz						
			Value 0.99	Value 26dB	Limit	Result
			9.313 MHz	9.889 MHz	Within Band	Pass



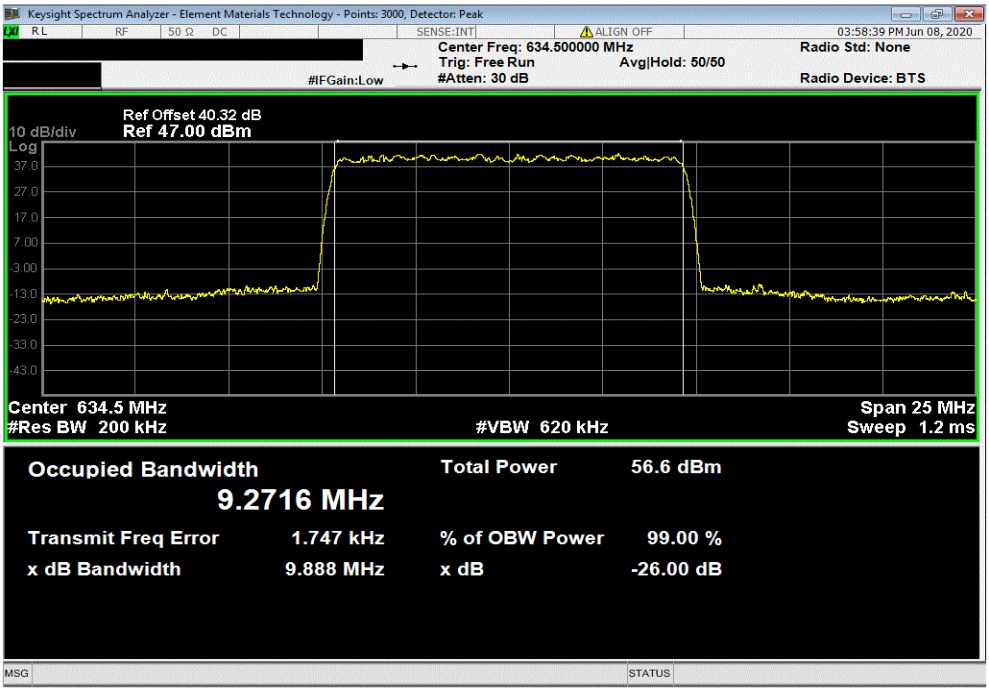
Port 1, Band 71, 617 MHz - 652 MHz, 10 MHz Bandwidth, 16-QAM Modulation, Mid Channel, 634.4 MHz						
			Value 0.99	Value 26dB	Limit	Result
			9.227 MHz	9.831 MHz	Within Band	Pass



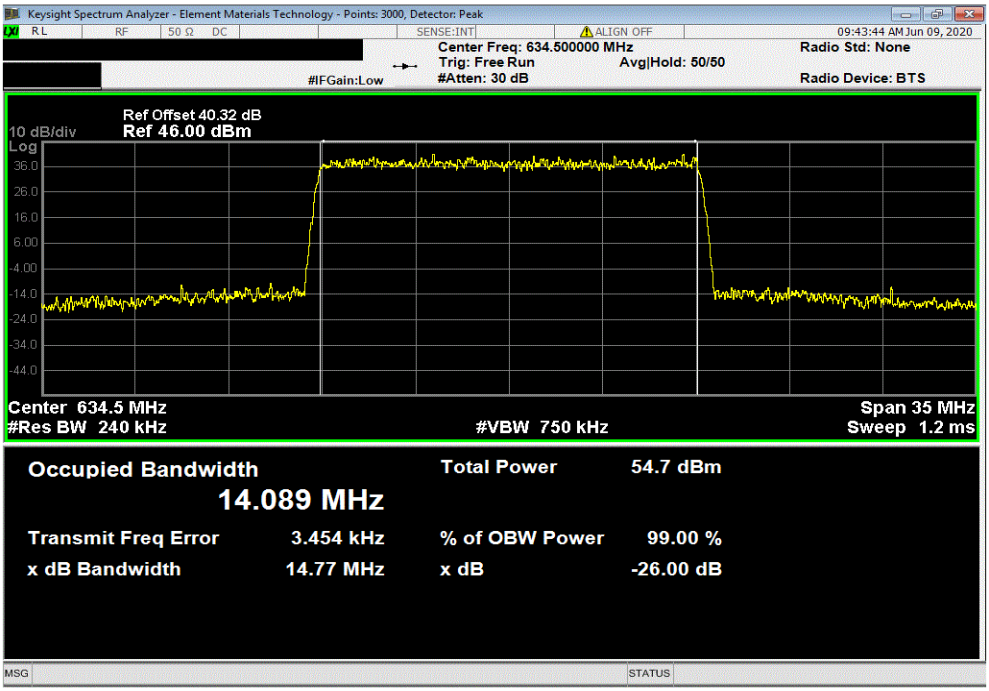
Port 1, Band 71, 617 MHz - 652 MHz, 10 MHz Bandwidth, 64-QAM Modulation, Mid Channel, 634.4 MHz						
			Value 0.99	Value 26dB	Limit	Result
			9.324 MHz	9.896 MHz	Within Band	Pass



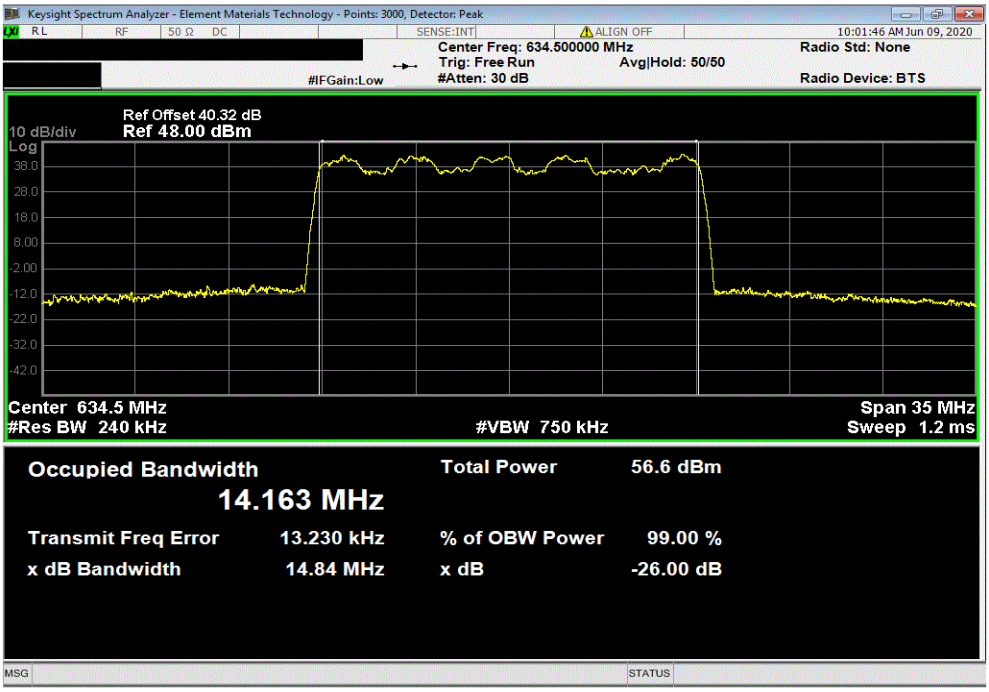
Port 1, Band 71, 617 MHz - 652 MHz, 10 MHz Bandwidth, 256-QAM Modulation, Mid Channel, 634.4 MHz						
			Value 0.99	Value 26dB	Limit	Result
			9.272 MHz	9.888 MHz	Within Band	Pass



Port 1, Band 71, 617 MHz - 652 MHz, 15 MHz Bandwidth, QPSK Modulation, Mid Channel, 634.3 MHz						
			Value 0.99	Value 26dB	Limit	Result
			14.089 MHz	14.772 MHz	Within Band	Pass

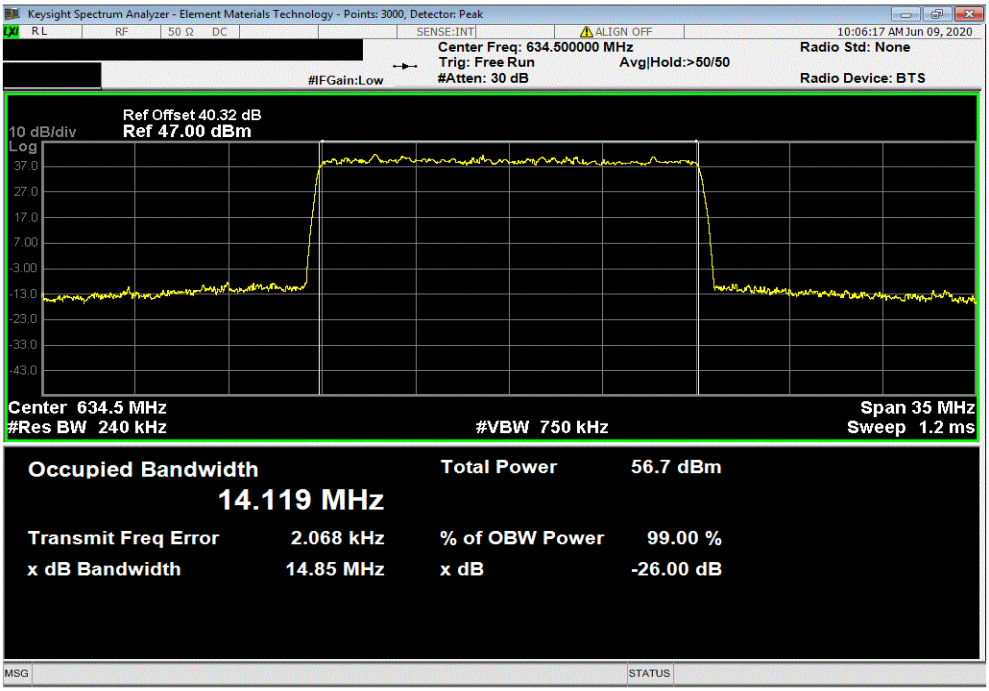


Port 1, Band 71, 617 MHz - 652 MHz, 15 MHz Bandwidth, 16-QAM Modulation, Mid Channel, 634.3 MHz						
			Value 0.99	Value 26dB	Limit	Result
			14.163 MHz	14.838 MHz	Within Band	Pass

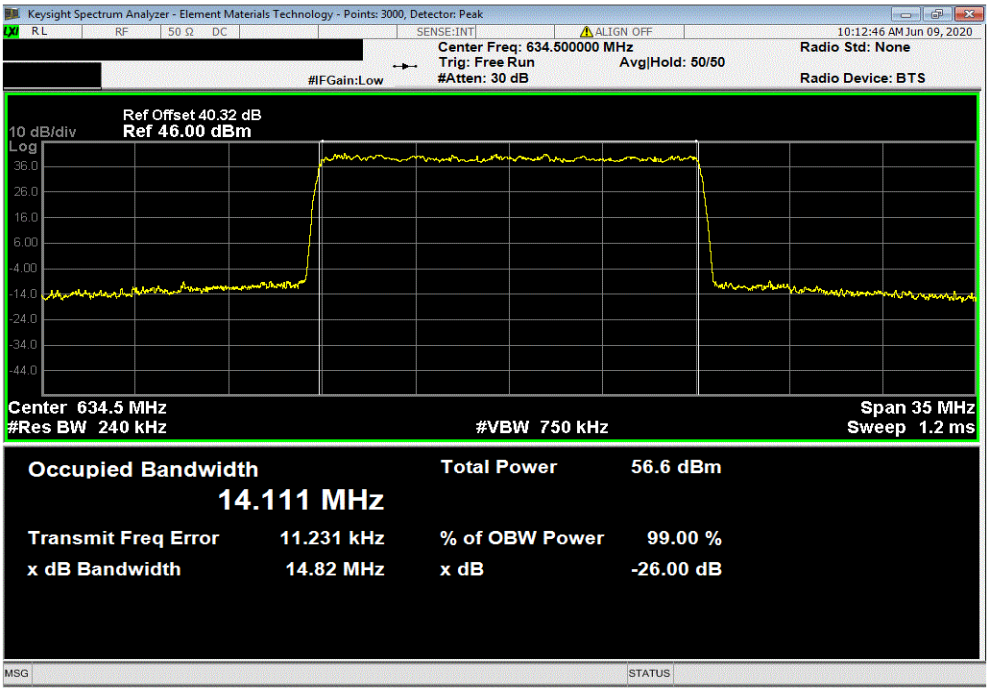


OCCUPIED BANDWIDTH

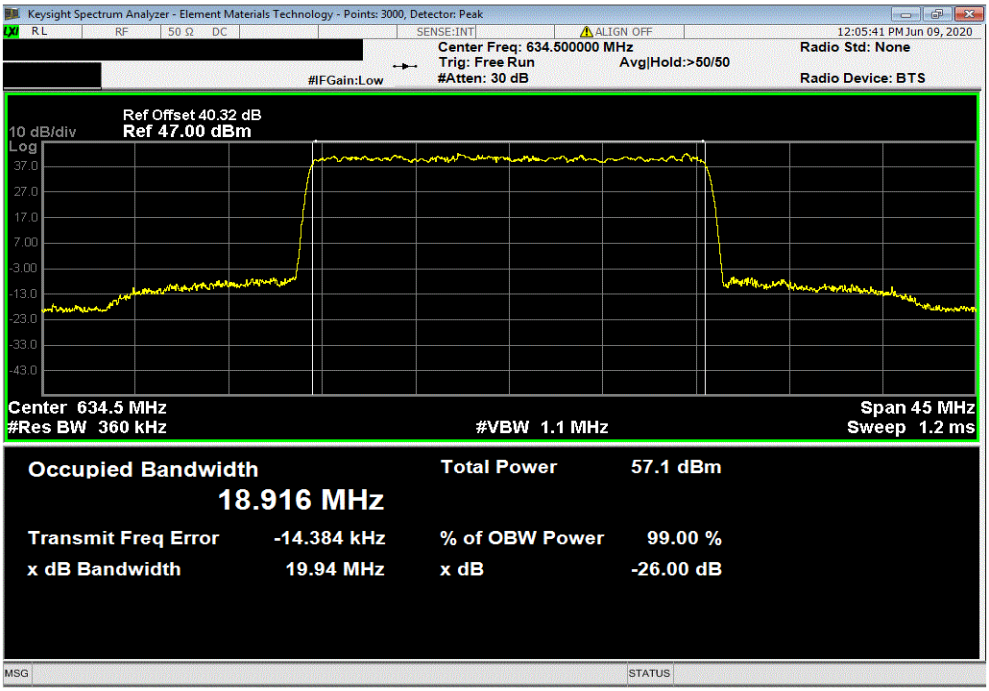
Port 1, Band 71, 617 MHz - 652 MHz, 15 MHz Bandwidth, 64-QAM Modulation, Mid Channel, 634.3 MHz						
			Value 0.99	Value 26dB	Limit	Result
			14.119 MHz	14.846 MHz	Within Band	Pass



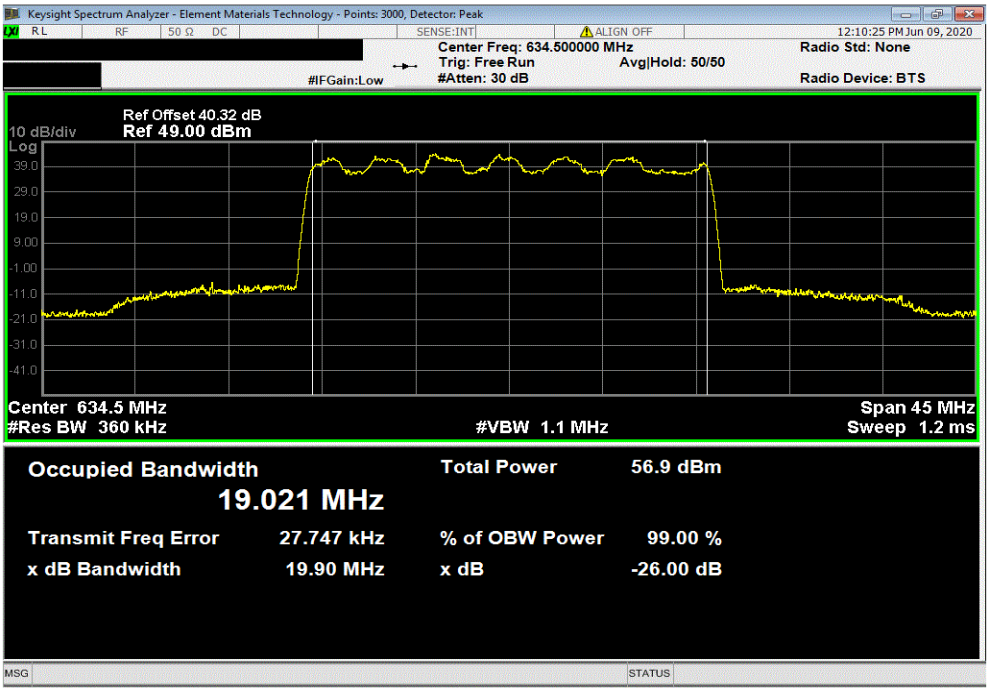
Port 1, Band 71, 617 MHz - 652 MHz, 15 MHz Bandwidth, 256-QAM Modulation, Mid Channel, 634.3 MHz						
			Value 0.99	Value 26dB	Limit	Result
			14.111 MHz	14.824 MHz	Within Band	Pass



Port 1, Band 71, 617 MHz - 652 MHz, 20 MHz Bandwidth, QPSK Modulation, Mid Channel, 634.2 MHz						
			Value 0.99	Value 26dB	Limit	Result
			18.916 MHz	19.941 MHz	Within Band	Pass

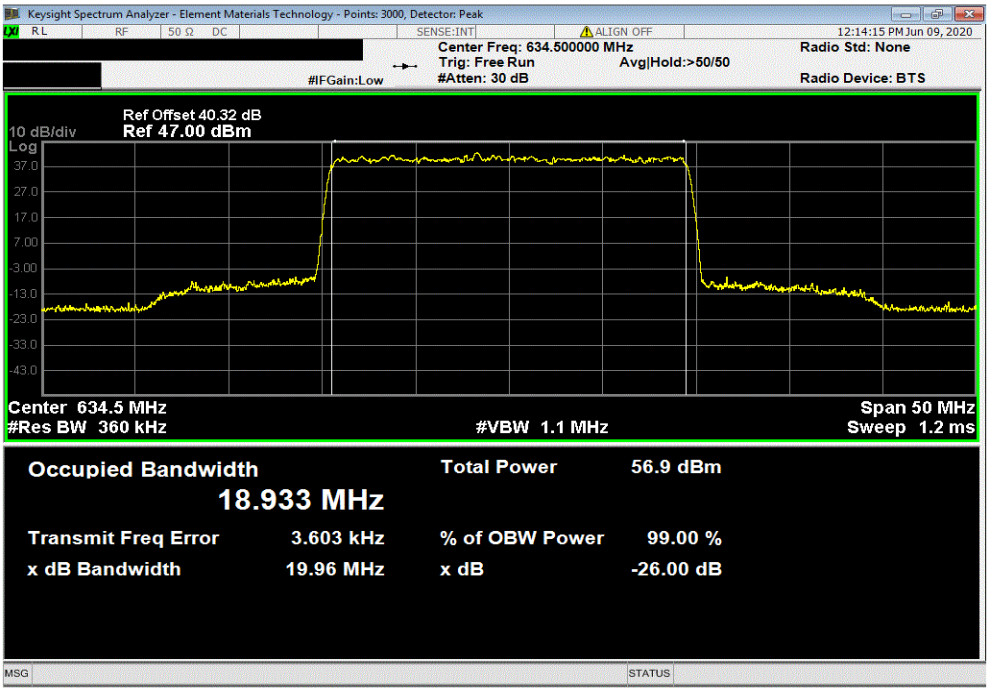


Port 1, Band 71, 617 MHz - 652 MHz, 20 MHz Bandwidth, 16-QAM Modulation, Mid Channel, 634.2 MHz						
			Value 0.99	Value 26dB	Limit	Result
			19.021 MHz	19.905 MHz	Within Band	Pass



OCCUPIED BANDWIDTH

Port 1, Band 71, 617 MHz - 652 MHz, 20 MHz Bandwidth, 64-QAM Modulation, Mid Channel, 634.2 MHz						
			Value 0.99	Value 26dB	Limit	Result
			18.933 MHz	19.963 MHz	Within Band	Pass



Port 1, Band 71, 617 MHz - 652 MHz, 20 MHz Bandwidth, 256-QAM Modulation, Mid Channel, 634.2 MHz						
			Value 0.99	Value 26dB	Limit	Result
			18.944 MHz	19.98 MHz	Within Band	Pass