

TEST REPORT

FCC ID: 2AZG7-BOOMBOX

Product: solar boombox

Model No.: solar boombox

Additional Model No.: N/A

Trade Mark: N/A

Report No.: TCT210205E036

Issued Date: Apr. 13, 2021

Issued for:

Solgaard Design Inc.

**4 / F Southwest, Jinyuda Industrial Zone 1, Shajing Street, Baoan District,
Shenzhen, China**

Issued By:

Shenzhen Tongce Testing Lab

**TCT Testing Industrial Park, Fuqiao 5th Industrial Zone, Fuhai Street, Bao'an
District, Shenzhen, Guangdong, 518103, People's Republic of China**

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1. Test Certification

Product:	solar boombox
Model No.:	solar boombox
Additional Model No.:	N/A
Trade Mark:	N/A
Applicant:	Solgaard Design Inc.
Address:	4 / F Southwest, Jinyuda Industrial Zone 1, Shajing Street, Baoan District, Shenzhen, China
Manufacturer:	Solgaard Design Inc.
Address:	4 / F Southwest, Jinyuda Industrial Zone 1, Shajing Street, Baoan District, Shenzhen, China
Date of Test:	Feb. 08, 2021 – Apr. 12, 2021
Applicable Standards:	FCC CFR Title 47 Part 15 Subpart C

The above equipment has been tested by Shenzhen Tongce Testing Lab and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By:

Brave Zeng

Date:

Apr. 12, 2021

Brave Zeng

Reviewed By:

Beryl Zhao

Date:

Apr. 13, 2021

Beryl Zhao

Approved By:

Tomsin

Date:

Apr. 13, 2021

Tomsin

2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	PASS
Spurious Emission	§15.209(a)(f)	PASS

Note:

1. PASS: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.

3. EUT Description

Product:	solar boombox
Model No.:	solar boombox
Additional Model No.:	N/A
Trade Mark:	N/A
Operation Frequency:	120.37 KHz -174.21KHz
Modulation Technology:	MSK
Antenna Type:	Inductive loop coil Antenna
Power Supply:	Rechargeable Li-ion Battery DC 3.7V
Max Wireless Charger Power:	5W

4. General Information

4.1. Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and with Fully-charged battery.
Mode 1:	AC power in +wireless charger(Max wireless charger power)
Mode 2:	Internal battery powered+wireless charger(Max wireless charger power)
Note:Report worse case(Mode 2)for Radiated emission,and only report worse case (Mode 1)for conducted emission.	
The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
Mobile Phone	MQ6M2CH/A	C7DV86Y3JC6F	/	IPHONE

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

5. Facilities and Accreditations

5.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 645098

Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1

The 3m Semi-anechoic chamber of SHENZHEN TONGCE TESTING LAB has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

5.2. Location

Shenzhen Tongce Testing Lab

Address: TCT Testing Industrial Park, Fuqiao 5th Industrial Zone, Fuhai Street,
Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China

TEL: +86-755-27673339

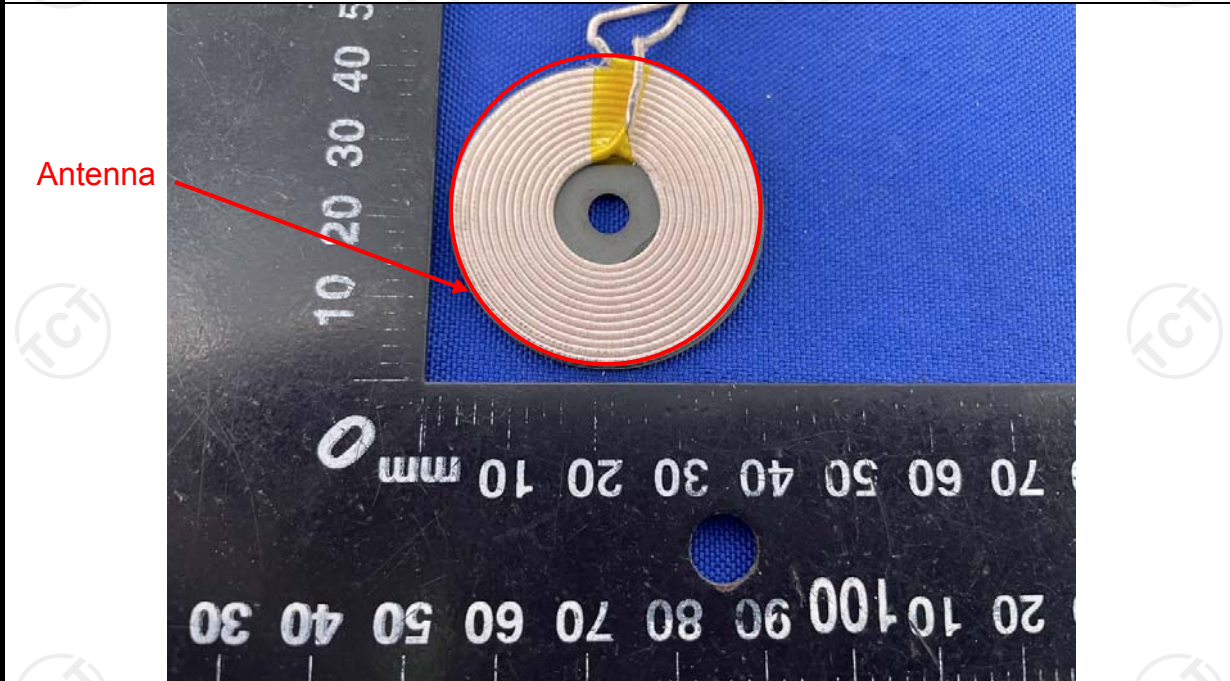
5.3. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	$\pm 2.56\text{dB}$
2	RF power, conducted	$\pm 0.12\text{dB}$
3	Spurious emissions, conducted	$\pm 0.11\text{dB}$
4	All emissions, radiated(<1G)	$\pm 3.92\text{dB}$
5	All emissions, radiated(>1G)	$\pm 4.28\text{dB}$
6	Temperature	$\pm 0.1^{\circ}\text{C}$
7	Humidity	$\pm 1.0\%$

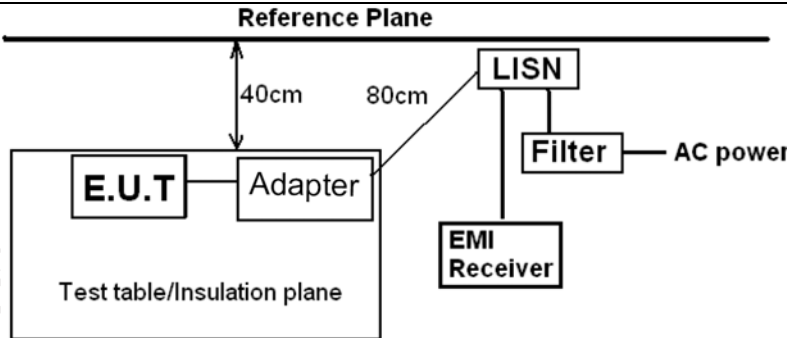
6. Test Results and Measurement Data

6.1. Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	
E.U.T Antenna:	
The antenna is inductive loop coil antenna which permanently attached.	
	

6.2. Conducted Emission

6.2.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.207														
Test Method:	ANSI C63.10:2013														
Frequency Range:	150 kHz to 30 MHz														
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto														
Limits:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table>	Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													
Test Setup:	Reference Plane  <i>Remark:</i> E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m														
Test Mode:	Charging + Transmitting Mode														
Test Procedure:	1. The E.U.T is connected to an adapter through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.														
Test Result:	PASS														

6.2.2. Test Instruments

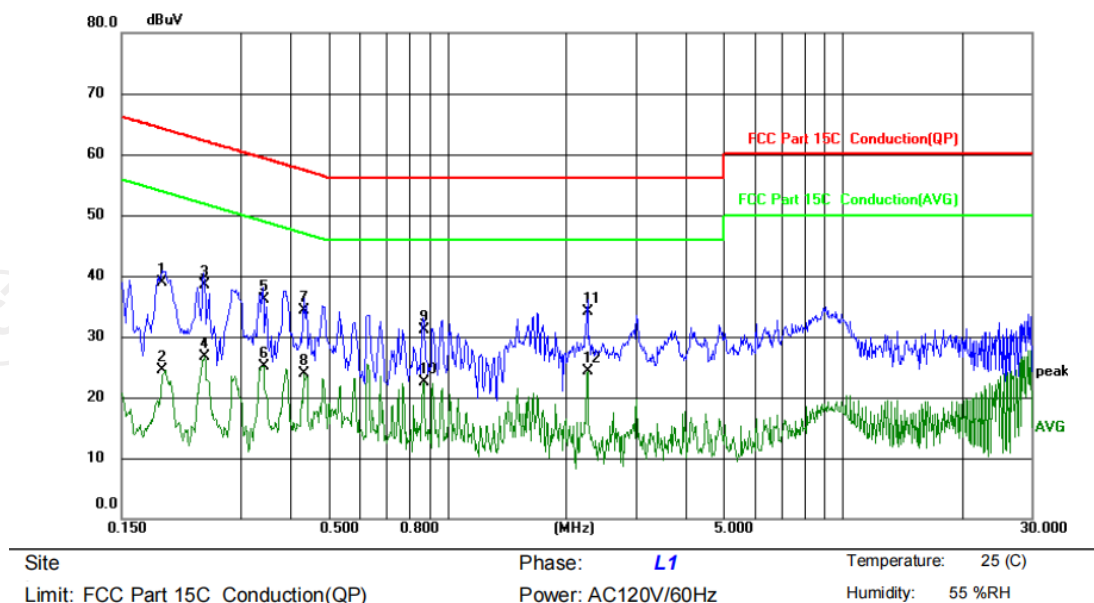
Conducted Emission Shielding Room Test Site (843)				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Test Receiver	R&S	ESCI3	100898	Jul. 27, 2021
LISN-2	Schwarzbeck	NSLK 8126	8126453	Sep. 11, 2021
Line-5	TCT	CE-05	N/A	Sep. 02, 2021
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

6.2.3. Test data

Please refer to following diagram for individual

Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1900	28.77	10.08	38.85	64.04	-25.19	QP	
2		0.1900	14.47	10.08	24.55	54.04	-29.49	AVG	
3		0.2419	28.42	10.08	38.50	62.03	-23.53	QP	
4		0.2419	16.58	10.08	26.66	52.03	-25.37	AVG	
5		0.3420	26.04	10.09	36.13	59.15	-23.02	QP	
6		0.3420	15.10	10.09	25.19	49.15	-23.96	AVG	
7		0.4339	24.26	10.10	34.36	57.18	-22.82	QP	
8		0.4339	13.71	10.10	23.81	47.18	-23.37	AVG	
9		0.8700	20.97	10.13	31.10	56.00	-24.90	QP	
10		0.8700	12.41	10.13	22.54	46.00	-23.46	AVG	
11		2.2620	23.95	10.19	34.14	56.00	-21.86	QP	
12	*	2.2620	14.07	10.19	24.26	46.00	-21.74	AVG	

Note:

Freq. = Emission frequency in MHz

Reading level (dBuV) = Receiver reading

Corr. Factor (dB) = Lisen factor + Cable loss

Measurement (dBuV) = Reading level (dBuV) + Corr. Factor (dB)

Limit (dBuV) = Limit stated in standard

Margin (dB) = Measurement (dBuV) – Limits (dBuV)

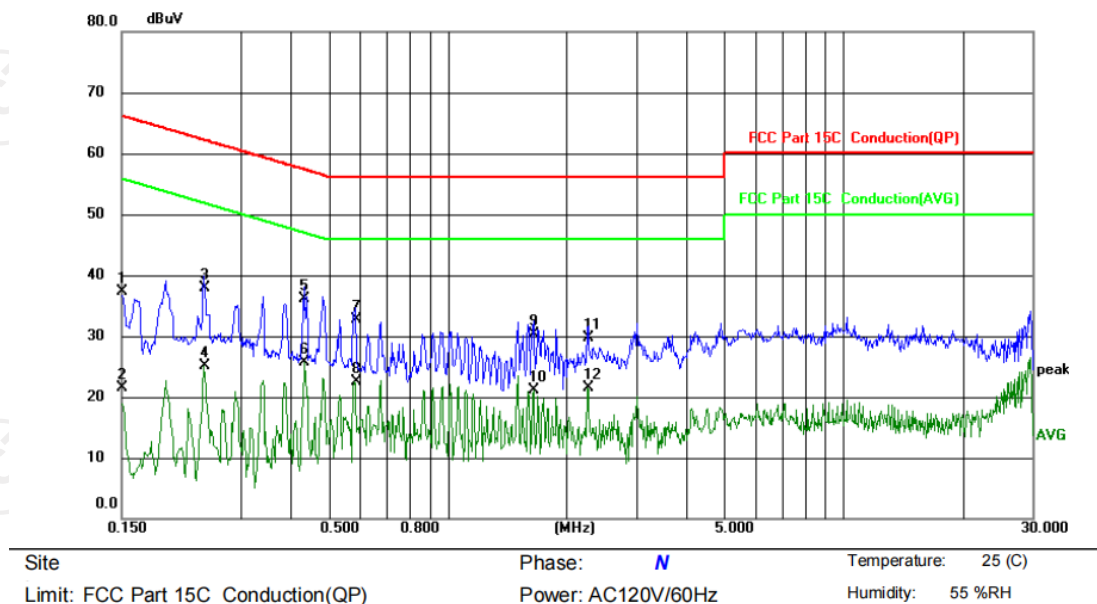
Q.P. =Quasi-Peak

AVG =average

Any value more than 10dB below limit have not been specifically reported.

* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz

Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



No.	Mk.	Freq. MHz	Reading Level dBμV	Correct Factor dB	Measure- ment dBμV	Limit dBμV	Over dB	Detector	Comment
1		0.1500	27.23	10.10	37.33	66.00	-28.67	QP	
2		0.1500	11.32	10.10	21.42	56.00	-34.58	AVG	
3		0.2419	27.86	10.12	37.98	62.03	-24.05	QP	
4		0.2419	14.94	10.12	25.06	52.03	-26.97	AVG	
5	*	0.4339	25.95	10.13	36.08	57.18	-21.10	QP	
6		0.4339	15.64	10.13	25.77	47.18	-21.41	AVG	
7		0.5859	22.50	10.14	32.64	56.00	-23.36	QP	
8		0.5859	12.27	10.14	22.41	46.00	-23.59	AVG	
9		1.6459	20.18	10.22	30.40	56.00	-25.60	QP	
10		1.6459	10.85	10.22	21.07	46.00	-24.93	AVG	
11		2.2620	19.49	10.26	29.75	56.00	-26.25	QP	
12		2.2620	11.29	10.26	21.55	46.00	-24.45	AVG	

Note1:

Freq. = Emission frequency in MHz

Reading level (dBμV) = Receiver reading

Corr. Factor (dB) = Liss factor + Cable loss

Measurement (dBμV) = Reading level (dBμV) + Corr. Factor (dB)

Limit (dBμV) = Limit stated in standard

Margin (dB) = Measurement (dBμV) – Limits (dBμV)

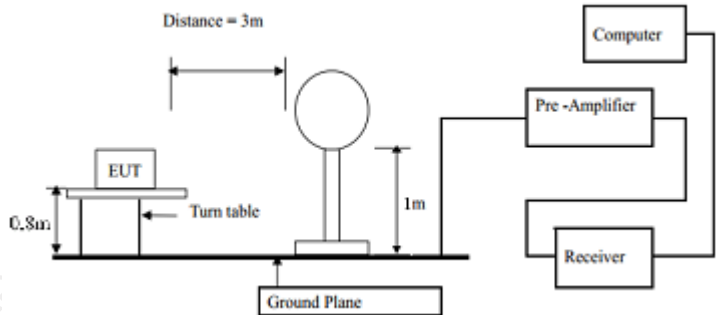
Q.P. =Quasi-Peak AVG =average

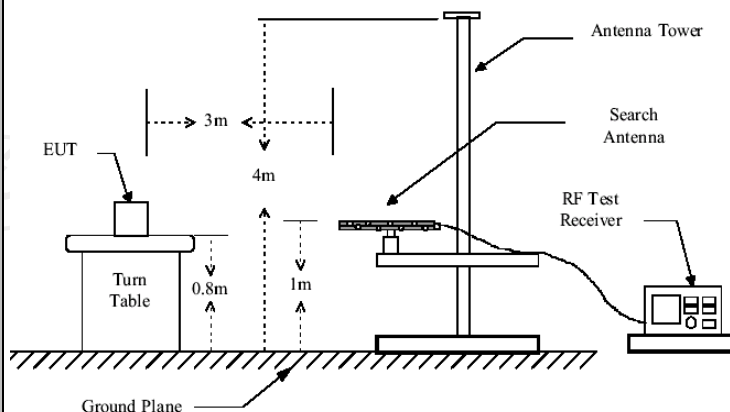
Any value more than 10dB below limit have not been specifically reported.

* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.

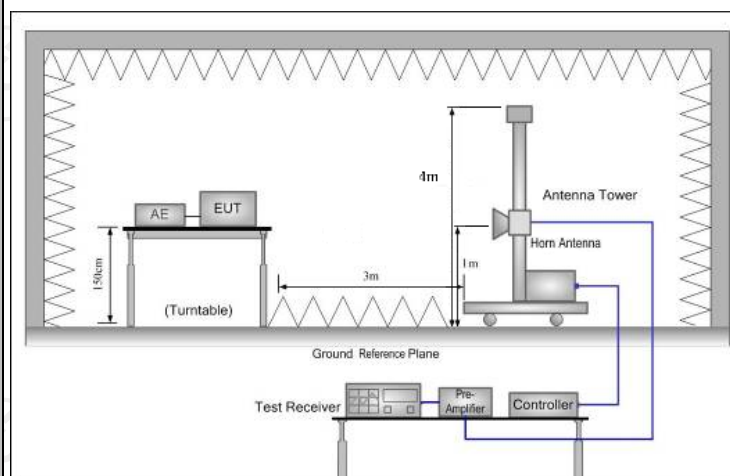
6.3. Radiated Spurious Emission Measurement

6.3.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.209			
Test Method:	ANSI C63.10: 2013			
Frequency Range:	9 kHz to 25 GHz			
Measurement Distance:	3 m			
Antenna Polarization:	Horizontal & Vertical			
Operation mode:	Refer to item 4.1			
Receiver Setup:	Frequency	Detector	RBW	VBW
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz
	150kHz- 30MHz	Quasi-peak	9kHz	30kHz
	30MHz-1GHz	Quasi-peak	120KHz	300KHz
	Above 1GHz	Peak	1MHz	3MHz
Limit:	Remark			
	Quasi-peak Value			
	Quasi-peak Value			
	Quasi-peak Value			
	Peak Value			
Test setup:	Average Value			
Test setup:	Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)	
	0.009-0.490	2400/F(KHz)	300	
	0.490-1.705	24000/F(KHz)	30	
	1.705-30	30	30	
	30-88	100	3	
Test setup:	88-216	150	3	
	216-960	200	3	
	Above 960	500	3	
Test setup:	Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)	Detector
	Above 1GHz	500	3	Average
		5000	3	Peak
Test setup:	For radiated emissions below 30MHz			
				
	30MHz to 1GHz			



Above 1GHz



Test Procedure:

1. For the radiated emission test below 1GHz:
The EUT was placed on a turntable with 0.8 meter above ground. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high PASS filter are used for the test in order to get better signal level.
For the radiated emission test above 1GHz:
Place the measurement antenna on a turntable with 1.5 meter above ground, which is away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final

	measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. 2. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level 3. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported. 4. Use the following spectrum analyzer settings: (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=120 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold; (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement. For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent. VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Test mode:	Refer to section 4.1 for details
Test results:	PASS

6.3.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Test Receiver	ROHDE&SCHW ARZ	ESIB7	100197	Jul. 27, 2021
Spectrum Analyzer	ROHDE&SCHW ARZ	FSQ40	200061	Sep. 11, 2021
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 02, 2021
Pre-amplifier	HP	8447D	2727A05017	Sep. 02, 2021
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 05, 2022
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 04, 2022
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 04, 2022
Horn Antenna	A-INFO	LB-180400-KF	J211020657	Sep. 04, 2022
Antenna Mast	Keleto	RE-AM	N/A	N/A
Line-4	RE-high-04	TCT	N/A	Sep. 02, 2021
Line-8	RE-01	TCT	N/A	Jul. 27, 2021
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

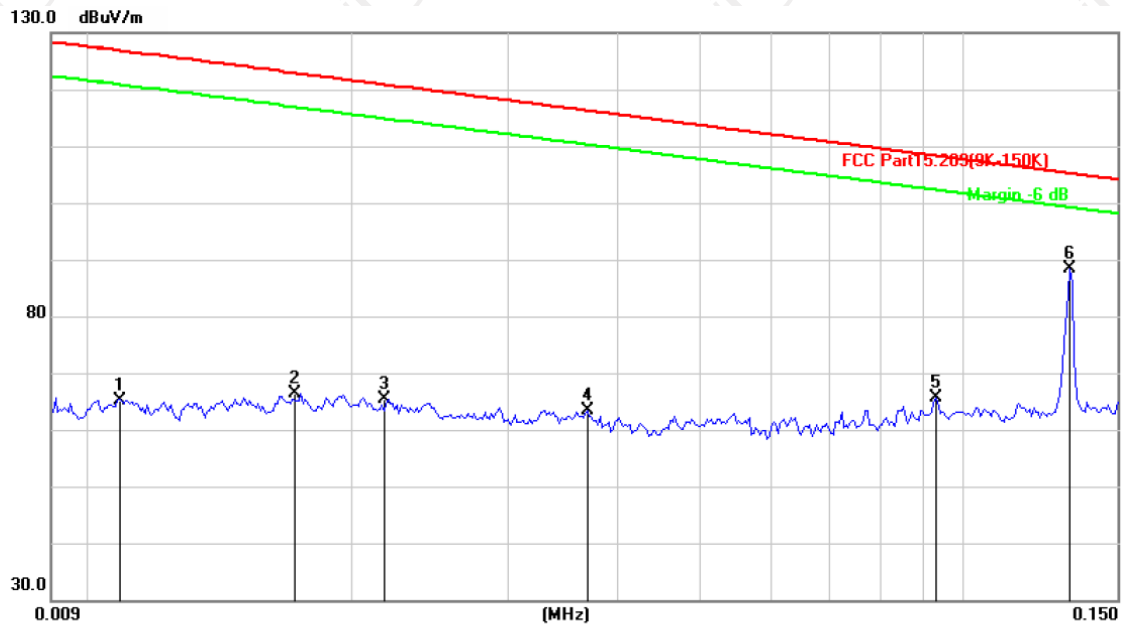
Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

6.3.3. Test Data

Please refer to following diagram for individual

9KHz-30MHz

9KHz-150KHz:



Site

Polarization: **Horizontal**

Temperature: 25

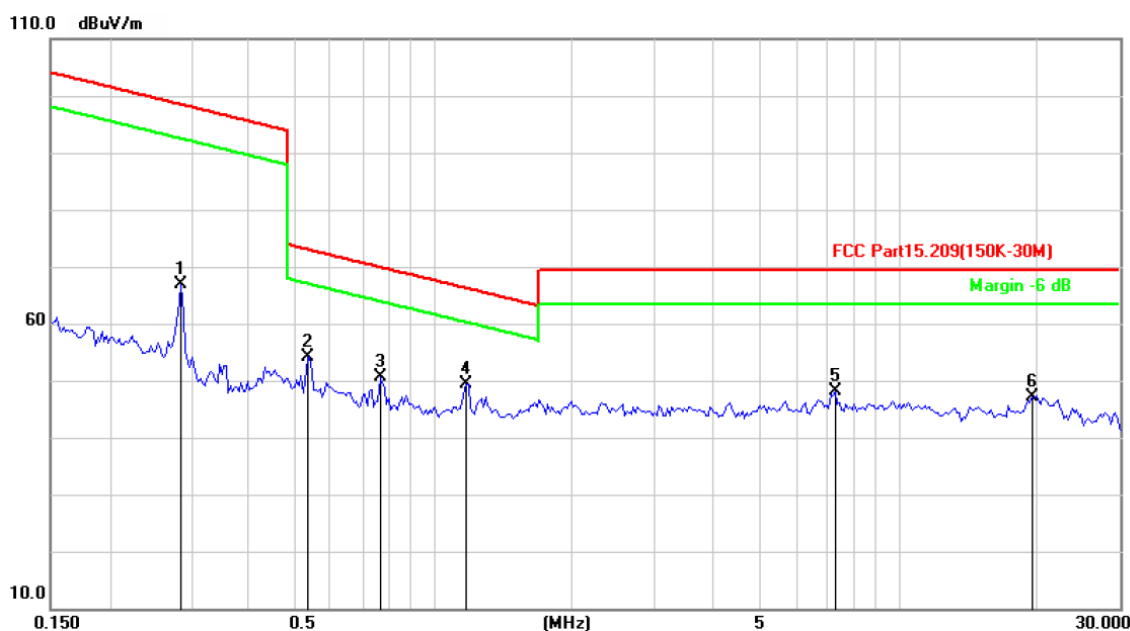
Limit: FCC Part15.209(9K-150K)

Power:

Humidity: 55 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		0.0108	41.83	23.42	65.25	126.9	-61.68	peak
2		0.0171	46.26	20.08	66.34	122.9	-56.60	peak
3		0.0217	46.76	18.65	65.41	120.8	-55.47	peak
4		0.0371	43.69	19.69	63.38	116.2	-52.84	peak
5		0.0926	42.07	23.46	65.53	108.2	-42.76	peak
6	*	0.1324	62.94	25.53	88.47	105.1	-16.71	peak

150KHz-30MHz:

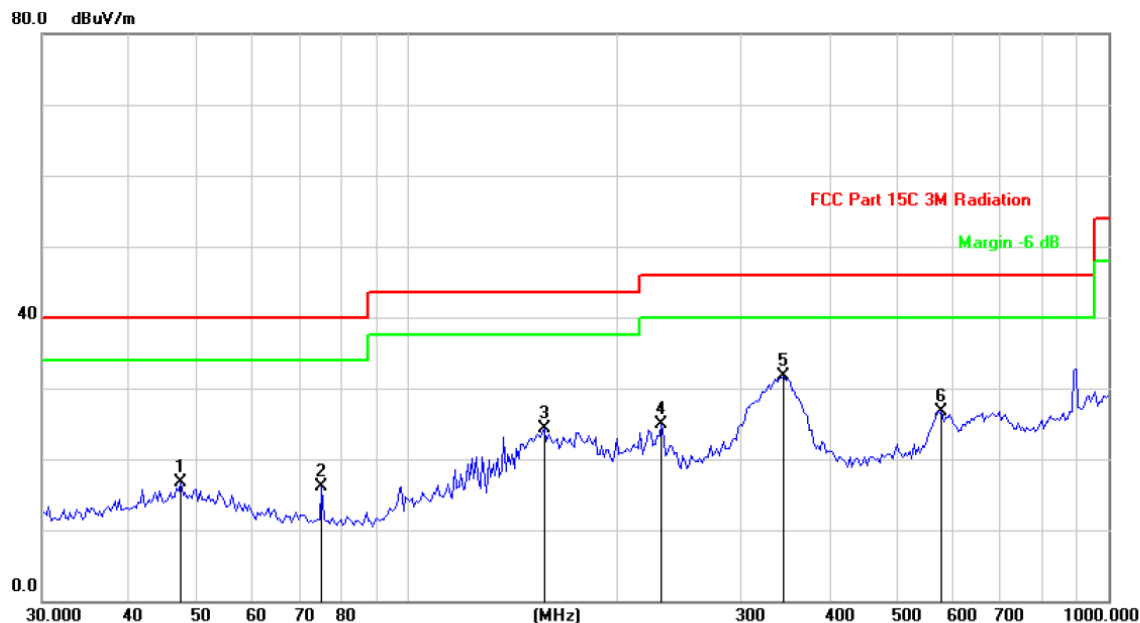


Site: Polarization: **Horizontal** Temperature: 25
 Limit: FCC Part15.209(150K-30M) Power: Humidity: 55 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		0.2867	41.16	25.83	66.99	98.46	-31.47	peak
2		0.5361	28.68	25.45	54.13	73.02	-18.89	peak
3		0.7691	25.12	25.45	50.57	69.90	-19.33	peak
4	*	1.1767	24.00	25.39	49.39	66.21	-16.82	peak
5		7.3083	22.31	25.73	48.04	69.50	-21.46	peak
6		19.4115	21.46	25.57	47.03	69.50	-22.47	peak

30MHz-1GHz

Horizontal:



Site

Polarization: **Horizontal**

Temperature: 25

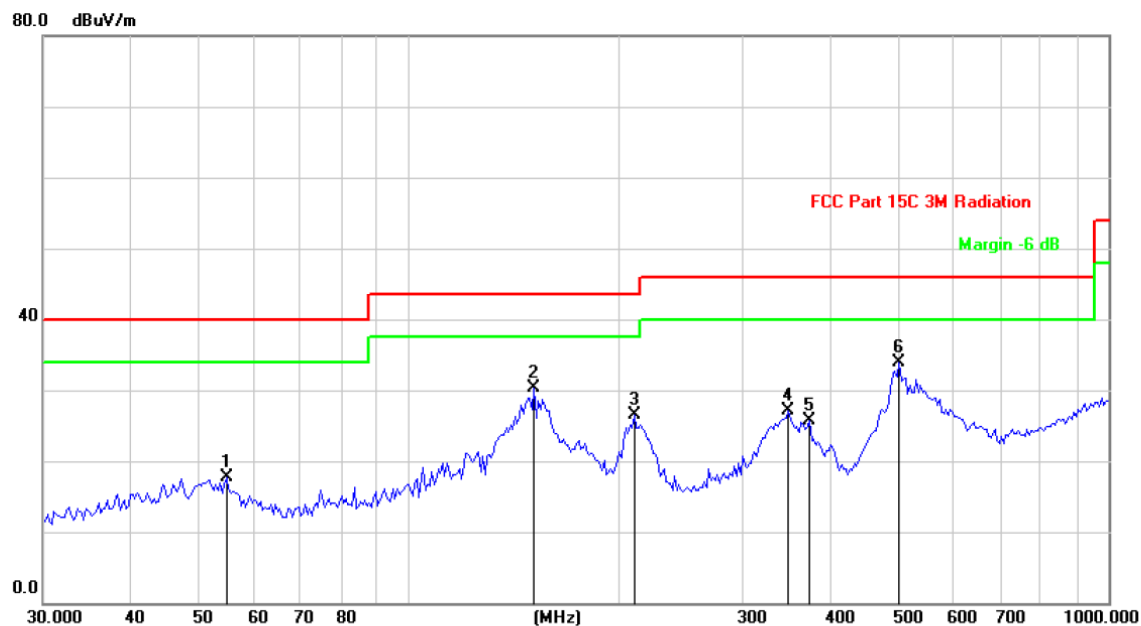
Limit: FCC Part 15C 3M Radiation

Power:

Humidity: 55 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector
		MHz	dBuV	dB	dBuV/m	dB/m	dB	
1		47.3688	28.80	-12.04	16.76	40.00	-23.24	peak
2		75.3208	31.80	-15.79	16.01	40.00	-23.99	peak
3		156.4259	39.72	-15.37	24.35	43.50	-19.15	peak
4		230.2295	37.71	-12.87	24.84	46.00	-21.16	peak
5	*	343.6506	41.12	-9.42	31.70	46.00	-14.30	peak
6		578.0359	32.19	-5.42	26.77	46.00	-19.23	peak

Vertical:



Site

Polarization: **Vertical**

Temperature: 25

Limit: FCC Part 15C 3M Radiation

Power:

Humidity: 55 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over
		MHz	dBuV	dB	dBuV/m	dB/m	Detector
1		54.9011	30.66	-13.01	17.65	40.00	-22.35 peak
2		151.0252	46.02	-15.62	30.40	43.50	-13.10 peak
3		210.1294	39.71	-13.28	26.43	43.50	-17.07 peak
4		348.5145	36.44	-9.33	27.11	46.00	-18.89 peak
5		373.8861	35.06	-9.35	25.71	46.00	-20.29 peak
6	*	502.2473	41.32	-7.51	33.81	46.00	-12.19 peak

Note:

Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

Appendix A: Photographs of Test Setup

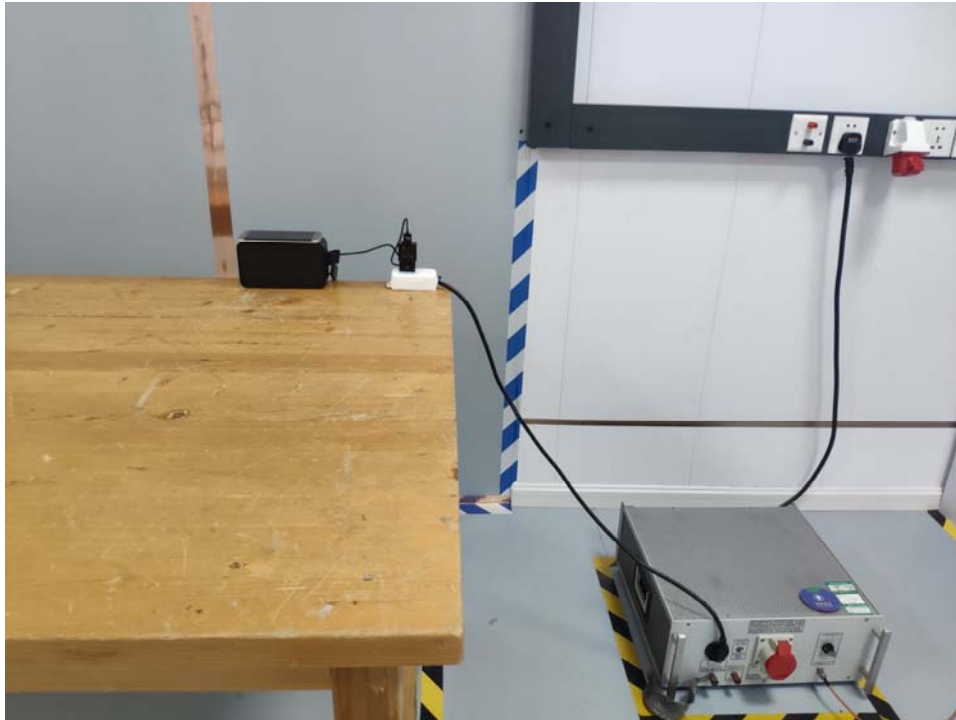
Product: Solar Boombox

Model: Boombox

Radiated Emission



Conducted Emission



Appendix B: Photographs of EUT

Refer to test report TCT210205E021

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