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Title 47 Code of Federal Regulations Test Report

Regulation:
FCC Part 2 and 27

Client:
NOKIA SOLUTIONS AND NETWORKS

Product Evaluated:
AirScale MAA 64T64R B41 320W AEHC (AEHC)

Report Number:
TR-2022-0032-FCC2-27

Date Issued:
April 8, 2022

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Revisions

Date	Revision	Section	Change
04/08/2022	0		Initial Release

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Prepared By:

Signed:

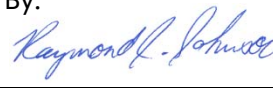


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1. System Information and Requirements

Report copies and other information not contained in this report are held by either the product engineer or in an identified file at the Global Product Compliance Laboratory in Murray-Hill, NJ.

Equipment Under Test (EUT):	AirScale MAA 64T64R B41 320W AEHC (AEHC)
Serial Number:	Refer to Section 1.3.1
FCC ID:	VBNAEHC-01
Hardware Version:	Refer to Section 1.3.1
Software Version:	SBTS22R3
Frequency Range:	2496 – 2690 MHz
GPCL Project Number:	2022-0032
Manufacturer:	NOKIA SOLUTIONS AND NETWORKS OY KARAKAARI 7, FI-02610 ESPOO FINLAND
Test Requirement(s):	Title 47 CFR Parts 2 and 27
Test Standards:	See Section 1.5.1
Measurement Procedure(s):	See Section 1.5.2
Test Date(s):	3/8/2022 – 3/11/2022
Test Performed By:	Nokia Global Product Compliance Laboratory 600-700 Mountain Ave. P.O. Box 636 Murray Hill, NJ 07974-0636 Test Site Number: US5302
Product Engineer(s):	Ron Remy
Lead Engineer:	Steve Gordon
Test Engineer (s):	Jaideep Yadav
Test Results: The EUT, <i>as tested</i> 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.	

1.1 Introduction

This Conformity test report applies to the **AirScale MAA 64T64R B41 320W AEHC (AEHC)**, hereinafter referred to as the Equipment Under Test (EUT).

1.2 Purpose and Scope

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

This report covers the Class II Permissive change to add single carrier 70 MHz at 280 W (53.01 dBm) and two 5G-NR carrier configurations (70+20 MHz and 70+50 MHz) to the existing grant.

The AEHC product is certified under FCC ID: VBNAEHC-01.

No Frequency Stability testing was considered necessary for this test program since there were no changes to the basic frequency determining and stabilizing circuitry (including clock and data rates).

1.3 EUT Details

1.3.1 Specifications

Specification Items	Description
Radio Access Technology	5G-NR & LTE
Duplex Mode	Time Division Duplex (TDD)
Modulation Type(s)	QPSK, 16QAM, 64QAM, 256QAM
Operation Frequency Range	2496 – 2690 MHz
Channel Bandwidth	70 MHz
Number of Tx Ports per Unit	64
MIMO	Yes
Deployment Environment	Outdoor
Supply Voltage	-48.0 VDC
Max RF Output Power	64X5 W (37 dBm $\pm$ 2.0dBm)

Serial Number



1.3.2 Photographs

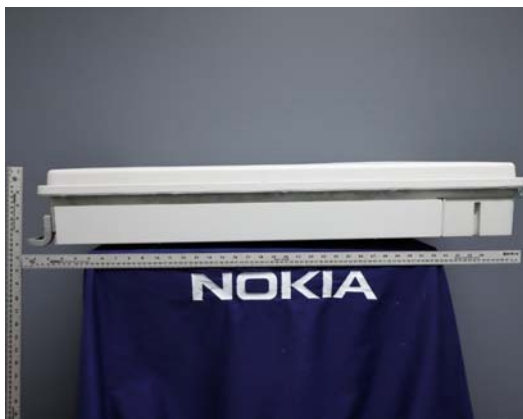
Front



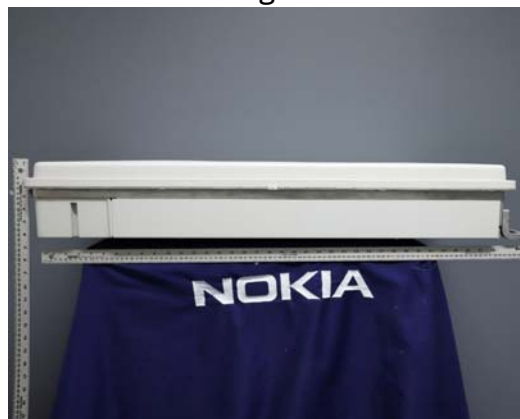
Rear



Left



Right



Top



Bottom



1.4 Test Requirements

Each required measurement is listed below:

47 CFR FCC Sections	Description of Tests	Test Required
2.1046, 27.53	RF Power Output	Yes
2.1047, 27.53	Modulation Characteristics	Yes
2.1049, 27.53	(a) Occupied Bandwidth (b) Out-of-Band Emissions	Yes
2.1051, 27.53	Spurious Emissions at Antenna Terminals	Yes
2.1053, 27.53	Field Strength of Spurious Radiation	Yes
2.1055, 27.53	Frequency Stability	No*

* No Frequency Stability testing was considered necessary for this test program since there were no changes to the basic frequency determining and stabilizing circuitry (including clock and data rates.)

1.5 Test Standards & Measurement Procedures

1.5.1 Test Standards

- Title 47 Code of Federal Regulations, Federal Communications Commission Part 2.
- Title 47 Code of Federal Regulations, Federal Communications Commission Part 27.
- KDB 971168 D01 Power Measurement License Digital Systems v03r01 April 9, 2018.
- KDB 662911 D01 Multiple Transmitter Output v02r01 Oct 2013.
- ANSI C63.26-2015, American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services.
- ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

1.5.2 Measurement Procedures

- FCC-IC-OB - GPCL Power Measurement, Occupied Bandwidth & Modulation Test Procedure 6-20-2019.
- FCC-IC-SE - GPCL Spurious Emissions Test Procedure 6-20-2019.

1.5.3 MEASUREMENT UNCERTAINTY

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

Worst-Case Estimated Measurement Uncertainties

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

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

1.6 Executive Summary

Requirement	Description	Result
47 CFR FCC Parts 2 and 27		
2.1046, 27.53	RF Power Output Peak to Average Power Ratio	COMPLIES
2.1047, 27.53	Modulation Characteristics	COMPLIES
2.1049, 27.53	(a) Occupied Bandwidth (b) Edge of Band Emissions	COMPLIES
2.1051, 27.53	Spurious Emissions at Antenna Terminals	COMPLIES
2.1053, 27.53	Field Strength of Spurious Radiation	COMPLIES
2.1055, 27.53	Frequency Stability	NT

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

1.7 Test Configuration

1.8 Test Setup for all Measurement at Antenna Ports



2. FCC Section 2.1046 - RF Power Output

2.1 RF Power Output

This test is a measurement of the total RF power level transmitted at the antenna-transmitting terminal. The product was configured for test as shown in section above and allowed to warm up and stabilize per KDB 971168 D01 and ANSI C63.26. The product has 64 ports divided into 8 segments. One segment of 8 ports was measured and is representative of the remaining segments. The results of one segment are then converted to watts, summed, and converted back to dBm to represent all 64 ports. Power measurements were made with an MXA Signal Analyzer. The measured results are tabulated below with maximum value bolded in each case.

2.1.1 1-Carrier Data

Tabular Data – Channel RF Power (1-Carrier)

Channel Power - Signal BW 70MHz					
Test Model 1.1 Modulation QPSK Channel Frequency 2531MHz		Test Model 3.2 Modulation QPSK/16QAM Channel Frequency 2593MHz		Test Model 3.1a Modulation 256QAM Channel Frequency 2655MHz	
TX Port	(dBm)	TX Port	(dBm)	TX Port	(dBm)
0	36.37	0	36.40	0	36.71
1	36.27	1	36.15	1	36.46
2	36.29	2	36.20	2	36.48
3	36.44	3	36.41	3	36.69
4	36.30	4	36.22	4	36.50
5	36.44	5	36.32	5	36.67
6	36.59	6	36.58	6	36.89
7	36.47	7	36.29	7	36.58
Total Power (dBm)	54.46	Total Power (dBm)	54.39	Total Power (dBm)	54.69
Total Power (W)	279.21	Total Power (W)	274.47	Total Power (W)	294.20

Manufacturer tolerance: +/- 2 dB

2.1.1 2-Carrier Data

Tabular Data – Channel RF Power (2-Carrier)

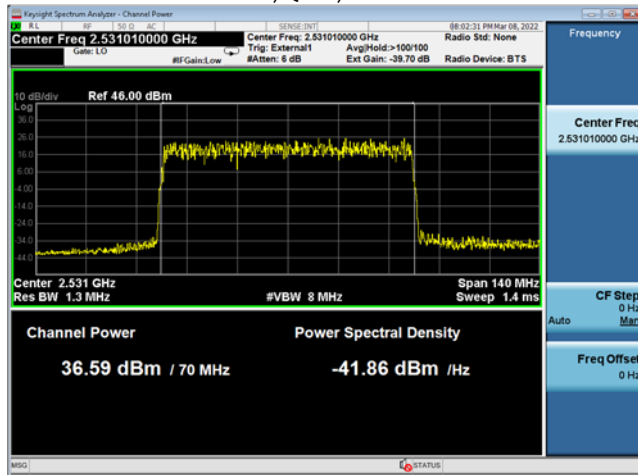
Channel Power - Signal BW 70+20MHz		Channel Power - Signal BW 70+50MHz	
Test Model 3.2 Modulation QPSK/16QAM Channel Frequency 2531+2576MHz		Test Model 3.1a Modulation 256QAM Channel Frequency 2605+2665MHz	
TX Port	(dBm)	TX Port	(dBm)
0	37.07	0	36.99
1	36.79	1	36.67
2	36.87	2	36.75
3	37.05	3	36.94
4	36.87	4	36.71
5	37.01	5	36.87
6	37.22	6	37.07
7	36.99	7	36.77
Total Power (dBm)	55.05	Total Power (dBm)	54.91
Total Power (W)	319.70	Total Power (W)	309.75

2.2 Channel RF Power – Plots

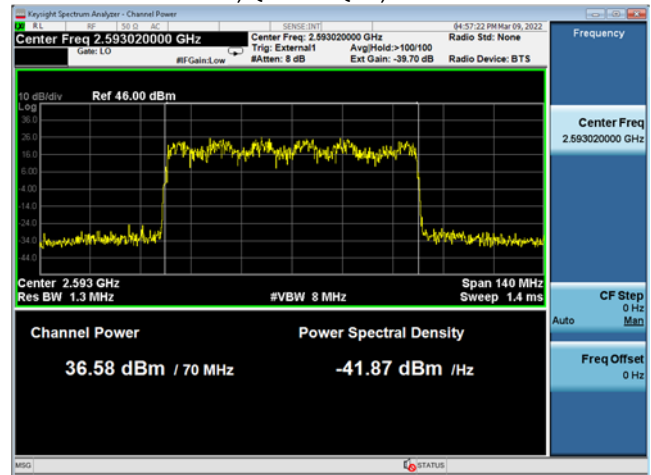
NOTE: Only the maximum value results in each case are used in this report. The full suite of raw data resides at the MH, New Jersey location.

2.2.1 1-Carrier, 70 MHz BW, TX6

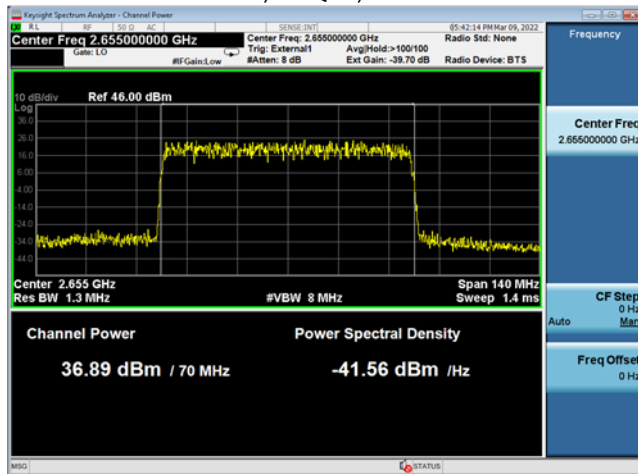
TM1.1, QPSK, 2531MHz



TM3.2, QPSK/16QAM, 2593MHz

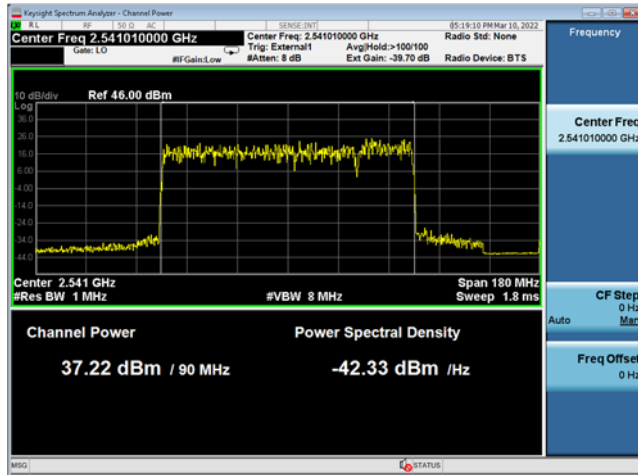


TM3.1a, 256QAM, 2655MHz

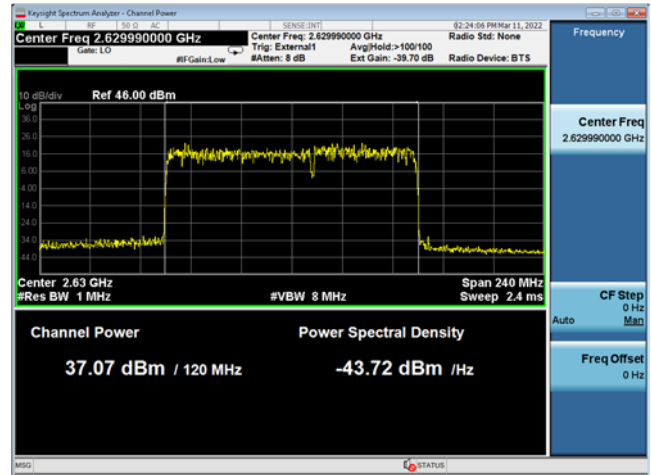


2.2.2 2-Carrier, TX6

TM3.2, QPSK/16QAM
70+20MHz BW
2531+2567MHz



TM3.1a, 256QAM
70+50MHz BW
2604+2664MHz



2.3 Peak-to-Average Power Ratio (PAPR)

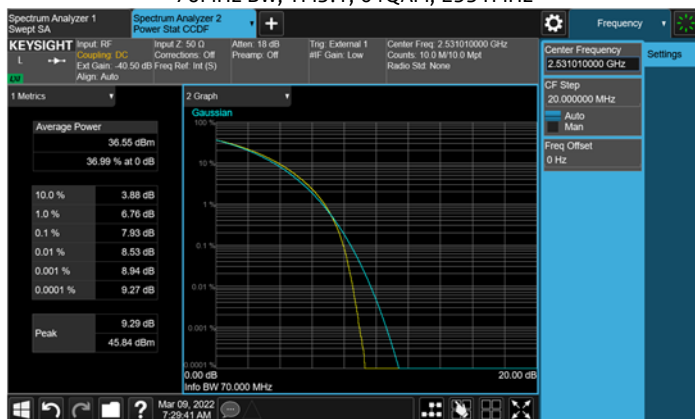
The Peak-to-Average Power Ratio (PAPR) was evaluated per KDB 971168 for Single and Multiple Carriers. The PAPR values of all carriers measured are below 13dB.

PAPR Tabular Data

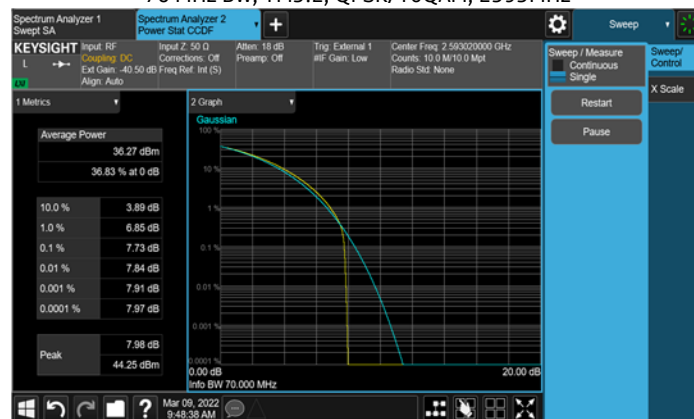
# of Carriers	Signal BW MHz	Test Model	Modulation	TX Port	Channel Frequency MHz	PAR at 0.1% Limit - 13 dB
1	70	3.1	64QAM	6	2531	7.93
1	70	3.2	QPSK/16QAM	6	2593	7.73
1	70	3.1a	256QAM	6	2655	7.98
2	70+20	3.2	QPSK/16QAM	6	2531	8.29
2	70+20	3.2	QPSK/16QAM	6	2576	8.40
2	70+50	3.1a	256QAM	6	2605	8.39
2	70+50	3.1a	256QAM	6	2665	8.30

2.3.1 Peak-to-Average Power Ratio Plots (1-Carrier)

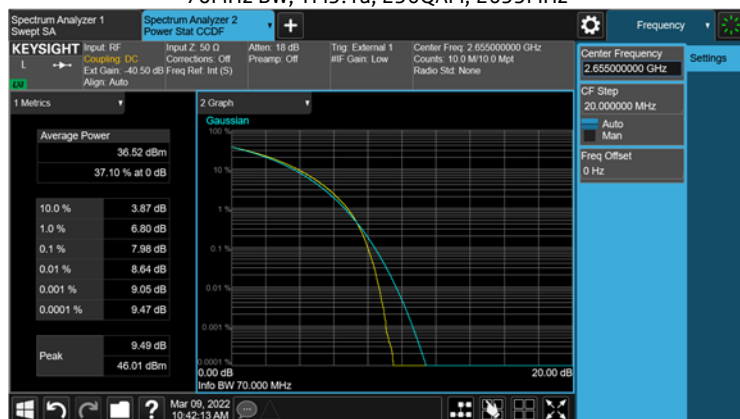
70MHz BW, TM3.1, 64QAM, 2531MHz



70 MHz BW, TM3.2, QPSK/16QAM, 2593MHz

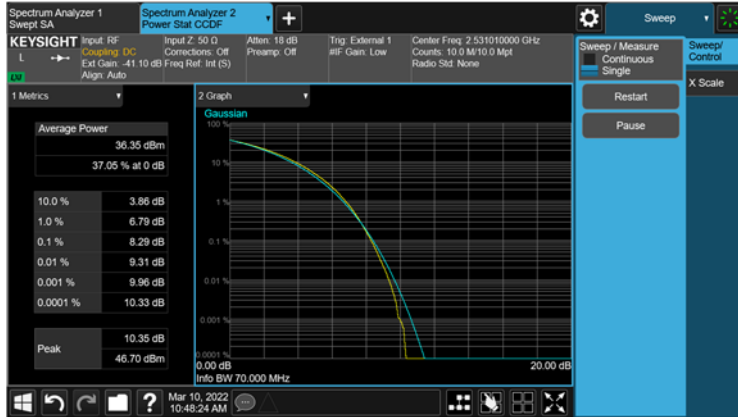


70MHz BW, TM3.1a, 256QAM, 2655MHz

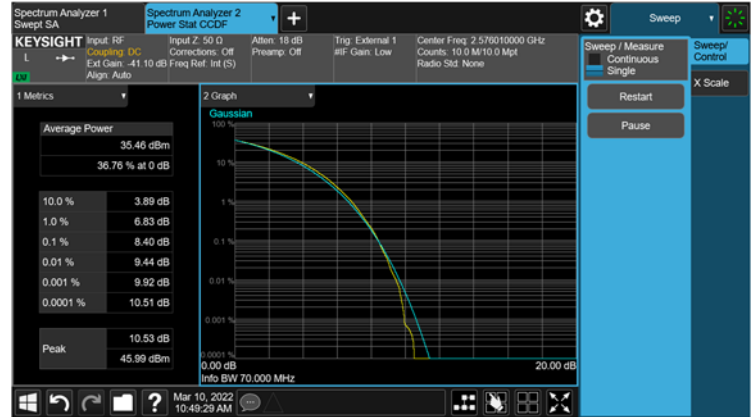


2.3.2 Peak-to-Average Power Ratio Plots (2-Carrier)

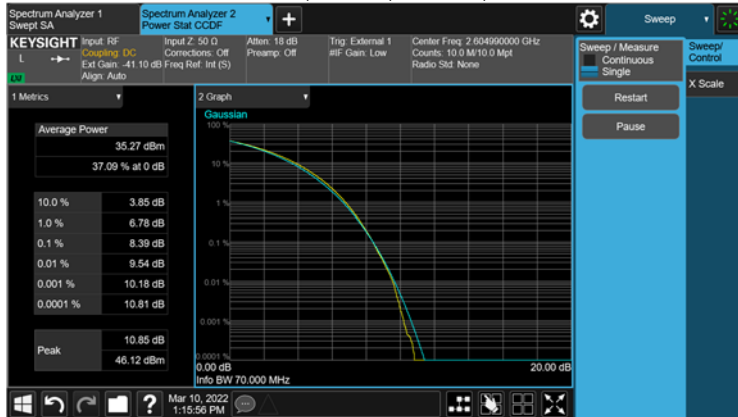
70+20MHz BW, TM3.2 QPSK/16QAM, 2531MHz



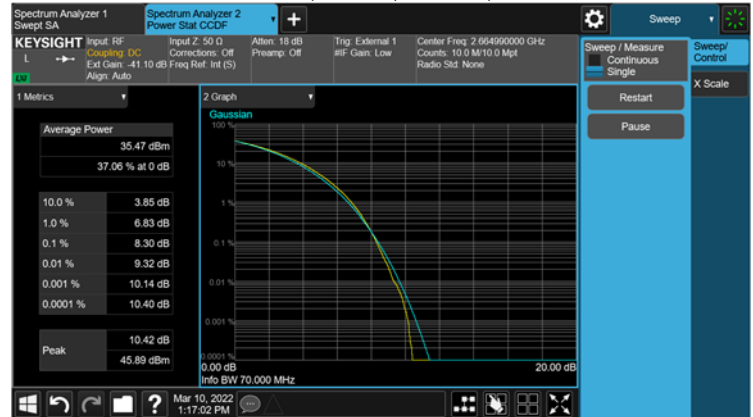
70+20MHz BW, TM3.2 QPSK/16QAM, 2576MHz



70+50MHz BW, TM3.1a, 256QAM, 2605MHz



70+50MHz BW, TM3.1a, 256QAM, 2665MHz



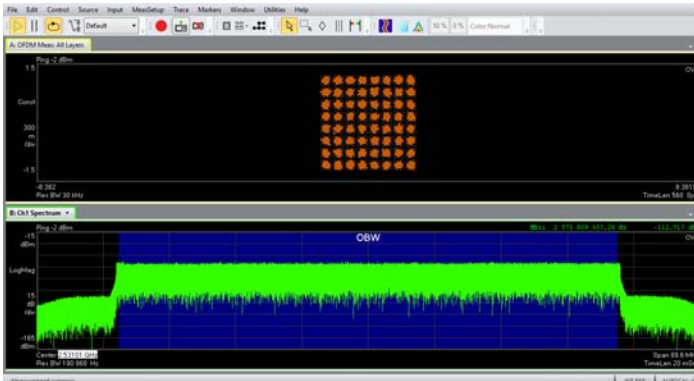
3. FCC Section 2.1047 - Modulation Characteristics

3.1 Modulation Characteristics

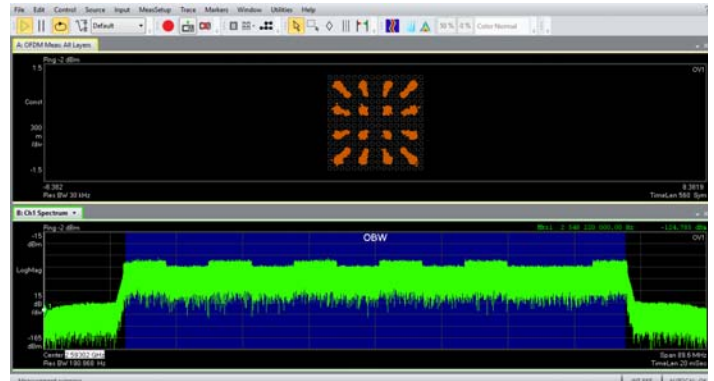
The RF signal at the antenna port was demodulated and verified for correctness of the modulation signal used before each test was performed.

3.1.1 Modulation Characteristics – Plots

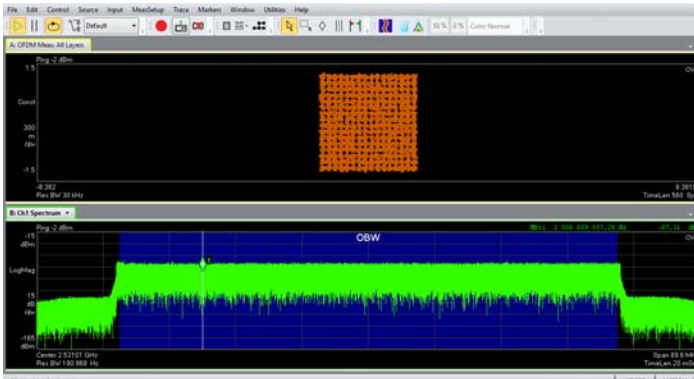
TM3.1 / 64QAM / 2531MHz



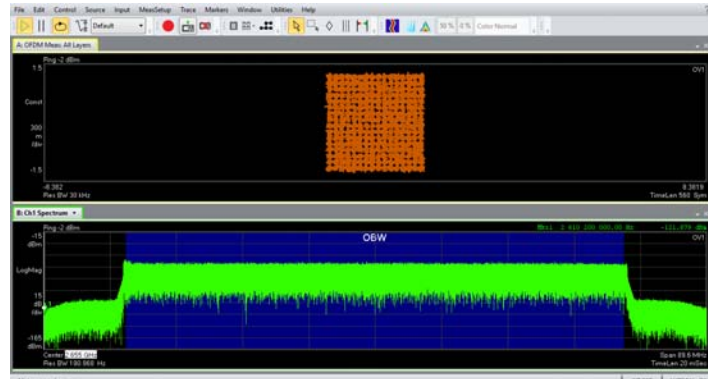
TM3.2 / QPSK/16QAM / 2593MHz



TM3.1a / 256QAM / 2531MHz



TM3.1a / 256QAM / 2655MHz



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

4.1 Occupied Bandwidth

In 47CFR 2.1049 the FCC requires:

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

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

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

Tabular Data – Occupied Bandwidth

# of Carriers	Signal BW MHz	Test Model	Modulation	TX Port	Channel Frequency MHz	99% Occupied BW MHz
1	70	1.1	QPSK	6	2531	67.373
1	70	3.2	QPSK/16QAM	6	2593	67.517
1	70	3.1a	256QAM	6	2655	67.184
2	70+20	3.2	QPSK/16QAM	6	2531+2576	86.933
2	70+50	3.1a	256QAM	6	2605+2665	116.86

Tabular Data – 26 dB Occupied Bandwidth

# of Carriers	Signal BW MHz	Test Model	Modulation	TX Port	Channel Frequency MHz	26dB Emission Bandwidth MHz
1	70	1.1	QPSK	6	2531	69.17
1	70	3.2	QPSK/16QAM	6	2593	69.83
1	70	3.1a	256QAM	6	2655	69.59
2	70+20	3.2	QPSK/16QAM	6	2531+2576	89.76
2	70+50	3.1a	256QAM	6	2605+2665	120.0

4.2 Occupied Bandwidth – Plots (1-Carrier)

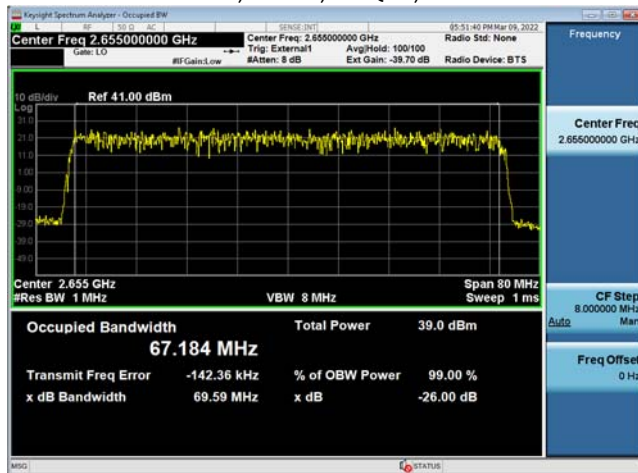
70MHz BW, TM1.1, QPSK, 2531MHz



70MHz BW, TM3.2, QPSK/16QAM, 2593MHz



70MHz BW, TM3.1a, 256QAM, 2655MHz

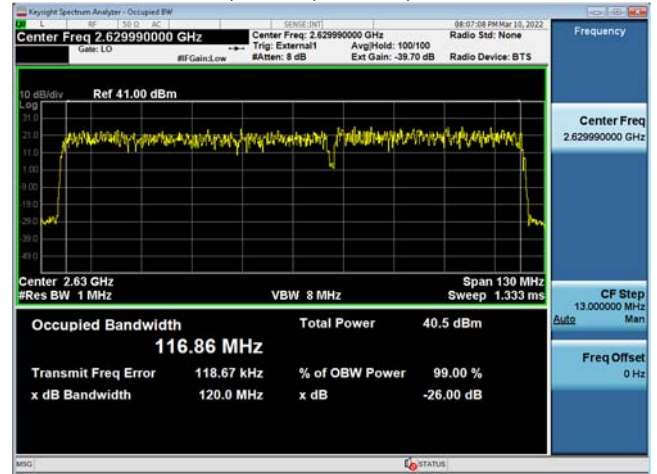


4.3 Occupied Bandwidth – Plots (2-Carrier)

70+20MHz BW, TM3.2, QPSK/16QAM, 2531+2576MHz



70+50MHz BW, TM3.1a, 256QAM, 2605+2665MHz



4.4 Edge of band Emissions

The Edge of Band emissions of the EUT at the external antenna connector (EAC) were measured using a Keysight MXA Signal Analyzer. Before measuring the Edge of Band emissions, the RF power level was confirmed with the Keysight MXA Signal Analyzer. The RF output from the EAC port to signal analyzer was reduced (to an amplitude usable by the signal analyzer) by using a calibrated attenuator and RF Switch. The path attenuation was offset on the display and the signal for the carrier was adjusted to the corrected RF power level for the resolution bandwidth used for the transmit signal. All mask values were adjusted based upon the designated signal bandwidth and measurement bandwidths. In accordance with KDB 662911 D01 Multiple Transmitter Output, the limit of -13 dBm has been adjusted to -31.06 dBm to reflect $10 \log(n)$ where $n=64$ for the 64x64 MIMO operation.

4.4.1 Edge of Band Emissions – Plots

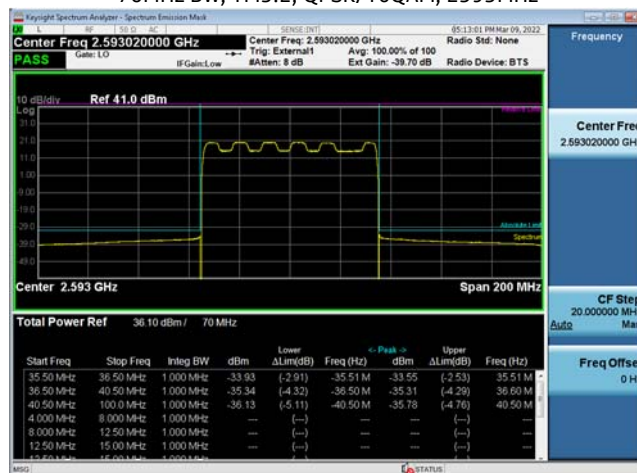
All of the measurements met the requirements of Part 27.53 when measured per Part 2.1049.

4.4.1.1 1-Carrier

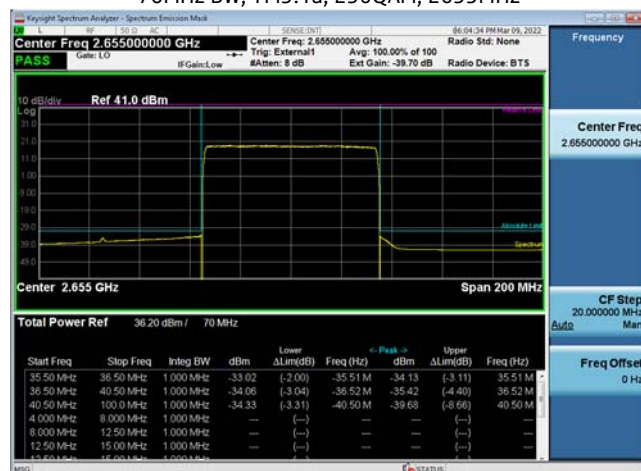
70MHz BW, TM1.1, QPSK, 2531MHz



70MHz BW, TM3.2, QPSK/16QAM, 2593MHz



70MHz BW, TM3.1a, 256QAM, 2655MHz

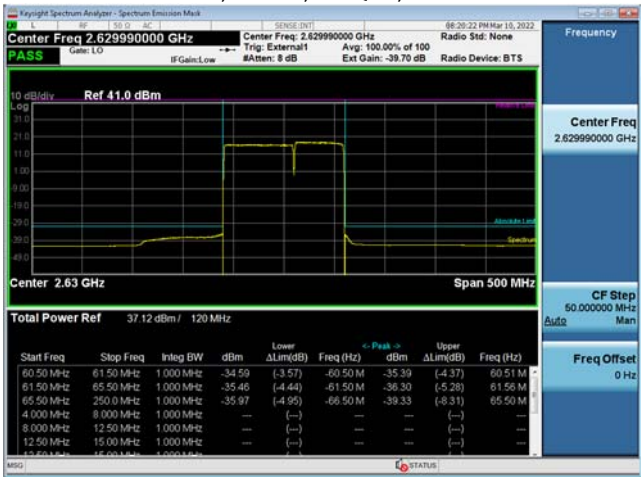


4.4.1.2 2-Carrier

70+20MHz BW, TM3.2, QPSK/16QAM, 2531+2576MHz



70+50MHz BW, TM3.1a, 256QAM, 2605+2665MHz



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

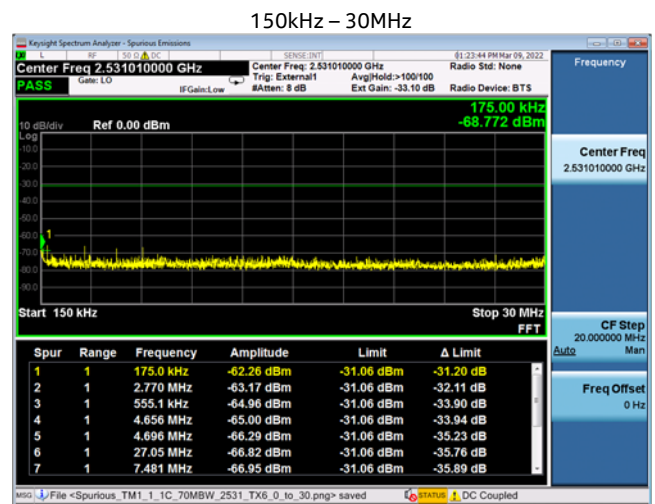
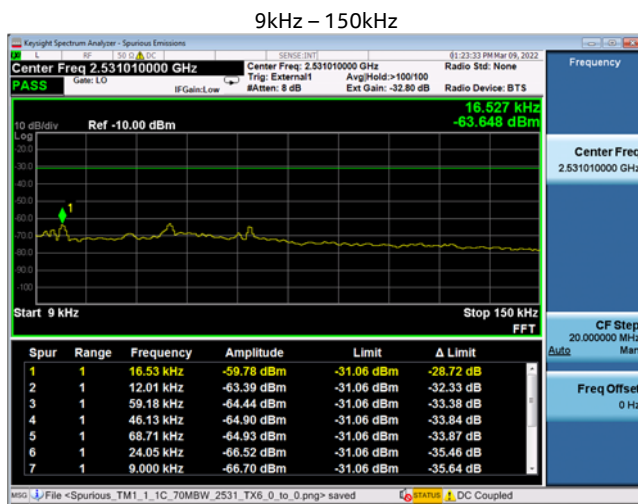
5.1 Measurement of Spurious Emissions at Transmit Antenna Port

Spurious Emissions at the transmit-antenna terminals were investigated over the frequency range of 10 MHz to beyond the 10th harmonic of the specific transmit band. Carrier Bandwidth is exempt. For this band of operation, the measurements were performed up to 27 GHz. Measurements were made using a Keysight MXA Signal Analyzer. The RF output from the transmitter was reduced (to an amplitude usable by the receivers) using calibrated attenuators. The RF power level was continuously monitored via a Keysight MXA Signal Analyzer.

The required emission limitation is specified as appropriate in 27.53. The measured spurious emission levels were plotted for the frequency range as specified in 2.1057. There were no reportable emissions. Data below documents performance up to 27 GHz.

5.1.1 Spurious Emissions at Tx Port - Plots

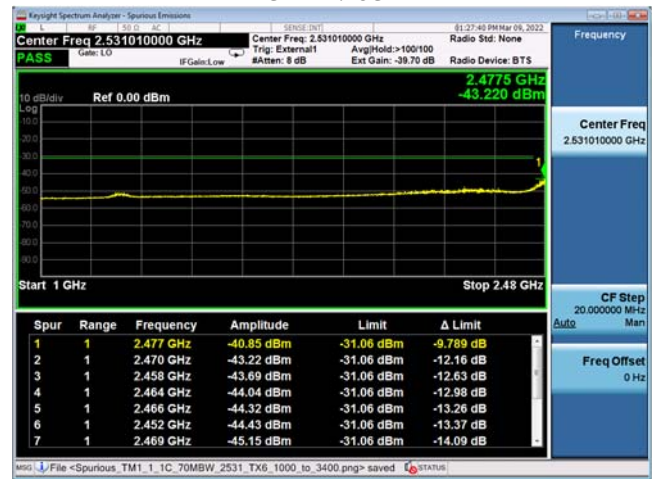
5.1.1.1 70 MHz BW, TM1.1, QPSK, 2531 MHz, TX6



30MHz – 1GHz



1GHz – 2.48GHz



2.6GHz – 6GHz



6GHz – 9GHz



9GHz – 27GHz

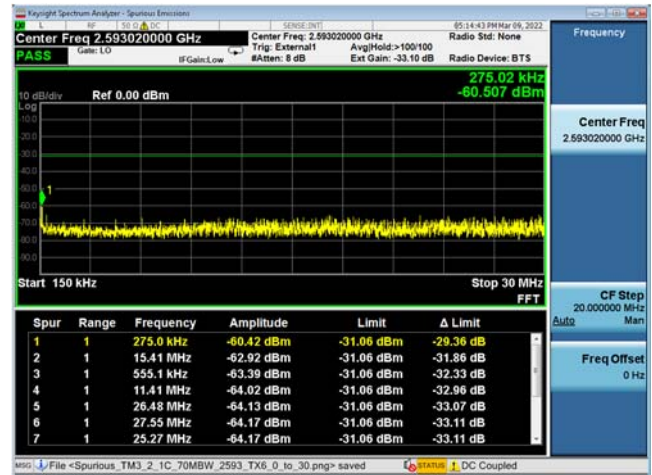


5.1.1.2 70 MHz BW, TM3.2, QPSK/16QAM, 2593 MHz, TX6

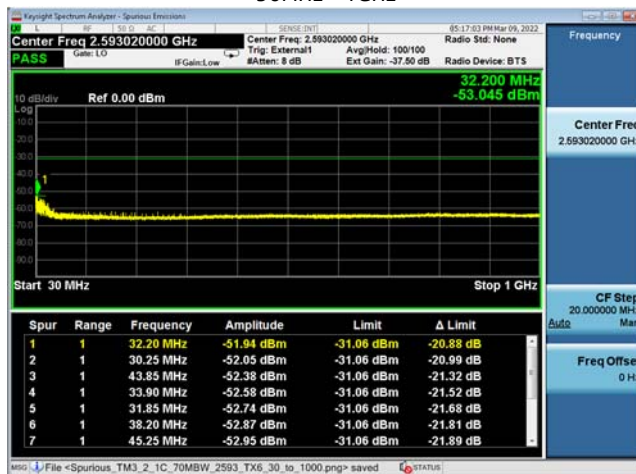
9kHz – 150kHz



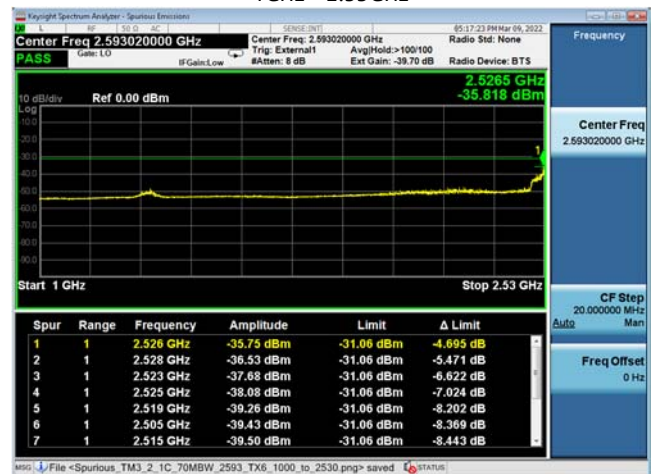
150kHz – 30MHz



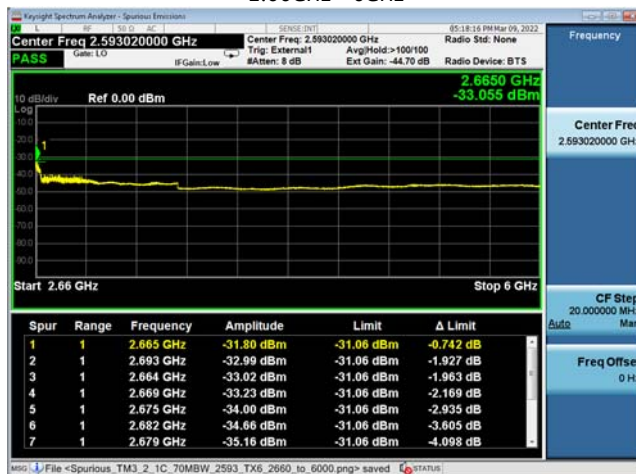
30MHz – 1GHz



1GHz – 2.53GHz



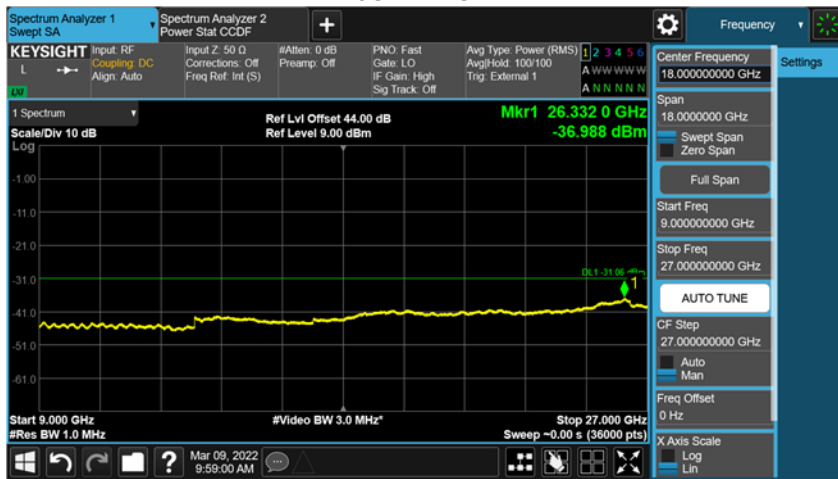
2.66GHz – 6GHz



6GHz – 9GHz



9GHz – 27GHz

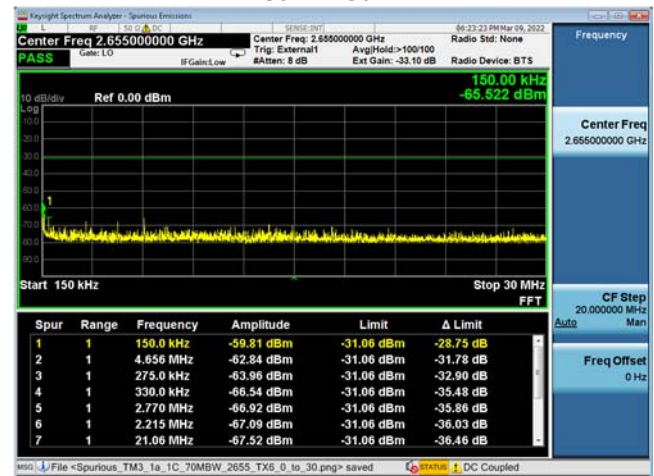


5.1.1.3 70 MHz BW, TM3.1a, 256QAM, 2655 MHz, TX6

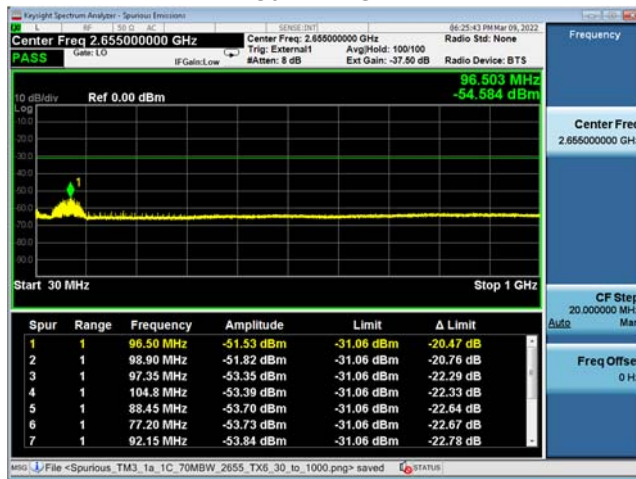
9kHz – 150kHz



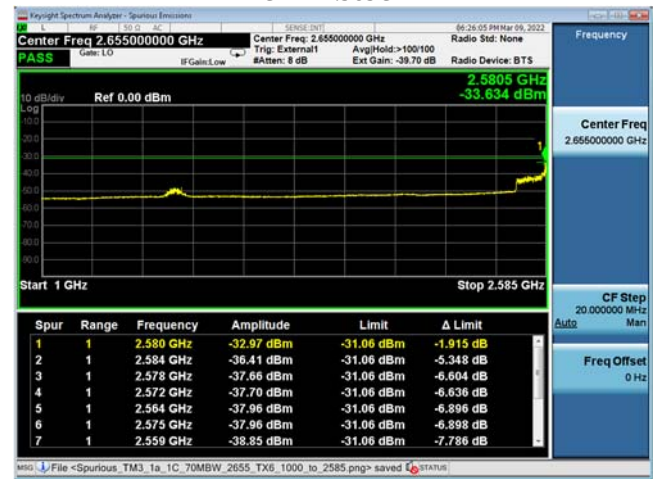
150kHz – 30MHz



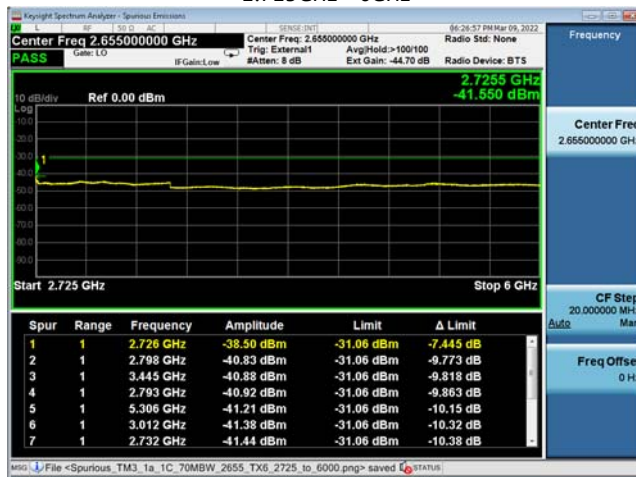
30MHz – 1GHz



1GHz – 2.585GHz



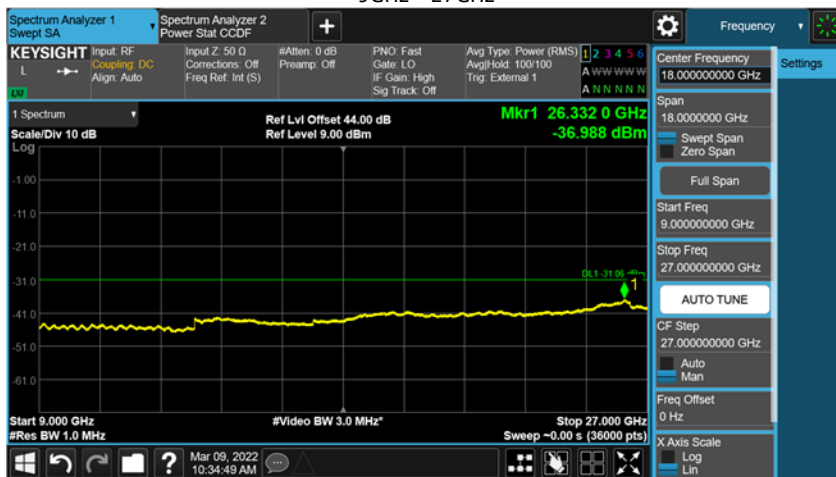
2.725GHz – 6GHz



6GHz – 9GHz



9GHz – 27GHz

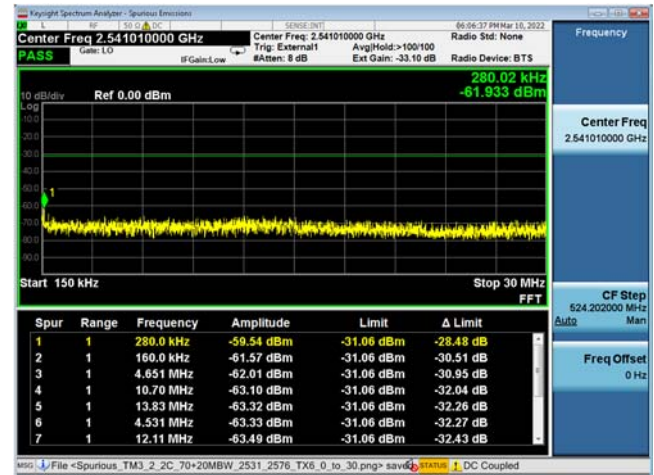


5.1.1.4 70+20 MHz BW, TM3.2, QPSK/16QAM, 2531+2576 MHz, TX6

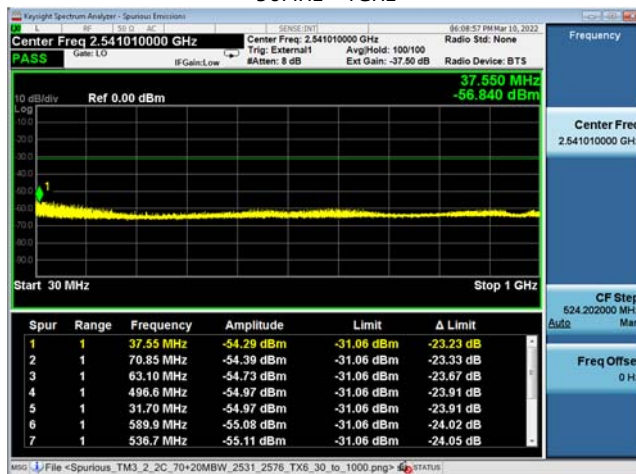
9kHz – 150kHz



150kHz – 30MHz



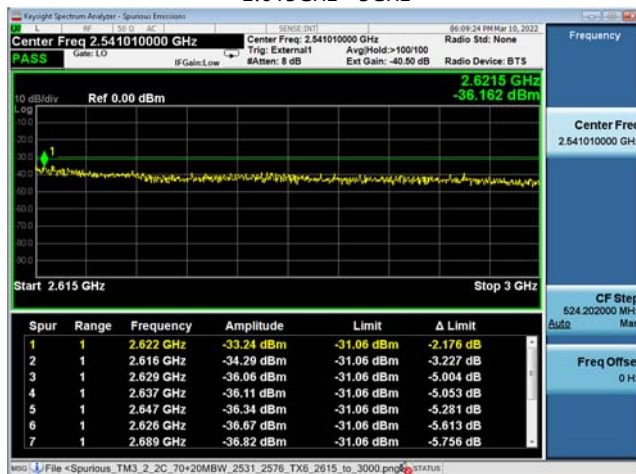
30MHz – 1GHz



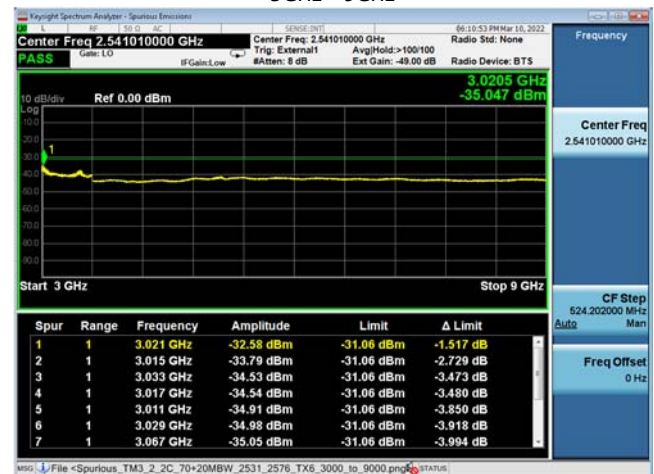
1GHz – 2.47GHz



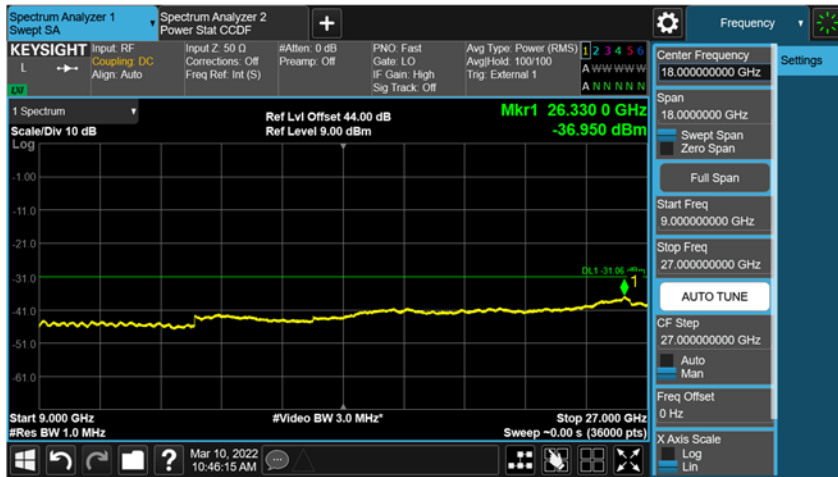
2.615GHz – 3GHz



3GHz – 9GHz



Global Product Compliance Laboratory
Report No.: TR-2022-0032-FCC2-27
Product: AirScale MAA 64T64R B41 320W AEHC
(AEHC)



Keysight Spectrum Analyzer - Spurious Emissions

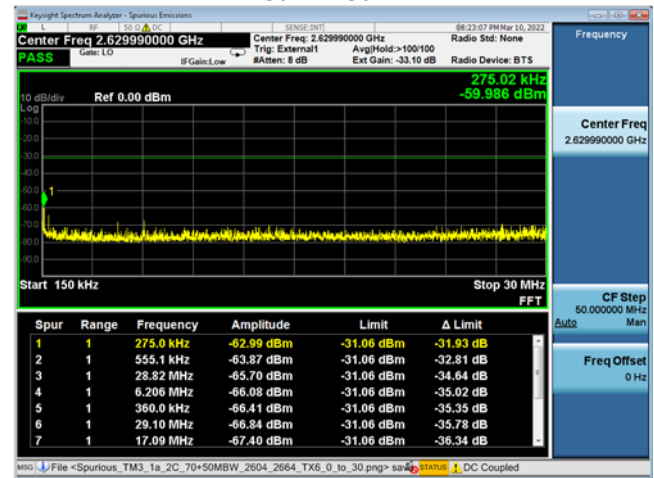
Center Freq 2.629990000 GHz

Start 9 kHz

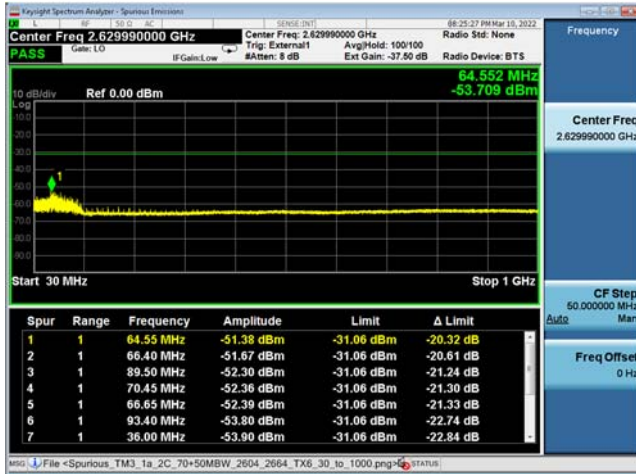
Stop 150 kHz

FFT

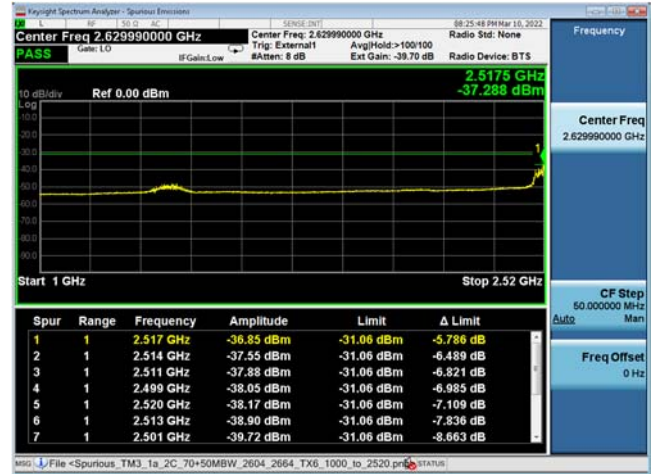
Spur	Range	Frequency	Amplitude	Limit	Δ Limit
1	1	69.21 kHz	-63.87 dBm	-31.06 dBm	-32.81 dB
2	1	36.60 kHz	-64.35 dBm	-31.06 dBm	-33.29 dB
3	1	65.70 kHz	-64.52 dBm	-31.06 dBm	-33.46 dB
4	1	34.09 kHz	-65.36 dBm	-31.06 dBm	-34.30 dB
5	1	42.62 kHz	-66.60 dBm	-31.06 dBm	-35.54 dB
6	1	14.52 kHz	-67.12 dBm	-31.06 dBm	-36.06 dB
7	1	47.64 kHz	-67.21 dBm	-31.06 dBm	-36.15 dB



30MHz – 1GHz



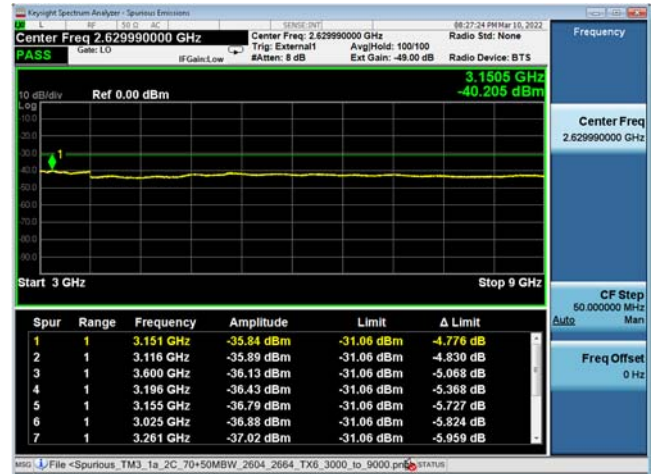
1GHz – 2.52GHz



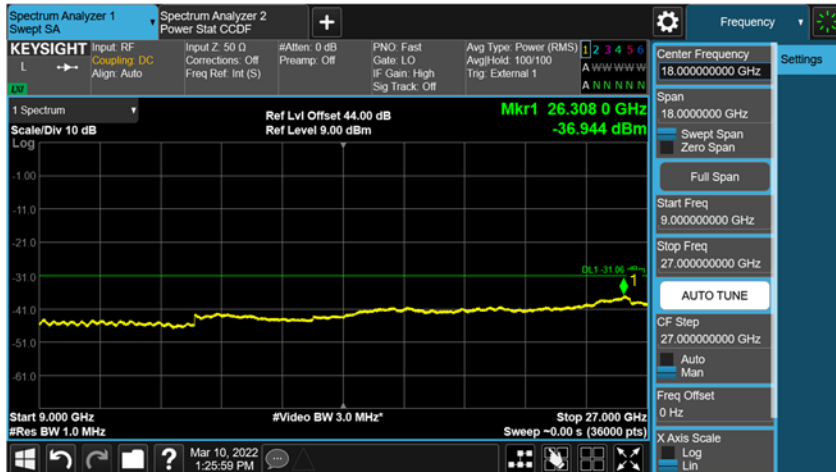
2.75GHz – 3GHz



3GHz – 9GHz

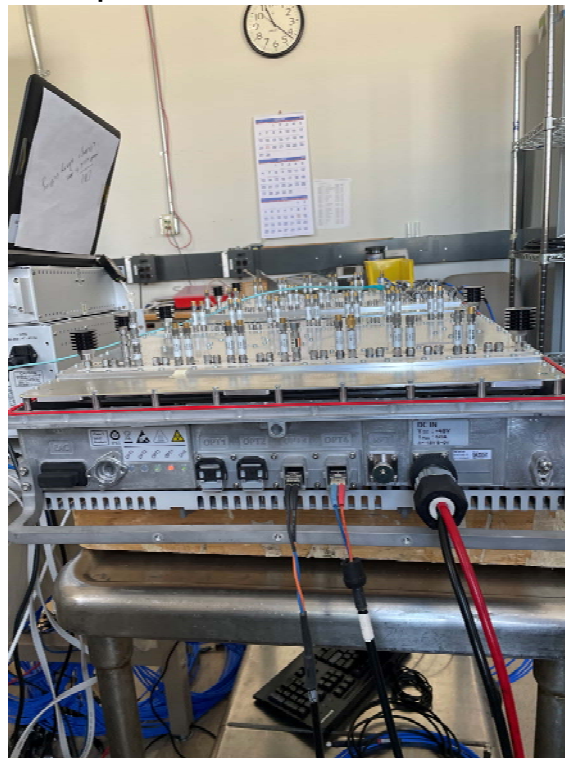
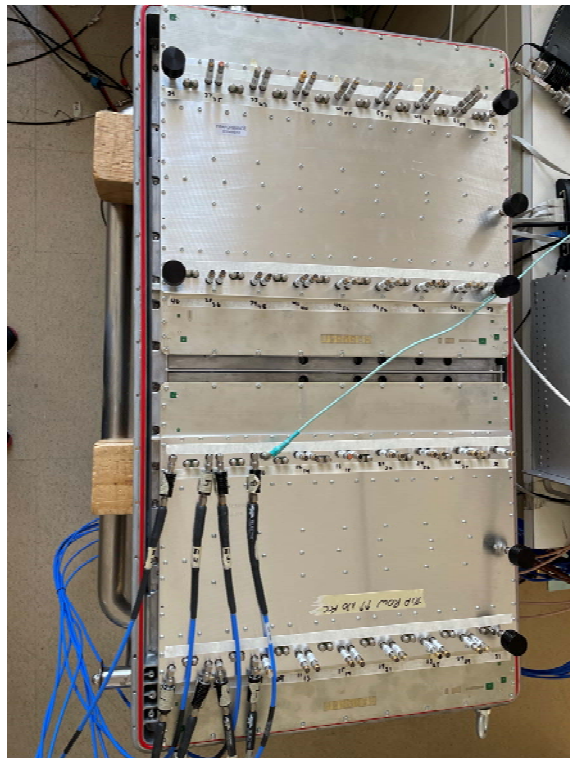


9GHz – 27GHz



Photographs

Radio Test Setup



Test Equipment**Radio Test Equipment**

Asset ID	Manufacturer	Type	Description	Model	Serial	Calibration Date	Calibration Due
E831	Agilent Technologies	MXA Signal Analyzer	20Hz-26.5GHz	N9020A	MY48011791	2020-06-16	2022-06-16
E896	Agilent Technologies	Network Analyzer	10MHz - 40GHz	N5230C	MY49000897	2021-03-03	2023-03-03
E1338	KeySight Technologies	MXA Signal Analyzer	10Hz – 44GHz	N9020B	MY57430927	2021-01-07	2023-01-07
E1579	KeySight Technologies	MXA Signal Analyzer	10Hz - 50GHz	N9021B	MY60080199	2021-11-30	2023-11-30
E1156	Weinschel	Attenuator	10dB 0.05GHz- 26GHz 25W	74-10-12	1069	CNR-V	CNR-V
E1154	Weinschel	Attenuator	30dB 25W 0.05GHz- 26GHz	74-30-12	1065	CNR-V	CNR-V
		Mini Circuit	8 port RF Switch	C/B11311100013	S E480101350		
		Mini Circuit	64 port RF Switch	S E210301724	S/N11702280003		
		Microcoax Utiflex	RF Cable	UFB142A-) 0720_2G0200 A	MFR 64639 227883- 001		
		Microcoax Utiflex	RF Cable	UFB142A-) 0720_2G0200 A	MFR 64639 227883- 002		

CNR-V: Calibration Not Required, Must Be Verified

Tests Dates: 3/8/2022 – 3/11/2022.

6. FCC Section 2.1053 - Field strength of spurious radiation

6.1 Section 2.1053 Field Strength of Spurious Emissions

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

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

6.2 Field Strength of Spurious Emissions - Limits

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

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

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

Where:

E = Field Intensity in Volts/meter

P = Transmitted Power in Watts

R = Measurement distance in meters = 3 m

The Part 27 Limit is 82.23 dB μ V/m at 3m and 91.77 dB μ V/m at 1m

The Part 27 non-report level is 62.23 dB μ V/m at 3m.

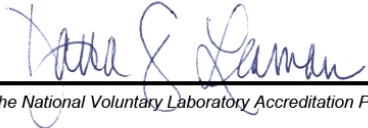
The calculated emission levels were found by:

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

RESULTS:

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

7. NVLAP Certificate of Accreditation

United States Department of Commerce National Institute of Standards and Technology NVLAP®  Certificate of Accreditation to ISO/IEC 17025:2017	
NVLAP LAB CODE: 100275-0	
Nokia, Global Product Compliance Lab Murray Hill, NJ	
<i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i>	
Electromagnetic Compatibility & Telecommunications	
<i>This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).</i>	
2021-09-24 through 2022-09-30 <i>Effective Dates</i>	 <i>For the National Voluntary Laboratory Accreditation Program</i>