

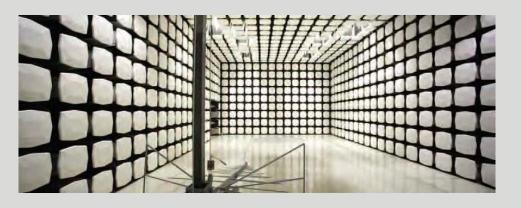
Radio Test Report Application for Class II Permissive Change of Equipment Authorization

> 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





This report must not be used to claim product certification, approval, or endorsement by A2LA or any agency of the U.S. Government. This Report shall not be reproduced, except in full without written approval of the laboratory.

EAR-Controlled Data - This document contains technical data whose export and reexport/retransfer is subject to control by the U.S. Department of Commerce under the Export Administration Act and the Export Administration Regulations. The Department of Commerce's prior written approval may be required for the export or re-export/retransfer of such technical data to any foreign person, foreign entity or foreign organization whether in the United States or abroad.





Last Date of Test: October 13, 2021 Nokia Solutions and Networks EUT: Airscale 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.

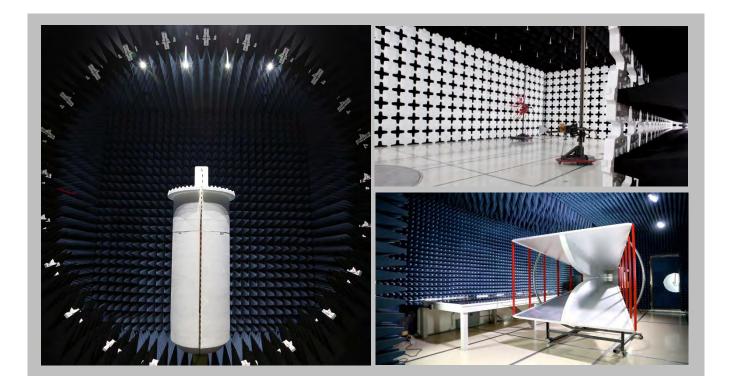
	SCOPE						
	For details on the Scopes of our Accreditations, please visit:						
<u>California</u>	<u>Minnesota</u>	<u>Oregon</u>	<u>Texas</u>	Washington			

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.

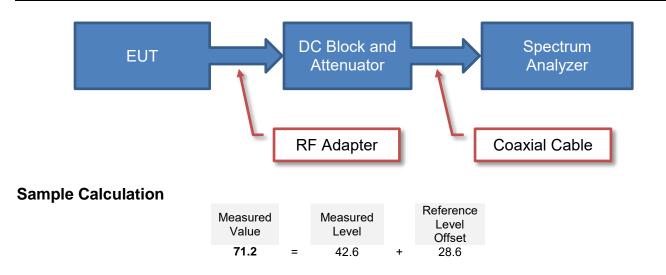
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

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

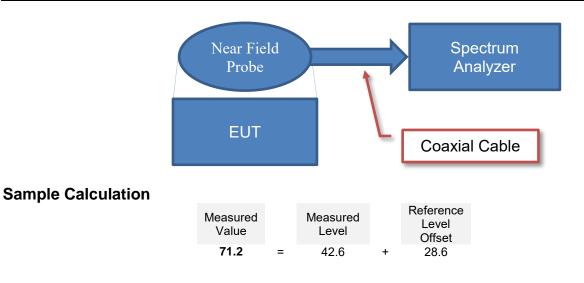
TEST SETUP BLOCK DIAGRAMS



Antenna Port Conducted Measurements



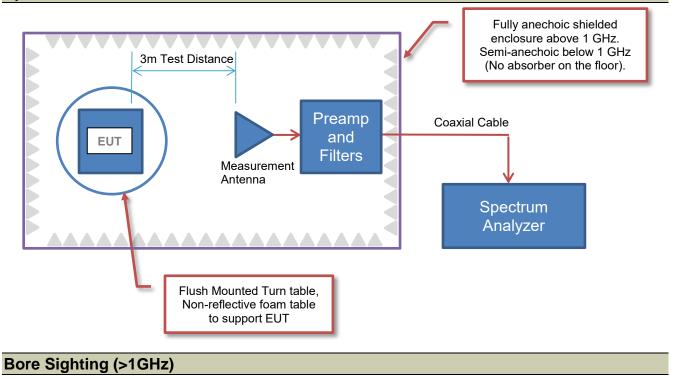
Near Field Test Fixture Measurements



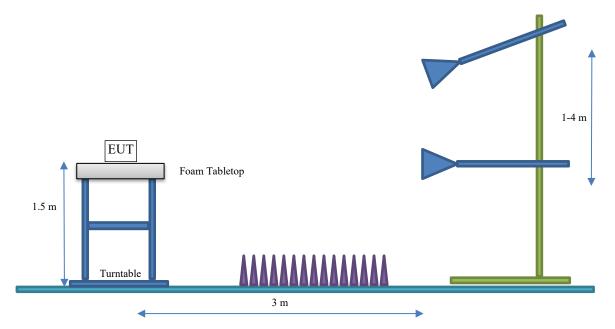
TEST SETUP BLOCK DIAGRAMS



Spurious Radiated Emissions



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.





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

Client and Equipment Under Test (EUT) Information

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 multistandard 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	5.6 W	7.5 W	7.5 W	11.3 W	15.0 W	18.8 W	22.5 W	26.3 W	30.0 W	33.8 W	40.0 W
or	or	or	or	or	or	or	or	or	or	or	or
36.0dBm	37.5dBm	38.8dBm	38.8dBm	40.5dBm	41.8dBm	42.7dBm	43.5dBm	44.2dBm	44.8dBm	45.3dBm	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.



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 $\pm 45^{\circ}$ 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 (\pm 1MHz), 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).



The AZHL downlink channel numbers and frequencies for 4G LTE TDD operations are as follows: <u>3GPP Frequency Band 41 LTE Band Edge EARFCNs</u>

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	Frequency	4G LTE	Channel B	andwidth
	EARFCN	(MHz)	10 MHz	15 MHz	20 MHz
	39650	2496.0		Lower Band Edg	je
	39700	2501.0	Bottom Ch		
8)					
AZHL Band 41 (Antennas 1 through 8)	39725	2503.5		Bottom Ch	
thro					
s 1	39750	2506.0			Bottom Ch
nna					
Ante	40620	2593.0		Middle Channel	
1 (A					
d 4	41490	2680.0			Top Channel
Bai					
HL	41515	2682.5		Top Channel	
AZ					
	41540	2685.0	Top Channel		
	41590	2690.0		Upper Band Edg	e

AZHL Downlink Band Edge 4G LTE Band 41 Frequency Channels



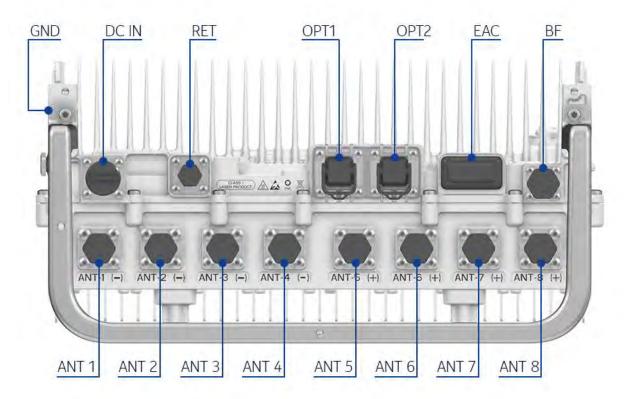
The AZHL downlink channel numbers and frequencies for 5G NR TDD operations are as follows: <u>3GPP Frequency Band n41 5G NR Band Edge NR-ARFCNs</u>

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	Frequency		•	5G NR	Chann	el Banc	lwidth	in MHz	L	
	NR- ARFCN Band Edge	(MHz)	20	30	40	50	60	70	80	90	100
	Band Edge	2496.00				Lo	wer Band E	dge			
	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			
gh 8)	507204	2536.02							Bot Ch		
hrou	 508200	2541.00								Bot Ch	
1 t											
nas	509202	2546.01									Bot Ch
nten		2502.00					iddle Chan	1			
(Aı	518598	2592.99				IVI		nei			
. n41	528000	2640.00									Top Ch
Band	528996	2644.98								Top Ch	
AZHL Band n41 (Antennas 1 through 8)	529998	2649.99							Top Ch		
A7	531000	2655.00						Top Ch			
	531996	2659.98					Top Ch				
	532998	2664.99				Top Ch					
	534000	2670.00			Top Ch						
		2070.00			Top Cil						
	534996	2674.98		Top Ch							
	535998	2679.99	Top Ch								
		2(00.00									
	Band Edge	2690.00 ZHL Downlin	 1 D 1	<u>F1</u>			per Band E		1		



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 Airscale Base Transceiver Station Remote Radio Head Model AZHL FCC radio certification.



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			

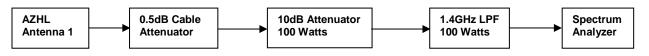
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.101	J8163420419
ASIB (4G BTS System Module)	Nokia Solutions and Networks	473764A.102	L1192005258
ABIO (4G BTS Baseband Module)	Nokia Solutions and Networks	475266A.102	L1205105867
ASIK (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



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	Ν	EUT [AZHL] Ant ports 2-8	150W -50ohm - Load	
Reference cables (Frame Clock & Trigger)	Υ	1 meter	Ν	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	Ν	Low Pass Filter 1.4G/100W	Analyzer

RF Test Setup Diagram:





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			

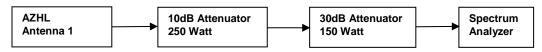
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.101	J8163420419
ASIB (4G BTS System Module)	Nokia Solutions and Networks	473764A.102	L1192005258
ABIO (4G BTS Baseband Module)	Nokia Solutions and Networks	475266A.102	L1205105867
ASIK (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 250W10dB	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
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



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





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			

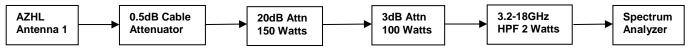
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.101	J8163420419
ASIB (4G BTS System Module)	Nokia Solutions and Networks	473764A.102	L1192005258
ABIO (4G BTS Baseband Module)	Nokia Solutions and Networks	475266A.102	L1205105867
ASIK (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



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	Ν	EUT [AZHL] Ant ports 2-8	150W -50ohm - Load	
Reference cables (Frame Clock & Trigger)	Y	1 meter	Ν	ASIK/ASIB	Analyzer	

Cables					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1	Connection 2
HS-SUCOFLEX_106	Y	2 meters	Ν	EUT [AZHL] RF port #1	Attenuator 150W/20dB
Attenuator 150W/20dB	N	NA	Ν	RF cable HS- SUCOFLEX_106	Attenuator 100W/3dB
Attenuator 100W/3dB	Ν	NA	Ν	Attenuator 150W/20dB	High Pass Filter 3.2GHz
High Pass Filter 3.2GHz/2W	N	NA	Ν	Attenuator 100W/3dB	RF cable HS- SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	Ν	High Pass Filter 3.2GHz/2W	Analyzer

RF Test Setup Diagram:





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			

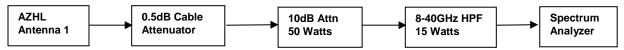
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.101	J8163420419
ASIB (4G BTS System Module)	Nokia Solutions and Networks	473764A.102	L1192005258
ABIO (4G BTS Baseband Module)	Nokia Solutions and Networks	475266A.102	L1205105867
ASIK (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



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	Ν	EUT [AZHL] Ant port #1	Attenuator 50W/10dB
Attenuator 50W/10dB	N	NA	Ν	RF cable HS- SUCOFLEX_104	High Pass Filter 8-40GHz
High Pass Filter 8-40GHz/15W	N	NA	Ν	Attenuator 50W/10dB	RF-Lambda -AC20040003
RF-Lambda -AC20040003	Y	1 meter	Ν	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.



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 ≥ 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.

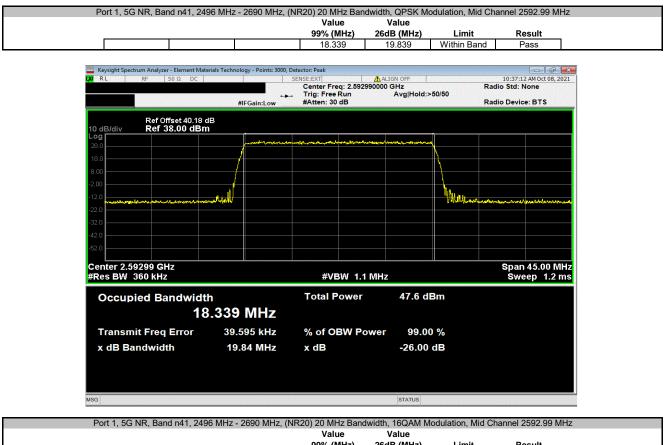
Band n41 (2496 MHz to 2690 MHz) Emission Designators derived from the measurement results:

FCC Em	ission Desig	nators for Ba	and n41 (249	6MHz to 26	90MHz)
Chan	Radio	5G-NR:	5G-NR:	5G-NR:	5G-NR:
BW	Channel	QPSK	16QAM	64QAM	256QAM
	Low				19M7G7W
20MHz	Mid	19M8G7W	19M7G7W	19M8G7W	19M7G7W
	High				19M7G7W
	Low				29M7G7W
30MHz	Mid	29M5G7W	29M8G7W	29M9G7W	29M8G7W
	High				29M8G7W
	Low				40M6G7W
40MHz	Mid	40M6G7W	40M6G7W	40M6G7W	40M7G7W
	High				40M6G7W
	Low				50M3G7W
50MHz	Mid	50M6G7W	50M5G7W	50M5G7W	50M4G7W
	High				50M3G7W
	Low				60M5G7W
60MHz	Mid	60M6G7W	60M6G7W	60M6G7W	60M6G7W
	High				60M5G7W
	Low				71M1G7W
70MHz	Mid	71M1G7W	71M2G7W	71M3G7W	71M2G7W
	High				71M1G7W
	Low				81M3G7W
80MHz	Mid	81M3G7W	81M0G7W	81M2G7W	81M3G7W
	High				81M3G7W
	Low				91M3G7W
90MHz	Mid	91M4G7W	91M4G7W	91M4G7W	91M4G7W
	High				91M3G7W
Note: FCC emis	sion designator	s are based on 2	26dB emission b	andwidth.	

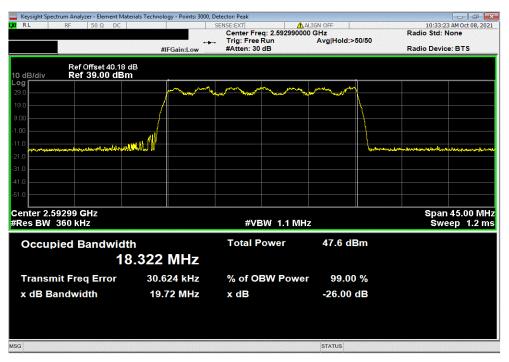


	AZHL (C2PC LTE/5G NR B41)		Work Order: Date:	NOKI0035 8-Oct-21	
Customer	r: Nokia Solutions and Networks		Temperature:	21.6 °C	
Project	: David Le, John Rattanavong t: None		Barometric Pres.:		
Tested by T SPECIFICA	r: Brandon Hobbs Power: 54 VDC TIONS Test Method		Job Site:	TX09	
27:2021	ANSI C63.26:	2015			
IMENTS					
osses in the r	neasurement path were accounted for: attenuators, cables, DC block and filter when in use. Bar	d n41 carriers and enabled at maximum p	ower. External 1 g	ating was set using	a trig dela
-	e length = 3.714ms.				
e	DM TEST STANDARD				
figuration #	2				
	Signature				
		Value 99% (MHz)	Value 26dB (MHz)	Limit	Resul
1, 5G NR, Bar	nd n41, 2496 MHz - 2690 MHz (NR20) 20 MHz Bandwidth				
	QPSK Modulation Mid Channel 2592.99 MHz	18.3	19.8	Within Band	Pass
	16QAM Modulation				
	Mid Channel 2592.99 MHz 64QAM Modulation	18.3	19.7	Within Band	Pass
	Mid Channel 2592.99 MHz 256QAM Modulation	18.3	19.8	Within Band	Pass
	Low Channel 2506.02 MHz	18.2	19.7	Within Band	Pass
	Mid Channel 2592.99 MHz High Channel 2679.99 MHz	18.3 18.3	19.7 19.7	Within Band Within Band	Pass Pass
	(NR30) 30 MHz Bandwidth QPSK Modulation				
	Mid Channel 2592.99 MHz 16QAM Modulation	27.9	29.5	Within Band	Pass
	Mid Channel 2592.99 MHz	28.0	29.8	Within Band	Pass
	64QAM Modulation Mid Channel 2592.99 MHz	28.0	29.9	Within Band	Pass
	256QAM Modulation Low Channel 2511.00 MHz	27.9	29.7	Within Band	Pass
	Mid Channel 2592.99 MHz High Channel 2674.98 MHz	27.9 27.9	29.8 29.8	Within Band Within Band	Pass
	(NR40) 40 MHz Bandwidth	21.5	23.0	Within Band	r d 55
	QPSK Modulation Mid Channel 2592.99 MHz	38.1	40.6	Within Band	Pass
	16QAM Modulation Mid Channel 2592.99 MHz	38.2	40.6	Within Band	Pass
	64QAM Modulation				
	Mid Channel 2592.99 MHz 256QAM Modulation	38.1	40.6	Within Band	Pass
	Low Channel 2516.01 MHz Mid Channel 2592.99 MHz	38.0 38.0	40.6 40.7	Within Band Within Band	Pass Pass
	High Channel 2670.00 MHz (NR50) 50 MHz Bandwidth	38.0	40.6	Within Band	Pass
	QPSK Modulation	17.0	50.0		_
	Mid Channel 2592.99 MHz 16QAM Modulation	47.6	50.6	Within Band	Pass
	Mid Channel 2592.99 MHz 64QAM Modulation	47.7	50.5	Within Band	Pass
	Mid Channel 2592.99 MHz 256QAM Modulation	47.6	50.5	Within Band	Pass
	Low Channel 2521.02 MHz	47.5	50.3	Within Band	Pass
	Mid Channel 2592.99 MHz High Channel 2664.99 MHz	47.6 47.6	50.4 50.3	Within Band Within Band	Pass Pass
	(NR60) 60 MHz Bandwidth QPSK Modulation				
	Mid Channel 2592.99 MHz	57.9	60.6	Within Band	Pass
	16QAM Modulation Mid Channel 2592.99 MHz	58.1	60.6	Within Band	Pass
	64QAM Modulation Mid Channel 2592.99 MHz	57.9	60.6	Within Band	Pass
	256QAM Modulation Low Channel 2526.00 MHz	57.7	60.5	Within Band	Pass
	Mid Channel 2592.99 MHz	57.8	60.6	Within Band	Pass
	High Channel 2659.98 MHz (NR70) 70 MHz Bandwidth	57.7	60.5	Within Band	Pass
	QPSK Modulation Mid Channel 2592.99 MHz	67.6	71.1	Within Band	Pass
	16QAM Modulation Mid Channel 2592.99 MHz	67.9	71.2	Within Band	Pass
	64QAM Modulation				
	Mid Channel 2592.99 MHz 256QAM Modulation	67.7	71.3	Within Band	Pass
	Low Channel 2531.01 MHz Mid Channel 2592.99 MHz	67.5 67.6	71.1 71.2	Within Band Within Band	Pass Pass
	High Channel 2655.00 MHz	67.5	71.1	Within Band	Pass
	(NR80) 80 MHz Bandwidth QPSK Modulation				<u> </u>
	Mid Channel 2592.99 MHz 16QAM Modulation	77.4	81.3	Within Band	Pass
	Mid Channel 2592.99 MHz 64QAM Modulation	77.8	81.0	Within Band	Pass
	Mid Channel 2592.99 MHz	77.5	81.2	Within Band	Pass
	256QAM Modulation Low Channel 2536.02 MHz	77.4	81.3	Within Band	Pass
	Mid Channel 2592.99 MHz High Channel 2649.99 MHz	77.5 77.5	81.3 81.3	Within Band Within Band	Pass Pass
	(NR90) 90 MHz Bandwidth				
	QPSK Modulation Mid Channel 2592.99 MHz	87.5	91.4	Within Band	Pass
	16QAM Modulation Mid Channel 2592.99 MHz	87.9	91.4	Within Band	Pass
	64QAM Modulation Mid Channel 2592.99 MHz	87.4	91.4	Within Band	Pass
	256QAM Modulation Low Channel 2541.00 MHz	87.3			Pass
			91.3	Within Band	

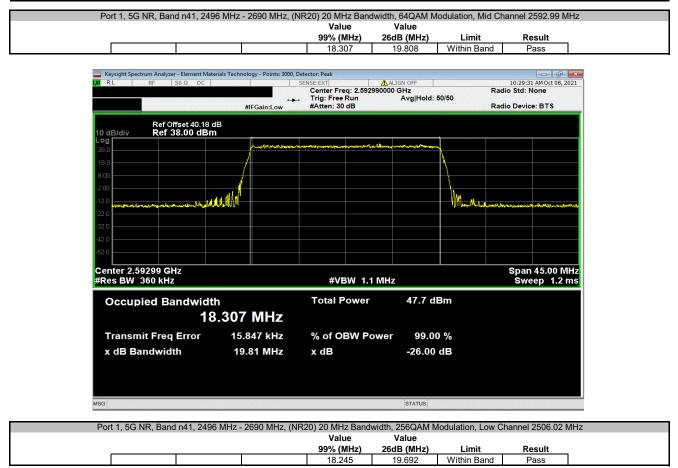


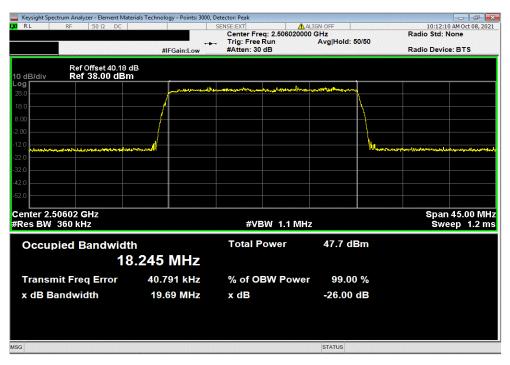


		Value	Value		
		99% (MHz)	26dB (MHz)	Limit	Result
		18.322	19.718	Within Band	Pass

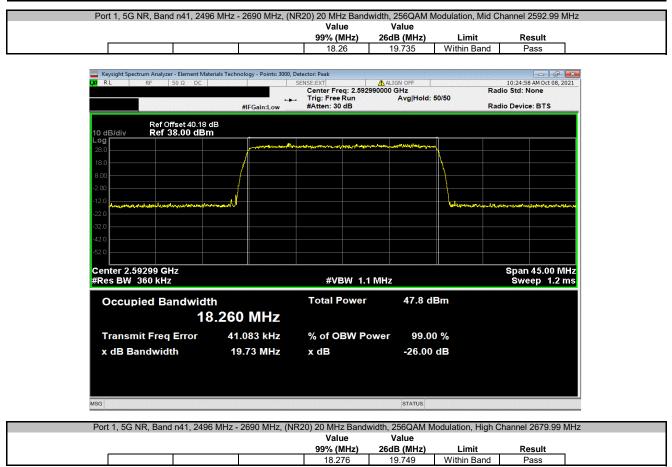


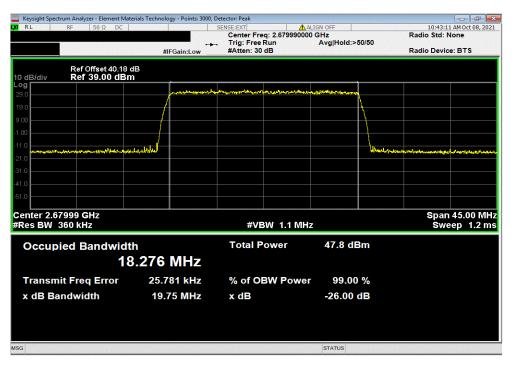




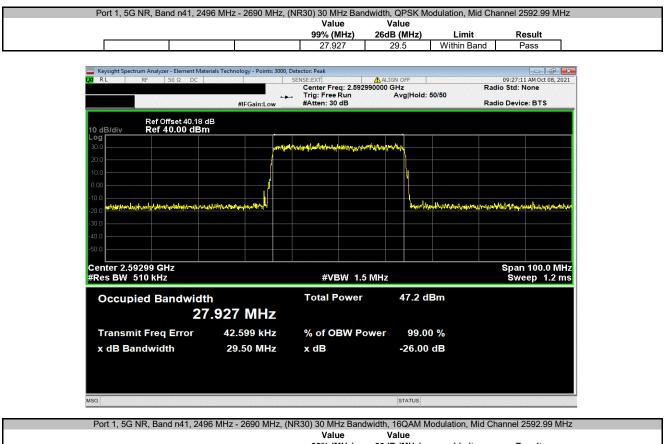




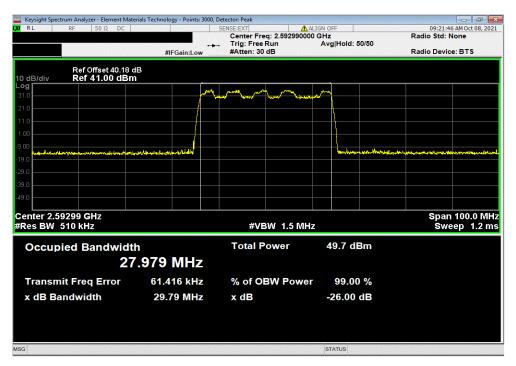




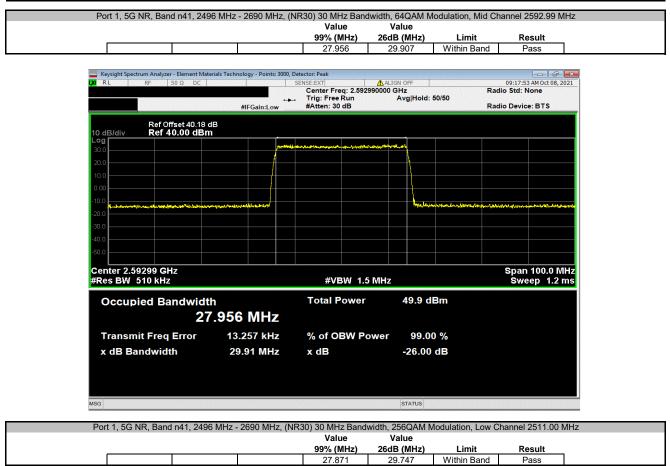




		Value	Value		
		99% (MHz)	26dB (MHz)	Limit	Result
		27.979	29.788	Within Band	Pass

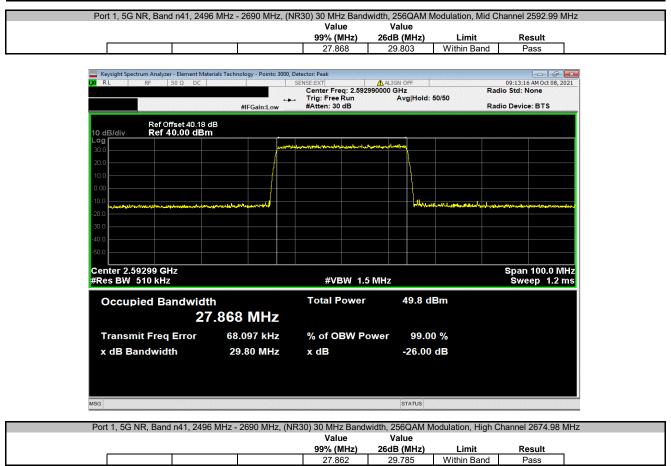






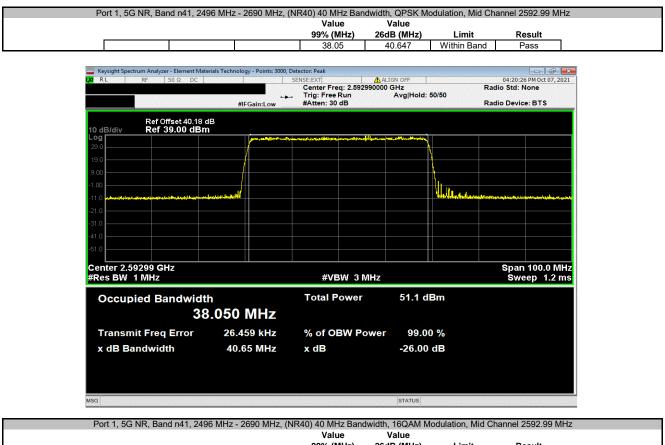
RL		erials Technology - Points: 3000,			
KL	RF 50 Ω DC			ALIGN OFF	05:09:00 PM Oct 07, 20
		++ #IFGain:Low	Center Freq: 2.511000 Trig: Free Run #Atten: 30 dB	000 GHz Avg Hold:>50/50	Radio Std: None Radio Device: BTS
dB/div	Ref Offset 40.18 o Ref 39.00 dBm				
9		مەسىر	and the second	man man	
0					
0					
- 					
Herberger Territoria	بهيري المراجعة المريون والجريد المروجوريين	and a star and a second star and a second		11 minutes 1840 47 minutes have been been	ale of a frankant frankant frankant of the hears and the s
0					
	1100 GHz 510 kHz		#VBW 1.5 M	IHz	Span 100.0 MI Sweep 1.2 n
					-
	i d Den denida	-	Total Bower	40.6 dBm	
	ied Bandwidt		Total Power	49.6 dBm	
		^h 7.871 MHz	Total Power	49.6 dBm	
Occupi			Total Power % of OBW Pow		
Occup Transm	27	7.871 MHz			
Occup Transm	27 it Freq Error	7.871 MHz 87.204 kHz	% of OBW Pow	ver 99.00 %	
Occup Transm	27 it Freq Error	7.871 MHz 87.204 kHz	% of OBW Pow	ver 99.00 %	
Occup Transm	27 it Freq Error	7.871 MHz 87.204 kHz	% of OBW Pow	ver 99.00 %	



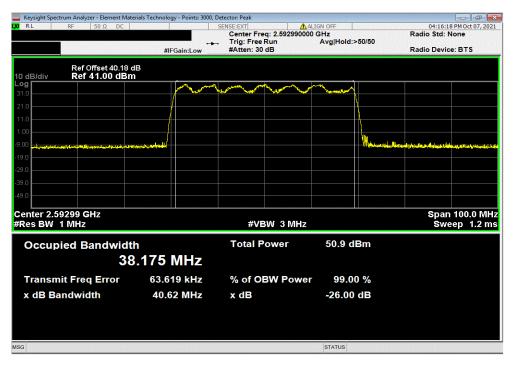


	ent Materials Technology - Point						
RL RF 50 Ω	DC	S	ENSE:EXT Center Freg: 2.674980				09:42:38 AM Oct 08, 20 Radio Std: None
	#IFGain:Lo		Trig: Free Run #Atten: 30 dB		g Hold:>	50/50	Radio Std. None Radio Device: BTS
Ref Offset 4 dB/div Ref 40.00							
g .0		-	nton attacked and any for some state	Aural Laster			
.0					<u>\</u>		
0							
00					H		
0 	ad the second and a second				hum	later month	warman and an all and an and a state of the state of the
0							
0							
.0							
enter 2.67498 GHz							Span 100.0 Mł
tes BW 510 kHz			#VBW 1.5 N	ЛНz			Sweep 1.2 n
Occupied Bandy	vidth		Total Power	4	19.8 d	Bm	
	27.862 MH	Z					
Transmit Freq Erro	or 30.612 kH	z	% of OBW Pow	/er	99.00) %	
x dB Bandwidth	29.78 MH	z	x dB		26.00	dB	

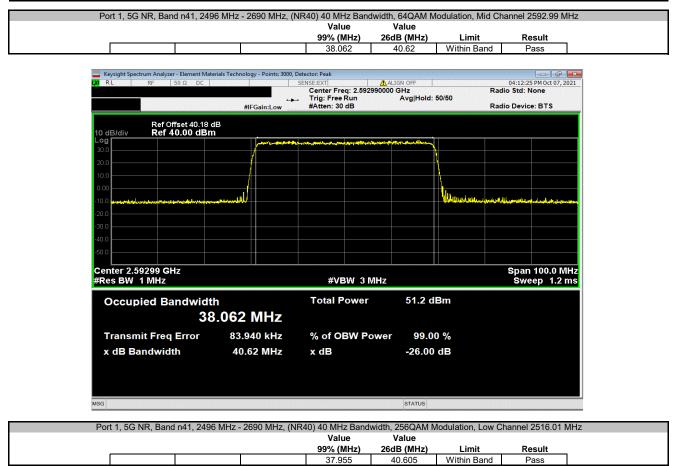


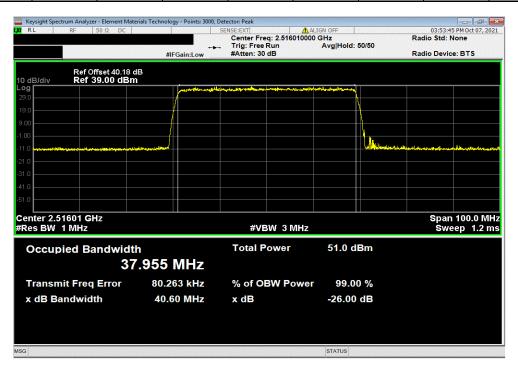


			Value	Value		
			99% (MHz)	26dB (MHz)	Limit	Result
			38.175	40.617	Within Band	Pass

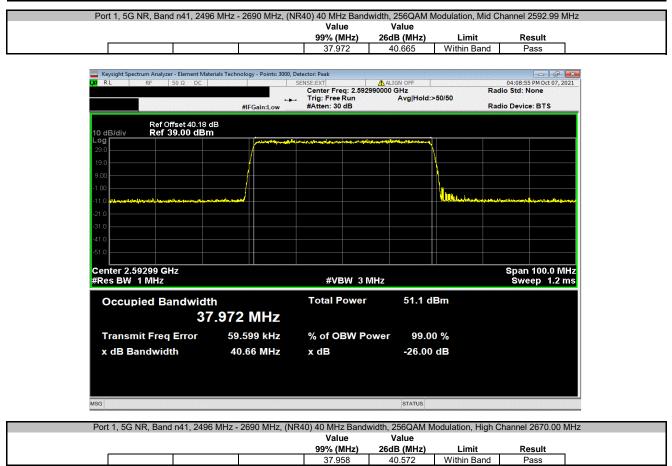














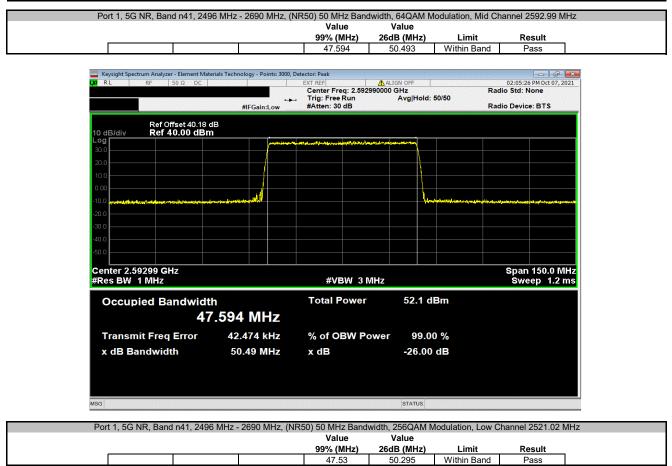


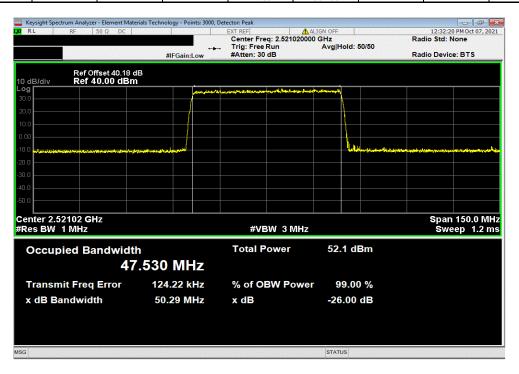


		Value	Value		
		99% (MHz)	26dB (MHz)	Limit	Result
		47.748	50.483	Within Band	Pass

Keysight Spectrum Analyzer - Element Mate	srials Technology - Points: 3000			
RL RF 50 Ω DC		EXT REF Center Freg: 2.59	ALIGN OFF	02:09:28 PM Oct 07, 202 Radio Std: None
	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Radio Std: None Radio Device: BTS	
Ref Offset 40.18 d dB/div Ref 40.00 dBn				
g		\sim		
.0	/			
0				
0 and dependent of the part of the dependent of the depen	لملهج بالمحمد والهالي أرادي والمحالي		Vinterhillindeteder	anin allalan ana ang sina ala ang ang sina ang s
.0				
0				
.0				
enter 2.59299 GHz		#) (B) W ()		Span 150.0 MH
tes BW 1 MHz		#VBW 3	IVIHZ	Sweep 1.2 n
Occupied Bandwidt	h	Total Power	51.9 dBm	
47	7.748 MHz			
	88.562 kHz	% of OBW P	ower 99.00 %	
Transmit Freq Error	88.562 kHz 50.48 MHz	% of OBW P x dB	ower 99.00 % -26.00 dB	
۳۲ Transmit Freq Error x dB Bandwidth				
Transmit Freq Error				









	,,		r, (NR50) 50 MHz Banc Value 99% (MHz)	Value 26dB (MHz)	Limit	Result	
			47.611	50.437	Within Band	Pass	٦
			47.011	50.457	Within Danu	F 455	_
Keysight Spectrur	m Analyzer - Element Ma	terials Technology - Points:	3000, Detector: Peak				X
X/ RL I	RF 50 Ω DC		EXT REF	ALIGN OFF	_	12:57:18 PM Oct 07,	
			Center Freq: 2.592	Avg Hold	:>50/50	dio Std: None	
		#IFGain:Low	#Atten: 30 dB		Ra	dio Device: BTS	_
10 dB/div	Ref Offset 40.18 Ref 40.00 dBi	dB					
Log	Rei 40.00 uBi		and all and a state of the stat				_
30.0		/					
20.0							
0.00							
-10.0							
-20.0	lynaitan mae'r alarh a hiardl ^a laet fan	and a state of the second s				an aite Maddillen aus d'aite à prince (Cassainean	al-an-in-
-30.0							
-40.0							
-50.0							
Center 2.592 #Res BW 11			#VBW 3	MU-2		Span 150.0 N Sweep 1.2	/IHz
	101112					Sweep 1.2	
Occupie	d Bandwid		Total Power	52.0 0	dBm		
	4	7.611 MHz					
Transmit	Freq Error	115.79 kHz	% of OBW P	ower 99.(00 %		
x dB Ban	dwidth	50.44 MHz	x dB	-26.00) dB		
MSG				STATUS			
Port 1 5G NR	R, Band n41, 249	6 MHz - 2690 MHz	, (NR50) 50 MHz Band		Modulation, High 0	Channel 2664.99	MHz
1 011 1, 00 1414							
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result	

Keysight Spectrum Analyzer - Element Mate RL RF 50 Ω DC			ALIGN OFF	02:58:28 PM Oct 07, 20		
		Center Freq: 2.664990		Radio Std: None		
			Radio Device: BTS			
	#IFGain:Low	#Atten: 30 dB				
dB/div Ref 0ffset 40.18 d						
g		where the state of	Distance of the second			
.0			المستخفف النظا			
0						
0	i <mark> </mark> .					
O parter and property and provided and the second	and a second		Understand and and and and and and and and and	والمتعادي المتحدية والمحمولية والمحمولية والمحمد والمحمولية والمحمد		
0						
0						
.0						
.0						
enter 2.66499 GHz es BW 1 MHz		#VBW 3 MH	-	Span 150.0 M Sweep 1.2 n		
		#VEW JIVIE	2	Sweep 1.2 h		
Occupied Bandwidt	h	Total Power	52.2 dBm	Bm		
Occupied Bandwidt						
47	.600 MHz					
	67.277 kHz	% of OBW Pow	ver 99.00 %			
Transmit Freq Error		% of OBW Pow x dB	ver 99.00 % -26.00 dB			
47 Transmit Freq Error x dB Bandwidth	67.277 kHz					
Transmit Freq Error	67.277 kHz					
Transmit Freq Error	67.277 kHz					
Transmit Freq Error	67.277 kHz					

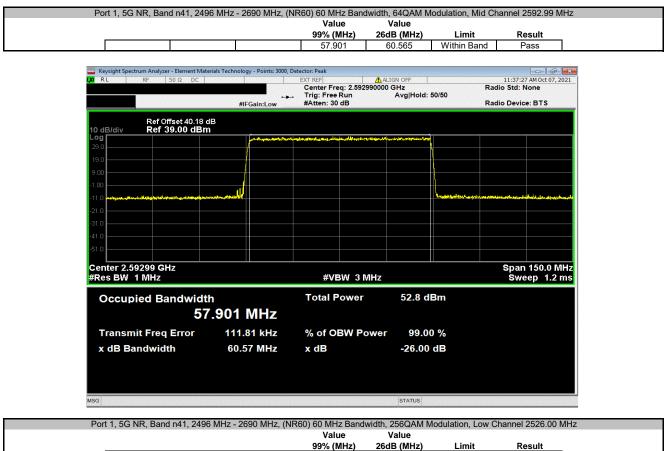


				Value dB (MHz)	Limit		Result
				60.587	Within Ban		Pass
Keysight Spectrum Analyzer - Element Materi	als Technology - Poi	ints: 3000, Detector: Peak		LCH OFF			
			req: 2.59299000	LIGN OFF		Radio Std	
	#FG 1	→ Trig: Fre		Avg Hold:	50/50	Radio Dev	dee: BTS
	#IFGain:	Low #Atten: 3				Radio Dev	ice: DI 3
Ref Offset 40.18 dE 10 dB/div Ref 39.00 dBm	3						
Log	anger.	August and the set of the second second	hallow good to a show the state of the second				
29.0	/						
19.0							
9.00							
-1.00	, /						
الاشتان المارينية والمتراجعة والمراجع والمحاجز والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع	- Heimberg				Windowski water	ومليطب ويقدر ويرامه	
21.0							
-31.0							
-41.0							
-51.0							
Center 2.59299 GHz							n 150.0 M
#Res BW 1 MHz		#V	BW 3 MHz			SV	veep 1.2 n
Occupied Bandwidth		Total	Power	52.8 d	Bm		
	872 MF	7					
Transmit Freq Error	72.766 k		DBW Power	99.00	0 %		
x dB Bandwidth	60.59 M	Hz x dB		-26.00	dB		
MSG				STATUS			
				And an other states and a second states and			

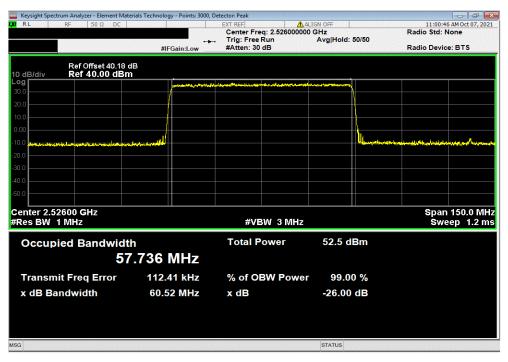
		99% (MHz)	26dB (MHz)	Limit	Result
		58.077	60.572	Within Band	Pass

	erials Technology - Points: 3000,			
RL RF 50 Ω DC		EXT REF A	ALIGN OFF	11:44:23 AM Oct 07, 202 Radio Std: None
	·•		Avg Hold: 50/50	Radio Std: None
	#IFGain:Low	#Atten: 30 dB	Aughtona. coloc	Radio Device: BTS
Ref Offset 40.18 d	iB			
dB/div Ref 41.00 dBm				
a 🗌 🗌 🗌	and the second second	and a second and a	m .	
.0		And an an an and a second and and		
.0				
.0				
00				
0	المحالية محالية المحالية محالية المحالية المحالية المحالية المحالية محالية المحالية محالية المحالية المحالية محالية مح			and the state of the second
0				
.0				
.0				
.0				
	l			A
enter 2.59299 GHz				Span 150.0 MH
es BW 1 MHz		#VBW 3 MHz		Sweep 1.2 m
• • • • • • • • • •		Total Downey	ED 0 dDm	
Occupied Bandwidt	h	Total Power	52.8 dBm	
		Total Power	52.8 dBm	
	^h 3.077 MHz	Total Power	52.8 dBm	
58		Total Power % of OBW Powe		
58 Transmit Freq Error	52.641 kHz	% of OBW Powe	r 99.00 %	
58 Transmit Freq Error	3.077 MHz			
	52.641 kHz	% of OBW Powe	r 99.00 %	
58 Transmit Freq Error	52.641 kHz	% of OBW Powe	r 99.00 %	
58 Transmit Freq Error	52.641 kHz	% of OBW Powe	r 99.00 %	
58 Transmit Freq Error	52.641 kHz	% of OBW Powe	r 99.00 %	





	· · · ·	Value	Value		
		99% (MHz)	26dB (MHz)	Limit	Result
		57.736	60.515	Within Band	Pass

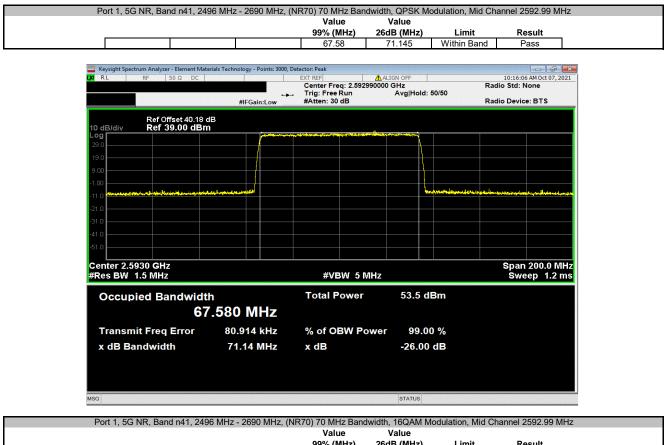




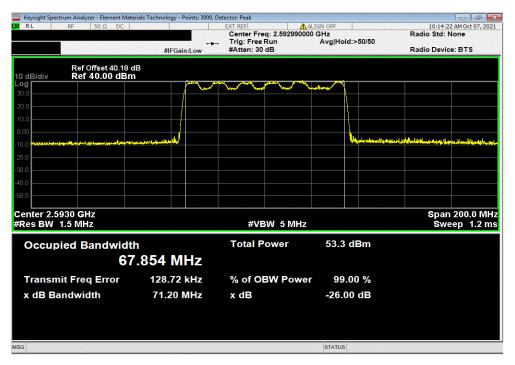
				Value 99% (MHz)	Value 26dB (MHz)	Limit	Result	
				57.775	60.552	Within Band		
	Analyzer - Element		y - Points: 3000, I					J
<mark>KI</mark> RL R	F 50 Ω DC			EXT REF Center Freq: 2.5	ALIGN OFF		11:32:51 AM Oct Radio Std: None	07,2021
			↔	💷 Trig: Free Run	Avg Hold:	: 50/50		
		#IF	Gain:Low	#Atten: 30 dB		R	adio Device: BTS	
	Ref Offset 40.1							
10 dB/div Log	Ref 40.00 dl	Bm				•		
30.0			antitiante a danger -	a far too a state of the state	******			
20.0								
10.0								
).00								
10.0	and a she is shown	المالىسىغا المعاديات				Ulunowana	وروافق والمتحد والالتحديد	
20.0							ستقر الفقاتين	
30.0								
40.0								
50.0								
.30.0								
Center 2.5929							Span 150.	
#Res BW 1 N	ЛНZ			#VBW 3	MHz		Sweep 1	.2 ms
Occupie	d Bandwi	dth		Total Powe	r 52.7 d	lBm		
		57.775						
Transmit	Freq Error	85.14	11 kHz	% of OBW F	ower 99.0	00 %		
x dB Band	dwidth	60.5	5 MHz	x dB	-26.00) dB		
ig.					STATUS			
SG					STATUS			
^{IISG} Port 1. 5G NR.	. Band n41. 24	196 MHz - 26	90 MHz. (N	R60) 60 MHz Ban		Modulation, High	Channel 2659.	.98 MH
	, Band n41, 24	496 MHz - 26	90 MHz, (N	R60) 60 MHz Ban Value		Modulation, High	ı Channel 2659.	.98 MH
	Band n41, 24	196 MHz - 26	90 MHz, (N	,	dwidth, 256QAM N	Modulation, High Limit Within Band	Result	98 MH

Keysight Spectrum Analyzer - Element Mate RL RF 50 Ω DC		EXT REF	/ ALI	GN OFF	11:55:51 AM Oct 07, 20
		Center Fre	q: 2.659980000		Radio Std: None
	→			Avg Hold: 50/50	
	#IFGain:Low	#Atten: 30	dB		Radio Device: BTS
Ref Offset 40.18 d					
dB/div Ref 40.00 dBm					
.0	and the second s	Byd.slaffin Physics Hereiter		- Brown and dar the party of	
	() () () () () () () () () ()			Ì	
.0					
.0					
				l li	
0 proposed in the second secon	(here a statistical de la statistical)				وموروفه محادث المرسان والإقباق محمدتها ومجمع مودخرة فالمحاورة للماهي
.0					
.0					
.0					
.0					
enter 2.65998 GHz					Span 150.0 MI
tes BW 1 MHz		#VE	3W/3MHz		Sweep 1.2 n
		T-A-L D		50.0 JB	
Occupied Bandwidth	n .	Total P	ower	52.9 dBm	
	704 MILL-				
_ 57					
57	.701 MHz				
	18.849 kHz	% of OI	BW Power	99.00 %	
Transmit Freq Error	18.849 kHz		BW Power		
Transmit Freq Error		% of OI x dB	BW Power	99.00 % -26.00 dB	
Transmit Freq Error	18.849 kHz		BW Power		
Transmit Freq Error	18.849 kHz		BW Power		
57 Transmit Freq Error x dB Bandwidth	18.849 kHz		BW Power		
Transmit Freq Error	18.849 kHz		BW Power		

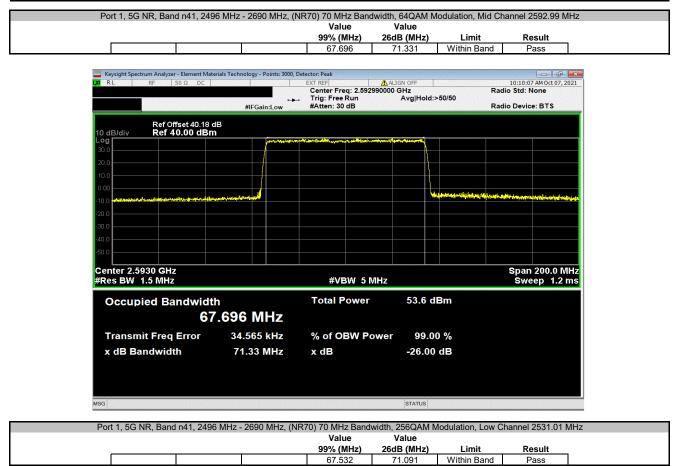


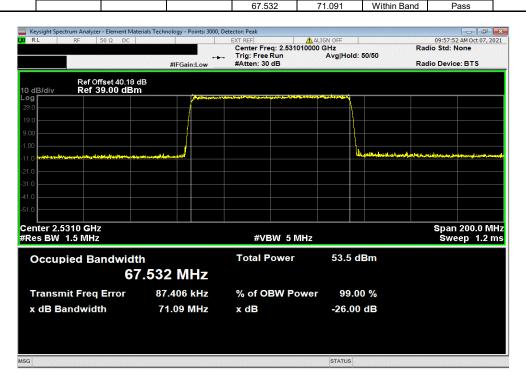


		Value	Value		
		99% (MHz)	26dB (MHz)	Limit	Result
		67.854	71.202	Within Band	Pass

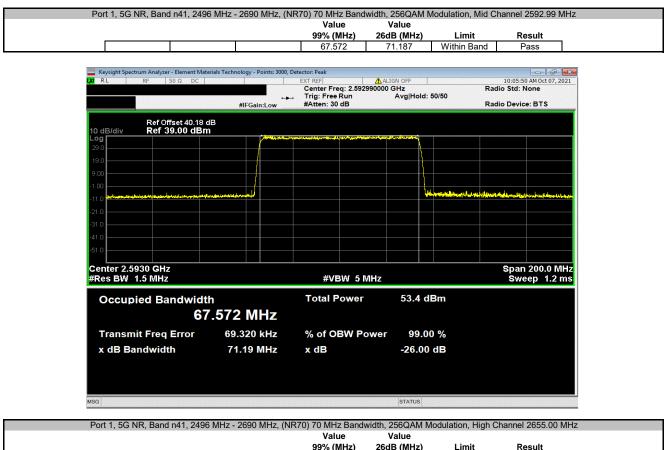




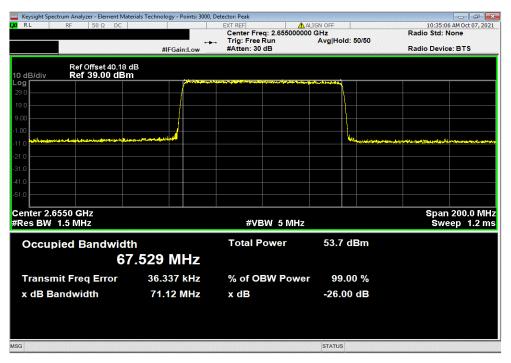




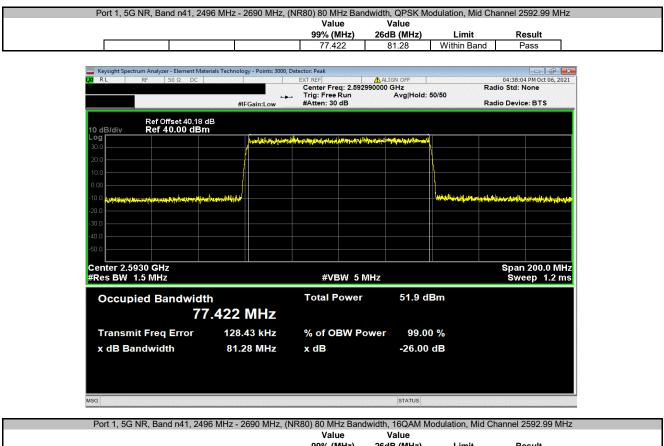




			Value	Value		
			99% (MHz)	26dB (MHz)	Limit	Result
			67.529	71.121	Within Band	Pass



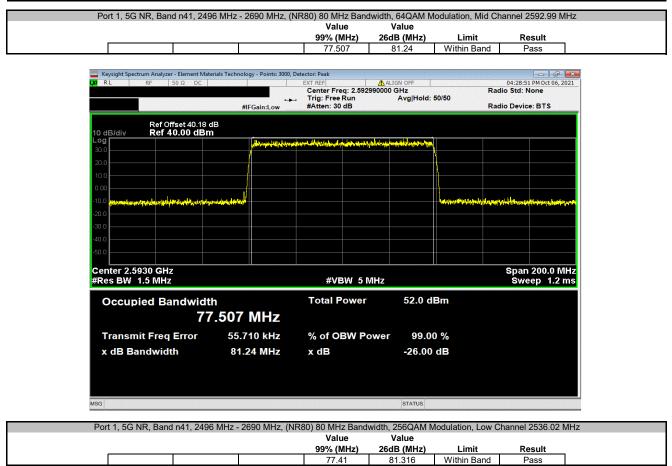


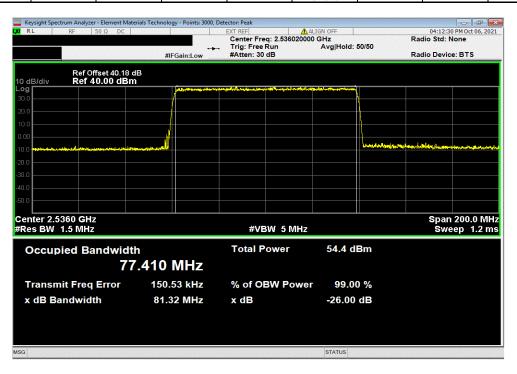


		Value	Value		
		99% (MHz)	26dB (MHz)	Limit	Result
		77.818	81.036	Within Band	Pass

RL RF 50 Ω DC			ALIGN OFF	04:33:50 PM Oct 06, 202
		Center Freg: 2.592990		Radio Std: None
	→		Avg Hold: 50/50	
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
Ref Offset 40.18 dB				
dB/div Ref 41.00 dBm				
.0	States of the second	an and the second and the second and the second sec	Martin Martin Martin	
			a and a start of the start of t	
.0			<u> </u>	
.0				
O Antomas eduction standard and in the first inc	and the state of the			lift in the standing to the second
.0				
0				
.0				
.0				
enter 2.5930 GHz				Span 200.0 MH
tes BW 1.5 MHz		#VBW 5 MH	7	Sweep 1.2 m
1.5 Mil 12		#¥644 5 1411	2	Gweep 1.2 II
Occupied Bandwidth		Total Power	51.9 dBm	
Occupied Bandwidth			51.5 dBm	
	318 MHz			
77.8				
77.8				
	184.33 kHz	% of OBW Pow	er 99.00 %	
Transmit Freq Error				
Transmit Freq Error	184.33 kHz 81.04 MHz	% of OBW Pow x dB	er 99.00 % -26.00 dB	
Transmit Freq Error				
77.8 Transmit Freq Error x dB Bandwidth				
Transmit Freq Error				
Transmit Freq Error				

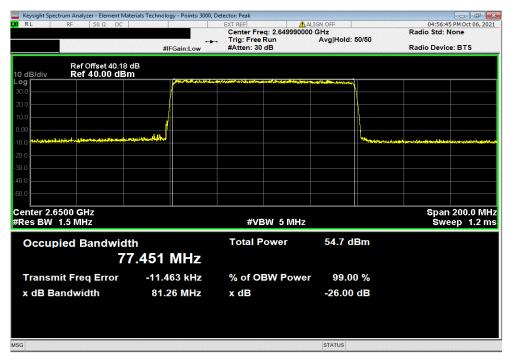




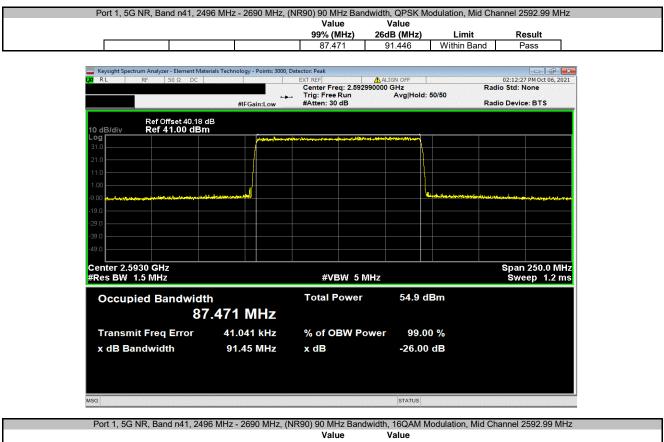




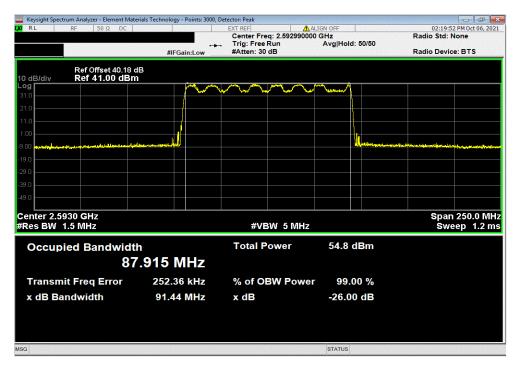
		Value 99% (MHz)		Value dB (MHz)	Limit	R	esult
		77.548		81.289	Within Bar	nd F	Pass
Keysight Spectrum Analyzer - Element Materials T XI RL RF 50 Ω DC	echnology - Points: 3000, D	etector: Peak EXT REF		LIGN OFF		04:22:0	🕞 🕞 🗾
N 2032 DC		Center Freq: 2.	592990000) GHz		Radio Std:	
	#IFGain:Low	Trig: Free Run #Atten: 30 dB		Avg Hold:	50/50	Radio Devi	ce: BTS
Ref Offset 40.18 dB 10 dB/div Ref 40.00 dBm							
Log	processition and the		و و الدر الله و الدي الدي	and the second second			
30.0							
20.0							
10.0							
0.00	اللغليه				Internet and the	م مرفو مرب المحالية ال	a lassification and
-20.0							
-20.0							
-40.0							
-50.0							
Center 2.5930 GHz			C 8411-				1 200.0 MHz
#Res BW 1.5 MHz		#VBW	SIVINZ			SW	eep 1.2 ms
Occupied Bandwidth		Total Pow	er	54.4 d	IBm		
77.5	48 MHz						
	72.816 kHz	% of OBW	Bower	99.0	0.9/		
•			Fower				
x dB Bandwidth	81.29 MHz	x dB		-26.00	dB		
MSG				STATUS			
Port 1, 5G NR, Band n41, 2496 MF	17 - 2600 MHz /NE	280) 80 MH- Po	ndwidth	2560 4 4	Adulation Li	ah Channa	
T OIL 1, 30 NIX, Ballu 1141, 2490 MI	12 - 2030 WITZ, (M		anawiatii,	Value		gri Grianne	2043.99 1011
		99% (MHz) 26	dB (MHz)	Limit	R	esult



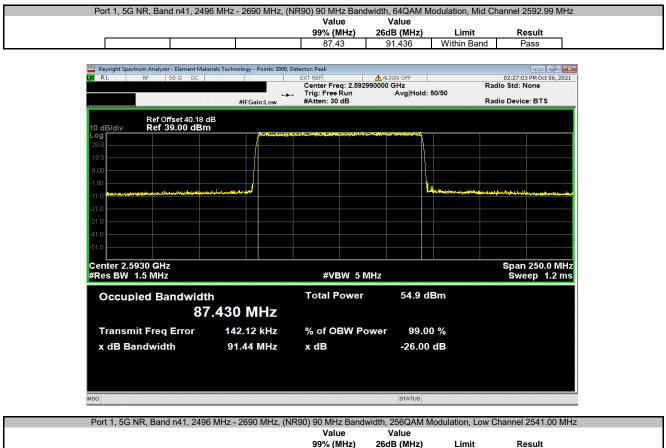




		99% (MHz)	26dB (MHz)	Limit	Result
		87.915	91.438	Within Band	Pass



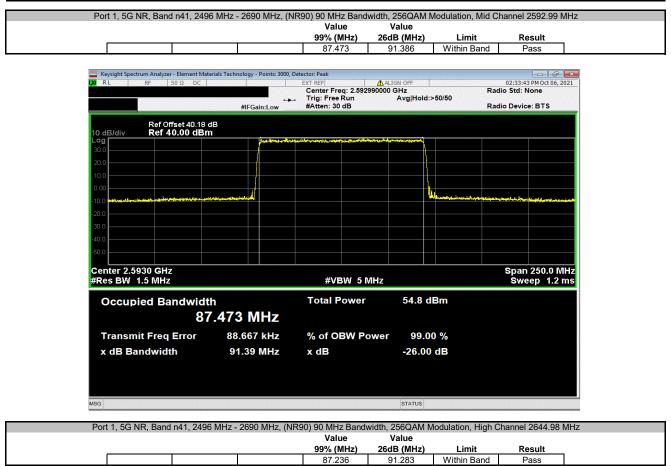




		Value	Value		
		99% (MHz)	26dB (MHz)	Limit	Result
		87.251	91.302	Within Band	Pass

Keysight Spectrum Analyzer - Element Mate	erials Technology - Points: 3000,			
RL RF 50 Ω DC			ALIGN OFF	01:30:03 PM Oct 06, 20
		Center Freq: 2.54100000 → Trig: Free Run	0 GHz Avg Hold: 50/50	Radio Std: None
	#IFGain:Low	#Atten: 30 dB	Radio Device: BTS	
dB/div Ref 0ffset 40.18 d				
a		erine adampeterine erine data an alasi data data d	and the second	
0				
0				
0				
0				
			and the second	and the second
				origonalised in a prophetic declaration of the declaration of the
0				
0				
0				
0				
nter 2.5410 GHz				Span 250.0 Mł
es BW 1.5 MHz		#VBW 6 MHz	Sweep 1.2 n	
Occupied Bandwidt	b	Total Power	52.6 dBm	
		i otari i otioi		
87	.251 MHz			
Transmit Freq Error	176.36 kHz	% of OBW Power	r 99.00 %	
x dB Bandwidth	91.30 MHz	x dB	-26.00 dB	
	01.00 10112		Loto up	





ials Technology - Points: 3000, Detector: Peak Keysight Sp CAN REF ALIGN OF Center Freq: 2.644980000 GHz Trig: Free Run Avg #Atten: 30 dB 03:22:49 PM Oct 06, 2021 Radio Std: None Avg|Hold:>50/50 #IFGain:Low Radio Device: BTS Ref Offset 40.18 dB Ref 40.00 dBm 10 dB/div - 99 Span 250.0 MHz Sweep 1.2 ms Center 2.6450 GHz #Res BW 1.5 MHz #VBW 5 MHz Total Power 55.1 dBm **Occupied Bandwidth** 87.236 MHz Transmit Freq Error 19.690 kHz % of OBW Power 99.00 % 91.28 MHz -26.00 dB x dB Bandwidth x dB STATUS