TESTREPORT

Applicant Name :	SHENZHEN TOPFLYtech CO., LIMITED
Address :	Rm409 Scientific Research Building Tsinghua, Hi-tech Park Hi-tech Industrial Nanshan District, shenzhen, China
Report Number:	RA230621-35652E-RF-00
FCC ID:	2ASWYSOLARGUARDX200

Test Standard (s)

FCC PART 15.225

Sample Description

Product Type:	SolarGuardX 200
Model No.:	SolarGuardX 200
Multiple Model(s) No.:	N/A
Trade Mark:	TOPFLYtech
Date Received:	2023/06/21
Report Date:	2023/07/10
Test Result:	Pass*

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

Prepared and Checked By:

Roger Liang
EM Engineer

Approved By:

Candy Li
EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★ ".
Shenzhen Accurate Technology Co., Ltd. is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.
This report cannot be reproduced except in full, without prior written approval of the Company. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RA230621-35652E-RF-00	Original Report	2023/07/10

GENERALINFORMATION

Product Description for Equipment under Test (EUT)

Frequency Range	13.56 MHz
E-field Strength	59.93dBuV/m@3m
Modulation Technique	ASK
Voltage Range	DC 3.6V from battery or 120V AC/5V DC adaptor or charging from solar panel
Sample serial number	276A-1 (Assigned by ATC)
Sample/EUT Status	Good condition

Objective

This Type approval report is in accordance with Part 2- Subpart J, and Part 15-Subparts A and C of the Federal Communication Commissions rules.

The objective is to determine the compliance of the EUT with FCC rules, section 15.203, 15.205, 15.207, 15.209 and 15.225.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF Frequency		$0.082*10^{-7}$
RF output power, conducted		0.71dB
Unwanted Emission, conducted		1.6dB
AC Power Lines Conducted Emissions	9k-30MHz	2.74dB, k=2
Emissions, Radiated	9kHz - 30MHz	2.06dB
	30MHz - 1GHz	5.08dB
	1GHz - 18GHz	4.96dB
	18GHz - 26.5GHz	5.16dB
	26.5GHz - 40GHz	4.64dB
Temperature		1℃
Humidity		6%
Supply voltages		0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the Floor 1, KuMaKe Building, Dongzhou Community, Guangming Street, Guangming District, Shenzhen, Guangdong, China

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0016. The Registration Number is 30241.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

EUT Exercise Software

No Exercise Software was used.

Equipment Modifications

No modification on the EUT.

Support Equipment List and Details

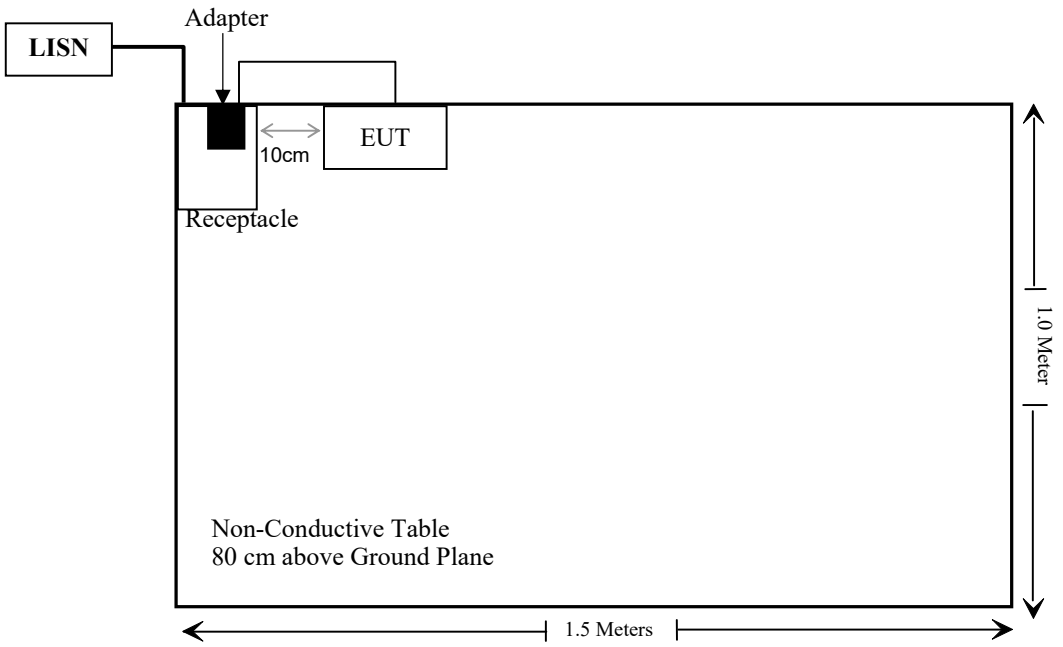
Manufacturer	Description	Model	Serial Number
TIANYIN	Adapter	TPA-10S260UU01	E326703

External I/O Cable

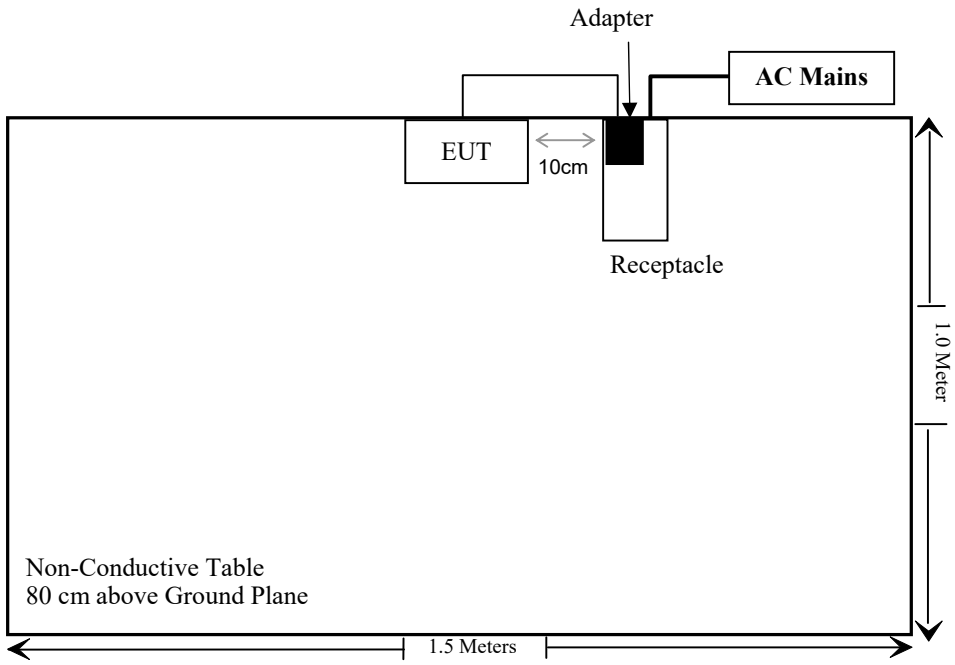
Cable Description	Length (m)	From Port	To
Un-shielding Detachable DC Cable	0.5	EUT	Adapter

Block Diagram of Test Setup

For conducted emission



For Radiated Emissions:



Note: the support table edge was flush with the center of turntable

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§2.1091	MAXIMUM PERMISSIBLE EXPOSURE (MPE)	Compliant
§15.207	AC Line Conducted Emission	Compliant
§15.225 §15.209§15.205	Radiated Emission Test	Compliant
§15.225(e)	Frequency Stability	Compliant
§15.215(c)	20dB Emission Bandwidth	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde& Schwarz	EMI Test Receiver	ESCI	100784	2022/11/25	2023/11/24
Rohde & Schwarz	L.I.S.N.	ENV216	101314	2022/11/25	2023/11/24
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2022/12/07	2023/12/06
Unknown	RF Coaxial Cable	No.17	N0350	2022/11/25	2023/11/24
Conducted Emission Test Software: e3 19821b (V9)					
Radiated Emission Test					
Rohde& Schwarz	Test Receiver	ESR	102725	2022/11/25	2023/11/24
SONOMA INSTRUMENT	Amplifier	310 N	186131	2022/11/08	2023/11/07
SCHWARZBECK	LOOP ANTENNA	FMZB1516	1516131	2021/12/22	2024/12/21
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Radiated Emission Test Software: e3 19821b (V9)					
Unknown	RF Coaxial Cable	No.12	N040	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.13	N300	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.14	N800	2022/11/25	2023/11/24
Frequency Stability					
Rohde& Schwarz	Test Receiver	ESR	102725	2022/11/25	2023/11/24
SCHWARZBECK	LOOP ANTENNA	FMZB1516	1516131	2021/12/22	2024/12/21
Unknown	RF Coaxial Cable	No.12	N040	2022/11/25	2023/11/24
REALE	Temp. & Humid. Chamber	RHP-800BT	R20170318310	2022/11/23	2023/11/22
Fluke	Multi Meter	45	7664009	2022/11/23	2023/11/22

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Antenna Connected Construction

The EUT has one internal antenna arrangement for NFC which was permanently attached; fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliant.

FCC §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (Minutes)**
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Mode	Frequency (MHz)	Antenna Gain		Tune up output power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
BLE	2402-2480	1.1	1.29	9.0	7.94	20	0.002	1.0
LTE B2	1850-1910	1.5	1.41	24	251.19	20	0.070	1.0
LTE B4	1710-1755	1.5	1.41	24	251.19	20	0.070	1.0
LTE B5	824-849	1.0	1.26	26	398.11	20	0.100	0.549
LTE B12	699-716	0.8	1.20	25	316.23	20	0.076	0.466
LTE B13	777-787	0.8	1.20	23	199.53	20	0.048	0.518
LTE B25	1850-1915	1.5	1.41	24	251.19	20	0.070	1.0
LTE B26	814-849	1.0	1.26	25	316.23	20	0.079	0.543
LTE B41	2496-2690	1.5	1.41	24	251.19	20	0.070	1.0
LTE B66	1710-1780	1.5	1.41	24	251.19	20	0.070	1.0
NFC	13.56	/	/	/	0.295	20	0.00006	0.98

Note: 1. The device contains a certified WWAN Module, FCC ID: 2AJYU-8PYA007, the output power was refer to the module report.
2. The antenna gain was provided by applicant
3. For NFC, the maximum E-field strength is 59.93dBuV/m@3m=0.992mV/m@3m
EIRP=(E*r)^2/30=(0.975*3)^2/30=0.295mW

Simultaneously transmitting consideration:

The ratio=MPE_{BLE}/Limit+MPE_{WWAN}/Limit+MPE_{NFC}/Limit =0.002/1+0.100/0.549+0.00006/0.98=0.184<1

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

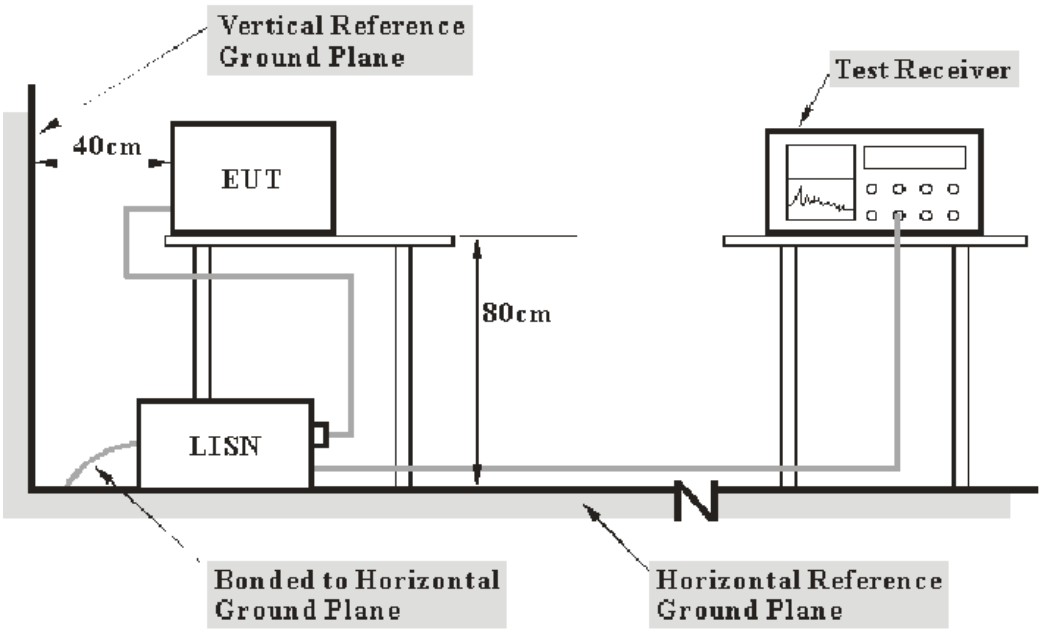
Result: Compliance

FCC §15.207 – AC LINE CONDUCTED EMISSION

Applicable Standard

FCC§15.207

EUT 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.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter of Host was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

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

Factor & Over Limit Calculation

The factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

Factor = LISN VDF + Cable Loss

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 7 dB below the limit. The equation for margin calculation is as follows:

Over limit = Level – Limit
Level = Read Level + Factor

Test Data

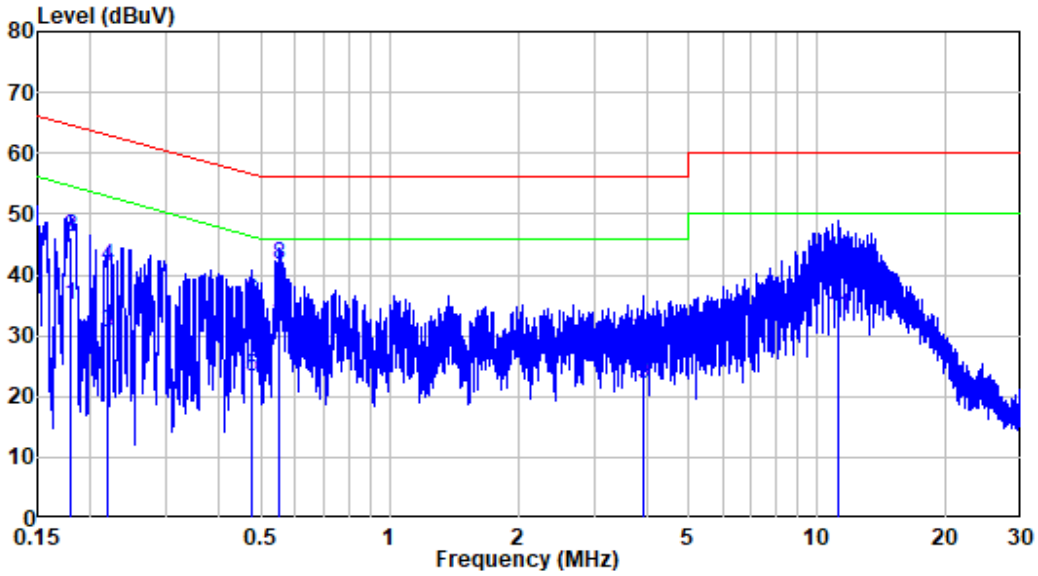
Environmental Conditions

Temperature:	23 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Jerry Wu on 2023-06-28.

Test mode: Transmitting

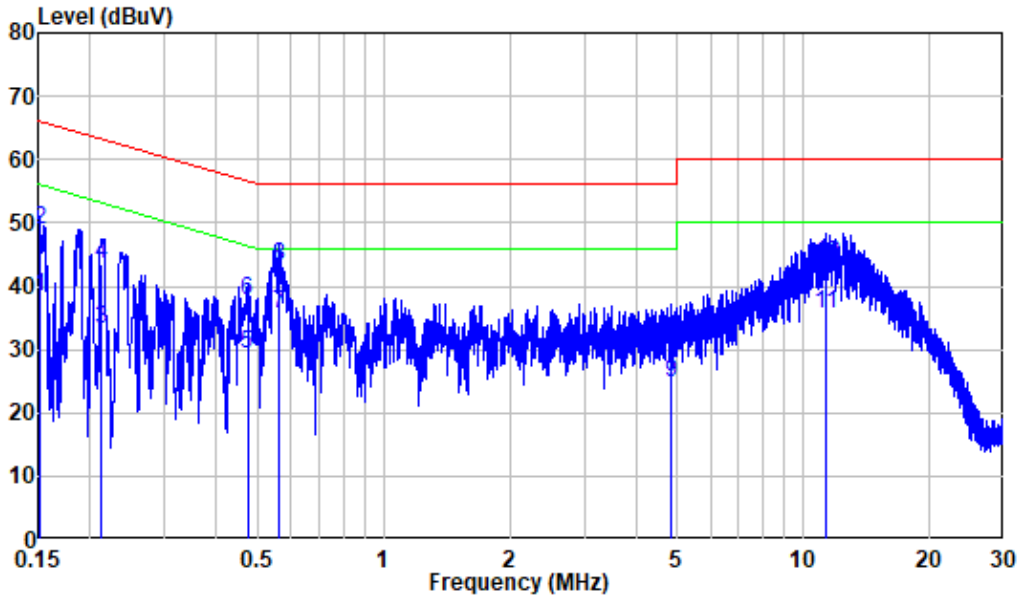
AC 120 V/60 Hz, Line:



Site : Shielding Room
Condition: Line
Job No. : RA230621-35652E-RF
Mode : NFC
Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.180	10.32	24.84	35.16	54.49	-19.33	Average
2	0.180	10.32	35.98	46.30	64.49	-18.19	QP
3	0.219	10.31	20.07	30.38	52.85	-22.47	Average
4	0.219	10.31	31.07	41.38	62.85	-21.47	QP
5	0.476	10.55	12.67	23.22	46.41	-23.19	Average
6	0.476	10.55	25.03	35.58	56.41	-20.83	QP
7	0.549	10.60	20.83	31.43	46.00	-14.57	Average
8	0.549	10.60	30.98	41.58	56.00	-14.42	QP
9	3.914	10.54	11.51	22.05	46.00	-23.95	Average
10	3.914	10.54	19.05	29.59	56.00	-26.41	QP
11	11.183	10.49	22.61	33.10	50.00	-16.90	Average
12	11.183	10.49	32.13	42.62	60.00	-17.38	QP

AC 120V/ 60 Hz, Neutral:



Site : Shielding Room
Condition: Neutral
Job No. : RA230621-35652E-RF
Mode : NFC
Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.151	10.27	28.20	38.47	55.94	-17.47	Average
2	0.151	10.27	38.73	49.00	65.94	-16.94	QP
3	0.212	10.30	22.81	33.11	53.12	-20.01	Average
4	0.212	10.30	33.31	43.61	63.12	-19.51	QP
5	0.473	10.45	18.75	29.20	46.46	-17.26	Average
6	0.473	10.45	27.36	37.81	56.46	-18.65	QP
7	0.563	10.47	25.28	35.75	46.00	-10.25	Average
8	0.563	10.47	32.60	43.07	56.00	-12.93	QP
9	4.854	10.52	14.16	24.68	46.00	-21.32	Average
10	4.854	10.52	20.33	30.85	56.00	-25.15	QP
11	11.272	10.56	25.19	35.75	50.00	-14.25	Average
12	11.272	10.56	32.99	43.55	60.00	-16.45	QP

FCC§15.225, §15.205& §15.209 - RADIATED EMISSIONS TEST

Applicable Standard

As per FCC Part 15.225

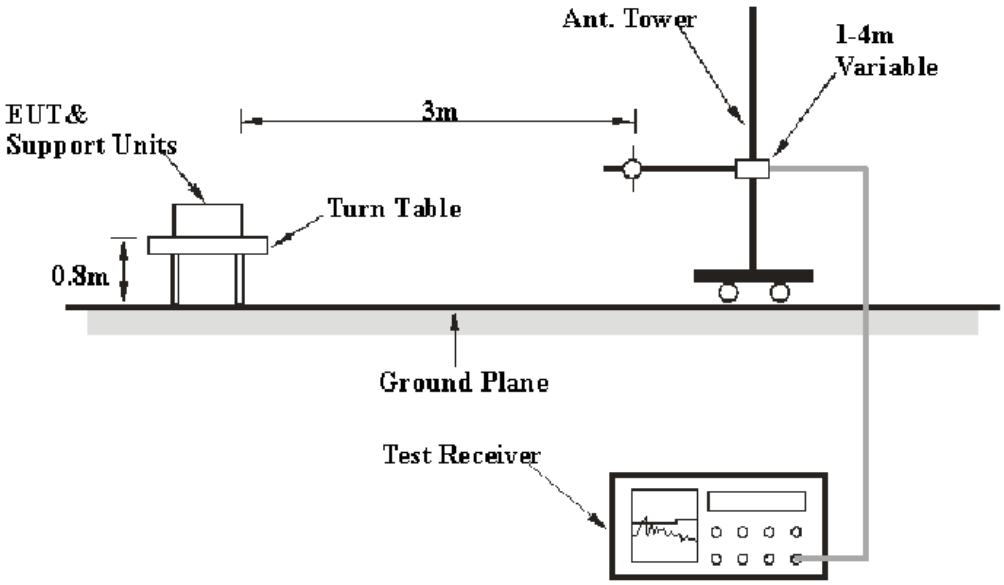
(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

EUT Setup



Note: Antenna is set up at 1m during test for below 30MHz.

The radiated emission tests were performed in the 3-meter chamber a test site, using the setup accordance with the ANSI C63.10-2013.

EMI Test Receiver Setup

According to FCC Rules, 47 CFR 15.33, the EUT emissions were investigated up to 1000 MHz.

During the radiated emission test, the EMI test Receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
9 kHz – 150 kHz	300 Hz	1kHz	/	QP
150 kHz –30MHz	10 kHz	30 kHz	/	QP
30MHz – 1000 MHz	100 kHz	300 kHz	/	QP

Note: detector for 9-90kHz and 110-490kHz is average

Level & Over Limit Calculation

The Level is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss- Amplifier Gain
Level= Read Level + Factor

The "**Over Limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over Limit of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Over Limit = Level – Limit

Test Data

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	49 %
ATM Pressure:	101.0 kPa

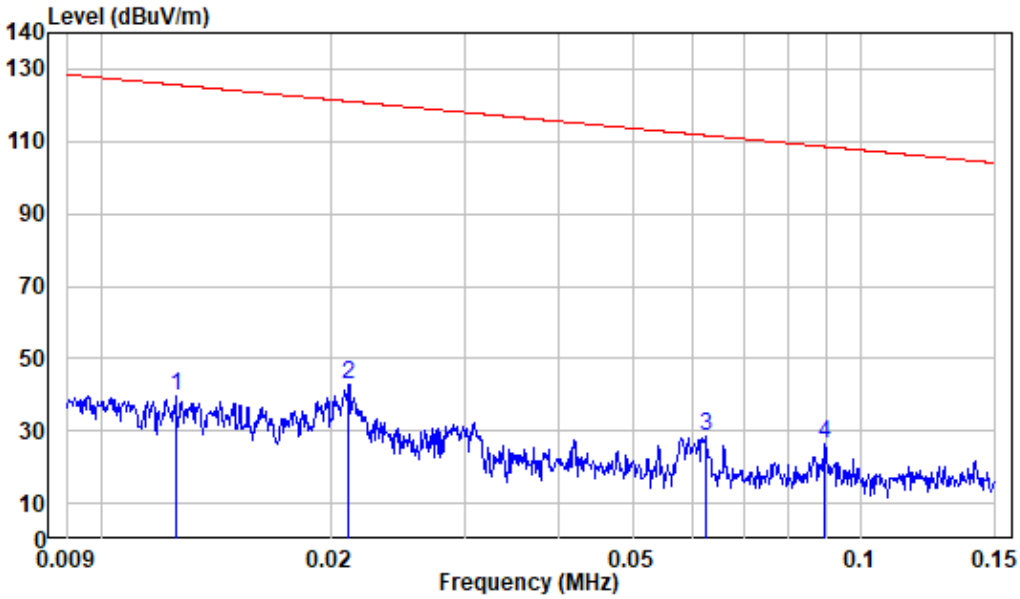
The testing was performed by Jason Liu on 2023-06-28

Test mode: Transmitting (Pre-scan in the X, Y and Z axes of orientation, the worst case of X-axes orientation were recorded)

1) Spurious Emissions (9 kHz~30 MHz):

Part 15 Section 15.31(f)(2) (9kHz-30MHz)
Limit @ 3m=Limit @ 300m-40*log(3(m)/300(m))
Limit @ 3m=Limit @ 30m-40*log(3(m)/30(m))

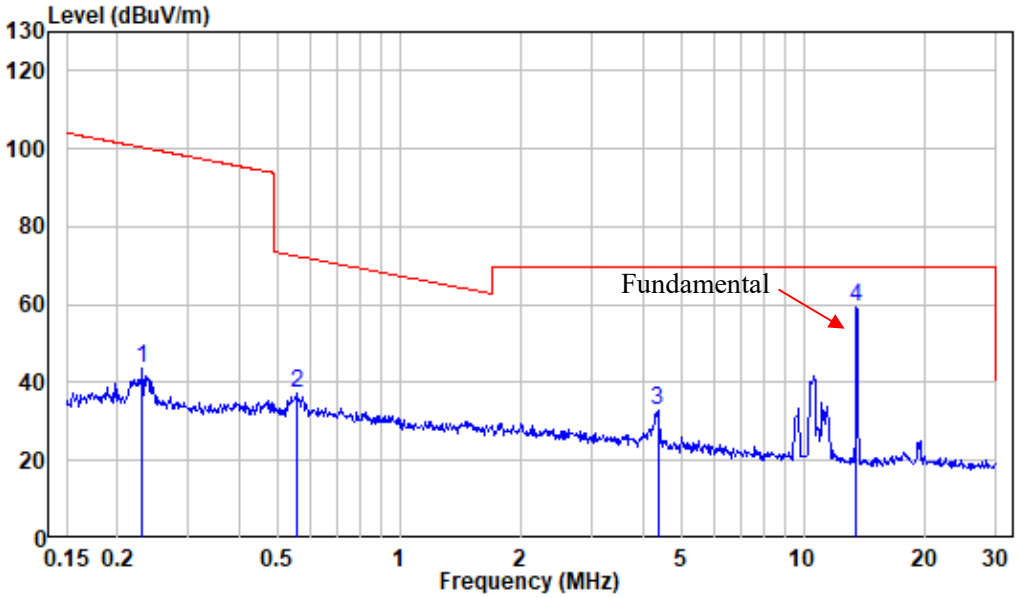
Ground-parallel
9 kHz~150 kHz



Site : chamber
Condition: 3m
Job No. : RA230621-35652E-RF
Test Mode: NFC
Note : Ground-parallel

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.013	-11.45	50.98	39.53	125.64	-86.11	Peak
2	0.021	-11.69	54.70	43.01	121.09	-78.08	Peak
3	0.062	-11.56	39.85	28.29	111.71	-83.42	Peak
4	0.090	-11.57	37.76	26.19	108.55	-82.36	Peak

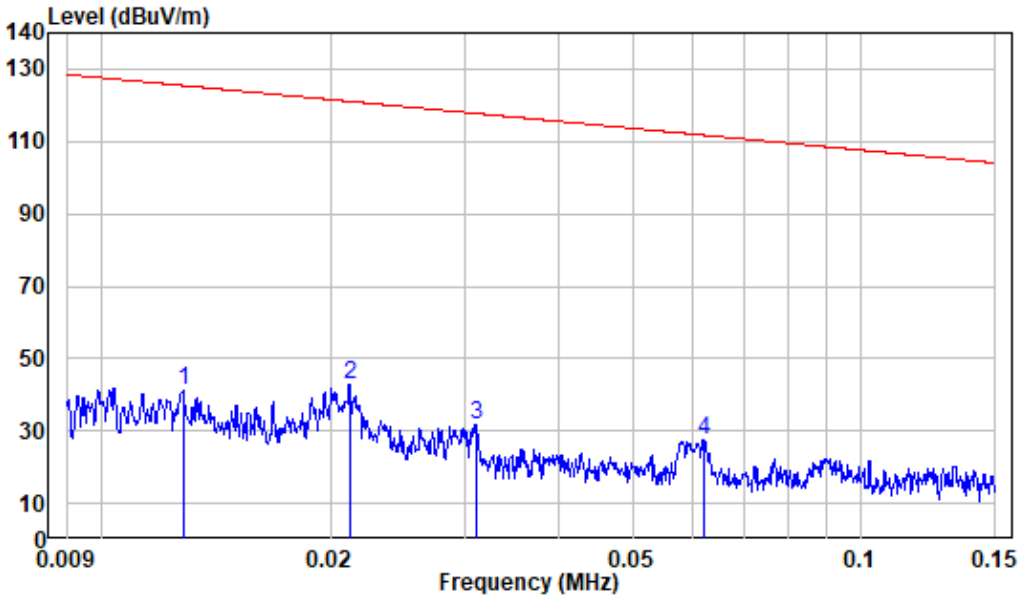
150 kHz~30 MHz



Site : chamber
Condition: 3m
Job No. : RA230621-35652E-RF
Test Mode: NFC
Note : Ground-parallel

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.230	-11.94	55.42	43.48	100.35	-56.87	Peak
2	0.555	-11.67	49.14	37.47	72.69	-35.22	Peak
3	4.361	-11.69	44.38	32.69	69.54	-36.85	Peak

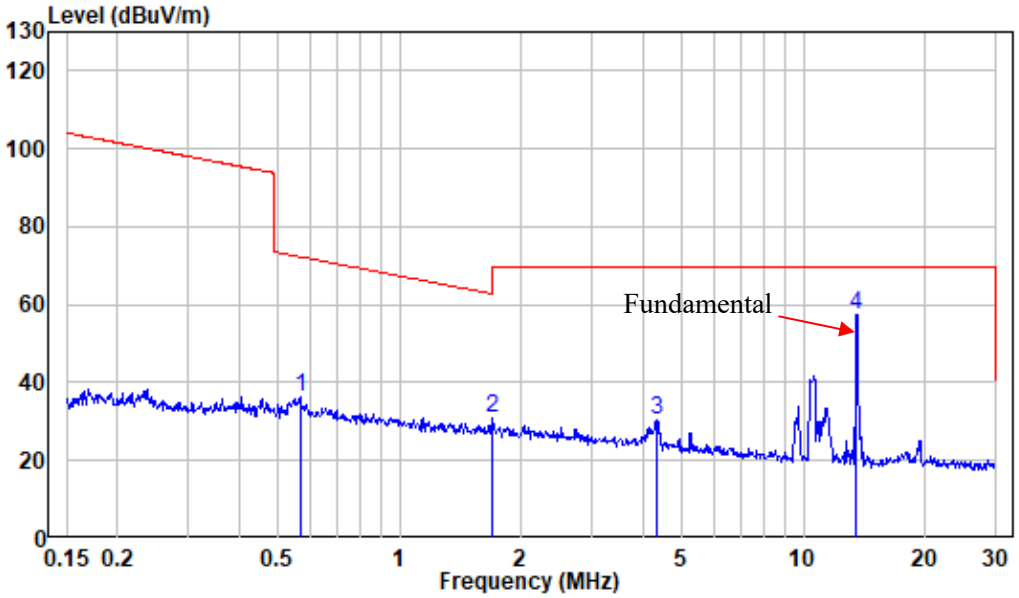
Perpendicular
9 kHz~150 kHz



Site : chamber
Condition: 3m
Job No. : RA230621-35652E-RF
Test Mode: NFC
Note : Perpendicular

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.013	-11.45	52.82	41.37	125.44	-84.07	Peak
2	0.021	-11.69	54.67	42.98	121.07	-78.09	Peak
3	0.031	-11.63	43.18	31.55	117.74	-86.19	Peak
4	0.062	-11.56	38.99	27.43	111.76	-84.33	Peak

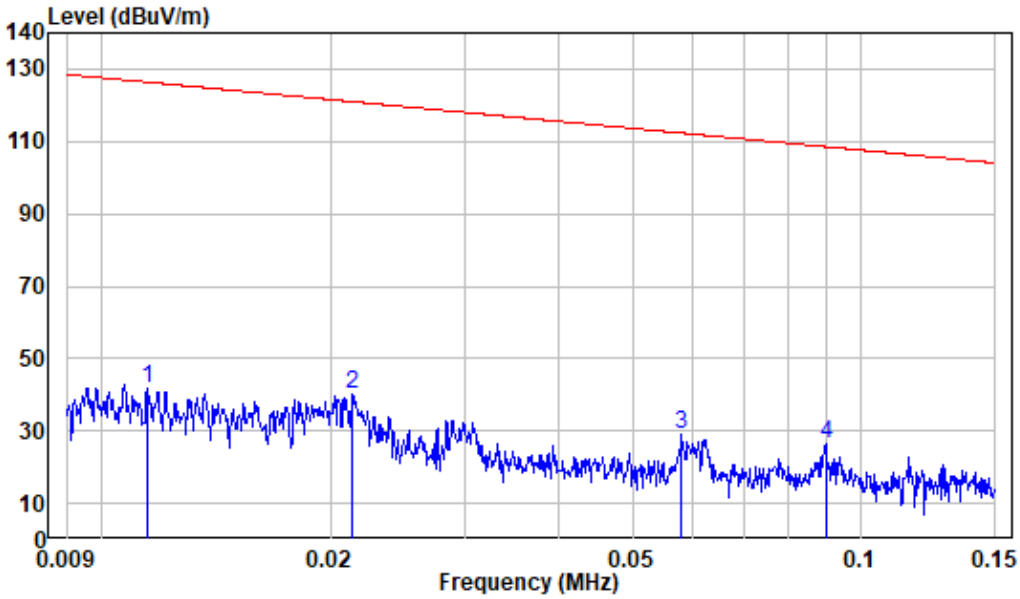
150 kHz~30 MHz



Site : chamber
Condition: 3m
Job No. : RA230621-35652E-RF
Test Mode: NFC
Note : Perpendicular

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.567	-11.68	48.06	36.38	72.50	-36.12	Peak
2	1.689	-11.41	42.20	30.79	62.82	-32.03	Peak
3	4.315	-11.69	41.96	30.27	69.54	-39.27	Peak

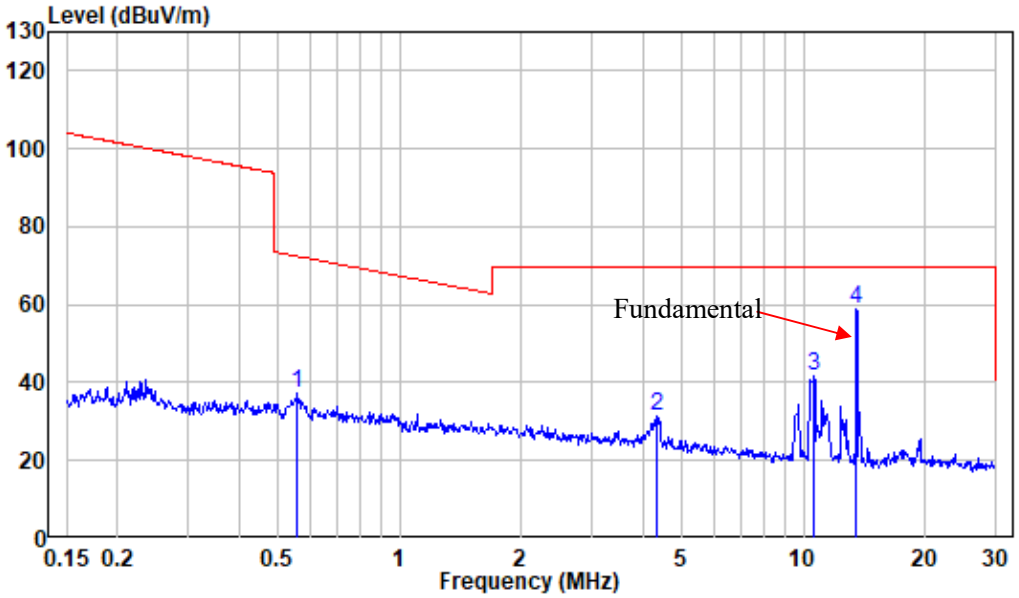
Parallel
9 kHz~150 kHz



Site : chamber
Condition: 3m
Job No. : RA230621-35652E-RF
Test Mode: NFC
Note : Parallel

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.011	-11.40	53.17	41.77	126.39	-84.62	Peak
2	0.021	-11.69	51.64	39.95	120.99	-81.04	Peak
3	0.058	-11.55	40.65	29.10	112.34	-83.24	Peak
4	0.090	-11.57	37.87	26.30	108.53	-82.23	Peak

150 kHz~30 MHz

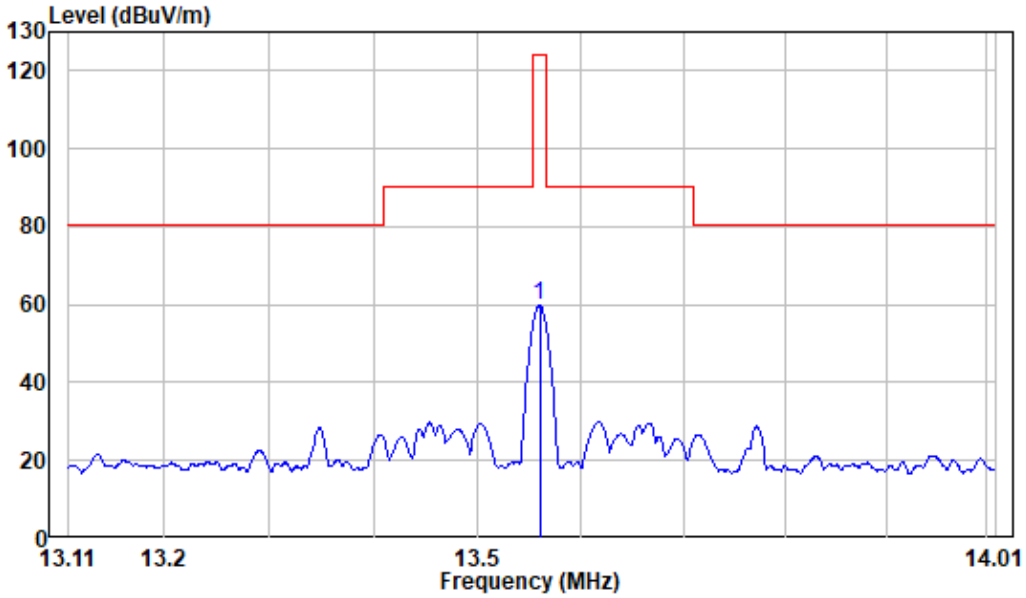


Site : chamber
Condition: 3m
Job No. : RA230621-35652E-RF
Test Mode: NFC
Note : Parallel

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.558	-11.67	48.75	37.08	72.65	-35.57	Peak
2	4.315	-11.69	42.88	31.19	69.54	-38.35	Peak
3	10.620	-10.93	52.69	41.76	69.54	-27.78	Peak

2) Emission Mask & Fundamental:

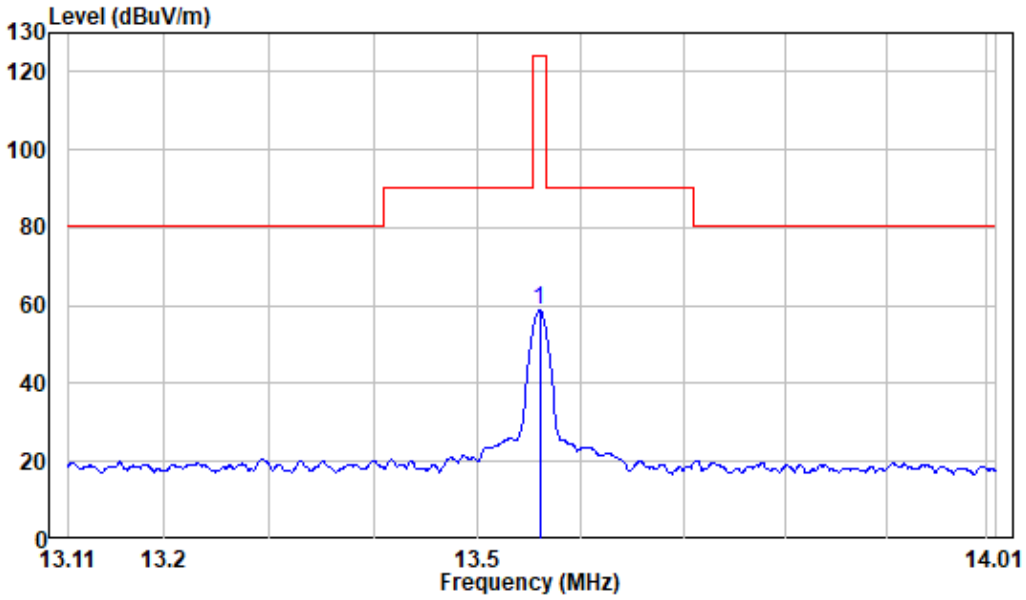
Ground-parallel



Site : chamber
Condition: 3m
Job No. : RA230621-35652E-RF
Test Mode: NFC
Note : Ground-parallel

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	13.560	-10.92	70.85	59.93	124.00	-64.07	Peak

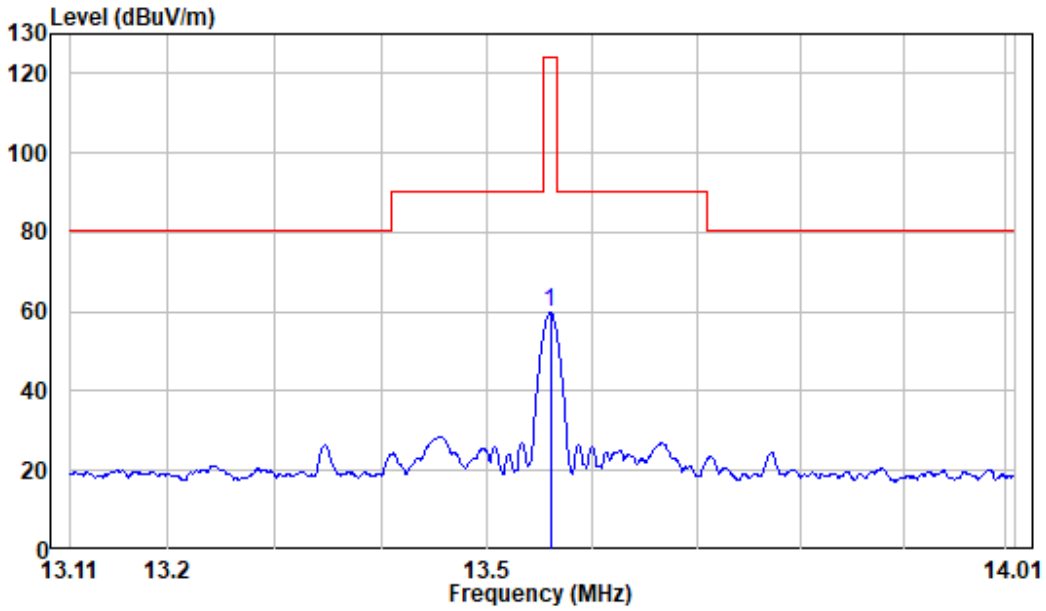
Perpendicular:



Site : chamber
Condition: 3m
Job No. : RA230621-35652E-RF
Test Mode: NFC
Note : Perpendicular

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	13.560	-10.92	69.82	58.90	124.00	-65.10	Peak

Parallel:

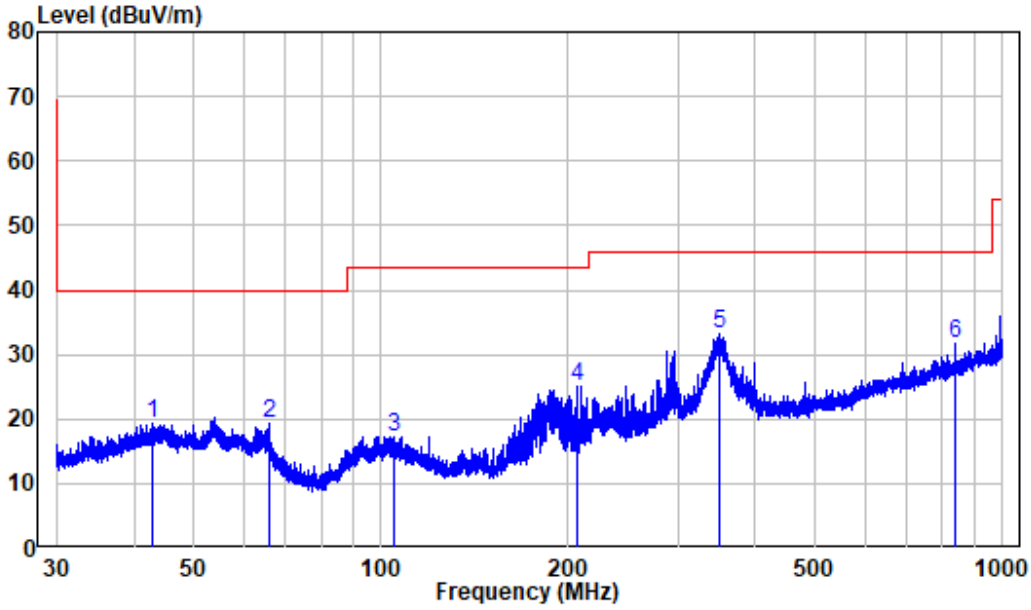


Site : chamber
Condition: 3m
Job No. : RA230621-35652E-RF
Test Mode: NFC
Note : Parallel

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	13.560	-10.92	70.70	59.78	124.00	-64.22	Peak

3) Spurious Emissions (30 MHz~1GHz):

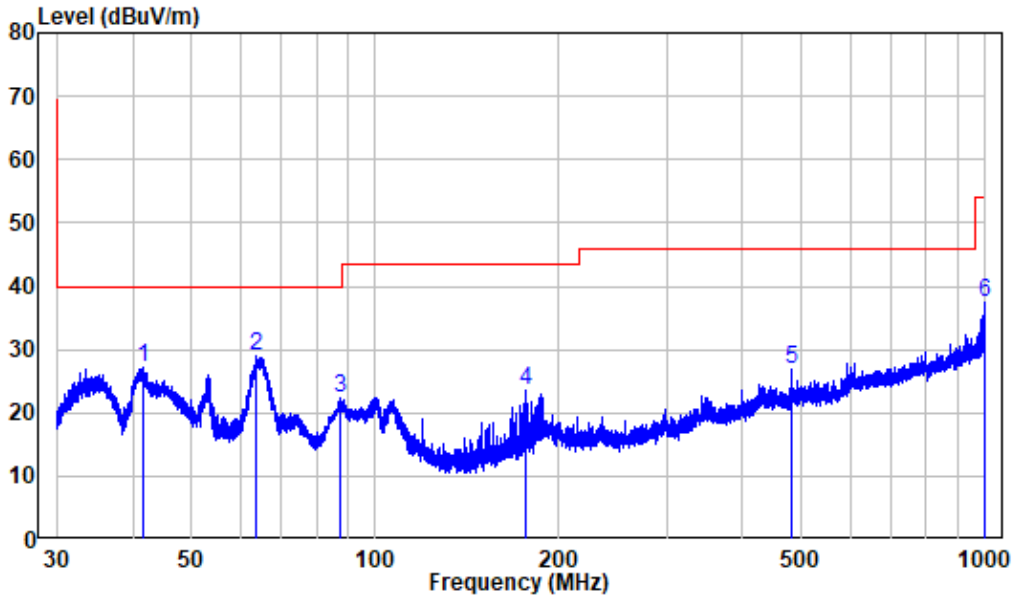
Horizontal:



Site : chamber
Condition: 3m HORIZONTAL
Job No. : RA230621-35652E-RF
Test Mode: NFC

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	42.975	-9.96	29.20	19.24	40.00	-20.76	Peak
2	65.919	-12.86	32.14	19.28	40.00	-20.72	Peak
3	105.041	-11.84	29.17	17.33	43.50	-26.17	Peak
4	206.669	-11.84	37.01	25.17	43.50	-18.33	Peak
5	350.630	-7.34	40.52	33.18	46.00	-12.82	Peak
6	838.814	0.26	31.48	31.74	46.00	-14.26	Peak

Vertical:



Site : chamber
Condition: 3m VERTICAL
Job No. : RA230621-35652E-RF
Test Mode: NFC

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	41.603	-10.09	37.30	27.21	40.00	-12.79	Peak
2	63.843	-12.09	41.07	28.98	40.00	-11.02	Peak
3	87.418	-14.75	37.10	22.35	40.00	-17.65	Peak
4	176.578	-13.05	36.55	23.50	43.50	-20.00	Peak
5	480.107	-5.00	32.00	27.00	46.00	-19.00	Peak
6	995.626	2.93	34.61	37.54	54.00	-16.46	Peak

FCC§15.225(e) - FREQUENCY STABILITY

Applicable Standard

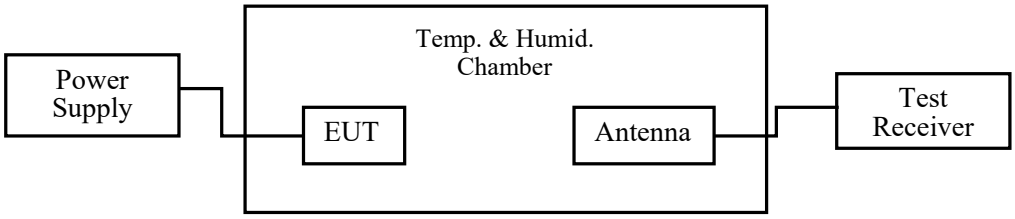
The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and inductive antenna was connected to a Spectrum Analyzer. The EUT was placed inside the temperature chamber.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: An external DC power supply Source. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.



Test Data

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	49%
ATM Pressure:	101.0 kPa

The testing was performed by Jimi Zheng on 2023-07-08.

Test Mode: Transmitting

Test Result: Pass

Battery:

Voltage Supply (V_{DC})	Temperature (℃)	Measured Frequency (MHz)	Frequency Error (%)	Part 15.225 Limit (%)
3.6	-20	13.559926	-0.000546	±0.01
	-10	13.559949	-0.000376	±0.01
	0	13.559902	-0.000723	±0.01
	10	13.559933	-0.000494	±0.01
	20	13.559939	-0.000450	±0.01
	30	13.559923	-0.000568	±0.01
	40	13.559965	-0.000258	±0.01
	50	13.559936	-0.000472	±0.01
3.3	20	13.559941	-0.000435	±0.01
4.2	20	13.559924	-0.000560	±0.01

Note: the extreme voltage was declared by the applicant.

120V AC/5V DC adapter:

Voltage Supply (V_{AC})	Temperature (℃)	Measured Frequency (MHz)	Frequency Error (%)	Part 15.225 Limit (%)
120	-20	13.559938	-0.000457	±0.01
	-10	13.559951	-0.000361	±0.01
	0	13.560072	0.000531	±0.01
	10	13.559905	-0.000701	±0.01
	20	13.559910	-0.000664	±0.01
	30	13.559890	-0.000811	±0.01
	40	13.560010	0.000074	±0.01
	50	13.559856	-0.001062	±0.01
102	20	13.559938	-0.000457	±0.01
138	20	13.560075	0.000553	±0.01

Note: the extreme voltage was declared by the applicant.

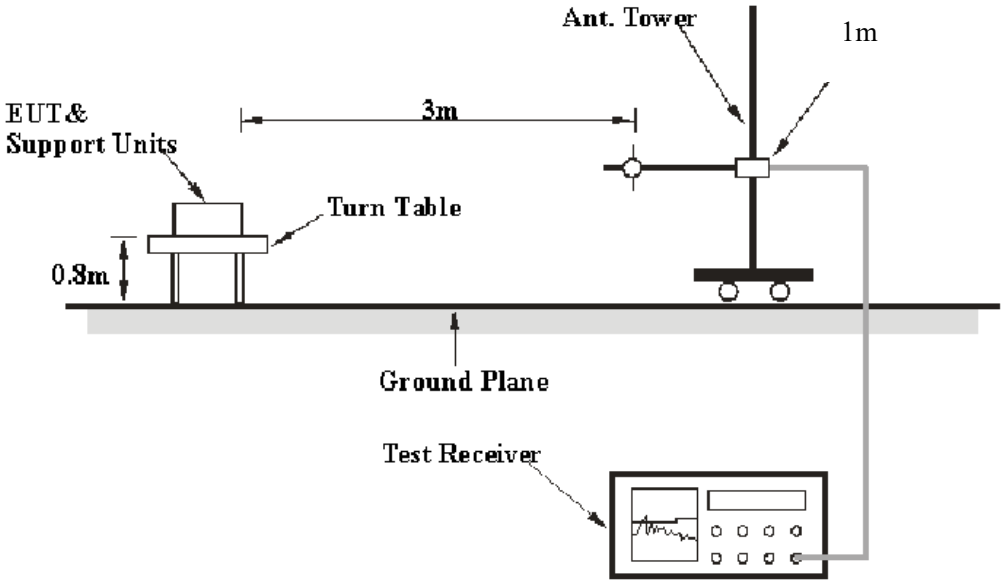
FCC§15.215(c) -20dBEMISSION BANDWIDTH

Requirement

Per 15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Procedure

Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.



Test Data

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	49%
ATM Pressure:	101.0 kPa

The testing was performed by Jimi Zheng on 2023-07-08.

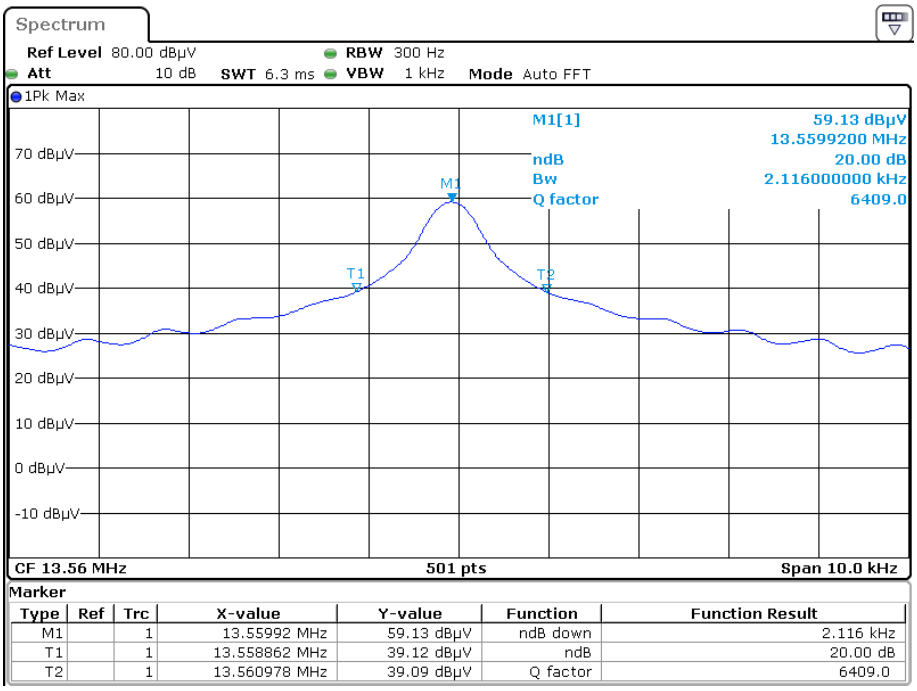
Test Mode: Transmitting

Note: worst case adapter powered

Test Result: Pass

Test Frequency (MHz)	20dB Bandwidth (kHz)
13.56	2.116

20 dB Emission Bandwidth



******* END OF REPORT *******