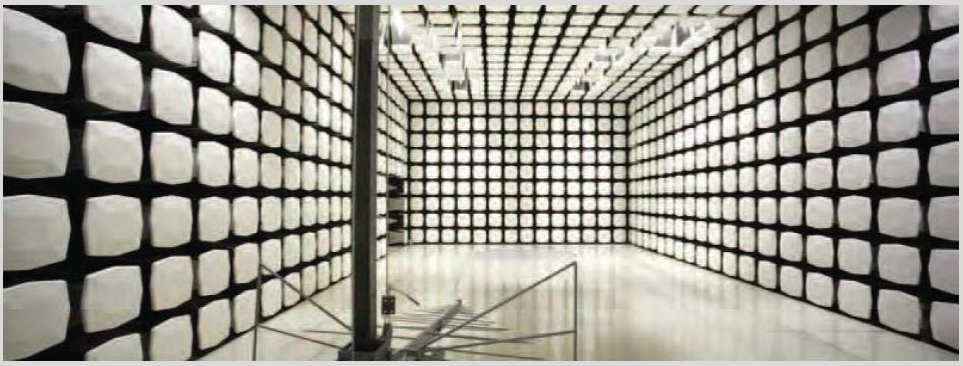
element

Radio Test Report
Application for Grant of Equipment Authorization
FCC Part 27 Subpart C and IC RSS-130
617MHz – 652MHz
And
728MHz – 746MHz

FCCID: VBNAHLOB-01
ICID: 661W-AHLOB

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

Report: NOKI0042, Issue Date: July 28, 2022



ilac-MRA

A2LA ACCREDITED
CERT #3310.03

CERTIFICATE OF TEST

Last Date of Test: July 1, 2022
Nokia Solutions and Networks
EUT: Airscale Base Transceiver Station Remote Radio Head Model AHLOB

Radio Equipment Testing

Standards

Specification	Method
Code of Federal Regulations (CFR) Title 47 Part 2 and (CFR) Title 47 Part 27 Subpart C (Radio Standards Specification) RSS-Gen Issue 5: April 2018 and RSS-130 Issue 2: February 2019	ANSI C63.26-2015 ANSI C63.4-2014 with FCC KDB 971168 D01 v03r01 FCC KDB 662911D01 v02r01

Results

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

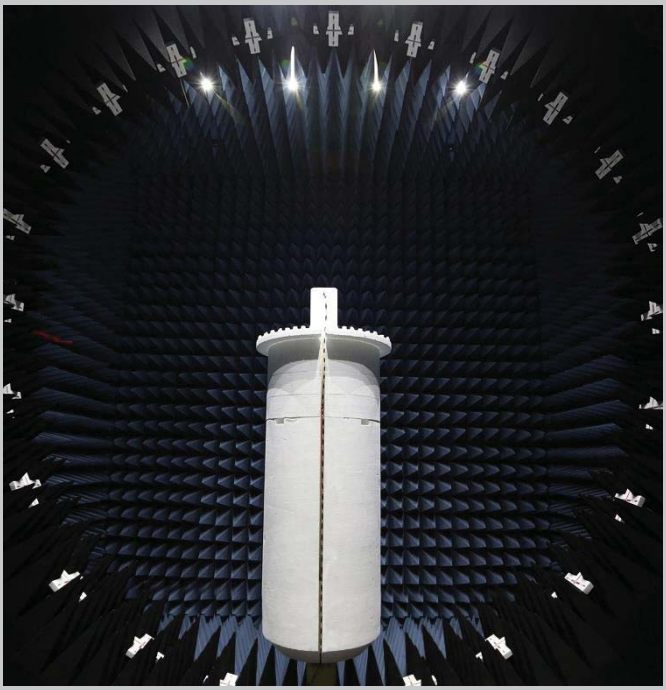
SCOPE

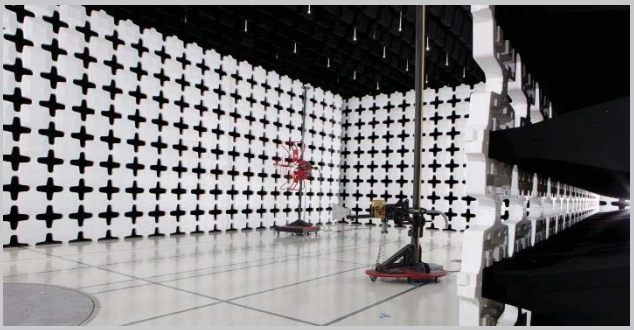
For details on the Scopes of our Accreditations, please visit:

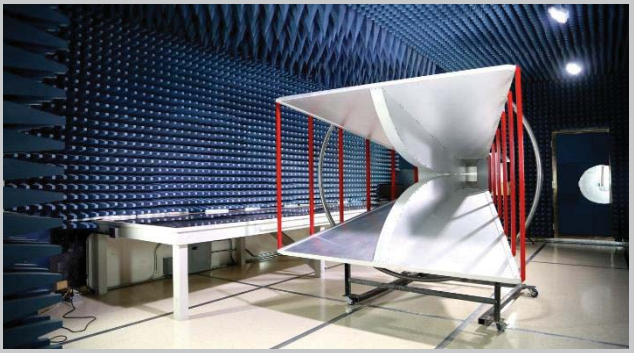
California Minnesota Oregon Texas Washington

FACILITIES

California	Minnesota	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-11 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
A2LA				
Lab Code: 3310.04	Lab Code: 3310.05	Lab Code: 3310.02	Lab Code: 3310.03	Lab Code: 3310.06
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157







MEASUREMENT UNCERTAINTY

element
TMU.2015.07.10

Measurement Uncertainty

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

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

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

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

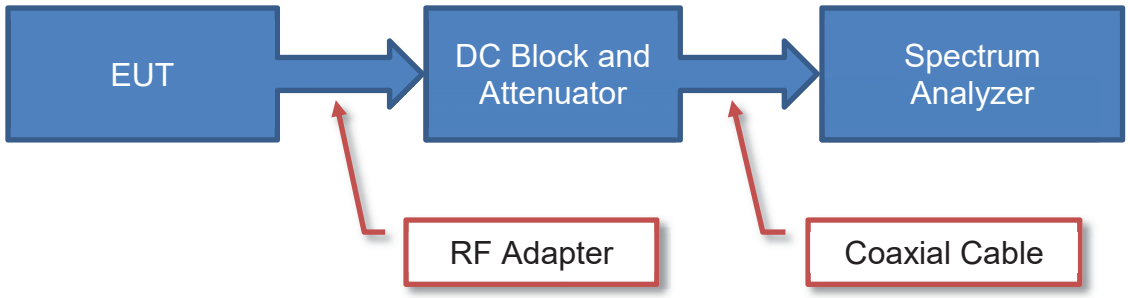
TEST SETUP BLOCK DIAGRAMS

Measurement Bandwidths

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

Unless otherwise stated, measurements were made using the bandwidths and detectors specified. No video filter was used.

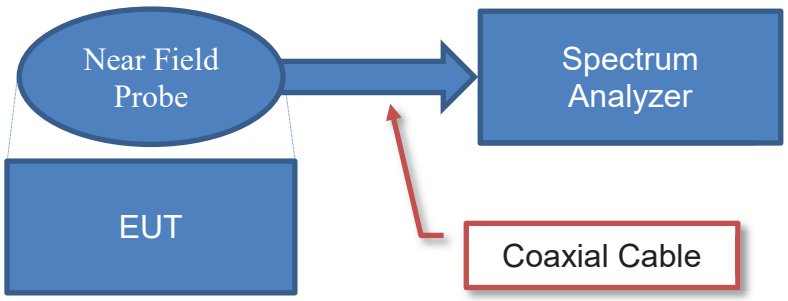
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

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

Near Field Test Fixture Measurements

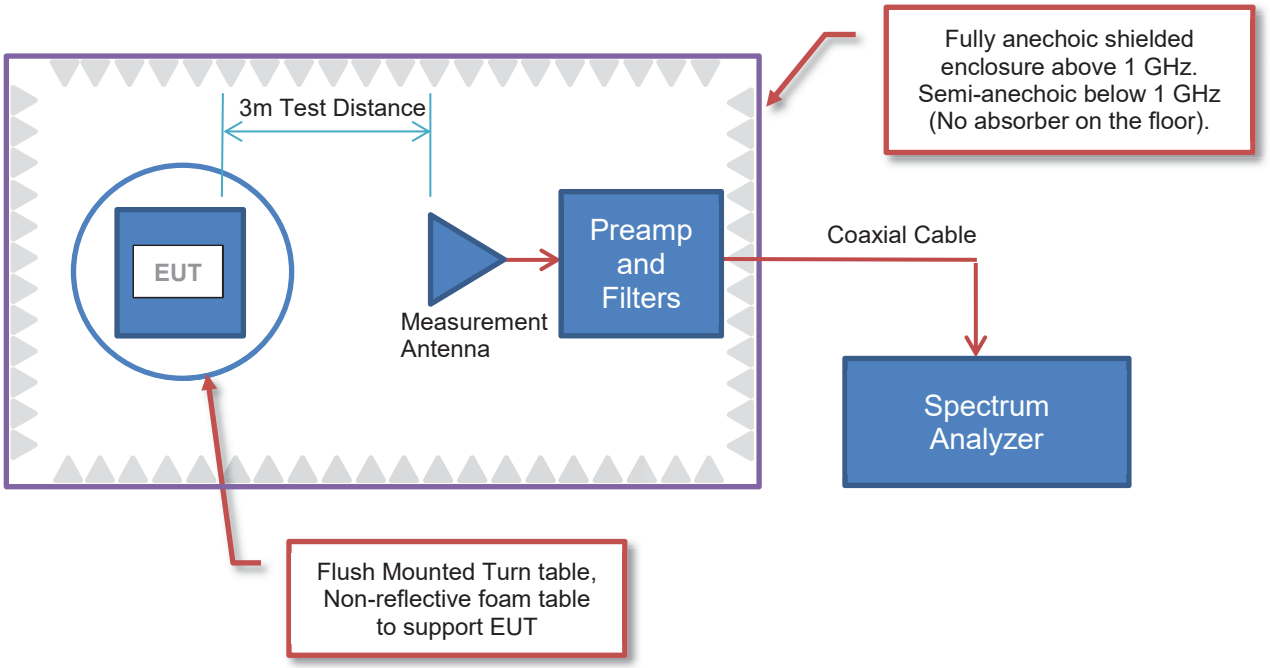


Sample Calculation (logarithmic units)

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

TEST SETUP BLOCK DIAGRAMS

Emissions Measurements



Sample Calculation (logarithmic units)

Radiated Emissions:

Measured Level (Amplitude)		Factor: Antenna Factor		Factor: Cable Factor		Factor: Amplifier Gain		Distance Adjustment Factor		External Attenuation		Field Strength
42.6	+	28.6	+	3.1	-	40.8	+	0.0	+	0.0	=	**33.5**

Conducted Emissions:

Measured Level (Amplitude)		Factor: Transducer Factor		Factor: Cable Factor		External Attenuation		Adjusted Level
26.7	+	0.3	+	0.1	+	20.0	=	**47.1**

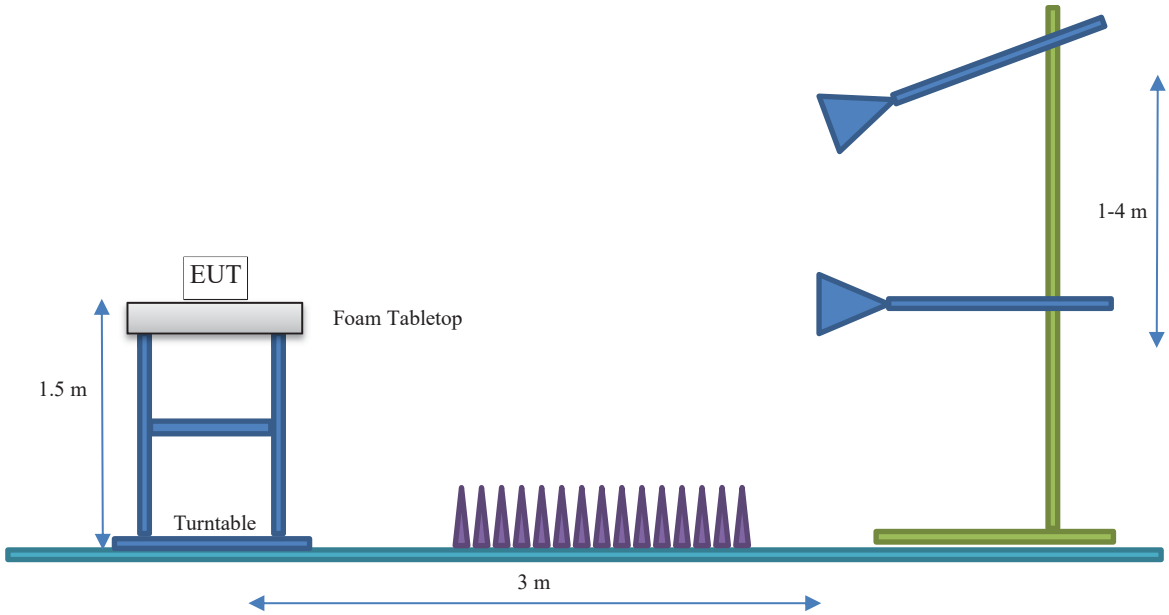
Radiated Power (ERP/EIRP) – Substitution Method:

Measured Level into Substitution Antenna (Amplitude dBm)		Substitution Antenna Factor (dBi)		EIRP to ERP (if applicable)		Measured power (dBm ERP/EIRP)
10.0	+	6.0	-	2.15	=	**13.9/16.0**

TEST SETUP BLOCK DIAGRAMS

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 AHLOB
First Date of Test:	June 21, 2022
Last Date of Test:	July 1, 2022
Receipt Date of Samples:	June 21, 2022
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

Nokia Solutions and Networks AirScale Base Transceiver Station (BTS) Remote Radio Head (RRH) variant AHLOB is being developed under this effort. The AHLOB remote radio head is a multi-standard multi-carrier radio module designed to support 4G LTE, 5G NR (new radio), narrow band IoT (internet of things) operations (in-band, guard band, standalone) and Dynamic Spectrum Sharing (DSS). **The scope of testing in this effort is for 5G NR-FDD operations.**

The AHLOB RRH has four transmit/four receive antenna ports (4TX/4RX for Band n71 and 4TX/4RX for Band n85). Each antenna port supports 3GPP frequency band n71 (BTS Rx: 663 to 698 MHz/BTS TX: 617 to 652 MHz) and 3GPP frequency band n85 (BTS Rx: 698 to 716 MHz/BTS TX: 728 to 746 MHz). The maximum RF output power of the RRH is 320 Watts (80 watts per antenna port shared between Band n71 and Band n85). The TX and RX instantaneous bandwidth cover the full operational bandwidth. Multi-carrier operation is supported. The maximum RF output power for single carriers are proved below.

Single Carrier Maximum RF Output Power per Port for each Channel Bandwidth				
NB IoT SA	**LTE5 or NR5**	**LTE10 or NR10**	**LTE15 or NR15**	**LTE20 or NR20**
20.0 Watts or 43.0 dBm	40.0 Watts or 46.0 dBm	60.0 Watts or 47.8 dBm	80.0 Watts or 49.0 dBm	80.0 Watts or 49.0 dBm

The RRH can be operated as a 4x4 MIMO, 2x2 MIMO or as non-MIMO. The RRH supports 5G NR bandwidths of 5, 10, 15, and 20MHz for 3GPP frequency band n71 operations. The RRH supports 5G NR bandwidths of 5, 10, and 15MHz for 3GPP frequency band n85. The RRH supports four NR downlink modulation types (QPSK, 16QAM, 64QAM and 256QAM).
The 5G NR carriers/modulation types for this testing are setup according to 3GPP TS 38.141 NR FR1 Test Models as follows 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).

Single carriers are tested at the bottom, middle and top channels provided in Band n71 and Band n85 frequency channel tables. Multicarrier testing is performed at maximum port/carrier power per KDB 971168 D03v01 guidance.
The RRH has external interfaces including DC power (DC In), ground, transmit/receive (ANT), external alarm (EAC), optical CPRI/eCPRI (OPT) and remote electrical tilt (RET). The RRH with applicable installation kit may be pole or wall mounted.
Tests performed include RF power, peak to average power ratio/CCDF, emission bandwidth (99% and 26 dB down), band edge spurious emissions (± 1MHz), spurious emissions (conducted and radiated), and frequency stability (over required voltage/temperature ranges).

Multicarrier test cases:

Multi-Carrier Test Case 1): 3GPP Band n71 Multicarrier In the Band n71 _Three NR5 carriers using two carriers (with minimum spacing between carrier frequencies) at the lower band edge (619.5 & 624.5MHz) and a third carrier with maximum spacing between the other two carrier frequencies (649.5MHz) at the upper band edge. The NR 5Mhz channel bandwidth was selected to maximize carrier power spectral density. The carriers are operated at maximum power for a total port power of 80 watts (~26.6W/Band n71 carriers). 3GPP Band n85 carrier is not enable.

Multi-Carrier Test Case 2): 3GPP Band n71 Multicarrier: In the Band n71 _ One NR 20MHz carriers and one NR 15MHz carriers (with minimum spacing between carrier frequencies) at the lower band edge (627.0 & 644.5MHz). The largest channel bandwidth is selected to maximize carrier OBW. The carriers are operated at maximum power for a total port power of 80 watts (~40W/Band n71 carriers). 3GPP Band n85 carrier is not enable.

Multi-Carrier Test Case 3): 3GPP Band n85 Multicarrier In the Band n85 _Two NR5 carriers using two carriers (with maximum spacing between carrier frequencies) at the lower band edge (730.5MHz) and a second carrier at maximum spacing at the upper band edge (743.5MHz). The NR5 channel bandwidth was selected to maximize carrier power spectral density. The carriers are operated at maximum power for a total port power of 80 watts (~40W/Band n85 carrier). 3GPP Band n71 carrier is not enable.

Multi-Carrier Test Case 4): 3GPP Band n71 and Band n85 Multicarrier Multiband: Three NR 5MHz carriers using two carriers (with minimum spacing between carrier frequencies) at the Band n71 lower band edge (619.5 & 624.5MHz) and a third carrier with maximum spacing between the other two carrier frequencies (743.5MHz) at the Band n85 upper band edge. The smallest channel bandwidth was selected to maximize carrier power spectral density. The carriers were operated at maximum power (~26.6/ Band n71 carrier and ~26.6W Band n85 carrier) for a total port power of 80 watts.

AHLOB 3GPP frequency band n71 Downlink Band Edge NR-ARFCNs

The 3GPP frequency band n71 (617 to 652 MHz) band edge downlink (BTS Transmit) NR-ARFCNs for NR channel bandwidths (5, 10, 15 and 20 MHz) are provided below. The NR-ARFCN is defined as Absolute Radio Frequency Channel Number. The channel spacing is 100 kHz between channel numbers. The formula for 5G NR ARFCN is described in 3GPP TS 38.104 chapter 5.4.2.1.

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

AHLOB Downlink Band Edge 5G NR Band n71 Frequency Channels

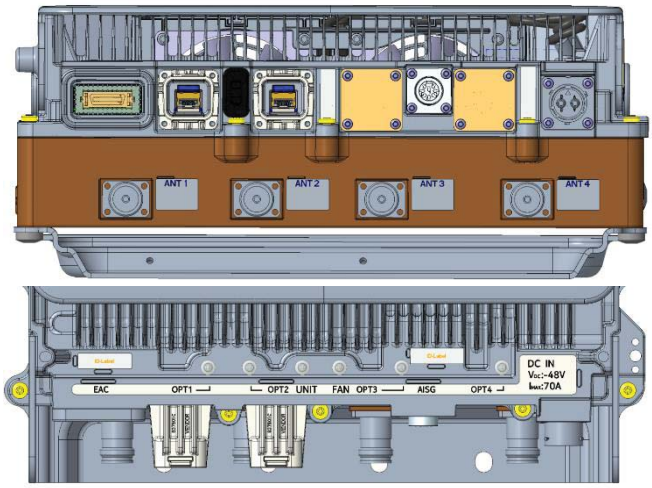
AHLOB 3GPP Frequency Band n85 NR Downlink Band Edge NR-ARFCNs

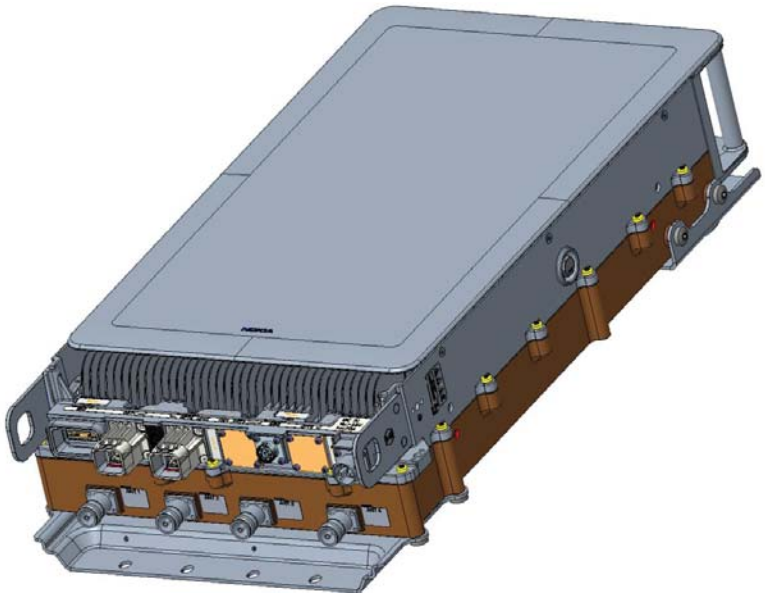
The 3GPP frequency band n85 (728 - 746 MHz) band edge downlink (BTS Transmit) NR-ARFCNs for NR channel bandwidths (5 , 10 and 15 MHz) are provided below. The NR-ARFCN is defined as Absolute Radio Frequency Channel Number. The channel spacing is 100 kHz between channel numbers. The formula for 5G NR ARFCN is described in 3GPP TS 38.104 chapter 5.4.2.1.

	Downlink NR-ARFCN	Downlink Frequency (MHz)	NR Channel Bandwidth		
			5 MHz	10 MHz	15 MHz
Band n85 (Ant 1, 2, 3, 4)	145600	728.0	Band Edge	Band Edge	Band Edge
	……				
	146100	730.5	Bottom Ch		
	……				
	146600	733.0		Bottom Ch	
	……				
	147100	735.5			Bottom Ch
	……				
	147400	737.0	Middle Ch	Middle Ch	Middle Ch
	……				
	147700	738.5			Top Channel
	……				
	148200	741.0		Top Channel	
	……				
	148700	743.5	Top Channel		
	……				
	149200	746.0	Band Edge	Band Edge	Band Edge

AHLOB Downlink Band Edge 5G NR Band n85 Frequency Channels

AHLOB Connector Layout:





AHLOB External Interfaces

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

Testing Objective:

Demonstrate FCC and ISED compliance of Airscale Base Transceiver Station (BTS) Remote Radio Head (RRH) module, AHLOB for 5G NR FDD single carrier/multi carriers operating in 3GPP Band n71 (617MHz to 652MHz) and 3GPP Band n85 (728MHz to 746MHz).

CONFIGURATIONS

Configuration NOKI0042- 1

Software/Firmware Running during test	
Description	**Version**
BTS Software Version (22R4)	SBTS22R4_ENB_9999_220607_000006
RF_SW	RF.FRM6.trunk.20220602.020

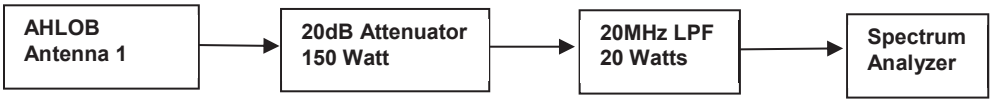
Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	RK182307104
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	DH211165881
ABIO (BTS Baseband Module)	Nokia Solutions and Networks	475266A.102	L1205105845
AHLOB (Radio Module Model)	Nokia Solutions and Networks	475910A.101	YK220900026
20MHz Low Pass Filter/20 Watt	Microwave Circuits, Inc.	VLFX-80+	15542
Attenuator 150W/20dB	Aeroflex Weinschel	66-20-33	BZ2075
SFP+ 9.8G,300M,850NM	Nokia	474900A.101	VF2023004CF
SFP+ 9.8G,300M,850NM	Nokia	474900A.101	VF2023003TA
Lenovo T470	HP	T470	N-20HEPF17B91U
Keysight- DC System power supply	Keysight	N8757A	US21D4053S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007170
2 Meter RF cable (Load Cable)	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297388
2 Meter RF cable (Load Cable)	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297386
2 Meter RF cable (Load Cable)	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297389
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV065
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC864
GPS cable 100m	FTSH	472577A.103	CA2029
FYGC GPS receiver	Nokia	474074A	1294000684
Cat-5e cable	CSA	LL73189	E151955
Fiber Optic cable 2m	Amphenol Fiber Optic	VZ1701	995741A
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297372
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551432/4

CONFIGURATIONS

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1 (5G)**	**Connection 2**
Fiber Optic Cable	N	3 meters	N	ABIO	AHLOB
GPS Receiver Cable	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e Cable	Y	7 meters	N	ASIB	WebEM- PC
HS-SUCOFLEX_106 – RF CABLES	Y	2 meters	N	EUT [AHLOB] Ant ports 2-4	250W -50ohm - Loads

Cables, Filters, Attenuators					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_106	Y	2 meters	N	EUT [AHLOB] Ant port #1	Attenuator 150W/20dB
Attenuator 150W/20dB	N	N/A	N	RF cable HS-SUCOFLEX_106	Low Pass Filter 20MHz/20W
Low Pass Filter 20MHz/20W	N	N/A	N	Attenuator 150W/20dB	HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	Low Pass Filter 20MHz/20W	Analyzer

RF Test Setup Diagram:



CONFIGURATIONS

Configuration NOKI0042- 2

Software/Firmware Running during test	
Description	**Version**
BTS Software Version (22R4)	SBTS22R4_ENB_9999_220607_000006
RF_SW	RF.FRM6.TRUNK.20220602.020

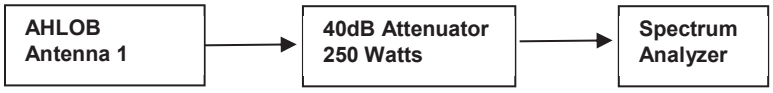
Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	RK182307104
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	DH211165881
ABIO (BTS Baseband Module)	Nokia Solutions and Networks	475266A.102	L1205105845
AHLOB (Radio Module Model)	Nokia Solutions and Networks	475910A.101	YK220900026
Attenuator 40dB/250 Watts	API Weinschel	58-40-43-LMI	TC909
SFP+ 9.8G,300M,850NM	Nokia	474900A.101	VF2023004CF
SFP+ 9.8G,300M,850NM	Nokia	474900A.101	VF2023003TA
Lenovo T470	HP	T470	N-20HEPF17B91U
Keysight- DC System power supply	Keysight	N8757A	US21D4053S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007170
2 Meter RF cable (Load Cable)	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297388
2 Meter RF cable (Load Cable)	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297386
2 Meter RF cable (Load Cable)	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297389
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV065
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC864
GPS cable 100m	FTSH	472577A.103	CA2029
FYGC GPS receiver	Nokia	474074A	1294000684
Cat-5e cable	CSA	LL73189	E151955
Fiber Optic cable 2m	Amphenol Fiber Optic	VZ1701	995741A
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297372
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551432/4

CONFIGURATIONS

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1 (5G)**	**Connection 2**
Fiber Optic Cable	N	3 meters	N	ABIO	AHLOB
GPS Receiver Cable	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e Cable	Y	7 meters	N	ASIB	WebEM- PC
HS-SUCOFLEX_106 – RF CABLES	Y	2 meters	N	EUT [AHLOB] Ant ports 2-4	250W -50ohm - Loads

Cables, Filters, Attenuators					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_106	Y	2 meters	N	EUT [AHLOB] Ant port #1	Attenuator 250W/40dB
Attenuator 250W/40dB	N	NA	N	HS-SUCOFLEX_106	HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	Attenuator 150W/40dB	Analyzer

RF Test Setup Diagram:



CONFIGURATIONS

Configuration NOKI0042- 3

Software/Firmware Running during test	
Description	**Version**
BTS Software Version (22R4)	SBTS22R4_ENB_9999_220607_000006
RF_SW	RF.FRM6.TRUNK.20220602.020

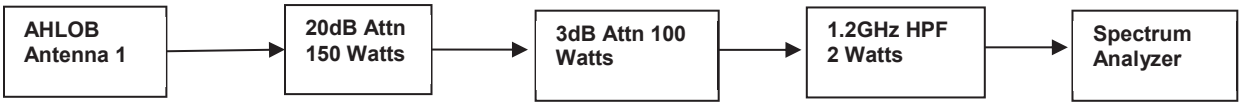
Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	RK182307104
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	DH211165881
ABIO (BTS Baseband Module)	Nokia Solutions and Networks	475266A.102	L1205105845
AHLOB (Radio Module Model)	Nokia Solutions and Networks	475910A.101	YK220900026
1.2 GHz HPF 2 Watts	Micro-Tronic	HPM11692	002
Attenuator 150W/20dB	Aeroflex Weinschel	66-20-33	BZ2075
Attenuator 100W/3dB	Aeroflex Weinschel	47-3-33	CG5493
SFP+ 9.8G,300M,850NM	Nokia	474900A.101	VF2023004CF
SFP+ 9.8G,300M,850NM	Nokia	474900A.101	VF2023003TA
Lenovo T470	HP	T470	N-20HEPF17B91U
Keysight- DC System power supply	Keysight	N8757A	US21D4053S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007170
2 Meter RF cable (Load Cable)	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297388
2 Meter RF cable (Load Cable)	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297386
2 Meter RF cable (Load Cable)	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297389
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV065
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC864
GPS cable 100m	FTSH	472577A.103	CA2029
FYGC GPS receiver	Nokia	474074A	1294000684
Cat-5e cable	CSA	LL73189	E151955
Fiber Optic cable 2m	Amphenol Fiber Optic	VZ1701	995741A
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297372
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551432/4

CONFIGURATIONS

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1 (5G)**	**Connection 2**
Fiber Optic Cable	N	3 meters	N	ABIO	AHLOB
GPS Receiver Cable	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e Cable	Y	7 meters	N	ASIB	WebEM- PC
HS-SUCOFLEX_106 – RF CABLES	Y	2 meters	N	EUT [AHLOB] Ant ports 2-4	250W -50ohm - Loads

Cables, Filters, Attenuators					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_106	Y	2 meters	N	EUT [AHLOB] Ant port #1	Attenuator 150W/20dB
Attenuator 150W/20dB	N	NA	N	HS-SUCOFLEX_106	Attenuator 100W/3dB
Attenuator 100W/3dB	N	NA	N	Attenuator 150W/20dB	1.2GHz HPF 2Watts
1.2GHz HPF 2Watts	N	NA	N	Attenuator 100W/3dB	HS-SUCOFLEX_104
HS-SUCOFLEX_104	N	1 meter	N	3-18GHz HPF 15Watts	Spectrum Analyzer

RF Test Setup Diagram:



CONFIGURATIONS

Configuration NOKI0042- 4

Software/Firmware Running during test	
Description	**Version**
BTS Software Version (22R4)	SBTS22R4_ENB_9999_220607_000006
RF_SW	RF.FRM6.TRUNK.20220602.020

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Remote Radio Head	Nokia Solutions and Networks	AHLOB/475910A.101	YK220900026

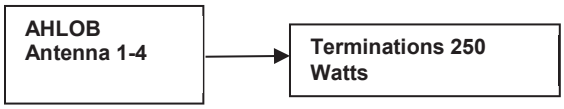
Peripherals in the test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AOMC SFP28+ 9.8G,70M,850NM (Multi-Mode - Radio)	Nokia	474900A.101	VF2023004CF
AOMC SFP28+ 9.8G,70M,850NM (Multi-Mode - Radio)	Nokia	474900A.101	VF20180015S
AOMC SFP28+ 9.8G,70M,850NM (Multi-Mode - BS)	Nokia	474900A.101	VF2023003TA
AOMC SFP28+ 9.8G,70M,850NM (Multi-Mode - BS)	Nokia	474900A.101	VF20230008Y
AOSD SFP28+ 9.8G,10KM,1310NM (Single-Mode - Radio)	Nokia	474902A.101	VF19220012F
AOSD SFP28+ 9.8G,10KM,1310NM (Single-Mode - Radio)	Nokia	474902A.101	VF1922001EI
AOSD SFP28+ 9.8G,10KM,1310NM (Single-Mode - BS)	Nokia	474902A.101	VF19230003E
AOSD SFP28+ 9.8G,10KM,1310NM (Single-Mode - BS)	Nokia	474902A.101	FR202427765

CONFIGURATIONS

Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	RK182307104
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	DH211165881
ABIO (BTS Baseband Module)	Nokia Solutions and Networks	475266A.102	L1205105845
250W -50ohm -Terminating Load	API Weinschel	1433-3-LIM	TV065
250W -50ohm -Terminating Load	API Weinschel	1433-3-LIM	TC867
250W -50ohm -Terminating Load	API Weinschel	1433-3-LIM	TC864
250W -50ohm -Terminating Load	API Weinschel	1433-3-LIM	TC866
Electric Fan (AC PWR)	Electric	L908	None
ThinkPad T490 (WebEM- PC)	Lenovo	20N3S88012	PF26RVZ0
Keysight N8757- DC System power supply	Keysight	N8757A	US21D4053S
Cat-5e cable	CSA	LL73189	E151955

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
TMS Load 1	Y	2m	N	EUT [AHLOB] Ant port #1	Antenna Load 1
TMS Load 2	Y	2m	N	EUT [AHLOB] Ant port #2	Antenna Load 2
TMS Load 3	Y	2m	N	EUT [AHLOB] Ant port #3	Antenna Load 3
TMS Load 4	Y	2m	N	EUT [AHLOB] Ant port #4	Antenna Load 4
AC Power (PS Base Station)	N	2m	N	AC mains	Power Supply (Base Station)
AC Power (Laptop)	N	1.65m	N	AC Mains	Power Supply (Laptop)
DC Power Leads	N	7.5m	Y	DC Power Supply (Keysight)	Remote Radio Head Module
AC Power (KeySight)	N	4m	N	AC mains	DC Power Supply (Radio)
Optical Fiber (MM + SM)	N	30m	N	Airscale Base Station (ABIO)	Remote Radio Head Module
RET	N	2.4m	N	Remote Radio Head Module	Unterminated
EAC	N	5.4m	N	Remote Radio Head Module	Unterminated
Grounding	N	3m	N	Remote Radio Head Module	Turntable Ground
Cat-5e Data cable	Y	2m	N	ASIB	WebEM- PC

RF Test Setup Diagram:



CONFIGURATIONS

Configuration NOKI0042- 5

Software/Firmware Running during test	
Description	**Version**
BTS Software Version (22R4)	SBTS22R4_ENB_9999_220607_000006
RF_SW	RF.FRM6.TRUNK.20220602.020

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	RK182307104
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	DH211165881
ABIO (BTS Baseband Module)	Nokia Solutions and Networks	475266A.102	L1205105845
AHLOB (Radio Module Model)	Nokia Solutions and Networks	475910A.101	YK220900026
Attenuator 40dB/250 Watts	API Weinschel	58-40-43-LMI	TC909
SFP+ 9.8G,300M,850NM	Nokia	474900A.101	VF2023004CF
SFP+ 9.8G,300M,850NM	Nokia	474900A.101	VF2023003TA
Lenovo T470	HP	T470	N-20HEPF17B91U
Keysight- DC System power supply	Keysight	N8757A	US21D4053S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007170
2 Meter RF cable (Load Cable)	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297388
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV065
GPS cable 100m	FTSH	472577A.103	CA2029
FYGC GPS receiver	Nokia	474074A	1294000684
Cat-5e cable	CSA	LL73189	E151955
Fiber Optic cable 2m	Amphenol Fiber Optic	VZ1701	995741A
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297372
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551432/4
Digital Multimeter	Fluke	77IV	CAL: 27210148
Thermometer	Omega Engineering Inc	HH31	1130101855
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-72

CONFIGURATIONS

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1 (4G)**	**Connection 2**
Fiber Optic Cable	N	2 meters	N	ABIO	AHLOB
Cat-5e Cable	Y	7 meters	N	ASIB	WebEM- PC
HS-SUCOFLEX_106	Y	2 meters	N	AHLOB Ant 1	Attenuator 250W/40dB
Attenuator 250W/40dB	N	NA	N	RF cable HS-SUCOFLEX_106	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	2 meters	N	Attenuator 250W/40dB	Analyzer
HS-SUCOFLEX_106 – RF CABLE	Y	2 meters	N	EUT [AHLOB] Ant 3	250W -50ohm - Load
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIB	Analyzer
Grounding	N	3 meters	N	Remote Radio Head Module	Interior Temp Chamber wall

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

RF Test Setup Diagram:

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2022-06-21	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2022-06-22	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	2022-06-22	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2022-06-23	Average Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2022-06-24	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	2022-06-24	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.
7	2022-06-28	Spurious Radiated 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.
8	2022-07-01	Frequency Stability	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

OCCUPIED BANDWIDTH - BAND n71

XMit 2022.02.07.0

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
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Block - DC	Fairview Microwave	SD3239	ANE	2022-03-02	2023-03-02
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFQ	2022-01-17	2023-01-17

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 AHLOB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) 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, and 6.4.

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

FCC and ISED Emission Designators for Band n71 (617MHz to 652MHz)

Ch BW	Radio Channel	5G-NR: QPSK		5G-NR: 16QAM		5G-NR: 64QAM		5G-NR: 256QAM	
		FCC	ISED	FCC	ISED	FCC	ISED	FCC	ISED
5MHz	Low							4M85G7W	4M49G7W
	Mid	4M84G7W	4M49G7W	4M84G7W	4M51G7W	4M84G7W	4M48G7W	4M82G7W	4M48G7W
	High							4M83G7W	4M48G7W
10MHz	Low							9M90G7W	9M31G7W
	Mid	9M92G7W	9M30G7W	9M83G7W	9M25G7W	9M87G7W	9M30G7W	9M90G7W	9M30G7W
	High							9M89G7W	9M31G7W
15MHz	Low							14M9G7W	14M1G7W
	Mid	14M9G7W	14M1G7W	14M8G7W	14M1G7W	14M9G7W	14M1G7W	14M8G7W	14M1G7W
	High							14M9G7W	14M1G7W
20MHz	Low							19M9G7W	18M9G7W
	Mid	20M0G7W	19M0G7W	19M9G7W	19M0G7W	20M0G7W	19M0G7W	20M0G7W	19M0G7W
	High							20M0G7W	18M9G7W

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

OCCUPIED BANDWIDTH - BAND n71

element

TbtTx 2022.06.03.0 XMit 2022.02.07.0

EUT:	AHLOB (FCC/ISED)			Work Order:	NOKI0042
Serial Number:	YK220900026			Date:	21-Jun-22
Customer:	Nokia Solutions and Networks			Temperature:	21.1 °C
Attendees:	David Le, John Rattanavong			Humidity:	53.5% RH
Project:	None			Barometric Pres.:	1023 mbar
Tested by:	Brandon Hobbs	Power:	54 VDC	Job Site:	TX07

TEST SPECIFICATIONS	Test Method
FCC 27:2022	ANSI C63.26:2015
RSS-130 Issue 2:2019	ANSI C63.26:2015

COMMENTS

All losses in the measurement path were accounted for: attenuators, cables, DC block and filter when in use. The carriers were enabled at maximum power.

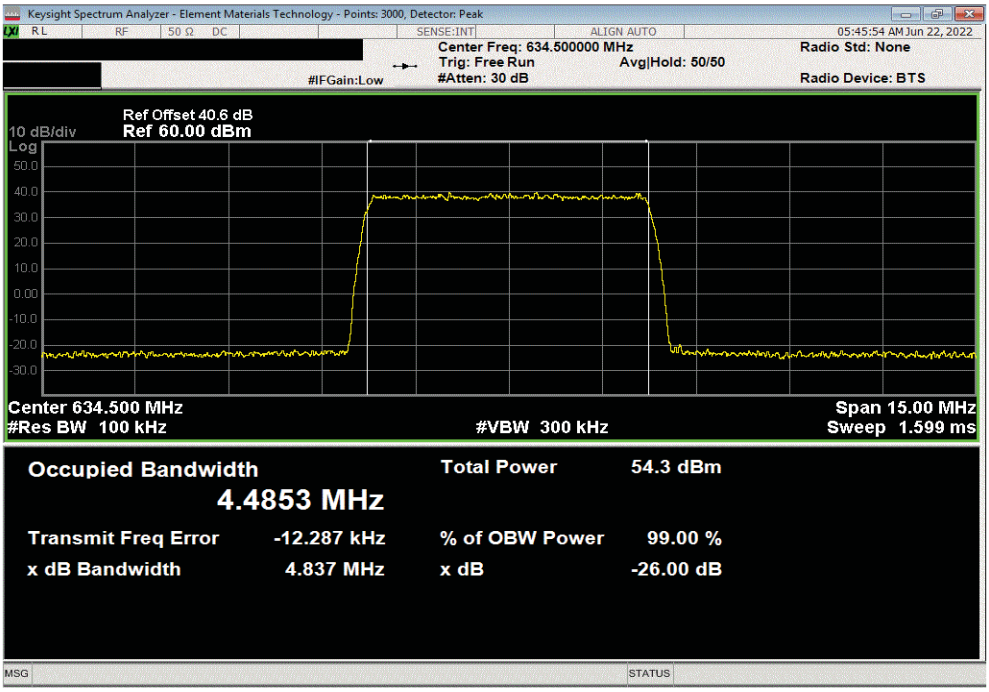
DEVIATIONS FROM TEST STANDARD

None

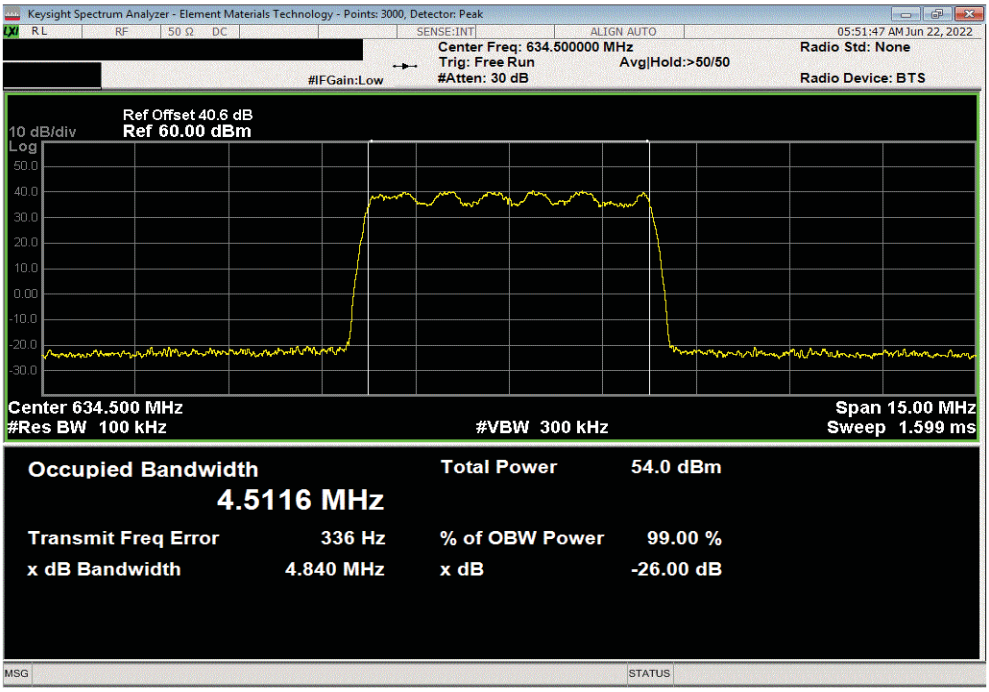
Configuration #	2	Signature

	Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz				
5 MHz Bandwidth				
QPSK Modulation				
Mid Ch. 634.5 MHz	4.49	4.84	Within Band	Pass
16-QAM Modulation				
Mid Ch. 634.5 MHz	4.51	4.84	Within Band	Pass
64-QAM Modulation				
Mid Ch. 634.5 MHz	4.48	4.84	Within Band	Pass
256-QAM Modulation				
Low Ch. 619.5 MHz	4.49	4.85	Within Band	Pass
Mid Ch. 634.5 MHz	4.48	4.82	Within Band	Pass
High Ch. 649.5 MHz	4.48	4.83	Within Band	Pass
10 MHz Bandwidth				
QPSK Modulation				
Mid Ch. 634.5 MHz	9.30	9.92	Within Band	Pass
16-QAM Modulation				
Mid Ch. 634.5 MHz	9.25	9.83	Within Band	Pass
64-QAM Modulation				
Mid Ch. 634.5 MHz	9.30	9.87	Within Band	Pass
256-QAM Modulation				
Low Ch. 622 MHz	9.31	9.90	Within Band	Pass
Mid Ch. 634.5 MHz	9.30	9.90	Within Band	Pass
High Ch. 647 MHz	9.31	9.89	Within Band	Pass
15 MHz Bandwidth				
QPSK Modulation				
Mid Ch. 634.5 MHz	14.1	14.9	Within Band	Pass
16-QAM Modulation				
Mid Ch. 634.5 MHz	14.1	14.8	Within Band	Pass
64-QAM Modulation				
Mid Ch. 634.5 MHz	14.1	14.9	Within Band	Pass
256-QAM Modulation				
Low Ch. 624.5 MHz	14.1	14.9	Within Band	Pass
Mid Ch. 634.5 MHz	14.1	14.8	Within Band	Pass
High Ch. 644.5 MHz	14.1	14.9	Within Band	Pass
20 MHz Bandwidth				
QPSK Modulation				
Mid Ch. 634.5 MHz	19.0	20.0	Within Band	Pass
16-QAM Modulation				
Mid Ch. 634.5 MHz	19.0	19.9	Within Band	Pass
64-QAM Modulation				
Mid Ch. 634.5 MHz	19.0	20.0	Within Band	Pass
256-QAM Modulation				
Low Ch. 627 MHz	18.9	19.9	Within Band	Pass
Mid Ch. 634.5 MHz	19.0	20.0	Within Band	Pass
High Ch. 642 MHz	18.9	20.0	Within Band	Pass

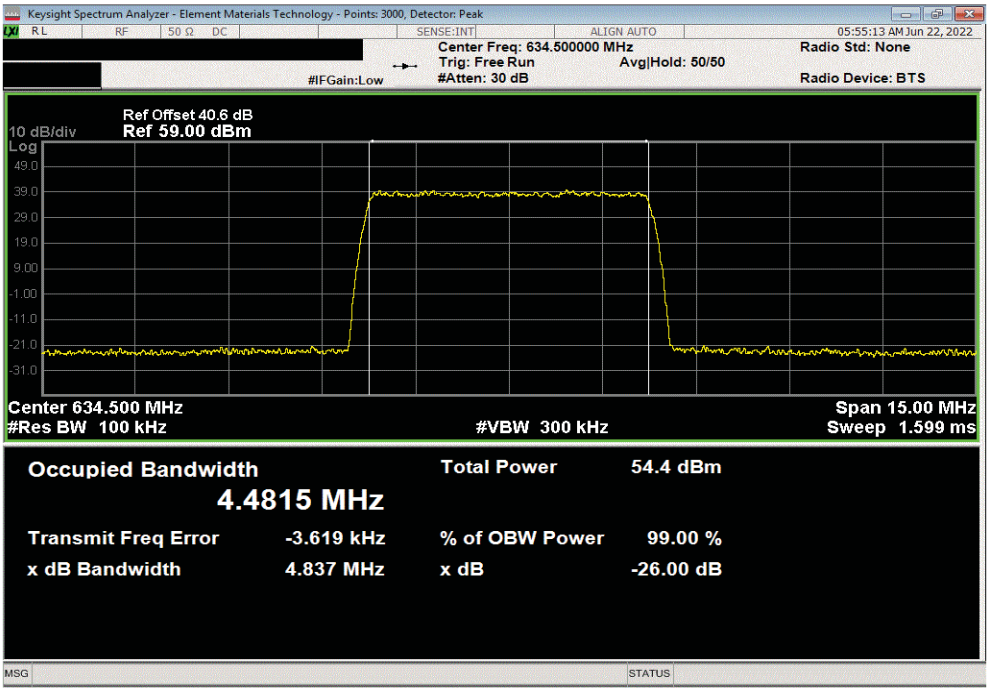
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 5 MHz Bandwidth, QPSK Modulation, Mid Ch. 634.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.485	4.837	Within Band	Pass



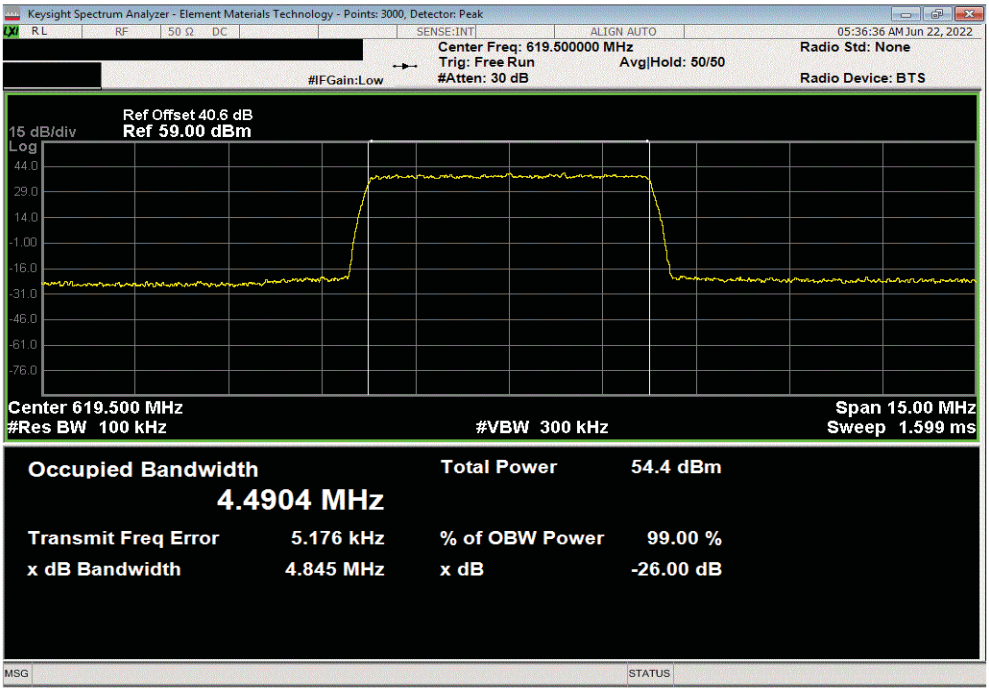
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 5 MHz Bandwidth, 16-QAM Modulation, Mid Ch. 634.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.512	4.84	Within Band	Pass



Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 5 MHz Bandwidth, 64-QAM Modulation, Mid Ch. 634.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.481	4.837	Within Band	Pass

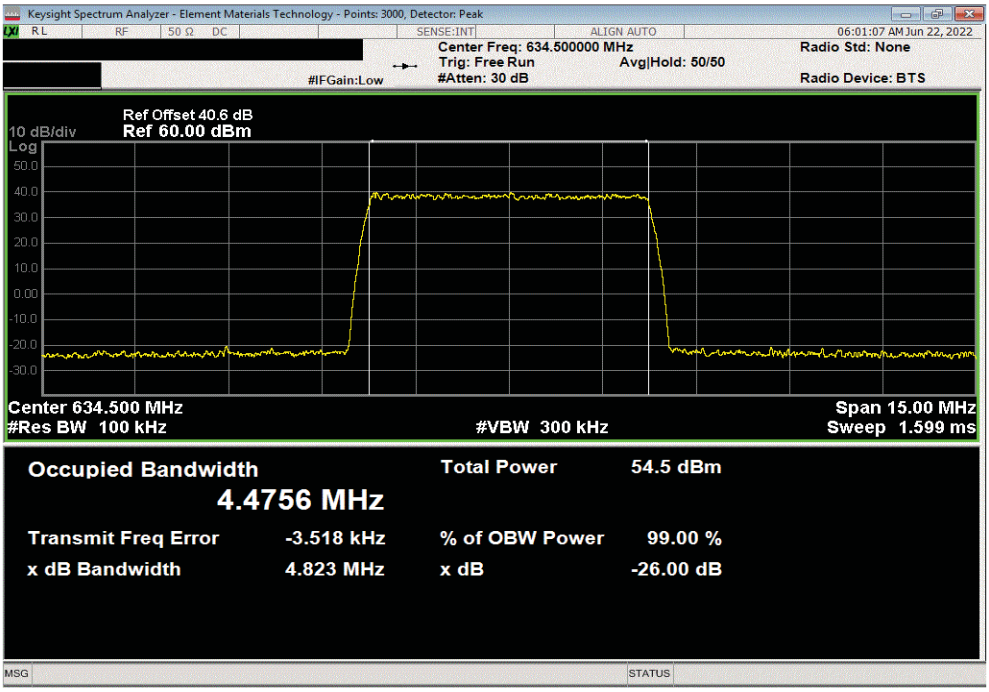


Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 5 MHz Bandwidth, 256-QAM Modulation, Low Ch. 619.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.49	4.845	Within Band	Pass



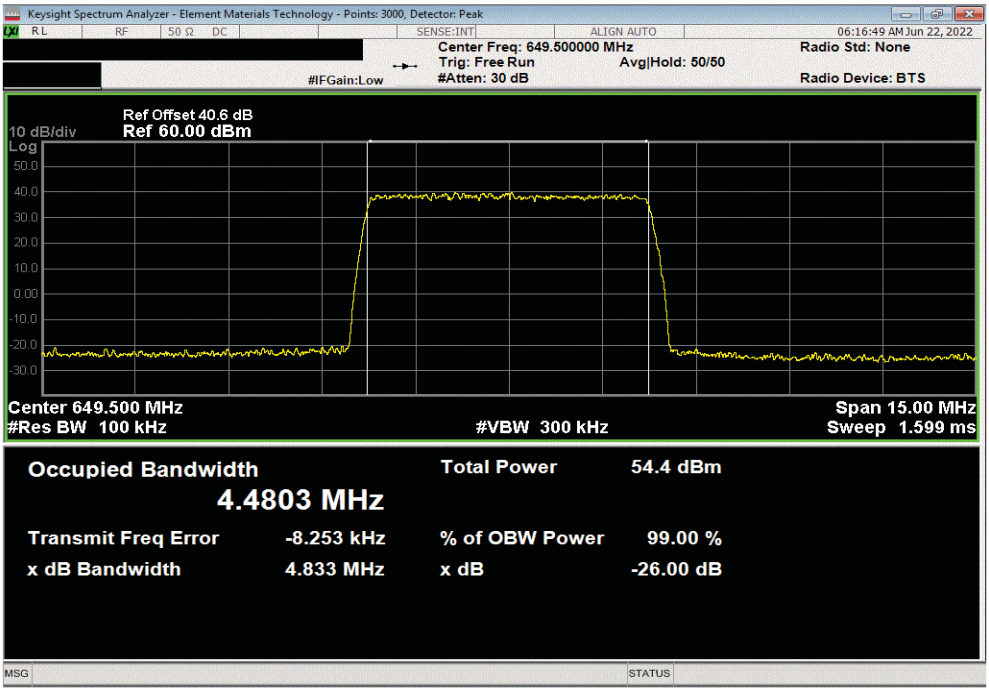
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 5 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 634.5 MHz

			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.476	4.823	Within Band	Pass

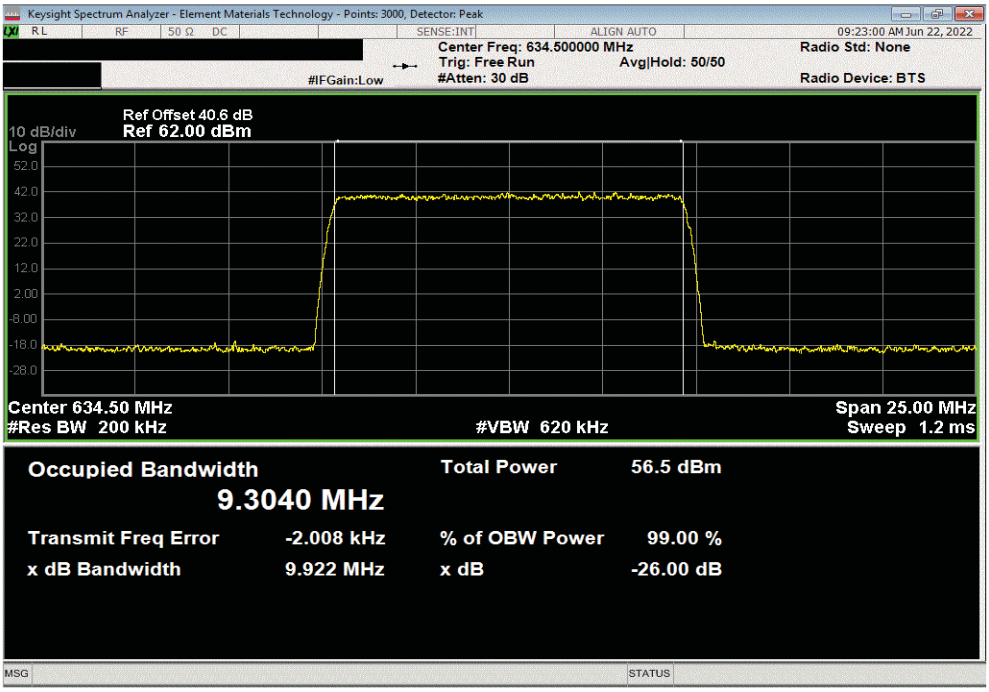


Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 5 MHz Bandwidth, 256-QAM Modulation, High Ch. 649.5 MHz

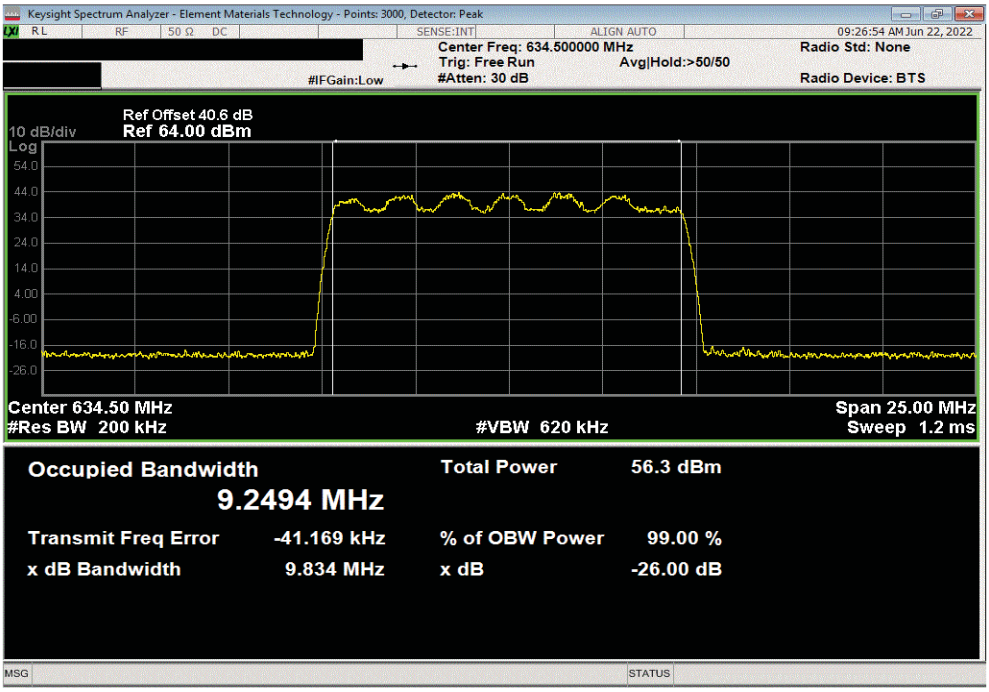
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.48	4.833	Within Band	Pass



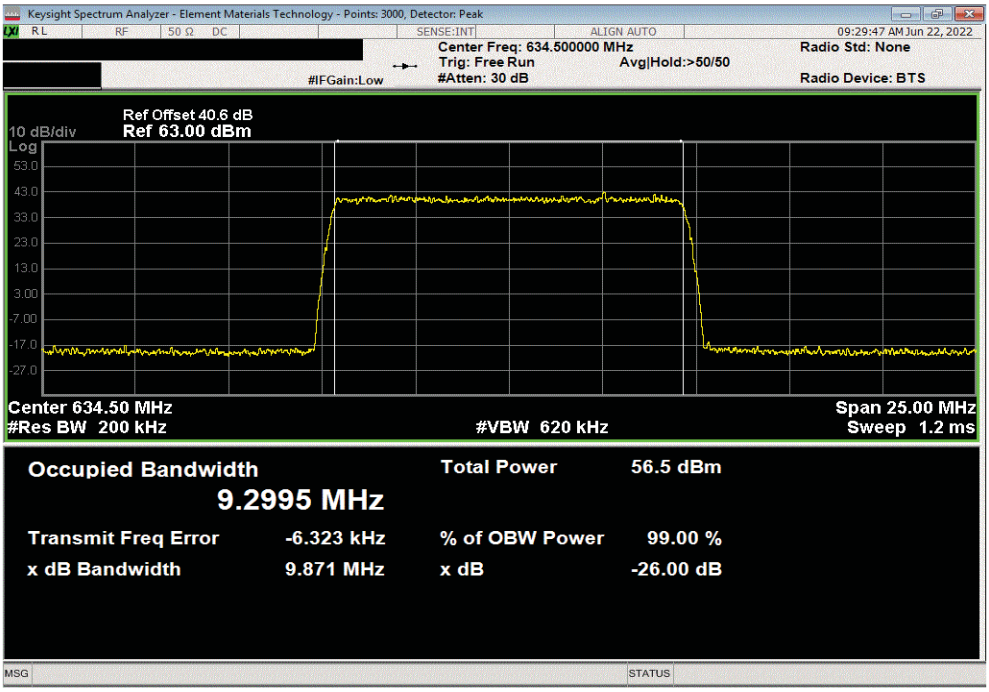
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 10 MHz Bandwidth, QPSK Modulation, Mid Ch. 634.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.304	9.922	Within Band	Pass



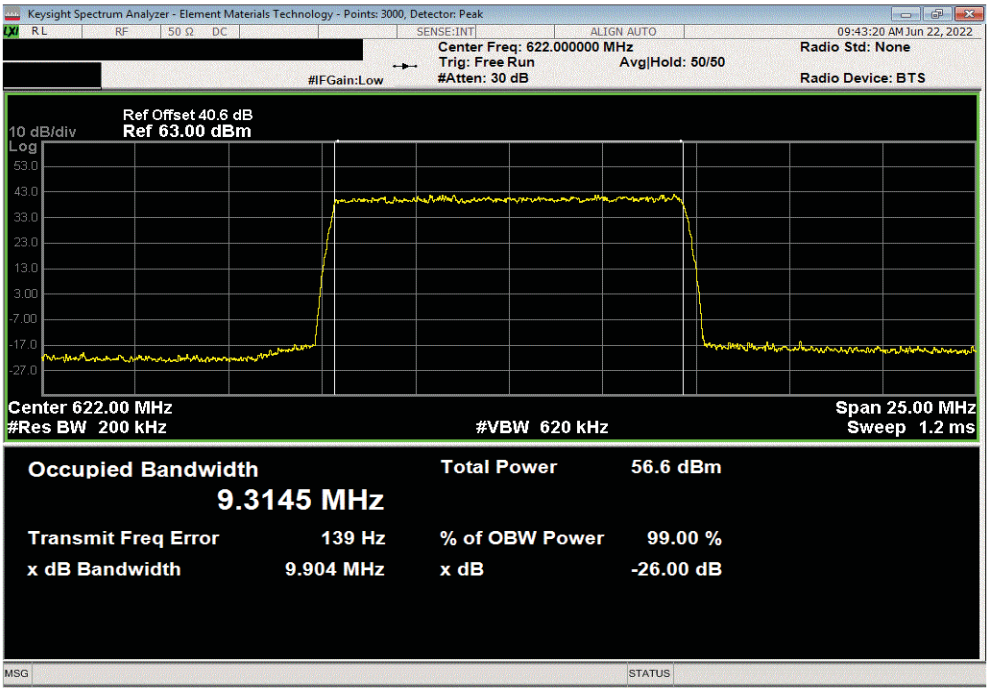
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 10 MHz Bandwidth, 16-QAM Modulation, Mid Ch. 634.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.249	9.834	Within Band	Pass



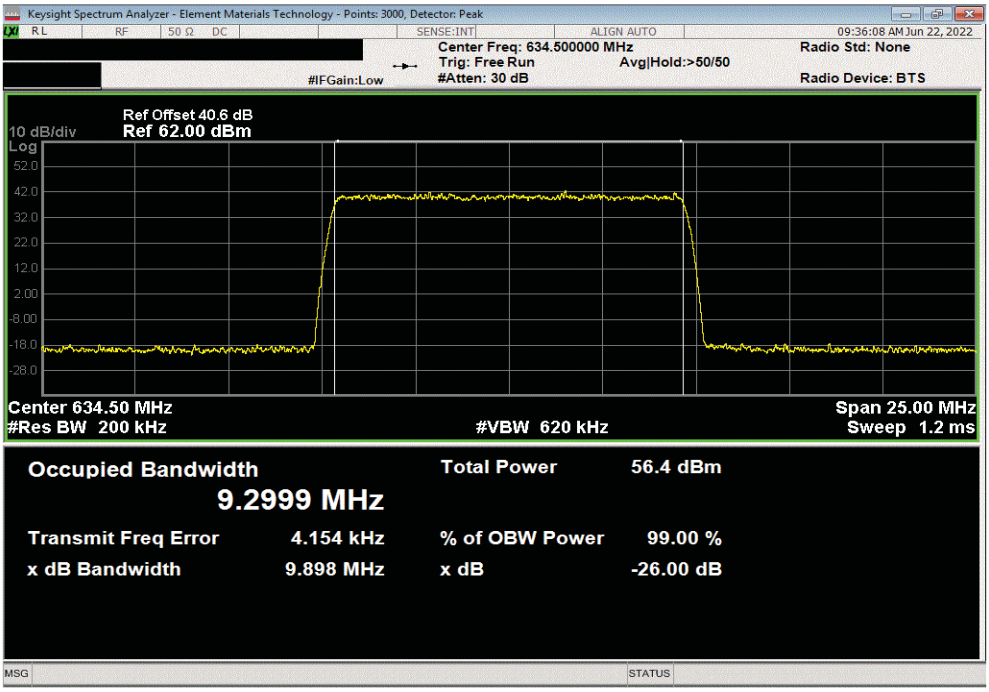
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 10 MHz Bandwidth, 64-QAM Modulation, Mid Ch. 634.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.299	9.871	Within Band	Pass



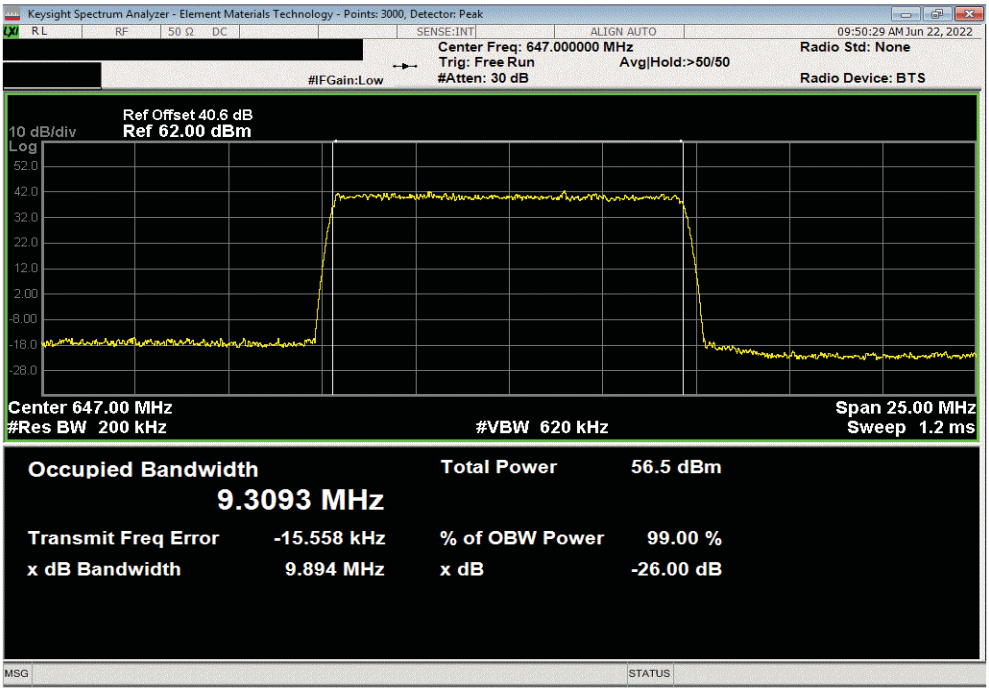
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 10 MHz Bandwidth, 256-QAM Modulation, Low Ch. 622 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.314	9.904	Within Band	Pass



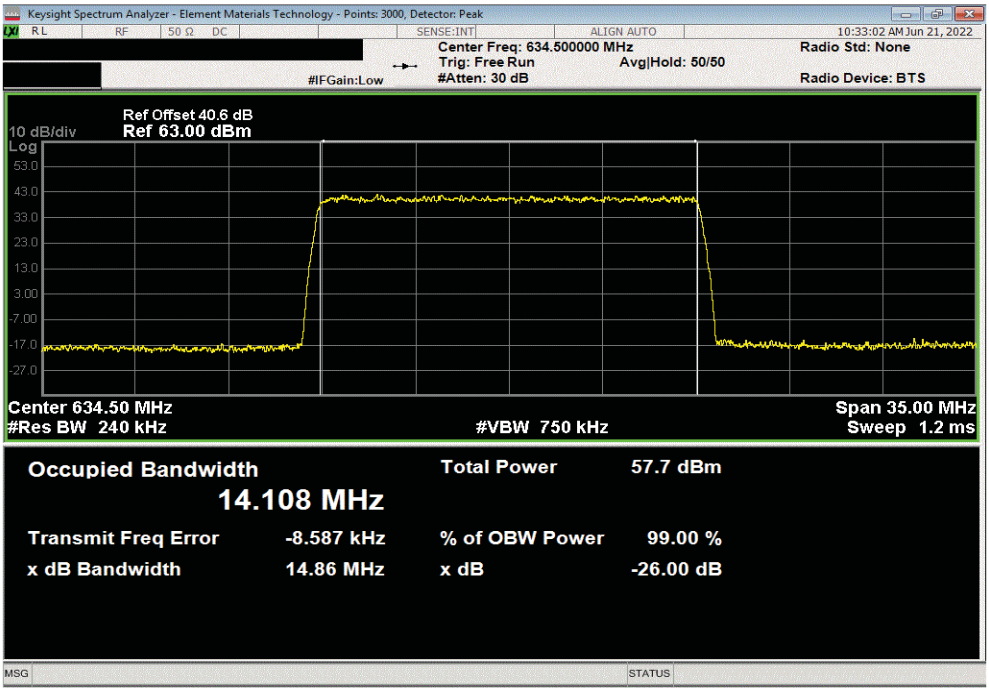
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 10 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 634.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.3	9.898	Within Band	Pass



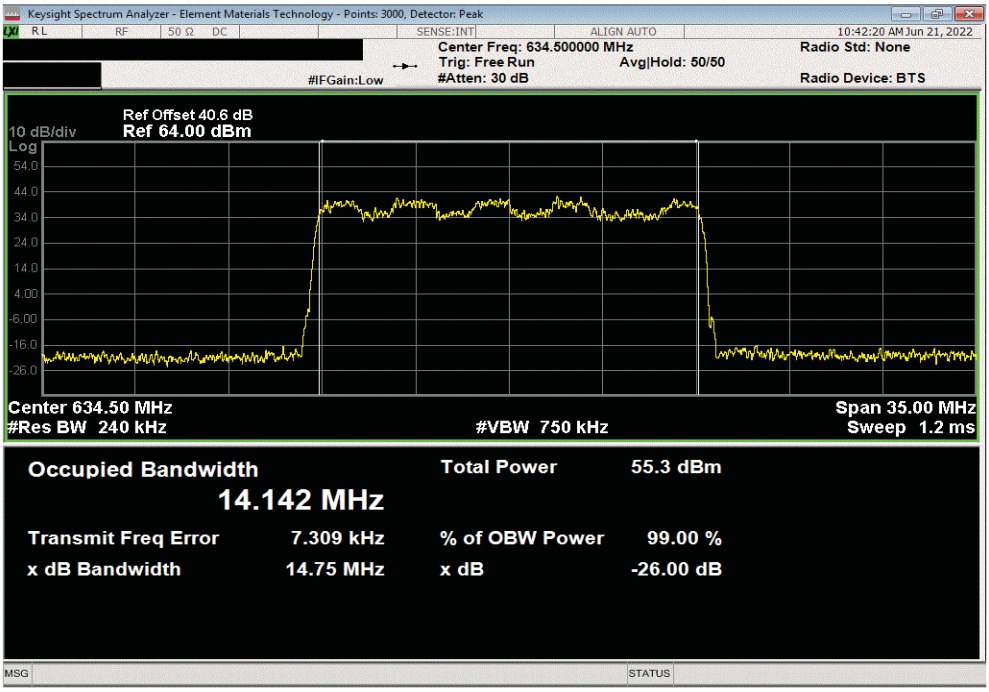
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 10 MHz Bandwidth, 256-QAM Modulation, High Ch. 647 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.309	9.894	Within Band	Pass



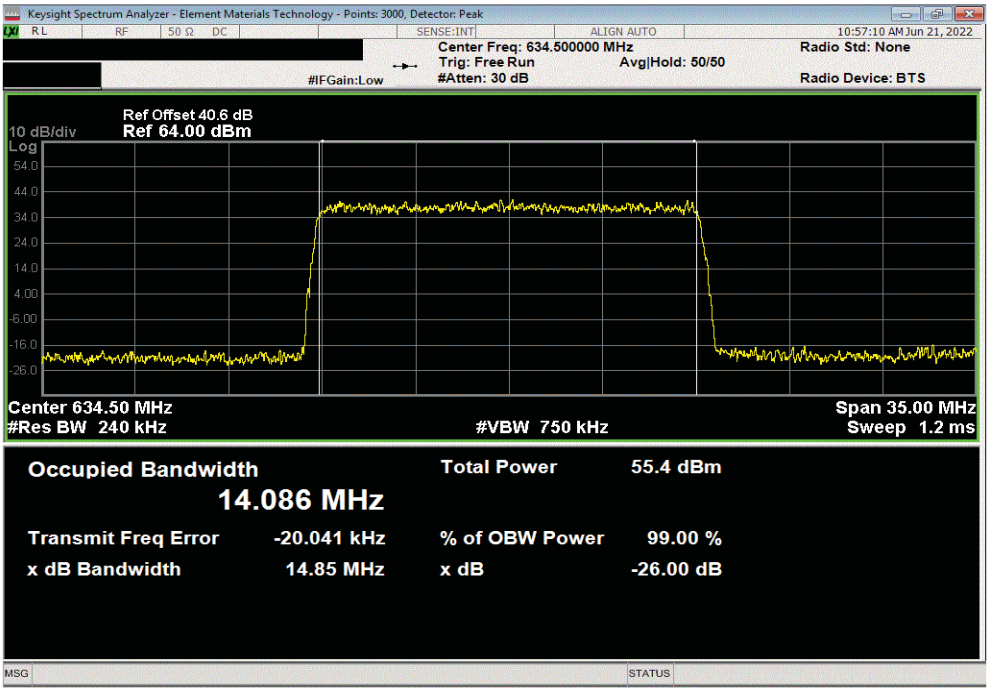
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 15 MHz Bandwidth, QPSK Modulation, Mid Ch. 634.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.108	14.865	Within Band	Pass



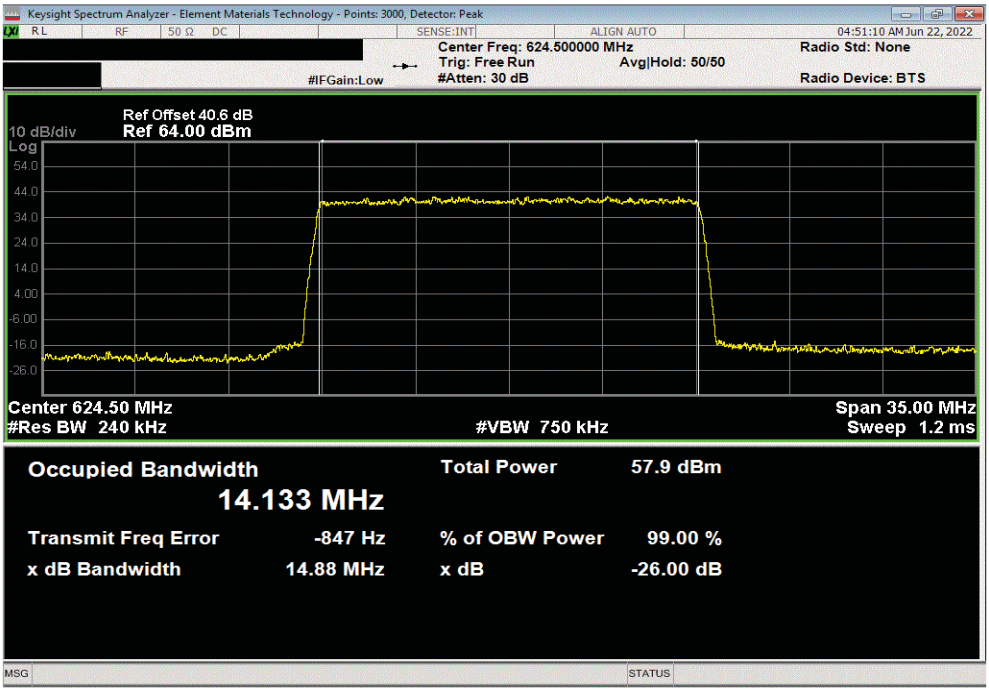
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 15 MHz Bandwidth, 16-QAM Modulation, Mid Ch. 634.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.142	14.752	Within Band	Pass



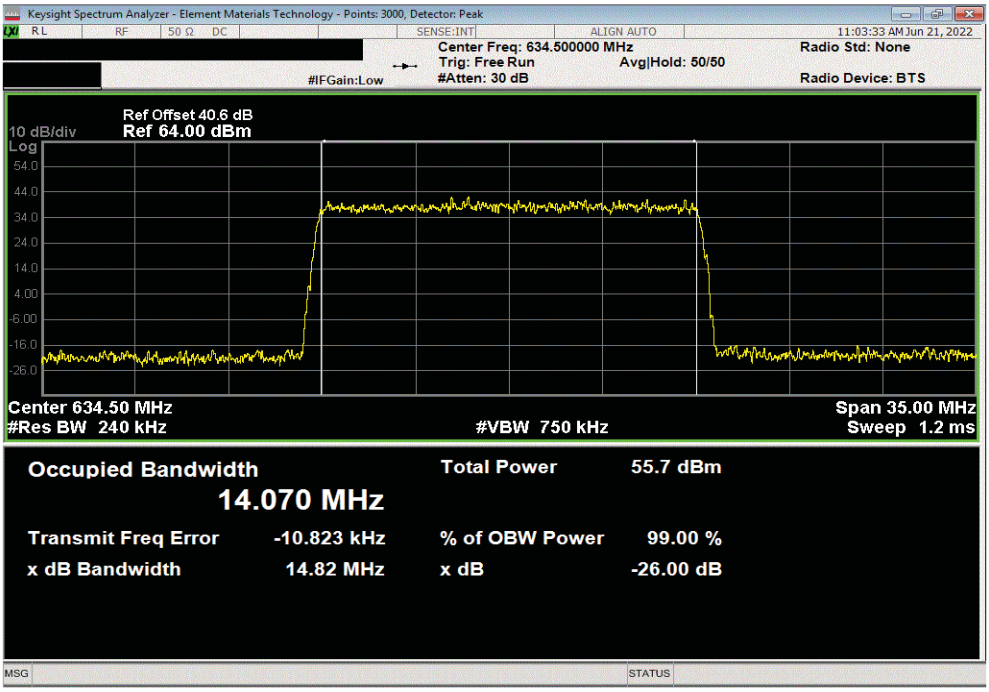
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 15 MHz Bandwidth, 64-QAM Modulation, Mid Ch. 634.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.086	14.852	Within Band	Pass



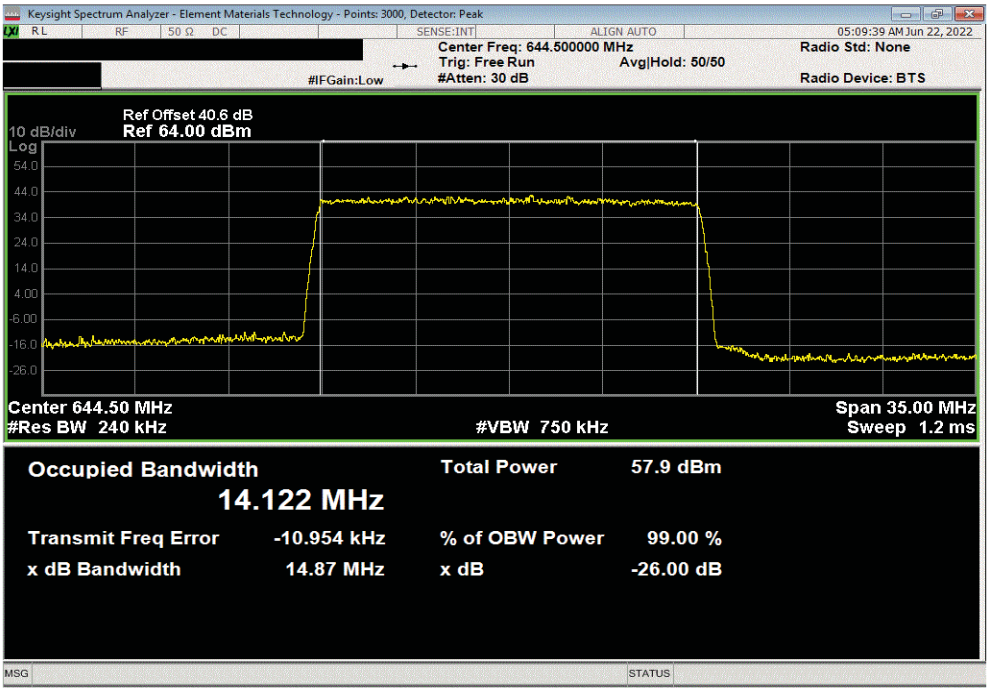
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 15 MHz Bandwidth, 256-QAM Modulation, Low Ch. 624.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.133	14.882	Within Band	Pass



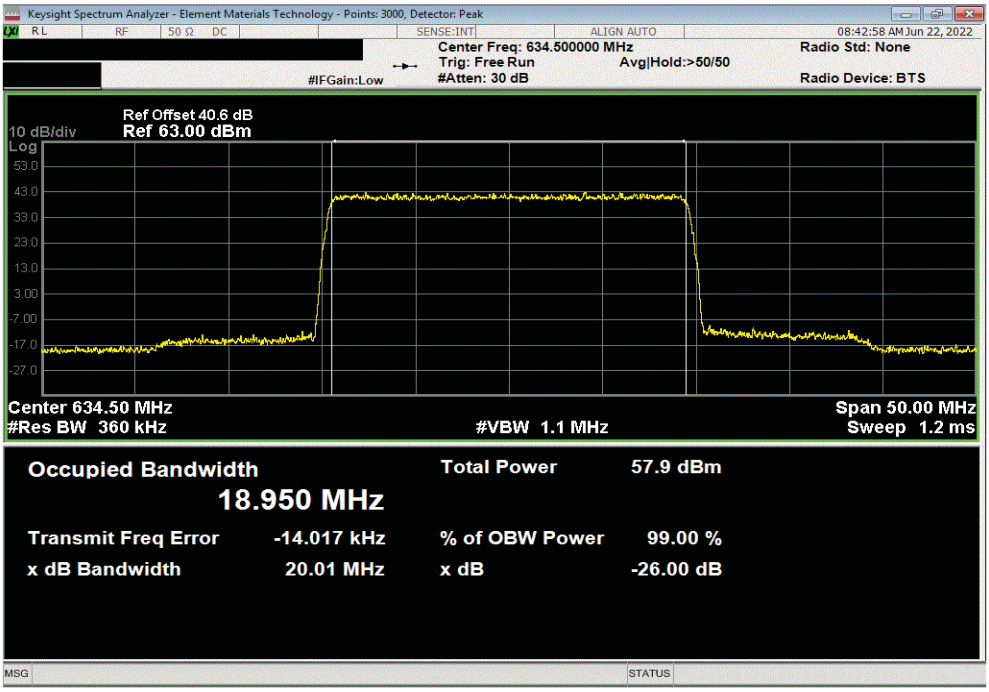
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 15 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 634.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.07	14.819	Within Band	Pass



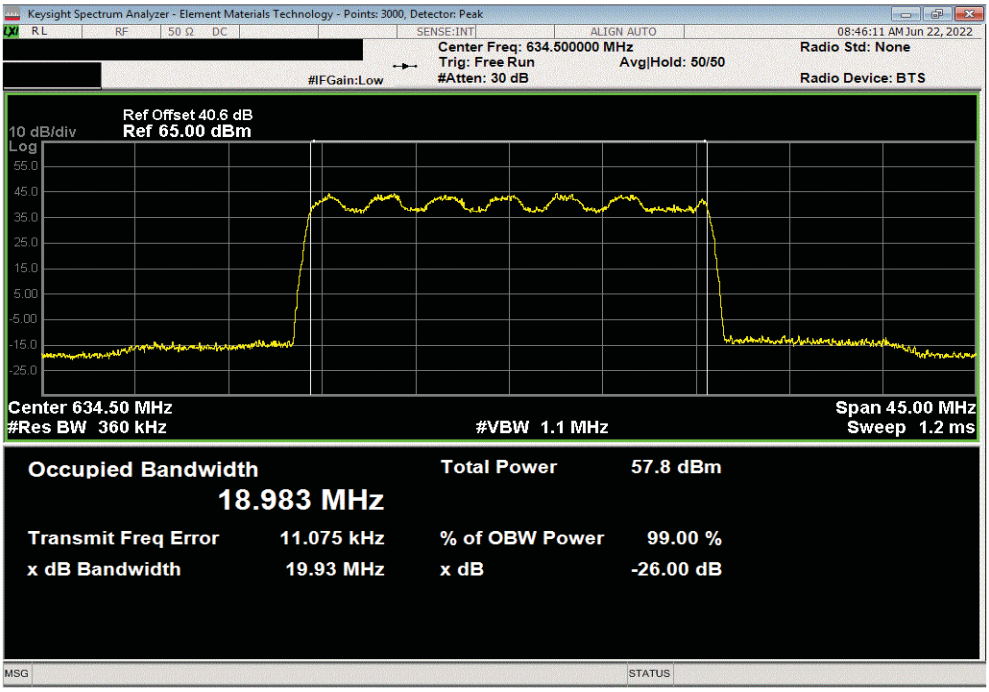
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 15 MHz Bandwidth, 256-QAM Modulation, High Ch. 644.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.122	14.869	Within Band	Pass



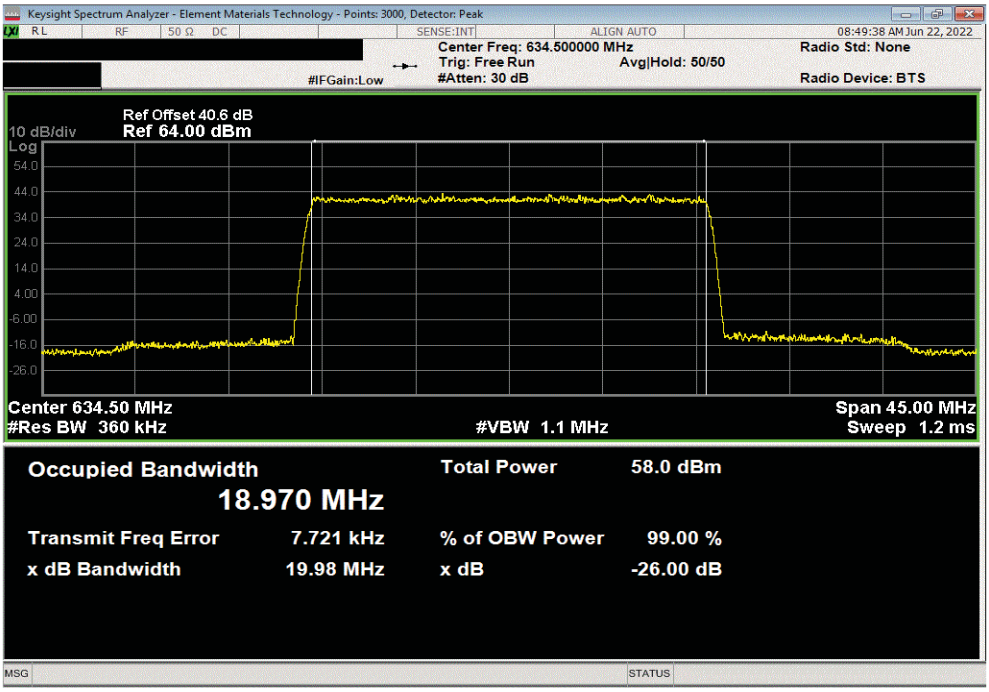
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 20 MHz Bandwidth, QPSK Modulation, Mid Ch. 634.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.95	20.012	Within Band	Pass



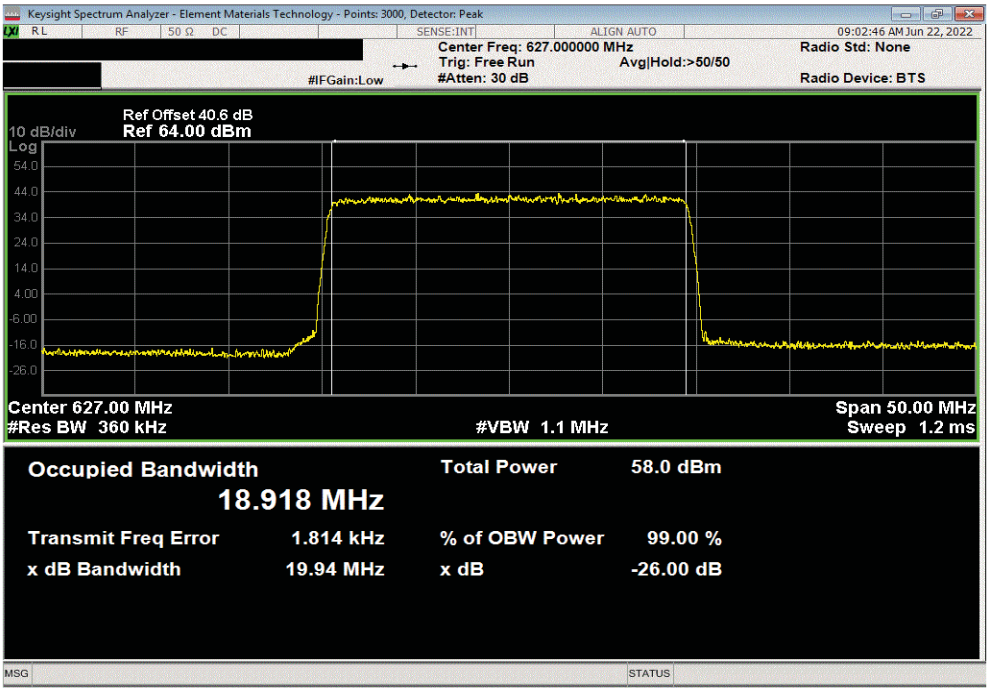
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 20 MHz Bandwidth, 16-QAM Modulation, Mid Ch. 634.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.983	19.935	Within Band	Pass



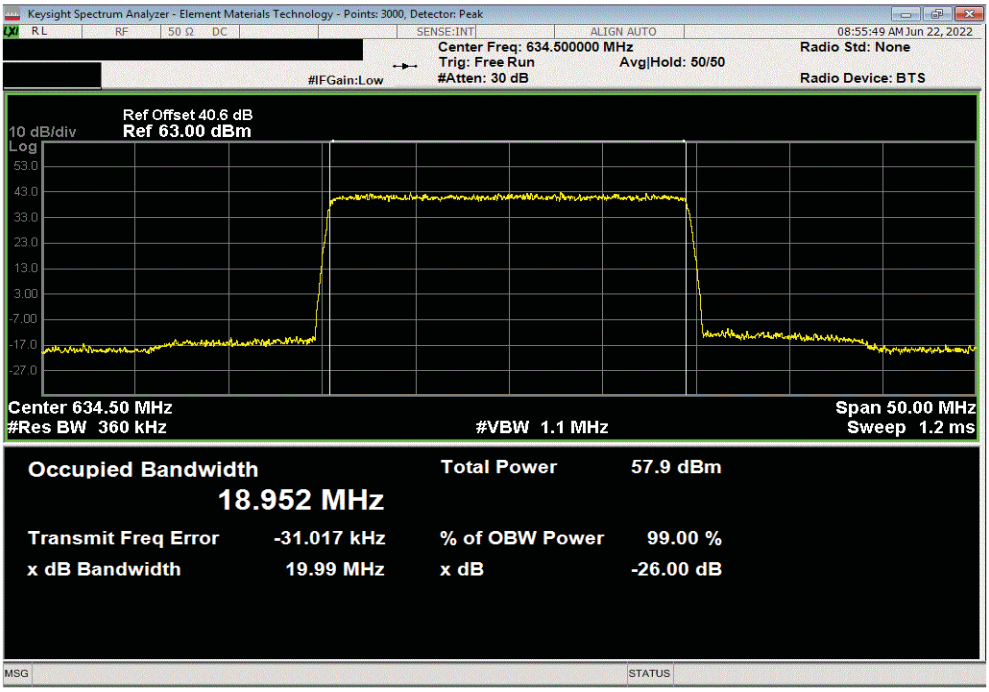
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 20 MHz Bandwidth, 64-QAM Modulation, Mid Ch. 634.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.97	19.978	Within Band	Pass



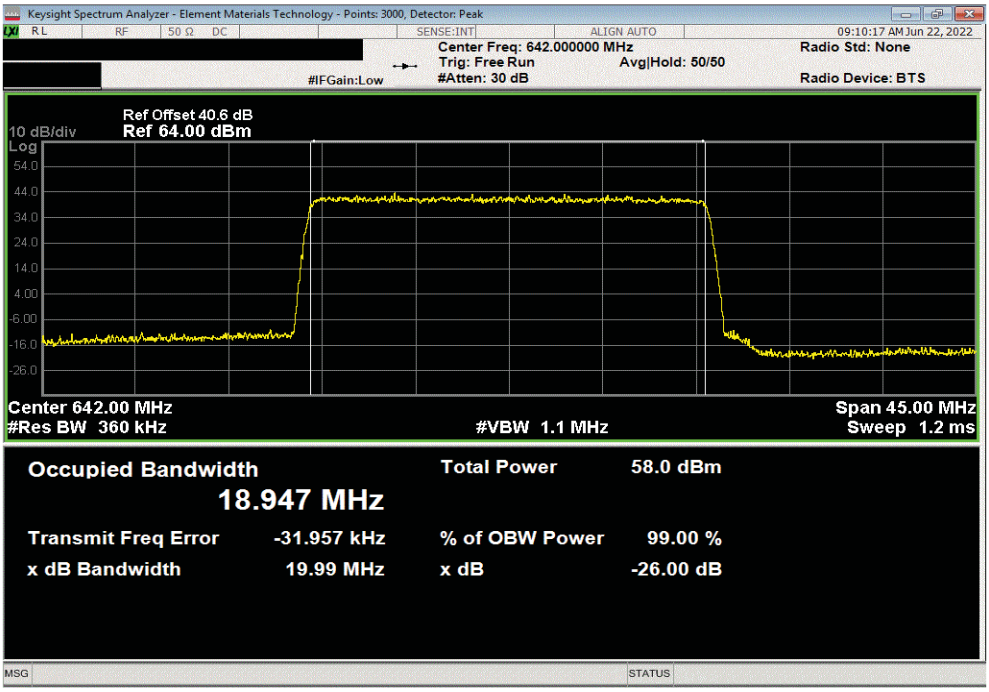
Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 20 MHz Bandwidth, 256-QAM Modulation, Low Ch. 627 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.918	19.944	Within Band	Pass



Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 20 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 634.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.952	19.994	Within Band	Pass



Port 1, 5G NR, Band 71, 617 MHz - 652 MHz, 20 MHz Bandwidth, 256-QAM Modulation, High Ch. 642 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.947	19.987	Within Band	Pass



OCCUPIED BANDWIDTH - BAND n85

XMit 2022.02.07.0

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
Block - DC	Fairview Microwave	SD3239	ANE	2022-03-02	2023-03-02
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFQ	2022-01-17	2023-01-17

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 AHLOB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) 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, and 6.4.

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

FCC and ISED Emission Designators for Band n85 (728MHz to 746MHz)									
Ch BW	Radio Channel	5G-NR: QPSK		5G-NR: 16QAM		5G-NR: 64QAM		5G-NR: 256QAM	
		FCC	ISED	FCC	ISED	FCC	ISED	FCC	ISED
5MHz	Low							4M82G7W	4M48G7W
	Mid	4M84G7W	4M48G7W	4M83G7W	4M52G7W	4M84G7W	4M48G7W	4M84G7W	4M49G7W
	High							4M83G7W	4M49G7W
10MHz	Low							9M93G7W	9M31G7W
	Mid	9M92G7W	9M30G7W	9M84G7W	9M23G7W	9M88G7W	9M31G7W	9M90G7W	9M30G7W
	High							9M92G7W	9M31G7W
15MHz	Low							14M9G7W	14M1G7W
	Mid	14M9G7W	14M1G7W	14M9G7W	14M1G7W	14M9G7W	14M1G7W	14M9G7W	14M1G7W
	High							14M8G7W	14M1G7W

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

OCCUPIED BANDWIDTH - BAND n85

TbtTx 2022.06.03.0 XMit 2022.02.07.0

EUT:	AHLOB (FCC/ISED)			Work Order:	NOKI0042
Serial Number:	YK220900026			Date:	22-Jun-22
Customer:	Nokia Solutions and Networks			Temperature:	21.3 °C
Attendees:	David Le, John Rattanavong			Humidity:	53.6% RH
Project:	None			Barometric Pres.:	1021 mbar
Tested by:	Brandon Hobbs	Power:	54 VDC	Job Site:	TX07

TEST SPECIFICATIONS	Test Method
FCC 27:2022	ANSI C63.26:2015
RSS-130 Issue 2:2019	ANSI C63.26:2015

COMMENTS

All losses in the measurement path were accounted for: attenuators, cables, DC block and filter when in use. The carriers were enabled at maximum power.

DEVIATIONS FROM TEST STANDARD

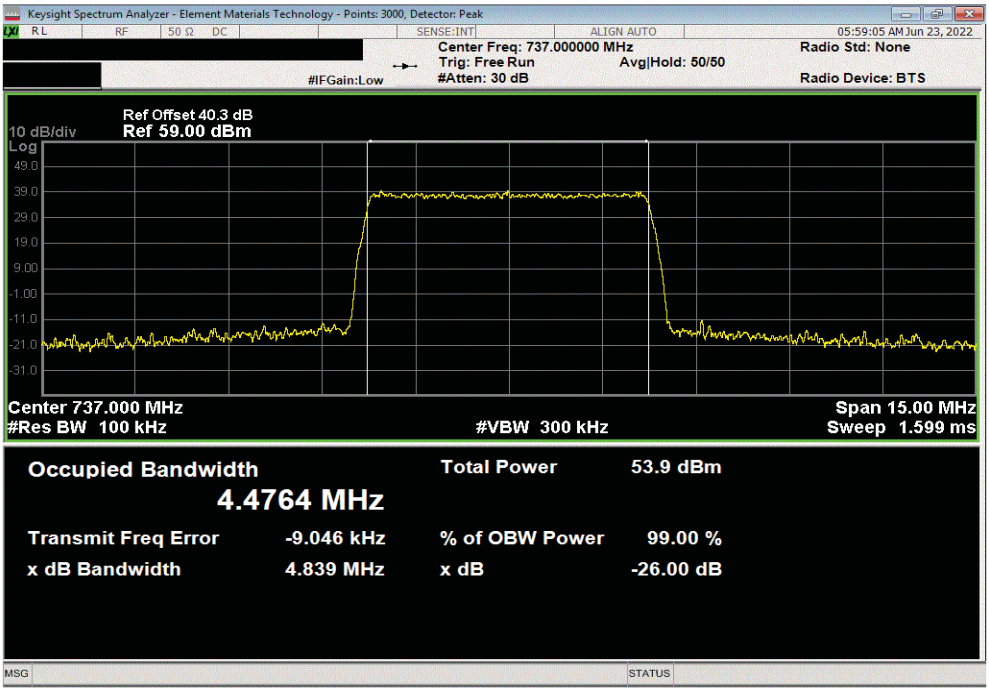
None

Configuration #	2	Signature

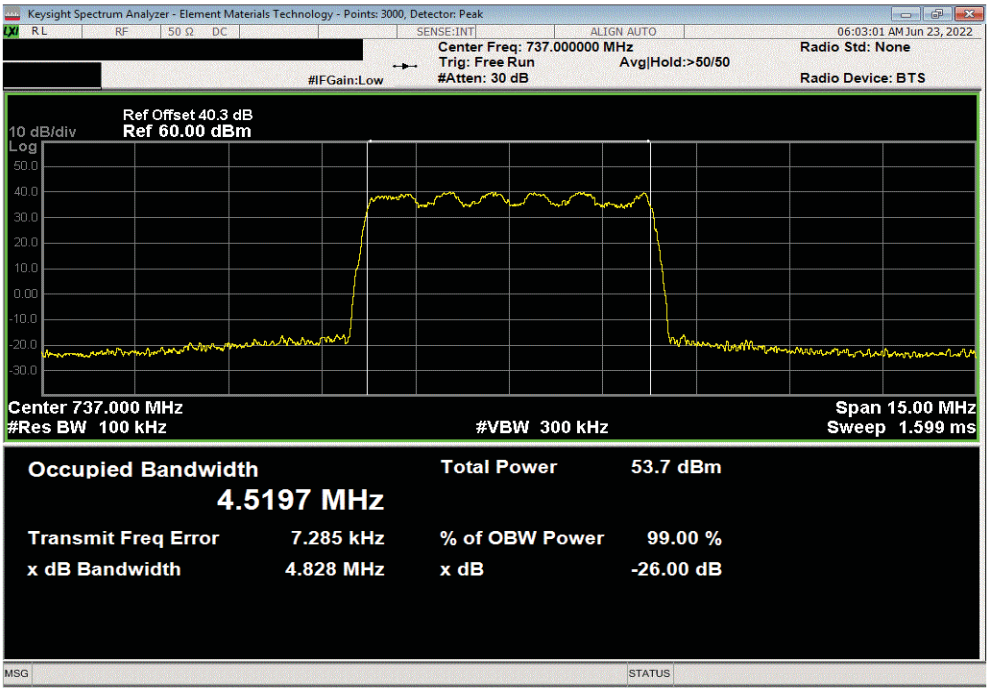
	Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
Port 1, 5G NR, Band n85, 728 MHz - 746 MHz				
5 MHz Bandwidth				
QPSK Modulation				
Mid Ch. 737 MHz	4.48	4.84	Within Band	Pass
16-QAM Modulation				
Mid Ch. 737 MHz	4.52	4.83	Within Band	Pass
64-QAM Modulation				
Mid Ch. 737 MHz	4.48	4.84	Within Band	Pass
256-QAM Modulation				
Low Ch. 730.5 MHz	4.48	4.82	Within Band	Pass
Mid Ch. 737 MHz	4.49	4.84	Within Band	Pass
High Ch. 743.5 MHz	4.49	4.83	Within Band	Pass
10 MHz Bandwidth				
QPSK Modulation				
Mid Ch. 737 MHz	9.30	9.92	Within Band	Pass
16-QAM Modulation				
Mid Ch. 737 MHz	9.23	9.84	Within Band	Pass
64-QAM Modulation				
Mid Ch. 737 MHz	9.31	9.88	Within Band	Pass
256-QAM Modulation				
Low Ch. 733 MHz	9.31	9.93	Within Band	Pass
Mid Ch. 737 MHz	9.30	9.90	Within Band	Pass
High Ch. 741 MHz	9.31	9.92	Within Band	Pass
15 MHz Bandwidth				
QPSK Modulation				
Mid Ch. 737 MHz	14.1	14.9	Within Band	Pass
16-QAM Modulation				
Mid Ch. 737 MHz	14.1	14.9	Within Band	Pass
64-QAM Modulation				
Mid Ch. 737 MHz	14.1	14.9	Within Band	Pass
256-QAM Modulation				
Low Ch. 735.5 MHz	14.1	14.9	Within Band	Pass
Mid Ch. 737 MHz	14.1	14.9	Within Band	Pass
High Ch. 738.5 MHz	14.1	14.8	Within Band	Pass

OCCUPIED BANDWIDTH - BAND n85

Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 5 MHz Bandwidth, QPSK Modulation, Mid Ch. 737 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.476	4.839	Within Band	Pass

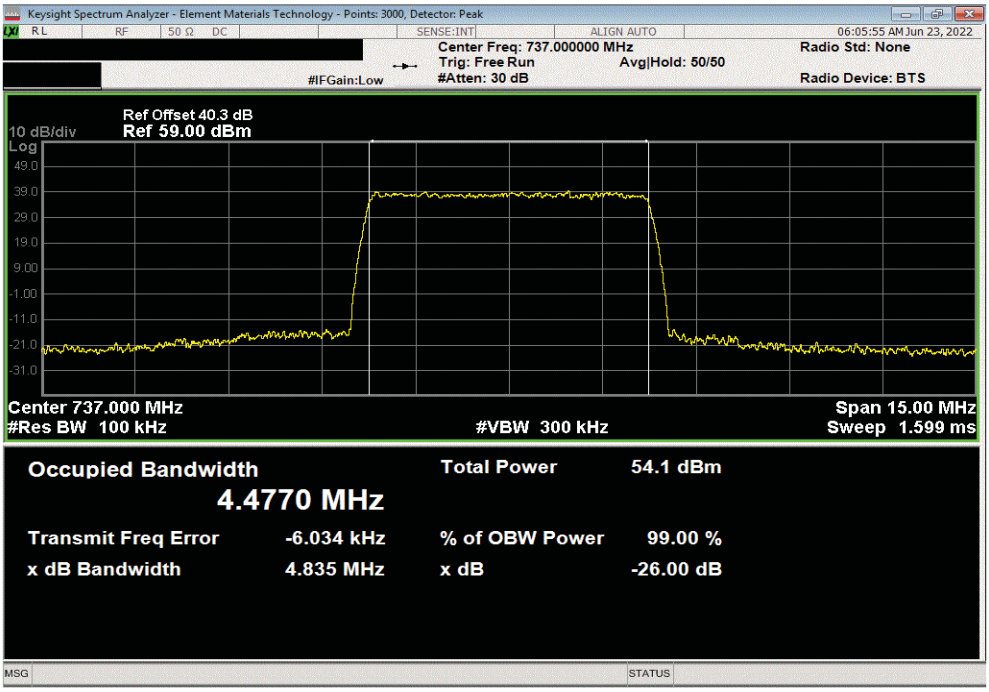


Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 5 MHz Bandwidth, 16-QAM Modulation, Mid Ch. 737 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.52	4.828	Within Band	Pass

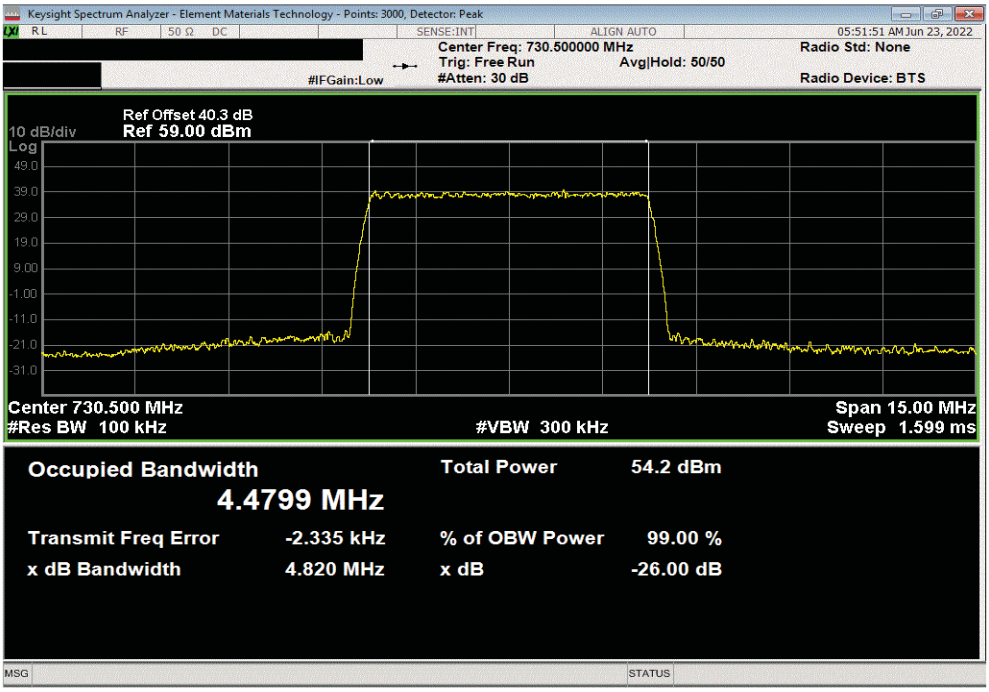


OCCUPIED BANDWIDTH - BAND n85

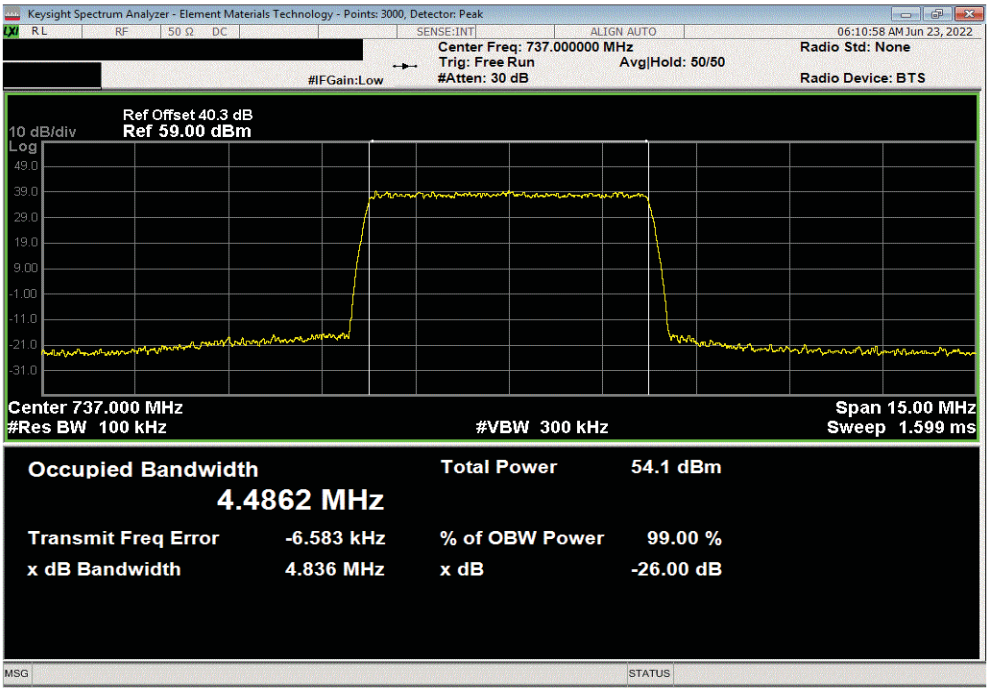
Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 5 MHz Bandwidth, 64-QAM Modulation, Mid Ch. 737 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.477	4.835	Within Band	Pass



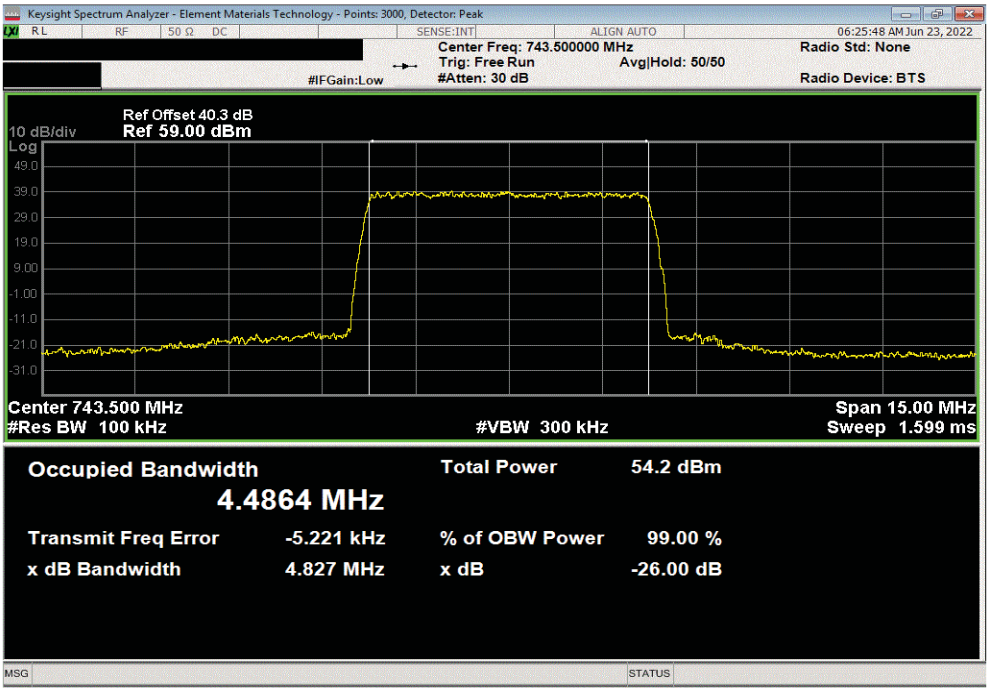
Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 5 MHz Bandwidth, 256-QAM Modulation, Low Ch. 730.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.48	4.82	Within Band	Pass



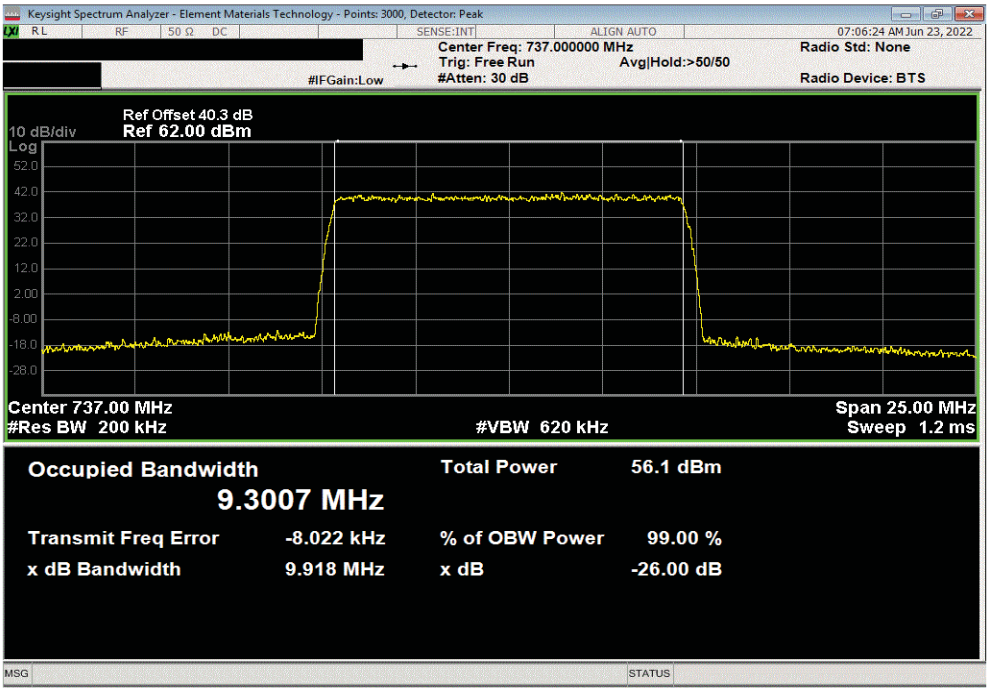
Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 5 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 737 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.486	4.836	Within Band	Pass



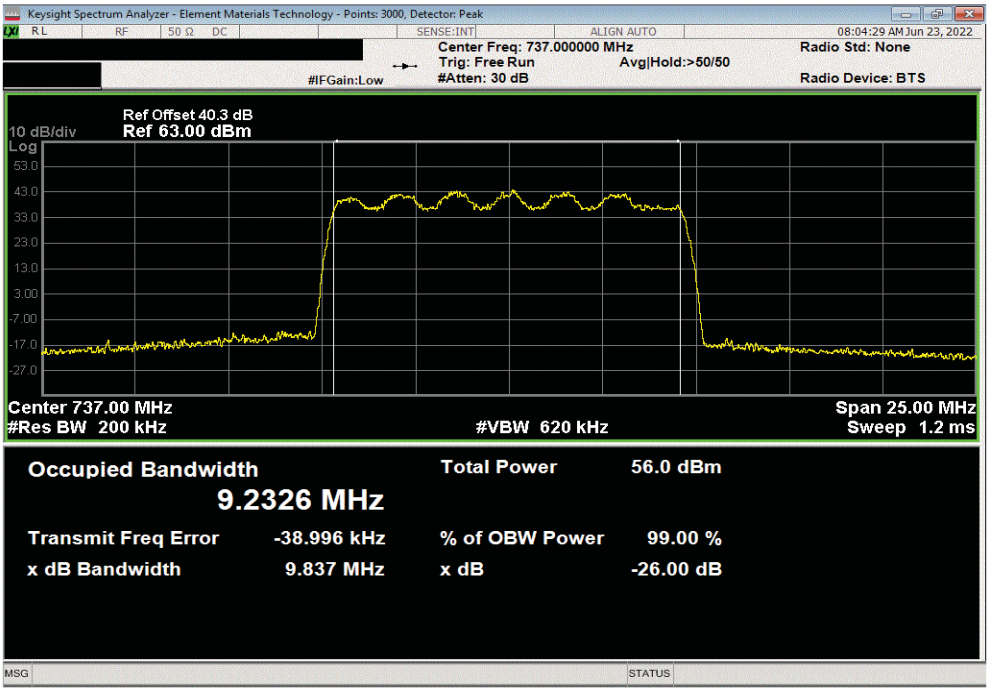
Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 5 MHz Bandwidth, 256-QAM Modulation, High Ch. 743.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			4.486	4.827	Within Band	Pass



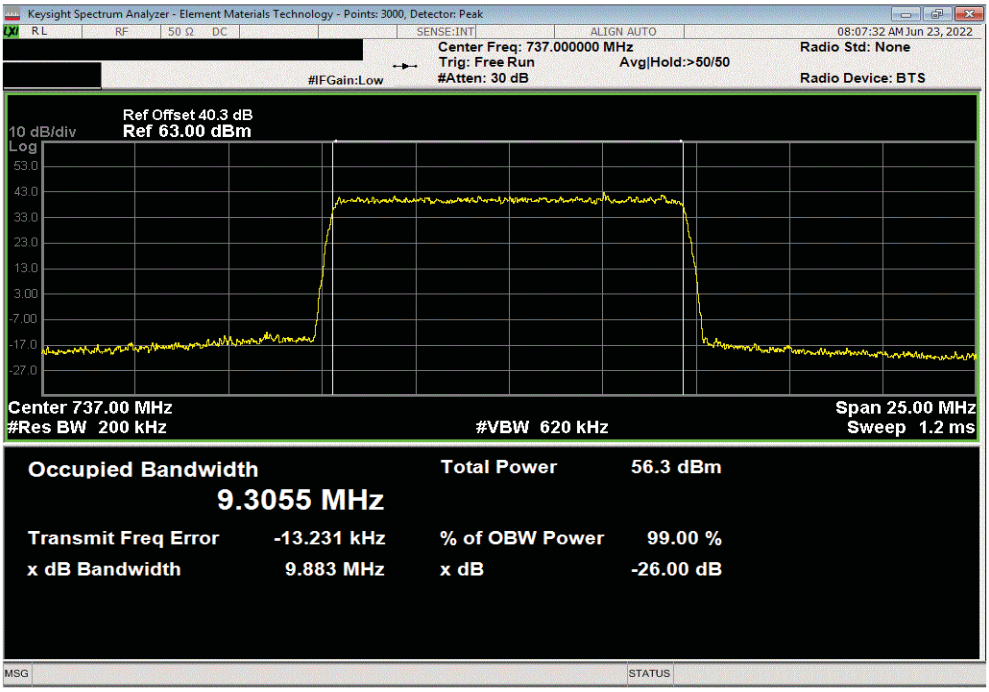
Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 10 MHz Bandwidth, QPSK Modulation, Mid Ch. 737 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.301	9.918	Within Band	Pass



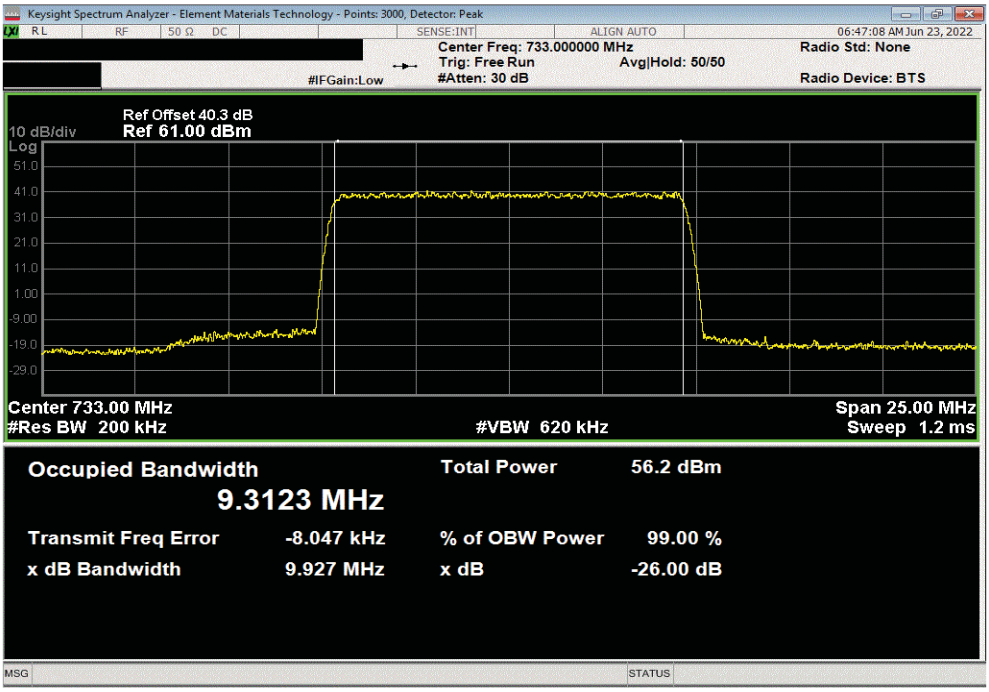
Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 10 MHz Bandwidth, 16-QAM Modulation, Mid Ch. 737 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.233	9.837	Within Band	Pass



Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 10 MHz Bandwidth, 64-QAM Modulation, Mid Ch. 737 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.305	9.883	Within Band	Pass

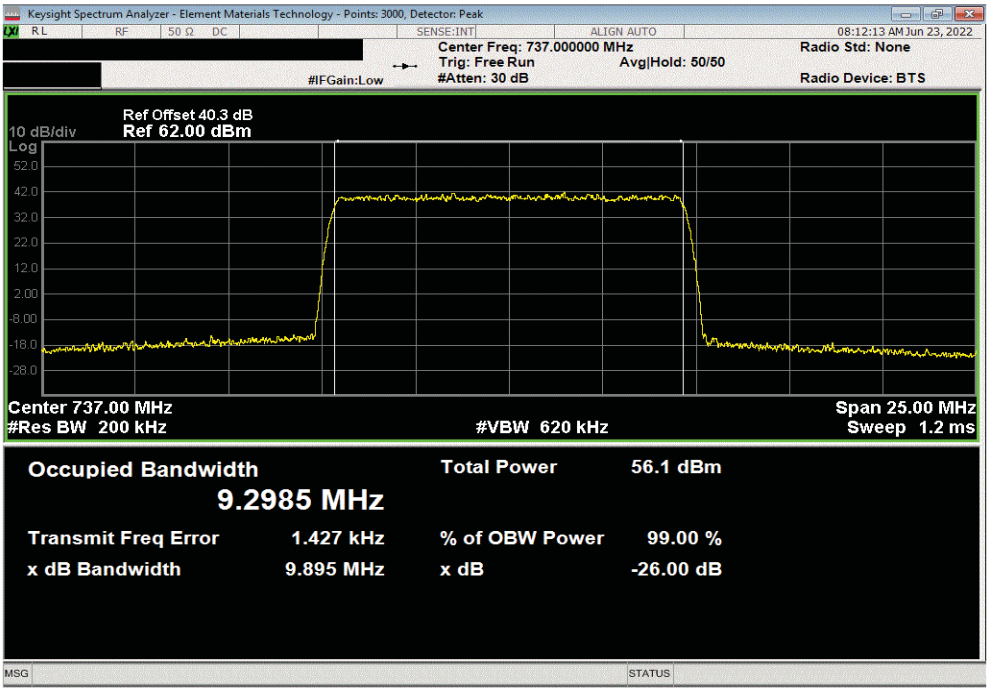


Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 10 MHz Bandwidth, 256-QAM Modulation, Low Ch. 733 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.312	9.927	Within Band	Pass

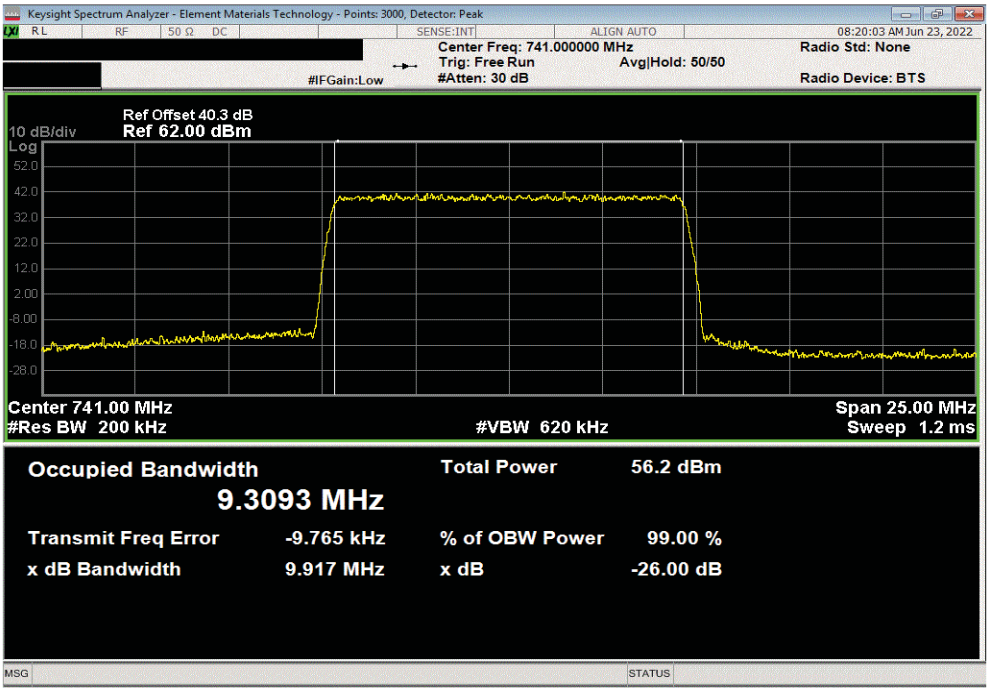


OCCUPIED BANDWIDTH - BAND n85

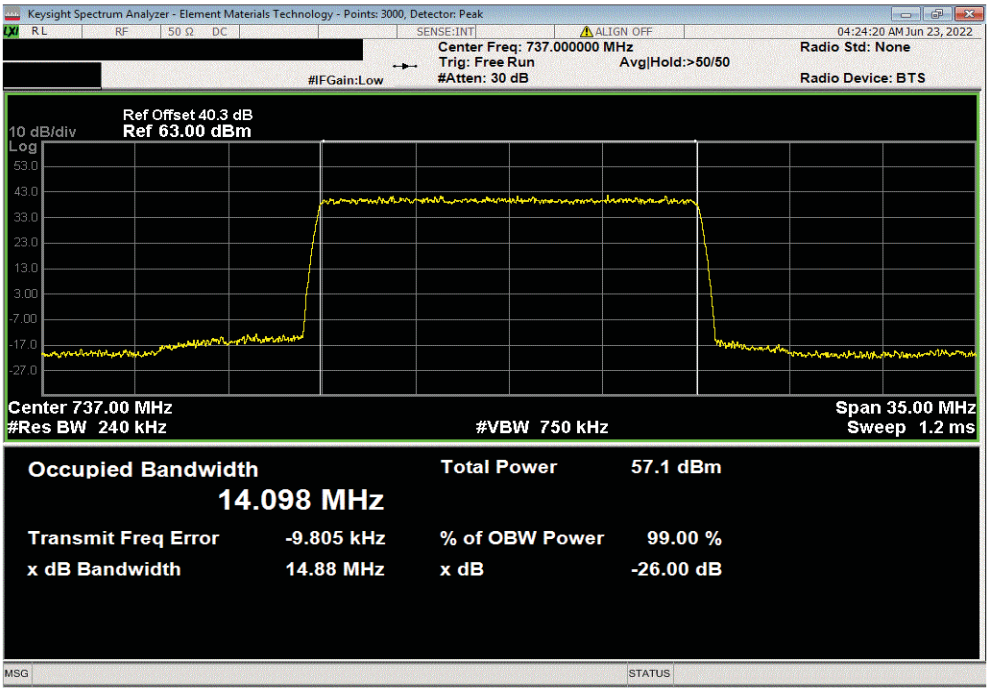
Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 10 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 737 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.298	9.895	Within Band	Pass



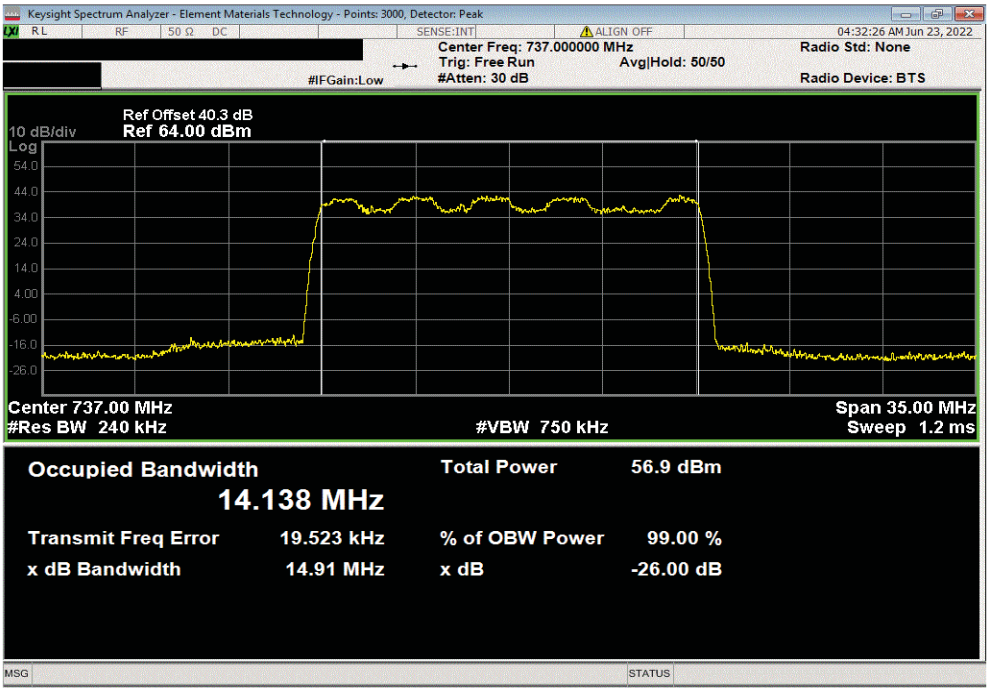
Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 10 MHz Bandwidth, 256-QAM Modulation, High Ch. 741 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			9.309	9.917	Within Band	Pass



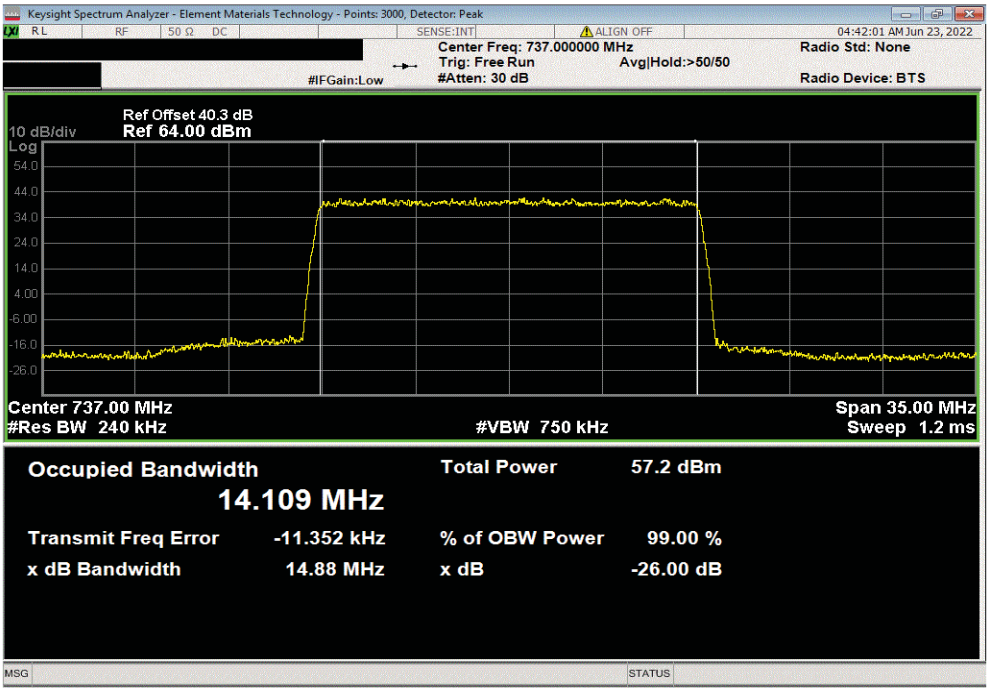
Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 15 MHz Bandwidth, QPSK Modulation, Mid Ch. 737 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.098	14.878	Within Band	Pass



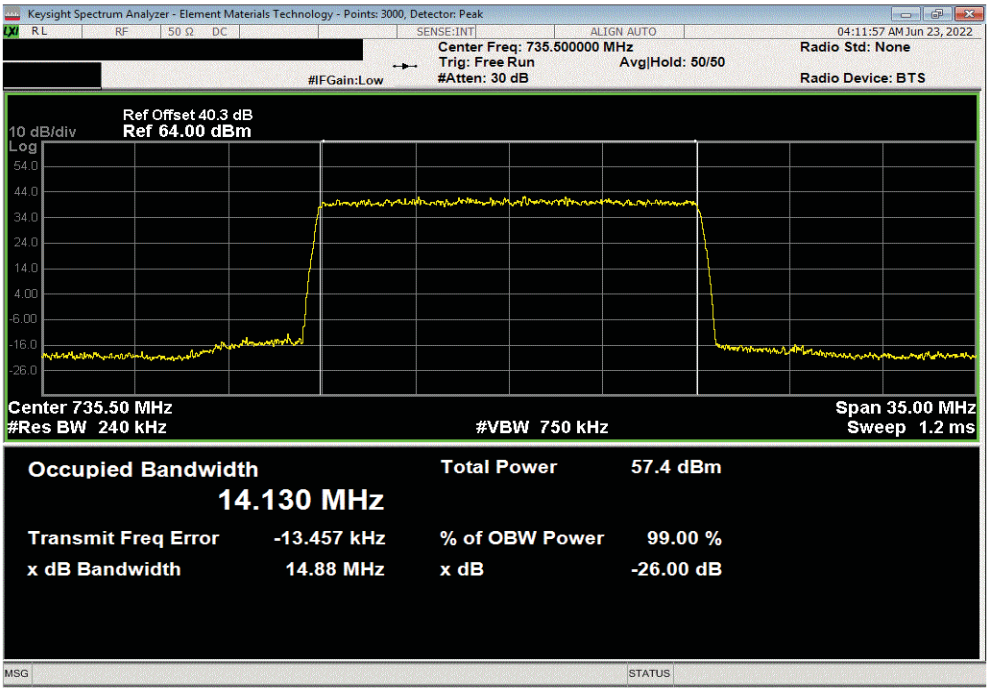
Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 15 MHz Bandwidth, 16-QAM Modulation, Mid Ch. 737 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.138	14.911	Within Band	Pass



Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 15 MHz Bandwidth, 64-QAM Modulation, Mid Ch. 737 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.109	14.882	Within Band	Pass

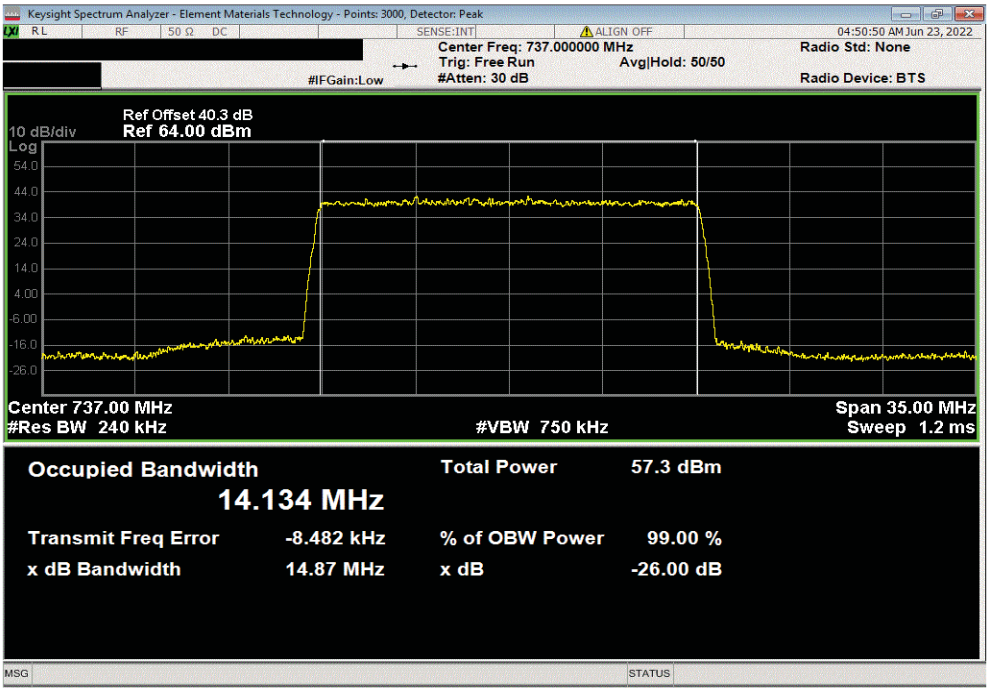


Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 15 MHz Bandwidth, 256-QAM Modulation, Low Ch. 735.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.13	14.876	Within Band	Pass

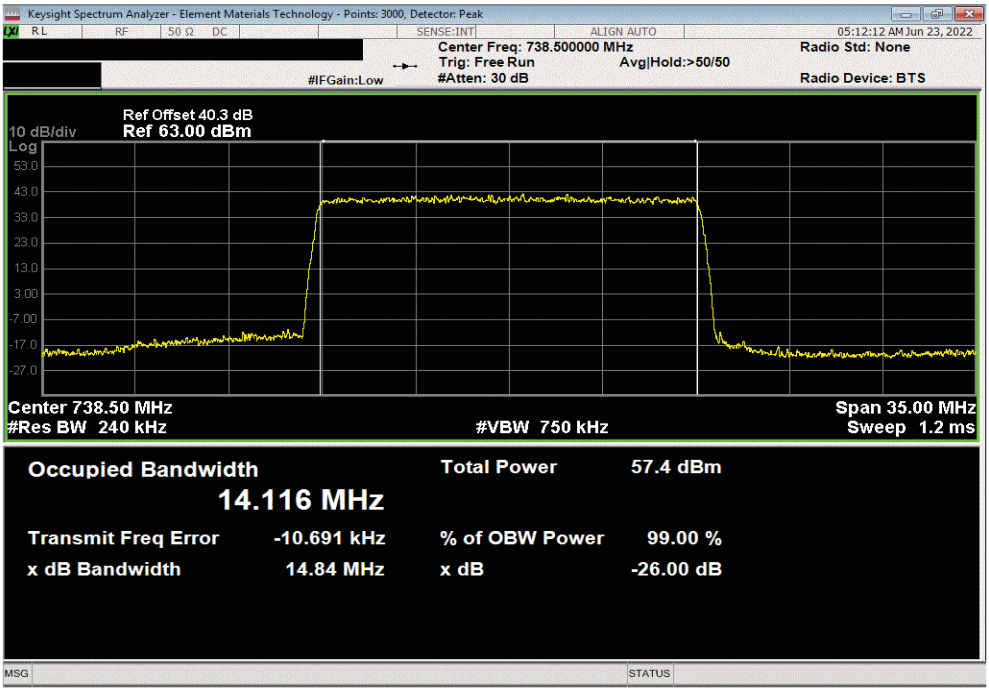


OCCUPIED BANDWIDTH - BAND n85

Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 15 MHz Bandwidth, 256-QAM Modulation, Mid Ch. 737 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.134	14.87	Within Band	Pass



Port 1, 5G NR, Band n85, 728 MHz - 746 MHz, 15 MHz Bandwidth, 256-QAM Modulation, High Ch. 738.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			14.116	14.843	Within Band	Pass



FREQUENCY STABILITY

XMit 2022.02.07.0

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
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-8-2-SCT/AC	TBH	NCR	NCR
Meter - Multimeter	Fluke	77 IV	MLT	2020-10-15	2023-10-15
Thermometer	Omega Engineering, Inc.	HH311	DUI	2021-02-02	2024-02-02

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The primary supply voltage was varied from 85 % to 115% of the nominal voltage Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range (-30 ° to +50° C) and at 10°C intervals.

Per the requirements of FCC Part 27.54:

“The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.”

ISED RSS 130 section 4.5 defines frequency stability as follows: “The frequency stability shall be sufficient to ensure that the occupied bandwidth remains within each frequency block range when tested at the temperature and supply voltage variations specified in RSS-Gen.”

Results with a frequency error of less than 1000 Hz will show the carrier to be operating within the band. The frequency stability/accuracy radio design is the same for all radio technologies and modulation types. The radio was configured for 5G NR to show compliance.

FREQUENCY STABILITY

XMit 2022.02.07.0

EUT:	**AHLOB (FCC/ISED)**			**Work Order:**	**NOKI0042**
Serial Number:	**YK220900026**			**Date:**	**1-Jul-22**
Customer:	**Nokia Solutions and Networks**			**Temperature:**	**22.5 °C**
Attendees:	**David Le, John Rattanavong**			**Humidity:**	**52% RH**
Project:	**None**			**Barometric Pres.:**	**1018 mbar**
Tested by:	**Jarrod Brenden**	**Power:**	**54 VDC**	**Job Site:**	**TX07**

TEST SPECIFICATIONS	**Test Method**
FCC 27:2022	ANSI C63.26:2015

COMMENTS

The EUT temperature was stabilized at each temperature step (for a minimum of 30 mins) prior to measurments. The EUT was operated with a 5 MHz channel bandwidth on the middle channel using QPSK modulation.

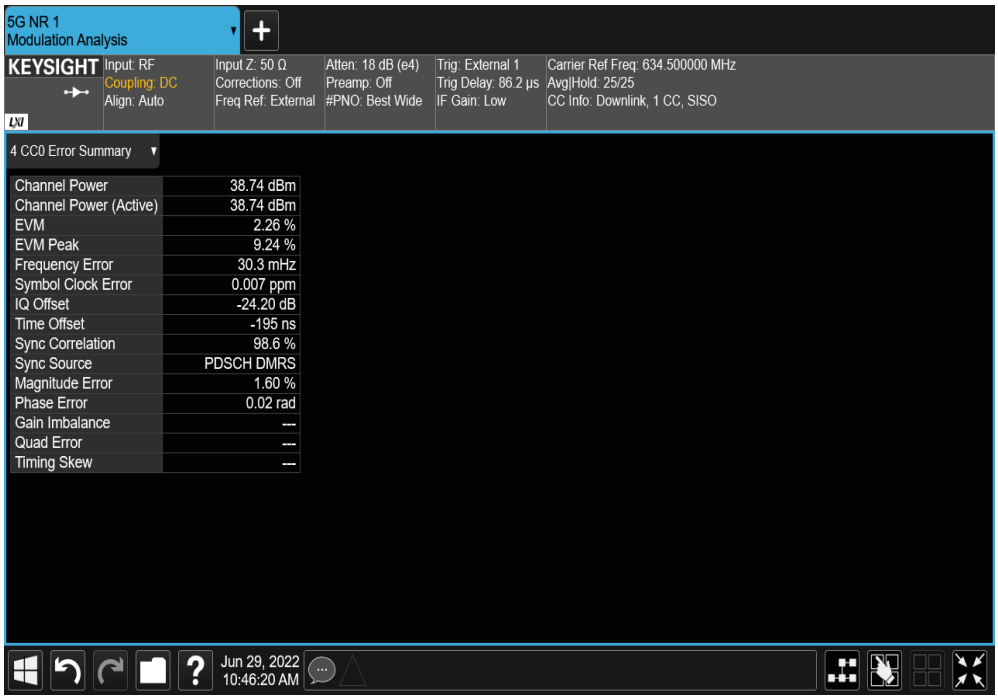
DEVIATIONS FROM TEST STANDARD

None

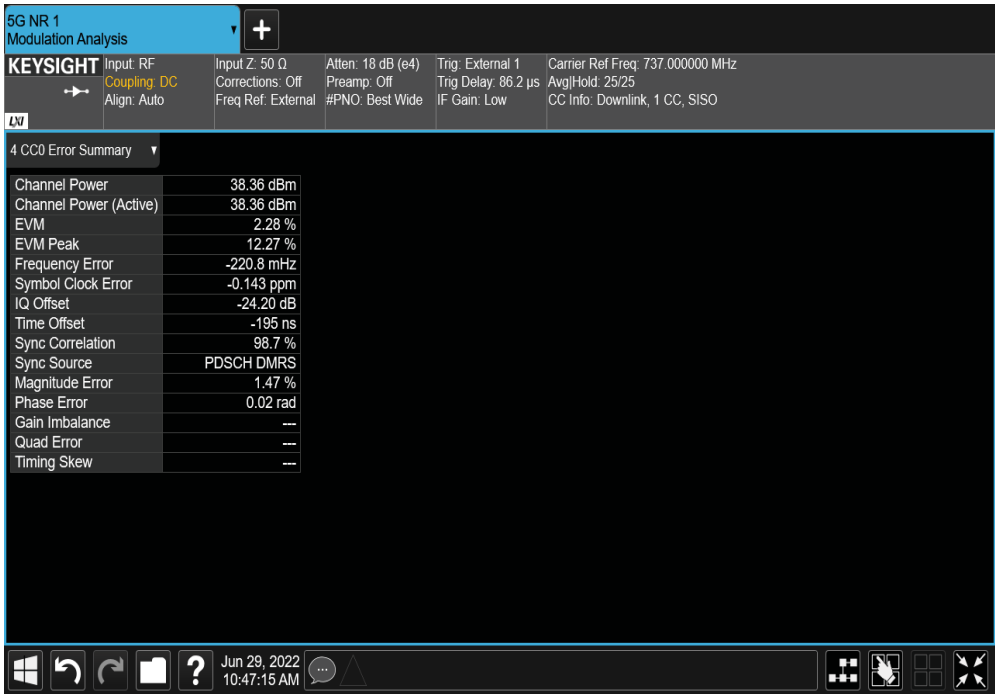
Configuration #	**5**	*Signature*

	Value Freq Δ (Hz)	Limit Δ (Hz)	Result
5G NR-FFD, Multi-carrier Radio			
Port 1, 5 MHz Bandwidth, QPSK Modulation			
20°C Temperature Conditions			
48.0 V Nominal Voltage Condition			
Band n71, Mid Channel, 634.5 MH	0.0303	1000	Pass
Band n85, Mid Channel, 737.0 MH	-0.2208	1000	Pass
40.8 V Extreme Voltage Condition			
Band n71, Mid Channel, 634.5 MH	0.0478	1000	Pass
Band n85, Mid Channel, 737.0 MH	-0.2235	1000	Pass
55.2 V Extreme Voltage Condition			
Band n71, Mid Channel, 634.5 MH	0.0799	1000	Pass
Band n85, Mid Channel, 737.0 MH	-0.1600	1000	Pass
48 VDC Nominal Voltage Conditions			
50º C Extreme Temperature Condition			
Band n71, Mid Channel, 634.5 MH	-0.0209	1000	Pass
Band n85, Mid Channel, 737.0 MH	-0.1865	1000	Pass
40º C Extreme Temperature Condition			
Band n71, Mid Channel, 634.5 MH	0.0330	1000	Pass
Band n85, Mid Channel, 737.0 MH	-0.1782	1000	Pass
30º C Extreme Temperature Condition			
Band n71, Mid Channel, 634.5 MH	0.0131	1000	Pass
Band n85, Mid Channel, 737.0 MH	-0.1464	1000	Pass
20º C Nominal Temperature Condition			
Band n71, Mid Channel, 634.5 MH	-0.0154	1000	Pass
Band n85, Mid Channel, 737.0 MH	-0.118	1000	Pass
10º C Extreme Temperature Condition			
Band n71, Mid Channel, 634.5 MH	0.0375	1000	Pass
Band n85, Mid Channel, 737.0 MH	-0.2318	1000	Pass
0º C Extreme Temperature Condition			
Band n71, Mid Channel, 634.5 MH	0.042	1000	Pass
Band n85, Mid Channel, 737.0 MH	-0.2014	1000	Pass
-10º C Extreme Temperature Condition			
Band n71, Mid Channel, 634.5 MH	0.0001	1000	Pass
Band n85, Mid Channel, 737.0 MH	-0.1998	1000	Pass
-20º C Extreme Temperature Condition			
Band n71, Mid Channel, 634.5 MH	0.0033	1000	Pass
Band n85, Mid Channel, 737.0 MH	-0.188	1000	Pass
-30º C Extreme Temperature Condition			
Band n71, Mid Channel, 634.5 MH	0.0671	1000	Pass
Band n85, Mid Channel, 737.0 MH	-0.2404	1000	Pass

NR-FFD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 20°C Temperature Conditions, 48.0 V Nominal Voltage Condition, Band n71, Mid Channel, 634.5						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				0.0303	1000	Pass

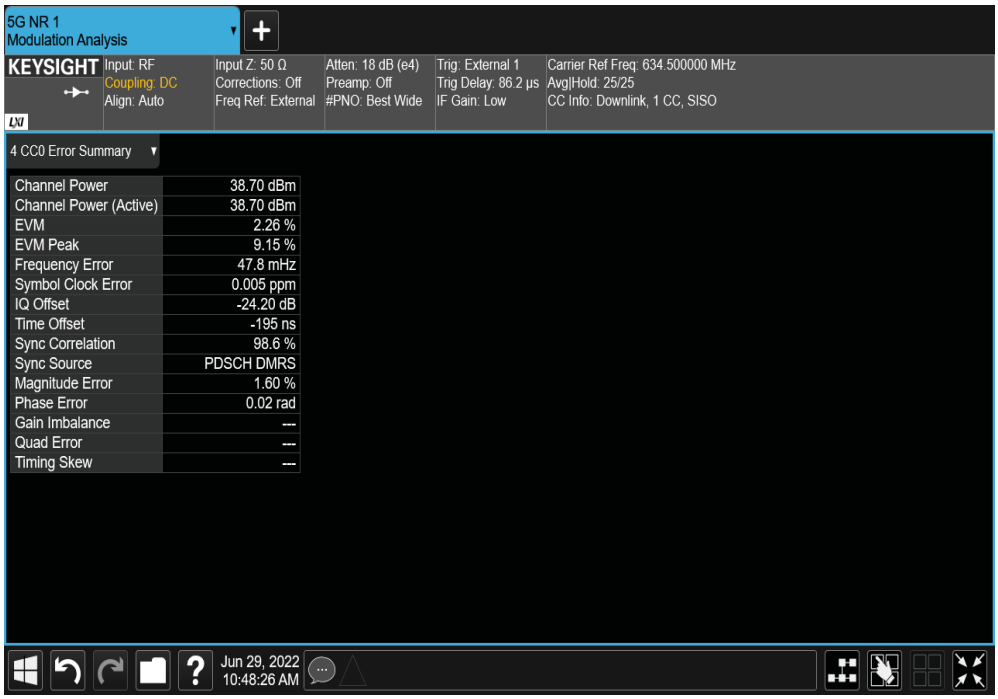


NR-FFD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 20°C Temperature Conditions, 48.0 V Nominal Voltage Condition, Band n85, Mid Channel, 737.0						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				-0.2208	1000	Pass



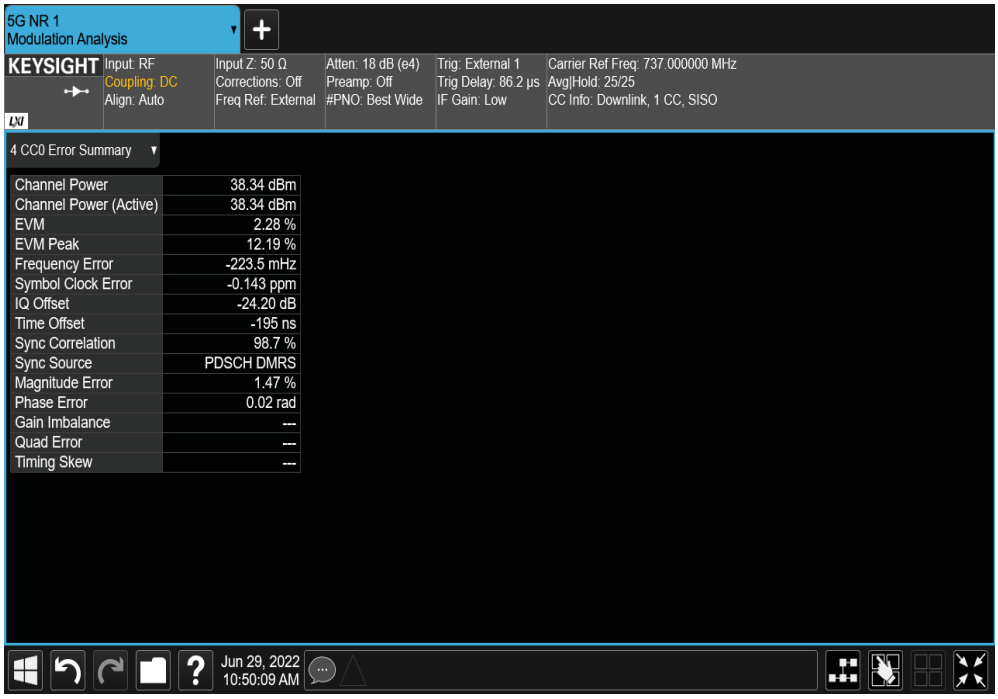
NR-FFD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 20°C Temperature Conditions, 40.8 V Extreme Voltage Condition, Band n71, Mid Channel, 634.5

				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				0.0478	1000	Pass



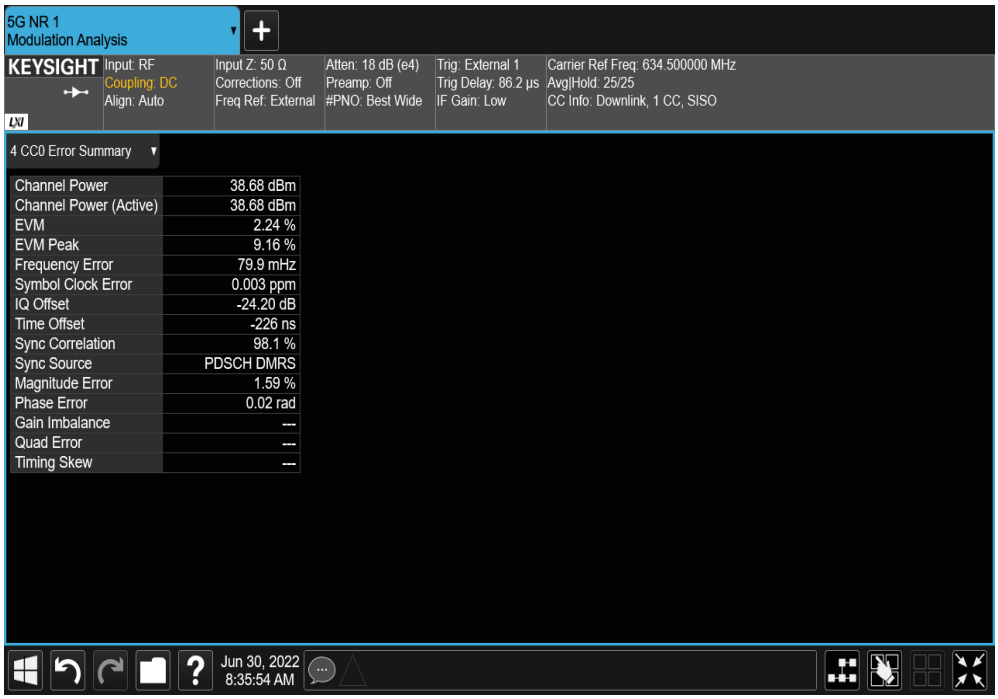
NR-FFD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 20°C Temperature Conditions, 40.8 V Extreme Voltage Condition, Band n85, Mid Channel, 737.0

				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				-0.2235	1000	Pass



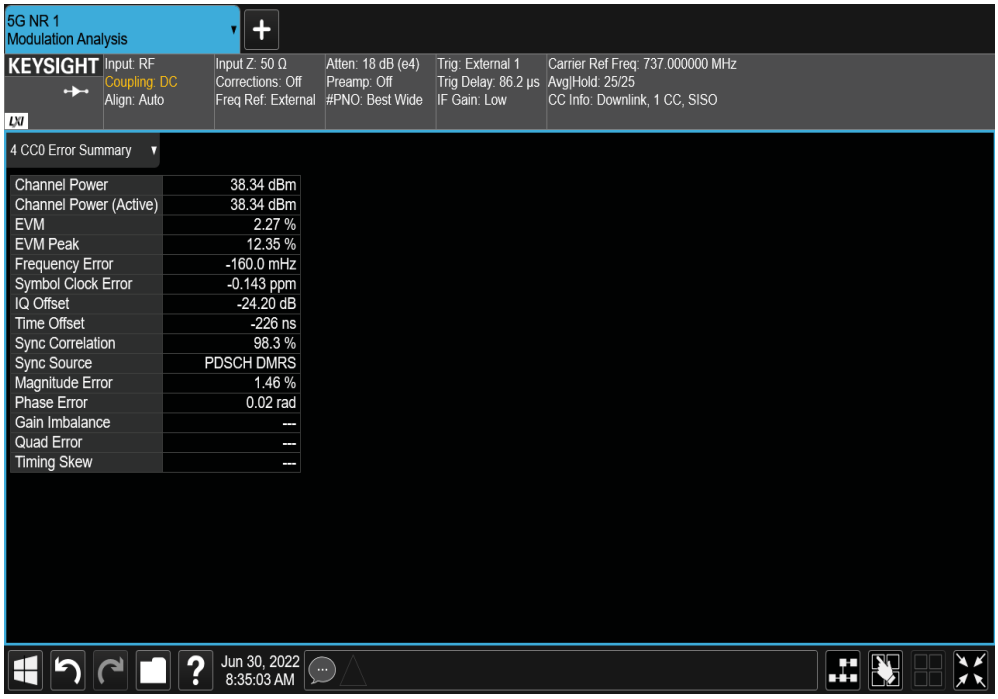
NR-FFD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 20°C Temperature Conditions, 55.2 V Extreme Voltage Condition, Band n71, Mid Channel, 634.5

				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				0.0799	1000	Pass



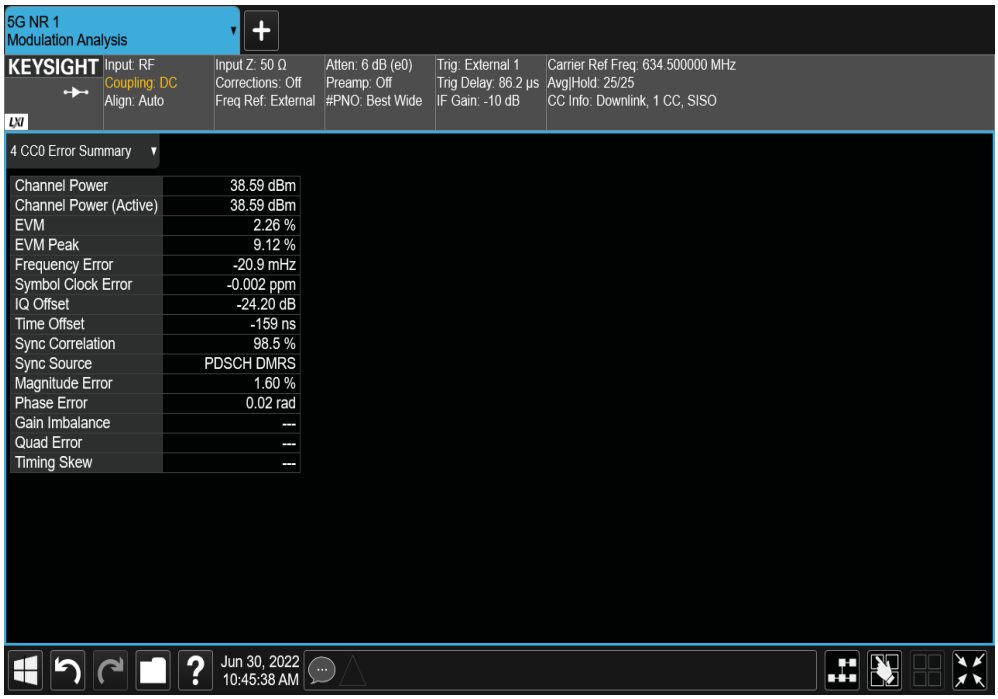
NR-FFD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 20°C Temperature Conditions, 55.2 V Extreme Voltage Condition, Band n85, Mid Channel, 737.0

				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				-0.1600	1000	Pass



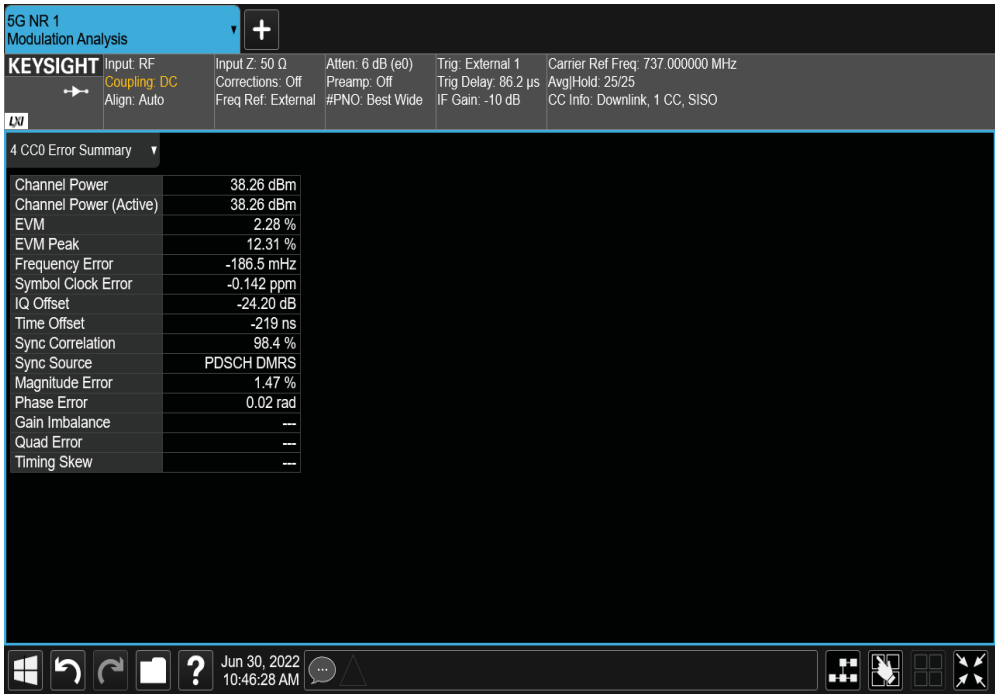
FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 50°C Extreme Temperature Condition, Band n71, Mid Channel, 6

				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				-0.0209	1000	Pass



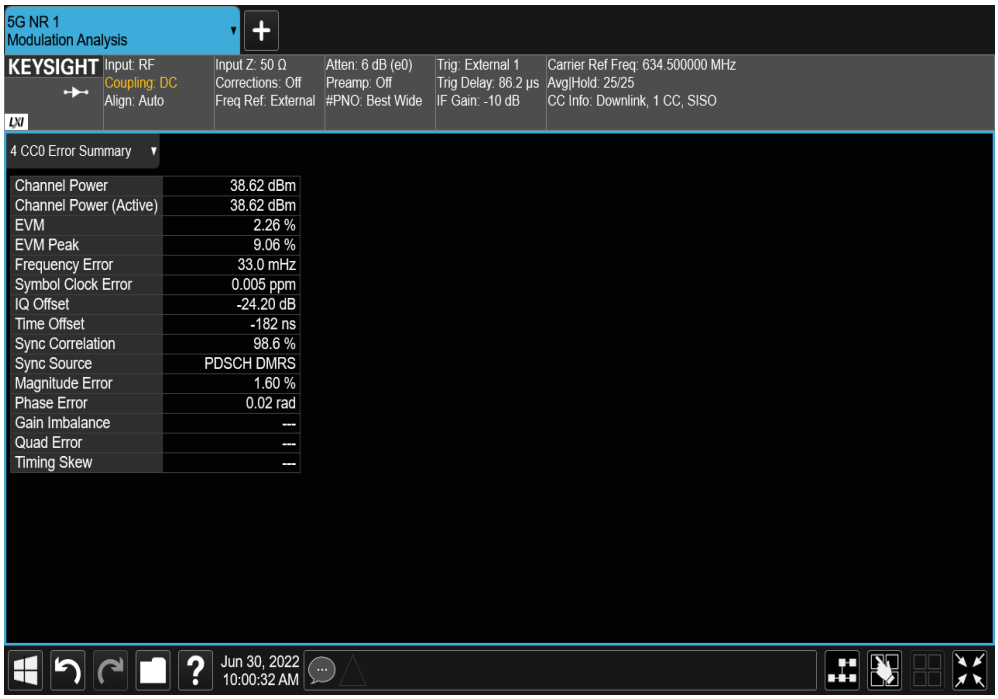
FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 50°C Extreme Temperature Condition, Band n85, Mid Channel, 7

				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				-0.1865	1000	Pass



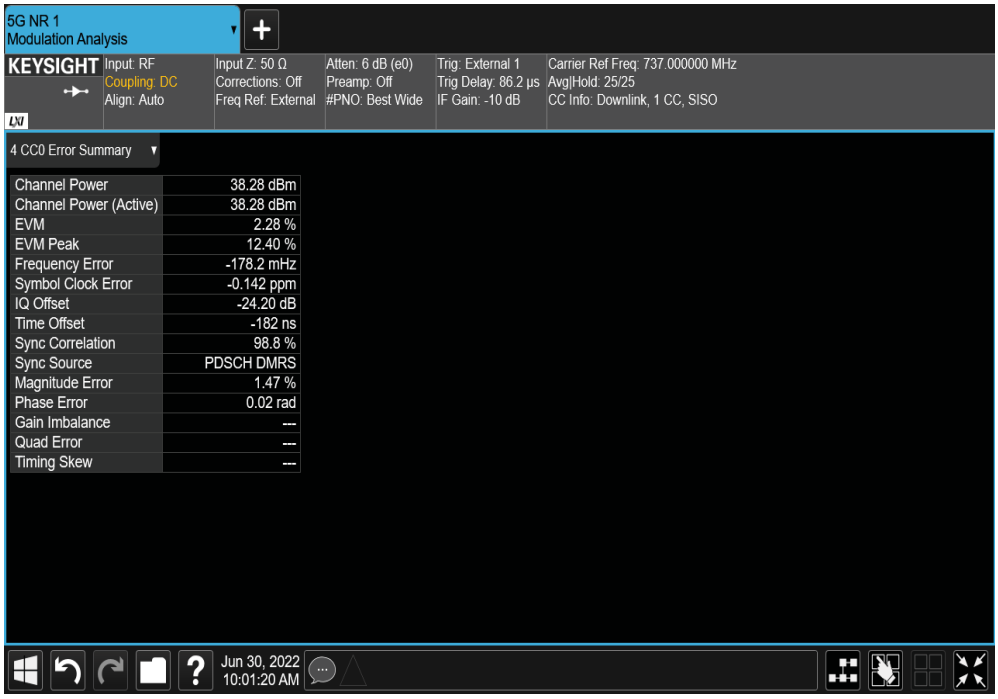
FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 40°C Extreme Temperature Condition, Band n71, Mid Channel, 6

				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				0.0330	1000	Pass



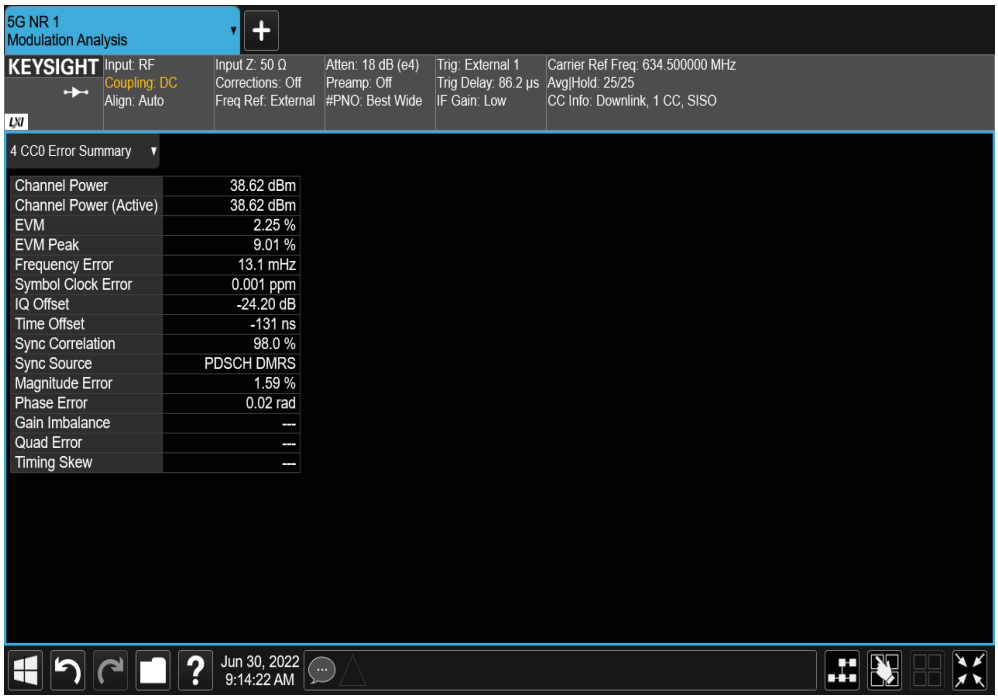
FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 40°C Extreme Temperature Condition, Band n85, Mid Channel, 7

				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				-0.1782	1000	Pass



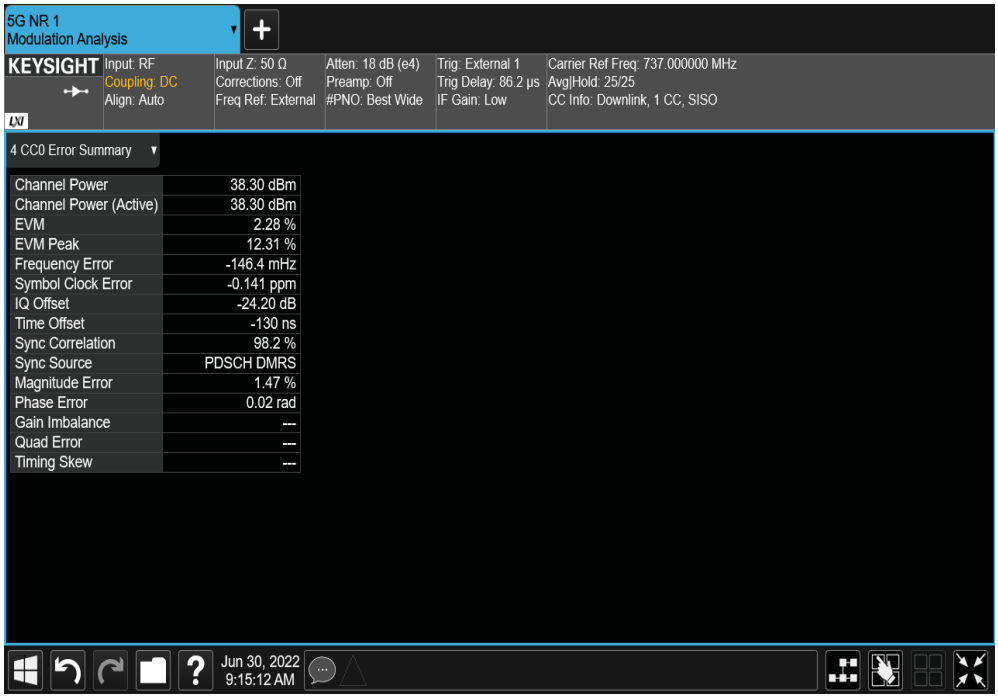
FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 30°C Extreme Temperature Condition, Band n71, Mid Channel, 6

				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				0.0131	1000	Pass



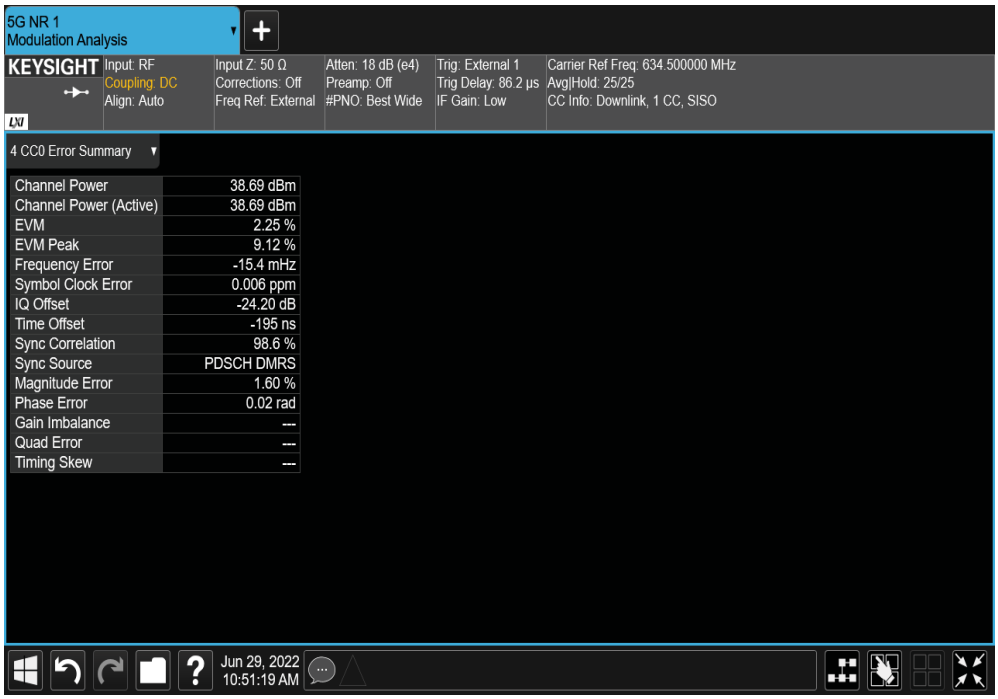
FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 30°C Extreme Temperature Condition, Band n85, Mid Channel, 7

				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				-0.1464	1000	Pass



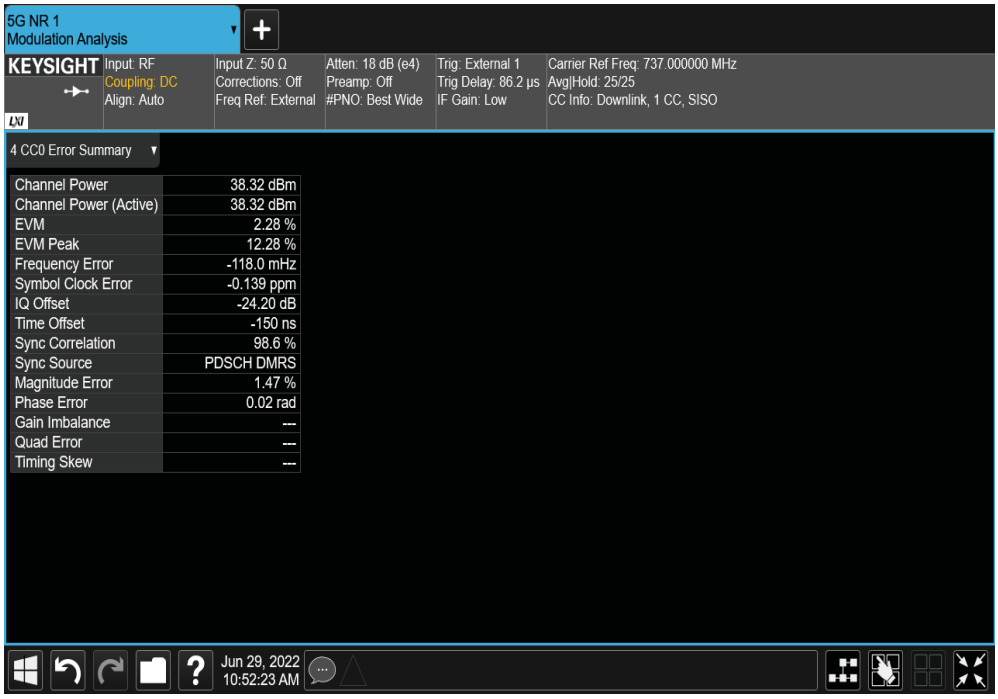
FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 20°C Nominal Temperature Condition, Band n71, Mid Channel, 6

				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				-0.0154	1000	Pass



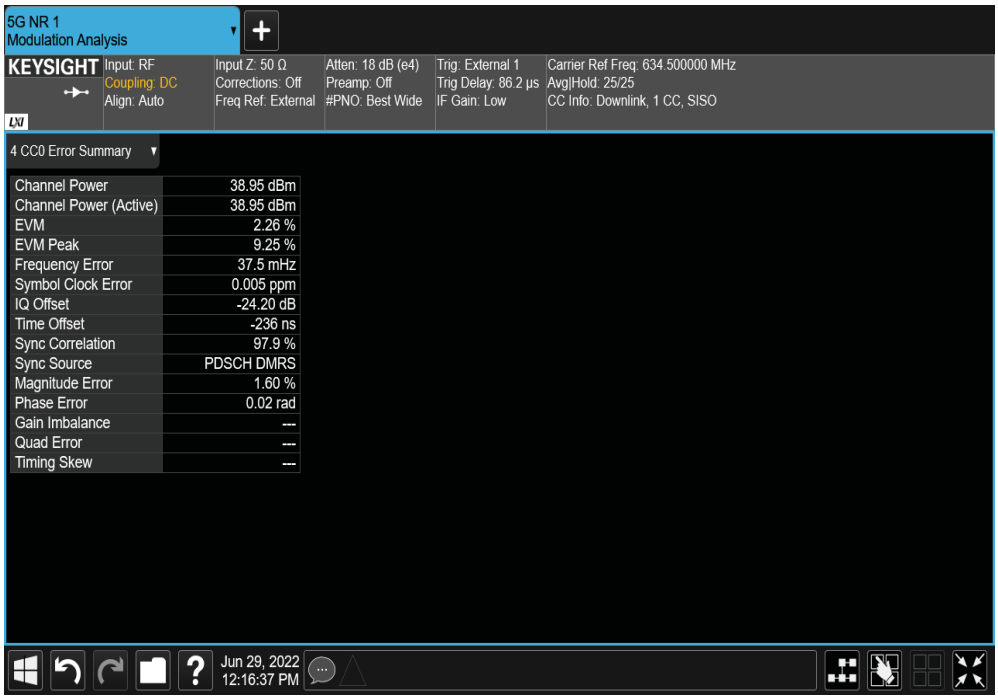
FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 20°C Nominal Temperature Condition, Band n85, Mid Channel, 7

				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				-0.1180	1000	Pass



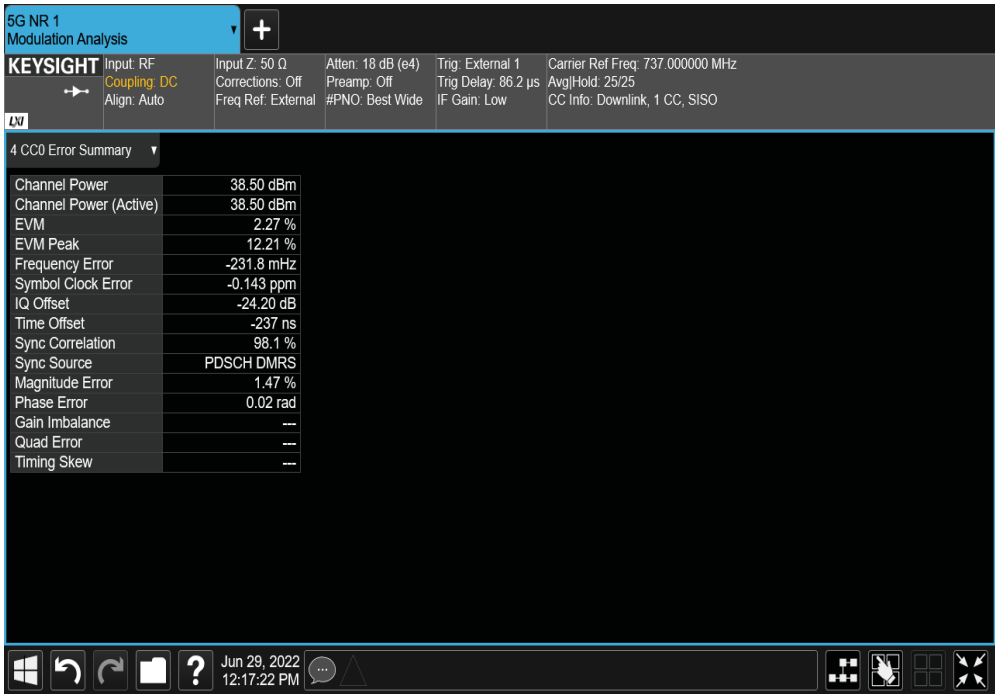
FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 10°C Extreme Temperature Condition, Band n71, Mid Channel, 6

				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				0.0375	1000	Pass

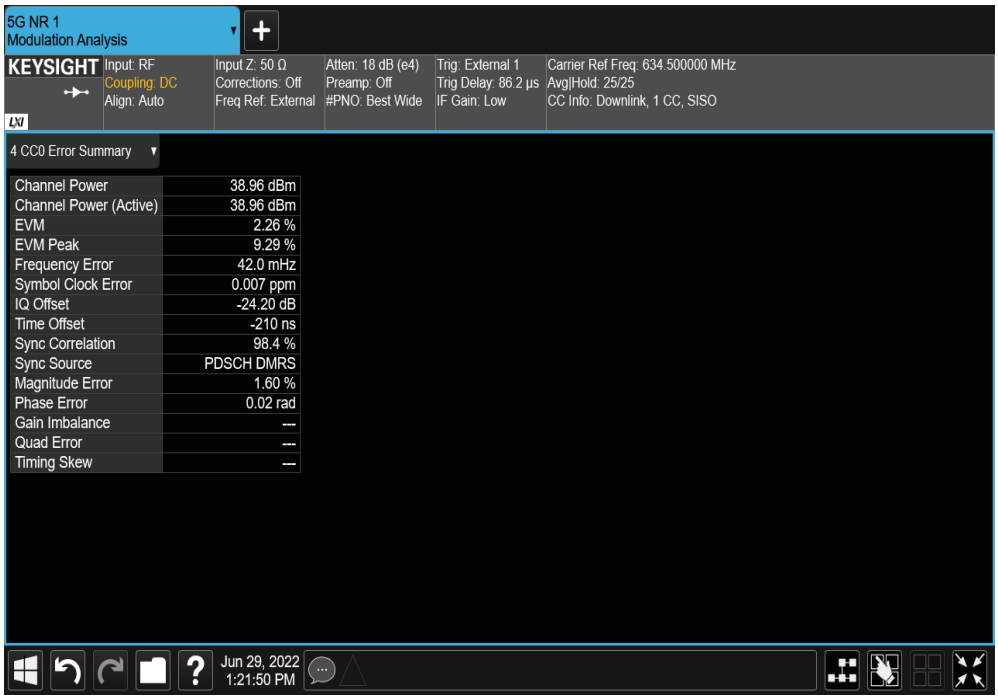


FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 10°C Extreme Temperature Condition, Band n85, Mid Channel, 7

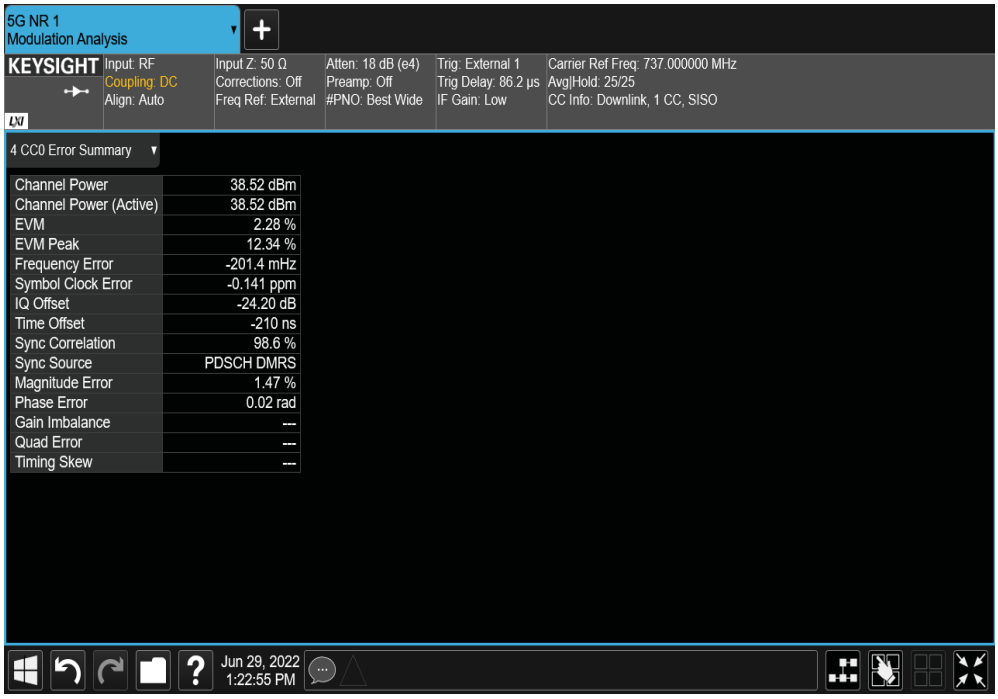
				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				-0.2318	1000	Pass



FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 0°C Extreme Temperature Condition, Band n71, Mid Channel, 63						
				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				0.0420	1000	Pass

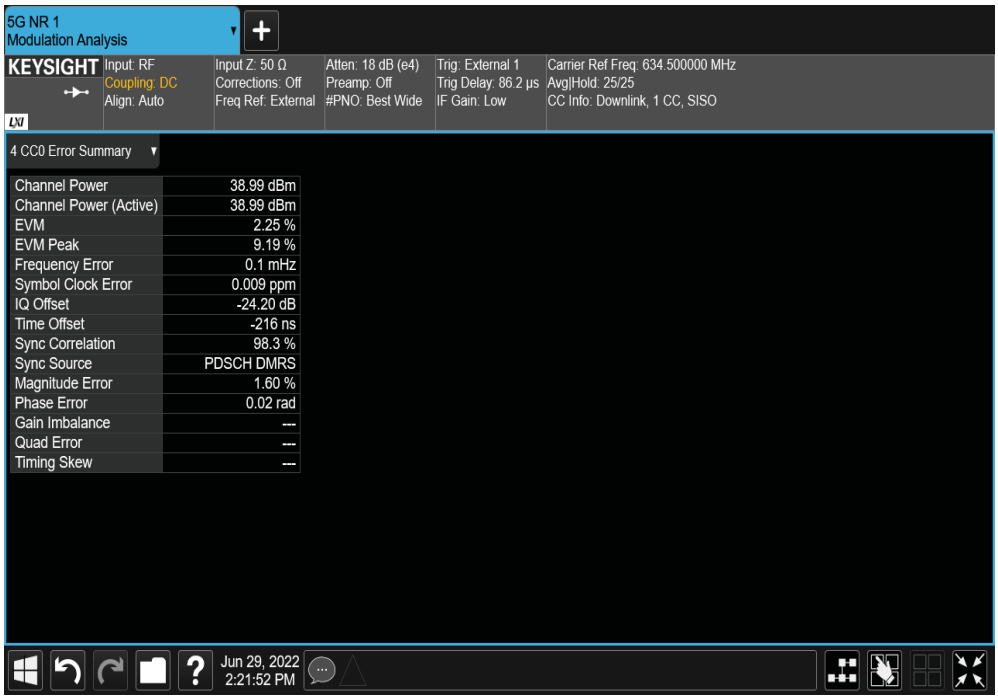


FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 0°C Extreme Temperature Condition, Band n85, Mid Channel, 73						
				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				-0.2014	1000	Pass



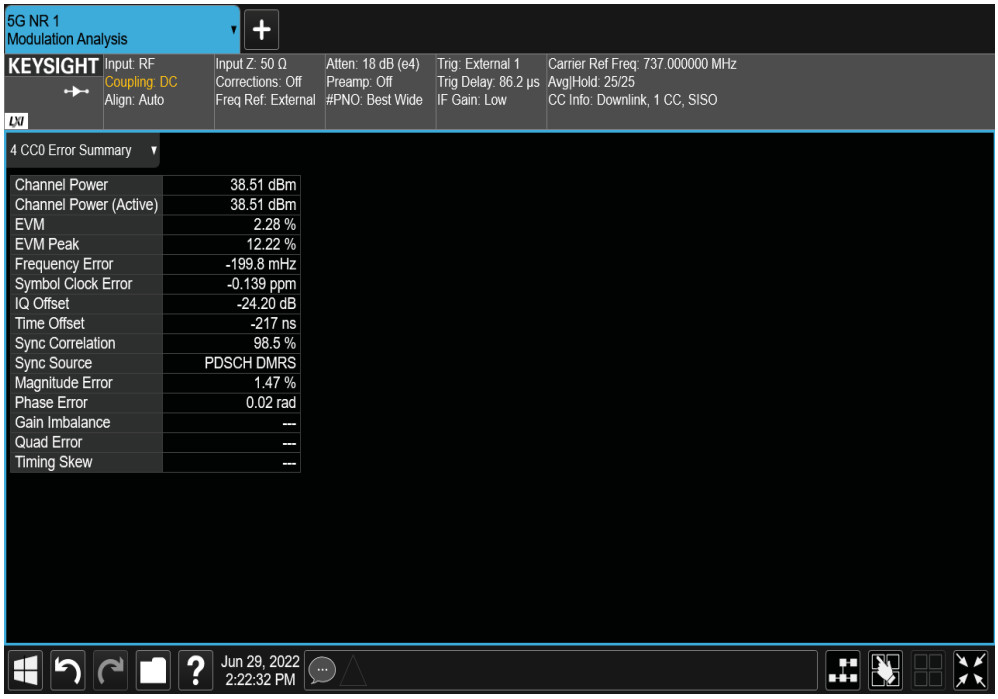
FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, -10°C Extreme Temperature Condition, Band n71, Mid Channel, 6

				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				0.0001	1000	Pass



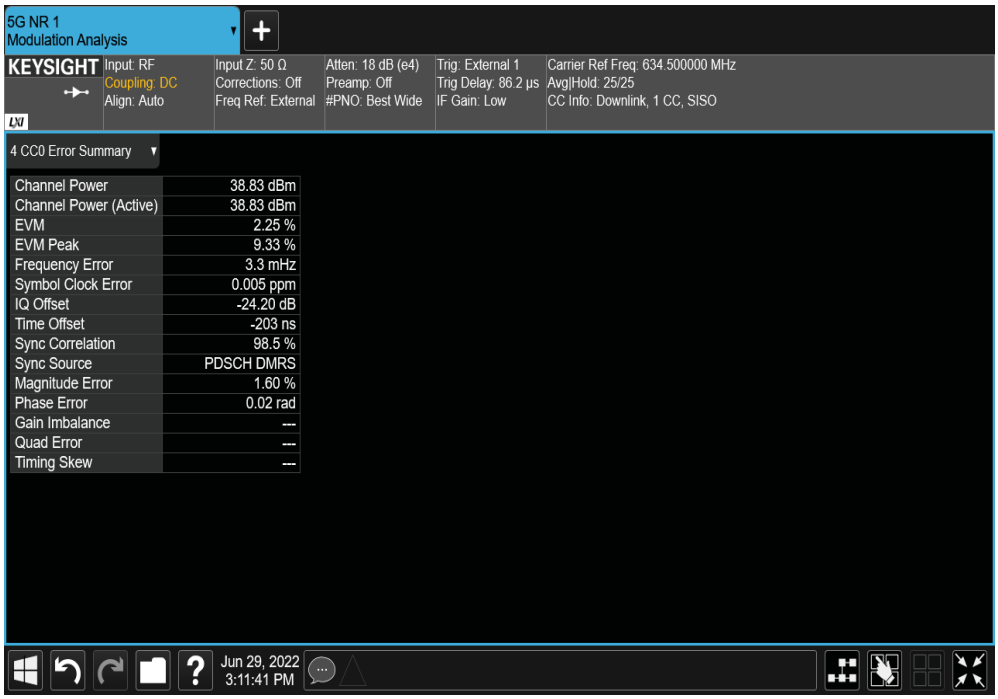
FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, -10°C Extreme Temperature Condition, Band n85, Mid Channel, 7

				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				-0.1998	1000	Pass



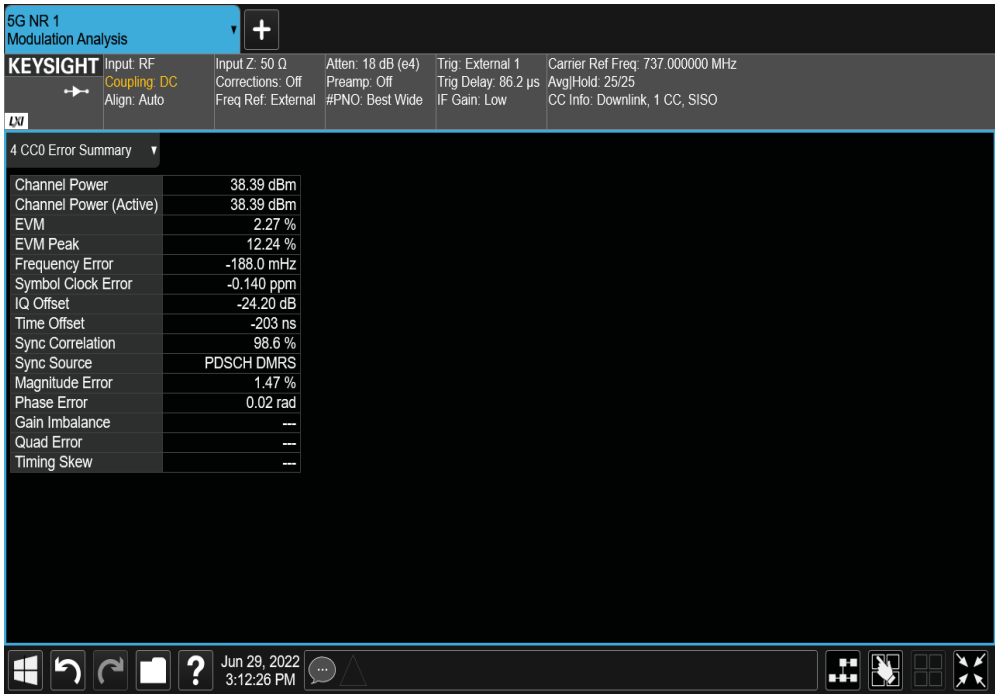
FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, -20°C Extreme Temperature Condition, Band n71, Mid Channel, 6

				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				0.0033	1000	Pass



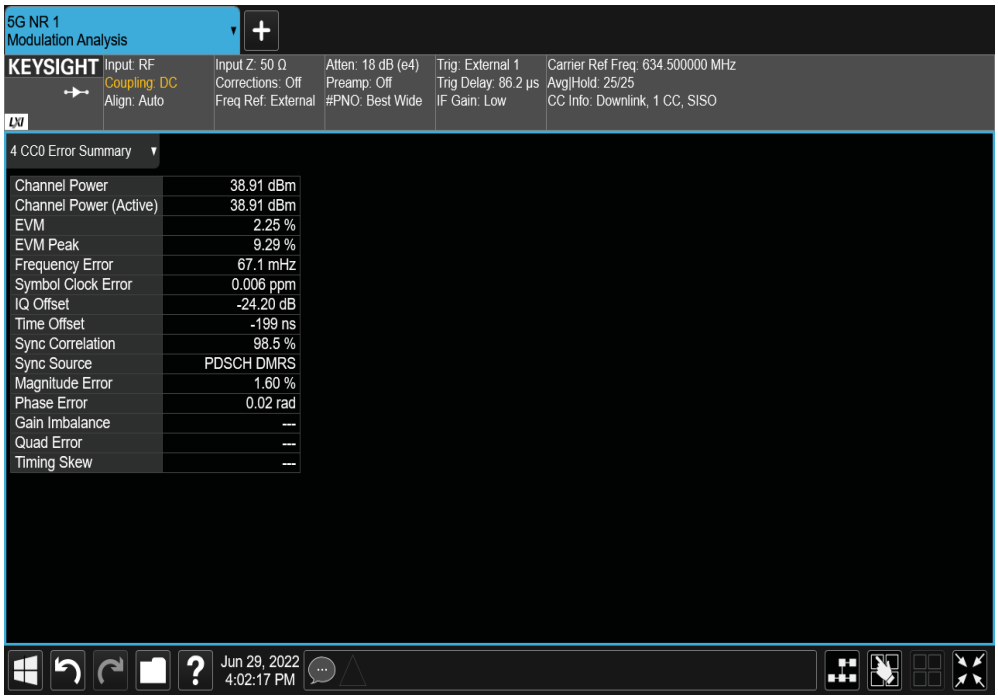
FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, -20°C Extreme Temperature Condition, Band n85, Mid Channel, 7

				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				-0.1880	1000	Pass



FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, -30°C Extreme Temperature Condition, Band n71, Mid Channel, 6

				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				0.0671	1000	Pass



FD, Multi-carrier Radio, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, -30°C Extreme Temperature Condition, Band n85, Mid Channel, 7

				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				-0.2404	1000	Pass