

Global Product Compliance Laboratory 600-700 Mountain Avenue Room 5B-108 Murray Hill, New Jersey 07974-0636 USA

TESTING NVLAP LAB CODE: 100275-0

Test Report

Regulation: FCC Part 2 and 27

<u>Client:</u> Nokia Mobility

Product Evaluated: AHNA AirScale RRH 4T4R B30 100W (AHNA)

Report Number: TR-2018-0259-FCC2-27

Date Issued: January 25, 2019

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Revisions

Date	Revision	Section	Change
1/25/2019	0		Initial Release

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1/25/2019

1/25/2019

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1. System Information and Requirements

Equipment Under Test (EUT):	AHNA AirScale RRH 4T4R B30 100W (AHNA)
Serial Number:	1M184225310
	1M184225329
Cell Name / Number	GPCL Project Number: 2019-0259
Company:	NOKIA SOLUTIONS AND NETWORKS OY
	KARAPORTTI 3, FI-02610 ESPOO
	FINLAND
Manufacturer:	NOKIA SOLUTIONS AND NETWORKS OY
Test Requirement(s):	47 CFR FCC Part 2 and Part 27
-	KDB 971168 D01 Power Measurement License Digital Systems v03r01
	April 9, 2018.
	KDB 662911 D01 Multiple Transmitter Output v02r01 Oct 2013
Measurement Procedure(s):	ANSI C63.26 (2015)
	47 CFR FCC Part 2 and FCC Part 27
	ANSI C63.4 (2014)
Test Date(s):	November 26, 2018 – January 16, 2019
Test Performed By:	Nokia
	Global Product Compliance Laboratory
	600-700 Mountain Ave.
	P.O. Box 636
	Murray Hill, NJ 07974-0636
	FCC Registration Number: 395774
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Product Engineer(s):	Ron Remy
Lead Engineer	Steve Gordon
Test Engineer (s):	Jaideep Yadav, Eugene Mitchell, Mike Soli

Test Results: The AHNA AirScale RRH 4T4R B30 100W (AHNA), *as tested* met the above listed requirements. Report copies and other information not contained in this report are held by either the product engineer or in an identified file at the Global Product Compliance Laboratory in New Providence, NJ.

1.1 Introduction

This Conformity Assessment Report applies to the AHNA AirScale RRH 4T4R B30 100W (AHNA), hereinafter referred to as the Equipment Under Test (EUT).

1.2 Purpose and Scope

The purpose of this document is to provide the testing data required for qualifying the EUT in compliance with FCC Parts 2 and 27, measured in accordance with the procedures set out in Section 2.1033 (c) (14) of the Rules.

1.3 EUT Description

The AHNA is part of AirScale Micro RRH Rel5.1 Quasar Program. It functions as a remote RF head designed to support 5 MHz and 10 MHz bandwidths in addition to the following modulations: QPSK, 16QAM, 64QAM and 256QAM.

Frequency of operation: 3GPP band 30 DL 2350-2360 MHz UL 2305-2315 MHz



AHNA AirScale RRH 4T4R B30 100 W

AHNA Dimensions and Weight

Property	Value	Dimensions orientation
Height	Core RRH: 336.5 mm (13.25 in.) With upper and lower mounting brackets 427.5 mm (16.83 in.)	
Depth	Core RRH: 140 mm (5.51 in.) With mounting brackets: 164 mm (6.46 in.)	height depth width
	With cover and mounting brackets: 183.5 mm (7.22 in.)	
Width	Core RRH: 306 mm (12.05 in.) With cover: 324 mm (12.76 in.)	
Weight	Core RRH: 15.5 kg (34.17 lbs) Core with brackets and cover: 17.7 kg (39.02 lbs)	
Volume	Core RRH: 14.4 I	





1.3.1 Test Requirements

47 CFR FCC Sections	Description of Tests	Test Required
2.1046	RF Power Output	Yes
2.1047	Modulation Characteristics	Yes
2.1049	(a) Occupied Bandwidth(b) Out-of-Band Emissions	Yes
2.1051	Spurious Emissions at Antenna Terminals	Yes
2.1053	Field Strength of Spurious Radiation	Yes
2.1055	Measurement of Frequency Stability	Yes

Each required measurement is listed below:

1.4 Reference Documents, Test Specifications & Procedures

A list of the applicable documents is provided herein.

1.4.1 Test Specifications

- Title 47 Code of Federal Regulations, Federal Communications Commission Part 2.
- Title 47 Code of Federal Regulations 47, Federal Communications Commission Part 27.

1.4.2 Procedures

- 1. FCC-IC-0B and FCC-IC-SE
- 2. C63.26 American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
- ANSI C63.4 (2014) entitled: "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz", American National Standards Institute, Institute of Electrical and Electronic Engineers, Inc., New York, NY 10017-2394, USA.
- 4. KDB 971168 D01 Power Measurement License Digital Systems v03r01 April 9, 2018. KDB 662911 D01 Multiple Transmitter Output v02r01 Oct 2013

1.4.3 MEASUREMENT UNCERTAINTY

The results of the calculations to estimate uncertainties for the several test methods and standards are shown in the Table below. These are the worst-case values.

	Standard, Method or Procedure	Condition	Frequency MHz	Expanded Uncertainty (k=2)
a.	Classical Emissions, (<i>e.g.</i> , ANSI C63.4, CISPR 11, 14, 22, <i>etc.</i> , using ESHS 30,	Conducted Emissions	0.009 - 30	±3.5 dB
		Radiated Emissions	30 MHz – 200MHz H	±5.1 dB
		(AR-6 Semi-Anechoic	30 MHz – 200 MHz V	±5.1 dB
		Chamber)	200 MHz – 1000 MHz H	±4.7 dB
			200 MHz – 1000 MHz V	±4.7 dB
			1 GHz - 18 GHz	±3.3 dB

Worst-Case Estimated Measurement Uncertainties

Antenna Port Test	Signal Bandwidth	Frequency Range	Expanded Uncertainty (k=2), Amplitude
Occurried Bondwidth Edge of Bond	10 Hz	9 kHz to 20 MHz	
Conducted Spurious Emissions	100 Hz 10 kHz to 1 MHz	1 GHz to 10 GHz	1.78 dB
	1MHz	10 GHz to 40 GHz:	
RF Power	10 Hz to 20 MHz	50 MHz to 18 GHz	0.5 dB

1.5 Executive Summary

Requirement	Description	Result
47 CFR FCC Parts 2 and 27		
2.1046	RF Power Output	COMPLIES
	Peak to Average Power Ratio	COMPLIES
2.1047	Modulation Characteristics	COMPLIES
2.1049	Occupied Bandwidth	COMPLIES
	(a) Emissions Signal Bandwidth	
	(b) Occupied Bandwidth/ Edge of	
	Band Emissions	
2.1051	Spurious Emissions at Antenna Terminals	COMPLIES
2.1053	Field Strength of Spurious Radiation	COMPLIES
2.1055	Measurement of Frequency Stability	COMPLIES

- 1. **COMPLIES -** Passed all applicable tests.
- 2. N/A Not Applicable.
- 3. NT Not Tested.

1.6 Test Configuration for all Antenna Port Measurements



2. FCC Section 2.1046 - RF Power Output

2.1 RF Power Output

This test is a measurement of the total RF power level transmitted at the antenna-transmitting terminal (J4), as shown in the accompanying test set-up diagram.

Power measurements were made with a broadband Power Meter in the average mode. Before the testing was started, the Base Station was given a sufficient "warm-up" period as required.

NOTE: Only a sample of all the data taken has been used in this report. The full suite of raw data resides at the MH, New Jersey location.

2.1.1 Single Carrier (5 MHz Bandwidth)

um Analyzer - Channel Po 11:27:08 AM Dec 04, 2018 Radio Std: None SENSE:INT Center Freq: 2.352500000 GHz Trig: Free Run Avg|Hol #Atten: 6 dB Ext Gair Frequency Center Freq 2.352500000 GHz Avg|Hold:>101/101 Ext Gain: -51.40 dB #IFGain:Low Radio Device: BTS 2.3529605 GHz 30.606 dBm Mkr1 Ref 45.00 dBm 10 dB/div **Center Freq** 2.352500000 GHz Center 2.353 GHz #Res BW 100 kHz Span 7.5 MHz Sweep 1.011 ms CF Step 750.000 kHz #VBW 3 MHz Auto Mar Channel Power **Power Spectral Density** Freq Offset 45.89 dBm / 5 MHz 38.90 dBm /MHz 0 H G 🗼 File < PSD_TM3_2_1C_5MBW_2352_TX1.state > saved

Channel Power, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.2, 2352.5 MHz

2.1.2 Single Carrier (10 MHz Bandwidth)

Channel Power, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 10 MBW, TM3.2, 2355 MHz

Keysight Spec	trum Analyzer	- Channe	el Power											- • •
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2.2 Peak-to-Average Power Ratio (PAPR) 47CFR 27.50

This measurement of the Peak-to-Average Power Ratio (PAPR) was performed using the Complementary Cumulative Distribution Function (CCDF) feature of a Keysight MXA Signal Analyzer. All the measured values were below the required 13dB limit at the required 0.1 percent of the time.

NOTE: Only a sample of all the data taken has been used in this report. The full suite of raw data resides at the MH, New Jersey location.

2.2.1 Single Carrier (5 MHz Bandwidth)

PAR, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.2, 2355 MHz



2.2.2 Single Carrier (10 MHz Bandwidth)

PAR, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 10 MBW, TM3.2, 2355 MHz



3. FCC Section 2.1047 - Modulation Characteristics

3.1 Modulation Characteristics

The RF signal at the antenna port was demodulated and verified for correctness of the modulation signal used before each test was performed. For these products the operation with 256QAM modulation was evaluated and verified.

NOTE: Only a sample of all the data taken has been used in this report. The full suite of raw data resides at the MH, New Jersey location.

3.1.1 Single Carrier (5 MHz Bandwidth)

AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.2, 2352.5 MHz



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Keysight LTE &	LTE-A FDD - Modulation Anal	/sis				
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Carrier Re	f Freg 2.3525000	00 GHz	Carrier Re	f Freq: 2.352500000 GHz	TRACE 12	3456 Frequency
		l	Frig: Free	Run	Direction: Down	link
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3.1.2 Single Carrier (10 MHz Bandwidth)

AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 10 MBW, TM3.2, 2355 MHz

wysight LTE & LTE-A FDD - Modulation Analysis			
22 RF 50 Ω AC C Carrier Ref Freq 2.355000000 GHz	SENSE:INT Carrier Ref Freq: 2.355000000 GHz Trig: Free Run Atten: 14 dB (Elec 0)	07:41:32 AM Dec 04, 2018 TRACE 12:34:5 6 Direction: Downlink Num CC(s): 1	Frequency
Layer0 OFDM Meas (CC0)			
400 m/div Ref 0			
1.0 1.2			
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-800m -1.2	• • • • •		
-1.6		7 3394	
Res BW 15 kHz		TimeLen 42 Sym	
Ch1 Spectrum (CC0)			
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-105			2.355000000 GHz
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Center 2.355 GHz Res BW 1.27312 kHz		Span 25.0000762939 MHz TimeLen 3.000023 ms	
MSG		STATUS	



	View			
Keysight LTE &	LTE-A FDD - Modulation Analysis			- 6
arrier Re	RF 50 Ω AC f Freq 2.355000000 GF	SENSE:INT Carrier Ref Freq: 2.355000000 GHz Trig: Free Run #Atten: 12 dB	11:23:10 AM Jan 16, 2019 TRACE 12 3 4 5 6 Direction: Downlink Num CC(s): 1	Frequenc
iyer0 OFDN	Meas (CC0)			
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4. FCC Section 2.1049 – Occupied Bandwidth

4.1 Occupied Bandwidth

In 47CFR 2.1049 the FCC requires:

"The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable."

This measurement is performed using either the 99% Occupied Bandwidth or the 26 dB Bandwidth method. For this product both measurements were recorded, but the 99% measurement results were used to determine the Emissions Designator.

During these measurements it is customary to evaluate the Edge of Band emissions at block/band edges.

The transmitted signal occupied bandwidth and 26dB bandwidth were measured using a Keysight MXA Signal Analyzer. All emissions were within the test parameters. Sample Charts are below.

NOTE: Only a sample of all the data taken has been used in this report. The full suite of raw data resides at the MH, New Jersey location.

Channel Frequency MHz	Signal BW MHz	Modulation	OBW MHz
2352.5	5	QPSK/16QAM	4.4847
2352.5	5	64QAM	4.4986
2352.5	5	256QAM	4.5063
2357.5	5	QPSK/16QAM	4.4874
2357.5	5	64QAM	4.4942
2357.5	5	256QAM	4.5038
2355.0	10	QPSK/16QAM	8.9289
2355.0	10	64QAM	8.9298
2355.0	10	256QAM	8.9279

Tabular Data – O	ccupied Bandwidth
------------------	-------------------

Tabular Data – 26dB Bandwidth

Channel Frequency MHz	Signal BW MHz	Modulation	26dB BW MHz
2352.5	5	QPSK/16QAM	4.773
2352.5	5	64QAM	4.790
2352.5	5	256QAM	4.775
2357.5	5	QPSK/16QAM	4.768
2357.5	5	64QAM	4.803
2357.5	5	256QAM	4.775
2355.0	10	QPSK/16QAM	9.292
2355.0	10	64QAM	9.315
2355.0	10	256QAM	9.295

4.1.1 Single Carrier (5 MHz Bandwidth)

26dB and 99%, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.2, 2352.5 MHz



26dB and 99%, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.1A, 2352.5 MHz



26dB and 99%, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.1, 2352.5 MHz







26dB and 99%, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.1, 2357.5 MHz



26dB and 99%, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.1A, 2357.5 MHz



4.1.2 Single Carrier (10 MHz Bandwidth)

26dB and 99%, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 10 MBW, TM3.2, 2355 MHz



26dB and 99%, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 10 MBW, TM3.1A, 2355 MHz





26dB and 99%, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 10 MBW, TM3.1, 2355 MHz

4.2 Occupied Bandwidth/ Edge of band Emissions

The Occupied Bandwidth / Edge of band emissions of the EUT at the external antenna connector (EAC) were measured using an Agilent MXA Spectrum Analyzer. The RF power level was continuously measured using a RF broadband power meter. The RF output from the EAC port to spectrum analyzer was reduced (to an amplitude usable by the spectrum analyzer) by using a calibrated attenuator and test coupler. The path attenuation was offset on the display and the signal for single carrier was adjusted to the corrected RF power level for the resolution bandwidth used for the transmit signal. All mask values were adjusted based upon the designated signal bandwidth and measurement bandwidths. The Top of Mask corresponds to the set rated power level as confirmed by the RF power meter. The Power reference line corresponds to the rated power adjusted for a resolution bandwidth of 3 MHz. This allows confirmation that the measured trace is properly calibrated to the mask.

The Block edge requirements as specified in 47CFR 27.53 were followed.

NOTE: Only a sample of all the data taken has been used in this report. The full suite of raw data resides at the MH, New Jersey location.

4.2.1 Single Carrier (5 MHz Bandwidth)

Band Edge, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.2, 2352.5 MHz

Keysight Spectru	m Analyzer - Spectrur	m Emission Mask							
<mark>LXI</mark>	RF 50 Ω A	C		SENSE:INT			11:25	:39 AM Dec 04, 2018	Fraguanay
Center Free	q 2.3525000	00 GHz	Cei	nter Freq: 2.	352500000 GH	lz	Radio	Std: None	Frequency
DAGG			Tri	g: Free Run	Avg:	100.00% of 2	25		
TASS		IFGain:Lo	w #A1	ten: 6 dB	Ext G	ain: -51.40 c	IB Radio	Device: BTS	
10 dB/div	Ref 39.0 dE	sm							
Log								Relative Limb	
29.0			M	description and	and the second s				Center Freq
19.0									2 352500000 GHz
9.00			i						
-1.00									
44.0									
-11.0									
-21.0									
31.0								Absolute Limit	
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-51.0									
51.0									
Contor 2.25	2 04-2						- Cn	on 25.4 MHz	
Genter 2.55	5 GHZ						əh	an 23.1 minz	CF Step
									2.510000 MHz
Total Power	Pof 46.0	5 dBm / 51	MHz						Auto Man
Total Fower	40.05	5 dbiii/ 51	VILIZ						
Start From	Stop Frog	Integ BW	dDm	Lower	<	Peak ->	Upper		Frea Offset
Start Fleq	Stop Fleg	integ bw	abiii	ALIM(OD)	rieq (nz)	abiii	Acim(ub)	neq (nz)	0 47
2.550 MHz	3.550 MHz	100.0 kHz	-28.91	(-9.89)	-2.550 M	-32.35	(-13.33)	2.550 M 📤	0 H2
3.550 MHz	7.550 MHz	100.0 kHz	-35.43	(-6.41)	-3.625 M	-36.34	(-7.32)	3.713 M	
7.550 MHz	12.55 MHz	100.0 kHz	-41.64	(-12.62)	-7.887 M	-39.29	(-10.27)	7.737 M 🗉	
4.000 MHz	8.000 MHz	1.000 MHz		()			()		
8.000 MHz	12.50 MHz	1.000 MHz		()			()		
12 50 MHz	15.00 MHz	1 000 MHz		()			()		
12.50 MHz	15.00 MHz	1.000 MHz		()			()		
	13.00 Winz					er	ATUS		
Mag						51	4105		

4.2.2 Single Carrier (10 MHz Bandwidth)

Band Edge, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 10 MBW, TM3.2, 2355 MHz

Keysight Spectrum	m Analyzer - Spectrur	n Emission Mask							
LXI	RF 50 Ω A	С		SENSE:INT	1		07:40	:22 AM Dec 04, 2018	Frequency
Center Free	2.3550000	00 GHz	C	enter Freq: 2.	355000000 GI	100 00% -f	Radio	Std: None	riequency
PASS		IEGain:		Atten: 6 dB	Avg: Ext G	ain: -51.40 c	B Radio	Device: BTS	
		IF Galli.	LOW #	tach. o ab	Exto	Julii: 01.400		Defice. D TO	
10 dB/div	Ref 39.0 dB	m							
Log								Relative Limit	
29.0			Mary Mary	where way and where	America Marina				Center Freq
19.0					<u> </u>				2.355000000 GHz
0.00									
9.00									
-1.00									
-11.0									
24.0]						
-21.0								Absolute Limit	
-31.0									
-41.0						and a start		Spectrum	
								تتفقد فينابل كك	
-51.0									
Contor 2.25	5 CH-							on 20.4 MHz	
Genter 2.55	J GHZ						əh	an su. i winz	CF Step
									3.010000 MHz
Total Power	Ref 45.63	3 dBm / 1	0 MHz						<u>Auto</u> Man
				Lower		- Peak ->	Upper		
Start Freq	Stop Freq	Integ BW	dBm	∆Lim(dB)	Freq (Hz)	dBm	∆Lim(dB)	Freq (Hz)	Freq Offset
5.050 MHz	6.050 MHz	100.0 kHz	-34.00	(-14.98)	-5.050 M	-34.60	(-15.58)	5.177 M 🔶	0 Hz
6 050 MHz	10.05 MHz	100 0 kHz	-38.00	(-8.98)	-6 320 M	-36 53	(-7.51)	6 050 M	
10.05 MHz	15.05 MHz	100.0 kHz	-41.88	(-12.86)	-11 07 M	-41 71	(-12.69)	11 20 M ≡	
4 000 MHz	8 000 MHz	1 000 MHz	11.00	(-12.00)	11.07 1		()		
8 000 MHz	12 50 MHz	1 000 MHz		()			()		
12 50 MHz	15.00 MHz	1 000 MHz		()			()		
12.50 MHz	15.00 MHz	1.000 MHz		()			()		
MSG	13.00 WH 2	1.000 WITZ		()		61	TATUS		
						5			

5. FCC Section 2.1051 - Spurious Emissions at Transmit Antenna Port

5.1 Measurement of Spurious Emissions at Transmit Antenna Port

Spurious Emissions at the transmit-antenna terminals were investigated over the frequency range of 10 MHz to the 10th harmonic of the specific transmit band. Depending on the specific band of operation, the measurements were performed up to 27GHz. Measurements were made either by using a Rohde & Schwarz ESIB40 / ESU40 (9 kHz to 40 GHz) EMI Test receiver or a Keysight MXA Signal Analyzer. The RF output from the transmitter was reduced (to an amplitude usable by the receivers) using calibrated attenuators. The RF power level was continuously monitored via a coupled RF Power Meter.

The required emission limitation is specified as appropriate in 27.53. The measured spurious emission levels were plotted for the frequency range as specified in 2.1057. Data below documents performance up to 10 GHz. NOTE: Only a sample of all the data taken has been used in this report. The full suite of raw data resides at the MH, New Jersey location.

5.1.1 Single Carrier (5 MHz Bandwidth)

Spurious Emissions, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.2, 2260 - 2285 MHz

🔤 Keysight Sp	ectrum Analyzer	- Spurious Emissions								
Center F	req 2.355	50 Ω AC 5000000 GHz	Center Fr	(SE:INT) eq: 2.35500	0000 GHz	50/50	Radio Std	M Dec 04, 2018 : None	Ra	nge Table
PASS		IFGair	:Low #Atten: 6	dB	Ext Gain:	-16.32 dB	Radio Dev	ice: BTS		Range
10 dB/div	Ref 0.	.00 dBm					2.27 -66.6	'34 GHz 15 dBm	<u>On</u>	1 Off
-10.0 -20.0 -30.0									2.26	Start Freq 0000000 GHz
-40.0 -50.0 -60.0				1					2.28	Stop Freq 5000000 GHz
-70.0									Auto	Res BW 1.0000 MHz <u>Man</u>
Start 2.2	6 GHz		A see as lifes of a		1 500 14		Stop 2	2.285 GHz	Auto	Video BW 3.0000 MHz <u>Man</u>
Spur	Range	Frequency	Amplitude		Limit		Limit			
	1	2.273 GHz	-66.62 dBm	-	51.00 dBr	n -1:	5.62 dB	Ê	F	ilter Type
	1	2.209 GHZ	-00.70 dBm	-	51.00 dBr	n -1: n 1	5.02 dB			Gaussian
3	1	2.265 GHZ	-00.03 dBill		51.00 dBr	n -1	5.01 dB	=		
5	1	2.203 GHZ	-66 93 dBm		51.00 dBr 51.00 dBr	n -14	5 03 dB			
6	1	2.210 GHz	-66 97 dBm		51.00 dBr	n -1	5 97 dB			More
7	1	2.262 GHz	-66.97 dBm	_	51.00 dBr	n -1	5.97 dB	-		1 of 3
мsg 🍑 File	<spurious_1< td=""><td>TM3_2_1C_5MBW</td><td>/_2352_TX1_2260_</td><td>to_2285.st</td><td>ate> saved</td><td>STATU</td><td>5</td><td></td><td></td><td></td></spurious_1<>	TM3_2_1C_5MBW	/_2352_TX1_2260_	to_2285.st	ate> saved	STATU	5			

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 5 MBW, TM3.2, 2285 – 2287.5 MHz

🔤 Keysight Sp	ectrum Analyzer	- Spurious Emissions								_	
Center F	req 2.35	50 Ω AC 5000000 GHz	z	Center Fr	(SE:INT) eq: 2.35500	00000 GHz	50/50	Radio Std	M Dec 04, 2018 : None	Ra	nge Table
PASS		IFGa	in:Low	#Atten: 6	dB	Ext Gain:	-16.32 dB	Radio Dev	vice: BTS		Range
10 dB/div	Ref 0	.00 dBm						2.28 -66.3	356 GHz 91 dBm	<u>On</u>	1 Off
-10.0 -20.0 -30.0										2.28	Start Freq 5000000 GHz
-40.0 -50.0 -60.0		1								2.28	Stop Freq 7500000 GHz
-70.0 -80.0 -90.0	i mana sanga menja Mana aya									Auto	Res BW 1.0000 MHz <u>Man</u>
Start 2.2	85 GHz							Stop 2	2.288 GHz	Auto	Video BW 3.0000 MHz <u>Man</u>
Spur	Range	Frequency	Am	plitude		Limit					
	1	2.280 GHZ	-00-	39 aBm 51 dBm		40.00 dBi	n -2 n -2	0.39 dB	<u> </u>	F	ilter Type
3	1	2.287 GHz	-66.	72 dBm		46.00 dBr	n -2 n -2	0.72 dB	=		Gaussian
4	1	2.286 GHz	-66.	78 dBm		46.00 dBr	n -2	0.78 dB			
5	1	2.287 GHz	-66.	95 dBm		46.00 dBr	n -2	0.95 dB			More
6	1	2.287 GHz	-67.	01 dBm		46.00 dBr	n -2	1.01 dB			1 of 3
7	1	2.286 GHz	-67.	02 dBm		46.00 dBr	n -2	1.02 dB	-		
мsg 🕕 File	<spurious_< td=""><td>TM3_2_1C_5MB</td><td>W_2352_T</td><td>X1_2285</td><td>to_2287.s</td><td>tate> saved</td><td>STATU</td><td>s</td><td></td><td></td><td></td></spurious_<>	TM3_2_1C_5MB	W_2352_T	X1_2285	to_2287.s	tate> saved	STATU	s			
Concession in the local division of the loca								-		_	

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 5 MBW, TM3.2, 2287.5 – 2300 MHz

🔤 Keysight Sp	ectrum Analyzer	- Spurious Emissions							
Center E	RF 5		SEI Center F	NSE:INT reg: 2.355000000 (GHz	11:14:16 A Radio Std	MDec 04, 2018	Rar	nge Table
PASS	169 2.335	IFGai	n:Low #Atten: 6	eRun Avg dB Ext	Hold: 50/50 Gain: -16.32 dB	B Radio Dev	ice: BTS		Range
10 dB/div	Ref 0.	.00 dBm				2.29 -66.6	52 GHz 07 dBm	<u>On</u>	1 Off
-10.0 -20.0 -30.0								2.287	Start Freq 7500000 GHz
-40.0 -50.0 -60.0								2.300	Stop Freq
-70.0							ng tang tang tang tang tang tang tang ta	Auto	Res BW 1.0000 MHz <u>Man</u>
Start 2.2	88 GHz		A constitution of a			Stop	2.3 GHz	Auto	Video BW 3.0000 MHz <u>Man</u>
Spur	Range	Frequency	Amplitude	LI	mit				
1 2 2	1	2.295 GHz 2.297 GHz	-66.61 dBm -66.63 dBm	-46.00 -46.00) dBm) dBm	-20.61 dB -20.63 dB		F	ilter Type Gaussian
3	1	2.298 GHZ	-00.08 dBm	-40.0) dBm	-20.08 0B			
5	1	2.294 GHZ	-66 81 dBm	-46.0) dBm	-20.79 dB			
6	1	2.298 GHz	-66.87 dBm	-46.0) dBm	-20.87 dB			More
7	1	2.299 GHz	-66.90 dBm	-46.0) dBm	-20.90 dB	-		1 of 3
MSG 🕕 File	<spurious t<="" td=""><td>FM3 2 1C 5MBV</td><td>V 2352 TX1 2287</td><td>to 2300.state>s</td><td>aved STA</td><td>TUS</td><td></td><td></td><td></td></spurious>	FM3 2 1C 5MBV	V 2352 TX1 2287	to 2300.state>s	aved STA	TUS			

Spurious Emissions, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.2, 2300 – 2305 MHz



Spurious Emissions, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.2, 2305 – 2320 MHz

🔤 Key	/sight Spect	rum Analyzer	- Spurious Emissions									
(<mark>)/</mark> Cen	ter Fre	RF 20.2.35	50 Ω AC	7	SE Center F	NSE:INT reg: 2.35500	0000 GHz		11:14:08 A Radio Std	M Dec 04, 2018 : None	Rar	nge Table
PAS	S	7q 2100		- ind out	Trig: Fre	e Run dB	Avg Hold	: 50/50 -16 32 dB	Radio Dev	rice: BTS		Pange
			IFG	ann.Low	witten. o		Extoun	10.02 0.0	2 34			1
10 de		Pof ()	00 dBm						-66.3	30 dBm	<u>On</u>	Off
Log	57019		.oo abiii									
-10.0												Start Freq
-20.0											2.30	5000000 GHz
-30.0												
-40.0												Stop Freq
-50.0				. 1							2.320	0000000 GHz
-60.0				•• ' -								
-70.0	alle in filmine of	and the series of	en de la company de la comp	a da stana da stille a de sera	indian da na ser an	ay di Langan in ciji	iyaan Kunandiri.	an yang sing di karantan	ang baya pangkang ang ang ang ang ang ang ang ang ang	artagilaria tapagén di Angena		Res BW
-80.0												1.0000 MHz
-90.0											Auto	<u>Man</u>
Star	t 2.30	5 GHz							Stop	2.32 GHz		
									- Hore			3 0000 MHz
s	pur	Range	Frequency	An	nplitude		Limit	Δ	Limit		Auto	Man
		1	2.311 GHz	-66	.33 dBm	_	19.00 dBi	m -4	7.33 dB	*		
2		1	2.307 GHz	-66	.86 dBm	_	19.00 dBi	m -4	7.86 dB		F	ilter Type
3		1	2.308 GHz	-66	.86 dBm	-	19.00 dBr	m -47	7.86 dB	=		Gaussian
4		1	2.308 GHz	-66	.88 dBm	-	19.00 dBi	m -47	7.88 dB			
5		1	2.317 GHz	-66	.89 dBm	-	19.00 dBi	m -47	7.89 dB			More
6		1	2.307 GHz	-66	.93 dBm	-	19.00 dBr	m -47	7.93 dB			1 of 3
7		1	2.308 GHz	-66	.96 dBm	-	19.00 dBi	n -47	7.96 dB	-		
MSG) Eilo <9	Pourious	TM2 2 10 5ME	W 2252 -	TV1 2205	to 2220 ct	ato> cayod	STATIS				
WISG Q	Prile <	spunous_	1013_2_10_5101E	ww_2352_	1 1_2305_	_t0_2320.st	ate > saved	STATUS				

Spurious Emissions, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.2, 2320 – 2345 MHz



Spurious Emissions, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.2, 2345 – 2360 MHz



TX Exempt

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 5 MBW, TM3.2, 2360 – 2362.5 MHz

🔤 Keysight Spectru	um Analyzer - Sp	ourious Emissions									
Center Fre	RF 50 Ω q 2.3550	2 AC 00000 GH	7	Center Fr	vse:INT eq: 2.355000	0000 GHz	. 50/50	11:14:22 A Radio Std	MDec 04, 2018 : None	Rar	nge Table
PASS		IFGa	ain:Low	#Atten: 6	dB	Ext Gain:	-19.17 dB	Radio Dev	vice: BTS		Range
10 dB/div	Ref 0.00) dBm						2.36 -54.3	615 GHz 47 dBm	<u>On</u>	1 Off
-10.0 -20.0 -30.0										2.360	Start Freq 0000000 GHz
-40.0		tenten men jaken berefe	aya dara sa		n, ang taong taoning taoning taoning taoning taon	<mark>∳1</mark> ₩Photoselantion		artical Constants	and the first section of the	2.362	Stop Freq 2500000 GHz
-70.0 -80.0 -90.0										Auto	Res BW 1.0000 MHz <u>Man</u>
Start 2.36 C	GHz							Stop 2	.363 GHz	Auto	Video BW 3.0000 MHz Man
Spur F	Range	Frequency	Am	plitude		Limit	4	Limit			
	1 2	2.362 GHz	-54.	35 dBm	-	19.00 dBi	m -3	5.35 dB	Â	F	ilter Type
	1 4	2.302 GHZ	-04.	39 dBm	-1	19.00 dBi	m -3: m -34	5.43 dB			Gaussian
4	1	2.362 GHz	-54	46 dBm		19.00 dB	m _3	5.46 dB			
5	1 _	2.361 GHz	-54	51 dBm	-	19.00 dB	m <u>-3</u>	5.51 dB			Mara
6	1 2	2.362 GHz	-54	53 dBm	-	19.00 dBi	m -3	5.53 dB			1 of 3
7	1 2	2.362 GHz	-54	66 dBm	-1	19.00 dBi	m -3	5.66 dB	*		1013
мsg 🗼 File <s< td=""><td>purious_TM</td><td>3_2_1C_5ME</td><td>3W_2352_T</td><td>X1_2360_</td><td>to_2362.sta</td><td>ate> saved</td><td>STATUS</td><td>3</td><td></td><td></td><td></td></s<>	purious_TM	3_2_1C_5ME	3W_2352_T	X1_2360_	to_2362.sta	ate> saved	STATUS	3			

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 5 MBW, TM3.2, 2362.5 – 2365 MHz

	Spectrum Analyzer	- Spurious Emissions								
Center	Freg 2.35	50 Ω AC 5000000 GH:	z Center	SENSE:INT Freq: 2.35500	0000 GHz		11:14:24 A Radio Std	MDec 04, 2018 None	Rar	nge Table
PASS		IFGa	ain:Low #Atten	ree Run : 6 dB	Avg Hold: Ext Gain:	: 50/50 -19.17 dB	Radio Dev	ice: BTS		Range
10 dB/di	Ref 0	.00 dBm					2.36 -59.5	26 GHz 35 dBm	<u>On</u>	1 Off
-10.0 -20.0 -30.0									2.362	Start Freq 2500000 GHz
-40.0 -50.0 -60.0		Y - Protection of the American Strategy of	۲	land at wine of the second	velanov pis under prografije	are, skile agensy		/ 4. stillings of Alley Stations of Alley	2.36	Stop Freq 5000000 GHz
-70.0 -80.0 -90.0									Auto	Res BW 1.0000 MHz <u>Man</u>
Start 2	.363 GHz						Stop 2	.365 GHz	Auto	Video BW 3.0000 MHz Map
Spu	Range	Frequency	Amplitud	e	Limit	Δ	Limit		Auto	Interi
1 2	1 1	2.363 GHz 2.363 GHz	-59.53 dBi -59.54 dBi	n - n -	31.00 dBr 31.00 dBr	n -28 n -28	.53 dB .54 dB	Â	F	ilter Type
3	1	2.363 GHz	-59.62 dB	n -	31.00 dBr	n -28	.62 dB	=		Gaussian
4	1	2.363 GHz	-59.69 dBi	n -	31.00 dBr	n -28	.69 dB			
5	1	2.363 GHz	-59.75 dBi	n -	31.00 dBr	n -28	.75 dB			More
6	1	2.363 GHz	-59.80 dBi	n -	31.00 dBr	n -28	8.80 dB			1 of 3
7	1	2.363 GHz	-59.81 dBi	n -	31.00 dBr	n -28	.81 dB	*		
мsg 🗼 Fi	le <spurious_1< td=""><td>TM3_2_1C_5ME</td><td>W_2352_TX1_236</td><td>2_to_2365.st</td><td>ate> saved</td><td>STATUS</td><td></td><td></td><td></td><td></td></spurious_1<>	TM3_2_1C_5ME	W_2352_TX1_236	2_to_2365.st	ate> saved	STATUS				

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 5 MBW, TM3.2, 2365 – 2367.5 MHz



Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 5 MBW, TM3.2, 2367.5 – 2370 MHz

🔤 Keysight Sp	ectrum Analyzer	- Spurious Emissions							
LXI	RF 5	50 Ω AC	SEN	NSE:INT		11:16:11 A	1 Dec 04, 2018	Ran	ge Table
Center F	req 2.35	5000000 GHZ	Trig: Free	eq: 2.355000000 GH2 eRun Avg Hold	I: 50/50	Radio Stu.	None		-
PASS		IFGain:	Low #Atten: 6	#Atten: 6 dB Ext Gain: -19.17 dB			ice: BTS		Range
						2.36	77 GHz	_	1
	Pof ()	00 dBm				-63.1	14 dBm	<u>on</u>	Οm
Log									
-10.0									Start Freq
-20.0								2.367	500000 GHz
-30.0									
-40.0									
70.0									Stop Freq
-30.0	1							2.370	000000 GHz
-60.0		an and an	and an adverse of the second			de trais datas da la	adultation allowed areas		
-70.0									Des BW
-80.0									1.0000 MHz
-90.0								Auto	Man
Start 2.3	68 GHz					Stop	2.37 GHz		Video BW
									3.0000 MHz
Spur	Range	Frequency	Amplitude	Limit	ΔΙ	imit		Auto	Man
1	1	2.368 GHz	-63.11 dBm	-51.00 dB	m -12. ⁻	11 dB	*		
2	1	2.368 GHz	-63.17 dBm	-51.00 dB	m -12. [•]	17 dB		Fi	lter Type
3	1	2.368 GHz	-63.27 dBm	-51.00 dB	m -12.	27 dB	=		Gaussian
4	1	2.368 GHz	-63.29 dBm	-51.00 dB	m -12.:	29 dB			
5	1	2.369 GHz	-63.35 dBm	-51.00 dB	m -12.	35 dB			Marri
6	1	2.368 GHz	-63.39 dBm	-51.00 dB	m -12.	39 dB			More
7	1	2.369 GHz	-63.39 dBm	-51.00 dB	m -12.	39 dB			1 of 3
							*		
MSG					STATUS				

Spurious Emissions, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.2, 2370– 2400 MHz



Spurious Emissions, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.2, 2400– 10000 MHz

🔤 Keysight Spectrum Analyzer - Spurious Emissions												
Cent	er Frea	50 g 2.3525	00000 GH	lz	Center F	NSE:INT req: 2.35250	0000 GHz		Radio Std	MDec 04, 2018 I: None	Ra	nge Table
PAS	S		IFC	Gain:Low	Trig: Fre #Atten: 0	e Run dB	Avg Hold: Ext Gain:	: 50/50 -53.50 dB	Radio De	vice: BTS		Range
10 dB	J/div	Ref 0.01	0 dBm						5.80 -31.8	018 GHz 25 dBm	<u>On</u>	ິ1 Off
-10.0 - -20.0 - -30.0 -					1						2.40	Start Freq 0000000 GHz
-40.0 - -50.0 - -60.0 -											10.00	Stop Freq 0000000 GHz
-70.0 - -80.0 - -90.0 -											Auto	Res BW 1.0000 MHz <u>Man</u>
Star	2.4 GHz	nde	Frequency		molitude		Limit		Sto	op 10 GHz	Auto	Video BW 3.0000 MHz <u>Man</u>
1 2 3 4	201 Ka 1 1 1	<u>iige</u>	5.802 GHz 5.402 GHz 5.868 GHz 5.291 GHz	-31 -31 -32 -32	1.83 dBm 1.95 dBm 2.16 dBm 2.18 dBm	-	19.00 dBr 19.00 dBr 19.00 dBr 19.00 dBr	n -1 n -1 n -1 n -1 n -1	2.83 dB 2.95 dB 3.16 dB 3 18 dB		F	Filter Type Gaussian
5 6 7	1 1 1		5.394 GHz 3.178 GHz 3.155 GHz	-32 -32 -32	2.25 dBm 2.25 dBm 2.26 dBm	- - -	19.00 dBr 19.00 dBr 19.00 dBr 19.00 dBr	n -1 n -1 n -1	3.25 dB 3.25 dB 3.26 dB	•		More 1 of 3
MSG								STATU	s			

Spurious Emissions, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.2, 10 GHz – 24 GHz



Spurious Emissions, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.2, 10 MHz – 1 GHz

🔤 Keysight Spectrum Analyzer - Spurious Emissions 📃											
(X) Contor F	RF 5		SEN Center Er	NSE:INT		11:19:47 / Radio Std	MDec 04, 2018	Ran	ge Table		
	req 2.552	2500000 GHZ	Trig: Free	Run Avg Hol	d: 50/50	rtaalo ota	. Hone				
PASS		IFGair	:Low #Atten: 0	dB Ext Gair	n: -49.10 dB	Radio Dev	vice: BTS		Range		
						796	.70 MHz	On	Off		
10 dB/div	Ref 0.	.00 dBm				-48.2	07 dBm	<u></u>			
Log 10.0											
-10.0									StartFreq		
-20.0								10.0	000000 MHz		
-30.0											
-40.0						↓ 1			Stop Freg		
-50.0						1		1.000	000000 GHz		
-60.0											
-70.0											
-80.0									100.00 kHz		
-90.0								Auto	Man		
Start 10	MHz					St	op 1 GHz		Video BW		
									1.0000 MHz		
Spur	Range	Frequency	Amplitude	Limit		∆ Limit		Auto	Man		
1	1	796.7 MHz	-48.21 dBm	-19.00 dE	3m -2	9.21 dB	*				
2	1	795.3 MHz	-48.21 dBm	-19.00 dE	3m -2	9.21 dB		Fi	Iter Type		
3	1	792.8 MHz	-48.30 dBm	-19.00 dE	3m -2	9.30 dB	=		Gaussian		
4	1	902.9 MHz	-48.32 dBm	-19.00 dE	3m -2	9.32 dB					
5	1	738.2 MHz	-48.34 dBm	-19.00 dE	3m -2	9.34 dB			More		
6	1	809.1 MHz	-48.39 dBm	-19.00 dE	3m -2	9.39 dB			1 of 3		
7	1	925.6 MHz	-48.40 dBm	-19.00 dE	3m -2	9.40 dB	*		1010		
MSG					STATU	IS					

Spurious Emissions, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 5 MBW, TM3.2, 1 GHz – 2.26 GHz



5.1.2 Single Carrier (10 MHz Bandwidth)

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 10 MBW, TM3.2, 10 MHz – 1 GHz

Center Fr PASS	req 2.355	ο Ω AC 6000000 GHz IFGain	Center Fr Center Fr Trig: Free :Low #Atten: 0	req: 2.355000000 GHz e Run Avg Hold dB Ext Gain:	: 50/50 -49.10 dB	08:16:41 A Radio Std Radio Dev	MDec 04, 2018 : None rice: BTS	Frequency			
10 dB/div	Ref 0.	00 dBm				945. -48.1	.85 MHz 01 dBm				
-10.0								Center Freq 2.355000000 GHz			
-30.0 -40.0							1				
-60.0											
-80.0 -90.0											
Start 10 I	ИНz					St	op 1 GHz	CF Step 1.500000 MHz			
Spur	Range	Frequency	Amplitude	Limit	Δ	Limit		Auto Man			
1	1	945.8 MHz	-48.10 dBm	-19.00 dB	m -29	.10 dB	^				
2	1	794.4 MHz	-48.11 dBm	-19.00 dB	m -29	.11 dB		FreqOffset			
3	1	935.6 MHz	-48.11 dBm	-19.00 dB	m -29	.11 dB	E	U HZ			
4	1	925.0 MHz	-48.12 dBm	-19.00 dB	m -29	.12 dB					
5	1	925.8 MHz	-48.12 dBm	-19.00 dB	m -29	.12 dB					
6	1	835.2 MHz	-48.12 dBm	-19.00 dB	m -29	.12 dB					
		919.5 MHZ	-48.13 dBm	-19.00 dB	-29	.15 GB	-				
MSG					STATUS						

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 10 MBW, TM3.2, 1 GHz – 2.26 GHz

🧧 Keysight Spectrum Analyzer - Spurious Emissions											
(X) Center	RF STOR 2 35		SEN Center Fr	reg: 2.355000000 GHz	08:17:4 Radio S	1 AM Dec 04, 2018 td: None	Range Tal	ble			
PASS	rieq 2.55.	3000000 GH2	Trig: Free	Run Avg Hold	: 50/50	audaau BTS		ango			
		IFGain	:Low #Atten: U	db Ext Gain:	-49.70 dB Radio L		R	ange 1			
					2.2	2522 GHZ	<u>On</u>	Off			
10 dB/div Loa	Ref 0	.00 dBm			-57.	365 UBII					
-10.0							Start	Freq			
-20.0							1.00000000	0 GHz			
-30.0						<mark>1\</mark>					
-40.0		and the second dependent and a first of the second	a a statistication in the second second state	na in farmely and a set of the farm state of the	۲۰۰ میلاده او میکوید او میکوید میکوید و میکوید او میکوید او میکوید او میکوید او میکوید و میکوید و میکوید و می			-			
-50.0							Stop	Freq			
-60.0							2.26000000	0 GHZ			
-70.0											
-80.0							Re 1 000	S BW			
-90.0							Auto	Man			
Start 1	GHz				Sto	p 2.26 GHz	Vide	o BW			
							3.000	0 MHz			
Spur	Range	Frequency	Amplitude	Limit	Δ Limit		Auto	<u>Ivian</u>			
1	1	2.252 GHz	-37.58 dBm	-19.00 dBr	m -18.58 dB	^					
2	1	2.163 GHz	-37.73 dBm	-19.00 dBr	m -18.73 dB		Filter T	ype			
3	1	2.170 GHz	-37.77 dBm	-19.00 dBr	m -18.77 dB	=	Gaus	sian			
4	1	2.161 GHz	-37.87 dBm	-19.00 dBr	m -18.87 dB						
5	1	2.156 GHz	-37.98 dBm	-19.00 dBr	m -18.98 dB			More			
6	1	2.241 GHz	-38.05 dBm	-19.00 dBr	m -19.05 dB			1 of 3			
7	1	2.121 GHz	-38.06 dBm	-19.00 dBr	m -19.06 dB	*					
MSG					STATUS						
mou					014105						

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 10 MBW, TM3.2, 2.26 GHz – 2.285 GHz

🔤 Keysight Spectrum Analyzer - Spurious Emissions 📃 🔂										
Center Fr	req 2.355	0 Ω AC 0000000 GHz	Center Fr	req: 2.355000000 GH: Run AvalH	z old: 50/50	08:27:13 A Radio Std	MDec 04, 2018 : None	Frequency		
PASS		IFGain:	Low #Atten: 6	dB Ext Ga	in: -16.32 dB	Radio Dev	rice: BTS			
10 dB/div	Ref 0.	00 dBm				2.26 -66.8	94 GHz 04 dBm			
-10.0								Center Fr 2.355000000 G	r eq SHz	
-30.0 -40.0 -50.0										
-60.0 -70.0		eren bestesd is endleren offense betwee	1	retniştiği yaratı Angoli Maşafi Maşafi ançışışıra kilan			a a da alla ser esta da alla da a			
-90.0										
Start 2.26	6 GHz					Stop 2	.285 GHz	CF St 1.500000 M	ep IHz	
Spur	Range	Frequency	Amplitude	Limi	t .	∆ Limit		Auto M	lan	
1	1	2.269 GHz	-66.80 dBm	-51.00 d	Bm -1	5.80 dB	^			
2	1	2.264 GHz	-66.97 dBm	-51.00 d	Bm -1	5.97 dB		Freq Offs	set	
3	1	2.284 GHz	-67.00 dBm	-51.00 d	Bm -1	6.00 dB	E	0	Hz	
4	1	2.265 GHz	-67.00 dBm	-51.00 d	Bm -1	6.00 dB				
5	1	2.266 GHz	-67.01 dBm	-51.00 d	Bm -1	6.01 dB				
6	1	2.283 GHz	-67.02 dBm	-51.00 d	Bm -1	6.02 dB				
7	1	2.275 GHz	-67.03 dBm	-51.00 d	Bm -1	6.03 dB	-			
мsg 🗼 File <	Spurious_T	M3_2_1C_10MBV	V_2355_TX1_2260	_to_2285.state> sa	ved STATI	JS				

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 10 MBW, TM3.2, 2.285 GHz – 2.2875 GHz

🔤 Keysight Spectrum Analyzer - Spurious Emissions										
L <mark>XI</mark>	RF	50 Ω AC	SE	NSE:INT	08	:27:10 AM Dec 04, 2018	Frequency			
Cente	er Freq 2.35	5000000 GHz	Center Fi	req: 2.355000000 GHz	Rad	dio Std: None	Frequency			
PASS		IECa	indow #Atten:6	dB ExtGain	:-16.32 dB Rad	lio Device: BTS				
	_	IFGa	III.LOW #/ttell.o	Ext out	. 10.02 0.0 110					
						2.2855 GHz				
10 dB/	div Ref 0	0.00 dBm			-	66.569 dBm				
Log										
-10.0							Center Freq			
-20.0							2.355000000 GHz			
-30.0										
40.0										
-40.0										
-50.0										
-60.0		 1								
-70 0 🗠	an a	anarticle restation in any sin		a de la secta de la compañía de la c	والمصافر بدارية والمراجع	i - haa dharift a in artsia ahii (ta)				
-80.0										
-90.0										
L										
Start	2.285 GHz				5	top 2.288 GHz	CF Step			
							1.500000 MHz			
Sp	ur Range	Frequency	Amplitude	Limit	ΔLin	nit	<u>Auto</u> Man			
1	1	2.285 GHz	-66.57 dBm	-46.00 dE	m -20.57	dB				
2	1	2 285 GHz	-66 67 dBm	-46 00 dB	m -20.67	dB	Freq Offset			
2	1	2 295 CHz	-66 99 dBm	-46 00 dB	m _20.99	dB	0 Hz			
		2.203 GHZ	-00.00 uBm	-40.00 dB	-20.00					
4	1	2.287 GHZ	-00.91 dBm	-40.00 dB	m -20.91	aB				
5	1	2.287 GHz	-66.91 dBm	-46.00 dB	m -20.91	aB				
6	1	2.286 GHz	-66.92 dBm	-46.00 dB	m -20.92	dB				
7	1	2.285 GHz	-66.94 dBm	-46.00 dB	m -20.94	dB 🗸				
мѕс 連	File <spurious_< td=""><td>TM3_2_1C_10M</td><td>BW_2355_TX1_2285</td><td>5_to_2287.state> save</td><td>d STATUS</td><td></td><td></td></spurious_<>	TM3_2_1C_10M	BW_2355_TX1_2285	5_to_2287.state> save	d STATUS					

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 10 MBW, TM3.2, 2.2875 GHz – 2.30 GHz

🔤 Keysight Spectrum Analyzer - Spurious Emissions											K
Center Fre	RF 5 eq 2.355	ο Ω AC 000000 GH	z	Center Fr Trig: Fre	NSE:INT req: 2.35500 e Run	0000 GHz Avg Hold	: 50/50	08:27:08 / Radio Std	M Dec 04, 2018 I: None	Frequency	
PASS		IFGa	ain:Low	#Atten: 6	dB	Ext Gain:	-16.32 dB	Radio De	vice: BTS		
10 dB/div	Ref 0.	00 dBm						2.28 -66.7	397 GHz 77 dBm		
-10.0										Center Free	a
-20.0										2.355000000 GH	Ч IZ
-30.0											
-40.0											
-50.0											
-60.0		↓ 1									
-70.0 m.//////			n de participant de la compañía	et interesting the	and a state of the	eliste frankrisk rekeletijen		ani jaadalaha Mahiraya	eneralije (neralisti stalja		
-80.0											
-90.0											
Start 2.29	0 0 4 7							Sto	n 2 2 CHz		
Start 2.26	o GHZ							SIU	р 2.3 GHZ	CF Step 1.500000 MH	p iz
Spur	Range	Frequency	Am	nplitude		Limit	L	Limit		<u>Auto</u> Mai	'n
1	1	2.290 GHz	-66.	.78 dBm	-	46.00 dBi	m -2	0.78 dB	<u>^</u>		
2	1	2.296 GHz	-67.	.03 dBm	-	46.00 dBi	m -2'	1.03 dB		Freq Offse	et
3	1	2.293 GHz	-67.	.09 dBm	-4	46.00 dBi	m -2'	1.09 dB	=	ОH	IZ
4	1	2.290 GHz	-67.	.10 dBm	-4	46.00 dBi	m -2'	1.10 dB			
5	1	2.288 GHz	-67.	12 dBm	-	46.00 dBi	m -2'	1.12 dB			
6	1	2.298 GHz	-67.	18 dBm	-4	46.00 dBi	m -2'	1.18 dB			
	1	2.291 GHZ	-07.	19 aBm	-	40.00 aBi	m -2	1.19 dB	*		
Msg JFile <spurious_tm3_2_1c_10mbw_2355_tx1_2287_to_2300.state> saved</spurious_tm3_2_1c_10mbw_2355_tx1_2287_to_2300.state>											

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 10 MBW, TM3.2, 2.30 GHz – 2.305 GHz

Keysight Spectrum Analyzer - Spurious Emissions									
Center F	RF 5	0 Ω AC	Center F	NSE:INT req: 2.355000000	GHz	08:27:06 A Radio Std	MDec 04, 2018 : None	Frequency	
PASS	CQ 21000	IEGair	Trig: Free #Atten: 6	eRun Av	/g Hold: 50/5	0 2 dB Radio Dev	vice: BTS		
			Low			2 30			
10 dB(div	Ref 0	00 dBm				-66.7	74 dBm		
Log									
-10.0								Center Freq	
-20.0								2.355000000 GHz	
-30.0									
-40.0									
-50.0									
-60.0		a tana a				` _			
-70.0				editer pil eta har harmadaetti					
-80.0									
-90.0									
Start 2.3	GHz					Stop 2	.305 GHz	CE Stop	
								1.500000 MHz	
Spur	Range	Frequency	Amplitude	L L	imit	Δ Limit		Auto Man	
1	1	2.304 GHz	-66.77 dBm	-19.0	00 dBm	-47.77 dB	<u>^</u>		
2	1	2.303 GHz	-66.79 dBm	-19.0	00 dBm	-47.79 dB		Freq Offset	
3	1	2.303 GHz	-66.82 dBm	-19.0	00 dBm	-47.82 dB	=	0 Hz	
4	1	2.303 GHz	-66.84 dBm	-19.0	00 dBm	-47.84 dB			
5	1	2.302 GHz	-66.88 dBm	-19.0	00 dBm	-47.88 dB			
6	1	2.302 GHz	-66.89 dBm	-19.0	00 dBm	-47.89 dB			
7	1	2.302 GHz	-67.00 dBm	-19.0	00 dBm	-48.00 dB	~		
мsg 🕕 File -	<spurious 1<="" td=""><td>FM3 2 1C 10MB</td><td>W 2355 TX1 230</td><td>0 to 2305.state</td><td>> saved</td><td>STATUS</td><td></td><td></td></spurious>	FM3 2 1C 10MB	W 2355 TX1 230	0 to 2305.state	> saved	STATUS			

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 10 MBW, TM3.2, 2.305 GHz – 2.320 GHz





Keysight Spectrum Analyzer - Spurious Emissions										
Center F	reg 2 355		Center Fr	ISE:INT eq: 2.355000000 GHz	08:27:02	AM Dec 04, 2018 d: None	Frequency			
PASS		IFGair	n:Low #Atten: 6	Run Avg Hold: dB Ext Gain:	50/50 -16.32 dB Radio De	vice: BTS				
					2.3	445 GHz				
10 dB/div	Ref -3	0.00 dBm			-58.0	27 aBm				
-40.0							Center Freq			
-50.0						1	2.355000000 GHz			
-60.0										
-70.0 ****** **	interipting benefiting a stage	terret at the particular terret define	a terdesia da	te est de la traductione de la state de la compactione de la		AND THE REAL PROPERTY OF				
-80.0										
-90.0										
-100										
-110										
-120										
Start 23	2 GH7				Ston	2 345 GHz				
Gtart 2.0					etop :		CF Step 1.500000 MHz			
Spur	Range	Frequency	Amplitude	Limit	Δ Limit		<u>Auto</u> Man			
1	1	2.345 GHz	-58.03 dBm	-51.00 dBr	n -7.027 dB	^				
2	1	2.345 GHz	-58.20 dBm	-51.00 dBr	n -7.196 dB		FreqOffset			
3	1	2.345 GHz	-58.39 dBm	-51.00 dBr	n -7.391 dB	=	0 Hz			
4	1	2.344 GHz	-58.49 dBm	-51.00 dBr	n -7.493 dB					
5	1	2.344 GHz	-58.57 dBm	-51.00 dBr	n -7.568 dB					
6	1	2.344 GHz	-58.60 dBm	-51.00 dBr	n -7.604 dB					
		2.343 GHZ	-38.00 dBm	-31.00 dBr	n -7.048 aB	-				
мsg 🗼 File	G UFile <spurious_tm3_2_1c_10mbw_2355_tx1_2320_to_2345.state> saved STATUS</spurious_tm3_2_1c_10mbw_2355_tx1_2320_to_2345.state>									

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 10 MBW, TM3.2, 2.345 GHz – 2.360 GHz



TX Exempt

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 10 MBW, TM3.2, 2.360 GHz – 2.362 GHz

🔤 Keysight Spectrum Analyzer - Spurious Emissions 📃												- ē 💌
<mark>IXI</mark> Cen	tor Er			7	SEI	NSE:INT reg: 2.35500	0000 GHz		08:27:15 A	M Dec 04, 2018	Fre	equency
PAS	S	eq 2.33		÷	Trig: Fre	e Run	Avg Hold	: 50/50	Radio Do	dee: BTS		
			IFG	ain:Low	#Attent 0	ub	Ext Gain.	-19.17 uB	Raulo Dev			
		B-60	00 JB						-19.5	26 dBm		
Log	3/div	Reru	.00 aBm						10.0			
-10.0	1—										с	enter Freq
-20.0	man	A									2.355	000000 GHz
-30.0		a more way	man									
-40.0			- monte	~~								
-50.0				a second second		an a	el la terrativitation de la companya de la company		V ^{ala} nt Matthewsie	and the second second		
-60.0										a los alternatives of the state		
-70.0												
-80.0												
-90 N												
00.0												
Star	t 2.36	GHz							Stop 2	2.363 GHz		CF Step
											1.	500000 MHz
S	pur	Range	Frequency	/ An	nplitude		Limit	Δ	Limit		<u>Auto</u>	Man
1		1	2.360 GHz	-19	.59 dBm	-	19.00 dBi	n -0.	586 dB	*		
2		1	2.360 GHz	-20	.35 dBm	-	19.00 dBr	m -1.	354 dB		F	req Offset
3		1	2.360 GHz	-20	.44 dBm	-	19.00 dBi	n -1.	443 dB	E		0 Hz
4		1	2.360 GHz	-20	.46 dBm	-	19.00 dBr	m -1.	461 dB			
5		1	2.360 GHz	-20	.53 dBm	-	19.00 dBr	n -1.	532 dB			
6		1	2.360 GHz	-20	.57 dBm	-	19.00 dBr	n -1.	567 dB			
7		1	2.360 GHz	-20	.71 dBm	-	19.00 dBi	m -1.	714 dB	~		
MSG 🤇	✓File <	Spurious_	TM3_2_1C_10N	1BW_2355	_TX1_2360)_to_2362.s	state> save	d STATUS	6			

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 10 MBW, TM3.2, 2.362 GHz – 2.365 GHz

Keysight Spectrum Analyzer - Spurious Emissions											
Cente	r Freq 2.3	50 Ω AC 855000000 GHz	Center Fr	NSE:INT req: 2.355000000 GHz e Run AvalHold	08:27:17 Radio St : 50/50	AM Dec 04, 2018 d: None	Frequency				
PASS		IFGa	in:Low #Atten: 6	dB Ext Gain:	-19.17 dB Radio De	evice: BTS					
10 dB/c	div Ref	f 0.00 dBm			2.3 -52.7	625 GHz 747 dBm					
-10.0							Center Freq				
-20.0							2.355000000 GHz				
-30.0											
-40.0											
500 1											
-60.0		والمحر والارد ويرغ والمناجع المراط المعالية	han territerise her nefeten store werdet in	n kan panakan kan pangkan pangkan pangkan ka	n en gegrangelen bjægt i gegete skonse bog der	de atheletin nyttere etc					
-70.0											
-80.0											
-90.0											
Start	2.363 GHz				Stop	2.365 GHz	CF Step				
							1.500000 MHz				
Spi	ur Rang	e Frequency	Amplitude	Limit	∆ Limit		<u>Auto</u> Man				
1	1	2.363 GHz	-52.75 dBm	-31.00 dB	m -21.75 dB	^	E				
2	1	2.363 GHz	-53.14 dBm	-31.00 dB	m -22.14 dB		FreqOffset				
3	1	2.363 GHz	-53.20 dBm	-31.00 dB	m -22.20 dB	E	0 H2				
4	1	2.363 GHz	-53.33 dBm	-31.00 dB	m -22.33 dB						
5	1	2.363 GHz	-53.52 dBm	-31.00 dB	m -22.52 dB						
6	1	2.363 GHz	-53.56 dBm	-31.00 dB	m -22.56 dB						
		2.303 GHZ	-53.62 dBm	-31.00 dB	-22.02 dB	*					
мѕд 🤳	а JFile <spurious_tm3_2_1c_10mbw_2355_tx1_2362_to_2365.state> saved sтатиs</spurious_tm3_2_1c_10mbw_2355_tx1_2362_to_2365.state>										

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 10 MBW, TM3.2, 2.365 GHz – 2.367 GHz

🔤 Keysight Spectrum Analyzer - Spurious Emissions											_	
	anter I	RF 5		,	SEI	NSE:INT reg: 2.35500	0000 GHz		08:27:19 A Radio Std	M Dec 04, 2018	F	requency
P/	ASS		IFGa	in:Low	Trig: Free #Atten: 6	e Run dB	Avg Hold Ext Gain:	: 50/50 -19.17 dB	Radio Dev	vice: BTS		
10	dBidiy	Ref û	00 dBm						2.36 -54.5	59 GHz 81 dBm		
Lc												
-10	1.0										0	Center Freq
-20	.0										2.35	5000000 GHz
-30	1.0											
-40	1.0			.1								
-50	1.0											
-60	I.O Marine	in an in the second			addar adaridadada	din panta hitu din	a fi stativi e ki la kana ki	direlated a prosperior	abethen texplan	hi kaling dipologika		
-70	1.0											
-80	i.o											
-90	1.0											
~									Stop 2	269 04-		
51	art z.J	05 GH2							Stop 2	308 GHZ		CF Step
	Spur	Range	Frequency	An	nplitude		Limit	Δ	Limit		<u>Auto</u>	Man
	1	1	2.366 GHz	-54	.58 dBm	-4	48.00 dBi	m -6.	581 dB	<u>^</u>		
	2	1	2.366 GHz	-54	.71 dBm	-4	48.00 dBi	m -6.	714 dB			Freq Offset
	3	1	2.366 GHz	-55	.12 dBm	-4	48.00 dBr	m -7.	118 dB	=		0 Hz
	4	1	2.366 GHz	-55	.12 dBm	-4	48.00 dBi	m -7.	122 dB			
	5	1	2.366 GHz	-55	.40 dBm	-4	48.00 dBi	m -7.	400 dB			
	6	1	2.366 GHz	-55	.50 dBm	-4	48.00 dBr	m -7.	496 dB			
	7	1	2.365 GHz	-55	.57 dBm	-4	48.00 dBi	m -7.	574 dB	-		
MS	a D Eilo	<spurious< td=""><td>TM3 2 1C 10M</td><td>BW 2355</td><td>TY1 236</td><td>5 to 2367 c</td><td>states cave</td><td>d status</td><td></td><td></td><td></td><td></td></spurious<>	TM3 2 1C 10M	BW 2355	TY1 236	5 to 2367 c	states cave	d status				
more		<opunious_i< td=""><td>1013_2_10_100</td><td>2000</td><td>_1/1_2000</td><td>5_10_2007.3</td><td>stater sure</td><td>u 0</td><td>, </td><td></td><td></td><td></td></opunious_i<>	1013_2_10_100	2000	_1/1_2000	5_10_2007.3	stater sure	u 0	, 			

Spurious Emissions, Nokia AHNA AirScale RRH 4T4R B30 100W, B30, 1C, 44dBm, 10 MBW, TM3.2, 2.367 GHz – 2.37 GHz

🔤 Keysight Sp	ectrum Analyzer	- Spurious Emissions					
<mark>W</mark> Center F	RF 5		SEN Center Fr	reg: 2.355000000 GHz	08:28:58 Radio St	AM Dec 04, 2018 d: None	Range Table
PASS	109 2.000	IFGain	Low #Atten: 6	Run Avg Hold: dB Ext Gain:	: 50/50 -19.17 dB Radio De	evice: BTS	Range
					2.3	676 GHz	1
10 dB/div	Ref 0.	.00 dBm			-59.	575 dBm	
Log							Stort From
-20.0							2 367500000 GHz
-30.0							2.00100000000112
-40.0							
-50.0	• 1 						Stop Freq
-60.0			Mushu an a data dari dari				2.370000000 GHZ
-70.0	haped rest in the second		and the state of the		an a shekara na sana ing kana na sana a sa		
-80.0							Res BW 1.0000 MHz
-90.0							Auto <u>Man</u>
Start 23	69 CH7				Stor	2 37 647	
oturt 2.5	OU GI12				010	52.37 GHZ	Video BW
Spur	Range	Frequency	Amplitude	Limit	A Limit		Auto <u>Man</u>
1	1	2.368 GH7	-59.57 dBm	-51.00 dBr	n -8.575 dB	*	
2	1	2.368 GHz	-59.58 dBm	-51.00 dBr	n -8.583 dB		Filter Type
3	1	2.368 GHz	-59.70 dBm	-51.00 dBr	n -8.704 dB	=	Gaussian
4	1	2.368 GHz	-59.81 dBm	-51.00 dBr	n -8.807 dB		
5	1	2.368 GHz	-60.10 dBm	-51.00 dBr	n -9.104 dB		More
6	1	2.368 GHz	-60.13 dBm	-51.00 dBr	n -9.132 dB		1 of 3
	1	2.368 GHZ	-60.16 dBm	-51.00 dBr	n -9.158 dB	-	
MSG					STATUS		

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 10 MBW, TM3.2, 2.37 GHz – 2.40 GHz

🔤 Keysight Sp	ectrum Analyzer	- Spurious Emissions							
IXI	RF S	50 Ω AC	SEN Contor Fr	ISE:INT		08:29:46 A	MDec 04, 2018	Ran	de Table
Center F	req 2.35:	5000000 GHZ	Trig: Free	Run Avg H	old: 50/50	Raulo Stu	. None		
PASS		IFGain	:Low #Atten: 6	dB Ext Ga	in: -19.17 dB	Radio Dev	rice: BTS		Range
						2.37	'08 GHz	0	1
10 dB/div	Ref 0	.00 dBm				-63.1	90 dBm	<u>on</u>	UII
Log									
-10.0									Start Freq
-20.0								2.370	000000 GHz
-30.0									
-40.0									
-50.0									Stop Freq
_ _1								2.400	000000 GHz
-00.0		والمحاجب والمحاجب والمحاجب		in the second state of the second in the local	antes programma and a second	e and the second se	***		
-70.0									Res BW
-80.0									1.0000 MHz
-90.0								Auto	<u>Man</u>
Start 2.3	7 GHZ					Sto) 2.4 GHZ		Video BW
									3.0000 MHz
Spur	Range	Frequency	Amplitude	Limi	t i	∆ Limit		Auto	Man
1	1	2.371 GHz	-63.19 dBm	-51. <u>00 d</u>	Bm -1	2.19 dB	^		
2	1	2.370 GHz	-63.33 dBm	-51. <u>00 d</u>	Bm -1	2.33 dB		Fi	iter Type
3	1	2.372 GHz	-63.42 dBm	-51.00 d	Bm -1	2.42 dB	=		Gaussian
4	1	2.370 GHz	-63.47 dBm	-51.00 d	Bm -1	2.47 dB			
5	1	2.370 GHz	-63.47 dBm	-51.00 d	Bm _1	2.47 dB			
6	1	2.382 GHz	-63.48 dBm	-51.00 d	Bm -1	2.48 dB			More
7	1	2.394 GHz	-63.50 dBm	-51.00 d	Bm _1	2.50 dB			1 of 3
		2100 - 0112	00.00-00	01.00 0			*		
MSG					STATU	JS			
					SIARC				

Spurious Emissions, Nokia **AHNA AirScale RRH 4T4R B30 100W**, B30, 1C, 44dBm, 10 MBW, TM3.2, 2.37 GHz – 10.0 GHz

🔤 Keysight S	pectrum Analyzer	- Spurious Emissions							
(X) Center	RF S		SEN Center Fre	ISE:INT eq: 2.355000000 GH:	2	08:18:25 A Radio Std	MDec 04, 2018	Rar	nge Table
PASS	169 2.55		Trig: Free	Run Avg H	old: 50/50	Dedie Dev			Danga
		IFGain:	Low #Atten. 0		In55.50 dB	Radio Dev	ICE. DIS		Range
						2.62	61 GHZ	<u>On</u>	Off
10 dB/div	Ref 0	.00 dBm				-91.2	20 UBIII		
-10.0									Start Freg
-20.0								2.400	0000000 GHz
-30.0									
-40.0									
-50.0									Stop Freq
-60.0								10.000	0000000 GHz
-70.0									
80.0									Res BW
-00.0								Auto	1.0000 MHz Man
-30.0								/ lato	Intern
Start 2.4	4 GHz					Sto	p 10 GHz		Video BW
									3.0000 MHz
Spur	Range	Frequency	Amplitude	Limi	t	∆ Limit		Auto	<u>Man</u>
1	1	2.626 GHz	-31.23 dBm	-19.00 d	IBm -1	2.23 dB	*		
2	1	3.170 GHz	-31.43 dBm	-19.00 d	Bm -1	2.43 dB		F	ilter Type
3	1	2.524 GHz	-31.45 dBm	-19.00 d	Bm -1	2.45 dB	=		Gaussian
4	1	3.070 GHz	-31.45 dBm	-19.00 d	Bm -1	2.45 dB			
5	1	3.142 GHz	-31.59 dBm	-19.00 d	IBm -1	2.59 dB			More
6	1	3.155 GHz	-31.67 dBm	-19.00 d	Bm -1	2.67 dB			1 of 3
7	1	3.176 GHz	-31.68 dBm	-19.00 d	IBm -1	2.68 dB	-		
MSG					STATI	JS			

6. Photographs



Global Product Compliance Laboratory Report No.: TR-2018-0259-FCC2-27 Product: AHNA AirScale RRH 4T4R B30 100W



7. Test Instrumentation

Asset ID	Manufacturer	Туре	Description	Model	Serial	Calibration Date	Calibration Due	Calibration Type	Status
<u>E831</u>	Agilent Technologies	MXA Signal Analyzer	20Hz- 26.5GHz	N9020A	MY48011791	2018-02-15	2020-02-15	Requires Calibration	Active
<u>E1238</u>	K & L Microwave	Notch Filter	1.5 to 3.0 GHz Notch filter	3TNF- 1500/3000- N/N	166	N/A	N/A	Calibration Not Required, Must Be Verified	Active
<u>E1239</u>	K & L Microwave	Notch Filter	1.5 to 3.0 GHz Notch filter	3TNF- 1500/3000- N/N	167	N/A	N/A	Calibration Not Required, Must Be Verified	Active
<u>E1208</u>	RLC Electronics Inc	High Pass Filter	2.5Ghz to 26Ghz High Pass Filter	F-19391	1440-001	N/A	N/A	Calibration Not Required, Must Be Verified	Active
<u>E1156</u>	Weinschel	Attenuator	10dB 0.05GHz- 26GHz 25W	74-10-12	1069	N/A	N/A	Calibration Not Required, Must Be Verified	Active
<u>E1237</u>	Weinschel	Attenuator	10dB 25 Watt	46-10-34	BH8105	N/A	N/A	Calibration Not Required, Must Be Verified	Active
<u>E1155</u>	Weinschel	Attenuator	10dB 25Watt 0.05GHz - 26GHz	74-10-12	1068	N/A	N/A	Calibration Not Required, Must Be Verified	Active
<u>E1154</u>	Weinschel	Attenuator	30dB 25W 0.05GHz- 26GHz	74-30-12	1065	N/A	N/A	Calibration Not Required, Must Be Verified	Active

8. FCC Section 2.1053 and Part 15.109

8.1 Section 2.1053 Field Strength of Spurious Emissions

Field strength measurements of radiated spurious emissions were made in 3m Semi-Anechoic Chambers the of Global Product Compliance Laboratories of Nokia Bell Labs in Murray Hill NJ. A complete description and full measurement data for the site is on file with the Commission (FCC File 515091).

The spectrum from 30 MHz to the tenth harmonic of the carrier, as high as 27 GHz depending upon the product, was searched for spurious radiation. Measurements were made using both horizontally and vertically polarized broadband antennas. Per FCC regulations, the comparison of out of band spurious emissions directly to the limit is appropriately made using the substitution method. However, when the emissions are more than 20 dB below the specification limit, the use of field strength measurements for compliance determination is acceptable and those emissions are considered not reportable (Section 2.1053 and the FCC Interpretive database for 2.1053). For this case the evaluation of acceptable radiated field strength is as follows.

Sections 2.1053 and 27.53 contain the requirements for the levels of spurious radiation as a function of the level of the unmodulated carrier. The reference level for the unmodulated carrier is calculated as the field produced by an ideal dipole excited by the transmitter output power according to the following relation taken from Reference Data for Radio Engineers, page 676, 4th edition, IT&T Corp.

$E = [(30*P)^{1/2}]/R$

$$20 \log (E^*10^6) - (43 + 10 \log P) = 82.23 \text{ dB}\mu\text{V/meter}$$

Where:

E = Field Intensity in Volts/meter P = Transmitted Power in Watts R = Measurement distance in meters = 3 m

The Part 27 Limit is 82.23 dBuV/m at 3m and 91.77 dBuV/m at 1m The Part 27 non-report level is 62.23 dBuV/m at 3m.

The calculated emission levels were found by:

Measured level $(dB\mu V)$ + Cable Loss(dB)+Antenna Factor(dB) = Field Strength $(dB\mu V/m)$

RESULTS:

For compliance with 47CFR Parts 2 and 27, the field strength of any spurious radiation, measured at 3m, is required to be less than 82.23 dB μ V/meter (82.23 @ 3m). Emissions equal to or less than 62.23 dB μ V/meter at 3m are not reportable and may be verified using field strength measurements and broadband antennas. Over the out of band spectrum investigated from 30 MHz to beyond the tenth harmonic of the carrier (up to 27 GHz), no reportable spurious emissions were detected.

9. Frequency Stability

Frequency Stability (FS) is the measurement of the EUT's frequency deviation from its assigned frequency, and is expressed in both Hz and parts-per-million (ppm). Frequency Tolerance (FT) is the deviation limit set by either the Regulatory Agency, in their Rules, Regulations and Standards, or the specific Design Standard (domestic or international) that an EUT is designed to comply with. Hence, the measured deviation value (FS) cannot exceed the frequency tolerance (FT) limit to which the radio/transceiver is designed to meet.

The frequency stability was measured with variation of ambient temperature and voltage as follows: From -30° to $+50^{\circ}$ centigrade for all equipment (If the EUT under test does not operate to the temperature range required, EUT status should be indicated at the temperature of departure.)

Frequency measurements were made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level was allowed prior to frequency measurement.

Vary primary supply voltage from 85 to 115 percent of the nominal value.

The supply voltage was measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

Frequency Block Tested: (CF = 2355MHz)

(a)Set the power supply to nominal Voltage. (b) Record the frequency at ~25°C. (c)Raise EUT operating temperature to 50°C. (d)Record the frequency difference. (e) Repeat step (d) at each 10°C step down to -30°C. Result will be 10 readings and take temperature readings to establish thermal stability at each point.

Transmit Frequency Deviation at +25°C at 100% of Nominal Voltage, -48VDC			
Time	Transmit Carrier Deviation		
(minutes)	(Hz)		
0	9.290		
0.5	7.118		
1.0	8.902		
1.5	9.715		
2.0	7.255		
2.5	8.426		
3.0	11.939		
FCC SPECIFICATION	±2355 MHz (±0.05ppm)		
	± 0.05 ppm = ± 117.75 Hz		
FCC RESULT	PASS		

Baseline Measurement at +25°C

Transmit Frequency Deviation at +50°C at 100% of Nominal Voltage, -48VDC				
Time	Transmit Carrier Deviation			
(minutes)	(Hz)			
0	9.333			
0.5	7.168			
1.0	10.749			
1.5	6.543			

Transmit Frequency Deviation at +50°C at 100% of Nominal Voltage, -48VDC			
2.0	9.777		
2.5	7.498		
3.0	9.089		
FCC SPECIFICATION	±2355 MHz (±0.05ppm)		
	± 0.05 ppm = ± 117.75 Hz		
FCC RESULT	PASS		

Transmit Frequency Deviation at +40°C at 100% of Nominal Voltage, -48VDC				
Time	Transmit Carrier Deviation			
(minutes)	(Hz)			
0	7.172			
0.5	10.677			
1.0	8.962			
1.5	9.439			
2.0	12.902			
2.5	8.426			
3.0	8.801			
FCC SPECIFICATION	±2355 MHz (±0.05ppm)			
	± 0.05 ppm = ± 117.75 Hz			
FCC RESULT	PASS			

Transmit Frequency Deviation at +30°C at 100% of Nominal Voltage, -48VDC				
Time	Transmit Carrier Deviation			
(minutes)	(Hz)			
0	10.322			
0.5	8.933			
1.0	7.889			
1.5	9.002			
2.0	8.116			
2.5	10.844			
3.0	4.936			
FCC SPECIFICATION	±2355 MHz (±0.05ppm)			
	± 0.05 ppm = ± 117.75 Hz			
FCC RESULT	PASS			

Transmit Frequency Deviation at +20°C at 100% of Nominal Voltage, -48VDC				
Time	Transmit Carrier Deviation			
(minutes)	(Hz)			
0	9.892			
0.5	10.207			
1.0	8.361			
1.5	9.079			
2.0	10.896			
2.5	8.252			
3.0	7.499			
FCC SPECIFICATION	±2355 MHz (±0.05ppm)			
	± 0.05 ppm = ± 117.75 Hz			
FCC RESULT	PASS			

Transmit Frequency Deviation at +10°C at 100% of Nominal Voltage, -48VD				
Time	Transmit Carrier Deviation			
(minutes)	(Hz)			
0	10.981			
0.5	8.593			
1.0	4.996			
1.5	8.871			
2.0	10.789			
2.5	8.612			
3.0	11.421			
FCC SPECIFICATION	±2355 MHz (±0.05ppm)			
	± 0.05 ppm = ± 117.75 Hz			
FCC RESULT	PASS			

Transmit Frequency Deviation at 0°C a	t 100% of Nominal Voltage, -48VDC
Time	Transmit Carrier Deviation
(minutes)	(Hz)
0	11.372
0.5	9.929
1.0	10.774
1.5	7.710
2.0	8.394
2.5	10.731
3.0	9.855
FCC SPECIFICATION	±2355 MHz (±0.05ppm)
	± 0.05 ppm = ± 117.75 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at -10°C at 100% of Nominal Voltage, -48VDC	
Time	Transmit Carrier Deviation
(minutes)	(Hz)
0	10.381
0.5	8.629
1.0	9.513
1.5	8.107
2.0	12.311
2.5	9.097
3.0	5.395
FCC SPECIFICATION	±2355 MHz (±0.05ppm)
	± 0.05 ppm = ± 117.75 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at -20°C at 100% of Nominal Voltage, -48VDC	
Time	Transmit Carrier Deviation
(minutes)	(Hz)
0	7.261
0.5	5.624
1.0	11.737
1.5	8.302
2.0	11.944
2.5	9.961
3.0	10.885
FCC SPECIFICATION	±2355 MHz (±0.05ppm)
	± 0.05 ppm = ± 117.75 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at -30°C at 100% of Nominal Voltage, -48VDC	
Time	Transmit Carrier Deviation
(minutes)	(Hz)
0	9.411
0.5	10.843
1.0	8.266
1.5	6.832
2.0	10.209
2.5	9.621
3.0	11.289
FCC SPECIFICATION	±2355 MHz (±0.05ppm)
	± 0.05 ppm = ± 117.75 Hz
FCC RESULT	PASS

Upon return to $+25^{\circ}$ C.

At ambient, vary voltage to +15% and -15% of nominal and record frequency difference. Result will be 12 readings for each voltage (nominal, ~+ 3%, ~+6%, ~+%9, ~+12%, +15%, and nominal, ~- 3%, ~-6%, ~-%9, ~-12%, -15%).

Transmit Frequency Deviation at +25°C at 100% of Nominal Voltage, -48VDC	
Time	Transmit Carrier Deviation
(minutes)	(Hz)
0	9.047
0.5	8.922
1.0	11.693
1.5	12.476
2.0	9.317
2.5	11.092
3.0	10.606
FCC SPECIFICATION	±2355 MHz (±0.05ppm)
	± 0.05 ppm = ± 117.75 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 103% of Nominal Voltage, -49.44VDC	
Time	Transmit Carrier Deviation
(minutes)	(Hz)
0	12.273
0.5	5.496
1.0	9.141
1.5	7.970
2.0	10.577
2.5	9.077
3.0	12.599
FCC SPECIFICATION	±2355 MHz (±0.05ppm)
	± 0.05 ppm = ± 117.75 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 106% of Nominal Voltage, -50.88VDC	
Time	Transmit Carrier Deviation
(minutes)	(Hz)
0	8.721
0.5	11.289
1.0	7.410
1.5	10.506
2.0	9.493
2.5	12.376
3.0	7.350
FCC SPECIFICATION	±2355 MHz (±0.05ppm)
	± 0.05 ppm = ± 117.75 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 109% of Nominal Voltage, -52.32VDC	
Time	Transmit Carrier Deviation
(minutes)	(Hz)
0	10.250
0.5	9.006
1.0	8.349
1.5	11.727
2.0	8.621
2.5	11.281
3.0	9.984
FCC SPECIFICATION	±2355 MHz (±0.05ppm)
	± 0.05 ppm = ± 117.75 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 112% of Nominal Voltage, -53.76VDC	
Time	Transmit Carrier Deviation
(minutes)	(Hz)
0	9.113
0.5	11.319
1.0	10.852
1.5	7.961
2.0	12.682
2.5	7.269
3.0	9.117
FCC SPECIFICATION	±2355 MHz (±0.05ppm)
	± 0.05 ppm = ± 117.75 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 115% of Nominal Voltage, -55.20VDC	
Time	Transmit Carrier Deviation
(minutes)	(Hz)
0	11.988
0.5	8.276
1.0	10.350
1.5	9.489
2.0	9.822
2.5	11.587
3.0	10.036
FCC SPECIFICATION	±2355 MHz (±0.05ppm)
	± 0.05 ppm = ± 117.75 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 100% of Nominal Voltage, -48.0VDC	
Time	Transmit Carrier Deviation
(minutes)	(Hz)
0	10.603
0.5	7.389
1.0	9.997
1.5	6.690
2.0	11.543
2.5	10.880
3.0	8.521
FCC SPECIFICATION	±2355 MHz (±0.05ppm)
	± 0.05 ppm = ± 117.75 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -3% of Nominal Voltage, -46.56VDC	
Time	Transmit Carrier Deviation
(minutes)	(Hz)
0	10.145
0.5	7.982
1.0	8.527
1.5	10.935
2.0	7.417
2.5	9.862
3.0	11.986
FCC SPECIFICATION	±2355 MHz (±0.05ppm)
	± 0.05 ppm = ± 117.75 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -6% of Nominal Voltage, -45.12VDC	
Time	Transmit Carrier Deviation
(minutes)	(Hz)
0	9.762
0.5	10.525
1.0	11.391
1.5	9.964
2.0	11.330
2.5	7.602
3.0	8.791
FCC SPECIFICATION	±2355 MHz (±0.05ppm)
	± 0.05 ppm = ± 117.75 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -9% of Nominal Voltage, -43.68VDC		
Time	Transmit Carrier Deviation	
(minutes)	(Hz)	
0	12.369	
0.5	9.782	
1.0	11.926	
1.5	10.583	
2.0	9.457	
2.5	12.101	
3.0	9.520	
FCC SPECIFICATION	±2355 MHz (±0.05ppm)	
	± 0.05 ppm = ± 117.75 Hz	
FCC RESULT	PASS	

Transmit Frequency Deviation at +25°C at -12% of Nominal Voltage, -42.24VDC		
Time	Transmit Carrier Deviation	
(minutes)	(Hz)	
0	11.768	
0.5	10.890	
1.0	12.976	
1.5	9.556	
2.0	11.713	
2.5	10.020	
3.0	9.491	
FCC SPECIFICATION	±2355 MHz (±0.05ppm)	
	± 0.05 ppm = ± 117.75 Hz	
FCC RESULT	PASS	

Transmit Frequency Deviation at +25°C at -15% of Nominal Voltage, -40.80VDC		
Time	Transmit Carrier Deviation	
(minutes)	(Hz)	
0	12.072	
0.5	8.669	
1.0	11.157	
1.5	10.139	
2.0	9.721	
2.5	10.550	
3.0	11.121	
FCC SPECIFICATION	±2355 MHz (±0.05ppm)	
	± 0.05 ppm = ± 117.75 Hz	
FCC RESULT	PASS	



Test Equipment

Asset ID	Manufacturer	Туре	Description	Model	Serial	Calibration Date	Calibration Due
<u>E1152</u>	Agilent Technologies	MXA Signal Analyzer	20Hz- 26.5GHz Analyzer	N9020A	MY53420147	2017-03-13	2019-03-13
<u>TH044</u>	Fluke	Multimeter		83III	74910377	2018-02-12	2020-02-12
<u>TH501-</u> <u>T02</u>	Synergy	Controller	Solutions Plus Controller	SPPCM	SP001628	2018-02-02	2020-02-02
<u>TH-T02</u>	Thermotron	Thermal Chamber	Chamber	N/A	6632	Not Required	Not Required
<u>TH014</u>	Yokogawa	Recorder	MVAdvanced portable paperless recorder	MV2048	S5JC04072	2017-06-02	2019-06-02

Additional Support Equipment

Instrument Type	Serial Number	Vendor	Cal Due Date
Power Meter	MY40511034	AGILENT E4419B	01/10/2020
Power Sensor	MY52280001	AGILENT E9301A	02/08/2020
Power Sensor	MY52280011	AGILENT E9301A	02/08/2020
GPS Receiver	KR93200773	SYMMETRICOM 58503B	No Cal Req.
Power supply	13N5112J	TDK-LAMBDA GEN60-85-3P208	No Cal Req.

Test Setup



Setup Photos





10. NVLAP Certificate of Accreditation

