



TEST REPORT

Applicant Name : SHENZHEN TOPFLYtech CO., LIMITED
Address : Rm409 Scientific Research Building Tsinghua, Hi-tech Park
Hi-tech Industrial Nanshan District, shenzhen, China
Report Number : SZNS220623-28255E-RF-00
FCC ID: 2ASWYSOLARGUARDX100

Test Standard (s)

FCC PART 15.225

Sample Description

Product Type: SolarPowered GPS Elock
Model No.: SolarGuardX 100
Multiple Model(s) No.: N/A
Trade Mark: TOPFLYtech
Date Received: 2022/06/23
Report Date: 2022/07/29

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Approved By:

Andy Yu
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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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Frequency Range	13.56 MHz
E-field Strength	93.64dBuV/m@3m
Modulation Technique	ASK
Voltage Range	DC 3.6V from battery or DC 5V from adapter
Sample serial number	RE&CE: SZNS220623-28255E-RF-S1 (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		0.73dB
Unwanted Emission, conducted		1.6dB
AC Power Lines Conducted Emissions		2.72dB
Emissions, Radiated	9kHz - 30MHz	2.66dB
	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
	18GHz -26.5GHz	5.06dB
	26.5GHz -40GHz	4.72dB
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 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. 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.

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

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

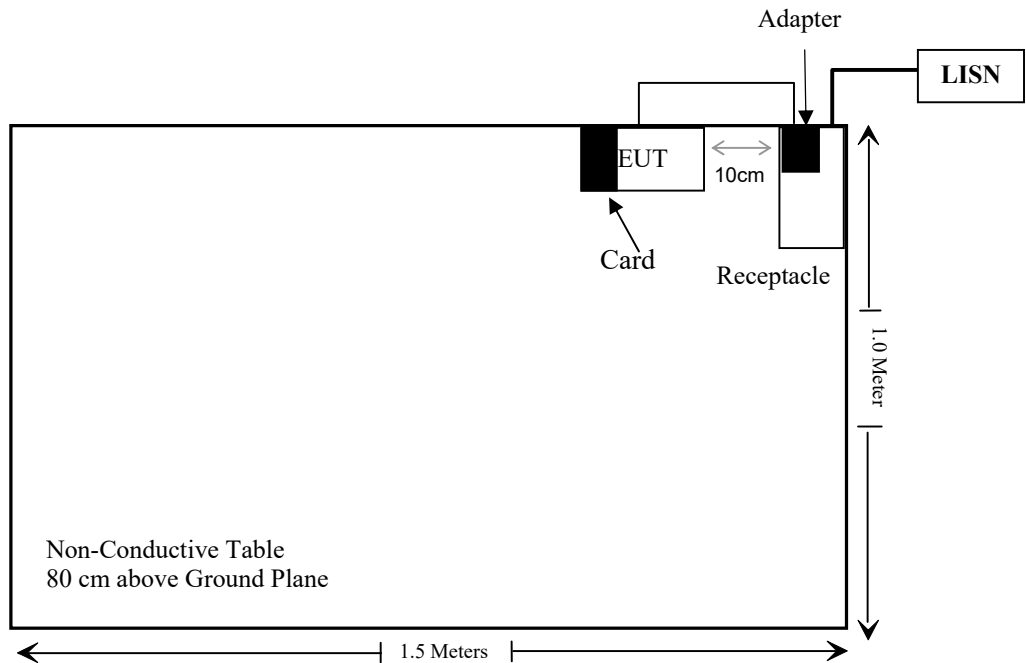
Manufacturer	Description	Model	Serial Number
Unknown	Card	Unknown	Unknown
TECNO	Adapter	U050TSA	AH07015321906

External I/O Cable

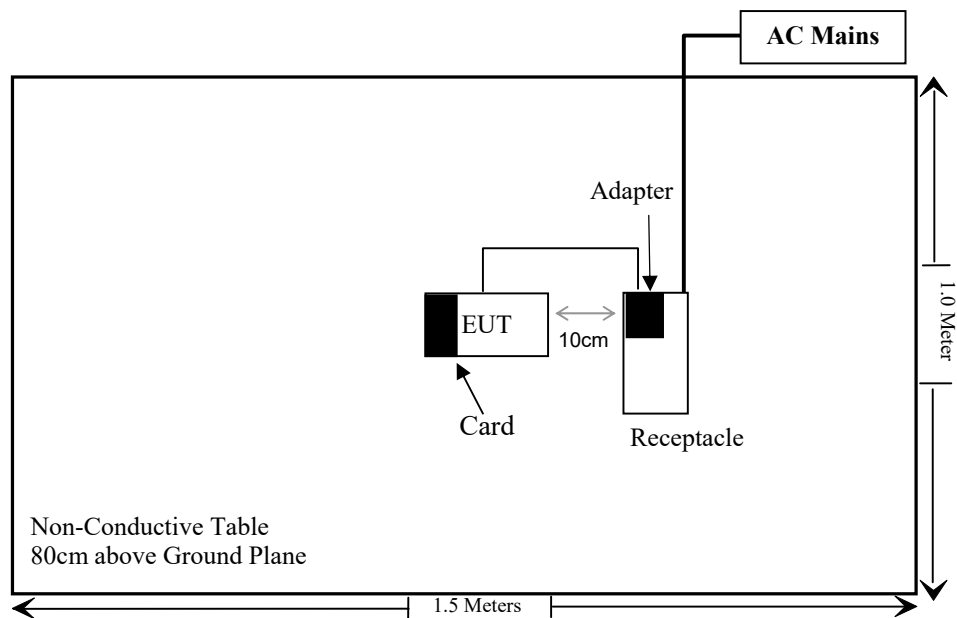
Cable Description	Length (m)	From Port	To
Un-shielding Detachable USB Cable	1.0	EUT	Adapter

Block Diagram of Test Setup

For conducted emission:



For radiated emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC§1.1307 (b) (3) &§2.1091	Maximum Permissible Exposure(MPE)	Compliant
§15.203	Antenna Requirement	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	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)					
Radiated Emission Test					
Rohde& Schwarz	Test Receiver	ESR	102725	2021/12/13	2022/12/12
SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/11/09	2022/11/08
Quinstar	Amplifier	QLW-184055 36-J0	15964001002	2021/11/11	2022/11/10
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	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
Wainwright	High Pass Filter	WHKX3.6/18 G-10SS	5	2021/12/14	2022/12/13
Frequency Stability					
Rohde& Schwarz	Test Receiver	ESR	102725	2021/12/13	2022/12/12
SCHWARZBECK	LOOP ANTENNA	FMZB1516	1516131	2020/01/05	2023/01/04
Gongwen	Temp. & Humid. Chamber	HSD-500	109	2021/10/14	2022/10/13
Fluke	Multi Meter	45	7664009	2021/12/14	2022/12/13
Manson	DC Power Source	KPS-6604	ATCS-205	NCR	NCR

*** 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 §1.1307 (b) (3) & §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.

According to KDB 447498 D04 Interim General RF Exposure Guidance

MPE-Based Exemption:

General frequency and separation-distance dependent MPE-based effective radiated power(ERP) thresholds are in Table B.1 [Table 1 of § 1.1307(b)(1)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz.

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R ² .
1.34-30	3,450 R ² /f ² .
30-300	3.83 R ² .
300-1,500	0.0128 R ² f.
1,500-100,000	19.2R ² .

R is the minimum separation distance in meters

f = frequency in MHz

For multiple RF sources: Multiple RF sources are exempt if:

in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation:

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

Result

Mode	Frequency (MHz)	Tune up conducted power	Antenna Gain		ERP		Evaluation Distance (m)	ERP Limit (W)
		(dBm)	(dBi)	(dBd)	(dBm)	(W)		
BLE	2402-2480	6.5	1.1	-1.05	5.45	0.004	0.2	0.768
NFC	13.56	/	/	/	/	0.00045	0.2	0.751
GSM850	824-849	25.97	1.0	-1.15	24.82	0.303	0.2	0.422
GSM1900	1850-1910	22.97	1.5	-0.65	22.32	0.171	0.2	0.768
Cat-M B2	1850-1910	22.0	1.5	-0.65	21.35	0.136	0.2	0.768
Cat-M B4	1710-1755	22.0	1.7	-0.45	21.55	0.143	0.2	0.768
Cat-M B5	824-849	22.0	1.0	-1.15	20.85	0.122	0.2	0.422
Cat-M B12	699-716	22.0	0.8	-1.35	20.65	0.116	0.2	0.358
Cat-M B13	777-787	22.0	0.8	-1.35	20.65	0.116	0.2	0.398
Cat-M B25	1850-1915	22.0	1.5	-0.65	21.35	0.136	0.2	0.768
Cat-M B26	814-849	22.0	1.0	-1.15	20.85	0.122	0.2	0.417
Cat-M B66	1710-1780	22.0	1.7	-0.45	21.55	0.143	0.2	0.768
Cat-M B85	698-716	22.0	0.8	-1.35	20.65	0.116	0.2	0.357
NB-IOT B2	1850-1910	22.0	1.5	-0.65	21.35	0.136	0.2	0.768
NB-IOT B4	1710-1755	22.0	1.7	-0.45	21.55	0.143	0.2	0.768
NB-IOT B5	824-849	22.0	1.0	-1.15	20.85	0.122	0.2	0.422
NB-IOT B12	699-716	22.0	0.8	-1.35	20.65	0.116	0.2	0.358
NB-IOT B13	777-787	22.0	0.8	-1.35	20.65	0.116	0.2	0.398
NB-IOT B25	1850-1915	22.0	1.5	-0.65	21.35	0.136	0.2	0.768
NB-IOT B66	1710-1780	22.0	1.7	-0.45	21.55	0.143	0.2	0.768
NB-IOT B71	663-698	22.0	0.8	-1.35	20.65	0.116	0.2	0.339
NB-IOT B85	698-716	22.0	0.8	-1.35	20.65	0.116	0.2	0.357

- Note: 1. The tune up conducted power and antenna gain was declared by the applicant.
 2. The device contain a WWAN module (FCC ID: XMR201910BG95M3) granted on 07/17/2020.
 3. The BLE, NFC and WWAN can transmit at same time.
 4. For NFC, the max E-field strength is 93.64dBuV/m@3m

$$EIRP = P_t \times g_t = (E \times d)^2 / 30$$

where

P_t is the transmitter output power in watts
 g_t is the numeric gain of the transmitting antenna (dimensionless)
 E is the electric field strength in V/m
 d is the measurement distance in meters (m)

$$ERP = EIRP/1.64 = (E \times d)^2 / (30 \times 1.64) = (E \times d)^2 / 49.2$$

$$\text{So, } ERP = (0.048 \times 3)^2 / 49.2 = 0.00042W = 0.42mW$$

The tune-up ERP=0.45mW

Simultaneous transmitting consideration (worst case):

The ratio= $\text{ERP}_{\text{BLE}}/\text{limit} + \text{ERP}_{\text{NFC}}/\text{limit} + \text{ERP}_{\text{WWAN}}/\text{limit}$
 $= 0.004/0.768 + 0.00045/0.751 + 0.303/0.422 = 0.724 < 1.0$, so simultaneous exposure is compliant.

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

Result: Compliant.

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.

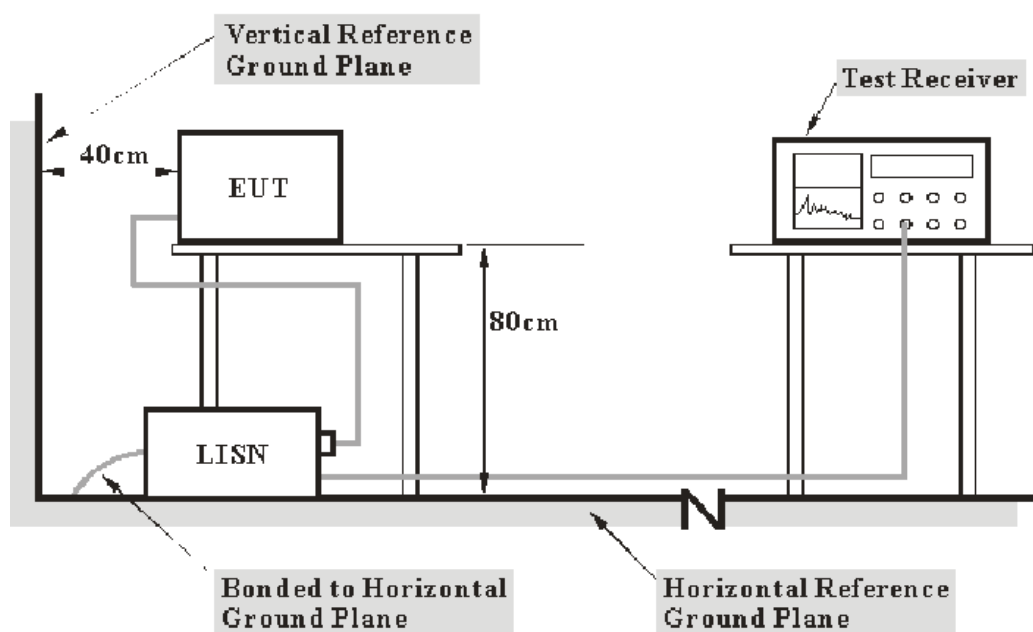
Result: Compliant.

FCC §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 30 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.

Corrected Factor & Margin Calculation

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

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss}$$

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:

$$\begin{aligned}\text{Over limit} &= \text{Result} - \text{Limit} \\ \text{Result} &= \text{Reading} + \text{Factor}\end{aligned}$$

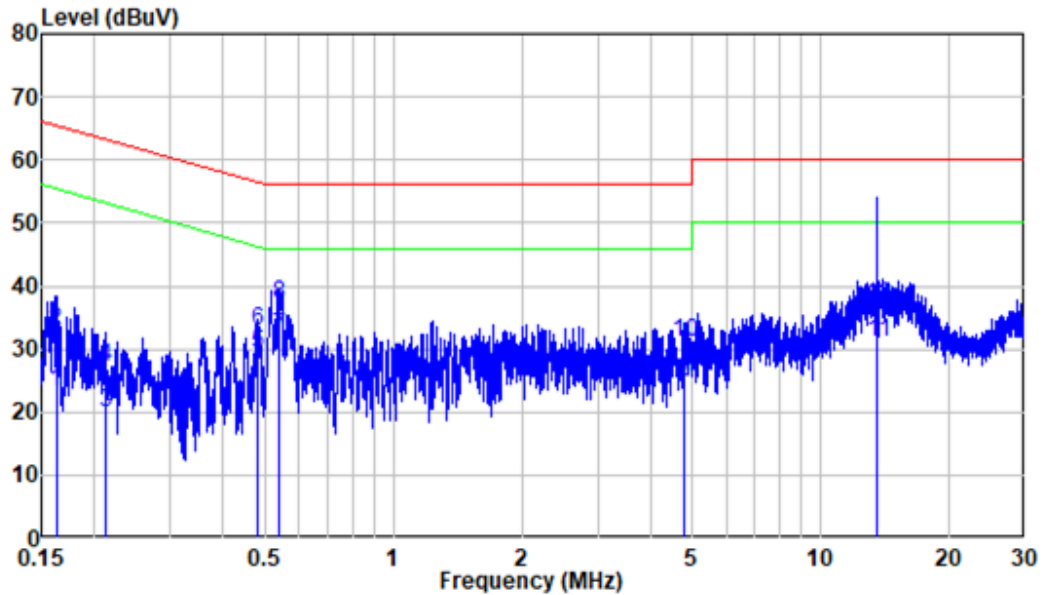
Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	42 %
ATM Pressure:	101.0 kPa

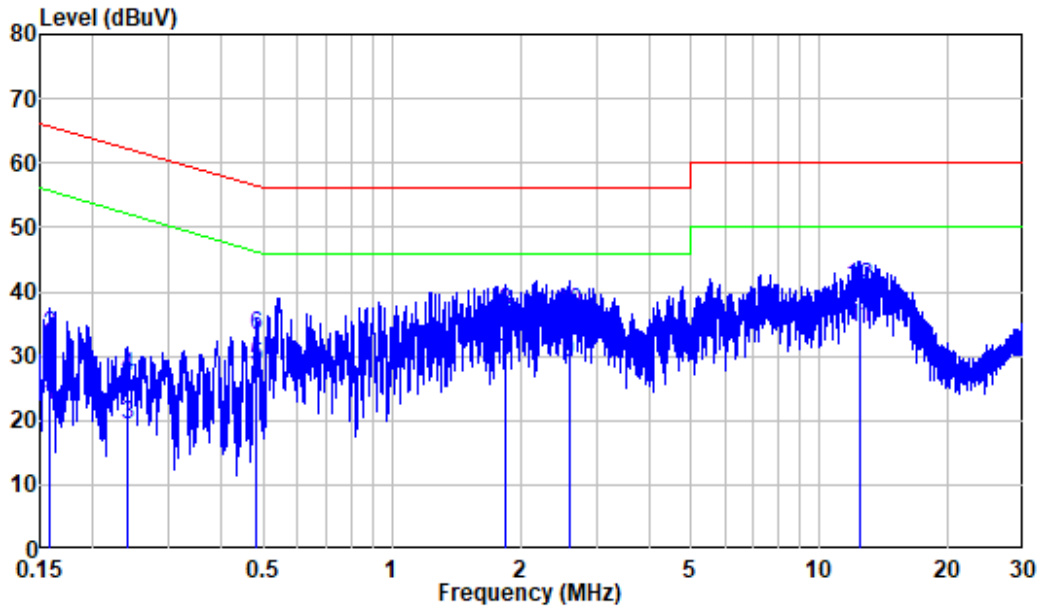
The testing was performed by Jason on 2022-07-13.

Test mode: Transmitting

AC 120 V/60 Hz, Line:

Site : Shielding Room
 Condition: Line
 Mode : NFC
 Model : SolarGuardX 100
 Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.162	9.80	13.32	23.12	55.35	-32.23	Average
2	0.162	9.80	23.05	32.85	65.35	-32.50	QP
3	0.212	9.80	10.21	20.01	53.15	-33.14	Average
4	0.212	9.80	17.44	27.24	63.15	-35.91	QP
5	0.480	9.80	19.39	29.19	46.34	-17.15	Average
6	0.480	9.80	22.96	32.76	56.34	-23.58	QP
7	0.541	9.81	22.05	31.86	46.00	-14.14	Average
8	0.541	9.81	27.17	36.98	56.00	-19.02	QP
9	4.787	9.85	14.94	24.79	46.00	-21.21	Average
10	4.787	9.85	21.22	31.07	56.00	-24.93	QP
11	13.569	9.94	21.13	31.07	50.00	-18.93	Average
12	13.569	9.94	27.00	36.94	60.00	-23.06	QP

AC 120V/ 60 Hz, Neutral:

Site : Shielding Room
 Condition: Neutral
 Mode : NFC
 Model : SolarGuardX 100
 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	12.53	22.33	55.53	-33.20	Average
2	0.159	9.80	23.46	33.26	65.53	-32.27	QP
3	0.240	9.80	9.47	19.27	52.10	-32.83	Average
4	0.240	9.80	17.18	26.98	62.10	-35.12	QP
5	0.482	9.80	18.62	28.42	46.31	-17.89	Average
6	0.482	9.80	23.56	33.36	56.31	-22.95	QP
7	1.841	9.82	19.30	29.12	46.00	-16.88	Average
8	1.841	9.82	26.96	36.78	56.00	-19.22	QP
9	2.589	9.83	19.20	29.03	46.00	-16.97	Average
10	2.589	9.83	27.04	36.87	56.00	-19.13	QP
11	12.367	10.02	24.44	34.46	50.00	-15.54	Average
12	12.367	10.02	30.79	40.81	60.00	-19.19	QP

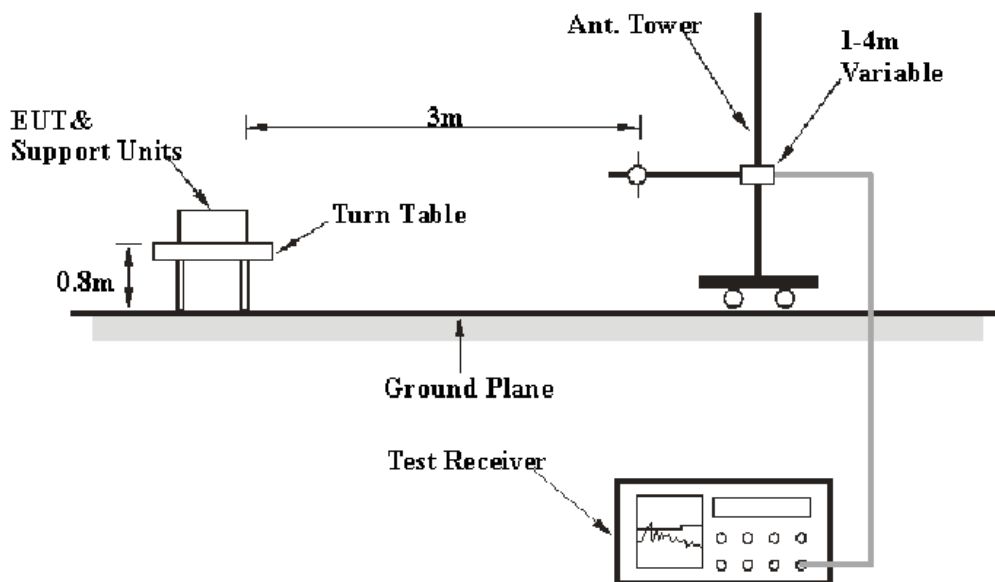
FCC§15.225, §15.205& §15.209 - RADIATED EMISSIONS TEST

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. The specification used was the FCC Part Subpart C limits.

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

Corrected Amplitude & Margin Calculation

The Corrected Amplitude 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:

$$\text{Corrected Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Corrected Factor}$$

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

$$\text{Over Limit / Margin} = \text{Level / Result} - \text{Limit}$$

$$\text{Level / Result} = \text{Reading level} + \text{Factor}$$

Test Data

Environmental Conditions

Temperature:	28°C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Level from 2022-07-14 to 2022-07-29.

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

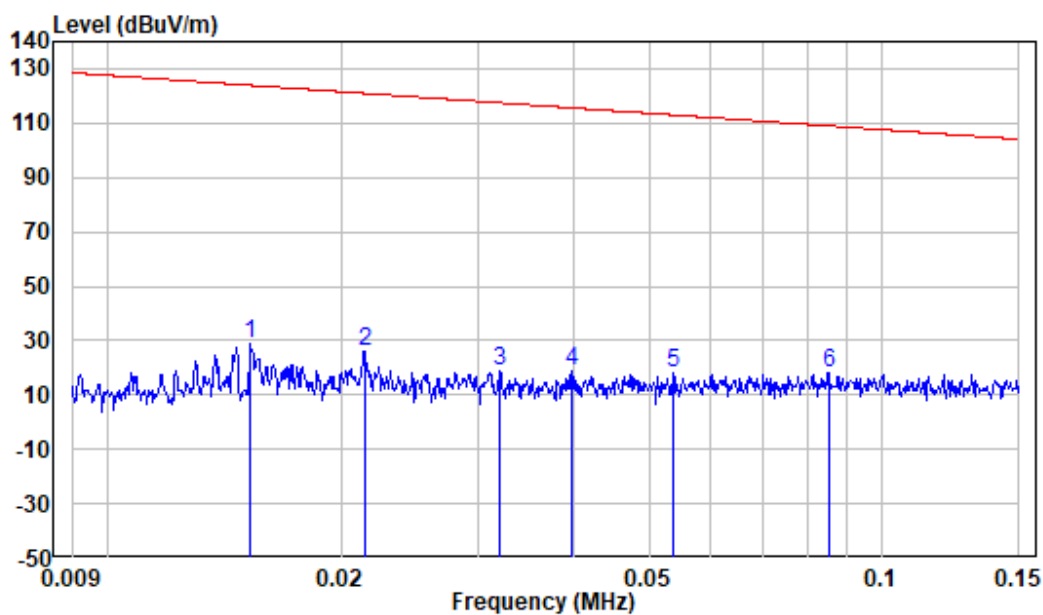
Note: when the result of Peak below the limit of QP more than 6dB, just the peak value was record.

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))



Site : chamber

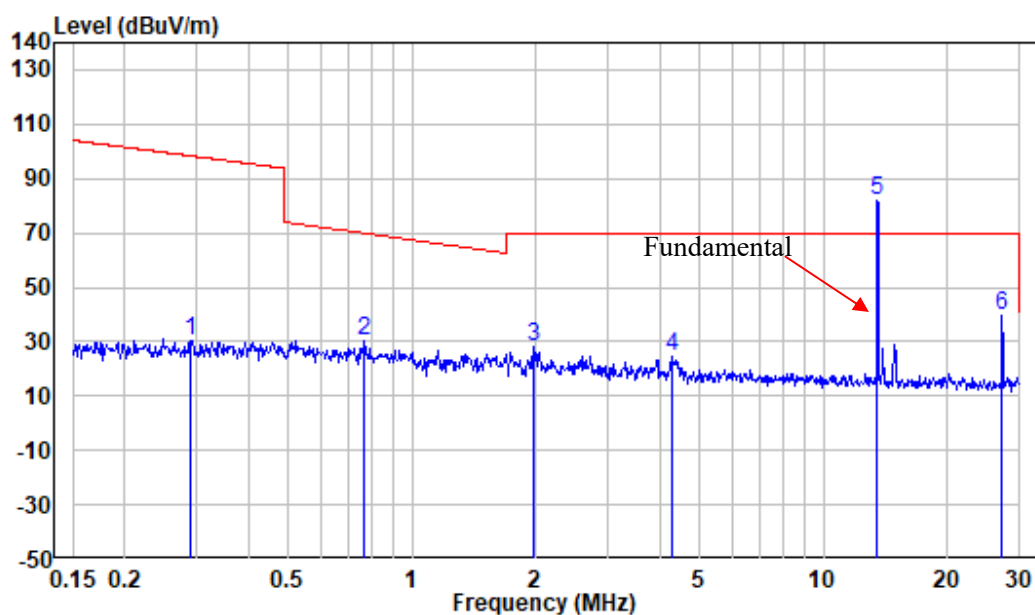
Condition: 3m

Job No. : SZNS220623-28255E-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	0.015	-11.53	40.60	29.07	123.90	-94.83	Peak
2	0.021	-11.69	37.72	26.03	120.97	-94.94	Peak
3	0.032	-11.63	30.80	19.17	117.47	-98.30	Peak
4	0.040	-11.59	30.15	18.56	115.64	-97.08	Peak
5	0.054	-11.53	29.65	18.12	113.00	-94.88	Peak
6	0.085	-11.57	29.60	18.03	108.99	-90.96	Peak



Site : chamber

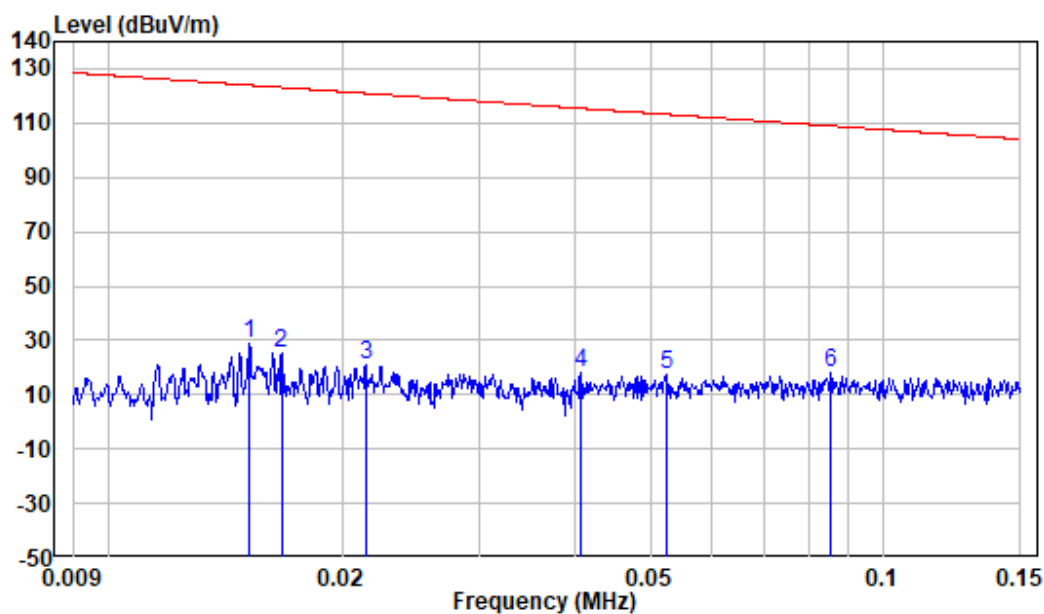
Condition: 3m

Job No. : SZNS220623-28255E-RF

Test Mode: NFC

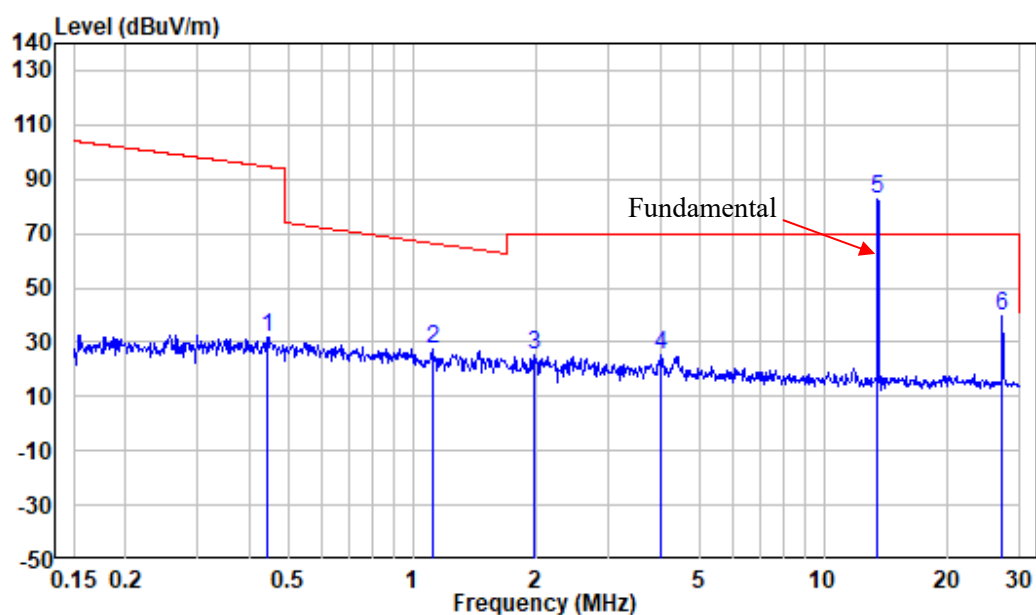
: Ground-parallel

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.289	-11.83	41.92	30.09	98.38	-68.29	Peak
2	0.767	-11.89	42.12	30.23	69.83	-39.60	Peak
3	1.980	-11.34	39.15	27.81	69.54	-41.73	Peak
4	4.292	-11.69	35.91	24.22	69.54	-45.32	Peak
5	13.551	-10.92	92.58	81.66	69.54	12.12	Peak
6	27.127	-9.97	49.92	39.95	69.54	-29.59	Peak



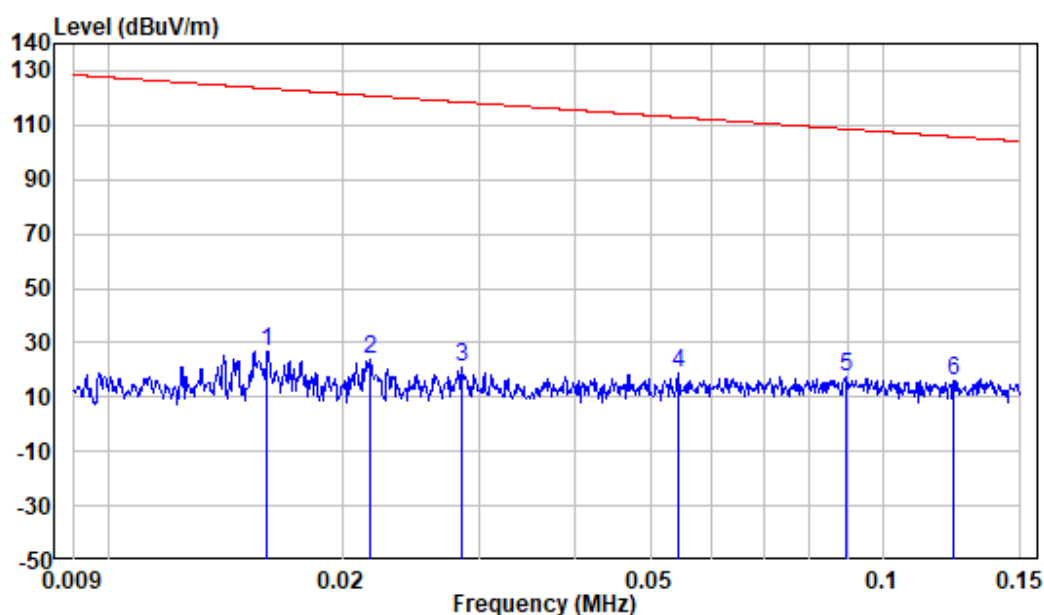
Site : chamber
 Condition: 3m
 Job No. : SZNS220623-28255E-RF
 Test Mode: NFC
 : Perpendicular

	Freq	Factor	Read Level	Level	Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.015	-11.53	40.52	28.99	123.97	-94.98	Peak
2	0.017	-11.58	36.88	25.30	123.14	-97.84	Peak
3	0.021	-11.69	32.75	21.06	120.97	-99.91	Peak
4	0.041	-11.57	29.40	17.83	115.42	-97.59	Peak
5	0.052	-11.54	28.87	17.33	113.22	-95.89	Peak
6	0.085	-11.57	29.74	18.17	108.99	-90.82	Peak



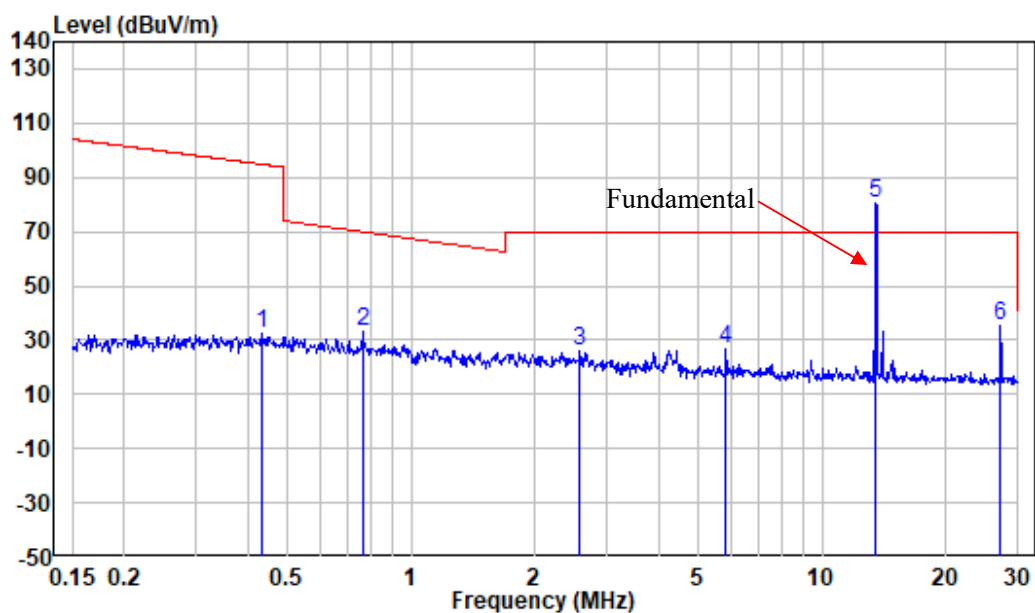
Site : chamber
 Condition: 3m
 Job No. : SZNS220623-28255E-RF
 Test Mode: NFC
 : Perpendicular

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.444	-11.65	43.32	31.67	94.65	-62.98	Peak
2	1.123	-11.56	39.25	27.69	66.44	-38.75	Peak
3	1.980	-11.34	36.76	25.42	69.54	-44.12	Peak
4	4.027	-11.69	37.27	25.58	69.54	-43.96	Peak
5	13.551	-10.92	93.29	82.37	69.54	12.83	Peak
6	27.127	-9.97	49.39	39.42	69.54	-30.12	Peak



Site : chamber
 Condition: 3m
 Job No. : SZNS220623-28255E-RF
 Test Mode: NFC
 Note : Parallel

	Freq	Factor	Read Level	Limit Level	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	0.016	-11.56	38.28	26.72	123.51	-96.79 Peak
2	0.022	-11.69	35.66	23.97	120.87	-96.90 Peak
3	0.029	-11.64	32.69	21.05	118.50	-97.45 Peak
4	0.054	-11.54	30.50	18.96	112.90	-93.94 Peak
5	0.089	-11.57	28.92	17.35	108.58	-91.23 Peak
6	0.123	-11.81	27.98	16.17	105.79	-89.62 Peak



Site : chamber

Condition: 3m

Job No. : SZNS220623-28255E-RF

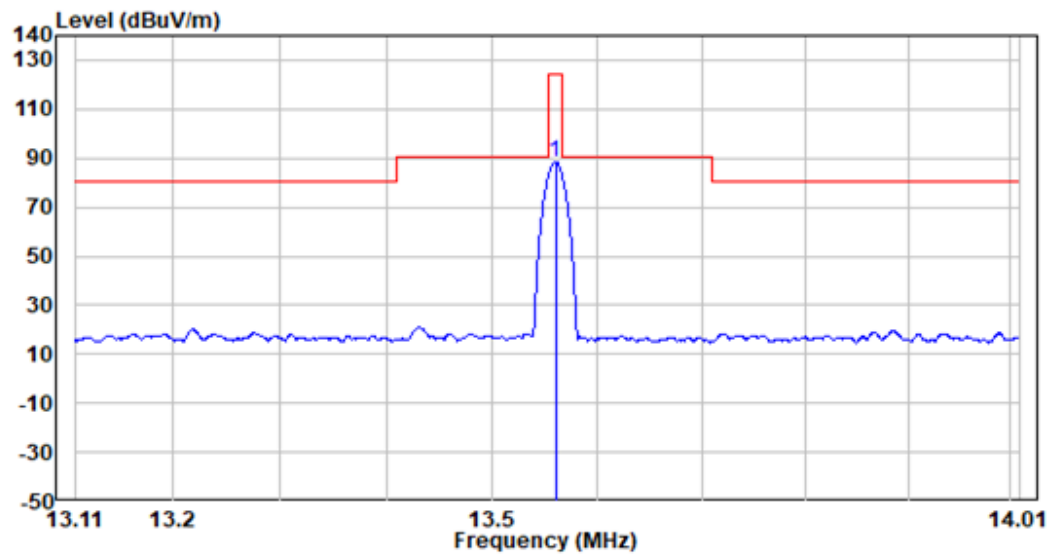
Test Mode: NFC

: Parallel

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.435	-11.66	44.12	32.46	94.83	-62.37	Peak
2	0.763	-11.89	45.30	33.41	69.87	-36.46	Peak
3	2.581	-11.65	37.37	25.72	69.54	-43.82	Peak
4	5.836	-11.60	38.00	26.40	69.54	-43.14	Peak
5	13.551	-10.92	91.58	80.66	69.54	11.12	Peak
6	27.127	-9.97	45.34	35.37	69.54	-34.17	Peak

2) Emission Mask & Fundamental:

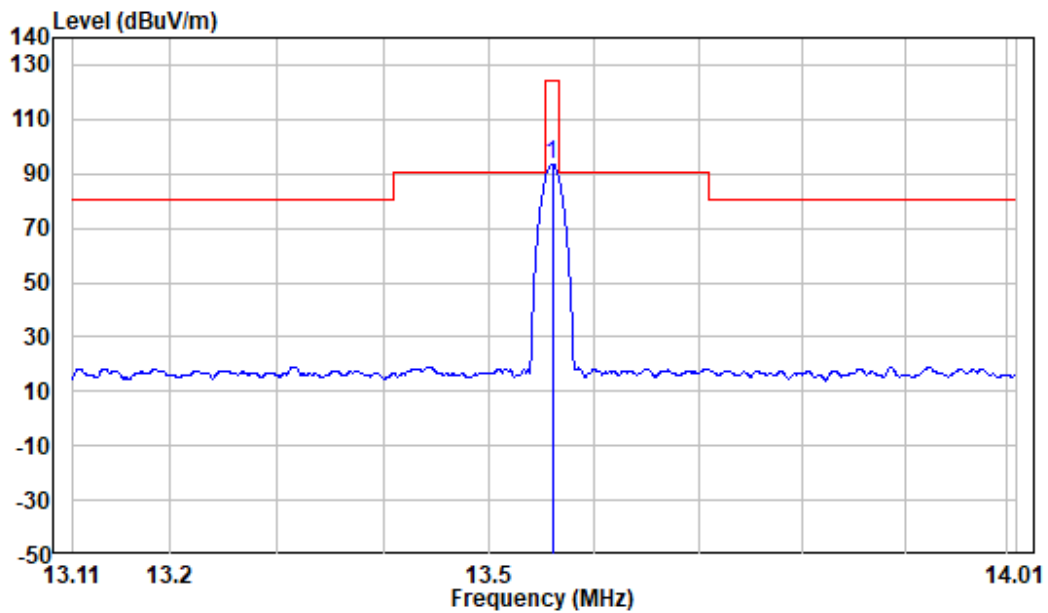
Ground-parallel



Site : chamber
Condition: 3m
Job No. : SZNS220623-28255E-RF
Test Mode: NFC
: Ground-parallel

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	13.560	-10.92	99.52	88.60	124.00	-35.40	Peak

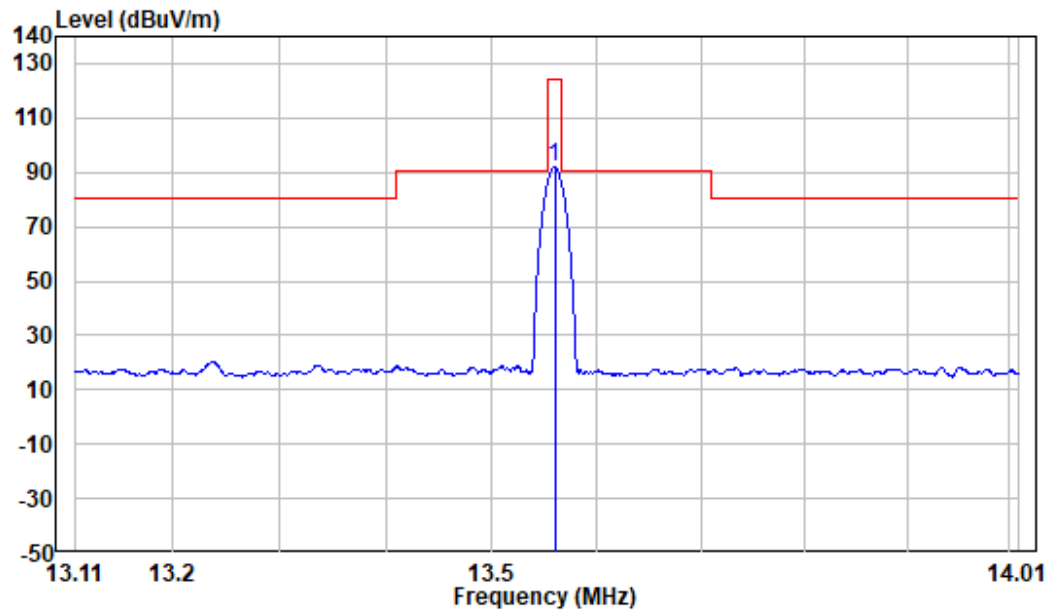
Perpendicular:



Site : chamber
Condition: 3m
Job No. : SZNS220623-28255E-RF
Test Mode: NFC
: Perpendicular

	Freq	Factor	Read	Limit	Over	Remark
			Level	Level	Limit	
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	13.560	-10.92	104.56	93.64	124.00	-30.36 Peak

Parallel:



Site : chamber

Condition: 3m

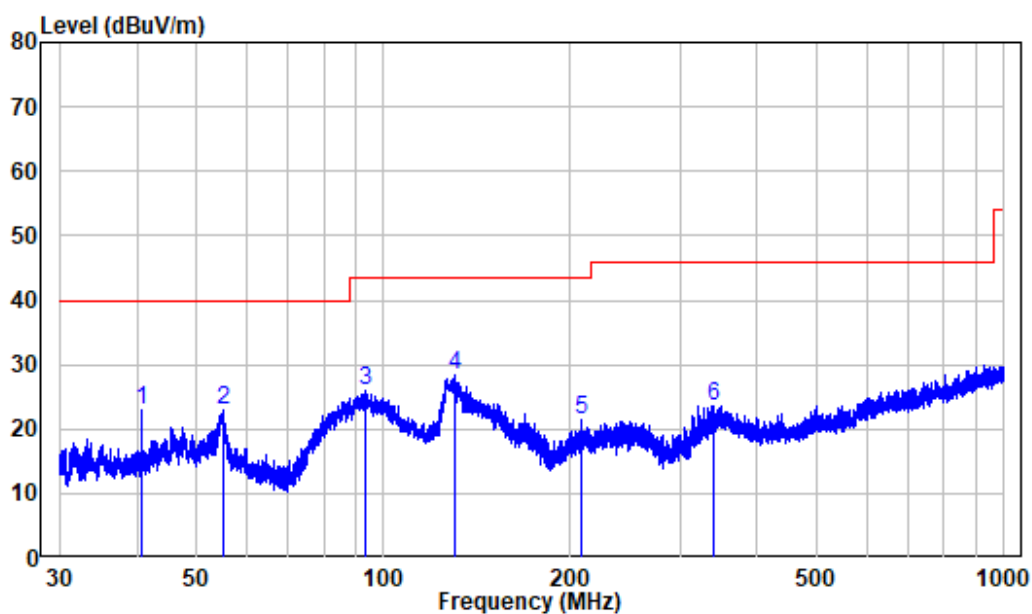
Job No. : SZNS220623-28255E-RF

Test Mode: NFC

: Parallel

	Freq	Factor	Read	Limit	Over	Remark
			Level	Level	Line	
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	13.560	-10.92	102.91	91.99	124.00	-32.01 Peak

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



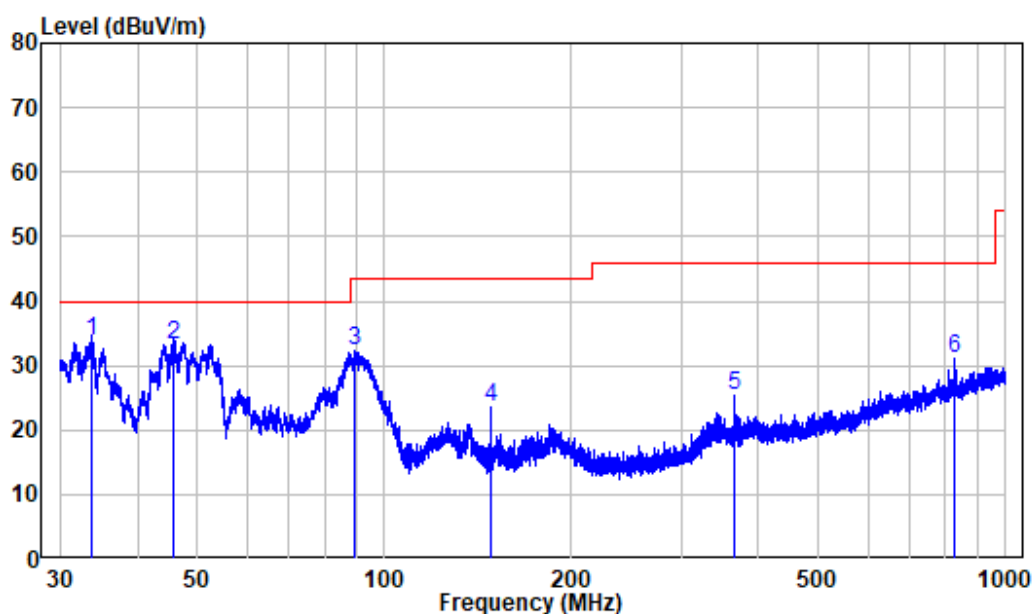
Site : chamber

Condition: 3m HORIZONTAL

Job No. : S2NS220623-28255E-RF

Test Mode: NFC

	Freq	Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	40.702	-10.22	33.05	22.83	40.00	-17.17	Peak
2	55.027	-10.28	33.09	22.81	40.00	-17.19	Peak
3	93.440	-12.87	38.81	25.94	43.50	-17.56	Peak
4	129.809	-14.88	43.33	28.45	43.50	-15.05	Peak
5	207.941	-11.85	33.25	21.40	43.50	-22.10	Peak
6	340.334	-7.42	31.03	23.61	46.00	-22.39	Peak



Site : chamber

Condition: 3m VERTICAL

Job No. : S2NS220623-28255E-RF

Test Mode: NFC

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	33.710	-11.89	45.60	33.71	40.00	-6.29	QP
2	45.775	-9.98	43.26	33.28	40.00	-6.72	QP
3	89.708	-14.09	46.29	32.20	43.50	-11.30	Peak
4	148.376	-15.36	38.82	23.46	43.50	-20.04	Peak
5	366.984	-7.45	32.74	25.29	46.00	-20.71	Peak
6	830.036	0.03	31.03	31.06	46.00	-14.94	Peak

FCC§15.225(e) - FREQUENCY STABILITY

Applicable Standard

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ 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 supplySource. 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:	25.5°C
Relative Humidity:	56%
ATM Pressure:	101.0 kPa

The testing was performed by Level Li on 2022-07-19.

Test Mode: Transmitting

Test Result: Pass

Voltage Supply (V _{DC})	Temperature (°C)	Measured Frequency (MHz)	Frequency Error (%)	Part 15.225 Limit (%)
3.6	-20	13.559983	-0.000125	± 0.01
	-10	13.559955	-0.000332	± 0.01
	0	13.559892	-0.000796	± 0.01
	10	13.559881	-0.000878	± 0.01
	20	13.559920	-0.000590	± 0.01
	30	13.559891	-0.000804	± 0.01
	40	13.559863	-0.001010	± 0.01
	50	13.559921	-0.000583	± 0.01
3.06	20	13.559933	-0.000494	± 0.01
4.14	20	13.559906	-0.000693	± 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:	25.5°C
Relative Humidity:	56%
ATM Pressure:	101.0 kPa

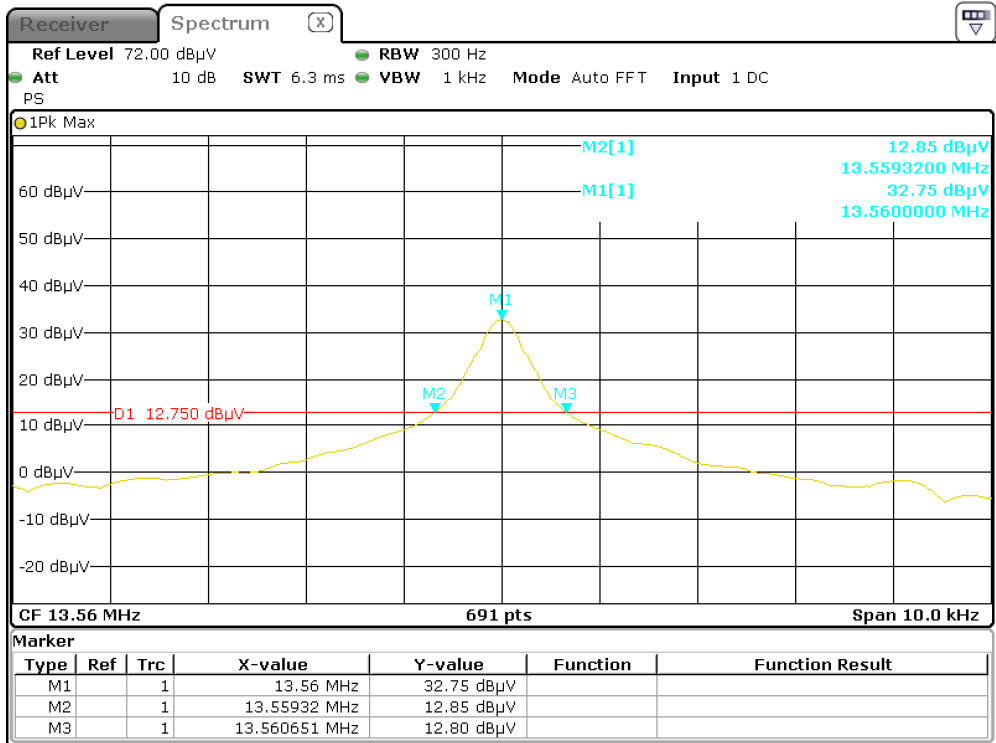
The testing was performed by Level Li on 2022-07-19.

Test Mode: Transmitting

Test Result: Pass

Test Frequency (MHz)	20dB Bandwidth (kHz)
13.56	1.331

20 dB Emission Bandwidth



Date: 19.JUL.2022 11:46:21

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