



element

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

FCC Part 27, IC RSS-139, and RSS-170
[2110MHz – 2200MHz]

FCC ID: VBNAAIB-01
IC ID: 661W-AAIB

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

Report # NOKI0006



NVLAP LAB CODE: 201049-0

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CERTIFICATE OF TEST

Last Date of Test: January 30, 2020

Nokia Solutions and Networks

EUT: Airscale Base Transceiver Station Radio Module Model AAIB

Radio Equipment Testing

Standards

Specification	Method
Code of Federal Regulations (CFR) Title 47 Part 2 (Radio Standards Specification) RSS-Gen Issue 6: 2019 CFR Title 47 Part 27 Subpart C RSS-139 Issue 3 - July 16, 2015 – Advanced Wireless Services (AWS) RSS-170 Issue 3- July 9, 2015	ANSI C63.26-2015 with FCC KDB 971168 D01 v03r01 FCC KDB 662911D01 v02r01

Results

Test Description	Applied	Results	Comments
Duty Cycle	No	N/A	Not requested.
Occupied Bandwidth	Yes	Pass	
Output Power	Yes	Pass	
Output Power – Worst Case Port	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:



Jeremiah Darden, 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 - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

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 – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

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

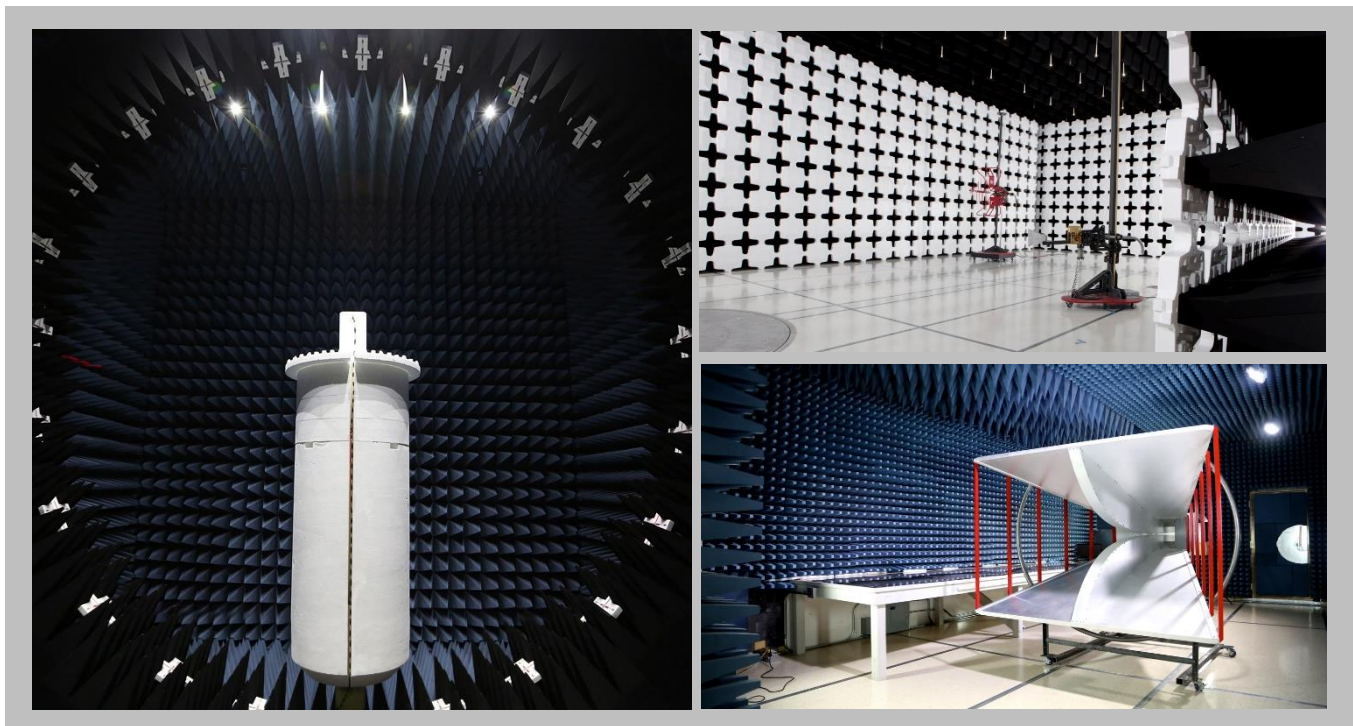
For details on the Scopes of our Accreditations, please visit:

<https://www.nwemc.com/emc-testing-accreditations>

FACILITIES



California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP				
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157



MEASUREMENT UNCERTAINTY



Measurement Uncertainty

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

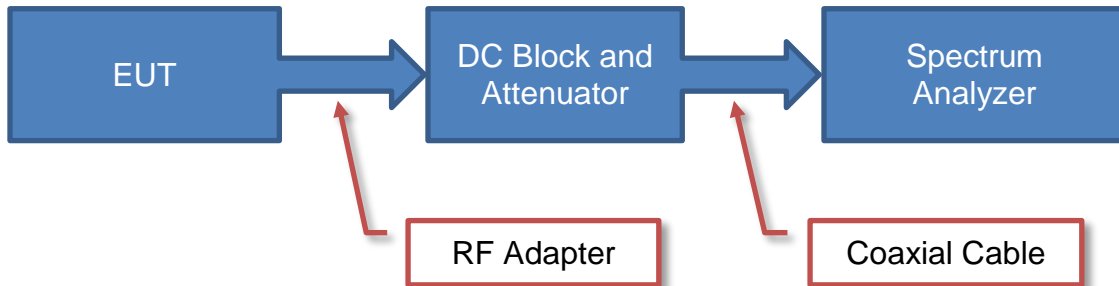
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. 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.

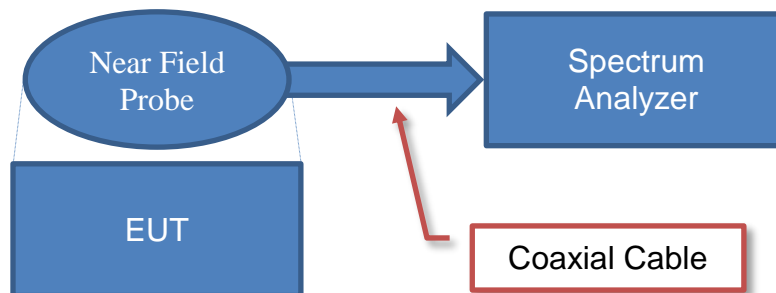
Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.1 dB	-5.1 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

Test Setup Block Diagrams

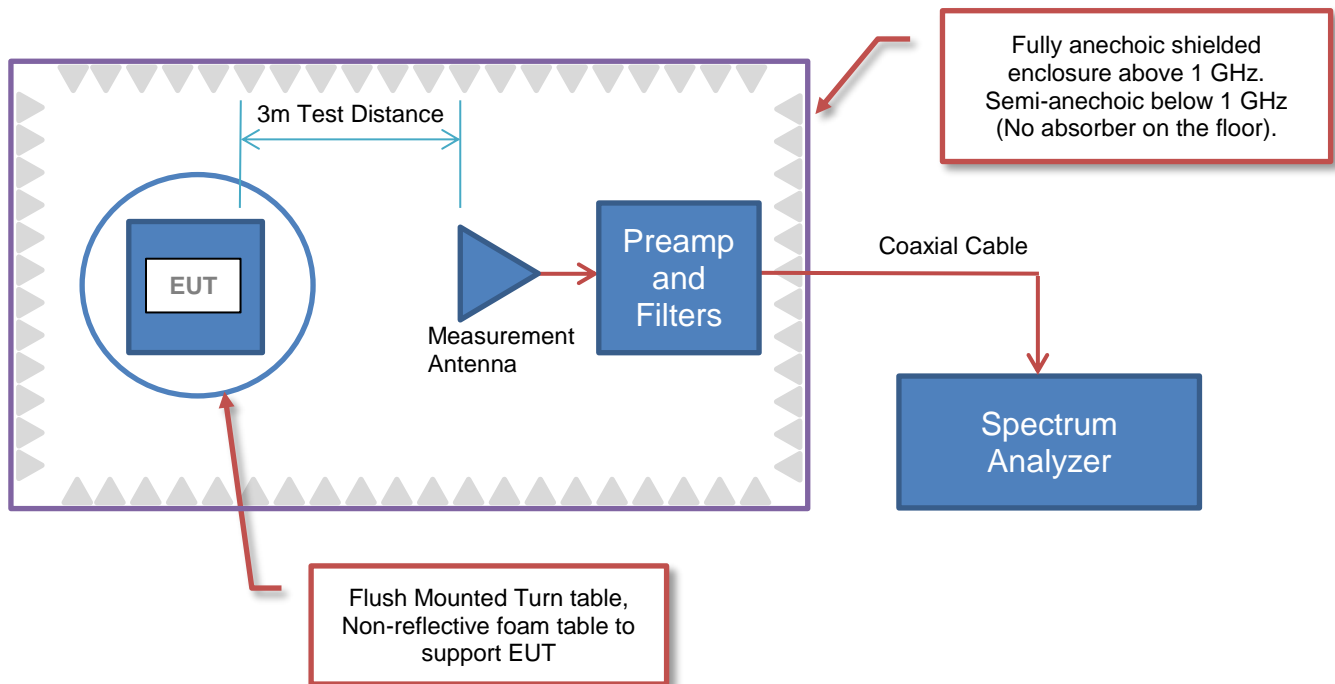
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Nokia Solutions and Networks
Address:	6000 Connection Drive
City, State, Zip:	Irving, TX 75039
Test Requested By:	Steve Mitchell
EUT:	Airscale Base Transceiver Station Radio Module Model AAIB
First Date of Test:	January 29, 2020
Last Date of Test:	January 30, 2020
Receipt Date of Samples:	January 28, 2020
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

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 Narrow Band IoT Guard Band (NB IoT GB) to the LTE carrier for the Airscale BTS Radio Module AAIB Federal Communication Commission and Industry Canada certifications. The original FCC and IC radio certification submittal was NTS Test Report Number PR083556 Revision 1 dated August 27, 2018. The original test effort included testing for LTE technologies. Please refer to the test report on the original certification (FCC ID: VBNA AIB-01) for details on all required testing. The scope of testing in this effort is for narrow band IoT guard band operations for 10, 15 and 20MHz LTE channel bandwidths.

All conducted RF testing performed for the original certification testing will be repeated using NB IoT GB for this class II permissive change per correspondence/guidance from Nemko TCB. The same test methodology used in the original certification testing will be used in this class II permissive change test effort. Tests performed under the class II change effort include RF power, CCDF, emission bandwidth (99% and 26 dB down), band edge spurious emissions, and conducted spurious emissions. The LTE modulation type for this testing was setup according to 3GPP TS 36.141 E-UTRA Test Models and is “E-TM 1.1 (QPSK modulation type) with N-TM (narrow band IoT)”. The base station and radio module software for this testing is an updated release that includes Narrow Band IoT Guard Band support.

The radiated emissions and frequency stability measurements performed in the original certification was 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 (BTS) radio module, model AAIB. The AAIB has 16 transmit/receive antenna ports that supports 3GPP frequency band 66 operations (BTS RX: 1710 to 1780 MHz/BTS TX: 2110 to 2200 MHz). The maximum RF output power of the radio module antenna port is 6.25 watts. The total RF output power for the AAIB radio module is 100 watts (16 x 6.25 watts). The radio module supports LTE-FDD, and narrow band IoT (internet of things) operations (in-band, guard band, standalone). The TX and RX instantaneous bandwidth cover the full operational (Band 66) bandwidth. The radio module supports 5, 10, 15, and 20MHz LTE bandwidths. The radio module supports four LTE downlink modulation types

PRODUCT DESCRIPTION



(QPSK, 16QAM, 64QAM and 256QAM) and NB-IoT.

The AAIB LTE channel numbers and frequencies are as follows:

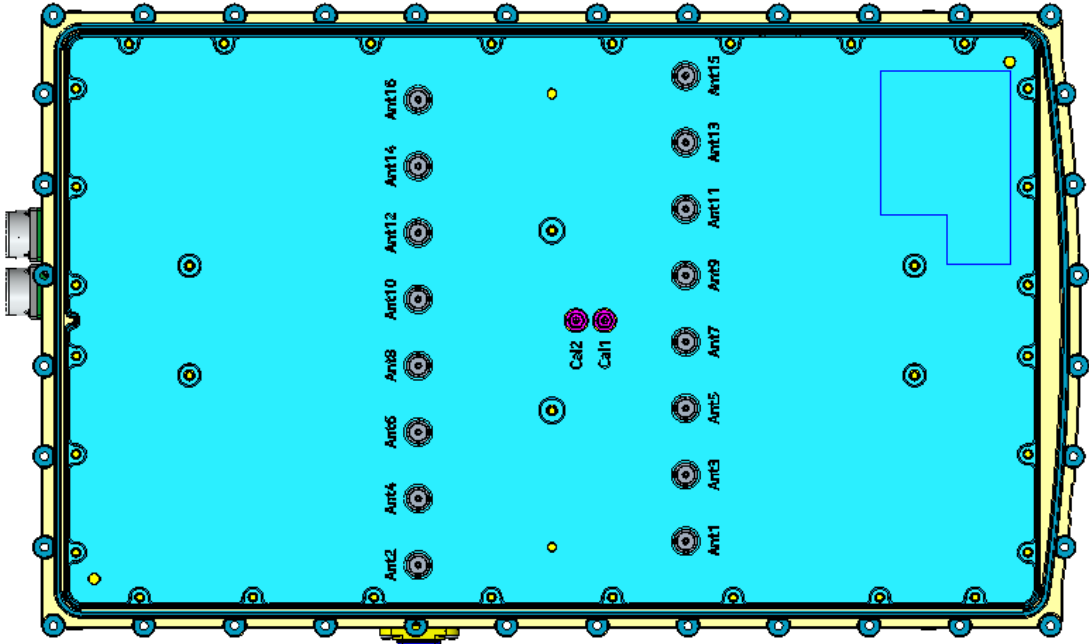
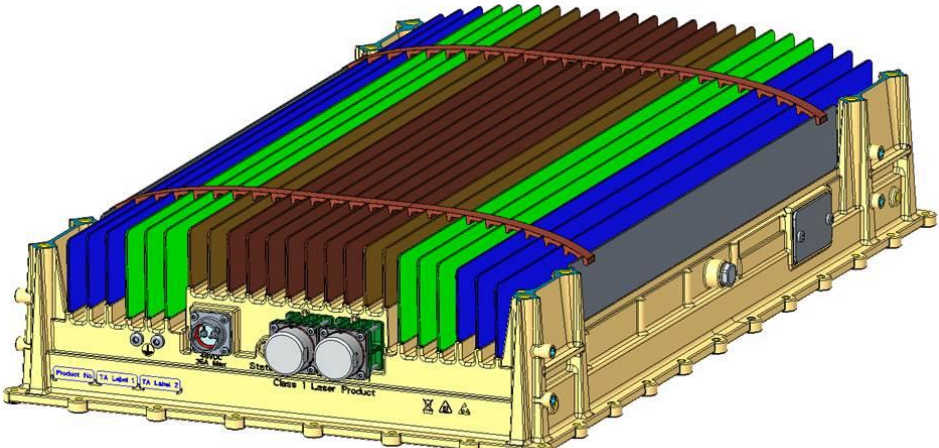
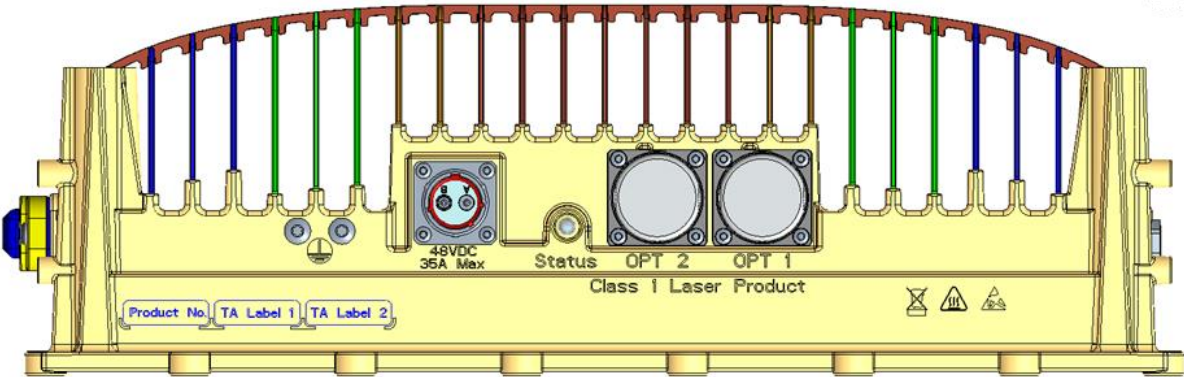
	Downlink EARFCN	Downlink Frequency (MHz)	LTE Channel Bandwidth			
			5 MHz	10 MHz	15 MHz	20 MHz
AAIB Band 66 (Antennas 1 through 16)	66436	2110.0	Band Edge	Band Edge	Band Edge	Band Edge
					
	66461	2112.5	Bottom Ch			
					
	66486	2115.0		Bottom Ch		
					
	66511	2117.5			Bottom Ch	
					
	66536	2120.0				Bottom Ch
					
	66886	2155.0	Middle Ch	Middle Ch	Middle Ch	Middle Ch
					
	67236	2190.0				Top Channel
					
	67261	2192.5			Top Channel	
					
	67286	2195.0		Top Channel		
					
67311	2197.5	Top Channel				
.....						
67336	2200.0	Band Edge	Band Edge	Band Edge	Band Edge	

AAIB Downlink Band Edge LTE Band 66 Frequency Channels

Note: AAIB narrow band IoT guard band operations for 10, 15 and 20MHz LTE channel bandwidths are supported.

PRODUCT DESCRIPTION

AAIB Connector Layout:



PRODUCT DESCRIPTION



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
OPT	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 Narrow Band IoT Guard Band to the LTE carrier for the Airscale BTS Radio Module AAIB Federal Communication Commission and Industry Canada certifications.

CONFIGURATIONS



Configuration NOKI0006-1

Software/Firmware Running during test	
Description	Version
Radio Module Software	FRM 59.10.R28L
BTS Software Version	SBTS19B_ENB_0000_000904

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
AAIB (Radio Module Model)	Nokia	090147A.101	YK183800029

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
30dB Attenuator (50W)	Narda	776B-30	None
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
AMIA (BTS system Module)	Nokia	473098A.101	RK16401509
ASIA (BTS system Module)	Nokia	473095A.203	AH173111443
ABIA (BTS system Module)	Nokia	473096A.102	L1164015939
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	Kr16180020006
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	MA17331610206
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP
Power Supply (Laptop)	HP	608428-002	F12941232064008

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
RF cable HS-SUCOFLEX_106	Y	2m	N	EUT [AAIB] RF port 2 (port under test)	Narda 30dB Attenuator (50W)
RF cable HS-SUCOFLEX_104	Y	1m	N	Narda 30dB Attenuator (50W)	Spectrum Analyzer
RF cable R&D Microwaves CBL-6ft-NMNM-402J-N 15 places	Y	~1.8m	N	EUT [AAIB] RF ports 1, and 3 thru 16	Antenna Loads (1 through 15)

CONFIGURATIONS



Configuration NOKI0006-2

Software/Firmware Running during test	
Description	Version
Radio Module Software	FRM 59.10.R28L
BTS Software Version	SBTS19B_ENB_0000_000904

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
AAIB (Radio Module Model)	Nokia	090147A.101	YK183800029

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
10dB Attenuator (100W)	API Weinschel	48-10-34-LIM	BJ1771
Low Pass Filter (100W)	Microwave Circuits, INC.	L13502G1	SN24254-01
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
AMIA (BTS system Module)	Nokia	473098A.101	RK16401509
ASIA (BTS system Module)	Nokia	473095A.203	AH173111443
ABIA (BTS system Module)	Nokia	473096A.102	L1164015939
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	Kr16180020006
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	MA17331610206
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP
Power Supply (Laptop)	HP	608428-002	F12941232064008

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
RF cable HS-SUCOFLEX_106	Y	2m	N	EUT [AAIB] RF port 2 (port under test)	10dB Attenuator (100W)
RF cable HS-SUCOFLEX_104	Y	1m	N	Low Pass Filter (100W)	Spectrum Analyzer
RF cable R&D Microwaves CBL-6ft-NMNM-402J-N 15 places	Y	~1.8m	N	EUT [AAIB] RF ports 1, and 3 thru 16	Antenna Loads (1 through 15)

CONFIGURATIONS



Configuration NOKI0006-3

Software/Firmware Running during test	
Description	Version
Radio Module Software	FRM 59.10.R28L
BTS Software Version	SBTS19B_ENB_0000_000904

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
AAIB (Radio Module Model)	Nokia	090147A.101	YK183800029

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
30dB Attenuator (50W)	Narda	776B-30	None
High Pass Filter (2W)	RLC Electronics	F-100-3000-5-R	0028
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
AMIA (BTS system Module)	Nokia	473098A.101	RK16401509
ASIA (BTS system Module)	Nokia	473095A.203	AH173111443
ABIA (BTS system Module)	Nokia	473096A.102	L1164015939
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	Kr16180020006
SFP+ 9.8G,300M,850NM	Nokia	473842.A101	MA17331610206
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP
Power Supply (Laptop)	HP	608428-002	F12941232064008

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
RF cable HS-SUCOFLEX_106	Y	2m	N	EUT [AAIB] RF port 2 (port under test)	Narda 30dB Attenuator (50W)
RF cable HS-SUCOFLEX_104	Y	1m	N	High Pass Filter (2W)	Spectrum Analyzer
RF cable R&D Microwaves CBL-6ft-NMNM-402J-N 15 places	Y	~1.8m	N	EUT [AAIB] RF ports 1, and 3 thru 16	Antenna Loads (1 through 15)

MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2020-01-29	Output Power – Worst Case Port	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	2020-01-30	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2020-01-30	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	2020-01-30	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	2020-01-30	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	2020-01-30	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

OCCUPIED BANDWIDTH



XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	19-Mar-19	19-Mar-20

TEST DESCRIPTION

The 99% bandwidth was measured utilizing the analyzer's peak detector and measuring the carrier's 26 db occupied bandwidth based on the peak output power level measured. A plot was taken to show the occupied bandwidth is contained within the allowable transmit band.

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 setting were as follows:

- RBW is 1% - 5% of the Occupied Bandwidth
- VBW is $\geq 3x$ the RBW
- Peak Dectector was used
- Trace max hold was used

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

FCC 27.53(h)(3) defines the 26dB emission bandwidth requirement.

RSS GEN Section 6.7 defines the 99% emission bandwidth requirement.

OCCUPIED BANDWIDTH



TelTx 2019.08.30.0 XMt 2019.09.05

EUT: AAIB		Work Order: NOKI0006	
Serial Number: YK183800029		Date: 30-Jan-20	
Customer: Nokia Solutions and Networks		Temperature: 21.8 °C	
Attendees: Mitch Hill, John Rattanavong		Humidity: 34.3% RH	
Project: None		Barometric Pres.: 1016 mbar	
Tested by: Willie Love, Brandon Hobbs		Power: 54VDC	
Job Site: TX09		Test Method	
TEST SPECIFICATIONS		ANSI C63.26:2015	
FCC 27:2020		RSS-Gen:2019	
RSS-Gen:2019		RSS-Gen:2019	
COMMENTS			
All losses in the measurement path were accounted for. The highest power port operating at maximum power was used for these measurements. The highest power port was determined by measuring the average power on each of the 16 antenna ports using a 10 MHz channel bandwidth at the middle channel shown elsewhere in the report.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature	
		Value	Value
		99% (MHz)	-26dB (MHz)
			Limit
			(>)
			Result
Band 66 (Single Carrier) Port 2			
10 MHz			
	NB IOT		
	Low Channel, 2115 MHz	9.45	9.86
	Mid Channel, 2155 MHz	9.44	9.86
	High Channel, 2195 MHz	9.43	9.84
			Within Band
			Pass
15 MHz			
	NB IOT		
	Low Channel, 2117.5 MHz	14.06	14.66
	Mid Channel, 2155 MHz	14.12	14.71
	High Channel, 2192.5 MHz	14.13	14.70
			Within Band
			Pass
20 MHz			
	NB IOT		
	Low Channel, 2120 MHz	18.65	19.35
	Mid Channel, 2155 MHz	18.60	19.54
	High Channel, 2190 MHz	18.60	19.55
			Within Band
			Pass

Band 66 Emission Designators:



Band 66 (2110MHz to 2200MHz) Emission Designators						
LTE Narrow Band <u>IoT</u> Guard Band						
LTE Channel Bandwidth	Low Channel		Middle Channel		High Channel	
	FCC	IC	FCC	IC	FCC	IC
10M	9M86F9W	9M45F9W	9M86F9W	9M44F9W	9M84F9W	9M43F9W
15M	14M7F9W	14M1F9W	14M7F9W	14M1F9W	14M7F9W	14M1F9W
20M	19M4F9W	18M6F9W	19M5F9W	18M6F9W	19M6F9W	18M6F9W

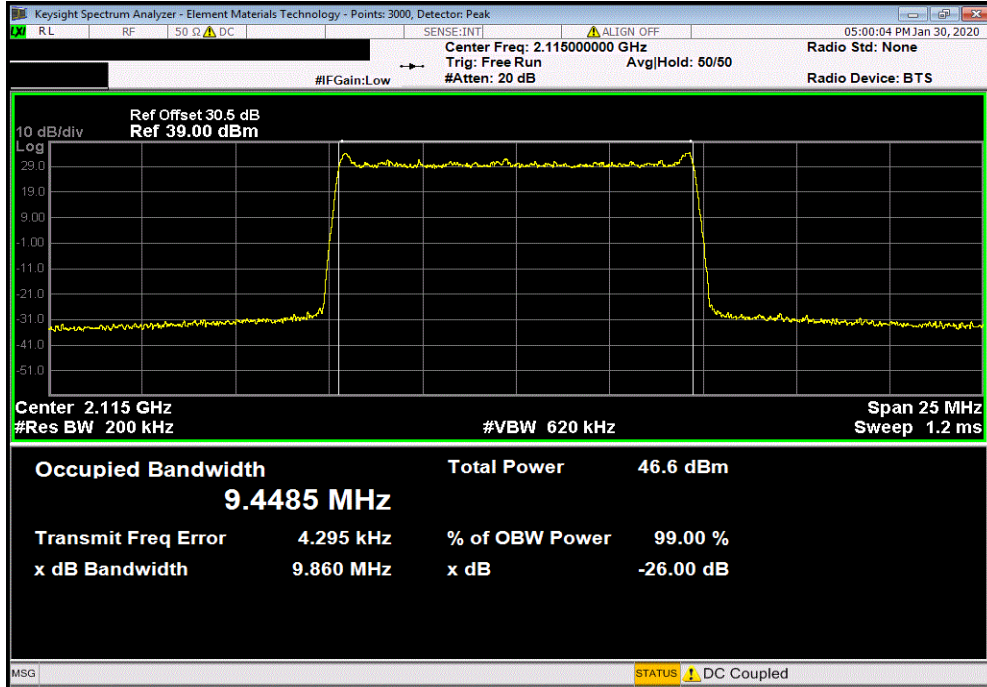
Note: FCC based on 26dB emission bandwidth; IC based on 99% emission bandwidth.

OCCUPIED BANDWIDTH

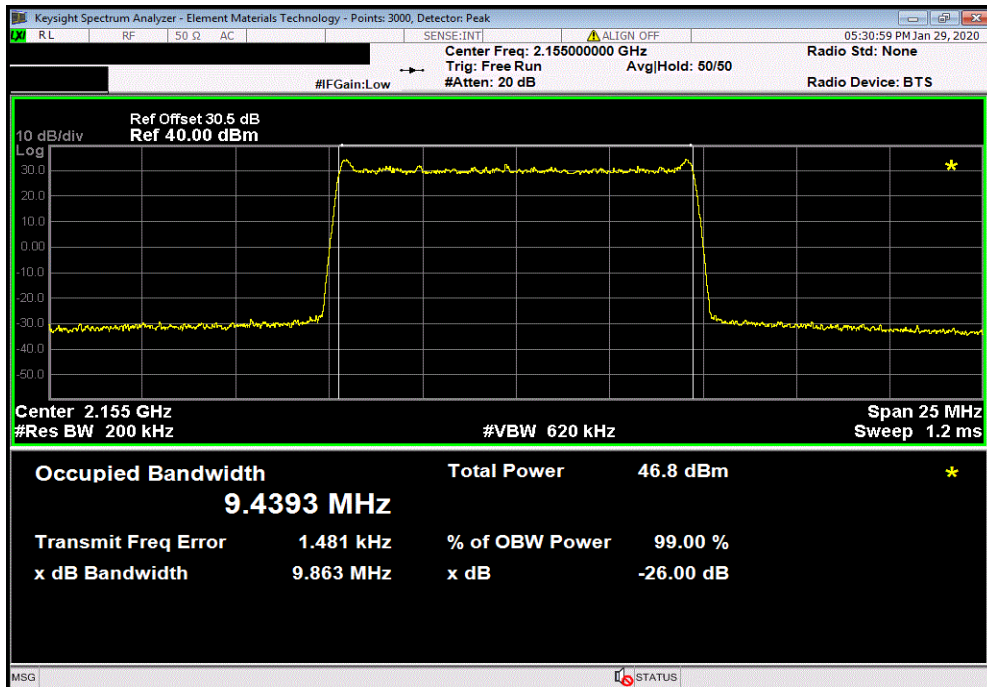


TbTx 2019.08.30.0 XMI 2019.09.05

Band 66 (Single Carrier) Port 2, 10 MHz, NB IOT, Low Channel, 2115 MHz						
	Value	Value	Limit			
	99% (MHz)	-26dB (MHz)	(>)	Result		
	9.448	9.86	Within Band	Pass		



Band 66 (Single Carrier) Port 2, 10 MHz, NB IOT, Mid Channel, 2155 MHz						
	Value	Value	Limit			
	99% (MHz)	-26dB (MHz)	(>)	Result		
	9.439	9.863	Within Band	Pass		

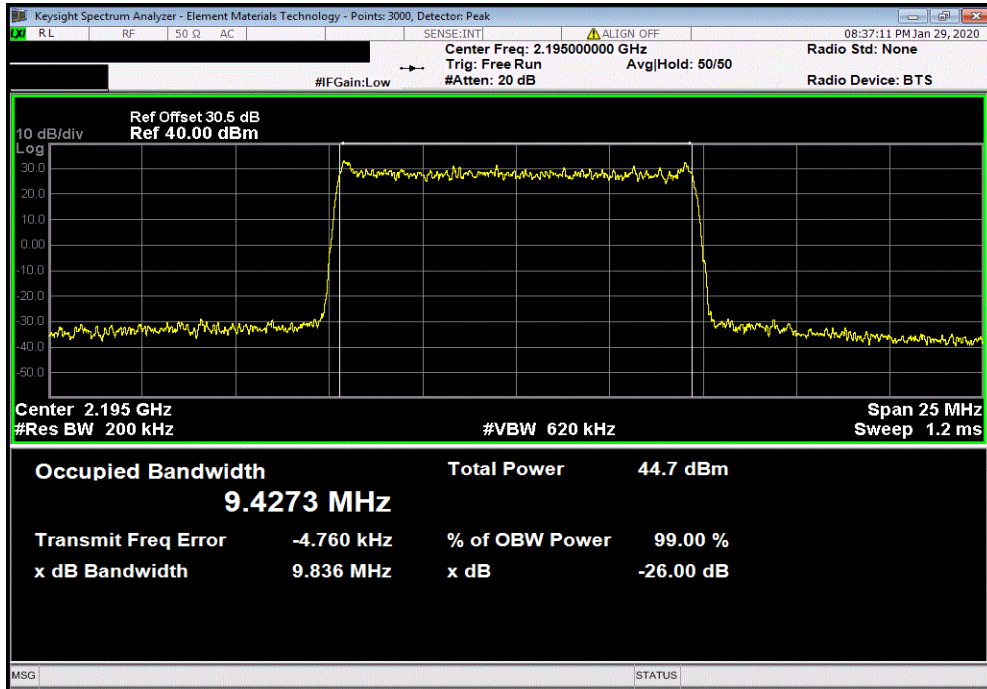


OCCUPIED BANDWIDTH

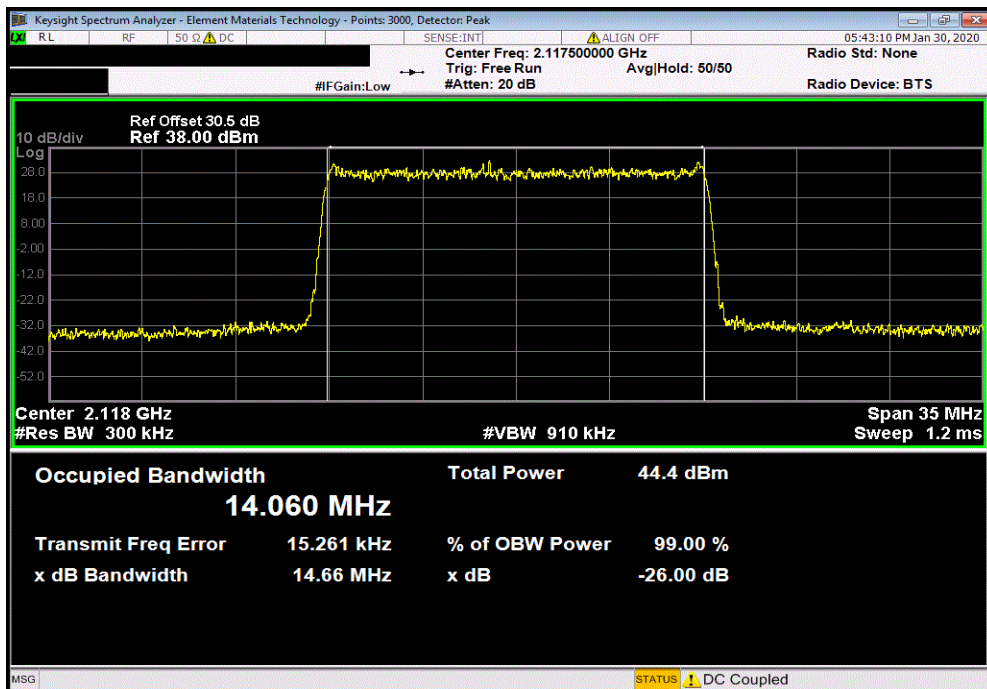


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Band 66 (Single Carrier) Port 2, 10 MHz, NB IOT, High Channel, 2195 MHz						
	Value	Value	Limit			
	99% (MHz)	-26dB (MHz)	(>)	Result		
	9.427	9.836	Within Band	Pass		



Band 66 (Single Carrier) Port 2, 15 MHz, NB IOT, Low Channel, 2115 MHz						
	Value	Value	Limit			
	99% (MHz)	-26dB (MHz)	(>)	Result		
	14.06	14.658	Within Band	Pass		

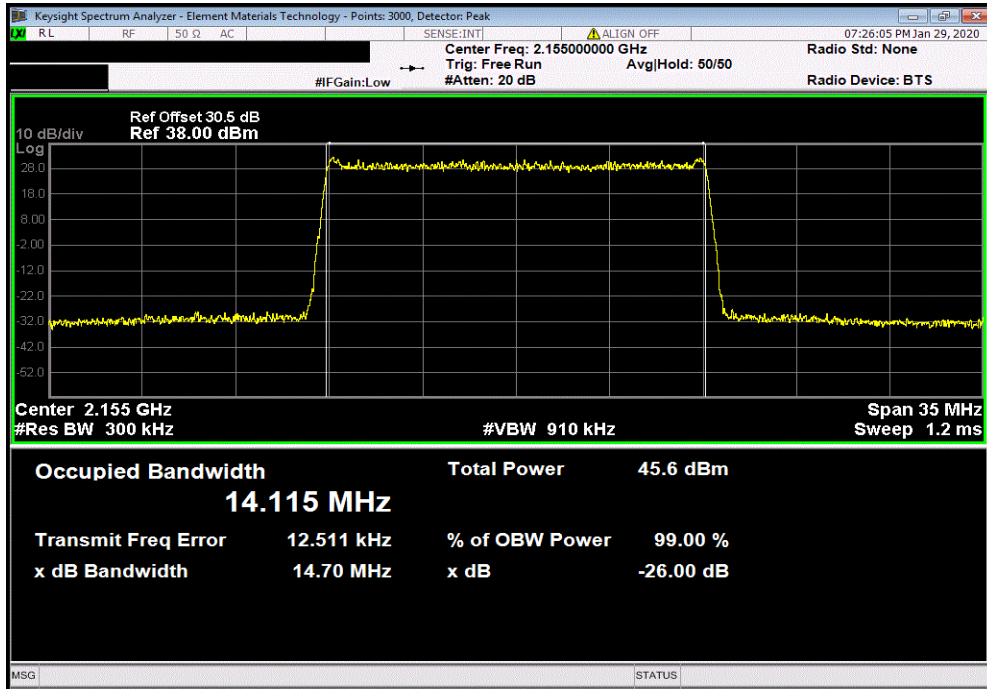


OCCUPIED BANDWIDTH

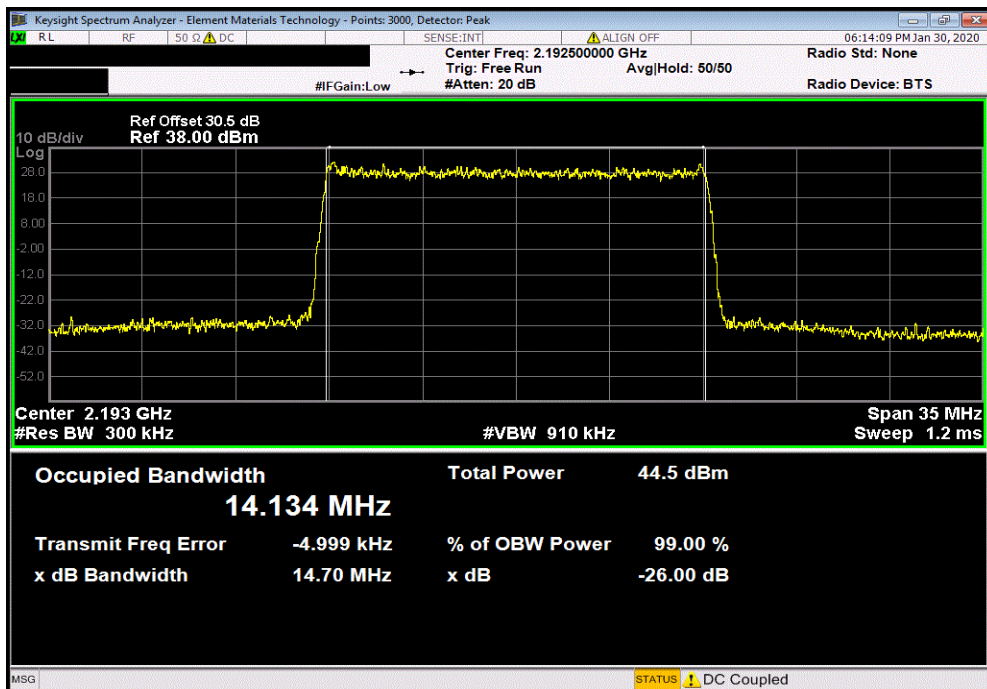


TbTx 2019.08.30.0 XMI 2019.09.05

Band 66 (Single Carrier) Port 2, 15 MHz, NB IOT, Mid Channel, 2155 MHz						
	Value	Value	Limit			
	99% (MHz)	-26dB (MHz)	(>)	Result		
	14.115	14.705	Within Band	Pass		



Band 66 (Single Carrier) Port 2, 15 MHz, NB IOT, High Channel, 2192.5 MHz						
	Value	Value	Limit			
	99% (MHz)	-26dB (MHz)	(>)	Result		
	14.134	14.697	Within Band	Pass		

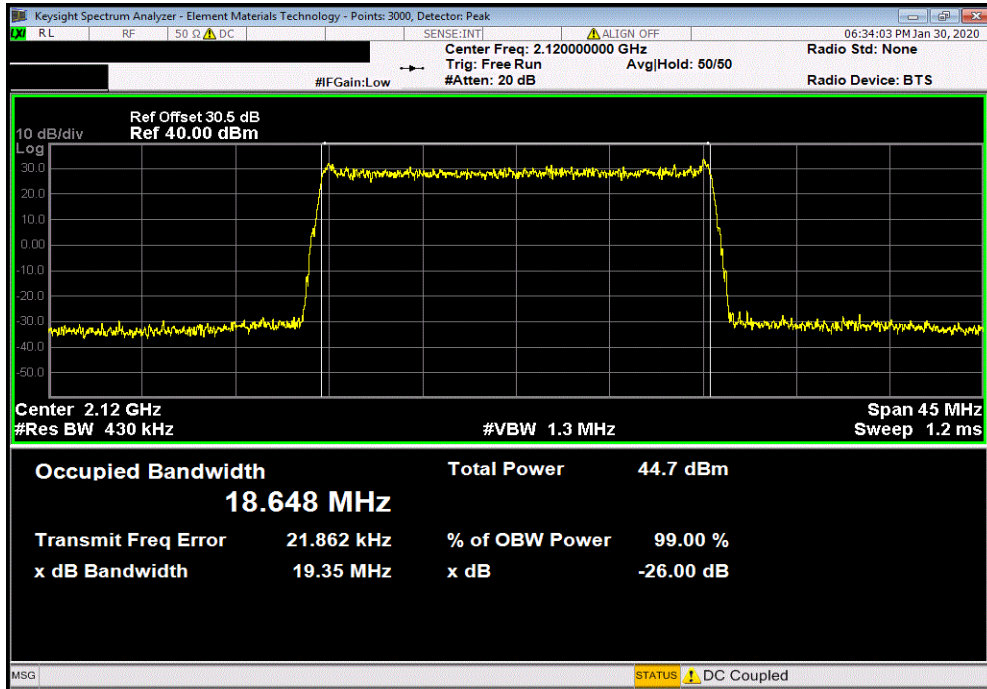


OCCUPIED BANDWIDTH

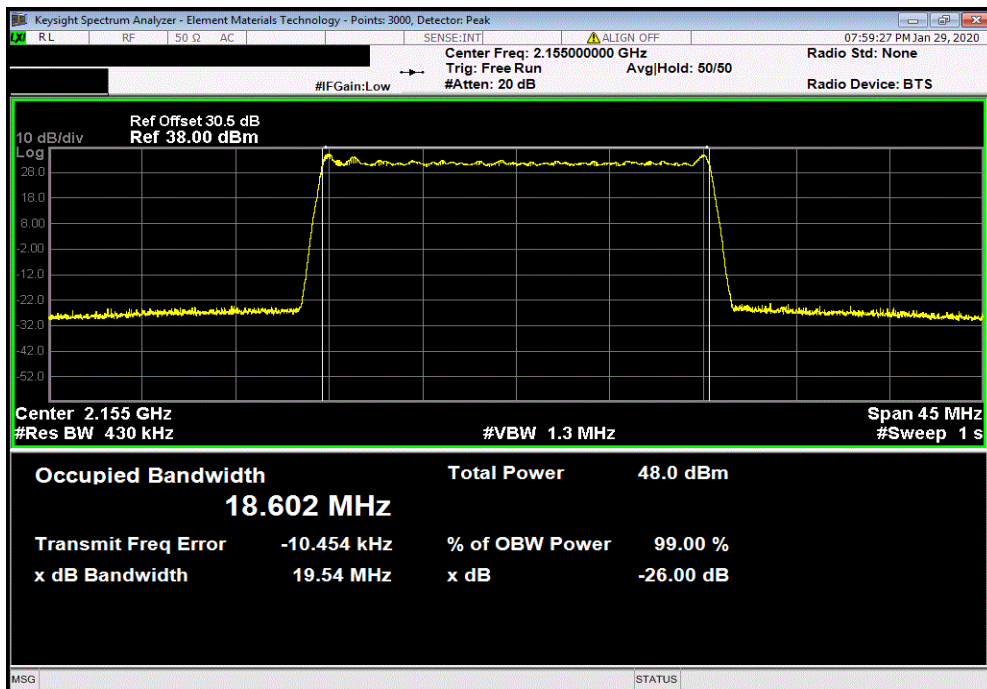


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Band 66 (Single Carrier) Port 2, 20 MHz, NB IOT, Low Channel, 2120 MHz						
	Value	Value	Limit			
	99% (MHz)	-26dB (MHz)	(>)	Result		
	18.648	19.35	Within Band	Pass		



Band 66 (Single Carrier) Port 2, 20 MHz, NB IOT, Mid Channel, 2155 MHz						
	Value	Value	Limit			
	99% (MHz)	-26dB (MHz)	(>)	Result		
	18.602	19.543	Within Band	Pass		

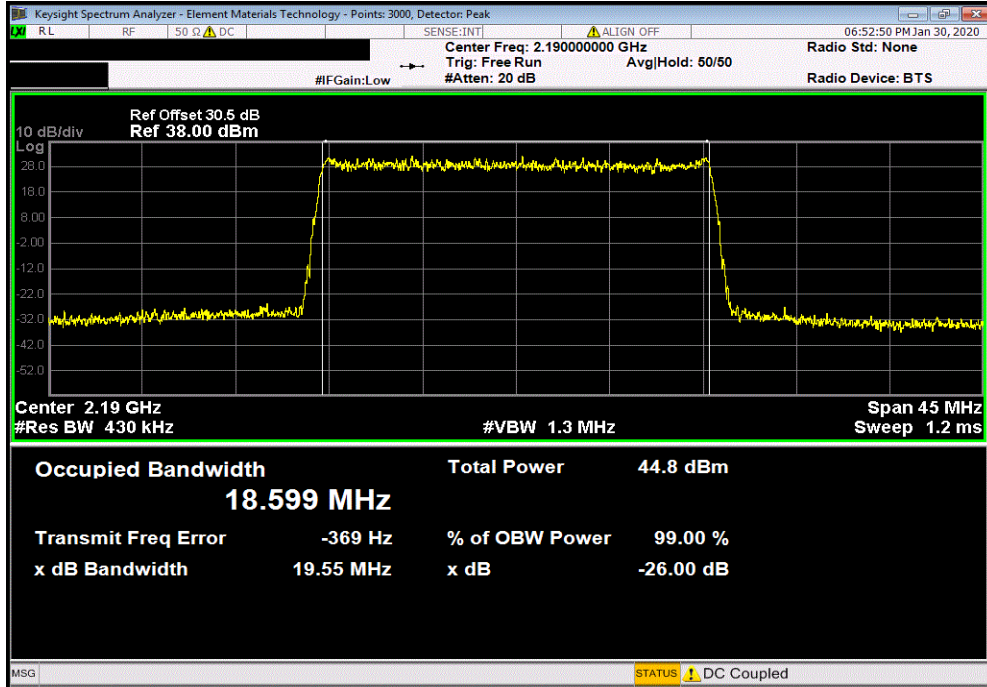


OCCUPIED BANDWIDTH



TbTx 2019.08.30.0 XMI 2019.09.05

Band 66 (Single Carrier) Port 2, 20 MHz, NB IOT, High Channel, 2190 MHz						
	Value	Value	Limit	Result		
	99% (MHz)	-26dB (MHz)	(>)			
	18.599	19.55	Within Band	Pass		



OUTPUT POWER



XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	19-Mar-19	19-Mar-20
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21

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.

Per FCC sections 27.50(d), 27.55(a)(1), RSS-139 6.5, RSS-170 5.3.1, the Equivalent Isotropically Radiated Power (EIRP) of the transceiver cannot exceed 1640 Watts/MHz.

OUTPUT POWER



TbTx 2019.06.30.0 XMI 2019.09.05

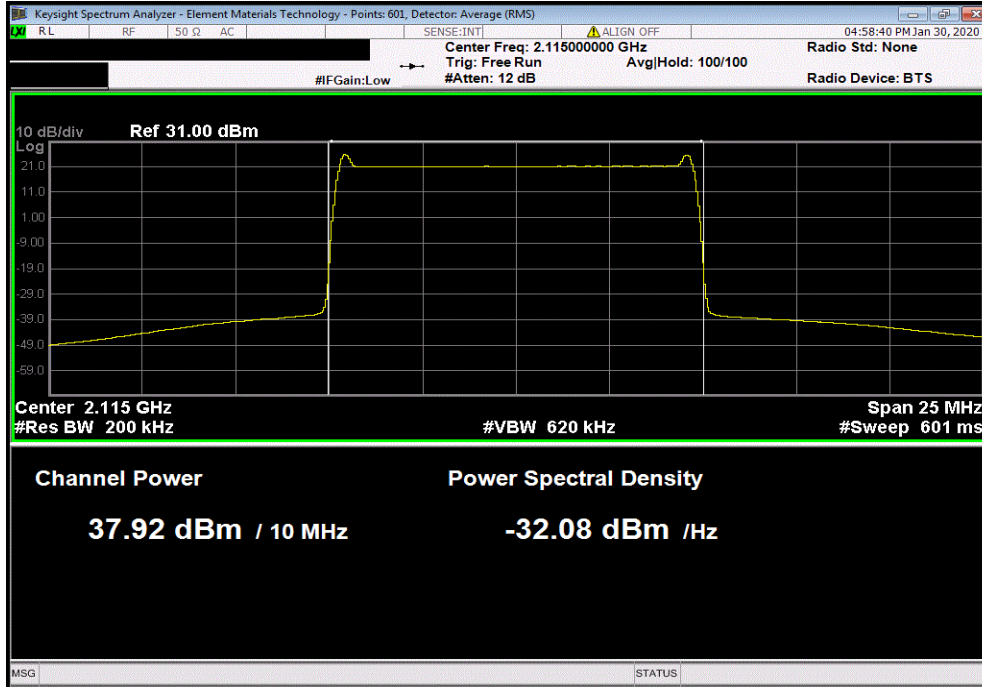
EUT: AAIB		Work Order: NOKI0006	
Serial Number: YK183800029		Date: 30-Jan-20	
Customer: Nokia Solutions and Networks		Temperature: 22 °C	
Attendees: Mitch Hill, John Rattanavong		Humidity: 33.5% RH	
Project: None		Barometric Pres.: 1013 mbar	
Tested by: Willie Love, Brandon Hobbs		Power: 54VDC	
Job Site: TX09		Test Method	
FCC 27:2020		ANSI C63.26:2015	
RSS-139:2015, RSS-170:2015		RSS-Gen:2019	
COMMENTS			
All losses in the measurement path were accounted for. Per ANSI C63.26-2015 section 4.2.3 a correction factor was used to determine the Power/MHz value based on a measured dBm/OBW with a reduced integration BW from the specification required reference bandwidth. CF= 10*Log(ref BW/measured integration channel BW) The highest power port operating at maximum power was used for these measurements. The highest power port was determined by measuring the average power on each of the 16 antenna ports using a 10 MHz channel bandwidth at the middle channel shown elsewhere in the report.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature	
		Antenna Gain (dBi)	Initial Power (dBm/OBW)
		Duty Cycle Factor (dB)	Correction Factor (dB)
		Final w/o Ant Gain Value (dBm/MHz)	Limit EIRP (dBm/MHz)
		Results	
Band 66 (Single Carrier) Port 2			
10 MHz			
NB IOT			
	Low Channel, 2115 MHz	Not Provided	37.9
	Mid Channel, 2155 MHz	Not Provided	38.1
	High Channel, 2195 MHz	Not Provided	38.0
		0.0	-10.0
		0.0	-10.0
		0.0	-10.0
		27.9	62.2
		28.1	62.2
		28.0	62.2
		Pass	Pass
		Pass	Pass
		Pass	Pass
15 MHz			
NB IOT			
	Low Channel, 2117.5 MHz	Not Provided	37.8
	Mid Channel, 2155 MHz	Not Provided	38.0
	High Channel, 2192.5 MHz	Not Provided	38.1
		0.0	-11.8
		0.0	-11.8
		0.0	-11.8
		26.1	62.2
		26.2	62.2
		26.3	62.2
		Pass	Pass
		Pass	Pass
		Pass	Pass
20 MHz			
NB IOT			
	Low Channel, 2120 MHz	Not Provided	38.1
	Mid Channel, 2155 MHz	Not Provided	38.2
	High Channel, 2190 MHz	Not Provided	38.2
		0.0	-13.0
		0.0	-13.0
		0.0	-13.0
		25.1	62.2
		25.2	62.2
		25.2	62.2
		Pass	Pass
		Pass	Pass
		Pass	Pass

OUTPUT POWER

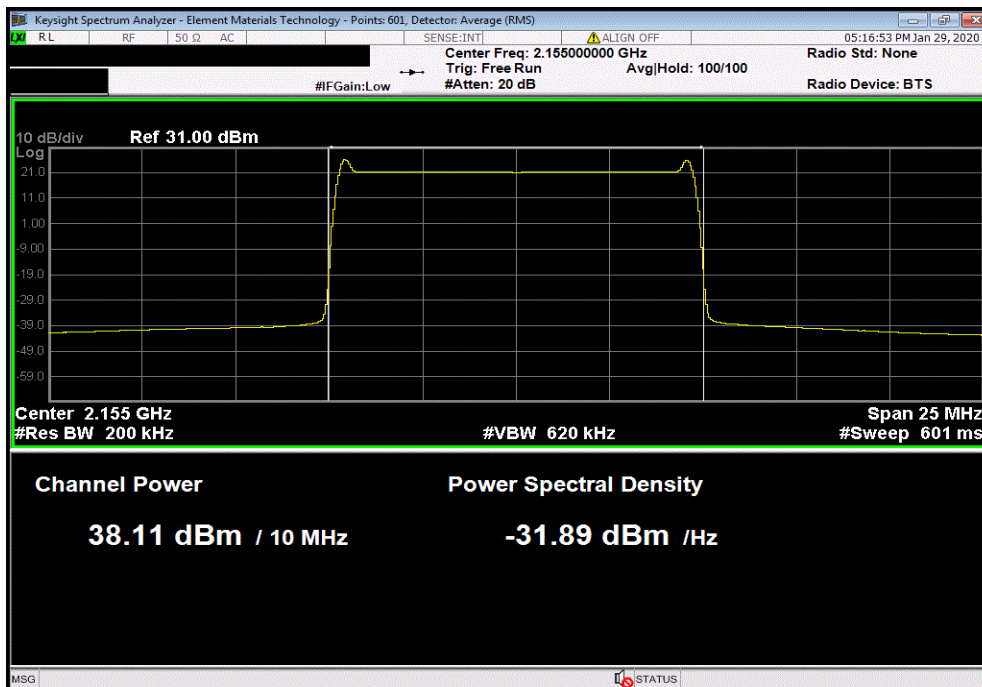


TbTtX 2019.08.30.0 XMI 2019.09.05

Band 66 (Single Carrier) Port 2, 10 MHz, NB IOT, Low Channel, 2115 MHz						
Antenna Gain (dBi)	Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Correction Factor (dB)	inal w/o Ant Gai value (dBm/MHz)	Limit EIRP (dBm/MHz)	Results
Not Provided	37.916	0	-10.00	27.92	62.15	Pass



Band 66 (Single Carrier) Port 2, 10 MHz, NB IOT, Mid Channel, 2155 MHz						
Antenna Gain (dBi)	Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Correction Factor (dB)	inal w/o Ant Gai value (dBm/MHz)	Limit EIRP (dBm/MHz)	Results
Not Provided	38.115	0	-10.00	28.12	62.15	Pass

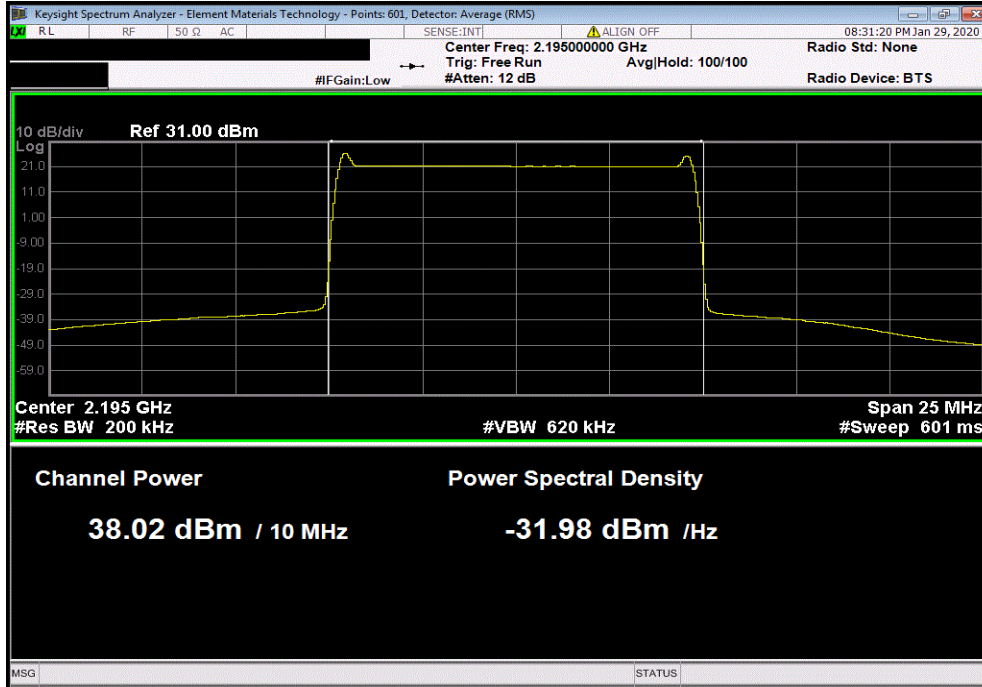


OUTPUT POWER

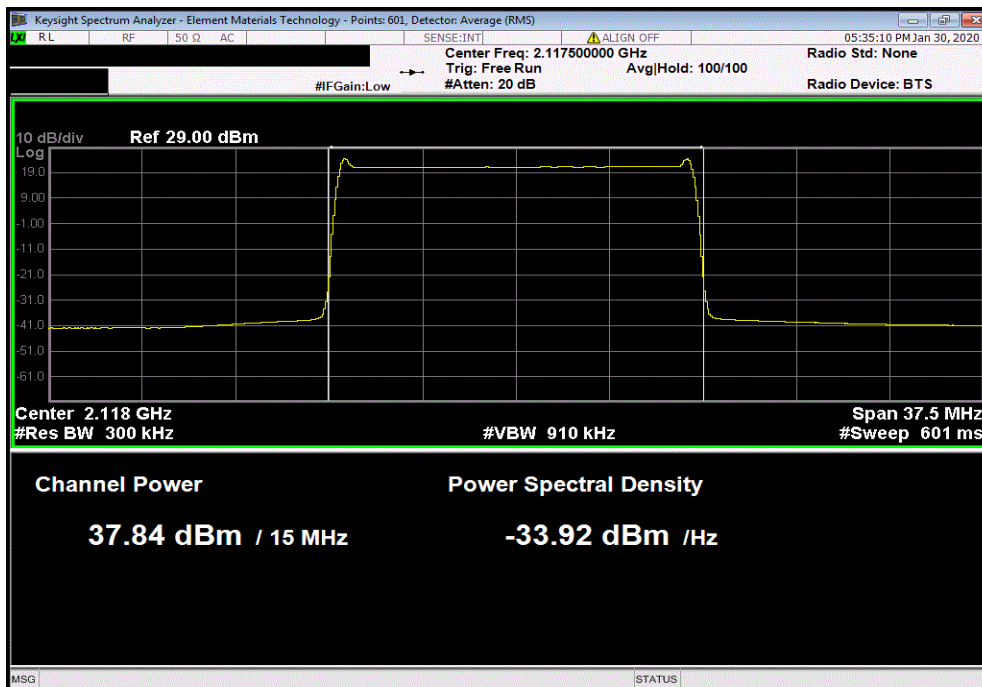


TbTtX 2019.08.30.0 XMI 2019.09.05

Band 66 (Single Carrier) Port 2, 10 MHz, NB IOT, High Channel, 2195 MHz						
Antenna Gain (dBi)	Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Correction Factor (dB)	inal w/o Ant Gai value (dBm/MHz)	Limit EIRP (dBm/MHz)	Results
Not Provided	38.019	0	-10.00	28.02	62.15	Pass



Band 66 (Single Carrier) Port 2, 15 MHz, NB IOT, Low Channel, 2117.5 MHz						
Antenna Gain (dBi)	Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Correction Factor (dB)	inal w/o Ant Gai value (dBm/MHz)	Limit EIRP (dBm/MHz)	Results
Not Provided	37.84	0	-11.76	26.08	62.15	Pass

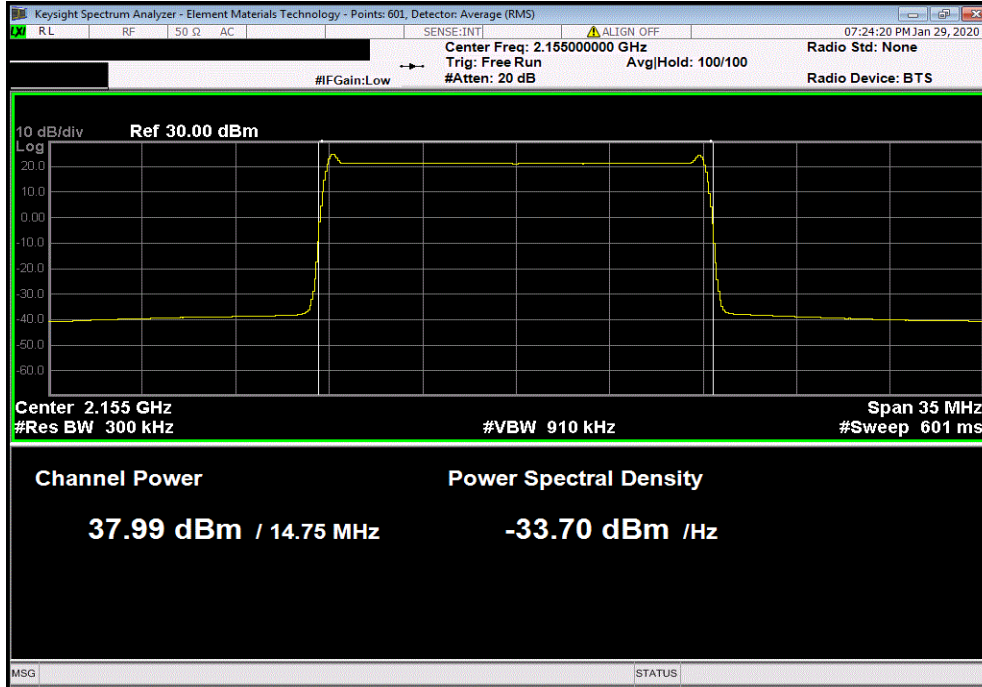


OUTPUT POWER

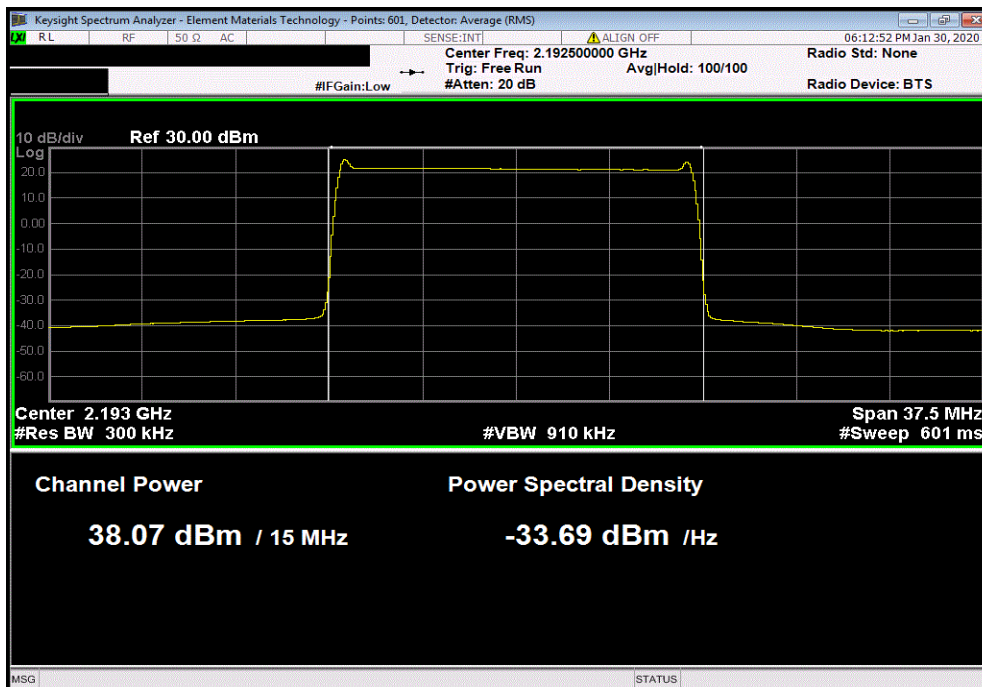


TbTbX 2019.08.30.0 XMI 2019.09.05

Band 66 (Single Carrier) Port 2, 15 MHz, NB IOT, Mid Channel, 2155 MHz						
Antenna Gain (dBi)	Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Correction Factor (dB)	inal w/o Ant Gai value (dBm/MHz)	Limit EIRP (dBm/MHz)	Results
Not Provided	37.989	0	-11.76	26.23	62.15	Pass



Band 66 (Single Carrier) Port 2, 15 MHz, NB IOT, High Channel, 2192.5 MHz						
Antenna Gain (dBi)	Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Correction Factor (dB)	inal w/o Ant Gai value (dBm/MHz)	Limit EIRP (dBm/MHz)	Results
Not Provided	38.071	0	-11.76	26.31	62.15	Pass

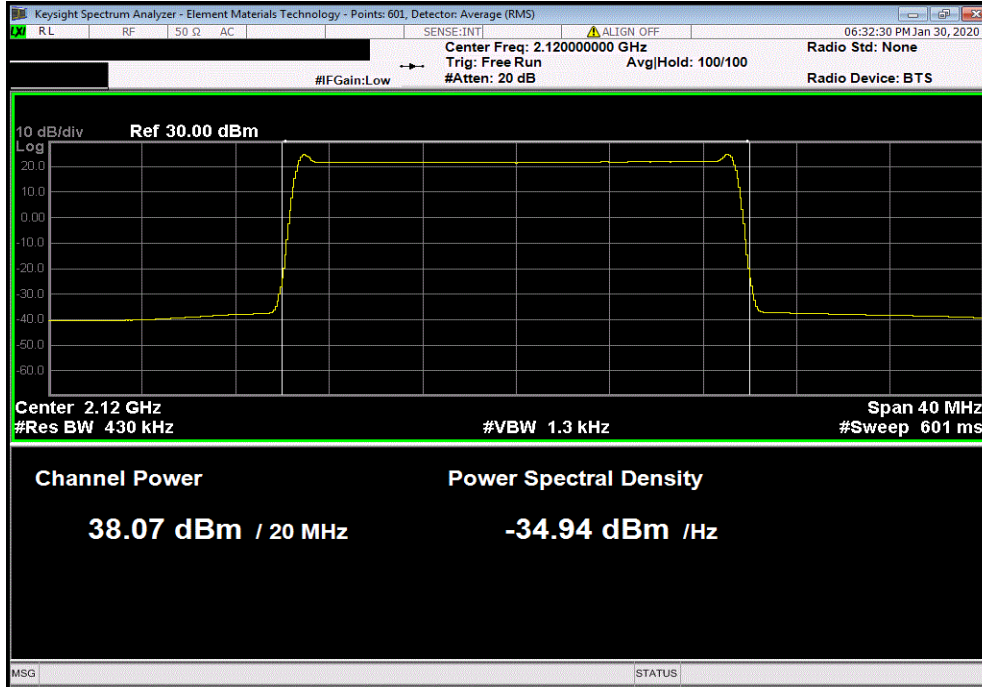


OUTPUT POWER

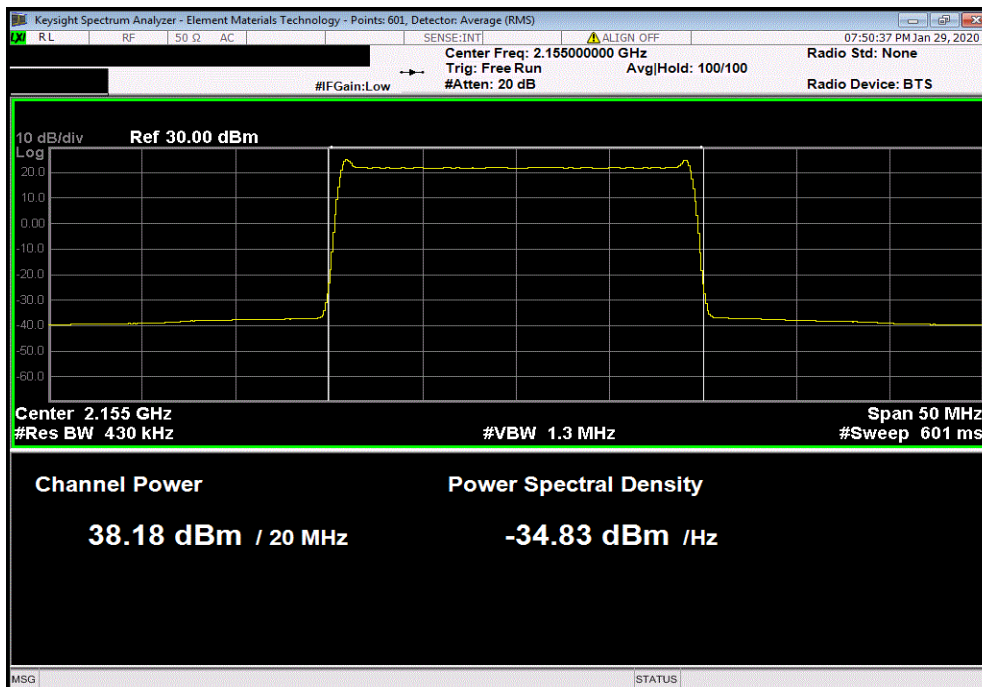


TbTtX 2019.08.30.0 XMI 2019.09.05

Band 66 (Single Carrier) Port 2, 20 MHz, NB IOT, Low Channel, 2120 MHz						
Antenna Gain (dBi)	Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Correction Factor (dB)	inal w/o Ant Gai value (dBm/MHz)	Limit EIRP (dBm/MHz)	Results
Not Provided	38.068	0	-13.01	25.06	62.15	Pass



Band 66 (Single Carrier) Port 2, 20 MHz, NB IOT, Mid Channel, 2155 MHz						
Antenna Gain (dBi)	Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Correction Factor (dB)	inal w/o Ant Gai value (dBm/MHz)	Limit EIRP (dBm/MHz)	Results
Not Provided	38.183	0	-13.01	25.17	62.15	Pass

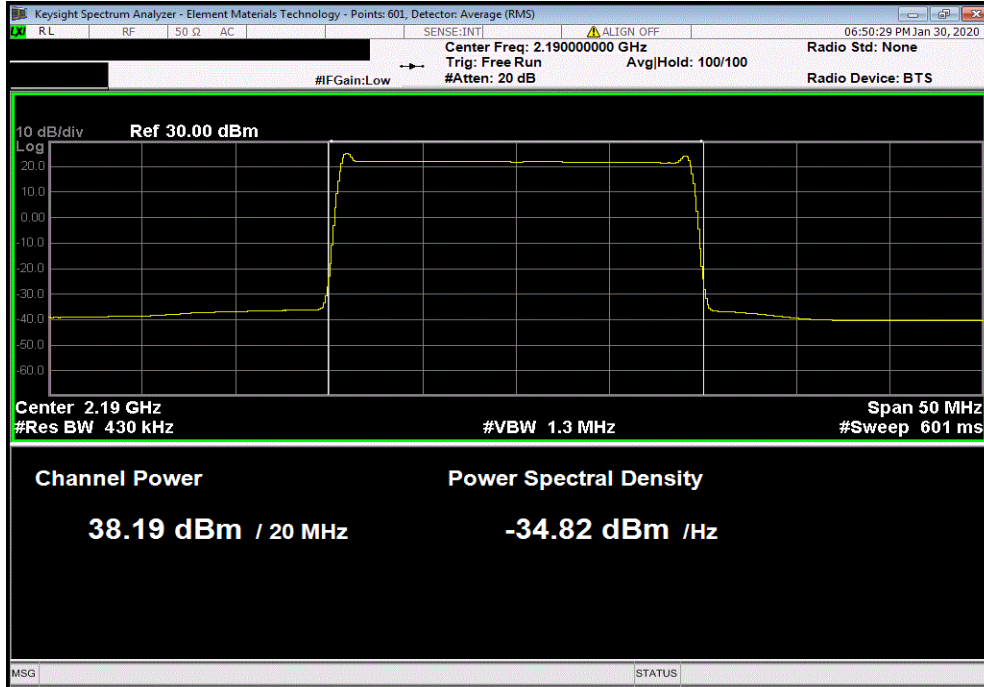


OUTPUT POWER



TyTix 2019.08.30.0 XMI 2019.09.05

Band 66 (Single Carrier) Port 2, 20 MHz, NB IOT, High Channel, 2190 MHz						
Antenna Gain (dBi)	Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Correction Factor (dB)	inal w/o Ant Gai value (dBm/MHz)	Limit EIRP (dBm/MHz)	Results
Not Provided	38.187	0	-13.01	25.18	62.15	Pass



OUTPUT POWER (WORST CASE PORT)



XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	19-Mar-19	19-Mar-20

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.

Per FCC sections 27.50(d), 27.55(a)(1), RSS-139 6.5, RSS-170 5.3.1, the Equivalent Isotropically Radiated Power (EIRP) of the transceiver cannot exceed 1640 Watts/MHz.

OUTPUT POWER (WORST CASE PORT)



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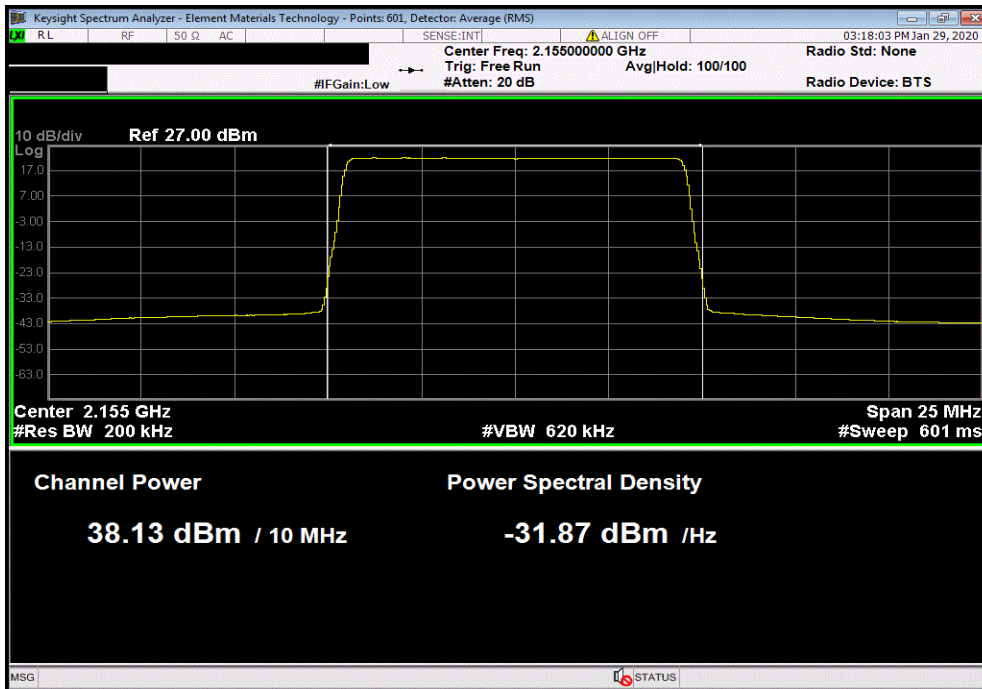
EUT: AAIB		Work Order: NOKI0006	
Serial Number: YK183800029		Date: 29-Jan-20	
Customer: Nokia		Temperature: 22.7 °C	
Attendees: Mitch Hill, John Rattanavong		Humidity: 28.2% RH	
Project: None		Barometric Pres.: 1041 mbar	
Tested by: Willie Love, Brandon Hobbs		Power: 54VDC	
Job Site: TX09			
TEST SPECIFICATIONS		Test Method	
FCC 27:2020		ANSI C63.26:2015	
RSS-139:2015, RSS-170:2015		RSS-139:2015, RSS-170:2015	
COMMENTS			
All losses in the measurement path were accounted for. Worst case port was found to be port 2			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature	
		Initial Power (dBm/OBW)	Duty Cycle Factor (dB)
		Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)
		Limit (dBm)	Results
Band 66 (Single Carrier) Port 1	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	38.13	0
			Not Provided
			38.1
			N/A
			N/A
Band 66 (Single Carrier) Port 2	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	38.17	0
			Not Provided
			38.2
			N/A
			N/A
Band 66 (Single Carrier) Port 3	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	38.01	0
			Not Provided
			38.0
			N/A
			N/A
Band 66 (Single Carrier) Port 4	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	37.95	0
			Not Provided
			37.9
			N/A
			N/A
Band 66 (Single Carrier) Port 5	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	37.96	0
			Not Provided
			38.0
			N/A
			N/A
Band 66 (Single Carrier) Port 6	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	38.08	0
			Not Provided
			38.1
			N/A
			N/A
Band 66 (Single Carrier) Port 7	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	37.93	0
			Not Provided
			37.9
			N/A
			N/A
Band 66 (Single Carrier) Port 8	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	38.04	0
			Not Provided
			38.0
			N/A
			N/A
Band 66 (Single Carrier) Port 9	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	38.10	0
			Not Provided
			38.1
			N/A
			N/A
Band 66 (Single Carrier) Port 10	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	38.20	0
			Not Provided
			38.2
			N/A
			N/A
Band 66 (Single Carrier) Port 11	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	37.95	0
			Not Provided
			37.9
			N/A
			N/A
Band 66 (Single Carrier) Port 12	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	38.09	0
			Not Provided
			38.1
			N/A
			N/A
Band 66 (Single Carrier) Port 13	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	38.00	0
			Not Provided
			38.0
			N/A
			N/A
Band 66 (Single Carrier) Port 14	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	38.06	0
			Not Provided
			38.1
			N/A
			N/A
Band 66 (Single Carrier) Port 15	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	37.85	0
			Not Provided
			37.8
			N/A
			N/A
Band 66 (Single Carrier) Port 16	10 MHz		
	256QAM		
	Mid Channel, 2155 MHz	38.19	0
			Not Provided
			38.2
			N/A
			N/A

OUTPUT POWER (WORST CASE PORT)

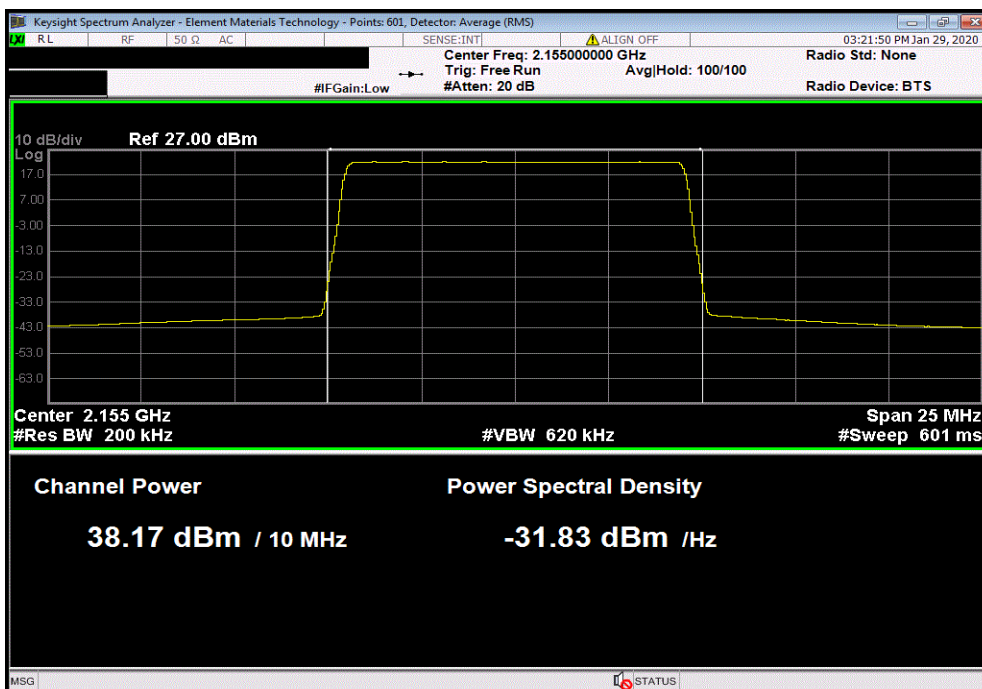


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Band 66 (Single Carrier) Port 1, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
38.13	0	Not Provided	38.1	N/A	N/A	



Band 66 (Single Carrier) Port 2, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
38.165	0	Not Provided	38.2	N/A	N/A	

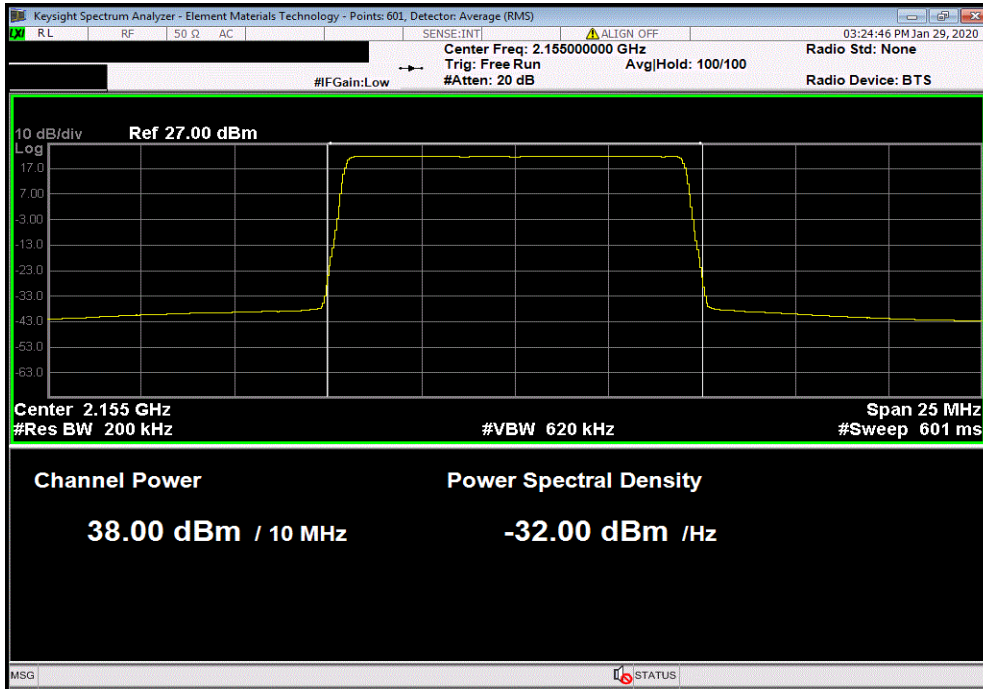


OUTPUT POWER (WORST CASE PORT)

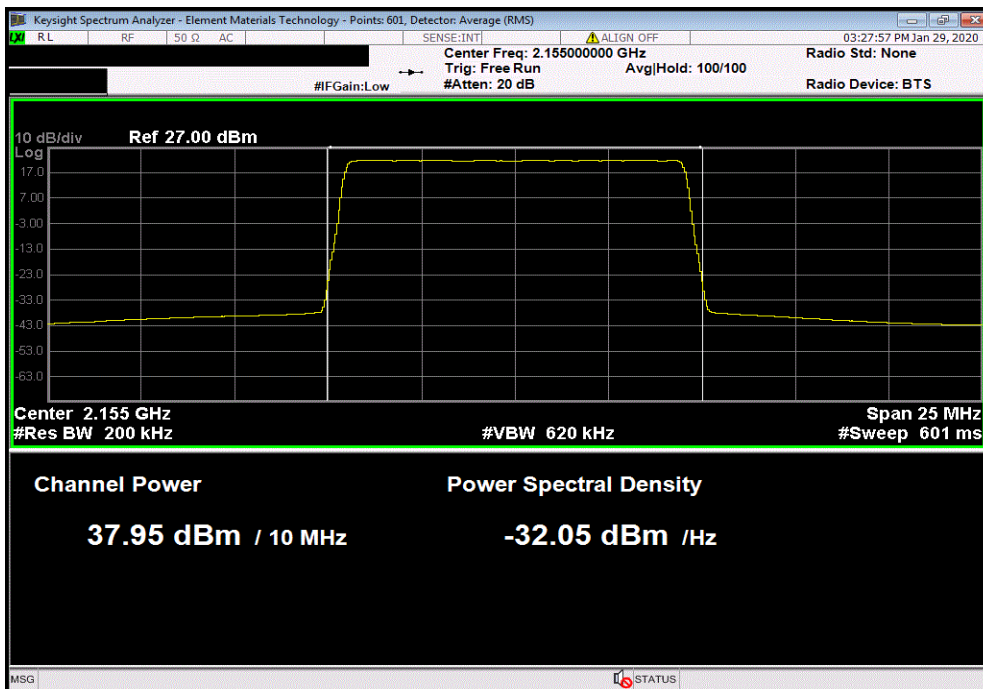


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Band 66 (Single Carrier) Port 3, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
38.005	0	Not Provided	38	N/A	N/A	



Band 66 (Single Carrier) Port 4, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
37.949	0	Not Provided	37.9	N/A	N/A	

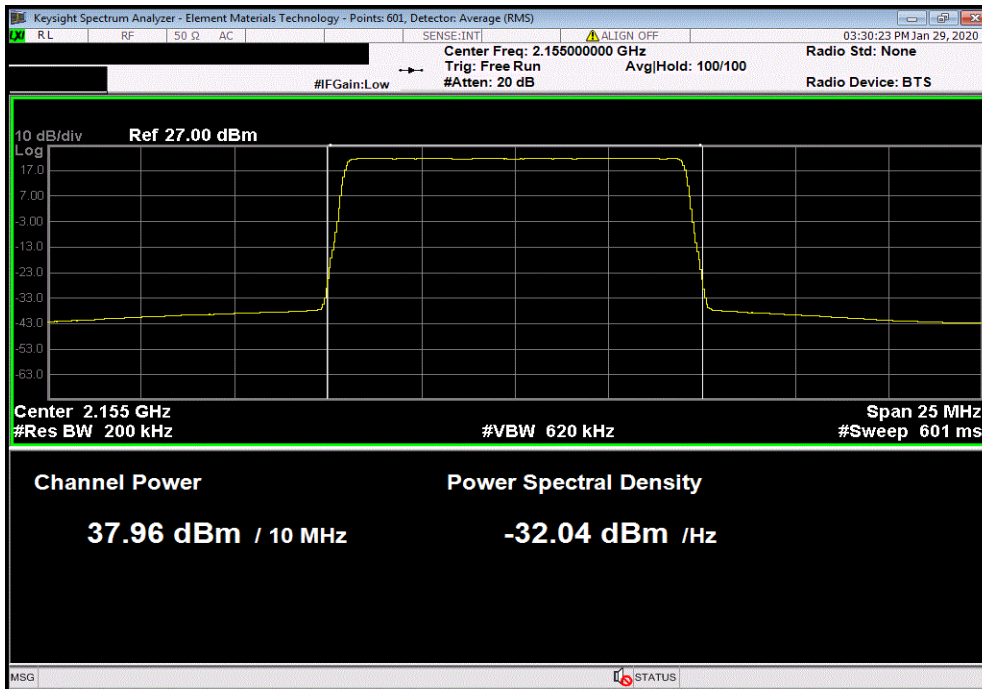


OUTPUT POWER (WORST CASE PORT)

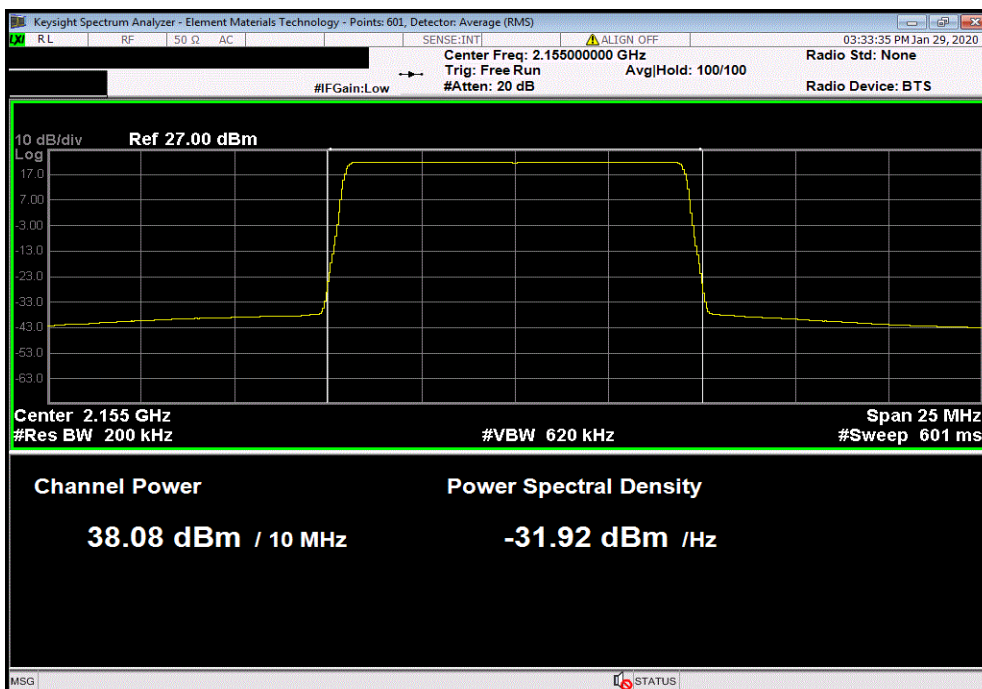


ThxTx 2019.08.30.0 XM4 2019.09.05

Band 66 (Single Carrier) Port 5, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
37.961	0	Not Provided	38	N/A	N/A	



Band 66 (Single Carrier) Port 6, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
38.08	0	Not Provided	38.1	N/A	N/A	

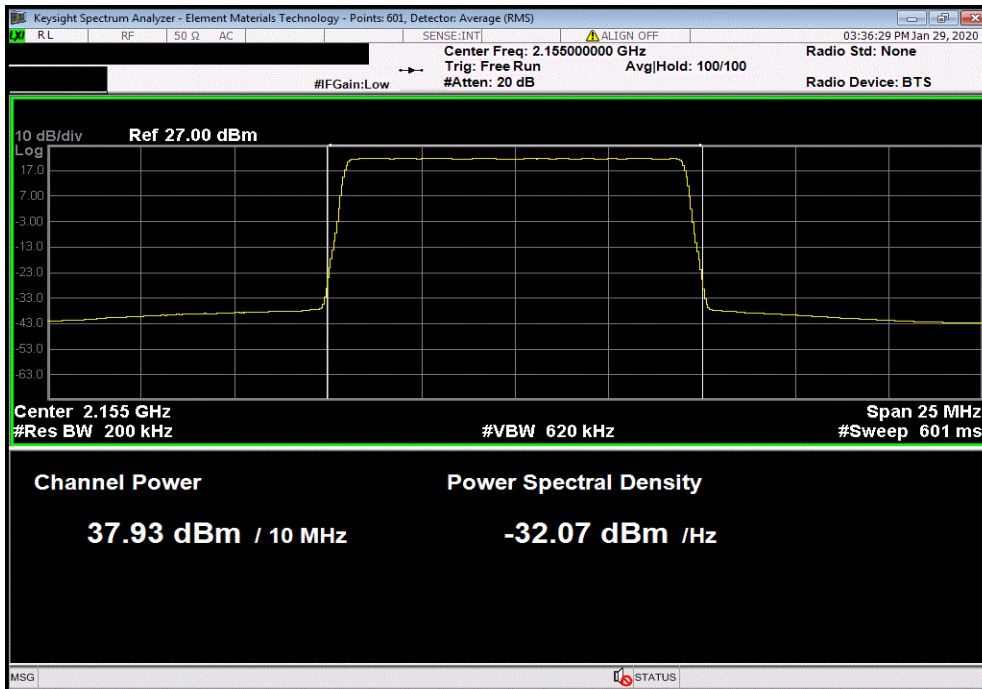


OUTPUT POWER (WORST CASE PORT)

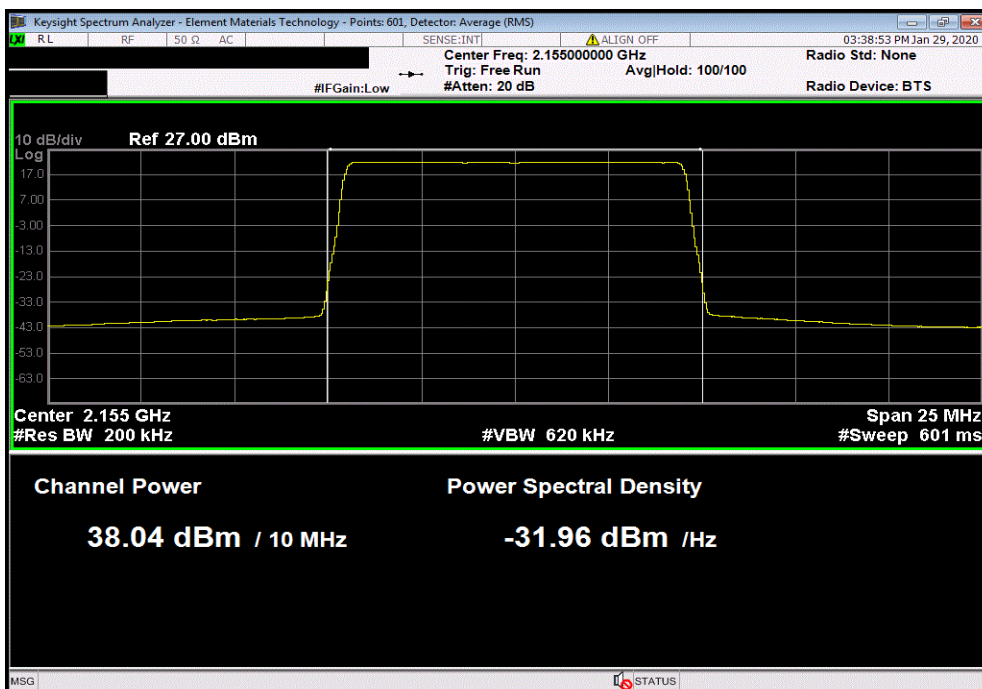


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Band 66 (Single Carrier) Port 7, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
37.927	0	Not Provided	37.9	N/A	N/A	



Band 66 (Single Carrier) Port 8, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
38.037	0	Not Provided	38	N/A	N/A	

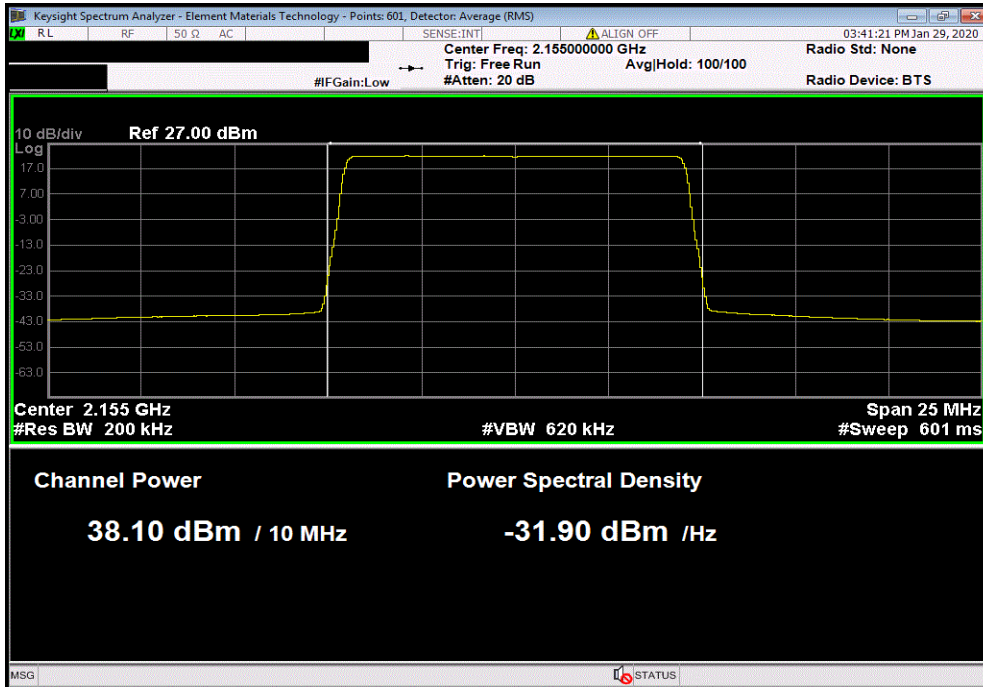


OUTPUT POWER (WORST CASE PORT)

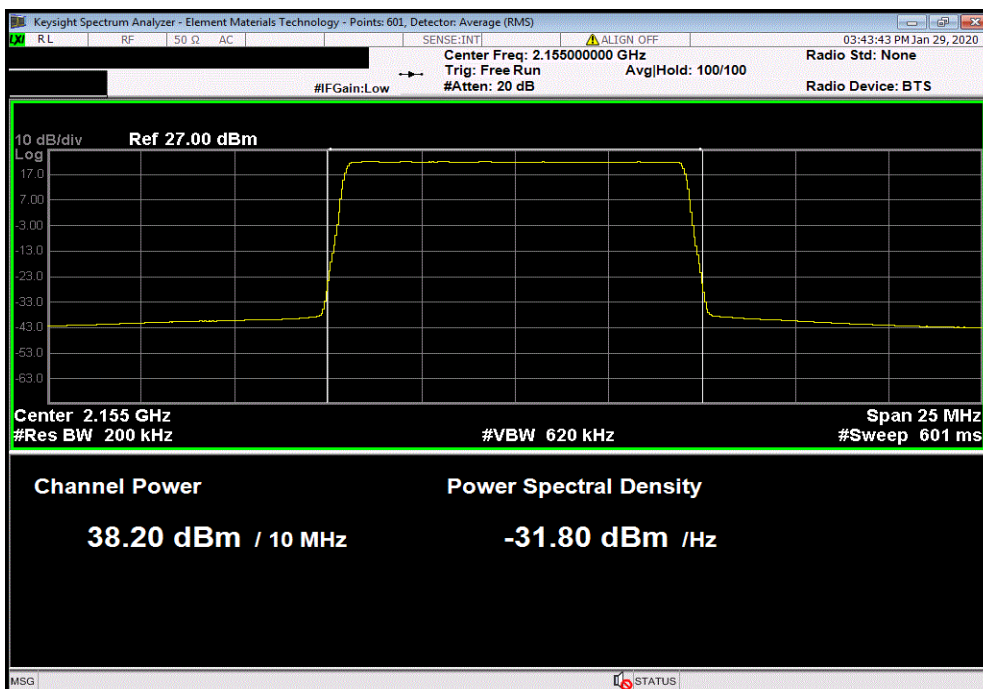


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Band 66 (Single Carrier) Port 9, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
38.1	0	Not Provided	38.1	N/A	N/A	



Band 66 (Single Carrier) Port 10, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
38.196	0	Not Provided	38.2	N/A	N/A	

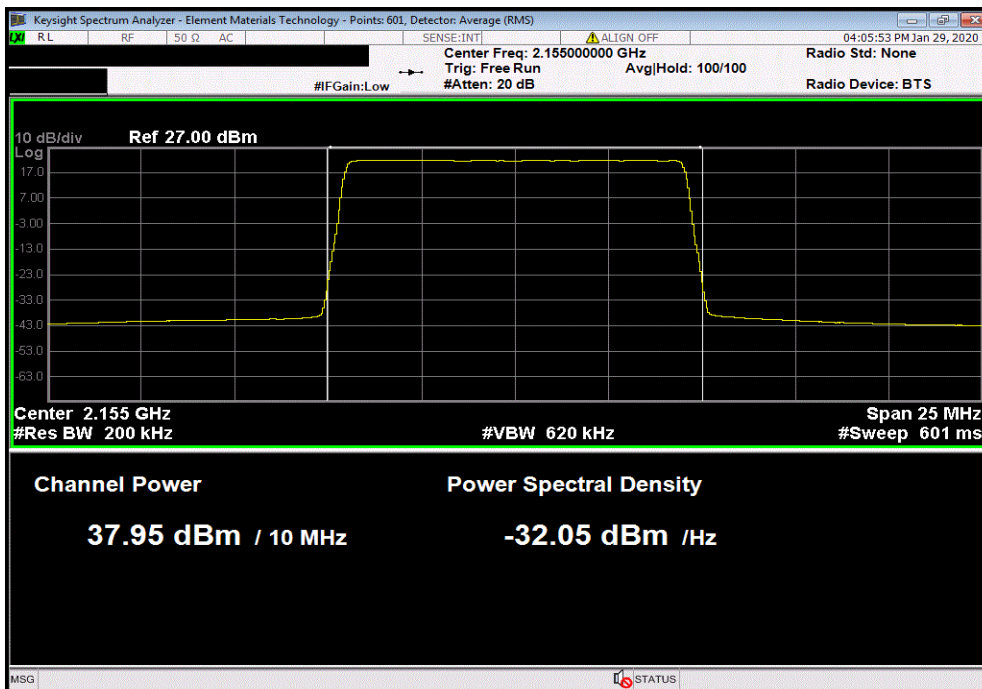


OUTPUT POWER (WORST CASE PORT)

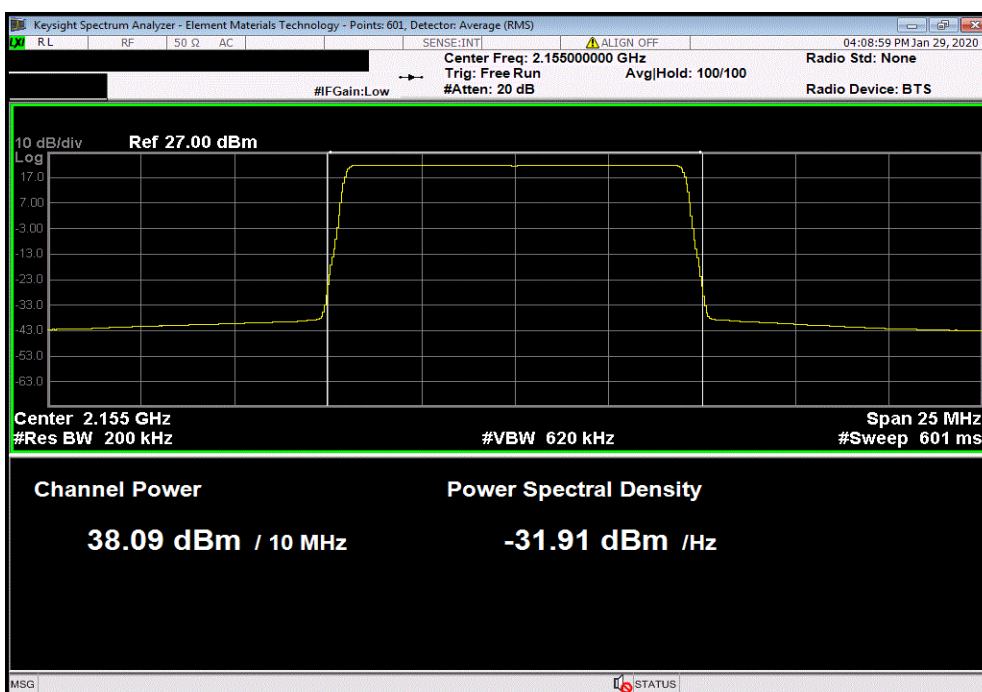


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Band 66 (Single Carrier) Port 11, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
37.949	0	Not Provided	37.9	N/A	N/A	



Band 66 (Single Carrier) Port 12, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
38.092	0	Not Provided	38.1	N/A	N/A	

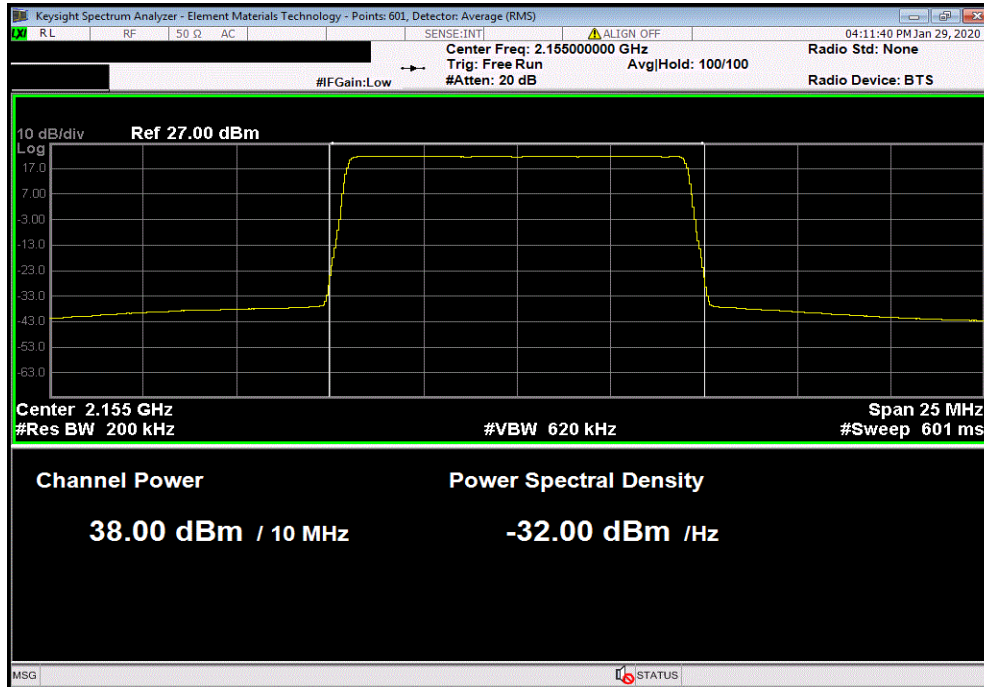


OUTPUT POWER (WORST CASE PORT)

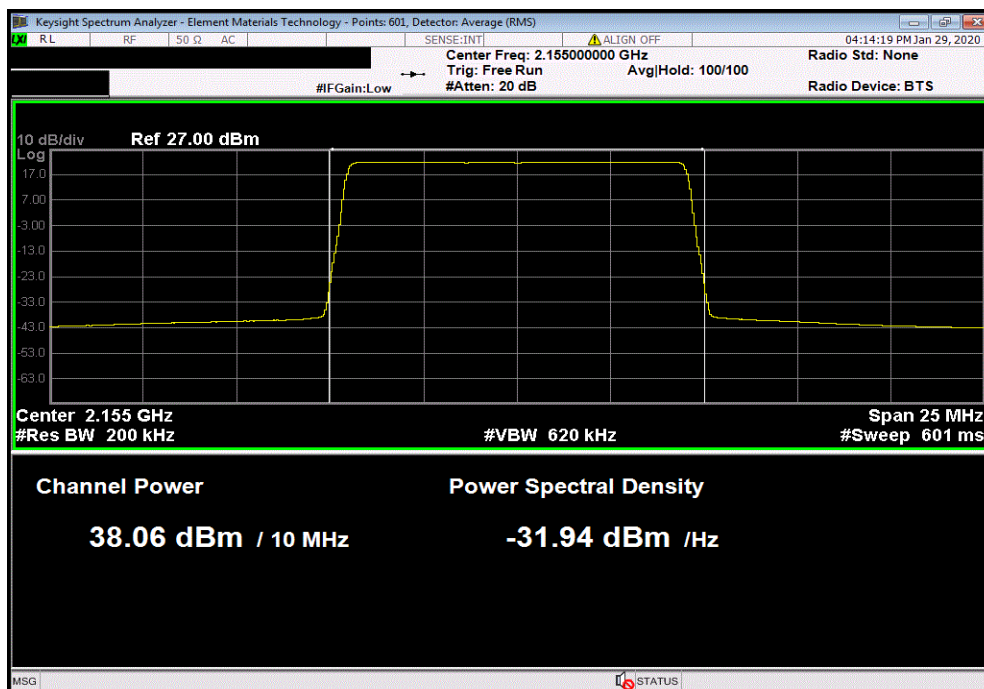


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Band 66 (Single Carrier) Port 13, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
37.996	0	Not Provided	38	N/A	N/A	



Band 66 (Single Carrier) Port 14, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
38.062	0	Not Provided	38.1	N/A	N/A	

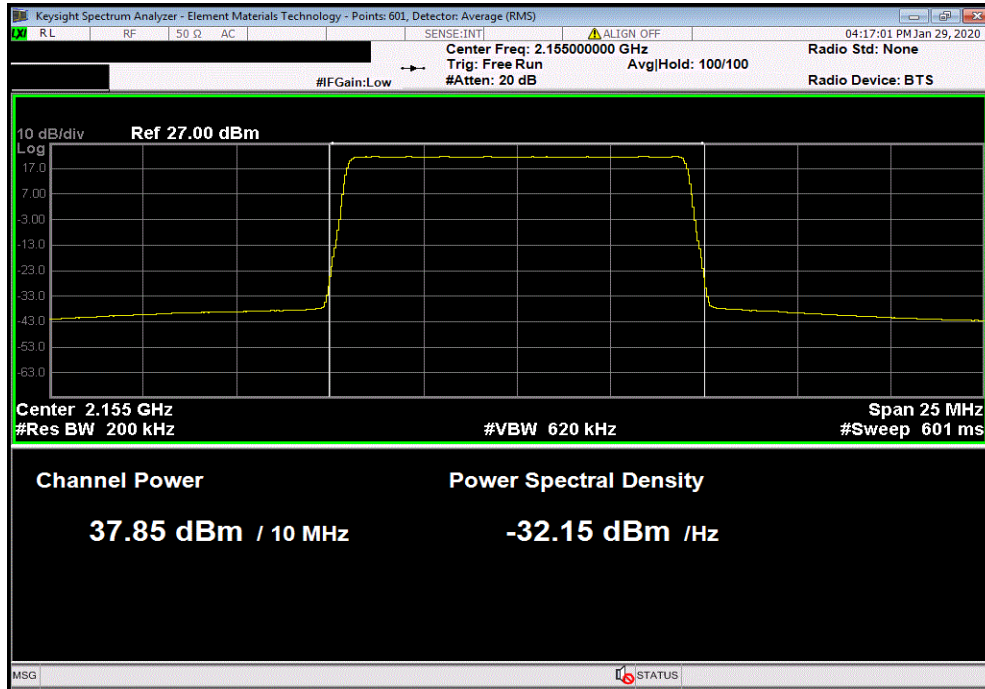


OUTPUT POWER (WORST CASE PORT)

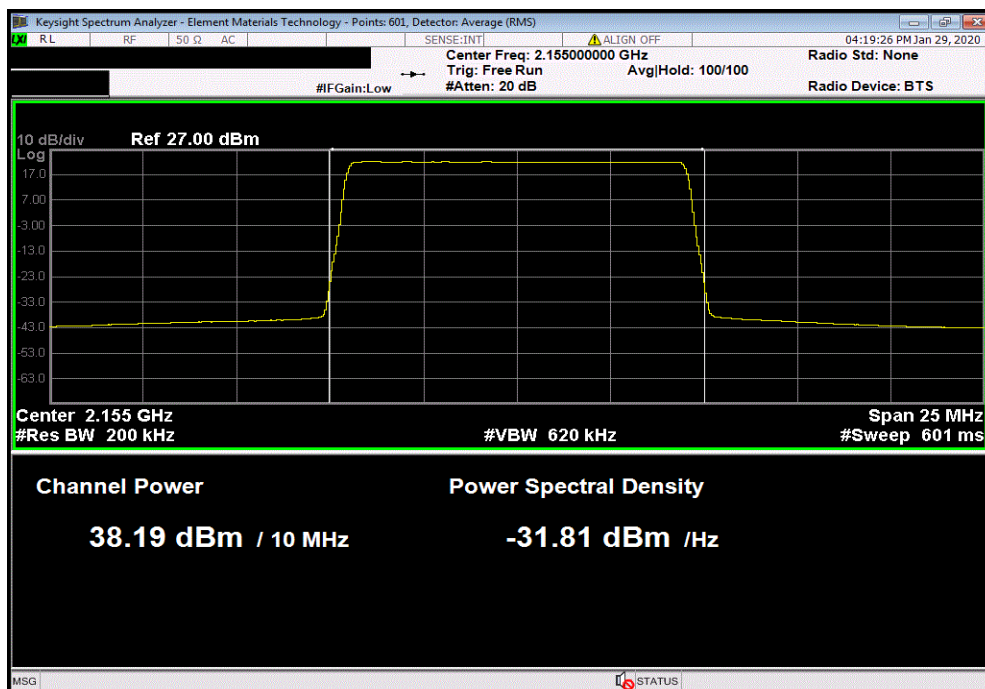


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Band 66 (Single Carrier) Port 15, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
37.849	0	Not Provided	37.8	N/A	N/A	



Band 66 (Single Carrier) Port 16, 10 MHz, 256QAM, Mid Channel, 2155 MHz						
Initial Power (dBm/OBW)	Duty Cycle Factor (dB)	Antenna Gain (dBi)	Final w/o Ant Gain Value (dBm/OBW)	Limit (dBm)	Results	
38.186	0	Not Provided	38.2	N/A	N/A	



PEAK TO AVERAGE POWER (CCDF)



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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	19-Mar-19	19-Mar-20
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21

TEST DESCRIPTION

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

Because the conducted Output Power was measured using a RMS Average detector, the Peak to Average Power Ratio (PAPR) was measured to show that the maximum peak-max-hold spectrum to the maximum of the average spectrum does not exceed the rule part defined limit.


The PAPR measurement method is described in ANSI C63.26 section 5.2.3.4.
The PAPR was measured using the CCDF function of the spectrum analyzer.

Per 27.50(d)(5), RSS-139 section 6.5, and RSS-170 section 5.3.1, the PAPR limit shall not exceed 13 dB for more than the ANSI described 0.1% of the time.

PEAK TO AVERAGE POWER (CCDF)



TelTx 2019.08.30.0 XMI 2019.09.05

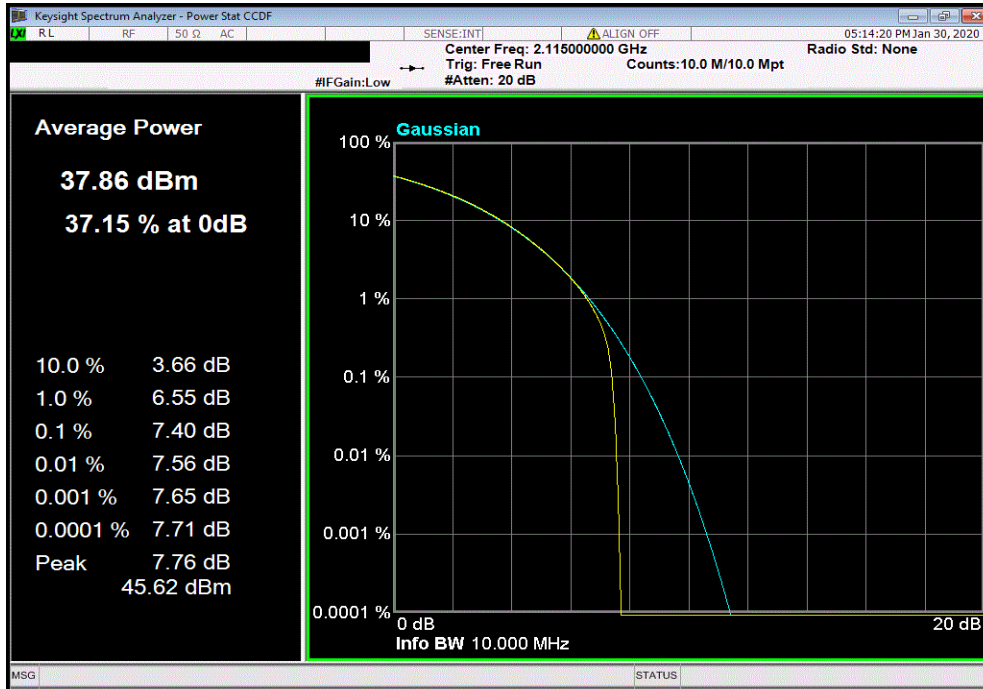
EUT: AAIB		Work Order: NOKI0006		
Serial Number: YK183800029		Date: 30-Jan-20		
Customer: Nokia Solutions and Networks		Temperature: 21.9 °C		
Attendees: Mitch Hill, John Rattanavong		Humidity: 34.4% RH		
Project: None		Barometric Pres.: 1016 mbar		
Tested by: Willie Love, Brandon Hobbs		Power: 54VDC		
		Job Site: TX09		
TEST SPECIFICATIONS				
FCC 27:2020		Test Method		
RSS-139:2015, RSS-170:2015		ANSI C63.26:2015		
		RSS-Gen:2019		
COMMENTS				
All losses in the measurement path were accounted for. The highest power port operating at maximum power was used for these measurements. The highest power port was determined by measuring the average power on each of the 16 antenna ports using a 10 MHz channel bandwidth at the middle channel shown elsewhere in the report.				
DEVIATIONS FROM TEST STANDARD				
None				
Configuration #	1	Signature 		
		PAPR Value (dB)	PAPR Limit (dB)	Results
Band 66 (Single Carrier) Port 2				
10 MHz				
	NB IOT			
	Low Channel, 2115 MHz	7.40	13	Pass
	Mid Channel, 2155 MHz	7.38	13	Pass
	High Channel, 2195 MHz	7.40	13	Pass
15 MHz				
	NB IOT			
	Low Channel, 2117.5 MHz	7.37	13	Pass
	Mid Channel, 2155 MHz	7.34	13	Pass
	High Channel, 2192.5 MHz	7.40	13	Pass
20 MHz				
	NB IOT			
	Low Channel, 2120 MHz	7.28	13	Pass
	Mid Channel, 2155 MHz	7.22	13	Pass
	High Channel, 2190 MHz	7.34	13	Pass

PEAK TO AVERAGE POWER (CCDF)

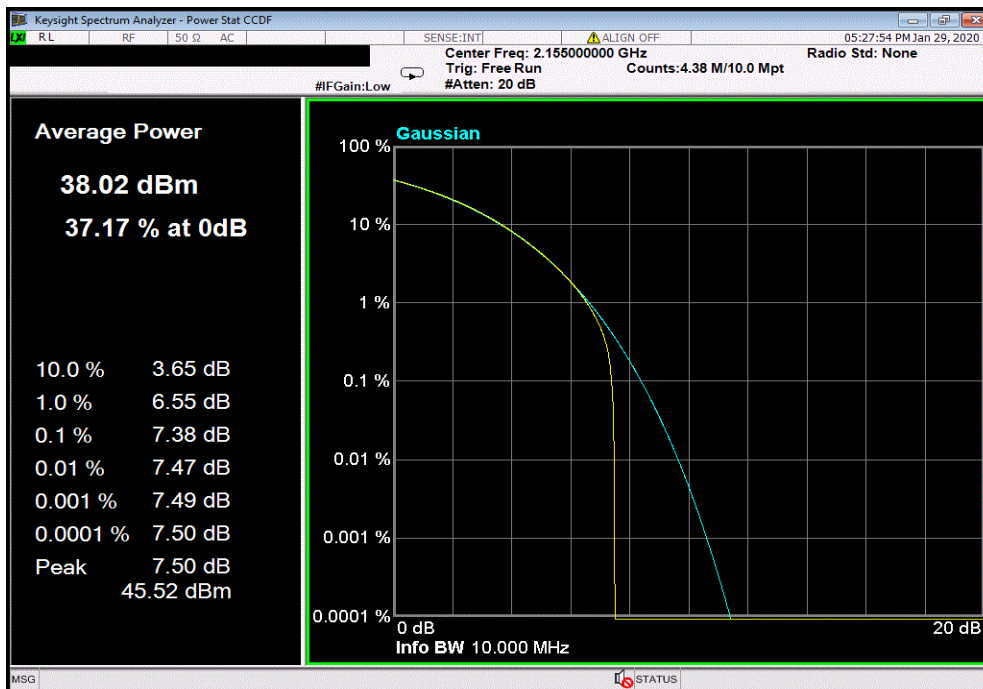


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Band 66 (Single Carrier) Port 2, 10 MHz, NB IOT, Low Channel, 2115 MHz						
		PAPR	PAPR	Results		
		Value (dB)	Limit (dB)			
		7.4	13	Pass		



Band 66 (Single Carrier) Port 2, 10 MHz, NB IOT, Mid Channel, 2155 MHz						
		PAPR	PAPR	Results		
		Value (dB)	Limit (dB)			
		7.38	13	Pass		

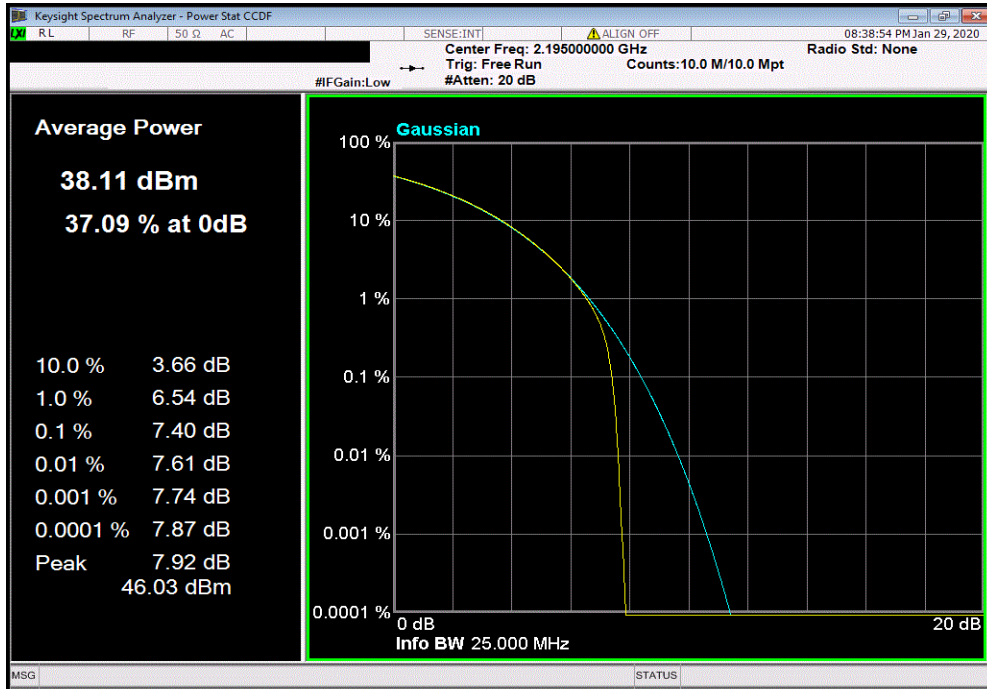


PEAK TO AVERAGE POWER (CCDF)

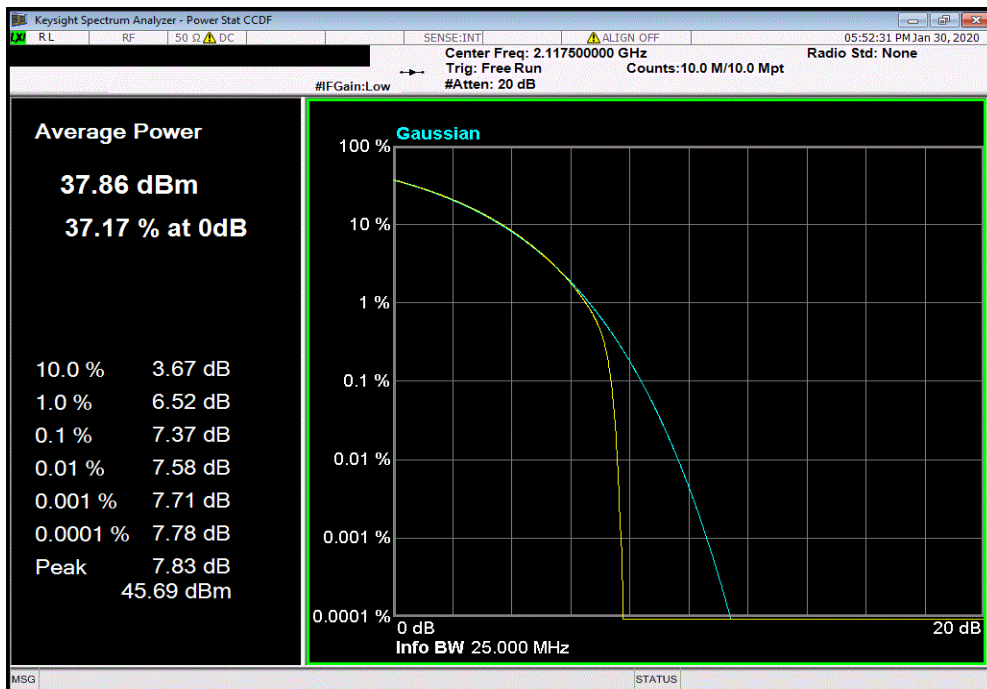


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Band 66 (Single Carrier) Port 2, 10 MHz, NB IOT, High Channel, 2195 MHz						
		PAPR	PAPR			
		Value (dB)	Limit (dB)	Results		
		7.4	13	Pass		



Band 66 (Single Carrier) Port 2, 15 MHz, NB IOT, Low Channel, 2117.5 MHz						
		PAPR	PAPR			
		Value (dB)	Limit (dB)	Results		
		7.37	13	Pass		

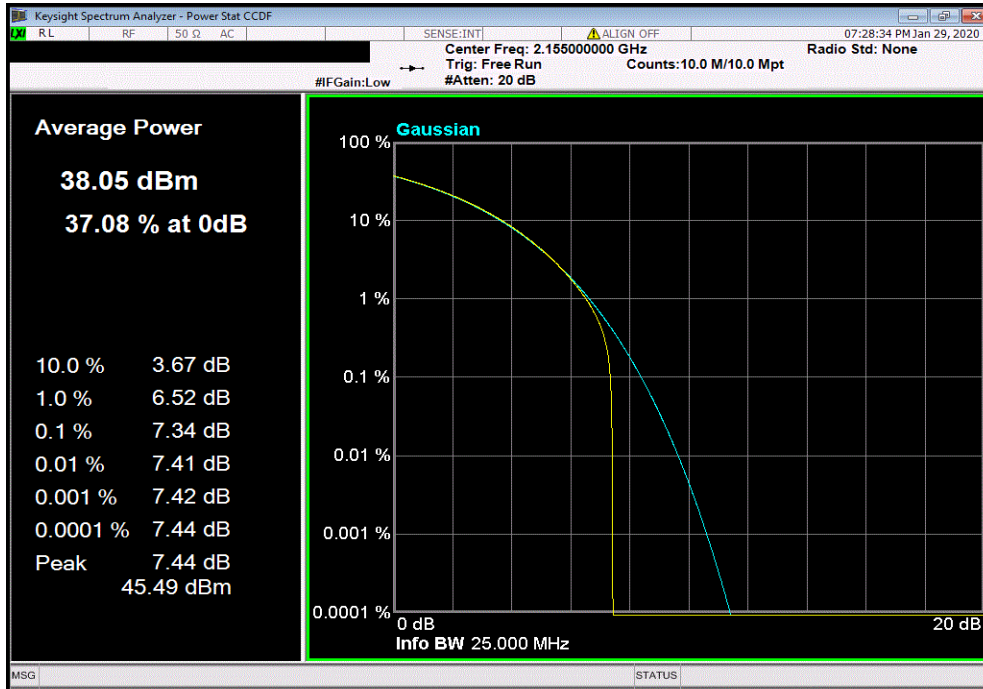


PEAK TO AVERAGE POWER (CCDF)

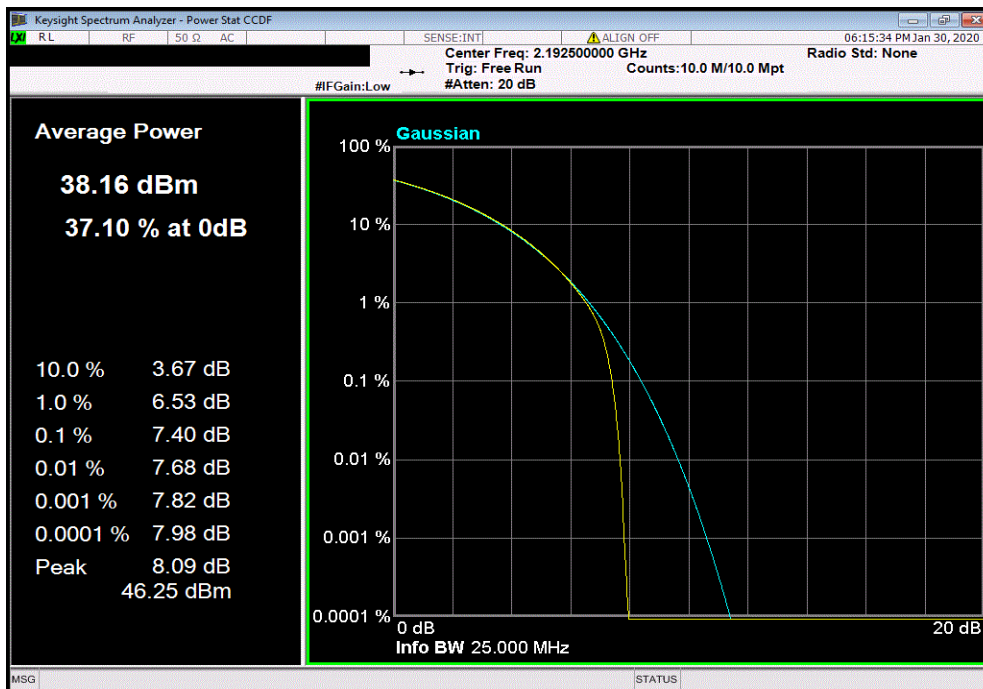


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Band 66 (Single Carrier) Port 2, 15 MHz, NB IOT, Mid Channel, 2155 MHz						
		PAPR	PAPR	Results		
		Value (dB)	Limit (dB)			
		7.34	13	Pass		



Band 66 (Single Carrier) Port 2, 15 MHz, NB IOT, High Channel, 2192.5 MHz						
		PAPR	PAPR	Results		
		Value (dB)	Limit (dB)			
		7.4	13	Pass		

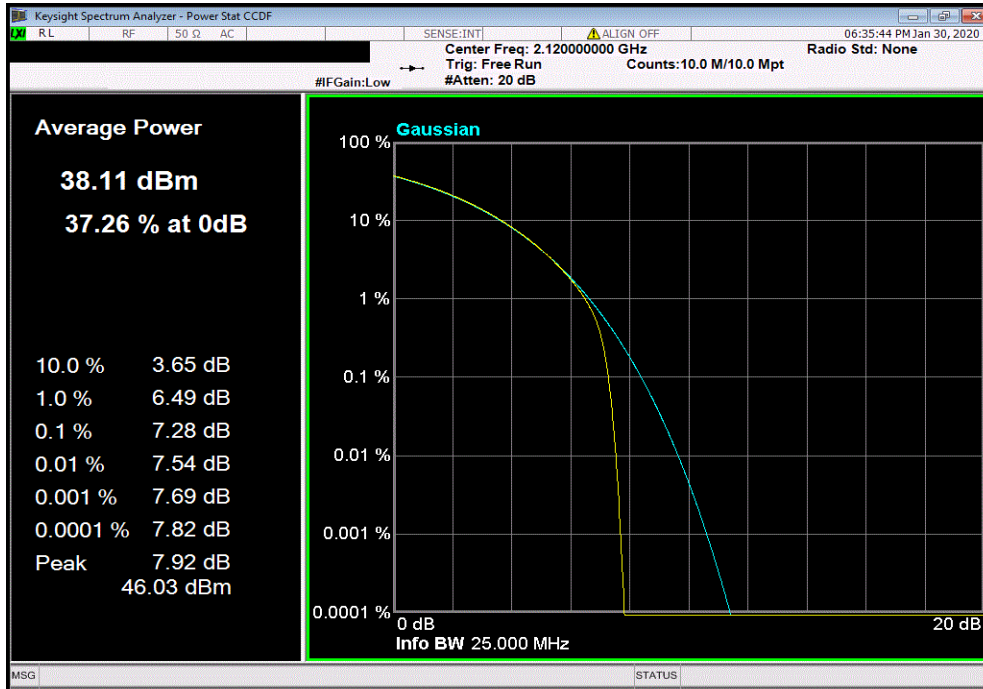


PEAK TO AVERAGE POWER (CCDF)

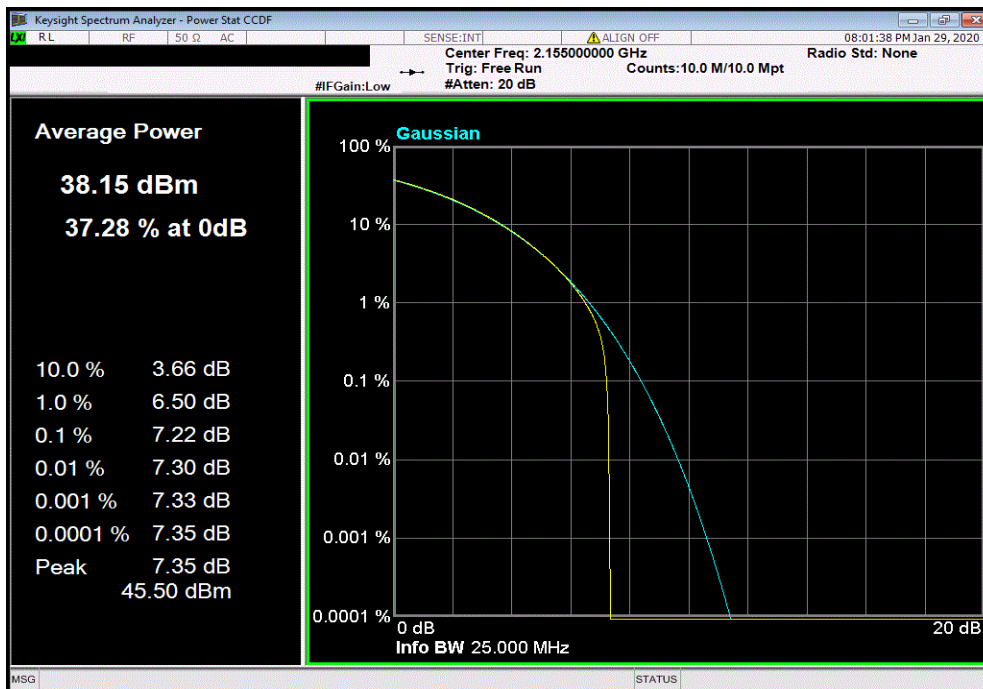


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Band 66 (Single Carrier) Port 2, 20 MHz, NB IOT, Low Channel, 2120 MHz						
		PAPR	PAPR	Results		
		Value (dB)	Limit (dB)			
		7.28	13	Pass		



Band 66 (Single Carrier) Port 2, 20 MHz, NB IOT, Mid Channel, 2155 MHz						
		PAPR	PAPR	Results		
		Value (dB)	Limit (dB)			
		7.22	13	Pass		



PEAK TO AVERAGE POWER (CCDF)



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Band 66 (Single Carrier) Port 2, 20 MHz, NB IOT, High Channel, 2190 MHz						
		PAPR	PAPR			
		Value (dB)	Limit (dB)	Results		
		7.34	13	Pass		

