

Radio Test Report Application for a Class II Permissive Change of Equipment Authorization FCC Part 27 Subpart C and IC RSS -130 [717MHz to 728 MHz and 729MHz to 745MHz] FCC Part 90 Subpart R and IC RSS -140 [758MHz to 768MHz]

> FCC ID: VBNAHLBBA-01 IC ID: 661W-AHLBBA

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

Report: NOKI0013, Issue Date: April 27, 2020





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### **CERTIFICATE OF TEST**



### Last Date of Test: March 26, 2020 Nokia Solutions and Networks EUT: Airscale Base Transceiver Station Remote Radio Head Model AHLBBA

### **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 – Miscellaneous Wireless Communication Services CFR Title 47 Part 90 Subpart R – Private Land Mobile Radio Services RSS-130 Issue 2 - February 2019 RSS-140 Issue 1 - April 2018	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	
Frequency Stability	No	N/A	Not requested.
Output Power	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.
Powerline Conducted Emissions	No	N/A	Not requested.

#### **Deviations From Test Standards**

None

Approved By:

Kyle Holgate, 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

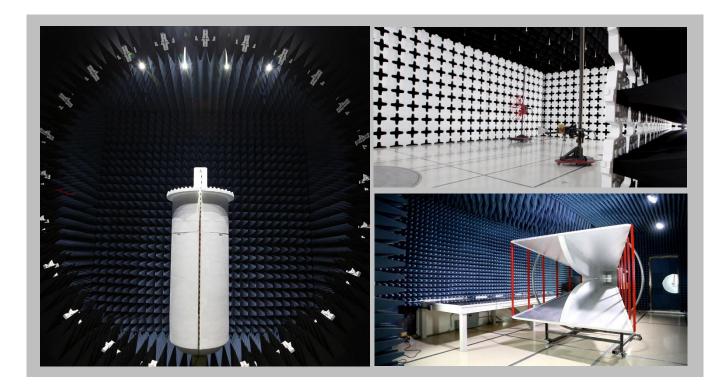
For details on the Scopes of our Accreditations, please visit: https://www.nwemc.com/emc-testing-accreditations

## **FACILITIES**





California	Minnesota	Oregon	Texas	Washington	
Labs OC01-17	Labs MN01-10	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	
		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.

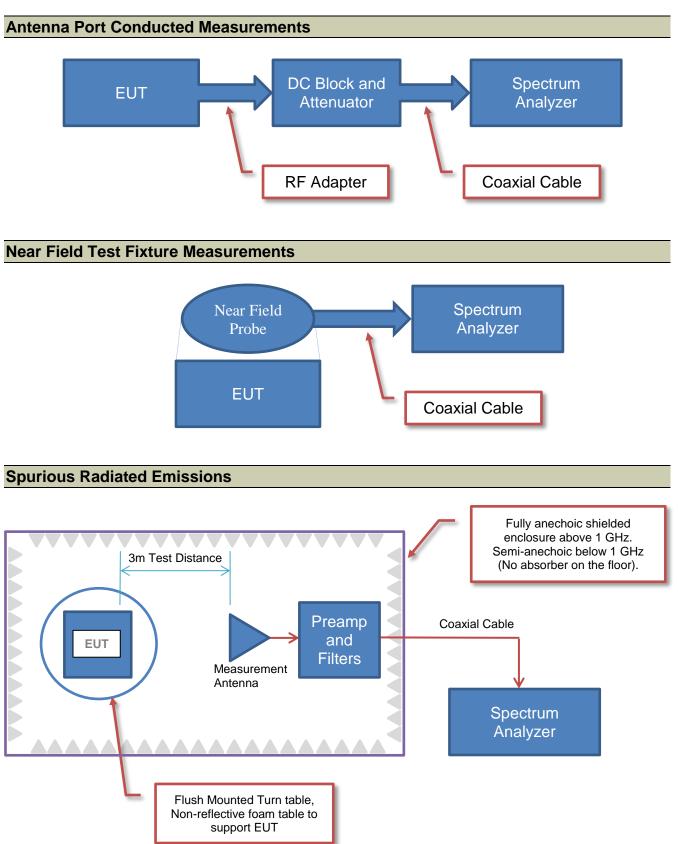
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable 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)	2.6 dB	-2.6 dB

## **Test Setup Block Diagrams**





## **PRODUCT DESCRIPTION**



Company Name:	Nokia Solutions and Networks
Address:	6000 Connection Drive
City, State, Zip:	Irving, 75039
Test Requested By:	Steve Mitchell
EUT:	Airscale Base Transceiver Station Remote Radio Head Model AHLBBA
First Date of Test:	March 23, 2020
Last Date of Test:	March 26, 2020
Receipt Date of Samples:	March 23, 2020
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 Airscale BTS RRH model AHLBBA FCC and ISED radio certifications is being pursued as follows:

- (1) LTE Band 12 frequency definition is changed from (BTS Rx: 699 to 714 MHz/BTS TX: 729 to 744 MHz) to (BTS Rx: 699 to 715 MHz/BTS TX: 729 to 745 MHz). Band 12 upper band edge increased by 1MHz.
- (2) LTE Band 29 frequency definition is changed from (BTS TX: 718 to 728 MHz) to (BTS TX: 717 to 728 MHz). Band 29 lower band edge extended by 1MHz.
- (3) LTE Narrow Band IoT Guard Band operations are added for Band 12, Band 14 and Band 29.
- (4) LTE Narrow Band IoT In-Band operations are added for Band 12

The original FCC certification submittal (FCC ID: VBNAHLBBA-01) was Element Test Report Number NOKI0004.1 Revision 00 and the original ISED certification submittal (IC ID: 661W-AHLBBA) was Element Test Report Number NOKI0004.2 Revision 00. The original test effort includes testing for LTE technologies. Please refer to the test report on the original certification for details on all required testing. The testing in this effort was performed on the same hardware (AHLBBA) as the original certification. The same RF ports determined in the original certification testing to be the highest power ports were used for all testing in this effort [Antenna 1 (measurements between Ant Ports 1 & 4) and Antenna 2 (measurements between Ant Ports 2 & 3)]. For changes 1 & 2 noted above, the band 12 and band 29 downlink frequency range changes are small (1MHz) so the conducted emission testing was limited to measurements at the new band edge frequencies per correspondence/guidance from Nemko TCB. The RF conducted emission measurements (at the new band 12 and band 29 band edges) include average power, CCDF and band edge spurious emissions. The emission bandwidth (99% and 26dB down) and conducted spurious emissions were not repeated since the band edge definition changes do not affect these measurements. The AHLBBA LTE Band 14 frequency definition has not changed from the original test effort. For changes 3 & 4 noted above, the conducted RF testing performed for the original certification testing has been repeated using NB IoT Guard Band and In-Band operations 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. The RF conducted emission measurements (at the new band 12 and band 29 band edges) include average power, CCDF, emission

## **PRODUCT DESCRIPTION**



bandwidth (99% and 26dB down), band edge spurious emissions and conducted spurious emissions. The radiated emissions and frequency stability measurements performed in the original certification were not repeated under this effort per TCB guidance. The radiated emission and frequency stability/accuracy results from the original certification had enough margin to preclude requiring additional testing. The same frequency stability/accuracy radio design is the same for all radio technologies/modulation types.

The equipment under test (EUT) is a Nokia Solutions and Networks Airscale Base Transceiver Station (BTS) Remote Radio Head (RRH) module, model AHLBBA. The AHLBBA remote radio head is a multistandard multi-carrier radio module designed to support LTE, LTE narrow band IoT (internet of things) operations (in-band, guard band, standalone) and 5G-NR (fifth generation – new radio). The scope of testing in this effort is for LTE-FDD operations (including NB IoT GB and NB IoT In-Band).

The AHLBBA RRH has four transmit/four receive antenna ports (4TX/4RX for Band 12, 4TX/4RX for Band 14 and 2TX for Band 29). Antenna ports 1-4 support 3GPP frequency band 12 (BTS Rx: 699 to 715 MHz/BTS TX: 729 to 745 MHz) and 3GPP frequency band 14 (BTS Rx: 788 to 798 MHz/BTS TX: 758 to 768 MHz) at 80 watts/carrier. Antenna ports 1 & 4 support 3GPP frequency band 29 downlink (BTS TX: 717 to 728 MHz) at 25 watts/carrier. The total output power is 105 watts for antenna ports 1 & 4 (supports frequency bands 12, 14 & 29) and 80 watts for antenna ports 2 & 3 (supports frequency bands 12 & 14 only). The maximum RRH RF output power for all antenna ports (1 - 4) is 370 Watts. The RRH can be operated as a 4x4 MIMO, 2x2 MIMO or as non-MIMO for Bands 12 & 14 and 2port MIMO or as non-MIMO for Band 29. The TX and RX instantaneous bandwidth cover the full operational bandwidth.

The RRH supports LTE bandwidths of 5 and 10MHz for 3GPP frequency band 12, band 14 and band 29 operations. The RRH supports four LTE downlink modulation types (QPSK, 16QAM, 64QAM and 256QAM). The LTE modulation types are setup according to 3GPP TS 36.141 E-UTRA Test Models (E-TM) as follows E-TM 1.1: QPSK, E-TM 3.1: 64QAM, E-TM3.1a: 256QAM and E-TM 3.2: 16QAM. Multi-carrier operation is supported. The LTE modulation type for IoT testing are 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)". Narrow band IoT Guard Band operations are supported in AHLBBA bands 12, 14, and 29 for the LTE10 channel bandwidth. Narrow band IoT In-Band operations are supported in AHLBBA band 12 for LTE5 and LTE10 channel bandwidths.

The RRH has external interfaces including DC power (DC In), ground, transmit/receive (ANT), external alarm (EAC), optical CPRI (OPT) and remote electrical tilt (RET). The RRH with applicable installation kit may be pole or wall mounted.



BALIE	LIE Band 12 downlink channel numbers and frequencies are				
		Downlink	Downlink	LTE Channel Bandwidth	
		EARFCN	Frequency (MHz)	5 MHz	10 MHz
		5010	729.0	Band Edge	Band Edge
		5035	731.5	Bottom Ch	
	<del>(</del>				
	2, 3,	5060	734.0		Bottom Ch
	1, 3				
	Band 12 (Ant 1, 2, 3, 4)	5090	737.0	Middle Ch	Middle Ch
	12 (				
	hud	5120	740.0		Top Channel
	B				
		5145	742.5	Top Channel	
		5170	745.0	Band Edge	Band Edge
A T TT T					a

The AHLBBA LTE Band 12 downlink channel numbers and frequencies are provided below.

AHLBBA Downlink Band Edge LTE Band 12 Frequency Channels

The AHLBBA LTE Band 14 downlink channel numbers and frequencies are provided below.

	Downlink Downlink LTE Chann		LTE Channel	Bandwidth
	EARFCN	Frequency (MHz)	5 MHz	10 MHz
	5280	758.0	Band Edge	Band Edge
,4)	5305	760.5	Bottom Ch	
2, 3				
Band 14 (Ant 1, 2, 3, 4)	5330	763.0	Middle Ch	Bottom Ch Middle Ch Top Channel
1 pu				
Baı	5355	765.5	Top Channel	
	5380	768.0	Band Edge	Band Edge

AHLBBA Downlink Band edge LTE Band 14 Frequency Channels

## **PRODUCT DESCRIPTION**

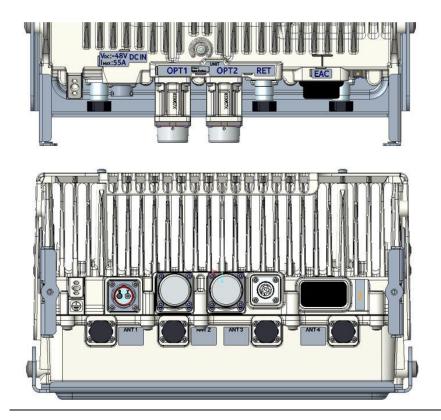


### The AHLBBA LTE Band 29 downlink channel numbers and frequencies are provided below:

Downlink	Downlink	LTE Channel Bandwidth	
EARFCN	Frequency (MHz)	5 MHz	10 MHz
9660	717.0	Band Edge	Band Edge
9685	719.5	Bottom Channel	
9710	722.0		Bottom Channel
9715	722.5	Middle Channel	Middle Channel
9720	723.0		Top Channel
9745	725.5	Top Channel	
9770	728.0	Band Edge	Band Edge
	EARFCN 9660  9685  9710  9715  9720  9720  9745  9770	EARFCN      Frequency (MHz)        9660      717.0        9685      719.5        9685      719.5        9710      722.0        9715      722.5        9720      723.0        9745      725.5	EARFCN      Frequency (MHz)      5 MHz        9660      717.0      Band Edge         9685      719.5        9685      719.5      Bottom Channel         9710      722.0        9710      722.0      Middle Channel         9715      722.5        9710      723.0      Image: State St

AHLBBA Downlink Band Edge LTE Band 29 Frequency Channels

AHLBBA Connector Layout:



## **PRODUCT DESCRIPTION**



AILEDBA 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	4	4.3-10	RF signal for Transmitter/Receiver (50 Ohm)		
Unit	1	LED	Unit Status LED		
EAC	1	MDR26	External Alarm Interface (4 alarms)		
OPT	2	SFP+ cage	Optical CPRI Interface up to 10 Gps.		
RET	1	8-pin circular connector conforming to IEC 60130-9 – Ed.3.0	AISG 2.0 to external devices		

#### AHLBBA External Interfaces

#### **Testing Objective:**

A class II permissive change on the original filing is being pursued to increase the AHLBBA LTE band 12 & 29 operational frequency ranges and to add LTE narrow band IoT Guard Band & In-Band carrier capability to the Airscale BTS RRH model AHLBBA FCC and ISED radio certifications.



### Configuration NOKI0013-1

Software/Firmware Running during test			
Description	Version		
Radio module Software	FRM 59.10.R32L		
BTS Software Version	SBTS19B_ENB_0000_001124_00000		

EUT					
Description	Manufacturer	Model/Part Number	Serial Number		
Airscale BTS Remote Radio Head Model AHLBBA	Nokia Solutions and Networks	475082A.101	K9193514835		

Peripherals in test setup boundary				
Description	Manufacturer	Model/Part Number	Serial Number	
AMIA (BTS system Module)	Nokia Solutions and Networks	473098A.101	RK182307104	
ASIA (BTS system Module)	Nokia Solutions and Networks	473095A.101	L1164105428	
ABIA (BTS system Module)	Nokia Solutions and Networks	473096A.102	L1164121378	
Attenuator 100W/10dB	Aeroflex Weinschel	48-10-34-LIM	BJ1771	
Attenuator 150W/20dB	Aeroflex Weinschel	66-20-33	BZ2075	
SFP+ 9.8G,300M,850NM	NOKIA	473842.A101	KR160900020030	
SFP+9.8G,300M,850NM	NOKIA	473842.A101	MA17331610207	
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146	
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00005TMC	
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00006TMC	
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00002TMC	
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867	
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066	
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870	
Low Pass Filter (3 Pieces)	Mimi-Circuits Inc.	NLP-550	None	
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_106	SN297372	
Fiber Optic cable 0300 mm	Amphenol	E201648	2701M	
CATe data cable	LEONI L	64867m	146180	
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_104	SN551123/4	
WebEM- PC	Lenovo	20HES2141X	None	



Remote Equipment Outside of Test Setup Boundary				
Description	Manufacturer	Model/Part Number	Serial Number	
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP	
HP-DC System power supply	HP	6032A	3440A-10308	

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
RF cable HS- SUCFLEX_106	Yes	2.0 m	No	AHLBBA RF Port 1	Attenuator 150W/20dB
Amphenol Fiber Optic cable	No	7.0 m	No	ABIA	AHLBBA
CAT5e data cable	Yes	7.0 m	No	ASIA	WebEM - PC
RF cable Port 4	Yes	2.0 m	No	AHLBBA RF Port 4	250W 50 ohm Load
RF cable Port 3	Yes	2.0 m	No	AHLBBA RF Port 3	250W 50 ohm Load
RF cable Port 2	Yes	2.0 m	No	AHLBBA RF Port 2	250W 50 ohm Load
RF cable HS- SUCFLEX_104	Yes	1.0 m	No	Low Pass Filter (3 Pieces)	Analyzer



### Configuration NOKI0013-2

Software/Firmware Running during test				
Description	Version			
Radio module Software	FRM 59.10.R32L			
BTS Software Version	SBTS19B_ENB_0000_001124_00000			

EUT				
Description	Manufacturer	Model/Part Number	Serial Number	
Airscale BTS Remote Radio Head Model AHLBBA	Nokia Solutions and Networks	475082A.101	K9193514835	

Peripherals in test setup boundary				
Description	Manufacturer	Model/Part Number	Serial Number	
AMIA (BTS system Module)	Nokia Solutions and Networks	473098A.101	RK182307104	
ASIA (BTS system Module)	Nokia Solutions and Networks	473095A.101	L1164105428	
ABIA (BTS system Module)	Nokia Solutions and Networks	473096A.102	L1164121378	
Attenuator 250W/40dB	Aeroflex Weinschel	58-40-53-LIM	TC909	
SFP+ 9.8G,300M,850NM	NOKIA	473842.A101	KR160900020030	
SFP+9.8G,300M,850NM	NOKIA	473842.A101	MA17331610207	
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146	
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00005TMC	
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00006TMC	
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00002TMC	
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867	
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066	
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870	
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_106	SN297372	
Fiber Optic cable 0300 mm	Amphenol	E201648	2701M	
CATe data cable	LEONI L	64867m	146180	
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_104	SN551123/4	
WebEM- PC	Lenovo	20HES2141X	None	

Remote Equipment Outside of Test Setup Boundary				
Description	Manufacturer	Model/Part Number	Serial Number	
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP	
HP-DC System power supply	HP	6032A	3440A-10308	



Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Amphenol Fiber Optic cable	No	7.0 m	No	ABIA	AHLBBA
CAT5e data cable	Yes	7.0 m	No	ASIA	WebEM - PC
RF cable Port 4	Yes	2.0 m	No	AHLBBA RF Port 4	250W 50 ohm Load
RF cable Port 3	Yes	2.0 m	No	AHLBBA RF Port 3	250W 50 ohm Load
RF cable Port 2	Yes	2.0 m	No	AHLBBA RF Port 2	250W 50 ohm Load
RF cable HS- SUCFLEX_106	Yes	2.0 m	No	AHLBBA RF Port 1	Attenuator 250W/40dB
RF cable HS- SUCFLEX_104	Yes	1.0 m	No	Attenuator 250W/40dB	Spectrum Analyzer



### Configuration NOKI0013-3

Software/Firmware Running during test				
Description	Version			
Radio module Software	FRM 59.10.R32L			
BTS Software Version	SBTS19B_ENB_0000_001124_00000			

EUT				
Description	Manufacturer	Model/Part Number	Serial Number	
Airscale BTS Remote Radio Head Model AHLBBA	Nokia Solutions and Networks	475082A.101	K9193514835	

Peripherals in test setup boundary				
Description	Manufacturer	Model/Part Number	Serial Number	
AMIA (BTS system Module)	Nokia Solutions and Networks	473098A.101	RK182307104	
ASIA (BTS system Module)	Nokia Solutions and Networks	473095A.101	L1164105428	
ABIA (BTS system Module)	Nokia Solutions and Networks	473096A.102	L1164121378	
Attenuator 150W/20dB	Aeroflex Weinschel	66-20-33	BZ2075	
SFP+ 9.8G,300M,850NM	NOKIA	473842.A101	KR160900020030	
SFP+9.8G,300M,850NM	NOKIA	473842.A101	MA17331610207	
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146	
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00005TMC	
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00006TMC	
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00002TMC	
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867	
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066	
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870	
Attenuator 100W/3dB	AeroflexWeinschel	47-3-33	CG5493	
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_106	SN297372	
Fiber Optic cable 0300 mm	Amphenol	E201648	2701M	
CATe data cable	LEONI L	64867m	146180	
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_104	SN551123/4	
WebEM- PC	Lenovo	20HES2141X	None	
High Pass Filter 2W	RLC Electronics	F-14699	0050	



Remote Equipment Outside of Test Setup Boundary				
Description	Manufacturer	Model/Part Number	Serial Number	
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP	
HP-DC System power supply	HP	6032A	3440A-10308	

Cables	Cables				
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
RF cable HS- SUCFLEX_106	Yes	2.0 m	No	AHLBBA RF Port 1	Attenuator 150W/20dB
Amphenol Fiber Optic cable	No	7.0 m	No	ABIA	AHLBBA
CAT5e data cable	Yes	7.0 m	No	ASIA	WebEM - PC
RF cable Port 4	Yes	2.0 m	No	AHLBBA RF Port 4	250W 50 ohm Load
RF cable Port 3	Yes	2.0 m	No	AHLBBA RF Port 3	250W 50 ohm Load
RF cable Port 2	Yes	2.0 m	No	AHLBBA RF Port 2	250W 50 ohm Load
RF cable HS- SUCFLEX_104	Yes	1.0 m	No	High Pass Filter 2W	Analyzer



### Configuration NOKI0013-4

Software/Firmware Running during test			
Description	Version		
Radio module Software	FRM 59.10.R32L		
BTS Software Version	SBTS19B_ENB_0000_001124_00000		

EUT					
Description	Manufacturer	Model/Part Number	Serial Number		
Airscale BTS Remote Radio Head Model AHLBBA	Nokia Solutions and Networks	475082A.101	K9193514835		

Peripherals in test setup boundary				
Description	Manufacturer	Model/Part Number	Serial Number	
AMIA (BTS system Module)	Nokia Solutions and Networks	473098A.101	RK182307104	
ASIA (BTS system Module)	Nokia Solutions and Networks	473095A.101	L1164105428	
ABIA (BTS system Module)	Nokia Solutions and Networks	473096A.102	L1164121378	
Attenuator 250W/40dB	Aeroflex Weinschel	58-40-53-LIM	TC909	
SFP+ 9.8G,300M,850NM	NOKIA	473842.A101	KR160900020030	
SFP+9.8G,300M,850NM	NOKIA	473842.A101	MA17331610207	
Carrier Blocking Filter	Nokia Solutions and Networks	TRI-BSBP	None	
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146	
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00005TMC	
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00006TMC	
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00002TMC	
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867	
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066	
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870	
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_106	SN297372	
Fiber Optic cable 0300 mm	Amphenol	E201648	2701M	
CATe data cable	LEONI L	64867m	146180	
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_104	SN551123/4	
WebEM- PC	Lenovo	20HES2141X	None	



Remote Equipment Outside of Test Setup Boundary				
Description	Manufacturer	Model/Part Number	Serial Number	
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP	
HP-DC System power supply	HP	6032A	3440A-10308	

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Amphenol Fiber Optic cable	No	7.0 m	No	ABIA	AHLBBA
CAT5e data cable	Yes	7.0 m	No	ASIA	WebEM - PC
RF cable Port 4	Yes	2.0 m	No	AHLBBA RF Port 4	250W 50 ohm Load
RF cable Port 3	Yes	2.0 m	No	AHLBBA RF Port 3	250W 50 ohm Load
RF cable Port 2	Yes	2.0 m	No	AHLBBA RF Port 2	250W 50 ohm Load
RF cable HS- SUCFLEX_106	Yes	2.0 m	No	AHLBBA RF Port 1	Attenuator 250W/40dB
RF cable HS- SUCFLEX_104	Yes	1.0 m	No	Carrier Filter TRI-BSBP	Spectrum Analyzer



### Configuration NOKI0013-5

Software/Firmware Running during test			
Description	Version		
Radio module Software	FRM 59.10.R32L		
BTS Software Version	SBTS19B_ENB_0000_001124_00000		

EUT					
Description	Manufacturer	Model/Part Number	Serial Number		
Airscale BTS Remote Radio Head Model AHLBBA	Nokia Solutions and Networks	475082A.101	K9193514835		

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AMIA (BTS system Module)	Nokia Solutions and Networks	473098A.101	RK182307104
ASIA (BTS system Module)	Nokia Solutions and Networks	473095A.101	L1164105428
ABIA (BTS system Module)	Nokia Solutions and Networks	473096A.102	L1164121378
Attenuator 100W/10dB	Aeroflex Weinschel	48-10-34-LIM	BJ1771
Attenuator 150W/20dB	Aeroflex Weinschel	66-20-33	BZ2075
SFP+ 9.8G,300M,850NM	NOKIA	473842.A101	KR160900020030
SFP+9.8G,300M,850NM	NOKIA	473842.A101	MA17331610207
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00005TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00006TMC
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00002TMC
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870
Low Pass Filter (3 Pieces)	Mimi-Circuits Inc.	NLP-550	None
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_106	SN297372
Fiber Optic cable 0300 mm	Amphenol	E201648	2701M
CATe data cable	LEONI L	64867m	146180
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_104	SN551123/4
WebEM- PC	Lenovo	20HES2141X	None



Remote Equipment Outside of Test Setup Boundary				
Description	Manufacturer	Model/Part Number	Serial Number	
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP	
HP-DC System power supply	HP	6032A	3440A-10308	

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Amphenol Fiber Optic cable	No	7.0 m	No	ABIA	AHLBBA
CAT5e data cable	Yes	7.0 m	No	ASIA	WebEM - PC
RF cable Port 4	Yes	2.0 m	No	AHLBBA RF Port 4	250W 50 ohm Load
RF cable Port 3	Yes	2.0 m	No	AHLBBA RF Port 3	250W 50 ohm Load
RF cable HS- SUCFLEX_104	Yes	1.0 m	No	Low Pass Filter (3 Pieces)	Analyzer
RF cable HS- SUCFLEX_106	Yes	2.0 m	No	AHLBBA RF Port 2	Attenuator 150W/20dB
RF cable Port 1	Yes	2.0 m	No	AHLBBA RF Port 1	250W 50 ohm Load



### Configuration NOKI0013-6

Software/Firmware Running during test			
Description	Version		
Radio module Software	FRM 59.10.R32L		
BTS Software Version	SBTS19B_ENB_0000_001124_00000		

EUT					
Description	Manufacturer	Model/Part Number	Serial Number		
Airscale BTS Remote Radio Head Model AHLBBA	Nokia Solutions and Networks	475082A.101	K9193514835		

Peripherals in test setup boundary					
Description	Manufacturer	Model/Part Number	Serial Number		
AMIA (BTS system Module)	Nokia Solutions and Networks	473098A.101	RK182307104		
ASIA (BTS system Module)	Nokia Solutions and Networks	473095A.101	L1164105428		
ABIA (BTS system Module)	Nokia Solutions and Networks	473096A.102	L1164121378		
Attenuator 250W/40dB	Aeroflex Weinschel	58-40-53-LIM	TC909		
SFP+ 9.8G,300M,850NM	NOKIA	473842.A101	KR160900020030		
SFP+9.8G,300M,850NM	NOKIA	473842.A101	MA17331610207		
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146		
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00005TMC		
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00006TMC		
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00002TMC		
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867		
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066		
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870		
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_106	SN297372		
Fiber Optic cable 0300 mm	Amphenol	E201648	2701M		
CATe data cable	LEÓNI L	64867m	146180		
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_104	SN551123/4		
WebEM- PC	Lenovo	20HES2141X	None		

Remote Equipment Outside of Test Setup Boundary				
Description	Manufacturer	Model/Part Number	Serial Number	
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP	
HP-DC System power supply	HP	6032A	3440A-10308	



Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Amphenol Fiber Optic cable	No	7.0 m	No	ABIA	AHLBBA
CAT5e data cable	Yes	7.0 m	No	ASIA	WebEM - PC
RF cable Port 4	Yes	2.0 m	No	AHLBBA RF Port 4	250W 50 ohm Load
RF cable Port 3	Yes	2.0 m	No	AHLBBA RF Port 3	250W 50 ohm Load
RF cable Port 1	Yes	2.0 m	No	AHLBBA RF Port 1	250W 50 ohm Load
RF cable HS- SUCFLEX_106	Yes	2.0 m	No	AHLBBA RF Port 2	Attenuator 250W/40dB
RF cable HS- SUCFLEX_104	Yes	1.0 m	No	Attenuator 250W/40dB	Spectrum Analyzer



### Configuration NOKI0013-7

Software/Firmware Running during test			
Description	Version		
Radio module Software	FRM 59.10.R32L		
BTS Software Version	SBTS19B_ENB_0000_001124_00000		

EUT					
Description	Manufacturer	Model/Part Number	Serial Number		
Airscale BTS Remote Radio Head Model AHLBBA	Nokia Solutions and Networks	475082A.101	K9193514835		

Peripherals in test setup boundary					
Description	Manufacturer	Model/Part Number	Serial Number		
AMIA (BTS system Module)	Nokia Solutions and Networks	473098A.101	RK182307104		
ASIA (BTS system Module)	Nokia Solutions and Networks	473095A.101	L1164105428		
ABIA (BTS system Module)	Nokia Solutions and Networks	473096A.102	L1164121378		
Attenuator 150W/20dB	Aeroflex Weinschel	66-20-33	BZ2075		
SFP+ 9.8G,300M,850NM	NOKIA	473842.A101	KR160900020030		
SFP+9.8G,300M,850NM	NOKIA	473842.A101	MA17331610207		
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146		
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00005TMC		
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00006TMC		
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00002TMC		
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867		
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066		
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870		
Attenuator 100W/3dB	AeroflexWeinschel	47-3-33	CG5493		
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_106	SN297372		
Fiber Optic cable 0300 mm	Amphenol	E201648	2701M		
CATe data cable	LEONI L	64867m	146180		
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_104	SN551123/4		
WebEM- PC	Lenovo	20HES2141X	None		
High Pass Filter 2W	RLC Electronics	F-14699	0050		



Remote Equipment Outside of Test Setup Boundary				
Description	Manufacturer	Model/Part Number	Serial Number	
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP	
HP-DC System power supply	HP	6032A	3440A-10308	

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Amphenol Fiber Optic cable	No	7.0 m	No	ABIA	AHLBBA
CAT5e data cable	Yes	7.0 m	No	ASIA	WebEM - PC
RF cable Port 4	Yes	2.0 m	No	AHLBBA RF Port 4	250W 50 ohm Load
RF cable Port 3	Yes	2.0 m	No	AHLBBA RF Port 3	250W 50 ohm Load
RF cable HS- SUCFLEX_104	Yes	1.0 m	No	High Pass Filter 2W	Analyzer
RF cable HS- SUCFLEX_106	Yes	2.0 m	No	AHLBBA RF Port 2	Attenuator 150W/20dB
RF cable Port 1	Yes	2.0 m	No	AHLBBA RF Port 1	250W 50 ohm Load



### Configuration NOKI0013-8

Software/Firmware Running during test			
Description	Version		
Radio module Software	FRM 59.10.R32L		
BTS Software Version	SBTS19B_ENB_0000_001124_00000		

EUT				
Description	Manufacturer	Model/Part Number	Serial Number	
Airscale BTS Remote Radio Head Model AHLBBA	Nokia Solutions and Networks	475082A.101	K9193514835	

Peripherals in test setup boundary					
Description	Manufacturer	Model/Part Number	Serial Number		
AMIA (BTS system Module)	Nokia Solutions and Networks	473098A.101	RK182307104		
ASIA (BTS system Module)	Nokia Solutions and Networks	473095A.101	L1164105428		
ABIA (BTS system Module)	Nokia Solutions and Networks	473096A.102	L1164121378		
Attenuator 250W/40dB	Aeroflex Weinschel	58-40-53-LIM	TC909		
SFP+ 9.8G,300M,850NM	NOKIA	473842.A101	KR160900020030		
SFP+9.8G,300M,850NM	NOKIA	473842.A101	MA17331610207		
Carrier Blocking Filter	Nokia Solutions and Networks	TRI-BSBP	None		
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146		
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00005TMC		
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00006TMC		
2 Meter RF cable	Times Microwave Systems	SPP250NM43MR3.0M	463695- 00002TMC		
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC867		
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TV066		
250W -50ohm -Terminating Load	API Weinschel inc	1433-3-LIM	TC870		
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_106	SN297372		
Fiber Optic cable 0300 mm	Amphenol	E201648	2701M		
CATe data cable	LEONI L	64867m	146180		
1 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLex_104	SN551123/4		
WebEM- PC	Lenovo	20HES2141X	None		



Remote Equipment Outside of Test Setup Boundary								
Description	Manufacturer	Model/Part Number	Serial Number					
HP ProBook 6470b	HP	B2G14EC#ABA	CNU246B8XP					
HP-DC System power supply	HP	6032A	3440A-10308					

Cables								
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2			
Amphenol Fiber Optic cable	No	7.0 m	No	ABIA	AHLBBA			
CAT5e data cable	Yes	7.0 m	No	ASIA	WebEM - PC			
RF cable Port 4	Yes	2.0 m	No	AHLBBA RF Port 4	250W 50 ohm Load			
RF cable Port 3	Yes	2.0 m	No	AHLBBA RF Port 3	250W 50 ohm Load			
RF cable Port 1	Yes	2.0 m	No	AHLBBA RF Port 1	250W 50 ohm Load			
RF cable HS- SUCFLEX_106	Yes	2.0 m	No	AHLBBA RF Port 2	Attenuator 250W/40dB			
RF cable HS- SUCFLEX_104	Yes	1.0 m	No	Carrier Filter TRI-BSBP	Spectrum Analyzer			

## **MODIFICATIONS**



### **Equipment Modifications**

Item	Date	Test	Modification	Note	Disposition of EUT
1	2020-03-23	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2020-03-24	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	2020-03-24	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.
4	2020-03-25	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.
5	2020-03-26	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.



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

#### **TEST EQUIPMENT**

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	27-Feb-20	27-Feb-21
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21

#### **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 settings 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 2.1049 defines the 26dB emission bandwidth requirement. RSS GEN Section 6.7 defines the 99% emission bandwidth requirement

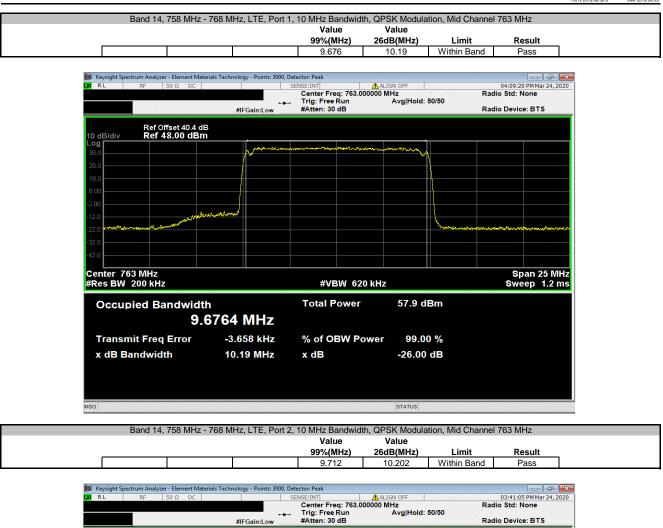
#### Band 14 Emission Designators:

Channel	Port Assignment	LIE: UPSK,	Single Ch.
Bandwidth	Fort Assignment	FCC	IC
10M	Port 1	10M19F9W	9M68F9W
1000	Port 2	10M20F9W	9M71F9W



						TbtTx 2019.08.30.0	XMit 2019.09.05
		er Station Remote Radio Head Model AHL	BBA		Work Order:		
Serial Number:						24-Mar-20	
	Nokia Solutions and Net				Temperature:		
	Mitch Hill, John Rattanav	/ong			Humidity:		
Project:					Barometric Pres.:		
	Brandon Hobbs		Power: 54 VDC		Job Site:	TX03	
TEST SPECIFICAT	IONS		Test Method				
FCC 2.1049:2020, F	FCC 90:2020		ANSI C63.26:2015				
RSS-140: 2018, RS	S-Gen:2019		RSS-140: 2018, RSS-Gen:2019				
COMMENTS							
		d for in the reference level offest includin ed test report. The carrier power was set t	ng any attenuators, filters and DC blocks. The hottest o maximum for all testing.	port per power am	plifier (PA) was us	ed for testing. The v	worst case port
DEVIATIONS FROM	M TEST STANDARD						
None							
Configuration #	2,6	Signature	2 Jan				
				Value 99%(MHz)	Value 26dB(MHz)	Limit	Result
Band 14, 758 MHz -	Port 1 10 MHz Band	dwidth QPSK Modulation					
		Mid Channel 763 MHz		9.676	10.19	Within Band	Pass
	Port 2 10 MHz Band	dwidth QPSK Modulation					
		Mid Channel 763 MHz		9.712	10.202	Within Band	Pass





	#IFGain:Low	Center Freq: 763.000000 F Trig: Free Run #Atten: 30 dB	Avg Hold: 50/50	Radio Std: None Radio Device: BTS
Ref Offset 40.4 dE dB/div Ref 48.00 dBm				
<b>&gt;g</b> 3.0	harman	- marken -	mmy	
.0				
0				
00				
O and and the many and and the second second	hourseyment		L	
.0				alle and a shall all a second
.0				
enter 763 MHz Res BW 200 kHz		#VBW 620 kHz		Span 25 MH Sweep 1.2 m
Occupied Bandwidt		Total Power	57.8 dBm	
	7118 MHz			
Transmit Freq Error	-4.589 kHz	% of OBW Power		
x dB Bandwidth	10.20 MHz	x dB	-26.00 dB	
3			STATUS	



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	Agilent	N9010A	AFL	27-Feb-20	27-Feb-21

#### **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 settings were as follows:

- · RBW is 1% 5% of the occupied bandwidth
- VBW is ≥ 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 2.1049 defines the 26dB emission bandwidth requirement. RSS GEN Section 6.7 defines the 99% emission bandwidth requirement

#### Band 12 Emission Designators:

E	Band 12 (729MHz to 745MHz) Emission Designators for NB IoT Guard Band								
Channel	Port	LTE: QPSI	(, Low Ch.	LTE: QPSI	(, Mid Ch.	LTE: QPSK	, High Ch.		
Bandwidth	Assignment	FCC	IC	FCC	IC	FCC	IC		
10M	Port 1	10M21F9W	9M72F9W	10M21F9W	9M73F9W	10M20F9W	9M72F9W		
10101	Port 2	10M20F9W	9M72F9W	10M20F9W	9M72F9W	10M21F9W	9M72F9W		
	Note: FCC based	l on 26dB emiss	ion bandwidth;	IC based on 999	% emission ban	dwidth.			

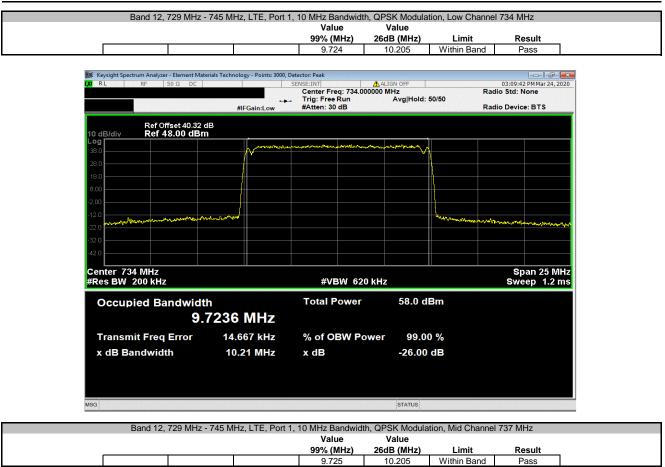
Band 29 Emission Designators :

Ba	Band 29 (717MHz to 728MHz) Emission Designators for NB IoT Guard Band						
Channel	Port	LTE: QPS	(, Low Ch.	LTE: QPS	K, Mid Ch.	LTE: QPSK	, High Ch.
Bandwidth	Assignment	FCC	IC	FCC	IC	FCC	IC
10M	Port 1	10M17F9W	9M65F9W	10M18F9W	9M69F9W	10M19F9W	9M69F9W
	Note: FCC based	on 26dB emiss	ion bandwidth;	IC based on 99	% emission ban	dwidth.	



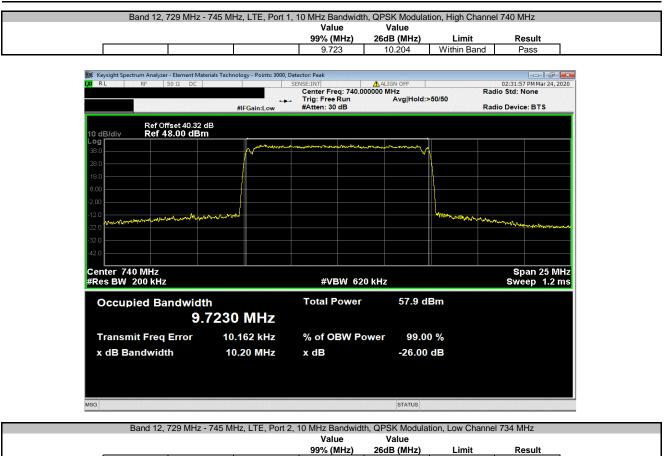
					TbtTx 2019.08.30.0	XMit 2019.
		r Station Remote Radio Head Model AHLBBA		Work Order:		-
Serial Number: K9					24-Mar-20	
	kia Solutions and Netw			Temperature:		
	ch Hill, John Rattanav	ong			49.2% RH	
Project: No				Barometric Pres.:		
Tested by: Bra		Power: 54 VD		Job Site:	TX03	
EST SPECIFICATION			Method			
CC 27:2020, FCC 2.10	49:2020	ANSI	C63.26:2015			
SS-130:2019, RSS-Ge	en:2019	RSS-7	130:2019, RSS-Gen:2019			
OMMENTS						
II measurement path	losses were accounted	d for in the reference level offest including any attenuators, filt	ters and DC blocks. The hottest port per power	amplifier (PA) was us	ed for testing. The v	vorst case po
EVIATIONS FROM TE	•	d test report. The carrier power was set to maximum for all tes	sung.			
one						
		2 /				
Configuration #	2,6	Signature				
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
and 12, 729 MHz - 745	6 MHz, LTE					
and 12, 729 MHz - 745 Poi						
		width				
	rt 1 10 MHz Band	width QPSK Modulation				
	rt 1 10 MHz Band		9.72	10.21	Within Band	Pass
	rt 1 10 MHz Band	QPSK Modulation	9.72 9.73	10.21 10.21	Within Band Within Band	Pass Pass
	rt 1 10 MHz Band	QPSK Modulation Low Channel 734 MHz				
	10 MHz Band	QPSK Modulation Low Channel 734 MHz Mid Channel 737 MHz	9.73	10.21	Within Band	Pass
Por	10 MHz Band	QPSK Modulation Low Channel 734 MHz Mid Channel 737 MHz High Channel 740 MHz	9.73	10.21	Within Band	Pass
Por	rt 1 10 MHz Band rt 2 10 MHz Band	QPSK Modulation Low Channel 734 MHz Mid Channel 737 MHz High Channel 740 MHz width QPSK Modulation	9.73	10.21	Within Band	Pass
Por	rt 1 10 MHz Band rt 2 10 MHz Band	QPSK Modulation Low Channel 734 MHz Mid Channel 737 MHz High Channel 740 MHz width	9.73	10.21	Within Band	Pass
Por	rt 1 10 MHz Band rt 2 10 MHz Band	QPSK Modulation Low Channel 734 MHz Mid Channel 737 MHz High Channel 740 MHz width QPSK Modulation	9.73 9.72	10.21 10.20	Within Band Within Band	Pass Pass
Por	rt 1 10 MHz Band rt 2 10 MHz Band	QPSK Modulation Low Channel 734 MHz Mid Channel 737 MHz High Channel 740 MHz width QPSK Modulation Low Channel 734 MHz	9.73 9.72 9.72	10.21 10.20 10.20	Within Band Within Band Within Band	Pass Pass Pass
Por	rt 1 10 MHz Band rt 2 10 MHz Band MHz, LTE rt 1	QPSK Modulation Low Channel 734 MHz Mid Channel 737 MHz High Channel 740 MHz width QPSK Modulation Low Channel 734 MHz Mid Channel 737 MHz High Channel 740 MHz	9.73 9.72 9.72 9.72 9.72	10.21 10.20 10.20 10.20	Within Band Within Band Within Band Within Band	Pass Pass Pass Pass
Poi Poi and 29, 717 MHz - 728	rt 1 10 MHz Band rt 2 10 MHz Band MHz, LTE rt 1 10 MHz Band	QPSK Modulation Low Channel 734 MHz Mid Channel 737 MHz High Channel 740 MHz width QPSK Modulation Low Channel 734 MHz Mid Channel 737 MHz High Channel 740 MHz width	9.73 9.72 9.72 9.72 9.72	10.21 10.20 10.20 10.20	Within Band Within Band Within Band Within Band	Pass Pass Pass Pass
Poi Poi and 29, 717 MHz - 728	rt 1 10 MHz Band rt 2 10 MHz Band MHz, LTE rt 1 10 MHz Band	QPSK Modulation Low Channel 734 MHz Mid Channel 737 MHz High Channel 740 MHz width QPSK Modulation Low Channel 734 MHz Mid Channel 737 MHz High Channel 740 MHz Width QPSK Modulation	9.73 9.72 9.72 9.72 9.72 9.72 9.72	10.21 10.20 10.20 10.20 10.21	Within Band Within Band Within Band Within Band Within Band	Pass Pass Pass Pass Pass
Por Band 29, 717 MHz - 728	rt 1 10 MHz Band rt 2 10 MHz Band MHz, LTE rt 1 10 MHz Band	QPSK Modulation Low Channel 734 MHz Mid Channel 737 MHz High Channel 740 MHz width QPSK Modulation Low Channel 734 MHz High Channel 737 MHz High Channel 740 MHz width QPSK Modulation Low Channel 722 MHz	9.73 9.72 9.72 9.72 9.72 9.72 9.72	10.21 10.20 10.20 10.20 10.21	Within Band Within Band Within Band Within Band Within Band	Pass Pass Pass Pass Pass Pass
Poi Poi and 29, 717 MHz - 728	rt 1 10 MHz Band rt 2 10 MHz Band MHz, LTE rt 1 10 MHz Band	QPSK Modulation Low Channel 734 MHz Mid Channel 737 MHz High Channel 740 MHz width QPSK Modulation Low Channel 734 MHz Mid Channel 737 MHz High Channel 740 MHz Width QPSK Modulation	9.73 9.72 9.72 9.72 9.72 9.72 9.72	10.21 10.20 10.20 10.20 10.21	Within Band Within Band Within Band Within Band Within Band	Pass Pass Pass Pass Pass





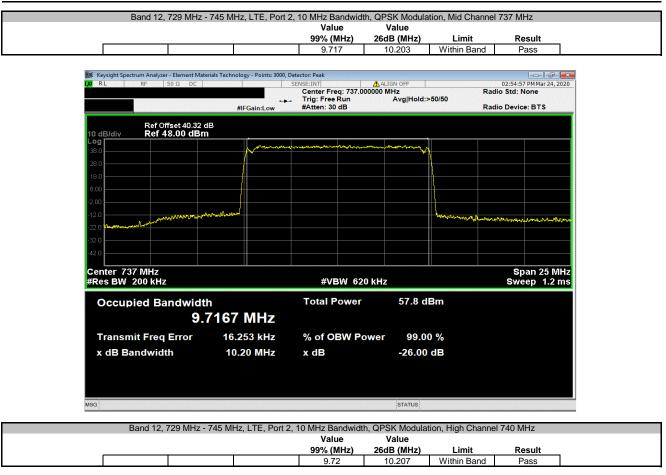
RL RF 50 Ω DC			ALIGN OFF	03:02:26 PM Mar 24, 20
	+ #IFGain:Low	Center Freq: 737.000000 Trig: Free Run #Atten: 30 dB	MHz Avg Hold: 50/50	Radio Std: None Radio Device: BTS
Ref Offset 40.32 dB/div Ref 48.00 dB				
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enter 737 MHz		#VBW 620 kH	-	Span 25 MH Sweep 1.2 m
es BW 200 kHz		#VBW 620 KH	2	Sweep 1.2 II
	lth	Total Power	58.0 dBm	Gweep 1.211
Occupied Bandwid	ith .7253 MHz			Зжеер 1.2 п
Occupied Bandwid 9			58.0 dBm	
Occupied Bandwid 9 Transmit Freq Error	.7253 MHz	Total Power	58.0 dBm	Sweep 1.2 1
Occupied Bandwid	.7253 MHz 11.406 kHz	Total Power % of OBW Power	58.0 dBm r 99.00 %	Sweep 1.2 II

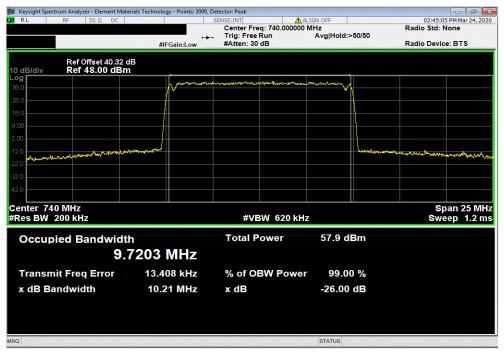




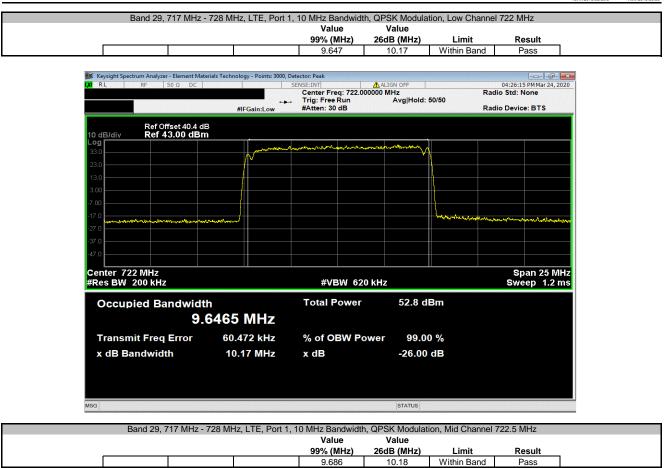












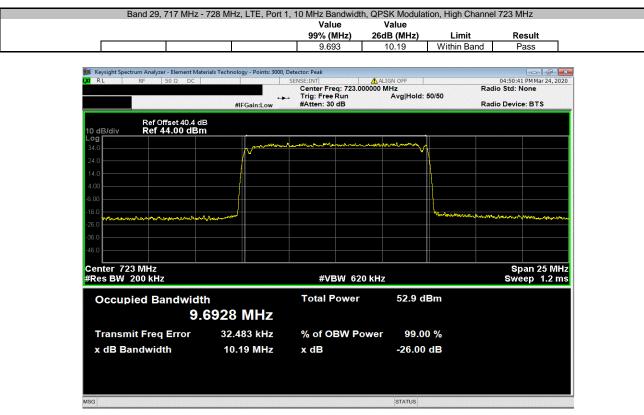
Keysight Spectrum Analyzer - Element Mate	erials Technology - Points: 3000,					
RL RF 50 Ω DC		SENSE:INT AL	IGN OFF	04:41:04 PM Mar 24, 20 Radio Std: None		
		🛶 Trig: Free Run	Avg Hold: 50/50			
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS		
Ref Offset 40.4 dE	3					
dB/div Ref 43.00 dBm						
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enter 722.5 MHz				Span 25 MH		
Res BW 200 kHz		#VBW 620 kHz		Sweep 1.2 m		
	h	Total Power	52.9 dBm			
Occupied Bandwidt		Total Power	52.9 dBm			
Occupied Bandwidt	<sub>h</sub> 6858 MHz	Total Power	52.9 dBm			
Occupied Bandwidt		Total Power % of OBW Power				
Occupied Bandwidt 9.1 Transmit Freq Error	6858 MHz 42.611 kHz	% of OBW Power	99.00 %			
Occupied Bandwidti 9.(	6858 MHz					
Occupied Bandwidtl 9.1 Transmit Freq Error	6858 MHz 42.611 kHz	% of OBW Power	99.00 %			
Occupied Bandwidtl 9.1 Transmit Freq Error	6858 MHz 42.611 kHz	% of OBW Power	99.00 %			
Occupied Bandwidt 9.1 Transmit Freq Error	6858 MHz 42.611 kHz	% of OBW Power	99.00 %			

9.686

10.18

Pass







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

#### **TEST EQUIPMENT**

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	27-Feb-20	27-Feb-21
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21

#### **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 specturm analyzer. The method in section 5.4 of ANSI C63.26 was used to make this measurement. The specturm analyzer settings were as follows:

- RBW is 1% 5% of the occupied bandwidth
- VBW is ≥ 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 2.1049 defines the 26dB emission bandwidth requirement. RSS GEN Section 6.7 defines the 99% emission bandwidth requirement

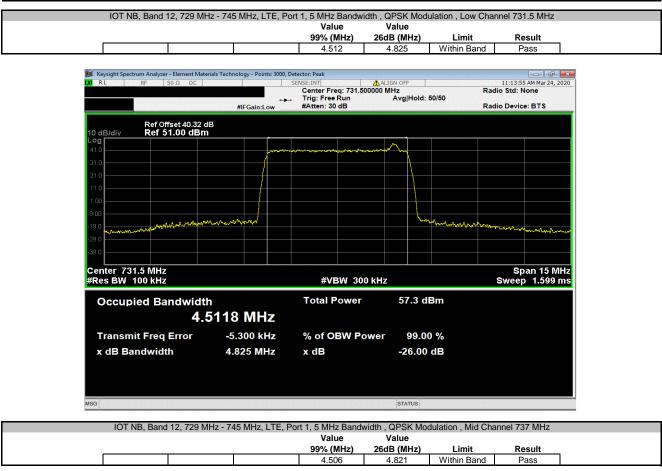
#### Band 12 Emission Designators:

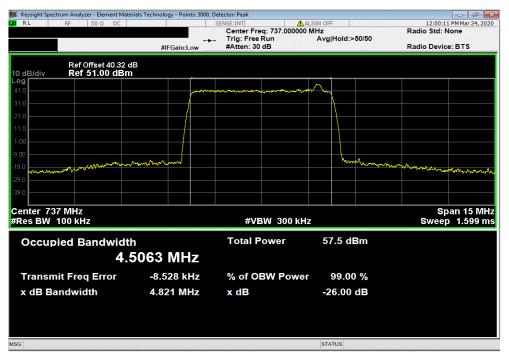
Band 12 (729MHz to 745MHz) Emission Designators for NB IoT In-Band									
Port	Channel	LTE: QPSK, Low Ch.		LTE: QPSI	K, Mid Ch.	LTE: QPSK, High Ch.			
Assignment	Bandwidth	FCC	IC	FCC	IC	FCC	IC		
Port 1	5M	4M83F9W	4M51F9W	4M82F9W	4M51F9W	4M82F9W	4M51F9W		
	10M	9M65F9W	8M99F9W	9M62F9W	9M00F9W	9M63F9W	8M98F9W		
D-+2	5M	4M83F9W	4M52F9W	4M82F9W	4M52F9W	4M82F9W	4M52F9W		
Port 2	10M	9M60F9W	8M99F9W	9M65F9W	9M01F9W	9M64F9W	8M99F9W		
Note: FCC based on 26dB emission bandwidth: IC based on 99% emission bandwidth.									



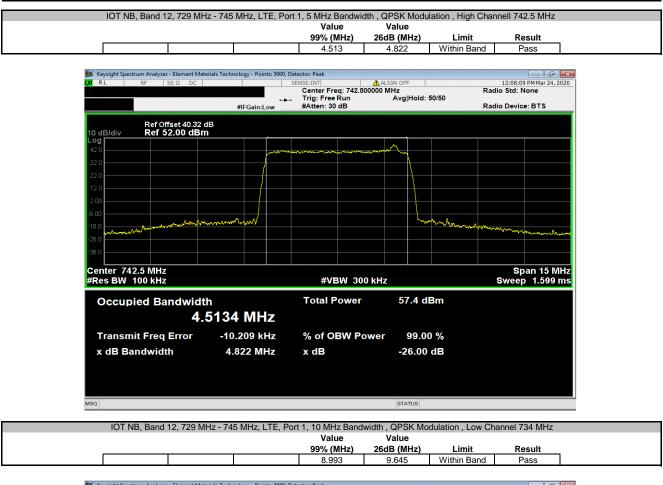
Signature    Value 99% (MHz)    Value 26dB (MHz)    Limit      DT NB, Band 12, 729 MHz - 745 MHz, LTE Port 1    5    Limit    Limit    Limit      0PSK Modulation    0PSK Modulation    4.512    4.825    Within Band Mid Channel 731.5 MHz    4.506    4.821    Within Band High Channel 742.5 MHz      10 MHz Bandwidth    0PSK Modulation    8.993    9.645    Within Band High Channel 737 MHz    8.993    9.645    Within Band Within Band      10 MHz Bandwidth    0PSK Modulation    8.993    9.643    Within Band High Channel 737 MHz    8.993    9.643    Within Band High Channel 737 MHz    8.998    9.632    Within Band      0PSK Modulation    10 MHz Bandwidth    0PSK Modulation    10 MHz    4.522    4.828    Within Band      10 Port 2    5 MHz Bandwidth    0PSK Modulation    4.522    4.823    Within Band      10 MHz Bandwidth    0PSK Modulation    4.522    4.823    Within Band      10 MHz Bandwidth    0PSK Modulation    4.524    4.823    Within Band      10 MHz Bandwidth    0PSK Modulation    0PSK Modulation    0PSK Modulation    0PSK Modulation    0PSK Modulation    0PSK Modula	EUT. A:	ineede Dees Trenssiver (	tation Domete Dadie Haad Madel			Werk Orden	TbtTx 2019.08.30.0	XMit 201	
Customer:      Interdesite      Temperature      22.3 °C        Attendees:      Barometric Press:      1006 mbar        Project:      Barometric Press:      1006 mbar        251 SPECIFICATIONS      Test Methid      Job Site      TX03        251 SPECIFICATIONS      TR05 SR0015      Status      Status      Status        27020 FCC 21049:2020      RS: 130:2019, RSS-Gen:2019      Status									
Name      Humidity:      99% RH        Project:      None      Barometric Pres:      1008 mbar        Tested by:      Barometric Pres:      1008 mbar      Job Site:      TX03        ST SPECIFCATONOS      Test Method      Job Site:      TX03        ST SPECIFCATONOS      ANSI C63.26:2015      Job Site:      TX03        St 302:019, RSS-Gen:2019      RSS-130:2019, RSS-Gen:2019      Job Site:      TX03        St 302:019, RSS-Gen:2019      RSS-130:2019, RSS-Gen:2019      Job Site:      TX03        St 302:019, RSS-Gen:2019      RSS-130:2019, RSS-Gen:2019      Job Site:      TNe        St 300:010      Signature      Signature      Signature      Signature      Job Site:      TNE        Signature      Signature      Value      Signature <td< td=""><td></td><td colspan="3"></td><td></td><td></td><td></td><td></td></td<>									
Project:      None      Barometric Pres:      1008 mbar        Tested by:      Job Site:      TX03      Job Site:      TX03        ST SPECIFICATIONS      Test Method      Job Site:      TX03      IX03        ST SPECIFICATIONS      Institution      Job Site:      TX03      IX03      IX03        ST SPECIFICATIONS      Institution      IX03									
Tested by:      Drawer: [54 VDC      Job Site:      TX03        ST SPECIFICATIONS      Test Method      Inst Gas 28:2015      Inst Gas 28:2016			<u>g</u>						
Str SPECIFICATIONS    Test Method    Image Method      C2 72:020, FCC 2.1049:0200    [ANS] C63.26:015      SS-130:2019, RSS-Gen:2019    [RSS-130:2019, RSS-Gen:2019      DMMENTS    Inseasurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. The hottest port per power amplifier (PA) was used for testing. The v as determined in the original client provided test report. The carrier power was set to maximum for all testing.      Value      Value    V				Davies 54 MDO					
C2 272020, FCC 21049:2020    ANSI C63.26:2015      SS-130:2019, RSS-Gen:2019    MMENT3      Imeasurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. The hottest port per power amplifier (PA) was used for testing. The value as determined in the original client provided test report. The carrier power was set to maximum for all testing.      EVIATIONS FROM TEST STANDARD    Value    Value      onfiguration #    2,6    Signature    Value    Value      T NE, Band 12, 729 MHz - 745 MHz, LTE    Signature    Value    Value    Limit      I T NE, Band 12, 729 MHz - 745 MHz, LTE    99% (MHz)    2.618 (MHz)    Limit      I T NE, Band 12, 729 MHz - 745 MHz, LTE    99% (MHz)    4.512    4.825    Within Band      I O MHz Bandwidth    OPSK Modulation    Iow Channel 731.5 MHz    4.513    4.822    Within Band      I O MHz Bandwidth    Io PSK Modulation    Iop PSK Modulati						Job Site:	1803		
SS-130:2019, RSS-Gen:2019    RSS-130:2019, RSS-Gen:2019      DMMENTS    Intersurrement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. The hottest port per power amplifier (PA) was used for testing. The v is determined in the original client provided test report. The carrier power was set to maximum for all testing.      EVATIONS FROM TEST STANDARD    Signature      Signature    Value      99% (MHz)    Z6dB (MHz)      Limit    10 MLz Bandwidth      OPSK Modulation    Low Channel 731 5 MHz      High Channel 737 MHz    4.512    4.822      Within Band    Low Channel 734 MHz    8.998    9.645      Mid Channel 734 MHz    8.998    9.632    Within Band      Mid Channel 735 MHz    High Channel 731 5 MHz    8.998    9.632    Within Band      OPSK Modulation    Low Channel 734 MHz    8.998    9.645    Within Band      Mid Channel 737 MHz    8.998    9.632    Within Band      Mid Channel 737 MHz    8.998    9.632    Within Band      Mid Channel 737 MHz    8.998    9.632    Within Band      Mid Channel 737 MHz    4.522    4.823    Within Band      Mid Channel 737									
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is determined in the original client provided test report. The carrier power was set to maximum for all testing.		en.2019		K35-130.2019, K35-	Gen.2019				
as determined in the original client provided test report. The carrier power was set to maximum for all testing.        EVIATIONS FROM TEST STANDARD        Ontiguration #      2,6        Signature      Value 98% (MHz)      Value 26dB (MHz)      Limit        T NB, Band 12, 729 MHz - 745 MHz, LTE      Signature      Limit      Limit        DPSK Modulation      6/0PSK Modulation      4.512      4.825      Within Band Mid Channel 731.5 MHz High Channel 737 MHz      4.512      4.825      Within Band Within Band        10 MHz Bandwidth      0PSK Modulation      UW      4.513      4.822      Within Band Mid Channel 737 MHz      4.513      4.822      Within Band Mid Channel 737 MHz      4.513      4.822      Within Band Mid Channel 737 MHz      8.993      9.645      Within Band Mid Channel 737 MHz      8.998      9.632      Within Band Mid Channel 737 MHz      8.998      9.632      Within Band Mid Channel 737 MHz      4.522      4.823      Within Band Mid Channel 737 MHz      4.524      4.823      Within Band Mid Channel 737 MHz      4.524      4.823      Within Band Mid Channel 737 MHz      4.524      4.823      Within Band High Channel 737 MHz      4.524      4.823      Within Band High Channel 737 MHz      4.524      4.823      Within Band High C	I measurement path	losses were accounted f	or in the reference level offest inc	cluding any attenuators, filters and DC blo	ocks. The hottest port per power an	plifier (PA) was u	sed for testing. The v	vorst case p	
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							within Dand	1 0 5 5	
High Channell 740 MHz 8.992 9.641 Within Band			Mid Channel 737 MHz		9.008	9.646	Within Band	Pass	





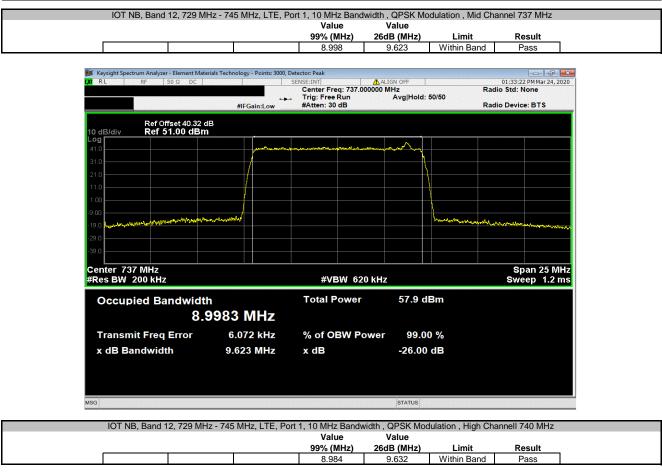


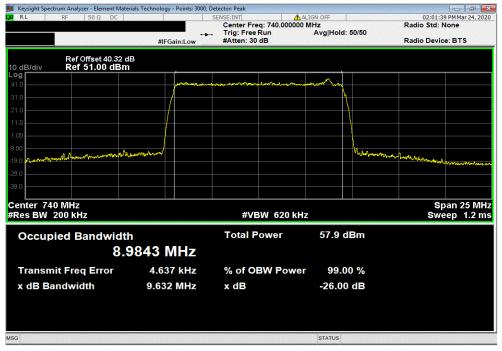




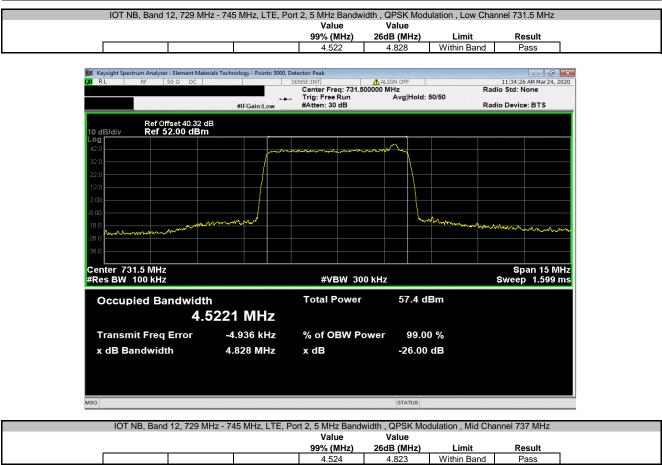
Keysight Spectrum Analyzer - Element Materia	Is Technology -	Points: 3000, E						
RL RF 50 Ω DC	#IFGa	ain:Low		eq: 734.000000 M Run	IGN OFF MHz Avg Hol	d: 50/50	01:26:41 Radio Std: N Radio Device	
Ref Offset 40.32 dB dB/div Ref 51.00 dBm								
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enter 734 MHz								an 25 MH
Res BW 200 kHz			#V	3W 620 kHz			Swe	ep 1.2 m
Occupied Bandwidth			Total F	ower	58.0	dBm		
8.9	930 N	lHz						
Transmit Freq Error	11.261	kHz	% of O	BW Power	99.	00 %		
x dB Bandwidth	9.645	MHz	x dB		-26.0	0 dB		

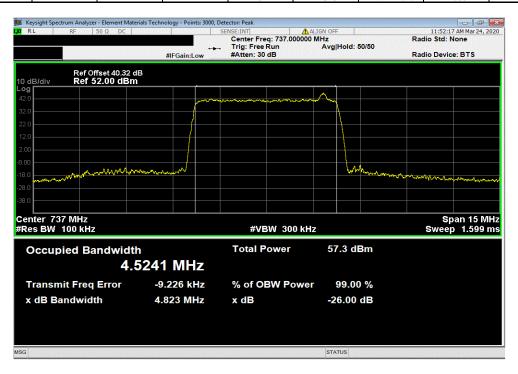




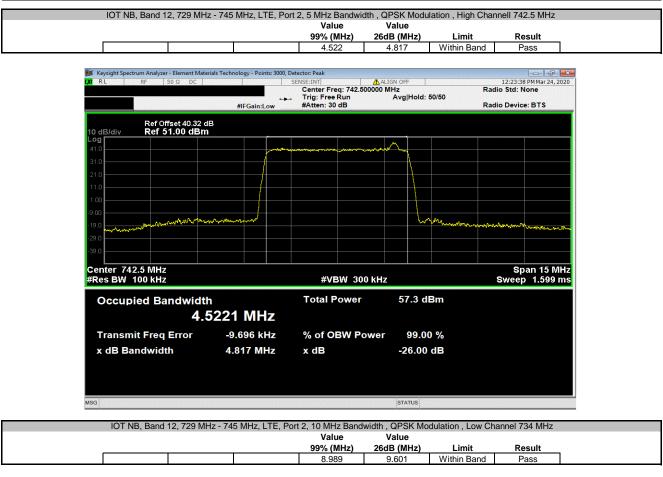












📕 Keysight Sp ils Technology - Points: 3000, Detector: Peak ALIGN OFF Center Freq: 734.000000 MHz Trig: Free Run Avg|Hold: 50/50 #Atten: 30 dB 12:37:27 PM Mar 24, 2020 Radio Std: None SEN #IFGain:Low Radio Device: BTS Ref Offset 40.32 dB Ref 51.00 dBm 10 dB/div - 99 Center 734 MHz #Res BW 200 kHz Span 25 MHz Sweep 1.2 ms #VBW 620 kHz Total Power 57.9 dBm **Occupied Bandwidth** 8.9894 MHz Transmit Freq Error 15.523 kHz % of OBW Power 99.00 % 9.601 MHz -26.00 dB x dB Bandwidth x dB STATUS



