



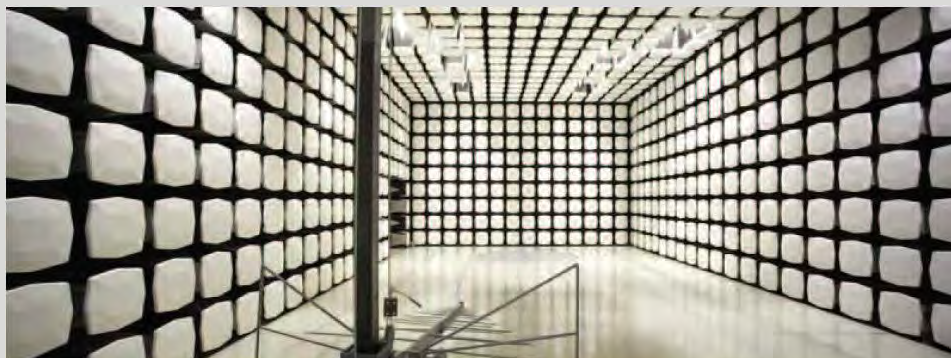
Radio Test Report
Application for Class II Permissive Change of Equipment Authorization

FCC Part 27
[2496MHz – 2690MHz]

FCC ID: VBNAZHL-01

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

Report: NOKI0035, Issue Date: October 27, 2021



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CERTIFICATE OF TEST



Last Date of Test: October 13, 2021

Nokia Solutions and Networks

EUT: Aircscale Base Transceiver Station Remote Radio Head Model AZHL

Radio Equipment Testing

Standards

Specification	Method
Code of Federal Regulations (CFR) Title 47 Part 2 CFR Title 47 Part 27 Subpart C	ANSI C63.26-2015 with FCC KDB 971168 D01 v03r01 FCC KDB 662911D01 v02r01 FCC KDB 662911D02 v01

Results

Test Description	Applied	Results	Comments
Duty Cycle	No	N/A	Not required. Typically operated at ~100% duty cycle.
Occupied Bandwidth	Yes	Pass	
Frequency Stability	No	N/A	Not requested.
Output Power	Yes	Pass	
Peak to Average Power (PAPR)CCDF	Yes	Pass	
Power Spectral Density	No	N/A	Not required.
Band Edge Compliance	Yes	Pass	
Spurious Conducted Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Adam Bruno, Operations Manager

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

REVISION HISTORY



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

ACCREDITATIONS AND AUTHORIZATIONS



United States

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

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

Canada

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

European Union

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

United Kingdom

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

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

SCOPE

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

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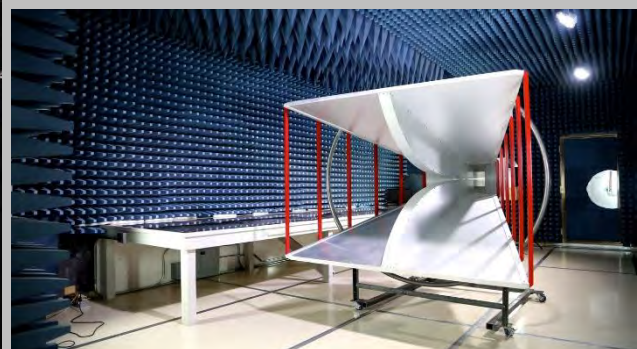
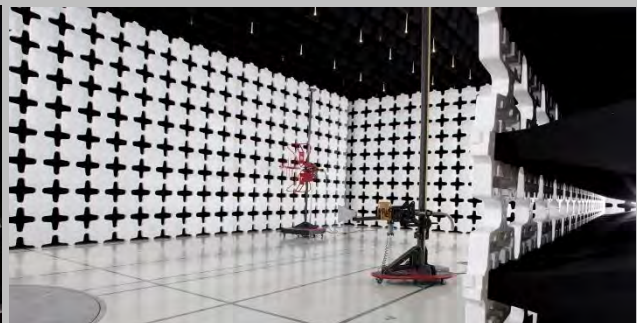
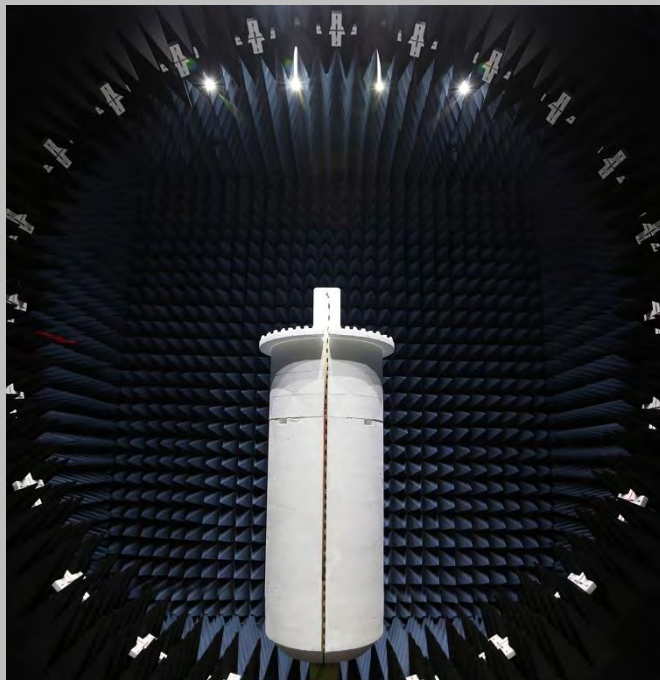
[Texas](#)

[Washington](#)

FACILITIES



California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-11 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
A2LA				
Lab Code: 3310.04	Lab Code: 3310.05	Lab Code: 3310.02	Lab Code: 3310.03	Lab Code: 3310.06
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157



MEASUREMENT UNCERTAINTY

Measurement Uncertainty

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

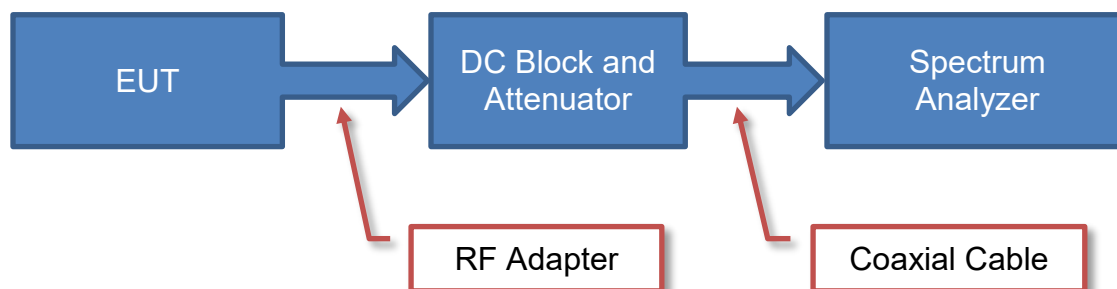
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found in the table below. A lab specific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

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

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

TEST SETUP BLOCK DIAGRAMS

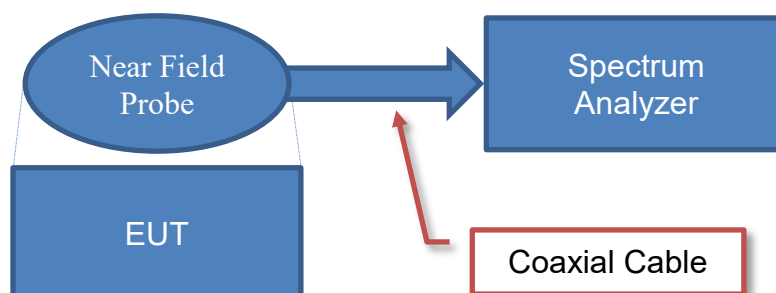
Antenna Port Conducted Measurements



Sample Calculation

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

Near Field Test Fixture Measurements

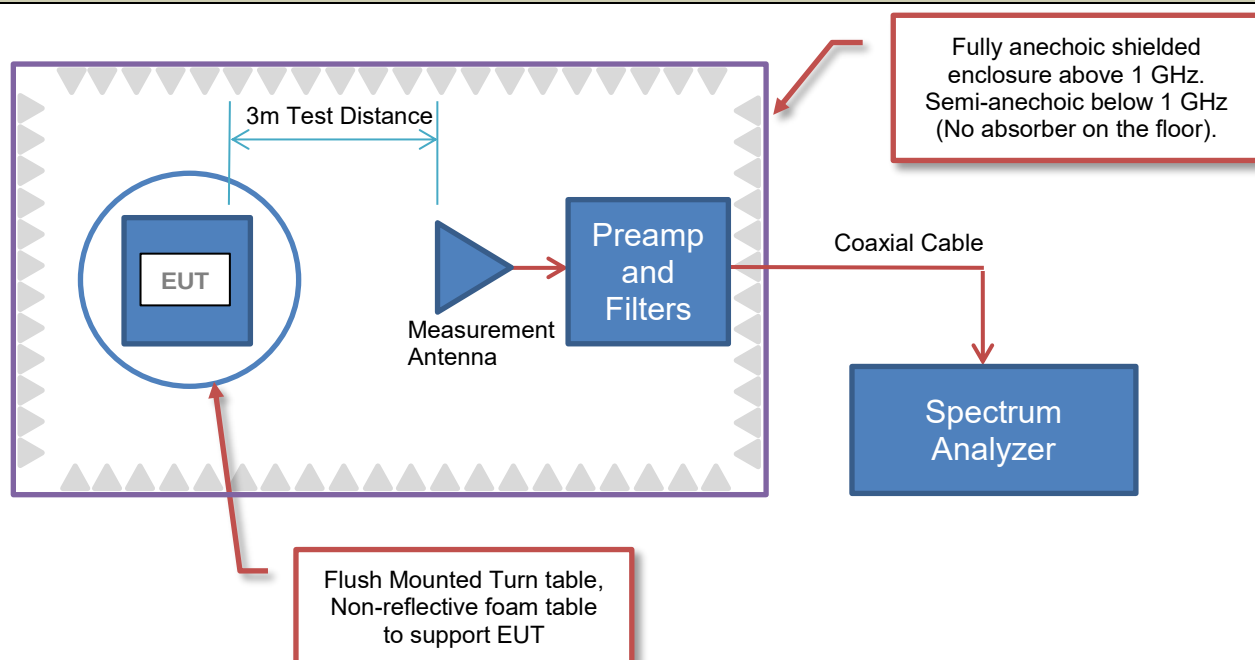


Sample Calculation

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

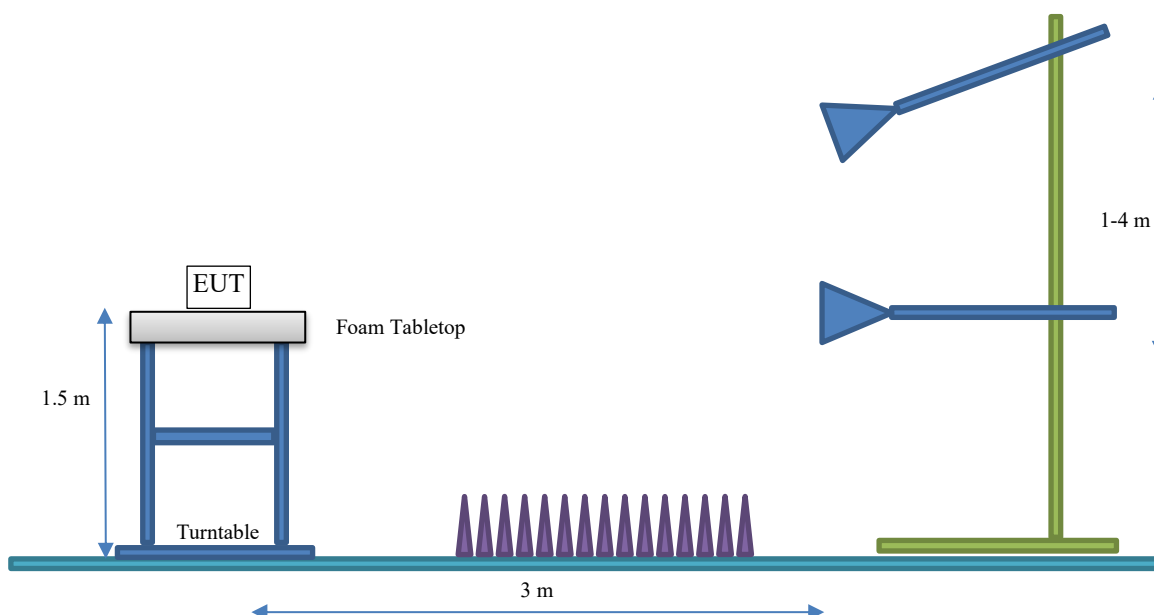
TEST SETUP BLOCK DIAGRAMS

Spurious Radiated Emissions



Bore Sighting (>1GHz)

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



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Nokia Solutions and Networks
Address:	3201 Olympus Blvd
City, State, Zip:	Dallas, TX 75019
Test Requested By:	Steve Mitchell
EUT:	Airscale Base Transceiver Station Remote Radio Head Model AZHL
First Date of Test:	October 8, 2021
Last Date of Test:	October 13, 2021
Receipt Date of Samples:	October 5, 2021
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

The equipment under test (EUT) is a Nokia Solutions and Networks AirScale Base Transceiver Station (BTS) Remote Radio Head (RRH) module, model AZHL. The AZHL remote radio head is a multi-standard multi-carrier remote radio head designed to support 4G LTE TDD and 5G NR TDD. The original radio certification test effort demonstrated FCC compliance for 4G LTE TDD single carrier LTE10, LTE15 and LTE20 channel bandwidths and for 5G NR TDD single carrier NR20, NR40, NR60, NR80 and NR 100 channel bandwidths (see Element Report NOKI0018.1 Rev 0 dated 3/19/2021). **This FCC permissive class 2 change effort is for additional 5G NR TDD single carrier (NR 30, NR50, NR70, & NR90) channel bandwidths and update single carrier power level for smaller channel bandwidths (LTE15, LTE20, NR20, NR40, NR60, & NR80).** The maximum antenna port power has not changed.

The AZHL RRH has 8 transmit/receive antenna ports that supports 3GPP frequency band 41/band n41 operations (BTS RX: 2496 to 2690 MHz/BTS TX: 2496 to 2690 MHz). The maximum RF output power of each antenna port is 40 watts. The total RF output power for the AZHL remote radio head is 320 watts (8 x 40 watts). The remote radio head software supports 10, 15, and 20MHz 4G LTE TDD bandwidths. The remote radio head software supports 20, 30, 40, 50, 60, 70, 80, 90 and 100MHz 5G NR TDD bandwidths. The maximum RF output power for single carrier operations are provided below.

Single Carrier Maximum RF Output Power per Port for each Radio Access Technology Channel Bandwidth											
LTE10	LTE15	LTE20	NR20	NR30	NR40	NR50	NR60	NR70	NR80	NR90	NR100
4.0 W or 36.0dBm	5.6 W or 37.5dBm	7.5 W or 38.8dBm	7.5 W or 38.8dBm	11.3 W or 40.5dBm	15.0 W or 41.8dBm	18.8 W or 42.7dBm	22.5 W or 43.5dBm	26.3 W or 44.2dBm	30.0 W or 44.8dBm	33.8 W or 45.3dBm	40.0 W or 46.0dBm

The AZHL software supports four downlink modulation types (QPSK, 16QAM, 64QAM, and 256QAM) for both 4G and 5G technologies. Single carrier operations will be certified/verified under this effort. Multicarrier operations will be verified/certified under separate effort. The instantaneous bandwidth covers the full operational bandwidth.

PRODUCT DESCRIPTION

The AZHL MIMO operating modes include 8T8R, 2x 4T4R and 4x 2T2R. The AZHL is designed to operate with cross-polarized (orthogonal radiators) antennas only. The eight transmit/receive ports connected to $\pm 45^\circ$ cross-polarized (orthogonal) radiators (four ports are connected to $+45^\circ$ radiators/antennas and four ports are connected to the -45° radiators/antennas).

The remote radio head has external interfaces including DC power (DC In), ground, RF transmit/receive (ANT), beamforming calibration (BF Cal), optical (OPT) and remote electrical tilt (RET). The RRH with applicable installation kit may be pole or wall mounted. The remote radio head may be configured with an optional cooling fan.

Tests performed include RF channel power, CCDF -peak to average power ratio, emission bandwidth (99% and 26 dB down), band edge spurious emissions (± 1 MHz), and conducted spurious emissions. 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 4G LTE modulation types are setup according to 3GPP TS 36.141 E-UTRA Test Models (E-TM) as follows E-TM 1.1: QPSK, E-TM 3.1: 64QAM, E-TM3.1a: 256QAM and E-TM 3.2: 16QAM. The 5G NR 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).

PRODUCT DESCRIPTION

The AZHL downlink channel numbers and frequencies for 4G LTE TDD operations are as follows:

3GPP Frequency Band 41 LTE Band Edge EARFCNs

The 3GPP frequency band 41 (2496-2690 MHz) band edge EARFCNs for 4G LTE channel bandwidths (10, 15 and 20 MHz) are provided below. The EARFCN is defined as E-UTRA Absolute Radio Frequency Channel Number. The spacing is 100 kHz between channel numbers.

	4G LTE EARFCN	Frequency (MHz)	4G LTE Channel Bandwidth		
			10 MHz	15 MHz	20 MHz
AZHL Band 41 (Antennas 1 through 8)	39650	2496.0	Lower Band Edge		
					
	39700	2501.0	Bottom Ch		
					
	39725	2503.5		Bottom Ch	
					
	39750	2506.0			Bottom Ch
					
	40620	2593.0	Middle Channel		
					
	41490	2680.0			Top Channel
					
	41515	2682.5		Top Channel	
					
	41540	2685.0	Top Channel		
					
	41590	2690.0	Upper Band Edge		

AZHL Downlink Band Edge 4G LTE Band 41 Frequency Channels

PRODUCT DESCRIPTION

The AZHL downlink channel numbers and frequencies for 5G NR TDD operations are as follows:

3GPP Frequency Band n41 5G NR Band Edge NR-ARFCNs

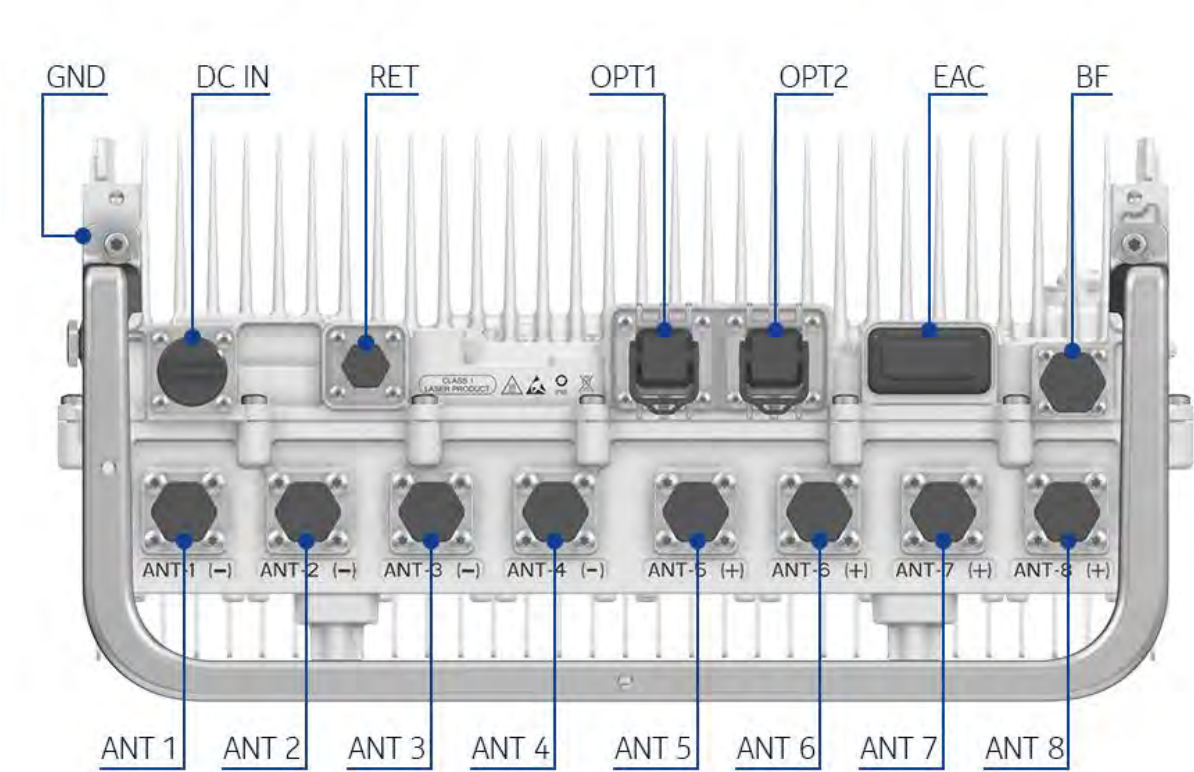
The 3GPP frequency band n41 (2496-2690 MHz) band edge NR-ARFCNs for 5G NR channel bandwidths (20, 30, 40, 50, 60, 80, 90 and 100 MHz) are provided below. The NR-ARFCN is defined as New Radio - Absolute Radio Frequency Channel Number.

	5G NR NR- ARFCN	Frequency (MHz)	5G NR Channel Bandwidth in MHz								
			20	30	40	50	60	70	80	90	100
AZHL Band n41 (Antennas 1 through 8)	Band Edge	2496.00	Lower Band Edge								
											
	501204	2506.02	Bot Ch								
											
	502200	2511.00		Bot Ch							
											
	503202	2516.01			Bot Ch						
											
	504204	2521.02				Bot Ch					
											
	505200	2526.00					Bot Ch				
											
	506202	2531.01						Bot Ch			
											
	507204	2536.02							Bot Ch		
											
	508200	2541.00								Bot Ch	
											
	509202	2546.01									Bot Ch
											
	518598	2592.99	Middle Channel								
											
	528000	2640.00									Top Ch
											
	528996	2644.98								Top Ch	
											
	529998	2649.99							Top Ch		
											
	531000	2655.00						Top Ch			
											
	531996	2659.98					Top Ch				
											
	532998	2664.99				Top Ch					
											
	534000	2670.00			Top Ch						
											
	534996	2674.98		Top Ch							
											
	535998	2679.99	Top Ch								
											
	Band Edge	2690.00	Upper Band Edge								

AZHL Downlink Band Edge 5G NR Band n41 Frequency Channels

PRODUCT DESCRIPTION

AZHL 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)	Ground
ANT	8	4.3-10	RF signal for Transmitter/Receiver (50 Ohm)
BF	1	4.3-10	Beamforming Calibration
EAC	1	MDR26	External Alarm Interface
OPT	2	SFP28	Optical CPRI Interface
RET	1	8-pin circular connector	AISG 2.0 to external devices
Fan	1	Nokia	Power for RRH Fan. Located on the side of RRH.

Testing Objective:

A class II permissive change on the original filing is being pursued to add additional 5G NR channel bandwidths and update single carrier power levels to the Aircscale Base Transceiver Station Remote Radio Head Model AZHL FCC radio certification.

CONFIGURATIONS



Configuration NOKI0035- 1

Software/Firmware Running during test	
Description	Version
BTS 5G/4G Software Version (21B)	SBTS21B ENB 0000 001295 000000
RF_SW (5G/4G)	ERM61.06. R20U

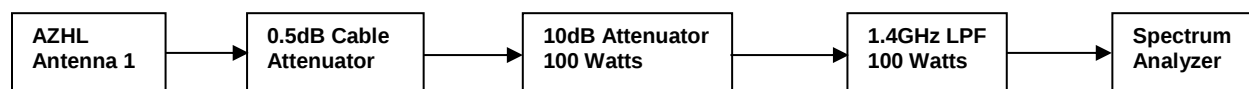
Equipment being tested (include Peripherals)			
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.101	J8163420419
ASIB (4G BTS System Module)	Nokia Solutions and Networks	473764A.102	L1192005258
ABIO (4G BTS Baseband Module)	Nokia Solutions and Networks	475266A.102	L1205105867
ASIK (5G BTS System Module)	Nokia Solutions and Networks	474021A.102	EA194259377
ABIL (5G BTS Baseband Module)	Nokia Solutions and Networks	474020A.102	L1183300437
AZHL (Radio Module Model)	Nokia Solutions and Networks	475432A.101	YK203400025
Low Pass Filter 1.4GHz/100W	Microwave Circuits, Inc.	L13502G1	SN2454-01
Attenuator 100W/10dB	Weinschel Corp	48-10-43-LIM	BJ1771
AOMC SFP28+ 9.8G, 70M, 850NM (Radio)	Nokia	474900A.101	VF2023004CF
AOMC SFP28+ 9.8G, 70M, 850NM (Radio)	Nokia	474900A.101	VF20180015S
AOMC SFP28 + 9.8G, 70M, 850NM (BS)	Nokia	474900A.101	VF20180016Z
AOMC SFP28 + 9.8G, 70M, 850NM (BS)	Nokia	474900A.101	VF20230008Y
ThinkPad T490 (WebEM- PC)	Lenovo	20N3S88012	PF26RVZ0
HP- DC System power supply (Radio)	HP	6032A	3440A-10308
FPAC (DC-PWR supply-BS)	Nokia	472438A.101	G7111007170
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-07
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-12
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-16
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-22
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-23
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-24
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-29
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR301
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR298
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	PZ468
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR297
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR303
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	MG669
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR300
(2) Fiber Optic cable 2m	Amphenol Fiber Optic	VZ1701	995741A
GPS Receiver Cable	Nokia	472510A.101	V31444
Cat-5e cable	CSA	E151955	LL79189
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297374
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551432/4
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-72
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-48

CONFIGURATIONS

Cables (Peripheral)					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1 (5G/4G)	Connection 2
Fiber Optic Cable (2)	N	2 meters	N	ABIL/ABIO	AZHL
GPS Receiver Cable	Y	20 meters	N	ASIK/ASIB	FYGB GPS receiver
Cat-5e Cable	Y	5 meters	N	ASIK/ASIB	WebEM- PC
RD Microwave Systems – RF CABLE	Y	2 meters	N	EUT [AZHL] Ant ports 2-8	150W -50ohm - Load
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIK/ASIB	Analyzer

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

RF Test Setup Diagram:



CONFIGURATIONS



Configuration NOKI0035- 2

Software/Firmware Running during test	
Description	Version
BTS 5G/4G Software Version (21B)	SBTS21B ENB 0000 001295 000000
RF_SW (5G/4G)	ERM61.06. R20U

Equipment being tested (include Peripherals)			
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.101	J8163420419
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ASIK (5G BTS System Module)	Nokia Solutions and Networks	474021A.102	EA194259377
ABIL (5G BTS Baseband Module)	Nokia Solutions and Networks	474020A.102	L1183300437
AZHL (Radio Module Model)	Nokia Solutions and Networks	475432A.101	YK203400025
Attenuator 250W/10dB	API Weinschel	58-10-43-LIM	TD446
Attenuator 150W/30dB	API Weinschel	73-30-34	MB323
AOMC SFP28+ 9.8G,70M,850NM (Radio)	Nokia	474900A.101	VF2023004CF
AOMC SFP28+ 9.8G,70M,850NM (Radio)	Nokia	474900A.101	VF20180015S
AOMC SFP28 + 9.8G,70M,850NM (BS)	Nokia	474900A.101	VF20180016Z
AOMC SFP28 + 9.8G,70M,850NM (BS)	Nokia	474900A.101	VF20230008Y
ThinkPad T490 (WebEM- PC)	Lenovo	20N3S88012	PF26RVZ0
HP- DC System power supply (Radio)	HP	6032A	3440A-10308
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2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-12
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-16
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-22
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-23
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-24
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-29
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR301
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR298
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	PZ468
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR297
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR303
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	MG669
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR300
(2) Fiber Optic cable 2m	Amphenol Fiber Optic	VZ1701	995741A
GPS Receiver Cable	Nokia	472510A.101	V31444
Cat-5e cable	CSA	E151955	LL79189
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297374
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551432/4
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-72
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-48

CONFIGURATIONS

Cables (Peripheral)					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1 (5G/4G)	Connection 2
Fiber Optic Cable (2)	N	2 meters	N	ABIL/ABIO	AZHL
GPS Receiver Cable	Y	20 meters	N	ASIK/ASIB	FYGB GPS receiver
Cat-5e Cable	Y	5 meters	N	ASIK/ASIB	WebEM- PC
RD Microwave Systems – RF CABLE	Y	2 meters	N	EUT [AZHL] Ant ports 2-8	150W -50ohm - Load
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIK/ASIB	Analyzer

Cables					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1	Connection 2
HS-SUCOFLEX_106	Y	2 meters	N	EUT [AZHL] Ant port #1	Attenuator 250W/10dB
Attenuator 250W/10dB	N	NA	N	RF cable HS-SUCOFLEX_106	Attenuator 150W/30dB
Attenuator 150W/30dB	N	NA	N	Attenuator 250W/10dB	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	Attenuator 150W/30dB	Analyzer

RF Test Setup Diagram:



CONFIGURATIONS

Configuration NOKI0035- 3

Software/Firmware Running during test	
Description	Version
BTS 5G/4G Software Version (21B)	SBTS21B ENB 0000 001295 000000
RF_SW (5G/4G)	ERM61.06. R20U

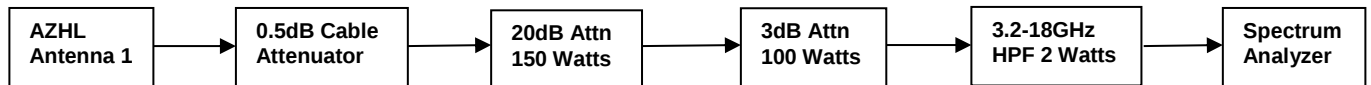
Equipment being tested (include Peripherals)			
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.101	J8163420419
ASIB (4G BTS System Module)	Nokia Solutions and Networks	473764A.102	L1192005258
ABIO (4G BTS Baseband Module)	Nokia Solutions and Networks	475266A.102	L1205105867
ASIK (5G BTS System Module)	Nokia Solutions and Networks	474021A.102	EA194259377
ABIL (5G BTS Baseband Module)	Nokia Solutions and Networks	474020A.102	L1183300437
AZHL (Radio Module Model)	Nokia Solutions and Networks	475432A.101	YK203400025
High Pass Filter 3.2GHz/2W	RLC Electronics	F-100-3000-5-R	0011
Attenuator 150W/20dB	Aeroflex Weinschel	66-20-33	BZ2075
Attenuator 100W/3dB	Aeroflex Weinschel	47-3-33	CG5493
AOMC SFP28+ 9.8G,70M,850NM (Radio)	Nokia	474900A.101	VF2023004CF
AOMC SFP28+ 9.8G,70M,850NM (Radio)	Nokia	474900A.101	VF20180015S
AOMC SFP28 + 9.8G,70M,850NM (BS)	Nokia	474900A.101	VF20180016Z
AOMC SFP28 + 9.8G,70M,850NM (BS)	Nokia	474900A.101	VF20230008Y
ThinkPad T490 (WebEM- PC)	Lenovo	20N3S88012	PF26RVZ0
HP- DC System power supply (Radio)	HP	6032A	3440A-10308
FPAC (DC-PWR supply-BS)	Nokia	472438A.101	G7111007170
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-07
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-12
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-16
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-22
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-23
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-24
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-29
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR301
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR298
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	PZ468
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR297
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR303
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	MG669
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR300
(2) Fiber Optic cable 2m	Amphenol Fiber Optic	VZ1701	995741A
GPS Receiver Cable	Nokia	472510A.101	V31444
Cat-5e cable	CSA	E151955	LL79189
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297374
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551432/4
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-72
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-48

CONFIGURATIONS

Cables (Peripheral)					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1 (5G/4G)	Connection 2
Fiber Optic Cable (2)	N	2 meters	N	ABIL/ABIO	AZHL
GPS Receiver Cable	Y	20 meters	N	ASIK/ASIB	FYGB GPS receiver
Cat-5e Cable	Y	5 meters	N	ASIK/ASIB	WebEM- PC
RD Microwave Systems – RF CABLE	Y	2 meters	N	EUT [AZHL] Ant ports 2-8	150W -50ohm - Load
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIK/ASIB	Analyzer

Cables					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1	Connection 2
HS-SUCOFLEX_106	Y	2 meters	N	EUT [AZHL] RF port #1	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 3.2GHz
High Pass Filter 3.2GHz/2W	N	NA	N	Attenuator 100W/3dB	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	High Pass Filter 3.2GHz/2W	Analyzer

RF Test Setup Diagram:



CONFIGURATIONS



Configuration NOKI0035- 4

Software/Firmware Running during test	
Description	Version
BTS 5G/4G Software Version (21B)	SBTS21B ENB 0000 001295 000000
RF_SW (5G/4G)	ERM61.06. R20U

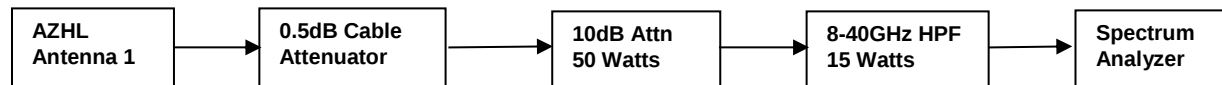
Equipment being tested (include Peripherals)			
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.101	J8163420419
ASIB (4G BTS System Module)	Nokia Solutions and Networks	473764A.102	L1192005258
ABIO (4G BTS Baseband Module)	Nokia Solutions and Networks	475266A.102	L1205105867
ASIK (5G BTS System Module)	Nokia Solutions and Networks	474021A.102	EA194259377
ABIL (5G BTS Baseband Module)	Nokia Solutions and Networks	474020A.102	L1183300437
AZHL (Radio Module Model)	Nokia Solutions and Networks	475432A.101	YK203400025
Attenuator 50W/10dB	RF-Lambda	RFS50G26S10FF	20031702
High Pass Filter 8-40GHz/15W	RF-Lambda	RHPF23G08G40	17102700014
AOMC SFP28+ 9.8G,70M,850NM (Radio)	Nokia	474900A.101	VF2023004CF
AOMC SFP28+ 9.8G,70M,850NM (Radio)	Nokia	474900A.101	VF20180015S
AOMC SFP28 + 9.8G,70M,850NM (BS)	Nokia	474900A.101	VF20180016Z
AOMC SFP28 + 9.8G,70M,850NM (BS)	Nokia	474900A.101	VF20230008Y
ThinkPad T490 (WebEM- PC)	Lenovo	20N3S88012	PF26RVZ0
HP- DC System power supply (Radio)	HP	6032A	3440A-10308
FPAC (DC-PWR supply-BS)	Nokia	472438A.101	G7111007170
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-07
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-12
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-16
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-22
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-23
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-24
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-29
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR301
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR298
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	PZ468
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR297
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR303
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	MG669
150W -50ohm -Terminating Load	API Weinschel inc	1435-3-LIM	SR300
(2) Fiber Optic cable 2m	Amphenol Fiber Optic	VZ1701	995741A
GPS Receiver Cable	Nokia	472510A.101	V31444
Cat-5e cable	CSA	E151955	LL79189
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297374
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551432/4
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-72
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-48

CONFIGURATIONS

Cables (Peripheral)					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1 (5G/4G)	Connection 2
Fiber Optic Cable (2)	N	2 meters	N	ABIL/ABIO	AZHL
GPS Receiver Cable	Y	20 meters	N	ASIK/ASIB	FYGB GPS receiver
Cat-5e Cable	Y	5 meters	N	ASIK/ASIB	WebEM- PC
RD Microwave Systems – RF CABLE	Y	2 meters	N	EUT [AZHL] Ant ports 2-8	150W -50ohm - Load
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIK/ASIB	Analyzer

Cables					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1	Connection 2
HS-SUCOFLEX_104	Y	2 meters	N	EUT [AZHL] Ant port #1	Attenuator 50W/10dB
Attenuator 50W/10dB	N	NA	N	RF cable HS-SUCOFLEX_104	High Pass Filter 8-40GHz
High Pass Filter 8-40GHz/15W	N	NA	N	Attenuator 50W/10dB	RF-Lambda -AC20040003
RF-Lambda -AC20040003	Y	1 meter	N	High Pass Filter 8-40GHz/15W	Analyzer

RF Test Setup Diagram:



MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2021-10-08	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2021-10-08	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	2021-10-08	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2021-10-12	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	2021-10-13	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

OCCUPIED BANDWIDTH - 5G NR



XMIT 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2021-03-11	2022-03-11
Block - DC	Fairview Microwave	SD3239	ANC	2021-06-24	2022-06-24
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and 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 AZHL antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown during output power testing on 8 ports) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i, 6.4.

The 99% bandwidth was measured utilizing the analyzer's peak detector and measuring the carrier's 26 dB occupied bandwidth based on the peak output power level measured. A plot was taken to show the occupied bandwidth is contained within the allowable transmit band. FCC 27.53(m)(6) defines the emission bandwidth to be used as 26dB down.

The occupied bandwidth was measured with the EUT configured in the modes called out in the data sheets.

Band n41 (2496 MHz to 2690 MHz) Emission Designators derived from the measurement results:

FCC Emission Designators for Band n41 (2496MHz to 2690MHz)					
Chan BW	Radio Channel	5G-NR: QPSK	5G-NR: 16QAM	5G-NR: 64QAM	5G-NR: 256QAM
20MHz	Low				19M7G7W
	Mid	19M8G7W	19M7G7W	19M8G7W	19M7G7W
	High				19M7G7W
30MHz	Low				29M7G7W
	Mid	29M5G7W	29M8G7W	29M9G7W	29M8G7W
	High				29M8G7W
40MHz	Low				40M6G7W
	Mid	40M6G7W	40M6G7W	40M6G7W	40M7G7W
	High				40M6G7W
50MHz	Low				50M3G7W
	Mid	50M6G7W	50M5G7W	50M5G7W	50M4G7W
	High				50M3G7W
60MHz	Low				60M5G7W
	Mid	60M6G7W	60M6G7W	60M6G7W	60M6G7W
	High				60M5G7W
70MHz	Low				71M1G7W
	Mid	71M1G7W	71M2G7W	71M3G7W	71M2G7W
	High				71M1G7W
80MHz	Low				81M3G7W
	Mid	81M3G7W	81M0G7W	81M2G7W	81M3G7W
	High				81M3G7W
90MHz	Low				91M3G7W
	Mid	91M4G7W	91M4G7W	91M4G7W	91M4G7W
	High				91M3G7W

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

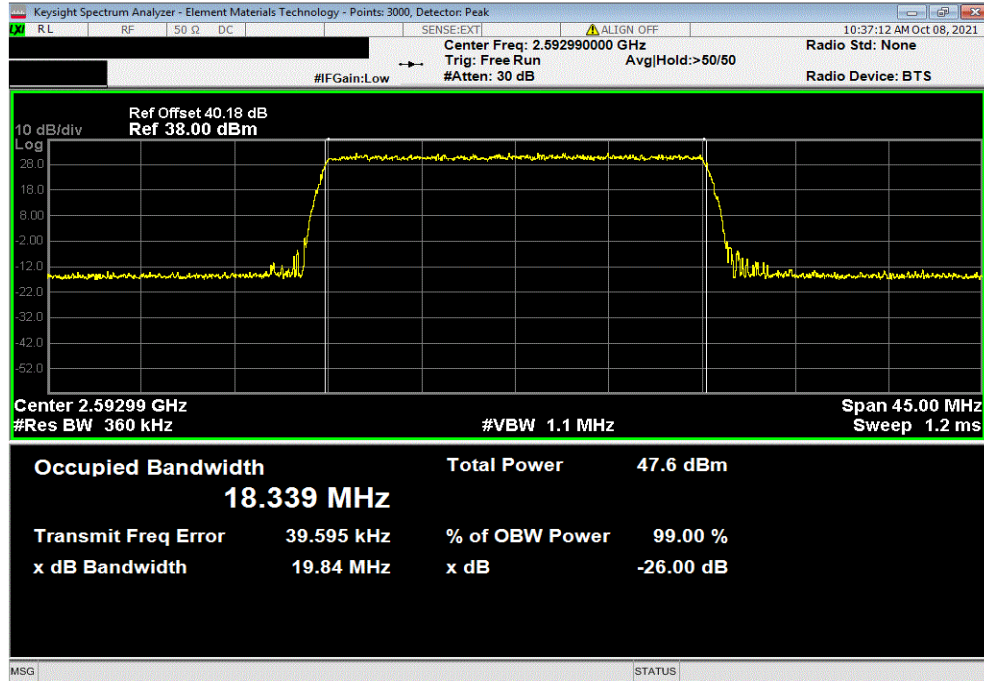
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OCCUPIED BANDWIDTH - 5G NR

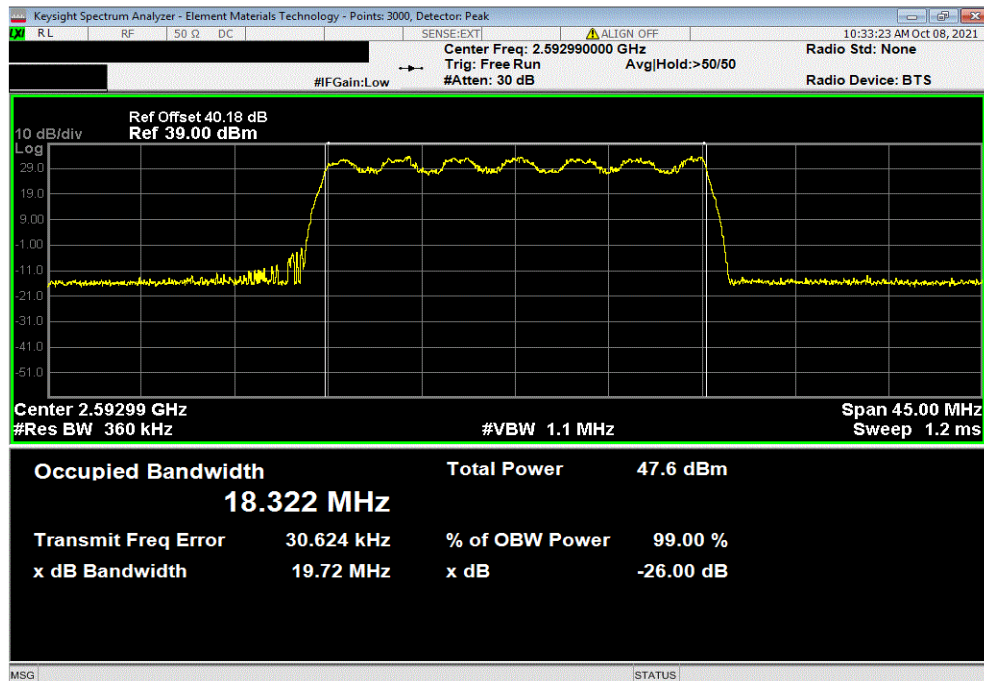


TbTx 2019.08.30.0 XMI 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR20) 20 MHz Bandwidth, QPSK Modulation, Mid Channel 2592.99 MHz							
		Value		Value		Limit	
		99% (MHz)		26dB (MHz)			
		18.339		19.839		Within Band	
						Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR20) 20 MHz Bandwidth, 16QAM Modulation, Mid Channel 2592.99 MHz							
		Value		Value		Limit	
		99% (MHz)		26dB (MHz)			
		18.322		19.718		Within Band	
						Pass	

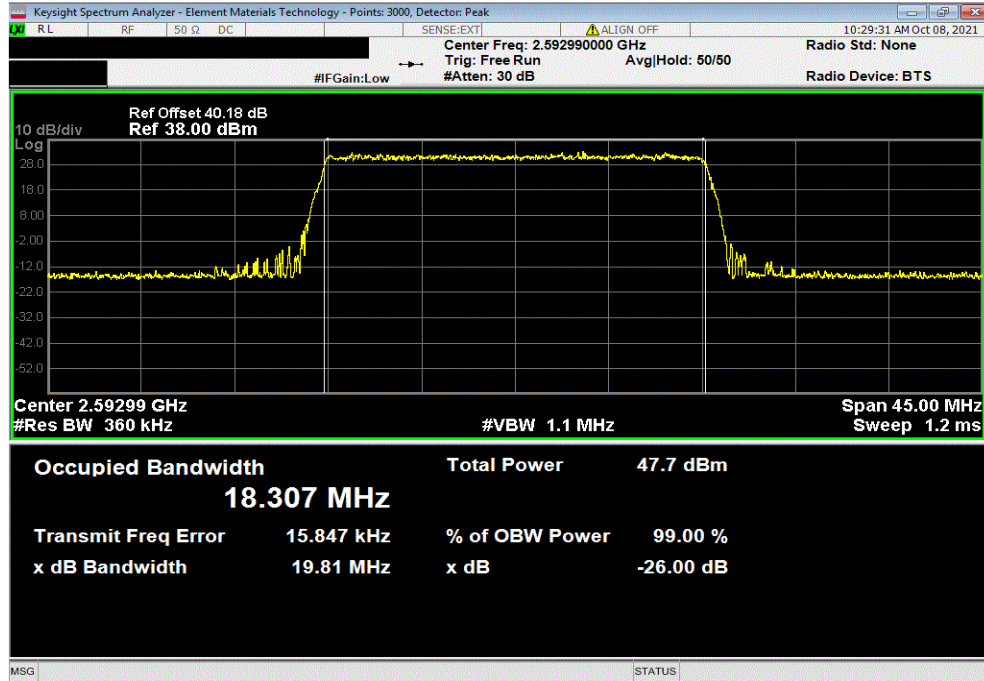


OCCUPIED BANDWIDTH - 5G NR

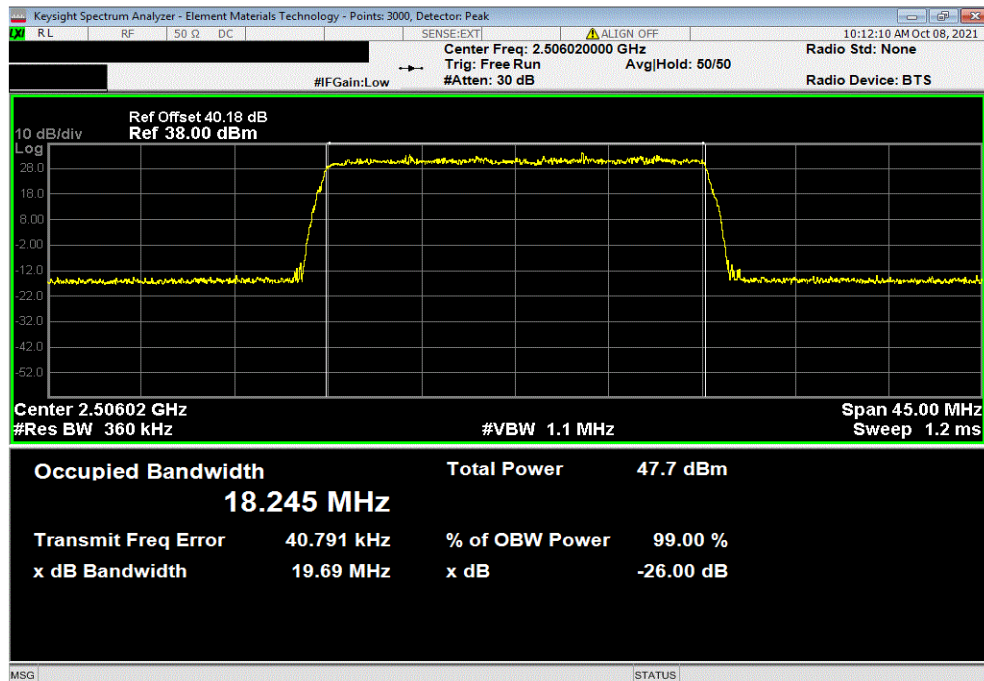


TbTtX 2019.08.30.0 XMit 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR20) 20 MHz Bandwidth, 64QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		18.307	19.808	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR20) 20 MHz Bandwidth, 256QAM Modulation, Low Channel 2506.02 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		18.245	19.692	Within Band		Pass	

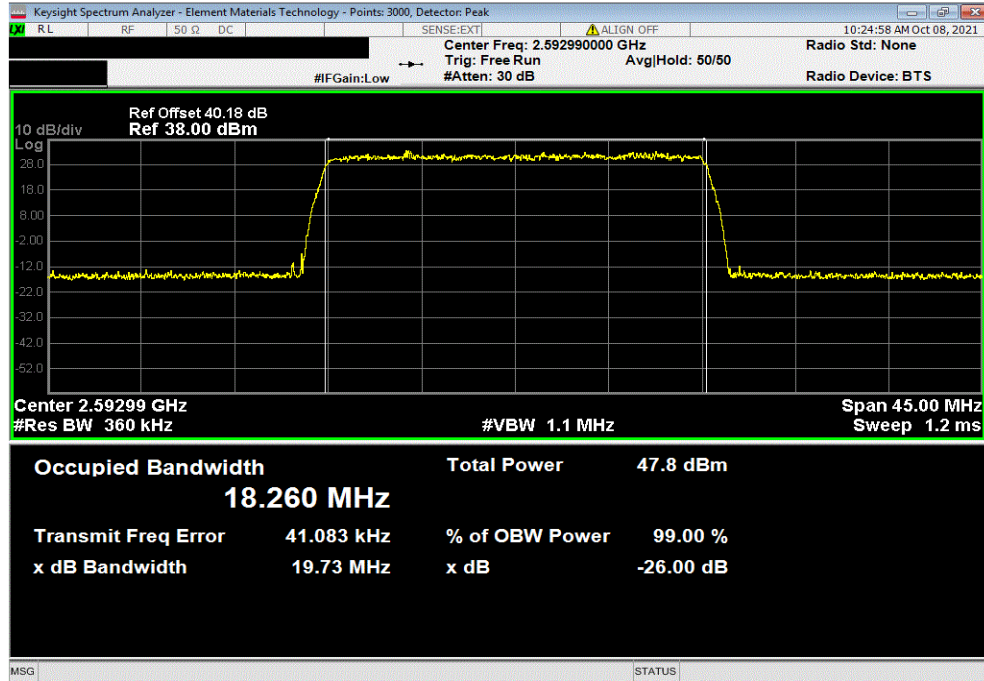


OCCUPIED BANDWIDTH - 5G NR

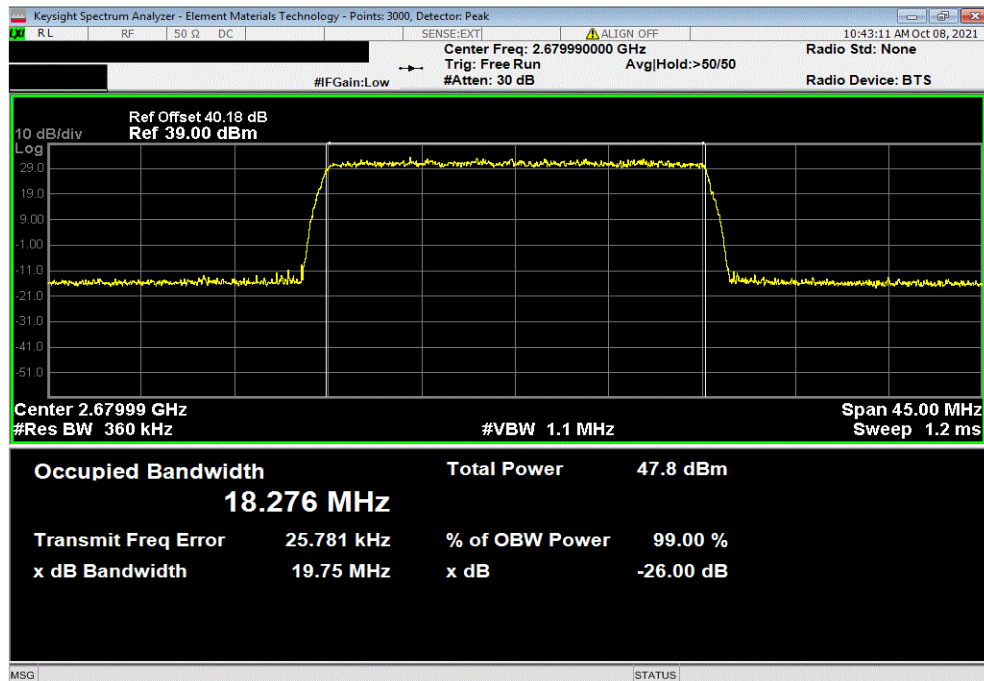


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR20) 20 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		18.26	19.735	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR20) 20 MHz Bandwidth, 256QAM Modulation, High Channel 2679.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		18.276	19.749	Within Band		Pass	

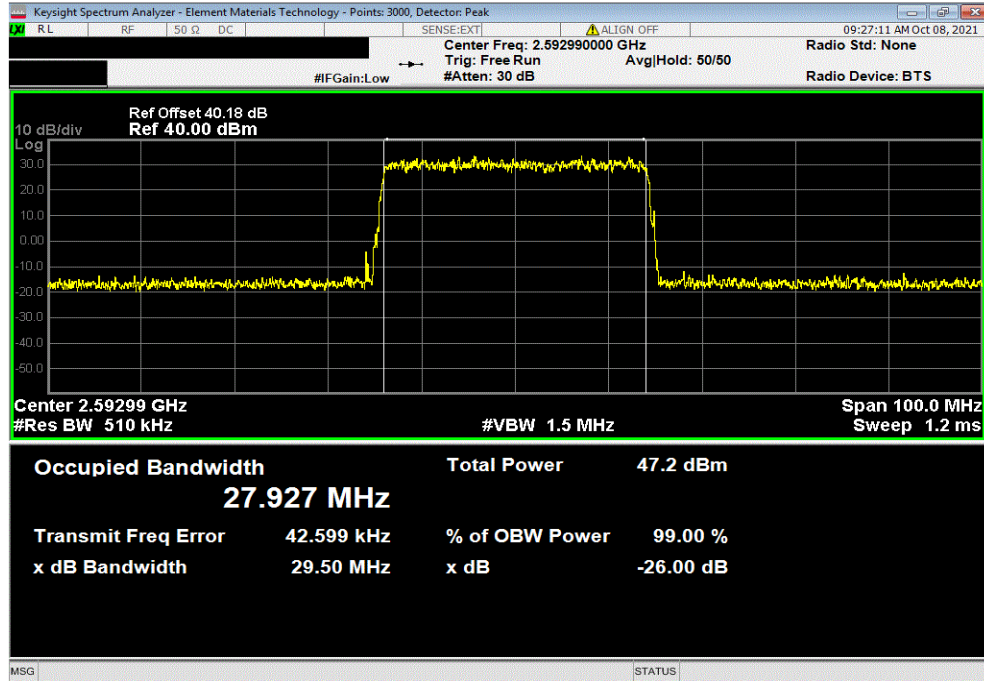


OCCUPIED BANDWIDTH - 5G NR

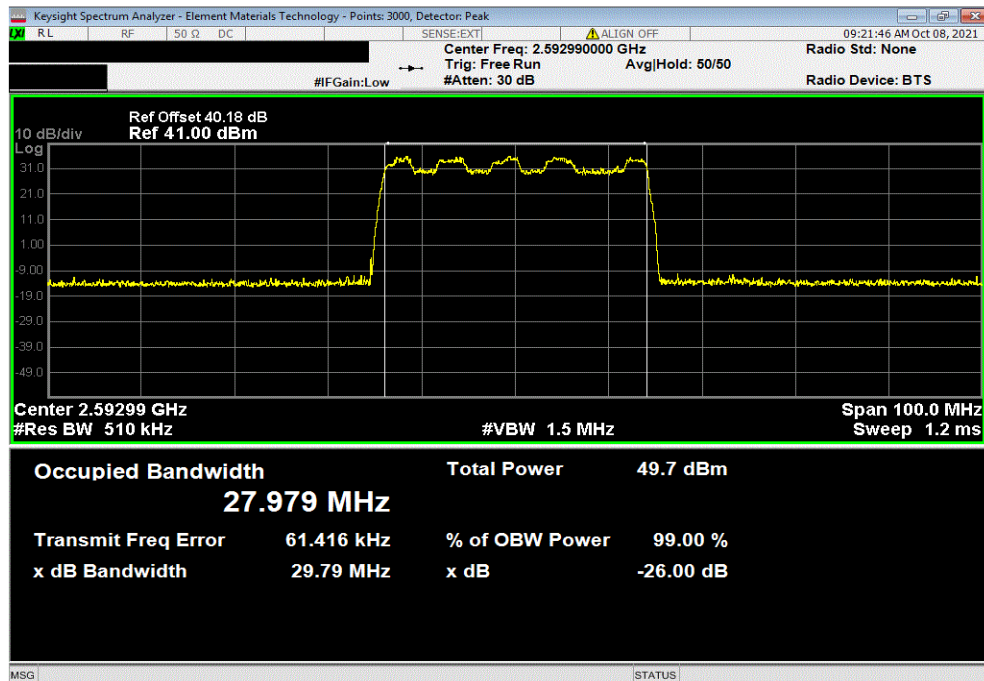


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR30) 30 MHz Bandwidth, QPSK Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		27.927	29.5	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR30) 30 MHz Bandwidth, 16QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		27.979	29.788	Within Band		Pass	

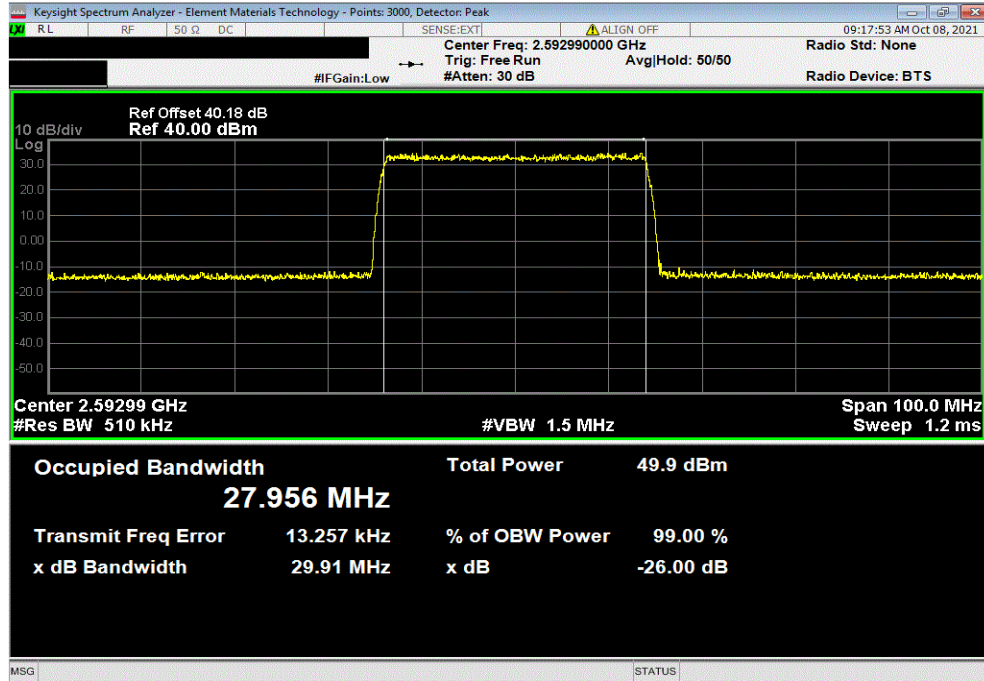


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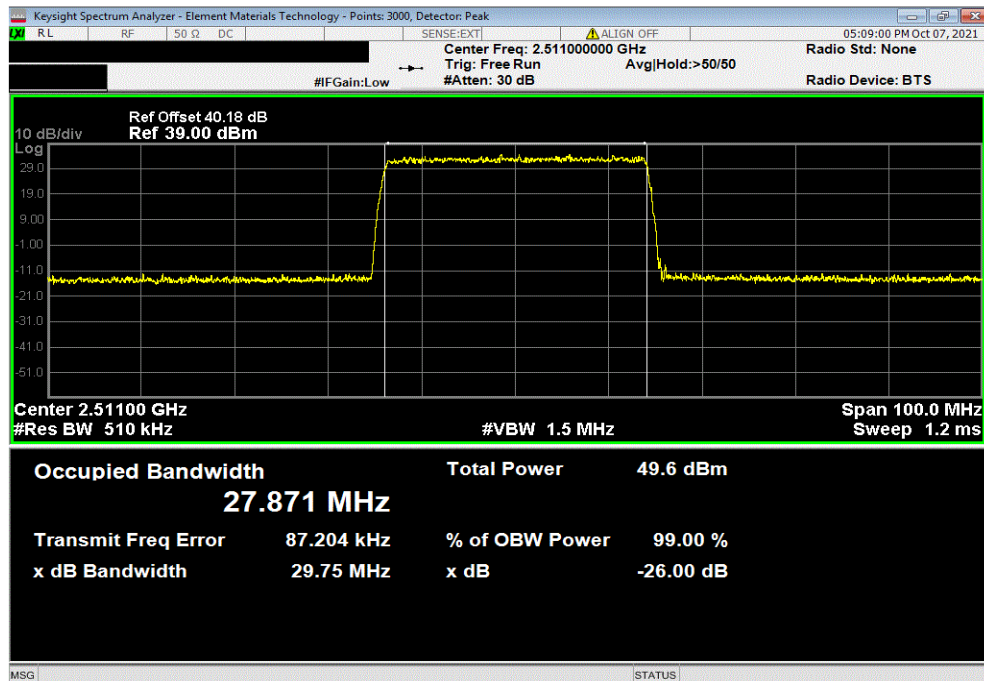


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR30) 30 MHz Bandwidth, 64QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		27.956	29.907	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR30) 30 MHz Bandwidth, 256QAM Modulation, Low Channel 2511.00 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		27.871	29.747	Within Band		Pass	

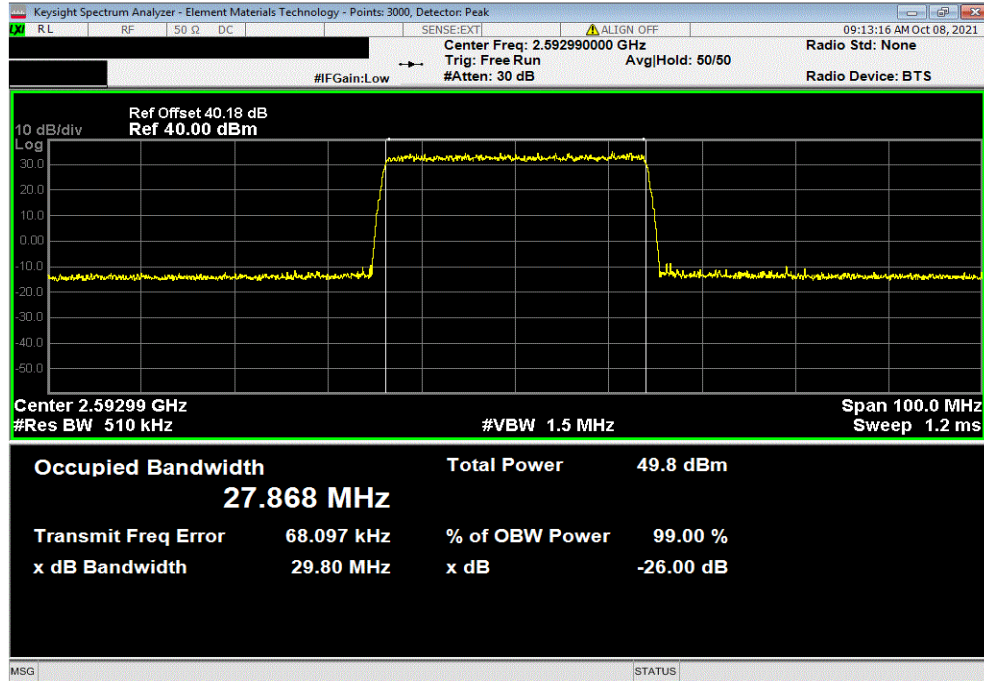


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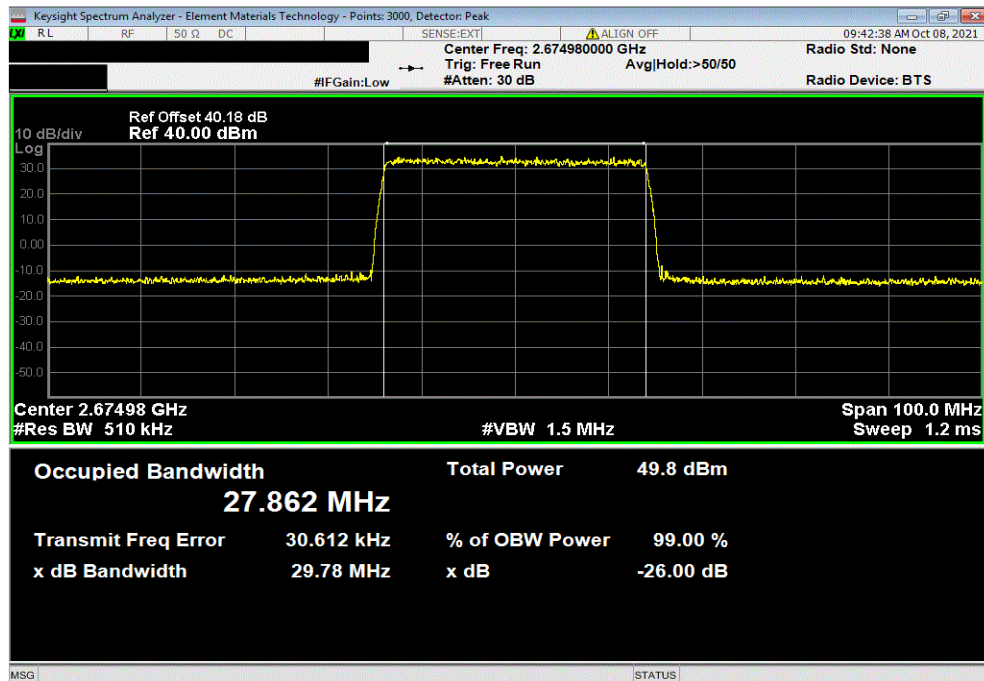


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR30) 30 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		27.868	29.803	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR30) 30 MHz Bandwidth, 256QAM Modulation, High Channel 2674.98 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		27.862	29.785	Within Band		Pass	

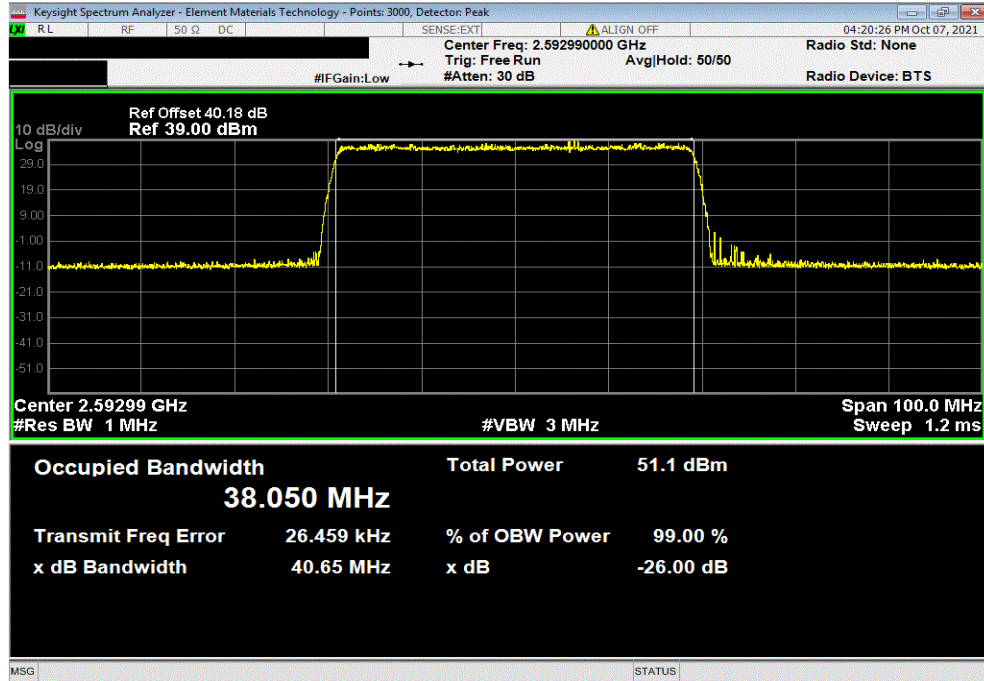


OCCUPIED BANDWIDTH - 5G NR

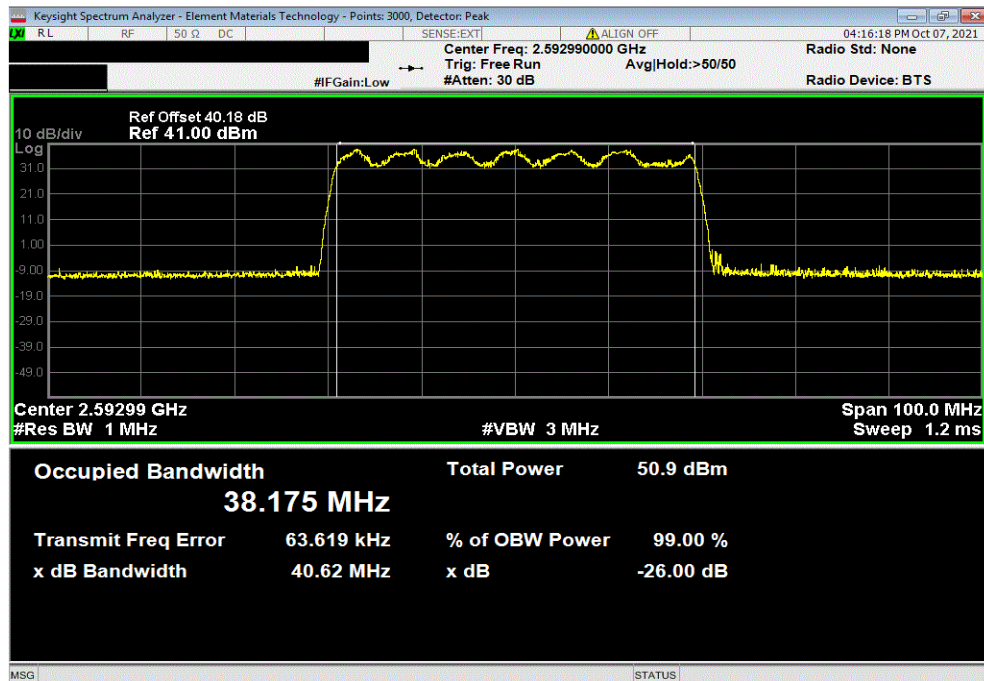


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR40) 40 MHz Bandwidth, QPSK Modulation, Mid Channel 2592.99 MHz							
		Value		Value		Limit	
		99% (MHz)		26dB (MHz)			
		38.05		40.647		Within Band	
						Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR40) 40 MHz Bandwidth, 16QAM Modulation, Mid Channel 2592.99 MHz							
		Value		Value		Limit	
		99% (MHz)		26dB (MHz)			
		38.175		40.617		Within Band	
						Pass	

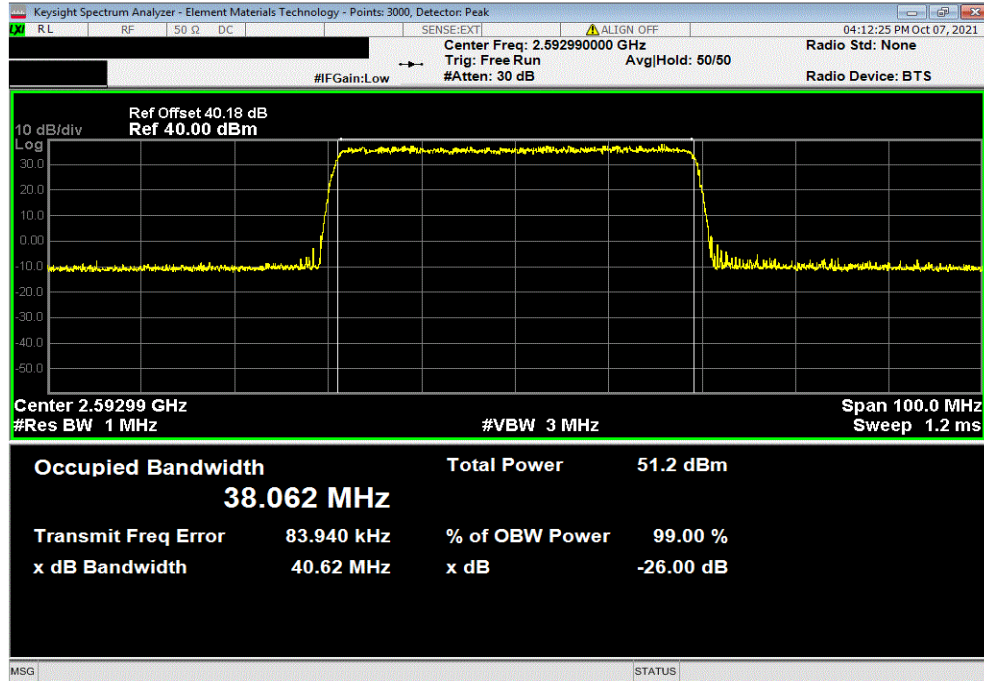


OCCUPIED BANDWIDTH - 5G NR

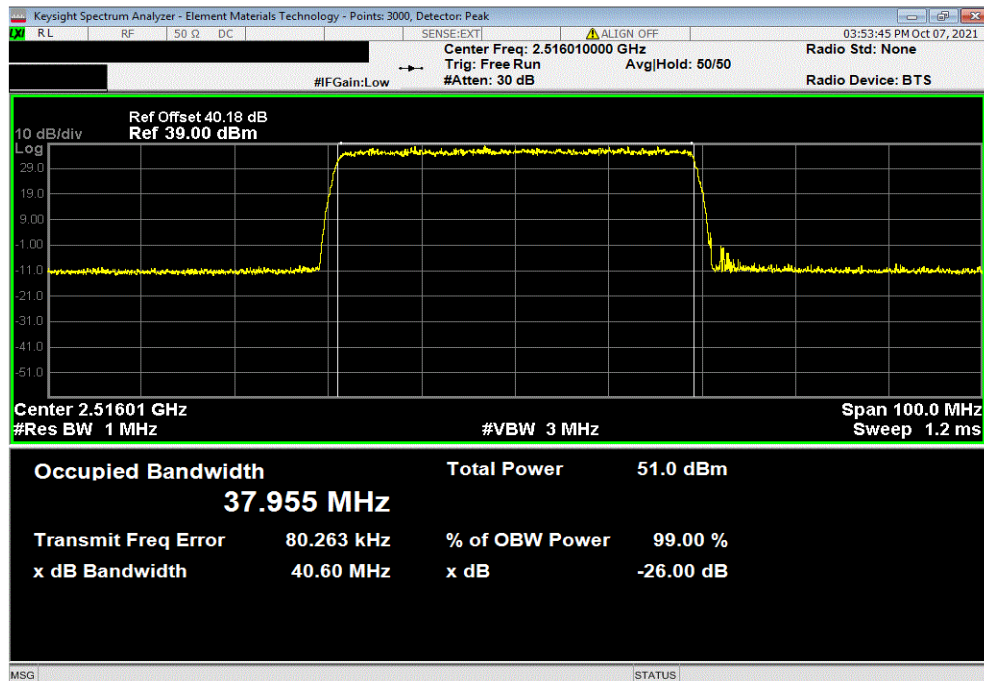


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR40) 40 MHz Bandwidth, 64QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		38.062	40.62	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR40) 40 MHz Bandwidth, 256QAM Modulation, Low Channel 2516.01 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		37.955	40.605	Within Band		Pass	

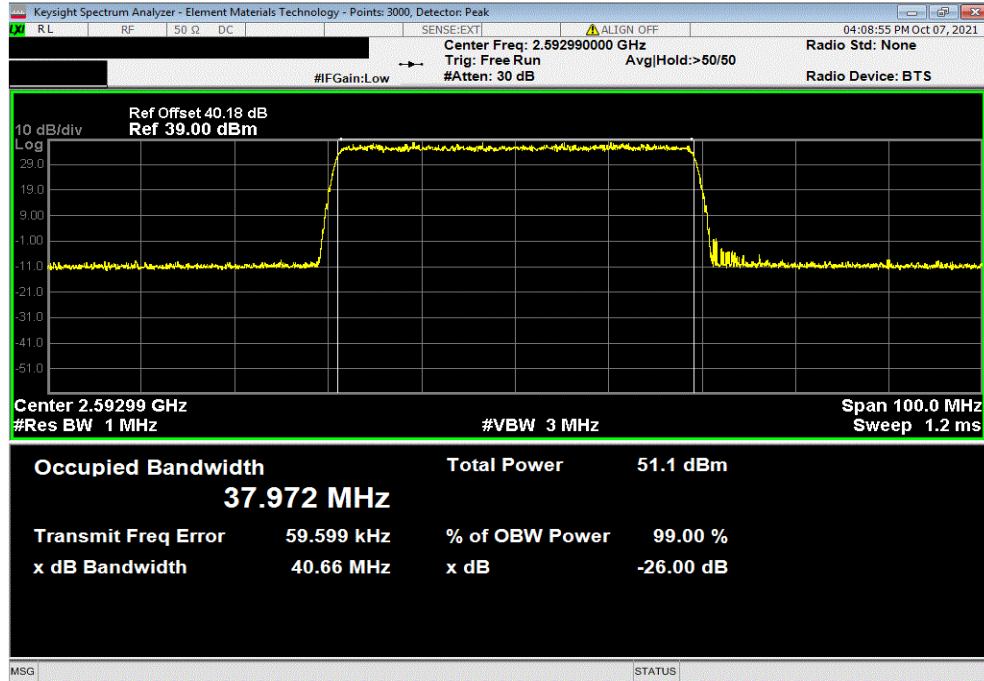


OCCUPIED BANDWIDTH - 5G NR

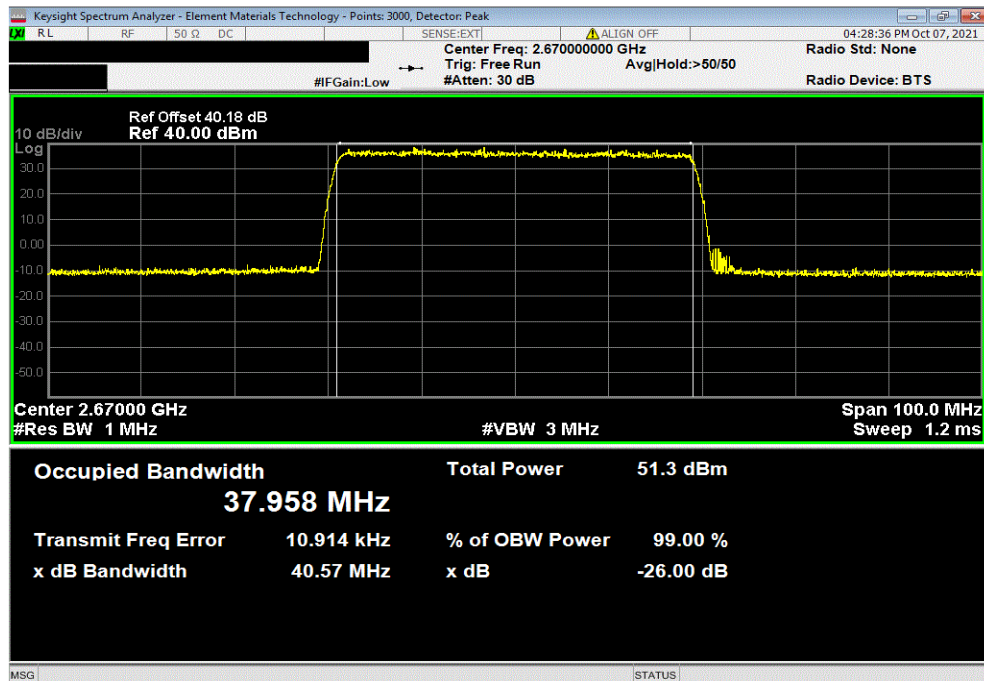


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR40) 40 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz							
			Value	Value			
			99% (MHz)	26dB (MHz)	Limit		Result
			37.972	40.665	Within Band		Pass



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR40) 40 MHz Bandwidth, 256QAM Modulation, High Channel 2670.00 MHz							
			Value	Value			
			99% (MHz)	26dB (MHz)	Limit		Result
			37.958	40.572	Within Band		Pass

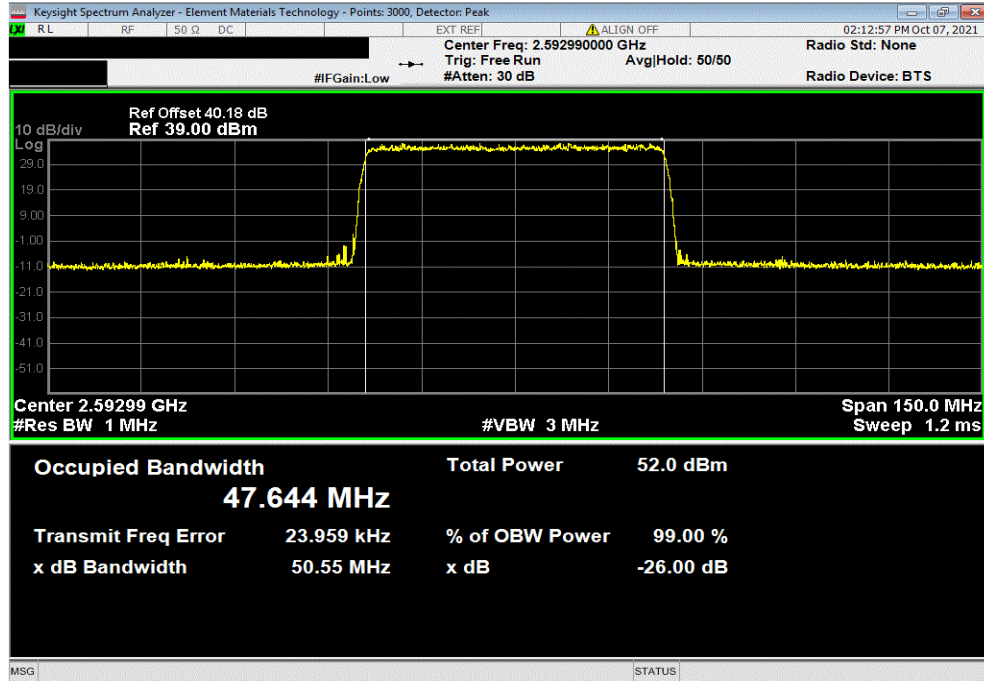


OCCUPIED BANDWIDTH - 5G NR

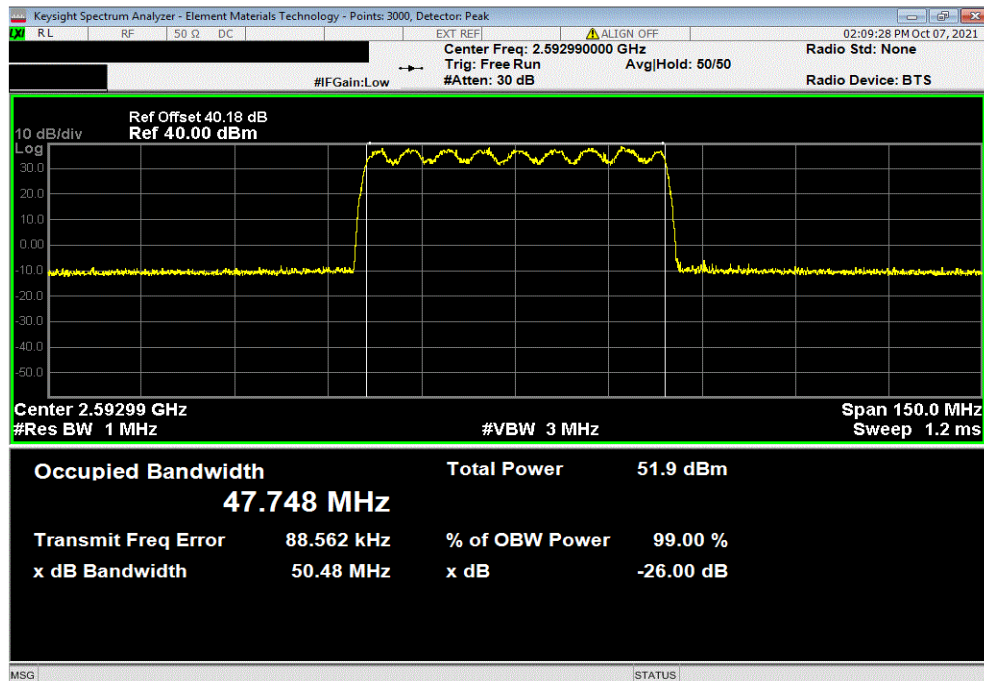


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR50) 50 MHz Bandwidth, QPSK Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		47.644	50.554	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR50) 50 MHz Bandwidth, 16QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		47.748	50.483	Within Band		Pass	

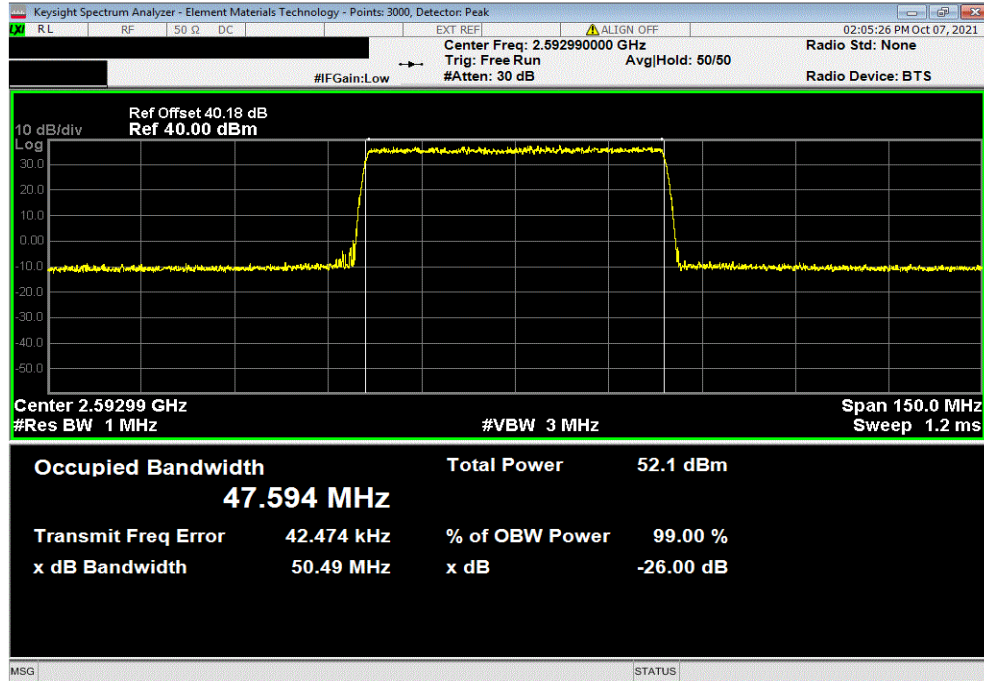


OCCUPIED BANDWIDTH - 5G NR

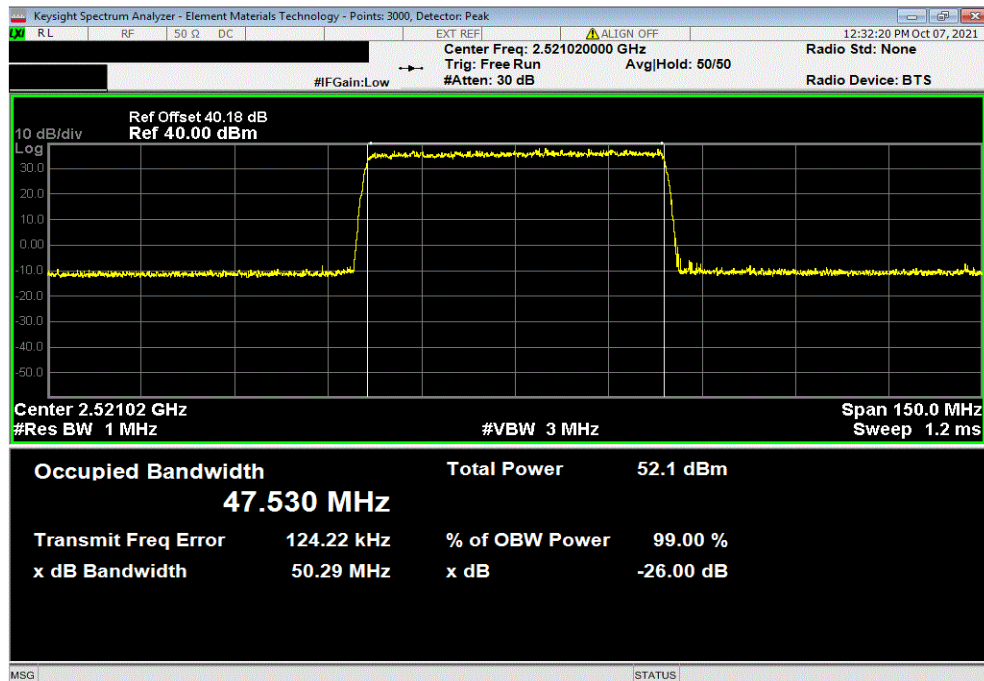


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR50) 50 MHz Bandwidth, 64QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		47.594	50.493	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR50) 50 MHz Bandwidth, 256QAM Modulation, Low Channel 2521.02 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		47.53	50.295	Within Band		Pass	

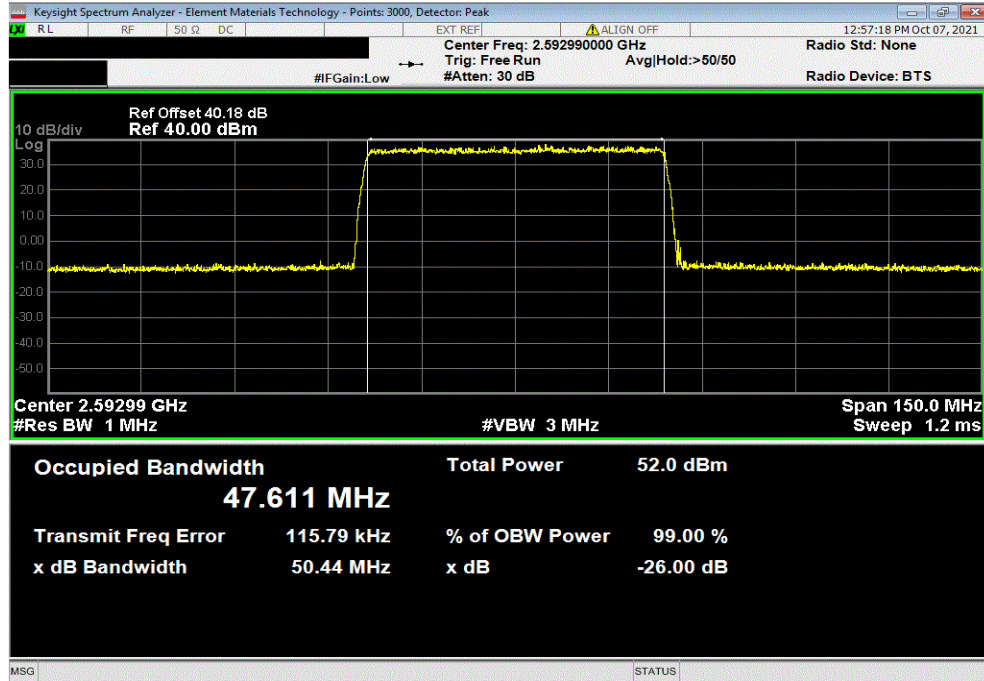


OCCUPIED BANDWIDTH - 5G NR

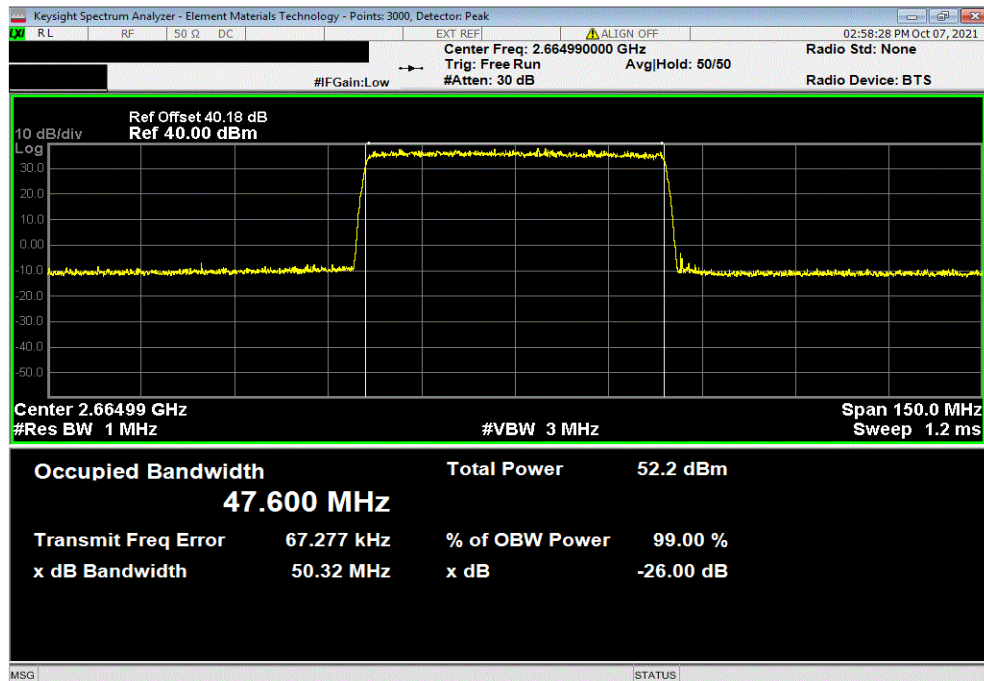


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR50) 50 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		47.611	50.437	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR50) 50 MHz Bandwidth, 256QAM Modulation, High Channel 2664.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		47.6	50.316	Within Band		Pass	

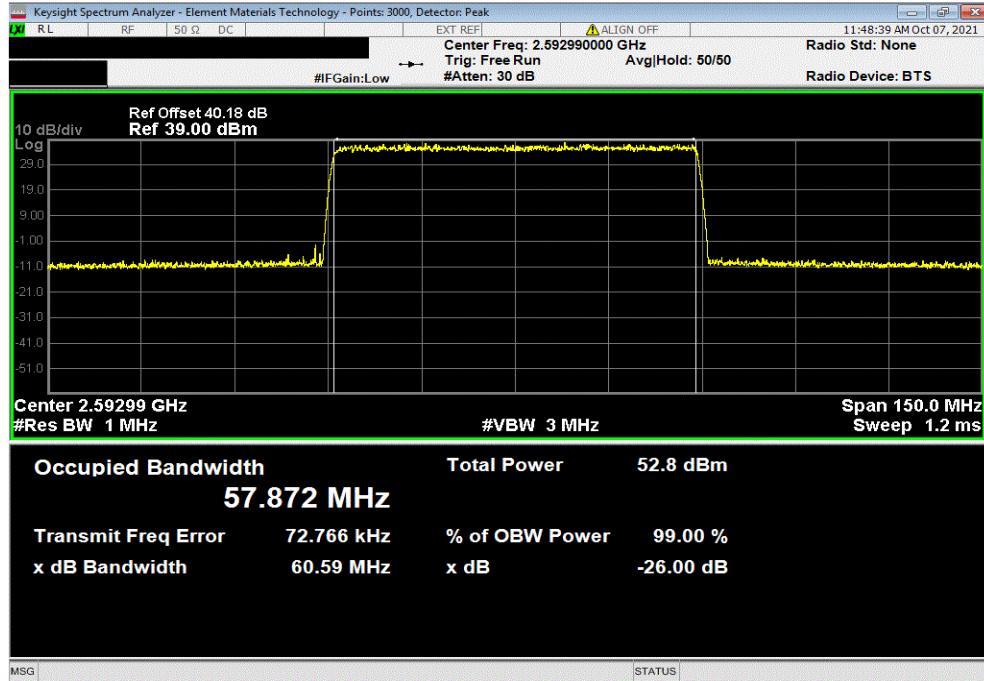


OCCUPIED BANDWIDTH - 5G NR

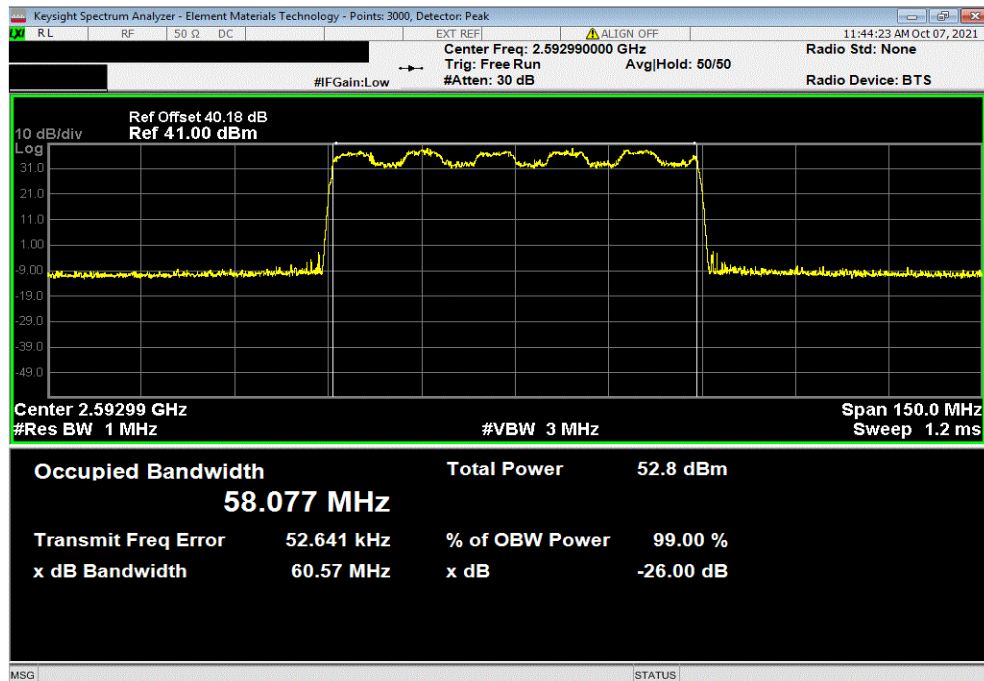


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR60) 60 MHz Bandwidth, QPSK Modulation, Mid Channel 2592.99 MHz							
		Value		Value		Limit	
		99% (MHz)		26dB (MHz)			
		57.872		60.587		Within Band	
						Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR60) 60 MHz Bandwidth, 16QAM Modulation, Mid Channel 2592.99 MHz							
		Value		Value		Limit	
		99% (MHz)		26dB (MHz)			
		58.077		60.572		Within Band	
						Pass	

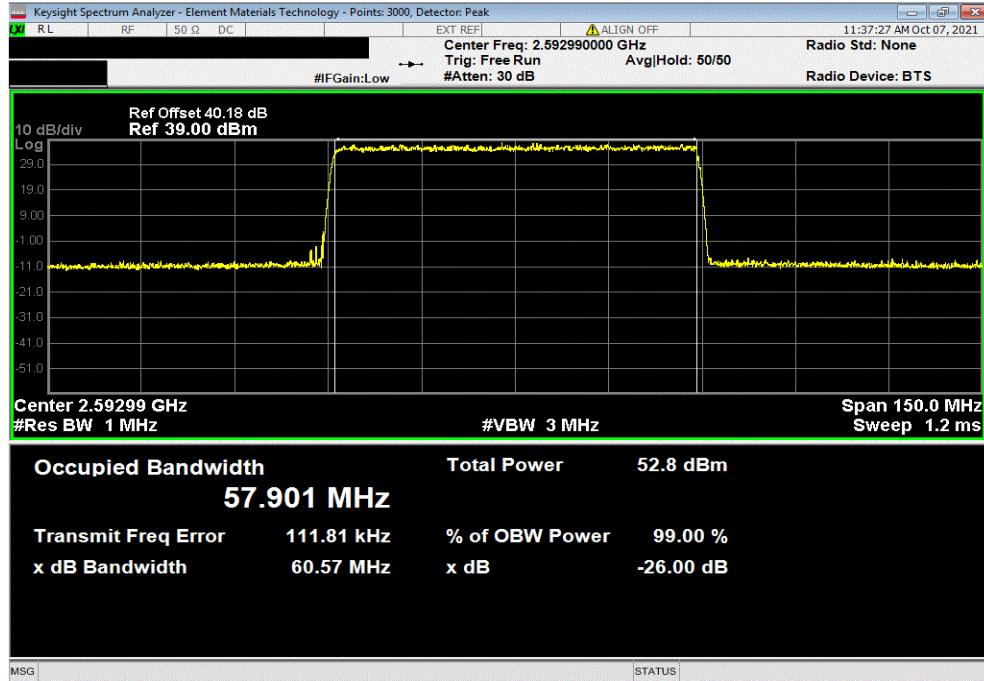


OCCUPIED BANDWIDTH - 5G NR

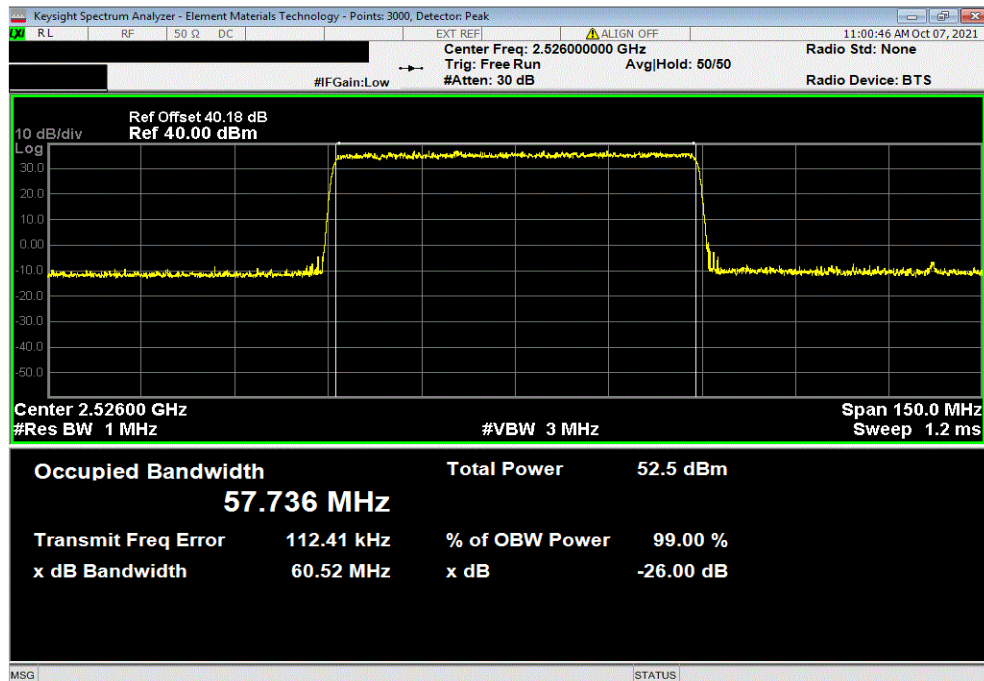


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR60) 60 MHz Bandwidth, 64QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		57.901	60.565	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR60) 60 MHz Bandwidth, 256QAM Modulation, Low Channel 2526.00 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		57.736	60.515	Within Band		Pass	

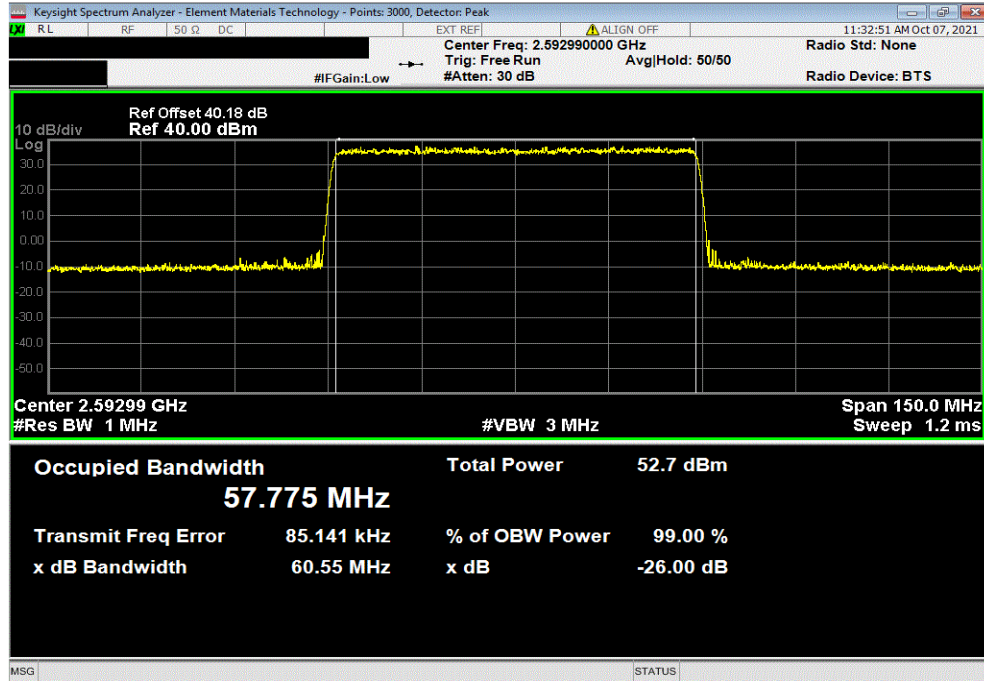


OCCUPIED BANDWIDTH - 5G NR

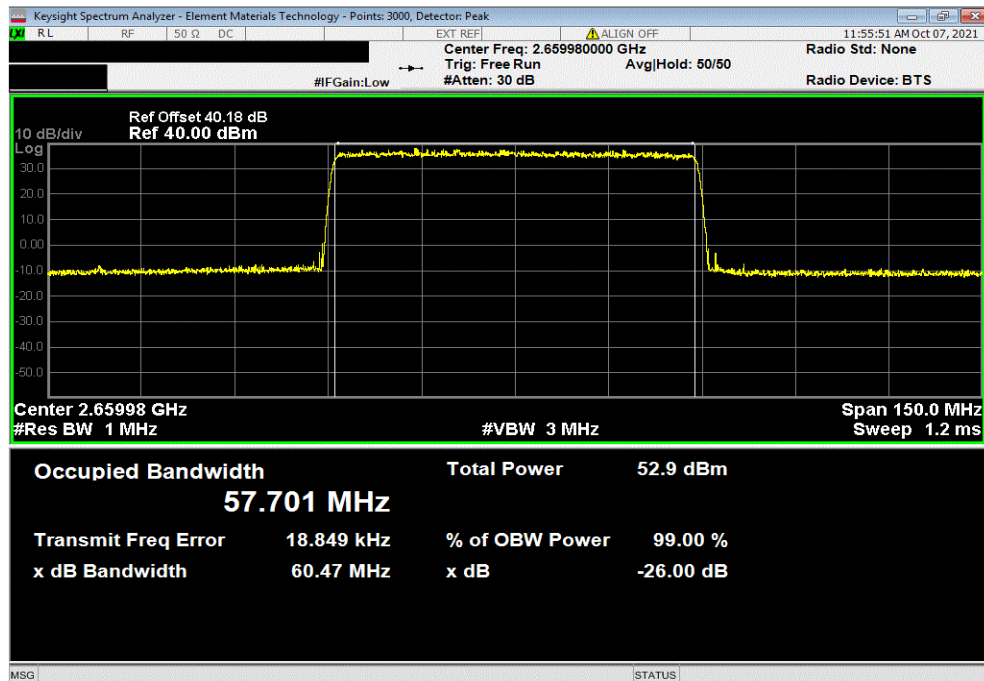


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR60) 60 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		57.775	60.552	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR60) 60 MHz Bandwidth, 256QAM Modulation, High Channel 2659.98 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		57.701	60.47	Within Band		Pass	

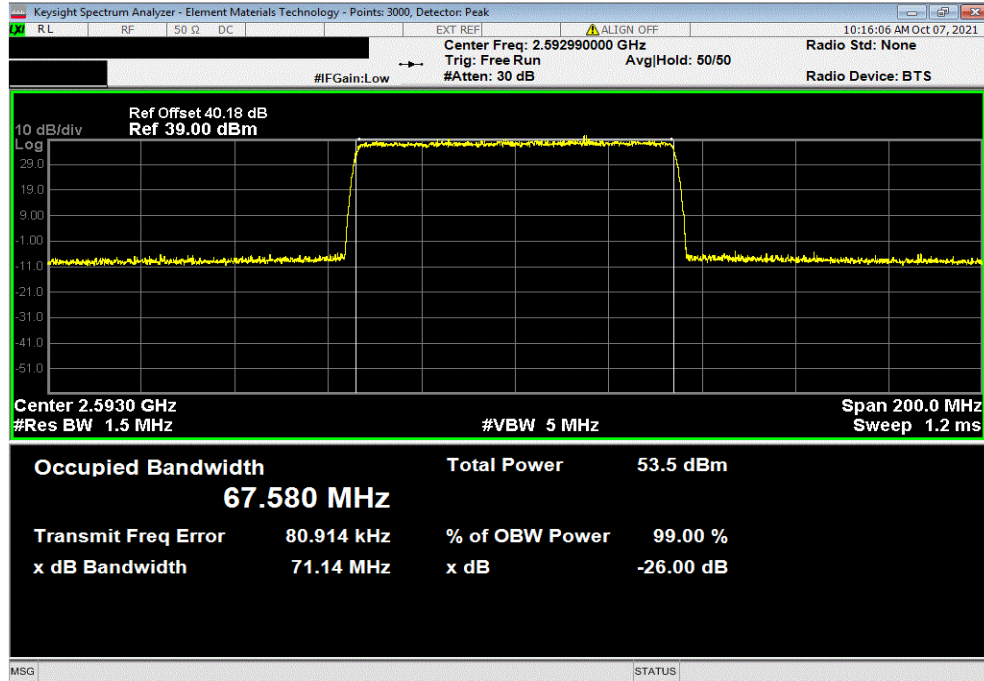


OCCUPIED BANDWIDTH - 5G NR

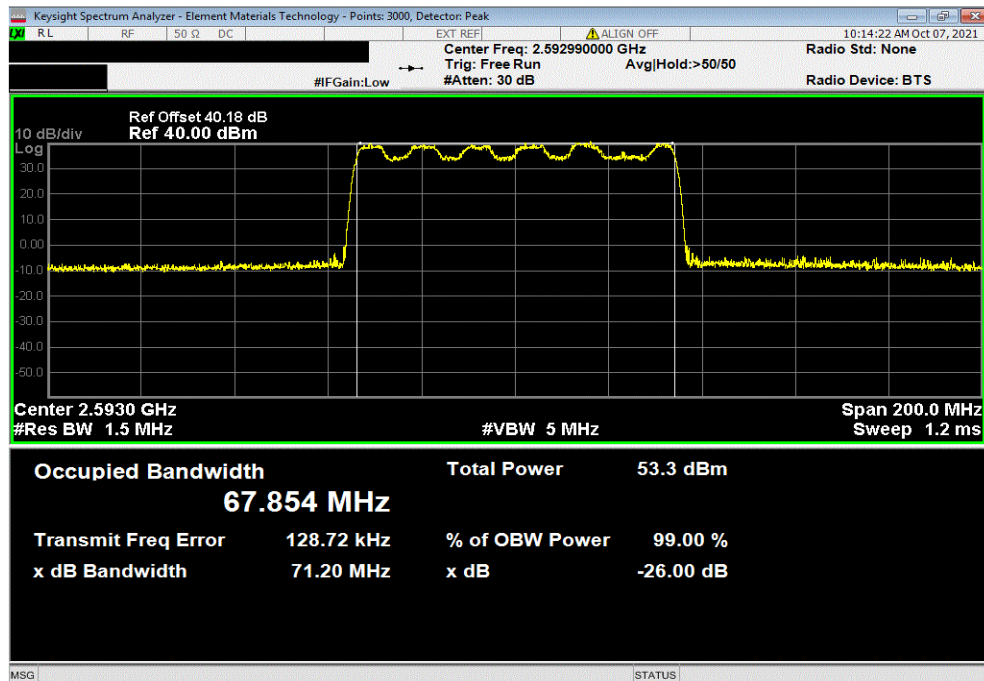


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR70) 70 MHz Bandwidth, QPSK Modulation, Mid Channel 2592.99 MHz							
			Value	Value			
			99% (MHz)	26dB (MHz)	Limit		Result
			67.58	71.145	Within Band		Pass



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR70) 70 MHz Bandwidth, 16QAM Modulation, Mid Channel 2592.99 MHz							
			Value	Value			
			99% (MHz)	26dB (MHz)	Limit		Result
			67.854	71.202	Within Band		Pass

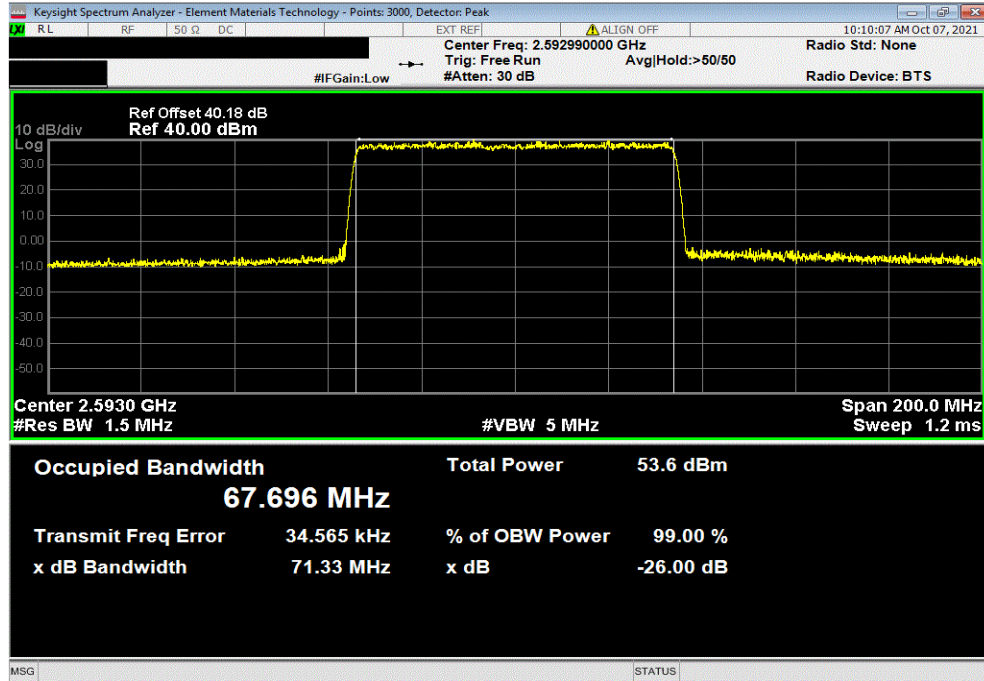


OCCUPIED BANDWIDTH - 5G NR

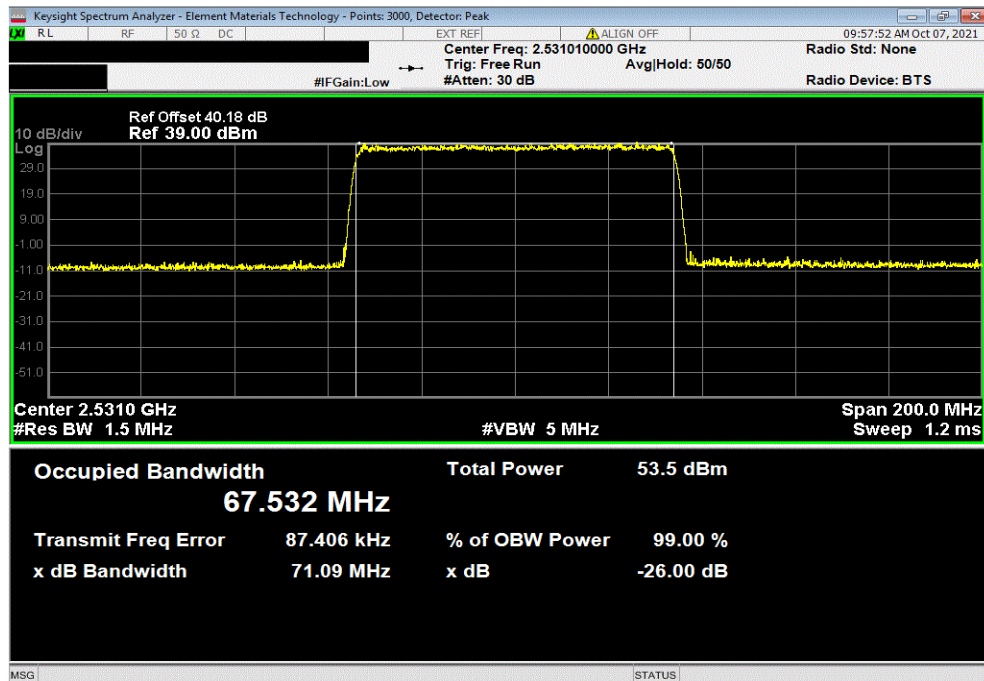


TbTx 2019.08.30.0 XMI 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR70) 70 MHz Bandwidth, 64QAM Modulation, Mid Channel 2592.99 MHz							
			Value	Value			
			99% (MHz)	26dB (MHz)	Limit		Result
			67.696	71.331	Within Band		Pass



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR70) 70 MHz Bandwidth, 256QAM Modulation, Low Channel 2531.01 MHz							
			Value	Value			
			99% (MHz)	26dB (MHz)	Limit		Result
			67.532	71.091	Within Band		Pass

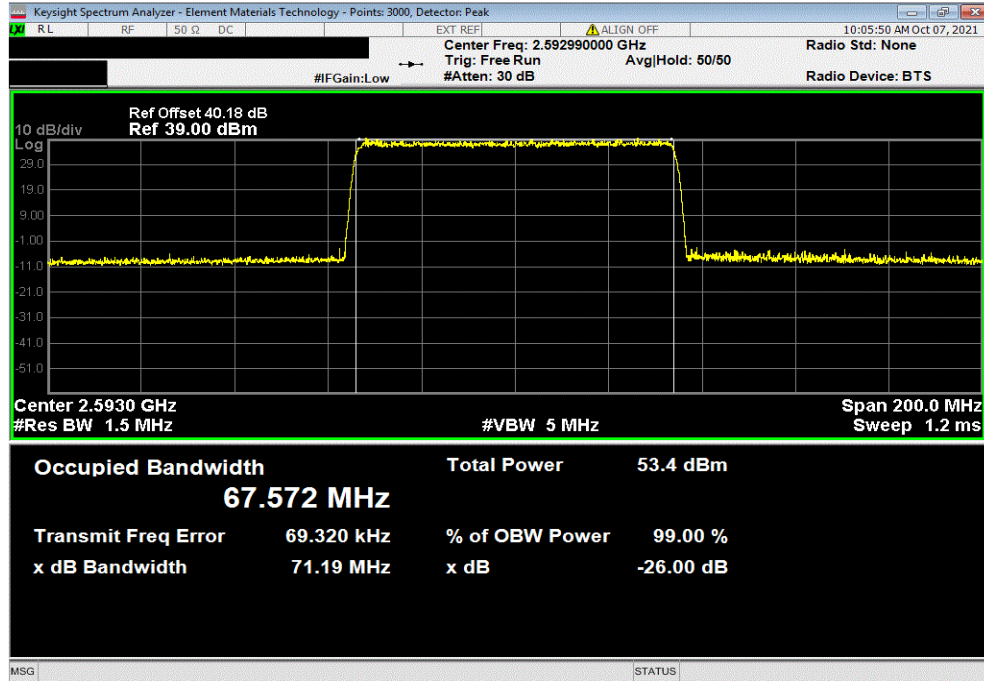


OCCUPIED BANDWIDTH - 5G NR

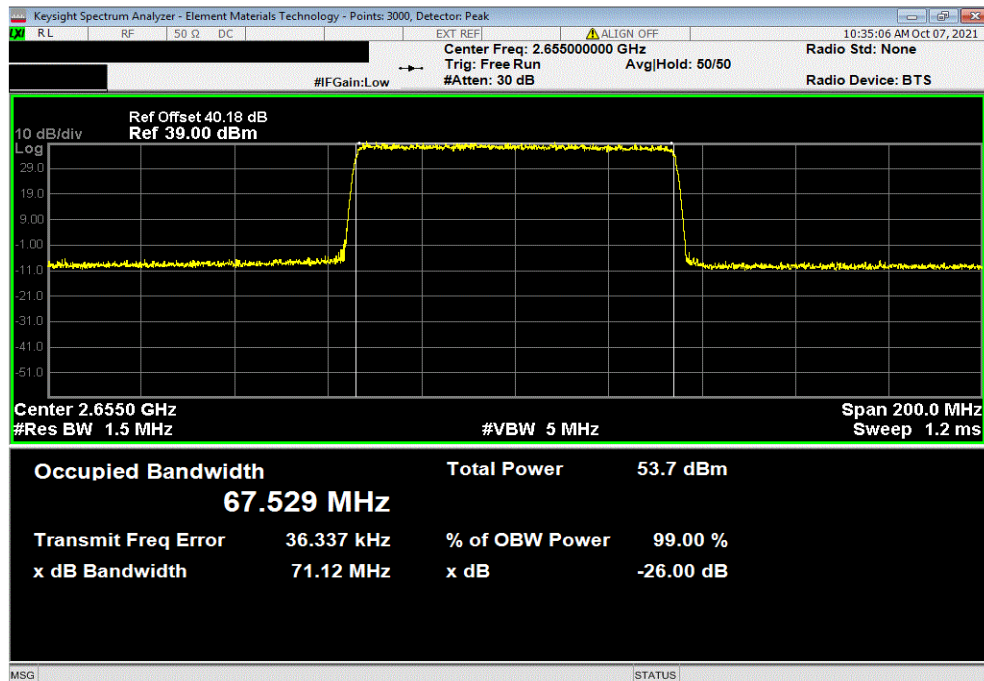


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR70) 70 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		67.572	71.187	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR70) 70 MHz Bandwidth, 256QAM Modulation, High Channel 2655.00 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		67.529	71.121	Within Band		Pass	

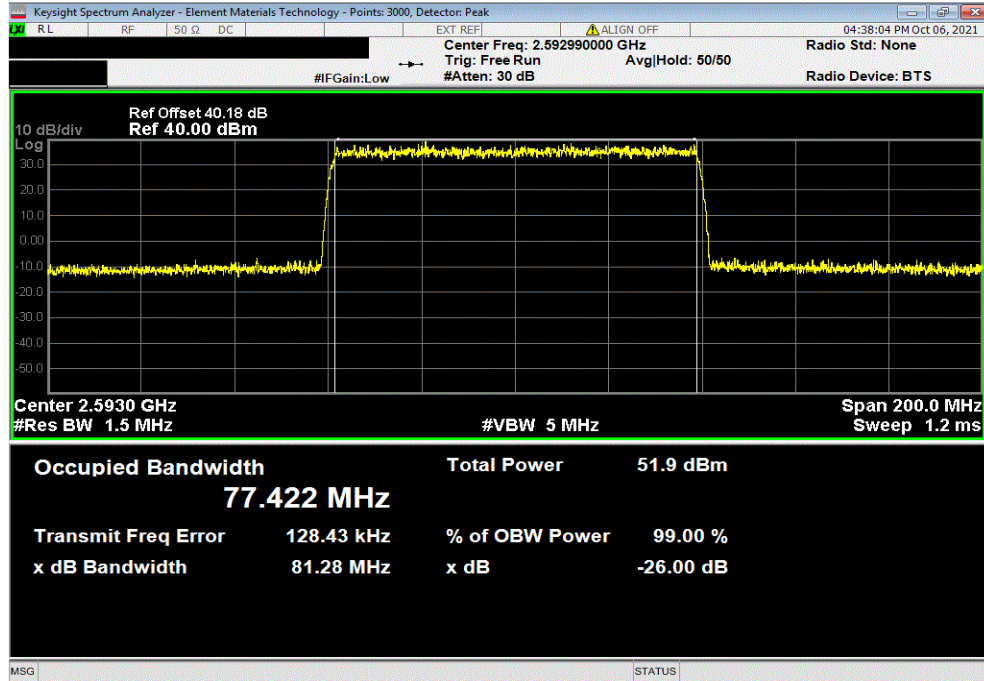


OCCUPIED BANDWIDTH - 5G NR

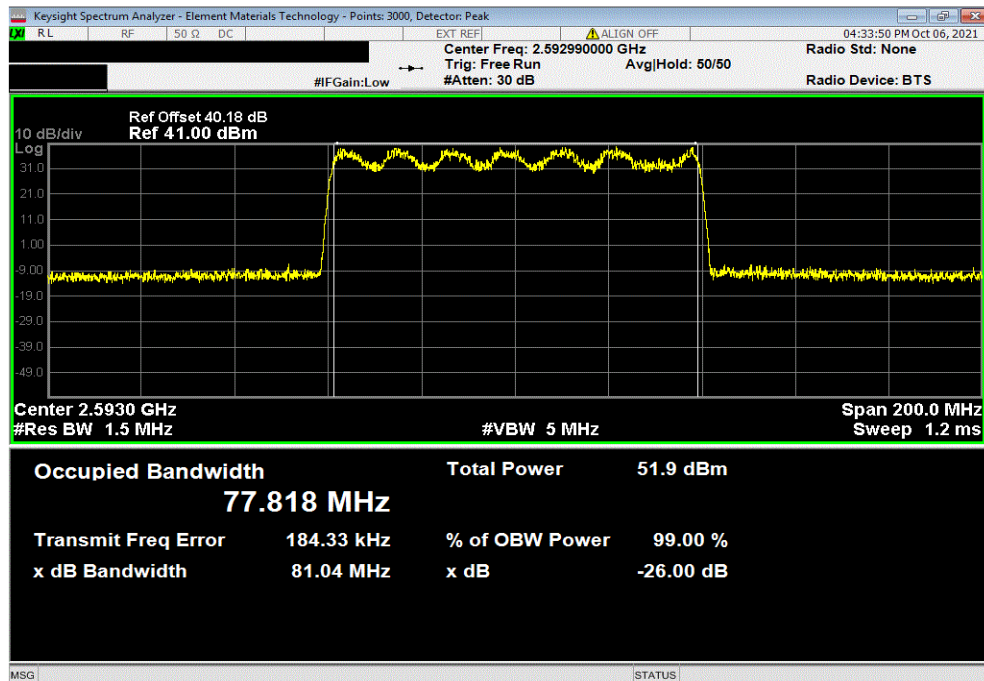


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR80) 80 MHz Bandwidth, QPSK Modulation, Mid Channel 2592.99 MHz							
		Value		Value		Limit	
		99% (MHz)		26dB (MHz)			
		77.422		81.28		Within Band	
						Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR80) 80 MHz Bandwidth, 16QAM Modulation, Mid Channel 2592.99 MHz							
		Value		Value		Limit	
		99% (MHz)		26dB (MHz)			
		77.818		81.036		Within Band	
						Pass	

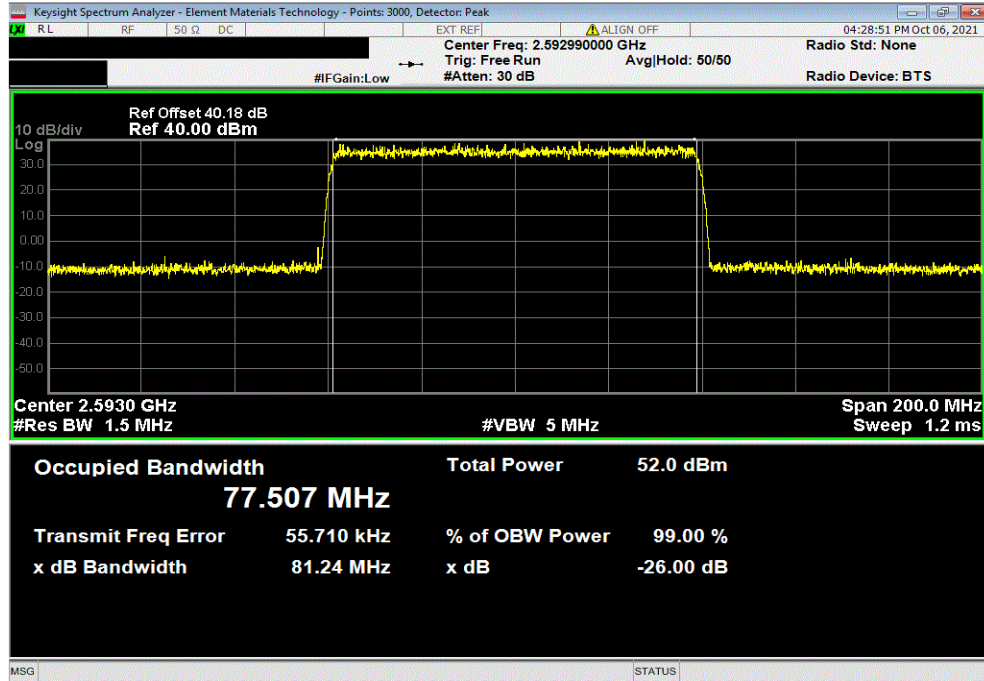


OCCUPIED BANDWIDTH - 5G NR

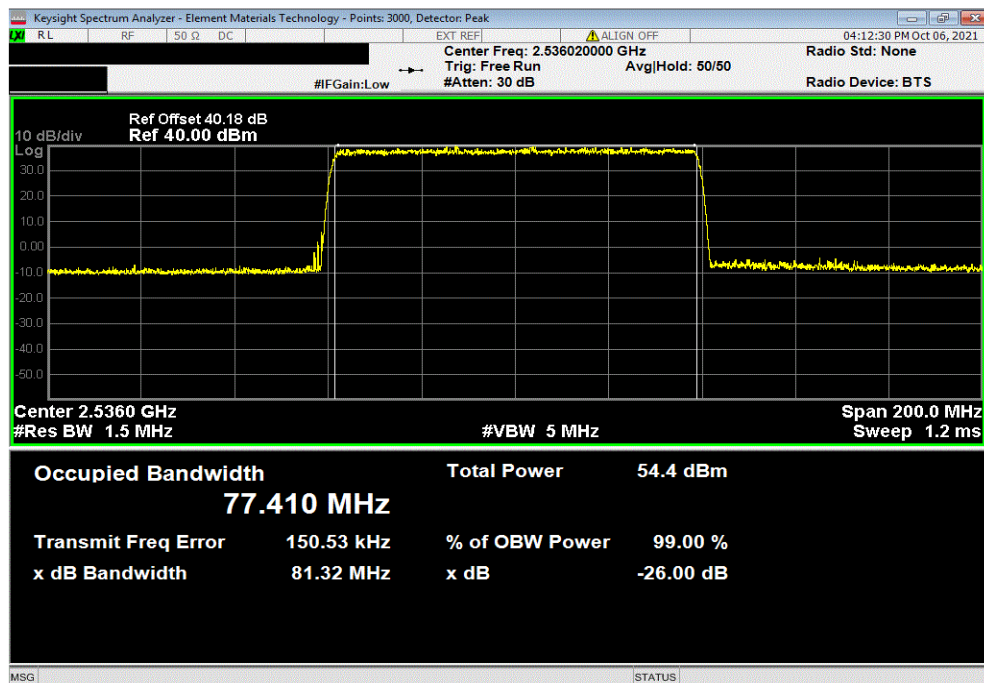


TbTx 2019.08.30.0 XMt 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR80) 80 MHz Bandwidth, 64QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		77.507	81.24	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR80) 80 MHz Bandwidth, 256QAM Modulation, Low Channel 2536.02 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		77.41	81.316	Within Band		Pass	

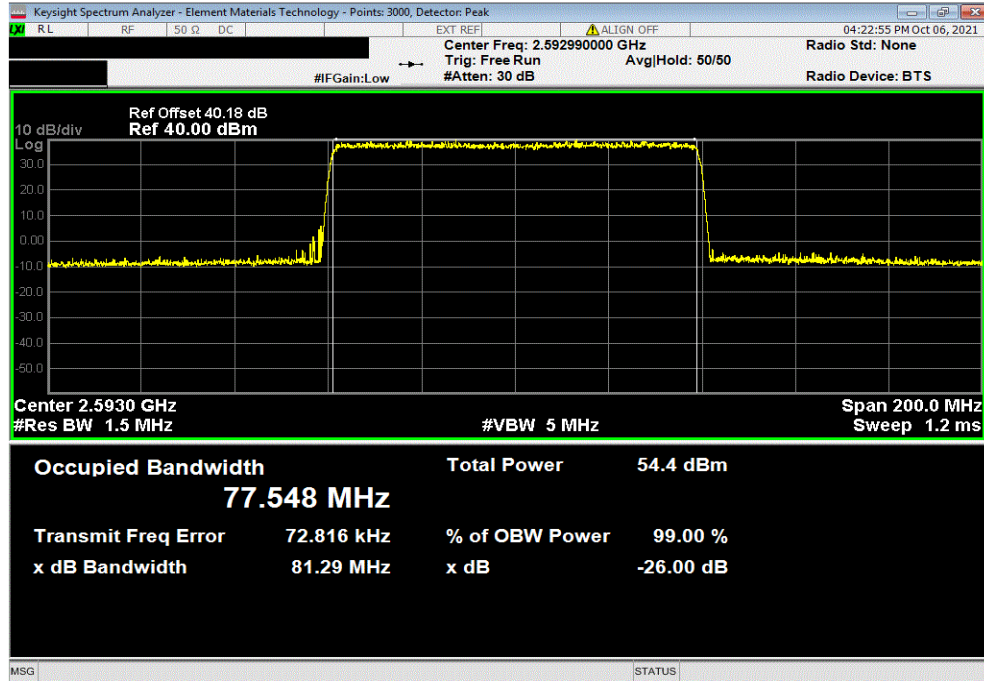


OCCUPIED BANDWIDTH - 5G NR

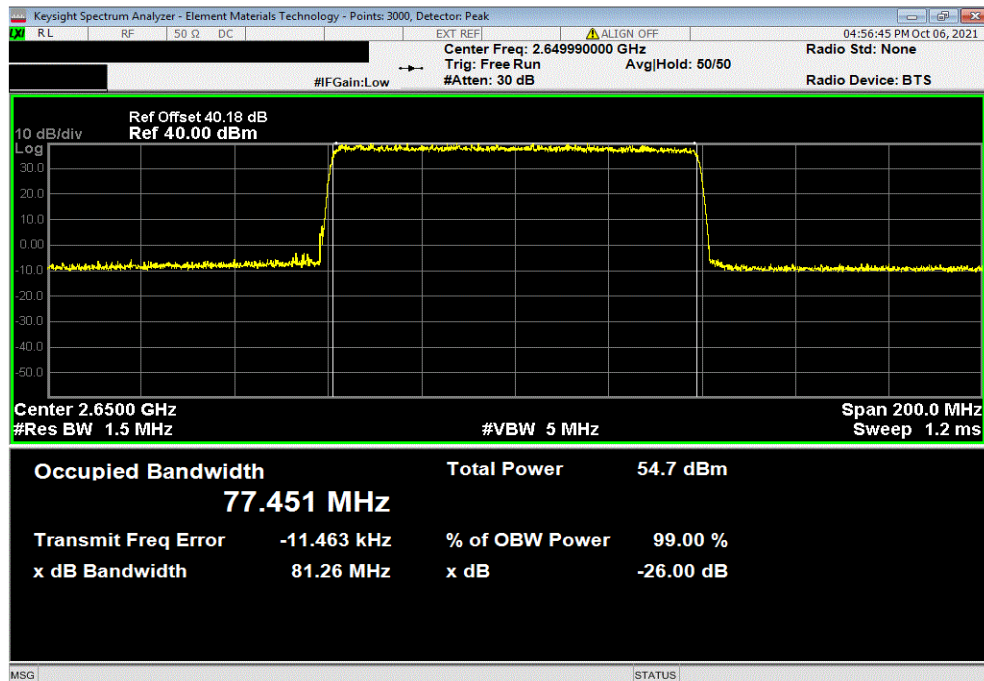


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR80) 80 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		77.548	81.289	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR80) 80 MHz Bandwidth, 256QAM Modulation, High Channel 2649.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		77.451	81.257	Within Band		Pass	

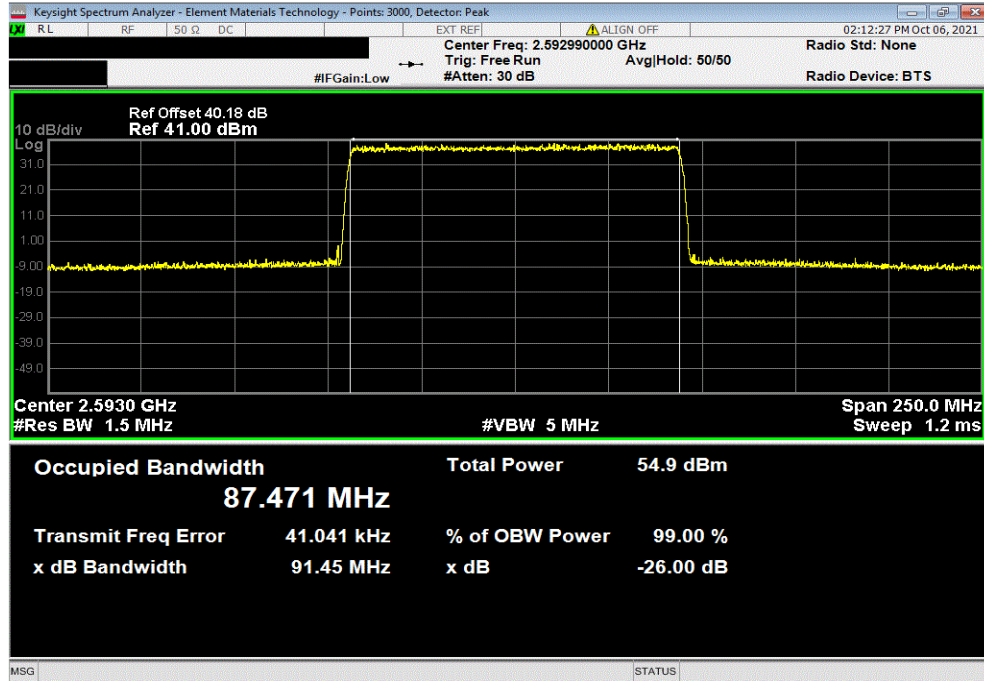


OCCUPIED BANDWIDTH - 5G NR

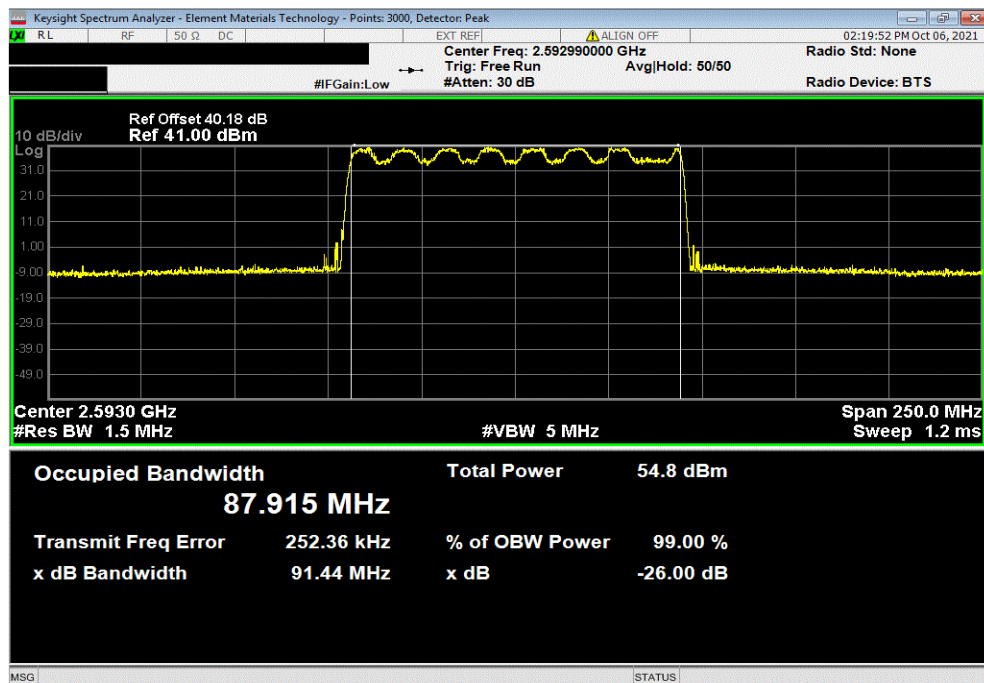


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR90) 90 MHz Bandwidth, QPSK Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		87.471	91.446	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR90) 90 MHz Bandwidth, 16QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		87.915	91.438	Within Band		Pass	

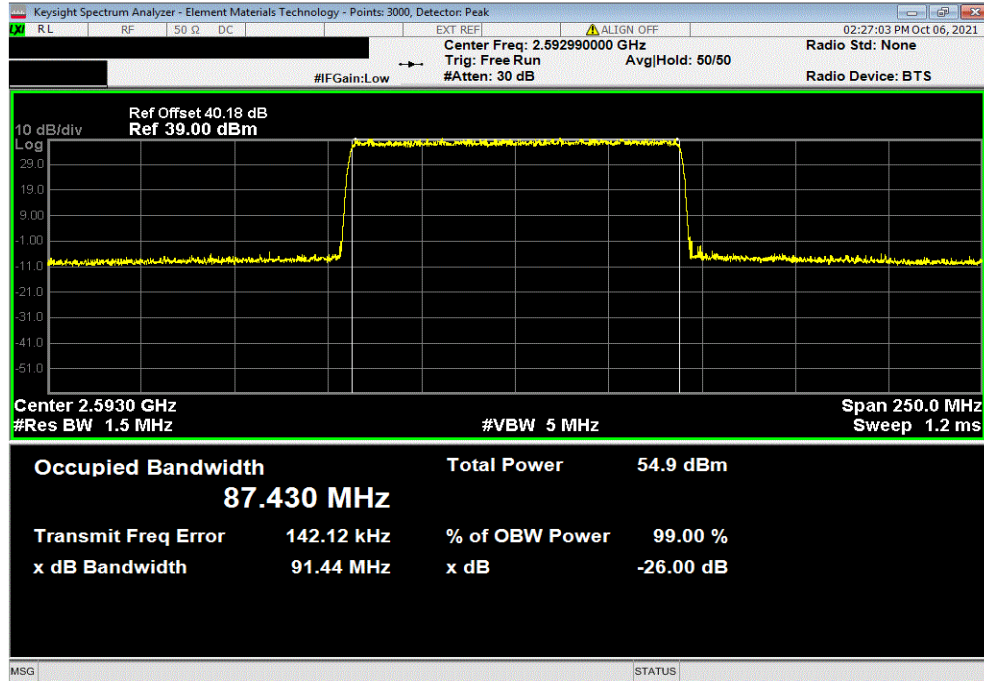


OCCUPIED BANDWIDTH - 5G NR

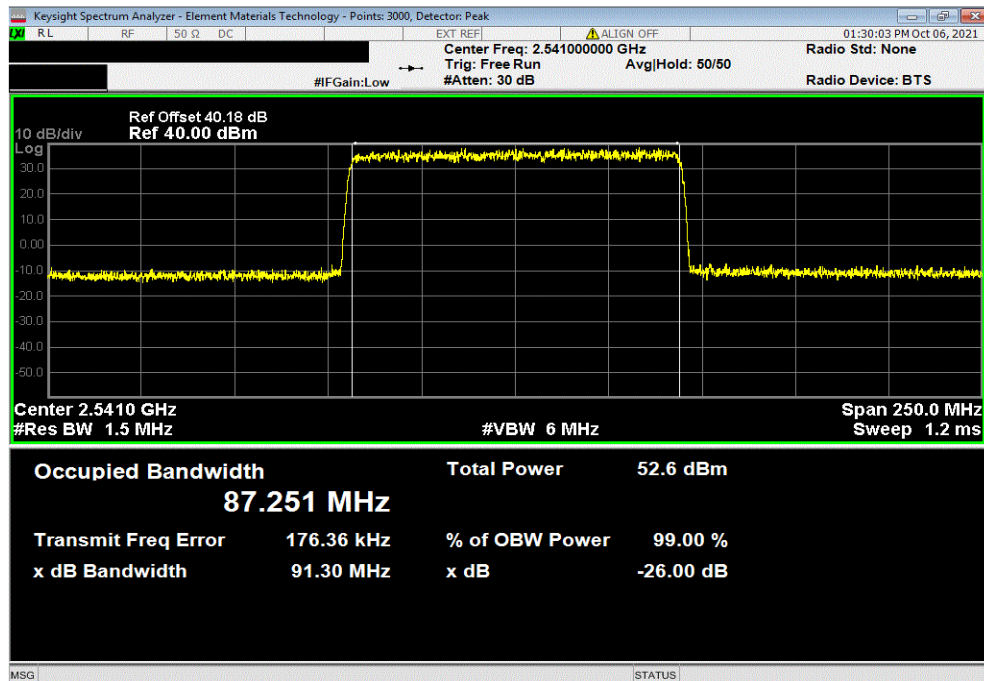


TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR90) 90 MHz Bandwidth, 64QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		87.43	91.436	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR90) 90 MHz Bandwidth, 256QAM Modulation, Low Channel 2541.00 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		87.251	91.302	Within Band		Pass	

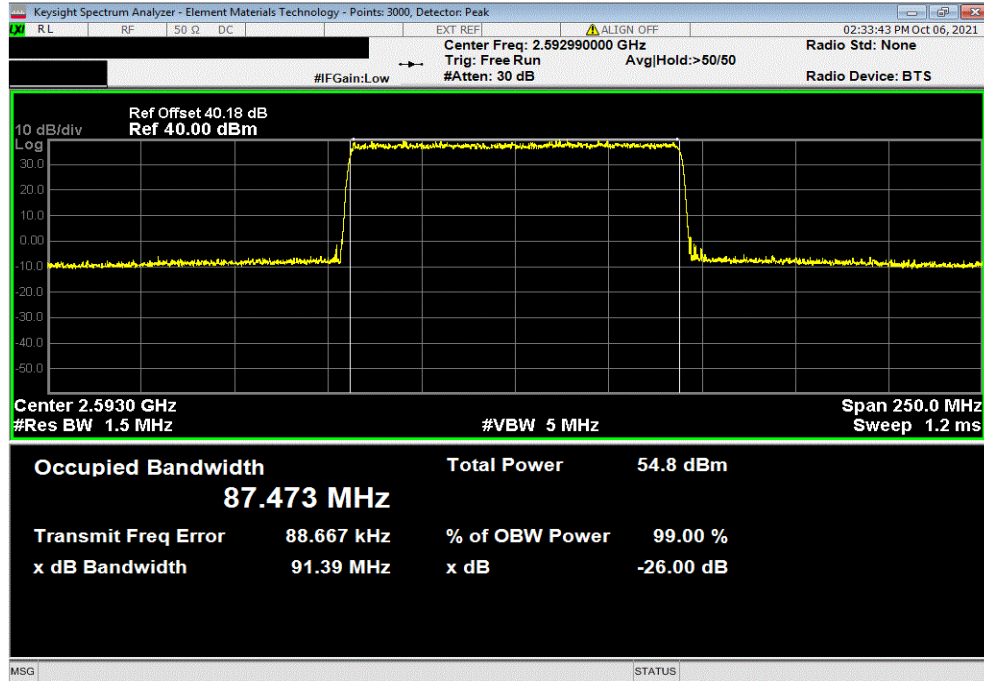


OCCUPIED BANDWIDTH - 5G NR



TbTx 2019.08.30.0 XbTx 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR90) 90 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		87.473	91.386	Within Band		Pass	



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR90) 90 MHz Bandwidth, 256QAM Modulation, High Channel 2644.98 MHz							
		Value	Value				
		99% (MHz)	26dB (MHz)	Limit		Result	
		87.236	91.283	Within Band		Pass	

