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TESTING
NVLAP LAB CODE: 100275-0

FCC Certification Part 30 Test Report

Product Evaluated

AWGUC/D AirScale mmWave 2T2R n258 60dBm EIRP
FCC ID: 2AD8UAWGUCD01

Customer

Nokia Solutions and Networks, OY
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Naperville, Illinois 60563

Test Laboratory

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Date

December 8, 2021

Revisions

Date	Revision	Section	Change
11/17/2021	0		Initial Release
11/19/2021	1	Cover, 1,5	Product name revised, Section 5 removed
12/2/2021	2	5.0	Section 5 added
12/8/2021	3	4.0,	Section 4.5.5 added and plots enlarged

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1. ATTESTATION OF TEST RESULTS

Equipment Under Test (EUT)	AWGUC/D AirScale mmWave 2T2R n258 60dBm EIRP
Serial Number(s)	**Radiated Emission:** AWGUC (AC) - YK213200123 AWGUD (DC) - YK213300003 **Radio Tests:** AWGUC (AC) - YK213200121 **Frequency Stability Tests:** AWGUC (AC) - Y YK213200172 AWGUD (DC) - YK213300013
FCC ID	2AD8UAWGUCD01
Model Name	AWGUC (AC), AWGUD (DC)
Hardware Version	**Radiated Emission:** AWGUC (AC) - 475946A.X21 AWGUD (DC) - 475946A.X2 **Radio Tests:** AWGUC (AC) - 475946A.X21 **Frequency Stability Tests:** AWGUC (AC) - 475946A.X21 AWGUD (DC) - 475947.X21
GPCL Project Number	2021-0122
Manufacturer	NOKIA SOLUTIONS AND NETWORKS OY KARAKAARI 7, FI-02610 ESPOO FINLAND
Test Requirement	• 47 CFR FCC Part 2 and Part 30 (Part 2.1047, 2.1055)
Test Standard(s)	• 47 CFR FCC Parts 2 and Part 30 • KDB 971168 D01 Power Meas License Digital Systems v03r01 April 9, 2018 • KDB 662911 D01 Multiple Transmitter Output v02r01 Oct 2013 • KDB 842590 D01 Upper Microwave Flexible Use Service v01r01–April 2020 • Procedures on TRP Compliance for Out of Band and Spurious Emissions C63.26 mmWave JTG - Version # 1 July 14th, 2018
Reference(s)	• ANSI C63.26 (2015) • ANSI C63.4 (2014) • TR 14-1001, MMW Measurements with Harmonic Mixers (April-4-2014)
Test Date	9/15/2021 – 11/16/2021
Test Performed By	Nokia Global Product Compliance Laboratory 600-700 Mountain Avenue P.O. Box 636 Murray Hill, NJ 07974-0636
FCC Registered Test Site Number	Designation Number: **US5302**, Test Firm Registration Number: **395774**
Product Engineer(s)	Ron Remy
Lead Engineer	W. Steve Majkowski
Test Engineer (s)	W. Steve Majkowski, Mike Soli, Jaideep Yadav, Joe Bordonaro

Test Results: The EUT, *as tested* met the above listed Test Requirements. The decision rule employed is binary (Pass/Fail) based on the measured values without accounting for Measurement Uncertainty or any Guard Band. The measured values obtained during testing were compared to a value given in the referenced regulation or normative standard. 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.

2. SUMMARY OF THE TEST RESULTS

47 CFR FCC Sections	Description of Tests	Compliance Results
2.1046, 30.202 (a)	RF Power Output	Pass
2.1047,	Modulation Characteristics	Pass
2.1049, 30.203	(a) Occupied Bandwidth (b) Edge-of-Band Emissions	Pass
2.1051, 30.203	Spurious Emissions at Antenna Terminals - Radiated	Pass
2.1053, 30.203	Field Strength of Spurious Radiation	Pass
2.1055,	Measurement of Frequency Stability	Pass

2.1 Measurement Uncertainty

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

Worst-Case Estimated Measurement Uncertainties

Standard, Method or Procedure	Condition	Frequency MHz	Expanded Uncertainty (k=2)
a. Classical Emissions, (*e.g.*, ANSI C63.4, CISPR 11, 14, 22, *etc.*, using ESHS 30,	Conducted Emissions	0.009 - 30	±3.5 dB
	Radiated Emissions (AR-8 Semi-Anechoic Chamber)	30 MHz – 200MHz H 30 MHz – 200 MHz V 200 MHz – 1000 MHz H 200 MHz – 1000 MHz V 1 GHz- 18 GHz	±5.4 dB ±5.4 dB ±4.7 dB ±4.7 dB ±3.3 dB

Antenna Port Test	Signal Bandwidth	Frequency Range	Expanded Uncertainty (k=2), Amplitude
Occupied Bandwidth, Edge of Band,	10 Hz 100 Hz 10 kHz to 1 MHz 1MHz to 100 MHz	9 kHz to 20 MHz 20 MHz to 1 GHz 1 GHz to 10 GHz 10 GHz to 40 GHz:	±2.2 dB
Conducted Spurious Emissions	30 kHz to 100 MHz	10 MHz to 40 GHz:	±2.8 dB
RF Power, Channel Power	10 Hz to 100 MHz	10 MHz to 40 GHz	±1.4 dB

3. GENERAL INFORMATION

3.1 Product Descriptions

The equipment under test (EUT) has the following specifications.

Table 3.1.1 Product Specifications

Specification Items	Description
Product Type	AWGUC (AC Pwr) AWGUD (DC Pwr) 5G 24GHz (60dBm)
Radio Type	Intentional Transceiver
Power Type	Both DC & AC
Modulation	QPSK, 16QAM, 64QAM, 256QAM
Operating Frequency Range	24.25 – 25.25 GHz, NR Band n258 **24.25-24.45 GHz and 24.75-25.25 GHz**
Channel Bandwidth	100, 200, 300, 400, 500, 600, 700, 800 MHz
Max Radiated Power (EIRP)	57 dBm (501W) EIRP per Array; 60 dBm (1000W) EIRP Total for the two Arrays
Antenna Gain	26 dBi
Operating Mode	2x2 MIMO (2 duplex Tx/Rx Ports)
Software Version	5G19B
Antenna(s)	Refer to Section 3.2

3.2 EIRP/ PSD Compliance and Antenna Information.

The product incorporates integrated antennas. Externally mounted antennas cannot be attached to the unit or mounted remotely. The units integrated antennas are electronically steerable with a maximum gain of 26 dBi. There is a single antenna board assembly inside the product. This antenna assembly has two individually polarized antenna Tx/Rx modules. Each antenna Tx/Rx modules is an 12x16 matrix (192 elements each). One antenna Tx/Rx modules is vertically polarized, and the second antenna Tx/Rx modules is horizontally polarized. The antennas nominal RF drive level is 31 dBm. The 31 dBm RF power and 26 dBi gain results in a 57 dBm EIRP per assembly. The sum of the two 57 dBm EIRP beams results in a maximum EIRP of 60 dBm. Antenna Gain vs frequency is detailed in Exhibit 6 of the filing package.

3.3 Antenna Far Field Determination Distance

The Moongilan Test (1) was performed to determine the far field boundary location using calculations and low power measurements. For the antenna array we can calculate the Fraunhofer distance from

$$d_{ff} \geq 2D^2/\lambda$$

where d_{ff} = Far Field distance in meters,
D is the maximum size of the radiating array λ = wavelength of the operating signal in meters

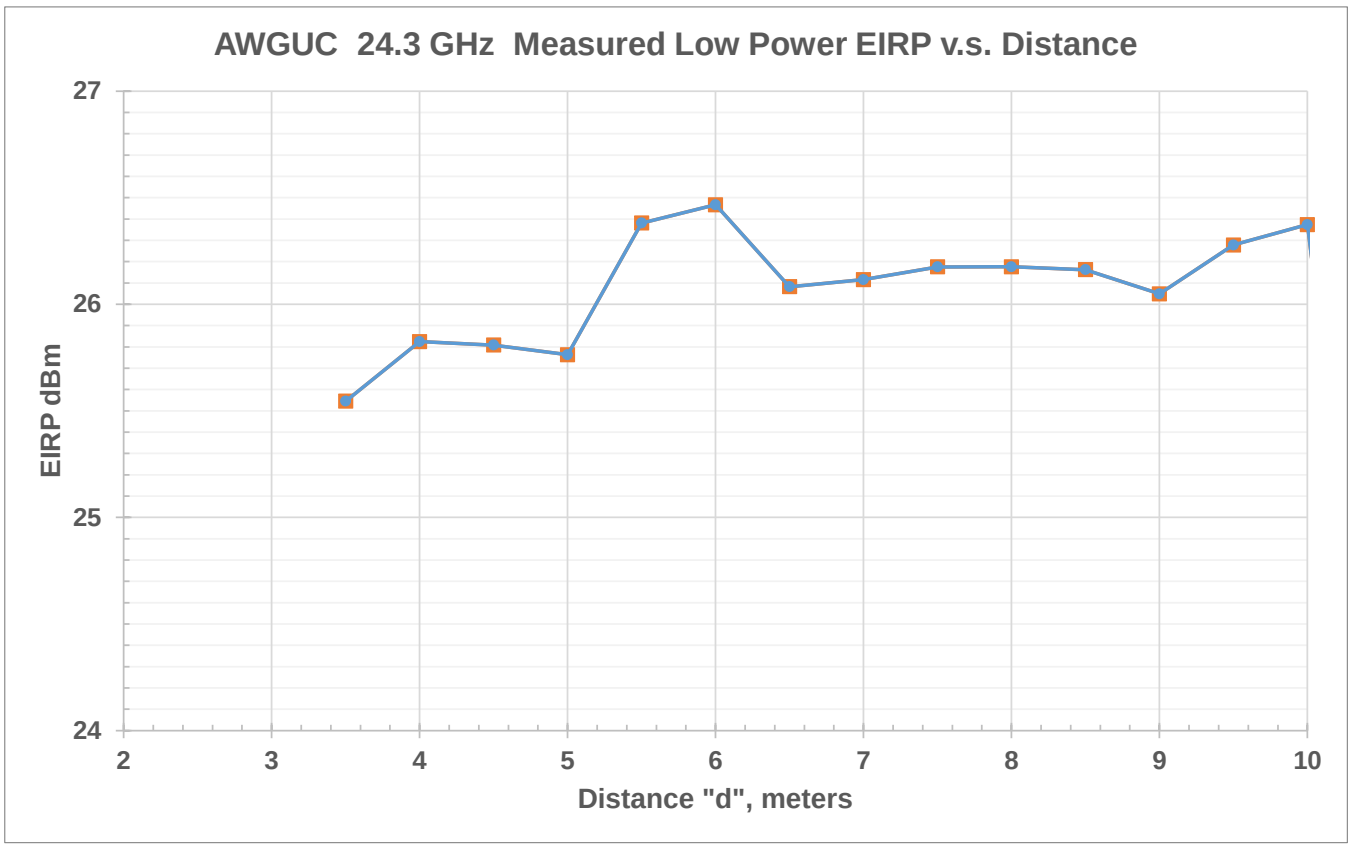
The individual polarization antenna array height is 105 mm and is 82 mm wide with a 134mm diagional. The diagional for both arrays is 254 mm.
At 25 GHz the individual array dimensions results in a minimum Fraunhofer far field distance, $d_{ff,}$ of 3m meters.
At 25 GHz the overall array dimensions results in a minimum Fraunhofer far field distance, $d_{ff,}$ of 10.75 meters.

While the Fraunhofer far field distance is the minimum distance where the far field can occur, it does not predict the actual distance where the far field occurs. The Moongilan Test determines the actual distance where the far field occurs for the specific configuration under test.

Measurements for the Moongilan Test were performed at low power using a standard gain horn antenna In the horizontal polarization the determined boundary was 6.5 m.

To eliminate any inconsistancy all Power, OBW and OOBE measurements were made at 6.5 m.

(1) The Moongilan Test is named in honor of the late Dheena Moongilan who discovered it and formulated its use into C63.26.



4. REQUIRED MEASUREMENTS AND RESULTS

Per 47CFR FCC Section 2.1033(c)(14), the following certification tests are required by Section 2.1046 through Section 2.1057. These tests are identified in Table 4.0a below.

Table 4.0a Required Certification Measurements

47 CFR FCC Sections	Description of Tests	Test Required for Class II Authorization
2.1046, 30.202 (a)	**RF Power Output** **(a) Power Limits, EIRP, PSD**	**Yes**
2.1047,	**Modulation Characteristics**	**Yes**
2.1049, 30.203	**(a) Occupied Bandwidth** **(b) Out-of-Band Emissions**	**Yes**
2.1051, 30.203	**Spurious Emissions at Antenna Terminals**	**Yes**
2.1053, 30.203, **30.204, 15.109(a) Class B**	**Field Strength of Spurious Radiation**	**Yes**
2.1055,	**Measurement of Frequency Stability**	**Yes**

The measurements were conducted in accordance with the procedures set out in Section 2.1041 and as appropriate per the test Standards listed in Table 4.0b below. The comprehensive list of tests performed included measurements at Left, Center and Right side of the Part 30 Band. These tests are presented to demonstrate compliance with FCC requirements.

The procedures defined in ANSI C63.26-2015 and KDB 971168 D01 were developed for conducted measurements. The mmWave Joint Technical Group with FCC oversight has been working diligently on revisions to add mmWave measurements for Upper Microwave Flexible Use Service (UMFUS). The new KDB, 842590, is closely aligned with those efforts.

All of the measurements performed herein were performed as radiated measurements. In order to perform these measurements, the equipment settings required to enable the FSW internal noise reduction capability were used. Measurements from 1-40 GHz required the use of average detector, and multiple sweep averages. Transmit carrier and Spurious Emissions above 40 GHz utilized multiple sweep averages and RMS detector. The individual test sections identify any changes in measurement process.

Table 4.0b Test Standards Used for Radiated Measurements of Radio Performance

Test Standard(s)	• 47 CFR FCC Parts 2 and Part 30 • KDB 971168 D01 Power Meas License Digital Systems v03r01 April 9, 2018 • KDB 662911 D01 Multiple Transmitter Output v02r01 Oct 2013 • KDB 842590 D01 Upper Microwave Flexible Use Service v01r01–April 2020 • Procedures on TRP Compliance for Out of Band and Spurious Emissions C63.26 mmWave JTG - Version # 1 July 14th 2018
Reference(s)	• 47 CFR FCC Part 2 and Part 30 • ANSI C63.26 (2015) • ANSI C63.4 (2014) • TR 14-1001, MMW Measurements with Harmonic Mixers (April-4-2014)

4.1 Section 2.1046 MEASUREMENT REQUIRED: RF POWER OUTPUT

The product incorporates internal antennas that are part of the signal source. There is no antenna terminal connection on the product. Therefore, this test as implemented is not a measurement of the total conducted power at the antenna terminal but rather the total radiated power in terms of the maximum EIRP radiated by the product.

The FCC recognized that these products would use integrated antennas and likewise structured the requirements under Part 30. Under Part 30 the average power of the sum of all antenna elements is limited to an equivalent isotopically radiated power (EIRP) density of +75dBm/100 MHz.

The **Nokia AirScale 24 GHz Radio Unit, AWGUC/ AWGUD, FCC ID: 2AD8UAWGUCD01**, is a LTE TDD Remote radio head can be configured for one to seven carrier operation in the US n258 band. It is specified to provide a maximum power output of 57 dBm /502 W EIRP per transmit polarization for a sum total of 60 dBm /1000W EIRP per unit. The product is designed for the 5G global market including operation per 47 CFR Part 30 rules for use in the USA authorized portions of 5G New Radio Band, n258, 24.25-24.45GHz and 24.75-25.25GHz.

4.1.1 RF Power Output Measurement

The product was allowed to warm up and stabilize per KDB 971168 D01 and ANSI C63.26.

Radiated Power measurements of the 5G New Radio transmit signal were conducted with an FSW Spectrum Analyzer per KDB 971168 D01 and KDB 842590 D01. Measurements were performed at a 6.5 m distance using a nominal 63 dB offset. An additional FSW transducer correction factor is used to ascertain the actual measured EIRP power. The calculation of path loss, cable loss and measurement antenna gain are listed in Table 4.1.1. below. The unit was configured to transmit at its maximum power.

The Channel Power function of the FSW spectrum analyzer was used to measure the maximum average Horizontal and Vertical EIRP at the 6.5m boundary distance. The measurements were performed for one through seven carriers in the 24.25-24.45GHz and 24.75-25.25GHz band. For all measurements a nominal 100 MHz bandwidth carrier with 5G-NR modulations was used. Channel power plots identify the individual carrier power, modulation and the total power.

Table 4.1.1 Corrections For Transmitter Power Measurements

Frequency	Free Space Path Loss, "PL"	Measurement Antenna Gain, "G1"	Measurement Cable Loss, "L1"	Total Offset Required PL -G1 + L1	FSW Measurement Offset	Required Final Correction
GHz	dB	dBi	dB	dB	dB	dB
22.00	75.55	23.70	11.33	63.18	63	0.176
22.50	75.74	23.90	11.43	63.27	63	0.269
23.00	75.93	23.85	11.61	63.70	63	0.697
23.50	76.12	24.10	11.81	63.84	63	0.836
24.00	76.30	24.25	11.95	64.01	63	1.006
24.50	76.48	24.30	12.14	64.32	63	1.320
25.00	76.66	24.38	12.41	64.69	63	1.689
25.50	76.83	24.45	12.64	65.02	63	2.024
26.00	77.00	24.65	12.91	65.26	63	2.262
26.50	77.16	24.55	13.13	65.74	63	2.740
27.00	77.33	24.65	13.20	65.88	63	2.882
27.50	77.49	24.75	13.37	66.10	63	3.103
28.00	77.64	24.85	13.65	66.44	63	3.441
28.50	77.80	24.75	13.91	66.96	63	3.957
29.00	77.95	25.00	14.14	67.09	63	4.087
29.50	78.10	24.95	14.37	67.52	63	4.517
30.00	78.24	25.10	14.57	67.71	63	4.713
30.50	78.39	25.00	14.69	68.08	63	5.077
31.00	78.53	25.13	14.90	68.30	63	5.296
31.50	78.67	25.00	15.18	68.85	63	5.850
32.00	78.80	25.25	15.28	68.84	63	5.838
32.50	78.94	25.12	15.50	69.31	63	6.314
33.00	79.07	25.20	15.71	69.58	63	6.582

4.1.1.1 RF Power Output Results

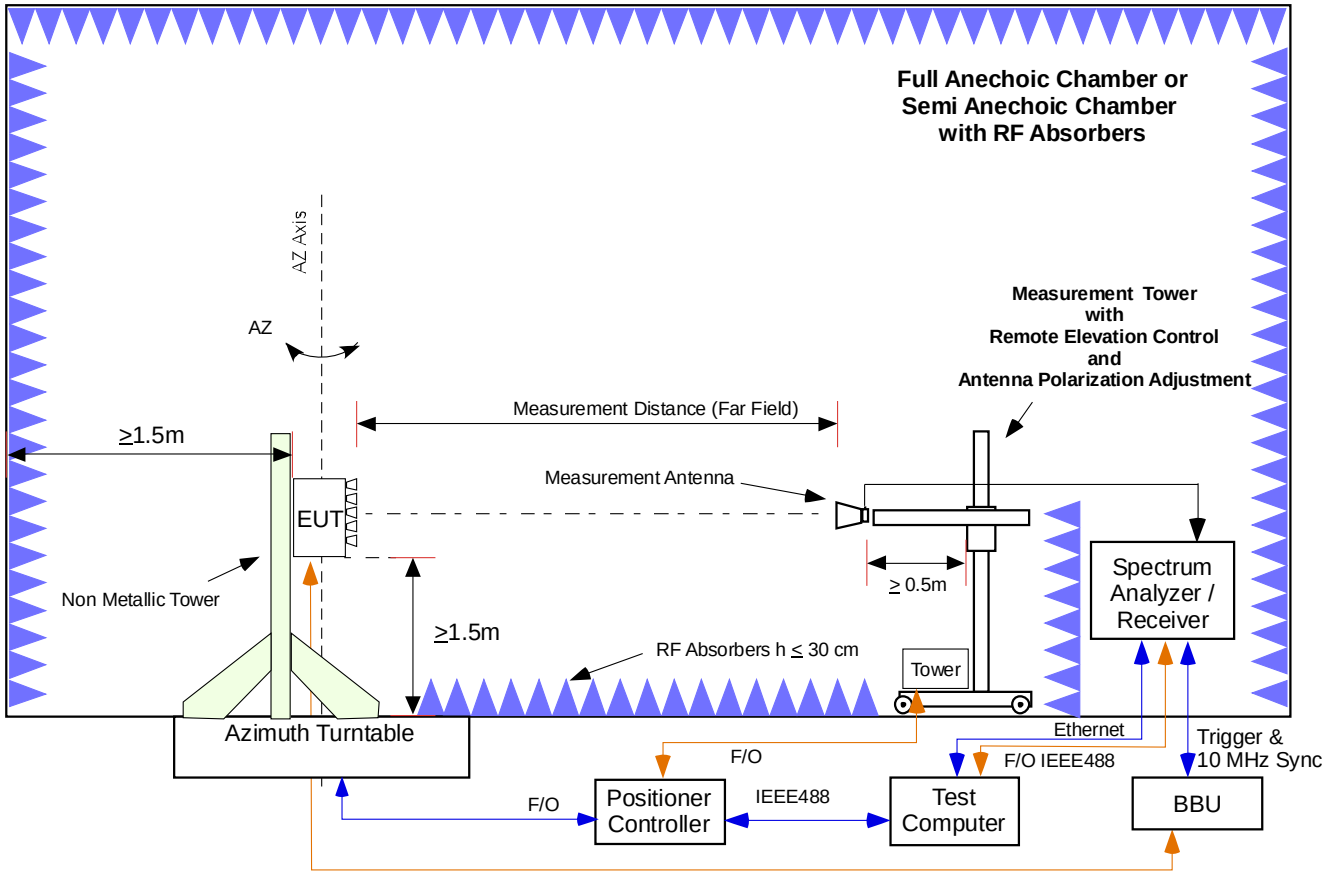
Power output measurements verified the expected performance of 57 dBm EIRP per polarization for a Total Power of 60 dBm. The maximum measured level was 57.56 dBm for a single polarization and 60.53 dBm total. This level is well within the maximum Part 30.202a limit of 75 dBm EIRP. Measurements were performed for each modulation.

The measured performance was in full compliance with the Rules of the Commission. The data plots are detailed below.

Table 4.1.1.1 – Channel Power Measurements (adjacent)

Location in Band	Channel Center Frequencies, GHz	# of carriers	Modulation	Horizontal Polarization Total Channel Power, EIRP	Vertical Polarization Total Channel Power, EIRP	Sum Total Channel Power EIRP
				dBm	dBm	dBm
	24.3	1	QPSK	57.39	57.25	60.33
	24.3 24.39984	2	QPSK	57.42	57.27	60.36
	24.80004 24.89988 24.99972	3	16QAM	57.08	57.23	60.17
	24.80004 24.89988 24.99972 25.09956	4	64QAM	57.56	57.47	60.53
	24.7992 24.89904 24.99888 25.09872 25.19856	5	64QAM	57.05	57.24	60.16
	24.3 24.7992 24.89904 24.99888 25.09872 25.19856	6	64QAM	57.45	57.25	60.36
	24.3 24.39984 24.7992 24.89904 24.99888 25.09872 25.19856	7	QPSK	57.05	57.18	60.13
	24.3 24.39984 24.7992 24.89904 24.99888 25.09872 25.19856	7	64QAM	57.11	57.02	60.08

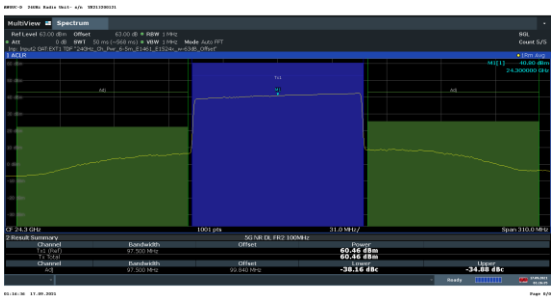
Figure 4.1.1 Test Set-Up for Measurement of Radio Transmitter Performance



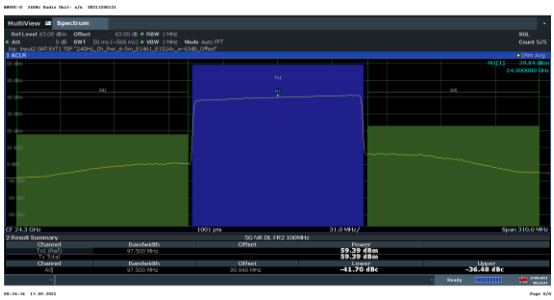
4.1.1.1.1 Channel Power Measurement Plots

Channel Power Measurements, 1 Carrier – QPSK

Horizontal

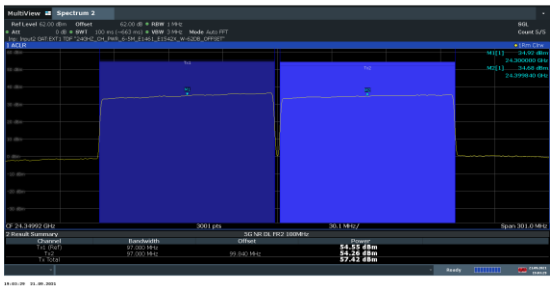


Vertical



Channel Power Measurements, 2 Carrier – QPSK

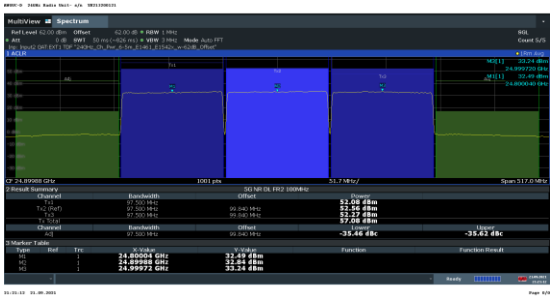
Horizontal



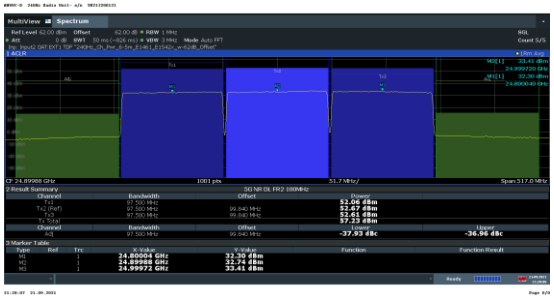
Vertical

Channel Power Measurements, 3 Carrier – 16QAM

Horizontal

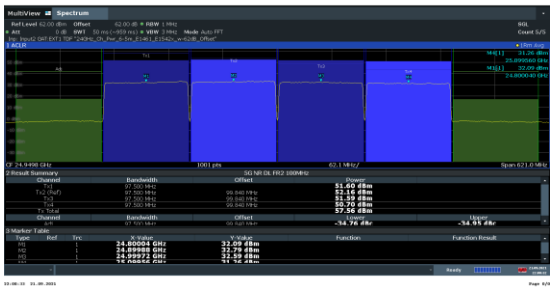


Vertical

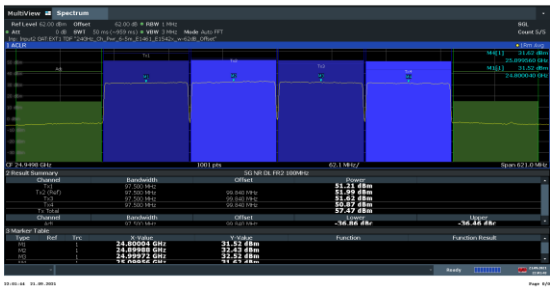


Channel Power Measurements, 4 Carrier –64QAM

Horizontal

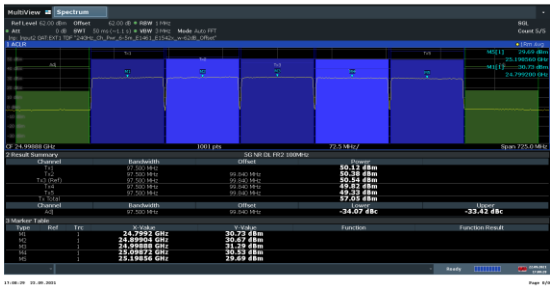


Vertical

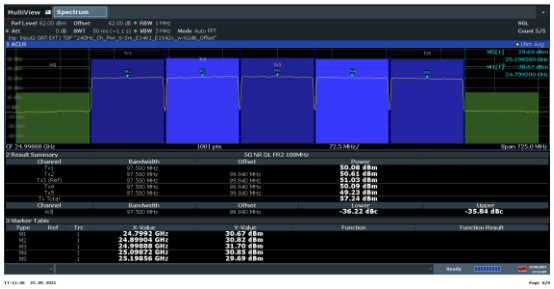


Channel Power Measurements, 5 Carrier –64QAM

Horizontal

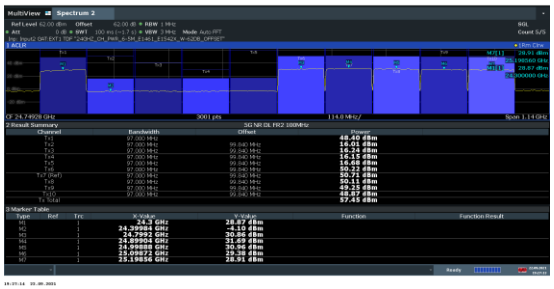


Vertical

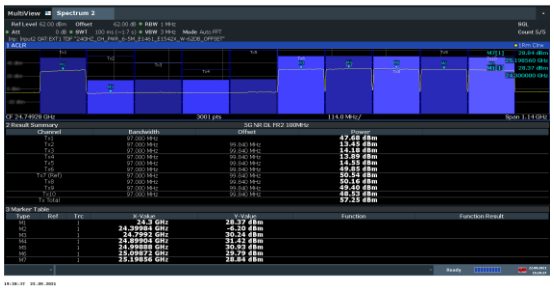


Channel Power Measurements, 6 Carrier – 64QAM

Horizontal

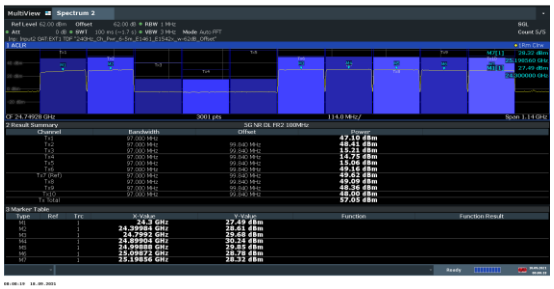


Vertical

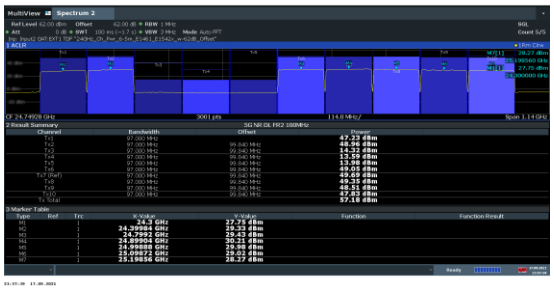


Channel Power Measurements, 7 Carrier – QPSK

Horizontal

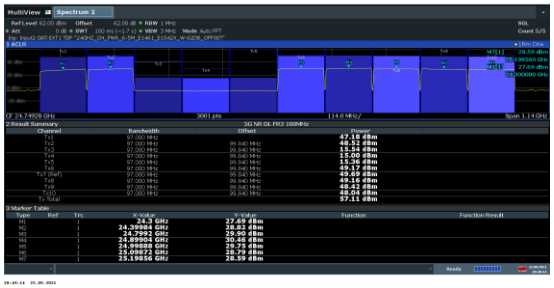


Vertical

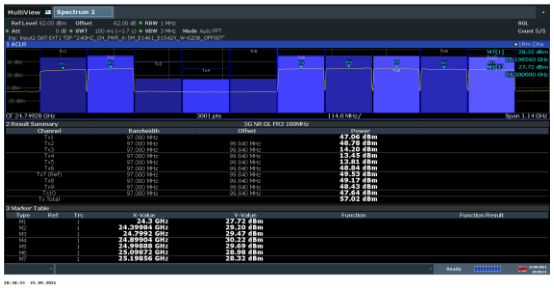


Channel Power Measurements, 7 Carrier – 64QAM

Horizontal



Vertical



4.2 Section 2.1047 MEASUREMENT REQUIRED: MODULATION CHARACTERISTICS

The **2AD8UAWGUCD01** supports the 5G New Radio Modulation Format based upon LTE TDD technologies. LTE utilizes Orthogonal Frequency Division Multiplexing (OFDM) which splits the carrier frequency bandwidth into many small subcarriers. Each individual subcarrier can be modulated with QPSK, 16QAM or 64QAM digital modulation formats.

In QPSK, there are 4 possible symbol states and each symbol carries 2 bits of information. In 16QAM, there are 16 possible symbol states and each 16-QAM symbol carries 4 bits of information. In 64QAM, there are 64 possible symbol states and each 64-QAM symbol carries 6 bits of information. The higher-order modulations, those where the constellations are more dense, are more sensitive to poor channel conditions than the lower-order modulation.

The modulation characteristics measurement of LTE carriers measures the difference between the ideal symbols and the measured symbols after the equalization. The 5G-New Radio format is still in revision in 3GPP and new Releases are expected. The constellations were recorded to assess that the subcarrier configurations were achieved.

There are no FCC Limits for Modulation and all of the formats presented look spectrally the same from a channel edge and regrowth standpoint and we are pleased with the fidelity that available with test equipment as configured.

4.2.1 Modulation Characteristics Measurement

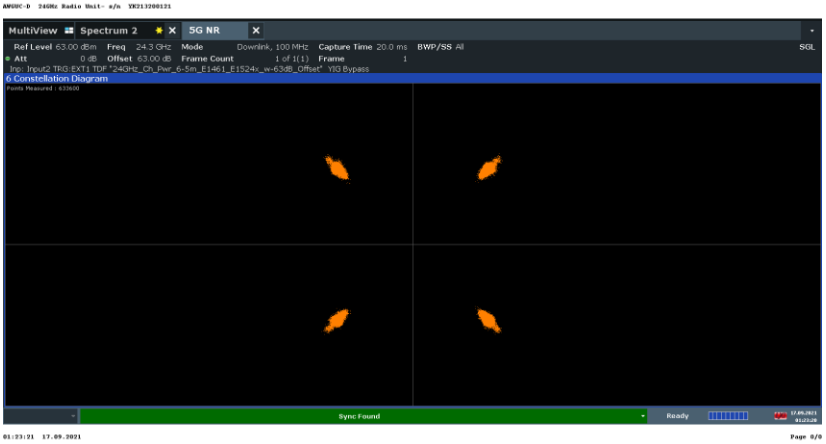
The measurements were performed at a distance of 6.5 m from the unit utilizing the test configuration in Figure 4.4.1 utilizing a Rohde & Schwarz FSW85 Signal analyzer with the 3GPP 5G-NR DL Measurement software option. Representative screen plots of the modulation measurement are attached below for all three of the subcarrier configurations and sample polarizations.

4.2.2 Modulation Measurements Results:

The typical measured modulation characteristics of the EUT are shown below:

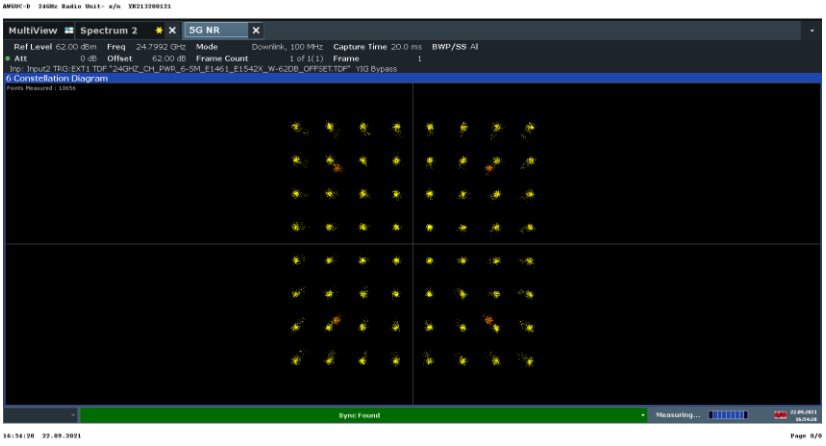
Figure 4.2 Sample Modulation Results

QPSK – 1 Carrier - Vertical Polarization



16QAM – 1 Carrier - Vertical Polarization

64QAM – 1 Carrier – Horizontal Polarization



4.3 Section 2.1049 MEASUREMENT REQUIRED: OCCUPIED BANDWIDTH and EDGE of BAND EMISSIONS

This test measures the Occupied Bandwidth of the transmitting carrier and the Edge of-Block Emissions in the frequency spectrum immediately outside and adjacent to the transmitting carrier(s).

The occupied bandwidth (OBW) is usually defined either as the 99% power OBW or a relative OBW. The 99% OBW is the signal bandwidth such that, below its lower and above its upper frequency limits, the mean power radiated or conducted are each equal to 0.5 percent of the total mean power radiated or conducted by a given emission. The relative OBW is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated by at least X dB below the transmitter power, where the value of X is typically specified as 26.

Per KDB 971168 D01 v02, the relative OBW must be measured and reported when it is specified in the applicable rule part; otherwise, the 99% OBW shall be measured and reported. The OBW shall be measured when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment is operated.

4.3.1 Results Occupied Bandwidth (Signal Bandwidth)

The measurements of 99% occupied bandwidth were performed with a Rohde & Schwartz FSW85 GHz spectrum analyzer. The measurements of the nominal 100 MHz 5G-NR carrier indicated compliance with the 97M0G7D emission designator. Sample results are presented below and shows that the measured signals are within the parameters of the 97M5G7D emissions designator. Most of the multicarrier measurements were made with a carrier spacing of 99.84 MHz.

Tabular Data – Occupied Bandwidth **1MHz** RBW

Location in Band	Carrier Frequencies (GHz)	Number of Carriers	Modulation	Horizontal Polarization Occupied Signal Bandwidth (MHz)	Vertical Polarization Occupied Signal Bandwidth (MHz)
	24.3	1	QPSK	94.045	94.044
	24.3 24.39984	2	QPSK	192.637	192.548
	24.80004 24.89988 24.99972	3	16QAM	291.488	291.227
	24.80004 24.89988 24.99972 25.09956	4	64QAM	390.253	390.114
	24.7992 24.89904 24.99888 25.09872 25.19856	5	64QAM	489.114	488.552
	24.3 24.39984 24.7992 24.89904 24.99888 25.09872 25.19856	7	QPSK	982.621	982.660
	24.3 24.39984 24.7992 24.89904 24.99888 25.09872 25.19856	7	64QAM	982.287	982.541

Tabular Data – Occupied Bandwidth **3MHz** RBW

Location in Band	Carrier Frequencies (GHz)	Number of Carriers	Modulation	Horizontal Polarization Occupied Signal Bandwidth (MHz)	Vertical Polarization Occupied Signal Bandwidth (MHz)
	24.3	1	QPSK	95.097	95.048
	24.3 24.39984	2	QPSK	192.963	193.026
	24.80004 24.89988 24.99972	3	16QAM	291.603	291.459
	24.80004 24.89988 24.99972 25.09956	4	64QAM	390.296	390.306
	24.7992 24.89904 24.99888 25.09872 25.19856	5	64QAM	489.115	488.541
	24.3 24.39984 24.7992 24.89904 24.99888 25.09872 25.19856	7	64QAM	982.451	982.307

Tabular Data – Occupied Bandwidth **5MHz** RBW

Location in Band	Carrier Frequencies (GHz)	Number of Carriers	Modulation	Horizontal Polarization Occupied Signal Bandwidth (MHz)	Vertical Polarization Occupied Signal Bandwidth (MHz)
	24.3	1	QPSK	96.682	96.624
	24.3 24.39984	2	QPSK	193.884	193.979
	24.80004 24.89988 24.99972	3	16QAM	292.275	292.113
	24.80004 24.89988 24.99972 25.09956	4	64QAM	390.633	390.651
	24.7992 24.89904 24.99888 25.09872 25.19856	5	QPSK	489.383	488.966
	24.7992 24.89904 24.99888 25.09872 25.19856	5	64QAM	489.339	488.700
	24.3 24.39984 24.7992 24.89904 24.99888 25.09872 25.19856	7	QPSK	982.621	
	24.3 24.39984 24.7992 24.89904 24.99888 25.09872 25.19856	7	64QAM	982.587	982.340

4.3.1.1 Results - Occupied Bandwidth Carrier Aggregation

The April 12, 2016 TCBC viewgraph package identified that Carrier Aggregation data should be supplied during filing. This requirement is not yet formalized in a KDB for LTE, 5G-NR or UMFUS but we used the same rules as used for Part 15. The multi-carrier bandwidth of the **AWGUC/D** is thus defined as follows.

The N258 24 GHz Band can be assigned a total of 7 carriers that are 100 MHz bandwidth. Two carriers side by side in the 24.25-24.45 GHz portion of the band and 5 side by side carriers in the 24.75-25.25 GHz portion of the band. The AWGUC/D can be operated anywhere within this 1 GHz wide band. Additionally, we have evaluated carrier spacing configuration of 99.96 MHz and 99.84 MHz respectively. There was no difference identified for Power, radiated spurious or OOBE measurements with either spacing.

The AWGUC/D product can actually support up to eight carriers operating within its maximum instantaneous 1.4 GHz bandwidth and within its maximum 24.25-27.5 GHz frequency range.

There is a 1% difference in the occupied signal bandwidth for eight aggregated carriers which was expected.

An example of the signal bandwidth for 4 adjacent carriers is depicted in Figure 4.3.1.1. The emissions designator for 2 thru seven is identical for either spacing. The eight carrier spacing using 99.84 MHz is 99.9% of the 99.96 spacing so a single emissions designator is appropriate.

The maximum calculated assessment for two through eight carriers using 99.96 and 99.84 channel spacings are identified below.

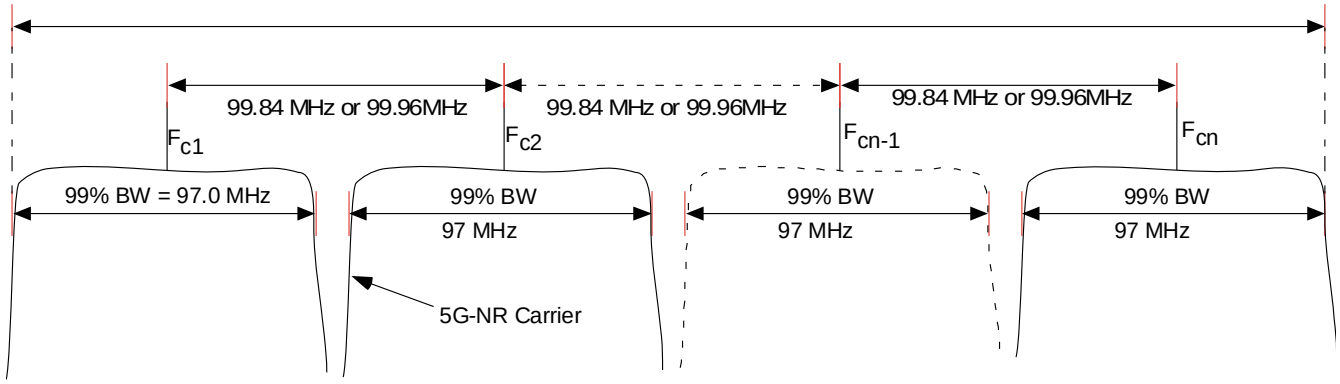
Two Carrier Aggregation Bandwidth = 1(99.96) + 97 MHz = 196.96 MHz = 197MG7W
Three Carrier Aggregation Bandwidth = 2(99.96) + 97 MHz = 296.92 MHz = 297MG7W
Four Carrier Aggregation Bandwidth = 3(99.96) + 97 MHz = 396.88 MHz = 397MG7W
Five Carrier Aggregation Bandwidth = 4(99.96) + 97 MHz = 496.84 MHz = 497MG7W
Six Carrier Aggregation Bandwidth = 5(99.96) + 97 MHz = 596.80 MHz = 597MG7W
Seven Carrier Aggregation Bandwidth = 6(99.96) + 97 MHz = 696.76 MHz = 697MG7W
Eight Carrier Aggregation Bandwidth = 7(99.96) + 97 MHz = 796.72 MHz = 797MG7W

The maximum calculated assessment for two through eight carriers using 99.84 channel spacing are identified below.

Two Carrier Aggregation Bandwidth = 1(99.84) + 97 MHz = 196.84 MHz = 197MG7W
Three Carrier Aggregation Bandwidth = 2(99.84) + 97 MHz = 296.68 MHz = 297MG7W
Four Carrier Aggregation Bandwidth = 3(99.84) + 97 MHz = 396.52 MHz = 397MG7W
Five Carrier Aggregation Bandwidth = 4(99.84) + 97 MHz = 496.36 MHz = 497MG7W
Six Carrier Aggregation Bandwidth = 5(99.84) + 97 MHz = 596.20 MHz = 597MG7W
Seven Carrier Aggregation Bandwidth = 6(99.84) + 97 MHz = 696.04 MHz = 697MG7W
Eight Carrier Aggregation Bandwidth = 7(99.84) + 97 MHz = 795.88 MHz $\leq$ 797MG7W

Since the values are identical for two through seven and nearly so for eight carriers the 99.96 set will be used.

Figure 4.3.1.1 Carrier Aggregation



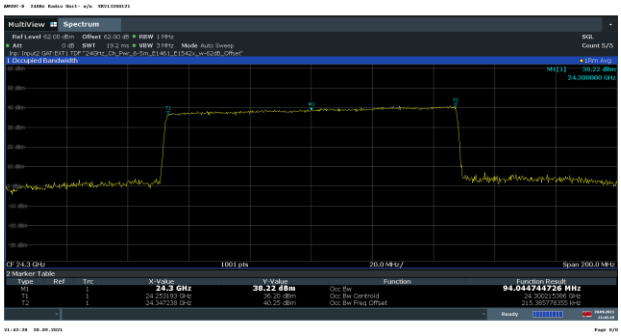
Carrier Aggregation nx(97M0)
WSM 7-12-21

4.3.1.2 99% Signal Bandwidth Plots

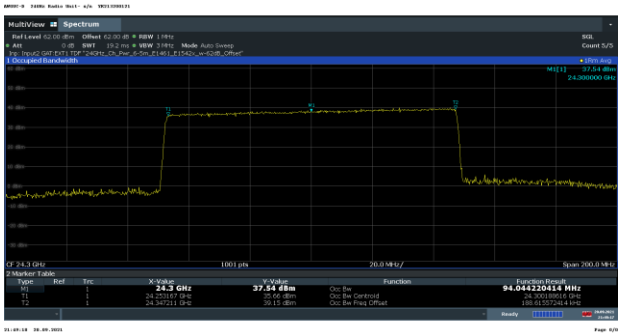
1MHz RBW

1 Carrier, QPSK

Horizontal

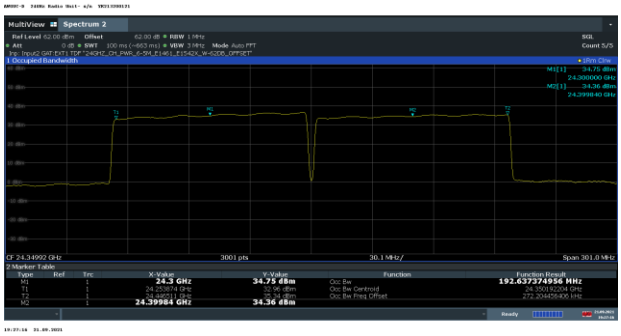


Vertical

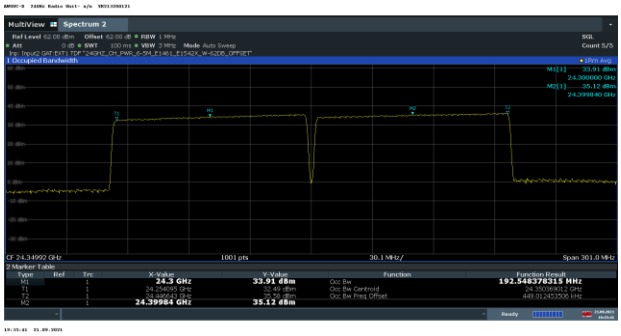


2 Carrier, QPSK

Horizontal

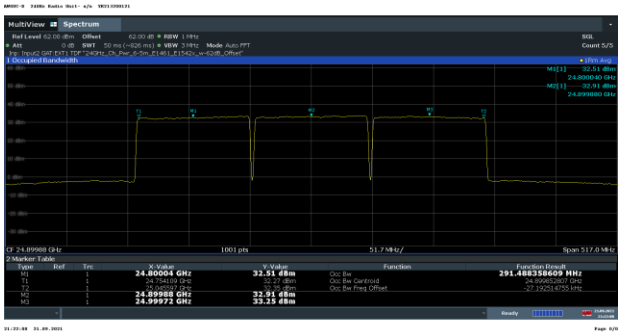


Vertical

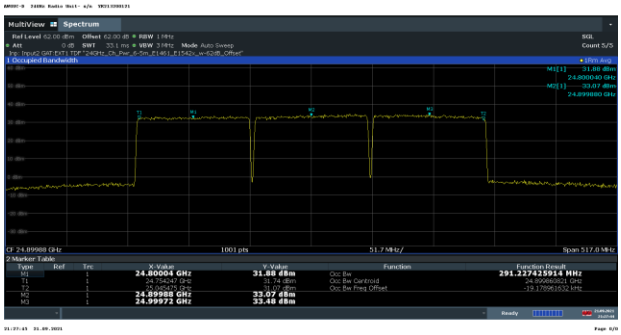


3 Carrier, 16QAM

Horizontal



Vertical



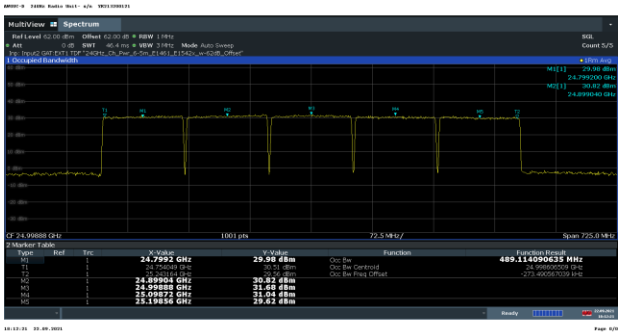
4 Carrier, 64QAM

Horizontal

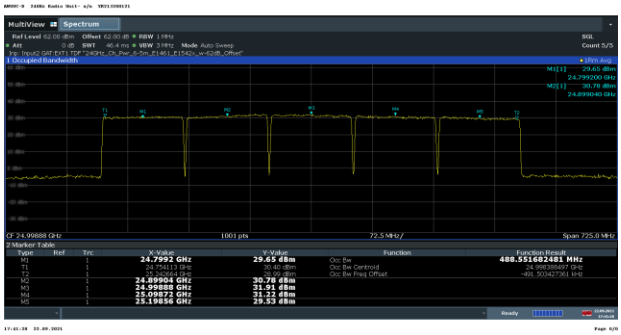
Vertical

5 Carrier, 64QAM

Horizontal

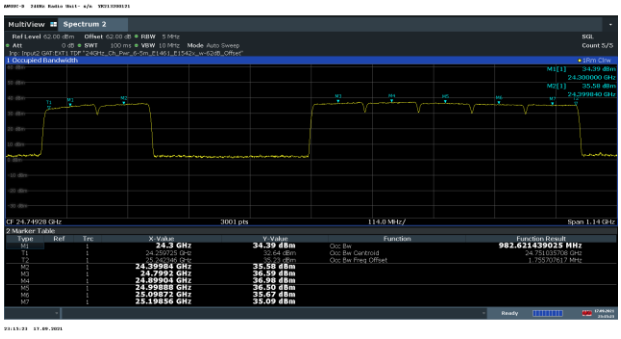


Vertical

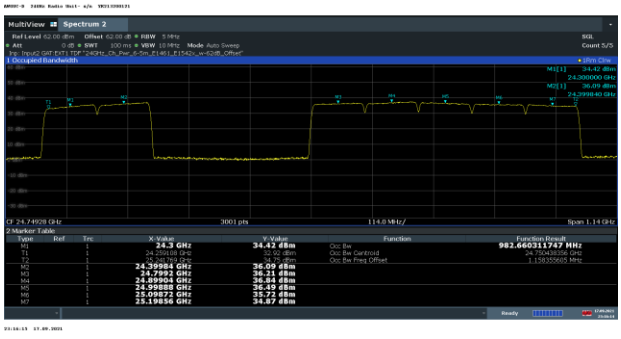


7 Carrier, QPSK

Horizontal

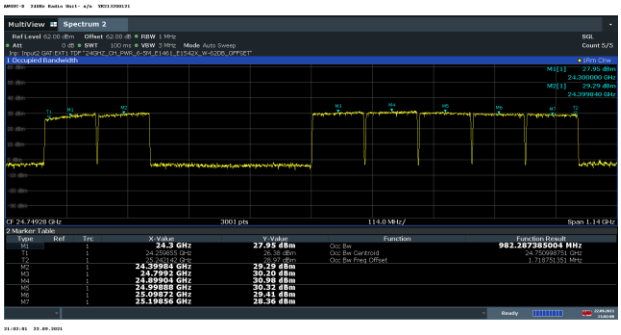


Vertical

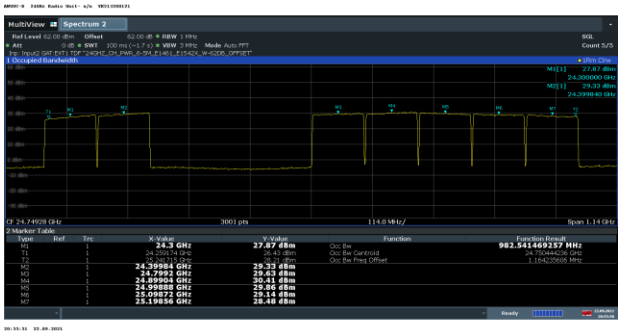


7 Carrier, 64QAM

Horizontal



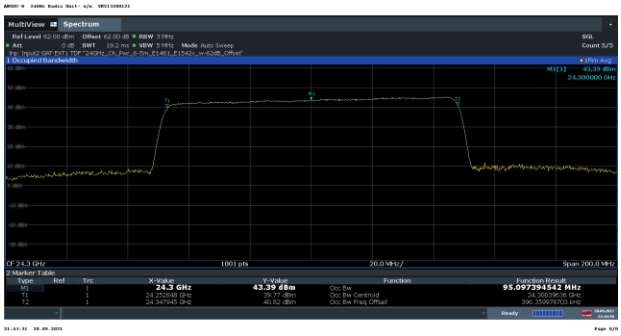
Vertical



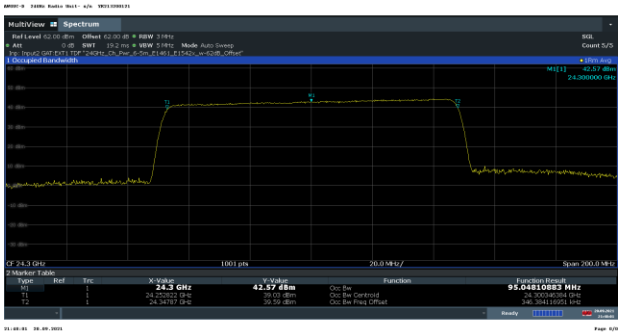
3MHz RBW

1 Carrier, QPSK

Horizontal

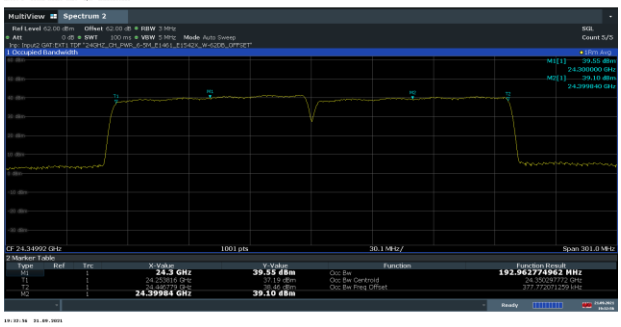


Vertical

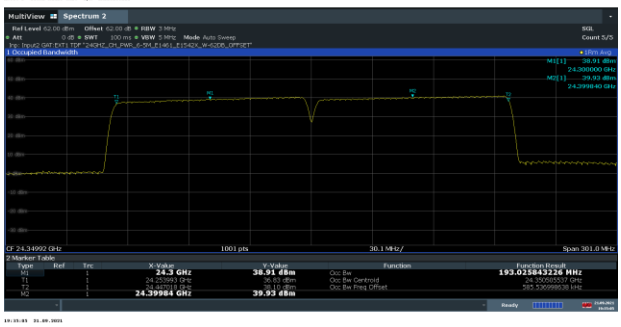


2 Carrier, QPSK

Horizontal

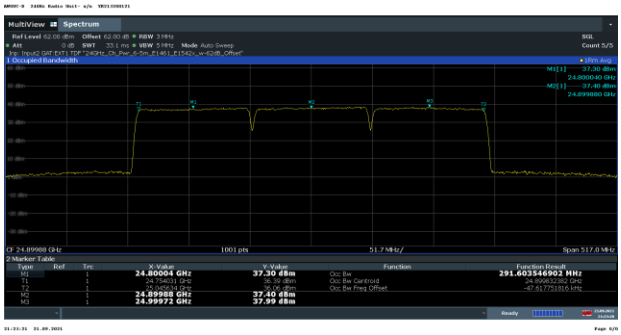


Vertical

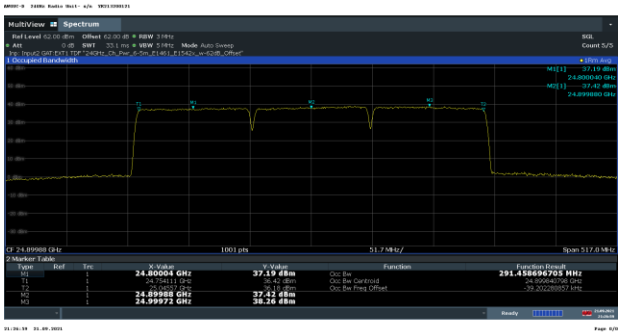


3 Carrier, 16QAM

Horizontal



Vertical



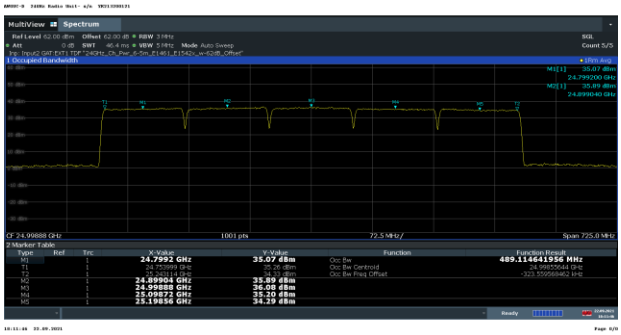
4 Carrier, 64QAM

Horizontal

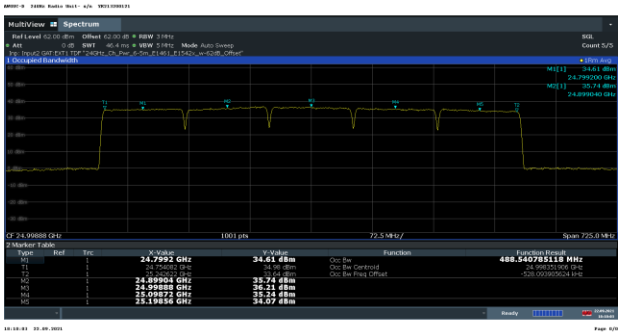
Vertical

5 Carrier, 64QAM

Horizontal



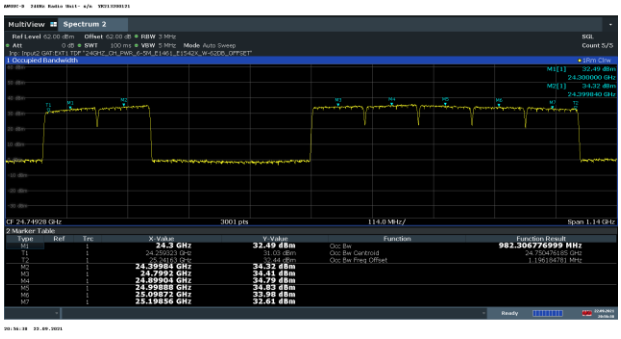
Vertical



7 Carrier, 64QAM

Horizontal

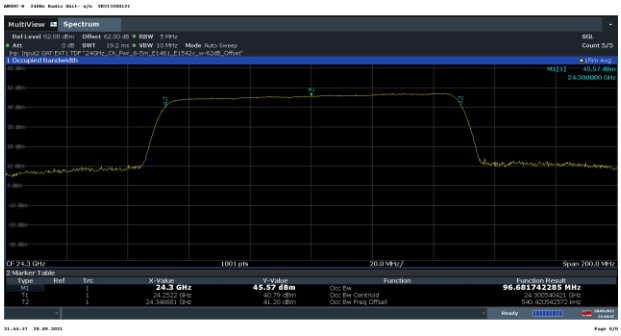
Vertical



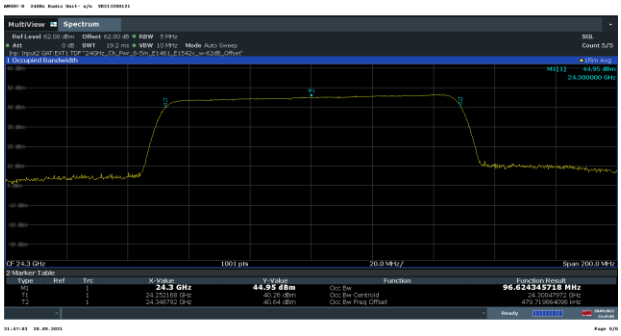
5MHz RBW

1 Carrier, QPSK

Horizontal



Vertical



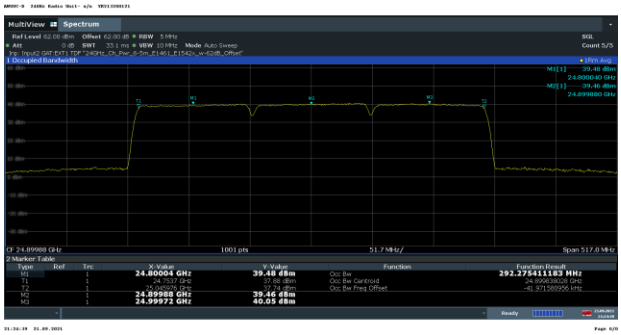
2 Carrier, QPSK

Horizontal

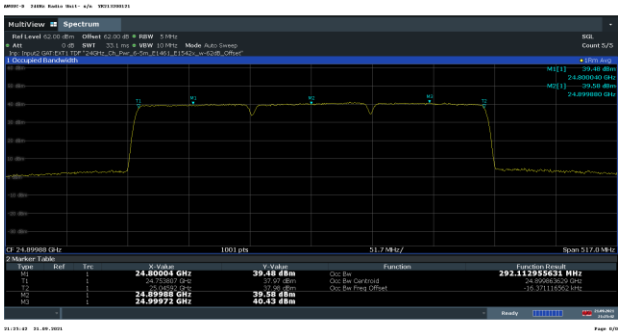
Vertical

3 Carrier, 16QAM

Horizontal



Vertical



4 Carrier, 64QAM

Horizontal

Vertical

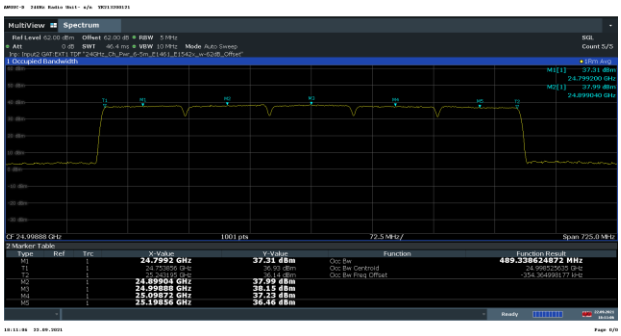
5 Carrier, QPSK

Horizontal

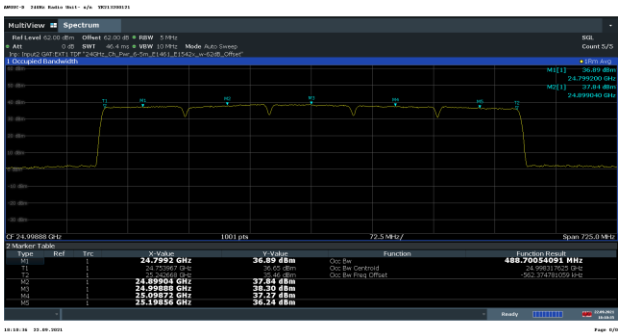
Vertical

5 Carrier, 64QAM

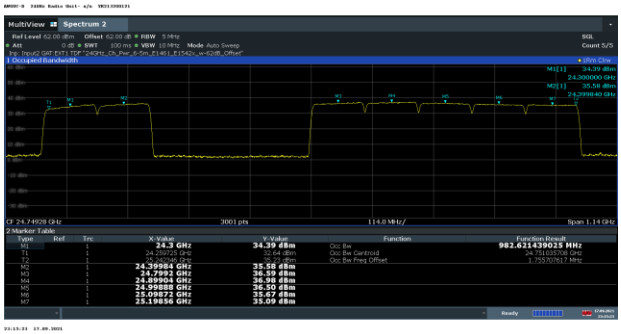
Horizontal



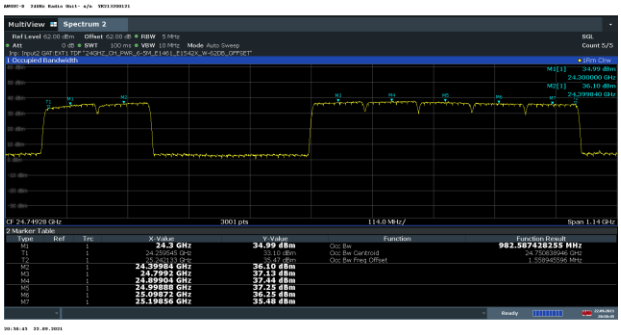
Vertical



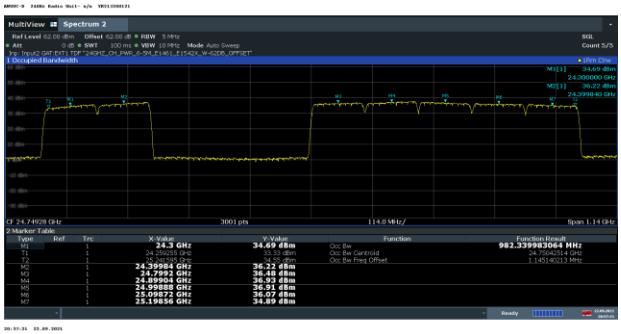
7 Carrier, QPSK
Horizontal



7 Carrier, 64QAM
Horizontal



Vertical



4.3.2 Occupied Bandwidth-Edge of Block Emissions

The classical Occupied Bandwidth measurement of Edge of Block Emissions or conveniently Out Of Band Emissions (OOBE) is an evaluation of the transmit carrier compliance with edge of block/edge of band requirements. This measurement documents the product's ability to maintain compliance with FCC Parts 2 and Part 30.203 limitations on emissions outside the block/ band of operation.

The **2AD8UAWGUCD01 AWGUC/D 5G AirScale 24 GHz mmWave Radio** Unit presently supports nominal 100 MHz bandwidth 5G-New Radio LTE TDD technologies. The Out Of Band evaluation addresses operation with one through seven carriers.

The OOBE evaluation is used to measure the maximum average spurious levels outside the transmit band as measured at the 6.5m boundary distance. The measurements were performed for one carrier which is the maximum spectral density carrier at the left, center and right side of band, two thru eight carriers at the left side of band and eight carriers at the left, center and right side of band. Additionally, the eight carrier non adjacent configurations spaced across the maximum instantaneous bandwidth of 1.4 GHz were evaluated at left side and right side of the band.

For each configuration channel power and modulation were verified prior to other measurements. The measurement process meets the requirements of ANSI C63.26 and ISO17025. The test setup was as shown in Figure 4.1.1. Measurements were performed in the far field at 6.5m for both vertical and horizontal polarizations.

The Out Of Band Emissions of each of the signals identified in Table 4.3.6 was measured using a Rohde & Schwarz FSW85 Spectrum analyzer, a remote PC based instrumentation controller and the same calibrated RF attenuation path used for channel power. The correction included the products antenna gain to correct the emissions to the relative "antenna connection" port. All spurious emissions > 10% Signal BW outside the band was evaluated for compliance without the product gain as is required.
Plots are provided using the triggered functionality of the test analyzer and demonstrate compliance with edge of band limits.

These sheets contain data for multiple mixed carrier configurations for Left Edge, Center and Right Edge of the 24 GHz Part 30 Upper Microwave Flexible Use Service spectrum.

4.3.3 Requirements 24 GHz Emissions Limits

The Limit in 47 CFR 30.203 for Emissions Limits is as follows:

(a) The conductive power or the total radiated power of any emission outside a licensee's frequency block shall be −13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be −5 dBm/MHz or lower.

(b)(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.

(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges as the design permits.

(3) The measurements of emission power can be expressed in peak or average values.

In order to address the limit as imposed for the requirement in 47CFR 96.41 we evaluated emissions per the requirements in ANSI C63.26 and per KDB 940660 D01 Part 30 CBRS Equipment.

The average detector function was used for all MXA measurements and the Peak detector function were used for EMC receiver measurements.

4.3.4 Measurement Offset and MIMO

As this was a radiated EIRP measurement no MIMO adjustment was used.

4.3.5 Mask Parameters

The mask parameters are in units as stated in Part 30 and are listed in Table 4.3.5. Mask parameters are as stated in Table 4.3.5. The Guard band was adjusted for 10% of the maximum signal bandwidth (80 MHz).
Mask Edge Offsets = ½ the measurement Resolution Bandwidth were not used.

Table 4.3.5 - Mask Parameters Out Of Band / Edge of Band Emissions

Frequency	Part 30 Limit
GHz	dBm
35.00	-13
36.00	-13
36.92	-13
36.92	-5
37.00	-5
37.00	57
40.00	57
40.00	-5
40.08	-5
40.08	-13
43.00	-13

4.3.6 Measurement Path Adjustments

The measured power at the spectrum analyzer input was adjusted for calculated free space loss, cable loss, measurement antenna gain and the product antenna gain over its applicable frequency range as documented in Exhibit 6 of the filing and in the table below. This is appropriate for Out Of Band Emissions / Edge of Band emissions only for the frequency range that the transmit antenna has documentable and consistent gain. Since different products have different gain responses vs frequency, the products documentable antenna gain only applies for the operational frequency range for which the product is designed.

Sample calculation: The sample calculation below is the formula and the correction for 35 GHz;

Adjustment **=** Free Space Path Loss - Measurement Antenna Gain + Cable Loss - Product Antenna Gain.

Total Required Adjustment (@35 GHz) **=** 50.32 dB = 79.58 dB -23.96dBi + 12.84dB – 18.14 dBi

This adjustment was only used for the OOBE/EoB frequency range. Table 4.3.6 below lists the offset correction factors used for the measurement distance of 6.5m including the AWGUC/D product gain. The measurements were made using a flat offset of 44 dB with a transducer correction identified below.

Table 4.3.6 Measurement Correction for Edge of Band / Out of Band Emissions

Frequency	Free Space Path Loss, PL	Measurement Antenna Gain, "G"	Measurement Cable Loss, "L"	PL-G1+L1	AEWF Antenna Gain, IEEE	Total Required Adjustment	FSW Offset	Transducer Correction Factor
GHz	dB	dBi	dB	dB	dBi	dB	dB	dB
35.00	79.58	23.96	12.84	68.46	18.14	50.32	44	6.324
35.50	79.70	23.52	13.03	69.21	20.05	49.16	44	5.162
36.00	79.83	24.27	13.20	68.75	21.97	46.78	44	2.784
36.50	79.95	23.28	13.35	70.01	22.81	47.20	44	3.203
37.00	80.06	24.42	13.39	69.04	23.65	45.39	44	1.387
37.50	80.18	23.27	13.39	70.29	23.82	46.47	44	2.469
38.00	80.30	24.29	13.45	69.45	23.99	45.46	44	1.461
38.50	80.41	23.18	13.54	70.76	24.11	46.65	44	2.653
39.00	80.52	23.65	13.73	70.60	24.22	46.38	44	2.382
39.50	80.63	23.03	13.76	71.36	24.10	47.26	44	3.256
40.00	80.74	23.00	13.79	71.53	23.98	47.55	44	3.547
40.50	80.85	23.35	13.84	71.34	23.91	47.43	44	3.433
41.00	80.96	23.22	13.98	71.72	23.84	47.88	44	3.880
41.50	81.06	23.28	14.14	71.93	23.20	48.73	44	4.731
42.00	81.17	23.39	14.23	72.01	22.56	49.46	44	5.459
42.50	81.27	23.81	14.36	71.81	21.52	50.29	44	6.290
43.00	81.37	23.55	15.30	73.11	20.49	52.62	44	8.620
43.50	81.47	23.60	16.14	74.01	18.55	55.46	44	11.462

4.3.7 Edge of Band Measurements

The Occupied Bandwidth and Edge-of-Band emissions measurements were made as a radiated measurement at a distance of 6.5m. The measurements were performed with an FSW spectrum analyzer in compliance with the procedure and requirements of ANSI C63.26. The test set-up diagram in Figure 4.1.1 was used. Testing was performed for the 100 MHz carrier configurations at the left side, and right side of the Part 30 Band. All of the Edge of Band measurements were performed at the specified 1 MHz resolution bandwidths. Adjustment factors were as described in Section 4.3.6 above.

4.3.7.1 Initial Results - Edge of Band Measurements

The initial Occupied Bandwidth and Edge-of-Band emissions measurements identified a single significant Out Of Band Emissions (OOBE). This emission was identified as a single LO narrowband spurious signal at 40.6489 GHz. Multiple transmit configurations were evaluated to determine the worst case operating configuration for generating the maximum spurious signal at 40.6489 GHz. Multiple scans confirmed that the maximum signal was generated by a single full power QPSK carrier at the Left side of the band.

The OOBE measurements determined that the 40.6489 GHz signal maximum value was 8.39 dBm when not adjusted for the AWGUC/D's Transmit Antenna gain. Per KDB 842590 D01 guidance these emissions needed to be evaluated using the Total Radiated Power methodology.

4.3.8 Total Radiated Power Evaluation of Out Of Band Emissions

Per KDB 842590 D01 the use of product array gain to reference the radiated spurious to the conducted transmit signal is not valid at greater than 10% of signal bandwidth outside the band. For reference, if the gain was allowable for the 40.6489 GHz spur it would result in a final value of -15.52 dBm which is 2.52 dB of margin to the limit. Without the consideration for transmit antenna gain the OOBE measurements determined that the 40.6489 GHz signals maximum value was 8.39 dBm and needed to be evaluated for Total Radiated Power.

Following the requirements and guidance of KDB 842590 D01 a Two and Three Cut Total Radiated Power (TRP) evaluation was performed on the spurious signals.

Two Cut and Three cut TRP evaluations were performed at a measurement distance of 4m per KDB 842590 D01. We used our ISO 17025 accredited Radiated Emissions measurement process software with updated software drivers for control of the FSW85 analyzer and modifications for data export. Measurements were performed every 4 degrees. For Cut #1 the maximum beam height was 175 cm. For Cut #2 the height was 181 cm. The first cut was performed with the receive antenna Vertically polarized and the second cut was performed with the receive antenna Horizontally polarized. The product under test has two arrays (H&V). The Cut#1 (Vertical) and Cut#2 (Horizontal) heights correspond to the maximum beam power location. There was no attempt to duplicate the data cuts as it would not result in any change in average value. The sweeps were performed with the following settings as follows:

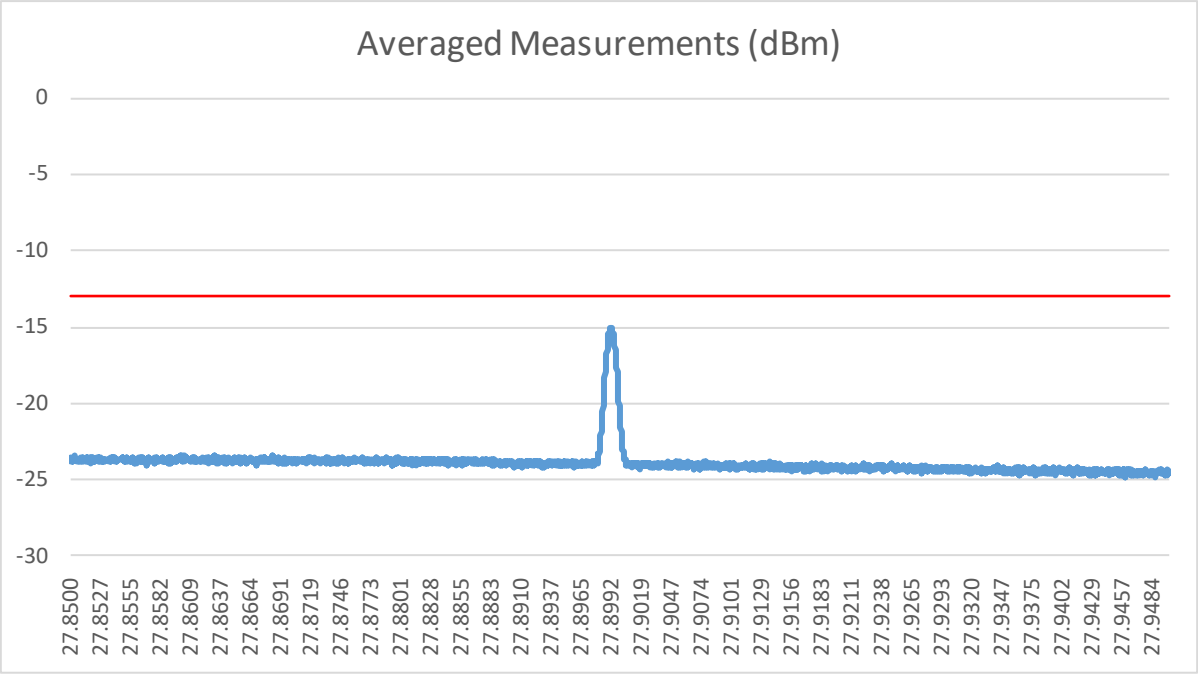
	Spur #1
Frequency range:	27.85 GHz to 27.95 GHz
Resolution Bandwidth:	1 MHz
Video bandwidth:	3 MHz
Detector:	RMS
Trace averaging Factor	480
Number of points	3001
Turntable step size	4 degrees
Three cut correction factor	2.0 dB

4.3.8.1 Total Radiated Power Results

The net result for the Spur was a maximum corrected TRP value of -15.103 dBm at 27.8992 GHz. Which demonstrates 2.103 dB margin to the -13 dBm limit. This emission is reportable.

The plot of the Two Cut Average TRP measurements over frequency are plotted below.

TRP Data Plot for 27.85 GHz to 27.95 GHz



4.3.8.2 Out Of Band Emissions Results

The Out Of Band Emissions plots for the tested configurations of one through eight carriers operation are below. These Occupied Bandwidth and Edge-of-Band emissions measurements were made as a radiated measurement at the verified far field measurement distance of 6.5m. The plots show compliance to the Part 30 FCC limit for the n258 Band for all signals except the single narrowband local oscillator spurious at 27.8992 GHz. This spur was evaluated for compliance using the three cut TRP method and found to be compliant.
The out-of-band emissions plots attached below document that all the emissions are compliant.

The measurement results of the occupied bandwidth and the out-of-band emissions as documented in the plots and Table 4.3.6.1 demonstrate the full compliance with the Rules of the Commission for the operating band.

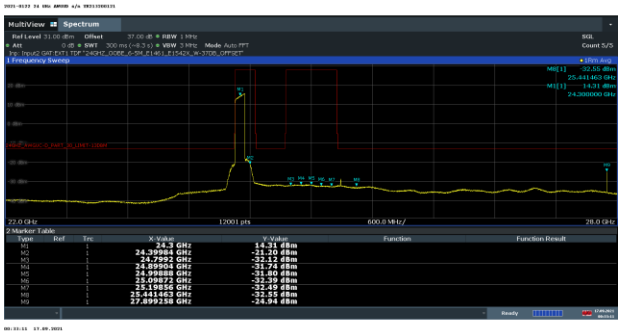
Table 4.3.7.1 Results - Occupied Bandwidth-Edge of Block Emissions/ OOBE

Center Frequencies of Edge Channels, GHz	Location	Number of Carriers	Modulation	Polarization	Occupied Bandwidth Edge of Block / OOBE Compliance
24.3	Left Side of Band	1	QPSK	Horizontal	Compliant
				Vertical	Compliant
24.3 24.39984	Left Side of Band	2	QPSK	Horizontal	Compliant
				Vertical	Compliant
24.7992 24.89904 24.99888	Right Side of Upper Band	3	16QAM	Horizontal	Compliant
				Vertical	Compliant
24.7992 24.89904 24.99888 25.09872	Right Side of Upper Band	4	64QAM	Horizontal	Compliant
				Vertical	Compliant
24.7992 24.89904 24.99888 25.09872 25.19856	Right Side of Upper Band	5	64QAM	Horizontal	Compliant
				Vertical	Compliant
24.7992 24.89904 24.99888 25.09872 25.19856		6	64QAM	Horizontal	Compliant
				Vertical	Compliant
24.3 24.39984 24.7992 24.89904 24.99888 25.09872 25.19856		7	QPSK	Horizontal	Compliant
				Vertical	Compliant
24.3 24.39984 24.7992 24.89904 24.99888 25.09872 25.19856		7	64QAM	Horizontal	Compliant
				Vertical	Compliant

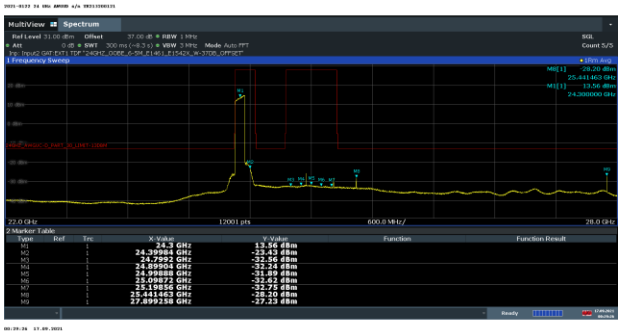
4.3.8.2.1 Occupied Bandwidth Edge of Band Plots

1 Carrier – QPSK / Left

OOBE/EoB – Horizontal Polarization

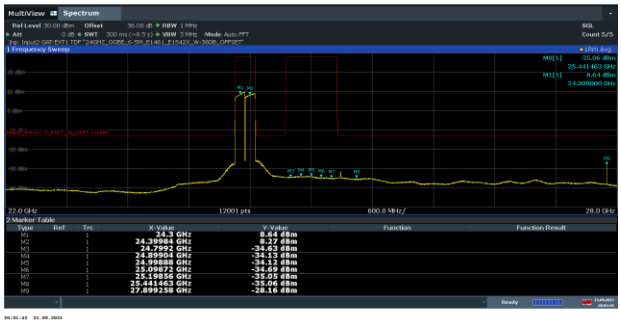


OOBE/EoB – Vertical Polarization

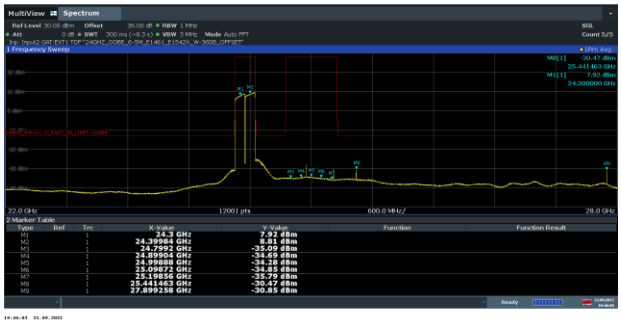


2 Carrier – QPSK / Left

OOBE/EoB – Horizontal Polarization

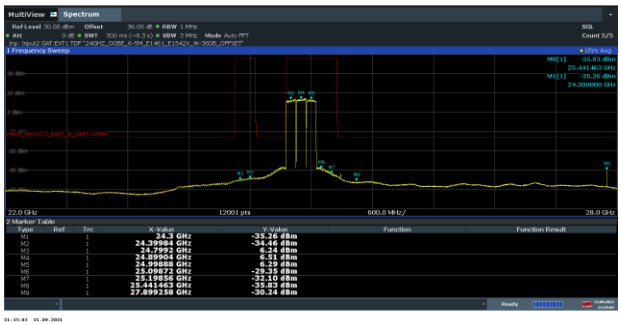


OOBE/EoB – Vertical Polarization

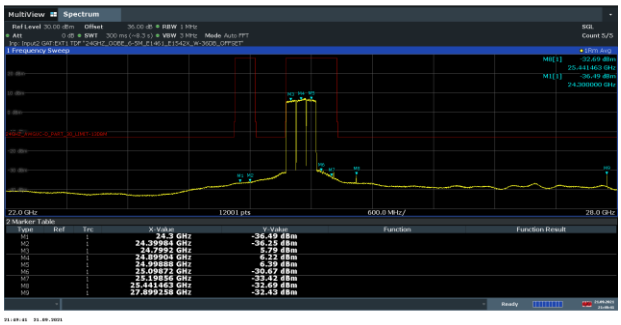


3 Carrier – 16QAM / Right

OOBE/EoB – Horizontal Polarization

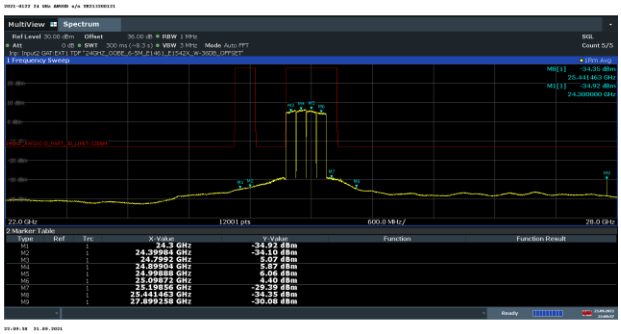


OOBE/EoB – Vertical Polarization

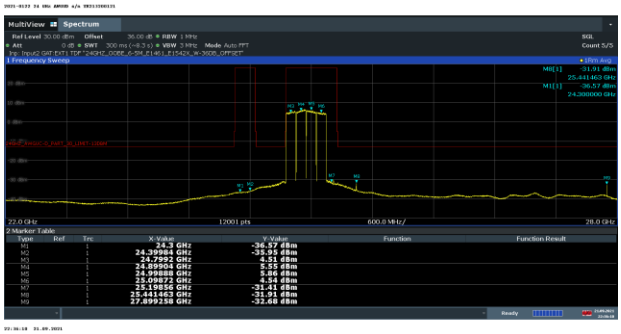


4 Carrier – 64QAM / Right

OOBE/EoB – Horizontal Polarization

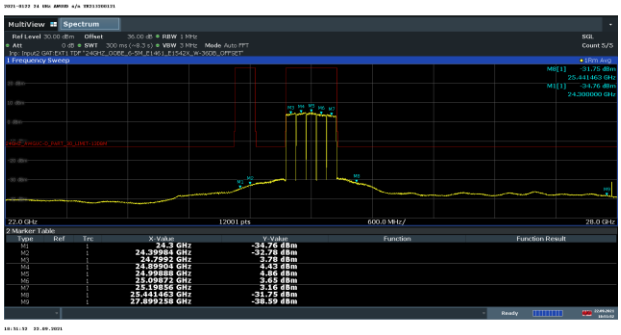


OOBE/EoB – Vertical Polarization

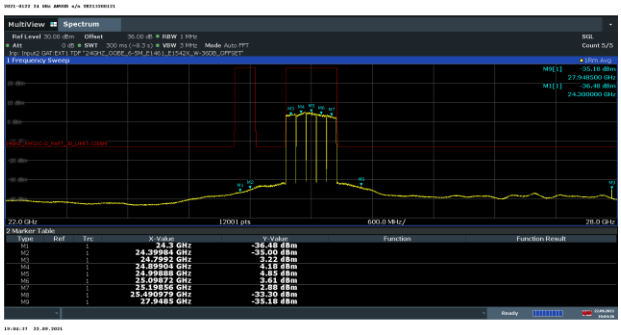


5 Carrier – 64QAM / Right

OOBE/EoB – Horizontal Polarization

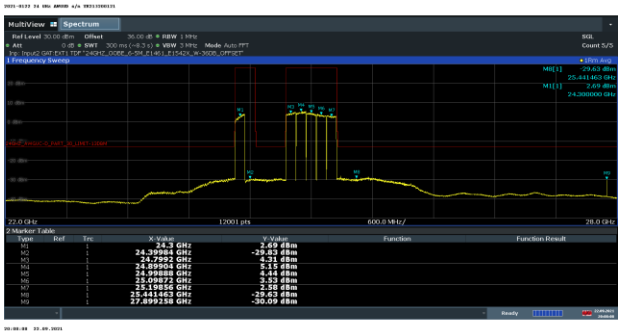


OOBE/EoB – Vertical Polarization

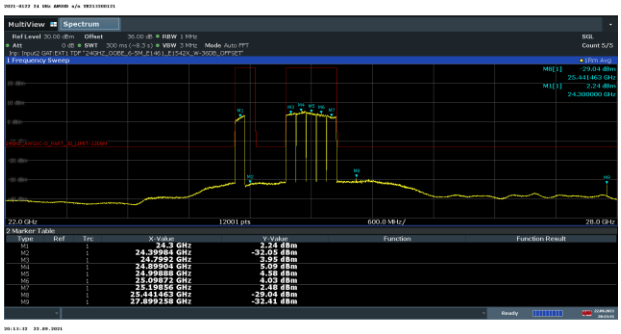


6 Carrier – 64QAM

OOBE/EoB – Horizontal Polarization

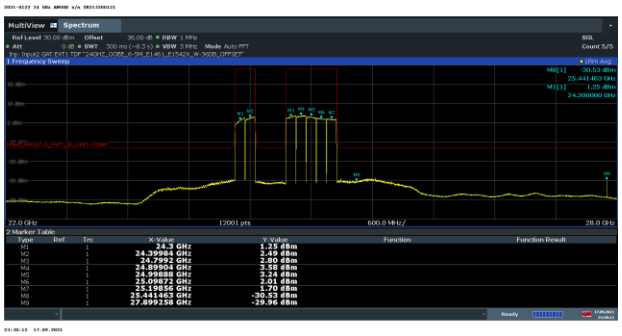


OOBE/EoB – Vertical Polarization

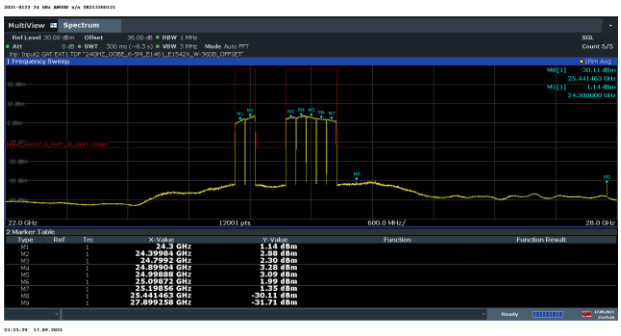


7 Carrier – QPSK

OOBE/EoB – Horizontal Polarization

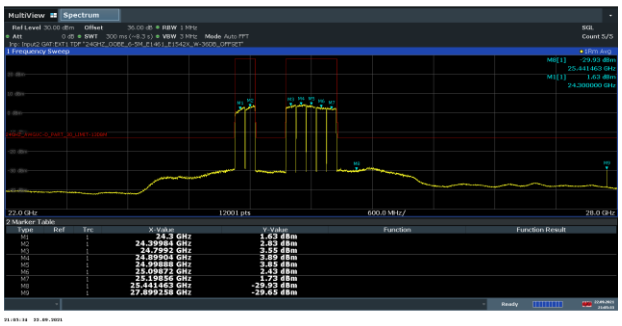


OOBE/EoB – Vertical Polarization

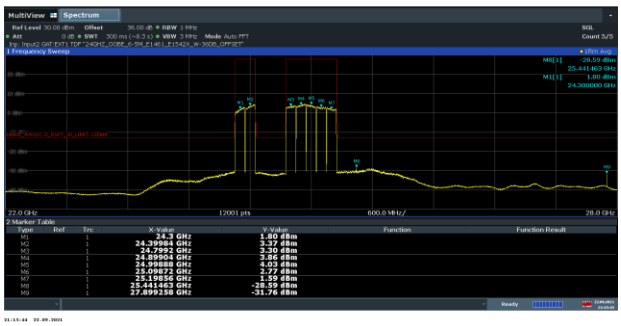


7 Carrier – 64QAM

OOBE/EoB – Horizontal Polarization



OOBE/EoB – Vertical Polarization



4.4 Section 2.1051 MEASUREMENT REQUIRED: SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

This test measures the emissions of spurious signals which may come from harmonic, parasitic, intermodulation and frequency conversion products and are outside the necessary bandwidth but excludes Edge-of-Band emissions.

4.4.1 Section 2.1051 Spurious Emissions at Antenna Terminals

Spurious Emissions were investigated per 47CFR Section 2.1057(a)(1) over the frequency range of 30 MHz to 200 GHz as specified in 2.1057(a)(2).

2.1057(a) In all of the measurements set forth in §§2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:

(3) If the equipment operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower.

(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

4.4.2 Required Limit

The required emission limitation specified in 47CFR 30.203 (a) was applied to these tests. Based upon the criterion given in Section 30 of the Code and as developed in 4.3.3, the required emission limit for emissions outside a licensee's frequency block is:
47CFR 30.203 (a) (a) The conductive power or the total radiated power of any emission outside a licensee's frequency block shall be -13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be -5 dBm/MHz or lower.

4.4.3 Results

Since there is no antenna terminal, all measurements were performed as radiated measurements and standard radiated emissions. The Edge of Band emissions, presented in Section 4.3.7 and the Total Radiated Power (TRP) evaluation in 4.3.8 document the OOBE compliance for the 36-41 GHz frequency range which is around the Transmit ranges of 37 - 40 GHz. Those measurements are appropriate as the products antenna gain is documented over the same ranges. There was one significant emission detected and was shown to be compliant in Section 4.3.8.1. There were no other emissions detected in these ranges within 20 dB of the limit.

The standard radiated emissions are documented in Section 4.5 "*Section 2.1053 Measurement Required: Field Strength of Spurious Radiation*". The test configuration is shown in Figure 4.4.1 documents the test set up used for the measurements. Measurements in Section 4.5

The measurements were performed in compliance with ANSI C63.26, KDB 842590 D01, C63.26 mmWave JTG, and our ISO17025 process. The measurement meets the ANSI C63.26 requirements in paragraphs 5.2.4.4.1 and 5.7 which requires that the number of points in the sweep be > 2 × Span/RBW. The ESW-44 spectrum analyzer measurements examine the 30 MHz to 40 GHz range. The FSW based mmWave transmitter test system were used to provide measurement capability from 40 GHz to 220 GHz range.

4.5 Section 2.1053 MEASUREMENT REQUIRED: FIELD STRENGTH OF SPURIOUS RADIATION

The field strength measurements of radiated spurious emissions were made in FCC registered five and ten meter semi-anechoic chambers AR-4 and AR-8 , (FCC Registration Number: 395774) **NVLAP** Lab Code: 100275-0 and IC (Filing Number: 6933F-4 & 8) which are maintained by Nokia Bell Labs in Murray Hill, New Jersey.

The **2AD8UAWGUCD01** (EUT) was configured in semi-anechoic chamber AR-4 in a manner simulating a normal field installation. The recommendations of ANSI C63.4–2014, C63.26-2015, KDB 842590 D01 and C63.26 mmWave JTG were followed for EUT testing setup and cabling. The EUT was configured to operate in a 5G-NR test model per the constraints identified in section 4.2. A photograph of this setup is in Exhibit 12 of the filing package.

The Main Radio Unit was configured into the full power forward beam transmit configuration as defined in Table 4.5.1. The unit was configured with the maximum transmit bandwidth of eight carriers for each polarization. The Vertical and Horizontal polarizations each transmitted 57 dBm EIRP, with the total transmit power of 60 dBm EIRP. The product in the below configurations was evaluated over the 30 MHz to 100 GHz frequency range as required.

Table 4.5.1 EUT Transmit Configuration

Test Configuration NRARFCN	AWGUC/D Tx Frequencies GHz	Transmit Active Polarization	Signal Bandwidth, MHz	Modulation	Total Power, dBm EIRP	Radiated Emissions Pass / Fail
2017499	24.30000	H & V	100	QPSK	60	Pass
2017499 2019163 2025819 2027483 2029147 2030811 2032475	24300.00 24399.84 24799.20 24899.04 24998.88 25098.72 25198.56	H & V	100	64QAM	60	Pass

4.5.1 Spurious Radiation and Radiated Emissions Requirements.

This product meets Part 15B, and Part 30.203 requirements. FCC Part 15 Class B require emissions to be below 54.5 dBuV/m at 3m. Part 30.203 requires emissions to be below the value generated by a conducted emission of -13 dBm. This is a standard value for wireless products typically defined as

-43+10LogP=-13 dBm.

The evaluation of emissions at the Edge of Band was detailed in Sections 4.3.7 and 4.3.8. Emissions removed from the transmit band were evaluated identically to other wireless products.

Measurements were performed in compliance with Section 2.1053, FCC publication 442401, the requirements detailed above and clause 5.5 of ANSI C63.26. For this case the evaluation of acceptable radiated field strength is as follows.

The calculated emission levels were found by:

Pmeas (dBm) + Cable Loss(dB) + Antenna Factor(dB) + 107 (dBμV/dBm) -Amplifier Gain (dB)
= Field Strength (dBμV/m)

Title 47CFR section 30.203 and 2.1053 contains the requirements for the levels of spurious radiation as a function of the EIRP of the modulated carrier with 100 MHz of bandwidth. The reference level for the modulated carrier is calculated as the field produced by an isotropic radiator excited by the transmitter output power according to the following relation taken from Reference Data for Radio Engineers, page 27-7, 6th edition, IT&T Corp.

$$\mathbf{E = (120\pi P)^{1/2} = [(30*P)^{1/2}] / R}$$

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

Where: E = Field Intensity in Volts/ meter R = Distance in meters = 3 m
P = Transmitted Power, Watts = 316.23 W

The field strength of radiated spurious emissions measured was determined by

E(dBμV/m) = V_{meas}(dBμV) + Cable Loss (dB) + Antenna Factor (dBi/m).

Field strength measurements of radiated spurious emissions were made in the semi-anechoic chamber, AR-4 as detailed above. The recommendations of ANSI C63.4 and ANSI C63.26 were followed for EUT testing setup, cabling, and measurement approach and procedures. All the measurement equipment used, including antennas, was calibrated in accordance with ISO 9001 process. The EUT setup diagram is given in the Figure 4.5. The minimum margins to the Part 30.203 limit is as measured in accordance with 2.1053. The test data follows.

4.5.2 Radiated Spurious Emissions Measurements: 40 GHz - 100 GHz

The radiated spurious emissions spectrum was investigated per 47CFR Section 2.1057(a)(1) for spurious emissions over the frequency range of 40 GHz to 100 GHz. The procedure and methodology followed the recommendations of ANSI C63.4–2014, C63.26-2015 and C63.26 mmWave JTG.

A Rohde & Schwarz FSW 67 was employed with external three port Harmonic Down Converters (HDC). The waveguide RF input converters provided coverage for 40-60 GHz (U), 60-90 GHz (E) and 90-140 GHz (F) bands. The HDC's were paired with 25 dB Standard Gain Horns. A 40 GHz waveguide high pass filter was utilized to limit the transmit carrier emissions from overloading the 40-60 GHz HDC.

Operation of the harmonic down converters utilizes a swept LO with a fixed IF frequency of 1.325 GHz. The IF cable loss for the 4m of cable was 1.03 dB and was corrected internally to the FSW along with the Conversion loss for the harmonic down converters. Additional external shielding of the HDC's was necessary to limit carrier energy from creating immunity issues with the measurements.

Cable loss compensation for the LO cable loss was necessary to enable scan heights from 1-3 meters. The experience of this test indicated that a 3m maximum test height with this product is adequate (0.5 m above the top of product). This allowed for a reduction of the test cables length and reduce IF images which occurred at multiples of the 1.325 GHz IF frequency.

Measurements were performed at the following distances:

mmWave Band	Frequency Range, GHz	Measurement distance meters
U	40-60	4
E	60-90	4
F	90-100	3

Operation was verified prior to testing by bore-sighting a mmWave signal generator or mmWave source module with an antenna identical to the measurement antenna at the test distance. The location of the maximum beams had previously been ascertained for both vertical and horizontal polarizations. The beam is narrow and radiated power is down 23 dB at just $\pm$ 12 degrees off center. All of the emissions and harmonics were found to be centered on the beam as well.

Based upon previous experience a continuous max hold (average detector) sweep of the product in elevation and azimuth was employed for full coverage scanning of the product. For these measurements in each band the scan was started at the beam peak location of 21 degrees azimuth, and a nominal elevations 172 cm for Vertical and Horizontal. The peak was first located for the most prominent emissions in the span. The elevation was then swept down to 1m and back up back to 3m and returned to the beam peak. The product was then rotated continuously to 360 degrees back to 0 degrees and back to 21 degrees. This method locates any emission and provides the maximum emissions but required operation without the analyzer internal noise reduction function. Peaks were noted using the marker function which were later formally measured with the required 1 MHz resolution bandwidth. Measurements for 40-100 GHz were performed this way for the 7 carrier transmit configuration.

4.5.2.1 Bandwidth Limits and Corrections: Radiated Measurements 40 GHz - 100 GHz

All corrections were made to the signal level as detailed below.

4.5.2.2 Resolution Bandwidth and # of Points:

For measurements above 40 GHz we performed final measurement scans with the required 1 MHz resolution bandwidth and preliminary scans with either a 10 MHz or 3 MHz resolution bandwidth.

Final measurements were performed so that the resolution bandwidth and span limitations of ANSI C63.26 were followed so that the number of measurement points > 2(Span/RBW).
Our FSW was upgraded from the original filing and now processes 100,000 data points across the screen which allows for 50 GHz spans with a 1 MHz RBW. Multiple spans were therefore used when necessary to evaluate the peak spurious emissions detected.

4.5.2.3 Part 30 Limit:

The -13 dBm emissions limit was not adjusted in any way.

4.5.2.4 Emissions Corrections

The measured signal was corrected by the FSW for the harmonic downconverter (HDC) conversion loss. In addition, a correction consisting of the radiated path loss, the gain of the measurement antenna and a 1 dB IF cable loss (at 1.3 GHz) was applied. There was no correction applied for the product antenna gain as these measurements are outside the transmit frequency range.

$$\text{Emissions Correction} = \text{Path Loss} - \text{Antenna Gain} + \text{IF Cable loss (1dB)}$$

$$\text{Where Free Space Path Loss} = ((4\pi d)/\lambda))^2$$

Table 4.5.2.4 details the correction for the three bands.

Table 4.5.2.4a Radiated Emissions Corrections for 40-60 GHz at 4m

Frequency	λ	Measurement Distance, d	Path Loss	Measurement Antenna Gain	IF Cable Loss	Emissions Correction Total
GHz	m	m	dB	dB	dB	dB
40.0	0.0075	4	76.52	21.80	1.03	55.75
42.5	0.0071	4	77.05	22.20	1.03	55.87
45.0	0.0067	4	77.55	22.50	1.03	56.07
47.5	0.0063	4	78.02	22.70	1.03	56.34
50.0	0.0060	4	78.46	23.00	1.03	56.49
52.5	0.0057	4	78.89	23.30	1.03	56.61
55.0	0.0055	4	79.29	23.40	1.03	56.91
57.5	0.0052	4	79.68	23.60	1.03	57.10
60.0	0.0050	4	80.05	23.70	1.03	57.37

Table 4.5.2.4b Radiated Emissions Corrections for 60-90 GHz at 4m

Frequency	λ	Measurement Distance, d	Path Loss	Measurement Antenna Gain	IF Cable Loss	Emissions Correction Total
GHz	m	m	dB	dB	dB	dB
60.0	0.0050	4	80.05	21.80	1.03	59.276
65.0	0.0046	4	80.74	22.30	1.03	59.471
70.0	0.0043	4	81.38	22.70	1.03	59.715
75.0	0.0040	4	81.98	23.00	1.03	60.014
80.0	0.0038	4	82.54	23.40	1.03	60.175
85.0	0.0035	4	83.07	23.60	1.03	60.501
90.0	0.0033	4	83.57	23.80	1.03	60.798

Table 4.5.2.4c Radiated Emissions Corrections for 90-100 GHz at 3m

Frequency	λ	Measurement Distance, d	Path Loss	Measurement Antenna Gain	IF Cable Loss	Emissions Correction Total
GHz	m	m	dB	dB	dB	dB
90.0	0.003333	3	81.07	21.90	1.03	60.199
95.0	0.003158	3	81.54	22.30	1.03	60.269
100.0	0.003	3	81.98	22.60	1.03	60.414

4.5.3 Field Strength of Spurious Radiation Results:

This product meets Part 15B limits below 10 GHz and Part 30 Requirements. For the Title 47CFR section 30.203 and 2.1053 test, the field strength of any spurious radiation, measured at 3m, is required to be less than 82.23 dBμV/meter. Emissions equal to or less than 62.23 dBμV/meter are not reportable.

The Total Radiated Power evaluation is detailed in section 4.3.8. There was a single LO spur at 27.8992 GHz which required evaluation. The net two cut result for the Spur was a maximum corrected TRP value of -15.103 dBm at 27.8992 GHz. This demonstrates 2.103 dB margin to the -13 dBm limit. This was the worst case overall margin.

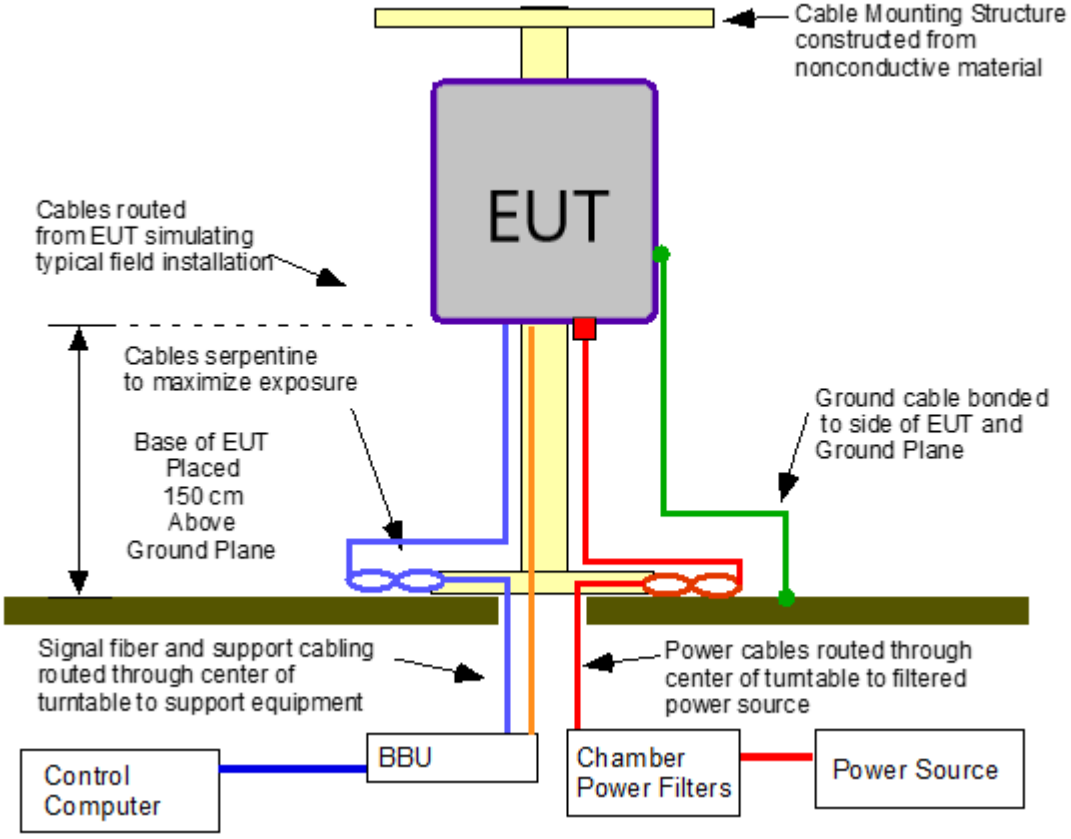
Presented results below include the standard measurements from 30 MHz to 40 GHz followed by the four mmWave bands for which the worst-case emissions are presented. The scans are performed with the required 1 MHz resolution bandwidth and sufficient number of points per ANSI C63.26 with markers at the frequencies of interest. The limit in the measurement is the conducted -13 dBm limit as specified in Part 30.203. Corrections to the emissions levels consisted of only the HDC conversion loss, the Free Space Path Loss, the gain of the measurement antenna and IF cable loss as detailed in Table 4.5.2.4. The measured worst case margin for the 40 GHz to 100 GHz frequency range is 5.47 dB at 90.175 GHz.

Over the out of band spectrum investigated from 30 MHz to 100 GHz, reportable spurious emissions were detected and determined to be compliant with the Part 30 limit.

This demonstrates that the **AWGUC/D 5G AirScale 24 GHz mmWave Radio FCC ID: 2AD8UAWGUCD01**, the subject of this application, complies with FCC Part 15 Class B, and FCC Sections 2.1053, 30.203 and 2.1057 of the Rules.

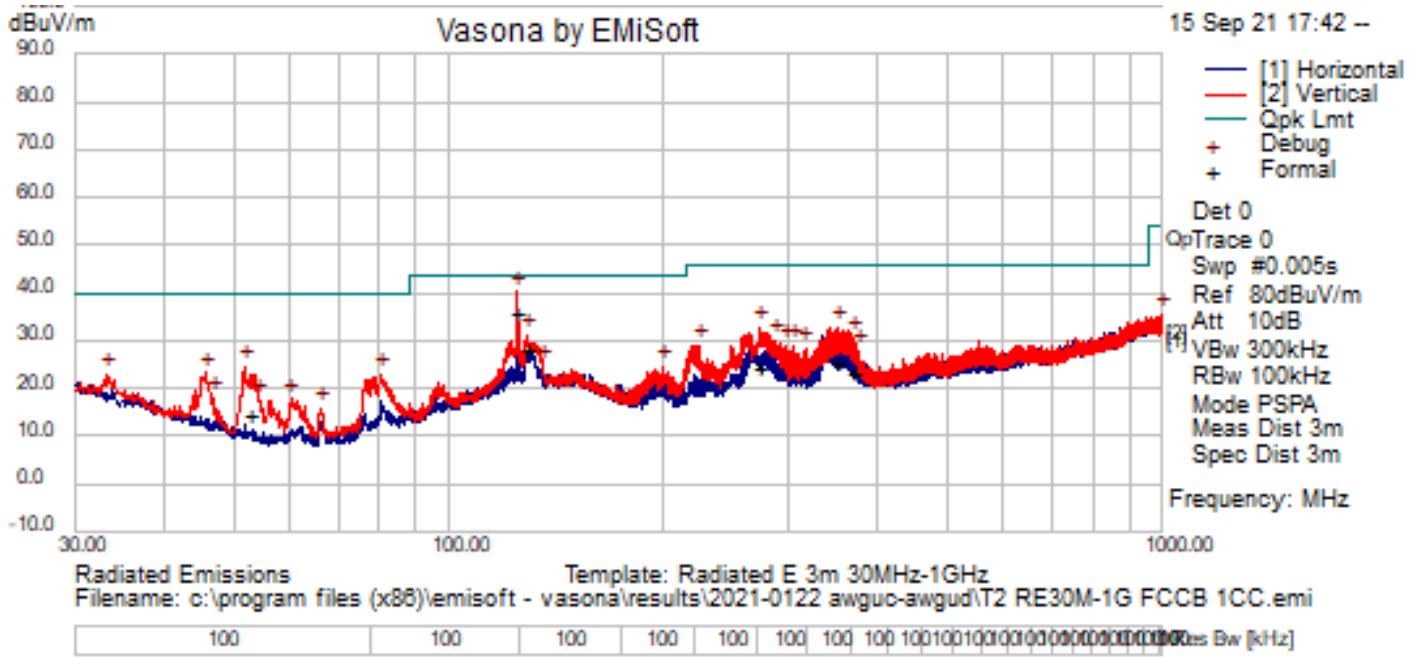
Photographs of the measurement setup are in the filing exhibits.

Figure 4.5 Radiated Emissions Product Setup



4.5.4 Transmitter Measurements of Radiated Spurious Emissions (

T2 Radiated Emissions 30MHz-1GHz 1 carrier Tx Configuration



Test Information

Results Title	Radiated Emissions 3m 30MHz-1GHz
File Name	T2 RE30M-1G FCCB 1CC.emi
Test Laboratory	MH-AR4, 52%RH, 22.8C, 994hPa
Test Engineer	JY / MJS
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless Group
EUT Details	AWGUC/D 5G n258 24G HP (60 dBm) FCC SN YK213300003, P/N 475946A.X2. 24300MHz. ETM1.1, P-Max-30dBm, 60dBm, 100MBW.
Configuration	AR4 Powered by -48Vdc, RS-ESI-E908, PA-E813, LPF-E1268, BiLog Ant-E601, RE 30MHz - 1GHz FCC Part 15. Cable set-AR4.Internal Attenuation 10dB Preview RBW Default; Formal RBW Default.
Date	2021-09-15 17:42:03

Formal Data

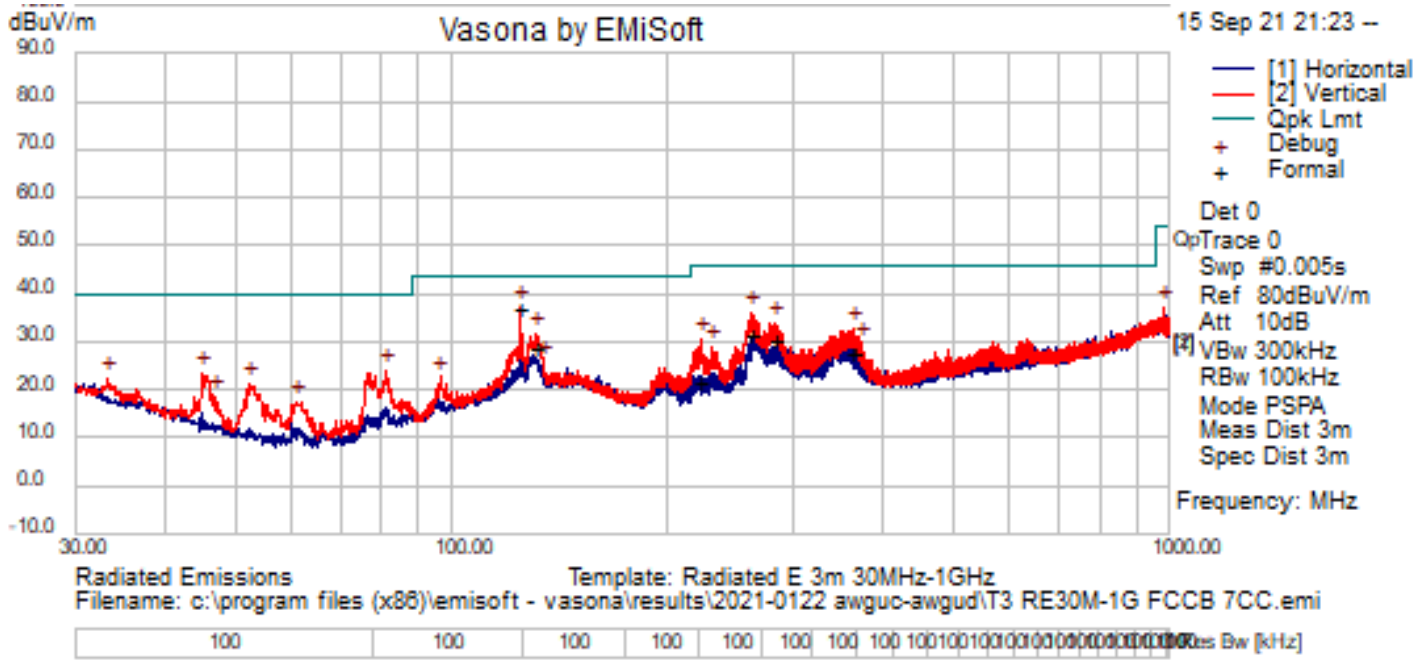
Frequency, MHz	Raw, dBuV	Cable, dB	Factor, dB	Level, dBuV/m	Emission Type	Pol H/V	Ht cm	Az deg	Limit dBuV/m	Margin dB	Pass/ Fail	Comments
125.002	44.17	1.55	-9.94	35.78	QuasiMax	V	105	193	43.50	-7.72	Pass	
128.693387	36.75	1.57	-9.82	28.51	QuasiMax	V	321	214	43.50	-14.99	Pass	
352.148297	36.03	2.65	-13.12	25.56	QuasiMax	V	160	316	46.00	-20.44	Pass	
272.885772	36.32	2.22	-13.91	24.63	QuasiMax	V	106	209	46.00	-21.37	Pass	
368.789579	33.11	2.74	-12.31	23.55	QuasiMax	V	223	297	46.00	-22.45	Pass	
52.928	33.47	1.01	-19.54	14.94	QuasiMax	V	198	37	40.00	-25.06	Pass	

Preview Data

Frequency, 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
125.038076	48.52	1.55	-9.94	40.13	Debug	V	100	180	43.50	-3.37	Pass	
128.693387	39.10	1.57	-9.82	30.85	Debug	V	300	225	43.50	-12.65	Pass	
272.885772	44.44	2.22	-13.91	32.75	Debug	V	100	225	46.00	-13.25	Pass	
352.148297	43.22	2.65	-13.12	32.74	Debug	V	100	0	46.00	-13.26	Pass	
368.789579	40.25	2.74	-12.31	30.68	Debug	V	100	315	46.00	-15.32	Pass	
51.835671	42.47	1.00	-19.17	24.29	Debug	V	100	135	40.00	-15.71	Pass	
287.507014	41.64	2.28	-14.06	29.86	Debug	V	100	135	46.00	-16.14	Pass	
45.583166	39.05	0.93	-16.86	23.12	Debug	V	100	315	40.00	-16.88	Pass	
33.270541	33.06	0.78	-10.80	23.04	Debug	V	200	180	40.00	-16.96	Pass	
224.40481	42.67	2.01	-15.76	28.93	Debug	V	100	180	46.00	-17.07	Pass	
298.184369	40.52	2.32	-13.97	28.86	Debug	V	100	180	46.00	-17.14	Pass	
80.693387	40.35	1.26	-18.78	22.82	Debug	V	100	315	40.00	-17.18	Pass	
304.436874	40.30	2.35	-13.88	28.77	Debug	V	100	135	46.00	-17.23	Pass	
316.364729	39.68	2.43	-13.68	28.43	Debug	V	100	180	46.00	-17.57	Pass	
376.773547	36.82	2.78	-11.96	27.64	Debug	V	100	315	46.00	-18.36	Pass	
135.619238	32.76	1.61	-9.59	24.78	Debug	V	200	90	43.50	-18.72	Pass	
998.657315	32.51	5.35	-2.59	35.28	Debug	V	360	135	54.00	-18.72	Pass	
199.298597	38.52	1.89	-15.79	24.62	Debug	V	200	135	43.50	-18.88	Pass	
46.737475	34.17	0.94	-17.31	17.80	Debug	V	100	135	40.00	-22.20	Pass	
60.108216	37.86	1.08	-21.34	17.61	Debug	V	100	315	40.00	-22.39	Pass	
54.336673	36.42	1.02	-20.01	17.43	Debug	V	100	180	40.00	-22.57	Pass	
66.264529	36.18	1.14	-21.53	15.78	Debug	V	100	45	40.00	-24.22	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.

T3 Radiated Emissions 3m 30MHz – 1GHz 7 Carrier Tx Configuration



Test Information

Results Title	Radiated Emissions 3m 30MHz-1GHz
File Name	T3 RE30M-1G FCCB 7CC.emi
Test Laboratory	MH-AR4, 52%RH, 22.8C, 994hPa
Test Engineer	MJS
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless Group
EUT Details	AWGUC/D 5G n258 24G HP (60 dBm) FCC Part 15b, SN YK213300003, P/N 475946A.X2. 7CC
Configuration	AR4, Powered by -48Vdc, RS-ESI-E908, PA-E813, BiLog Ant-E601, RE 30MHz - 1GHz FCC Part 15. Cable set-AR4.Internal Attenuation 10dB Preview RBW Default; Formal RBW Default.
Date	2021-09-15 21:23:21

Formal Data

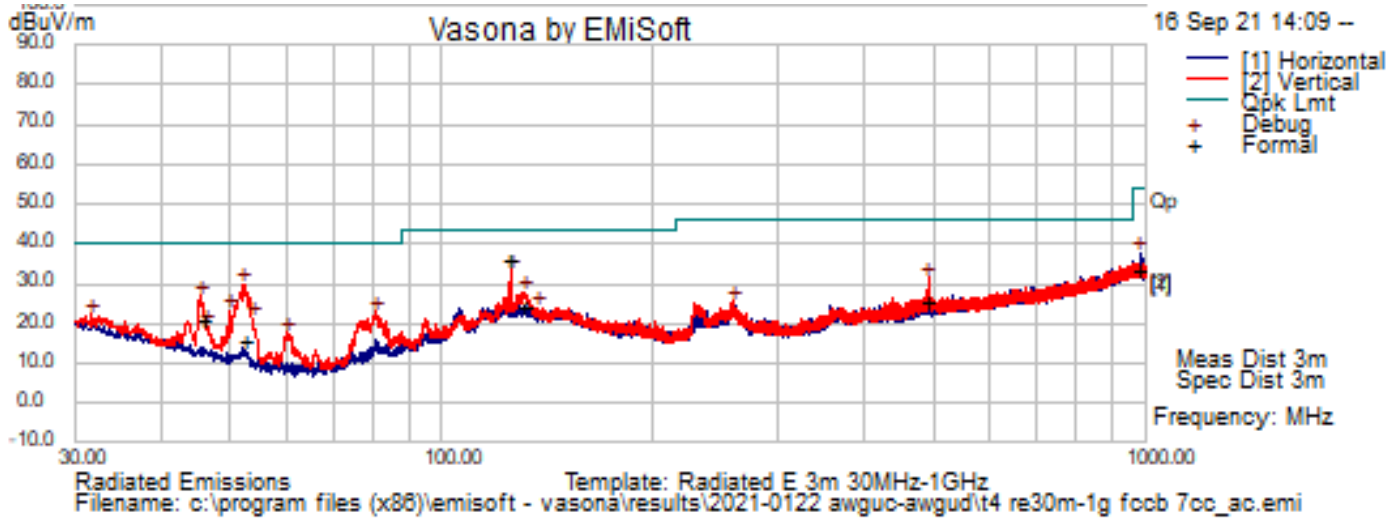
Frequency, MHz	Raw, dBuV	Cable, dB	Factor, dB	Level, dBuV/m	Emission Type	Pol H/V	Ht cm	Az deg	Limit dBuV/m	Margin dB	Pass/ Fail	Comments
124.987	45.40	1.55	-9.95	37.00	QuasiMax	V	106	199	43.50	-6.50	Pass	
262.112224	42.14	2.18	-12.60	31.72	QuasiMax	V	115	44	46.00	-14.28	Pass	
131.194389	36.91	1.59	-9.73	28.76	QuasiMax	V	177	129	43.50	-14.74	Pass	
281.927856	42.18	2.26	-14.10	30.34	QuasiMax	V	114	212	46.00	-15.66	Pass	
363.498998	37.91	2.71	-12.56	28.06	QuasiMax	V	177	343	46.00	-17.94	Pass	
223.250501	35.48	2.01	-15.76	21.73	QuasiMax	V	185	143	46.00	-24.27	Pass	

Preview Data

Frequency, 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
125.134269	45.57	1.55	-9.94	37.18	Debug	V	100	225	43.50	-6.32	Pass	
262.112224	46.44	2.18	-12.60	36.02	Debug	V	100	45	46.00	-9.98	Pass	
131.194389	39.88	1.59	-9.73	31.73	Debug	V	175	135	43.50	-11.77	Pass	
281.927856	45.56	2.26	-14.10	33.71	Debug	V	100	225	46.00	-12.29	Pass	
363.498998	42.71	2.71	-12.56	32.86	Debug	V	175	0	46.00	-13.14	Pass	
223.250501	44.18	2.01	-15.76	30.43	Debug	V	100	180	46.00	-15.57	Pass	
81.366733	41.16	1.26	-18.63	23.79	Debug	V	100	315	40.00	-16.21	Pass	
372.541082	39.01	2.76	-12.13	29.64	Debug	V	175	0	46.00	-16.36	Pass	
45.102204	38.96	0.93	-16.67	23.22	Debug	V	100	45	40.00	-16.78	Pass	
231.330661	41.49	2.05	-14.52	29.02	Debug	V	100	0	46.00	-16.98	Pass	
983.074148	34.42	5.24	-2.80	36.87	Debug	V	175	270	54.00	-17.13	Pass	
134.46493	33.83	1.60	-9.63	25.80	Debug	V	175	45	43.50	-17.70	Pass	
33.270541	32.23	0.78	-10.80	22.21	Debug	V	100	45	40.00	-17.79	Pass	
52.220441	39.55	1.00	-19.30	21.25	Debug	V	100	45	40.00	-18.75	Pass	
96.372745	35.96	1.37	-14.80	22.52	Debug	V	360	180	43.50	-20.98	Pass	
46.737475	34.77	0.94	-17.31	18.40	Debug	V	100	0	40.00	-21.60	Pass	
60.685371	37.64	1.09	-21.37	17.36	Debug	V	175	45	40.00	-22.64	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.

T4 Radiated Emissions 3m 3MHz – 1GHz 7CC AC



Test Information

Results Title	Radiated Emissions 3m 30MHz-1GHz
File Name	T4 RE30m-1G FCCB 7CC_AC.emi
Test Laboratory	MH-AR4, 52%RH, 22.8C, 994hPa
Test Engineer	JY
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless Group
EUT Details	AWGUC/D 5G n258 24G HP (60 dBm) FCC SN YK213200123, P/N 475946A.X21. 7CC
Configuration	AR4, AC Powered, RS-ESI-E908, PA-E813, BiLog Ant-E601, RE 30MHz - 1GHz FCC Part 15. Cable set-AR4.Internal Attenuation 10dB Preview RBW Default; Formal RBW Default.
Date	2021-09-16 14:09:11

Formal Data

Frequency, 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
124.995	44.61	1.55	-9.95	36.21	QuasiMax	V	212	123	43.50	-7.29	Pass	
45.676	37.20	0.93	-16.90	21.24	QuasiMax	V	151	233	40.00	-18.76	Pass	
131.120	32.51	1.59	-9.74	24.36	QuasiMax	V	230	164	43.50	-19.14	Pass	
491.517	32.44	3.09	-9.69	25.85	QuasiMax	V	110	300	46.00	-20.15	Pass	
983.035	31.20	5.24	-2.80	33.65	QuasiMax	H	136	45	54.00	-20.35	Pass	
52.510	34.16	1.00	-19.40	15.76	QuasiMax	V	225	236	40.00	-24.24	Pass	

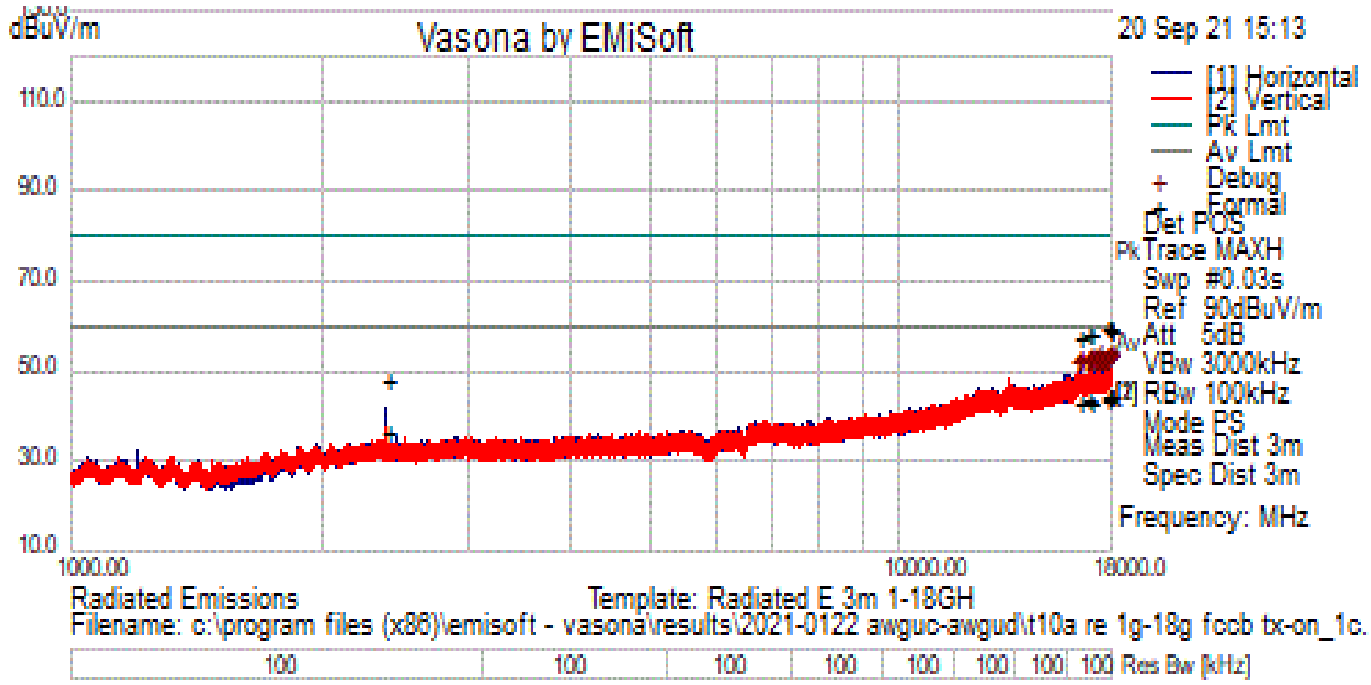
Preview Data

Frequency, 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
125.134269	41.87	1.55	-9.94	33.48	Debug	V	200	90	43.50	-10.02	Pass	
52.028056	47.96	1.00	-19.24	29.72	Debug	V	200	225	40.00	-10.28	Pass	
45.198397	42.68	0.93	-16.71	26.90	Debug	V	100	225	40.00	-13.10	Pass	
491.531062	37.96	3.09	-9.69	31.37	Debug	V	100	315	46.00	-14.63	Pass	
131.386774	36.11	1.59	-9.73	27.97	Debug	V	200	135	43.50	-15.53	Pass	
983.074148	35.06	5.24	-2.80	37.51	Debug	H	260	90	54.00	-16.49	Pass	

Frequency, 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
49.719439	40.59	0.97	-18.43	23.14	Debug	V	360	225	40.00	-16.86	Pass	
80.308617	40.63	1.25	-18.87	23.01	Debug	V	100	135	40.00	-16.99	Pass	
31.731463	31.40	0.76	-9.94	22.22	Debug	V	200	270	40.00	-17.78	Pass	
53.855711	39.95	1.02	-19.85	21.11	Debug	V	100	90	40.00	-18.89	Pass	
136.677355	31.97	1.62	-9.55	24.03	Debug	V	300	135	43.50	-19.47	Pass	
260.188377	35.64	2.17	-12.36	25.46	Debug	V	100	180	46.00	-20.54	Pass	
46.352705	35.58	0.94	-17.16	19.36	Debug	V	100	225	40.00	-20.64	Pass	
60.300601	37.90	1.08	-21.35	17.64	Debug	V	200	135	40.00	-22.36	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.

T10a Radiated Emissions 3m 1GHz – 18GHz 1CC TX-On



Test Information

Results Title	Radiated Emissions 3m 1-18GHz
File Name	T10a RE1g-18G FCCB Tx-on_1CC B.emi
Test Laboratory	MH-AR4, 52%RH, 22.8C, 994hPa
Test Engineer	JY
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless Group
EUT Details	AWGUC-AC Unit 5G n258 24G HP (60 dBm) FCC SN YK213200123, P/N 475946A.X21. 7cc Bottom. Tx-On.
Configuration	AR4, AC Powered, FSW-E1260, PA-E447, Horn Ant-E1073, LPF-E1476, RE1GHz - 18GHz FCC Part 15b. Cable Set-E1503 + E1504, .Internal Attenuation 5dB Preview RBW 100k/3M; Formal RBW 1M/3M.
Date	2021-09-20 15:13:37

Formal Data

Frequency, 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
17995.679	26.63	12.99	4.86	44.49	AvgMax	H	194	174	60.00	-15.51	Pass	
17971.808	26.63	12.96	4.83	44.43	AvgMax	V	186	136	60.00	-15.57	Pass	
17957.642	26.53	12.95	4.82	44.29	AvgMax	H	277	296	60.00	-15.71	Pass	
17899.488	26.55	12.89	4.74	44.19	AvgMax	V	350	91	60.00	-15.81	Pass	
17857.767	26.54	12.85	4.69	44.07	AvgMax	H	169	11	60.00	-15.93	Pass	
16991.617	26.31	12.39	4.79	43.49	AvgMax	H	258	246	60.00	-16.51	Pass	
17006.067	26.04	12.39	4.80	43.23	AvgMax	H	312	49	60.00	-16.77	Pass	
16593.250	26.65	12.25	3.98	42.87	AvgMax	H	226	118	60.00	-17.13	Pass	
17899.488	42.20	12.89	4.74	59.83	PeakMax	V	350	91	80.00	-20.17	Pass	

Frequency, 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
17857.767	42.19	12.85	4.69	59.73	PeakMax	H	169	11	80.00	-20.27	Pass	
17995.679	41.84	12.99	4.86	59.70	PeakMax	H	194	174	80.00	-20.30	Pass	
17971.808	41.53	12.96	4.83	59.33	PeakMax	V	186	136	80.00	-20.67	Pass	
17957.642	41.53	12.95	4.82	59.30	PeakMax	H	277	296	80.00	-20.70	Pass	
16991.617	41.49	12.39	4.79	58.67	PeakMax	H	258	246	80.00	-21.33	Pass	
17006.067	41.26	12.39	4.80	58.45	PeakMax	H	312	49	80.00	-21.55	Pass	
16593.250	41.50	12.25	3.98	57.72	PeakMax	H	226	118	80.00	-22.28	Pass	
2399.994	38.27	4.19	-6.25	36.21	AvgMax	H	305	114	60.00	-23.79	Pass	
2399.994	50.07	4.19	-6.25	48.01	PeakMax	H	305	114	80.00	-31.99	Pass	

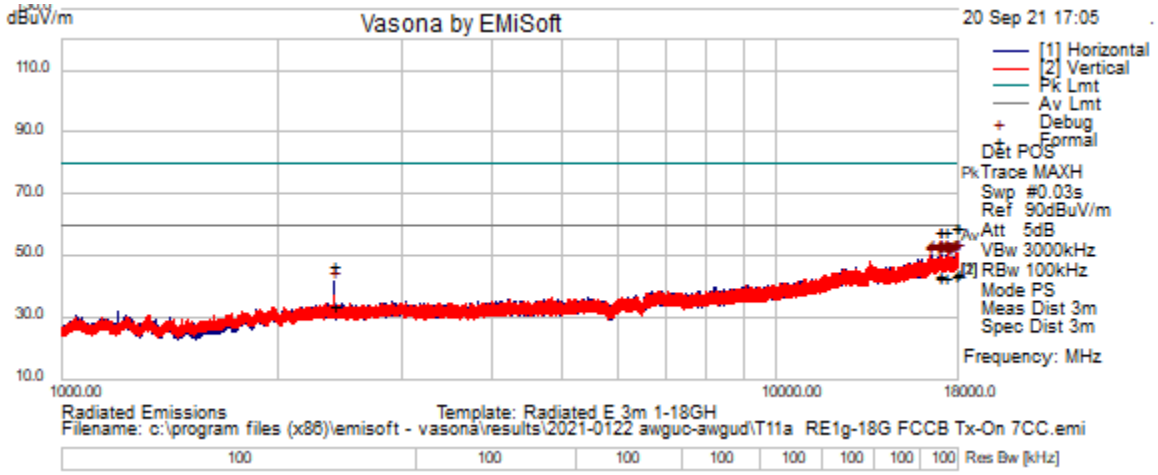
Preview Data

Frequency, 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
17457.771	34.36	12.47	4.27	51.10	Debug	V	360	30	60.00	-8.90	Pass	
17933.488	33.39	12.93	4.78	51.10	Debug	V	100	210	60.00	-8.90	Pass	
17969.613	32.90	12.96	4.83	50.70	Debug	V	160	210	60.00	-9.30	Pass	
17987.038	32.83	12.98	4.85	50.66	Debug	V	100	90	60.00	-9.34	Pass	
17897.150	32.99	12.89	4.74	50.61	Debug	H	100	90	60.00	-9.39	Pass	
17925.483	32.90	12.92	4.77	50.59	Debug	V	160	120	60.00	-9.41	Pass	
17385.450	33.73	12.46	4.35	50.55	Debug	H	100	210	60.00	-9.45	Pass	
17053.100	33.30	12.40	4.75	50.45	Debug	H	100	210	60.00	-9.55	Pass	
17905.154	32.78	12.90	4.75	50.43	Debug	H	200	90	60.00	-9.57	Pass	
17998.796	32.46	12.99	4.87	50.32	Debug	H	300	30	60.00	-9.68	Pass	
16958.183	33.13	12.38	4.72	50.23	Debug	H	100	90	60.00	-9.77	Pass	
17913.654	32.56	12.91	4.76	50.22	Debug	H	100	60	60.00	-9.78	Pass	
17863.575	32.67	12.85	4.69	50.22	Debug	V	260	270	60.00	-9.78	Pass	
17005.075	32.99	12.39	4.80	50.18	Debug	H	100	120	60.00	-9.82	Pass	
16573.771	33.97	12.24	3.94	50.15	Debug	H	200	60	60.00	-9.85	Pass	
17837.083	32.65	12.83	4.66	50.14	Debug	V	360	30	60.00	-9.86	Pass	
17308.313	33.24	12.45	4.44	50.13	Debug	H	100	90	60.00	-9.87	Pass	
16975.183	32.81	12.38	4.76	49.96	Debug	H	200	120	60.00	-10.04	Pass	
16487.213	33.98	12.22	3.76	49.96	Debug	V	160	240	60.00	-10.04	Pass	
17008.333	32.75	12.39	4.80	49.94	Debug	V	360	180	60.00	-10.06	Pass	
17387.008	33.09	12.46	4.35	49.90	Debug	H	100	270	60.00	-10.10	Pass	
16985.383	32.71	12.39	4.78	49.87	Debug	V	160	270	60.00	-10.13	Pass	
17398.554	33.04	12.46	4.34	49.84	Debug	V	160	90	60.00	-10.16	Pass	
17037.304	32.61	12.40	4.76	49.77	Debug	H	100	30	60.00	-10.23	Pass	
17596.958	32.78	12.58	4.35	49.71	Debug	H	300	270	60.00	-10.29	Pass	
17780.700	32.35	12.77	4.59	49.71	Debug	H	200	90	60.00	-10.29	Pass	
17524.283	32.94	12.51	4.25	49.70	Debug	V	160	120	60.00	-10.30	Pass	
17039.783	32.45	12.40	4.76	49.61	Debug	H	300	0	60.00	-10.39	Pass	
17294.146	32.64	12.44	4.46	49.55	Debug	V	260	120	60.00	-10.45	Pass	
17057.279	32.41	12.40	4.74	49.55	Debug	V	100	330	60.00	-10.45	Pass	
16935.375	32.50	12.37	4.68	49.55	Debug	H	300	240	60.00	-10.45	Pass	
17525.771	32.76	12.51	4.25	49.52	Debug	V	160	240	60.00	-10.48	Pass	
17069.817	32.37	12.40	4.73	49.50	Debug	V	260	90	60.00	-10.50	Pass	
17460.888	32.76	12.47	4.27	49.50	Debug	H	200	90	60.00	-10.50	Pass	
17400.608	32.68	12.46	4.34	49.48	Debug	V	260	300	60.00	-10.52	Pass	
17358.108	32.64	12.46	4.39	49.48	Debug	H	100	240	60.00	-10.52	Pass	

Frequency, 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
17405.000	32.68	12.46	4.33	49.47	Debug	H	100	60	60.00	-10.53	Pass	
17734.304	32.22	12.72	4.53	49.47	Debug	H	200	0	60.00	-10.53	Pass	
17460.108	32.71	12.47	4.27	49.45	Debug	V	360	180	60.00	-10.55	Pass	
17324.958	32.52	12.45	4.42	49.39	Debug	H	100	210	60.00	-10.61	Pass	
17264.042	32.43	12.44	4.50	49.37	Debug	H	300	120	60.00	-10.63	Pass	
17702.217	32.16	12.69	4.49	49.34	Debug	V	260	330	60.00	-10.66	Pass	
17502.892	32.61	12.48	4.22	49.32	Debug	V	260	330	60.00	-10.68	Pass	
17016.479	32.13	12.39	4.79	49.31	Debug	H	360	240	60.00	-10.69	Pass	
16916.746	32.31	12.36	4.64	49.31	Debug	H	300	330	60.00	-10.69	Pass	
17468.113	32.55	12.48	4.26	49.28	Debug	V	260	210	60.00	-10.72	Pass	
17588.246	32.32	12.57	4.34	49.23	Debug	H	200	270	60.00	-10.77	Pass	
16499.325	33.21	12.21	3.79	49.21	Debug	H	300	90	60.00	-10.79	Pass	
16894.575	32.26	12.35	4.60	49.21	Debug	V	260	150	60.00	-10.79	Pass	
16548.696	33.08	12.23	3.89	49.20	Debug	V	160	240	60.00	-10.80	Pass	
16475.171	33.22	12.22	3.73	49.17	Debug	V	160	30	60.00	-10.83	Pass	
16774.796	32.50	12.31	4.35	49.16	Debug	V	260	90	60.00	-10.84	Pass	
17252.708	32.20	12.44	4.51	49.14	Debug	H	360	150	60.00	-10.86	Pass	
16421.408	33.31	12.24	3.59	49.14	Debug	H	100	90	60.00	-10.86	Pass	
17540.929	32.34	12.52	4.27	49.14	Debug	V	160	270	60.00	-10.86	Pass	
17694.354	31.96	12.68	4.48	49.12	Debug	V	360	30	60.00	-10.88	Pass	
16883.950	32.19	12.35	4.58	49.11	Debug	V	360	120	60.00	-10.89	Pass	
17415.271	32.32	12.47	4.32	49.10	Debug	V	360	0	60.00	-10.90	Pass	
17360.446	32.25	12.46	4.38	49.09	Debug	H	360	150	60.00	-10.91	Pass	
16851.367	32.23	12.34	4.51	49.07	Debug	H	200	60	60.00	-10.93	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.

T11a Radiated Emissions 3m 1GHz – 18GHz 7CC TX-On



Test Information

Results Title	Radiated Emissions 3m 1-18GHz
File Name	T11a RE1g-18G FCCB Tx-On 7CC.emi
Test Laboratory	MH-AR4, 52%RH, 22.8C, 994hPa
Test Engineer	JY / MJS
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless Group
EUT Details	AWGUC-AC Unit 5G n258 24G HP (60 dBm) FCC SN YK213200123, P/N 475946A.X21. 7CC Botom. Tx-On.
Configuration	AR4, AC Powered, FSW-E1260, PA-E447, Horn Ant-E1073, LPF-E1476, RE1GHz - 18GHz FCC Part 15b. Cable Set-E1503 + E1504, .Internal Attenuation 5dB Preview RBW 100k/3M; Formal RBW 1M/3M.
Date	2021-09-20 17:05:56

Formal Data

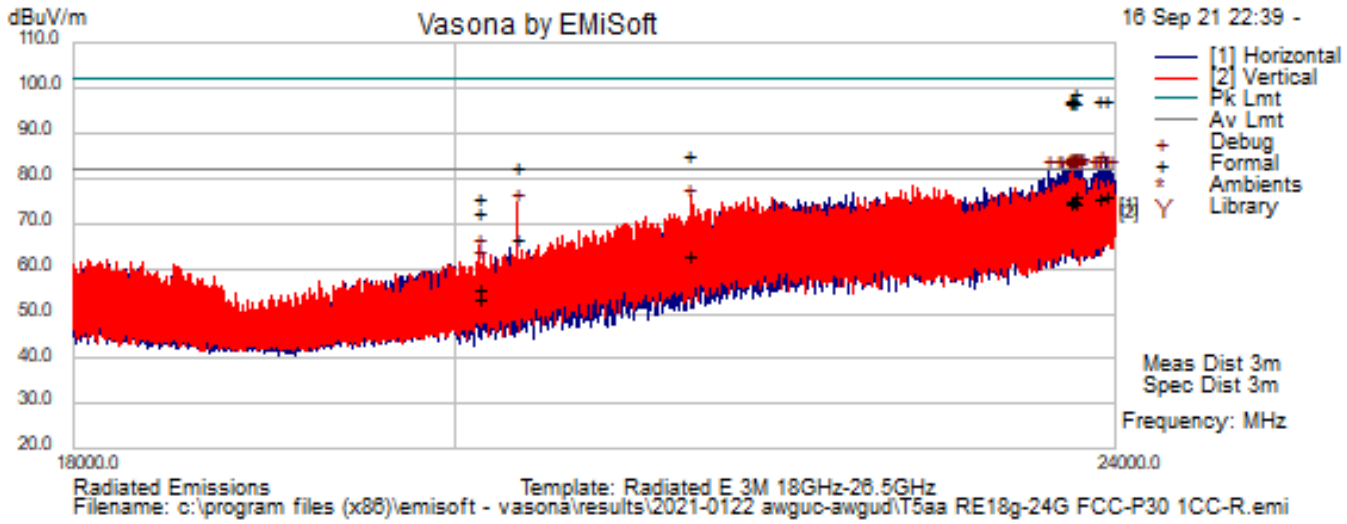
Frequency, MHz	Raw, dBuV	Cable, dB	Factor, dB	Level, dBuV/m	Emission Type	Pol H/V	Ht cm	Az deg	Limit dBuV/m	Margin dB	Pass/ Fail	Comments
17998.796	26.68	12.99	4.87	44.54	AvgMax	H	358	285	60.00	-15.46	Pass	
17905.154	26.51	12.90	4.75	44.16	AvgMax	H	100	217	60.00	-15.84	Pass	
16958.183	26.45	12.38	4.72	43.56	AvgMax	H	125	172	60.00	-16.44	Pass	
17053.100	26.31	12.40	4.75	43.46	AvgMax	H	115	283	60.00	-16.54	Pass	
17385.450	26.25	12.46	4.35	43.07	AvgMax	H	148	221	60.00	-16.93	Pass	
17905.154	41.87	12.90	4.75	59.51	PeakMax	H	100	217	80.00	-20.49	Pass	
17998.796	41.62	12.99	4.87	59.48	PeakMax	H	358	285	80.00	-20.52	Pass	
16958.183	41.24	12.38	4.72	58.34	PeakMax	H	125	172	80.00	-21.66	Pass	
17053.100	41.12	12.40	4.75	58.27	PeakMax	H	115	283	80.00	-21.73	Pass	
17385.450	41.26	12.46	4.35	58.08	PeakMax	H	148	221	80.00	-21.92	Pass	
2399.999	35.94	4.19	-6.25	33.88	AvgMax	H	118	12	60.00	-26.12	Pass	
2399.999	48.86	4.19	-6.25	46.80	PeakMax	H	118	12	80.00	-33.20	Pass	

Preview Data

Frequency, 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
17385.450	33.73	12.46	4.35	50.55	Debug	H	100	210	60.00	-9.45	Pass	
17053.100	33.30	12.40	4.75	50.45	Debug	H	100	210	60.00	-9.55	Pass	
17905.154	32.78	12.90	4.75	50.43	Debug	H	200	90	60.00	-9.57	Pass	
17998.796	32.46	12.99	4.87	50.32	Debug	H	300	30	60.00	-9.68	Pass	
16958.183	33.13	12.38	4.72	50.23	Debug	H	100	90	60.00	-9.77	Pass	
17913.654	32.56	12.91	4.76	50.22	Debug	H	100	60	60.00	-9.78	Pass	
17863.575	32.67	12.85	4.69	50.22	Debug	V	260	270	60.00	-9.78	Pass	
17005.075	32.99	12.39	4.80	50.18	Debug	H	100	120	60.00	-9.82	Pass	
16573.771	33.97	12.24	3.94	50.15	Debug	H	200	60	60.00	-9.85	Pass	
17837.083	32.65	12.83	4.66	50.14	Debug	V	360	30	60.00	-9.86	Pass	
17308.313	33.24	12.45	4.44	50.13	Debug	H	100	90	60.00	-9.87	Pass	
16975.183	32.81	12.38	4.76	49.96	Debug	H	200	120	60.00	-10.04	Pass	
16487.213	33.98	12.22	3.76	49.96	Debug	V	160	240	60.00	-10.04	Pass	
17008.333	32.75	12.39	4.80	49.94	Debug	V	360	180	60.00	-10.06	Pass	
17387.008	33.09	12.46	4.35	49.90	Debug	H	100	270	60.00	-10.10	Pass	
16985.383	32.71	12.39	4.78	49.87	Debug	V	160	270	60.00	-10.13	Pass	
17398.554	33.04	12.46	4.34	49.84	Debug	V	160	90	60.00	-10.16	Pass	
17037.304	32.61	12.40	4.76	49.77	Debug	H	100	30	60.00	-10.23	Pass	
17596.958	32.78	12.58	4.35	49.71	Debug	H	300	270	60.00	-10.29	Pass	
17780.700	32.35	12.77	4.59	49.71	Debug	H	200	90	60.00	-10.29	Pass	
17524.283	32.94	12.51	4.25	49.70	Debug	V	160	120	60.00	-10.30	Pass	
17039.783	32.45	12.40	4.76	49.61	Debug	H	300	0	60.00	-10.39	Pass	
17294.146	32.64	12.44	4.46	49.55	Debug	V	260	120	60.00	-10.45	Pass	
17057.279	32.41	12.40	4.74	49.55	Debug	V	100	330	60.00	-10.45	Pass	
16935.375	32.50	12.37	4.68	49.55	Debug	H	300	240	60.00	-10.45	Pass	
17525.771	32.76	12.51	4.25	49.52	Debug	V	160	240	60.00	-10.48	Pass	
17069.817	32.37	12.40	4.73	49.50	Debug	V	260	90	60.00	-10.50	Pass	
17460.888	32.76	12.47	4.27	49.50	Debug	H	200	90	60.00	-10.50	Pass	
17400.608	32.68	12.46	4.34	49.48	Debug	V	260	300	60.00	-10.52	Pass	
17358.108	32.64	12.46	4.39	49.48	Debug	H	100	240	60.00	-10.52	Pass	
17405.000	32.68	12.46	4.33	49.47	Debug	H	100	60	60.00	-10.53	Pass	
17734.304	32.22	12.72	4.53	49.47	Debug	H	200	0	60.00	-10.53	Pass	
17460.108	32.71	12.47	4.27	49.45	Debug	V	360	180	60.00	-10.55	Pass	
17324.958	32.52	12.45	4.42	49.39	Debug	H	100	210	60.00	-10.61	Pass	
17264.042	32.43	12.44	4.50	49.37	Debug	H	300	120	60.00	-10.63	Pass	
17702.217	32.16	12.69	4.49	49.34	Debug	V	260	330	60.00	-10.66	Pass	
17502.892	32.61	12.48	4.22	49.32	Debug	V	260	330	60.00	-10.68	Pass	
17016.479	32.13	12.39	4.79	49.31	Debug	H	360	240	60.00	-10.69	Pass	
16916.746	32.31	12.36	4.64	49.31	Debug	H	300	330	60.00	-10.69	Pass	
17468.113	32.55	12.48	4.26	49.28	Debug	V	260	210	60.00	-10.72	Pass	
17588.246	32.32	12.57	4.34	49.23	Debug	H	200	270	60.00	-10.77	Pass	
16499.325	33.21	12.21	3.79	49.21	Debug	H	300	90	60.00	-10.79	Pass	
2399.981	43.41	4.19	-6.25	41.35	Debug	H	100	330	60.00	-18.65	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.

T5aa Radiated Emissions 3m 18GHz – 24GHz 1CC



Test Information

Results Title	Radiated Emission 3m 18GHz-24GHz
File Name	T5aa RE18g-24G FCC-P30 1CC-R.emi
Test Laboratory	MH-AR4, 52%RH, 22.8C, 994hPa
Test Engineer	MJS
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless Group
EUT Details	AWGUC-AC Unit 5G n258 24G HP (60 dBm) FCC SN YK213200123, P/N 475946A.X21. 1CC = 25198.56MHz, ETM1.1
Configuration	AR4, AC Powered, FSW-E1260, PA-E1525, Horn Ant-E1527, RE18GHz - 24GHz FCC Part 30. Cable set-E1501 + E1502, .Internal Attenuation 10dB Preview RBW 100k/3M; Formal RBW 1M/3M.
Date	2021-09-16 22:39:27

Formal Data

Frequency, 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
23738.700	67.33	22.89	8.52	98.75	PeakMax	H	178	21	102.23	-3.48	Pass	
23949.333	61.99	26.85	8.79	97.63	PeakMax	H	174	19	102.23	-4.60	Pass	
23702.633	66.90	22.21	8.49	97.60	PeakMax	H	163	20	102.23	-4.63	Pass	
23725.233	66.16	22.64	8.51	97.31	PeakMax	H	185	22	102.23	-4.92	Pass	
23902.333	62.54	25.97	8.67	97.18	PeakMax	H	171	20	102.23	-5.05	Pass	
23712.500	66.14	22.40	8.50	97.04	PeakMax	H	156	20	102.23	-5.19	Pass	
23735.833	65.54	22.84	8.52	96.89	PeakMax	H	183	24	102.23	-5.34	Pass	
23732.700	65.47	22.78	8.52	96.77	PeakMax	H	176	16	102.23	-5.46	Pass	
23738.700	44.83	22.89	8.52	76.24	AvgMax	H	178	21	82.23	-5.99	Pass	
23949.333	40.54	26.85	8.79	76.18	AvgMax	H	174	19	82.23	-6.05	Pass	
23902.333	41.17	25.97	8.67	75.80	AvgMax	H	171	20	82.23	-6.43	Pass	
23725.233	44.18	22.64	8.51	75.33	AvgMax	H	185	22	82.23	-6.90	Pass	
23702.633	44.57	22.21	8.49	75.27	AvgMax	H	163	20	82.23	-6.96	Pass	
23732.700	43.69	22.78	8.52	74.98	AvgMax	H	176	16	82.23	-7.25	Pass	
23735.833	43.32	22.84	8.52	74.67	AvgMax	H	183	24	82.23	-7.56	Pass	
23712.500	43.77	22.40	8.50	74.66	AvgMax	H	156	20	82.23	-7.57	Pass	

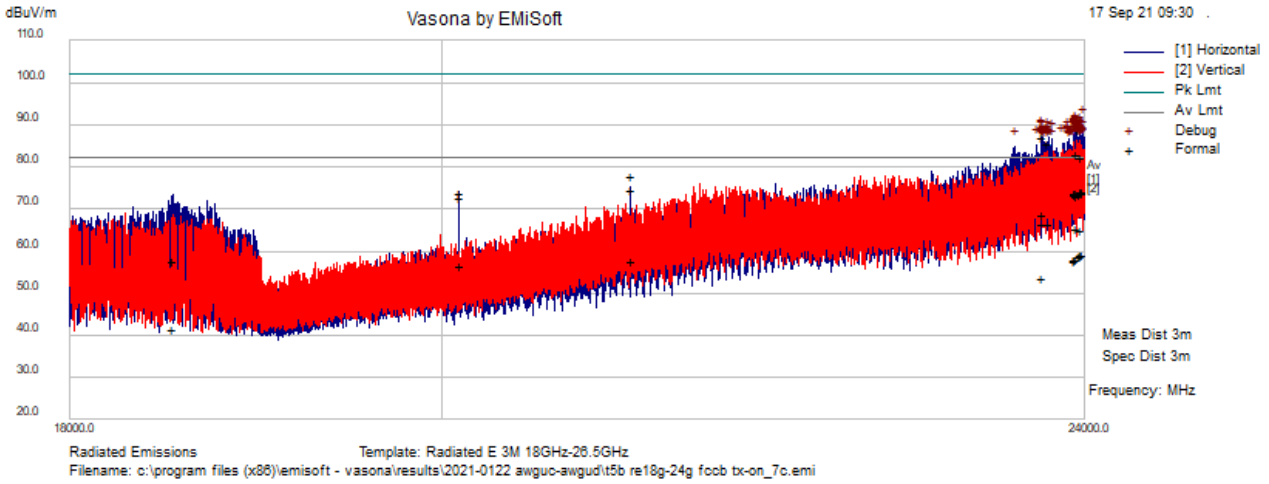
Frequency, MHz	Raw, dBuV	Cable, dB	Factor, dB	Level, dBuV/m	Emission Type	Pol H/V	Ht cm	Az deg	Limit dBuV/m	Margin dB	Pass/ Fail	Comments
20346.899	50.21	12.82	3.91	66.94	AvgMax	V	167	22	82.23	-15.29	Pass	
21346.907	66.83	13.22	5.15	85.20	PeakMax	V	194	11	102.23	-17.03	Pass	
21346.907	44.53	13.22	5.15	62.90	AvgMax	V	194	11	82.23	-19.33	Pass	
20346.899	65.72	12.82	3.91	82.45	PeakMax	V	167	22	102.23	-19.78	Pass	
20138.511	39.30	12.74	3.72	55.76	AvgMax	V	180	26	82.23	-26.47	Pass	
20138.511	59.13	12.74	3.72	75.59	PeakMax	V	180	26	102.23	-26.64	Pass	
20134.909	37.31	12.73	3.72	53.76	AvgMax	V	185	33	82.23	-28.47	Pass	
20134.909	56.10	12.73	3.72	72.55	PeakMax	V	185	33	102.23	-29.68	Pass	

Preview Data

Frequency, 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
23909.300	47.27	26.10	8.69	82.05	Debug	H	175	22	82.23	-0.18	Pass	
23746.200	49.84	23.03	8.53	81.41	Debug	H	175	22	82.23	-0.82	Pass	
23775.367	49.25	23.58	8.55	81.38	Debug	H	175	22	82.23	-0.85	Pass	
23779.100	49.13	23.65	8.55	81.34	Debug	H	175	22	82.23	-0.89	Pass	
23783.100	49.05	23.73	8.56	81.33	Debug	H	175	22	82.23	-0.90	Pass	
23744.133	49.81	22.99	8.53	81.33	Debug	H	175	22	82.23	-0.90	Pass	
23751.667	49.66	23.14	8.53	81.33	Debug	H	175	22	82.23	-0.90	Pass	
23748.400	49.70	23.08	8.53	81.31	Debug	H	175	22	82.23	-0.92	Pass	
23709.800	50.44	22.35	8.50	81.28	Debug	H	175	22	82.23	-0.95	Pass	
23724.500	50.14	22.62	8.51	81.27	Debug	H	175	22	82.23	-0.96	Pass	
23727.633	50.03	22.68	8.51	81.23	Debug	V	175	22	82.23	-1.00	Pass	
23734.867	49.87	22.82	8.52	81.21	Debug	H	175	22	82.23	-1.02	Pass	
23898.767	46.63	25.90	8.66	81.19	Debug	H	175	22	82.23	-1.04	Pass	
23872.133	47.13	25.40	8.64	81.17	Debug	H	175	22	82.23	-1.06	Pass	
23630.833	51.84	20.85	8.47	81.16	Debug	H	175	22	82.23	-1.07	Pass	
23705.667	50.38	22.27	8.50	81.15	Debug	H	175	22	82.23	-1.08	Pass	
23982.100	44.73	27.46	8.88	81.07	Debug	H	175	22	82.23	-1.16	Pass	
23937.367	45.68	26.62	8.76	81.06	Debug	H	175	22	82.23	-1.17	Pass	
23892.400	46.62	25.78	8.65	81.06	Debug	H	175	22	82.23	-1.17	Pass	
23772.033	48.99	23.52	8.55	81.06	Debug	H	175	22	82.23	-1.17	Pass	
23699.767	50.28	22.16	8.49	80.93	Debug	H	175	22	82.23	-1.30	Pass	
23860.933	47.04	25.19	8.63	80.86	Debug	H	175	22	82.23	-1.37	Pass	
23562.567	52.85	19.56	8.44	80.84	Debug	H	175	22	82.23	-1.39	Pass	
23946.567	45.17	26.80	8.79	80.75	Debug	H	175	22	82.23	-1.48	Pass	
23654.167	50.97	21.30	8.48	80.74	Debug	H	175	22	82.23	-1.49	Pass	
23742.667	49.23	22.97	8.52	80.72	Debug	H	175	22	82.23	-1.51	Pass	
23773.467	48.62	23.55	8.55	80.72	Debug	H	175	22	82.23	-1.51	Pass	
23707.500	49.91	22.30	8.50	80.71	Debug	V	175	22	82.23	-1.52	Pass	
20346.899	56.98	12.82	3.91	73.71	Debug	V	100	352	82.23	-8.52	Pass	
21346.907	56.24	13.22	5.15	74.61	Debug	V	100	352	82.23	-7.62	Pass	
20138.511	47.00	12.74	3.72	63.46	Debug	V	100	352	82.23	-18.77	Pass	
20134.909	44.67	12.73	3.72	61.12	Debug	V	100	352	82.23	-21.11	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.

T5b Radiated Emissions 3m 18GHz – 24GHz 7CC



Test Information

Results Title	Radiated Emissions 3m 18GHz-24GHz
File Name	T5b RE18g-24G FCC Part 30 Ttx-On_7CC.emi
Test Laboratory	MH-AR4, 52%RH, 22.8C, 994hPa
Test Engineer	MJS / JY
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless Group
EUT Details	AWGUC-AC Unit 5G n258 24G HP (60 dBm) FCC. SN YK213200123, P/N 475946A.X21. Tx-On with 7CC
Configuration	AR4, AC Powered, FSW-E1260, PA-E1525, Horn Ant-E1527, HPF-E1498. RE18GHz - 24GHz FCC Part 30. Cable set-E1501 + E1502, .Internal Attenuation 10dB Preview RBW 100k/3M; Formal RBW 1M/3M.
Date	2021-09-17 09:30:47

Formal Data

Frequency, 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
21101.129	56.97	13.12	4.57	74.66	Debug	H	173	0	82.23	-7.57	Pass	
20101.087	57.48	12.72	3.68	73.88	Debug	H	173	-1	82.23	-8.35	Pass	
23714.400	56.23	22.43	8.50	87.17	PeakMax	H	164	0	102.23	-15.06	Pass	
23714.400	35.80	22.43	8.50	66.74	AvgMax	H	164	0	82.23	-15.49	Pass	
23756.733	34.79	23.23	8.54	66.56	AvgMax	H	182	0	82.23	-15.67	Pass	
23756.733	53.82	23.23	8.54	85.59	PeakMax	H	182	0	102.23	-16.64	Pass	
23940.167	30.02	26.68	8.77	65.47	AvgMax	H	181	0	82.23	-16.76	Pass	
23973.033	28.91	27.29	8.86	65.05	AvgMax	H	190	0	82.23	-17.18	Pass	
23940.167	47.72	26.68	8.77	83.17	PeakMax	H	181	0	102.23	-19.06	Pass	
23973.033	46.23	27.29	8.86	82.37	PeakMax	H	190	0	102.23	-19.86	Pass	
23986.567	23.00	27.54	8.89	59.44	AvgMax	H	217	226	82.23	-22.79	Pass	
23980.267	22.90	27.42	8.88	59.20	AvgMax	H	191	227	82.23	-23.03	Pass	
23976.500	22.90	27.35	8.87	59.12	AvgMax	H	278	226	82.23	-23.11	Pass	

Frequency, 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
23972.200	22.88	27.27	8.86	59.01	AvgMax	H	228	226	82.23	-23.22	Pass	
23963.124	22.86	27.10	8.83	58.79	AvgMax	H	132	225	82.23	-23.44	Pass	
23945.267	22.77	26.77	8.78	58.32	AvgMax	H	297	225	82.23	-23.91	Pass	
21101.094	60.49	13.12	4.57	78.19	PeakMax	H	173	0	102.23	-24.04	Pass	
23939.033	22.73	26.65	8.77	58.15	AvgMax	H	195	225	82.23	-24.08	Pass	
23932.300	22.74	26.53	8.75	58.02	AvgMax	H	150	225	82.23	-24.21	Pass	
21101.094	40.26	13.12	4.57	57.95	AvgMax	H	173	0	82.23	-24.28	Pass	
23928.600	22.70	26.46	8.74	57.89	AvgMax	H	299	226	82.23	-24.34	Pass	
20101.131	40.15	12.72	3.68	56.55	AvgMax	H	168	0	82.23	-25.68	Pass	
23986.567	38.02	27.54	8.89	74.46	PeakMax	H	217	226	102.23	-27.77	Pass	
23972.200	38.03	27.27	8.86	74.16	PeakMax	H	228	226	102.23	-28.07	Pass	
23980.267	37.81	27.42	8.88	74.11	PeakMax	H	191	227	102.23	-28.12	Pass	
23976.500	37.85	27.35	8.87	74.07	PeakMax	H	278	226	102.23	-28.16	Pass	
23945.267	38.48	26.77	8.78	74.04	PeakMax	H	297	225	102.23	-28.19	Pass	
23928.600	38.76	26.46	8.74	73.96	PeakMax	H	299	226	102.23	-28.27	Pass	
23963.124	37.83	27.10	8.83	73.77	PeakMax	H	132	225	102.23	-28.46	Pass	
23932.300	38.47	26.53	8.75	73.75	PeakMax	H	150	225	102.23	-28.48	Pass	
23710.867	22.82	22.37	8.50	53.69	AvgMax	H	322	226	82.23	-28.54	Pass	
23939.033	37.71	26.65	8.77	73.13	PeakMax	H	195	225	102.23	-29.10	Pass	
20101.131	56.58	12.72	3.68	72.99	PeakMax	H	168	0	102.23	-29.24	Pass	
23710.867	37.95	22.37	8.50	68.81	PeakMax	H	322	226	102.23	-33.42	Pass	
18530.760	25.88	12.16	3.78	41.82	AvgMax	H	140	1	82.23	-40.41	Pass	
18530.760	41.82	12.16	3.78	57.76	PeakMax	H	140	1	102.23	-44.47	Pass	

Preview Data

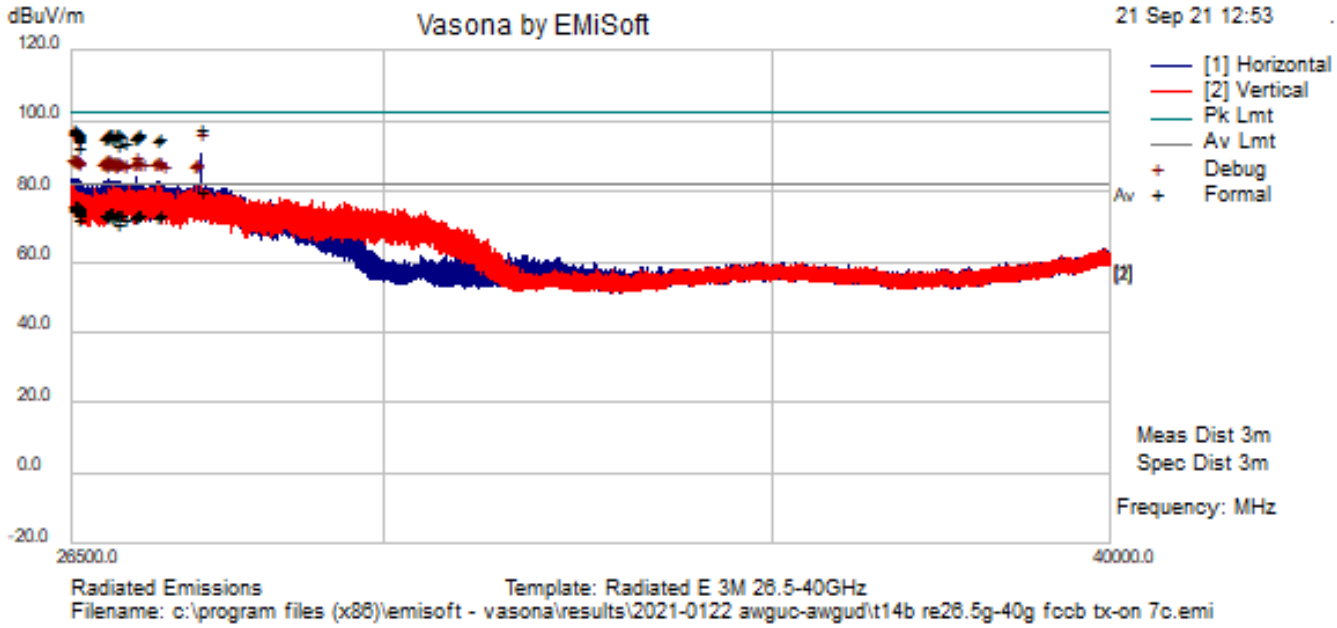
Frequency, MHz	Raw, dBuV	Cable, dB	Factor, dB	Level, dBuV/m	Emission Type	Pol H/V	Ht cm	Az deg	Limit dBuV/m	Margin dB	Pass/ Fail	Comments
23990.200	53.34	27.61	8.90	89.86	Debug	H	175	22	82.23	7.63	Fail	
23940.167	53.05	26.68	8.77	88.49	Debug	H	175	22	82.23	6.26	Fail	
23945.267	52.60	26.77	8.78	88.15	Debug	H	175	22	82.23	5.92	Fail	
23973.033	51.84	27.29	8.86	87.99	Debug	H	175	22	82.23	5.76	Fail	
23932.300	52.56	26.53	8.75	87.83	Debug	H	175	22	82.23	5.60	Fail	
23939.033	52.35	26.65	8.77	87.77	Debug	H	175	22	82.23	5.54	Fail	
23976.500	51.28	27.35	8.87	87.51	Debug	H	175	22	82.23	5.28	Fail	
23928.600	52.28	26.46	8.74	87.48	Debug	H	175	22	82.23	5.25	Fail	
23972.200	51.09	27.27	8.86	87.22	Debug	H	175	22	82.23	4.99	Fail	
23714.400	56.26	22.43	8.50	87.20	Debug	H	175	22	82.23	4.97	Fail	
23710.867	56.26	22.37	8.50	87.13	Debug	H	175	22	82.23	4.90	Fail	
23986.567	50.64	27.54	8.89	87.07	Debug	H	175	22	82.23	4.84	Fail	
23756.733	55.30	23.23	8.54	87.07	Debug	H	175	22	82.23	4.84	Fail	
23980.267	50.75	27.42	8.88	87.05	Debug	H	175	22	82.23	4.82	Fail	
23931.700	51.78	26.52	8.75	87.05	Debug	H	175	22	82.23	4.82	Fail	
23979.600	50.72	27.41	8.88	87.01	Debug	H	175	22	82.23	4.78	Fail	
23956.000	51.20	26.97	8.81	86.98	Debug	H	175	22	82.23	4.75	Fail	
23996.700	50.27	27.73	8.92	86.92	Debug	H	175	22	82.23	4.69	Fail	
23891.433	52.41	25.76	8.65	86.83	Debug	H	175	22	82.23	4.60	Fail	
23948.700	51.13	26.84	8.79	86.75	Debug	H	175	22	82.23	4.52	Fail	
23942.033	51.05	26.71	8.77	86.53	Debug	H	175	22	82.23	4.30	Fail	

Frequency, 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
23783.067	54.25	23.73	8.56	86.53	Debug	H	175	22	82.23	4.30	Fail	
23953.500	50.75	26.92	8.80	86.47	Debug	V	175	22	82.23	4.24	Fail	
23969.233	50.25	27.22	8.85	86.32	Debug	V	175	22	82.23	4.09	Fail	
23952.633	50.58	26.91	8.80	86.29	Debug	H	175	22	82.23	4.06	Fail	
23726.633	54.85	22.66	8.51	86.02	Debug	H	175	22	82.23	3.79	Fail	
23971.700	49.90	27.26	8.85	86.02	Debug	H	175	22	82.23	3.79	Fail	
23923.300	50.90	26.36	8.72	85.98	Debug	V	175	22	82.23	3.75	Fail	
23937.367	50.55	26.62	8.76	85.93	Debug	H	175	22	82.23	3.70	Fail	
23886.700	51.59	25.67	8.65	85.91	Debug	H	175	22	82.23	3.68	Fail	
23751.300	54.17	23.13	8.53	85.84	Debug	H	175	22	82.23	3.61	Fail	
23946.600	50.25	26.80	8.79	85.83	Debug	H	175	22	82.23	3.60	Fail	
23956.733	49.95	26.99	8.81	85.75	Debug	H	175	22	82.23	3.52	Fail	
23983.000	49.35	27.48	8.88	85.71	Debug	H	175	22	82.23	3.48	Fail	
23974.733	49.49	27.32	8.86	85.67	Debug	H	175	22	82.23	3.44	Fail	
23867.133	51.70	25.31	8.63	85.64	Debug	H	175	22	82.23	3.41	Fail	
23985.700	49.20	27.53	8.89	85.61	Debug	H	175	22	82.23	3.38	Fail	
23981.233	49.28	27.44	8.88	85.60	Debug	H	175	22	82.23	3.37	Fail	
23739.000	54.17	22.90	8.52	85.59	Debug	H	175	22	82.23	3.36	Fail	
23958.100	49.67	27.01	8.82	85.50	Debug	V	175	22	82.23	3.27	Fail	
23951.233	49.79	26.88	8.80	85.47	Debug	H	175	22	82.23	3.24	Fail	
23851.633	51.76	25.02	8.62	85.39	Debug	H	175	22	82.23	3.16	Fail	
23712.500	54.46	22.40	8.50	85.36	Debug	H	175	22	82.23	3.13	Fail	
23890.833	50.94	25.75	8.65	85.34	Debug	H	175	22	82.23	3.11	Fail	
23991.633	48.78	27.64	8.91	85.33	Debug	H	175	22	82.23	3.10	Fail	
23712.233	54.42	22.39	8.50	85.32	Debug	H	175	22	82.23	3.09	Fail	
23984.467	48.82	27.50	8.89	85.21	Debug	H	175	22	82.23	2.98	Fail	
23984.867	48.79	27.51	8.89	85.19	Debug	H	175	22	82.23	2.96	Fail	
23981.867	48.85	27.45	8.88	85.18	Debug	H	175	22	82.23	2.95	Fail	
23930.400	49.94	26.49	8.74	85.18	Debug	H	175	22	82.23	2.95	Fail	
23993.367	48.59	27.67	8.91	85.17	Debug	H	175	22	82.23	2.94	Fail	
23977.733	48.92	27.38	8.87	85.16	Debug	H	175	22	82.23	2.93	Fail	
23963.300	49.22	27.11	8.83	85.16	Debug	H	175	22	82.23	2.93	Fail	
23906.667	50.41	26.05	8.68	85.14	Debug	H	175	22	82.23	2.91	Fail	
23736.733	53.76	22.86	8.52	85.14	Debug	H	175	22	82.23	2.91	Fail	
23757.333	53.35	23.24	8.54	85.13	Debug	H	175	22	82.23	2.90	Fail	
23675.533	54.85	21.70	8.48	85.03	Debug	H	175	22	82.23	2.80	Fail	
23761.700	53.13	23.33	8.54	85.00	Debug	H	175	22	82.23	2.77	Fail	
23754.300	53.21	23.19	8.53	84.93	Debug	H	175	22	82.23	2.70	Fail	
23711.900	54.04	22.39	8.50	84.92	Debug	H	175	22	82.23	2.69	Fail	
23959.800	49.05	27.04	8.82	84.91	Debug	V	175	22	82.23	2.68	Fail	
23771.133	52.86	23.50	8.55	84.91	Debug	H	175	22	82.23	2.68	Fail	
23913.933	50.00	26.18	8.70	84.88	Debug	H	175	22	82.23	2.65	Fail	
23907.500	50.13	26.06	8.68	84.87	Debug	H	175	22	82.23	2.64	Fail	
23720.600	53.73	22.55	8.51	84.79	Debug	H	175	22	82.23	2.56	Fail	
23725.567	53.60	22.64	8.51	84.76	Debug	H	175	22	82.23	2.53	Fail	
23722.133	53.66	22.58	8.51	84.75	Debug	H	175	22	82.23	2.52	Fail	
23910.533	49.94	26.12	8.69	84.75	Debug	H	175	22	82.23	2.52	Fail	
23975.267	48.54	27.33	8.86	84.74	Debug	H	175	22	82.23	2.51	Fail	
23983.367	48.37	27.48	8.89	84.73	Debug	H	175	22	82.23	2.50	Fail	

Frequency, 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
23530.767	57.35	18.95	8.42	84.73	Debug	H	175	22	82.23	2.50	Fail	
23926.967	49.51	26.43	8.73	84.67	Debug	H	175	22	82.23	2.44	Fail	
23925.500	49.52	26.40	8.73	84.65	Debug	V	175	22	82.23	2.42	Fail	
23780.833	52.37	23.69	8.56	84.61	Debug	H	175	22	82.23	2.38	Fail	
23901.867	49.98	25.96	8.67	84.61	Debug	H	175	22	82.23	2.38	Fail	
23767.567	52.61	23.44	8.54	84.59	Debug	H	175	22	82.23	2.36	Fail	
23734.033	53.25	22.80	8.52	84.57	Debug	H	175	22	82.23	2.34	Fail	
23900.633	49.97	25.94	8.66	84.56	Debug	H	175	22	82.23	2.33	Fail	
23718.667	53.53	22.51	8.51	84.55	Debug	H	175	22	82.23	2.32	Fail	
23754.533	52.83	23.19	8.53	84.55	Debug	H	175	22	82.23	2.32	Fail	

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.

T14b Radiated Emissions 3m 26.5GHz – 40GHz TX-On 7CC



Test Information

Results Title	Radiated Emissions 3m 26.5-40GHz
File Name	T14b RE26.5g-40g FCC Part 30 Tx-On 7CC.emi
Test Laboratory	MH-AR4, 52%RH, 22.8C, 994hPa
Test Engineer	JY
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless Group
EUT Details	AWGUC-AC Unit 5G n258 24G HP (60 dBm) FCC SN YK213200123, P/N 475946A.X21. 7CC Tx-On.
Configuration	AR4, AC Powered, FSW-E1260, PA-E1525, Horn Ant-E1527, HPF-E1472, RE26.5GHz - 40GHz FCC Part 15b. Cable Set-E1501 + E1502, .Internal Attenuation 5dB Preview RBW 100k/3M; Formal RBW 1M/3M.
Date	2021-09-21 12:53:24

Formal Data

Frequency, 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
27899.200	55.48	14.79	10.09	80.36	AvgMax	H	166	18	82.23	-1.87	Pass	
27899.200	73.09	14.79	10.09	97.98	PeakMax	H	166	18	102.23	-4.25	Pass	
26527.776	65.49	22.24	10.03	97.76	PeakMax	H	173	21	102.23	-4.47	Pass	
26546.069	65.61	21.92	10.05	97.57	PeakMax	H	182	19	102.23	-4.66	Pass	
26511.673	64.99	22.53	10.02	97.54	PeakMax	H	172	17	102.23	-4.69	Pass	
26530.094	65.19	22.20	10.03	97.43	PeakMax	H	167	19	102.23	-4.80	Pass	
26533.469	64.90	22.14	10.04	97.08	PeakMax	H	163	19	102.23	-5.15	Pass	
27212.350	71.80	14.91	10.11	96.82	PeakMax	H	180	19	102.23	-5.41	Pass	
26927.219	70.28	16.52	10.01	96.82	PeakMax	H	171	18	102.23	-5.41	Pass	
26898.496	69.97	16.81	10.02	96.80	PeakMax	H	178	20	102.23	-5.43	Pass	
26511.673	44.09	22.53	10.02	76.63	AvgMax	H	172	17	82.23	-5.60	Pass	

Frequency, 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
26985.494	70.65	15.93	9.99	96.58	PeakMax	H	171	18	102.23	-5.65	Pass	
26901.006	69.72	16.79	10.02	96.52	PeakMax	H	171	17	102.23	-5.71	Pass	
26527.776	44.22	22.24	10.03	76.50	AvgMax	H	173	21	82.23	-5.73	Pass	
26535.024	64.35	22.11	10.04	96.50	PeakMax	H	155	18	102.23	-5.73	Pass	
26561.507	64.77	21.64	10.06	96.47	PeakMax	H	167	20	102.23	-5.76	Pass	
26960.800	70.29	16.18	10.00	96.47	PeakMax	H	180	19	102.23	-5.76	Pass	
27189.378	71.33	15.00	10.09	96.43	PeakMax	H	168	18	102.23	-5.80	Pass	
26575.038	64.92	21.41	10.07	96.40	PeakMax	H	176	18	102.23	-5.83	Pass	
26898.306	69.52	16.81	10.02	96.35	PeakMax	H	186	20	102.23	-5.88	Pass	
26530.094	44.11	22.20	10.03	76.34	AvgMax	H	167	19	82.23	-5.89	Pass	
26954.388	70.06	16.25	10.00	96.31	PeakMax	H	170	20	102.23	-5.92	Pass	
26546.069	44.22	21.92	10.05	76.19	AvgMax	H	182	19	82.23	-6.04	Pass	
26863.319	68.90	17.17	10.02	96.08	PeakMax	H	174	17	102.23	-6.15	Pass	
26874.576	68.99	17.05	10.02	96.06	PeakMax	H	183	20	102.23	-6.17	Pass	
27014.125	70.30	15.73	10.00	96.03	PeakMax	H	181	18	102.23	-6.20	Pass	
26533.469	43.72	22.14	10.04	75.90	AvgMax	H	163	19	82.23	-6.33	Pass	
27216.175	70.86	14.89	10.12	95.87	PeakMax	H	167	19	102.23	-6.36	Pass	
27437.688	70.75	14.74	10.26	95.75	PeakMax	H	171	19	102.23	-6.48	Pass	
26842.788	68.17	17.38	10.01	95.56	PeakMax	H	175	18	102.23	-6.67	Pass	
26561.507	43.84	21.64	10.06	75.54	AvgMax	H	167	20	82.23	-6.69	Pass	
27199.748	70.46	14.96	10.10	95.52	PeakMax	H	163	18	102.23	-6.71	Pass	
26581.563	64.10	21.29	10.08	95.46	PeakMax	H	184	21	102.23	-6.77	Pass	
27157.900	70.25	15.13	10.07	95.45	PeakMax	H	182	21	102.23	-6.78	Pass	
26857.694	68.13	17.22	10.02	95.37	PeakMax	H	178	22	102.23	-6.86	Pass	
26929.750	68.74	16.50	10.01	95.24	PeakMax	H	191	19	102.23	-6.99	Pass	
26907.419	68.40	16.72	10.02	95.14	PeakMax	H	170	23	102.23	-7.09	Pass	
26573.463	63.62	21.43	10.07	95.12	PeakMax	H	190	20	102.23	-7.11	Pass	
26575.038	43.59	21.41	10.07	75.06	AvgMax	H	176	18	82.23	-7.17	Pass	
26535.024	42.68	22.11	10.04	74.83	AvgMax	H	155	18	82.23	-7.40	Pass	
27403.994	69.64	14.74	10.24	94.62	PeakMax	H	176	16	102.23	-7.61	Pass	
26898.496	47.54	16.81	10.02	74.37	AvgMax	H	178	20	82.23	-7.86	Pass	
26581.563	42.91	21.29	10.08	74.27	AvgMax	H	184	21	82.23	-7.96	Pass	
27071.838	68.72	15.49	10.02	94.23	PeakMax	H	174	22	102.23	-8.00	Pass	
26901.006	47.31	16.79	10.02	74.12	AvgMax	H	171	17	82.23	-8.11	Pass	
26927.219	47.58	16.52	10.01	74.12	AvgMax	H	171	18	82.23	-8.11	Pass	
26573.463	42.56	21.43	10.07	74.06	AvgMax	H	190	20	82.23	-8.17	Pass	
26960.800	47.79	16.18	10.00	73.97	AvgMax	H	180	19	82.23	-8.26	Pass	
26874.576	46.86	17.05	10.02	73.93	AvgMax	H	183	20	82.23	-8.30	Pass	
26954.388	47.67	16.25	10.00	73.92	AvgMax	H	170	20	82.23	-8.31	Pass	
27212.350	48.86	14.91	10.11	73.88	AvgMax	H	180	19	82.23	-8.35	Pass	
27437.688	48.87	14.74	10.26	73.87	AvgMax	H	171	19	82.23	-8.36	Pass	
27189.378	48.76	15.00	10.09	73.85	AvgMax	H	168	18	82.23	-8.38	Pass	
26898.306	47.01	16.81	10.02	73.84	AvgMax	H	186	20	82.23	-8.39	Pass	
26985.494	47.77	15.93	9.99	73.69	AvgMax	H	171	18	82.23	-8.54	Pass	
27014.125	47.94	15.73	10.00	73.66	AvgMax	H	181	18	82.23	-8.57	Pass	
26863.319	46.46	17.17	10.02	73.65	AvgMax	H	174	17	82.23	-8.58	Pass	
27216.175	48.57	14.89	10.12	73.58	AvgMax	H	167	19	82.23	-8.65	Pass	
26980.431	67.54	15.98	10.00	93.52	PeakMax	H	165	14	102.23	-8.71	Pass	
26842.788	46.09	17.38	10.01	73.48	AvgMax	H	175	18	82.23	-8.75	Pass	

Frequency, 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
27199.748	48.27	14.96	10.10	73.33	AvgMax	H	163	18	82.23	-8.90	Pass	
27157.900	48.08	15.13	10.07	73.28	AvgMax	H	182	21	82.23	-8.95	Pass	
26857.694	45.98	17.22	10.02	73.22	AvgMax	H	178	22	82.23	-9.01	Pass	
26907.419	46.46	16.72	10.02	73.20	AvgMax	H	170	23	82.23	-9.03	Pass	
26929.750	46.61	16.50	10.01	73.12	AvgMax	H	191	19	82.23	-9.11	Pass	
27403.994	48.07	14.74	10.24	73.06	AvgMax	H	176	16	82.23	-9.17	Pass	
26569.188	61.37	21.51	10.07	92.95	PeakMax	H	158	15	102.23	-9.28	Pass	
27071.838	46.87	15.49	10.02	72.38	AvgMax	H	174	22	82.23	-9.85	Pass	
26569.188	40.80	21.51	10.07	72.37	AvgMax	H	158	15	82.23	-9.86	Pass	
26980.431	45.16	15.98	10.00	71.14	AvgMax	H	165	14	82.23	-11.09	Pass	

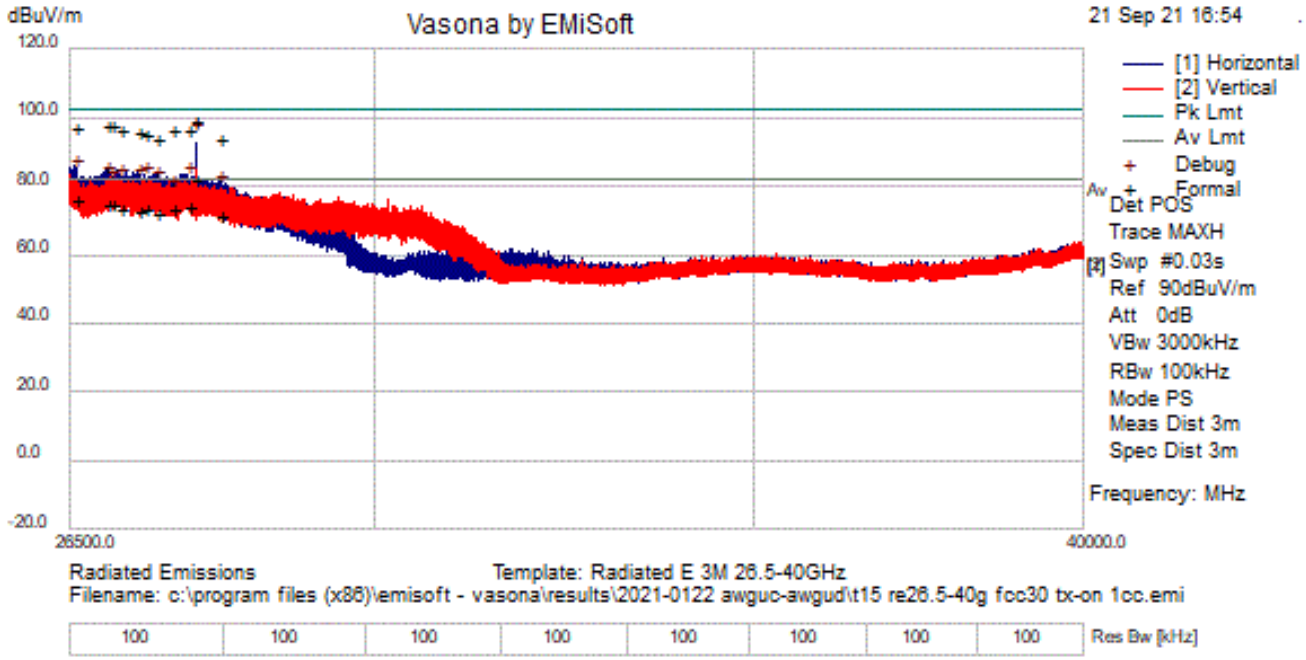
Preview Data

Frequency, 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
27899.219	65.62	14.79	10.09	90.50	Debug	H	175	22	82.23	8.27	Fail	
27181.413	58.81	15.04	10.09	83.93	Debug	H	175	22	82.23	1.70	Fail	
26896.056	56.84	16.84	10.02	83.70	Debug	H	175	22	82.23	1.47	Fail	
26536.675	51.52	22.08	10.04	83.65	Debug	H	175	22	82.23	1.42	Fail	
26876.763	56.58	17.03	10.02	83.63	Debug	H	175	22	82.23	1.40	Fail	
26509.225	50.97	22.57	10.02	83.56	Debug	H	175	22	82.23	1.33	Fail	
26525.538	51.17	22.28	10.03	83.48	Debug	H	175	22	82.23	1.25	Fail	
26531.163	51.22	22.18	10.03	83.44	Debug	H	175	22	82.23	1.21	Fail	
26559.738	51.69	21.68	10.06	83.42	Debug	H	175	22	82.23	1.19	Fail	
27192.325	58.00	14.99	10.10	83.08	Debug	H	175	22	82.23	0.85	Fail	
27437.688	57.98	14.74	10.26	82.99	Debug	H	175	22	82.23	0.76	Fail	
26533.469	50.80	22.14	10.04	82.98	Debug	H	175	22	82.23	0.75	Fail	
26569.188	51.39	21.51	10.07	82.97	Debug	H	175	22	82.23	0.74	Fail	
26857.694	55.71	17.22	10.02	82.95	Debug	H	175	22	82.23	0.72	Fail	
26546.069	50.98	21.92	10.05	82.94	Debug	H	175	22	82.23	0.71	Fail	
26901.006	56.06	16.79	10.02	82.87	Debug	H	175	22	82.23	0.64	Fail	
27403.994	57.87	14.74	10.24	82.85	Debug	H	175	22	82.23	0.62	Fail	
26927.219	56.29	16.52	10.01	82.82	Debug	H	175	22	82.23	0.59	Fail	
26575.038	51.33	21.41	10.07	82.81	Debug	H	175	22	82.23	0.58	Fail	
26573.463	51.29	21.43	10.07	82.79	Debug	H	175	22	82.23	0.56	Fail	
26960.800	56.52	16.18	10.00	82.71	Debug	H	175	22	82.23	0.48	Fail	
26985.494	56.77	15.93	9.99	82.69	Debug	H	175	22	82.23	0.46	Fail	
26898.306	55.78	16.81	10.02	82.61	Debug	H	175	22	82.23	0.38	Fail	
26842.788	55.21	17.38	10.01	82.60	Debug	H	175	22	82.23	0.37	Fail	
26929.750	56.05	16.50	10.01	82.55	Debug	H	175	22	82.23	0.32	Fail	
26581.563	51.12	21.29	10.08	82.48	Debug	H	175	22	82.23	0.25	Fail	
27014.125	56.73	15.73	10.00	82.46	Debug	H	175	22	82.23	0.23	Fail	
26863.319	55.25	17.17	10.02	82.43	Debug	H	175	22	82.23	0.20	Fail	
27212.350	57.34	14.91	10.11	82.36	Debug	H	175	22	82.23	0.13	Fail	
27216.175	57.34	14.89	10.12	82.35	Debug	H	175	22	82.23	0.12	Fail	
27157.900	57.12	15.13	10.07	82.32	Debug	H	175	22	82.23	0.09	Fail	
26954.388	56.07	16.25	10.00	82.32	Debug	H	175	22	82.23	0.09	Fail	
26907.419	55.56	16.72	10.02	82.30	Debug	H	175	22	82.23	0.07	Fail	
27071.838	56.77	15.49	10.02	82.28	Debug	H	175	22	82.23	0.05	Fail	

Frequency, 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
26980.431	56.30	15.98	10.00	82.28	Debug	H	175	22	82.23	0.05	Fail	
26563.900	50.58	21.60	10.06	82.25	Debug	H	175	22	82.23	0.02	Pass	
27005.406	56.48	15.76	9.99	82.23	Debug	H	175	22	82.23	0.00	Pass	
26919.681	55.60	16.60	10.01	82.21	Debug	H	175	22	82.23	-0.02	Pass	
27376.825	57.22	14.75	10.23	82.20	Debug	H	175	22	82.23	-0.03	Pass	
27446.969	57.16	14.74	10.27	82.17	Debug	H	175	22	82.23	-0.06	Pass	
26981.725	56.16	15.97	10.00	82.12	Debug	H	175	22	82.23	-0.11	Pass	
27171.906	56.96	15.07	10.08	82.11	Debug	H	175	22	82.23	-0.12	Pass	
26947.806	55.75	16.31	10.01	82.07	Debug	H	175	22	82.23	-0.16	Pass	
26882.838	55.07	16.97	10.02	82.06	Debug	H	175	22	82.23	-0.17	Pass	
26989.994	56.11	15.89	9.99	81.99	Debug	H	175	22	82.23	-0.24	Pass	
26820.625	54.37	17.60	10.01	81.99	Debug	H	175	22	82.23	-0.24	Pass	
26865.344	54.80	17.15	10.02	81.96	Debug	H	175	22	82.23	-0.27	Pass	
27442.694	56.91	14.74	10.27	81.92	Debug	H	175	22	82.23	-0.31	Pass	
27839.088	56.96	14.80	10.14	81.90	Debug	H	175	22	82.23	-0.33	Pass	
27841.000	56.90	14.80	10.14	81.84	Debug	H	175	22	82.23	-0.39	Pass	
27252.231	56.93	14.75	10.15	81.83	Debug	H	175	22	82.23	-0.40	Pass	
26844.081	54.45	17.36	10.01	81.82	Debug	H	175	22	82.23	-0.41	Pass	
27388.863	56.84	14.75	10.24	81.82	Debug	H	175	22	82.23	-0.41	Pass	
26877.494	54.74	17.02	10.02	81.78	Debug	H	175	22	82.23	-0.45	Pass	
27488.594	56.74	14.74	10.29	81.77	Debug	H	175	22	82.23	-0.46	Pass	
26964.513	55.62	16.14	10.00	81.76	Debug	H	175	22	82.23	-0.47	Pass	
27847.188	56.83	14.79	10.14	81.76	Debug	V	175	22	82.23	-0.47	Pass	
26973.175	55.70	16.06	10.00	81.76	Debug	H	175	22	82.23	-0.47	Pass	
27070.713	56.24	15.49	10.02	81.75	Debug	H	175	22	82.23	-0.48	Pass	
27810.063	56.78	14.80	10.17	81.75	Debug	H	175	22	82.23	-0.48	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.

T15 Radiated Emissions 3m 26.5GHz – 40GHz 1CC Bottom TX-On



Test Information

Results Title	Radiated Emissions 3m 26.5-40GHz
File Name	T15 RE26.5-40g FCC Part 30 Tx-on 1CC_Bottom.emi
Test Laboratory	MH-AR4, 52%RH, 22.8C, 994hPa
Test Engineer	JY / MJS
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless Group
EUT Details	AWGUC-AC Unit 5G n258 24G HP (60 dBm) FCC SN YK213200123, P/N 475946A.X21. 1CC Tx-On. Bottom
Configuration	AR4, AC Powered, FSW-E1260, PA-E1525, Horn Ant-E1527, HPF-E1472, RE26.5GHz - 40GHz FCC Part 15b. Cable Set-E1501 + E1502, .Internal Attenuation 0dB Preview RBW 100k/3M; Formal RBW 1M/3M.
Date	2021-09-21 16:55:17

Formal Data

Frequency, 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
27899.204	74.52	14.79	10.09	99.40	PeakMax	H	173	17	102.23	-2.83	Pass	
26565.547	66.02	21.57	10.06	97.66	PeakMax	H	168	19	102.23	-4.57	Pass	
27813.557	71.56	14.80	10.17	96.53	PeakMax	H	177	19	102.23	-5.70	Pass	
27331.089	70.71	14.75	10.21	95.67	PeakMax	H	177	20	102.23	-6.56	Pass	
26912.336	71.12	16.67	10.02	97.80	PeakMax	H	162	19	102.23	-4.43	Pass	
27056.772	71.14	15.55	10.01	96.70	PeakMax	H	182	18	102.23	-5.53	Pass	
27258.041	71.07	14.75	10.16	95.98	PeakMax	H	188	17	102.23	-6.25	Pass	
27460.807	69.01	14.74	10.28	94.03	PeakMax	H	164	15	102.23	-8.20	Pass	
26956.696	72.00	16.22	10.00	98.23	PeakMax	H	167	19	102.23	-4.00	Pass	
28170.838	69.42	14.73	10.16	94.31	PeakMax	H	186	22	102.23	-7.92	Pass	
27636.619	71.78	14.77	10.26	96.80	PeakMax	H	173	19	102.23	-5.43	Pass	

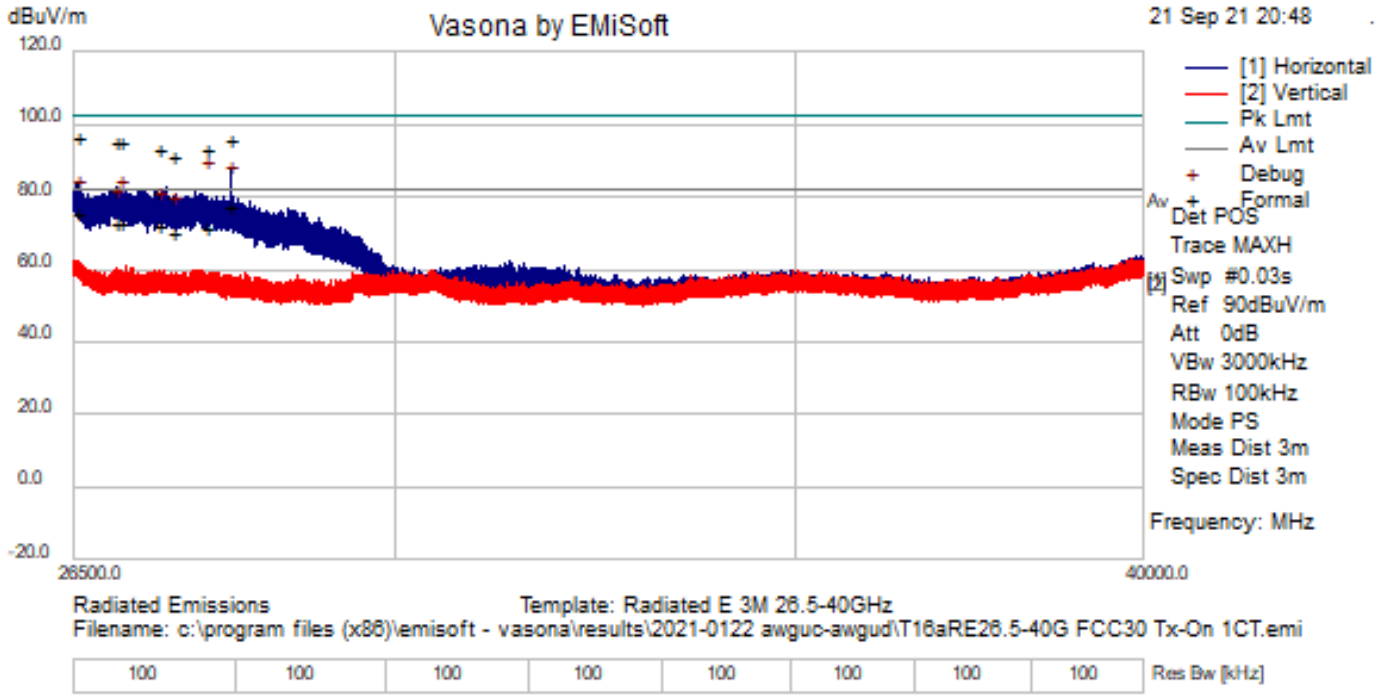
Frequency, MHz	Raw, dBuV	Cable, dB	Factor, dB	Level, dBuV/m	Emission Type	Pol H/V	Ht cm	Az deg	Limit dBuV/m	Margin dB	Pass/ Fail	Comments
27899.204	**57.42**	**14.79**	**10.09**	**82.31**	**AvgMax**	**H**	**173**	**17**	**82.23**	**0.08**	**Above limit**	**This signal was evaluated via TRP Measurement.**
26565.547	44.57	21.57	10.06	76.21	AvgMax	H	168	19	82.23	-6.02	Pass	
27813.557	49.32	14.80	10.17	74.29	AvgMax	H	177	19	82.23	-7.94	Pass	
27331.089	48.88	14.75	10.21	73.84	AvgMax	H	177	20	82.23	-8.39	Pass	
26912.336	48.28	16.67	10.02	74.97	AvgMax	H	162	19	82.23	-7.26	Pass	
27056.772	48.41	15.55	10.01	73.97	AvgMax	H	182	18	82.23	-8.26	Pass	
27258.041	48.02	14.75	10.16	72.93	AvgMax	H	188	17	82.23	-9.30	Pass	
27460.807	47.55	14.74	10.28	72.57	AvgMax	H	164	15	82.23	-9.66	Pass	
26956.696	48.68	16.22	10.00	74.91	AvgMax	H	167	19	82.23	-7.32	Pass	
28170.838	47.09	14.73	10.16	71.98	AvgMax	H	186	22	82.23	-10.25	Pass	
27636.619	48.55	14.77	10.26	73.58	AvgMax	H	173	19	82.23	-8.65	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
27899.204	67.97	14.79	10.09	92.85	Debug	H	176	20	82.23	10.62	Fail	
26565.547	50.77	21.57	10.06	82.41	Debug	H	176	20	82.23	0.18	Fail	
27813.557	55.32	14.80	10.17	80.29	Debug	H	176	20	82.23	-1.94	Pass	
27331.089	55.28	14.75	10.21	80.24	Debug	H	176	20	82.23	-1.99	Pass	
26912.336	53.26	16.67	10.02	79.95	Debug	H	176	20	82.23	-2.28	Pass	
27056.772	54.03	15.55	10.01	79.59	Debug	H	176	20	82.23	-2.64	Pass	
27258.041	54.54	14.75	10.16	79.45	Debug	H	176	20	82.23	-2.78	Pass	
27460.807	53.86	14.74	10.28	78.88	Debug	H	176	20	82.23	-3.35	Pass	
26956.696	52.34	16.22	10.00	78.57	Debug	H	176	20	82.23	-3.66	Pass	
28170.838	52.73	14.73	10.16	77.62	Debug	H	176	20	82.23	-4.61	Pass	
27636.619	51.06	14.77	10.26	76.09	Debug	H	176	20	82.23	-6.14	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.

T16a Radiated Emissions 3m 26.5GHz – 40GHz 1CC Top TX-On



Test Information

Results Title	Radiated Emissions 3m 26.5-40GHz
File Name	T16a RE26.5-40G FCC Part 30 Tx-On 1CC Top.emi
Test Laboratory	MH-AR4, 52%RH, 22.8C, 994hPa
Test Engineer	MJS
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless Group
EUT Details	AWGUC-AC Unit 5G n258 24G HP (60 dBm) FCC SN YK213200123, P/N 475946A.X21. 1CC Tx-On. Top.
Configuration	AR4, AC Powered, FSW-E1260, PA-E1525, Horn Ant-E1527, HPF-E1472, RE26.5GHz - 40GHz FCC Part 15b. Cable Set-E1501 + E1502, .Internal Attenuation 0dB Preview RBW 100k/3M; Formal RBW 1M/3M.
Date	2021-09-21 20:48:55

Formal Data

Frequency, 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
28147.851	52.76	14.74	10.14	77.64	AvgMax	H	180	16	82.23	-4.59	Pass	
26543.680	64.79	21.96	10.04	96.80	PeakMax	H	169	17	102.23	-5.43	Pass	
28147.851	71.11	14.74	10.14	96.00	PeakMax	H	180	16	102.23	-6.23	Pass	
26543.680	43.59	21.96	10.04	75.59	AvgMax	H	169	17	82.23	-6.64	Pass	
26934.507	69.11	16.45	10.01	95.57	PeakMax	H	167	18	102.23	-6.66	Pass	
26984.458	69.62	15.94	9.99	95.55	PeakMax	H	176	17	102.23	-6.68	Pass	
27381.775	68.74	14.75	10.23	93.72	PeakMax	H	184	18	102.23	-8.51	Pass	
27899.186	68.42	14.79	10.09	93.31	PeakMax	H	180	17	102.23	-8.92	Pass	

Frequency, 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
26934.507	46.83	16.45	10.01	73.29	AvgMax	H	167	18	82.23	-8.94	Pass	
26984.458	47.12	15.94	9.99	73.05	AvgMax	H	176	17	82.23	-9.18	Pass	
27381.775	47.22	14.75	10.23	72.20	AvgMax	H	184	18	82.23	-10.03	Pass	
27534.398	66.70	14.75	10.29	91.74	PeakMax	H	172	14	102.23	-10.49	Pass	
27899.186	46.84	14.79	10.09	71.72	AvgMax	H	180	17	82.23	-10.51	Pass	
27534.398	45.51	14.75	10.29	70.54	AvgMax	H	172	14	82.23	-11.69	Pass	

Preview Data

Frequency, 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
27899.186	58.91	14.79	10.09	83.80		H	172	18	82.23	1.57	Fail	
26934.507	49.52	16.45	10.01	75.98	Debug	H	170	17	82.23	-6.25	Pass	
26984.458	53.09	15.94	9.99	79.03	Debug	H	170	17	82.23	-3.20	Pass	
27381.775	50.85	14.75	10.23	75.83	Debug	H	170	17	82.23	-6.40	Pass	
26543.680	47.03	21.96	10.04	79.04	Debug	H	170	17	82.23	-3.19	Pass	
27534.398	49.41	14.75	10.29	74.45	Debug	H	170	17	82.23	-7.78	Pass	
28147.920	58.15	14.74	10.14	83.03	Debug	H	170	17	82.23	0.80	Fail	

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.