

FCC Test Report

Client Name : Seeed Technology Co., Ltd.

Address : 9F, G3 Building, TCL International E City, Zhongshanyuan
Road, Nanshan District, Shenzhen, Guangdong Province,
P.R.C

Product Name : Seeeduino XIAO

Date : Mar. 30, 2020



Shenzhen Anbotech Compliance Laboratory Limited

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TEST REPORT

Applicant : Seeed Technology Co., Ltd.

Manufacturer : Seeed Technology Co., Ltd.

Product Name : Seeeduino XIAO

Model No. : Seeeduino XIAO

Trade Mark : Seeed Studio

Rating(s) : DC 5V, 50mA

Test Standard(s) : FCC Rules and Regulations Part 15 Subpart B: 2019

Test Method(s) : ANSI C63.4-2014

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited 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 Anbotek Compliance Laboratory Limited Is assumed full responsibility for the accuracy and completeness of these measurements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited

Date of Receipt: Mar. 12, 2020

Date of Test: Mar. 12~28, 2020

Prepared By:

Flora Luo

(Engineer / Flora Luo)

Reviewer:

Well Wang

(Supervisor / Well Wang)

Approved & Authorized Signer:

Tom Chen

(Manager / Tom Chen)

1. General Information

1.1. Client Information

Applicant	:	Seed Technology Co., Ltd.
Address	:	9F, G3 Building, TCL International E City, Zhongshanyuan Road, Nanshan District, Shenzhen, Guangdong Province, P.R.C
Manufacturer	:	Seed Technology Co., Ltd.
Address	:	9F, G3 Building, TCL International E City, Zhongshanyuan Road, Nanshan District, Shenzhen, Guangdong Province, P.R.C
Factory	:	Seed Technology Co., Ltd.
Address	:	9F, G3 Building, TCL International E City, Zhongshanyuan Road, Nanshan District, Shenzhen, Guangdong Province, P.R.C

1.2. Description of Device (EUT)

Product Name	:	Seeeduino XIAO
Model No.	:	Seeeduino XIAO
Trade Mark	:	Seed Studio
Test Power Supply	:	DC 5V via adapter
Test Sample No.	:	1-1-1
Product Description	:	Adapter: N/A
Remark: (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.		

1.3. Auxiliary Equipment Used During Test

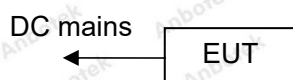
N/A	
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1.4. Description of Test Mode

Pretest Mode	Description
Mode 1	On

For Mode 1 Block Diagram of Test Setup



1.5. Test Summary

Test Items	Test Mode	Status
Power Line Conducted Emission Test (150KHz To 30MHz)	Mode 1	P
Radiated Emission Test (30MHz To 1000MHz)	Mode 1	P
P) Indicates "PASS". N) Indicates "Not applicable".		

1.6. Test Equipment List

Conducted Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Nov. 04, 2019	1 Year
2.	L.I.S.N. Artificial Mains Network	Schwarzbeck	NSLK 8127	8127386	Nov. 04, 2019	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Nov. 04, 2019	1 Year
4.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Nov. 04, 2019	1 Year
5.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A

Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Nov. 04, 2019	1 Year
2.	Pre-amplifier	SONOMA	310N	186860	Nov. 04, 2019	1 Year
3.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 01, 2019	1 Year
4.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A

1.7. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 3.9 dB (Horizontal)
		Ur = 3.8 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4 dB
Disturbance Uncertainty	:	Ud = 3.4 dB

1.8. Description of Test Facility

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

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111, September 27, 2019.

ISED-Registration No.: 8058A

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A, March 07, 2019.

Test Location

Shenzhen Anbotek Compliance Laboratory Limited.
1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518128



2. Power Line Conducted Emission Test

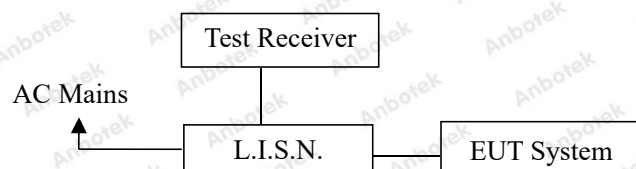
2.1. Test Standard and Limit

Test Standard	FCC Part 15 Subpart B
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Power Line Conducted Emission Measurement Limits (FCC Part 15 Class B)

Test Limit	Frequency (MHz)	At mains terminals (dBμV)	
		Quasi-peak Level	Average Level
	0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
	0.50 ~ 5.00	56	46
	5.00 ~ 30.00	60	50
Remark: (1) The lower limit shall apply at the transition frequencies. (2) * Decreasing linearly with logarithm of frequency.			

2.2. Test Setup



2.3. EUT Configuration on Measurement

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.

2.4. Operating Condition of EUT

2.4.1. Setup the EUT as shown in Section 2.2.

2.4.2. Turn on the power of all equipments.

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

2.5. Test Procedure

The EUT system 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 line 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 FCC ANSI C63.4-2014 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9KHz.

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

All the test results are listed in Section 2.6.

2.6. Test Results

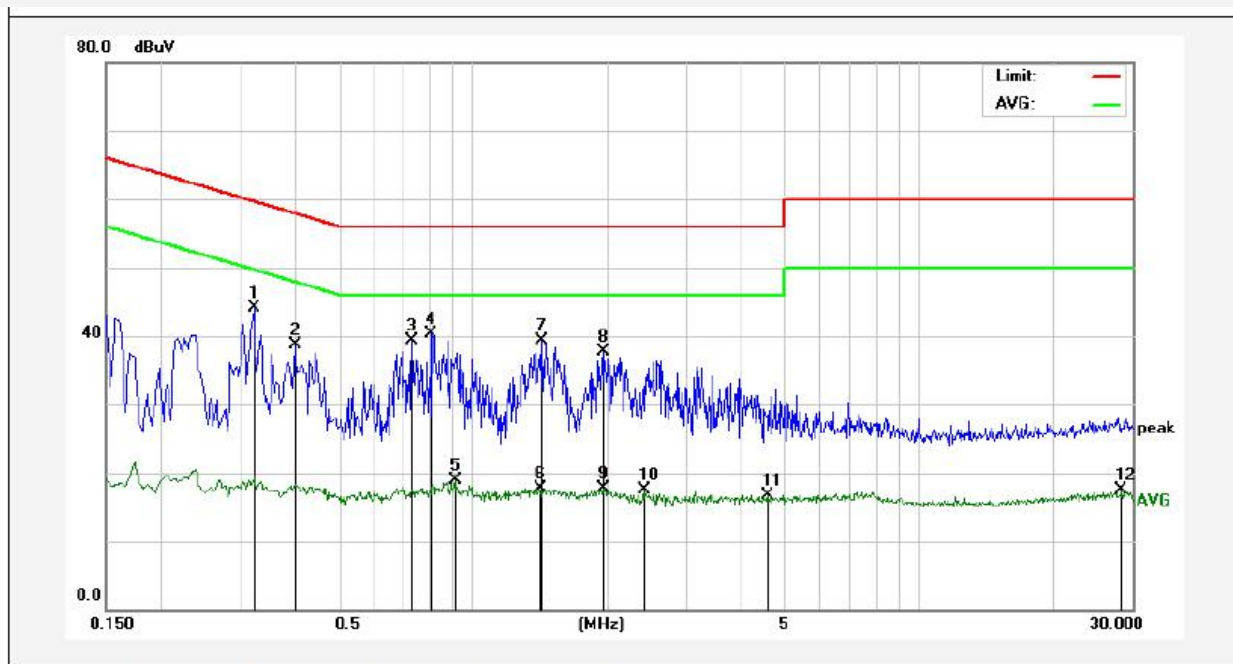
PASS

The test curves are shown in the following pages.



Conducted Emission Test Data

Test Site: 1# Shielded Room
Test Specification: DC 5V via adapter
Comment: Live Line
Temp.: 22.5°C Hum.: 52%

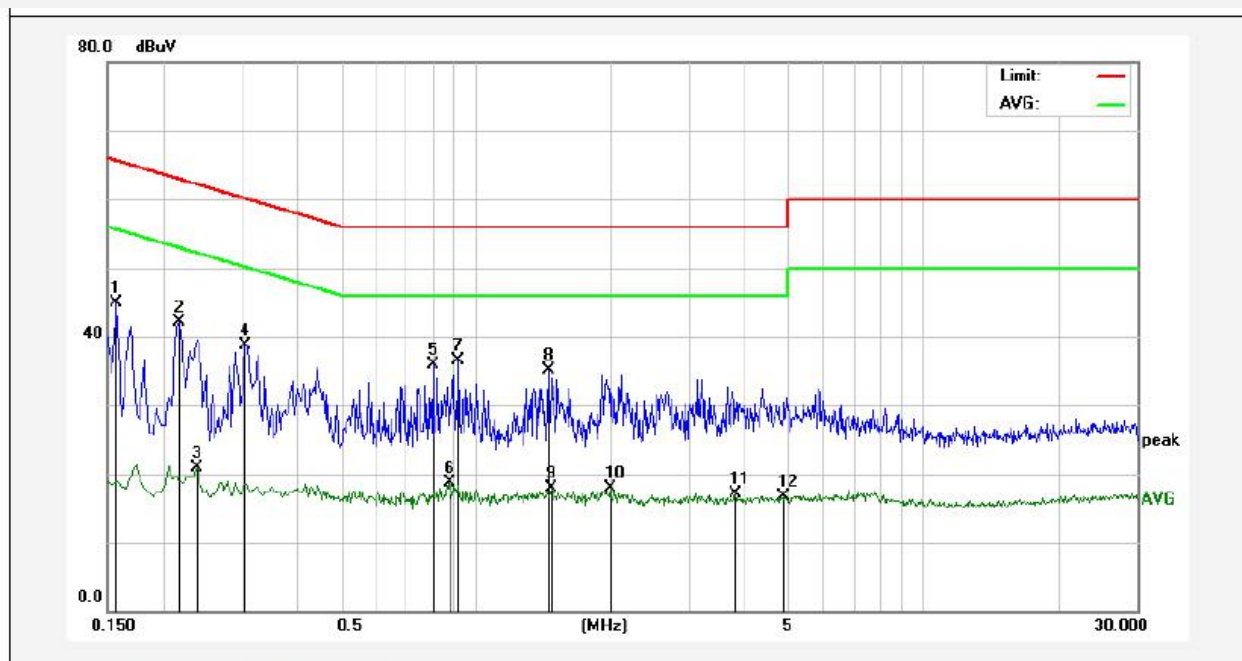


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.3220	24.13	19.90	44.03	59.65	-15.62	QP	
2	0.3980	18.77	19.93	38.70	57.89	-19.19	QP	
3	0.7300	19.32	20.05	39.37	56.00	-16.63	QP	
4	0.8059	20.14	20.07	40.21	56.00	-15.79	QP	
5	0.9100	-1.24	20.10	18.86	46.00	-27.14	AVG	
6	1.4100	-2.41	20.13	17.72	46.00	-28.28	AVG	
7	1.4299	19.15	20.13	39.28	56.00	-16.72	QP	
8	1.9500	17.66	20.14	37.80	56.00	-18.20	QP	
9	1.9500	-2.44	20.14	17.70	46.00	-28.30	AVG	
10	2.4140	-2.72	20.15	17.43	46.00	-28.57	AVG	
11	4.5580	-3.40	20.19	16.79	46.00	-29.21	AVG	
12	28.4380	-2.81	20.27	17.46	50.00	-32.54	AVG	

Note: Result=Reading+Factor Over Limit=Result-Limit

Conducted Emission Test Data

Test Site: 1# Shielded Room
 Test Specification: DC 5V via adapter
 Comment: Neutral Line
 Temp.: 22.5°C Hum.: 52%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1580	24.91	19.90	44.81	65.56	-20.75	QP	
2	0.2180	22.27	19.90	42.17	62.89	-20.72	QP	
3	0.2380	0.99	19.89	20.88	52.16	-31.28	AVG	
4	0.3060	18.88	19.89	38.77	60.08	-21.31	QP	
5	0.8020	15.76	20.07	35.83	56.00	-20.17	QP	
6	0.8700	-1.45	20.09	18.64	46.00	-27.36	AVG	
7	0.9180	16.33	20.10	36.43	56.00	-19.57	QP	
8	1.4540	15.03	20.13	35.16	56.00	-20.84	QP	
9	1.4740	-2.29	20.13	17.84	46.00	-28.16	AVG	
10	1.9940	-2.31	20.14	17.83	46.00	-28.17	AVG	
11	3.8180	-2.98	20.18	17.20	46.00	-28.80	AVG	
12	4.8739	-3.58	20.20	16.62	46.00	-29.38	AVG	

Note: Result=Reading+Factor Over Limit=Result-Limit



3. Radiated Emission Test

3.1. Test Standard and Limit

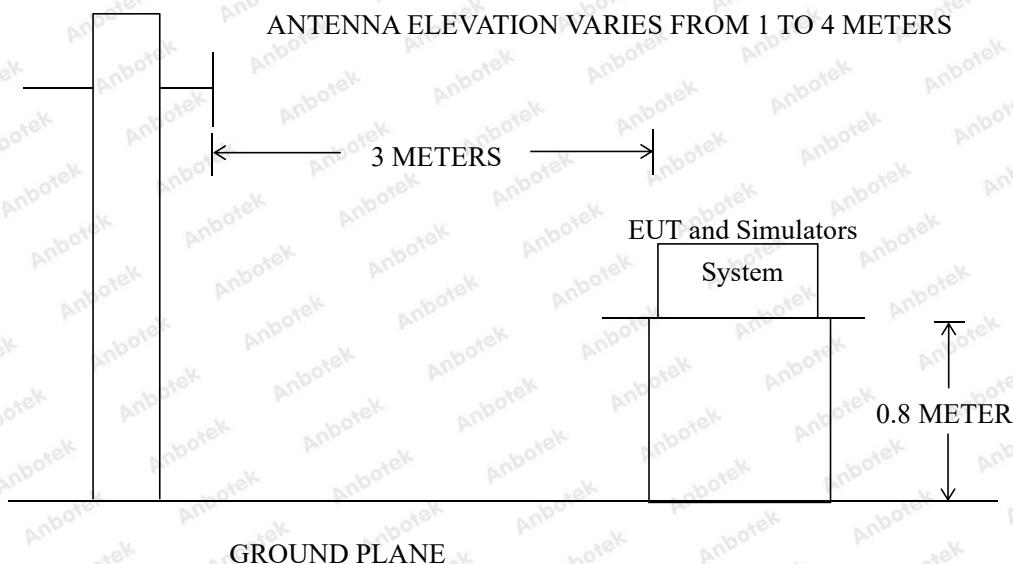
Test Standard	FCC Part 15 Subpart B
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Radiated Emission Test Limit (Subpart B Class B)

Test Limit	Frequency (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT	
			$\mu\text{V/m}$	(dB $\mu\text{V/m}$)
	30 ~ 88	3	100	40
	88 ~ 216	3	150	43.5
	216 ~ 960	3	200	46
	960 ~ 1000	3	500	54

Remark: (1) Emission level (dB) μV = 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.

3.2. Test Setup



3.3. EUT Configuration on Measurement

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

3.4. Operating Condition of EUT

3.4.1. Setup the EUT as shown in Section 3.2.

3.4.2. Turn on the power of all equipments.

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

3.5. Test Procedure

EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground. The turn table 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 a 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 (Trilog Broadband 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 EMI test receiver (ESCI) is set at 120kHz.

The frequency range from 30MHz to 1000MHz is checked.

The test results are listed in Section 3.6.

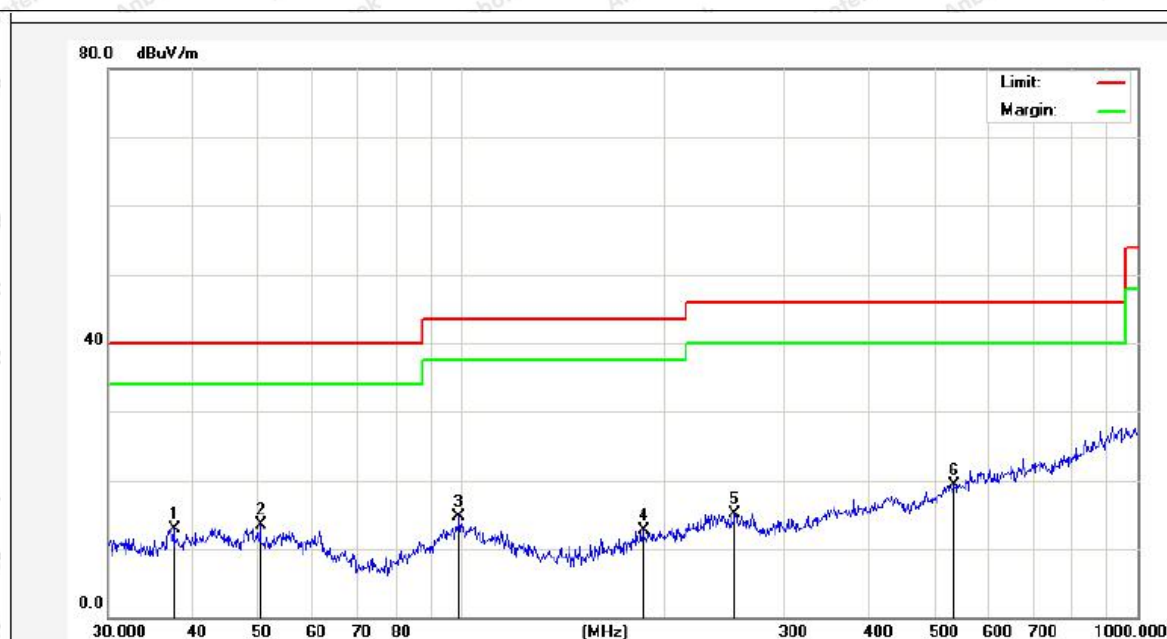
3.6. Test Results

PASS

The test curves are shown in the following pages.



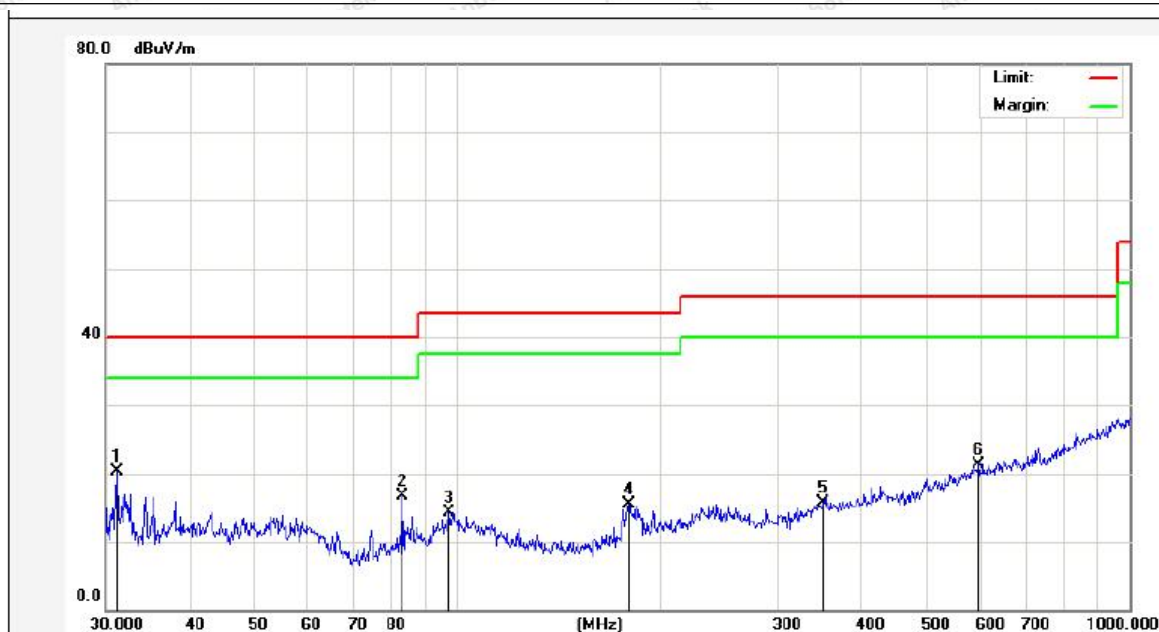
Test item: Radiation Test **Polarization:** Horizontal
Standard: (RE)FCC Part 15 Subpart B **Power Source:** DC 5V via adapter
Distance: 3m **Temp.(°C)/Hum.(%RH):** 22.1(°C)/49%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	37.5479	31.42	-18.46	12.96	40.00	-27.04	peak			
2	50.4089	31.66	-18.12	13.54	40.00	-26.46	peak			
3	99.1797	37.25	-22.59	14.66	43.50	-28.84	peak			
4	185.7882	35.84	-23.17	12.67	43.50	-30.83	peak			
5	253.8367	35.95	-20.79	15.16	46.00	-30.84	peak			
6	535.7073	32.35	-13.00	19.35	46.00	-26.65	peak			

Note: Result=Reading+Factor Over Limit=Result-Limit

Test item: Radiation Test **Polarization:** Vertical
Standard: (RE)FCC Part 15 Subpart B **Power Source:** DC 5V via adapter
Distance: 3m **Temp.(°C)/Hum.(%RH):** 22.1(°C)/49%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	31.1798	38.62	-18.25	20.37	40.00	-19.63	peak			
2	82.9385	37.00	-20.30	16.70	40.00	-23.30	peak			
3	97.1148	30.95	-16.73	14.22	43.50	-29.28	peak			
4	180.0165	34.62	-19.16	15.46	43.50	-28.04	peak			
5	350.4768	30.86	-15.19	15.67	46.00	-30.33	peak			
6	597.2234	32.32	-10.92	21.40	46.00	-24.60	peak			

Note: Result=Reading+Factor Over Limit=Result-Limit



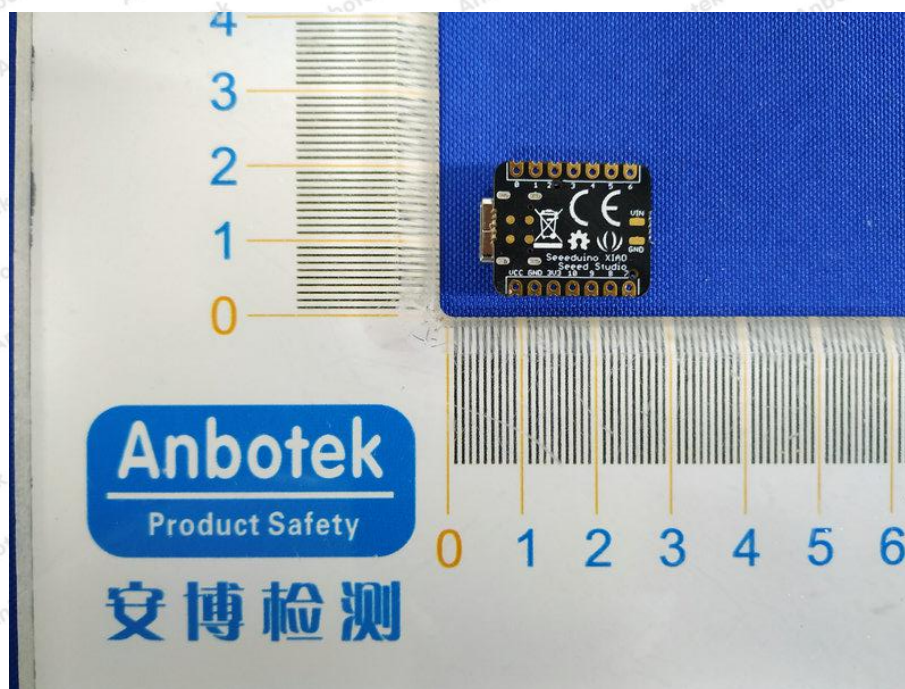
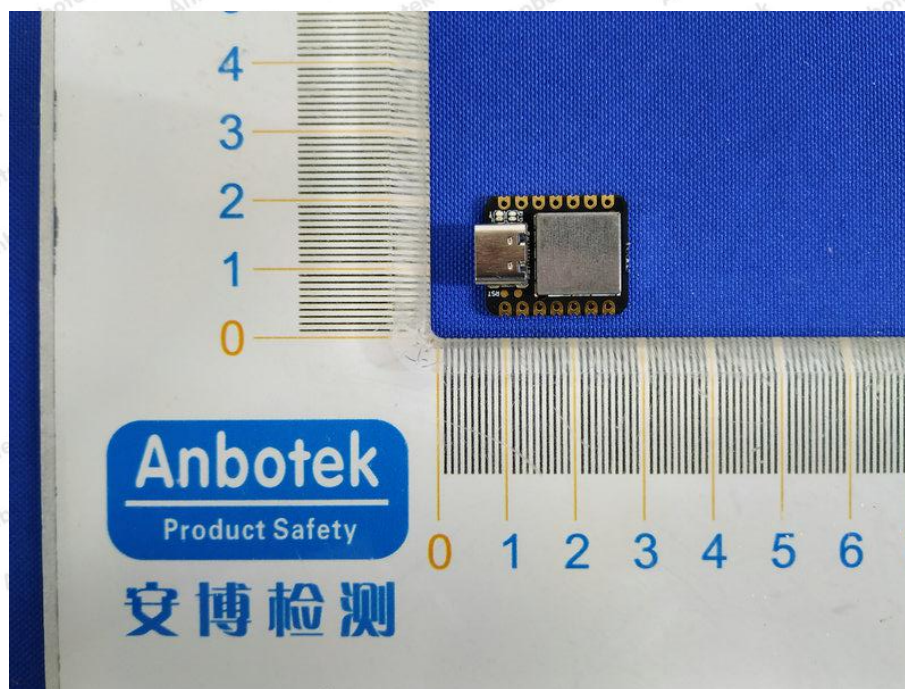
APPENDIX I -- TEST SETUP PHOTOGRAPH

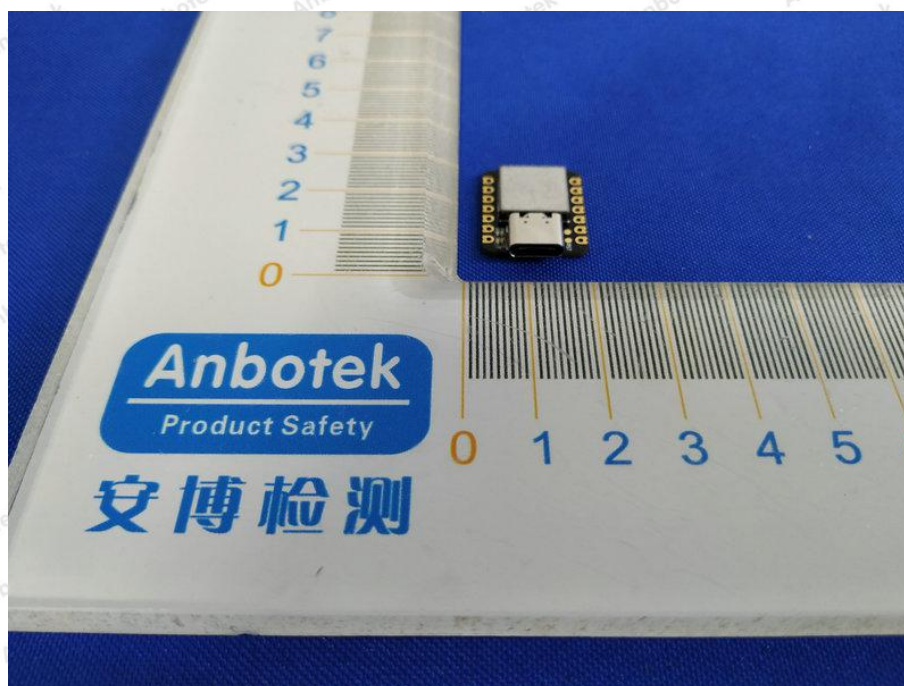
Photo of Power Line Conducted Emission Test



Photo of Radiated Emission Test



APPENDIX II -- EXTERNAL PHOTOGRAPH



----- End of Report -----

