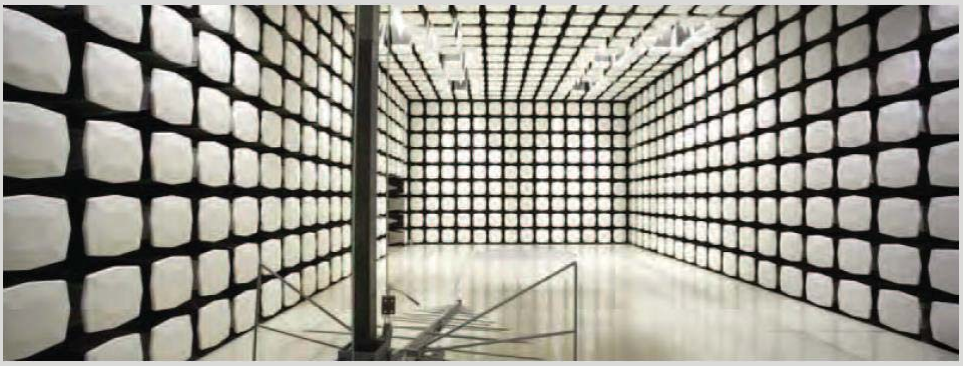
Radio Test Report
Application for Grant of Equipment Authorization

FCC Part 27
[3450MHz – 3550MHz and 3700MHz – 3980MHz]

FCC ID: VBNAQQQA-01

Nokia Solutions and Networks
Airscale Base Transceiver Station Radio Unit
Model: AQQQA

Report: NOKI0052.1 Rev. 0, Issue Date: February 22, 2023



CERT #3310.03

CERTIFICATE OF TEST

Last Date of Test: January 26, 2023
Nokia Solutions and Networks
EUT: Airscale Base Transceiver Station Radio Unit Model AQQQA

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
Occupied Bandwidth	Yes	Pass	
Frequency Stability	Yes	Pass	
Average Power	Yes	Pass	
Peak to Average Power (PAPR)CCDF	Yes	Pass	
Power Spectral Density and EIRP Calculation	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

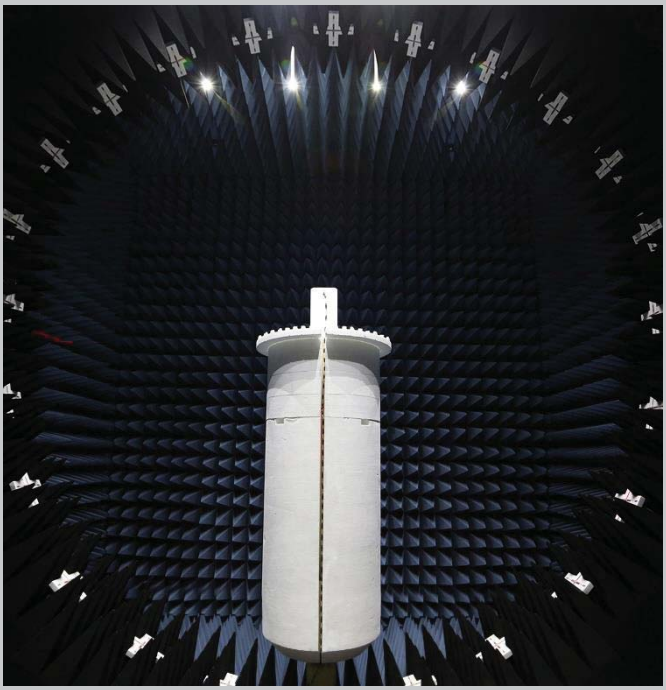
For details on the Scopes of our Accreditations, please visit:

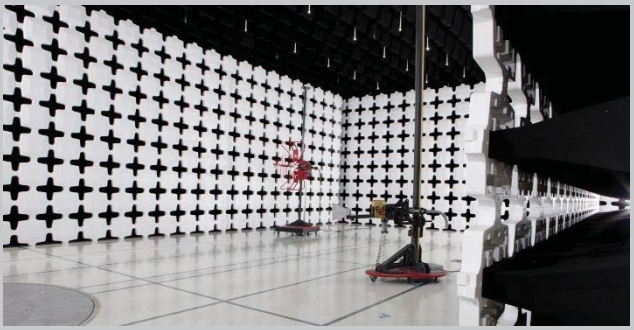
California Minnesota Oregon Texas Washington

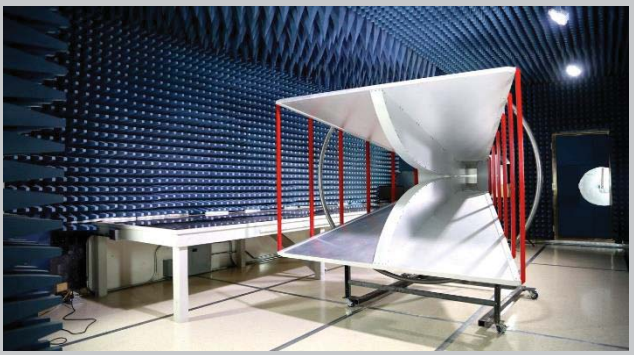
FACILITIES

element
2020.12.15

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

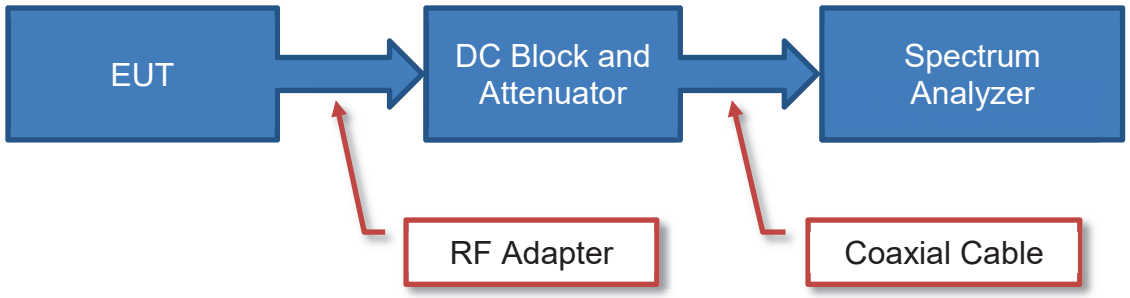
TEST SETUP BLOCK DIAGRAMS

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.

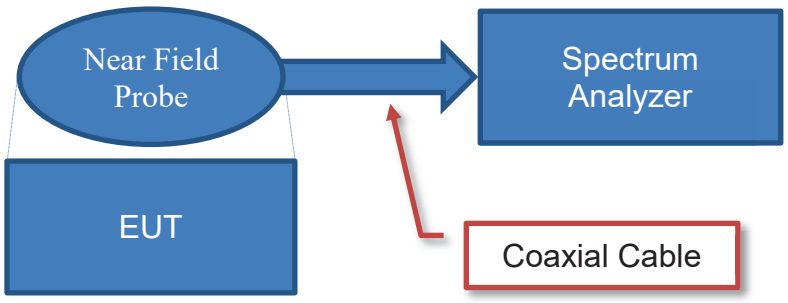
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

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

Near Field Test Fixture Measurements

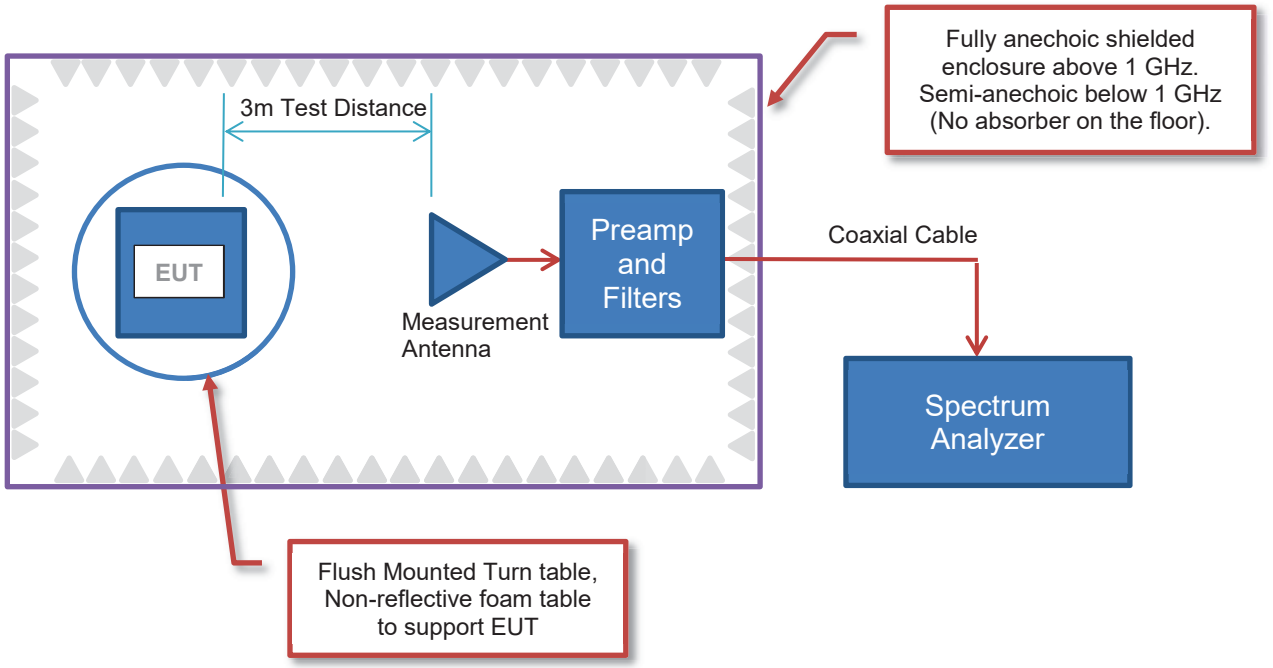


Sample Calculation (logarithmic units)

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**

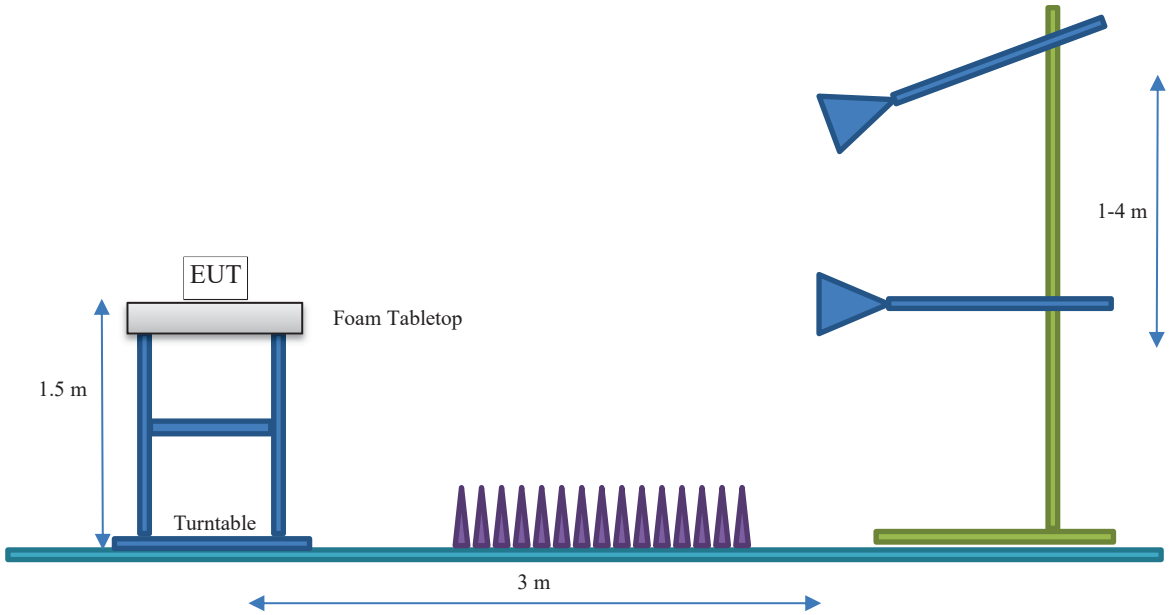
Radiated Power (ERP/EIRP) – Substitution Method:

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 Radio Unit Model AQQQA
First Date of Test:	December 13, 2022
Last Date of Test:	January 26, 2023
Receipt Date of Samples:	December 13, 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:

The equipment under test (EUT) is a Nokia Solutions and Networks AirScale Dual Band MAA (Massive Adaptive Antenna) 64T64R Radio Unit (RU) variant AQQQA. The AQQQA Radio Unit is designed to support 5G NR (New Radio) TDD (Time Division Duplex) operations. **The scope of testing in this effort is FCC radio certification of the AQQQA for 5G NR TDD Single Carrier operations in the 3.45G and 3.7G Bands.** Single carriers in each band may be operated simultaneously. Single band multicarrier operations will be covered under a separate effort.

The AQQQA RU supports 3GPP frequency band n77 operations including the 3.45G Band (BTS Tx/Rx: 3450 to 3550 MHz) and 3.7G Band (BTS Tx/Rx: 3700 to 3980 MHz). Each band supports 64 transmit/receive paths. The AQQQA supports up to 64 port MIMO operation in each band. The 3.45G Band maximum RF output power is 200 watts (3.125W/TRX x 64 TRXs). The 3.7G Band maximum RF output power is 320 watts (5W/TRX x 64 TRXs). The total AQQQA RU RF output power (including both bands) is limited to 480 watts (64 x 7.5 watts). The AQQQA RU 3.45G Band supports 5G NR TDD bandwidths of 20, 30 and 40MHz. The AQQQA RU 3.7G Band supports 5G NR TDD bandwidths of 20, 40, 60, 80 and 100MHz. The single carrier channel bandwidth maximum RF output power per TRX are as follows.

Single Carrier 3.45G Band Maximum RF Output Power per TRX		
NR20	**NR30**	**NR40**
2.500 Watts or 34.0 dBm	2.500 Watts or 34.0 dBm	3.125 Watts or 35.0 dBm

Single Carrier 3.7G Band Maximum RF Output Power per TRX				
NR20	**NR40**	**NR60**	**NR80**	**NR100**
2.500 Watts or 34.0 dBm	5.000 Watts or 37.0 dBm	5.000 Watts or 37.0 dBm	5.000 Watts or 37.0 dBm	5.000 Watts or 37.0 dBm

PRODUCT DESCRIPTION

The AQQQA RU supports four downlink modulation types (QPSK, 16QAM, 64QAM, and 256QAM). The AQQQA RU instantaneous bandwidth is 100MHz per band. The AQQQA RU occupied bandwidth is 100MHz per band. Simultaneous single carrier operation in each band is supported. Single band multicarrier operations will be covered under a separate effort.
The AQQQA antenna assembly has an array of 4 rows and 8 columns of (±45°) cross-polarized (orthogonal) radiators. This antenna assembly has a maximum beamforming gain of 25.5dBi. The sixty-four AQQQA transmitter outputs are connected to the antenna array (thirty-two are connected to +45° radiators/antennas and thirty-two are connected to the -45° radiators/antennas).

The radio unit has external interfaces including DC power (DC1, DC2), ground (GND), optical (OPT1-4) and remote electrical tilt (AISG). The RU with applicable installation kit is pole mounted. Tests performed include RF channel power, CCDF -peak to average power ratio, power spectral density (power/1MHz), 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). 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). AQQQA radio unit was configured with a connector panel to allow RF conducted measurements for this effort. The connector panel simulates antenna mechanical interface to the radio and provides RF interface to radio transceiver ports/antenna array ports. These transceiver array boundary ports are referenced within the document as 'TAB' or 'TAB Port'.

The AQQQA RU supports 3.45G Band only operation, 3.7G Band only operation and dual band (3.45G & 3.7G simultaneous) operation. The following AQQQA RU configurations were verified for compliance.

(a) 3.45G Band Carriers only at maximum power (200W/Band total)
(b) 3.7G Band Carriers only at maximum power (320W/Band total)
(c) Dual band with 3.45G carriers at maximum (200W) and 3.7G carriers at 280W.
(d) Dual band with 3.7G carriers at maximum (320W) and 3.45G carriers at 160W.

The 3GPP frequency Band n77 – FCC 3.45G Band (3450-3550 MHz) band edge NR-ARFCNs for 5G NR channel bandwidths (20, 30, and 40 MHz) are provided below. The NR-ARFCN is defined as New Radio - Absolute Radio Frequency Channel Number.

	5G NR NR-ARFCN	Frequency (MHz)	5G NR Channel Bandwidth		
			20 MHz	30 MHz	40 MHz
AQQQA 3.45G Band (Antennas 1 through 64)	Band Edge	3450.00	Lower Band Edge		
	……				
	630668	3460.02	Bot Ch		
	……				
	631000	3465.00		Bot Ch	
	……				
	631334	3470.01			Bot Ch
	……				
	633334	3500.01	Middle Channel		
	……				
	635332	3529.98			Top Ch
	……				
	635666	3534.99		Top Ch	
	……				
	636000	3540.00	Top Ch		
	……				
	Band Edge	3550.00	Upper Band Edge		

AQQQA 3.45G Band _Band Edge 5G NR Frequency Channels

The 3GPP frequency Band n77 – FCC 3.7G Band (3700-3980 MHz) band edge NR-ARFCNs for 5G NR channel bandwidths (20, 40, 60, 80 and 100 MHz) are provided below.

	5G NR NR-ARFCN	Frequency (MHz)	5G NR Channel Bandwidth				
			20 MHz	40 MHz	60 MHz	80 MHz	100 MHz
AQQQA 3.7G Band (Antennas 1 through 64)	Band Edge	3700.00	Lower Band Edge				
	……						
	647334	3710.01	Bot Ch				
	……						
	648000	3720.00		Bot Ch			
	……						
	648668	3730.02			Bot Ch		
	……						
	649334	3740.01				Bot Ch	
	……						
	650000	3750.00					Bot Ch
	……						
	656000	3840.00	Middle Channel				
	……						
	662000	3930.00					Top Ch
	……						
	662666	3939.99				Top Ch	
	……						
	663332	3949.98			Top Ch		
	……						
	664000	3960.00		Top Ch			
	……						
	664666	3969.99	Top Ch				
	……						
	Band Edge	3980.00	Upper Band Edge				

AQQQA 3.7G Band _Band Edge 5G NR Frequency Channels

PRODUCT DESCRIPTION

AQQQA Radio Unit Outline

AQQQA External Interfaces

Name	Qty	Connector Type	Purpose (and Description)
DC1-2	2	APPG	Power supply, -48V DC + GND
GND	1	Screw lugs (M8, 2xM5)	Grounding of the Unit
OPT1-4	4	SFP28	10/25GbE Ethernet/Optical eCPRI Interface
AISG	1	8-pin circular connector	AISG to external devices

Testing Objective:

FCC radio certification of the AirScale Dual Band MAA 64T64R Radio Unit variant AQQQA for 5G NR TDD Single Carrier operations in the 3.45G and 3.7G Bands.

CONFIGURATIONS

Configuration NOKI0052-1

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.CTA6.trunk.2022.1030.001
BTS Software Version (23R1)	SBTS23R1_ENB_9999_221102_000001

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	K9214331950
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246457
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246455
AQQQA (Radio Module Model)	Nokia Solutions and Networks	476090A.101	YK224300010
3.45G Band Diplexer CW-DPF-3450-3550-EB1-M2 100 Watt	.CREOWAVE	CW-DPF-3450-3550-EB1-M2	SN:2273001
Attenuator 50W/10dB	AeroflexWeinschel	66-20-33	BZ1165
SFP+ 9.8G,300M,850NM	Nokia	462265	VF20470022K
SFP+ 9.8G,300M,850NM	Nokia	462265	FR214719867
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
1 Meter RF cable SMA/SMA	Huber+suhner	SUCOFLEX 104	SN 564428 /4
2 Meter RF cable N-Type/SMA	Huber+suhner	SUCOFLEX 104	SN 184424 /4
50W/10dB Attenuator	RF-LAMBDA	RFS50G26S10FF	20032017
20W -50ohm -Terminating Load	Jiangsu Wutong IoT Tech Co. Ltd.	F Coaxial Load	BC-TE20-05/ 40ct
10W -50ohm -Terminating Load	MCLI	TSM-10	0926/ 6ct
10W -50ohm -Terminating Load	IDK	IDK-BS	1--17
4 Meter- RF cable	CBL	CBL-10F-SMSF-402J-N	402J-N/ 64ct
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable (EM-PC)	ETL	E316395	6066M
SYNC-analyzer 10MHz/FrameClk Cable	Nokia	101	.0001
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431
Cat-5e cable	CSA	LL73189	E151955
Antenna Connector Panel	Nokia	838114	X2

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic cable	N	20 meters	N	ASIB	AQQQA
Cat-5e cable (CSA)	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIB	WebEM- PC
CBL RF-Cable	Y	4 meters	N	EUT [RRH] TAB ports 0--56,58--64	10W and 20W -50ohm -Terminating Loads

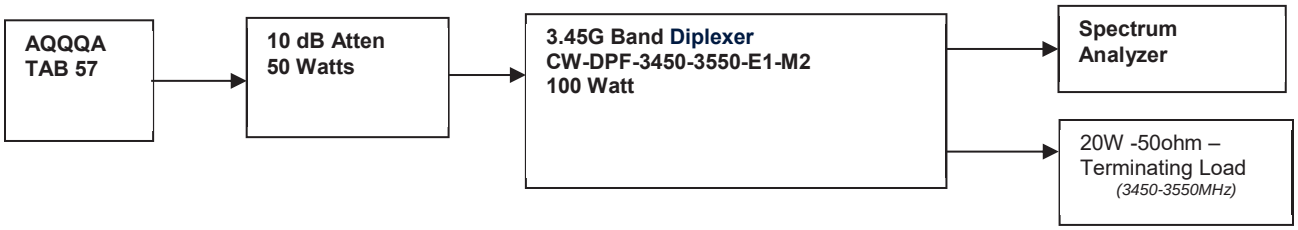
CONFIGURATIONS

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_104	Y	2 meters	N	EUT [AQQQA] TAB port #57	Attenuator 50W/10dB [LAMBDA]
Attenuator 50W/10dB [LAMBDA]	N	NA	N	RF cable HS-SUCOFLEX_104	3.45G Band Blocking Filter
3.45G Band Diplexer	N	NA	N	Attenuator 50W/10dB [LAMBDA]	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	3.45G Band Blocking Filter	Analyzer 20W -50ohm - Terminating Load

RF Test Setup Diagram:

Band Edge Test Setup
- Single Band 3.45GHz: 3100MHz to 3430MHz & 3570MHz to 4030MHz; Limit line at -58.1dBm/MHz

Conducted Spurious Emissions Test Setup
- Single Band 3.45GHz: 9kHz to 150kHz, 150kHz to 30MHz, 30MHz to 3430MHz and 3570MHz to 6000MHz. Limit line at -58.1 dBm.



CONFIGURATIONS

Configuration NOKI0052-2

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.CTA6.trunk.2022.1030.001
BTS Software Version (23R1)	SBTS23R1_ENB_9999_221102_000001

Equipment being tested (include Peripherals)			
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Attenuator 50W/10dB	AeroflexWeinschel	66-20-33	BZ1165
SFP+ 9.8G,300M,850NM	Nokia	462265	VF20470022K
SFP+ 9.8G,300M,850NM	Nokia	462265	FR214719867
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
1 Meter RF cable SMA/SMA	Huber+suhner	SUCOFLEX 104	SN 564428 /4
2 Meter RF cable N-Type/SMA	Huber+suhner	SUCOFLEX 104	SN 184424 /4
50W/10dB Attenuator	RF-LAMBDA	RFS50G26S10FF	20032017
20W -50ohm -Terminating Load	Jiangsu Wutong IoT Tech Co. Ltd.	F Coaxial Load	BC-TE20-05/ 40ct
10W -50ohm -Terminating Load	MCLI	TSM-10	0926/ 6ct
10W -50ohm -Terminating Load	IDK	IDK-BS	1--17
4 Meter- RF cable	CBL	CBL-10F-SMSF-402J-N	402J-N/ 64ct
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable (EM-PC)	ETL	E316395	6066M
SYNC-analyzer 10MHz/FrameClk Cable	Nokia	101	.0001
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431
Cat-5e cable	CSA	LL73189	E151955
Antenna Connector Panel	Nokia	838114	X2

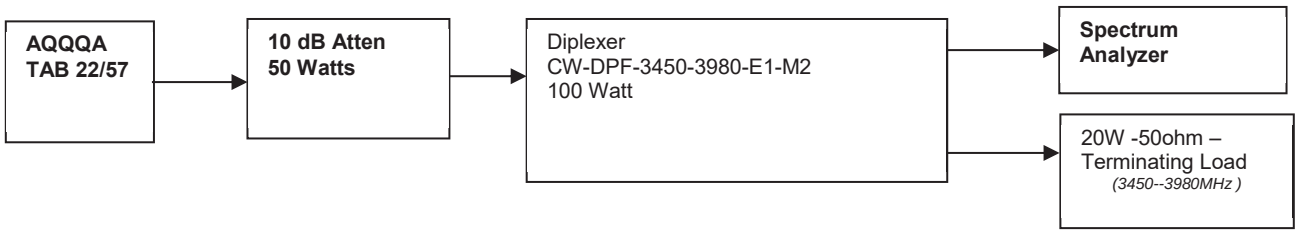
Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic cable	N	20 meters	N	ASIB	AQQQA
Cat-5e cable (CSA)	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIB	WebEM- PC
CBL RF-Cable	Y	4 meters	N	EUT [RRH] TAB ports 0--21,23--56,58--64	10W and 20W -50ohm -Terminating Loads

CONFIGURATIONS

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_104	Y	2 meters	N	EUT [AQQQA] TAB port #57 & #22	Attenuator 50W/10dB [LAMBDA]
Attenuator 50W/10dB [LAMBDA]	N	NA	N	RF cable HS-SUCOFLEX_104	3450 to 3980MHz Diplexer
3450 to 3980MHz Diplexer	N	NA	N	Attenuator 50W/10dB [LAMBDA]	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	3450 to 3980MHz Diplexer	Analyzer 20W -50ohm - Terminating Load

RF Test Setup Diagram:

Conducted Spurious Emissions Test Setups
- Single Band 3.7GHz: 9kHz to 150kHz, 150kHz to 30MHz, 30MHz to 3400MHz. Limit line at -31.1 dBm.
- Dual Band 3.7GHz (320Watt) and 3.45GHz (160Watt): 9kHz to 150kHz, 150kHz to 30MHz, 30MHz to 3400MHz and 4030MHz to 6000MHz; Limit Line at -58.1 dBm
- Dual Band 3.45GHz (200Watt) and 3.7GHz (280Watt): 9kHz to 150kHz, 150kHz to 30MHz, 30MHz to 3400MHz and 4030MHz to 6000MHz; Limit Line at -58.1 dBm



CONFIGURATIONS

Configuration NOKI0052-3

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.CTA6.trunk.2022.1030.001
BTS Software Version (23R1)	SBTS23R1_ENB_9999_221102_000001

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	K9214331950
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246457
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246455
AQQQA (Radio Module Model)	Nokia Solutions and Networks	476090A.101	YK224300010
3450-3550MHz & 3700-3980MHz Dual Diplexer CW-DDPF-3450-3550 & 3700-3980-E1-M2 100 Watt	.CREOWAVE	CW-DDPF-3450-3550 & 3700-3980-E1-M2	2205002
Attenuator 50W/10dB	AeroflexWeinschel	66-20-33	BZ1165
SFP+ 9.8G,300M,850NM	Nokia	462265	VF20470022K
SFP+ 9.8G,300M,850NM	Nokia	462265	FR214719867
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
1 Meter RF cable SMA/SMA	Huber+suhner	SUCOFLEX 104	SN 564428 /4
2 Meter RF cable N-Type/SMA	Huber+suhner	SUCOFLEX 104	SN 184424 /4
50W/10dB Attenuator	RF-LAMBDA	RFS50G26S10FF	20032017
20W -50ohm -Terminating Load	Jiangsu Wutong IoT Tech Co. Ltd.	F Coaxial Load	BC-TE20-05/ 40ct
10W -50ohm -Terminating Load	MCLI	TSM-10	0926/ 6ct
10W -50ohm -Terminating Load	IDK	IDK-BS	1--17
4 Meter- RF cable	CBL	CBL-10F-SMSF-402J-N	402J-N/ 64ct
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable (EM-PC)	ETL	E316395	6066M
SYNC-analyzer 10MHz/FrameClk Cable	Nokia	101	.0001
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431
Cat-5e cable	CSA	LL73189	E151955
Antenna Connector Panel	Nokia	838114	X2

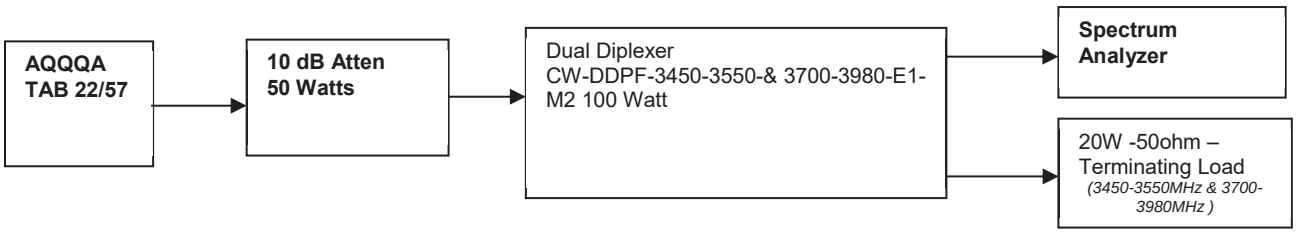
CONFIGURATIONS

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic cable	N	20 meters	N	ASIB	AQQQA
Cat-5e cable (CSA)	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIB	WebEM- PC
CBL RF-Cable	Y	4 meters	N	EUT [RRH] TAB ports 0--21,23--56,58--64	10W and 20W - 50ohm -Terminating Loads

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_104	Y	2 meters	N	EUT [AQQQA] TAB port #57 & #22	Attenuator 50W/10dB [LAMBDA]
Attenuator 50W/10dB [LAMBDA]	N	NA	N	RF cable HS-SUCOFLEX_104	Dual Diplexer CW-DDPF-3450-3550-& 3700-3980-E1-M2 100 Watt
Dual Diplexer CW-DDPF-3450-3550-& 3700-3980-E1-M2 100 Watt	N	NA	N	Attenuator 50W/10dB [LAMBDA]	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	Dual Diplexer CW-DDPF-3450-3550-& 3700-3980-E1-M2 100 Watt	Analyzer 20W -50ohm - Terminating Load

RF Test Setup Diagram:

Conducted Spurious Emissions Test Setup
- Dual Band 3.7GHz (320Watt) and 3.45GHz (160Watt): 3100MHz to 3430MHz, 3570MHz to 3680MHz and 4000MHz to 4200MHz; Limit line at -58.1 dBm/MHz
- Dual Band Carrier 3.45GHz (200Watt) and 3.7GHz (280Watt): 3100MHz to 3430MHz, 3570MHz to 3680MHz and 4000MHz to 4200MHz; Limit line at -58.1 dBm/MHz



CONFIGURATIONS

Configuration NOKI0052-4

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.CTA6.trunk.2022.1030.001
BTS Software Version (23R1)	SBTS23R1_ENB_9999_221102_000001

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	K9214331950
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246457
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246455
AQQQA (Radio Module Model)	Nokia Solutions and Networks	476090A.101	YK224300010
SFP+ 9.8G,300M,850NM	Nokia	462265	VF20470022K
SFP+ 9.8G,300M,850NM	Nokia	462265	FR214719867
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
Attenuator 10W/20dB	Fairview Microwave	SA3N10W-20	21071308
Attenuator 100W/3dB	Aeroflex/ Weinschel	47-3-33	CC7387
Attenuator 100W/3dB	Aeroflex/ Weinschel	47-3-33	CG5493
1 Meter RF cable SMA/SMA	Huber+suhner	SUCOFLEX 104	SN 564428 /4
2 Meter RF cable N-Type/SMA	Huber+suhner	SUCOFLEX 104	SN 184424 /4
20W -50ohm -Terminating Load	Jiangsu Wutong IoT Tech Co. Ltd.	F Coaxial Load	BC-TE20-05/ 40ct
10W -50ohm -Terminating Load	MCLI	TSM-10	0926/ 6ct
10W -50ohm -Terminating Load	IDK	IDK-BS	1--17
4 Meter- RF cable	CBL	CBL-10F-SMSF-402J-N	402J-N/ 64ct
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable (EM-PC)	ETL	E316395	6066M
SYNC-analyzer 10MHz/FrameClk Cable	Nokia	101	.0001
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431
Antenna Connector Panel	Nokia	838114	X2

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic cable	N	25 meters	N	ASIB	AQQQA
Cat-5e cable (CSA)	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIB	WebEM- PC
CBL RF-Cable	Y	4 meters	N	EUT [RRH] TAB ports 0--21,23--56,58--64	10W and 20W - 50ohm - Terminating Loads

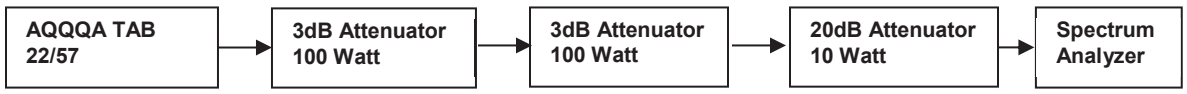
CONFIGURATIONS

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_104	Y	2 meters	N	EUT [AQQQA] TAB port #57& #22	Attenuator 100W/3dB/ CC7387
Attenuator 100W/3dB/ CC7387	N	NA	N	RF cable N-Type/SMA HS-SUCOFLEX_104	Attenuator 100W/3dB/ CG5493
Attenuator 100W/3dB/ CG5493	N	NA	N	Attenuator 100W/3dB/ CC7387	Attenuator 10W/20dB/ 21071308
Attenuator 10W/20dB/ 21071308	N	NA	N	Attenuator 100W/3dB/ CG5493	RF cable SMA/SMA HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	Attenuator 10W/20dB/ 21071308	Analyzer

RF Test Setup Diagram:

Band Edge Test Setup
- Single Band 3.7GHz (80&100MHz bandwidths): 3550MHz to 3700MHz and 3980MHz to 4130MHz; Limit Line at -31.1 dBm

Conducted Spurious Emission Setup
- Single Band 3.7GHz: 3400MHz to 6000MHz. Limit line at -31.1dBm/MHz
- Single Band 3.45GHz: 3400MHz to 3600MHz. Limit line at -31.1dBm/MHz
- Dual Band 3.45GHz (200W) and 3.7GHz(280W): 3400MHz to 4030MHz. Limit line at -31.1dBm/MHz
- Dual Band 3.7GHz(320W) and 3.45GHz (160W): 3400MHz to 4030MHz. Limit line at -31.1dBm/MHz



CONFIGURATIONS

Configuration NOKI0052-5

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.CTA6.trunk.2022.1030.001
BTS Software Version (23R1)	SBTS23R1_ENB_9999_221102_000001

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	K9214331950
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246457
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246455
AQQQA (Radio Module Model)	Nokia Solutions and Networks	476090A.101	YK224300010
SFP+ 9.8G,300M,850NM	Nokia	462265	VF20470022K
SFP+ 9.8G,300M,850NM	Nokia	462265	FR214719867
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
Attenuator 150W/40dB	AeroflexWeinschel	66-20-33	BZ1165
1 Meter RF cable SMA/SMA	Huber+suhner	SUCOFLEX 104	SN 564428 /4
2 Meter RF cable N-Type/SMA	Huber+suhner	SUCOFLEX 104	SN 184424 /4
20W -50ohm -Terminating Load	Jiangsu Wutong IoT Tech Co. Ltd.	F Coaxial Load	BC-TE20-05/ 40ct
10W -50ohm -Terminating Load	MCLI	TSM-10	0926/ 6ct
10W -50ohm -Terminating Load	IDK	IDK-BS	1--17
4 Meter- RF cable	CBL	CBL-10F-SMSF-402J-N	402J-N/ 64ct
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable (EM-PC)	ETL	E316395	6066M
SYNC-analyzer 10MHz/FrameClk Cable	Nokia	101	.0001
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431
Antenna Connector Panel	Nokia	838114	X2

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic cable	N	25 meters	N	ASIB	AQQQA
Cat-5e cable (CSA)	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIB	WebEM- PC
CBL RF-Cable	Y	4 meters	N	EUT [RRH] TAB ports 0--21,23--56,58--64	10W and 20W - 50ohm - Terminating Loads

CONFIGURATIONS

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_104	Y	2 meters	N	EUT [AQQQA] TAB port #57& #22	Attenuator 150W/40dB
Attenuator 150W/40dB [TC909]	N	NA	N	RF cable N-Type/SMA HS-SUCOFLEX_104	RF cable SMA/SMA HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	Attenuator 250W/40dB	Analyzer

RF Test Setup Diagram:

Band Edge Test Setup
- Single Band 3.7GHz (20, 40, 60MHz bandwidths): 3550MHz to 3700MHz and 3980MHz to 4130MHz.

Limit Line at -31.1 dBm
- Single Band 3.45GHz: 3440MHz to 3450MHz & 3550 to 3560MHz; Limit Line at -31.1 dBm/MHz
- Single Band 3.45GHz: 3430MHz to 3440MHz & 3560 to 3570MHz; Limit Line at -43.1 dBm/MHz

CONFIGURATIONS

Configuration NOKI0052-6

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.CTA6.trunk.2022.1030.001
BTS Software Version (23R1)	SBTS23R1_ENB_9999_221102_000001

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	K9214331950
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246457
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246455
AQQQA (Radio Module Model)	Nokia Solutions and Networks	476090A.101	YK224300010
SFP+ 9.8G,300M,850NM	Nokia	462265	VF20470022K
SFP+ 9.8G,300M,850NM	Nokia	462265	FR214719867
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
50W/10dB Attenuator	RF-LAMBDA	RFS50G26S10FF	20032017
HPF 5.5-13GHz	Microwave Circuits, INC.	DC0240	SN2454-01
1 Meter RF cable SMA/SMA	Huber+suhner	SUCOFLEX 104	SN 564428 /4
2 Meter RF cable N-Type/SMA	Huber+suhner	SUCOFLEX 104	SN 184424 /4
20W -50ohm -Terminating Load	Jiangsu Wutong IoT Tech Co. Ltd.	F Coaxial Load	BC-TE20-05/ 40ct
10W -50ohm -Terminating Load	MCLI	TSM-10	0926/ 6ct
10W -50ohm -Terminating Load	IDK	IDK-BS	1--17
4 Meter- RF cable	CBL	CBL-10F-SMSF-402J-N	402J-N/ 64ct
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable (EM-PC)	ETL	E316395	6066M
SYNC-analyzer 10MHz/FrameClk Cable	Nokia	101	.0001
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431
Antenna Connector Panel	Nokia	838114	X2

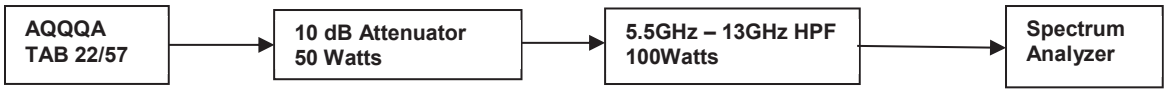
Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic cable	N	25 meters	N	ASIB	AQQQA
Cat-5e cable (CSA)	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIB	WebEM- PC
CBL RF-Cable	Y	4 meters	N	EUT [RRH] TAB ports 0--21,23--56,58--64	10W and 20W – 50 ohm – terminating loads

CONFIGURATIONS

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_104	Y	2 meters	N	EUT [RRH] RF TAB port #22/57	Attenuator 50W/10dB [BZ1165]
Attenuator 50W/10dB	N	NA	N	HS-SUCOFLEX_104	High Pass Filter 5.5-13GHz
High Pass Filter 5.5-13GHz/100W	N	NA	N	Attenuator 50W/10dB [BZ1165]	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	High Pass Filter 5.5-13GHz/100W	Analyzer

RF Test Setup Diagram:

Conducted Spurious Emissions Test Setup
- Single Band 3.45GHz: 6GHz to 13GHz; Limit Line at -58.1 dBm/MHz
- Single Band 3.7GHz: 6GHz to 13GHz; Limit Line at -31.1 dBm/MHz
- Dual Band 3.45GHz (200W) and 3.7GHz(280W): 6GHz to 13GHz; Limit Line at -58.1 dBm/MHz
- Dual Band 3.7GHz (320W) and 3.45GHz (160W): 6GHz to 13GHz; Limit Line at -58.1 dBm/MHz



CONFIGURATIONS

Configuration NOKI0052-7

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.CTA6.trunk.2022.1030.001
BTS Software Version (23R1)	SBTS23R1_ENB_9999_221102_000001

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	K9214331950
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246457
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246455
AQQQA (Radio Module Model)	Nokia Solutions and Networks	476090A.101	YK224300010
SFP+ 9.8G,300M,850NM	Nokia	462265	VF20470022K
SFP+ 9.8G,300M,850NM	Nokia	462265	FR214719867
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
50W/10dB Attenuator	RF-LAMBDA	RFS50G26S10FF	20032017
8-40GHz HPF /15Watts	RF-LAMBDA	RHPF23G08G40	17102700016
1 Meter RF cable SMA/SMA	Huber+suhner	SUCOFLEX 104	SN 564428 /4
2 Meter RF cable N-Type/SMA	Huber+suhner	SUCOFLEX 104	SN 184424 /4
20W -50ohm -Terminating Load	Jiangsu Wutong IoT Tech Co. Ltd.	F Coaxial Load	BC-TE20-05/ 40ct
10W -50ohm -Terminating Load	MCLI	TSM-10	0926/ 6ct
10W -50ohm -Terminating Load	IDK	IDK-BS	1--17
4 Meter- RF cable	CBL	CBL-10F-SMSF-402J-N	402J-N/ 64ct
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable (EM-PC)	ETL	E316395	6066M
SYNC-analyzer 10MHz/FrameClk Cable	Nokia	101	.0001
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431
Antenna Connector Panel	Nokia	838114	X2

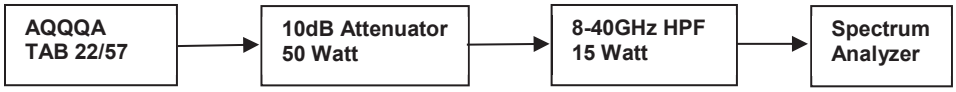
Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic cable	N	25 meters	N	ASIB	Fiber Optic cable
Cat-5e cable (CSA)	Y	100 meters	N	ASIB	Cat-5e cable (CSA)
Cat-5e cable	Y	25 meters	N	ASIB	Cat-5e cable
CBL RF-Cable	Y	4 meters	N	EUT [RRH] TAB ports 0--21,23--56,58--64	CBL RF-Cable

CONFIGURATIONS

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_104 SMA/SMA	Y	1 meter	N	EUT [AQQQA] TAB port #22/57	Attenuator 50W/10dB
Attenuator 50W/30dB	N	NA	N	HS-SUCOFLEX_104 SMA/SMA	High Pass Filter 8-40GHz
High Pass Filter 8-40GHz/15W	N	NA	N	Attenuator 50W/10dB	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104 N-Type/SMA	Y	2 meter	N	High Pass Filter 8-40GHz/15W	Analyzer

RF Test Setup Diagram:

Conducted Spurious Emissions Test Setup
-Single Band 3.45GHz: 13GHz to 40GHz; Limit Line at -58.1 dBm/MHz
-Single Band 3.7GHz: 13GHz to 40GHz; Limit Line at -31.1 dBm/MHz
-Dual Band 3.7GHz (320Watt) and 3.45GHz (160Watt): 13GHz to 40GHz; Limit Line at -58.1 dBm/MHz
-Dual Band 3.45GHz (200Watt) and 3.7GHz (280Watt):13GHz to 40GHz; Limit Line at -58.1 dBm/MHz



CONFIGURATIONS

Configuration NOKI0052-8

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.CTA6.trunk.2022.1030.001
BTS Software Version (23R1)	SBTS23R1_ENB_9999_221102_000001

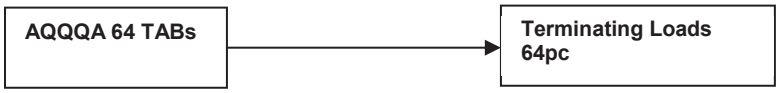
Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	K9214331950
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246457
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246455
AQQQA (Radio Module Model)	Nokia Solutions and Networks	476090A.101	YK224300010
SFP+ 9.8G,300M,850NM	Nokia	462265	VF20470022K
SFP+ 9.8G,300M,850NM	Nokia	462265	FR214719867
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
20W -50ohm -Terminating Load	Jiangsu Wutong IoT Tech Co. Ltd.	F Coaxial Load	BC-TE20-05/ 40ct
10W -50ohm -Terminating Load	MCLI	TSM-10	0926/ 6ct
10W -50ohm -Terminating Load	IDK	IDK-BS	1--18
4 Meter- RF cable	CBL	CBL-10F-SMSF-402J-N	402J-N/ 64ct
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable (EM-PC)	ETL	E316395	6066M
SYNC-analyzer 10MHz/FrameClk Cable	Nokia	101	.0001
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431
Antenna Connector Panel	Nokia	838114	X2

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic cable	N	25 meters	N	ASIB	AQQQA
Cat-5e cable (CSA)	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIB	WebEM- PC
CBL RF-Cable	Y	4 meters	N	EUT [RRH] TAB ports 0--21,23--56,58--64	10W and 20W -50ohm - Terminating Loads
RET	Y	2.4 meters	N	EUT	Unterminated
EAC	Y	5.4 meters	N	EUT	Unterminated
Ground	Y	3 meters	N	EUT	Turntable

CONFIGURATIONS

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
CBL 4 Meter- RF cable	Y	4 meters	N	EUT [AQQQA] TAB port #1--64	10W and 20W - 50ohm - Terminating Loads
RET	Y	2.4m	N	Remote Radio Head Module	Unterminated
EAC	Y	5.4m	N	Remote Radio Head Module	Unterminated
Grounding	N	3m	N	Remote Radio Head Module	Turntable Ground

RF Test Setup Diagram: Radiated Test Setup



CONFIGURATIONS

Configuration NOKI0052-9

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.CTA6.trunk.2022.1030.001
BTS Software Version (23R1)	SBTS23R1_ENB_9999_221102_000001

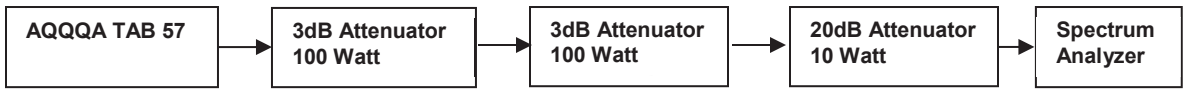
Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	K9214331950
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246457
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246455
AQQQA (Radio Module Model)	Nokia Solutions and Networks	476090A.101	YK224300010
SFP+ 9.8G,300M,850NM	Nokia	462265	VF20470022K
SFP+ 9.8G,300M,850NM	Nokia	462265	FR214719867
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
Attenuator 10W/20dB	Fairview Microwave	SA3N10W-20	21071308
Attenuator 100W/3dB	Aeroflex/ Weinschel	47-3-33	CC7387
Attenuator 100W/3dB	Aeroflex/ Weinschel	47-3-33	CG5493
1 Meter RF cable SMA/SMA	Huber+suhner	SUCOFLEX 104	SN 564428 /4
2 Meter RF cable N-Type/SMA	Huber+suhner	SUCOFLEX 104	SN 184424 /4
20W -50ohm -Terminating Load	Jiangsu Wutong IoT Tech Co. Ltd.	F Coaxial Load	BC-TE20-05/ 40ct
10W -50ohm -Terminating Load	MCLI	TSM-10	0926/ 6ct
10W -50ohm -Terminating Load	IDK	IDK-BS	1--17
4 Meter- RF cable	CBL	CBL-10F-SMSF-402J-N	402J-N/ 64ct
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable (EM-PC)	ETL	E316395	6066M
SYNC-analyzer 10MHz/FrameClk Cable	Nokia	101	.0001
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431
Antenna Connector Panel	Nokia	838114	X2

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic cable	N	25 meters	N	ASIB	AQQQA
Cat-5e cable (CSA)	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIB	WebEM- PC
CBL RF-Cable	Y	4 meters	N	EUT [RRH] TAB ports 0--56,58--64	10W and 20W - 50ohm - Terminating Loads

CONFIGURATIONS

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_104	Y	2 meters	N	EUT [AQQQA] TAB port #57	Attenuator 100W/3dB/ CC7387
Attenuator 100W/3dB/ CC7387	N	NA	N	RF cable N-Type/SMA HS-SUCOFLEX_104	Attenuator 100W/3dB/ CG5493
Attenuator 100W/3dB/ CG5493	N	NA	N	Attenuator 100W/3dB/ CC7387	Attenuator 10W/20dB/ 21071308
Attenuator 10W/20dB/ 21071308	N	NA	N	Attenuator 100W/3dB/ CG5493	RF cable SMA/SMA HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	Attenuator 10W/20dB/ 21071308	Analyzer

RF Test Setup Diagram: Frequency Stability Test Setup



CONFIGURATIONS

Configuration NOKI0052-12

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.CTA6.trunk.2022.1030.001
BTS Software Version (23R1)	SBTS23R1_ENB_9999_221102_000001

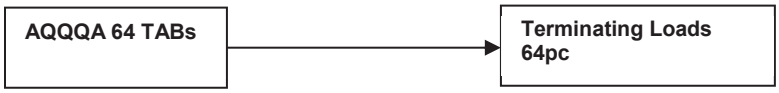
Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	K9214331950
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246457
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.103	DH223246455
AQQQA (Radio Module Model)	Nokia Solutions and Networks	476090A.101	YK224300010
SFP 10Km SM I-temp RS	Nokia	474902A.101	VF19230003E
SFP 10Km SM I-temp RS	Nokia	474902A.101	VF19220012F
EMI Filter	Spectrum Control	12-PMB-260-DC-E	1.0001
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
20W -50ohm -Terminating Load	Jiangsu Wutong IoT Tech Co. Ltd.	F Coaxial Load	BC-TE20-05/ 40ct
10W -50ohm -Terminating Load	MCLI	TSM-10	0926/ 6ct
10W -50ohm -Terminating Load	IDK	IDK-BS	1--18
4 Meter- RF cable	CBL	CBL-10F-SMSF-402J-N	402J-N/ 64ct
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable (EM-PC)	ETL	E316395	6066M
SYNC-analyzer 10MHz/FrameClk Cable	Nokia	101	.0001
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431
Antenna Connector Panel	Nokia	838114	X2

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic cable	N	25 meters	N	ASIB	AQQQA
Cat-5e cable (CSA)	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIB	WebEM- PC
CBL RF-Cable	Y	4 meters	N	EUT [RRH] TAB ports 0--64	10W and 20W - 50ohm - Terminating Loads

CONFIGURATIONS

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
CBL 4 Meter- RF cable	Y	4 meters	N	EUT [AQQQA] TAB port #1--64	10W and 20W - 50ohm - Terminating Loads
RET	Y	2.4m	N	Remote Radio Head Module	Unterminated
EAC	Y	5.4m	N	Remote Radio Head Module	Unterminated
Grounding	N	3m	N	Remote Radio Head Module	Turntable Ground

RF Test Setup Diagram: Radiated Test Setup



MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2022-12-13	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.
2	2023-01-19	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.
3	2023-01-19	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2023-01-19	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.
5	2023-01-19	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.
6	2023-01-24	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.
7	2023-01-25	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.
8	2023-02-01	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 SINGLE 3.45G

element

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	ANC	2022-03-02	2023-03-02
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2022-09-08	2023-09-08
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 on the worst case (highest average power) port by band. The AQQQA antenna ports are all within the manufacturer's rated output power tolerances (the RF power variation between antenna ports is small as shown in this certification testing) and the antenna port 57 for the 3.45GHz band was selected to perform the testing for this effort.

The occupied bandwidth was measured with the EUT configured in the modes called out in the data sheets.
FCC 27.53(n)(1) defines he 26dB emission bandwidth requirement.

FCC 5G Emission Designators for 3.45G Band (3450MHz to 3550MHz)					
Channel Bandwidth	Radio Channel	5G-NR: QPSK	5G-NR: 16QAM	5G-NR: 64QAM	5G-NR: 256QAM
20MHz	Low				19M7G7W
	Mid	19M7G7W	19M7G7W	19M7G7W	19M7G7W
	High				19M8G7W
30MHz	Low				29M9G7W
	Mid	29M7G7W	29M9G7W	29M7G7W	29M7G7W
	High				29M8G7W
40MHz	Low				39M8G7W
	Mid	39M8G7W	39M8G7W	39M8G7W	39M7G7W
	High				39M7G7W
Note: FCC emission designators are based on 26dB emission bandwidth measurement data.					

OCCUPIED BANDWIDTH SINGLE 3.45G

TbtTx 2022.06.03.0 XMit 2022.02.07.0

EUT:	AQQQA			Work Order:	NOKI0052
Serial Number:	YK224300010			Date:	16-Jan-23
Customer:	Nokia of America Corporation			Temperature:	20.9 °C
Attendees:	John Rattanavong, Michell Hill			Humidity:	47.4% RH
Project:	None			Barometric Pres.:	1011 mbar
Tested by:	Brandon Hobbs	Power:	54 VDC	Job Site:	TX07

TEST SPECIFICATIONS	Test Method
FCC 27:2023	ANSI C63.26:2015

COMMENTS

All losses in the measurement path were accounted for: attenuators, cables, DC block and filter when in use. Band n77 carriers were enabled at maximum power levels for the 3.45GHz band (at 3.125 watts/carrier for NR40 and at 2.5 watts/carrier for NR20 & NR30) in the single carrier operating mode configuration.

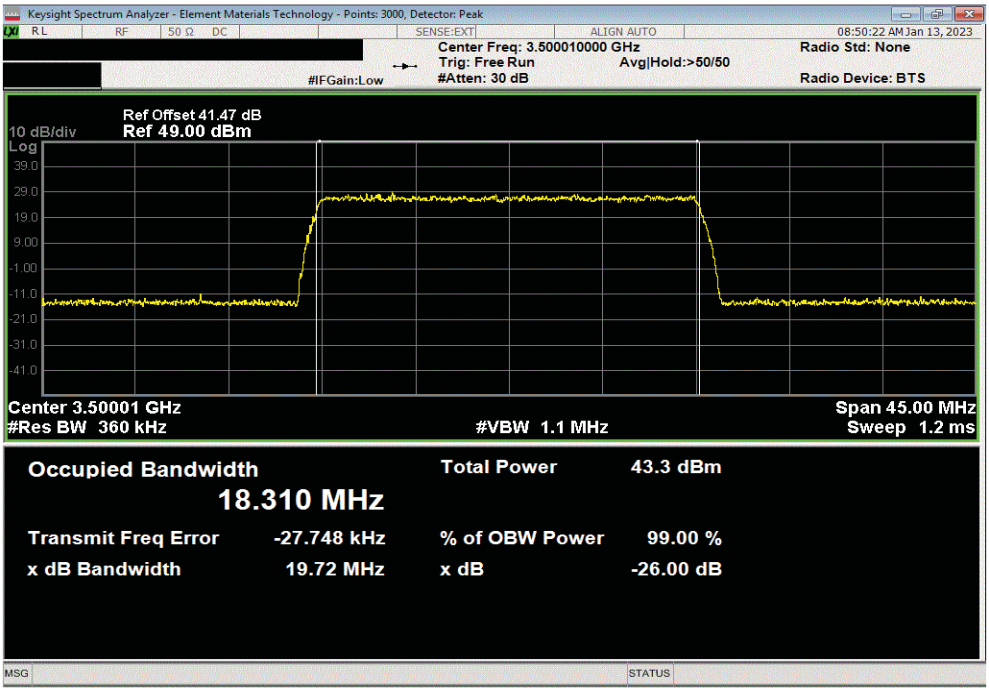
DEVIATIONS FROM TEST STANDARD

None

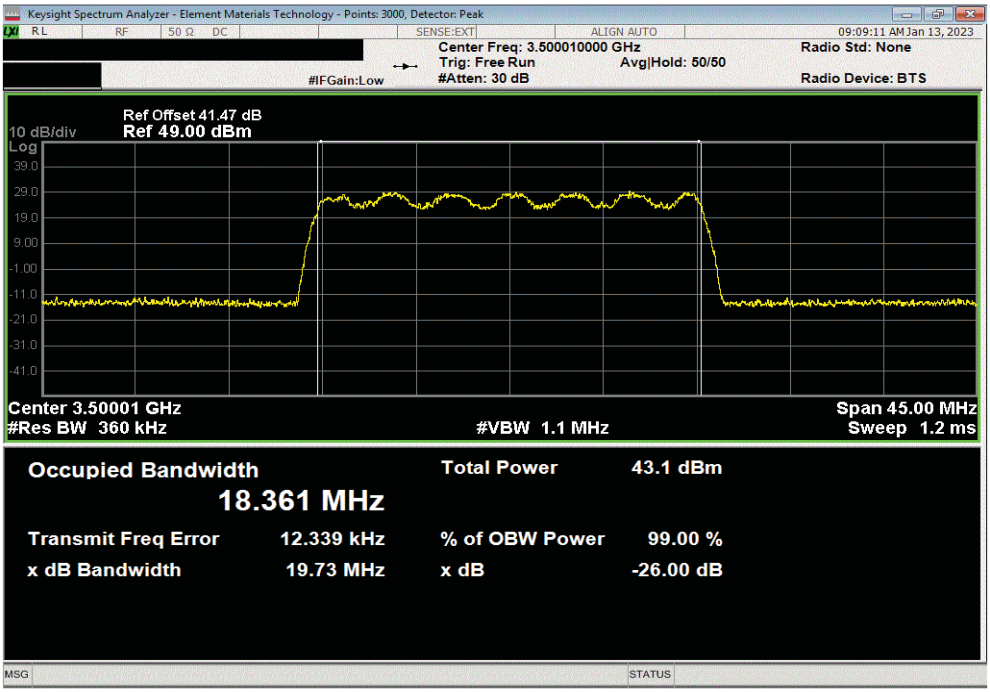
Configuration #	5	Signature

	Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
Port 57				
Band n77, 3450 - 3550 MHz				
20 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 3500.01 MHz	18.3	19.7	Within Band	Pass
16QAM Modulation				
Mid Channel, 3500.01 MHz	18.4	19.7	Within Band	Pass
64QAM Modulation				
Mid Channel, 3500.01 MHz	18.3	19.7	Within Band	Pass
256QAM Modulation				
Low Channel, 3460.02 MHz	18.3	19.7	Within Band	Pass
Mid Channel, 3500.01 MHz	18.3	19.7	Within Band	Pass
High Channel, 3540.00 MHz	18.3	19.8	Within Band	Pass
30 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 3500.01 MHz	27.9	29.7	Within Band	Pass
16QAM Modulation				
Mid Channel, 3500.01 MHz	28.0	29.9	Within Band	Pass
64QAM Modulation				
Mid Channel, 3500.01 MHz	27.9	29.7	Within Band	Pass
256QAM Modulation				
Low Channel, 3465.00 MHz	27.9	29.9	Within Band	Pass
Mid Channel, 3500.01 MHz	27.9	29.7	Within Band	Pass
High Channel, 3534.99 MHz	27.9	29.8	Within Band	Pass
40 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 3500.01 MHz	37.9	39.8	Within Band	Pass
16QAM Modulation				
Mid Channel, 3500.01 MHz	38.0	39.8	Within Band	Pass
64QAM Modulation				
Mid Channel, 3500.01 MHz	37.8	39.8	Within Band	Pass
256QAM Modulation				
Low Channel, 3470.01 MHz	37.9	39.8	Within Band	Pass
Mid Channel, 3500.01 MHz	37.9	39.7	Within Band	Pass
High Channel, 3529.98 MHz	37.9	39.7	Within Band	Pass

Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, QPSK Modulation, Mid Channel, 3500.01 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.31	19.725	Within Band	Pass

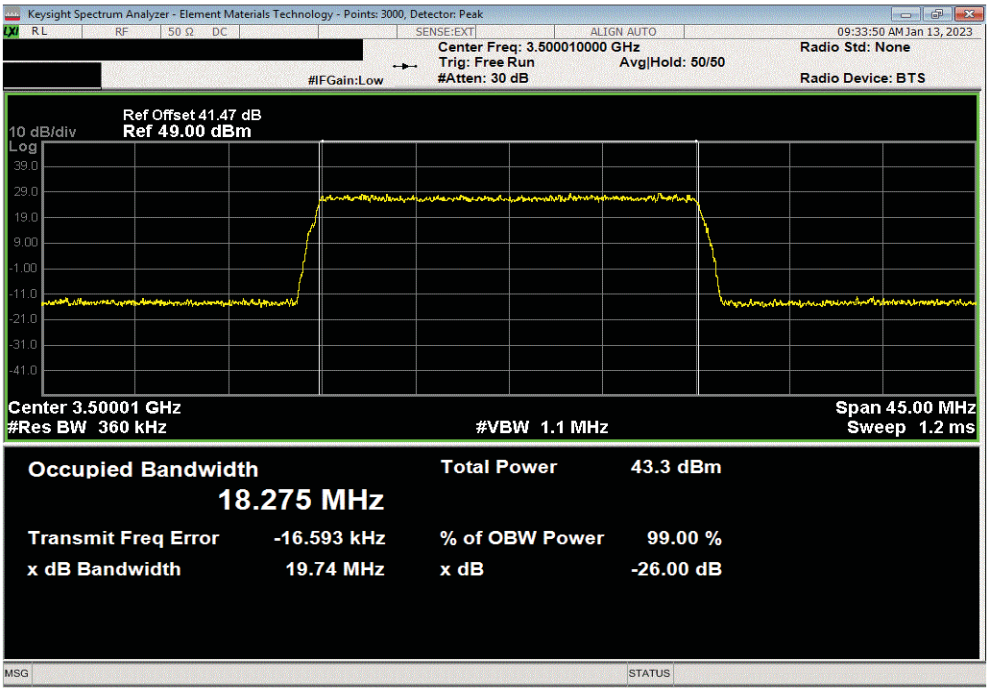


Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3500.01 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.361	19.728	Within Band	Pass

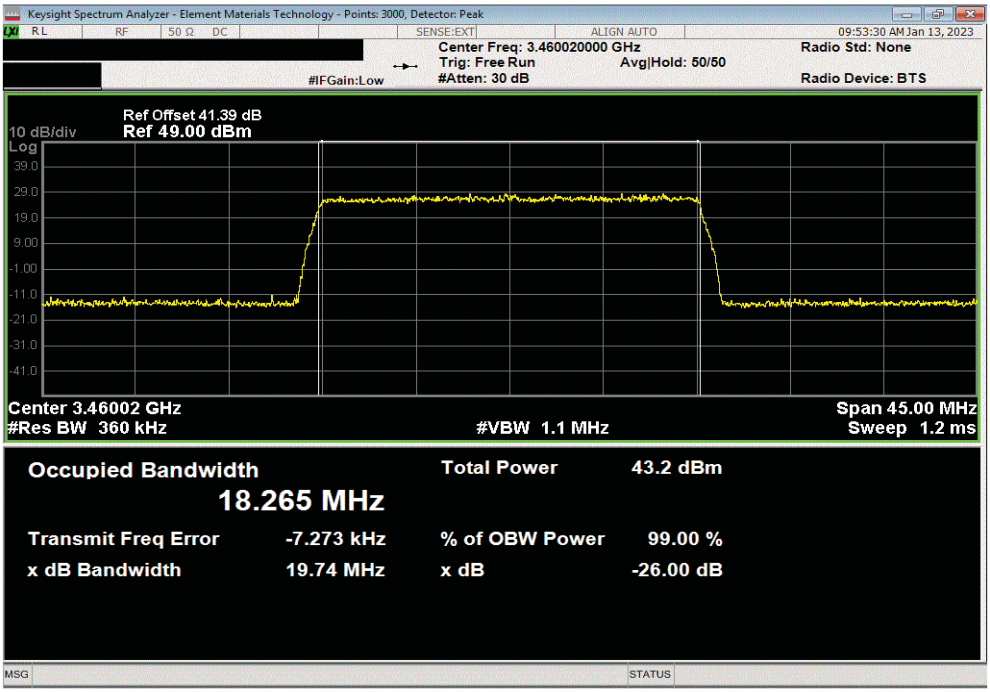


OCCUPIED BANDWIDTH SINGLE 3.45G

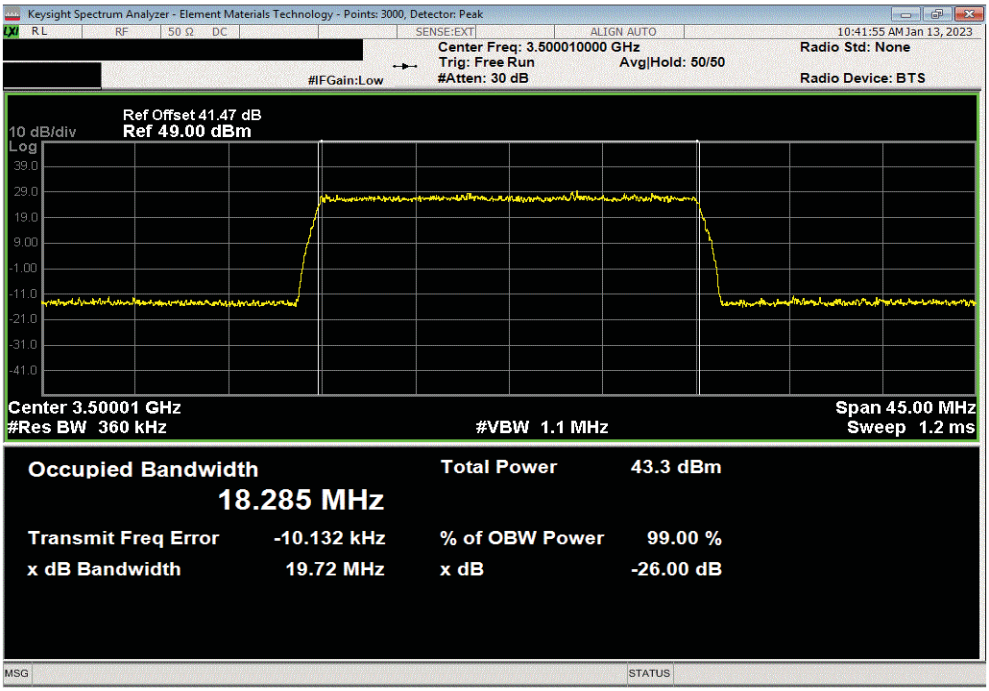
Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3500.01 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.275	19.744	Within Band	Pass



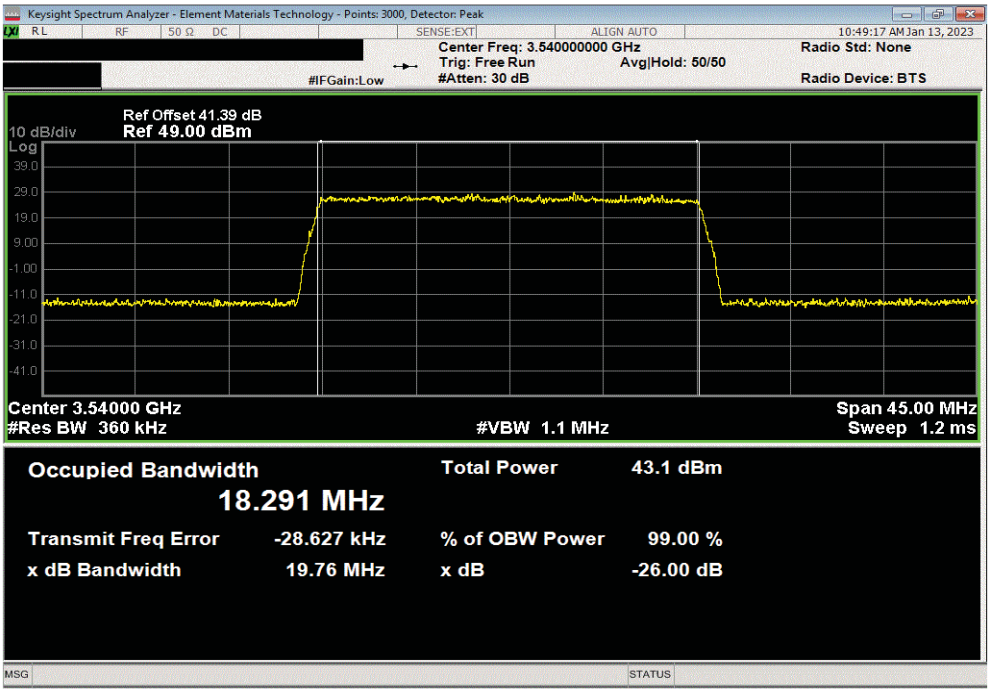
Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, Low Channel, 3460.02 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.265	19.74	Within Band	Pass



Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3500.01 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.285	19.717	Within Band	Pass

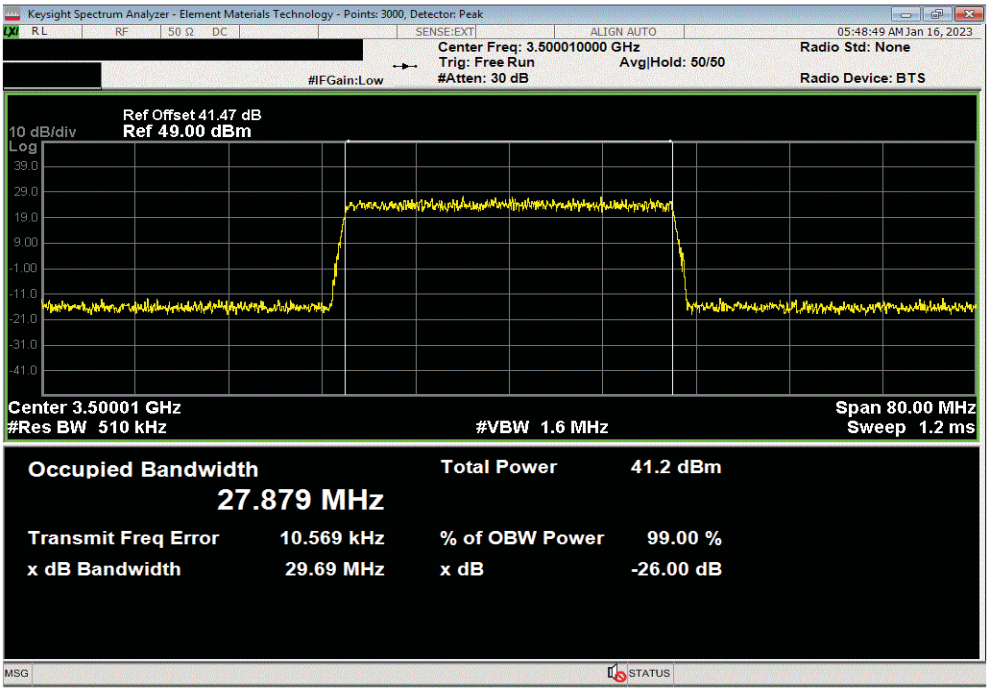


Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, High Channel, 3540.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.291	19.755	Within Band	Pass

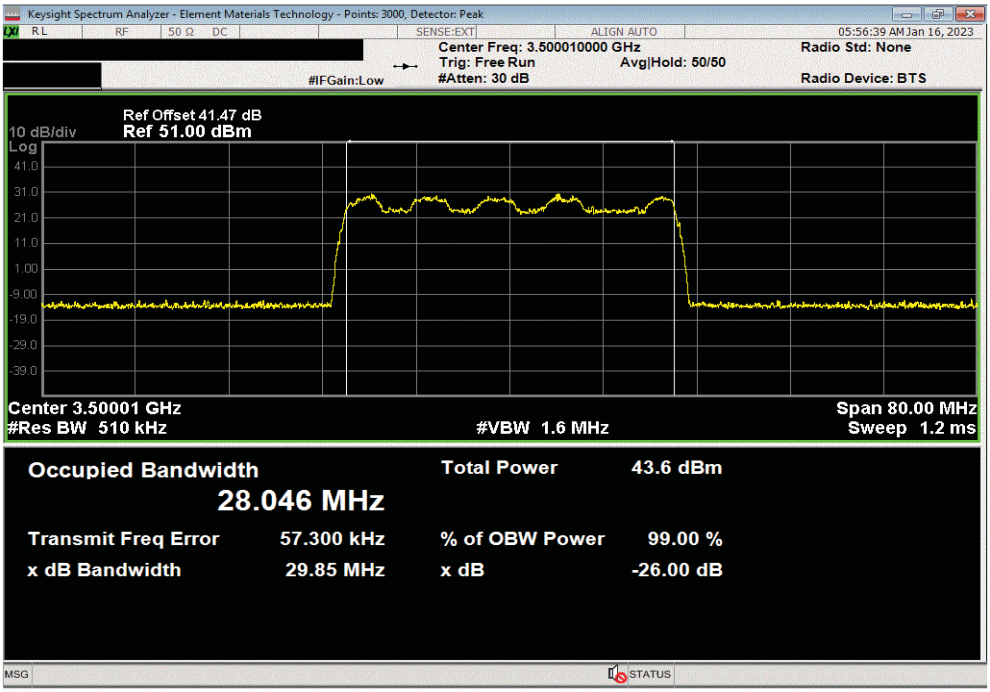


OCCUPIED BANDWIDTH SINGLE 3.45G

Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, QPSK Modulation, Mid Channel, 3500.01 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			27.879	29.694	Within Band	Pass

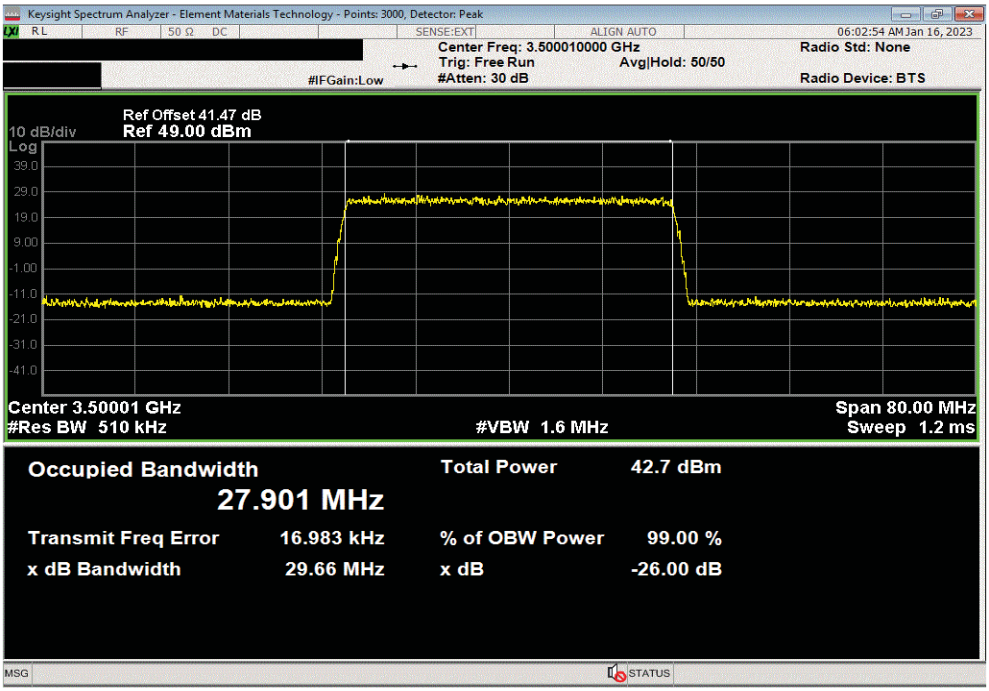


Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3500.01 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			28.046	29.85	Within Band	Pass

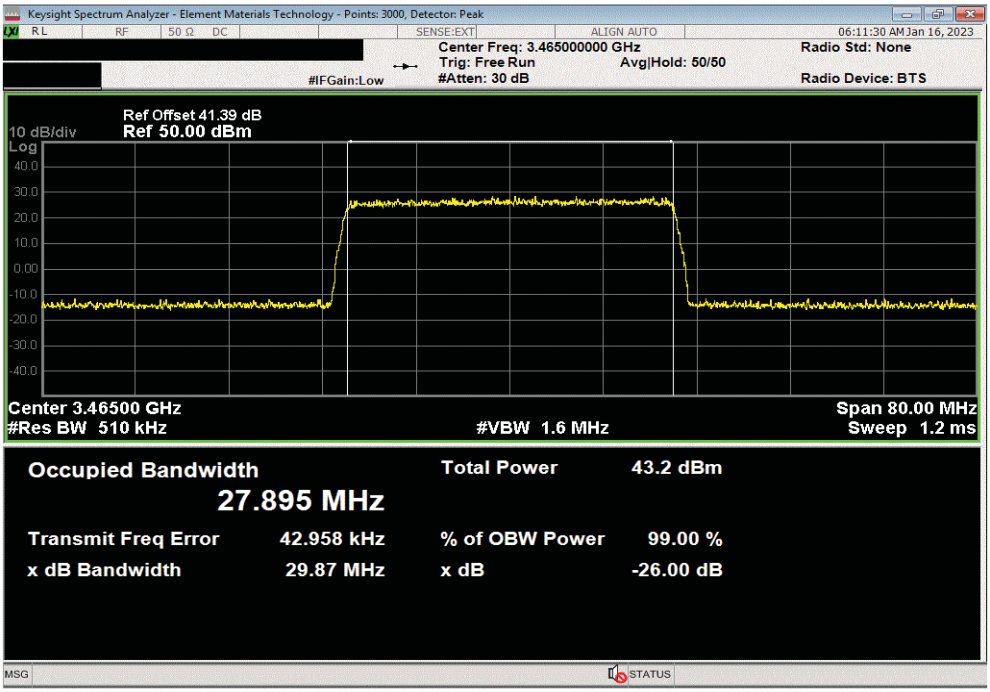


OCCUPIED BANDWIDTH SINGLE 3.45G

Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3500.01 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			27.901	29.662	Within Band	Pass

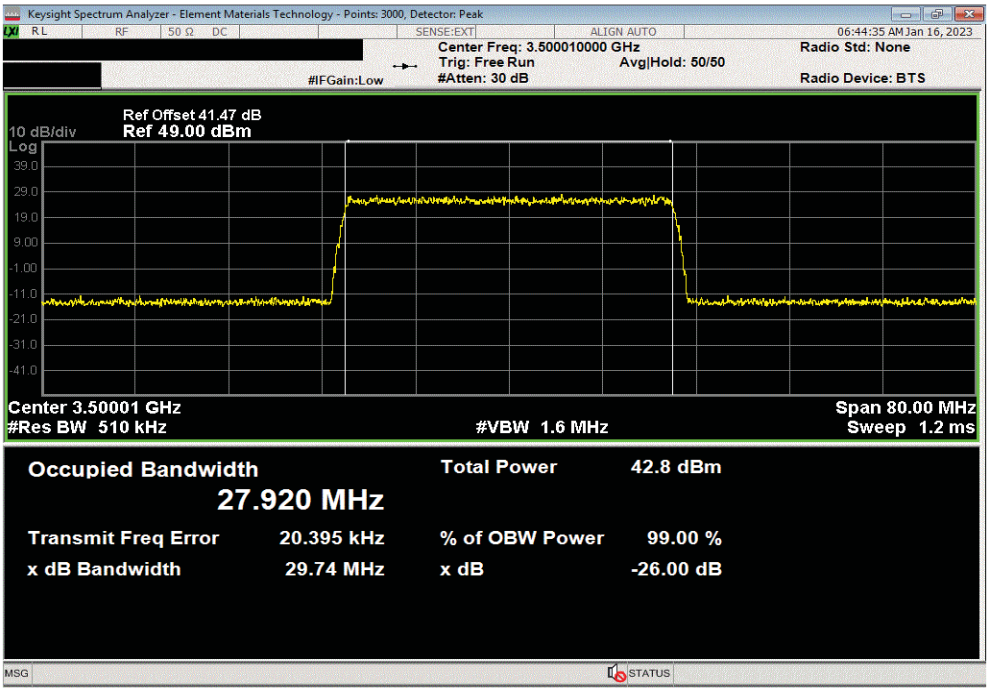


Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 256QAM Modulation, Low Channel, 3465.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			27.895	29.874	Within Band	Pass

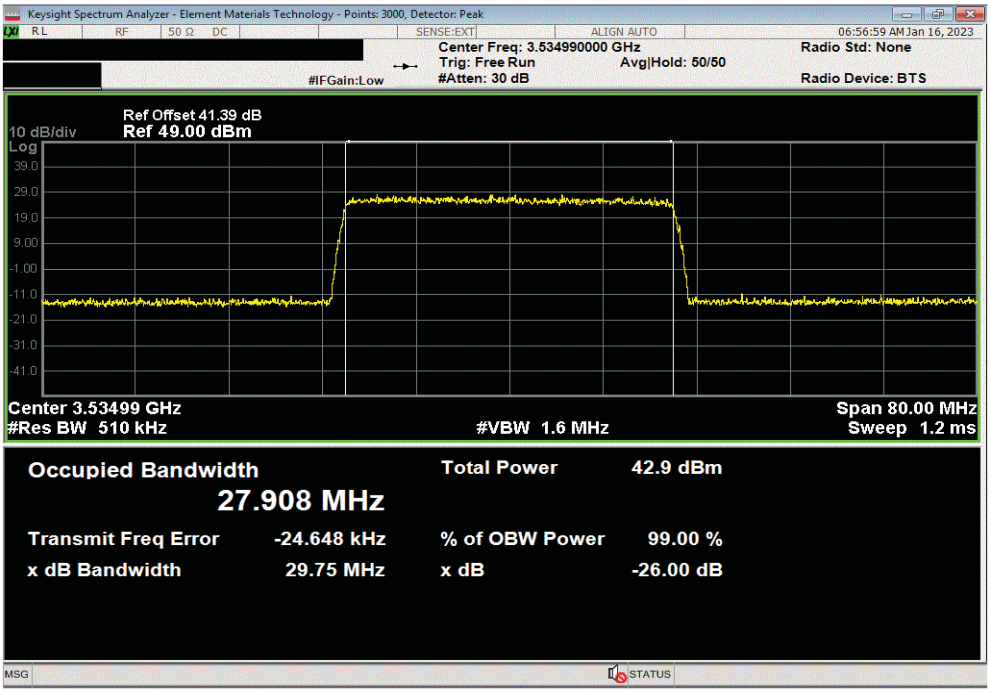


OCCUPIED BANDWIDTH SINGLE 3.45G

Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3500.01 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			27.92	29.743	Within Band	Pass

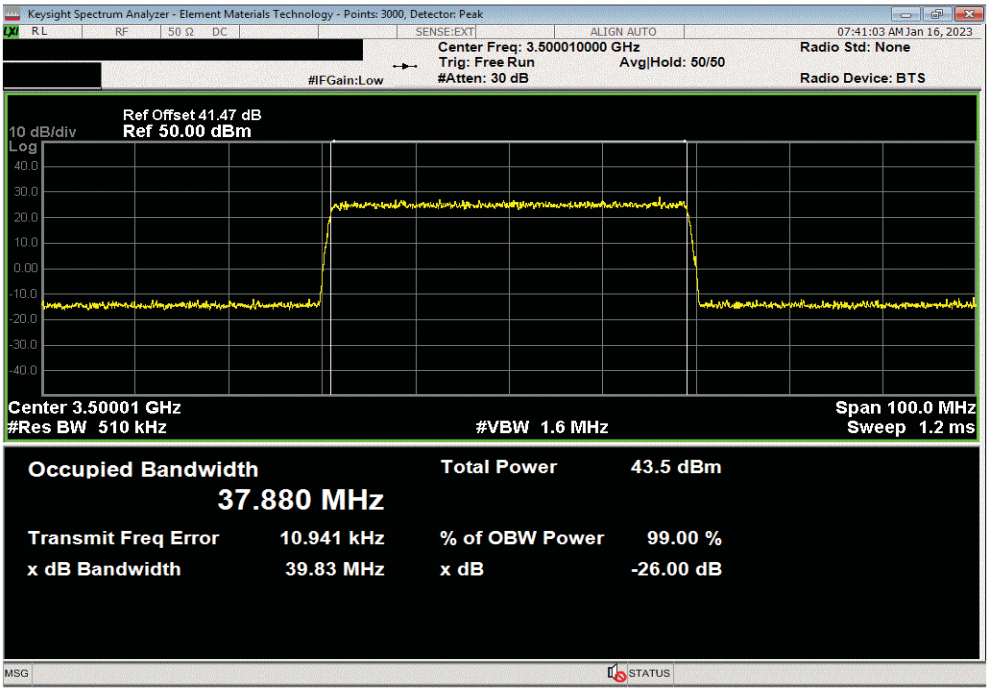


Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 256QAM Modulation, High Channel, 3534.99 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			27.908	29.752	Within Band	Pass

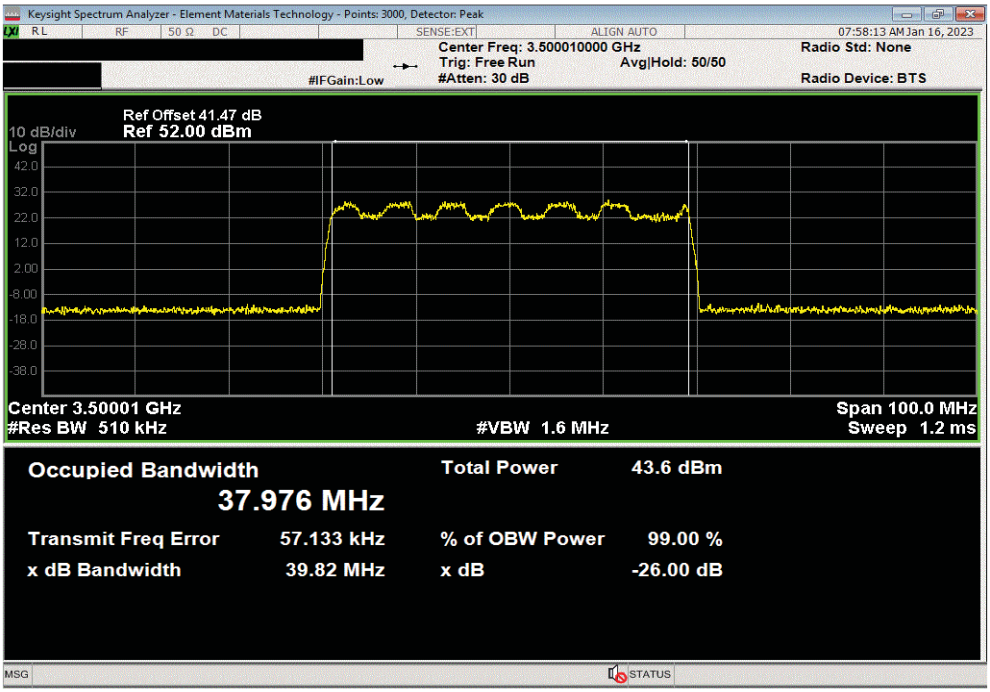


OCCUPIED BANDWIDTH SINGLE 3.45G

Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, QPSK Modulation, Mid Channel, 3500.01 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			37.88	39.83	Within Band	Pass

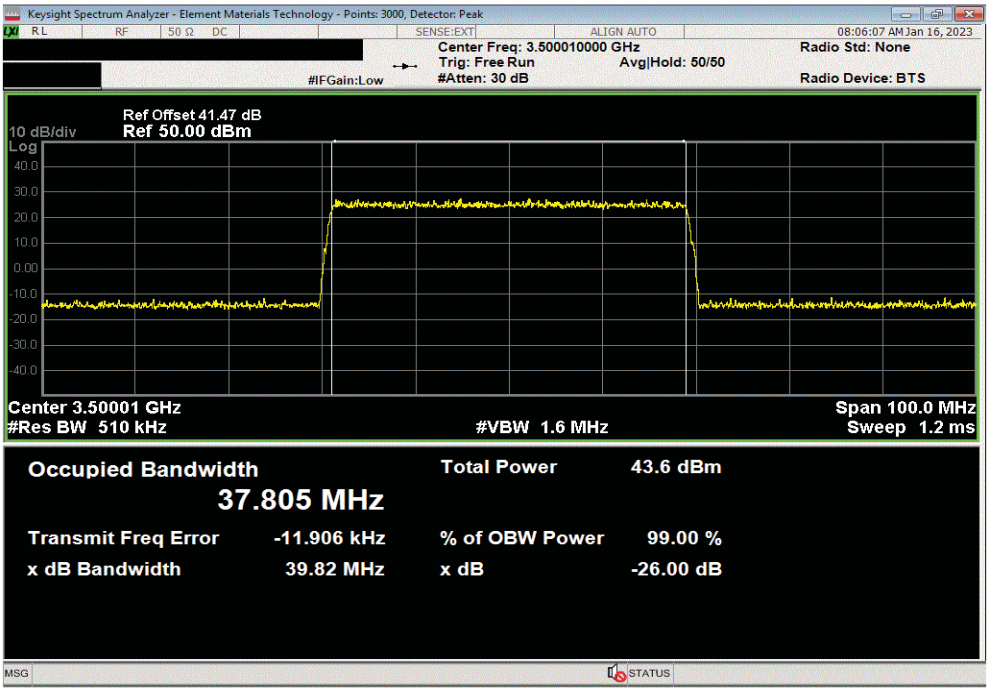


Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3500.01 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			37.976	39.821	Within Band	Pass

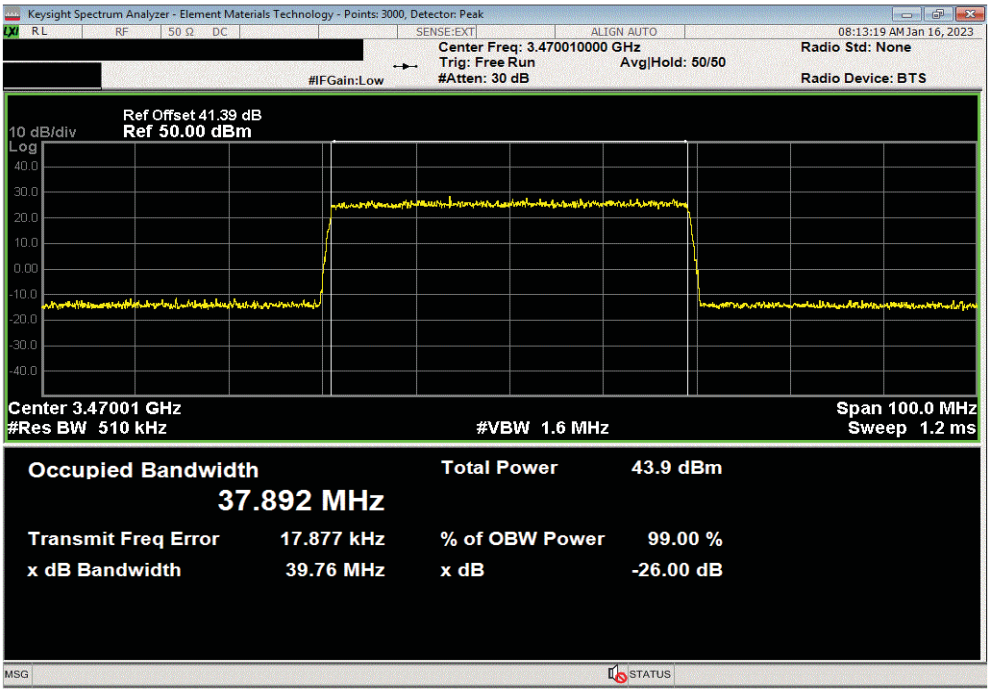


OCCUPIED BANDWIDTH SINGLE 3.45G

Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3500.01 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			37.805	39.822	Within Band	Pass

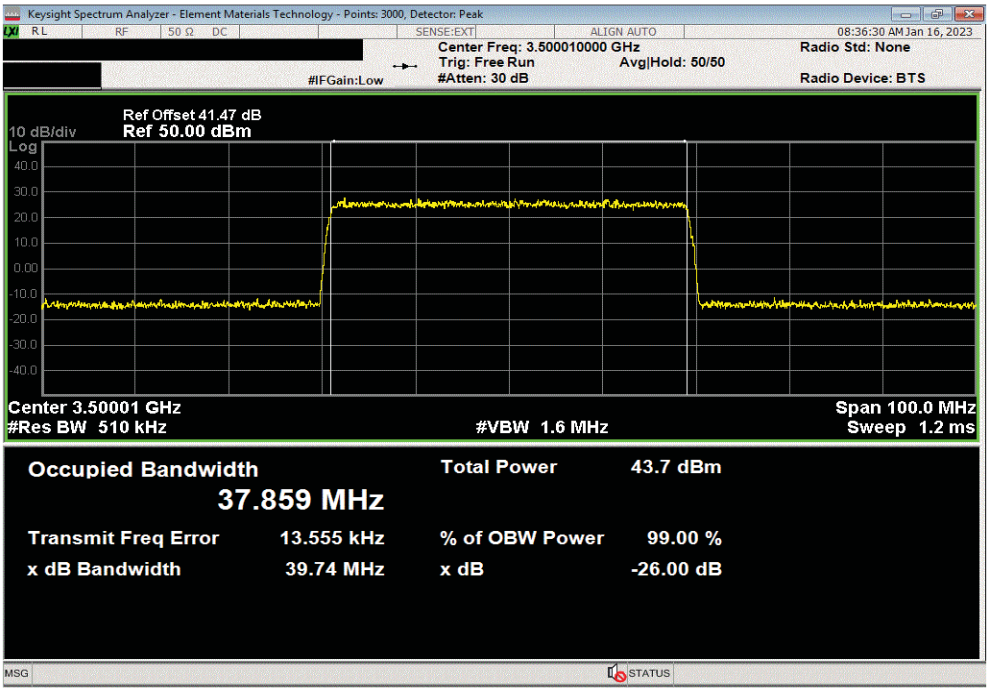


Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 256QAM Modulation, Low Channel, 3470.01 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			37.892	39.759	Within Band	Pass

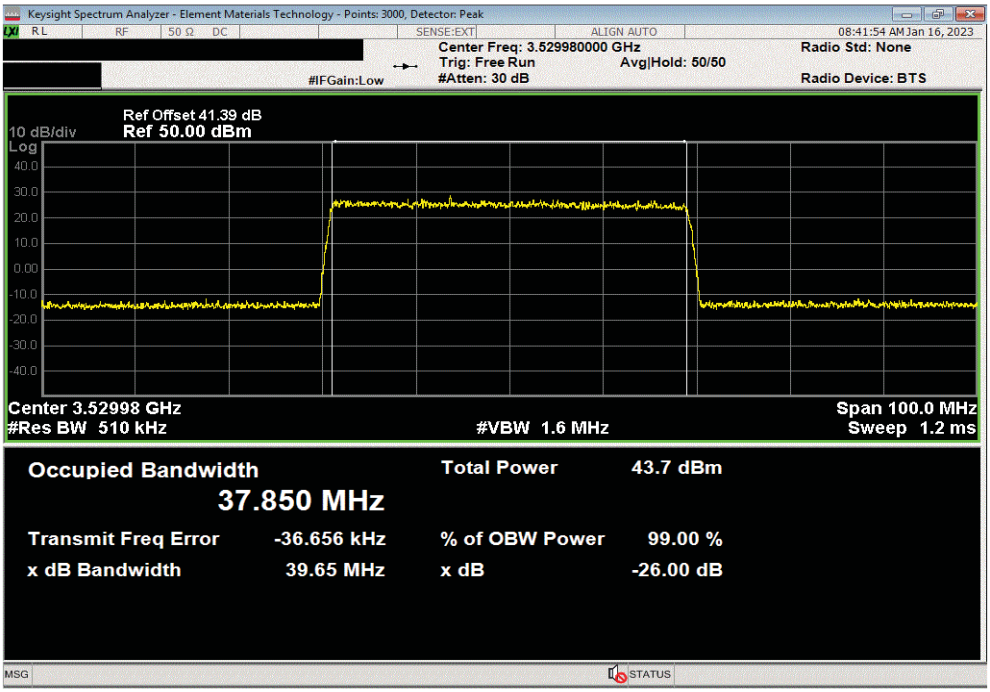


OCCUPIED BANDWIDTH SINGLE 3.45G

Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3500.01 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			37.859	39.738	Within Band	Pass



Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 256QAM Modulation, High Channel, 3529.98 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			37.85	39.652	Within Band	Pass



OCCUPIED BANDWIDTH SINGLE 3.7G

element

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	ANC	2022-03-02	2023-03-02
Attenuator	Fairview Microwave	SA3N10W-20	RKY	2022-11-15	2023-11-15
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2022-09-08	2023-09-08

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 on the worst case (highest average power) port by band. The AQQQA antenna ports are all within the manufacturer's rated output power tolerances (the RF power variation between antenna ports is small as shown in this certification testing) and the antenna port 22 for the 3.7GHz band was selected to perform the testing for this effort.

The occupied bandwidth was measured with the EUT configured in the modes called out in the data sheets.
FCC 27.53(l) defines he 26dB emission bandwidth requirement.

FCC 5G Emission Designators for 3.7G Band (3700MHz to 3980MHz)					
Channel Bandwidth	Radio Channel	5G-NR: QPSK	5G-NR: 16QAM	5G-NR: 64QAM	5G-NR: 256QAM
20MHz	Low				19M5G7W
	Mid	19M7G7W	19M5G7W	19M6G7W	19M3G7W
	High				19M5G7W
40MHz	Low				39M6G7W
	Mid	39M8G7W	39M5G7W	39M7G7W	39M6G7W
	High				39M6G7W
60MHz	Low				60M1G7W
	Mid	60M0G7W	60M0G7W	60M0G7W	60M0G7W
	High				60M0G7W
80MHz	Low				81M2G7W
	Mid	81M3G7W	81M3G7W	81M3G7W	81M4G7W
	High				81M2G7W
100MHz	Low				102MG7W
	Mid	102MG7W	102MG7W	102MG7W	102MG7W
	High				102MG7W
Note: FCC emission designators are based on 26dB emission bandwidth measurement data.					

OCCUPIED BANDWIDTH SINGLE 3.7G

element

TbtTx 2022.06.03.0 XMit 2022.02.07.0

EUT:	AQQQA			**Work Order:**	NOKI0052
Serial Number:	YK224300010			**Date:**	19-Jan-23
Customer:	Nokia of America Corporation			**Temperature:**	19.9 °C
Attendees:	John Rattanavong, Michell Hill			**Humidity:**	31.9% RH
Project:	None			**Barometric Pres.:**	1022 mbar
Tested by:	Brandon Hobbs	**Power:**	54 VDC	**Job Site:**	TX07

TEST SPECIFICATIONS	Test Method
FCC 27:2023	ANSI C63.26:2015

COMMENTS

All losses in the measurement path were accounted for: attenuators, cables, DC block and filter when in use. Band n77 carriers were enabled at maximum power levels for the 3.7GHz band (at 2.5 watts/carrier for NR20 and at 5 watts/carrier for NR40, NR60, NR80 & NR100) in the single carrier operating mode configuration.

DEVIATIONS FROM TEST STANDARD

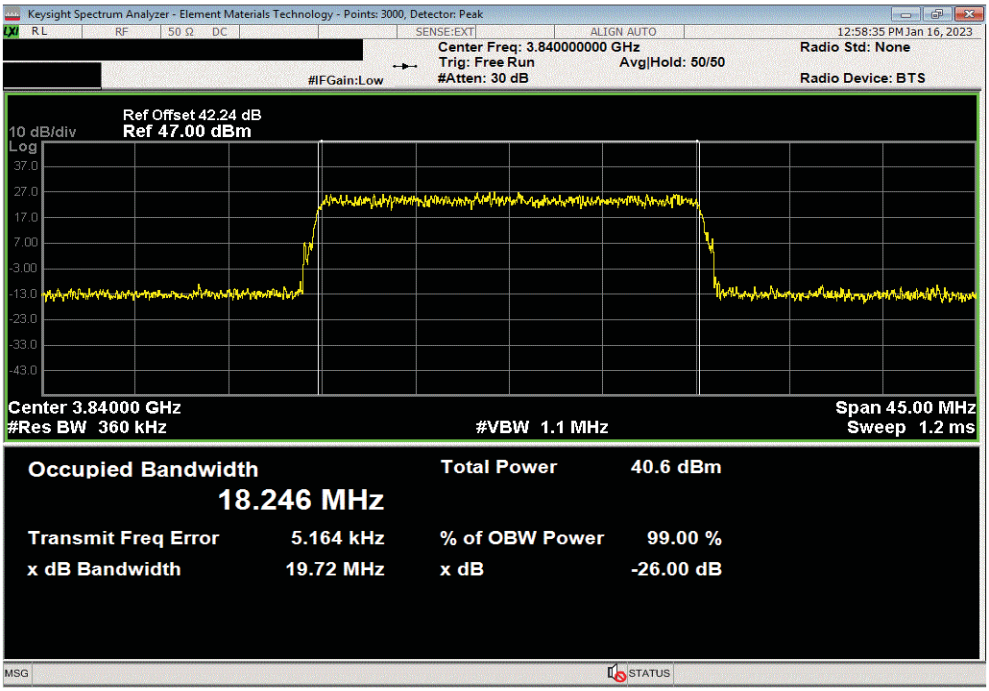
None

Configuration #	4,5	*Signature*

	Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
Port 22				
Band n77, 3700 - 3980 MHz				
20 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 3840.00 MHz	18.2	19.7	Within Band	Pass
16QAM Modulation				
Mid Channel, 3840.00 MHz	18.3	19.5	Within Band	Pass
64QAM Modulation				
Mid Channel, 3840.00 MHz	18.3	19.6	Within Band	Pass
256QAM Modulation				
Low Channel, 3710.01 MHz	18.3	19.5	Within Band	Pass
Mid Channel, 3840.00 MHz	18.3	19.3	Within Band	Pass
High Channel, 3969.99 MHz	18.3	19.5	Within Band	Pass
40 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 3840.00 MHz	37.8	39.8	Within Band	Pass
16QAM Modulation				
Mid Channel, 3840.00 MHz	38.0	39.5	Within Band	Pass
64QAM Modulation				
Mid Channel, 3840.00 MHz	37.8	39.7	Within Band	Pass
256QAM Modulation				
Low Channel, 3720.00 MHz	37.8	39.4	Within Band	Pass
Mid Channel, 3840.00 MHz	37.8	39.6	Within Band	Pass
High Channel, 3960.00 MHz	37.7	39.4	Within Band	Pass
60 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 3840.00 MHz	57.9	60.0	Within Band	Pass
16QAM Modulation				
Mid Channel, 3840.00 MHz	57.9	60.0	Within Band	Pass
64QAM Modulation				
Mid Channel, 3840.00 MHz	57.8	60.0	Within Band	Pass
256QAM Modulation				
Low Channel, 3730.02 MHz	57.8	60.1	Within Band	Pass
Mid Channel, 3840.00 MHz	57.9	60.0	Within Band	Pass
High Channel, 3949.98 MHz	57.7	60.0	Within Band	Pass
80 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 3840.00 MHz	77.7	81.3	Within Band	Pass
16QAM Modulation				
Mid Channel, 3840.00 MHz	77.9	81.3	Within Band	Pass
64QAM Modulation				
Mid Channel, 3840.00 MHz	77.6	81.3	Within Band	Pass
256QAM Modulation				
Low Channel, 3740.01 MHz	77.5	81.2	Within Band	Pass
Mid Channel, 3840.00 MHz	77.6	81.4	Within Band	Pass
High Channel, 3939.99 MHz	77.6	81.2	Within Band	Pass
100 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 3840.00 MHz	97.6	102.2	Within Band	Pass
16QAM Modulation				
Mid Channel, 3840.00 MHz	97.3	102.3	Within Band	Pass
64QAM Modulation				
Mid Channel, 3840.00 MHz	97.5	102.3	Within Band	Pass
256QAM Modulation				
Low Channel, 3750.00 MHz	97.5	102.3	Within Band	Pass
Mid Channel, 3840.00 MHz	97.4	102.3	Within Band	Pass
High Channel, 3930.00 MHz	97.6	102.4	Within Band	Pass

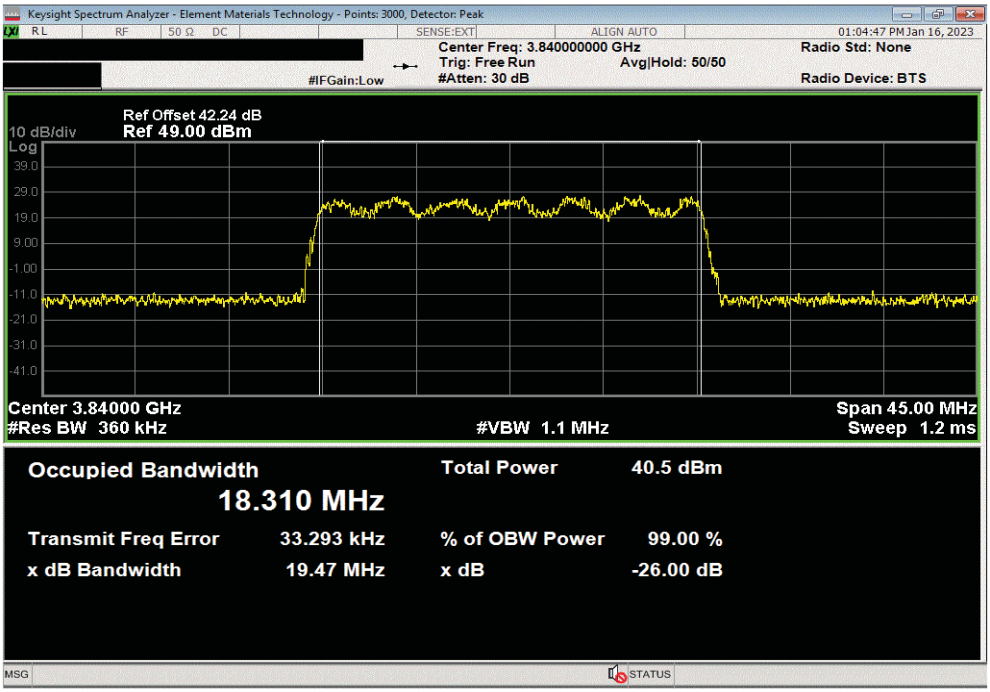
Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, QPSK Modulation, Mid Channel, 3840.00 MHz

			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.246	19.718	Within Band	Pass



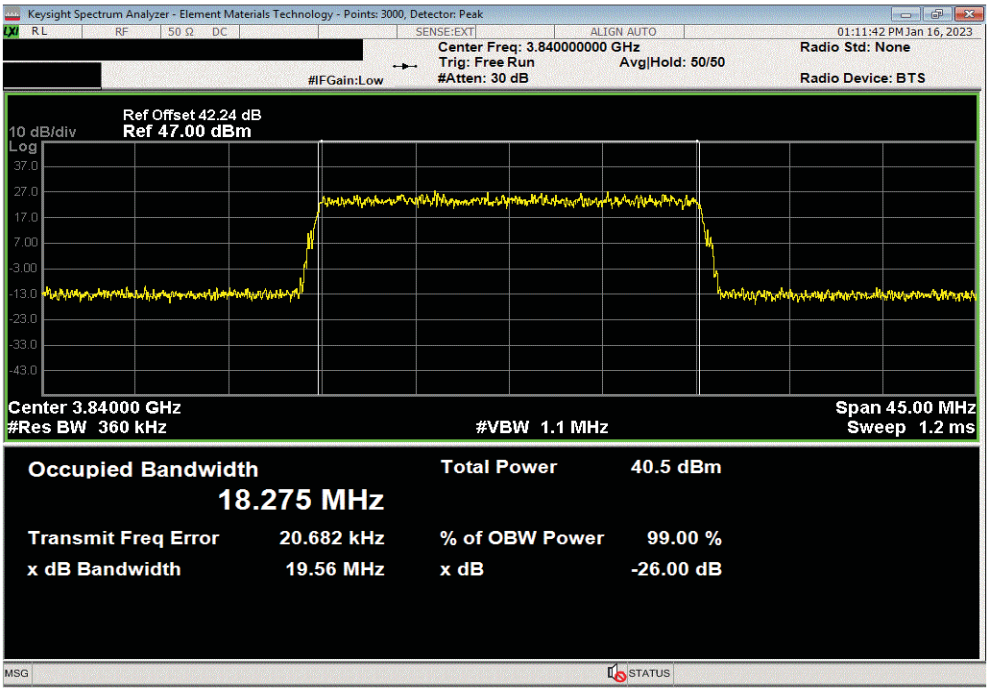
Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3840.00 MHz

			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.31	19.468	Within Band	Pass

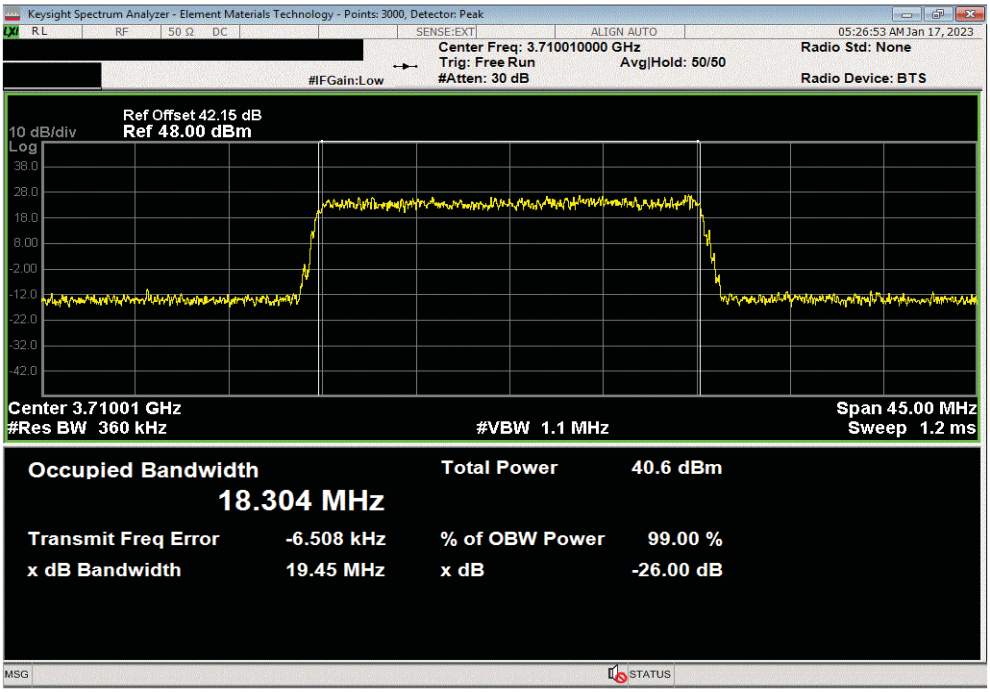


OCCUPIED BANDWIDTH SINGLE 3.7G

Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.275	19.557	Within Band	Pass

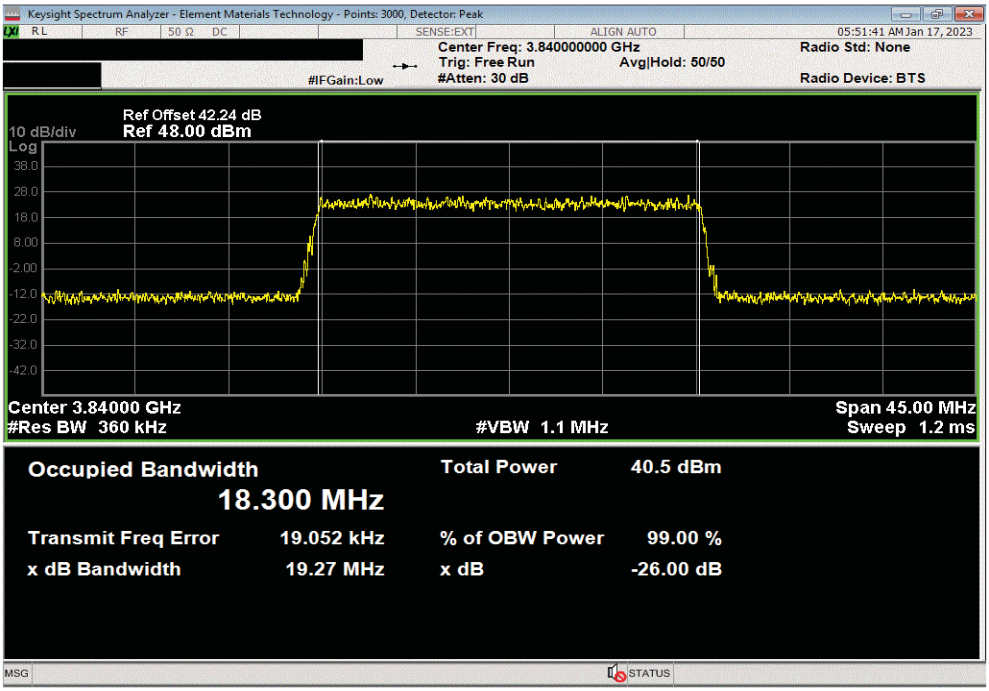


Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, 256QAM Modulation, Low Channel, 3710.01 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.304	19.454	Within Band	Pass

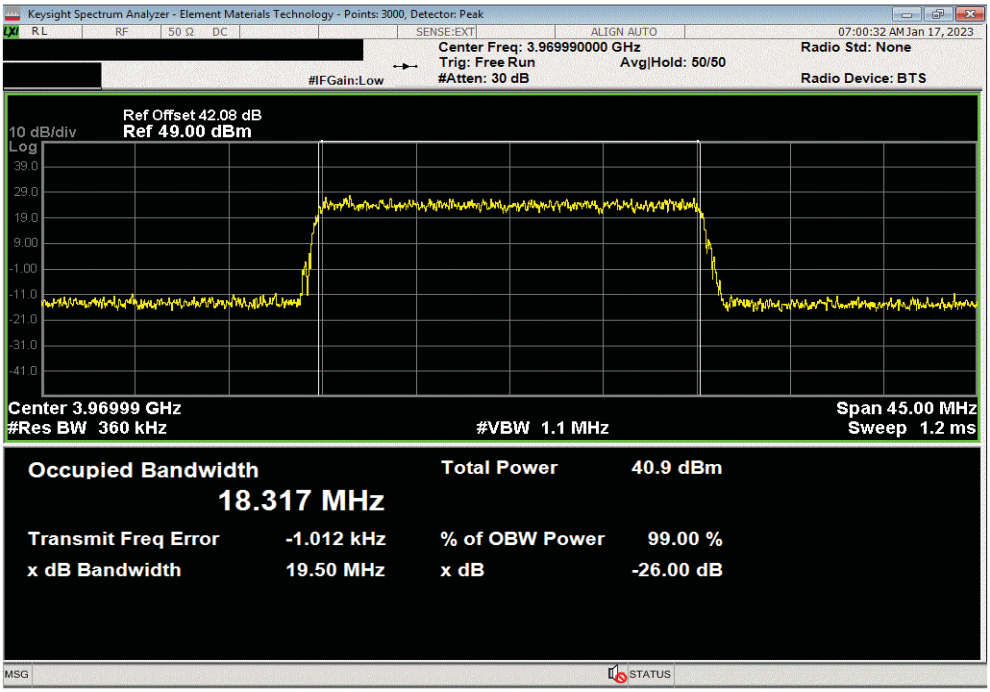


OCCUPIED BANDWIDTH SINGLE 3.7G

Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.3	19.271	Within Band	Pass

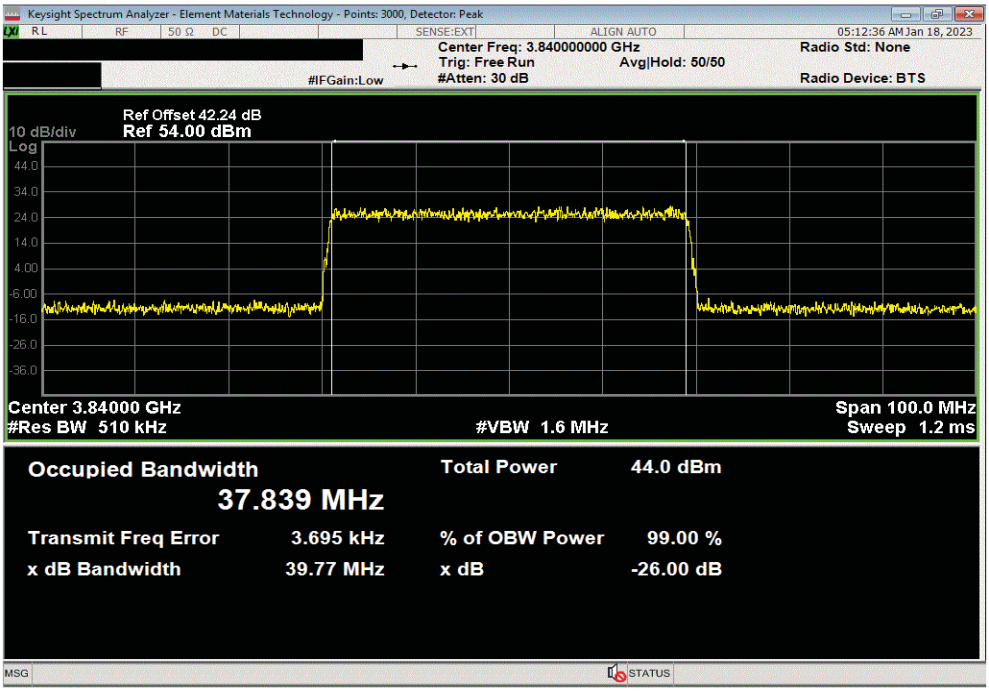


Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, 256QAM Modulation, High Channel, 3969.99 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			18.317	19.495	Within Band	Pass

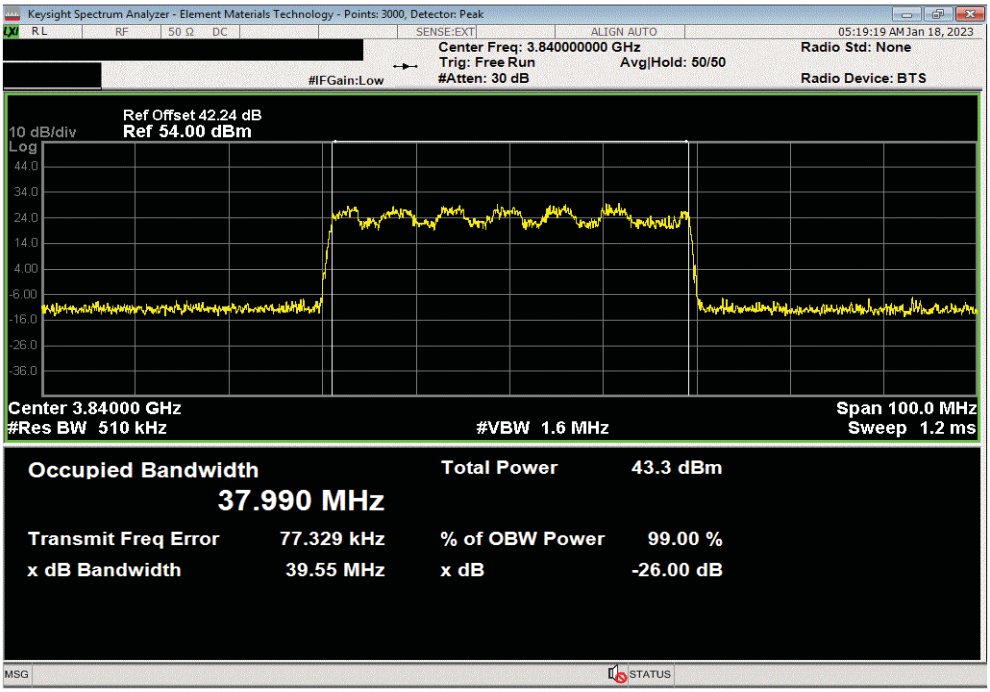


OCCUPIED BANDWIDTH SINGLE 3.7G

Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, QPSK Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			37.839	39.772	Within Band	Pass

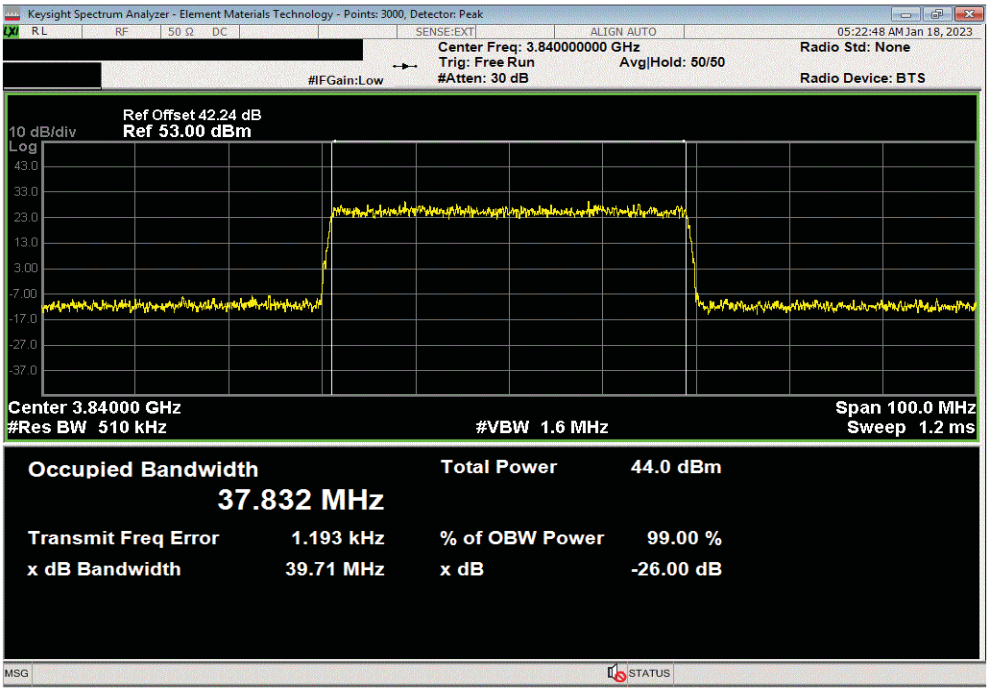


Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			37.99	39.548	Within Band	Pass

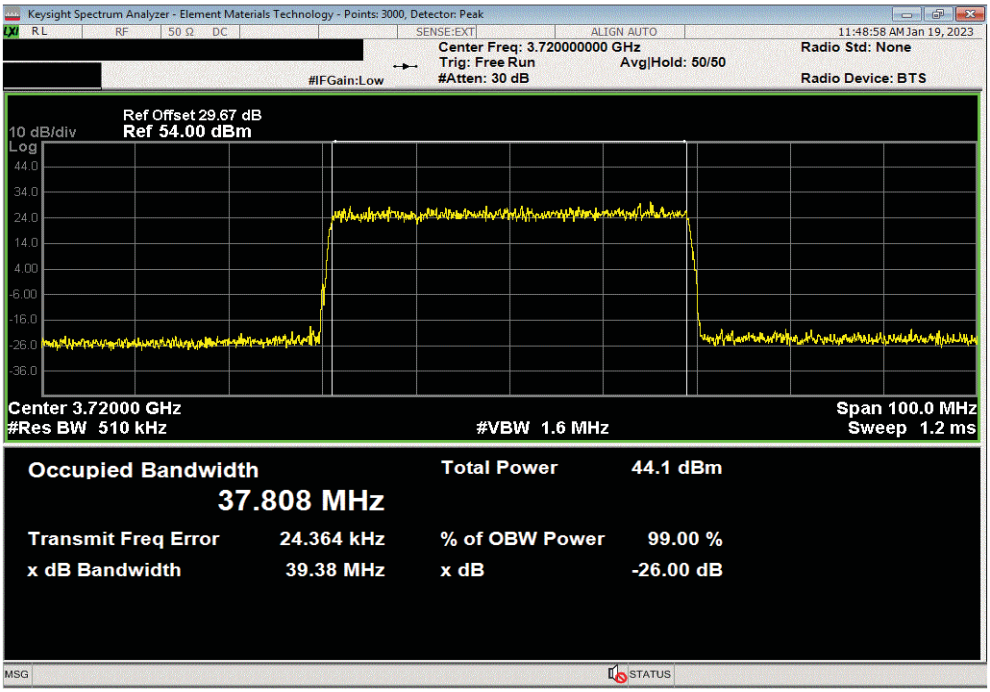


OCCUPIED BANDWIDTH SINGLE 3.7G

Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			37.832	39.712	Within Band	Pass

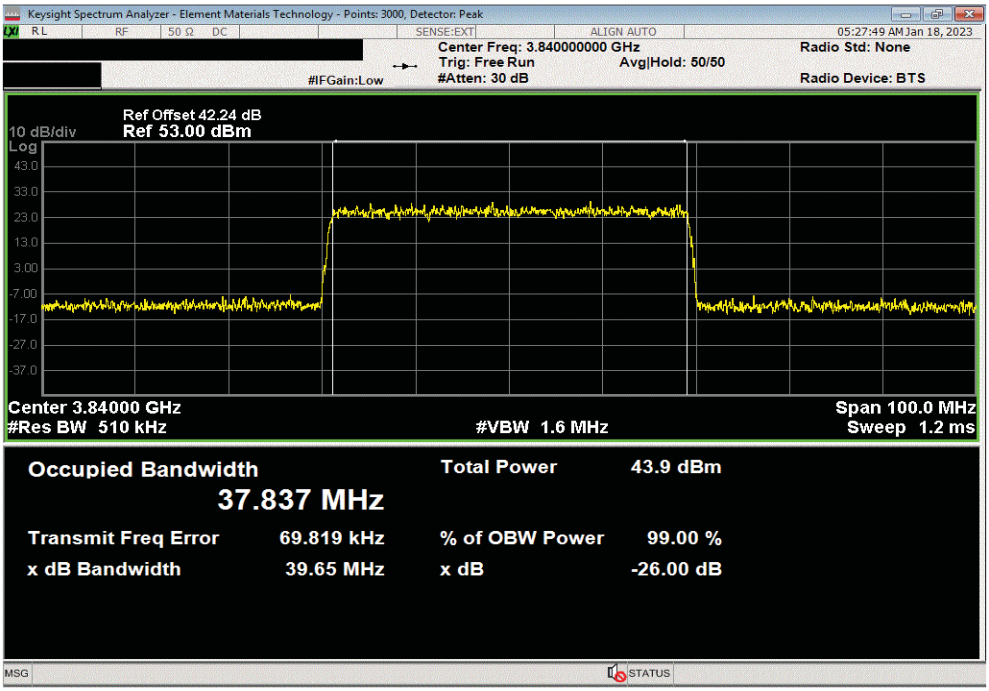


Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, Low Channel, 3720.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			37.808	39.381	Within Band	Pass

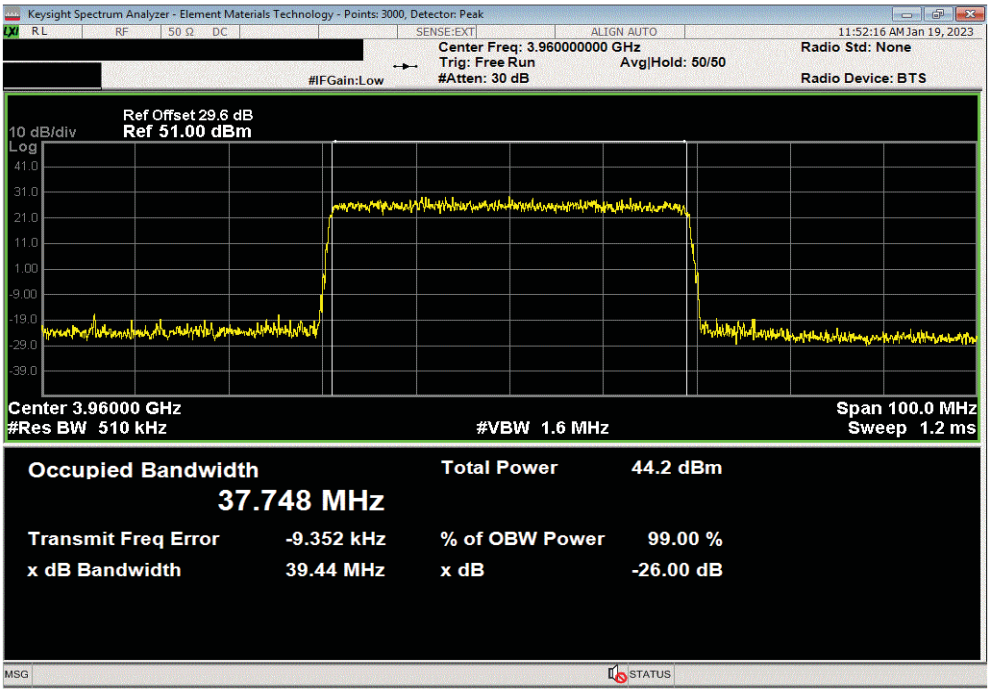


OCCUPIED BANDWIDTH SINGLE 3.7G

Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			37.837	39.649	Within Band	Pass

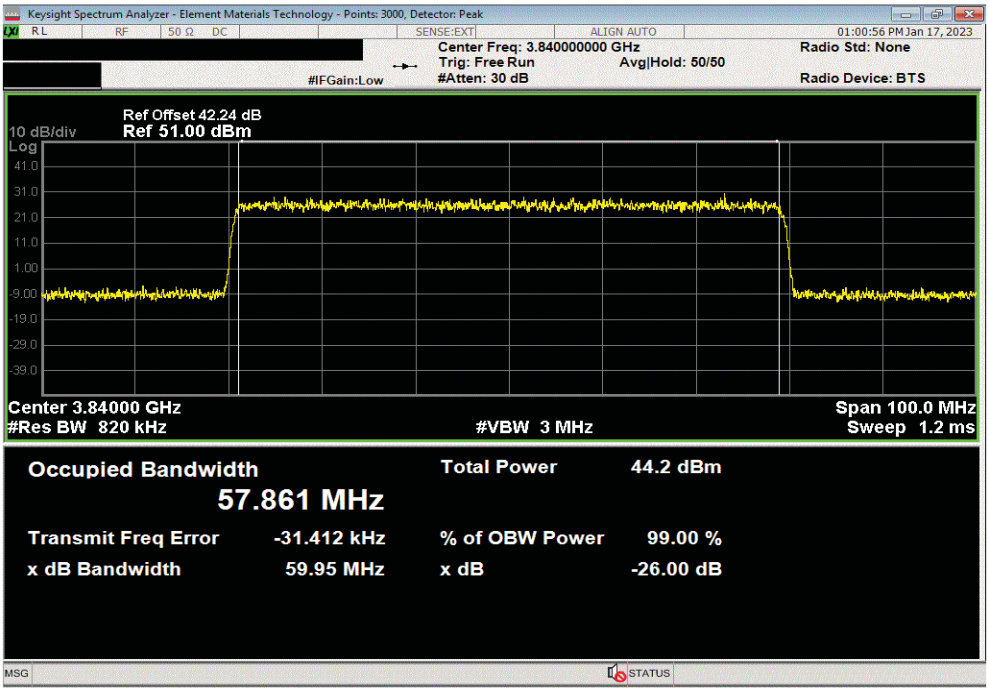


Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, High Channel, 3960.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			37.748	39.442	Within Band	Pass



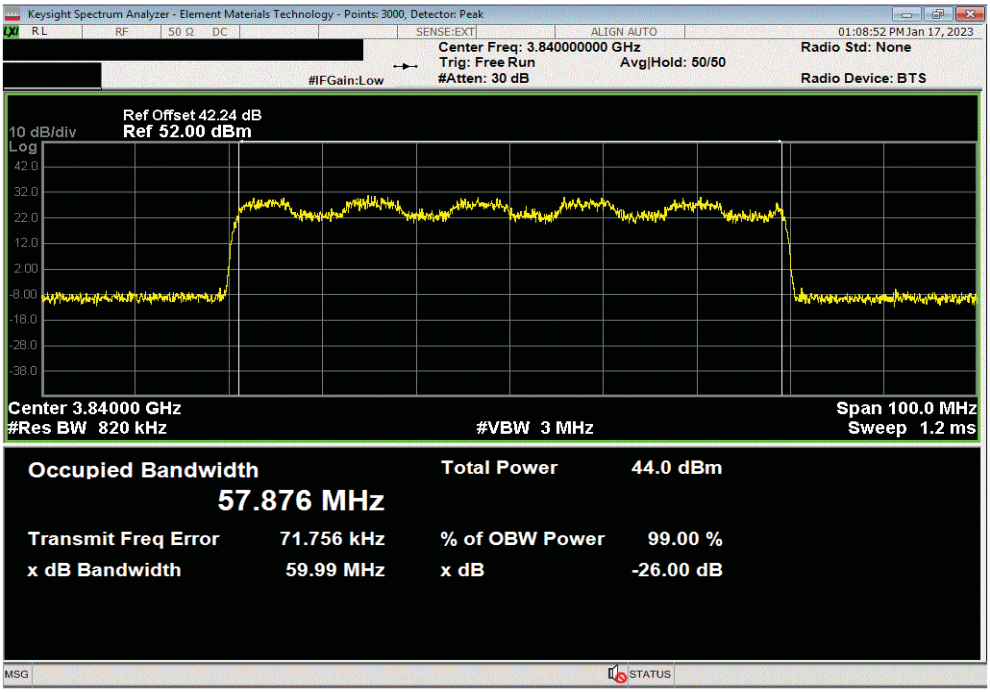
Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, QPSK Modulation, Mid Channel, 3840.00 MHz

			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			57.861	59.951	Within Band	Pass



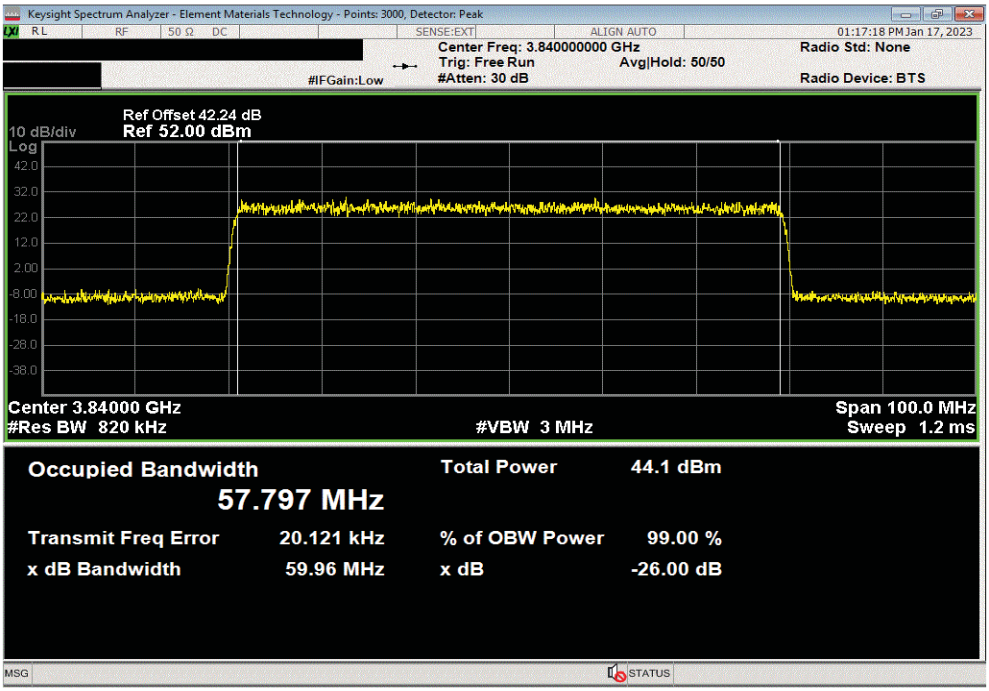
Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3840.00 MHz

			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			57.876	59.989	Within Band	Pass

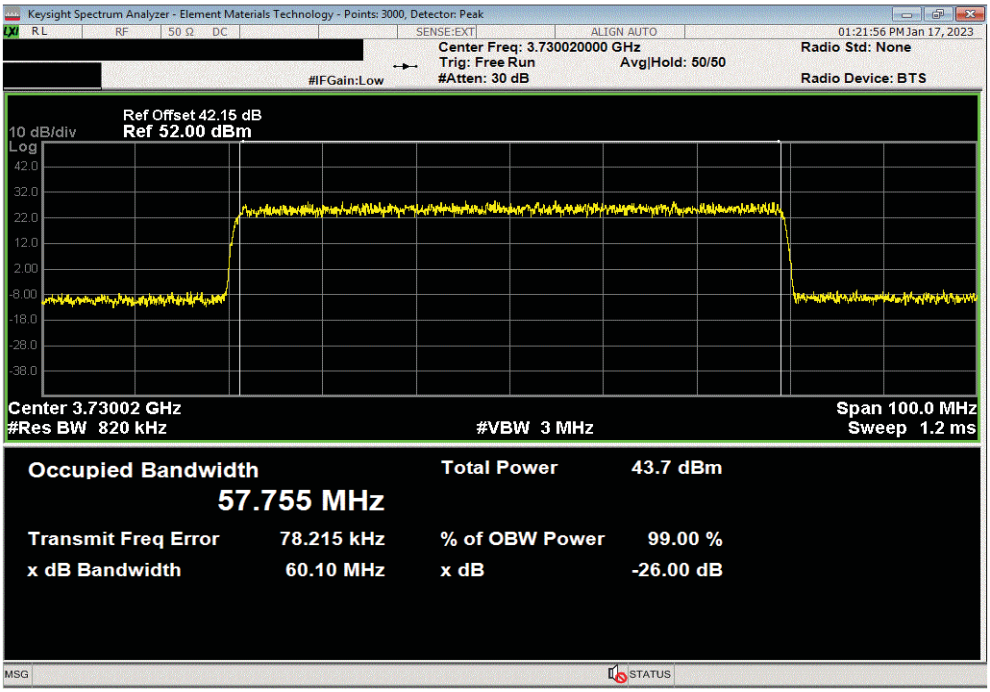


OCCUPIED BANDWIDTH SINGLE 3.7G

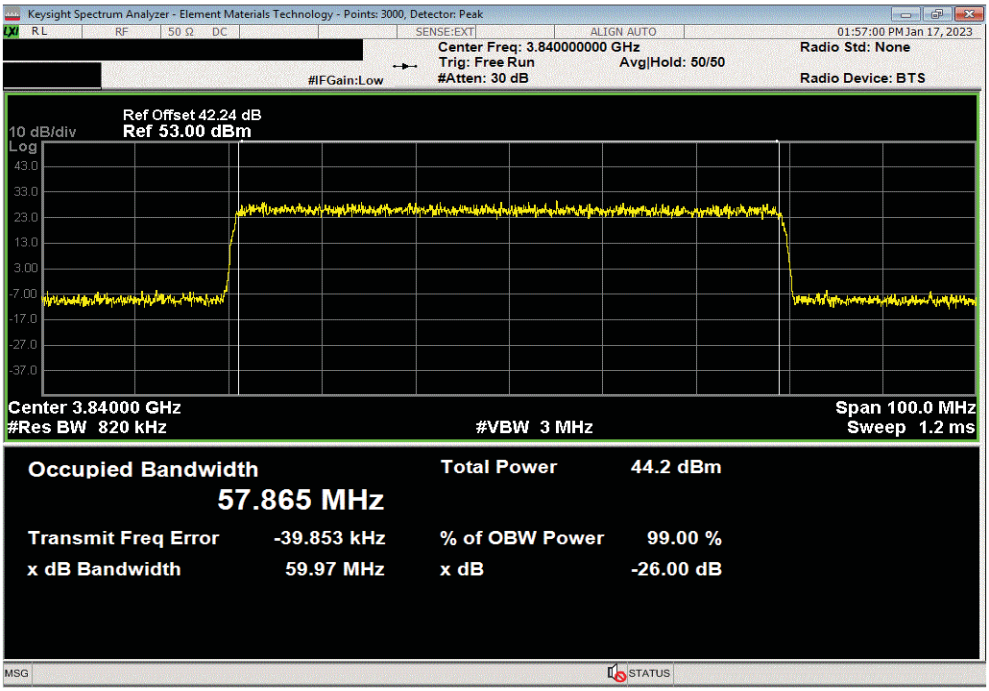
Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			57.797	59.958	Within Band	Pass



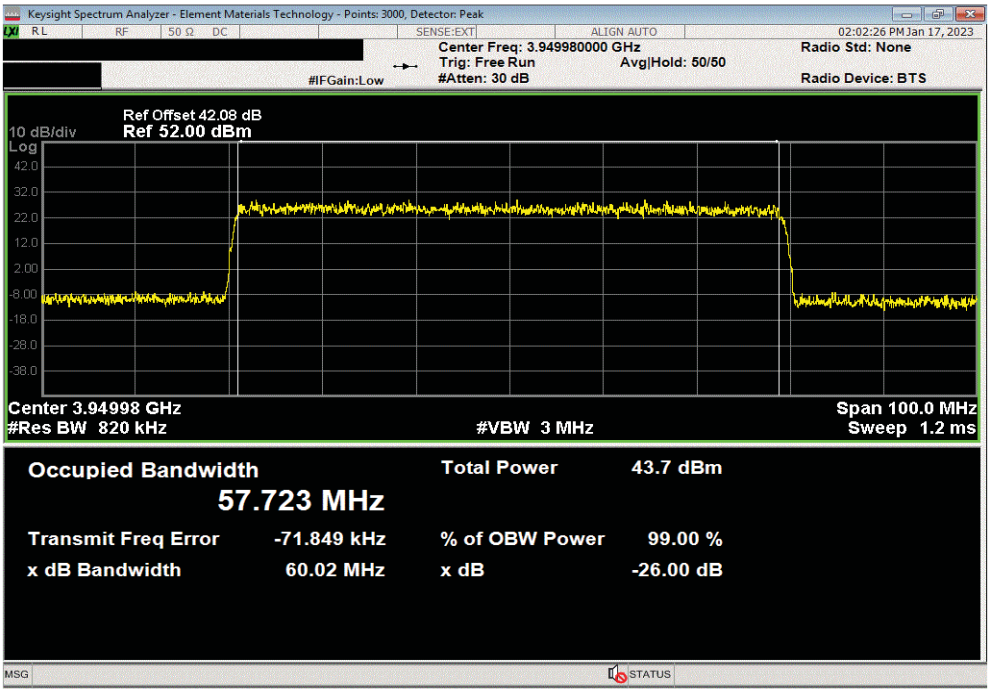
Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 256QAM Modulation, Low Channel, 3730.02 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			57.755	60.096	Within Band	Pass



Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			57.865	59.973	Within Band	Pass

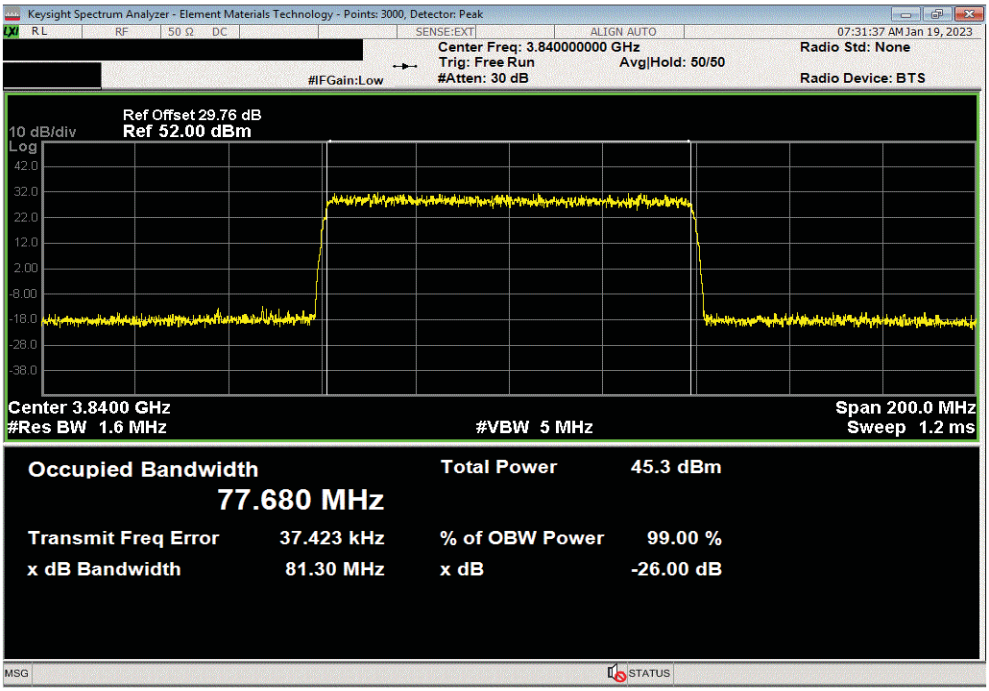


Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 256QAM Modulation, High Channel, 3949.98 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			57.723	60.018	Within Band	Pass

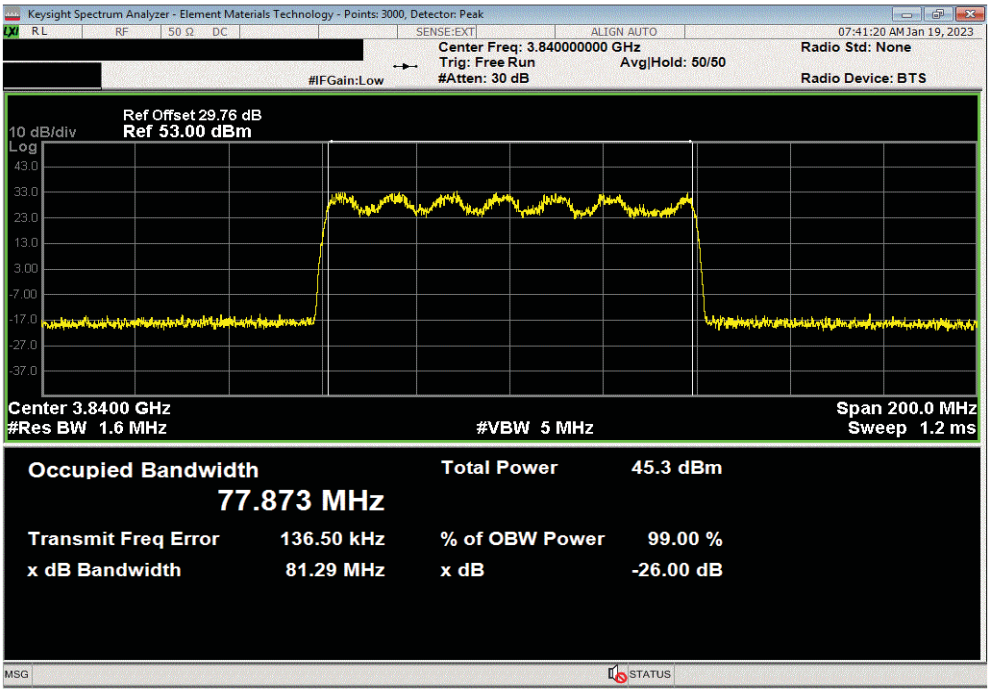


OCCUPIED BANDWIDTH SINGLE 3.7G

Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, QPSK Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			77.68	81.298	Within Band	Pass

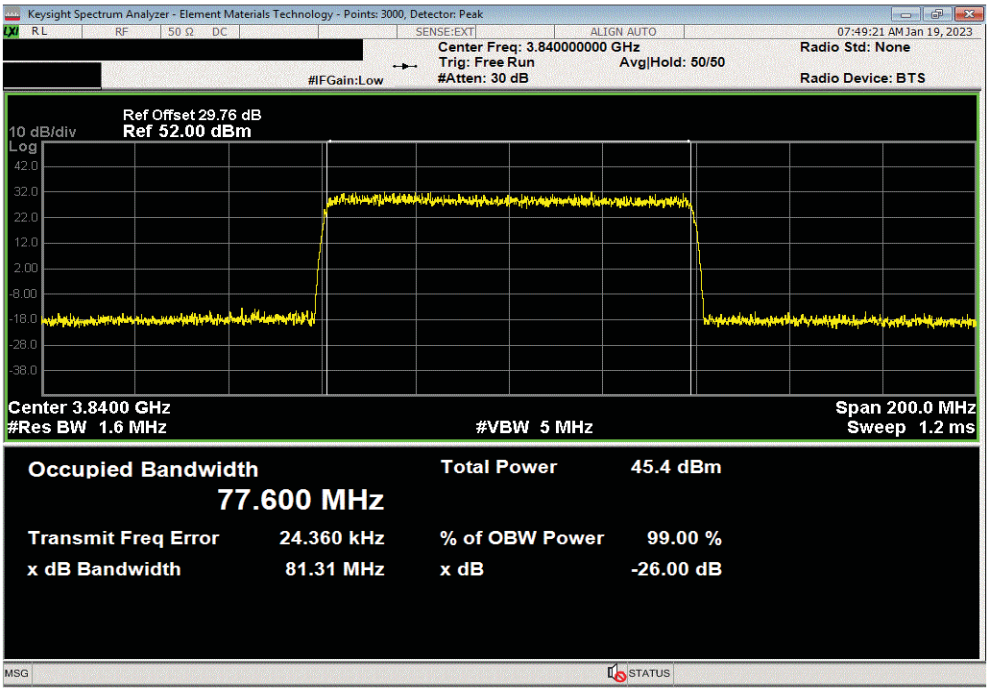


Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			77.873	81.286	Within Band	Pass

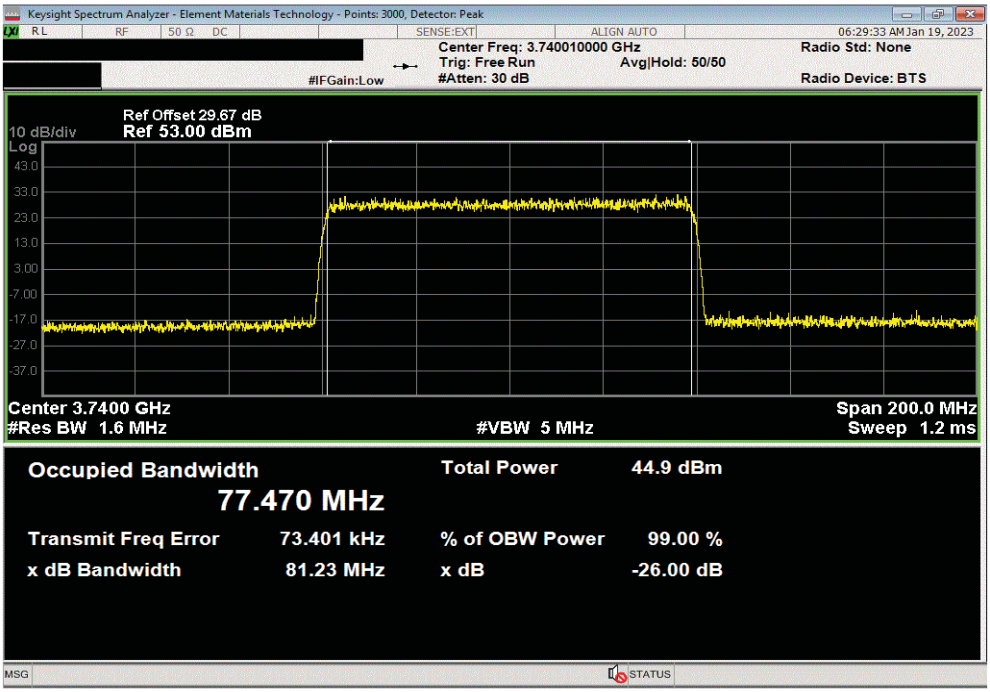


OCCUPIED BANDWIDTH SINGLE 3.7G

Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			77.6	81.314	Within Band	Pass

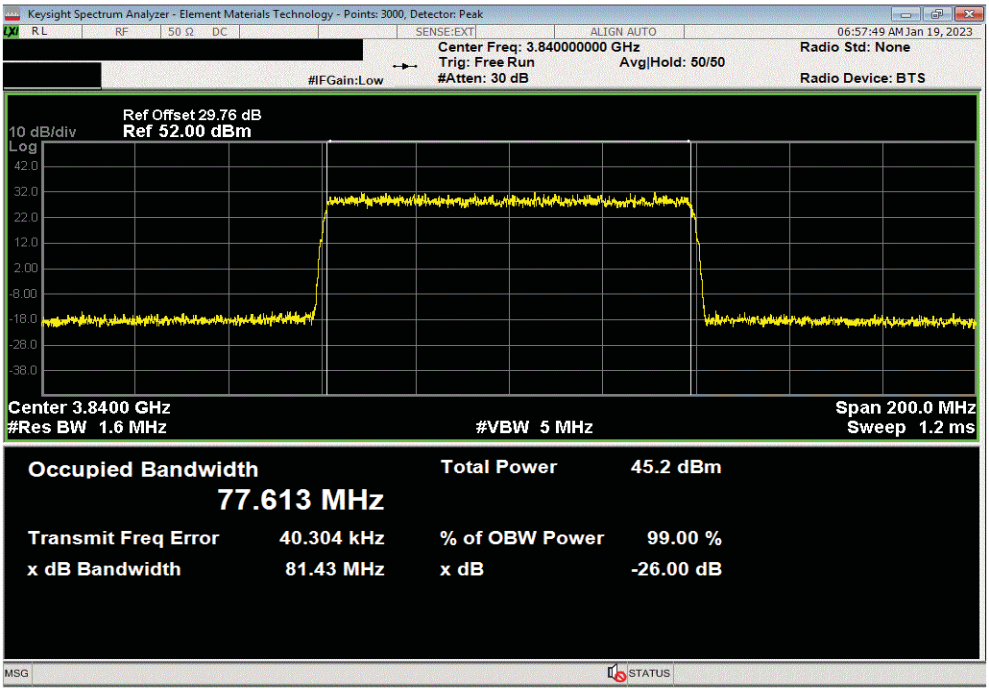


Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 256QAM Modulation, Low Channel, 3740.01 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			77.47	81.232	Within Band	Pass

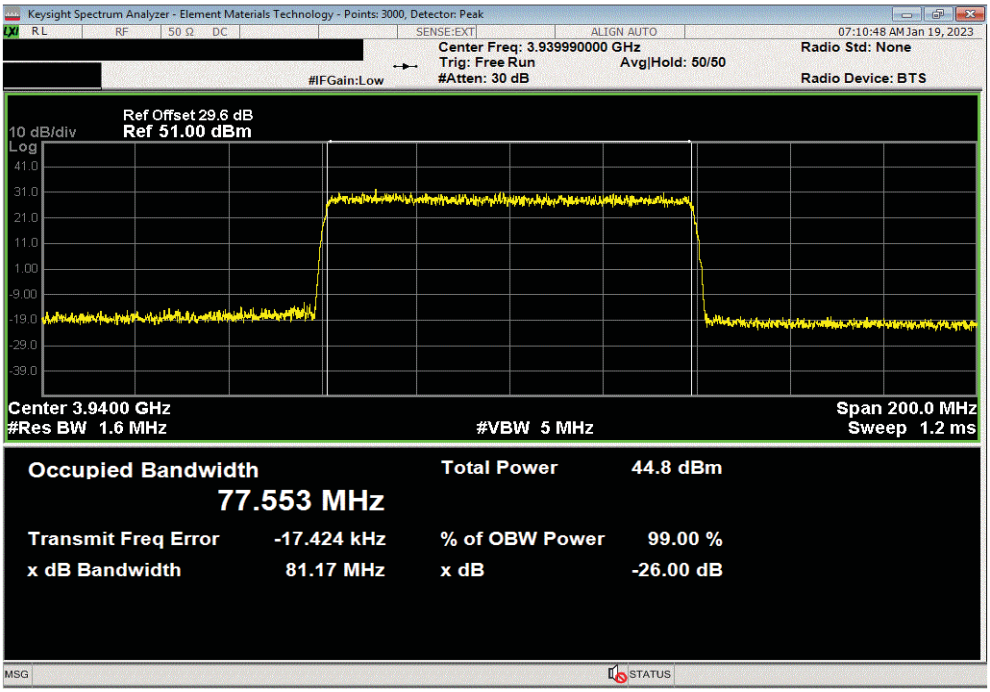


OCCUPIED BANDWIDTH SINGLE 3.7G

Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			77.613	81.435	Within Band	Pass

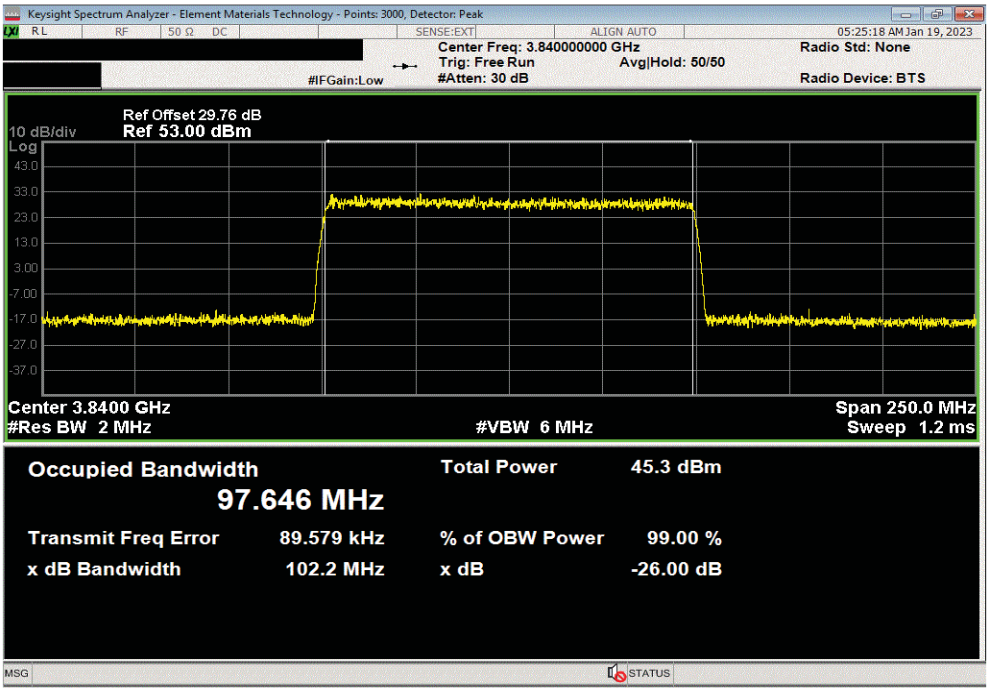


Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 256QAM Modulation, High Channel, 3939.99 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			77.553	81.168	Within Band	Pass

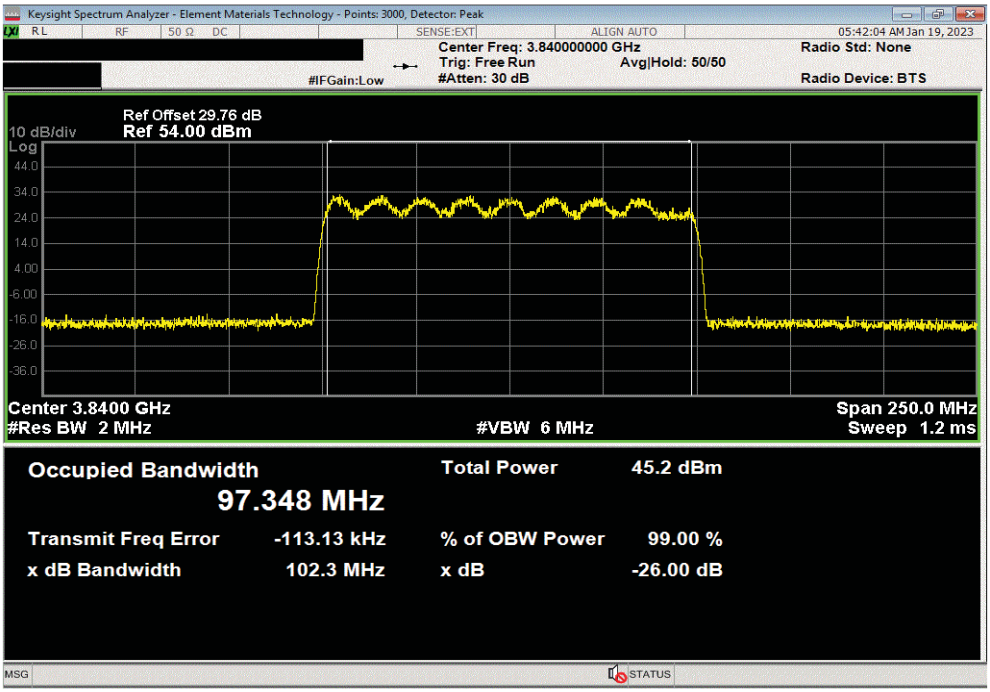


OCCUPIED BANDWIDTH SINGLE 3.7G

Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, QPSK Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			97.646	102.205	Within Band	Pass

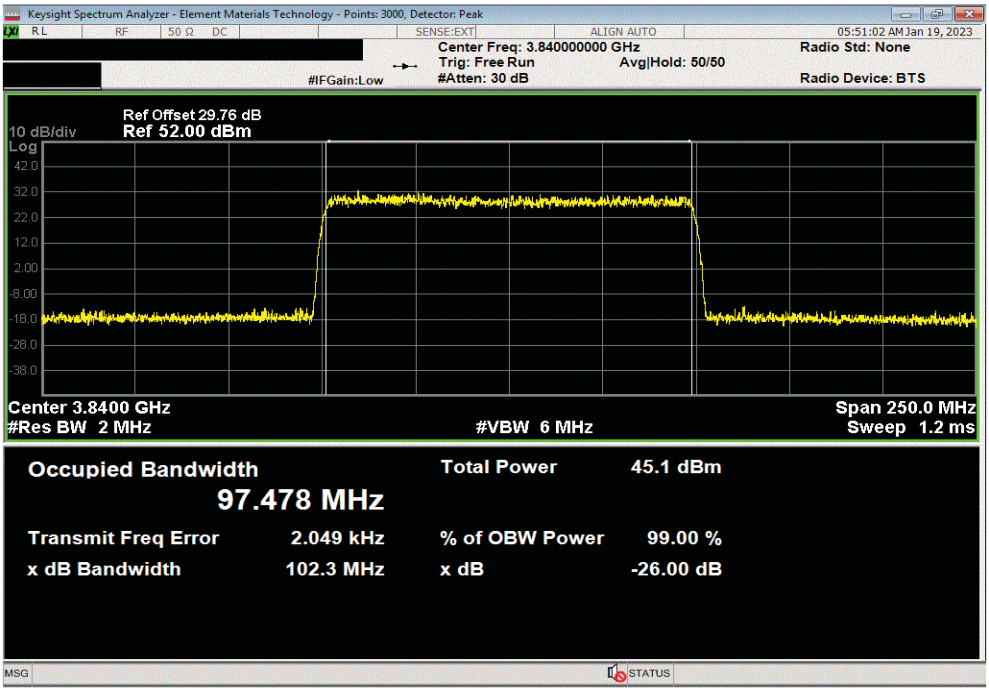


Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			97.348	102.273	Within Band	Pass

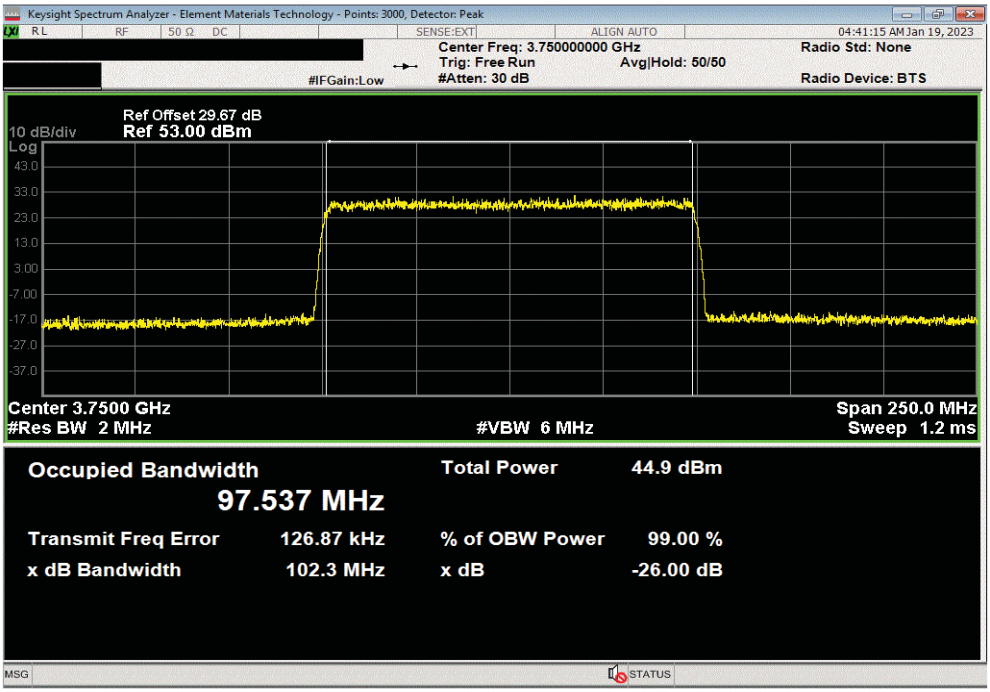


OCCUPIED BANDWIDTH SINGLE 3.7G

Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			97.478	102.267	Within Band	Pass

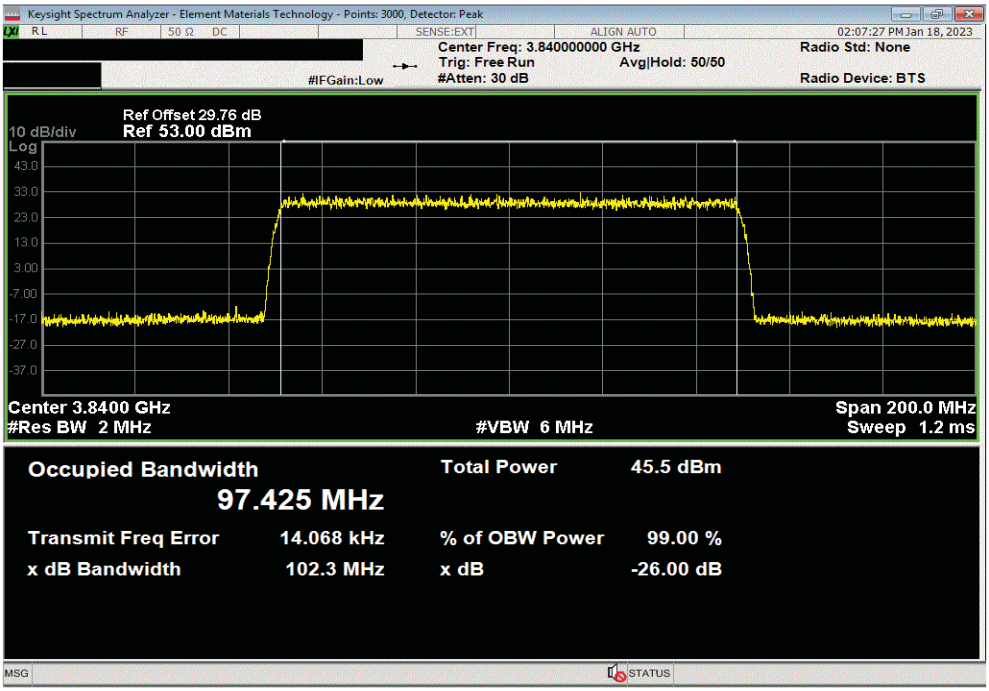


Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, 256QAM Modulation, Low Channel, 3750.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			97.537	102.307	Within Band	Pass

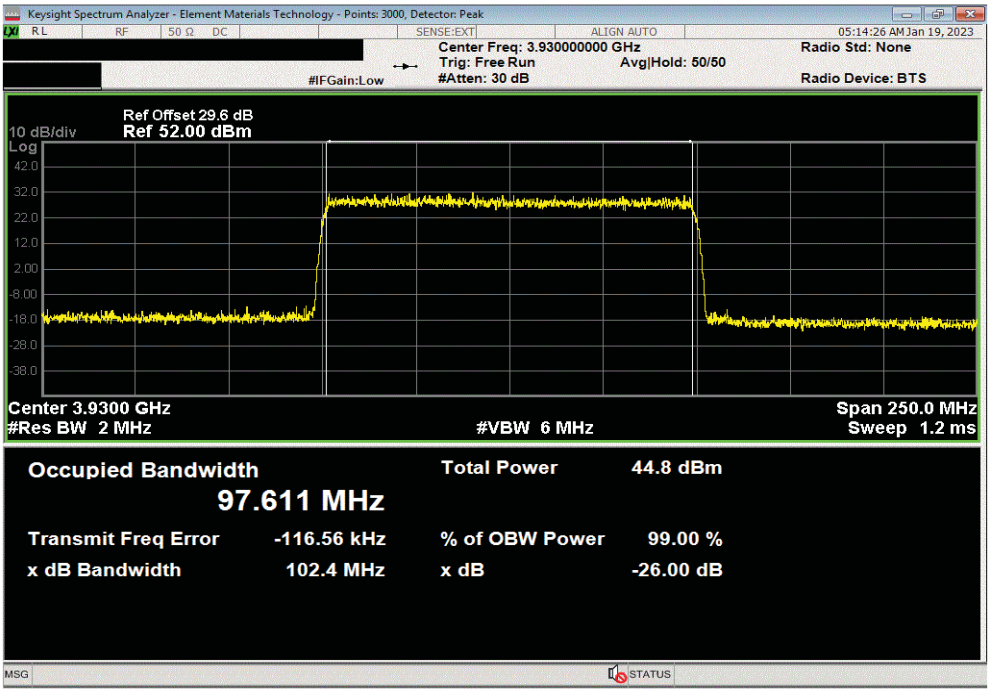


OCCUPIED BANDWIDTH SINGLE 3.7G

Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3840.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			97.425	102.268	Within Band	Pass



Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, 256QAM Modulation, High Channel, 3930.00 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			97.611	102.362	Within Band	Pass



FREQUENCY STABILITY 3.45G

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
Attenuator	Fairview Microwave	SA3N10W-20	RKY	2022-11-15	2023-11-15
Signal Analyzer	Keysight	N9030B	R332	2022-07-28	2023-07-28
Thermometer	Omega Engineering, Inc.	HH311	DUI	2021-02-02	2024-02-02
Meter - Multimeter	Fluke	77 IV	MLT	2023-01-18	2024-01-18
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-8-2-SCT/AC	TBH	NCR	NCR

TEST DESCRIPTION

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

Measurements were made as called out on the data sheets. Testing was done using QPSK modulation with NR40 channel bandwidth mode of operation.

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.”

No specific limits are provided in either FCC 27.54, the product specific rule part, or FCC 2.1055, the equipment authorization procedure for testing frequency stability. While there are no limits called out, any results less than 1000 Hz will still allow the radio to be operating within the band.

FREQUENCY STABILITY 3.45G

element

XMit 2022.02.07.0

EUT:	AQQQA			Work Order:	NOKI0052
Serial Number:	YK224300010			Date:	1-Feb-23
Customer:	Nokia of America Corporation			Temperature:	20.8 °C
Attendees:	John Rattanavong, Michell Hill			Humidity:	22% RH
Project:	None			Barometric Pres.:	1032 mbar
Tested by:	Brandon Hobbs	Power:	54 VDC	Job Site:	TX07

TEST SPECIFICATIONS	Test Method
FCC 27:2023	ANSI C63.26:2015

COMMENTS

40 MHz Bandwidth, Mid channel, QPSK. The EUT temperature was stabilized at each temperature step (for a minimum of 30 mins) prior to measurments. The EUT was operated with a 40 MHz channel bandwidth on the middle channel using QPSK modulation.

DEVIATIONS FROM TEST STANDARD

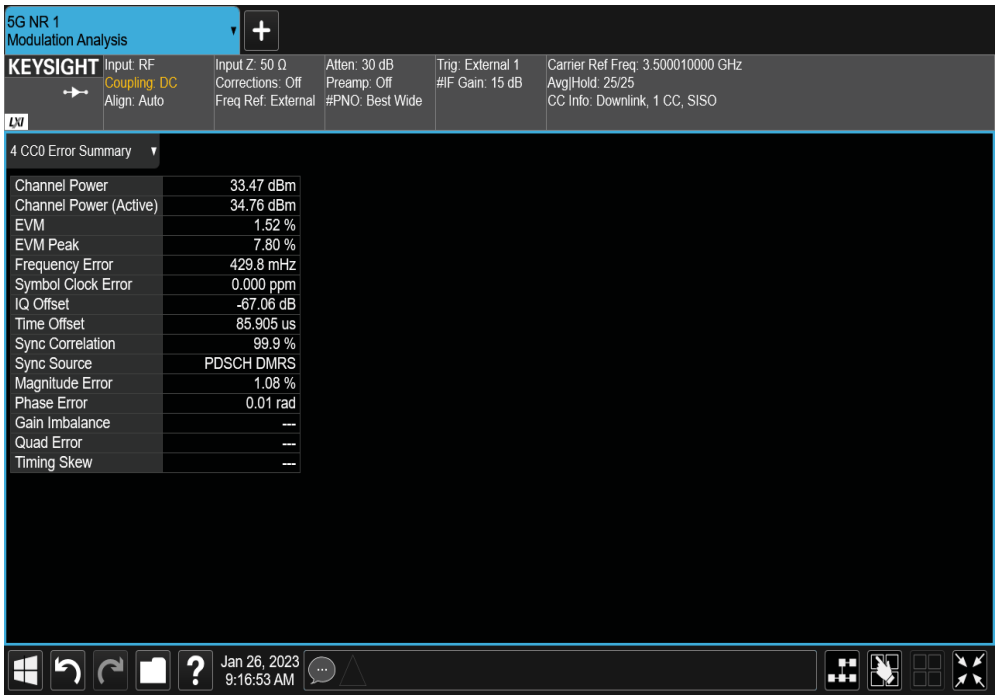
None

Configuration #	9	Signature

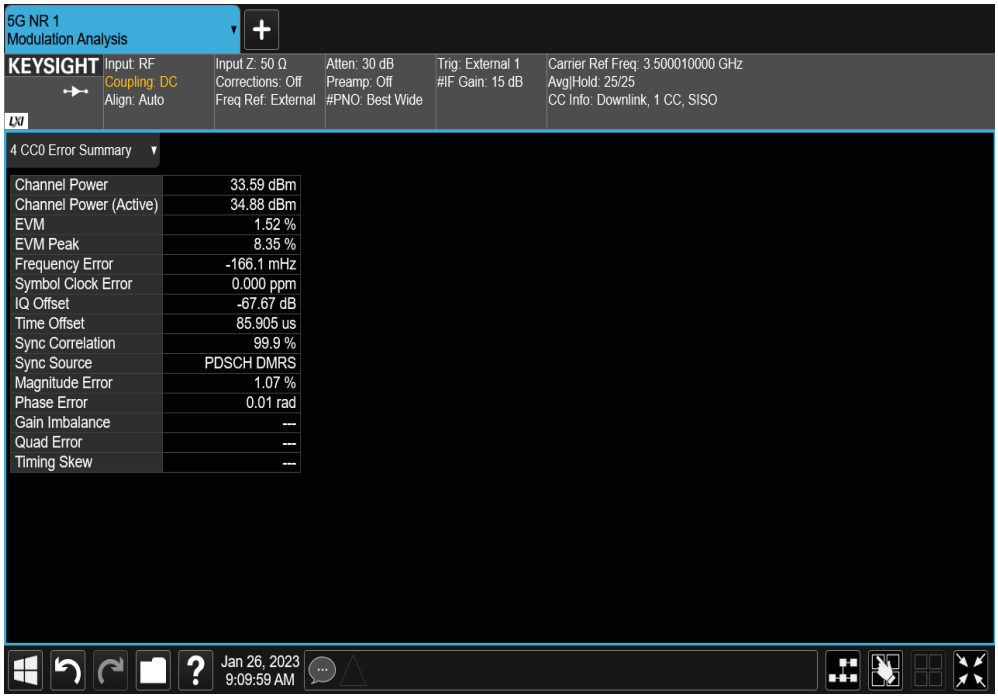
	Value Freq Δ (Hz)	Limit Δ (Hz)	Result
Port 57			
Band n77, 3450 - 3550 MHz			
NR40, QPSK Modulation			
Mid Channel, 3500.01 MHz			
85% Low Voltage Condition 40.8 VDC (@20°C)	0.4298	1000	Pass
100% Nominal Voltage Condition 48 VDC (@20°C)	-0.1661	1000	Pass
115% High Voltage Condition 55.2 VDC (@20°C)	-0.6166	1000	Pass
-30°C Temp, Nominal Voltage Condition 48 VDC	0.2218	1000	Pass
-20°C Temp, Nominal Voltage Condition 48 VDC	0.4530	1000	Pass
-10°C Temp, Nominal Voltage Condition 48 VDC	0.3956	1000	Pass
0°C Temp, Nominal Voltage Condition 48 VDC	-0.2083	1000	Pass
10°C Temp, Nominal Voltage Condition 48 VDC	0.6993	1000	Pass
20°C Temp, Nominal Voltage Condition 48 VDC	0.4298	1000	Pass
30°C Temp, Nominal Voltage Condition 48 VDC	0.0911	1000	Pass
40°C Temp, Nominal Voltage Condition 48 VDC	-0.3993	1000	Pass
50°C Temp, Nominal Voltage Condition 48 VDC	-0.1661	1000	Pass

FREQUENCY STABILITY 3.45G

Port 57, Band n77, 3450 - 3550 MHz, NR40, QPSK Modulation, Mid Channel, 3500.01 MHz, 85% Low Voltage Condition 40.8 VDC (@20°C)						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				0.4298	1000	Pass

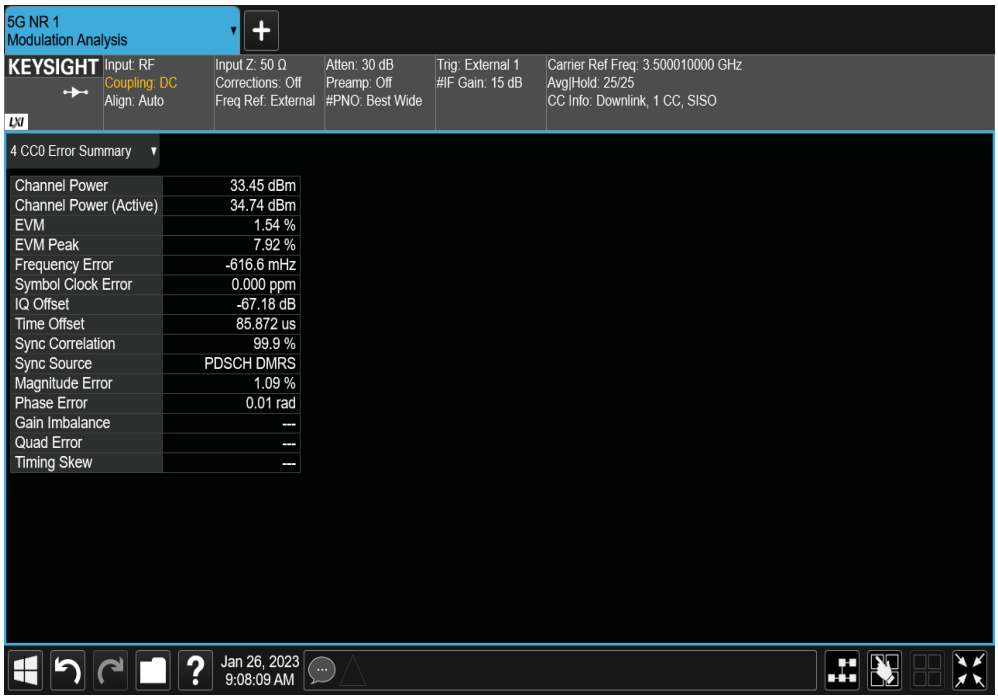


Port 57, Band n77, 3450 - 3550 MHz, NR40, QPSK Modulation, Mid Channel, 3500.01 MHz, 100% Nominal Voltage Condition 48 VDC (@20°C)						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				-0.1661	1000	Pass

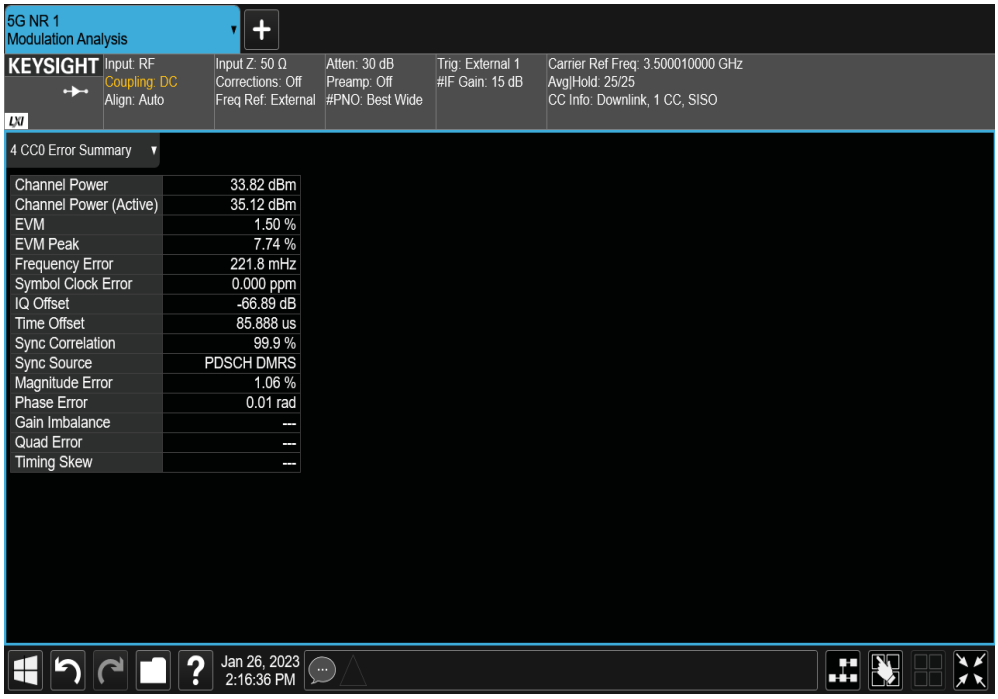


FREQUENCY STABILITY 3.45G

Port 57, Band n77, 3450 - 3550 MHz, NR40, QPSK Modulation, Mid Channel, 3500.01 MHz, 115% High Voltage Condition 55.2 VDC (@20°C)						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				-0.6166	1000	Pass

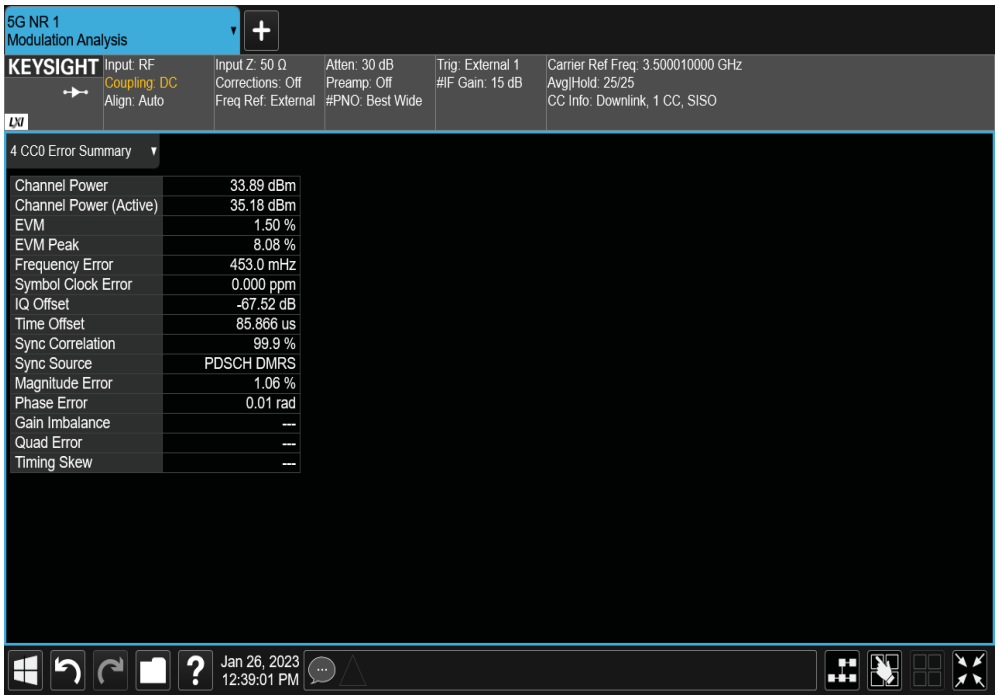


Port 57, Band n77, 3450 - 3550 MHz, NR40, QPSK Modulation, Mid Channel, 3500.01 MHz, -30°C Temp, Nominal Voltage Condition 48 VDC						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				0.2218	1000	Pass

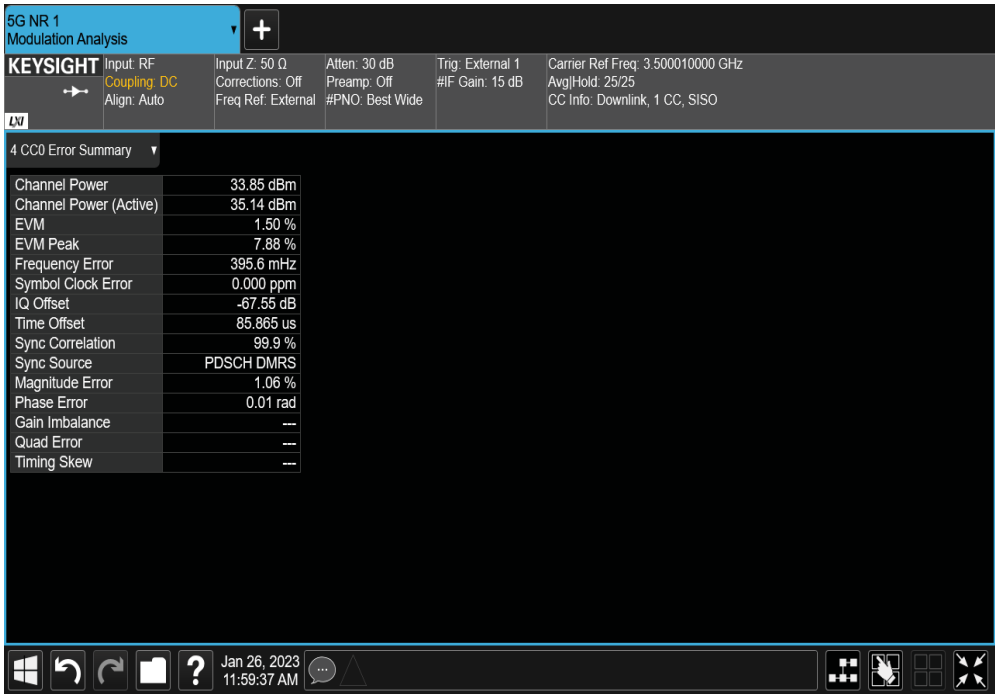


FREQUENCY STABILITY 3.45G

Port 57, Band n77, 3450 - 3550 MHz, NR40, QPSK Modulation, Mid Channel, 3500.01 MHz, -20°C Temp, Nominal Voltage Condition 48 VDC						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				0.453	1000	Pass

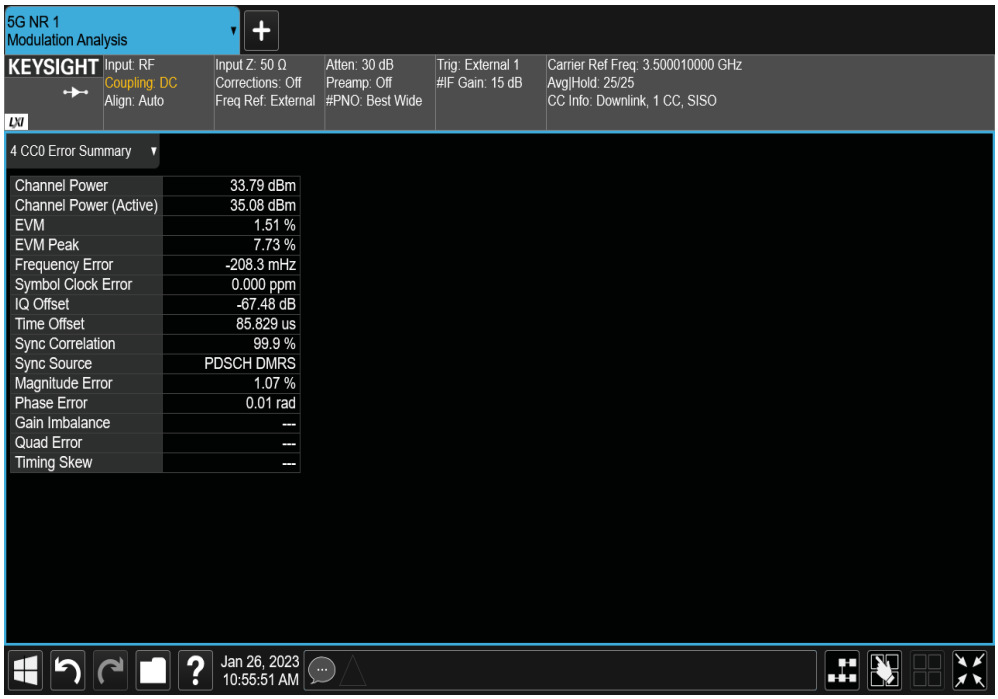


Port 57, Band n77, 3450 - 3550 MHz, NR40, QPSK Modulation, Mid Channel, 3500.01 MHz, -10°C Temp, Nominal Voltage Condition 48 VDC						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				0.3956	1000	Pass

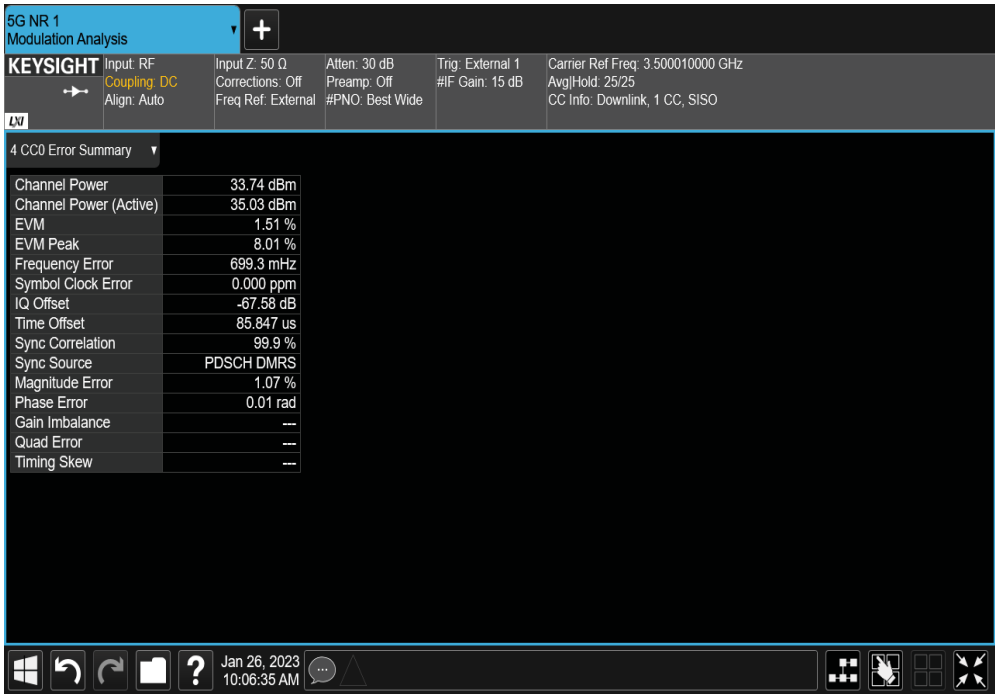


FREQUENCY STABILITY 3.45G

Port 57, Band n77, 3450 - 3550 MHz, NR40, QPSK Modulation, Mid Channel, 3500.01 MHz, 0°C Temp, Nominal Voltage Condition 48 VDC						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				-0.2083	1000	Pass

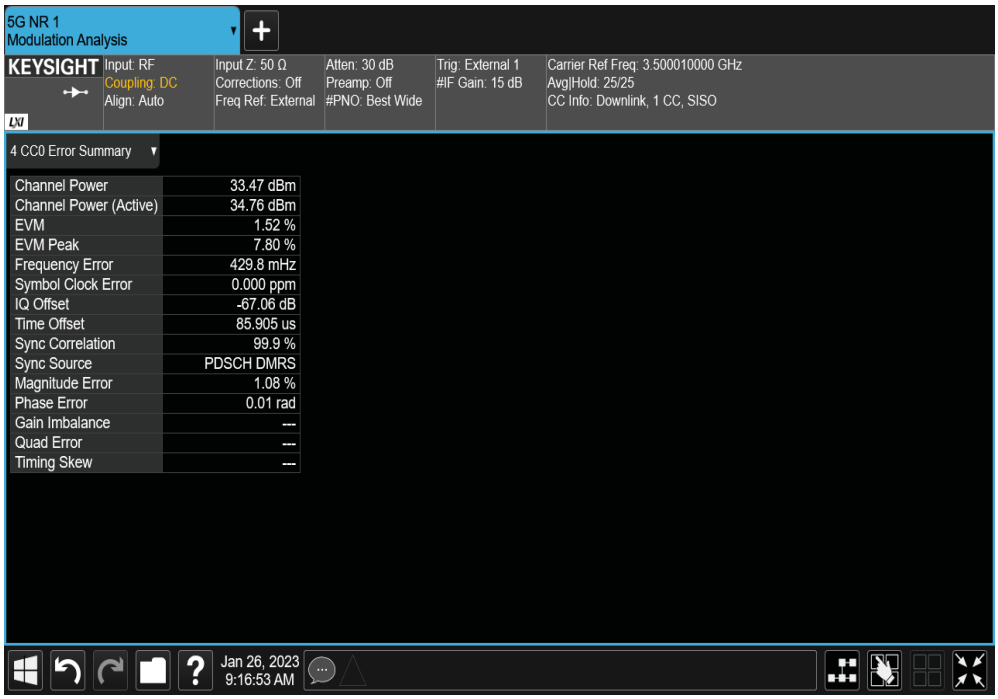


Port 57, Band n77, 3450 - 3550 MHz, NR40, QPSK Modulation, Mid Channel, 3500.01 MHz, 10°C Temp, Nominal Voltage Condition 48 VDC						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				0.6993	1000	Pass

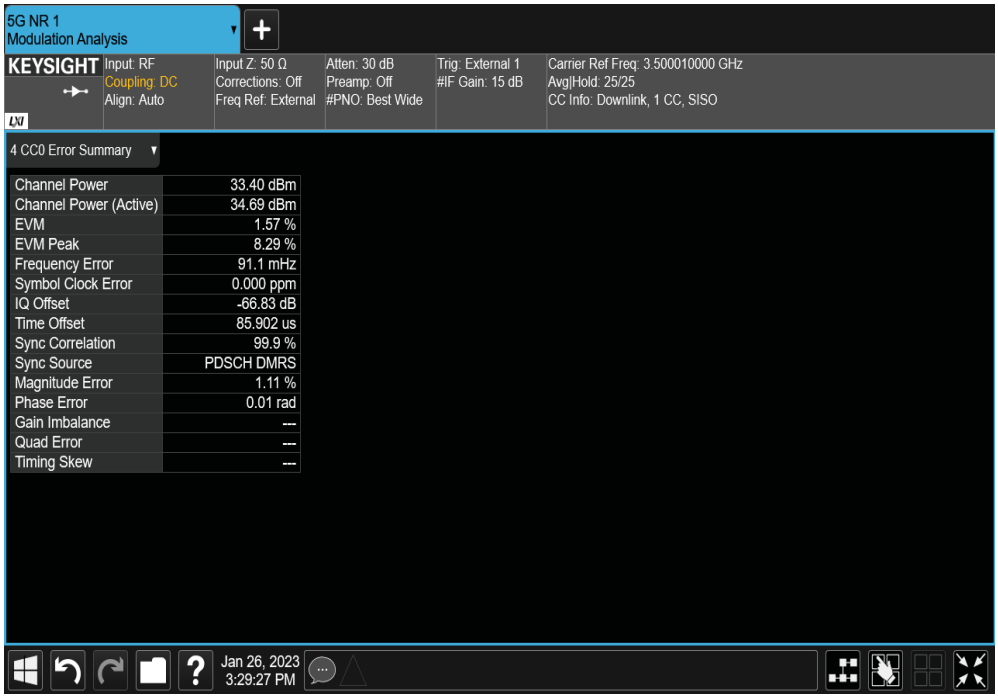


FREQUENCY STABILITY 3.45G

Port 57, Band n77, 3450 - 3550 MHz, NR40, QPSK Modulation, Mid Channel, 3500.01 MHz, 20°C Temp, Nominal Voltage Condition 48 VDC						
				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				0.4298	1000	Pass

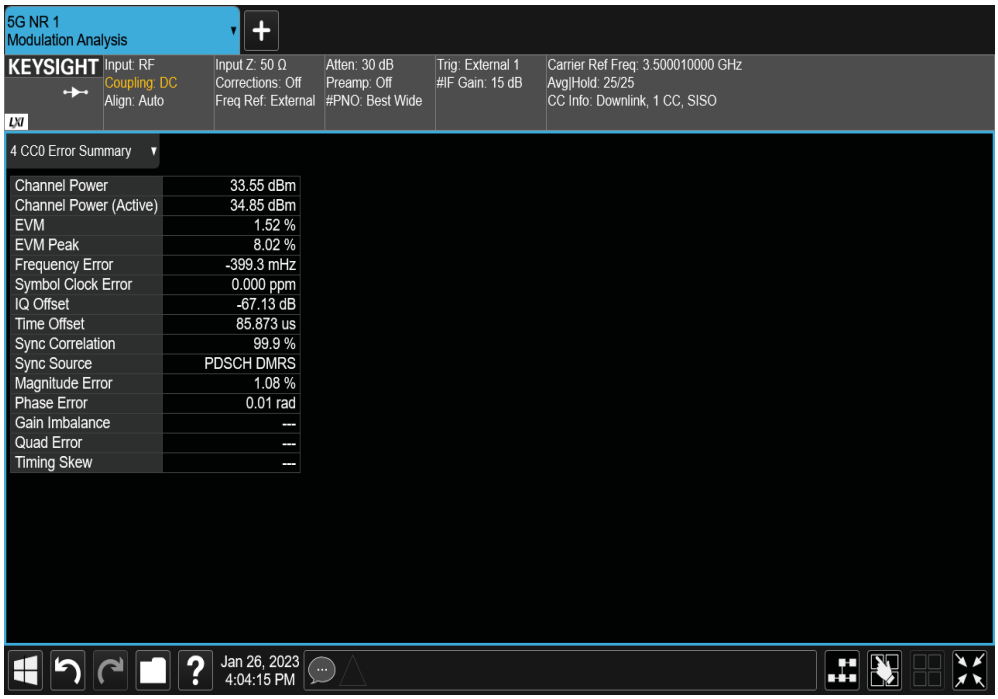


Port 57, Band n77, 3450 - 3550 MHz, NR40, QPSK Modulation, Mid Channel, 3500.01 MHz, 30°C Temp, Nominal Voltage Condition 48 VDC						
				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				0.0911	1000	Pass

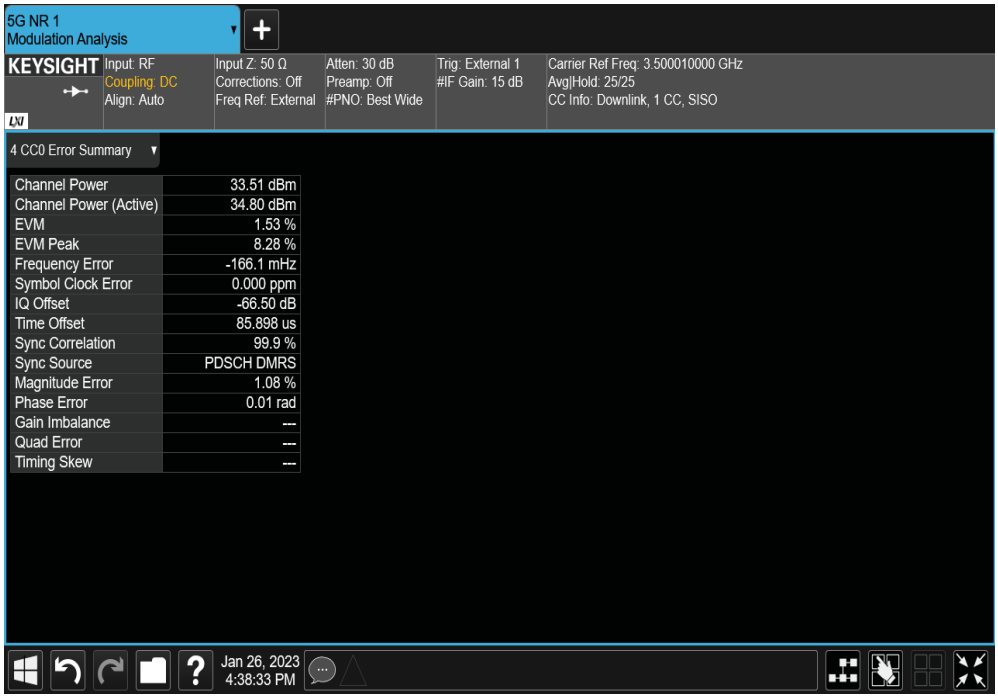


FREQUENCY STABILITY 3.45G

Port 57, Band n77, 3450 - 3550 MHz, NR40, QPSK Modulation, Mid Channel, 3500.01 MHz, 40°C Temp, Nominal Voltage Condition 48 VDC						
				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				-0.3993	1000	Pass



Port 57, Band n77, 3450 - 3550 MHz, NR40, QPSK Modulation, Mid Channel, 3500.01 MHz, 50°C Temp, Nominal Voltage Condition 48 VDC						
				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				-0.1661	1000	Pass



FREQUENCY STABILITY SINGLE 3.7G

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	2023-01-18	2024-01-18
Thermometer	Omega Engineering, Inc.	HH311	DUI	2021-02-02	2024-02-02
Block - DC	Fairview Microwave	SD3239	ANC	2022-03-02	2023-03-02
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Attenuator	Fairview Microwave	SA3N10W-20	RKY	2022-11-15	2023-11-15
Signal Analyzer	Keysight	N9030B	R332	2022-07-28	2023-07-28

TEST DESCRIPTION

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

Measurements were made as called out on the data sheets. Testing was done using QPSK modulation with NR40 channel bandwidth mode of operation.

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.”

No specific limits are provided in either FCC 27.54, the product specific rule part, or FCC 2.1055, the equipment authorization procedure for testing frequency stability. While there are no limits called out, any results less than 1000 Hz will still allow the radio to be operating within the band.

FREQUENCY STABILITY SINGLE 3.7G

XMit 2022.02.07.0

EUT:	AQQQA			Work Order:	NOKI0052
Serial Number:	YK224300010			Date:	1-Feb-23
Customer:	Nokia of America Corporation			Temperature:	21 °C
Attendees:	John Rattanavong, Michell Hill			Humidity:	22.6% RH
Project:	None			Barometric Pres.:	1029 mbar
Tested by:	Brandon Hobbs	Power:	54 VDC	Job Site:	TX07

TEST SPECIFICATIONS	Test Method
FCC 27:2023	ANSI C63.26:2015

COMMENTS

40 MHz Bandwidth, Mid channel, QPSK. The EUT temperature was stabilized at each temperature step (for a minimum of 30 mins) prior to measurments. The EUT was operated with a 40 MHz channel bandwidth on the middle channel using QPSK modulation.

DEVIATIONS FROM TEST STANDARD

None

Configuration #	9	Signature

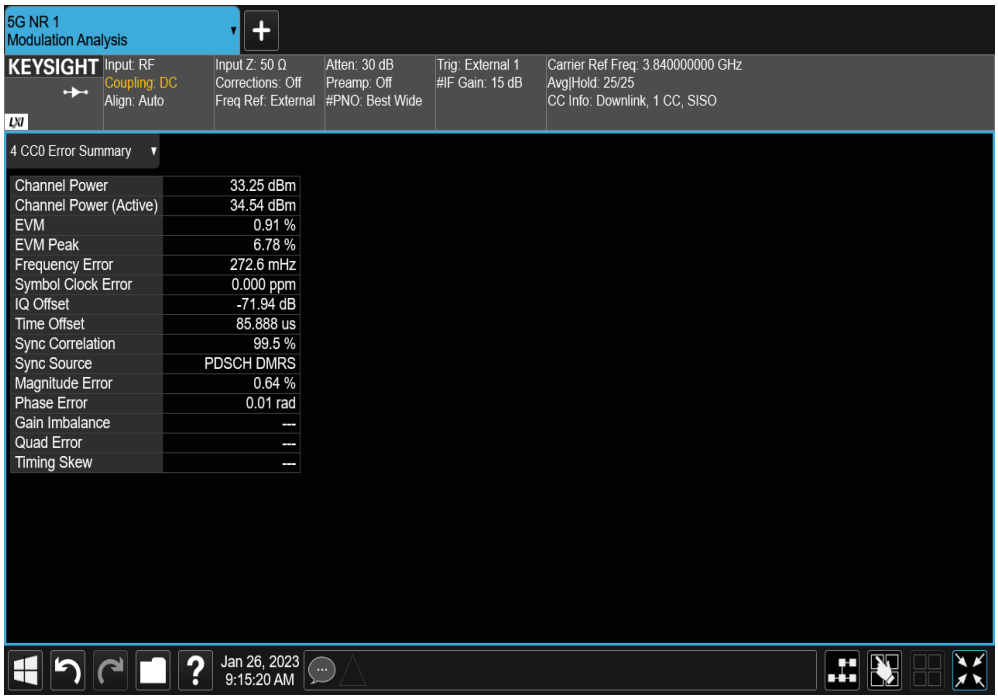
	Value Freq Δ (Hz)	Limit Δ (Hz)	Result
Port 22			
Band n77, 3700 - 3980 MHz			
NR40, QPSK Modulation			
Mid Channel, 3840.00 MHz			
85% Low Voltage Condition 40.8 VDC (@20°C)	0.2726	1000	Pass
100% Nominal Voltage Condition 48 VDC (@20°C)	0.1162	1000	Pass
115% High Voltage Condition 55.2 VDC (@20°C)	-0.4332	1000	Pass
-30°C Temp, Nominal Voltage Condition 48 VDC	-0.2440	1000	Pass
-20°C Temp, Nominal Voltage Condition 48 VDC	-0.2164	1000	Pass
-10°C Temp, Nominal Voltage Condition 48 VDC	0.0127	1000	Pass
0°C Temp, Nominal Voltage Condition 48 VDC	1.2100	1000	Pass
10°C Temp, Nominal Voltage Condition 48 VDC	0.0427	1000	Pass
20°C Temp, Nominal Voltage Condition 48 VDC	0.1162	1000	Pass
30°C Temp, Nominal Voltage Condition 48 VDC	-0.9040	1000	Pass
40°C Temp, Nominal Voltage Condition 48 VDC	-0.0166	1000	Pass
50°C Temp, Nominal Voltage Condition 48 VDC	-1.4000	1000	Pass

FREQUENCY STABILITY SINGLE 3.7G

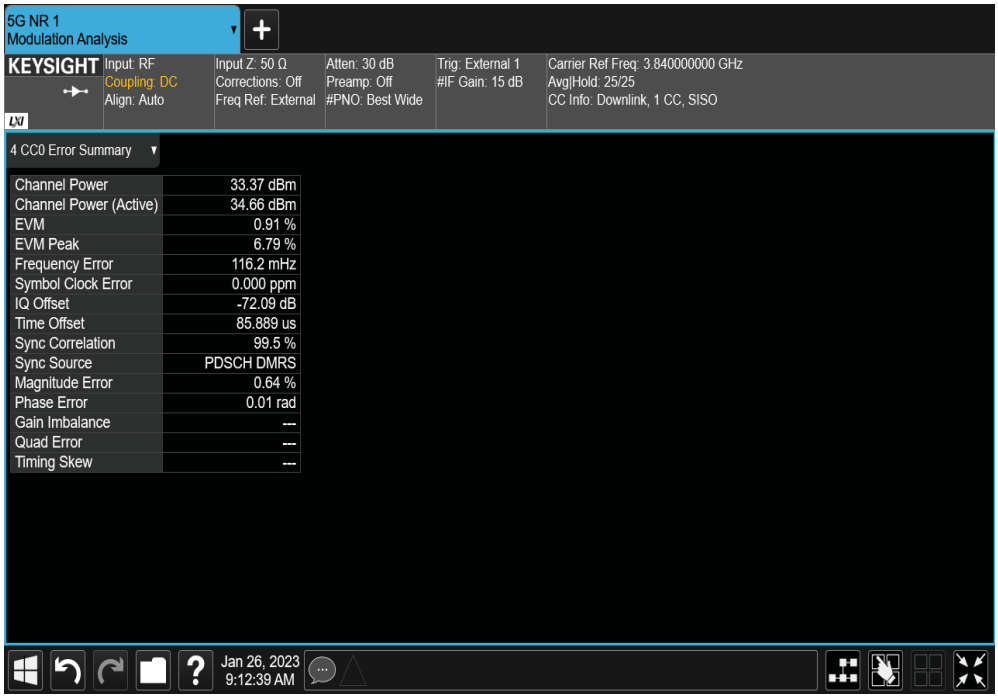
element

XMit 2022.02.07.0

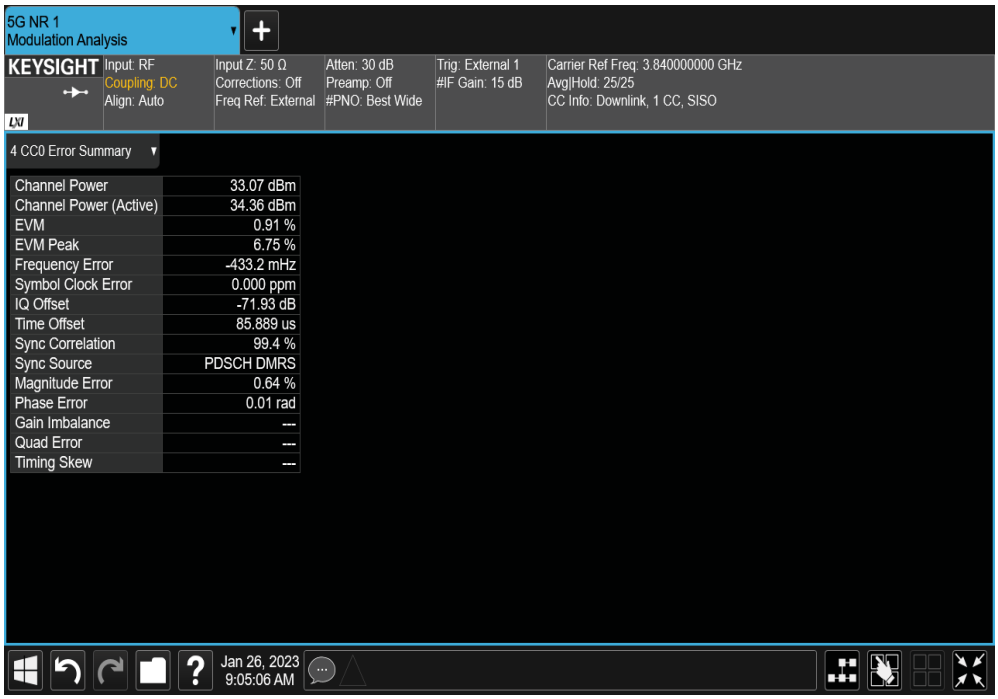
Port 22, Band n77, 3700 - 3980 MHz, NR40, QPSK Modulation, Mid Channel, 3840.00 MHz, 85% Low Voltage Condition 40.8 VDC (@20°C)						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				0.2726	1000	Pass



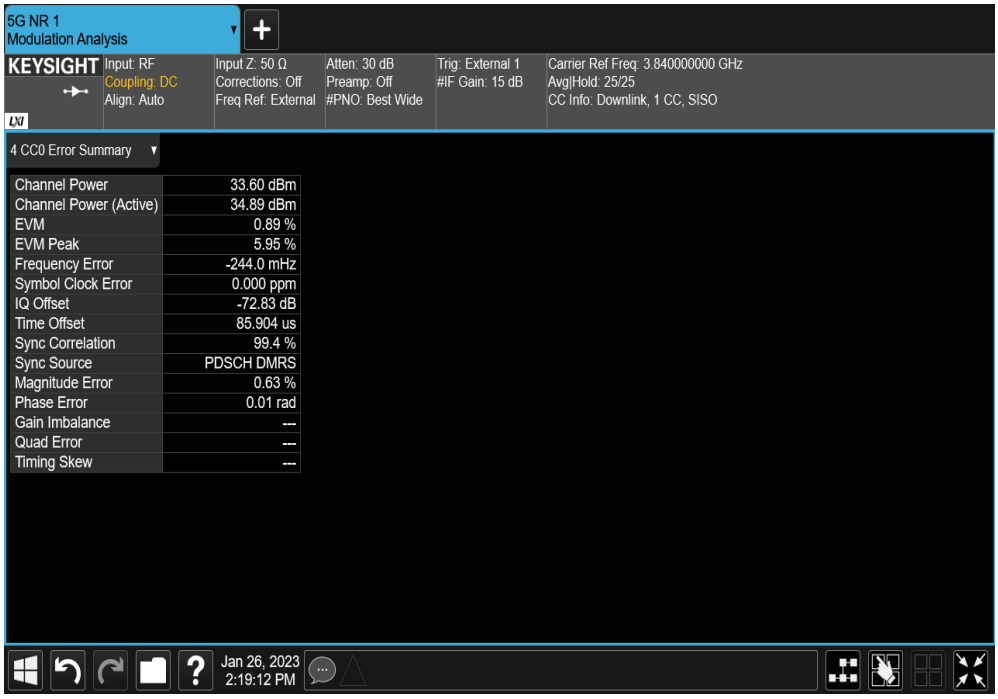
Port 22, Band n77, 3700 - 3980 MHz, NR40, QPSK Modulation, Mid Channel, 3840.00 MHz, 100% Nominal Voltage Condition 48 VDC (@20°C)						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				0.1162	1000	Pass



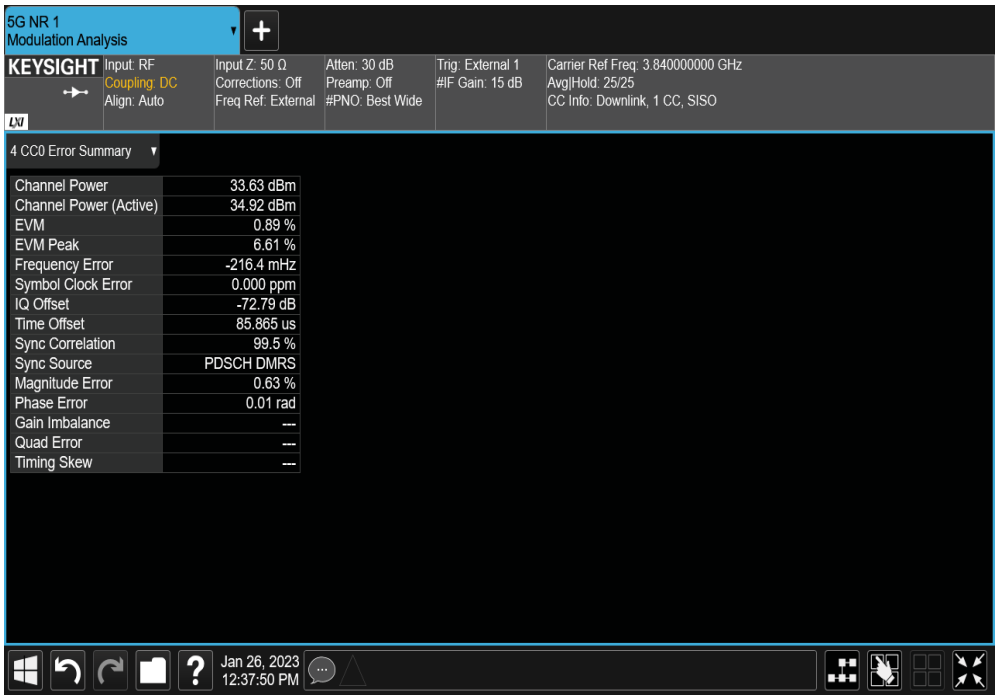
Port 22, Band n77, 3700 - 3980 MHz, NR40, QPSK Modulation, Mid Channel, 3840.00 MHz, 115% High Voltage Condition 55.2 VDC (@20°C)						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				-0.4332	1000	Pass



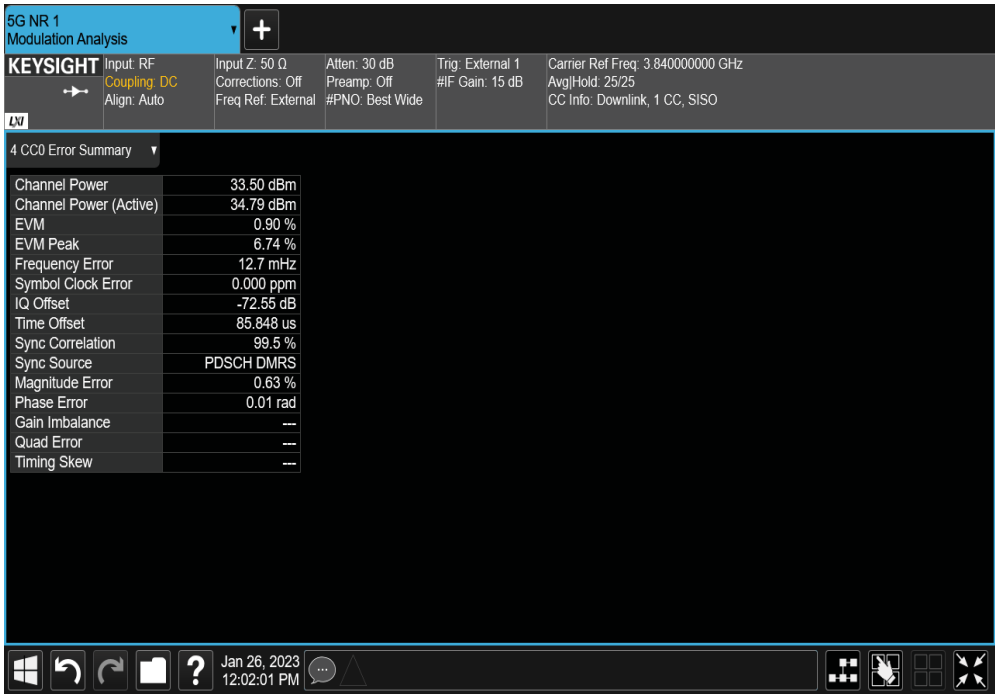
Port 22, Band n77, 3700 - 3980 MHz, NR40, QPSK Modulation, Mid Channel, 3840.00 MHz, -30°C Temp, Nominal Voltage Condition 48 VDC						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				-0.244	1000	Pass



Port 22, Band n77, 3700 - 3980 MHz, NR40, QPSK Modulation, Mid Channel, 3840.00 MHz, -20°C Temp, Nominal Voltage Condition 48 VDC						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				-0.2164	1000	Pass



Port 22, Band n77, 3700 - 3980 MHz, NR40, QPSK Modulation, Mid Channel, 3840.00 MHz, -10°C Temp, Nominal Voltage Condition 48 VDC						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				0.0127	1000	Pass

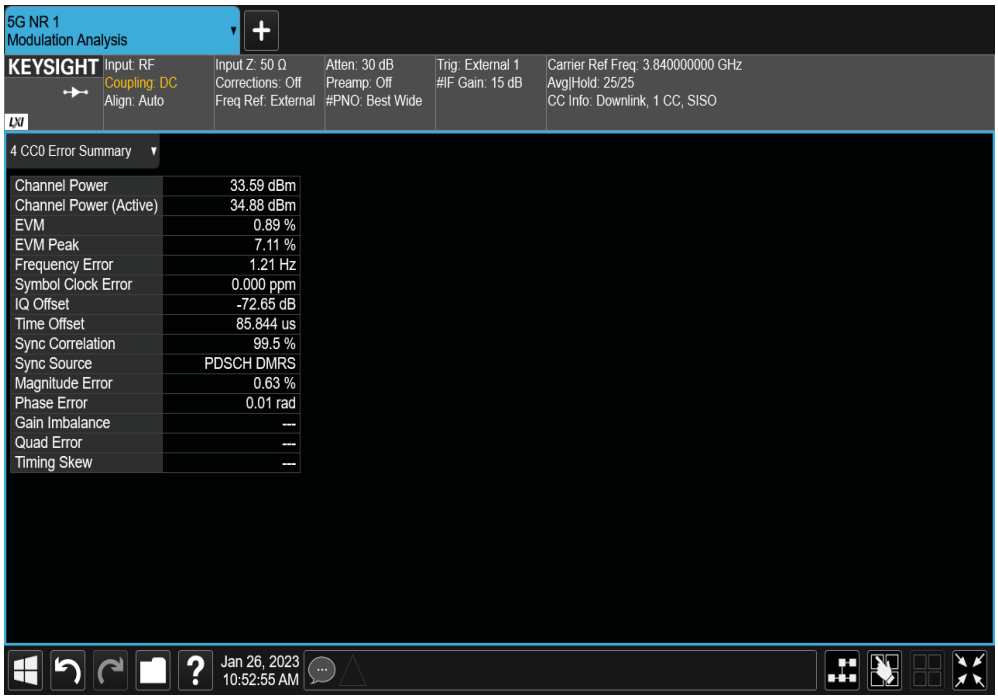


FREQUENCY STABILITY SINGLE 3.7G

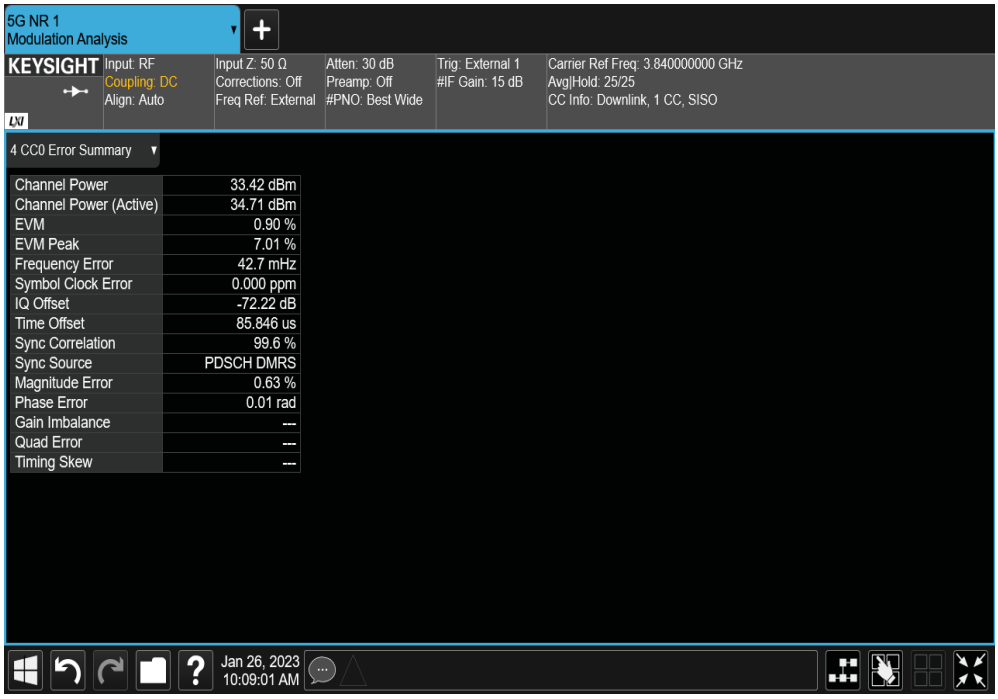
element

XMit 2022.07.0

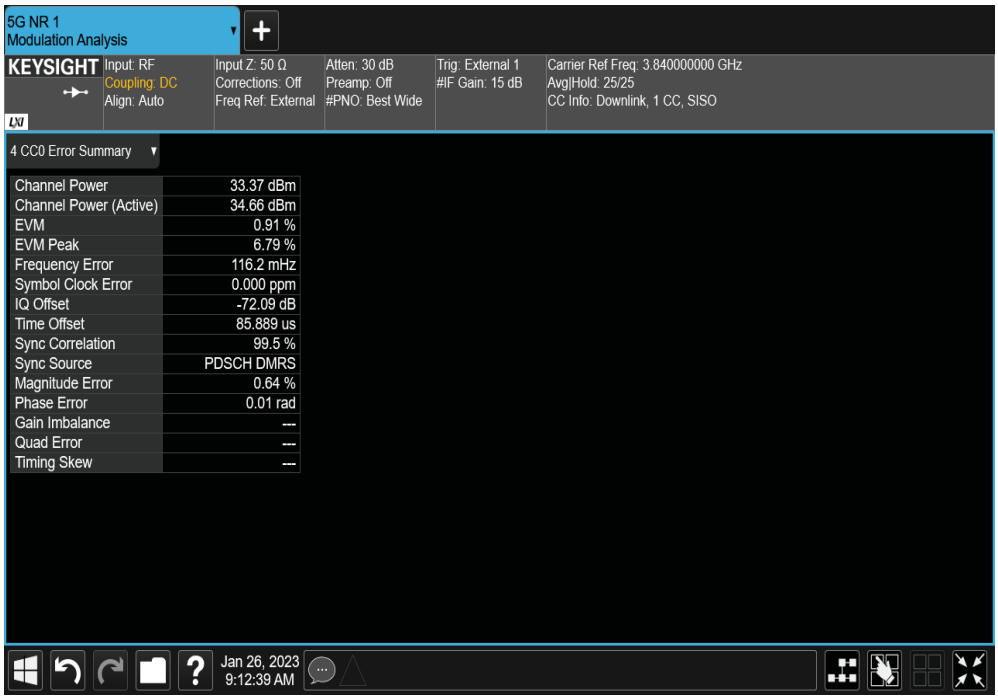
Port 22, Band n77, 3700 - 3980 MHz, NR40, QPSK Modulation, Mid Channel, 3840.00 MHz, 0°C Temp, Nominal Voltage Condition 48 VDC						
				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				1.21	1000	Pass



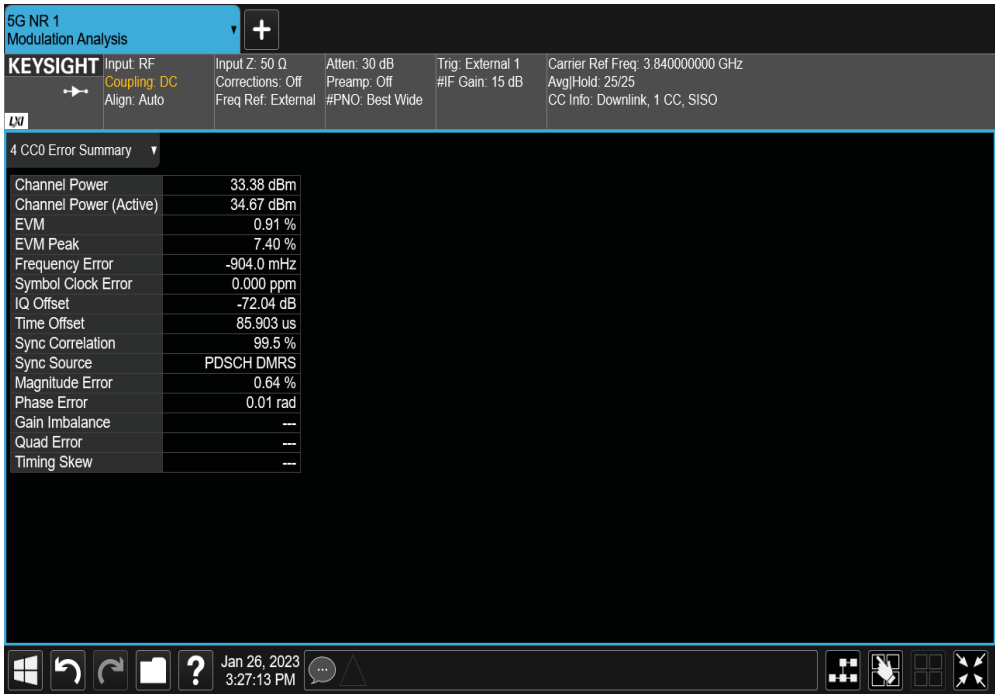
Port 22, Band n77, 3700 - 3980 MHz, NR40, QPSK Modulation, Mid Channel, 3840.00 MHz, 10°C Temp, Nominal Voltage Condition 48 VDC						
				Value Freq Δ (Hz)	Limit Δ (Hz)	Result
				0.0427	1000	Pass



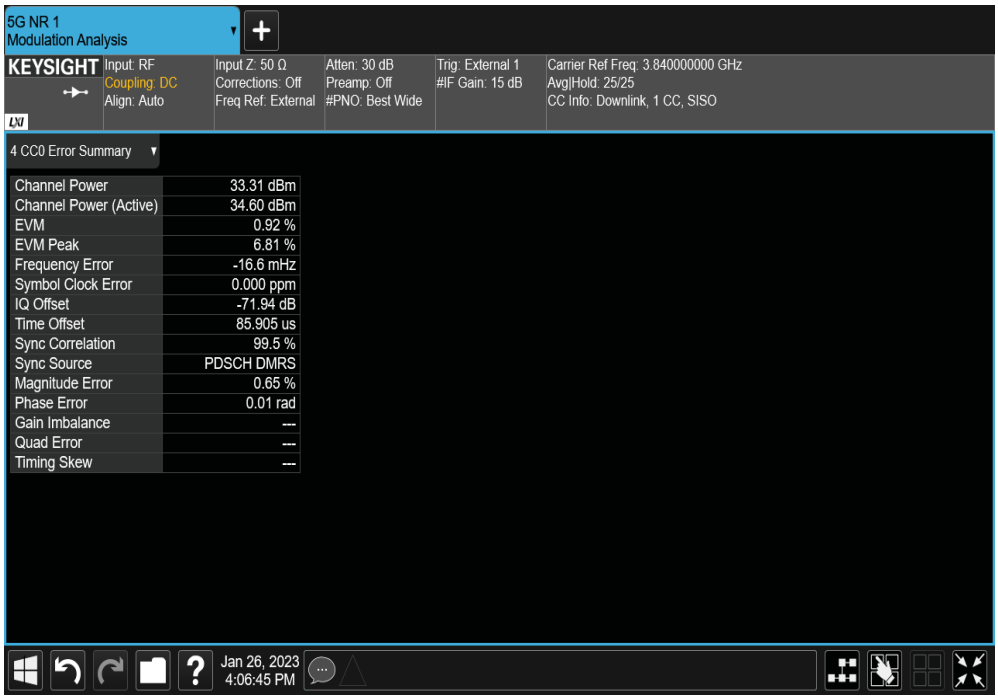
Port 22, Band n77, 3700 - 3980 MHz, NR40, QPSK Modulation, Mid Channel, 3840.00 MHz, 20°C Temp, Nominal Voltage Condition 48 VDC						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				0.1162	1000	Pass



Port 22, Band n77, 3700 - 3980 MHz, NR40, QPSK Modulation, Mid Channel, 3840.00 MHz, 30°C Temp, Nominal Voltage Condition 48 VDC						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				-0.904	1000	Pass



Port 22, Band n77, 3700 - 3980 MHz, NR40, QPSK Modulation, Mid Channel, 3840.00 MHz, 40°C Temp, Nominal Voltage Condition 48 VDC						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				-0.0166	1000	Pass



Port 22, Band n77, 3700 - 3980 MHz, NR40, QPSK Modulation, Mid Channel, 3840.00 MHz, 50°C Temp, Nominal Voltage Condition 48 VDC						
				Value	Limit	
				Freq Δ (Hz)	Δ (Hz)	Result
				-1.4	1000	Pass