

# Report On

Radio Testing of the Nokia Solutions and Networks Oy AirScale Base Station RRH 1.9GHz Radio Access technology: E-UTRA (FDD) In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 24

COMMERCIAL-IN-CONFIDENCE

FCC ID: VBNAHFB-01

Document 75945683 Report 01 Issue 2

**April 2019** 



TÜV SÜD, Octagon House, Concorde Way, Segensworth North, Fareham, Hampshire, United Kingdom, PO15 5RL Tel: +44 (0) 1489 558100. Website: <a href="www.tuv-sud.co.uk">www.tuv-sud.co.uk</a>

#### COMMERCIAL-IN-CONFIDENCE

REPORT ON	Radio Testing of the Nokia Solutions and Networks Oy AirScale Base Station RRH 1.9GHz Radio Access technology: E-UTRA (FDD) In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 24,
	Document 75945683 Report 01 Issue 2
	April 2019
PREPARED FOR	Nokia Solutions and Networks Oy PO Box 319 Kaapelitie 4 FI-90620 Oulu Finland
PREPARED BY	Daria Fiedorowicz Senior Administrator (Technical)
APPROVED BY	Steve Scarte Authorised Signatory

18 April 2019

**DATED** 



# **CONTENTS**

Section		Page No
1	REPORT SUMMARY	3
1.1	Introduction	4
2	DISCLAIMERS AND COPYRIGHT	5
2.1	Disclaimers and Copyright	6
ANNEX	A Nokia Solutions and Networks Ov Test Report No: TVPEAPPR-1508717799-611	Δ2



## **SECTION 1**

## **REPORT SUMMARY**

Radio Testing of the Nokia Solutions and Networks Oy
AirScale Base Station RRH 1.9GHz
Radio Access technology: E-UTRA (FDD)
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 24



#### 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Radio Testing of the Nokia Solutions and Networks Oy AirScale Base Station RRH 1.9GHz Radio Access technology: E-UTRA (FDD) in accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 24

Objective To perform Radio Testing to determine the Equipment

Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.

Manufacturer Nokia Solutions and Networks Oy

Model Number(s) AHFB

Serial Number(s) EA183011453

Number of Samples Tested 1

Test Specification/Issue/Date FCC CFR 47 Part 2 (2017)

FCC CFR 47 Part 24 (2018)

Order Number VSH/ 90960183
Date 02 April 2019
Start of Test 18 March 2019

Finish of Test 02 April 2019

Name of Engineer(s) Mika Kallankari and Sami Riuttanen

This report has been up issued to issue 2 and should be read in place of Issue 1 to correct Emission Designators and typographical errors



# **SECTION 2**

**DISCLAIMERS AND COPYRIGHT** 



## 2.1 DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

This report must not be reproduced, except in its entirety, without the written permission of  $T\ddot{U}V$   $S\ddot{U}D$ 

© 2019 TÜV SÜD



## **ANNEX A**

NOKIA SOLUTIONS AND NETWORKS OY TEST REPORT NO: TYPEAPPR-1508717799-611





Nokia Networks

TEST REPORT NO: TYPEAPPR-1508717799-611

FCC ID: VBNAHFB-01

Date: Oulu 10. Apr 2019

Pages: 113 Appendices: -

Equipment Under Test: AirScale Base Station RRH 1.9GHz

Radio Access technology: E-UTRA (FDD)

Type: AHFI

Manufacturer: Nokia Solutions and Networks Oy

Address: P.O. Box 319,

Kaapelitie 4, FI-90620, Oulu, Finland

Task: Conformance test according to the specifications

mentioned below

Test Specification(s): FCC 47 CFR part 2 (2017) and

FCC 47 CFR part 24 (2018)

Result: The EUT complies with the requirements of the

specification

The results relate only to the items tested as described in this test report.

Approved by: Date Signature

Jari Virta

**Product Conformity** 

Manager

Nokia Solutions and

Networks Oy 10. Apr 2019



FCC ID: VBNAHFB-01 Test Report No: TYPEAPPR-1508717799-

# **CONTENTS**

1.	S	UMMARY	4
	1.1	Time Schedule	.5
	1.2	Participants	.5
2.	E	QUIPMENT UNDER TEST	.5
	2.1	Configuration of EUT	.5
	2.2	Operating Conditions	.7
3.	T	EST CONFIGURATION	8
	3.1	Calibration of the Test Equipment	8
4.	T	EST RESULTS	.9
	4.1	Test No. 1: RF Power Output (§ 2.1046, § 24.232)	9
	4.	1.1. Limits	.9
	4.	1.2. Test Procedure and Results	9
	4.2	Test No. 2: Modulation Characteristics (§ 2.1047, § 2.201)	7
	4.3	Test No. 3: Occupied Bandwidth (§ 2.1049)	8
	4.	3.1. Limits	8
	4.	3.2. Test Procedure and Results	8
	4.4	Test No. 4: Spurious Emissions at Antenna Terminals (§ 2.1051, § 2.1057, § 24.238)	24
	4.	4.1. Limits	
	4.	4.2. Test Procedure and Results	
	4.5	Test No. 5: Field Strength of Spurious Radiation (§ 2.1053, § 2.1057, § 24.238	
	4.	5.1. Limits	8
	4.	5.2. Test Configuration	8
	4.	5.3. Test Procedure and Results	8
5.	T	EST DATA AND SCREENSHOTS	Ю
EC	C 47	CED nort 24 (2019) 10 Apr 20	10

FCC 47 CFR part 24 (2018)

10. Apr 2019 Page 2 of 113



FCC ID:
VBNAHFB-01

Test Report No: TYPEAPPR-1508717799-

611

5.1	Part	List of the RF Measurement Test Equipment	40
5.2	Spec	tral Plots	4
5.	2.1.	Test No. 2: Modulation Characteristics	4
5.	2.2.	Test No. 3: Occupied Bandwidth	40
5.	2.3.	Test No. 4: Spurious Emissions at the Antenna Terminals	54
5	24	Test No. 5: Field Strength of Spurious Radiation	9



FCC ID: VBNAHFB-01 Test Report No: TYPEAPPR-1508717799-

611

#### 1. SUMMARY

Due to HW version changes of AHFB unit a FCC class 2 permissive change is mandatory to grant the permission to use these configurations.

The following tests were performed according to the FCC rules in order to verify the compliance of the EUT with the FCC requirements:

Test No.	Measurement	FCC Rule	Page Number of this Report	Result
1	RF Power Output	§ 2.1046, § 24.232	8	compliant
2	Modulation Characteristics	§ 2.1047, § 2.201	13	compliant
3	Occupied Bandwidth	§ 2.1049	14	compliant
4	Spurious Emissions at Antenna Terminals	§ 2.1051, § 2.1057, § 24.238	18	compliant
5	Field Strength of Spurious Radiation	§ 2.1053, § 2.1057, § 24.238,	26	compliant

#### Table 1 Results - Summary

In accordance with the FCC Rule §15.3 (z) the equipment was tested with the limits that are valid for an *unintentional radiator*.

Measurements guidance: FCC OET laboratory KDB: 662911 D01 Multiple Transmitter Output v01r02 and FCC KDB 971168 D01 Power Meas License Digital Systems v02r02.

Test Laboratory:

Nokia Solutions and Networks Oy

Kaapelitie 4,

FI-90620, Oulu, Finland

Jari Virta

FCC Reg. No: 411251 OATS number: 661AI-1

Testing laboratory accreditation number: T297

FCC 47 CFR part 24 (2018)

10. Apr 2019 Page 4 of 113



FCC ID: VBNAHFB-01

Test Report No: TYPEAPPR-1508717799-

611

#### 1.1 Time Schedule

Test No.	1, 2, 3, 4	5
Start of Test:	18 Mar 2019	31 Mar 2019
End of Test:	2 Apr 2019	2 Apr 2019

#### 1.2 Participants

Name	Function	Signature
RF Test person (Nokia) Mika Kallankari	Tests nos: 1,2,3,4 Setup of EUT	Maka Hadadan
EMC Test person (Nokia) Sami Riuttanen	Test no 5, Setup of EUT	Sami Rintlane

## EQUIPMENT UNDER TEST

The EUT is a LTE Base transceiver station RRH 1.9GHz with 4 power amplifiers.

The BTS performs the full RAN function of LTE system (evolved UTRA). This is sometimes referred to as collapsed RAN, where equivalent functions of former 3G BTS and 3G RNC are all integrated into BTS. BTS is connected directly to the core network via S1 interface, and to mobile stations via Air interface (Uu). In addition BTS's are optionally connected directly to each other via X2 interface for handover

The tested equipment is representative for serial production.

#### 2.1 Configuration of EUT

The used different EUT configurations are shown by the following table.

Module Type	AirScale Base Station RRH 1.9GHz			
Radio Access Technology		E-UTRA		
Duplex mode		Frequency Division Duplex (FDD)		
Channel Bandwidth		Single carrier 5MHz (Config. A), Single carrier 10MHz (Config. B), Single carrier 15MHz (Config. C), Single carrier 20MHz (Config. D).		
Supply Voltage		48.0 V DC		
		Frequency Bands		
Channel Bandwidth 5MHz	Lov	vest tunable freq. Singe carrier	1932.5MHz	
	Mid	dle freq. Single carrier	1962.5MHz	
	Hig	hest tunable freq. Single carrier	1992.5MHz	

FCC 47 CFR part 24 (2018)

10. Apr 2019



FCC ID: VBNAHFB-01 Test Report No: TYPEAPPR-1508717799-

Channel Bandwidth 10MHz	Low	vest tunable freq. Singe carrier	1935.0MHz	
	Mid	dle freq. Single carrier	1962.5MHz	
	Higl	nest tunable freq. Single carrier	1990.0MHz	
Channel Bandwidth 15MHz	1 200	contituum la face Cinna annian	1937.5MHz	
Channel Bandwidth 15WHZ	LOW	vest tunable freq. Singe carrier	1937.5IVIH2	
	Mid	dle freq. Single carrier	1962.5MHz	
	Hial	nest tunable freg. Single carrier	1987.5MHz	
Channel Bandwidth 20MHz	Lowest tunable freq. Singe carrier		1940.0MHz	
	Mid	dle freq. Single carrier	1962.5MHz	
	Higl	nest tunable freq. Single carrier	1985.0MHz	
		Single carrier	*	
Rated Output Power (Prat)		5W (37.0dBm) conducted / carrier		
		RX	тх	
Number of Antenna Ports	4 (ANT1 to ANT4) 4 (ANT1 to ANT4)			
MiMo		Yes Yes		

**Table 2 Overview of EUT configuration** 

FCC 47 CFR part 24 (2018)

10. Apr 2019 Page 6 of 113



FCC ID: VBNAHFB-01

Test Report No: TYPEAPPR-1508717799-

611

The tests were performed with one EUT at the antenna ports ANT1, ANT2, ANT3 or ANT4.

The used different EUT configurations are shown by the following table.

	The disease difference and a second of the s					
Module Name	Serial-No.	Module Type	Config.			
AHFB	EA183011453	RRH	A, B, C, D			
Other Modules	Module Type	Module Type				
AMIA	AirScale Subrack	AirScale Subrack				
ASIA	AirScale Common uni	AirScale Common unit				
ABIA	AirScale Capacity unit	AirScale Capacity unit				

#### **Table 3 Configuration of EUT**

For a functional description of the modules, please refer to the appropriate related parts and exhibit sections of this certification application.

#### 2.2 Operating Conditions

The EUT supports QPSK, 16QAM, 64QAM and 256QAM modulation. If not stated otherwise, the following standard setup procedure for the EUT was used:

The transmitter was set up according to 3GPP TS 36.141 E-UTRA Test Models (E-TM) for all tests:

- E-TM 1.1: All QPSK modulation testing
- E-TM 3.1: All 64QAM modulation testing
- E-TM 3.2: All 16QAM modulation testing
- E-TM 3.1A: All 256QAM modulation testing

During the measurements, one carrier channel was tested at a time. The carrier was set to the maximum power level to ensure the maximum emission amplitudes during all measurements.

During the tests, the Flexi Multiradio BTS is transmitting a pseudo random bit pattern on the data channels. This ensures that the measurements of the emission characteristics of the transmitter are pursuant to § 2.1049.

FCC 47 CFR part 24 (2018)

10. Apr 2019 Page 7 of 113



FCC ID: VBNAHFB-01 Test Report No: TYPEAPPR-1508717799-

611

#### 3. TEST CONFIGURATION

If not stated otherwise, the following measurement configuration was used to perform all measurements (see figure below).

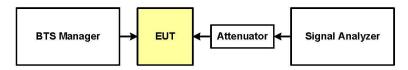


Figure 1 Test Configuration (single output)

The RF output of the transceiver (cell) under test is connected to a signal analyzer via a high power attenuator to protect the input of the signal analyzer from high RF power levels. A description of the analyzer settings is given in each of the sections describing the measurements. The other transceivers are terminated.

A complete list of the measurement equipment is included on page 35 of this measurement report.

#### 3.1 Calibration of the Test Equipment

All relevant test equipment has a valid calibration from an external calibration laboratory. Additionally the signal analyzer has a built-in self-calibration procedure. This calibration procedure was activated prior to the measurements so that the analyzer is deemed accurate. High quality cables were used to connect the measurement equipment to the EUT. The actual loss of the attenuator and the cables was measured with a high precision network analyzer and taken into account for all measurements.

FCC 47 CFR part 24 (2018)

10. Apr 2019 Page 8 of 113



FCC ID: VBNAHFB-01 Test Report No: TYPEAPPR-1508717799-

611

#### 4. TEST RESULTS

#### 4.1 Test No. 1: RF Power Output (§ 2.1046, § 24.232)

#### 4.1.1. Limits

Para. No. 24.232 (a)(2). Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters

#### 4.1.2. Test Procedure and Results

Detachable Antenna: The maximum output power at the antenna terminals was measured using a signal analyzer.

The RF power was measured with a frequency sweep across the carrier (see screenshots). The carrier power was calculated from the signal analyzer by integration over the result. The base station maximum output power is the sum of the measured carrier power and the external attenuation (cable loss of the test set up).

For the MiMo output, RF power output was measured from each antenna port individually and the results summed mathematically in accordance to FCC KDB 662911 D01 -guidance.

Peak to average power (PAPR) was examined using CCDF method and 0.1% value recorded in dB to the tables below.

FCC 47 CFR part 24 (2018)

10. Apr 2019 Page 9 of 113



FCC ID: VBNAHFB-01 Test Report No: TYPEAPPR-1508717799-611

The following table shows the measured output powers at the antenna connector.

Measuro	ed laboratory room te	mperature and humidi	ity during the tests	
Date	Temperature Min-Max: Hu			/ Min-Max:
19.Mar- 2.Apr 2019	23 °C	24 °C	14 RH%	21 RH%

Config A:

RF Pov	Power Output PAPR		
[dBm]	[W]	[dB]	Result
	~		
35.71	3.72392	7.39	compliant
36.14	4.11150	7.36	compliant
35.74	3.74973	7.36	compliant
35.77	3.77572	7.39	compliant
36.18	4.14954	7.36	compliant
35.82	3.81944	7.36	compliant
35.69	3.70681	7.36	compliant
36.13	4.10204	7.36	compliant
35.70	3.71535	7.36	compliant
35.68	3.69828	7.39	compliant
36.07	4.04576	7.36	compliant
35.70	3.71535	7.36	compliant
+ANT3+ANT4 Calcula	ated Total		
41.73	14.90473	÷	compliant
42.15	16.40884	=	compliant
41.76	14.99987	=	compliant
35.68	3.69828	7.42	compliant
36.05	4.02717	7.31	compliant
35.73	3.74111	7.31	compliant
35.77	3.77572	7.39	compliant
36.22	4.18794	7.39	compliant
35.82	3.81944	7.39	compliant
1001041000031-00		The state of the s	0-709/5-7- <b>-</b> -00-7-00-7-0-00
35.60	3.63078	7.39	compliant
1200000000	4.07380	20020000	compliant
ALTERNATION	3.72392	10.100.000	compliant
**************************************	reserved-1999 LACK		······································
35.68	3.69828	7.39	compliant
PERSONAL PROPERTY AND ADDRESS OF THE PERSONAL PR	4.00867	00 - 00 months	compliant
	3.68978		compliant
	1990/00/40/10/10/00/00/00	1	
	14.80307	<u>=</u>	compliant
***************************************	ac accommona	2	compliant
	14.97424	_	compliant
101.10	is some compo		- Onnplicati
35.71	3.72392	7.42	compliant
	35.71 36.14 35.74 35.77 36.18 35.82 35.69 36.13 35.70 35.68 36.07 35.70 35.68 36.07 35.70 41.73 42.15 41.76 35.68 36.05 35.73 35.77 36.22 35.82 35.60 36.10 35.71 35.68 36.03 35.71	[dBm]         [W]           35.71         3.72392           36.14         4.11150           35.74         3.74973           35.77         3.77572           36.18         4.14954           35.82         3.81944           35.89         3.70681           36.13         4.10204           35.70         3.71535           35.68         3.69828           36.07         4.04576           35.70         3.71535           *ANT3+ANT4 Calculated Total           41.73         14.90473           42.15         16.40884           41.76         14.99987           35.68         3.69828           36.05         4.02717           35.73         3.77572           36.22         4.18794           35.82         3.81944           35.60         3.63078           36.10         4.07380           35.71         3.72392           35.68         3.69828           36.03         4.00867           35.67         3.68978           2+ANT3+ANT4 Calculated Total           41.70         14.80307           42.12	[dBm]         [W]         [dB]           35.71         3.72392         7.39           36.14         4.11150         7.36           35.74         3.74973         7.36           35.77         3.77572         7.39           36.18         4.14954         7.36           35.82         3.81944         7.36           35.89         3.70681         7.36           35.70         3.71535         7.36           35.70         3.71535         7.36           35.68         3.69828         7.39           36.07         4.04576         7.36           35.70         3.71535         7.36           *ANT3+ANT4 Calculated Total         41.73         14.90473         -           42.15         16.40884         -         -           41.76         14.99987         -           35.68         3.69828         7.31           35.73         3.74111         7.31           35.73         3.77572         7.39           36.22         4.18794         7.39           35.82         3.81944         7.39           35.60         3.63078         7.39           36.10

FCC 47 CFR part 24 (2018)

10. Apr 2019 Page 10 of 113



FCC ID: VBNAHFB-01 Test Report No: TYPEAPPR-1508717799-611

1962.5	36.07	4.04576	7.39	compliant
1992.5	35.74	3.74973	7.39	compliant
64QAM-Modulation ANT2				
1932.5	35.80	3.80189	7.42	compliant
1962.5	36.21	4.17830	7.39	compliant
1992.5	35.85	3.84592	7.39	compliant
64QAM-Modulation ANT3				
1932.5	35.70	3.71535	7.39	compliant
1962.5	36.11	4.08319	7.39	compliant
1992.5	35.70	3.71535	7.39	compliant
64QAM-Modulation ANT4			•	
1932.5	35.70	3.71535	7.39	compliant
1962.5	36.08	4.05509	7.39	compliant
1992.5	35.69	3.70681	7.39	compliant
64QAM-Modulation ANT1+AN	IT2+ANT3+ANT4 Calc	ulated Total	•	
1932.5	41.75	14.95652	2	compliant
1962.5	42.14	16.36234	-	compliant
1992.5	41.77	15.01781		compliant
256QAM-Modulation ANT1		l-	•	
1932.5	35.62	3.64754	7.39	compliant
1962.5	36.06	4.03645	7.39	compliant
1992.5	35.74	3.74973	7.39	compliant
256QAM-Modulation ANT2		<u>.</u>	•	
1932.5	35.80	3.80189	7.39	compliant
1962.5	36.17	4.14000	7.39	compliant
1992.5	35.81	3.81066	7.39	compliant
256QAM-Modulation ANT3		.C		
1932.5	35.66	3.68129	7.39	compliant
1962.5	36.10	4.07380	7.39	compliant
1992.5	35.66	3.68129	7.39	compliant
256QAM-Modulation ANT4			•	•
1932.5	35.63	3.65595	7.39	compliant
1962.5	36.07	4.04576	7.39	compliant
1992.5	35.67	3.68978	7.39	compliant
256QAM-Modulation ANT1+A	NT2+ANT3+ANT4 Cal	culated Total		
1932.5	41.70	14.78667	-	compliant
recension and the		10,00001		700 F 200 C
1962.5	42.12	16.29601	-	compliant

Table 4 RF Power Output (5 MHz Channel BW)

## Config B:

Config B:	RF Powe	r Output	PAPR	
Carrier Frequency [MHz]	[dBm]	[W]	[dB]	Result
QPSK-Modulation ANT1				
1935	35.82	3.81944	7.36	compliant
1962.5	36.15	4.12098	7.30	compliant
1990	35.91	3.89942	7.33	compliant
QPSK-Modulation ANT2				
1935	36.13	4.10204	7.36	compliant
1962.5	36.34	4.30527	7.30	compliant
1990	36.17	4.14000	7.33	compliant

FCC 47 CFR part 24 (2018)

10. Apr 2019 Page 11 of 113



FCC ID: VBNAHFB-01 Test Report No: TYPEAPPR-1508717799-611

QPSK-Modulation ANT3 1935	35.91	3.89942	7.36	compliant
1962.5	36.11	4.08319	7.30	compliant
1990	35.96	3.94457	7.33	compliant
QPSK-Modulation ANT4	33.30		7.55	Compilant
1935	35.91	3.89942	7.36	compliant
1962.5	36.16	4.13048	7.30	compliant
1990	35.93	3.91742	7.33	compliant
QPSK-Modulation ANT1+ANT		CHAMBOURNAL LIBERT	1.00	Sompliant
1935	41.96	15.72032	-	compliant
1962.5	42.21	16.63991	121	compliant
1990	42.01	15.90141	( <u>2</u> )	compliant
16QAM-Modulation ANT1	42.01	13-13-20-11	1201	Compilant
1935	35.89	3.88150	7.36	compliant
1962.5	36.15	4.12098	7.30	compliant
1990	35.96	3.94457	7.33	compliant
16QAM-Modulation ANT2	33.90	0.01107	1.33	Compliant
1935	36.16	4.13048	7.36	oomplia-t
1962.5	36.36	4.32514	7.36	compliant
1962.5	36.36	4.13048	7.30	compliant
10.1.0	30.10	4.13040	1.33	compliant
16QAM-Modulation ANT3	05.00	3.97192	7.00	1
1935	35.99	100000000000000000000000000000000000000	7.36	compliant
1962.5	36.16	4.13048	7.30	compliant
1990	35.94	3.92645	7.33	compliant
16QAM-Modulation ANT4				4 0
1935	35.90	3.89045	7.33	compliant
1962.5	36.12	4.09261	7.30	compliant
1990	35.91	3.89942	7.33	compliant
16QAM-Modulation ANT1+AN	T2+ANT3+ANT4 Calcula			
1935	42.01	15.87435	( <del>-</del> )	compliant
1962.5	42.22	16.66920	(#)	compliant
1990	42.01	15.90092	8	compliant
64QAM-Modulation ANT1				
1935	35.88	3.87258	7.36	compliant
1962.5	36.17	4.14000	7.30	compliant
1990	35.93	3.91742	7.33	compliant
64QAM-Modulation ANT2				
1935	36.10	4.07380	7.36	compliant
1962.5	36.35	4.31519	7.30	compliant
1990	36.16	4.13048	7.33	compliant
64QAM-Modulation ANT3	-		0.000	
1935	35.94	3.92645	7.36	compliant
1962.5	36.12	4.09261	7.30	compliant
1990	35.93	3.91742	7.33	compliant
64QAM-Modulation ANT4		MICHARD (999) (8746)	1000 E.E.	T
1935	35.90	3.89045	7.36	compliant
1962.5	36.19	4.15911	7.30	compliant
1992.3	35.92	3.90841	7.33	compliant
64QAM-Modulation ANT1+AN		100-100-100-100-100-100-100-100-100-100	1.33	Compliant
	41.98	15.76328	1000	compliant
	41.90		h <b>=</b> 2	100
1935 1962.5	42.23	16.70690		compliant

FCC 47 CFR part 24 (2018)

10. Apr 2019 Page 12 of 113



FCC ID: VBNAHFB-01 Test Report No: TYPEAPPR-1508717799-611

1935	35.88	3.87258	7.36	compliant
1962.5	36.15	4.12098	7.30	compliant
1990	35.99	3.97192	7.33	compliant
256QAM-Modulation ANT2				
1935	36.13	4.10204	7.36	compliant
1962.5	36.37	4.33511	7.30	compliant
1990	36.18	4.14954	7.33	compliant
256QAM-Modulation ANT3				
1935	35.89	3.88150	7.36	compliant
1962.5	36.10	4.07380	7.30	compliant
1990	35.91	3.89942	7.33	compliant
256QAM-Modulation ANT4				
1935	35.90	3.89045	7.36	compliant
1962.5	36.12	4.09261	7.30	compliant
1990	35.95	3.93550	7.33	compliant
256QAM-Modulation ANT1+	ANT2+ANT3+ANT4 Calcu	lated Total		
1935	41.97	15.74657		compliant
1962.5	42.21	16.62249		compliant
1990	42.03	15.95638		compliant

Table 5 RF Power Output (10 MHz Channel BW)

## Config C:

Carrier Frequency [MHz]	RF Powe	r Output	PAPR	B14
	[dBm]	[W]	[dB]	Result
QPSK-Modulation ANT1				
1937.5	35.99	3.97192	7.42	compliant
1962.5	36.09	4.06443	7.30	compliant
1987.5	36.01	3.99025	7.36	compliant
QPSK-Modulation ANT2				
1937.5	36.03	4.00867	7.39	compliant
1962.5	36.28	4.24620	7.30	compliant
1987.5	36.15	4.12098	7.39	compliant
QPSK-Modulation ANT3				
1937.5	36.06	4.03645	7.39	compliant
1962.5	36.15	4.12098	7.30	compliant
1987.5	36.02	3.99945	7.36	compliant
QPSK-Modulation ANT4				
1937.5	35.92	3.90841	7.39	compliant
1962.5	36.10	4.07380	7.30	compliant
1987.5	36.07	4.04576	7.36	compliant
QPSK-Modulation ANT1+ANT2+	ANT3+ANT4 Calculat	ed Total		
1937.5	42.02	15.92545		compliant
1962.5	42.18	16.50541	(4)	compliant
1987.5	42.08	16.15643	121	compliant
16QAM-Modulation ANT1				
1937.5	35.87	3.86367	7.39	compliant
1962.5	36.15	4.12098	7.30	compliant
1987.5	35.96	3.94457	7.36	compliant
16QAM-Modulation ANT2		,		•
1937.5	36.12	4.09261	7.36	compliant
1962.5	36.42	4.38531	7.30	compliant

FCC 47 CFR part 24 (2018)

10. Apr 2019 Page 13 of 113



FCC ID: VBNAHFB-01 Test Report No: TYPEAPPR-1508717799-611

1987.5	36.26	4.22669	7.36	compliant
16QAM-Modulation ANT3				
1937.5	36.02	3.99945	7.36	compliant
1962.5	36.13	4.10204	7.30	compliant
1987.5	36.06	4.03645	7.36	compliant
16QAM-Modulation ANT4				
1937.5	35.83	3.82825	7.36	compliant
1962.5	36.09	4.06443	7.30	compliant
1987.5	36.08	4.05509	7.36	compliant
16QAM-Modulation ANT1+AN	IT2+ANT3+ANT4 Calcula	ated Total		
1937.5	41.98	15.78397		compliant
1962.5	42.22	16.67276		compliant
1987.5	42.11	16.26280	(8)	compliant
64QAM-Modulation ANT1				
1937.5	35.96	3.94457	7.39	compliant
1962.5	36.11	4.08319	7.30	compliant
1987.5	36.00	3.98107	7.36	compliant
64QAM-Modulation ANT2				_
1937.5	36.07	4.04576	7.39	compliant
1962.5	36.19	4.15911	7.30	compliant
1987.5	36.19	4.15911	7.39	compliant
64QAM-Modulation ANT3				
1937.5	36.01	3.990249	7.36	compliant
1962.5	36.11	4.08319	7.30	compliant
1987.5	36.03	4.00867	7.36	compliant
64QAM-Modulation ANT4	34			
1937.5	35.94	3.92645	7.39	compliant
1962.5	36.09	4.06443	7.30	compliant
1987.5	36.06	4.03645	7.39	compliant
64QAM-Modulation ANT1+AN	IT2+ANT3+ANT4 Calcula	ated Total		
1937.5	42.02	15.90703	н	compliant
1962.5	42.15	16.38993	-	compliant
1987.5	42.09	16.18530	(4)	compliant
256QAM-Modulation ANT1				
1937.5	35.97	3.95367	7.42	compliant
1962.5	36.06	4.03645	7.33	compliant
1987.5	36.05	4.02717	7.36	compliant
256QAM-Modulation ANT2	·			
1937.5	35.97	3.95367	7.42	compliant
1962.5	36.06	4.03645	7.33	compliant
1987.5	36.05	4.02717	7.36	compliant
256QAM-Modulation ANT3		20 March 1997		- Sompliant
1937.5	36.04	4.01791	7.42	compliant
1962.5	36.09	4.06443	7.30	compliant
1987.5	36.02	3.99945	7.39	compliant
256QAM-Modulation ANT4	30.02	2.200.10	7.55	L compliant
1937.5	35.89	3.88150	7.42	compliant
PC CONTROL OF	Excessed that	4.08319	ET AMELIA	E001/000 *D00/0000000
1962.5	36.11	3.99945	7.33	compliant
1987.5	36.02		7.39	compliant
256QAM-Modulation ANT1+A	100000 000000	Control of the Contro		T
1937.5	41.99	15.80674		compliant
1962.5	42.10	16.22054	( <del>-</del> )	compliant

FCC 47 CFR part 24 (2018)

10. Apr 2019 Page 14 of 113



FCC ID: VBNAHFB-01 Test Report No: TYPEAPPR-1508717799-611

1987.5 42.06 16.05324 - compliant

Table 6 RF Power Output (15 MHz Channel BW)

Config D:

Carrier Frequency [MHz]	RF Powe	r Output	PAPR	Result
	[dBm]	[W]	[dB]	Result
QPSK-Modulation ANT1				
1940	36.72	4.69894	7.42	compliant
1962.5	36.75	4.73151	7.26	compliant
1985	36.60	4.57088	7.36	compliant
QPSK-Modulation ANT2				
1940	36.70	4.67735	7.88	compliant
1962.5	36.87	4.86407	7.36	compliant
1985	36.83	4.81948	7.70	compliant
QPSK-Modulation ANT3				
1940	36.97	4.97737	7.44	compliant
1962.5	37.00	5.01187	7.26	compliant
1985	36.85	4.84172	7.38	compliant
QPSK-Modulation ANT4				
1940	36.81	4.79733	7.42	compliant
1962.5	36.83	4.81948	7.26	compliant
1985	36.73	4.70977	7.38	compliant
QPSK-Modulation ANT1+ANT2+	ANT3+ANT4 Calculat	ed Total		
1940	42.82	19.15100		compliant
1962.5	42.88	19.42693		compliant
1985	42.77	18.94186	141	compliant
16QAM-Modulation ANT1				
1940	36.87	4.86407	7.42	compliant
1962.5	36.72	4.69894	7.26	compliant
1985	36.78	4.76431	7.38	compliant
16QAM-Modulation ANT2	AL CHAPPONE	,	34 474534	
1940	36.86	4.85289	7.86	compliant
1962.5	36.99	5.00035	7.34	compliant
1985	36.70	4.67735	7.68	compliant
16QAM-Modulation ANT3		990/893 ROUNGE		
1940	37.10	5.12861	7.44	compliant
1962.5	36.86	4.85289	7.24	compliant
1985	36.86	4.85289	7.38	compliant
16QAM-Modulation ANT4	00.00		1.00	Compilant
1940	36.71	4.68813	7.42	compliant
1962.5	36.96	4.96592	7.26	compliant
1982.5	36.76	4.74242	7.26	compliant
16QAM-Modulation ANT1+ANT2	400000000000		7.30	Compilant
1940	42.91	19.53370	2	compliant
1962.5	42.90	19.51809	_	compliant
1982.5	42.80	19.03697		compliant
64QAM-Modulation ANT1	42.00	10.00007		Compilant
1940	26.75	4.73151	7.40	Ogmanliant
	36.75	4.65586	7.42	compliant
1962.5 1985	36.68	4.60257	7.28 7.38	compliant
1900	36.63	4.00257	1.30	compliant

FCC 47 CFR part 24 (2018)

10. Apr 2019 Page 15 of 113



FCC ID: VBNAHFB-01 Test Report No: TYPEAPPR-1508717799-611

1940	36.71	4.68813	7.82	compliant
1962.5	36.87	4.86407	7.38	compliant
1985	36.83	4.81948	7.74	compliant
64QAM-Modulation ANT3				
1940	36.94	4.94311	7.42	compliant
1962.5	37.03	5.04661	7.26	compliant
1985	36.87	4.86407	7.40	compliant
64QAM-Modulation ANT4				
1940	36.91	4.90908	7.42	compliant
1962.5	36.90	4.89779	7.26	compliant
1985	36.78	4.76431	7.40	compliant
64QAM-Modulation ANT1+Al	NT2+ANT3+ANT4 Calcula	ated Total		
1940	42.85	19.27183	=	compliant
1962.5	42.89	19.46433	(=)	compliant
1985	42.80	19.05043	121	compliant
256QAM-Modulation ANT1		, ,		-1-
1940	36.69	4.66659	7.40	compliant
1962.5	36.65	4.62381	7.28	compliant
1985	36.60	4.57088	7.38	compliant
256QAM-Modulation ANT2	•			
1940	36.80	4.78630	7.86	compliant
1962.5	36.91	4.90908	7.36	compliant
1985	36.80	4.78630	7.68	compliant
256QAM-Modulation ANT3		*		
1940	37.05	5.06991	7.42	compliant
1962.5	36.94	4.94311	7.26	compliant
1985	36.87	4.86407	7.38	compliant
256QAM-Modulation ANT4	•			
1940	36.83	4.81948	7.40	compliant
1962.5	36.92	4.92040	7.26	compliant
1985	36.75	4.73151	7.38	compliant
256QAM-Modulation ANT1+A	ANT2+ANT3+ANT4 Calcu	lated Total	tr. Whites	transport transferrible
1940	42.87	19.34228	10 <del>0</del> 00	compliant
1962.5	42.88	19.39639	-	compliant
1985	42.78	18.95277	9-0	compliant

Table 7 RF Power Output (20 MHz Channel BW)

The base station maximum output power was found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

FCC 47 CFR part 24 (2018)

10. Apr 2019 Page 16 of 113