EXHIBIT 4

TEST REPORT

SECTION 2.1033(c)(14)

The data required by Section 2.1046 through 2.1057, inclusive, measured in accordance with the procedures set out in Section 2.1041.

SECTION 2.911 (e)

Technical test data submitted to the TCB and to the Commission shall be signed by the person who performed or supervised the tests. The person signing the test data shall attest to the accuracy of such data. The Commission or TCB may require the person signing the test data to submit a statement showing that they are qualified to make or supervise the required measurements.

Response

A RF test report meeting the above requirements was attached.

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

TESTING
NVLAP LAB CODE: 100275-0

RF Transmitter Certification Test Report
(FCC ID: 2AD8UFW2IMBOM1)
(IC ID: 109D-FW2IMBOM1)

Regulation

FCC CFR 47 Part 27 Subpart C
IC RSS-139

Client

Nokia Solutions and Networks Oy

Product Evaluated

MBO B66 Dual Carriers

(PRI20183480)

GPCL Report Number
TR2018-0042 FCC/IC

GPCL Project Number
2018-0042

Date Issued
June 5, 2018

TABLE OF CONTENTS

Revisions

Date	Revision	Section	Change

Nokia Global Product Compliance Laboratory represents to the client that testing was done in accordance with standard procedures as applicable, and that reported test results are accurate within generally accepted commercial ranges of accuracy in accordance with the scope of our NVLAP Accreditation. Nokia Global Product Compliance reports only apply to the specific samples tested. This report is the property of the client. This report shall not be reproduced except in full without the written approval of the Nokia Global Product Compliance Laboratory.

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Nokia Global Product Compliance Laboratory represents to the client that the laboratory's accreditation or any of its calibration or test reports in no way constitutes or implies product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

The test results documented in this report refer exclusively to the test model/sample specified, under the conditions and modes of operation as described herein.

Prepared By:

Signed: Steve Gordon 6/5/2018

Steve Gordon
Date
GPCL Compliance Engineer
NVLAP Approved Signatory

Reviewed By:

Signed: Raymond L. Johnson 6/5/2018

Ray Johnson
Date
Technical Manager

1 ATTESTATION OF TEST RESULTS

Company Name (Manufacturer)	Nokia Solutions and Networks Oy 2000 W. Lucent Lane Naperville, IL 60563
FCC ID	2AD8UFW2IMBOM1
Industry Canada ID	109D-FW2IMBOM1
Product Name	Flexi Zone Multiband Outdoor Micro Base Station RF Transceiver Band 66 Module
Model Name	MBO B66 Module: FW2IMBOM1
Serial Number(s)	EB181111199
Test Requirement(s)	47 CFR FCC Part 27 Subpart C, IC RSS-139
Test Procedures/Methods	• ANSI C63.26-2015 • FCC KDB 971168 D01, v03r01, April 2018 • FCC KDB 662911 D01, v02r01, October 2013 • RSS-GEN, Issue 5, April 2018 • RSS-139, Issue 3, July 2015 • SRSP-513, Issue 3, July 2015
Frequency Band	1710-1780 MHz (Rx); 2110-2180 MHz (Tx) E-UTRAN Band 66
Operation Mode(s)	MIMO: 2x5W
FCC Part 15 Subpart B Section 15.109 Class B, ICES-003	Passed (Data in FCC Part 15 Test Report)
Date Tested	March 12 – May 29, 2018
Type of Application	Class II Permissive Change of Authorized Equipment
Submission Type	N/A
Test Laboratory	Nokia Global Product Compliance Laboratory 600-700 Mountain Avenue Murray Hill, New Jersey 07974-0636 USA FCC Registration No/Designation No: 515091/US5302
Test Engineers	J. Yadav, M. Soli

The above product has been evaluated and found to be in compliance with the Commission's Rules and Regulations set forth in the above standards.

FCC Section 2.911(e) Certification of Technical Test Data

The technical test data presented in this report are accurate.

2 SUMMARY OF THE TEST RESULTS

Applied Standards: 47 CFR FCC Part 27 Subpart C and IC RSS-139				
Section	**FCC/IC Rules**	**Description of Tests**	**Test Condition**	**Results In Compliance**
4.4	FCC 2.1046 & 27.50(d), RSS-GEN Section 6.12, RSS-139 Sections 4.1 & 6.5	RF Power Output	Conducted	Yes
4.5	FCC 2.1051 & 27.53, RSS-GEN Section 6.13, RSS-139 Section 6.6	Out-of-Band Emissions at Antenna Terminals		Yes
4.6	FCC 2.1051 & 27.53, RSS-GEN Section 6.13, RSS-139 Section 6.6	Spurious Emissions at Antenna Terminals		Yes
4.7	FCC 2.1053 & 27.53, RSS-GEN Section 8.9 & RSS-139 Section 6.6	Field Strength of Spurious Radiation	Radiated	Yes
4.8	RSS-Gen Sections 5.3 & 7.3	Spurious Emissions at Receiver Antenna Terminals	Conducted	Yes

2.1. Measurement Uncertainties for EMC Conducted and Radiated Emissions

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.

Worst-Case Estimated Measurement Uncertainties

Standard, Method or Procedure	**Condition**	**Frequency MHz**	**Expanded Uncertainty (k=2)**
a. EMC Emissions, (*e.g.*, ANSI C63.4, CISPR 11, 14, 22, *etc.*, using ESHS 30, EMC-60, LISNs/AMNs and antennas)	Conducted Emissions	0.009 - 30	± 2.0 dB
	Radiated Emissions (AR4 - AR9 Semi-Anechoic Chambers)	30 – 200 200 – 1000	±5.1 ~ ±5.4 dB ±4.3 ~ ±4.7 dB
	Radiated Emissions (OATS)	1000 – 18,000	±3.3 dB

2.2. Measurement Uncertainties for Antenna Port Conducted Testing

Worst-Case Estimated Measurement Uncertainties

Standard, Method or Procedure	**Expanded Uncertainty (k=2)**
RF Power	± 1.4 dB
Occupied Bandwidth	± 2.2 dB
Conducted Spurious Emissions	± 2.8 dB

3 GENERAL INFORMATION

3.1 Product Descriptions

Table 3.1.1 Product Specifications

Specification Items	Description
Product Type	MBO B66
Radio Type	Intentional Transceiver
Power Type	-48VDC
FCC/IC Rules	47 CFR Part 27 Subpart C
Modulation	OFDM (QPSK, 16QAM, 64QAM, 256QAM)
Technology	LTE-FDD
Frequency Range	1710-1780 MHz (Rx); 2110-2200 MHz (Tx) E-UTRAN Band 66
Channel Bandwidth(s)	5/10/15/20MHz
MIMO	2x5W
Max Rated Conducted RF Power	5W (37.0 dBm) per port and 10W (40dBm) total
Maximum No of Carrier per Port	2
Software Version	FLF18P
Hardware Version	101
Antennas	Detached

The above equipment has been certified for operating in the Band 66 with the maximum rated RF output power of 5W (37.0 dBm) per port. Single carrier configurations were authorized for 5MHz, 10MHz, 15MHz and 20MHz bandwidth. The measurement results for the above evaluations can be found in the test report under TR2016-0155. This new change is to add contiguous and non-contiguous dual carriers of 5+5, 10+10, 15+15 and 20+20 MHz configurations. The total output power and modulations remain unchanged. Since 5MHz, 10MHz, 15MHz and 20MHz carriers have been authorized, only the RF output power and unwanted emissions need to be evaluated for its compliance with FCC and IC requirements.

3.2 Accessories

A Nokia BBU, ASMi, was used for all testing. ASMi consists of an ASIA system module circuit pack and an ABIA baseband sub-module circuit pack. The ASMi was connected to the MBO through fiber connection. The above accessory device is unmodified and is commercially available.

3.3 Description of Antenna(s)

The product does not incorporate integrated antennas.

4 REQUIRED MEASUREMENTS AND RESULTS

4.1 Regulatory Requirements

The tests in this report were performed for AWS equipment operating in the 2110-2180 MHz (Tx)/1710-1780 MHz (Rx) in accordance with the requirements of FCC CFR 47 Part 27 Subpart C and IC RSS-GEN and RSS-139. The requirements are provided in the following:

(1) RF Power Output (FCC 27.50(d), RSS-139 Sections 4.1 & 6.5) & SRSP-513 Section 5)

Power measurements for transmissions may be made either in accordance with a Commission-approved average power technique or in compliance with peak transmit power. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

FCC 27.50(d) and SRSP-513 stated that for fixed and base stations operating within the frequency range 2110-2180 MHz with a channel bandwidth greater than 1 MHz, the maximum permissible EIRP is 1640 watts/MHz EIRP with an antenna height above average terrain (HAAT) up to 300 metres.

When multiple antennas are used at a station to transmit the same digital data in a given symbol period (even with different coding or phase shifts) for transmit diversity or to steer signal energy towards a particular direction for enhanced directional gain (i.e. beamforming) or to devise any other transmission mode where signals from different antennas are correlated, the EIRP shall be calculated based on the aggregate power conducted across all antennas and resulting directional gain 10 log10(N) + Gmax dBi. Here, N is the number of antennas and Gmax is the highest gain in dBi among all antennas.

When multiple antennas are used at a station in which each antenna transmits different digital data during any given symbol period (i.e. space-time codes) or independent parallel data stream over the same frequency bandwidth in order to increase data rates (i.e. spatial multiplexing), or forms any other transmission mode where signals from different antennas are completely uncorrelated, the EIRP shall be calculated based on the aggregate power conducted across all antennas and maximum antenna gain Gmax.

(2) Unwanted Emission Limitations (FCC 2.1051 & 27.53, IC RSS-139 Section 6.6 & RSS-GEN Section 6.13).

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 1 MHz or 1 percent of emission bandwidth, as specified).

The power of any unwanted emissions measured shall be attenuated (in dB) below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} P$.

Table 4.1.1 FCC Part 27 and RSS-139 Transmitter Unwanted Emission Limits

Frequency	Limits w/o MIMO	Minimum Resolution Bandwidth of Spectrum Analyzer*
1MHz Bands Immediately Outside Transmitting Channel Edges	-13dBm	1% of the occupied bandwidth
Beyond 1MHz Bands Immediately Outside Transmitting Channel Edge	-13dBm	1MHz

*A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz, or 1% or 2% of the occupied bandwidth, as applicable.

RSS-GEN Section 6.13 stated when limits are expressed in absolute terms, compliance with the emission limits below 1GHz shall be demonstrated using a CISPR quasi-peak detector and the related measurement bandwidth. As an alternative to CISPR quasi-peak measurement, compliance with the emission limits can be demonstrated using measuring equipment employing a peak detector function properly adjusted for factors such as pulse desensitization as required, with an equal or greater measurement bandwidth relative to the applicable CISPR quasi-peak bandwidth. Above 1G Hz, compliance with the emission limits shall be demonstrated using an average detector with a minimum resolution bandwidth of 1 MHz.FCC 2.1057 and RSS-GEN stated that in measuring unwanted emissions, the spectrum shall be investigated from 30 MHz or the lowest radio frequency signal generated in the equipment, whichever is lower, without going below 9 kHz, up to at least to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower if the equipment operates below 10 GHz.Particular attention should be paid to harmonics and sub-harmonics of the carrier frequency, as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. *Radiation* at the frequencies of multiplier stages should also be checked.

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value need not be reported.

(3) Field Strength of Spurious Radiation (FCC 2.1053, FCC KDB 971168 D01 Section 7, RSS-139 Section 6.6, RSS-Gen Section 8.9)

FCC KDB 971168 D01 Section 7 stated that when antenna-port *conducted* measurements (per Section 2.1051) are performed to demonstrate compliance to the applicable unwanted emission limits, a separate radiated measurement (per Section 2.1053) is required to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation.

These measurements are performed with the transmit antenna port(s) terminated. Unless otherwise specified in the applicable rule section, the same limits applicable to spurious (unwanted) emissions at the antenna terminals also apply to radiated spurious emissions. For example, the out-of-band emission limit has been generally applied for conducted and radiated unwanted emission test data for equipment authorization compliance reporting purposes.

(4) Receiver Spurious Emissions (RSS-GEN Sections 5.3 and 7.4)

RSS-GEN Section 5.3 stated that all receivers in all frequency bands shall comply with the limits set forth in RSS-Gen.

The radiated method is preferred. Radiated emission measurements *shall be performed with the receiver antenna* connected. The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is higher, to at least 5x the highest tunable or local oscillator frequency, whichever is higher, without exceeding 40 GHz. The radiated limits specified for spurious emissions from receivers are identical to ICES-003 Class B emission limits.

If the receiver has a detachable antenna of known impedance, an antenna-conducted spurious emissions measurement is permitted as an alternative to radiated measurement. The antenna-conducted test shall be performed with the antenna disconnected and with the receiver antenna terminals connected to a measuring instrument having equal impedance to that specified for the antenna. The receiver-spurious emissions measured at the antenna terminals by the antenna-conducted method shall not exceed 2 nW (57dBm) in the band 30-1000 MHz, nor 5 nW (53dBm) above 1000 MHz.

For emissions at frequencies below 1 GHz, measurements shall be performed using a CISPR quasi-peak detector and the related measurement bandwidth. At frequencies above 1 GHz, measurements shall be performed using a linear average detector with a minimum resolution bandwidth of 1 MHz. As an alternative to CISPR quasi-peak or average measurements, compliance with the emission limit can be demonstrated using measuring equipment employing a peak detector function properly adjusted for factors such as pulse desensitization, as required, with a measurement bandwidth equal to, or greater than, the applicable CISPR quasi-peak bandwidth or 1 MHz bandwidth, respectively.

Table 4.1.2 RSS-GEN Receiver Conducted Spurious Emission Limits*

Frequency	Limit (dBm)	Minimum RBW of Spectrum Analyzer
Max{ f_L, 30 MHz} – 1GHz	-57	100 kHz, QP or Peak
1GHz – 5 x f_H	-53	1MHz, Ave or Peak

*The impact of MIMO on the limits has not been included.

4.2 AWS Band Carrier Frequencies

Table 4.2.1 PCS (2110-2170MHz) Frequency Band

PCS Blocks	Tx Frequency (MHz)	Rx Frequency (MHz)	Bandwidth (MHz)
A	2110 - 2120	1710 - 1720	10
B	2120 - 2130	1720 - 1730	10
C	2130 - 2135	1730 - 1735	5
D	2135 - 2140	1735 - 1740	5
E	2140 - 2145	1740 - 1745	5
F	2145 - 2155	1745 - 1755	10
G	2155 - 2160	1755 - 1760	5
H	2160 - 2165	1760 - 1765	5
I	2165 - 2170	1765 - 1770	5

Table 4.2.2(a) Test Configurations for Contiguous Dual Carriers 2x5W with 2.5W (34.0dBm) Per Carrier Per Port

Test Configuration	Carrier Freq (MHz)	Channel Bandwidth (MHz)
1	2112.5 + 2117.5	5+5 MHz Contiguous
	2172.5.0 + 2177.5	5+5 MHz Contiguous
2	2115.0 + 2125.0	10+10 MHz Contiguous
	2165.0 + 2175.0	10+10 MHz -Contiguous
3	2117.5 + 2132.5	15+15 MHz Contiguous
	2157.5.0 + 2172.5	15+15 MHz Contiguous
4	2120.0 + 2140.0	20+20 MHz Contiguous
	2150.0 + 2170.0	20+20 MHz -Contiguous

Table 4.2.2(b) Test Configurations for Non-Contiguous Dual Carriers 2x5W with 2.5W (34.0dBm) Per Carrier Per Port

Test Configuration	Carrier Freq (MHz)	Channel Bandwidth (MHz)
1	2112.5 + 2167.5	5+5 MHz Non-Contiguous
2	2115.0 + 2165	10+10 MHz Non-Contiguous
3	2117.5.0 + 2162.5	15+15 MHz Non-Contiguous
4	2120.0 + 2160.0	20+20 MHz Non-Contiguous

4.3 Test Configurations and Setup

All measurements were performed with the EUT (Equipment Under Test) transmitting at 100% duty cycle (at least 98% if required by the EUT for amplitude control purposes) at the maximum rated power control level.

RF power output and unwanted emissions were evaluated for the compliance with FCC/IC requirements for all modulation types QPSK/16QAM, 64QAM and 256QAM. Both the modulation characteristics and 26dB emission bandwidth for QPSK/16QAM, 64QAM and 256QAM were verified as well.

The test setup diagrams are given below.

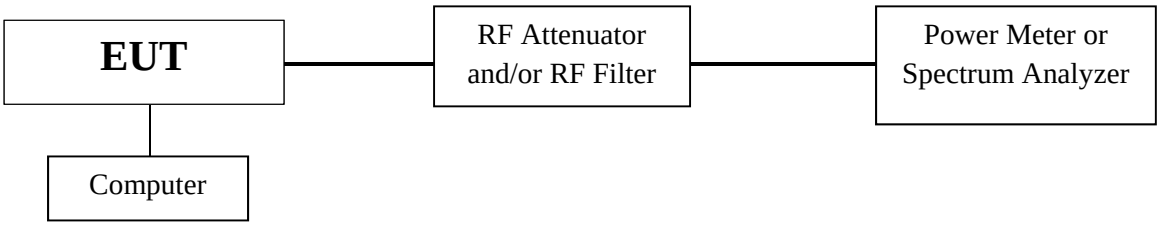


Figure 4.3.1 Setup Diagram of Conducted Tests for RF Output Power, Modulation Characteristics, Occupied Bandwidth and Unwanted Emissions.

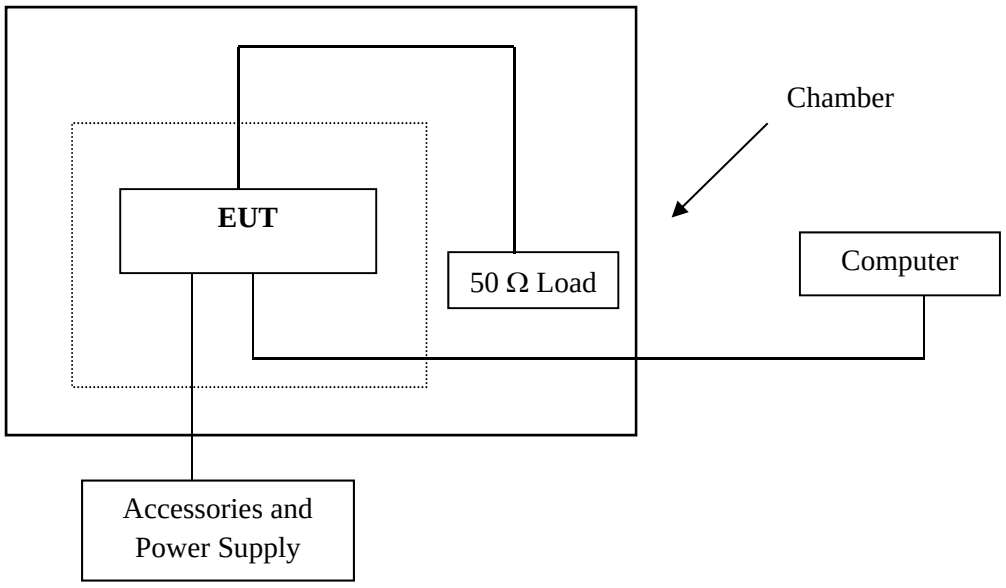


Figure 4.3.2 Setup Diagram of Radiated Test

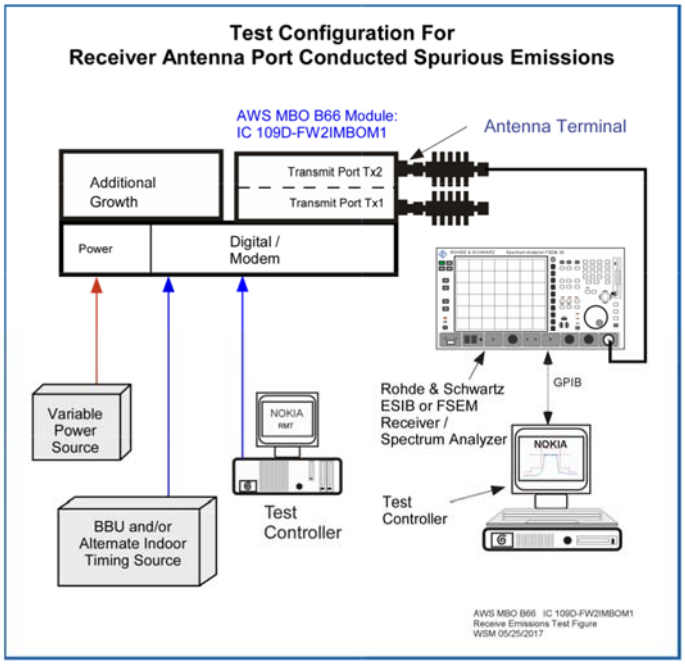


Figure 4.3.3. Receiver Spurious Test Set-up Diagram

4.4 MEASUREMENT REQUIRED: MAXIMUM POWER OUTPUT – FCC SECTIONS 2.1046 & 27.50(d) & IC RSS-GEN SECTION 6.12, RSS-139 SECTIONS 4.1 & 6.5)

The maximum ouput power was measured at one antenna port (port 1) during the Unwanted Out of Band Emissions tests. The measurement follows the procedures given in ANSI C63.26-2015 and FCC KDB 971168 D01.

The output power of the EUT was first verified by a power meter and then measured by a spectrum analyzer.

The Peak-to-Average Power Ratio (PAPR) of RRH has also been verified per KDB 971168 procedures for each of 5, 10, 15 and 20 MHz LTE carriers. The PAPR values (0.1% probability) measured are all below the 13dB requirement per 27.50 (b) and RSS-139 Section 6.5.

Table 4.4.1 (a) PAPR for 5+5 MHz Carriers

Configurations	Modulation	PAR for Contiguous Carriers (dB)	Limit (dB)	Test Results
2112.5 (5MHz) + 2117.5 (5MHz)	Q/16QAM	7.22	13	Pass
	64QAM	7.20		Pass
	256QAM	724		Pass
2172.5.0 (5MHz) + 2177.5 (5MHz)	Q/16QAM	7.24		Pass
	64QAM	7.24		Pass
	256QAM	7.25		Pass

Table 4.4.1 b) PAPR for 10+10 MHz Carriers

Configurations	Modulation	PAR for Contiguous Carriers (dB)	Limit (dB)	Test Results
2115 (10MHz) + 2125 (10MHz)	Q/16QAM	7.23	13	Pass
	64QAM	7.24		Pass
	256QAM	729		Pass
2165.0 (10MHz) + 2175 (10MHz)	Q/16QAM	7.27		Pass
	64QAM	7.31		Pass
	256QAM	7.28		Pass

Table 4.4.1 (c) PAPR for 15+15 MHz Carriers

Configurations	Modulation	PAR for Contiguous Carriers (dB)	Limit (dB)	Test Results
2117.5 (15MHz) + 2132.5 (15MHz)	Q/16QAM	8.17	13	Pass
	64QAM	8.06		Pass
	256QAM	8.04		Pass
2157.5.0 (15MHz) + 2172.5 (15MHz)	Q/16QAM	8.14		Pass
	64QAM	8.10		Pass
	256QAM	8.04		Pass

Table 4.4.1 (d) PAPR for 20+20 MHz Carriers

Configurations	Modulation	PAR for Contiguous Carriers (dB)	Limit (dB)	Test Results
2120 (20MHz) + 2140 (20MHz)	Q/16QAM	8.12	13	Pass
	64QAM	8.14		Pass
	256QAM	8.25		Pass
2150 (20MHz) + 2170 (20MHz)	Q/16QAM	8.14		Pass
	64QAM	8.11		Pass
	256QAM	8.25		Pass

Table 4.4.1 (e) PAPR for 5+5 MHz Non-Contiguous Carriers

Configurations	Modulation	PAR for Non-Contiguous Carriers (dB)	Limit (dB)	Test Results
2112.5 (5MHz)	Q/16QAM	8.02	13	Pass
	64QAM	7.89		Pass
	256QAM	8.03		Pass
2167.5.0 (5MHz)	Q/16QAM	8.07		Pass
	64QAM	8.06		Pass
	256QAM	8.03		Pass

Table 4.4.1 (f) PAPR for 10+10 MHz Carriers

Configurations	Modulation	PAR for Non-Contiguous Carriers (dB)	Limit (dB)	Test Results
2115 (10MHz)	Q/16QAM	7.97	13	Pass
	64QAM	8.03		Pass
	256QAM	8.1		Pass
2165.0 (10MHz)	Q/16QAM	8.04		Pass
	64QAM	8.03		Pass
	256QAM	8.03		Pass

Table 4.4.1 (g) PAPR for 15+15 MHz Carriers

Configurations	Modulation	PAR for Non-Contiguous Carriers (dB)	Limit (dB)	Test Results
2117.5 (15MHz)	Q/16QAM	8.02	13	Pass
	64QAM	7.98		Pass
	256QAM	8.14		Pass
2162.5 (15MHz)	Q/16QAM	8.04		Pass
	64QAM	8.03		Pass
	256QAM	8.14		Pass

Table 4.4.1 (h) PAPR for 20+20 MHz Carriers

Configurations	Modulation	PAR for Non-Contiguous Carriers (dB)	Limit (dB)	Test Results
2120 (20MHz)	Q/16QAM	8.08	13	Pass
	64QAM	8.02		Pass
	256QAM	8.06		Pass
2160 (20MHz)	Q/16QAM	8.06		Pass
	64QAM	8.02		Pass
	256QAM	8.06		Pass

The measured results are all below FCC/IC required limits and are in full compliance with the Rules of the Commission.

4.5 MEASUREMENT REQUIRED: UNWANTED OUT-OF-BAND EMISSIONS – FCC SECTIONS 2.1051 & 27.53, IC RSS-GEN SECTION 6.13 & RSS-139 SECTION 6.6

The requirements of the out-of-band emissions are provided in Section 4.1. The minimum emission requirements and the setting of measurement equipment for the out-of-band and spurious emissions measurement are tabulated in the following table:

Table 4.5.1 FCC Part 27 and RSS-139 Transmitter Unwanted Emission Limits

Frequency	Limit/Port @ 2x5 (dBm)	Min RBW	Detector
1MHz Bands Immediately Outside the Tx Freq Band	-16	50 kHz for 5 MHz 100 kHz for 10 MHz 150 kHz for 15 MHz and 200 kHz for 20 MHz carrier	Ave
Outside the Above Freq Spectrum	-16	1MHz	

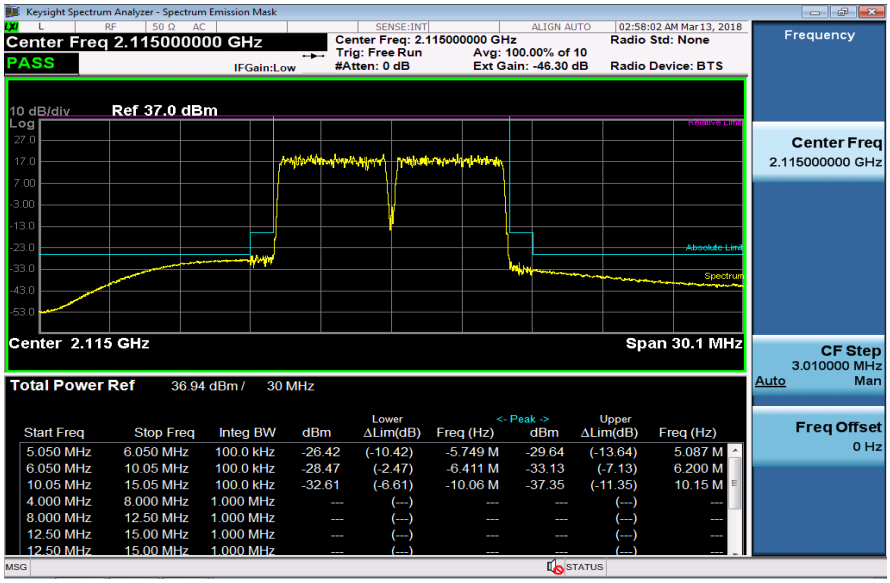
The out-of-band emissions provided in this section are the unwanted emissions outside and near the band edges. The unwanted emissions at the frequencies away from the band edges were provided in the next section.

The out-of-band emissions plots which give the minimum emission margin evaluated were shown below in Figures 4.5.1.

The unwanted out-of-band emissions with the EUT transmitting in the AWS band measured are all below FCC/IC required limits and are in full compliance with the Rules of the Commission.

Figure 4.5.1 The Unwanted Conducted Out-of-Band Emissions of the EUT, Port 1, with 2 Carriers

2112.5 & 2117.5 MHz Contiguous 64QAM (5+5 MHz)

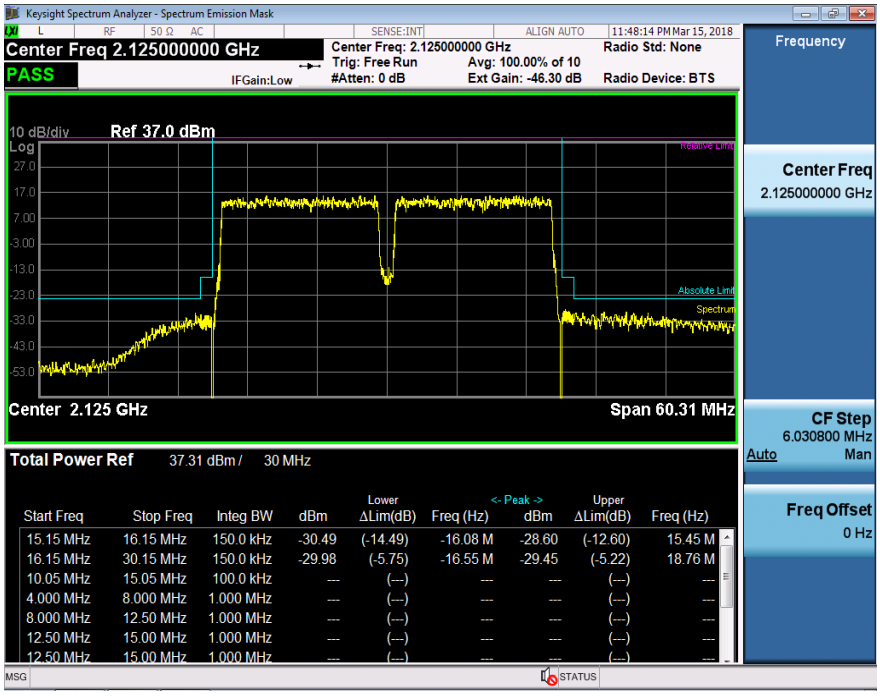


Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Upper Freq (Hz)
5.050 MHz	6.050 MHz	100.0 kHz	-26.42	(-10.42)	-5.749 M	-29.64	(-13.64)	5.087 M
6.050 MHz	10.05 MHz	100.0 kHz	-28.47	(-2.47)	-6.411 M	-33.13	(-7.13)	6.200 M
10.05 MHz	15.05 MHz	100.0 kHz	-32.61	(-6.61)	-10.06 M	-37.35	(-11.35)	10.15 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	---	(---)	---	---	(---)	---

2115 & 2125 MHz Contiguous QPSK/16QAM (10+10 MHz)

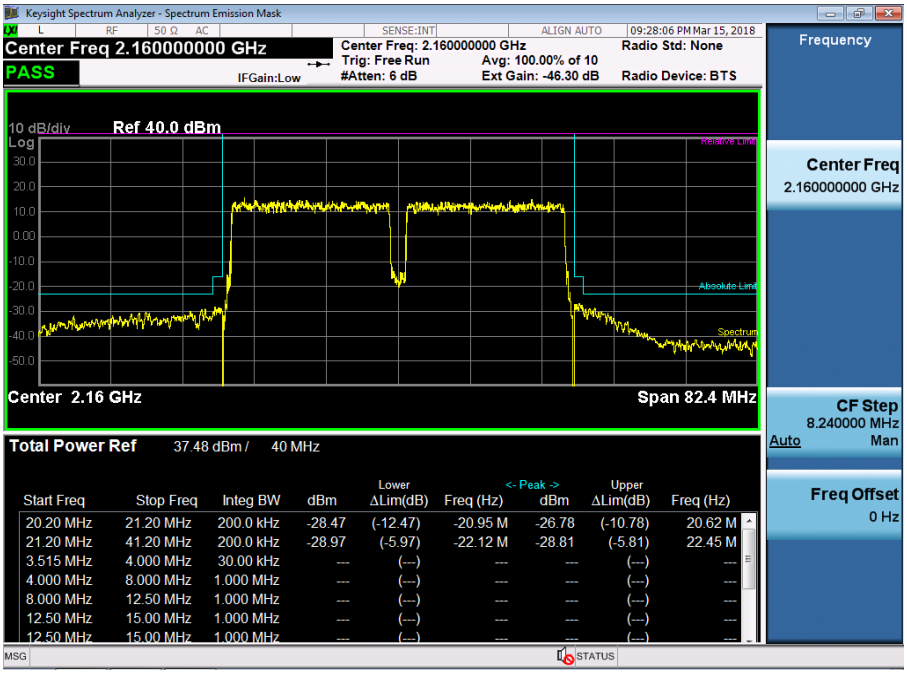
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Upper Freq (Hz)
10.10 MHz	11.10 MHz	100.0 kHz	-30.68	(-14.68)	-10.37 M	-30.19	(-14.19)	10.30 M
11.10 MHz	20.10 MHz	100.0 kHz	-33.48	(-7.48)	-11.60 M	-32.18	(-6.18)	11.37 M
10.05 MHz	15.05 MHz	100.0 kHz	---	(---)	---	---	(---)	---
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	---	(---)	---	---	(---)	---

2117.5 & 2132.5 MHz Contiguous QPSK/16QAM (15+15 MHz)



Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Upper Freq (Hz)
15.15 MHz	16.15 MHz	150.0 kHz	-30.49	(-14.49)	-16.08 M	-28.60	(-12.60)	15.45 M
16.15 MHz	30.15 MHz	150.0 kHz	-29.98	(-5.75)	-16.55 M	-29.45	(-5.22)	18.76 M
10.05 MHz	15.05 MHz	100.0 kHz	---	(---)	---	---	(---)	---
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	---	(---)	---	---	(---)	---

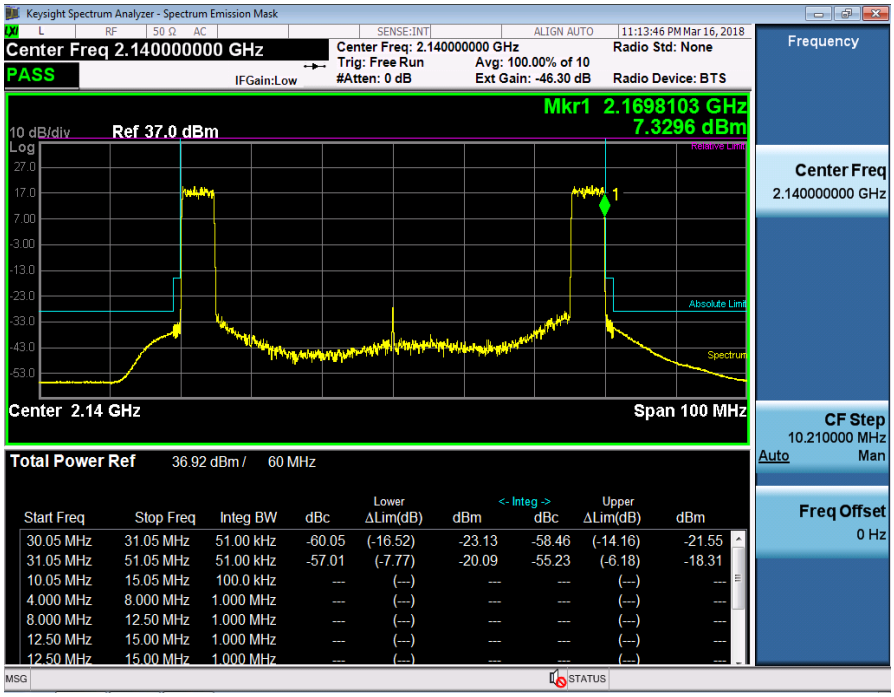
2150 & 2170 MHz Contiguous QPSK/16QAM (20+20 MHz)



Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Upper Freq (Hz)
20.20 MHz	21.20 MHz	200.0 kHz	-28.47	(-12.47)	-20.95 M	-26.78	(-10.78)	20.62 M
21.20 MHz	41.20 MHz	200.0 kHz	-28.97	(-5.97)	-22.12 M	-28.81	(-5.81)	22.45 M
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
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	---	(---)	---	---	(---)	---

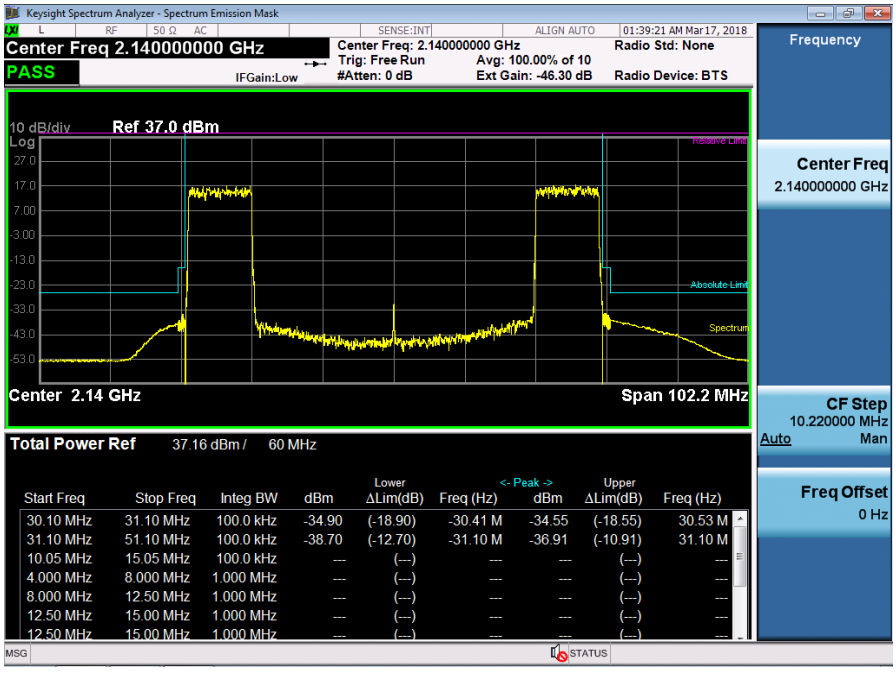
Figure 4.5.2 The Unwanted Conducted Out-of-Band Emissions of the EUT, Port 1, with 2 Carriers

2112.5 & 2167.5 MHz Non-Contiguous 64QAM (5+5 MHz)



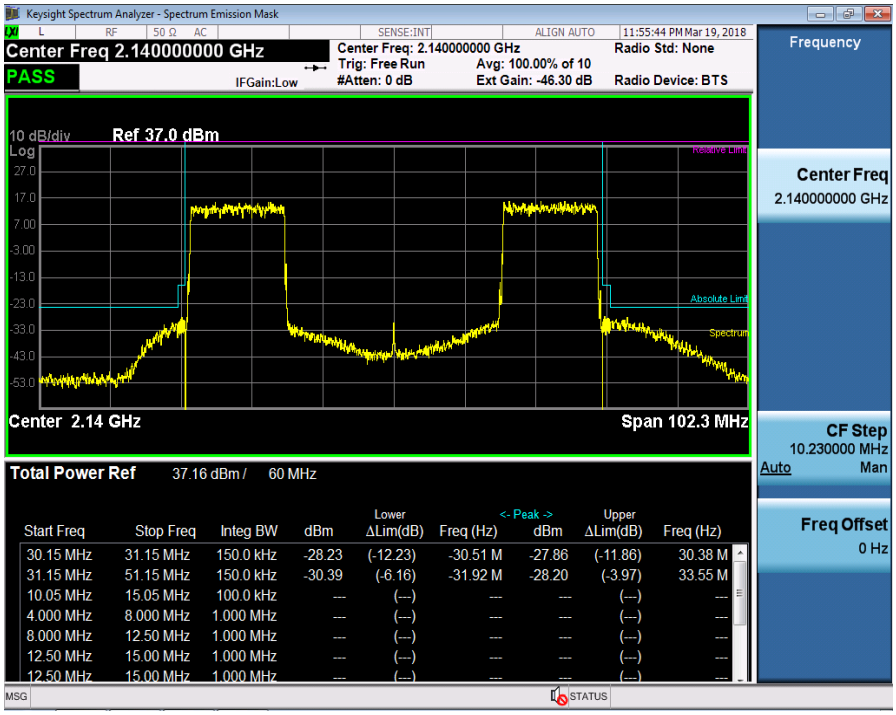
Start Freq	Stop Freq	Integ BW	dBc	Lower ΔLim(dB)	dBm	<- Integ -> dBc	Upper ΔLim(dB)	dBm
30.05 MHz	31.05 MHz	51.00 kHz	-60.05	(-16.52)	-23.13	-58.46	(-14.16)	-21.55
31.05 MHz	51.05 MHz	51.00 kHz	-57.01	(-7.77)	-20.09	-55.23	(-6.18)	-18.31
10.05 MHz	15.05 MHz	100.0 kHz	---	(---)	---	---	(---)	---
4.000 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	---	(---)	---	---	(---)	---

2115 & 2165 MHz Contiguous 64QAM (10+10 MHz)

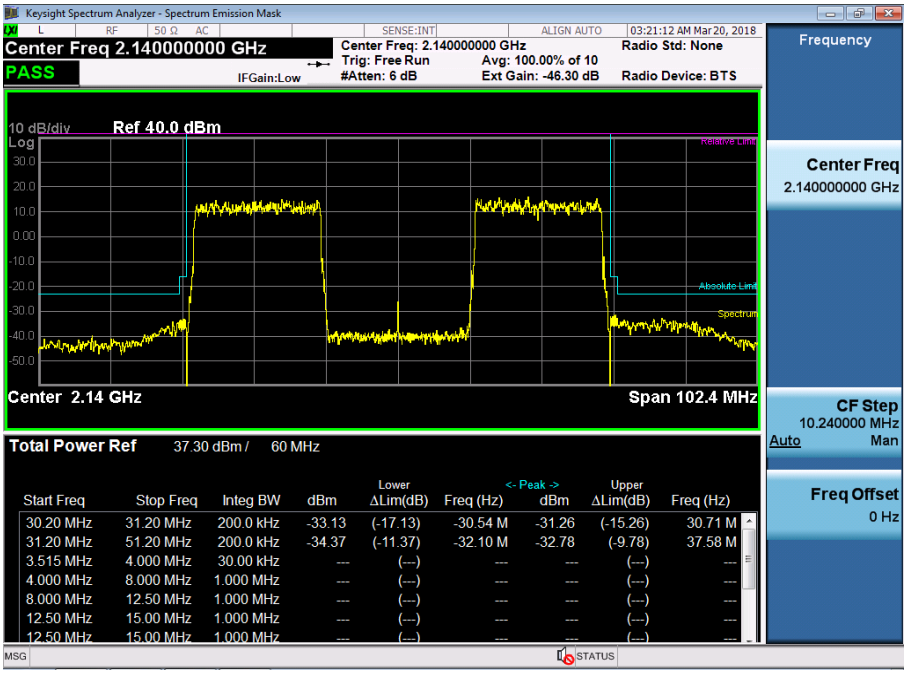


Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Freq (Hz)
30.10 MHz	31.10 MHz	100.0 kHz	-34.90	(-18.90)	-30.41 M	-34.55	(-18.55)	30.53 M
31.10 MHz	51.10 MHz	100.0 kHz	-38.70	(-12.70)	-31.10 M	-36.91	(-10.91)	31.10 M
10.05 MHz	15.05 MHz	100.0 kHz	---	(---)	---	---	(---)	---
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	---	(---)	---	---	(---)	---

2117.5 & 2162.5 MHz Non-Contiguous 256QAM (15+15 MHz)

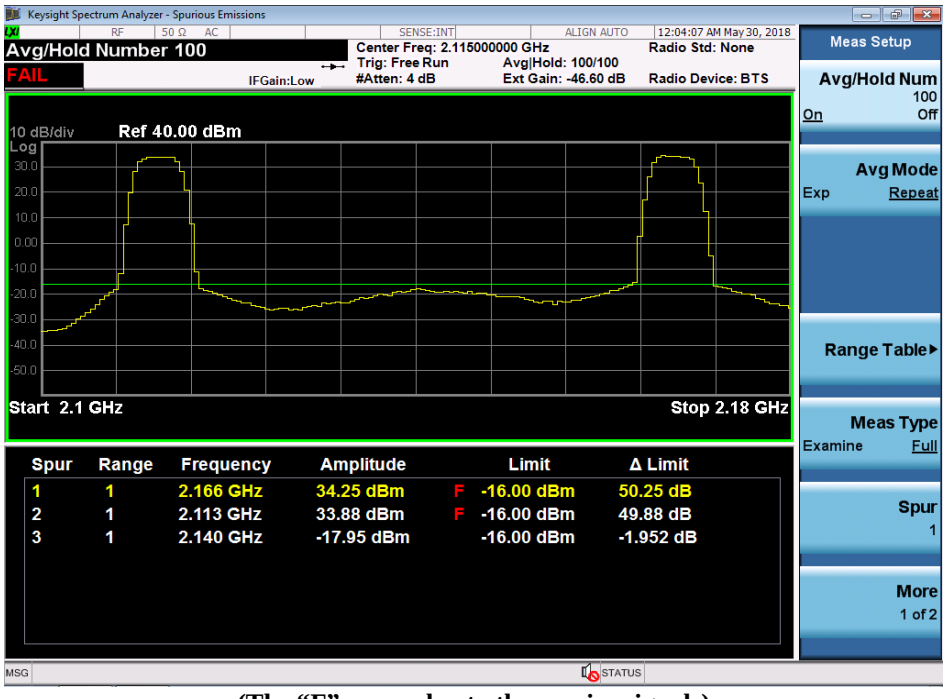


2120 & 2160 MHz Contiguous QPSK/16QAM (20+20 MHz)



Unwanted Emissions of MBO B66 Between 2C, 5W, 5+5 MBW, TM3.1A, 2112.5 and 2167.5 MHz.

Unwanted Emissions of MBO B66 Between 2C, 5W, 5+5 MBW, TM3.1A, 2112.5 and 2167.5 MHz



(The "F"s were due to the carrier signals)

4.6 MEASUREMENT REQUIRED: UNWANTED SPURIOUS EMISSIONS – FCC 2.1051 & 27.53, IC RSS-GEN SECTION 6.13 & RSS-139 SECTION 6.6

The requirements of the spurious emissions are provided in Section 4.1. The minimum emission requirements and the setting of measurement equipment for the out-of-band and spurious emissions measurement are given in the above section.

The out-of-band emissions provided in the above section are the unwanted emissions outside and near the band edges. The unwanted emissions at the frequencies away from the band edges were provided in this section.

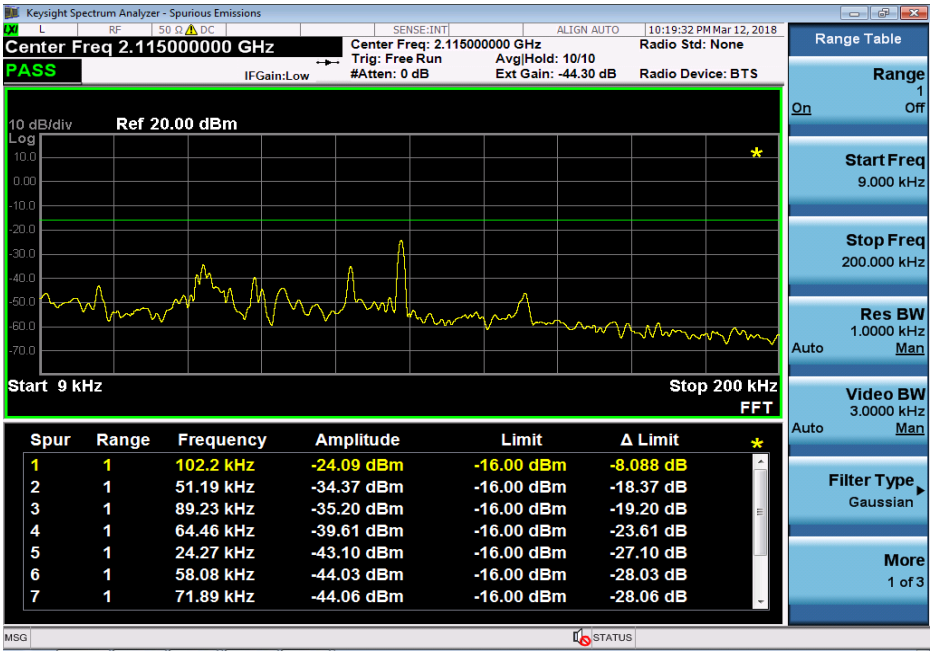
The spurious emissions between 10MHz to 22GHz were measured at one antenna port (port 1) for the configurations listed in Table 4.2.2 which has the largest seperation and usually is the worst case and with the maximum rated mean power, all modulations and all bandwidths. The measurement follows the procedures given in ANSI C63.26-2015 and FCC KDB 971168 D01.

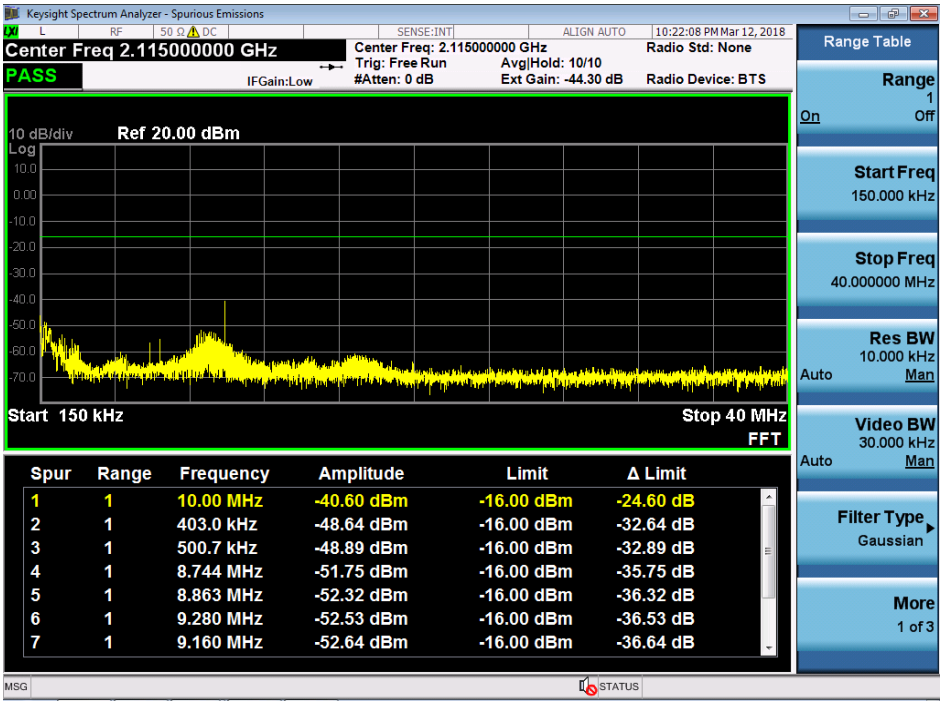
The conducted spurious emissions plots which give the minimum emission margin among evaluated were shown below in Figure 4.6.1.

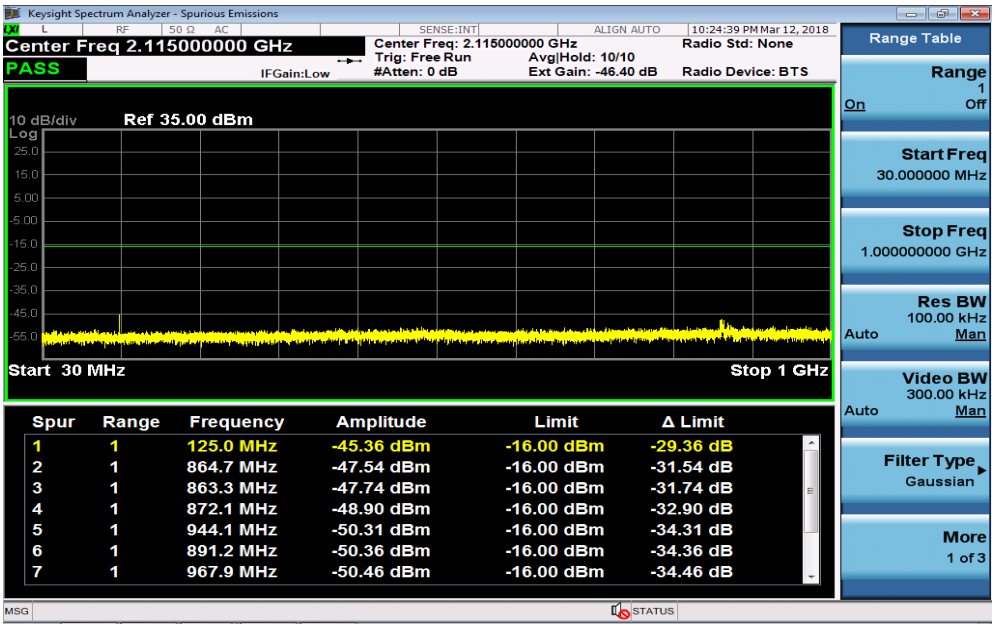
The unwanted spurious emissions with the EUT transmitting in the AWS band measured for all modulations are all below FCC/IC required limits and are in full compliance with the Rules of the Commission.

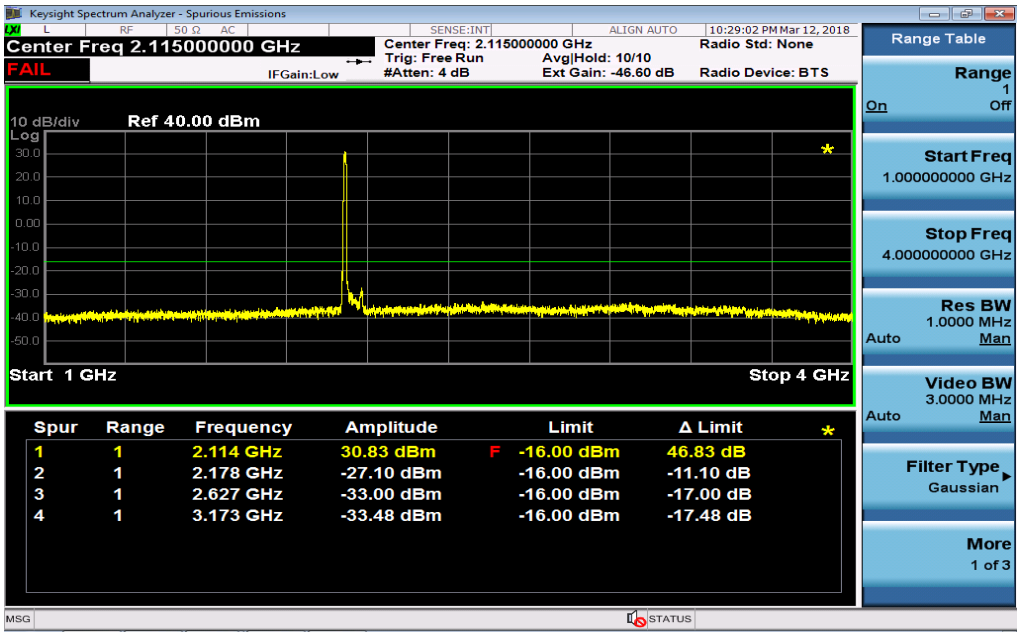
Figure 4.6.1 The Unwanted Conducted Spurious Emissions of the EUT in 30MHz-22GHz, Port 1, with 2 Carriers

2112.5 & 2117.5 MHz Contiguous QPSK & 16QAM (5+5 MHz)

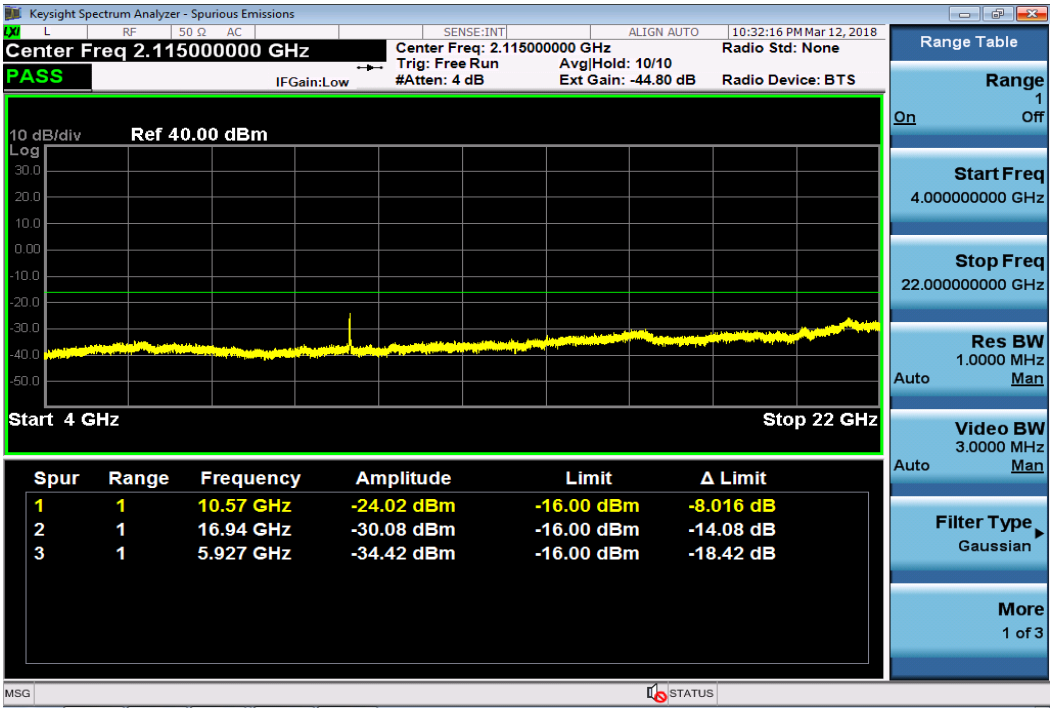




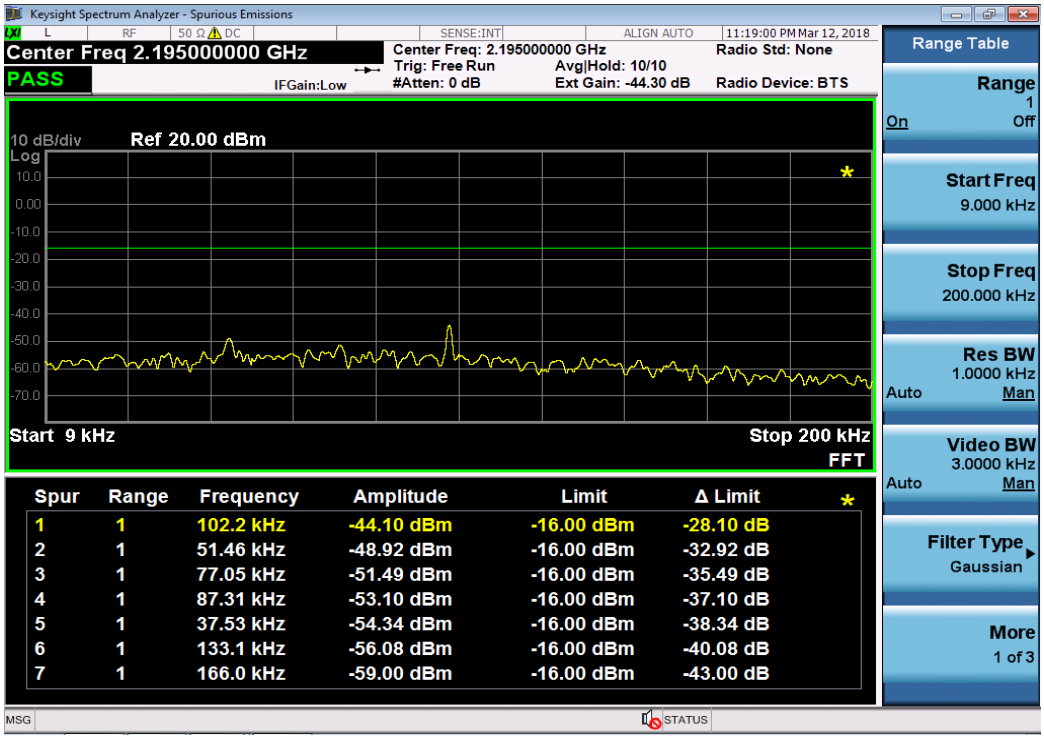


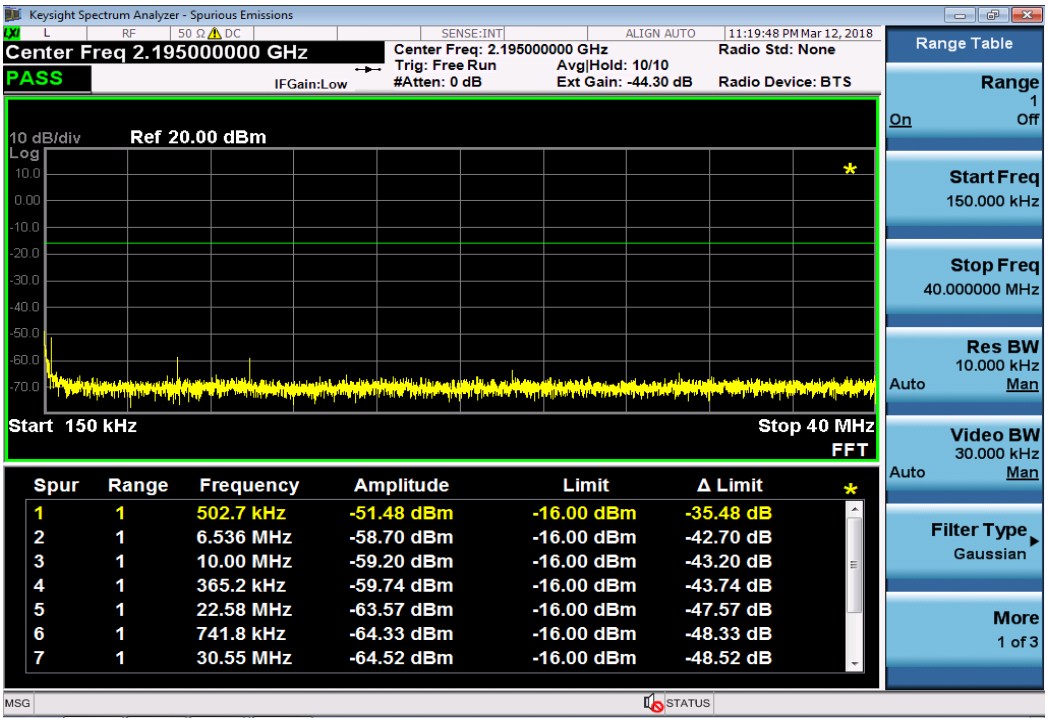


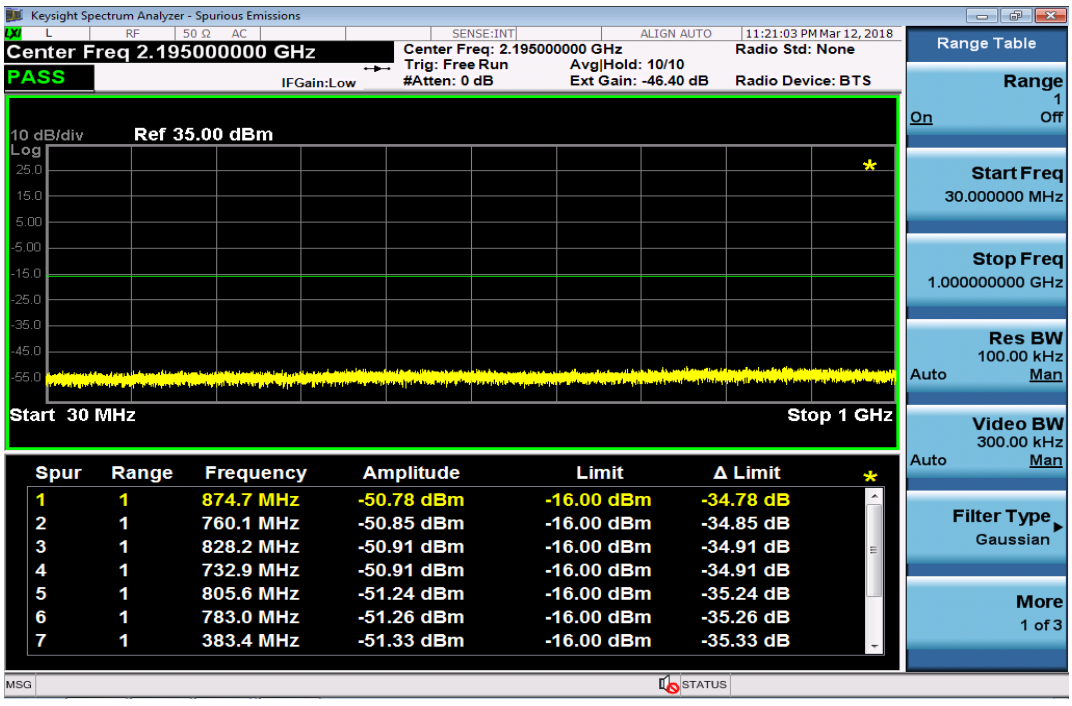
(The "F" was due to carrier signals)

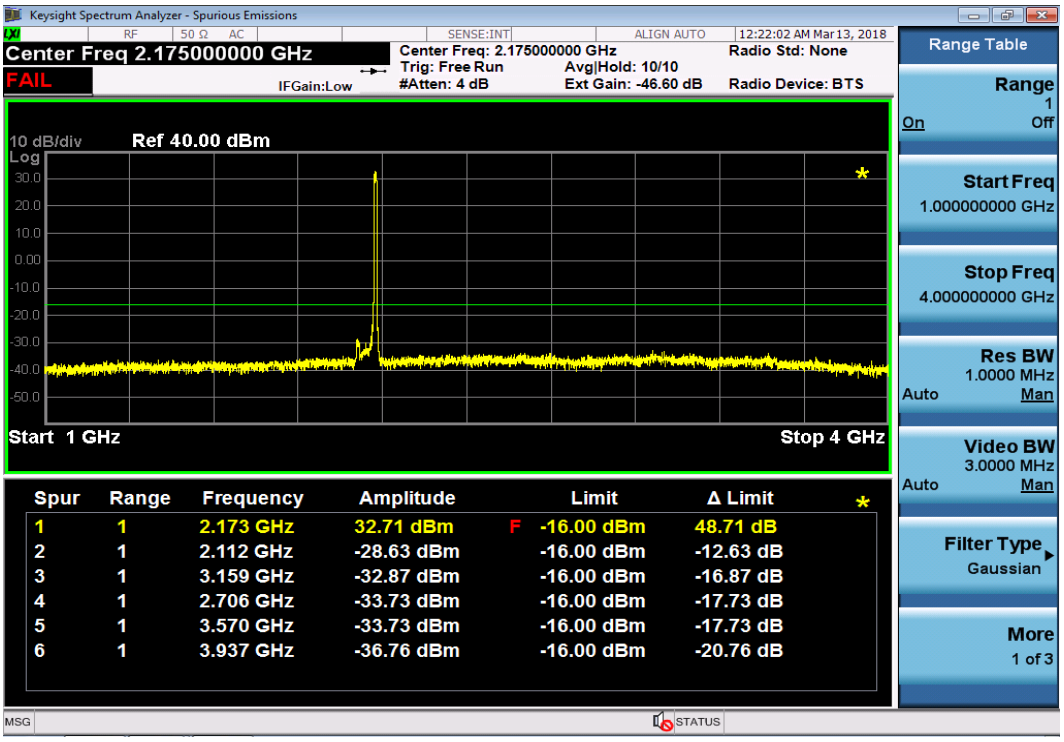


2192.5 & 2197.5 MHz Contiguous QPSK & 16QAM (5+5 MHz)

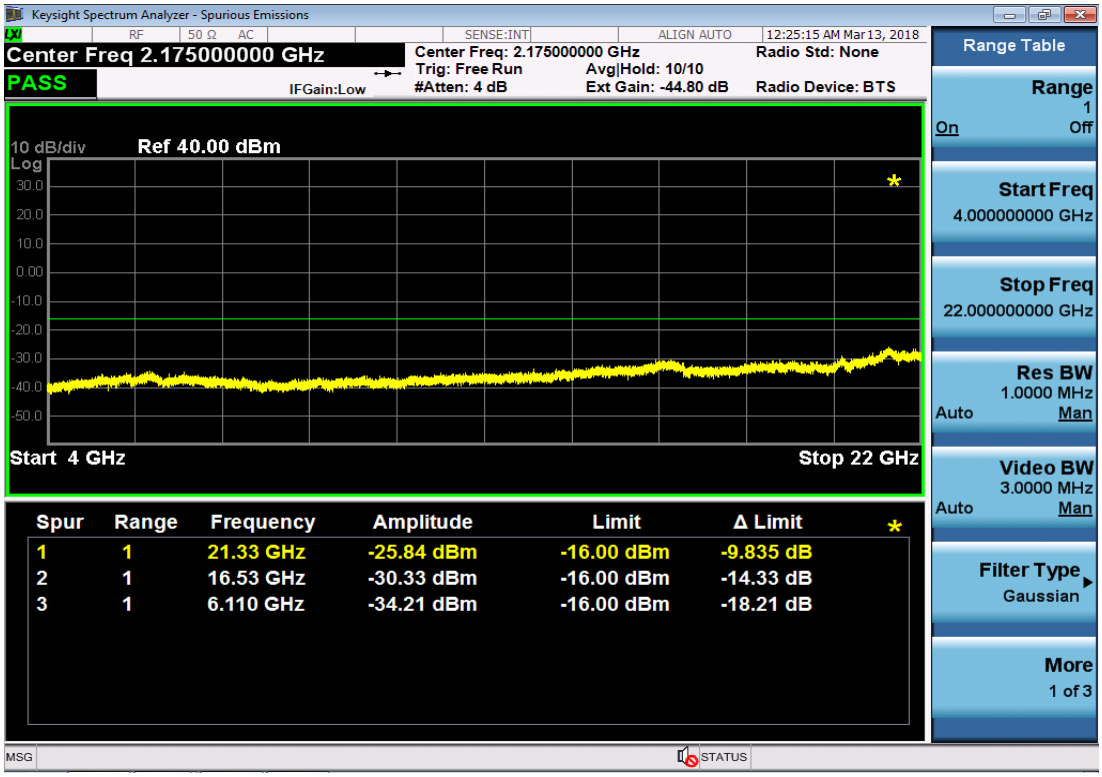



Keysight Spectrum Analyzer - Spurious Emissions
Center Freq 2.195000000 GHz
PASS
Center Freq: 2.195000000 GHz
Trig: Free Run
#Atten: 0 dB
Avg|Hold: 10/10
Ext Gain: -44.30 dB
Radio Std: None
Radio Device: BTS
11:19:48 PM Mar 12, 2018
IFGain:Low
10 dB/div
Ref 20.00 dBm
Start 150 kHz
Stop 40 MHz
FFT
Range Table
Range 1
Start Freq 150.000 kHz
Stop Freq 40.000000 MHz
Res BW 10.000 kHz
Video BW 30.000 kHz
Filter Type Gaussian
More 1 of 3
Spur Range Frequency Amplitude Limit Δ Limit
1 1 502.7 kHz -51.48 dBm -16.00 dBm -35.48 dB
2 1 6.536 MHz -58.70 dBm -16.00 dBm -42.70 dB
3 1 10.00 MHz -59.20 dBm -16.00 dBm -43.20 dB
4 1 365.2 kHz -59.74 dBm -16.00 dBm -43.74 dB
5 1 22.58 MHz -63.57 dBm -16.00 dBm -47.57 dB
6 1 741.8 kHz -64.33 dBm -16.00 dBm -48.33 dB
7 1 30.55 MHz -64.52 dBm -16.00 dBm -48.52 dB


Keysight Spectrum Analyzer - Spurious Emissions
Center Freq 2.195000000 GHz
PASS
Center Freq: 2.195000000 GHz
Trig: Free Run
#Atten: 0 dB
Avg|Hold: 10/10
Ext Gain: -46.40 dB
Radio Std: None
Radio Device: BTS
11:21:03 PM Mar 12, 2018
IFGain:Low
10 dB/div
Ref 35.00 dBm
Start 30 MHz
Stop 1 GHz
Range Table
Range 1
Start Freq 30.000000 MHz
Stop Freq 1.000000000 GHz
Res BW 100.00 kHz
Video BW 300.00 kHz
Filter Type Gaussian
More 1 of 3
Spur Range Frequency Amplitude Limit Δ Limit
1 1 874.7 MHz -50.78 dBm -16.00 dBm -34.78 dB
2 1 760.1 MHz -50.85 dBm -16.00 dBm -34.85 dB
3 1 828.2 MHz -50.91 dBm -16.00 dBm -34.91 dB
4 1 732.9 MHz -50.91 dBm -16.00 dBm -34.91 dB
5 1 805.6 MHz -51.24 dBm -16.00 dBm -35.24 dB
6 1 783.0 MHz -51.26 dBm -16.00 dBm -35.26 dB
7 1 383.4 MHz -51.33 dBm -16.00 dBm -35.33 dB



(The "F" was due to carrier signals)



4.7 MEASUREMENT REQUIRED: FIELD STRENGTH OF SPURIOUS RADIATION – FCC SECTIONS 2.1053 & 27.53 & IC RSS-GEN SECTION 8.9 & RSS-139 SECTION 6.6

The field strength measurements of radiated spurious emissions were conducted in a FCC (Site Registration Number: 515091) and IC (Filing Number: 6933F-5) registered three-meter semi-anechoic chamber AR5.

The emission limitations and the setting of measurement equipment for the conducted spurious emissions measurement of a AWS carrier were specified in FCC Sections 2.1053 & 27.53, RSS-GEN Section 8.9 & RSS-139 Section 6.6 and shown in Section 4.6.

Per KDB 971168 D01, for the radiated measurement, the field strength limit E is obtained from the Friss Transmission formula by

$$E = \frac{\sqrt{30 \cdot EIRP}}{d},$$

where

- E is the field strength in V/m;
- d is the measurement distance in m;
- EIRP is the equivalent isotropically radiated power in W.

Therefore,

$$E\ (\mathrm{dB\mu V/m}) = EIRP(dBm) - 20 * \log(d) + 104.77.$$

At 3m with P^{lim} = - 13dBm, the limit of the field strength becomes

$$E\left(\mathrm{dB\mu}\frac{\mathrm{V}}{\mathrm{m}}\right) = P(dBm) + G(dBi) + 95.22$$

$$= G(dBi) + 82.22.$$

Hence, the field strength from an ideal dipole (G=2.15dBi) is equal to 84.4 dBμV/m. The field strength of radiated spurious emissions measured was determined by

$$E\ (\mathrm{dB\mu V/m}) = V_{\mathrm{meas}}\ (\mathrm{dB\mu V}) + \text{Cable Loss (dB)} + \text{Antenna Factor (dB1/m)}.$$

FCC Sections 2.1051 and 2.1057(c) and IC RSS-GEN Section 6.13 specify that the spurious emissions attenuated more than 20 dB below the permissible value need not be reported.

The EUT was investigated from 30 MHz to the 10th harmonic of the carrier or 22 GHz, per Section 2.1057(a)(1). The EUT was setup as in the normal mode of the installation and operation and was configured to transmit two Contiguous 5MHz LTE carriers in A Block at 2112.5 MHz and 2117.5 MHz, with the maximum mean power of 5W at each antenna port of TX1 and TX2. All carriers were transmitting to non-radiating 50 Ω resistive loads. The EUT setup diagram is given in the Figure 4.3.2. The recommendations of ANSI C63.4 were followed for EUT testing setup and cabling.

Table 4.7.1 Equivalent Field Strength Limit for Spurious Emissions with 2x2 MIMO

Frequency of Emissions (MHz)	Separation Distance (m)	E (dBμV/m)	Reportable Limit (dBμV/m)	Detector/RBW
10-220,000	3	81.4	61.4	Average/1MHz

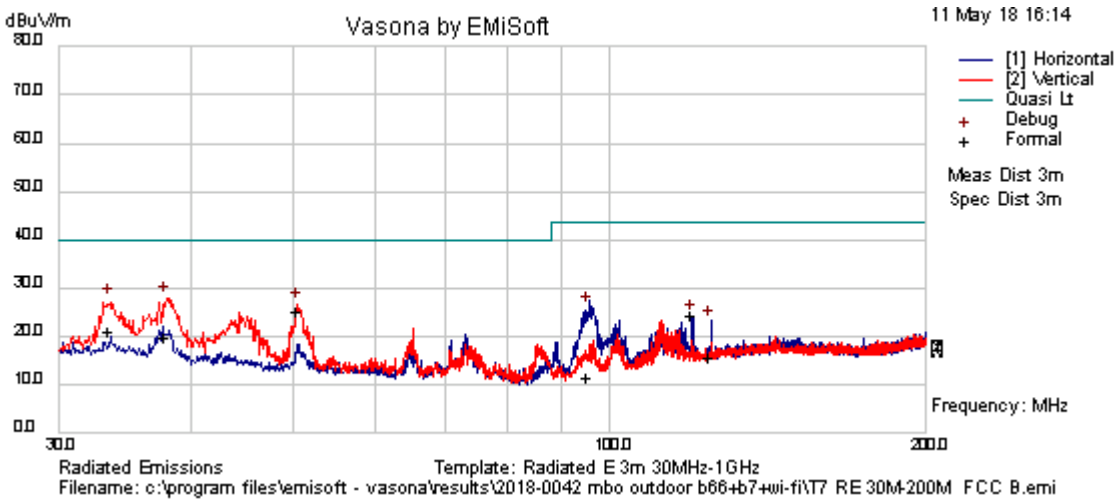
Table 4.7.1. FCC 15.109 and ICES-003 Class B Radiated Emissions Limits

Frequency (MHz)	Field Stength at 3m (dBuV/m)	RBW (kHz)	Detector
30 - 88	40		
88 - 216	43.5		
216 - 230	46	100	QP
230 - 960	46		
960 - 1000	54		
1000 - 3000	54		Ave.
	74	1000	Peak
> 3000 - 5 f_c	54		Ave.
	74	1000	Peak
5 f_c - 10 f_c / 40GHz			Ave.
		1000	Peak

Over the frequency spectrum investigated (10MHz to 22GHz), no reportable radiated spurious emissions were detected. The plots were provided below for information only. The EUT demonstrated the full compliance with the Rules of the Commission.

Figure 4.7.1 The Radiated Spurious Emissions of the EUT in 30MHz-22GHz with 2 Carriers at 2112.5MHz (5MHz) and 2117.5MHz (5MHz), 256QAM,

T7 **RE 30M-200MHz FCC Class B Limits**



Results Title:	Radiated E 3m 30MHz-1GHz
File Name:	c:\program files\emisoft - vasona\results\2018-0042 mbo outdoor b66+b7+wi-fi\T7 RE 30M-200M. FCC B.emi
Test Laboratory:	GPCL AR6MH 22C,40%RH, 1006mB
Test Engineer:	MJS
Test Software:	Vasona by EMISoft, version 2.161
Equipment:	Nokia
EUT Details:	MBO Outdoor B66+B7+Wi-Fi Model: FW2HIWB Multiband Outdoor (S) EB181111199 B66 Module: , WIFI Module: B7 Module: 120VAC 60Hz, POE Connected on Port C (Inactive), Wi-Fi Optical Ethernet on Port D , Band-7 2630 MHz , 5MHz BW 256QAM, Tx Output =37 dBm Wi-Fi 2452 MHz & 5775 MHz, TX Output = 19 dBm Dual Carrier Band-66: 2112.5 MHz (5MHz BW) & 2117.5 MHz (5 MHz BW) TM3.1, 256QAM, Each Carrier Tx Power Output Set for 34dBm (2.5 W), Pole Mount 80cm, Optical Wi-Fi cable Port D, Port B Disconnected. EUT was replaced with production model.
Configuration:	Radiated Emissions 30 MHz - 200 MHz., Test Spec: FCC Part 15 B Class B, RCVR E908, Preamp E507, 6dB pad – E1131, Bicon Antenna E051, 3M Distance, ESI- detector; Preview BW (default RBW/ default VBW); Formal BW (default RBW)
Date:	2018-05-11 16:14:26

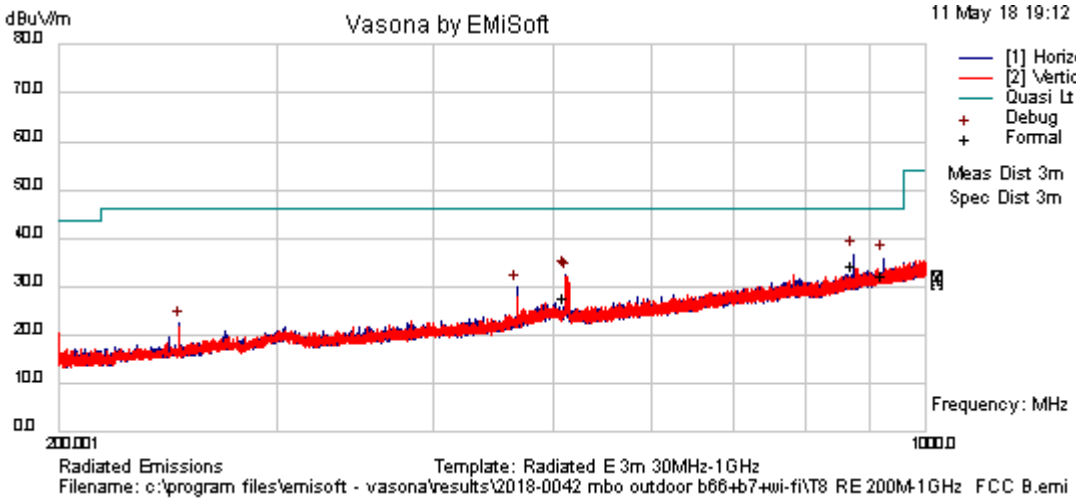
FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
50.5852	36.9	6.83	-21.5	22.23	Quasi Max	V	102	82	40	-17.77	Pass	
120.023	34.43	7.54	-20.4	21.62	Quasi Max	H	132	124	43.5	-21.88	Pass	
33.5591	30.01	6.8	-18.7	18.1	Quasi Max	V	103	214	40	-21.9	Pass	
37.984	29.49	6.81	-19.4	16.89	Quasi Max	V	131	189	40	-23.11	Pass	
125.139	25.02	7.57	-19.9	12.65	Quasi Max	H	147	115	43.5	-30.85	Pass	

FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
95.7065	24.69	7.36	-23.5	8.58	Quasi Max	H	295	308	43.5	-34.92	Pass	

PREVIEW DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
37.984	40.45	6.81	-19.4	27.85	Preview	V	105	270	40	-12.15	Pass	
33.5591	39.06	6.8	-18.7	27.15	Preview	V	105	315	40	-12.85	Pass	
50.5852	41.22	6.83	-21.5	26.55	Preview	V	205	45	40	-13.45	Pass	
95.7065	41.8	7.36	-23.5	25.69	Debug	H	105	316	43.5	-17.81	Pass	
125.139	35.25	7.57	-19.9	22.88	Debug	H	105	316	43.5	-20.62	Pass	
120.023	36.89	7.54	-20.4	24.08	Debug	H	105	316	43.5	-19.42	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement.
Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies.
Failure in preview data does not necessarily constitute failure in formal data.

T8 RE 200M-1 GHz FCC Class B



Results Title:	Radiated E 3m 30MHz-1GHz
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Test Laboratory:	GPCL AR6MH 22C,40%RH, 1006mB
Test Engineer:	MJS
Test Software:	Vasona by EMISoft, version 2.161
Equipment:	Nokia
EUT Details:	MBO Outdoor B66+B7+Wi-Fi Model: FW2HIWB Multiband Outdoor (S) EB181111199 B66 Module: , WIFI Module: B7 Module: 120VAC 60Hz, POE Connected on Port C (Inactive), Wi-Fi Optical Ethernet on Port D , Band-7 2630 MHz , 5MHz BW 256QAM, Tx Output =37 dBm Wi-Fi 2452 MHz & 5775 MHz, TX Output = 19 dBm Dual Carrier Band-66: 2112.5 MHz (5MHz BW) & 2117.5 MHz (5 MHz BW) TM3.1, 256QAM, Each Carrier Tx Power Output Set for 34dBm (2.5 W), Pole Mount 80cm, Optical Wi-Fi cable Port D, Port B Disconnected. EUT was replaced with production model.
Configuration:	Radiated Emissions 200 MHz - 1000 MHz, Test Spec: FCC Part 15 B Class B, RCVR E908, 6dB pad-E1131, Preamp E507, Log-Periodic Antenna E060, 3M Distance, ESI- detector; Preview BW (default RBW/ default VBW); Formal BW (default RBW)
Date:	2018-05-11 19:12:55

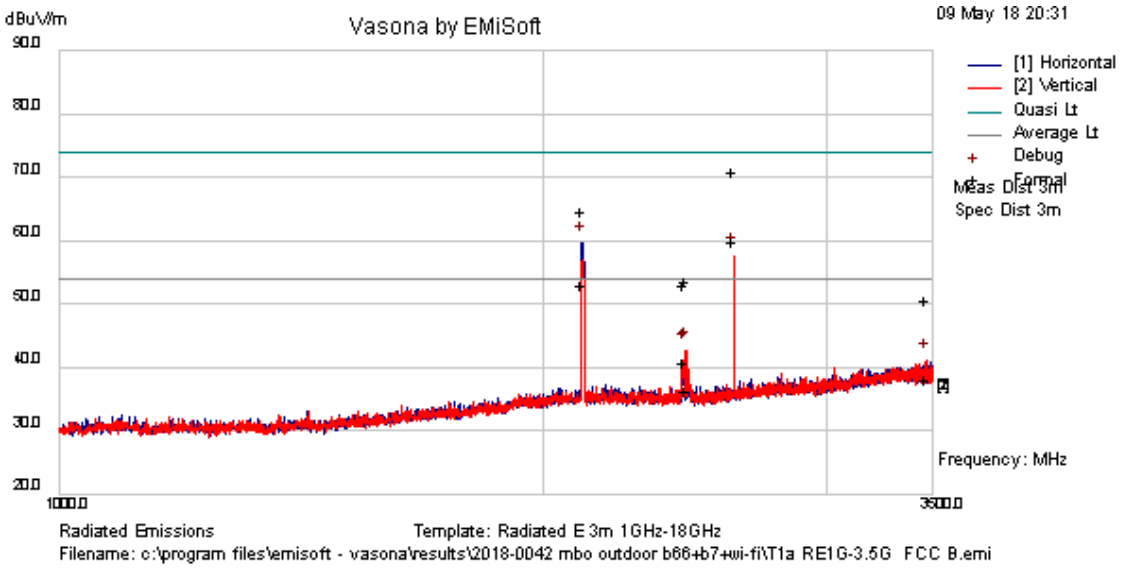
FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
874.988	29.68	9.97	-8.32	31.33	Quasi Max	H	201	188	46	-14.67	Pass	
925.036	26.23	10.1	-7.13	29.2	Quasi Max	H	208	182	46	-16.8	Pass	
511.645	28.99	8.92	-13	24.95	Quasi Peak	H	141	182	46	-21.05	Pass	

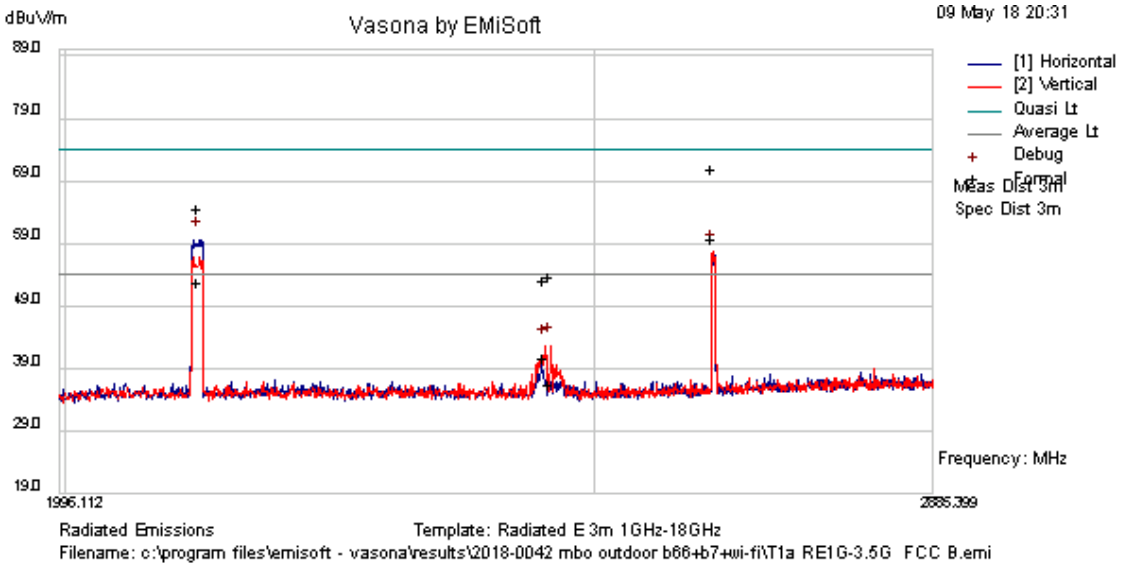
PREVIEW DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
875.05	35.07	9.97	-8.32	36.72	Preview	H	105	0	46	-9.28	Pass	

PREVIEW DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
925.07	32.82	10.1	-7.13	35.79	Preview	H	105	0	46	-10.21	Pass	
511.731	36.52	8.92	-13	32.47	Preview	H	290	90	46	-13.53	Pass	
513.559	36.21	8.92	-13	32.12	Preview	V	105	180	46	-13.88	Pass	
468.757	34.89	8.79	-14.1	29.57	Debug	H	105	316	46	-16.43	Pass	
250.071	33.15	8.06	-19.1	22.1	Debug	V	105	316	46	-23.9	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement.
Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies.
Failure in preview data does not necessarily constitute failure in formal data.

T1a RE 1G-3.5GHz FCC Class B





Results Title:	Radiated E 3m 1GHz-18GHz
File Name:	c:\program files\emisoft - vasona\results\2018-0042 MBO outdoor b66+b7+wi-fi\T1a RE1G-3.5G FCC B.emi
Test Laboratory:	GPCL AR6MH 22C,43%RH, 1006mB
Test Engineer:	MJS
Test Software:	Vasona by EMISoft, version 2.161
Equipment:	Nokia
EUT Details:	MBO Outdoor B66+B7+Wi-Fi Model: FW2HIWB Multiband Outdoor (S) EB181111199 B66 Module: , WIFI Module: B7 Module: 120VAC 60Hz, POE Connected on Port C (Inactive), Wi-Fi Optical Ethernet on Port D , Band-7 2630 MHz , 5MHz BW 256QAM, Tx Output =37 dBm Wi-Fi 2452 MHz & 5775 MHz, TX Output = 19 dBm Dual Carrier Band-66: 2112.5 MHz (5MHz BW) & 2117.5 MHz (5 MHz BW) TM3.1,

	256QAM, Each Carrier Tx Power Output Set for 34dBm (2.5 W), Pole Mount 80cm, Optical Wi-Fi cable Port D, Port B Disconnected. EUT was replaced with production model.
Configuration:	Radiated Emissions 1 GHz - 3 GHz Test Spec: FCC Part 15 B Class B, RCVR E908, Preamp E1166, 6dB pad E1132, Horn E057, 3M Distance, Straight, ESI-1G detector; Preview BW (100 kHz RBW/ 3MHz VBW); Formal BW (1 MHz RBW)
Date:	2018-05-09 20:31:07

FORMAL DATA

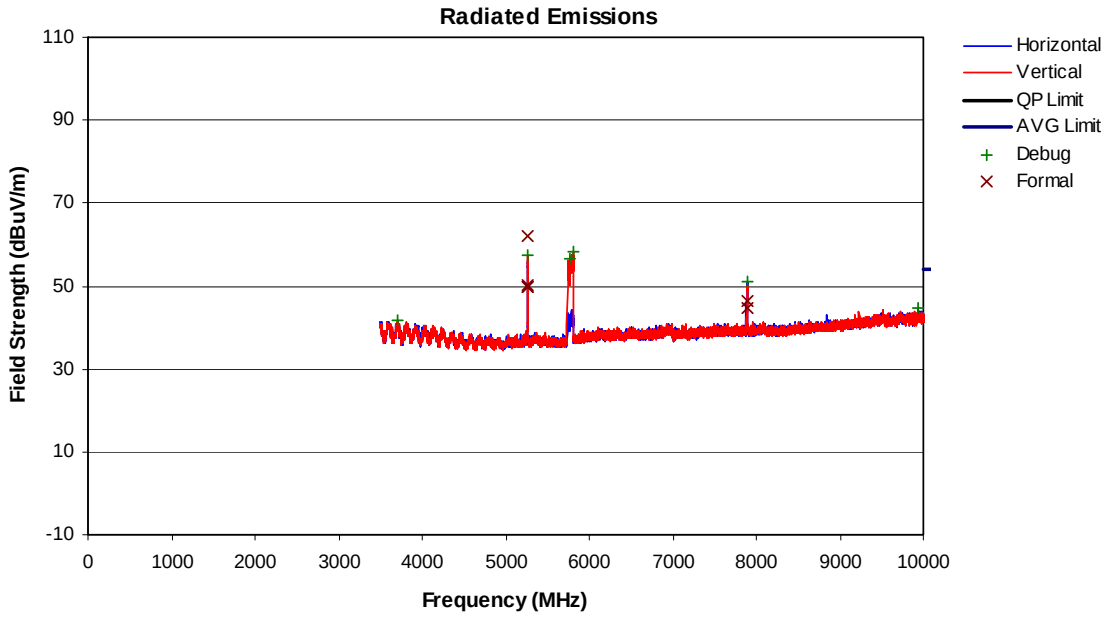
Freq. (MHz)	Raw (dBuV)	Cable (dB)	Factor (dB)	Level (dBuV/m)	Emission Type	Pol (H/V)	Ht (cm)	Az (deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail	Comments
2629.2	56.02	10.43	-9.72	56.72	Average	V	186	269	54	2.72	Fail	Tx Signal B7
2117.21	50.62	9.13	-9.85	49.9	Average	H	291	84	54	-4.1	Pass	
2629.2	67.24	10.43	-9.72	67.94	Peak	V	186	269	74	-6.06	Pass	
2117.21	62.42	9.13	-9.85	61.7	Peak	H	291	84	74	-12.3	Pass	
2449.96	37.69	10.01	-10	37.67	Average	V	125	14	54	-16.33	Pass	
3465.31	30.5	12.33	-7.84	34.99	Average	V	102	239	54	-19.01	Pass	
2455.77	33.38	10.02	-10	33.37	Average	V	102	236	54	-20.63	Pass	
2455.77	50.69	10.02	-10	50.68	Peak	V	102	236	74	-23.32	Pass	
2449.96	50.02	10.01	-10	50	Peak	V	125	14	74	-24	Pass	
3465.31	43.1	12.33	-7.84	47.59	Peak	V	102	239	74	-26.41	Pass	

PREVIEW DATA

Freq. (MHz)	Raw (dBuV)	Cable (dB)	Factor (dB)	Level (dBuV/m)	Emission Type	Pol (H/V)	Ht (cm)	Az (deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail	Comments
2117.21	60.39	9.13	-9.85	59.67	Preview	H	105	90	54	5.67	Fail	
2629.2	56.96	10.43	-9.72	57.66	Preview	V	190	270	54	3.66	Fail	
2455.59	42.73	10.02	-10	42.72	Preview	V	105	225	54	-11.28	Pass	
2449.96	42.62	10.01	-10	42.6	Preview	V	190	0	54	-11.4	Pass	
3465.31	36.68	12.33	-7.84	41.17	Preview	V	190	225	54	-12.83	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement.
Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies.
Failure in preview data does not necessarily constitute failure in formal data.

T6a RE 3.5 GHz-10 GHz FCC Class B



Results Title:	Radiated E 3m 1GHz-18GHz
File Name:	c:\program files\emisoft - vasona\results\2018-0042 mbo outdoor b66+b7+wi-fi\T6 A RE 3.5GHz-10GHz FCC B.emi
Test Laboratory:	GPCL AR6MH 22C,43%RH, 1006mB
Test Engineer:	GM
Test Software:	Vasona by EMISoft, version 2.161
Equipment:	Nokia
EUT Details:	MBO Outdoor B66+B7+Wi-Fi Model: FW2HIWB Multiband Outdoor (S) EB181111199 B66 Module: , WIFI Module: B7 Module: 120VAC 60Hz, POE Connected on Port C (Inactive), WiFi Optical Ethernet on Port D , Band-7 2630 MHz , 5MHz BW 256QAM, Tx Output =37 dBm WiFi 2452 MHz & 5775 MHz, TX Output = 19 dBm Dual Carrier Band-66: 2112.5 MHz (5MHz BW) & 2117.5 MHz (5 MHz BW) TM3.1, 256QAM, Each Carrier Tx Power Output Set for 34dBm (2.5 W), Pole Mount 80cm, Optical Wi-Fi cable Port D, Port B Disconnected. EUT was replaced with production model.
Configuration:	Radiated Emissions 1 GHz - 18 GHz. Test Spec: FCC Part 15 B Class B, RCVR E908, Preamp E1166, Horn E057, 3M Distance, Straight, ESI-1G detector; Preview BW (100 kHz RBW/ 3MHz VBW); Formal BW (1 MHz RBW)
Date:	2018-05-09 14:17:50

FORMAL DATA

Freq. (MHz)	Raw (dBuV)	Cable (dB)	Factor (dB)	Level (dBuV/m)	Emission Type	Pol (H/V)	Ht (cm)	Az (deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail	Comments
5260.06	45.68	8.91	-4.37	50.22	AvgMax	V	154	360	54	-3.78	Pass	
5260.06	45.38	8.91	-4.37	49.92	AvgMax	V	147	360	54	-4.08	Pass	
5260.06	45.05	8.91	-4.37	49.59	AvgMax	V	235	2	54	-4.41	Pass	

FORMAL DATA

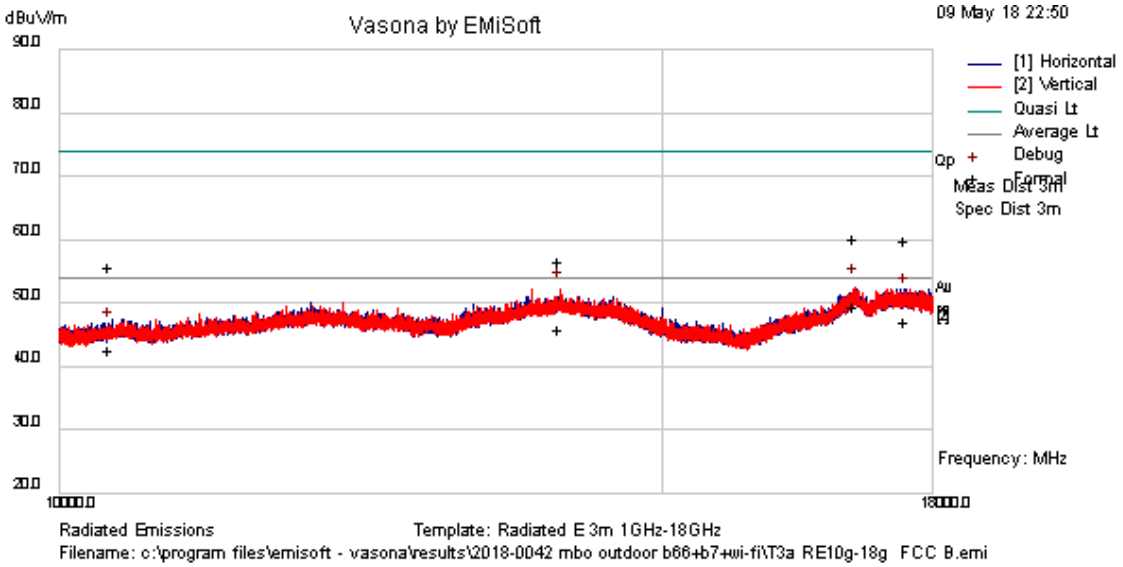
Freq. (MHz)	Raw (dBuV)	Cable (dB)	Factor (dB)	Level (dBuV/m)	Emission Type	Pol (H/V)	Ht (cm)	Az (deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail	Comments
7890.08	38.92	8.78	-1.24	46.46	AvgMax	H	145	340	54	-7.54	Pass	
7890.08	37.2	8.78	-1.24	44.74	AvgMax	H	136	344	54	-9.26	Pass	
5260.06	57.44	8.91	-4.37	61.98	Peak	V	154	360	74	-12.02	Pass	
5260.06	57.08	8.91	-4.37	61.63	Peak	V	147	360	74	-12.37	Pass	
5260.06	56.84	8.91	-4.37	61.38	Peak	V	235	2	74	-12.62	Pass	
9929.98	28.62	10.8	-0.15	39.27	AvgMax	H	245	333	54	-14.73	Pass	
7890.08	51.63	8.78	-1.24	59.16	Peak	H	145	340	74	-14.84	Pass	
7890.08	50.42	8.78	-1.24	57.96	Peak	H	136	344	74	-16.04	Pass	
3713.21	30.72	13.09	-7.13	36.69	AvgMax	V	127	216	54	-17.31	Pass	
5809.98	29.09	8.89	-3.23	34.75	AvgMax	V	272	285	54	-19.25	Pass	
5772.53	28.35	8.89	-3.32	33.92	AvgMax	V	345	168	54	-20.08	Pass	
9929.98	41.6	10.8	-0.15	52.25	Peak	H	245	333	74	-21.75	Pass	
3713.21	44.95	13.09	-7.13	50.92	Peak	V	127	216	74	-23.08	Pass	
5809.98	41.82	8.89	-3.23	47.48	Peak	V	272	285	74	-26.52	Pass	
5772.53	41.57	8.89	-3.32	47.13	Peak	V	345	168	74	-26.87	Pass	

PREVIEW DATA

Freq. (MHz)	Raw (dBuV)	Cable (dB)	Factor (dB)	Level (dBuV/m)	Emission Type	Pol (H/V)	Ht (cm)	Az (deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail	Comments
5808.02	52.45	8.89	-3.24	58.1	Preview	V	105	0	54	4.1	Fail	
5260.67	52.99	8.91	-4.37	57.53	Preview	V	190	0	54	3.53	Fail	
5770.24	50.98	8.89	-3.33	56.55	Preview	V	105	0	54	2.55	Fail	
7888.12	43.4	8.78	-1.24	50.94	Preview	H	105	0	54	-3.06	Pass	
9929.98	33.9	10.8	-0.15	44.55	Preview	H	390	180	54	-9.45	Pass	
3713.21	35.64	13.09	-7.13	41.6	Preview	V	190	270	54	-12.4	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement. Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies. Failure in preview data does not necessarily constitute failure in formal data.

T3a RE 10G-18 GHz FCC Class B



Results Title:	Radiated E 3m 1GHz-18GHz
File Name:	c:\program files\emisoft - vasona\results\2018-0042 MBO outdoor b66+b7+wi-fi\T3a RE10g-18g FCC B.emi
Test Laboratory:	GPCL AR6MH 22C,43%RH, 1006mB
Test Engineer:	MJS
Test Software:	Vasona by EMISoft, version 2.161
Equipment:	Nokia
EUT Details:	MBO Outdoor B66+B7+Wi-Fi Model: FW2HIWB Multiband Outdoor (S) EB181111199 B66 Module: , WIFI Module: B7 Module: 120VAC 60Hz, POE Connected on Port C (Inactive), WiFi Optical Ethernet on Port D , Band-7 2630 MHz , 5MHz BW 256QAM, Tx Output =37 dBm WiFi 2452 MHz & 5775 MHz, TX Output = 19 dBm Dual Carrier Band-66: 2112.5 MHz (5MHz BW) & 2117.5 MHz (5 MHz BW) TM3.1, 256QAM, Each Carrier Tx Power Output Set for 34dBm (2.5 W), Pole Mount 80cm, Optical Wi-Fi cable Port D, Port B Disconnected. EUT was replaced with production model.
Configuration:	Radiated Emissions 10 GHz - 18 GHz Test Spec: FCC Part 15 B Class B, RCVR E908, Preamp E1166, HPF E1208, Horn E057, 3M Distance, Straight, ESI-1G detector; Preview BW (100 kHz RBW/ 3MHz VBW); Formal BW (1 MHz RBW)
Date:	2018-05-09 22:50:19

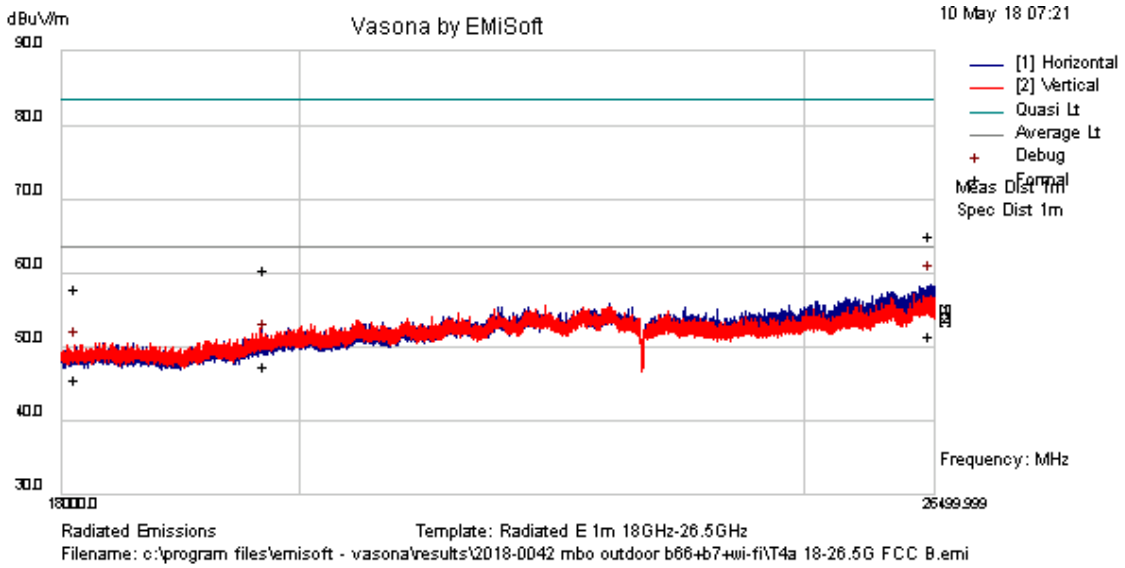
FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
17072.5	29.15	12.58	4.53	46.26	Average	H	174	268	54	-7.74	Pass	
17675	25.87	12.03	5.99	43.89	Average	V	363	176	54	-10.11	Pass	
14011.1	26.37	11.13	5.17	42.68	Average	V	181	92	54	-11.32	Pass	
10346.8	28.19	11.07	0.35	39.6	Average	V	368	243	54	-14.4	Pass	
17072.5	40.06	12.58	4.53	57.18	Peak	H	174	268	74	-16.82	Pass	

FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
17675	38.85	12.03	5.99	56.87	Peak	V	363	176	74	-17.13	Pass	
14011.1	37.27	11.13	5.17	53.57	Peak	V	181	92	74	-20.43	Pass	
10346.8	41.31	11.07	0.35	52.72	Peak	V	368	243	74	-21.28	Pass	

PREVIEW DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
17072.5	35.53	12.58	4.53	52.64	Preview	H	105	315	54	-1.36	Pass	
14011.1	35.9	11.13	5.17	52.21	Preview	V	105	180	54	-1.79	Pass	
17675	33.3	12.03	5.99	51.32	Debug	V	102	317	54	-2.68	Pass	
10346.8	34.3	11.07	0.35	45.71	Debug	V	102	317	54	-8.29	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement.
Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies.
Failure in preview data does not necessarily constitute failure in formal data.

T4a RE 18G-26.5 GHz FCC B



Results Title:	Radiated E 1m 18GHz-26.5GHz
File Name:	c:\program files\emisoft - vasona\results\2018-0042 mbo outdoor b66+b7+wi-fi\T4a 18-26.5G FCC B.emi
Test Laboratory:	GPCL AR6MH 22C,43%RH, 1006mB
Test Engineer:	MJS / EEM
Test Software:	Vasona by EMISoft, version 2.161
Equipment:	Nokia
EUT Details:	MBO Outdoor B66+B7+Wi-Fi Model: FW2HIWB Multiband Outdoor (S) EB181111199 B66 Module: , WIFI Module: B7 Module: 120VAC 60Hz, POE Connected on Port C (Inactive), Wi-Fi Optical Ethernet on Port D , Band-7 2630 MHz , 5MHz BW 256QAM, Tx Output =37 dBm Wi-Fi 2452 MHz & 5775 MHz, TX Output = 19 dBm Dual Carrier Band-66: 2112.5 MHz (5MHz BW) & 2117.5 MHz (5 MHz BW) TM3.1, 256QAM, Each Carrier Tx Power Output Set for 34dBm (2.5 W), Pole Mount 80cm, Optical Wi-Fi cable Port D, Port B Disconnected. EUT was replaced with production model.
Configuration:	Radiated Emissions 18 GHz - 26.5 GHz Test Spec: FCC Part 15 B Class B, RCVR E908, Preamp E1166 Horn E513, 1M Distance, Straight, ESI-1G detector; Preview BW (100 kHz RBW/ 3MHz VBW); Formal BW (1 MHz RBW)
Date:	2018-05-10 07:21:40

FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
26451.8	27.42	10.35	11.02	48.8	Average	H	114	349	63.5	-14.7	Pass	
19697.5	28.41	8.44	7.8	44.65	Average	V	142	327	63.5	-18.85	Pass	
18118.7	28.01	7.82	7.12	42.96	Average	V	148	26	63.5	-20.54	Pass	
26451.8	40.92	10.35	11.02	62.3	Peak	H	120	347	83.5	-21.2	Pass	
19697.5	41.57	8.44	7.8	57.81	Peak	V	142	327	83.5	-25.69	Pass	
18118.7	40.18	7.82	7.12	55.12	Peak	V	148	26	83.5	-28.38	Pass	

PREVIEW DATA

Freq. (MHz)	Raw (dBuV)	Cable (dB)	Factor (dB)	Level (dBuV/m)	Emission Type	Pol (H/V)	Ht (cm)	Az (deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail	Comments
26451.8	37.03	10.35	11.02	58.41	Preview	H	105	286	63.5	-5.09	Pass	
19697.5	34.3	8.44	7.8	50.55	Debug	V	102	354	63.5	-12.95	Pass	
18118.7	34.63	7.82	7.12	49.57	Debug	V	102	354	63.5	-13.93	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement.
Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies.
Failure in preview data does not necessarily constitute failure in formal data.

4.8 SPURIOUS EMISSIONS AT THE RECEIVER ANTENNA TERMINALS - RSS-GEN SECTIONS 5.3 & 7.4

The spurious emissions at the receiver antenna transmitting terminal were investigated from 10 MHz to the 10th harmonic of the carrier or 22 GHz, per RSS-Gen (6.2).

The carrier setup and configurations were the same but the transmit carrier was set to off.

Refer to Section 4.1 for the full requirements.

The measurements were performed with a Rohde & Schwarz EMI Receiver, which was calibrated in accordance with ISO 9001 process. The spectrum analyzer was set to a 1MHz resolution bandwidth and used the specified detector functions. Measurements were performed in compliance with ANSI C63.26.

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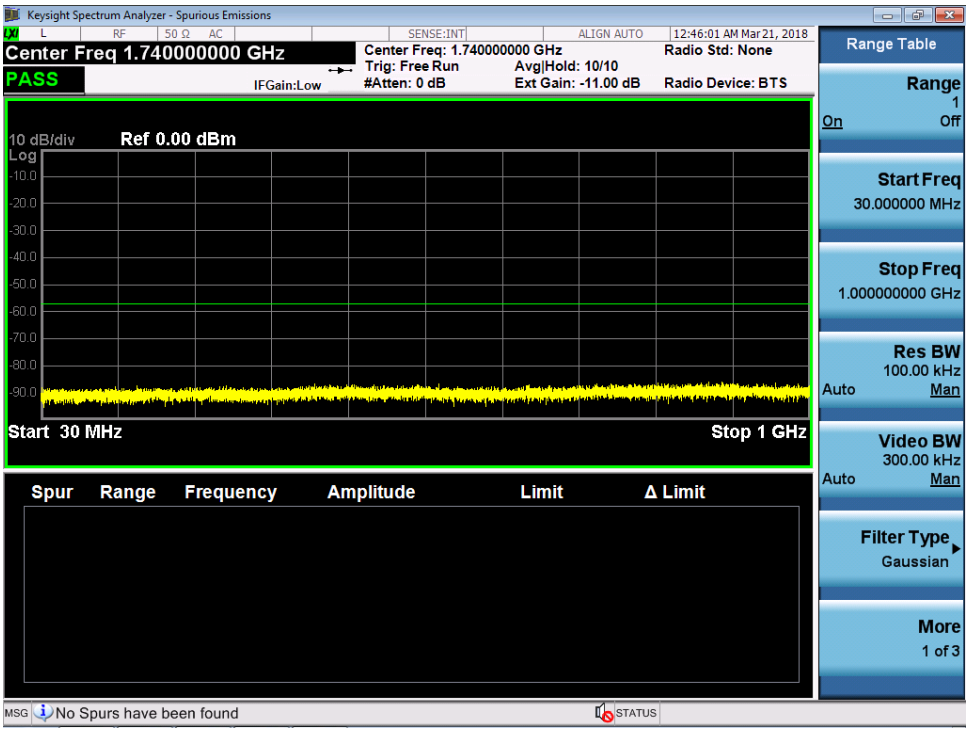
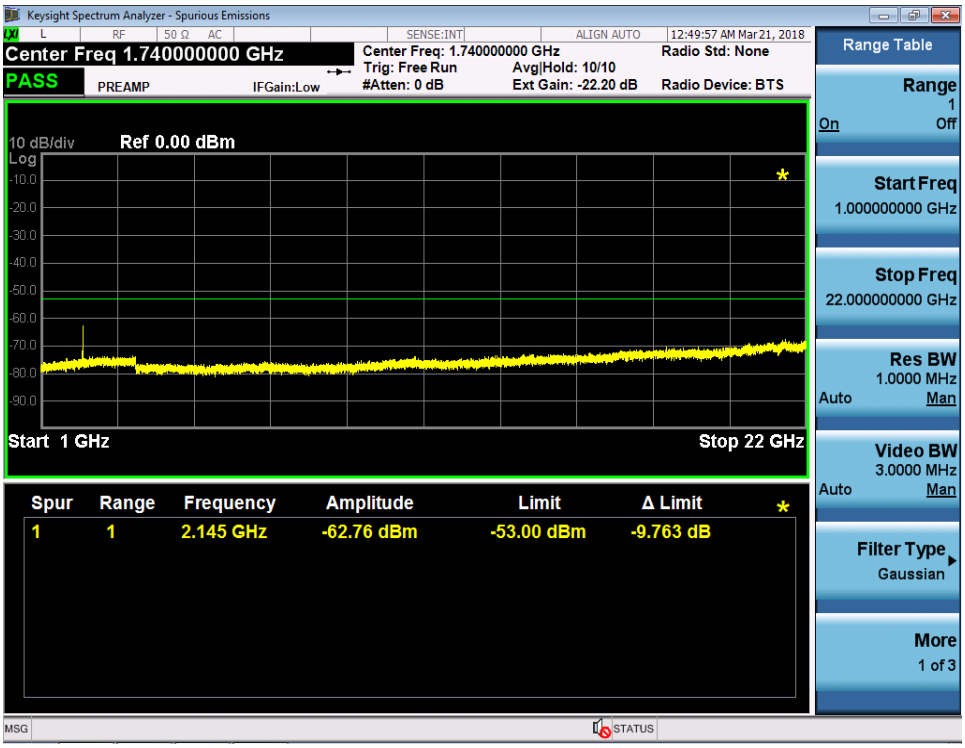
The spurious emissions at each of the receiver antenna ports were investigated from 10 MHz to 22 GHz which is beyond the 5th harmonic of the carrier (10 GHz). The results and limits are displayed below. The measurement results demonstrate that the subject of the application is in full compliance with the Requirements of RSS-Gen (7.4).

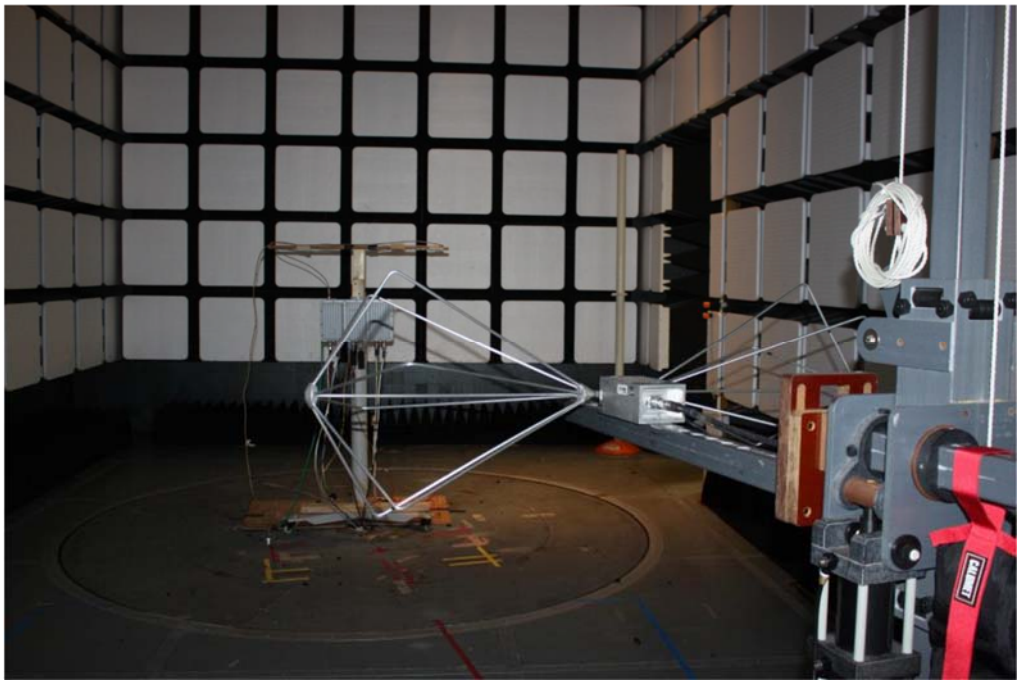
Figure 4.8.1 The Receiver Spurious Emissions of the EUT in 30MHz-22GHz

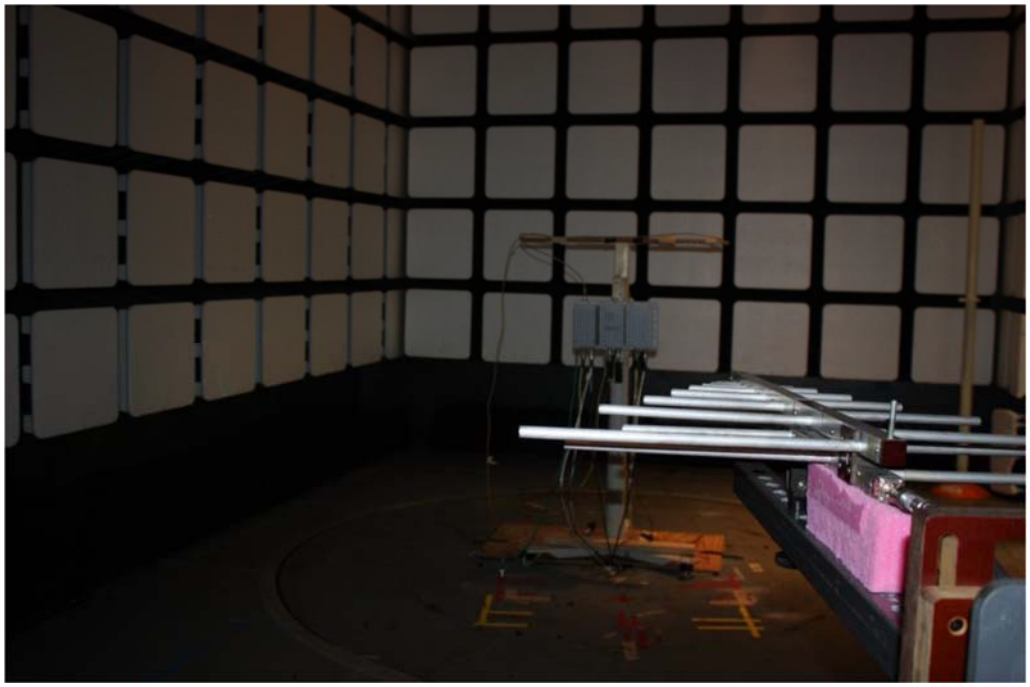


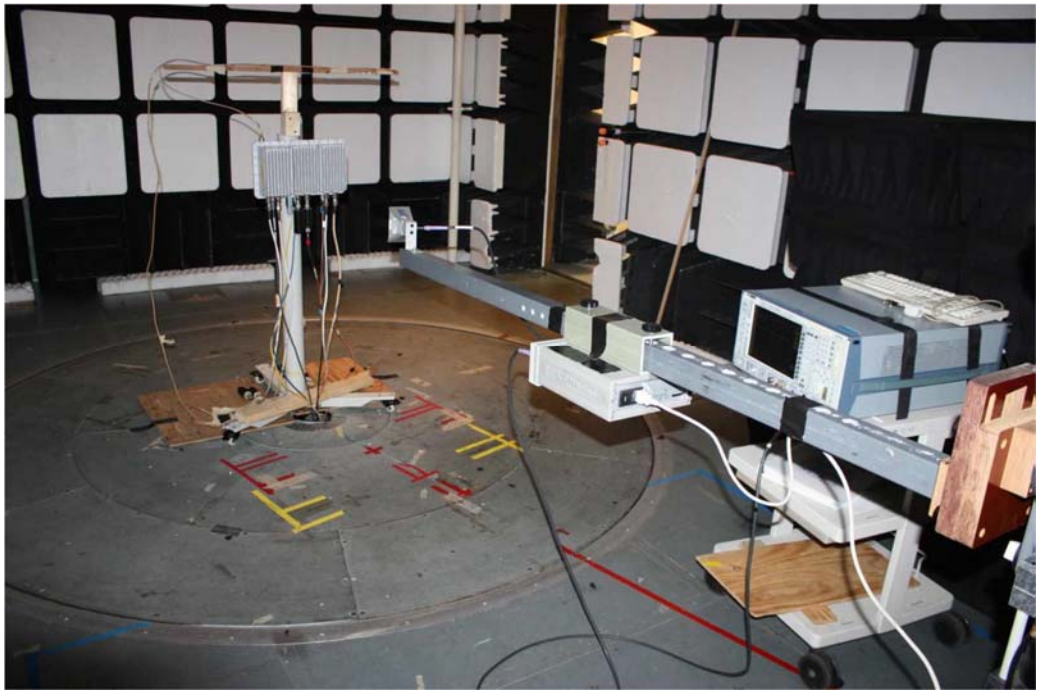


5 PHOTOGRAPHS OF EUT SETUP

The setup photos of the conducted and radiated emissions tests were provided below.







6 LIST OF TEST EQUIPMENT

All the measurement equipment used, including antennas, was calibrated in accordance with ISO 9001 process.

Table 6.1 Radiated Emissions List of Test Equipment

Manufacturer	Type	Description	Model	Serial	Calibration Date	Calibration Due	Calibration Type
Agilent Technologies	Amplifier	Pre-Amplifier 1-26.5GHz	8449B	3008A01740	2016-02-25	2018-05-25	Requires Calibration
EMC Test Systems	Horn Antenna	Double Ridged Horn 18-40 GHz	3116	2539	2017-06-16	2019-06-16	Requires Calibration
EMC Test Systems	Multi-Device Controller		2090	1600			Calibration Not Required
EMCO	Horn Antenna	Double Ridged Horn 1-18 GHz	3115	9006-3460	2017-05-24	2019-05-24	Requires Calibration
RLC Electronics Inc	High Pass Filter	2.5Ghz to 26Ghz High Pass Filter	F-19391	1440-001			Calibration Not Required, Must Be Verified
Rohde & Schwarz	Test Receiver	EMI (20Hz to 40 GHz) -150 +30dBM	ESIB40	100100	2018-03-12	2020-03-12	Requires Calibration
Weinschel	Attenuator	6dB	2-6	CD2534	2017-05-23	2019-05-23	Requires Calibration

Table 6.2 Antenna Port List of Test Equipment

Manufacturer	Type	Description	Model	Serial	Calibration Date	Calibration Due	Calibration Type
KeySight Technologies	EMI Receiver	MXE EMI Receiver 26.5GHz	N9038A	MY54130087	2016-12-28	2018-12-28	Requires Calibration
Trilithic	High Pass Filter	PCS 2.85GHz - 18.05GHz	5HC2850/18050-1.8-KK	200113078			Calibration Not Required
Weinschel	Attenuator	10dB 25W DC-18GHz	46-10-34	BF0123	2016-06-06	2018-06-06	Requires Calibration
Weinschel	Attenuator	20dB 25W DC-18GHz	46-20-34	BJ2718	2018-05-10	2020-05-10	Requires Calibration
Weinschel	Attenuator	30 dB / 150 W	66-30-33	BV2473			Calibration Not Required, Must Be Verified
Weinschel	Attenuator	6dB Attenuator 25W	46-6-34	BH9330			Calibration Not Required, Must Be Verified

7 TEST FACILITIES

All measurement facilities used to collect the measurement data under normal condition are located at 600-700 Mountain Avenue, Murray Hill, New Jersey 07974-0636 USA. The field strength measurements of radiated spurious emissions are made in a FCC and IC registered 3-meter semi-anechoic chamber AR5 (FCC Site Registration Number: 515091, IC Filing Number: 6933F-5). The sites were constructed and are continuously in conformance with the requirements of ANSI C63.4 and CISPR Publication 22.

Nokia Global Product Compliance Laboratory is accredited with the US Department of Commerce National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with criteria established in Title 15, Part 7 Code of Federal Regulations for offering test services for selected test methods in Electromagnetic Compatibility; Voluntary Control Council for Interference (VCCI), Japan; Australian Communications and Media Authority (ACMA). The laboratory is ISO 9001:2008 Certified.

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 100275-0

Nokia, Global Product Compliance Lab
Murray Hill, NJ

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Electromagnetic Compatibility & Telecommunications

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2017-08-17 through 2018-09-30
Effective Dates

For the National Voluntary Laboratory Accreditation Program

8 REFERENCES

[1]. Title 47 Code of Federal Regulations (CFR) Parts 2 and 27.

[2]. ANSI C63.26-2015, American Nation Standard for Compliance Testing of Transmitters Used in Licensed Radio Services.

[3]. FCC KDB 971168 D01, Measurement Guidance for Certification of Licensed Digital Transmitters**,** April 2018, v03r01.

[4]. FCC KDB 662911D01, Emissions Testing of Transmitters with Multiple Outputs in the Same Band, October 2013, v02r01.

[5]. ANSI C63.4-2014, American Nation 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.

[6]. RSS-GEN, General Requirements for Compliance of Radio Apparatus, Issue 5, April 2018.

[7]. RSS-139, Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710-1780 MHz and 2110-2180 MHz, Issue 3, July 2015.

[8]. SRSP-513, Technical Requirements for Advanced Wireless Services (AWS) in the Bands 1710-1780 MHz and 2110-2180 MHz, Issue 3, July 2015