



TESTREPORT

Applicant Name : Grandstream Networks, Inc.
Address : 126 Brookline Ave, 3rd Floor Boston, MA 02215, USA
Manufacturer Name : Grandstream Networks, Inc.
Address : 126 Brookline Ave, 3rd Floor Boston, MA 02215, USA
Report Number: SZNS220124-03493E-RF-00A
FCC ID: YZZGWN7664LR

Test Standard (s)

FCC PART 15B, CLASS B

Sample Description

Product Type: High-Performance Outdoor Long-Range Wi-Fi 6 Access Point
Model No.: GWN7664LR
Multiple Model(s) No.: N/A
Trade Mark: GRANDSTREAM
Date Received: 2022/01/24
Report Date: 2022/06/13

Test Result:

Pass*

* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Approved By:

Ting Lü
EMC Engineer

Candy Li
EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*".

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Test Report Declaration

Applicant .: Grandstream Networks, Inc.
Manufacturer : Grandstream Networks, Inc.
Product : High-Performance Outdoor Long-Range Wi-Fi 6 Access Point
Model No. : GWN7664LR
Trade Mark : GRANDSTREAM

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart B Class B
ANSI C63.4: 2014

The device described above is tested by Shenzhen Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart B Class B limits both radiated and conducted emissions. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

1. TEST RESULTS SUMMARY

Test Items	Test Standard	Test Results
Power Line Conducted Emission (0.15-30MHz)	FCC Part 15 Subpart B	Pass
Radiated Emission (30-1000MHz)	FCC Part 15 Subpart B	Pass
Radiated Emission (Above 1GHz)	FCC Part 15 Subpart B	Pass

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Product : High-Performance Outdoor Long-Range Wi-Fi 6 Access Point
Model No. : GWN7664LR
Rating : DC 48V from POE
Trade Mark : GRANDSTREAM

Remark(s) : The highest operation frequency is 5850 MHz.
Sample Number : SZNS220124-03493E-RF-S2

2.2. Test Mode

Mode: Working

Accessory and Auxiliary Equipment

Manufacturer	Description	Model	Serial Number
GOSPELL	POE	G0720-480-050	G0720-480-050
DELL	Notebook	Latitude E6410	11429208685
HIKVISION	Router	DS-3WR03-E	10021642429

2.3. Description of Test Facility

EMC Lab : Accredited by American Association for Laboratory
Accreditation (A2LA)
The Certificate Number is 4297.01

Listed by Innovation, Science and Economic Development
Canada (ISED)
The Registration Number is 5077A

Accredited by China National Accreditation Service for
Conformity Assessment (CNAS)
The Registration Number is CNAS L3193

Name of Firm : Shenzhen Accurate Technology Co., Ltd.

Site Location : 1/F., Building A, Changyuan New Material Port, Science &
Industry Park, Nanshan District, Shenzhen, Guangdong, P.R.
China

2.4. Measurement Uncertainty

Radiated emission expanded uncertainty : $U=4.28dB, k=2$
(30MHz-1000MHz)

Radiated emission expanded uncertainty : $U=4.98dB, k=2$
(1GHz -18GHz)

Radiated emission expanded uncertainty : $U=5.06dB, k=2$
(18GHz - 26.5GHz)

Radiated emission expanded uncertainty : $U=4.72dB, k=2$
(26.5GHz - 40GHz)

Conduction Emission Expanded Uncertainty : $U=2.72dB, k=2$
(0.15kHz-30MHz)

3. MEASURING DEVICE AND TEST EQUIPMENT

3.1. For Conducted Emission Test

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde& Schwarz	EMI Test Receiver	ESCI	100784	2021/12/13	2022/12/12
Rohde & Schwarz	L.I.S.N.	ENV216	101314	2021/12/13	2022/12/12
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2021/12/13	2022/12/12
Unknown	RF Coaxial Cable	No.17	N0350	2021/12/14	2022/12/13
Conducted Emission Test Software: e3 19821b (V9)					

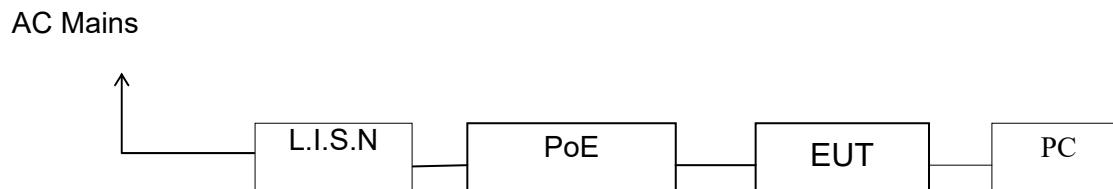
3.2. For Radiated Emission Measurement

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde& Schwarz	Test Receiver	ESR	102725	2021/12/13	2022/12/12
Rohde&Schwarz	Spectrum Analyzer	FSV40	101949	2021/12/13	2022/12/12
SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/11/09	2022/11/08
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2021/11/09	2022/11/08
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2021/11/11	2022/11/10
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2020/01/05	2023/01/04
Radiated Emission Test Software: e3 19821b (V9)					
Unknown	RF Coaxial Cable	No.10	N050	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.11	N1000	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.12	N040	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.13	N300	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.14	N800	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.15	N600	2021/12/14	2022/12/13

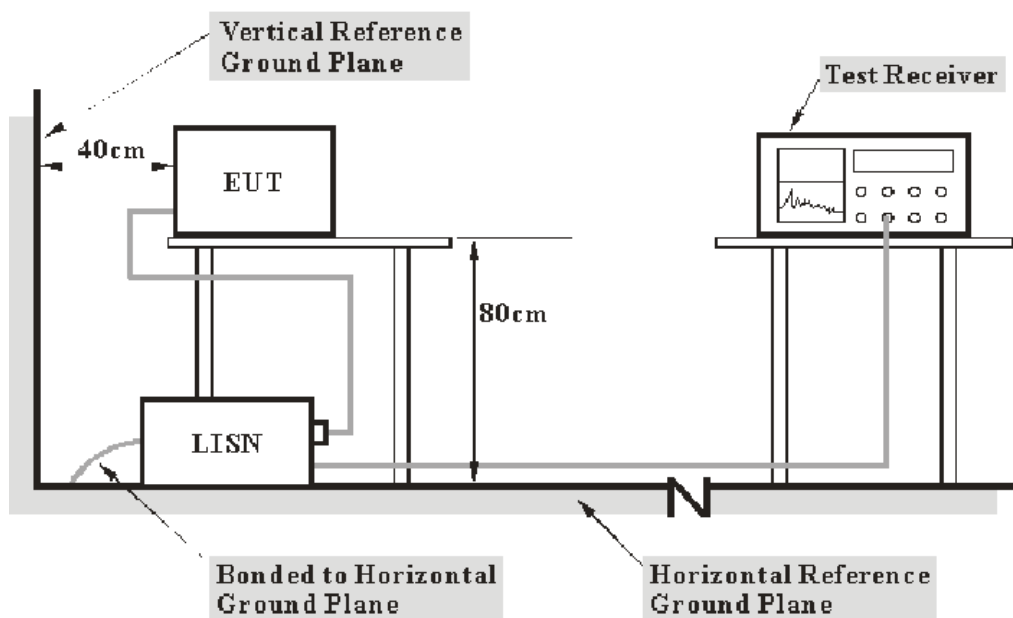
4. POWER LINE CONDUCTED MEASUREMENT

4.1. Block Diagram of Test Setup

4.1.1. Block diagram of connection between the EUT and simulators



4.1.2. Test System Setup



- Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

4.2. Power Line Conducted Emission Measurement Limits (Class B)

Frequency (MHz)	Limit dB(μV)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0
NOTE1: The lower limit shall apply at the transition frequencies.		
NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

4.3. Test mode description

Mode: Working

4.4. Manufacturer

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

4.4.1. High-Performance Outdoor Long-Range Wi-Fi 6 Access Point

Model Number : GWN7664LR

Manufacturer : Grandstream Networks, Inc.

4.5. Operating Condition of EUT

4.5.1. Setup the EUT and simulator as shown as Section 4.1.

4.5.2. Turn on the power of all equipment.

4.5.3. Let the EUT work in test mode and measure it.

4.6. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4: 2014 on Conducted Emission Measurement.

The bandwidth of test receiver is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

4.7.Data Explain

$$\text{Over Limit} = \text{Level (dB}\mu\text{V)} - \text{Limit(dB}\mu\text{V)}$$

4.8.Power Line Conducted Emission Measurement Results

PASS.

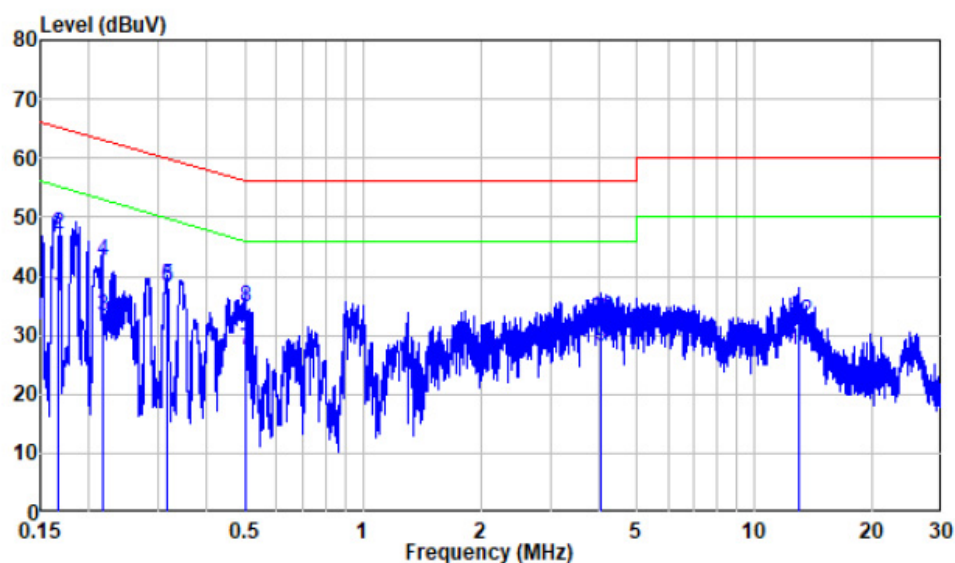
The frequency range from 150kHz to 30MHz is checked.

Maximizing procedure was performed on the six (6) highest emissions of the EUT. Emissions attenuated more than 20 dB below the permissible value are not reported.

All data was recorded in the Quasi-peak and average detection mode.

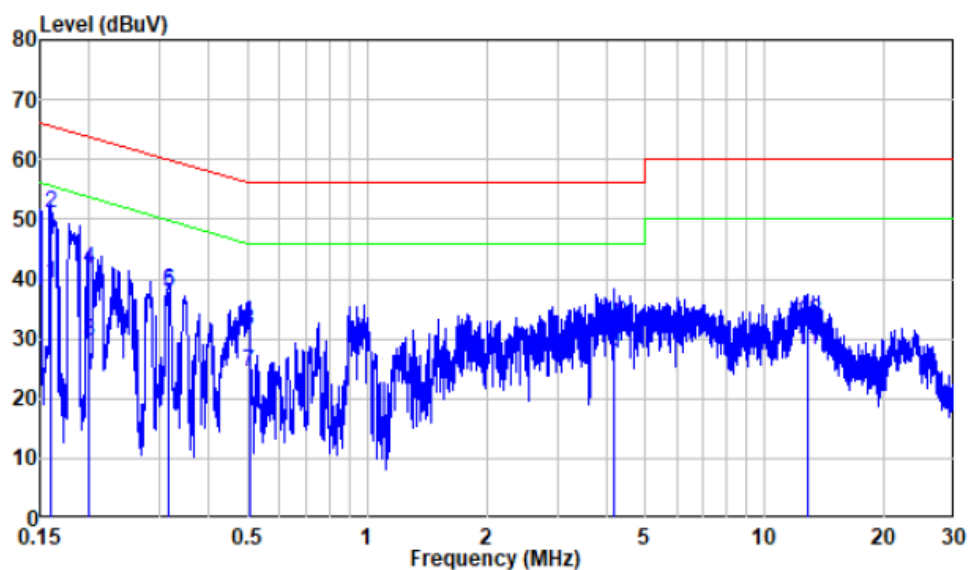
The spectral diagrams are attached as below.

Job No.:	SZNS220124-03493E-RF	Power:	AC 120V 60Hz
Mode:	Working	Test By:	Caro Hu
Limit:	FCC PART 15B	Test item:	Conducted Emission
Climatic:	23° C 53%RH 101kPa	Date:	2022-03-08



Site : Shielding Room
 Condition: Line
 Mode : Working
 Model : GWN7664LR
 Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.166	9.80	26.64	36.44	55.14	-18.70	Average
2	0.166	9.80	37.31	47.11	65.14	-18.03	QP
3	0.216	9.80	23.33	33.13	52.98	-19.85	Average
4	0.216	9.80	32.75	42.55	62.98	-20.43	QP
5	0.315	9.80	28.50	38.30	49.84	-11.54	Average
6	0.315	9.80	28.31	38.11	59.84	-21.73	QP
7	0.500	9.80	17.66	27.46	46.00	-18.54	Average
8	0.500	9.80	24.93	34.73	56.00	-21.27	QP
9	4.027	9.84	18.30	28.14	46.00	-17.86	Average
10	4.027	9.84	23.01	32.85	56.00	-23.15	QP
11	12.928	9.93	17.44	27.37	50.00	-22.63	Average
12	12.928	9.93	22.33	32.26	60.00	-27.74	QP



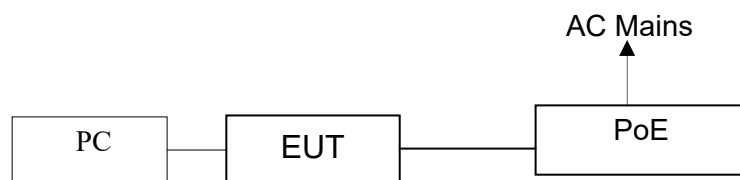
Site : Shielding Room
 Condition: Neutral
 Mode : Working
 Model : GWN7664LR
 Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.159	9.80	29.53	39.33	55.51	-16.18	Average
2	0.159	9.80	41.35	51.15	65.51	-14.36	QP
3	0.200	9.80	19.75	29.55	53.62	-24.07	Average
4	0.200	9.80	31.82	41.62	63.62	-22.00	QP
5	0.315	9.80	27.90	37.70	49.83	-12.13	Average
6	0.315	9.80	28.30	38.10	59.83	-21.73	QP
7	0.504	9.80	14.79	24.59	46.00	-21.41	Average
8	0.504	9.80	21.63	31.43	56.00	-24.57	QP
9	4.177	9.85	17.89	27.74	46.00	-18.26	Average
10	4.177	9.85	22.75	32.60	56.00	-23.40	QP
11	12.826	10.03	18.05	28.08	50.00	-21.92	Average
12	12.826	10.03	22.90	32.93	60.00	-27.07	QP

5. RADIATED EMISSION MEASUREMENT

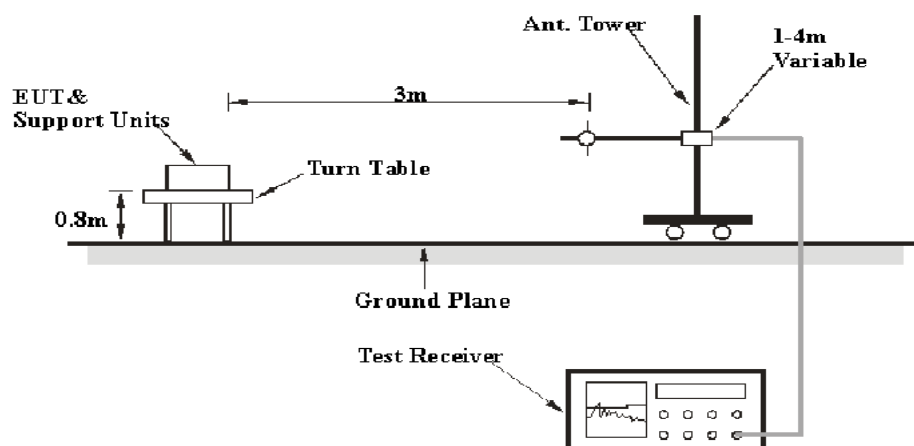
5.1. Block Diagram of Test Setup

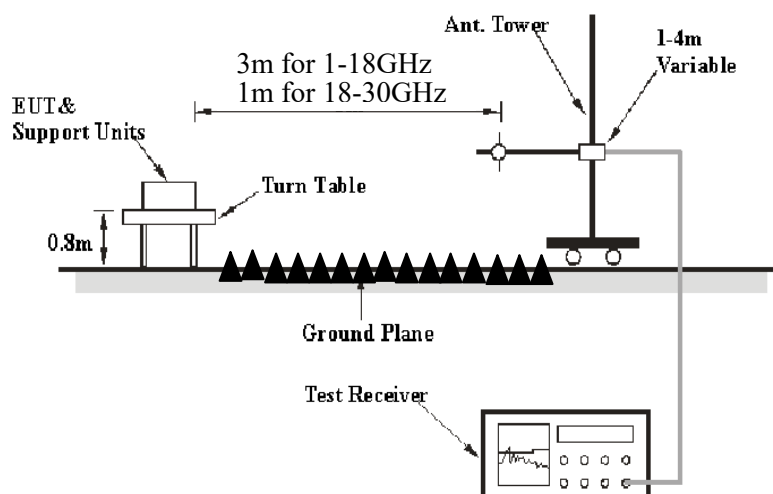
5.1.1. Block diagram of connection between the EUT and simulators



5.1.2. Test System Setup

Below 1GHz:



Above 1GHz:**5.2. Radiated Emission Limit (Class B)**

All emanations from a class B device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

Frequency MHz	Distance Meters	Field Strengths QP Limit	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V/m})$
30-88	3	100	40.0
88-216	3	150	43.5
216-960	3	200	46.0
Above 960	3	500	54.0

Remark:

(1) Emission level $\text{dB}(\mu\text{V}) = 20 \log$ Emission level $\mu\text{V/m}$.

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument antenna and the closest point of any part of the device or system.

Frequency MHz	Distance Meters	Field Strengths Limit	
		Peak $\text{dB}(\mu\text{V/m})$	AVG $\text{dB}(\mu\text{V/m})$
Above 1GHz	3	74	54

5.3. Test Mode Description

Mode: Working

5.4.Manufacturer

The following equipments are installed on Radiated Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

5.4.1.High-Performance Outdoor Long-Range Wi-Fi 6 Access Point

Model Number : GWN7664LR
Manufacturer : Grandstream Networks, Inc.

5.5.Operating Condition of EUT

5.5.1. Setup the EUT and simulator as shown as Section 5.1.

5.5.2. Turn on the power of all equipment.

5.5.3. Let the EUT work in test mode and measure it.

5.6.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2014 on radiated emission measurement.

The bandwidth of the Receiver/Spectrum Analyzer is set at 9kHz in 9kHz-30MHz, 120 kHz in 30-1000MHz, and 1MHz in above 1000MHz.

The frequency range from 30MHz to 30000MHz is investigated.

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.
1.705–108	1000.
108–500	2000.
500–1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

5.7.Data Sample

Over limit (dB) = Result(dB μ v/m) - Limit (dB μ v/m)

QP = Quasi-peak Reading

The “Over limit” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over limit of -7dB means the emission is 7dB below the limit.

5.8.Radiated Emission Measurement Result

PASS.

The frequency range from 30MHz to 30GHz is investigated.

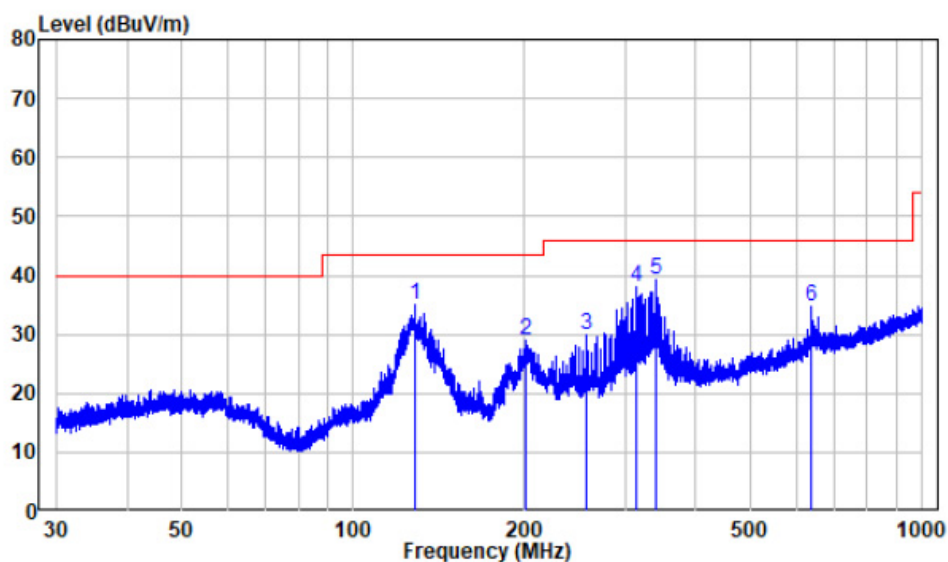
The spectral diagrams are attached as below.

Note 1: For radiated emission above 1GHz, the test result of peak was less than the limit of average, so just peak values were recorded.

Note 2: Pre-scan in the X,Y and Z axes of orientation, the worst case Y-axis of orientation was recorded

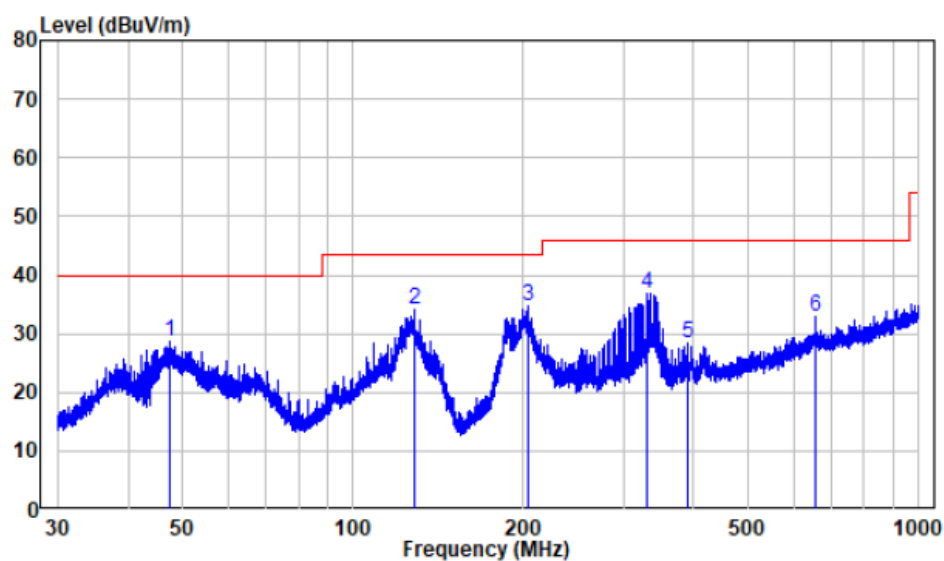
30MHz~1GHz

Job No.:	SZNS220124-03493E-RF	Power:	AC 120V 60Hz
Mode:	Working	Test By:	Caro Hu
Limit:	FCC PART 15B	Test item:	Radiated Emission
Climatic:	20° C 58%RH 101kPa	Date:	2022-03-07



Site : chamber
Condition: 3m HORIZONTAL
Job No. : SZNS220124-03493E-RF
Test Mode: Working

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	128.001	-14.70	49.66	34.96	43.50	-8.54	Peak
2	201.128	-11.49	40.37	28.88	43.50	-14.62	Peak
3	256.072	-10.61	40.60	29.99	46.00	-16.01	Peak
4	313.688	-8.77	46.81	38.04	46.00	-7.96	Peak
5	339.291	-7.46	46.58	39.12	46.00	-6.88	Peak
6	640.050	-1.92	36.53	34.61	46.00	-11.39	Peak



Site : chamber

Condition: 3m VERTICAL

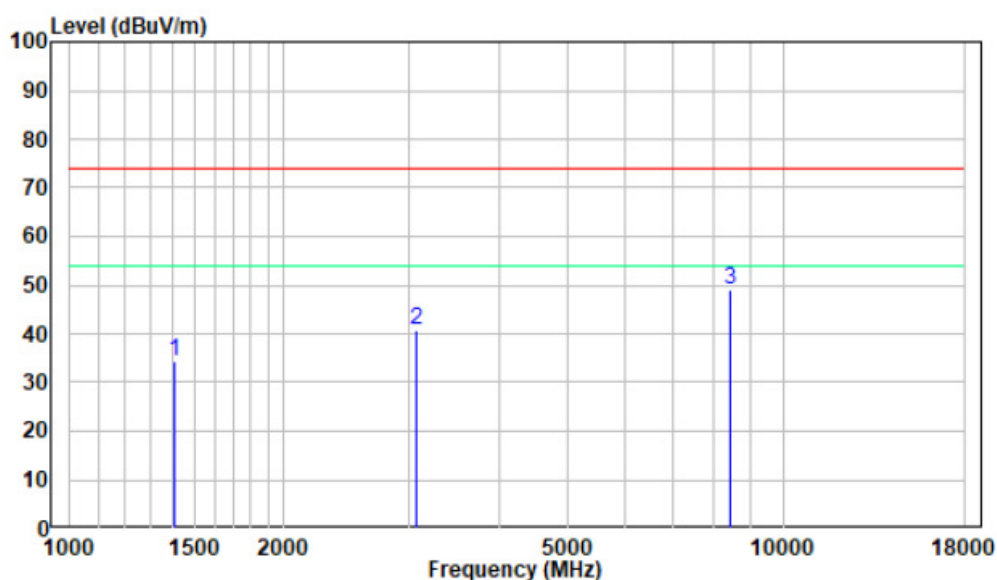
Job No. : SZNS220124-03493E-RF

Test Mode: Working

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	47.429	-10.00	38.54	28.54	40.00	-11.46	Peak
2	128.057	-14.71	48.97	34.26	43.50	-9.24	Peak
3	203.880	-11.74	46.42	34.68	43.50	-8.82	Peak
4	329.617	-8.00	44.86	36.86	46.00	-9.14	Peak
5	390.380	-6.88	35.27	28.39	46.00	-17.61	Peak
6	656.242	-1.59	34.49	32.90	46.00	-13.10	Peak

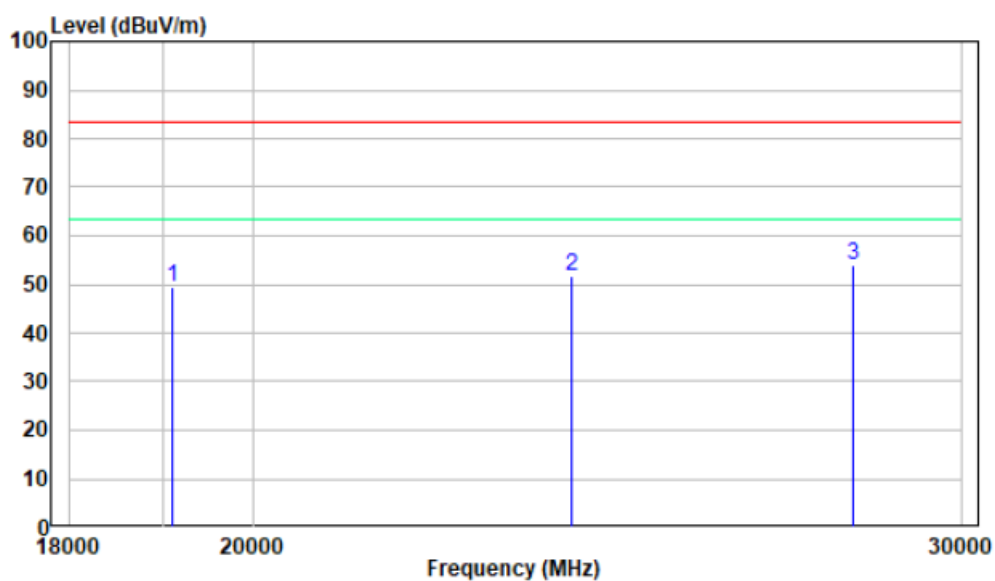
Above 1GHz:

Job No.:	SZNS220124-03493E-RF	Power:	AC 120V 60Hz
Mode:	Working	Test By:	Leo Li
Limit:	FCC PART 15B	Test item:	Radiated Emission
Climatic:	26° C 65%RH 101kPa	Date:	2022-05-22



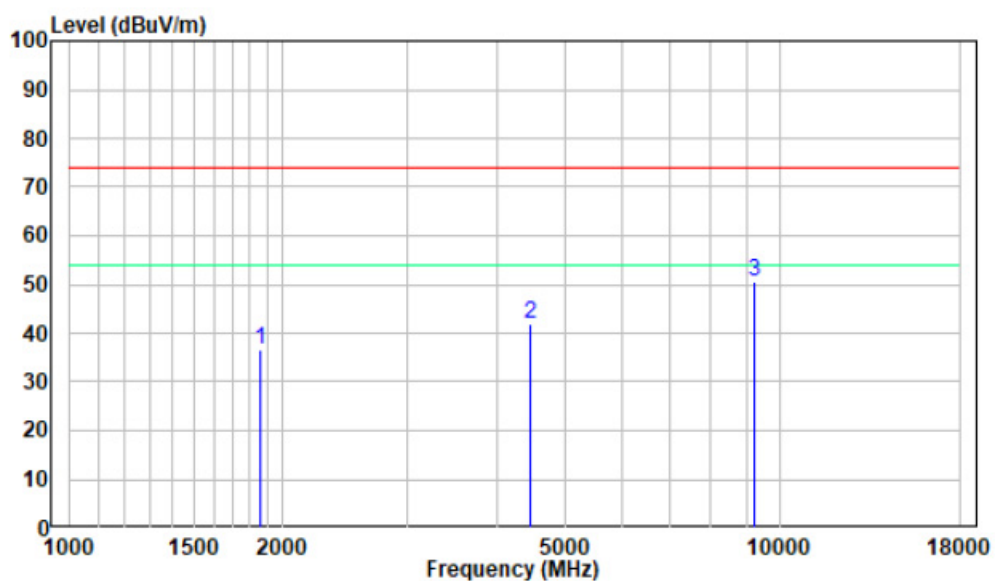
Site : chamber
Condition: 3m Horizontal
Job No. : SZNS220124-03493E-RF
Test Mode: Working

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1405.875	-9.95	44.42	34.47	74.00	-39.53	Peak
2	3071.875	-5.85	46.45	40.60	74.00	-33.40	Peak
3	8420.500	4.94	44.23	49.17	74.00	-24.83	Peak



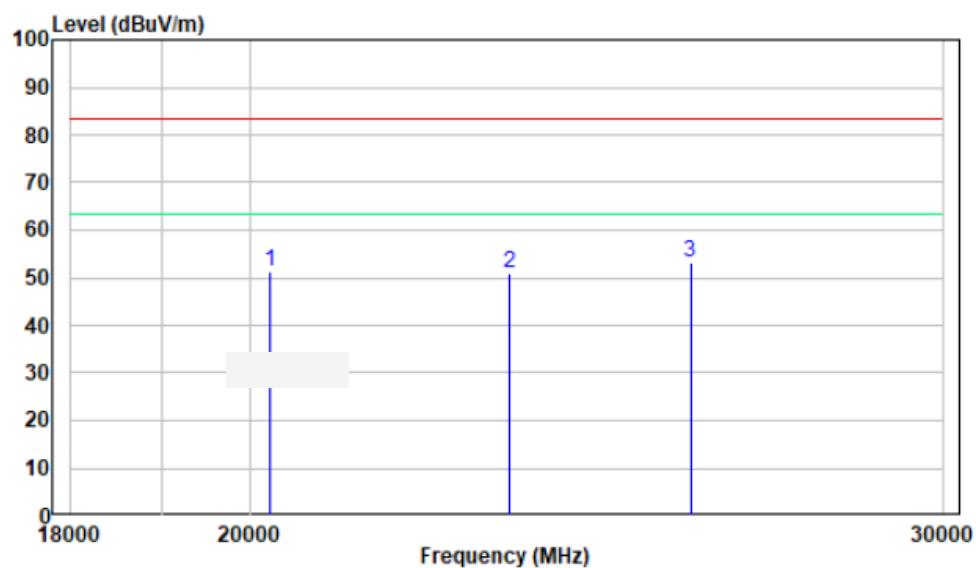
Site : chamber
Condition: 1m HORIZONTAL
Job No. : SZNS220124-03493E-RF
Test Mode: Working

Freq		Factor	Read Level	Level	Limit Line	Over Limit	Remark
MHz		dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	19093.500	6.39	43.11	49.50	83.50	-34.00	Peak
2	23988.000	12.22	39.64	51.86	83.50	-31.64	Peak
3	28197.000	14.16	39.70	53.86	83.50	-29.64	Peak



Site : chamber
Condition: 3m VERTICAL
Job No. : SZNS220124-03493E-RF
Test Mode: Working

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1860.625	-8.31	44.91	36.60	74.00	-37.40	Peak
2	4453.125	-4.72	46.52	41.80	74.00	-32.20	Peak
3	9228.000	5.76	44.74	50.50	74.00	-23.50	Peak



Site : chamber
Condition: 1m VERTICAL
Job No. : SZNS220124-03493E-RF
Test Mode: Working

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	20230.500	8.76	42.50	51.26	83.50	-32.24	Peak
2	23269.500	10.41	40.61	51.02	83.50	-32.48	Peak
3	25870.500	12.74	40.43	53.17	83.50	-30.33	Peak

----- THE END OF TEST REPORT -----