

Radio Test Report Application for a Class II Permissive Change of Equipment Authorization FCC Part 24 and IC RSS-133 [1930MHz – 1995MHz]

> FCC ID: VBNAAFB-01 IC ID: 661W-AAFB

Nokia Solutions and Networks Airscale Base Transceiver Station Radio Module Model: AAFB

Report: NOKI0031, Issue Date: August 12, 2021





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### Last Date of Test: July 31, 2021 Nokia Solutions and Networks EUT: Airscale Base Transceiver Station Radio Module Model AAFB

## **Radio Equipment Testing**

**Standards** 

Specification	Method
Code of Federal Regulations (CFR) Title 47 Part 2	ANSI C63.26-2015 with
(Radio Standards Specification) RSS-Gen Issue 5: 2019	FCC KDB 971168 D01 v03r01
CFR Title 47 Part 24 Subpart E – Broadband PCS	FCC KDB 662911D01 v02r01
RSS-133 Issue 6 - January 18, 2018 – 2GHz Personal Communications Services	FCC KDB 662911D02 v01

Results

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

#### **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**

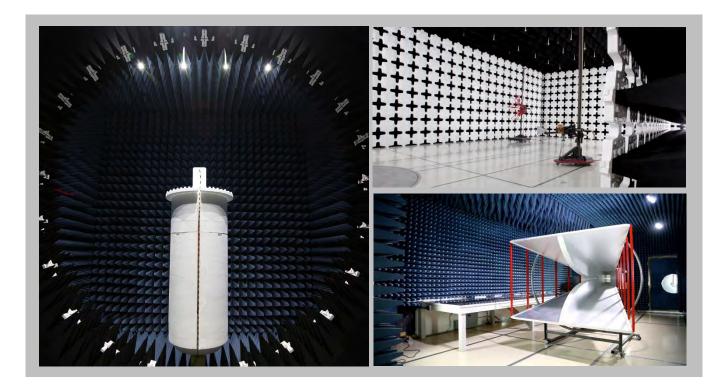
For details on the Scopes of our Accreditations, please visit: https://www.nwemc.com/emc-testing-accreditations

## FACILITIES





California	Minnesota	Oregon	Texas	Washington		
Labs OC01-17	Labs MN01-11	Labs EV01-12	Labs TX01-09	Labs NC01-05		
41 Tesla	9349 W Broadway Ave.	6775 NE Evergreen Pkwy #400	3801 E Plano Pkwy	19201 120 <sup>th</sup> Ave NE		
Irvine, CA 92618	Brooklyn Park, MN 55445	Hillsboro, OR 97124	Plano, TX 75074	Bothell, WA 98011		
(949) 861-8918	(612)-638-5136	(503) 844-4066	(469) 304-5255	(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						
	US0175	US0017	US0191	US0157		



## **MEASUREMENT UNCERTAINTY**



#### **Measurement Uncertainty**

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

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

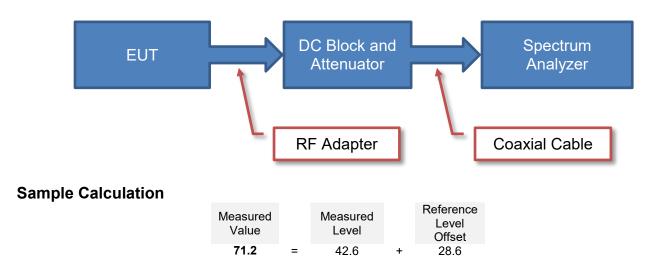
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

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

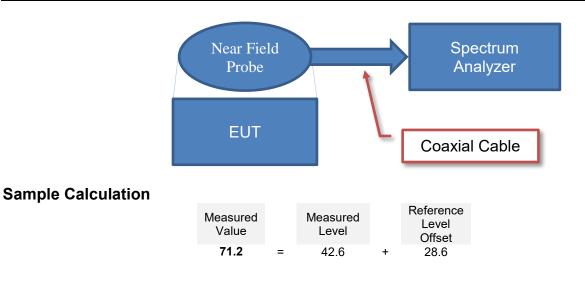
## **TEST SETUP BLOCK DIAGRAMS**



#### Antenna Port Conducted Measurements



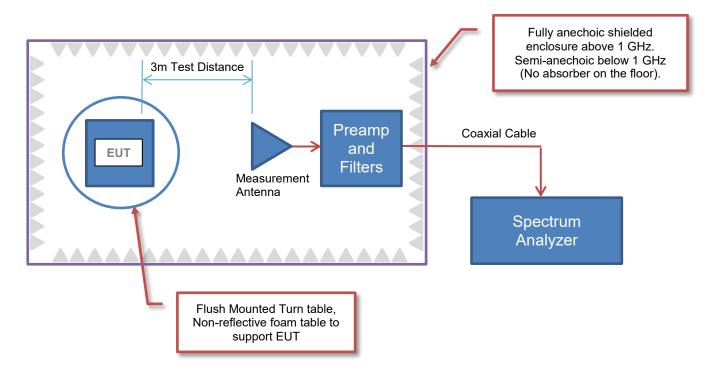
#### **Near Field Test Fixture Measurements**



## **TEST SETUP BLOCK DIAGRAMS**



### **Spurious Radiated Emissions**





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 Module Model AAFB
First Date of Test:	July 22, 2021
Last Date of Test:	July 31, 2021
Receipt Date of Samples:	July 22, 2021
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

### Client and Equipment Under Test (EUT) Information

### Information Provided by the Party Requesting the Test

#### Functional Description of the EUT:

A class II permissive change on the original filing is being pursued to add 5G NR (new radio) carriers to the Airscale Base Transceiver Station Radio Module Model AAFB FCC and ISED radio certifications. The original certification effort included testing for LTE technologies. Please refer to the test report on the original certification (FCC ID: VBNAAFB-01/IC ID: 661W-AAFB) for details on all required testing.

All conducted RF testing performed for the original certification testing has been repeated using 5G NR carriers for this class II permissive change per correspondence/guidance from Nemko TCB. The same test methodology used in the original certification testing was used in this class II permissive change test effort. 5G NR carrier bandwidths of 5MHz, 10MHz, 15MHz and 20MHz with OPSK, 16QAM, 64QAM and 256QAM modulation types were verified under this effort. Tests performed under the class II change effort include RF power, PSD, CCDF, emission bandwidth (99% and 26 dB down), band edge spurious emissions, and conducted spurious emissions. The 5G NR carriers/modulation types for this testing are setup according to 3GPP TS 38.141-1 Test Models and are NR-FR1-TM 1.1 (QPSK modulation type), NR-FR1-TM 3.2 (16QAM modulation type), NR-FR1-TM 3.1 (64QAM modulation type), and NR-FR1-TM 3.1a (256QAM modulation type). The testing was performed on the same hardware version (AAFB) as the original certification test. The base station and remote radio head software for this testing is an updated release that includes 5G NR carrier support. The radiated emissions and frequency stability measurements performed in the original certification were not repeated under this effort per TCB guidance. The radiated emission and frequency stability/accuracy results from the original certification had enough margin to preclude requiring additional testing. The same frequency stability/accuracy radio design is the same for all radio technologies/modulation types.

The equipment under test (EUT) is a Nokia Solutions and Networks Airscale Base Transceiver Station Radio Module Model AAFB. The AAFB radio module is a multi-standard multi-carrier radio module designed to support 4G LTE-FDD and 5G NR-FDD operations. **The scope of testing in this effort is for 5G NR Single Carrier operations.** 

The AAFB radio module is a subassembly of the massive MIMO adaptive antenna (MMAA) assembly. The MMAA integrates radio module variants with the 8 column antenna into one assembly. The MMAA assembly/antenna is not directly used/part of this radio approval test effort (i.e.: The AAFB radio module is tested under this effort. The antenna assembly is not part of the test under this



effort). The MMAA AAFIA assembly also contains the AAIB radio module whose certification/testing are documented elsewhere. The MMAA AAFIA Dual 16T16R 100W +100W (8 column antenna) contains the AAIB and AAFB radio modules.

The AAFB RRH has 16 transmit/receive antenna ports (16TX/16RX) that supports 3GPP frequency band n25 operations (BTS RX: 1850 to 1915 MHz/BTS TX: 1930 to 1995 MHz). The maximum RF output power of the radio module antenna port is 6.25 watts. The total RF output power for the AAFB radio module is 100 watts (16 x 6.25 watts). The TX and RX instantaneous bandwidth cover the full AAFB operational bandwidth (Band n25). The AAFB supports 5, 10, 15 and 20MHz 5G NR bandwidths. The AAFB supports four 5G NR downlink modulation types (QPSK, 16QAM, 64QAM and 256QAM).

The radio module has external interfaces including DC power (DC In), ground, transmit/receive (ANT), and optical (OPT). The massive MIMO adaptive antenna assembly (configured with AAFB and AAIB radios) may be pole or wall mounted.

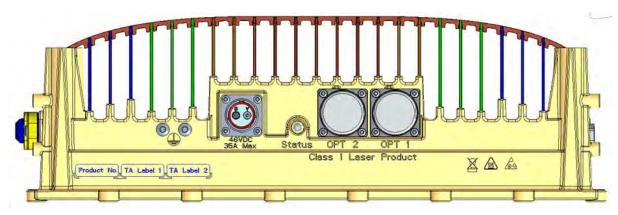
The AAFB PCS Band 5G NR channel bandwidths are 5, 10, 15 and 20MHz. The downlink channel numbers and frequencies are provided below.



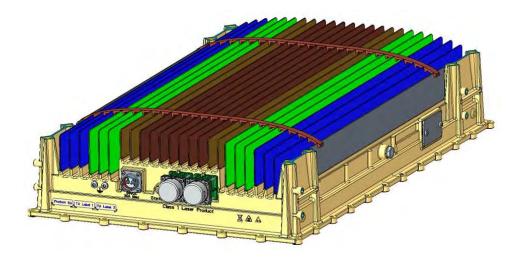
	Downlink	Downlink		5G NR Chan	nel Bandwidt	h
	5G NR NR- ARFCN	Frequency (MHz)	5 MHz	10 MHz	15 MHz	20 MHz
	386000	1930.0	Band Edge	Band Edge	Band Edge	Band Edge
	386500	1932.5	Bottom Ch			
çh 16)	387000	1935.0		Bottom Ch		
throug	387500	1937.5			Bottom Ch	
5 (Ant 1	388000	1940.0				Bottom Ch
and n25	392500	1962.5	Middle Ch	Middle Ch	Middle Ch	Middle Ch
AAFB Band n25 (Ant 1 through 16)	397000	1985.0				Top Channel
V	397500	1987.5			Top Channel	
	398000	1990.0		Top Channel		
	398500	1992.5	Top Channel			
	399000	1995.0	Band Edge	Band Edge	Band Edge	Band Edge

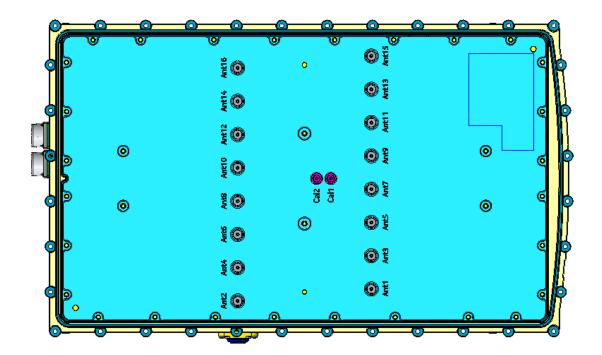
AAFB Downlink Band Edge 5G NR Band n25 Frequency Channels

#### AAFB Connector Layout:











EUT External Interfaces						
Name	Qty	Connector Type	Purpose (and Description)			
DC In	1	Quick Disconnect	2-pole Power Circular Connector			
GND	1	Screw lug (2xM5/1xM8)	Ground			
ANT	16	4.3-10 Blind Mate/Quick Disconnect	RF signal for Transmitter/Receiver (50 Ohm)			
Unit	1	LED	Unit Status LED			
ΟΡΤ	2	SFP+ cage	Optical Interface			
Fan	1	Microfit	Power for fan on the side of radio module.			

### **Testing Objective:**

A class II permissive change on the original filing is being pursued to add 5G NR (new radio) carriers to the Airscale BTS Radio Module AAFB Federal Communication Commission and Industry Canada certifications.



## Configuration NOKI0031-1

Software/Firmware Running during test				
Description	Version			
5G BTS Software Version	SBTS00_ENB_9900_210629_000001			
5G RF_SW	SRM51.06.R04			

Description	Manufacturer	Model/Part Number	Serial Number	
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	J8181470035	
ASIK (5G BTS System Module)	Nokia Solutions and Networks	474021A.101	L1184301617	
ABIL (5G BTS Baseband Module)	Nokia Solutions and Networks	474020A.102	L1183605740	
AAFB (Radio Module Model)	Nokia Solutions and Networks	090148A.103	BL2032H23PI	
Low Pass Filter 1.4GHz/100W	Microwave Circuits, Inc.	L13502G1	SN2454-01	
Attenuator 100W/10dB	Weinschel Corp	48-10-43-LIM	BJ1771	
AOMC SFP28+ 9.8G,70M,850NM (Radio)	Nokia	474900A.101	VF20230058S	
AOMC SFP28+ 9.8G,70M,850NM (BS)	Nokia	474900A.101	VF20230008Y	
ThinkPad T490 (WebEM- PC)	Lenovo	20N3S88012	PF26RVZ0	
DC System power supply (Radio)	KEYSIGHT	N8757A	US21D4053S	
FPAC (DC-PWR supply-BS)	Nokia	472438A.101	G711007170	
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-11	
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-14	
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-10	
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-20	
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-04	
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-05	
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-17	
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-29	
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-30	
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-08	
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-27	
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-24	
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-01	
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-15	
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-28	
Antenna Load 1	R&D Microwaves LLC	TA-A40NFCB-BR	N/A	
Antenna Load 2	R&D Microwaves LLC	TA-A40NFCB-BR	N/A	
Antenna Load 3	R&D Microwaves LLC	TA-A40NFCB-BR	N/A	
Antenna Load 4	R&D Microwaves LLC	TA-A40NFCB-BR	N/A	
Antenna Load 5	R&D Microwaves LLC	TA-A40NFCB-BR	N/A	
Antenna Load 6	R&D Microwaves LLC	TA-A40NFCB-BR	N/A	
Antenna Load 7	R&D Microwaves LLC	TA-A40NFCB-BR	N/A	
Antenna Load 8	R&D Microwaves LLC	TA-A40NFCB-BR	N/A	
Antenna Load 9	R&D Microwaves LLC	TA-A40NFCB-BR	N/A	
Antenna Load 10	R&D Microwaves LLC	TA-A40NFCB-BR	N/A	
Antenna Load 11	R&D Microwaves LLC	TA-A40NFCB-BR	N/A	
Antenna Load 12	R&D Microwaves LLC	TA-A40NFCB-BR	N/A	
Antenna Load 13	R&D Microwaves LLC	TA-A40NFCB-BR	N/A	
Antenna Load 14	R&D Microwaves LLC	TA-A40NFCB-BR	N/A	
Antenna Load 15	R&D Microwaves LLC	TA-A40NFCB-BR	N/A	
Fiber Optic cable 10m	Amphenol Fiber Optic	E201648	995109C-180512	
GPS Receiver Cable	Nokia	995426C	CA2029	
Cat-5e cable	CSA	E151955	LL79189	
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX 106	SN297374	
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX 104	SN551432/4	



Cables (Peripheral)					
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1 (5G)	Connection 2
Fiber Optic Cable	Ν	10 meters	N	ABIL	AAFB
GPS Receiver Cable	Y	100 meters	N	ASIK	FYGB GPS receiver
Cat-5e Cable	Y	7 meters	N	ASIK	WebEM- PC
RD Microwave Systems – RF CABLE	Y	2 meters	Ν	EUT [AAFB] Ant ports 2-16	Antenna Load

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

RF Test Setup Diagram:





## Configuration NOKI0031-2

Software/Firmware Running during test					
Description	Version				
5G BTS Software Version	SBTS00_ENB_9900_210629_000001				
5G RF_SW	SRM51.06.R04				

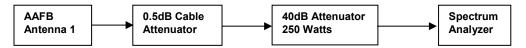
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	J8181470035
ASIK (5G BTS System Module)	Nokia Solutions and Networks	474021A.101	L1184301617
ABIL (5G BTS Baseband Module)	Nokia Solutions and Networks	474020A.102	L1183605740
AAFB (Radio Module Model)	Nokia Solutions and Networks	090148A.103	BL2032H23PI
Attenuator 250W/40dB	API Weinschel	58-40-43-LIM	TC909
AOMC SFP28+ 9.8G,70M,850NM (Radio)	Nokia	474900A.101	VF20230058S
AOMC SFP28+ 9.8G,70M,850NM (BS)	Nokia	474900A.101	VF20230008Y
ThinkPad T490 (WebEM- PC)	Lenovo	20N3S88012	PF26RVZ0
DC System power supply (Radio)	KEYSIGHT	N8757A	US21D4053S
FPAC (DC-PWR supply-BS)	Nokia	472438A.101	G711007170
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-11
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-14
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-10
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-20
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-04
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-05
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-17
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-29
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-30
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-08
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-27
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-24
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-01
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-15
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-28
Antenna Load 1	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 2	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 3	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 4	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 5	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 6	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 7	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 8	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 9	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 10	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 11	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 12	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 13	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 14	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 15	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Fiber Optic cable 10m	Amphenol Fiber Optic	E201648	995109C-180512
GPS Receiver Cable	Nokia	995426C	CA2029
Cat-5e cable	CSA	E151955	LL79189
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_106	SN297374
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX 104	SN551432/4



Cables (Peripheral)								
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1 (5G)	Connection 2			
Fiber Optic Cable	Ν	10 meters	N	ABIL	AAFB			
GPS Receiver Cable	Y	100 meters	N	ASIK	FYGB GPS receiver			
Cat-5e Cable	Y	7 meters	N	ASIK	WebEM- PC			
RD Microwave Systems – RF CABLE	Y	2 meters	Ν	EUT [AAFB] Ant ports 2-16	Antenna Load			

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

**RF Test Setup Diagram:** 





## Configuration NOKI0031-3

Software/Firmware Running during test					
Description	Version				
5G BTS Software Version	SBTS00_ENB_9900_210629_000001				
5G RF_SW	SRM51.06.R04				

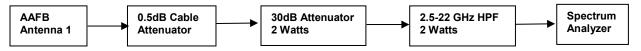
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS System Module)	Nokia Solutions and Networks	473098A.203	J8181470035
ASIK (5G BTS System Module)	Nokia Solutions and Networks	474021A.101	L1184301617
ABIL (5G BTS Baseband Module)	Nokia Solutions and Networks	474020A.102	L1183605740
AAFB (Radio Module Model)	Nokia Solutions and Networks	090148A.103	BL2032H23PI
High Pass Filter 2.5GHz/2W	Microwave Circuits	F-100-3000-5-R	0028
Attenuator 50W/30dB	Narda	776B-30	N/A
AOMC SFP28+ 9.8G,70M,850NM (Radio)	Nokia	474900A.101	VF20230058S
AOMC SFP28+ 9.8G,70M,850NM (BS)	Nokia	474900A.101	VF20230008Y
ThinkPad T490 (WebEM- PC)	Lenovo	20N3S88012	PF26RVZ0
DC System power supply (Radio)	KEYSIGHT	N8757A	US21D4053S
FPAC (DC-PWR supply-BS)	Nokia	472438A.101	G711007170
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-11
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-14
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-10
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-20
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-04
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-05
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-17
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-29
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-30
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-08
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-27
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-24
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-01
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-15
2 Meter RF cable	RD Microwave Systems	CBL-6FT-NMNM-402J-N	18-0204-28
Antenna Load 1	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 2	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 3	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 4	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 5	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 6	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 7	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 8	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 9	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 10	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 11	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 12	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 13	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 13	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Antenna Load 15	R&D Microwaves LLC	TA-A40NFCB-BR	N/A
Fiber Optic cable 10m	Amphenol Fiber Optic	E201648	995109C-180512
GPS Receiver Cable	Nokia	995426C	CA2029
Cat-5e cable	CSA	E151955	LL79189
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX 106	SN297374
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX 104	SN551432/4



Cables (Peripheral)								
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1 (5G)	Connection 2			
Fiber Optic Cable	N	10 meters	N	ABIL	AAFB			
GPS Receiver Cable	Y	100 meters	Ν	ASIK	FYGB GPS receiver			
Cat-5e Cable	Y	7 meters	N	ASIK	WebEM- PC			
RD Microwave Systems – RF CABLE	Y	2 meters	Ν	EUT [AAFB] Ant ports 2-16	Antenna Load			

Cables								
Description	Shield (Y/N)	Length (m)	Ferrite (Y/N)	Connection 1	Connection 2			
HS-SUCOFLEX_106	Y	2 meters	Ν	EUT [AAFB] Ant port #1	Attenuator 50W/30dB			
Attenuator 50W/30dB	N	NA	Ν	RF cable HS- SUCOFLEX_106	High Pass Filter 2.5GHz/2W			
High Pass Filter 2.5GHz/2W	N	NA	Ν	Attenuator 50W/30dB	RF cable HS- SUCOFLEX_104			
HS-SUCOFLEX_104	Y	1 meter	Ν	High Pass Filter 2.5GHz/2W	Analyzer			

#### **RF Test Setup Diagram:**



## **MODIFICATIONS**



## **Equipment Modifications**

Item	Date	Test	Modification	Note	Disposition of EUT
1	2021-07-22	Output Power	Tested as delivered to	No EMI suppression devices were added or	EUT remained at Element following the
		<b>.</b>	Test Station.	modified during this test.	test.
2	2021-07-23	Peak to Average Power (PAPR)CCDF	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2021-07-26	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	2021-07-26	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2021-07-31	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	2021-07-31	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.



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

#### **TEST EQUIPMENT**

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Block - DC Fairview Microwave		AMM	2020-09-21	2021-09-21
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2021-03-11	2022-03-11
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17

#### **TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The method in section 5.4 of ANSI C63.26 was used to make this measurement. The spectrum analyzer settings were as follows:

- RBW is 1% 5% of the occupied bandwidth
- VBW is ≥ 3x the RBW
- Peak Detector was used
- Trace max hold was used

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AAFB) as the original certification test. The AAFB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i, and 6.4.

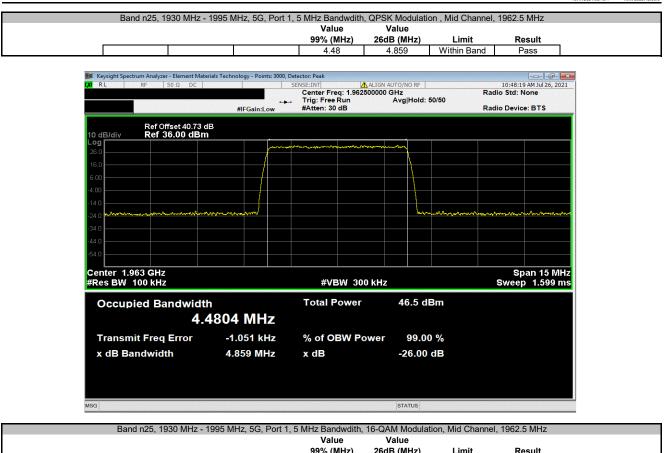
The occupied bandwidth was measured with the EUT configured in the modes called out in the data sheets. FCC 24.238(b) defines he 26dB emission bandwidth requirement. RSS GEN Section 6.7 defines the 99% emission bandwidth requirement.

Ch BW	Radio	5G-NR: QPSK		5G-NR:	5G-NR: 16QAM		64QAM	5G-NR: 2	5G-NR: 256QAM	
	Channel	FCC	ISED	FCC	ISED	FCC	ISED	FCC	ISED	
	Low							4M84G7W	4M47G7W	
5MHz	Mid	4M86G7W	4M48G7W	4M85G7W	4M51G7W	4M87G7W	4M50G7W	4M86G7W	4M48G7W	
	High							4M84G7W	4M49G7W	
	Low							9M88G7W	9M28G7W	
10MHz	Mid	9M89G7W	9M31G7W	9M85G7W	9M26G7W	9M87G7W	9M31G7W	9M88G7W	9M28G7W	
	High							9M88G7W	9M27G7W	
	Low							15M0G7W	14M1G7W	
15MHz	Mid	15M0G7W	14M2G7W	15M0G7W	14M2G7W	14M9G7W	14M1G7W	14M9G7W	14M1G7W	
	High							14M9G7W	14M1G7W	
	Low							19M9G7W	18M9G7W	
20MHz	Mid	19M9G7W	19M0G7W	19M9G7W	19M0G7W	20M0G7W	18M9G7W	19M9G7W	18M9G7W	
	High							20M0G7W	18M9G7W	

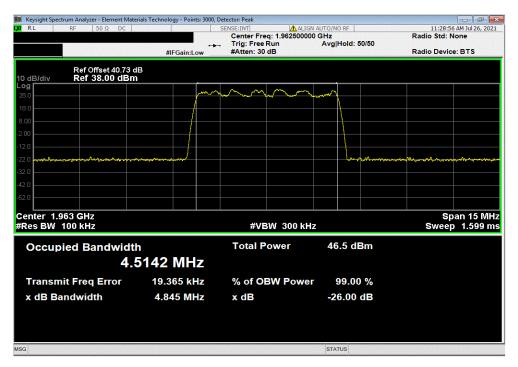


						TbtTx 2021.03.19.1	XMit 202
	3 (FCC/ISED C2PC)				Work Order:		
Serial Number: BL20						26-Jul-21	
	a Solutions and Net d Le, Mitchell Hill	WORKS			Temperature:		
Project: None					Humidity: Barometric Pres.:		
Tested by: Bran			Power: 54 VDC		Job Site:		
T SPECIFICATIONS			Test Method		Job Sile.	1703	
24E:2021			ANSI C63.26:2015				
-133 Issue 6:2013+A	1.2049			018			
MENTS	1:2016		RSS-133 Issue 6:2013+A1:2	.018			
		d for in the reference level offest including any a	attenuators, filters and DC blocks.Ban	d n25 carriers are enabled at	maximum power (6	.25 watts/carrier).	
IATIONS FROM TES	T STANDARD						
figuration #	2	Signature	Jan				
		ognatio	-	Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
l n25, 1930 MHz - 199							
Port	5 MHz Bandy	vdith					
		QPSK Modulation					
		Mid Channel, 1962.5 MHz		4.48	4.86	Within Band	Pass
		16-QAM Modulation		4.54	4.05	Mithin David	Deres
		Mid Channel, 1962.5 MHz 64-QAM Modulation		4.51	4.85	Within Band	Pass
		Mid Channel, 1962.5 MHz		4.50	4.87	Within Band	Pass
		256-QAM Modulation		4.50	4.07	within Dang	1 435
		Low Channel, 1932.5 MHz		4.47	4.84	Within Band	Pass
		Mid Channel, 1962.5 MHz		4.48	4.86	Within Band	Pass
		High Channel, 1992.5 MHz		4.49	4.84	Within Band	Pass
	10 MHz Band			07.70	4.04	Within Dana	1 455
		QPSK Modulation					
		Mid Channel, 1962.5 MHz		9.31	9.89	Within Band	Pass
		16-QAM Modulation					
		Mid Channel, 1962.5 MHz		9.26	9.85	Within Band	Pass
		64-QAM Modulation					
		Mid Channel, 1962.5 MHz		9.31	9.87	Within Band	Pass
		256-QAM Modulation					
		Low Channel, 1935.0 MHz		9.28	9.88	Within Band	Pass
		Mid Channel, 1962.5 MHz		9.28	9.88	Within Band	Pass
		High Channel, 1990 MHz		9.27	9.88	Within Band	Pass
	15 MHz Band						
		QPSK Modulation					
		Mid Channel, 1962.5 MHz		14.2	15.0	Within Band	Pass
		16-QAM Modulation		14.0	15.0	Within Dand	Derr
		Mid Channel, 1962.5 MHz		14.2	15.0	Within Band	Pass
		64-QAM Modulation Mid Channel, 1962.5 MHz		14.1	14.9	Within Band	Pass
		256-QAM Modulation		14.1	14.5	Within Band	газэ
		Low Channel, 1937.5 MHz		14.1	15.0	Within Band	Pass
		Mid Channel, 1962.5 MHz		14.1	14.9	Within Band	Pass
		High Channel, 1987.5 MHz		14.1	14.9	Within Band	Pass
	20 MHz Band				11.0		
		QPSK Modulation					
		Mid Channel, 1962.5 MHz		19.0	19.9	Within Band	Pass
		16-QAM Modulation					
		Mid Channel, 1962.5 MHz		19.0	19.9	Within Band	Pass
		64-QAM Modulation					
		Mid Channel, 1962.5 MHz		18.9	20.0	Within Band	Pass
		256-QAM Modulation					
		Low Channel, 1940 MHz		18.9	19.9	Within Band	Pass
		Mid Channel, 1962.5 MHz		18.9	19.9	Within Band	Pass
		High Channel, 1985 MHz		18.9	20.0	Within Band	

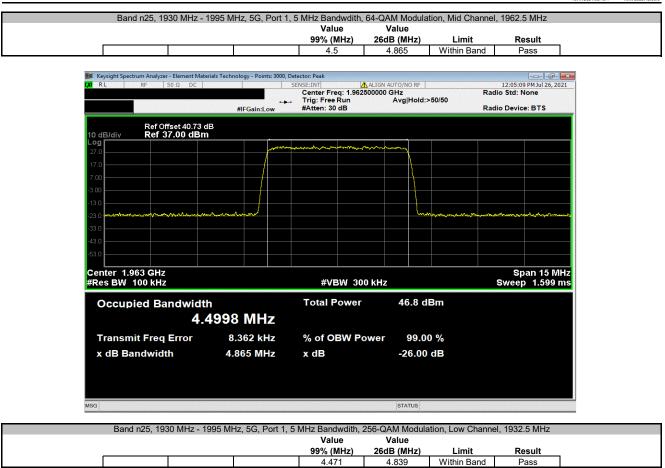


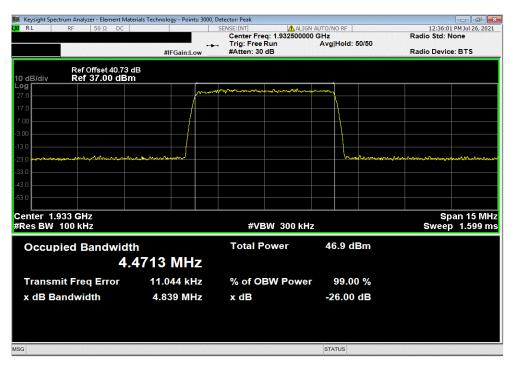


	99% (MHz)	26dB (MHz)	Limit	Result
	4.514	4.845	Within Band	Pass

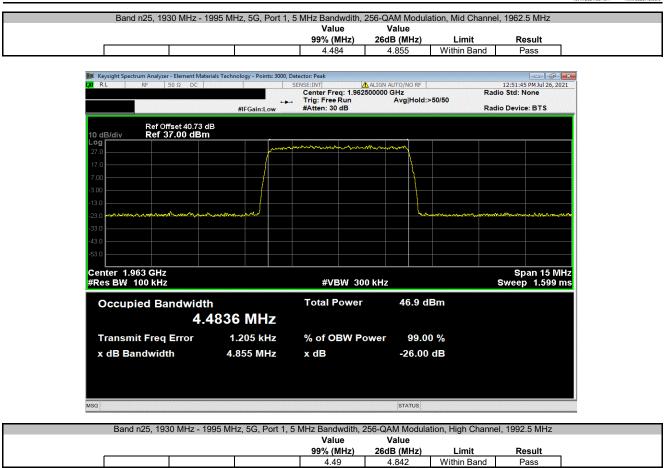












RL RE 50 Q D0		oints: 3000, De					
00 30 01	2	S	ENSE:INT	ALIGN AUTO/			4 PM Jul 26, 202
	#IFGair	n:Low	Center Freq: 1 Trig: Free Rur #Atten: 30 dB	.992500000 GHz Avg	g Hold: 50/50	Radio Std: Radio Devid	
Ref Offset 40.7 dB/div Ref 37.00 d							
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enter 1.993 GHz tes BW 100 kHz			#VBW	300 kHz		S Swee	oan 15 MH p   1.599 n
Occupied Bandwi	dth		Total Pov	ver 4	6.8 dBm		
Occupied Bandwi	<sup>dth</sup> 4.4898 M	Hz	Total Pow	/er 4	6.8 dBm		
	4.4898 M	Hz Hz	Total Pov % of OBW		6.8 dBm 99.00 %		
ransmit Freq Error	4.4898 M	) Hz		Power			
4	4.4898 M	) Hz	% of OBW	Power	99.00 %		



		Value	Value		
		99% (MHz)	26dB (MHz)	Limit	Result
		9.311	9.891	Within Band	Pass
Keysight Spectrum Analyzer - Element Mate					
RL RF 50Ω DC		SENSE:INT Center Freq: 1.962	ALIGN AUTO/NO RF	Ra	04:04:36 PM Jul 23, 2021 dio Std: None
		. Trig: Free Run #Atten: 30 dB	Avg Hold:		dio Device: BTS
	#IFGain:Low	#Atten: 30 dB		Ra	dio Device. B13
Ref Offset 40.73 d	IB				
I0 dB/div Ref 38.00 dBm					
28.0	manton	an management	man mark mark		
18.0					
3.00					
2.00					
12.0					
a second water and a second a second se	mound			human	man have more thank
22.0					
32.0					
2.0					
2.0					
Center 1.963 GHz					Span 25 MH
Res BW 200 kHz		#VBW 62	0 kHz		Sweep 1.2 m
Occupied Bandwidth	h	Total Power	46.8 d	Bm	
		i otari i otror	1010 a		
9	3107 MHz				
Transmit Freq Error	2.198 kHz	% of OBW P	ower 99.0	0 %	
x dB Bandwidth	9.891 MHz	x dB	-26.00	dB	
	9.091 WITZ	хub	-20.00	uв	
SG			STATUS		
Band n25, 1930 MHz - 1	005 MHz 5C Port 1	10 MUZ Pandwdith		ation Mid Channe	1062 5 MU-
Banu 1125, 1950 MHZ - 1	995 MINZ, 56, FUILT,	Value	Value		SI, 1902.5 IVINZ
		99% (MHz)	26dB (MHz)	Limit	Result
		9.262	9.848	Within Band	Pass

Keysight Spectrum Analyzer - Element Ma	terials Technology - Points: 3000			
RL   RF   50 Ω DC	#IFGain:Low	SENSE:INT Center Freq: 1.96250000 Trig: Free Run #Atten: 30 dB	N AUTO/NO RF 0 GHz Avg Hold: 50/50	05:06:55 PM Jul 23, 202 Radio Std: None Radio Device: BTS
Ref Offset 40.73 dB/div Ref 38.00 dBr				
<b>3</b> .0				
3.0				
00				
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.0 Mary mary marked and a solar market	manner		Lunn	and a share and a second and a second and
2.0				
2.0				
enter 1.963 GHz				Span 25 Mł
Res BW 200 kHz		#VBW 620 kH	z	Sweep 1.2 n
Occupied Bandwidt	th	Total Power	46.6 dBm	
9.	2622 MHz			
Transmit Freq Error	-26.270 kHz	% of OBW Powe	r 99.00 %	
	9.848 MHz	x dB	-26.00 dB	
x dB Bandwidth	9.848 WHZ	A db	20.00 48	
x dB Bandwidth	9.848 MHZ		20.00 48	
x dB Bandwidth	9.040 MHZ	× dD		



			Value	Value		
			99% (MHz)	26dB (MHz)	Limit	Result
			9.308	9.874	Within Band	Pass
Keysight Spectrum Analyzer	r - Element Materials Tech 50 Ω DC		SENSE:INT Center Freq: 1.96	ALIGN AUTO/NO RF 2500000 GHz Avg Hold:		09:16:33 AM Jul 26, 20 adio Std: None
		#IFGain:Low	#Atten: 30 dB	Avginoid.		adio Device: BTS
10 dB/div Ref 3	fset 40.73 dB 7 <b>.00 dBm</b>					
og 7.0		man	and have a second and a second a	warman to market and		
7.0		/				
7.00						
3.00						
3.0						
3.0	non managements month	and			- breen marganet	an and the state of the second
3.0						
13.0						
53.0						
Center 1.963 GHz #Res BW 200 kHz			#VBW 6	20 kHz		Span 25 M Sweep 1.2 i
Occupied Ba		2 MHz	Total Powe	r 47.0 d	IBm	
Transmit Freq		2.390 kHz	% of OBW F	ower 99.0	0 %	
x dB Bandwidt	:h 9	.874 MHz	x dB	-26.00	) dB	
Band n25, 193	0 MHz - 1995 MI	Hz, 5G, Port 1, 1	0 MHz Bandwdith Value	status I, 256-QAM Modu Value	lation, Low Chan	nnel, 1935.0 MHz
			99% (MHz)	26dB (MHz)	Limit	Result

RL RF 50 Ω DC		Detector: Peak		- 6
NC N 5032 DC	+ #IFGain:Low	SENSE:INT ALIGN Center Freq: 1.935000000 Trig: Free Run #Atten: 30 dB	OGHz Avg Hold: 50/50	01:49:48 PM Jul 26, 20 Radio Std: None Radio Device: BTS
Ref Offset 40.73 dB/div Ref 38.00 dB				
g	Junior	and and a second and a second and the second and th		
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_ wardstronger all and an and the second states and the second sta	and the second			and a freedorie and the second second
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0				
enter 1.935 GHz es BW 200 kHz		#VBW 620 kH	Z	
	th	#VBW 620 kH: Total Power	2 47.1 dBm	
es BW 200 kHz Occupied Bandwid	<sup>th</sup> .2747 MHz			
es BW 200 kHz Occupied Bandwid 9.			47.1 dBm	
es BW 200 kHz Occupied Bandwid	.2747 MHz	Total Power	47.1 dBm	Span 25 MI Sweep 1.2 n
es BW 200 kHz Occupied Bandwid 9, Transmit Freq Error	.2747 MHz 19.373 kHz	Total Power % of OBW Power	47.1 dBm 99.00 %	
es BW 200 kHz Occupied Bandwid 9, Transmit Freq Error	.2747 MHz 19.373 kHz	Total Power % of OBW Power	47.1 dBm 99.00 %	



Band n25, 1930 MHz - 1995 MHz,		Valu	e	Value			
· · · · · · · · · · · · · · · · · · ·		99% (M		6dB (MHz)	Limit	Result	-
		9.28	3	9.875	Within Band	Pass	
Keysight Spectrum Analyzer - Element Materials Technolog							
XIRL RF 50Ω DC	SEI	NSE:INT	aLio	IN AUTO/NO RF	F	09:46:00 AM Jul 26, Radio Std: None	2021
		Trig: Free F	Run	Avg Hold:	>50/50		
#IF	Gain:Low	#Atten: 30	dB		F	adio Device: BTS	
Ref Offset 40.73 dB							
10 dB/div Ref 37.00 dBm							
Log	momente	han marine	monte	mmmmmm			
27.0	/						
17.0	/						
7.00							
-3.00				_	_		
-13.0					_		
-23.0 white the har white har was a set of					mound	manager and a state of the stat	www.
-33.0							
-43.0							
-53.0							
Center 1.963 GHz						Span 25 l	MHZ
#Res BW 200 kHz		#VB	W 620 kH	lz		Sweep 1.2	
						-	
Occupied Bandwidth		Total P	ower	47.0 d	lBm		
9.2827	MHZ						
Transmit Freq Error 12.40	03 kHz	% of OE	3W Powe	r 99.0	0 %		
x dB Bandwidth 9.87	5 MHz	x dB		-26.00	) dB		
				STATUS			
MSG	while we are also being a fit wanted in the second in the second se						
MSG Band n25, 1930 MHz - 1995 MHz,	5G, Port 1, 10				ulation, High Cha	annel, 1990 MHz	
	5G, Port 1, 10	Valu	e	Value			
	5G, Port 1, 10		e  Hz) 20		ulation, High Cha Limit Within Band	Result	_

RL RF 50 Ω DC	erials Technology - Points: 3000,		N AUTO/NO RF	02:01:11 PM Jul 26, 202
KL RF 50.52 DC		Center Frea: 1.9900000		Radio Std: None
			Avg Hold: 50/50	Hadio ota. Hone
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
Ref Offset 40.73 of				
dB/div Ref 37.00 dBm	<u>,                                     </u>			
.0	monter	werder of the second over the mark the free	mannen	
	/		N N	
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10				
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an able of seathers and hard an bold and	monorm		margan	war and and a sub- and a sub-
0				
0				
.0				
.0				
enter 1.99 GHz				Span 25 Mi
es BW 200 kHz		#VBW 620 kH	IZ	Sweep 1.2 n
Occupied Bandwidt	h	Total Power	46.9 dBm	
	2677 MHz			
<b>9</b> '				
9.3				
	14.381 kHz	% of OBW Powe	r 99.00 %	
Transmit Freq Error	14.381 kHz			
9./ Transmit Freq Error x dB Bandwidth		% of OBW Powe x dB	r 99.00 % -26.00 dB	
Transmit Freq Error	14.381 kHz			
Transmit Freq Error	14.381 kHz			
Transmit Freq Error	14.381 kHz			
Transmit Freq Error	14.381 kHz			



		Value	Value		
		99% (MHz)	26dB (MHz)	Limit	Result
		14.152	14.967	Within Band	Pass
23.0	#IFGain:Low	SENSE:INT Center Freq: 1.962 Trig: Free Run #Atten: 30 dB	ALIGN AUTO/NO RF 500000 GHz Avg Hold:	50/50 Rac	01:27:36 PM Jul 23, 202 dio Std: None dio Device: BTS
330 430 430 430 430 430 430 430 430 430		#VBW 75	0 kHz		Span 35 M <del>I</del> Sweep 1.2 m
	152 MHz	Total Power			
Transmit Freq Error	5.176 kHz	% of OBW P	ower 99.0	0 %	
x dB Bandwidth	14.97 MHz	x dB	-26.00	dB	
ISG			STATUS		
Band n25, 1930 MHz - 199	95 MHz, 5G, Port 1,	15 MHz Bandwdith Value 99% (MHz)	Value	ation, Mid Channe Limit	,
		397⁄₀ (IVIFIZ)	26dB (MHz)	LIIIII	Result

RL RF 50 Ω DC	erials Technology - Points: 3000,		ALIGN AUTO/NO RF	01:56:25 PM Jul 23, 202
		Center Freq: 1.9625		Radio Std: None
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
Ref Offset 40.73 of				
dB/div Ref 38.00 dBn	<u>ן א</u>			
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enter 1.963 GHz				Snop 25 Mil
es BW 240 kHz		#VBW 750		Span 35 MI Sweep 1.2 n
		#VDVV / JU		Sweep 1.21
Occupied Bandwidt	h	Total Power	47.1 dBm	
Occupied Bandwidt		Total Power	47.1 dBm	
	հ Խ153 MHz	Total Power	47.1 dBm	
14	.153 MHz			
14 Transmit Freq Error	15.946 kHz	% of OBW Po	wer 99.00 %	
	.153 MHz			
14 Transmit Freq Error	15.946 kHz	% of OBW Po	wer 99.00 %	
14 Transmit Freq Error	15.946 kHz	% of OBW Po	wer 99.00 %	
14 Transmit Freq Error	15.946 kHz	% of OBW Po	wer 99.00 %	
14 Transmit Freq Error	15.946 kHz	% of OBW Po	wer 99.00 %	



Center Freq: 1.962500000 GHz     Radio Std: None       #//FGain:Low     Trig: Free Run     Avg Hold: 50/50       Ref Offset 40.73 dB     dB       0 dB/div     Ref 37.00 dBm       0 g	It.121     14.121     14.931     Within Band     Pass       It. Reprint Spectrum Analyzer - Element Materials Technology - Points: 3000, Detector. Peak     Control Peak     Control Peak       RL     RF     50 Ω     DC     SENSE:INT     ALIGN AUTO/NO RF     02:42:14 PM Jul 23, 2021       RL     RF     50 Ω     DC     Center Freq: 1.962500000 GHz     Radio Std: None       #IFGain:Low     #IFGain:Low     #ALIGN AUTO/NO RF     Radio Std: None       Ref Offset 40.73 dB     Ref 37.00 dBm     Radio Std: None       9     Control Peak     Control Peak			Value	Value		
Keysight Spectrum Analyzer - Element Materials Technology - Points: 3000, Detector: Peak       02:42:14 PM Jul 23, 2021         RL       RF       50 Ω       DC       SENSE:INT       ALIGN AUTO/NO RF       02:42:14 PM Jul 23, 2021         Center Freq: 1.962500000 GHz       Trig: Free Run       Avg Hold: 50/50       Radio Device: BTS         Ref Offset 40.73 dB       #HEGain:Low       #Atten: 30 dB       Radio Device: BTS         7.00       0       0       0       0         7.00       0       0       0       0         800       0       0       0       0         7.00       0       0       0       0         800       0       0       0       0       0         7.00       0       0       0       0       0         800       0       0       0       0       0         800       0       0       0       0       0       0         800       0       0       0       0       0       0       0         800       0       0       0       0       0       0       0       0         800       0       0       0       0       0	Keysight Spectrum Analyzer - Element Materials Technology - Points: 3000, Detector: Peak       C       SENSE::UT       ALIGN AUTO/NO RF       02:42:14 PMJ U32, 2021         RL       RF       50 Ω       DC       SENSE::UT       ALIGN AUTO/NO RF       02:42:14 PMJ U32, 2021         #IFGain:Low       #IFGain:Low       #Atign Auto/No RF       02:42:14 PMJ U32, 2021       Radio Std:: None         Ref Offset 40.73 dB       #IFGain:Low       #Atten: 30 dB       AuglHold: 50/50       Radio Device: BTS         0 d5/div       Ref 37.00 dBm       0 <t< th=""><th></th><th></th><th></th><th>26dB (MHz)</th><th>Limit</th><th>Result</th></t<>				26dB (MHz)	Limit	Result
RL     RF     50 Ω     DC     SENSE:INT     ALIGN AUTO/NO RF     02:42:14 PM Jul 23, 2021       Center Freq: 1.9620000 GHz     Radio Std: None     Radio Std: None     Radio Std: None       #FGain:Low     #Atten: 30 dB     Radio Device: BTS	RL       RF       50 Ω       DC       SENSE:INT       ALIGN AUTO/NO RF       02:42:14 PMJul 23, 2021         Center Freq: 1.962 00000 GHz       Radio Std: None       Radio Std: None       Radio Device: BTS         Ref Offset 40.73 dB       Ref 37.00 dBm       Game and			14.121	14.931	Within Band	Pass
	Sing Sing Span 35 MHz	RL         RF         50 Ω         DC           Ref Offset 40.73 dB         Ref 37.00 dBm         Ref 37.00 dBm           0         dB/div         Ref 37.00 dBm         Ref 37.00 dBm           0         30         30         Ref 37.00 dBm         Ref 37.00 dBm	#IFGain:Low	SENSE:INT Center Freq: 1.962 Trig: Free Run #Atten: 30 dB	500000 GHz Avg Hold: :	50/50 Ra	02:42:14 PM Jul 23, 202 dio Std: None dio Device: BTS
Occupied Bandwidth Total Power 47.0 dBm 14.121 MHz		Transmit Freq Error	17.705 kHz	% of OBW P	ower 99.00	0 %	
14.121 MHz	Transmit Freq Error 17.705 kHz % of OBW Power 99.00 %	x dB Bandwidth	14 93 MHz	x dB	-26.00	dB	
14.121 MHz		so Band n25, 1930 MHz - 1995 N	MHz, 5G, Port 1,	,		ation, Low Chanr	nel, 1937.5 MHz
14.121 MHz         Transmit Freq Error       17.705 kHz       % of OBW Power       99.00 %         x dB Bandwidth       14.93 MHz       x dB       -26.00 dB	x dB Bandwidth 14.93 MHz x dB -26.00 dB			99% (MHz)	26dB (MHz)	Limit	Result
14.121 MHz         Transmit Freq Error       17.705 kHz       % of OBW Power       99.00 %         x dB Bandwidth       14.93 MHz       x dB       -26.00 dB         sq       status         Band n25, 1930 MHz - 1995 MHz, 5G, Port 1, 15 MHz Bandwdith, 256-QAM Modulation, Low Channel, 1937.5 MHz         Value	x dB Bandwidth 14.93 MHz x dB -26.00 dB						

Keysight Spectrum Analyzer - Element Mate	rials Technology - Points: 3000,			
RL RF 50 Ω DC		SENSE:INT ALIGN Center Freq: 1.937500000 Trig: Free Run #Atten: 30 dB	AUTO/NO RF GHz Avg Hold: 50/50	03:27:38 PM Jul 23, 202 Radio Std: None
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
Ref Offset 40.73 d dB/div Ref 38.00 dBm				
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nter 1.938 GHz				Span 35 Mł
es BW 240 kHz		#VBW 750 kHz		Sweep 1.2 n
Occupied Bandwidt	h	Total Power	47.4 dBm	
	.069 MHz			
14				
	32.660 kHz	% of OBW Power	99.00 %	
Transmit Freq Error		% of OBW Power x dB	99.00 % -26.00 dB	
Transmit Freq Error	32.660 kHz			
Transmit Freq Error	32.660 kHz			
Transmit Freq Error x dB Bandwidth	32.660 kHz			



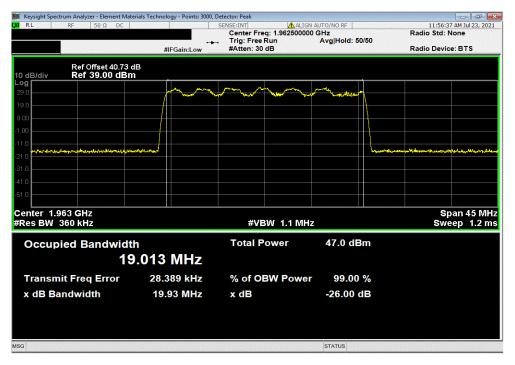
		Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
		14.101	14.902	Within Band	Pass
Keysight Spectrum Analyzer - Elem	ent Materials Technology - Points: 3	000, Detector: Peak			
<mark>X/</mark> RL RF 50 Ω	DC		ALIGN AUTO/NO RF	-	03:16:23 PM Jul 23, 20
		Center Freq: 1.962	Avg Hold:		idio Std: None
	#IFGain:Low	#Atten: 30 dB		Ra	dio Device: BTS
Ref Offset 4	10 73 dB				
10 dB/div Ref 38.00	dBm				
28.0		men the set with a lallow of the	making		
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18.0					
8.00					
-2.00					
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22.0 Agronne and a constants	anananantahashari			and a second and a second	hallshare and held proved a state of the second
-32.0					
-42.0					
-52.0					
Center 1.963 GHz		4) (D)41 7(			Span 35 M
#Res BW 240 kHz		#VBW 75	OU KHZ		Sweep 1.2
Occupied Bandy	width	Total Power	47.2 d	Bm	
Cocupied Ballat	14.101 MHz				
Transmit Freq Erro	or 30.954 kHz	% of OBW P	ower 99.0	0 %	
x dB Bandwidth	14.90 MHz	x dB	-26.00	dB	
	14.50 1112		20.00		
MSG			STATUS		

		Value	Value		
		99% (MHz)	26dB (MHz)	Limit	Result
		14.091	14.935	Within Band	Pass

RL RF 50 Ω DC				
			AUTO/NO RF	03:05:07 PM Jul 23, 202
	+ #IFGain:Low	Center Freq: 1.987500000 Trig: Free Run #Atten: 30 dB	Avg Hold:>50/50	Radio Std: None Radio Device: BTS
Ref Offset 40.73 dB/div Ref 39.00 dB				
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Constrant with many laders of strategy	monorman		Logobers	mond along the second and the second
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enter 1.988 GHz				Span 35 Mi
		#VBW 750 kHz	2	Sweep 1.2 n
Occupied Bandwid	lth	#VBW 750 kHz Total Power	47.2 dBm	Sweep 1.2 n
es BW 240 kHz Occupied Bandwid	<sub>ith</sub> 4.091 MHz			Sweep 1.2 n
es BW 240 kHz Occupied Bandwid			47.2 dBm	Sweep 1.2 n
es BW 240 kHz Occupied Bandwid 1	4.091 MHz	Total Power	47.2 dBm	Sweep 1.2 n
es BW 240 kHz Occupied Bandwid 1 Transmit Freq Error	4.091 MHz 24.573 kHz	Total Power % of OBW Power	47.2 dBm 99.00 %	Sweep 1.2 n



						TbtTx 2021.03.19.1
Band n25, 1930 MHz - 1995 MH	Iz, 5G, Port 1, 2			ion , Mid Channel	, 1962.5 MHz	
		Value	Value	Linet	Desult	
		99% (MHz) 18.953	26dB (MHz) 19.919	Limit Within Band	Result Pass	
		10.955	19.919	Within Danu	Pass	
-						
Keysight Spectrum Analyzer - Element Materials Technol M RL RF 50 Ω DC			ALIGN AUTO/NO RF		12:21:43 PM Jul 23, 2021	
N 5032 DC		Center Freq: 1.962	500000 GHz		lio Std: None	
	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>		lio Device: BTS	
	HI Gam.LOW					-
Ref Offset 40.73 dB						
10 dB/div Ref 37.00 dBm		_				
27.0	and the second and a second	strikeyessentre rangere	durt and the property and the second	-m		
17.0						
7.00						
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-23.0				Marine and a series	and the second	<b>~</b>
-33.0						
-33.0						
-53.0						
Center 1.963 GHz			1		Span 45 MH	z
#Res BW 360 kHz		#VBW 1.1	l MHz		Sweep 1.2 m	
		Total Power	47.1 d	D		
Occupied Bandwidth		rotal Power	47.1 0	BIII		
18.953	MHz					
Transmit Freq Error 1.	729 kHz	% of OBW Po	ower 99.00	0 %		
x dB Bandwidth 19	.92 MHz	x dB	-26.00	dB		
MSG			STATUS			
						our contraction of the second s
Band n25, 1930 MHz - 1995 MH	z, 5G, Port 1, 2	0 MHz Bandwdith,	, 16-QAM Modula	ation, Mid Channe	l, 1962.5 MHz	
		Value	Value			
		99% (MHz)	26dB (MHz)	Limit	Result	
		19.013	19.934	Within Band	Pass	





		lue Value	1	Desult
		(MHz) 26dB (MHz 937 20.02	) Limit Within Band	Result Pass
	10.	337 20.02	Within Danu	1 435
Keysight Spectrum Analyzer - Element Materials Technolog	gy - Points: 3000, Detector: Peak			
X RL RF 50 Ω DC	SENSE:INT	ALIGN AUTO/NO R		11:13:55 AM Jul 23, 202
	Center F	req: 1.962500000 GHz e Run Avg Hol	d:>50/50	adio Std: None
#1	Gain:Low #Atten:	30 dB	Ra	adio Device: BTS
Ref Offset 40.73 dB				
10 dB/div Ref 37.00 dBm				
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-33.0				
-43.0				
-53.0				
				0 5 0 MI
Center 1.963 GHz #Res BW 360 kHz	#\	/BW 1.1 MHz		Span 50 MH Sweep 1.2 m
Occupied Bandwidth		Power 47.2	dBm	
18.937	MHz			
Transmit Freq Error 27.8	82 kHz % of (	OBW Power 99	.00 %	
x dB Bandwidth 20.0	2 MHz x dB	-26.0	00 dB	
una				
MSG		STATUS		
Band n25, 1930 MHz - 1995 MHz,	5G Port 1 20 MHz B	andwdith 256-0AM Mc	dulation I ow Cha	nnel 1940 MH <del>z</del>
		lue Value	Calledon, Low Ond	
	99%	(MHz) 26dB (MHz	) Limit	Result

RL RF 50 Ω DC	aterials Technology - Points: 3000,			
			AUTO/NO RF	10:29:22 AM Jul 23, 202
	#IFGain:Low	Center Freq: 1.94000000 , Trig: Free Run #Atten: 30 dB	GHz Avg Hold: 50/50	Radio Std: None Radio Device: BTS
Ref Offset 40.73 dB/div Ref 37.00 dB				
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enter 1.94 GHz		#VBW 1.1 MHz	,	Span 45 MH Sweep 1.2 m
tes BW 360 kHz				0wccb 1.2 ll
	lth	Total Power	47.3 dBm	0wccp 1.21
Occupied Bandwid	<sup>ith</sup> 8.893 MHz			
Occupied Bandwid 1			47.3 dBm	
tes BW 360 kHz Occupied Bandwid 1 Transmit Freq Error x dB Bandwidth	8.893 MHz	Total Power	47.3 dBm	
Occupied Bandwid 1 Transmit Freq Error	8.893 MHz 26.246 kHz	Total Power % of OBW Power	47.3 dBm 99.00 %	



		Value		I insit	Desult
		99% (MHz) 18.903	26dB (MHz) 19.947	Limit Within Band	Result Pass
Keysight Spectrum Analyzer - Element Materials Techno RL RF 50 Ω DC		Detector: Peak	ALIGN AUTO/NO RF		10:01:41 AM Jul 23, 20
	#IFGain:Low	Center Freq: 1.9		50/50	adio Std: None
Ref Offset 40.73 dB 10 dB/div Ref 37.00 dBm					
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23.0					
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Center 1.963 GHz #Res BW 360 kHz		#VBW	1.1 MHz		Span 45 MI Sweep 1.2 n
Occupied Bandwidth		Total Powe	er 47.0 di	Зm	
18.903					
•	067 kHz	% of OBW			
x dB Bandwidth 19	.95 MHz	x dB	-26.00	dB	
ISG			STATUS		
Band n25, 1930 MHz - 1995 MH	z, 5G, Port 1,			ation, High Chai	nnel, 1985 MHz
		Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
		•• /• (mili iz)			

	erials Technology - Points: 3000,			
RL RF 50 Ω DC			AUTO/NO RF	10:47:28 AM Jul 23, 202
		Center Freq: 1.985000000 Trig: Free Run #Atten: 30 dB	GHz Avg Hold:>50/50	Radio Std: None Radio Device: BTS
Ref Offset 40.73 d dB/div Ref 38.00 dBm				
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enter 1.985 GHz		#VBW 1.1 MHz	1. I	Span 45 Mł Sweep 1.2 n
				Jweep 1.2 li
tes BW 360 kHz				
Occupied Bandwidt		Total Power	47.2 dBm	
Occupied Bandwidt	<sup>h</sup> 8.898 MHz		47.2 dBm	
Occupied Bandwidt 18			47.2 dBm 99.00 %	
Occupied Bandwidt	8.898 MHz	Total Power		
Occupied Bandwidt 18 Transmit Freq Error	10.587 kHz	Total Power % of OBW Power	99.00 %	
Occupied Bandwidt 18 Transmit Freq Error	10.587 kHz	Total Power % of OBW Power	99.00 %	
Occupied Bandwidt 18 Transmit Freq Error	10.587 kHz	Total Power % of OBW Power	99.00 %	

## **OUTPUT POWER**



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	SD3379	AMM	2020-09-21	2021-09-21
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2021-03-11	2022-03-11
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 a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AAFB) as the original certification test. The AAFB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i and 6.4.

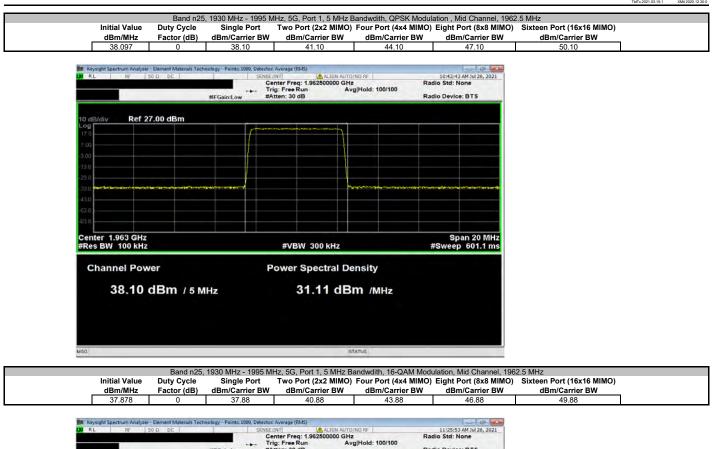
The total average transmit power of all antenna ports was determined per ANSI C63.26-2105 paragraph 6.4.3.1.

### **OUTPUT POWER**



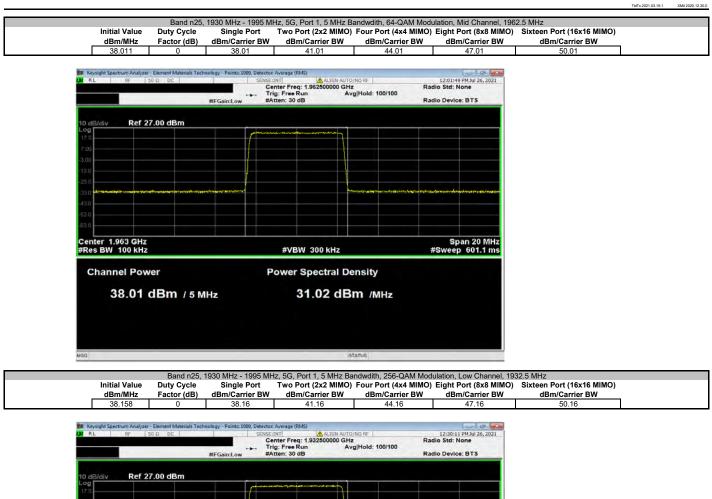
								TbtTx 2021.03.19.1	XMit 2020.12.3
	AAFB (FCC/ISED C2PC)						Work Order:		
	BL2032H23PI							26-Jul-21	
Customer:	Nokia Solutions and Netw	works					Temperature:		
Attendees:	David Le, Mitchell Hill						Humidity:		
Project:							Barometric Pres.:		
	Brandon Hobbs		Power	: 54 VDC			Job Site:	TX09	
EST SPECIFICATI	ONS			Test Method					
CC 24E:2021				ANSI C63.26:201	5				
SS-133 Issue 6:20	013+A1:2018			RSS-133 Issue 6:	2013+A1:2018				
OMMENTS									
neasurements at t vas determined ba	he radio output ports. The used upon ANSI 63.26 clau	d for in the reference level offest in output power was measured for a ises 6.4.3.1 and 6.4.3.2.4 (10 log Noi for eight port operation is single po	single carrier over th it). The total output p	e carrier channel b ower for two port	andwidth on port 1. Toperation is single po	The total output power t ort power + 3dB [i.e. 10]	for multiport (2x2 MIMC og(2)]. The total output	, 4x4 MIMO, 8x8 MIMO power for four port op	& 16x16 MIMO) operation
EVIATIONS FROM	I TEST STANDARD								
one									
onfiguration #	2	Signature	7-4	Jar					
			Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Two Port (2x2 MIMO) dBm/Carrier BW	Four Port (4x4 MIMO) dBm/Carrier BW	Eight Port (8x8 MIMO) dBm/Carrier BW	Sixteen Port (16x16 MIMC dBm/Carrier BW
and n25, 1930 MH	z - 1995 MHz, 5G		(B)	r dotor (dB)	abiliteration bit	abilit out it of the	abilito bit	abili danioi bili	abilit danier bit
	Port 1 5 MHz Bandw								
		QPSK Modulation							
		Mid Channel, 1962.5 MH	z 38.097	0	38.1	41.1	44.1	47.1	50.1
		Mid Channel, 1962.5 MH 16-QAM Modulation							
	i	Mid Channel, 1962.5 MH 16-QAM Modulation Mid Channel, 1962.5 MH		0	38.1 37.9	41.1 40.9	44.1 43.9	47.1 46.9	50.1 49.9
	i	Mid Channel, 1962.5 MH 16-QAM Modulation Mid Channel, 1962.5 MH 64-QAM Modulation	z 37.878	0	37.9	40.9	43.9	46.9	49.9
	1	Mid Channel, 1962.5 MH 16-QAM Modulation Mid Channel, 1962.5 MH 64-QAM Modulation Mid Channel, 1962.5 MH	z 37.878						
	1	Mid Channel, 1962.5 MH 16-QAM Modulation Mid Channel, 1962.5 MH 64-QAM Modulation Mid Channel, 1962.5 MH 256-QAM Modulation	iz 37.878 iz 38.011	0	37.9 38.0	40.9 41.0	43.9 44.0	46.9 47.0	49.9 50.0
	1	Mid Channel, 1962.5 MH 16-QAM Modulation Mid Channel, 1962.5 MH 64-QAM Modulation Mid Channel, 1962.5 MH 256-QAM Modulation Low Channel, 1932.5 MI	iz 37.878 iz 38.011 iz 38.158	0	37.9 38.0 38.2	40.9 41.0 41.2	43.9 44.0 44.2	46.9 47.0 47.2	49.9 50.0 50.2
	1	Mid Channel, 1962.5 MF 16-QAM Modulation Mid Channel, 1962.5 MF 64-QAM Modulation Mid Channel, 1962.5 MF 256-QAM Modulation Low Channel, 1982.5 MF Mid Channel, 1962.5 MF	z 37.878 z 38.011 tz 38.158 z 37.949	0 0 0 0 0 0 0	37.9 38.0 38.2 37.9	40.9 41.0 41.2 40.9	43.9 44.0 44.2 43.9	46.9 47.0 47.2 46.9	49.9 50.0 50.2 49.9
	10 MHz Band	Mid Channel, 1962.5 MF 16-QAM Modulation Mid Channel, 1962.5 MF 64-QAM Modulation 256-QAM Modulation Low Channel, 1932.5 M Mid Channel, 1932.5 M High Channel, 1992.5 M High Channel, 1992.5 M S66-QAM Modulation	z 37.878 Iz 38.011 Iz 38.158 Iz 37.949 Hz 37.927	0 0 0 0 0 0	37.9 38.0 38.2 37.9 37.9	40.9 41.0 41.2 40.9 40.9	43.9 44.0 44.2 43.9 43.9	46.9 47.0 47.2 46.9 46.9	49.9 50.0 50.2 49.9 49.9
	10 MHz Band	Mid Channel, 1962.5 MF 16-QAM Modulation Mid Channel, 1962.5 MF 64-QAM Modulation Mid Channel, 1962.5 MF 256-QAM Modulation High Channel, 1982.5 M High Channel, 1992.5 M 256-QAM Modulation Low Channel, 1935 MHz	z 37.878 z 38.011 łz 38.158 z 37.949 Hz 37.927 38.245	0 0 0 0 0	37.9 38.0 38.2 37.9 37.9 37.9	40.9 41.0 41.2 40.9 40.9 41.2	43.9 44.0 44.2 43.9 43.9 44.2	46.9 47.0 47.2 46.9 46.9 46.9	49.9 50.0 50.2 49.9 49.9 50.2
	10 MHz Band	Mid Channel, 1962.5 MF 16-QAM Modulation Mid Channel, 1962.5 MF 64-QAM Modulation Mid Channel, 1962.5 MF 256-QAM Modulation Low Channel, 1982.5 M High Channel, 1982.5 MF High Channel, 1982.5 MF 256-QAM Modulation Low Channel, 1985 MF Mid Channel, 1982.5 MF	Iz 37.878 Iz 38.011 Iz 38.158 Iz 37.949 IIZ 37.927 38.245 IZ 37.978	0 0 0 0 0 0	37.9 38.0 38.2 37.9 37.9 37.9 38.2 38.0	40.9 41.0 41.2 40.9 40.9 41.2 41.0	43.9 44.0 44.2 43.9 43.9 44.2 44.0	46.9 47.0 47.2 46.9 46.9 46.9 47.2 47.0	49.9 50.0 60.2 49.9 49.9 49.9 50.2 50.2 50.0
	10 MHz Band	Mid Channel, 1962.5 MF 16-QAM Modulation Mid Channel, 1962.5 MF 64-QAM Modulation Mid Channel, 1962.5 MF 256-QAM Modulation Low Channel, 1932.5 M High Channel, 1982.5 MF High Channel, 1992.5 MF 256-QAM Modulation Low Channel, 1935 MF Mid Channel, 1935 MF High Channel, 1930 MF	Iz 37.878 Iz 38.011 Iz 38.158 Iz 37.949 IIZ 37.927 38.245 IZ 37.978	0 0 0 0 0	37.9 38.0 38.2 37.9 37.9 37.9	40.9 41.0 41.2 40.9 40.9 41.2	43.9 44.0 44.2 43.9 43.9 44.2	46.9 47.0 47.2 46.9 46.9 46.9	49.9 50.0 50.2 49.9 49.9 50.2
	10 MHz Band 15 MHz Band	Mid Channel, 1962.5 MF 16-QAM Modulation Mid Channel, 1962.5 MF 64-QAM Modulation Mid Channel, 1962.5 MF 256-QAM Modulation Low Channel, 1932.5 M High Channel, 1992.5 M Width 256-QAM Modulation Low Channel, 1935 MFL Mid Channel, 1990 MH Wdth Width 256-QAM Modulation	z 37.878 z 38.011 tz 38.158 z 37.949 tz 37.927 38.245 z 37.978 z 38.015		37.9 38.0 37.9 37.9 37.9 37.9 38.0 38.0 38.0 38.0	40.9 41.0 41.2 40.9 40.9 41.2 41.0 41.0	43.9 44.0 44.2 43.9 43.9 43.9 44.2 44.0 44.0	46.9 47.0 47.2 46.9 46.9 47.2 47.0 47.0 47.0	49.9 50.0 50.2 49.9 49.9 50.2 50.0 50.0
	10 MHz Band 15 MHz Band	Mid Channel, 1962.5 MF 18-QAM Modulation Mid Channel, 1962.5 MF 84-QAM Modulation Low Channel, 1962.5 MF USE Channel, 1962.5 MF High Channel, 1962.5 MF High Channel, 1992.5 MF Width 256-QAM Modulation High Channel, 1962.5 MF High Channel, 1962.5 MF High Channel, 1992.6 MF High Channel, 1992.7 MF Low Channel, 1992.7 MF Start Channel, 1993.7 S MF Low Channel, 1937.5 MF	z 37.878 z 38.011 tz 38.158 z 37.949 Hz 37.927 s8.245 tz 37.978 z 38.015 tz 38.107		37.9 38.0 37.9 37.9 37.9 38.2 38.0 38.0 38.0 38.0	40.9 41.0 41.2 40.9 40.9 40.9 41.2 41.0 41.0	43.9 44.0 44.2 43.9 43.9 43.9 44.2 44.0 44.0 44.0	46.9 47.0 47.2 46.9 46.9 47.2 47.0 47.0 47.0	49.9 50.0 50.2 49.9 49.9 50.2 50.0 50.0 50.0 50.0
	10 MHz Band 15 MHz Band	Mid Channel, 1962.5 MF 16-QAM Modulation Mid Channel, 1962.5 MF 64-QAM Modulation Mid Channel, 1962.5 MF 256-QAM Modulation Low Channel, 1982.5 MF High Channel, 1982.5 MF 266-QAM Modulation Low Channel, 1982.5 MF High Channel, 1982.5 MF High Channel, 1982.5 MF High Channel, 1982.5 MF Channel, 1982.5 MF Mid Channel, 1982.5 MF	z 37.878 z 38.011 tz 38.158 tz 37.949 Hz 37.949 Hz 37.927 38.245 iz 37.978 z 38.015 tz 37.791		37.9 38.0 37.9 37.9 37.9 38.2 38.0 38.0 38.0 38.0 38.1 37.8	40.9 41.0 40.9 40.9 40.9 41.2 41.0 41.0 41.0 41.1 40.8	43.9 44.0 44.2 43.9 43.9 43.9 44.0 44.0 44.0 44.0 44.1 43.8	46.9 47.0 47.2 46.9 46.9 47.2 47.0 47.0 47.0 47.0 47.1 48.8	49.9 50.0 50.2 49.9 49.9 50.2 50.0 50.0 50.0 50.0
	10 MHz Band 15 MHz Band	Mid Channel, 1962.5 MF 16-QAM Modulation Mid Channel, 1962.5 MF 64-QAM Modulation Mid Channel, 1962.5 MF 256-QAM Modulation Low Channel, 1932.5 Mi High Channel, 1932.5 MF Kid Channel, 1935 MF Mid Channel, 1935 MF High Channel, 1935 MF High Channel, 1930 MF 256-QAM Modulation Low Channel, 1937.5 Mi Mid Channel, 1937.5 Mi Mid Channel, 1937.5 Mi	z 37.878 z 38.011 tz 38.158 tz 37.949 Hz 37.949 Hz 37.927 z 38.245 z 38.015 tz 37.781		37.9 38.0 37.9 37.9 37.9 38.2 38.0 38.0 38.0 38.0	40.9 41.0 41.2 40.9 40.9 40.9 41.2 41.0 41.0	43.9 44.0 44.2 43.9 43.9 43.9 44.2 44.0 44.0 44.0	46.9 47.0 47.2 46.9 46.9 47.2 47.0 47.0 47.0	49.9 50.0 50.2 49.9 49.9 50.2 50.0 50.0 50.0 50.0
	10 MHz Band 15 MHz Band 20 MHz Band	Mid Channel, 1962.5 MF 16-QAM Modulation Mid Channel, 1962.5 MF 64-QAM Modulation Mid Channel, 1962.5 MF 256-QAM Modulation Low Channel, 1932.5 Mi High Channel, 1932.5 MF Kid Channel, 1935 MF Mid Channel, 1935 MF High Channel, 1935 MF High Channel, 1930 MF 256-QAM Modulation Low Channel, 1937.5 Mi Mid Channel, 1937.5 Mi Mid Channel, 1937.5 Mi	z 37.878 z 38.011 tz 38.158 tz 37.949 Hz 37.949 Hz 37.927 38.245 iz 37.978 z 38.015 tz 37.791		37.9 38.0 37.9 37.9 37.9 38.2 38.0 38.0 38.0 38.0 38.1 37.8	40.9 41.0 40.9 40.9 40.9 41.2 41.0 41.0 41.0 41.1 40.8	43.9 44.0 44.2 43.9 43.9 43.9 44.0 44.0 44.0 44.0 44.1 43.8	46.9 47.0 47.2 46.9 46.9 47.2 47.0 47.0 47.0 47.0 47.1 48.8	49.9 50.0 50.2 49.9 49.9 49.9 50.2 50.0 50.0 50.0 50.0
	10 MHz Band 15 MHz Band 20 MHz Band	Mid Channel, 1962.5 MF 16-QAM Modulation Mid Channel, 1962.5 MF 64-QAM Modulation Mid Channel, 1962.5 MF 256-QAM Modulation Low Channel, 1932.5 Mi High Channel, 1982.5 MF High Channel, 1987.5 MF 256-QAM Modulation Low Channel, 1982.5 MF High Channel, 1982.5 MF Mid Modulation	IZ 37.878 IZ 38.011 IZ 38.158 IZ 37.949 IZ 37.927 38.245 IZ 37.978 S8.015 IZ 38.107 IZ 37.791 HZ 37.867		37.9 38.0 38.2 37.9 37.9 37.9 38.2 38.0 38.0 38.0 38.1 37.8 37.9	40.9 41.0 41.2 40.9 40.9 41.0 41.0 41.0 41.1 40.8 40.8 40.9	43.9 44.0 44.2 43.9 43.9 44.9 44.0 44.0 44.1 43.8 43.9	46.9 47.0 47.2 46.9 46.9 47.2 47.0 47.0 47.0 47.1 48.8 46.9	49.9 50.0 50.2 49.9 49.9 50.2 50.0 50.0 50.0 50.0 50.1 49.8 49.9
	10 MHz Band 15 MHz Band 20 MHz Band	Mid Channel, 1962.5 MF 16-QAM Modulation Mid Channel, 1962.5 MF 64-QAM Modulation Low Channel, 1962.5 MF 256-QAM Modulation Low Channel, 1932.5 MF High Channel, 1932.5 MF Mid Channel, 1935.5 MF Mid Channel, 1962.5 MF High Channel, 1935.5 MF Mid Channel, 1962.5 MF High Channel, 1937.5 Mf Mid Channel, 1962.5 MF High Channel, 1973.5 MF Mid Channel, 1973.5 MF	z 37.878 z 38.011 4z 38.158 z 37.949 Hz 37.927 z 37.978 z 38.107 z 37.978 z 38.107 z 37.791 Hz 37.867		37.9 38.0 37.9 37.9 37.9 38.2 38.0 38.0 38.0 38.0 38.1 37.8	40.9 41.0 40.9 40.9 40.9 41.2 41.0 41.0 41.0 41.1 40.8	43.9 44.0 44.2 43.9 43.9 43.9 44.0 44.0 44.0 44.0 44.1 43.8	46.9 47.0 47.2 46.9 46.9 47.2 47.0 47.0 47.0 47.0 47.1 48.8	49.9 50.0 50.2 49.9 49.9 49.9 50.2 50.0 50.0 50.0 50.0





RL RF 50 Q DC	SENSE:INT	ALIGN AUTO/NO RF	11:25:53 AM Jul 26, 202
#FGain:	Trig: Free R		Radio Std: None Radio Device: BTS
0 dB/div Ref 29.00 dBm			
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D			
0			
enter 1.963 GHz			Span 20 MH
Res BW 100 kHz	#VBV	V 300 kHz	#Sweep 601.1 n
Channel Power	Power	Spectral Density	
37.88 dBm / 5 MHz	3	0.89 dBm /мнz	
3		STATUS	

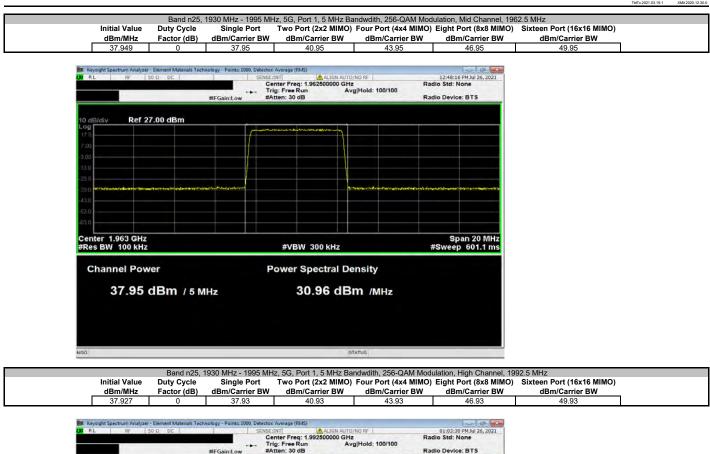




dB/div Ref 27.00 dBm		
<b>19</b>	A second s	
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a comparison in the second second as a second		
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0		
nter 1.933 GHz es BW 100 kHz	#VBW 300 kHz	Span 20 M #Sweep 601.1 r
Channel Power	Power Spectral Density	
38.16 dBm / 5 MHz	31.17 dBm /мнz	

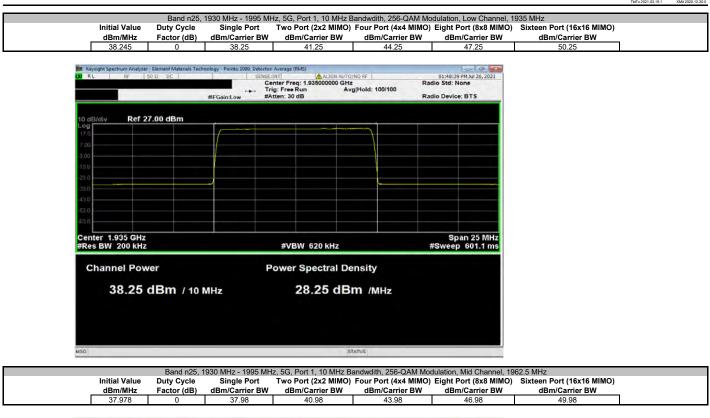
### Report No. NOKI0031





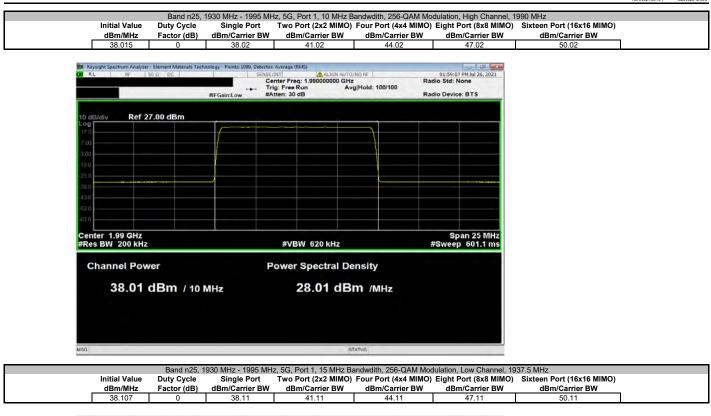
	#IFGain:Low	Center Freq: 1.992500000 Trig: Free Run #Atten: 30 dB	) GHz Avg Hold: 100/100	Radio Std: None Radio Device: BTS
Bidiv Ref 27.00 dBm				
og 7.0	(			
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enter 1.993 GHz Res BW 100 kHz		#VBW 300 kH	2	Span 20 MH #Sweep  601.1 m
Channel Power		Power Spectral	Density	
37.93 dBm /	5 MHz	30.94 c	Bm /MHz	
			ISTATUS	





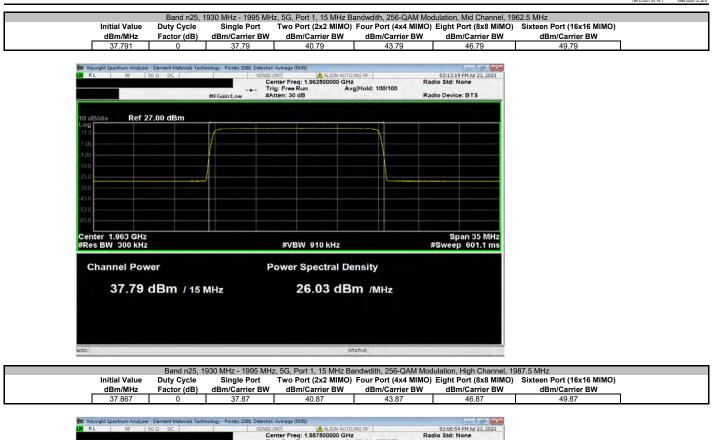
RL	pectrum Analyzer - Element Materials RF 50 Ω DC	rectinicity) Pullins 1000,	SENSE:INT	JGN AUTO/NO RF	01:37:42 PM Jul 26, 202
		#IFGain:Low	Center Freq: 1.962500 Trig: Free Run #Atten: 30 dB	Avg Hold: 100/100	Radio Std: None Radio Device: BTS
) dB/div	Ref 27.00 dBm				
7.0					
		/			
.0.					
.0.					
3.0					
10.					
	1.963 GHz V 200 kHz		#VBW 6201	(Hz	Span 25 MH #Sweep 601.1 m
Chan	nnel Power		Power Spect	ral Density	
	37.98 dBm / 1	0 MHz	27.98	dBm /MHz	
2				STATUS	





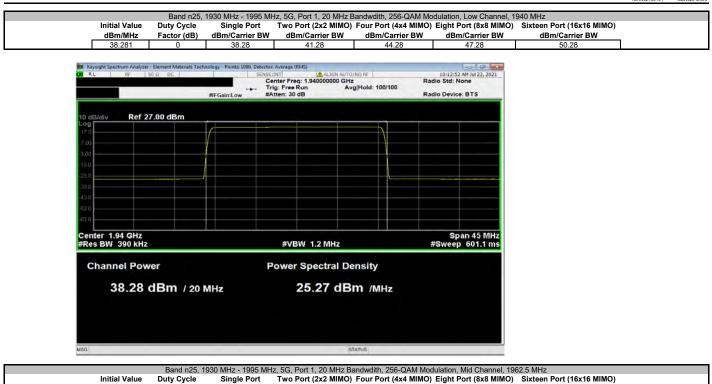
RL RF	50 Ω DC	Technology - Points: 1000, D	ENSE:INT		N AUTO/NO RE		03:24:12	PM Jul 23, 202
	Joen Du	#IFGain:Low		eq: 1.93750000 Run		100/100	Radio Std: N Radio Device	one
	ef 27.00 dBm							
7.0						1		
où		/				N.		
00								
.0.								
.0								
0								
0								
enter 1.938 G Res BW 300 F			#V	BW 910 KH	z		Sp #Sweep	an 35 MH 601.1 m
Channel P	ower		Powe	r Spectra	I Density	/		
38.1	1 dBm /	15 MHz		26.35	dBm /	MHz		
1					STATUS			





RL RF 50Ω DC	#FGain:Low	Center Freq: 1.9875	ALIGN AUTO/NO RF 500000 GHz Avg Hold: 100/100	03:00:54 PMJul 23, 202: Radio Std: None Radio Device: BTS
	a			
o dB/div Ref 27.00 dBr	n			
7.0				
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5,0'				
.0				
3.0				
.a.				
10				
10.				
enter 1.988 GHz				Span 35 MH
Res BW 300 kHz		#VBW 910	0 KHZ	#Sweep 601.1 m
Channel Power		Power Spec	ctral Density	
37.87 dBm	/ 15 MHz	26.1	1 dBm /мнz	
3			ISTATUS	





	Danu hzb, 1950 Wilz - 1955 Wilz, 56, Fort 1, 20 Wilz Danuwulli, 250-QAW Modulation, Mild Channel, 1962.5 Wilz									
Initial Value	alue Duty Cycle Single Port Two Port (2x2 MIMO) Four Port (4x4 MIMO) Eight Port (8x8 MIMO) Sixteen Port (16x16 MIMO)									
dBm/MHz	Factor (dB)	dBm/Carrier BW								
37.939	0	37.94	40.94	43.94	46.94	49.94				

Keysight Spectrum Analyzer - Element N				
RL RF 50 Ω DC	#IFGain:Low	Center Freq: 1.962500	IGN AUTO/NO RF   D00 GHz Avg Hold: 100/100	09:45:09 AM Jul 23, 202 Radio Std: None Radio Device: BTS
Bidiy Ref 27.00 dE	Sm			
og 7.0	/			
.00				
.00				
3.0				
30				
aú				
э.ц				
3.0				
30				
enter 1.963 GHz Res BW 390 kHz		#VBW 1.2 M	Hz	Span 45 MH #Sweep  601.1 m
Channel Power		Power Spectr	al Density	
37.94 dBm	/ 20 MHz	24.93	dBm /мнz	



dBm/MHz Factor (	te Single Port B) dBm/Carrier BW	dBm/Carrier BW	dBm/Carrier B		) Sixteen Port (16x16 MIMO) dBm/Carrier BW
38.07 0	38.07	41.07	44.07	47.07	50.07
Keysight Spectrum Analyzer - Element Materia					
RL RF 50 Ω DC	SENSE:	NT ALIGN AUTO		10:41:30 AM Jul 23, 2021 Radio Std: None	
	Tri	g: Free Run Av	g Hold: 100/100		
	#IFGain:Low #A	tten: 30 dB		Radio Device: BTS	
o dB/div Ref 27.00 dBm					
7.0	1				
.00					
3.0					
3.0					
13.0					
3.0					
3.0					
ii0					
enter 1.985 GHz				Span 45 MHz	
Res BW 390 kHz		#VBW 1.2 MHz		#Sweep 601.1 ms	
Channel Power	P	ower Spectral De	ensity		
38.07 dBm /	20 MHz	25.06 dB	m /MHz		



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	SD3379	AMM	2020-09-21	2021-09-21
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2021-03-11	2022-03-11
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 a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurement. This method uses trace averaging across ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

RF conducted emissions testing was performed on all sixteen ports at NR5 middle channel to demonstrate that the AAFB antenna ports are essentially electrically identical. AAFB antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i, and 6.4.

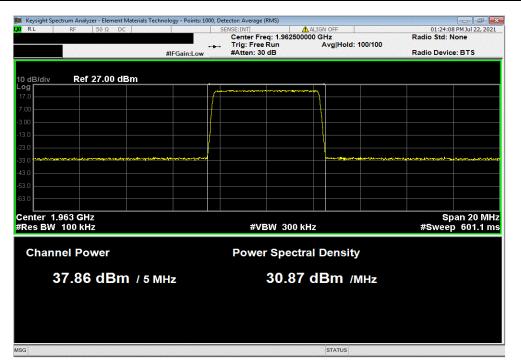


						TbtTx 2021.03.19.1	XMit 2020.12
	AAFB (FCC/ISED C2PC)				Work Order:		
Serial Number:						22-Jul-21	
	Nokia Solutions and Net	tworks			Temperature:		
	David Le, Mitchell Hill				Humidity:		
Project:					Barometric Pres.:		
	Brandon Hobbs		Power: 54 VDC		Job Site:	TX09	
EST SPECIFICATI	IONS		Test Method				
CC 24E:2021			ANSI C63.26:2015				
SS-133 Issue 6:20	)13+A1:2018		RSS-133 Issue 6:20	13+A1:2018			
OMMENTS							
l measurement p	ath losses were accounte	ed for in the reference level offest inc	luding any attenuators, filters and DC b	locks.Band n25 N	R5 carriers are enabled at maximum p	oower (6.25 watts/car	rier).
	I TEST STANDARD						
one							
onfiguration #	2	Signature	7-J-1				
			Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Limit	Results
and n25, 1930 MH	z - 1995 MHz, 5G						
	z - 1995 MHz, 5G 5 MHz Bandwidth						
	5 MHz Bandwidth	lodulation Mid Channel, 1962.5 MHz					
	5 MHz Bandwidth	Mid Channel, 1962.5 MHz Port 1	37.948	0	37.9	Inside Tolerance	N/A
	5 MHz Bandwidth	Mid Channel, 1962.5 MHz	37.948 37.863	0	37.9	Inside Tolerance Inside Tolerance	N/A
	5 MHz Bandwidth	Mid Channel, 1962.5 MHz Port 1	37.948				
	5 MHz Bandwidth	Mid Channel, 1962.5 MHz Port 1 Port 2 Port 3 Port 4	37.948 37.863 37.874 37.992	0	37.9 37.9 38.0	Inside Tolerance Inside Tolerance Inside Tolerance	N/A N/A N/A
	5 MHz Bandwidth	Mid Channel, 1962.5 MHz Port 1 Port 2 Port 3 Port 4 Port 5	37.948 37.863 37.874 37.992 37.770	0	37.9 37.9 38.0 37.8	Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance	N/A N/A N/A
	5 MHz Bandwidth	Mid Channel, 1962.5 MHz Port 1 Port 2 Port 3 Port 4 Port 5 Port 5	37.948 37.863 37.874 37.992 37.770 37.860	0 0 0	37.9 37.9 38.0 37.8 37.9	Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance	N/A N/A N/A N/A
	5 MHz Bandwidth	Mid Channel, 1962.5 MHz Port 1 Port 2 Port 3 Port 4 Port 5	37.948 37.863 37.874 37.992 37.770	0 0 0 0	37.9 37.9 38.0 37.8	Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance	N/A N/A N/A
	5 MHz Bandwidth	Mid Channel, 1962.5 MHz Port 1 Port 2 Port 3 Port 4 Port 5 Port 5	37.948 37.863 37.874 37.992 37.770 37.860	0 0 0 0 0	37.9 37.9 38.0 37.8 37.9	Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance	N/A N/A N/A N/A
	5 MHz Bandwidth	Mid Channel, 1962.5 MHz Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7	37,948 37,863 37,874 37,992 37,770 37,860 37,860 37,837	0 0 0 0 0	37.9 37.9 38.0 37.8 37.9 37.9 37.8	Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance	N/A N/A N/A N/A N/A
	5 MHz Bandwidth	Mid Channel, 1962.5 MHz Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 7 Port 8	37.948 37.863 37.874 37.992 37.770 37.860 37.837 37.959	0 0 0 0 0 0 0	37.9 37.9 38.0 37.8 37.9 37.8 37.8 38.0	Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance	N/A N/A N/A N/A N/A N/A
	5 MHz Bandwidth	Mid Channel, 1962.5 MHz Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 8 Port 9	37.948 37.863 37.874 37.992 37.770 37.860 37.837 37.959 37.672	0 0 0 0 0 0 0 0	37.9 37.9 38.0 37.8 37.9 37.8 38.0 37.7	Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance	N/A N/A N/A N/A N/A N/A N/A
	5 MHz Bandwidth	Mid Channel, 1962.5 MHz Port 1 Port 2 Port 3 Port 4 Port 5 Port 5 Port 6 Port 7 Port 8 Port 8 Port 9 Port 10	37.948 37.863 37.874 37.992 37.770 37.860 37.837 37.959 37.672 37.837	0 0 0 0 0 0 0 0 0 0	37.9 37.9 38.0 37.8 37.9 37.8 38.0 37.7 37.7 37.9	Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance	N/A N/A N/A N/A N/A N/A N/A
	5 MHz Bandwidth	Mid Channel, 1962.5 MHz Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 7 Port 9 Port 9 Port 10 Port 10 Port 11	37.948 37.863 37.874 37.992 37.770 37.860 37.837 37.659 37.672 37.897 37.654	0 0 0 0 0 0 0 0 0 0 0	37.9 37.9 38.0 37.8 37.9 37.8 38.0 37.7 37.9 37.7 37.9	Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance	N/A N/A N/A N/A N/A N/A N/A N/A
	5 MHz Bandwidth	Mid Channel, 1962.5 MHz Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 8 Port 9 Port 10 Port 11 Port 11 Port 12	37,948 37,863 37,874 37,992 37,770 37,860 37,837 37,959 37,672 37,897 37,654 37,902	0 0 0 0 0 0 0 0 0 0 0 0 0 0	37.9 37.9 38.0 37.8 37.9 37.8 38.0 37.7 37.7 37.7 37.9 37.7	Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance Inside Tolerance	N/A N/A N/A N/A N/A N/A N/A N/A
	5 MHz Bandwidth	Mid Channel, 1962.5 MHz Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 8 Port 9 Port 10 Port 11 Port 11 Port 12 Port 3	37.948 37.863 37.874 37.992 37.770 37.860 37.837 37.959 37.672 37.897 37.654 37.654 37.593	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	37.9 37.9 38.0 37.8 37.9 37.8 38.0 37.7 37.7 37.9 37.7 37.9 37.7 37.9 37.6	Inside Tolerance Inside Tolerance	N/A N/A N/A N/A N/A N/A N/A N/A N/A



241141120, 1	Avg Cond	MHz, 5G, 5 MHz Duty Cycle			le Port		
	Pwr (dBm)	Factor (dB)			arrier B	W Limit	Results
	37.948	0			37.9	Inside Tolerance	N/A
Keysight Spectrum Analyzer	- Element Materials Tech 50 Ω DC		ector: Average (I	RMS)	N OFF	01	21:30 PM Jul 22, 2021
		#IFGain:Low	Center Fre Trig: Free #Atten: 30	q: 1.962500000 G Run		100/100	td: None levice: BTS
	7.00 dBm						
17.0		(**					
7.00							
-3.00							
-13.0					1		
-23.0					1		
-33.0 <b></b>		A				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
-43.0							
-53.0							
-63.0							
Center 1.963 GHz	I						Span 20 MHz
#Res BW 100 kHz			#VE	W 300 kHz		#Sw	eep 601.1 ms
Channel Pow	/er		Power	Spectral	Densit	y	
37.95	dBm / 5 N	IHz		30.96 d	Bm /	MHz	
MSG					STATUS		

Band n25, 1	930 MHz - 1995 N	MHz, 5G, 5 MHz	Bandwidth, 256-C	AM Modulation, M	lid Channel, 1962.5	MHz, Port 2
	Ava Cond	Duty Cycle		Single Port		
	5					
	Pwr (dBm)	Factor (dB)		dBm/Carrier BW	Limit	Results
	37.863	0		37.9	Inside Tolerance	N/A
	01.000	0		01.0	monae reference	10//





	Avg Cond	Duty Cycle			gle Port			
	Pwr (dBm)	Factor (dB)			arrier B			Results
	37.874	0			37.9	Inside Tolerar	nce	N/A
Keysight Spectrum Analyze								
X RL RF	50 Ω DC	S	ENSE:INT	q: 1.962500000 C	IN OFF	Pa	01:26:4 dio Std: N	2 PM Jul 22, 2021
			Trig: Free	Run	Avg Hold	: 100/100		
		#IFGain:Low	#Atten: 30	dB		Rad	dio Devic	e: BTS
	27.00 dBm							
17 0		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	and the second	mannany				
7.00								
-3.00								
-13.0					ţ			
-23.0								
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Center 1.963 GHz							er	oan 20 MHz
#Res BW 100 kHz			#VE	W 300 kHz		;		p 601.1 ms
							-	
Channel Pov	ver		Power	Spectral	Densit	ty in the second s		
0								
37.87	dBm / 5 M	Hz		30.88 d	Bm /	MHz		
MSG					STATUS			

Band n25, 1	930 MHz - 1995	MHz, 5G, 5 MHz	Bandwidth, 256-QAM Modulation	, Mid Channel, 1962.5	6 MHz, Port 4
	Avg Cond	Duty Cycle	Single Port		
	Pwr (dBm)	Factor (dB)	dBm/Carrier B	W Limit	Results
	37.992	0	38	Inside Tolerance	N/A

RL	RF 50 Ω DC	rials Technology - Points:		SENSE:INT		IIG	N OFF	01.20.	L7 PM Jul 22, 202
	10 20 32 00			Center Fr	eq: 1.96250000	G	Hz	Radio Std:	
		#IFGain:Low	· ••	Trig: Free #Atten: 30		,	Avg Hold: 100/100	Radio Devi	ce: BTS
dB/div	Ref 27.00 dBm		_						
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nter 1.9								S	pan 20 Mi
es BW	100 kHz			#V	BW 300 kHz	Z		#Swee	p 601.1 n
Chann	el Power			Powe	r Spectral		Doneity		
Chain	er Power			FOWC	горесна		Jensity		
3	7.99 dBm	5 MHz			31.00 c		3m /мнz		



	Avg Cond	Duty Cycle		Single Port		
	Pwr (dBm)	Factor (dB)	d	Bm/Carrier BV	V Limit	Results
	37.77	0		37.8	Inside Tolerance	N/A
Keyright Spectrum Ana	lyzer - Element Materials Tech	nology - Pointr: 1000 Detect	tor: Average (RMS)			
IXI RL RF	50 Ω DC			ALIGN OFF	01:31	:57 PM Jul 22, 2021
			Center Freq: 1.96250	0000 GHz	Radio Std	
			Trig: Free Run #Atten: 30 dB	Avg Hold:	100/100 Radio Dev	vice: BTS
		#IFGain:Low	#Atten: 00 dB		Radio Dev	ice. DT3
10 dB/div Re	f 27.00 dBm		i i			
17.0				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
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Center 1.963 G	Hz	· · · · · · · · · · · · · · · · · · ·			Ş	Span 20 MHz
#Res BW 100 k	Hz		#VBW 300	kHz	#Swe	ep 601.1 ms
Channel Po	ower		Power Spect	ral Density	/	
37.7	7 dBm / 5 №	Hz	30.78	dBm /⊮	MHz	
MSG				STATUS		

Band n25, 19	930 MHz - 1995 I	MHz, 5G, 5 MHz	Bandwidth, 256-QAM Modulation, M	/lid Channel, 1962.5	MHz, Port 6
	Avg Cond	Duty Cycle	Single Port		
	Pwr (dBm)	Factor (dB)	dBm/Carrier BW	Limit	Results
	37.86	0	37.9	Inside Tolerance	N/A

RL	RF	50 Ω		Technology - Points:		ENSE:INT		N ALL	TO/NO RF		01.34.	50 PM Jul 22, 202
	rsl.	00.36	00				a: 1.96250000				Radio Std:	
				#IFGain:Low	•••		Run		Avg Hold: 1	100/100	Radio Devi	
dB/div g	Ret	f 27.00	dBm						1			
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nter 1.9											S	pan 20 MH
es BW	100 K	IZ				#VE	300 kH	z			#Swee	p 601.1 n
Chann	iel Po	ower				Power	Spectra	I C	Density			
									_			
3	7.8	6 dB	m / 5	MHz			30.87	dE	3m /N	1Hz		
									STATUS			



	Avg Cond	Duty Cycle		Single Port		
	Pwr (dBm)	Factor (dB)	di	m/Carrier B	N Limit	Results
	37.837	0		37.8	Inside Tolerance	N/A
Keysight Spectrum Analyze	er - Element Materials Tech	nology - Points: 1000, Detecto	or: Average (RMS)			
	50 Ω DC	SENS	E:INT AL	GN AUTO/NO RF		19 PM Jul 22, 2021
			Center Freq: 1.962500 Trig: Free Run	000 GHz Avg Hold:	Radio Std	: None
			Atten: 30 dB	Avginoia:	Radio Dev	vice: BTS
		an duniedi				
10 dB/div Ref 2	27.00 dBm		I			
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-33.0 - monoral books in the state of	her the second states and the second s	See Male and Second		harrow and a second	*******	and and an
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Center 1.963 GHz #Res BW 100 kHz			#VBW 300 H	LI-3		Span 20 MHz ep   601.1 ms
#Res DW TOURN2			#APAA 2001	Π2	#SWE	ep oor.rms
Channel Pov	ver		Power Spect	al Densit	/	
37.84	dBm / 5 M	Hz	30.85	dBm /I	MHz	
MSG				STATUS		

Band n25, 1	930 MHz - 1995 l	MHz, 5G, 5 MHz	Bandwidth, 256-C	AM Modulation, M	lid Channel, 1962.5	MHz, Port 8
	Avg Cond	Duty Cycle		Single Port		
	Pwr (dBm)	Factor (dB)		dBm/Carrier BW	Limit	Results
	37.959	0		38	Inside Tolerance	N/A

- 50 Ω DC		IFGain:Low		Center Fre			TO/NO RF		Radio Std: I	2 PM Jul 22, 202
				Trig: Free #Atten: 30	Run		Hz Avg Hold: 1	00/100	Radio Std: 1	
Ref 27.00 di	Bm									
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				#VE	W 300 kH	7				oan 20 MH o 601.1 m
Power				Power	Spectra		Density			
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ac dBn		-			30 97	d	2m /M	LI -		
		2			50.57	u		пг		
	GHz kHz Power 96 dBn	Power	kHz	<sup>r kHz</sup> Power	Power Power	Power Power Spectra	Power Power Spectral I	Power Power Spectral Density	#VBW 300 kHz Power Power Spectral Density 96 dBm / 5 мHz 30.97 dBm /мHz	Power Power Spectral Density 96 dBm / 5 MHz 300.97 dBm /MHz



	Avg Cond	Duty Cycle		ingle Port		
	Pwr (dBm)	Factor (dB)	dBi	n/Carrier B\		Results
	37.672	0		37.7	Inside Tolerance	N/A
	er - Element Materials Tech	nology - Points: 1000, Detect				
XI RL RF	50 Ω DC		E:INT ALIO	N AUTO/NO RF	01:42 Radio Std	:42 PM Jul 22, 2021
			rig: Free Run	Avg Hold:		. None
		#IFGain:Low #	Atten: 30 dB		Radio Dev	rice: BTS
10 dB/div Ref 2	27.00 dBm					
Log						
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-03.0						
Center 1.963 GHz						Span 20 MHz
#Res BW 100 kHz	-		#VBW 300 kH	z	#Swe	ep 601.1 ms
Channel Pov	ver		Power Spectra	I Density	/	
37.67	dBm / 5 M	Hz	30.68	dBm //	MHz	
MSG				STATUS		

Band n25, 19	930 MHz - 1995 N	1Hz, 5G, 5 MHz E	Bandwidth, 256-Q	AM Modulation, Mi	id Channel, 1962.5	MHz, Port 10
	Avg Cond	Duty Cycle		Single Port		
	Pwr (dBm)	Factor (dB)		dBm/Carrier BW	Limit	Results
	37.897	0		37.9	Inside Tolerance	N/A

	RF 50 Ω D	C		SENSE:INT	ALIGN	AUTO/NO RF		01:45:18 PM Jul 22, 20		
#FGain:				Center Fr Trig: Free #Atten: 30	00/100	Radio Std: None Radio Device: BTS				
dB/div	Ref 27.00 c	lBm								
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nter 1.9	963 GHz			#VI	BW 300 kHz				oan 20 MH p−601.1 m	
	100 KHZ									
es BW	el Power			Powe	r Spectral	Density				
es BW Chann		n / 5 MH	z	Powe	r Spectral 30.91 d					
es BW Chann	el Power	n /5M⊦	Iz	Powe						
es BW Chann	el Power	n /5M⊦	z	Powe						
es BW Chann	el Power	n /5M⊦	Iz	Powe						
es BW Chann	el Power	n /5M⊦	Iz	Powe						



	Avg Cond	Duty Cycle			gle Port			
	Pwr (dBm)	Factor (dB)			Carrier B			Results
	37.654	0			37.7	Inside Tole	rance	N/A
Keysight Spectrum Analyzer								
X RL RF	50 Ω DC	SI	ENSE:INT	ALIGN A : 1.962500000	UTO/NO RF		01:47: Radio Std:	54 PM Jul 22, 2021
			Trig: Free F	un	Avg Hold:		Raulo Stu.	None
		#IFGain:Low	#Atten: 30 d	IB		le la	Radio Devi	ice: BTS
	7.00 dBm							
17.0			ala hara ang ang ang bara					
7.00								
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-13.0								
-23.0					1			
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-43.0								
-53.0								
-63.0								
Center 1.963 GHz							_	
#Res BW 100 kHz			#VB	W 300 kHz				pan 20 MHz ep   601.1 ms
Channel Pow	ver		Power	Spectral	Densit	v		
						<i>.</i>		
37 65	dBm / 5 M	Hz		30.66 d	Bm_/	MHz		
01.00		112		10.00 u	Bull /			
MSG					STATUS			

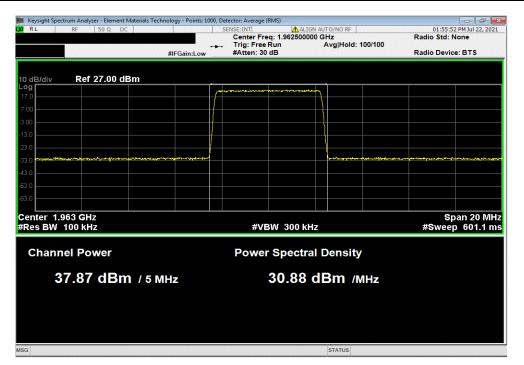
Band n25, 19	930 MHz - 1995 N	/Hz, 5G, 5 MHz E	Bandwidth, 256-Q	AM Modulation, Mi	id Channel, 1962.5 l	MHz, Port 12
	Avg Cond	Duty Cycle		Single Port		
	Pwr (dBm)	Factor (dB)		dBm/Carrier BW	Limit	Results
	37.902	0		37.9	Inside Tolerance	N/A

RL	RF 50 Ω DC		Iology - Points: 1000, Detector: Average (RMS) SENSE:INT SENSE:INT ALIGN AUTO/NO RF							8 PM Jul 22, 202
		#IFGain:Low		Center Fre	eq: 1.96250000 Run	0 GI			Radio Std: N	lone
dB/div	Ref 27.00 dE	3m			1					
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	.963 GHz 100 kHz			#VE	300 kH	z			Sp #Swee	oan 20 MH 5 601.1 n
Channel Power				Power						
	37.90 dBm	) / 5 MHz			30.91	dE	3m /мнz			



Band n25 10	930 MHz - 1995 M	Hz 5G 5 MHz Bandwi	idth, 256-QAM Modulation,	Mid Channel 1962 5 M	/Hz Port 13
Bana nzo, ra	Avg Cond	Duty Cycle	Single Port		1112, 1 OIC 10
	Pwr (dBm)	Factor (dB)	dBm/Carrier B	W Limit	Results
	37.593	0	37.6	Inside Tolerance	N/A
💓 Keysight Spectrum Analyzer	- Element Materials Techno	logy - Points: 1000, Detector: Ave	rage (RMS)		
	50 Ω DC	SENSE:INT	ALIGN AUTO/NO RF		53:20 PM Jul 22, 2021
			r Freq: 1.962500000 GHz Free Run Avg Hold:	Radio St 100/100	d: None
			1: 30 dB		evice: BTS
10 dB/div Ref 2	7.00 dBm				
Log		مستسميهم ا			
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-33.0			Phanning-Thompson		and the second second second
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-53.0					
-63.0					
Center 1.963 GHz #Res BW 100 kHz			#VBW 300 kHz		Span 20 MHz eep   601.1 ms
Channel Pow	/er	Pov	ver Spectral Densit	y	
37.59	dBm / 5 мн	z	30.60 dBm //	MHz	
MSG			STATUS		
MOG			Onnoo		

Band n25, 19	930 MHz - 1995 N	/Hz, 5G, 5 MHz E	Bandwidth, 256-Q	AM Modulation, Mi	id Channel, 1962.5	MHz, Port 14
	Avg Cond	Duty Cycle		Single Port		
	Pwr (dBm)	Factor (dB)		dBm/Carrier BW	Limit	Results
	37.871	0		37.9	Inside Tolerance	N/A





Avg Cond	Duty Cycle	Sir	gle Port		
Pwr (dBm)	Factor (dB)			V Limit	Results
37.731	0		37.7	Inside Tolerance	N/A
lyzer - Element Materials Tech	nology - Points: 1000, Detec	tor: Average (RMS)			
50 Ω DC					58:29 PM Jul 22, 2021
					a: None
	#IFGain:Low	#Atten: 30 dB		Radio De	evice: BTS
f 27.00 dBm			_		
			1		
			1		
and a state of the st			Contraction of the other	(hulpunitum to minister of selfs to produce	-toollo-allowed where
Hz					Span 20 MHz
Hz		#VBW 300 kHz			eep 601.1 ms
ower		Power Spectral	Density	/	
		i onoi opoonai			
3 dBm / 5 м	Hz	30.74 d	Bm /M	٨Hz	
			STATUS		
	37.731 yzer - Element Materials Tech 50 Ω DC 27.00 dBm 27.00 dBm 12 12 12 12 50 Ω DC	37.731     0       yzer - Element Materials Technology - Points: 1000, Detect     50 Ω       50 Ω     DC       27.00 dBm	37.731     0       yzer - Element Materials Technology - Points: 1000, Detectors Average (RMS)       50 Ω     DC       50 Ω     DC       SENSE:INT     ALIGN A       Center Freq: 1.962500000       Trig: Free Run       #IFGain:Low       #IFGain:Low       #Atten: 30 dB	37.731     0     37.7       yzer - Element Materials Technology - Points: 1000, Detector: Average (RMS)     A LIGN AUTO/NO RF       50 Ω     DC     SENSE:INT       20 DC     SENSE:INT     A LIGN AUTO/NO RF       20 DC     SENSE:INT     A LIGN AUTO/NO RF       27.00 dBm     Trig: Free Run     Avg[Hold:       12     #VBW 300 kHz       12     #VBW 300 kHz       28 dBm / 5 MHz     30.74 dBm /N	37.731       0       37.7       Inside Tolerance         yzer - Element Materials Technology - Points: 1000, Detector, Average (RMS)       ALIGN AUTO/NO RF       01:         S0 Ω DC       SENSE:INT       ALIGN AUTO/NO RF       01:         #FGain:Low       #Atten: 30 dB       Avg Hold: 100/100       Radio SI         "27.00 dBm       Trig: Free Run       Avg Hold: 100/100       Radio D         "27.00 dBm       #FGain:Low       #VBW 300 kHz       #Sw         vower       Power Spectral Density       Sol 74 dBm /MHz

Band n25, 19	930 MHz - 1995 N	1Hz, 5G, 5 MHz E	Bandwidth, 256-Q	AM Modulation, Mi	id Channel, 1962.5	MHz, Port 16
	Avg Cond	Duty Cycle		Single Port		
	Pwr (dBm)	Factor (dB)		dBm/Carrier BW	Limit	Results
	37.968	0		38	Inside Tolerance	N/A

