

**Bell Labs** 

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



# Title 47 Code of Federal Regulations Test Report

Regulation: FCC Part 2 and 24

<u>Client:</u> Nokia Mobile Networks

Product Evaluated: UHFB 65MHz RRH – Addition of 20MHz

> Report Number: TR-2019-0120-FCC2-24

> > Date Issued: October 25, 2019

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### Revisions

Date	Revision	Section	Change
10/25/2019	0		Initial Release

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# 1. System Information and 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 Murray-Hill, NJ.

Equipment Under Test (EUT):	UHFB 65 MHz RRH - Addition of 20MHz		
FCC ID:	AS5BBTRX-05		
Serial Number:	See Section 1.3		
Hardware Version:	See Section 1.3		
Software Version:	FL19A		
Frequency Range:	1930 – 1990 MHz		
GPCL Project Number:	2019-0120		
Manufacturer:	NOKIA SOLUTIONS AND NETWORKS OY		
	KARAPORTTI 3, FI-02610 ESPOO		
	FINLAND		
Test Requirement(s):	Title 47 CFR Parts 2 and 24		
Test Standards:	Title 47 CFR Parts 2 and 24		
	KDB 971168 D01 Power Measurement License Digital Systems		
	v03r01 April 9, 2018.		
	KDB 662911 D01 Multiple Transmitter Output v02r01 Oct 2013		
	• ANSI C63.26 (2015)		
ANSI C63.4 (2014)			
Measurement Procedure(s):	• FCC-IC-OB - GPCL Occupied Bandwidth and Power Measurement		
	Test Procedure 12-4-2017		
	• FCC-IC-SE - GPCL Spurious Emissions Test Procedure 12-4-2017		
Test Date(s): September 2019			
Test Performed By:	Nokia		
	Global Product Compliance Laboratory		
600-700 Mountain Ave.			
	P.O. Box 636		
	Murray Hill, NJ 07974-0636		
Product Engineer(s): Ron Remy			
Lead Engineer: Steve Gordon			
Test Engineer (s):   Jaideep Yadav, Eugene Mitchell, Mike Soli			
Test Results: The EUT, 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 test report applies to the UHFB 65MHz RRH, 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 24 measured in accordance with the procedures set out in Section 2.1033 (c) (14) of the Rules.

The 65MHz RRH was previously qualified for 1.25 CDMA and 5, 10, 15 and 20 MHz LTE. This testing is for an LTE 20MHz upgrade, 20MHz single carrier and 5+15 and 10+10 contiguous/non-contiguous multi-carrier.

# 1.3 EUT Details





# 1.4 Test Requirements

47 CFR FCC Sections	Description of Tests	Test Required
2.1046, 24.238	RF Power Output	Yes
2.1047, 24.238	Modulation Characteristics	Yes
2.1049, 24.238	(a) Occupied Bandwidth	Yes
	(b) Out-of-Band Emissions	
2.1051, 24.238	Spurious Emissions at Antenna Terminals	Yes
2.1053, 24.238	Field Strength of Spurious Radiation	Yes

Each required measurement is listed below:

### 1.5 Standards & Procedures

#### 1.5.1 Standards

- Title 47 Code of Federal Regulations, Federal Communications Commission Part 2.
- Title 47 Code of Federal Regulations, Federal Communications Commission Part 24.
- ANSI C63.26, American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

### 1.5.2 Procedures

- 1. FCC-IC-0B and FCC-IC-SE
- 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 9kHz to 40 GHz", American National Standards Institute, Institute of Electrical and Electronic Engineers, Inc., New York, NY 10017-2394, USA.
- 3. FCC KDB 971168 D01 Power Measurement License Digital Systems v03r01 April 9, 2018. FCC KDB 662911 D01 Multiple Transmitter Output v02r01 Oct 2013

## **1.5.3 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.

s	tandard, 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 (AR-6 Semi-Anechoic	30 MHz – 200MHz H 30 MHz – 200 MHz V	±5.1 dB ±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
	10 Hz	9 kHz to 20 MHz	
Occupied Bandwidth, Edge of Band,	100 Hz	20 MHz to 1 GHz	1 70 dp
Conducted Spurious Emissions	10 kHz to 1 MHz	1 GHz to 10 GHz	1.70 UD
	1MHz	10 GHz to 40 GHz:	
RF Power	10 Hz to 20 MHz	50 MHz to 18 GHz	0.5 dB

# 1.6 Executive Summary

Requirement	Description	Result
47 CFR FCC Parts 2 and 24		
2.1046, 24.238	RF Power Output	COMPLIES
2.1047, 24.238	Modulation Characteristics	COMPLIES
2.1049, 24.238	(a) Occupied Bandwidth	COMPLIES
	(b) Edge of Band Emissions	
2.1051, 24.238	Spurious Emissions at Antenna	COMPLIES
	Terminals	
2.1053, 24.238	Field Strength of Spurious Radiation	COMPLIES

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

# **1.7** 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. The product was configured for test as shown in section above and allowed to warm up and stabilize per KDB 971168 D01 and ANSI C63.26.

Power measurements were made with an MXA Signal Analyzer.

Channel Frequency	Channel Power
MHz	dBm
1940	44.73
1955	44.64
1985	44.91

1940	44.73	
1955	44.64	
1985	44.91	
	•	

Tabular Data – Channel RF Power, 2C

Channel Frequency MHz	Bandwidth MHz	Modulation	Channel Power dBm
1937.5+1947.5	5+15	64QAM+256QAM	42.39
1980+1990	10+10	64QAM+256QAM	42.33
1937.5+1992.5	5+15	64QAM+256QAM	41.72
1935+1990	10+10	64QAM+256QAM	42.39
1962.5+1990	10+10	Q16+256QAM	43.57
1962.5+1992.5	15+5	Q16+256QAM	43.33

Tabular Data – Channel RF Power, 1C, 64QAM, 20MHz BW

# 2.1.1 Channel RF Power - Plots.

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



Channel Power, 64QAM, 20MHz BW, 1940MHz, TX1

Channel Power, 64QAM+256QAM, 5+15MHz BW, 1937.5+1947.5MHz, TX1



Channel Power, Q16+256QAM, 10+10MHz BW, 1962.5+1990MHz, TX1



# 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 QPSK, 16QAM, 64QAM and 256QAM modulation was evaluated and verified to demonstrate proper operation before testing.

## 3.1.1 Modulation Characteristics – Plots.

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

Q16 (QPSK+16QA	.M)	
Traynight LTR & LTE & FED - Modulations Analysis Traynight LTR & LTE & FED - Modulations Analysis Traynight LTR & LTE & FED - Modulations Traynight LTR & LTE & FED - Modulations	10.21.56 AM(0x126, 2019	Hans Calu
Carrier Ref Freq 1.955000000 GHz Trig: Free Run Honor: 12 40	Direction: Downlink	Component
Layer0 OFDM Meas (CC0)	them outp. 1	Carrier>
eog mility Ref0		
10 A. P. P. P.		Sync/Format
		Meas Time
4.131	9.1314	C. C.
Ch1 Spectrum (CC0)	TimeLen 42' Sym	Chan Profile,
10 dBudiy Ref -20 dBm		setup
id data han ben dan ber akating alik birke disastra data mithada mari	and the	
		Convectore
Center 1 955 GHz Sp	an 25.0000762939 MHz	copyccolor
Res BW 1.27312 kHz	TimeLen 3.000023 ms	
6404M		
04QAM		
Reynight Life & CLE-A FOU - Medulation Analysis Ref. 59 0, AC Service 1,93500000 GHz rejer Ref. Free: 1,935000000 GHz	09:39:17 AM Aug 16, 2019	Frequency
The Free Run #Atten: 6 dB	Direction: Downlink Num CC(s): 1	
Layer0 OFDM Meas (CC0)		
400 m/div Ref0		
12 600m 400m		
-00		
400m -1.2 -1.6		
.9.368 Res BW 15 kHz	9.3577 TimeLen 42 Sym	
Ch1 Spectrum (CC0)		
10 dB/div Ref -20 dBm		
- 20 - 20		
Center 1.935 GHz Span	25.0000762939 MHz	Ref Freq
MSG STATUS	rus	1.93000000 GHz
2560AM		
Veyaget (TE & LTL-A FED - Manufacture Analysis		
Carrier Ref Freq 1.955000000 GHz Carrier Ref Freq: 1.955000000 GHz	10:50:10PM Oct 25, 2019 TRACE 66 00000	Frequency
Atten: 12 dB	Num CC(s): 1	
Layer0 OFDM Meas (CC0) 400 m/ery Ref0		
400m		
430e 833e		
-1.0		
Res BW 15 kHz	9.0282 TimeLen 42 Sym	
Ch1 Spectrum (CC0)		
Linux and a first an are the the second of the area in the second	Alandar	0
		Ref Freq
Center 1955 GHz Sp Res BW 1.27312 kHz Sp	an 25.0000762939 MHz TimeLen 3.000023 ms	and a sta
MID File <modanalysis_tm3_1a_1c_20mbw_1955_tx1_1955-1.png> saved</modanalysis_tm3_1a_1c_20mbw_1955_tx1_1955-1.png>	rus	

# 4. FCC Section 2.1049 – Occupied Bandwidth/Edge of Band Emissions

## 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 required measurement is the 99% Occupied Bandwidth, also called the designated signal bandwidth and needs to be within the parameters of the products specified emissions designator. During these measurements it is customary to evaluate the Edge of Band emissions at block/band edges.

The transmitted signal occupied bandwidth was measured using a Keysight MXA Signal Analyzer. All emissions were within the parameters as required.

	/ / /
Channel Frequency	Occupied BW
MHz	MHz
1940	17.822
1955	17.849
1985	17.846

#### Tabular Data – Occupied Bandwidth, 1C, 64QAM, 20MHz BW

Channel Frequency MHz	Bandwidth MHz	Modulation	Occupied BW MHz
1937.5+1947.5	5+15 Contiguous	64QAM+256QAM	18.862
1980+1990	10+10 Contiguous	64QAM+256QAM	18.834
1937.5+1992.5	5+15 Non-Contiguous	64QAM+256QAM	4.5283+13.388
1935+1990	10+10 Non-Contiguous	64QAM+256QAM	8.9364+8.9315
1962.5+1990	10+10 Non-Contiguous	Q16+256QAM	8.9302+8.9433
1962.5+1992.5	15+5 Non-Contiguous	Q16+256QAM	13.383+4.4660

#### Tabular Data – Occupied Bandwidth, 2C

# 4.1.1 Occupied Bandwidth – Plots.

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





#### OBW, 64QAM+256QAM, 5+15MHz BW, 1937.5+1947.5MHz, TX1







# 4.2 Edge of band Emissions

The Edge of Band emissions of the EUT at the external antenna connector (EAC) were measured using a Keysight MXA Signal 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.

### 4.2.1 Edge of Band Emissions - Plots.

All of the measurements met the requirements of Part 24.238 when measured per Part 2.1049.

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



#### OOBE, 64QAM, 20MHz BW, 1985MHz, TX1





OOBE, Q16+256QAM, 10+10MHz BW, 1962.5+1990MHz, TX1



# 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 beyond the 10th harmonic of the specific transmit band. For this band of operation, the measurements were performed up to 20GHz. Measurements were made using 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 24.238. The measured spurious emission levels were plotted for the frequency range as specified in 2.1057. There were no reportable emissions. Data below documents performance up to 20 GHz.

# 5.1.1 Spurious Emissions at Tx Port - Plots

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

Spurious,	64QAM, 20MHz	BW, 1955MHz,	TX1	
Keysight Spectrum Analyzer	Spurious Emissions			27

Center F	req 1.955	© Ω ▲ DC 0000000 GHz IFGain:Low	ter Freq: 1.950	5000000 GHz Avg Hold: 50/50 Ext Gain: -50.80 dB	11:48:20 AMSep 12, 2019 Radio Std: None Radio Device: BTS	Frequency
20 dB/div	Ref -1	0.00 dBm			873.13 MHz -47.686 dBm	
-50.0					• <b>1</b>	Center Freq 1.955000000 GHz
-110 -130 -150						
-170 -190	MHz				Stop 1 GHz	
Spur	Range	Frequency	Amplitude	Limit	Δ Limit	
1 2	1	873.1 MHz 869.3 MHz	-47.69 dBm -47.97 dBm	-19.00 dBm -19.00 dBm	-28.69 dB -28.97 dB	CF Step 3.000000 MHz Auto Man
3 4	1 1	760.4 MHz 903.0 MHz	-48.00 dBm -48.01 dBm	-19.00 dBm -19.00 dBm	-29.00 dB -29.01 dB	

MIC VFile <Spurious\_TM3\_1\_1C\_20MBW\_1955\_TX1\_10\_to\_1000.state> saved STATUS ADD Coupled

🔤 Keysight Sp	ectrum Analyter -	Spurious Emissions				
Center F PASS	req 1.955	0000000 GHz IFGain:Low	ter Freq: 1.95	5000000 GHz Avg Hold: 50/50 Ext Gain: -55.90 dB	11:48:30 AMSep 12, 2019 Radio Std: None Radio Device: BTS	Frequency
20 dB/div	Ref 0.	00 dBm			1.9674 GHz -26.836 dBm	
-40.0						Center Freq 1.955000000 GHz
-100						
-140						
Start 1.9	65 GHz				Stop 10 GHz	
Spur	Range	Frequency	Amplitude	Limit	∆ Limit	
1	1	1.967 GHz	-26.84 dBm	-19.00 dBm	-7.836 dB	CF Step
2	1	1.969 GHz	-27.36 dBm	-19.00 dBm	-8.358 dB	Auto Man
3	1	1.970 GHz	-28.36 dBm	-19.00 dBm	-9.364 dB	
4 5	1 1	1.971 GHz 1.977 GHz	-28.84 dBm -29.05 dBm	-19.00 dBm -19.00 dBm	-9.844 dB -10.05 dB	Freq Offset

MSG []File <Spurious\_TM3\_1\_1C\_20MBW\_1955\_TX1\_1965\_to\_10000.state> savSTATUS

🔤 Keysight Spe	ectrum Analyzer -	Spurious Emissions				
Center F	req 1.955	5000000 GHz IFGain:Low	ter Freq: 1.95	5000000 GHz Avg Hold: 50/50 Ext Gain: -51.50 dB	11:48:22 AM5ep 12, 2019 Radio Std: None Radio Device: BTS	Frequency
20 dB/div	Ref 0.	.00 dBm			1.9434 GHz -33.758 dBm	
-20.0 -40.0 -60.0						Center Freq 1.955000000 GHz
-100						
-160						
Start 1 G	Hz				Stop 1.945 GHz	
Spur	Range	Frequency	Amplitude	Limit	Δ Limit	CE Sten
2	1	1.943 GHz	-33.86 dBm	-19.00 dBm	-14.86 dB	3.000000 MHz
3	1	1.943 GHz	-34.20 dBm	-19.00 dBm	-15.20 dB	Auto Man
4 5	1	1.942 GHz 1.940 GHz	-34.63 dBm -35.31 dBm	-19.00 dBm -19.00 dBm	-15.63 dB -16.31 dB	Freq Offset
						0 Hz

MSG File <Spurious\_TM3\_1\_1C\_20MBW\_1955\_TX1\_1000\_to\_1945.state> savestatus

- K	eysight Spe	ctrum Analyzer	- Spurious Emissions				
Ce PA	nter F . <mark>SS</mark>	req 1.95	5000000 GHz IFGain:Low	sense: ter Freq: 1.955 Trig: Free Run #Atten: 0 dB	NT 5000000 GHz Avg Hold: 50/50 Ext Gain: -54.00 dB	11:00:35 AMSep 12, 2019 Radio Std: None Radio Device: BTS	Frequency
20	dB/div	Ref -1	10.00 dBm			16.649 GHz -26.986 dBm	
-30							Center Freq 1.955000000 GHz
-901 -11 -13							
-17							
Sta	art 10	GHz				Stop 20 GHz	
	Spur	Range	Frequency	Amplitude	Limit	∆ Limit	05.000
	1	1	16.65 GHz	-26.99 dBm	-19.00 dBm	-7.986 dB	3 000000 MHz
	2	1	16.58 GHz	-27.19 dBm	-19.00 dBm	-8.186 dB	Auto Man
	3	1	16.58 GHz	-27.25 dBm	-19.00 dBm	-8.246 dB	
	4 5	1	16.72 GHz 16.58 GHz	-27.35 dBm -27.39 dBm	-19.00 dBm -19.00 dBm	-8.349 dB -8.389 dB	Freq Offset
	1)mile	Davidavia 3	TH2 1 10 20H0W	10FF TV1 10000 +	. 00000 -1-1-5	n	

#### **Global Product Compliance Laboratory** Report No: TR-2019-0120-FCC2-24 Product: UHFB 65MHz RRH-Addition of 20MHz

#### Spurious, 64QAM+256QAM, 15+5MHz BW, 1937.5+1992.5 MHz, TX1

	idio Device: BTS	50/50 -61.20 dB	Avg Hold Ext Gain	ng: Free Run Atten: 0 dB	IFGain:Low	2000	req 1.552	SS
	787.89 MHz 37.492 dBm				dBm	10.00	Ref -1	dB/div
Center 1.99250000								
	Stop 1 GHz						MHz	art 10
	Δ Limit	imit	L	mplitude	quency	Fr	Range	Spur
CF	-18.49 dB	0 dBm	-19.0	7.49 dBm	9 MHz	78	1	1
1.50000 Auto	-18.51 dB	0 dBm	-19.0	7.51 dBm	.0 MHz	894	1	2
Charles .	-18.54 dB	0 dBm	-19.0	7.54 dBm	.8 MHz	87	1	3
	-18.56 dB	0 dBm	-19.0	7.56 dBm	.5 MHz	89	1	4
FreqC	-18.59 dB	0 dBm	-19.0	7.59 dBm	.8 MHz	86	1	5

enter F	req 1.962	2500000 GHz IFGain:Low	Hig: Free Run #Atten: 0 dB	2500000 GHz Avg Hold: 50/50 Ext Gain: -62.20 dB	Radio Std: None Radio Device: BTS	Frequency
dB/div	Ref -1	0.00 dBm			1.9184 GHz -27.853 dBm	
						Center Fred 1.962500000 GH:
10 30 50						
tart 1 G	Hz				Stop 1.93 GHz	
Spur	Range	Frequency	Amplitude	Limit	∆ Limit	
1	1	1.918 GHz	-27.85 dBm	-19.00 dBm	-8.853 dB	CF Step
2	1	1.928 GHz	-28.26 dBm	-19.00 dBm	-9.261 dB	9.750000 MH
3	1	1.908 GHz	-28.28 dBm	-19.00 dBm	-9.278 dB	Charles - Million
4	1	1.929 GHz	-28.33 dBm	-19.00 dBm	-9.329 dB	
5	1	1.573 GHz	-28.34 dBm	-19.00 dBm	-9.342 dB	Freq Offse

enter F	req 1.945	5000000 GHz IFGain:Low	MAtten: 0 dB	5000000 GHz Avg Hold: 50/50 Ext Gain: -54.00 dB	Radio Std: None Radio Device: BTS	Frequency
0 dB/div	Ref -1	0.00 dBm			16.591 GHz -27.143 dBm	
0.0				1		Center Fre 1.945000000 GH
0.0 10 30						
170						
tart 10	GHZ		6 114 d	1	Stop 20 GHZ	
1	1	16.59 GHz	-27.14 dBm	-19.00 dBm	-8.143 dB	CF Step
2 3	1	16.62 GHz 16.57 GHz	-27.30 dBm -27.33 dBm	-19.00 dBm -19.00 dBm	-8.299 dB -8.332 dB	Auto Mar
4 5	1 1	16.56 GHz 16.57 GHz	-27.40 dBm -27.46 dBm	-19.00 dBm -19.00 dBm	-8.396 dB -8.463 dB	Freq Offse
File.	411			STAT	us	

nter F	req 1.962	2500000 GHz IFGain:Low	Matter: 0 dB	2500000 GHz Avg Hold: 50/50 Ext Gain: -55.90 dB	Radio Std: None Radio Device: BTS	Frequency
dB/div	Ref 0	.00 dBm			5.9847 GHz -29.986 dBm	
8			1			0
0						1.962500000 G
a						
0						
ů —						
art 1.9	95 GHz				Stop 10 GHz	
Spur	Range	Frequency	Amplitude	Limit	∆ Limit	
1	1	5.985 GHz	-29.99 dBm	-19.00 dBm	-10.99 dB	CF St
2	1	6.091 GHz	-30.06 dBm	-19.00 dBm	-11.06 dB	9.750000 N Auto
3	1	6.028 GHz	-30.22 dBm	-19.00 dBm	-11.22 dB	a la constante de la constante
4	1	6.071 GHz	-30.23 dBm	-19.00 dBm	-11.23 dB	E
5	1	6.044 GHz	-30.28 dBm	-19.00 dBm	-11.28 dB	FreqOm

MSG File <Spurious\_TM3\_1\_2C\_15+5MBW\_1937\_1992\_3\_1+3\_1a\_1995\_to\_1(STATUS

# Photographs



Asset ID	Manufacturer	Туре	Description	Model	Serial	Calibration Date	Calibration Due
E1152	Agilent Technologies	MXA Signal Analyzer	20Hz- 26.5GHz Analyzer	N9020A	MY53420147	2019-04-24	2021-04-24
E1006	Weinschel	Attenuator	30 dB DC- 18GHz 150W	6528-30-34-LIM	BN4172	CNR	CNR
E986	Trilithic	High Pass Filter	PCS	5HC2850/18050- 1.8-KK	PCS-HPF-5	CNR	CNR
E896	Agilent Technologies	Network Analyzer	10 MHz - 40 GHz	N5230C	MY49000897	2019-01-31	2021-01-31

# **Test Equipment**

Environmental Conditions: RH= 34.6%, Temp=24.5°C, Pressure=1005.9hPa

# 6. FCC Section 2.1053 - Field strength of spurious radiation.

## 6.1 Section 2.1053 Field Strength of Spurious Emissions

Field strength measurements of radiated spurious emissions were made in an FCC registered 3m Semi-Anechoic Chamber which is maintained by Nokia Bell Labs in Murray Hill, New Jersey. A complete description and full measurement data for the site is on file with the Commission (Site Registration Number: 515091).

The spectrum from 30 MHz to beyond the tenth harmonic of the carrier, 21 GHz, 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.

# 6.2 Field Strength of Spurious Emissions - Limits

Sections 2.1053 and 24.238 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, 4<sup>th</sup> edition, IT&T Corp.

E= [(30\*P)<sup>1/2</sup>]/R

20 log (E\*10<sup>6</sup>) – (43 + 10 log P) = 82.23 dBµV/meter

Where:

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

The Part 24 Limit is 82.23 dBuV/m at 3m and 91.77 dBuV/m at 1m The Part 24 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 24, the field strength of any spurious radiation, measured at 3m, is required to be less than 82.23 dB $\mu$ V/meter (82.23 @ 3m). Emissions equal to or less than 62.23 dB $\mu$ 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 21GHz), no reportable spurious emissions were detected.

# 7. NVLAP Certificate of Accreditation

