

TEST REPORT

Applicant Name : Seeed Technology Co., Ltd
Address : 9F, G3 Building, TCL International E City, Zhongshanyuan Road,
Nanshan District, Shenzhen, Guangdong Province, P.R.C
Report Number : SZNS1220329-11264E-EM

Test Standard (s)

EN 55032: 2015/A1:2020
EN IEC 61000-3-2:2019
EN 61000-3-3:2013+A1:2019
EN 55035: 2017/A11:2020

Sample Description

Product Type: XIAO RP2040
Model No.: XIAO RP2040
Trade Mark: Seeed Studio
Date Received: 2022-03-29
Date of Test: 2022-03-31 to 2022-04-08
Report Date: 2022-04-12

Test Result:

Pass*

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

Prepared and Checked By:

Approved By:

Amy Cao

Amy Cao
Engineer

Robert Li
Manager

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

Applicant : Seeed Technology Co., Ltd
Manufacturer : Seeed Technology Co., Ltd
Product : XIAO RP2040
Model No. : XIAO RP2040
Trade Mark : Seeed Studio

Measurement Procedure Used:

EN 55032: 2015/A1:2020
EN IEC 61000-3-2:2019
EN 61000-3-3:2013+A1:2019
EN 55035: 2017/A11:2020

The device described above is tested by Shenzhen Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full of responsibility for the accuracy and completeness of these measurements.

This report applies to above tested sample only and 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
Conducted Emission	EN 55032: 2015/A1:2020	Pass
Radiated Emission	EN 55032: 2015/A1:2020	Pass
Harmonic Current	EN IEC 61000-3-2:2019	Not applicable*
Voltage Fluctuation and Flicker	EN 61000-3-3:2013+A1:2019	Pass
Electrostatic discharges (ESD)	IEC61000-4-2:2008	Pass
RF electromagnetic field disturbances	IEC61000-4-3:2006+A1:2007+A2:2010	Pass
Electrical fast transients/burst (EFT/B)	IEC61000-4-4:2012	Pass
Surge	IEC61000-4-5:2014+A1:2017	Pass
Continuous induced RF disturbances	IEC61000-4-6:2013	Pass
Power frequency magnetic field	IEC61000-4-8:2009	Pass
Voltage dips and interruptions	IEC61000-4-11:2004+A1:2017	Pass

Note:

Not applicable*: The EUT power is 0.5W, less than 75W, so the harmonic is unnecessary to test.

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Product	: XIAO RP2040
Model No.	: XIAO RP2040
Rating	: AC 230V/50Hz
Rating	: AC 100-240V~50/60Hz
Remark(s)	: The EUT's highest operating frequency is 1000MHz, the radiated emission measurement shall be made up to 2GHz.
Applicant	: Seeed Technology Co., Ltd
Address	: 9F, G3 Building, TCL International E City, Zhongshanyuan Road, Nanshan District, Shenzhen, Guangdong Province, P.R.C
Manufacturer	: Seeed Technology Co., Ltd
Address	: 9F, G3 Building, TCL International E City, Zhongshanyuan Road, Nanshan District, Shenzhen, Guangdong Province, P.R.C
Sample Number	: SZNS1220329-11264E-EM -S1

2.2. Test mode

Test mode: Normal Working

2.3. General disclaimer

1. Each test item follows test standard and with no deviation.
2. The test results presented in this report relate only to the object tested. The information supplied by the customer can affect the validity of results.

2.4. Accessory and Auxiliary Equipment

Adapter : Switching Adapter:
Model: HJ-050T000B3-EU
INPUT: 100-240V, 50/60Hz 0.15A
OUTPUT: DC5V/1A

Unshielded : 95cm
Detachable USB
Cable

2.5. Performance criteria

A functional description and a definition of performance criteria, during or as a consequence of the EMC testing, shall be provided by the manufacturer and noted in the test report, based on the following criteria.

Performance criterion A: The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however no change of actual operating state or stored data is allowed to persist after the test. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C: Temporary loss of function is allowed, provided the function is selfrecoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

2.6. Description of Test Facility

EMC Lab

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

2.7. Measurement Uncertainty

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

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

Conduction Emission Expanded Uncertainty
(150kHz-30MHz) : $U=2.72dB, k=2$

Harmonic current expanded uncertainty : $U=0.512\%, k=2$

3. MEASURING DEVICE AND TEST EQUIPMENT

3.1.For Conducted Emission Test

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

3.2.For Radiated Emission Measurement

Item	Manufacturer	Equipment	Model No.	Serial No.	Calibration Date	Calibration Due Date
1.	Rohde& Schwarz	Test Receiver	ESR	102725	2021/12/13	2022/12/12
2.	SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/11/09	2022/11/08
3.	Rohde& Schwarz	Spectrum Analyzer	FSV40	101949	2021/12/13	2022/12/12
4.	A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2021/11/09	2022/11/08
5.	Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
6.	Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
7.	Unknown	RF Coaxial Cable	No.10	N050	2021/12/14	2022/12/13
8.	Unknown	RF Coaxial Cable	No.11	N1000	2021/12/14	2022/12/13
9.	Unknown	RF Coaxial Cable	No.12	N040	2021/12/14	2022/12/13
10.	Unknown	RF Coaxial Cable	No.13	N300	2021/12/14	2022/12/13
11.	Unknown	RF Coaxial Cable	No.14	N800	2021/12/14	2022/12/13
12.	Radiated Emission Test Software: e3 19821b (V9)					

3.3.For Harmonic & Flicker Test

Item	Manufacturer	Equipment	Model No.	Serial No.	Calibration Date	Calibration Due Date
1.	California Instruments	5KVA AC POWER SOURCE	5001iX-400	55692	2021/12/14	2022/12/13
2.	California Instruments	HARMONICS/FLICKER TEST ANALYZER	PACS-1	72254	2021/12/17	2022/12/16

3.4.For Electrostatic Discharge Immunity Test

Item	Manufacturer	Equipment	Model No.	Serial No.	Calibration Date	Calibration Due Date
1.	TESEQ	ESD Generator	NSG 437	823	2021/12/17	2022/12/16

3.5.For RF Strength Susceptibility Test

Item	Manufacturer	Equipment	Model No.	Serial No.	Calibration Date	Calibration Due Date
1.	TESEQ	RF-Generator	ITS 6006	37538	2021/12/13	2022/12/12
2.	TESEQ	Power Amplifier(80 – 1000MHz)	CBA 1G-070	T44328	NCR	NCR
3.	A&R	Linear Power Amplifier (1 – 6GHz)	AS0860-40/45	1060913	NCR	NCR
4.	A&R	Trapezoidal Log Periodic Antenna	ATT700M12G	0357149	NCR	NCR
5.	A&R	Log-Periodic Antenna	ATL80M1G	0356913	NCR	NCR
6.	TESEQ	Power Meter	PM6006	73801	2021/12/14	2021/12/13

3.6.For Electrical fast transients/burst (EFT/B) Test

Item	Manufacturer	Equipment	Model No.	Serial No.	Calibration Date	Calibration Due Date
1.	EM TEST	ULTRA COMPACT SIMULATOR	UCS 500 N5	V0928104968	2021/12/14	2022/12/13

3.7.For Surge Test

Item	Manufacturer	Equipment	Model No.	Serial No.	Calibration Date	Calibration Due Date
1.	EM TEST	ULTRA COMPACT SIMULATOR	UCS 500 N5	V0928104968	2021/12/14	2022/12/13

3.8.For Continuous induced RF disturbances Test

Item	Manufacturer	Equipment	Model No.	Serial No.	Calibration Date	Calibration Due Date
1.	FRANKONIA	Conducted Immunity Test System	CIT-10	126B1121	2021/12/14	2022/12/13
2.	FRANKONIA	CDN	CDN-M2/3	A3027020	2021/12/14	2022/12/13
3.	Weinschel	6dB Attenuator	WA59-6-33	091824	NCR	NCR

3.9.For Magnetic Field Immunity Test

Item	Manufacturer	Equipment	Model No.	Serial No.	Calibration Date	Calibration Due Date
1.	HAEFELY	Magnetic Field Tester	MAG100	150577	2021/12/13	2022/12/12

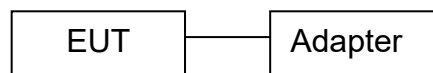
3.10.For Voltage Dips and Interruptions Test

Item	Manufacturer	Equipment	Model No.	Serial No.	Calibration Date	Calibration Due Date
1.	EM TEST	ULTRA COMPACT SIMULATOR	UCS 500 N5	V0928104968	2021/12/14	2022/12/13

4. CONDUCTED EMISSION TEST

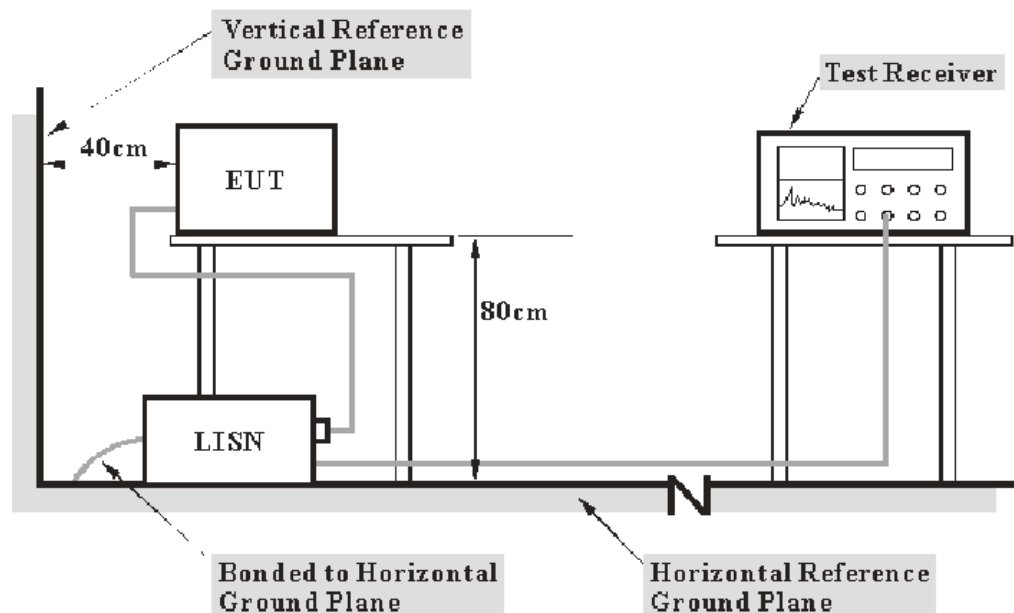
4.1. Block Diagram of Test Setup

4.1.1. Block diagram of connection between the EUT and simulators



(EUT: XIAO RP2040)

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. Test Standard and Limit(Class B)

4.2.1. Test Standard

EN 55032: 2015/A1:2020

4.2.2. Test Limit

Table A.9 – Requirements for conducted emissions from the AC mains power ports of Class B equipment

Applicable to				
1. AC mains power ports (3.1.1)				
Table clause	Frequency range MHz	Coupling device (see Table A.7)	Detector type / bandwidth	Class B limits dB(μV)
A9.1	0,15 – 0,5	AMN	Quasi Peak / 9 kHz	66 – 56
	0,5 – 5			56
	5 – 30			60
A9.2	0,15 – 0,5	AMN	Average / 9 kHz	56 – 46
	0,5 – 5			46
	5 – 30			50
Apply A9.1 and A9.2 across the entire frequency range.				

Telecommunication Conducted Emission Limits (Class B)

Frequency (MHz)	Voltage Limit dB(μV)		Current Limit dB(μA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15-0.50	84.0 - 74.0 *	74.0 - 64.0 *	40.0 - 30.0 *	30.0 - 20.0 *
0.50-30.00	74.0	64.0	30.0	20.0

NOTE 1 - The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

NOTE 2 – The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN), which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is $20\log_{10}^{150/1} = 44$ dB).

NOTE 3 – Provisionally, a relaxation of 10 dB over the frequency range of 6 MHz to 30MHz is allowed for high speed services having significant spectral density in this band. However, this relaxation is restricted to the common mode disturbance converted by the cable from the wanted signal.

4.3.EUT Configuration on Measurement

The equipments are installed on Conducted Emission Measurement to meet EN55032 requirements and operating in a manner, which tend to maximize its emission characteristics in a normal application.

4.4.Operating Condition of EUT

4.4.1.Setup the EUT as shown in Section 4.1.

4.4.2.Turn on the power of all equipments.

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

4.5.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Artificial Mains Network (AMN). This provided a 50Ω coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN 55032 regulations during conducted emission measurement.

The bandwidth of the field strength meter (R&S Test Receiver ESCS30) is set at 9 kHz in 150 kHz-30MHz and 200Hz in 9 kHz 150 kHz.

The frequency range from 150 kHz to 30MHz is investigated for AC mains.

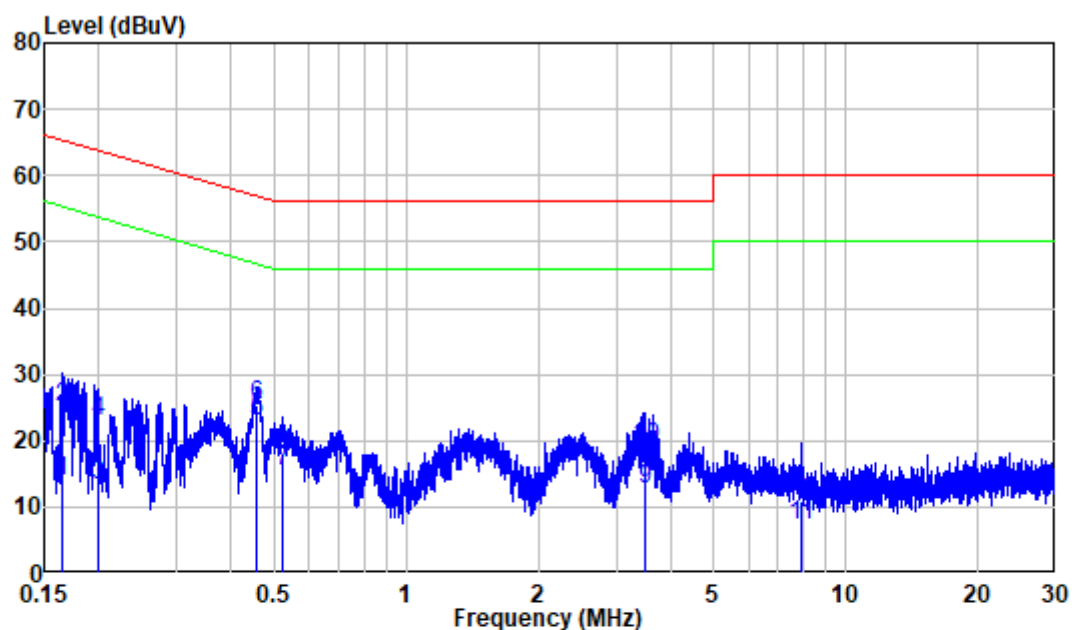
Calculation Formula:

Margin = Limit –level value

4.6.Test Results

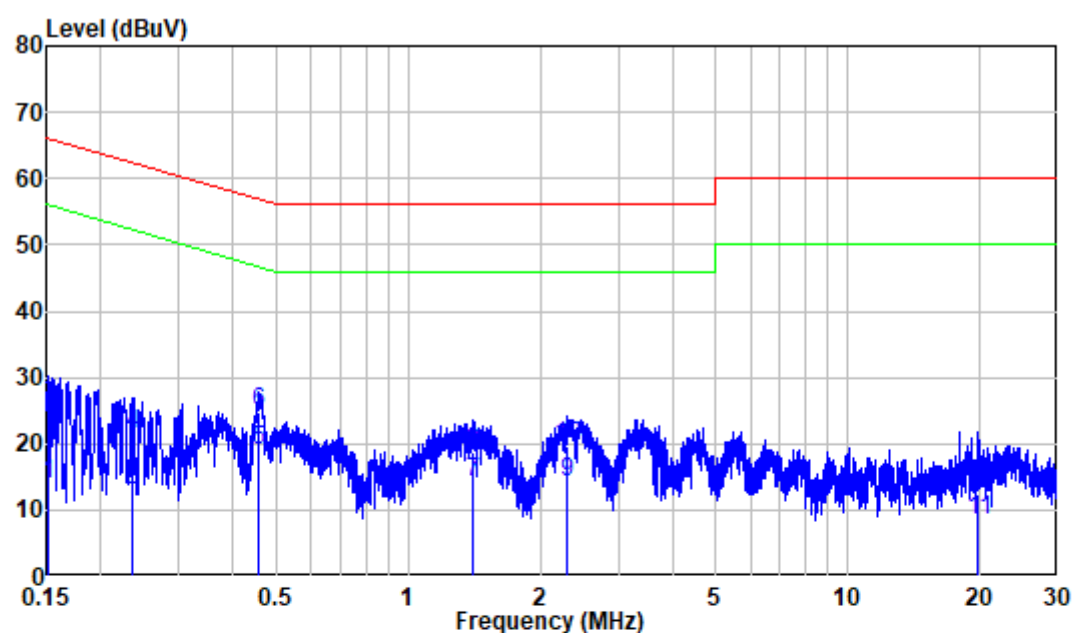
Pass.

Note: The frequency range from 150 kHz to 30MHz is investigated



Site : Shielding Room
 Condition: Line
 Job No. : SZNS1220329-11265E-EM
 Mode : Normal working
 Power : AC 230V 50Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.166	9.80	4.18	13.98	55.18	-41.20	Average
2	0.166	9.80	15.41	25.21	65.18	-39.97	QP
3	0.200	9.80	3.35	13.15	53.62	-40.47	Average
4	0.200	9.80	13.17	22.97	63.62	-40.65	QP
5	0.457	9.80	13.13	22.93	46.75	-23.82	Average
6	0.457	9.80	15.51	25.31	56.75	-31.44	QP
7	0.525	9.81	5.73	15.54	46.00	-30.46	Average
8	0.525	9.81	8.32	18.13	56.00	-37.87	QP
9	3.502	9.83	2.89	12.72	46.00	-33.28	Average
10	3.502	9.83	9.08	18.91	56.00	-37.09	QP
11	7.914	9.88	-2.69	7.19	50.00	-42.81	Average
12	7.914	9.88	0.97	10.85	60.00	-49.15	QP



Site : Shielding Room
 Condition: Neutral
 Job No. : SZNS1220329-11265E-EM
 Mode : Normal working
 Power : AC 230V 50Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.152	9.80	4.07	13.87	55.91	-42.04	Average
2	0.152	9.80	16.00	25.80	65.91	-40.11	QP
3	0.237	9.80	3.11	12.91	52.21	-39.30	Average
4	0.237	9.80	11.60	21.40	62.21	-40.81	QP
5	0.458	9.80	9.16	18.96	46.73	-27.77	Average
6	0.458	9.80	15.08	24.88	56.73	-31.85	QP
7	1.399	9.81	4.23	14.04	46.00	-31.96	Average
8	1.399	9.81	9.03	18.84	56.00	-37.16	QP
9	2.303	9.82	4.24	14.06	46.00	-31.94	Average
10	2.303	9.82	9.75	19.57	56.00	-36.43	QP
11	19.779	10.10	-1.79	8.31	50.00	-41.69	Average
12	19.779	10.10	2.41	12.51	60.00	-47.49	QP

5. RADIATED EMISSION MEASUREMENT

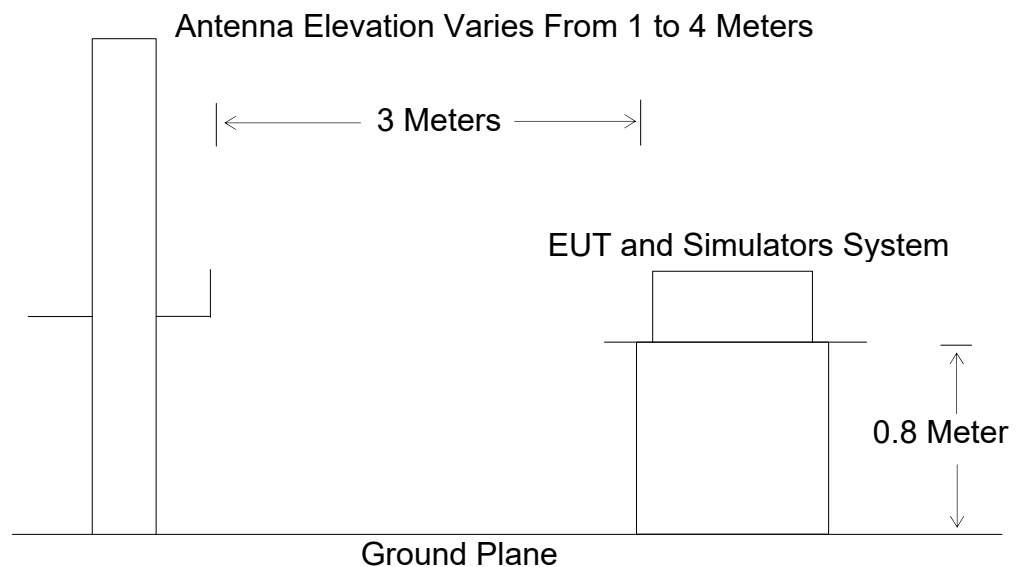
5.1. Block Diagram of Test

5.1.1. Block diagram of connection between the EUT and simulators



(EUT: XIAO RP2040)

5.1.2. Block diagram of test setup (In chamber)



5.2. Measuring Standard

EN 55032: 2015/A1:2020

5.3. Radiated Emission Limits (Class B)

5.3.1. Limit below 1GHz

Frequency (MHz)	Quasi-peak limits dB(μ V/m)
30 – 230	40
230 - 1000	47
Note: (1) The smaller limit shall apply at the combination point between two frequency bands. (2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.	

5.3.2. Limit above 1GHz

Table clause	Frequency range MHz	Measurement			Class B limits dB(μV/m)
		Facility (see table A.1)	Distance m	Detector type/ bandwidth	
A5.1	1 000 to 6 000	FSOATS	3	Average/ 1 MHz	54
A5.2	1 000 to 6 000			Peak/ 1 MHz	74
Apply A5.1 and A5.2 across the frequency range from 1 000 MHz to the highest required frequency of measurement derived from Table 1 .					
These requirements are not applicable to the local oscillator and harmonics frequencies of equipment covered by Table A.7.					

5.4. Conditional Testing Procedure

If the highest frequency of the internal sources of the EUT is less than 108MHz, the measurement shall only be made up to 1GHz.

If the highest frequency of the internal sources of the EUT is between 108MHz and 500MHz, the measurement shall only be made up to 2GHz.

If the highest frequency of the internal sources of the EUT is between 500MHz and 1GHz, the measurement shall only be made up to 5GHz.

If the highest frequency of the internal sources of the EUT is above 1GHz, the measurement shall only be made up to 5 times the highest frequency or 6GHz, whichever is less.

5.5.Manufacturer

The equipments are installed on Conducted Emission Measurement to meet EN 55032 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

5.6.Operating Condition of EUT

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

5.6.2.Turn on the power of all equipment.

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

5.7.Test Procedure

The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarizations of the antenna are set on test.

The bandwidth of the Receiver (ESR) is set at 120 kHz in 30-1000MHz, and 1MHz in above 1000MHz.

Margin=Result-Limit

5.8.Measuring Results

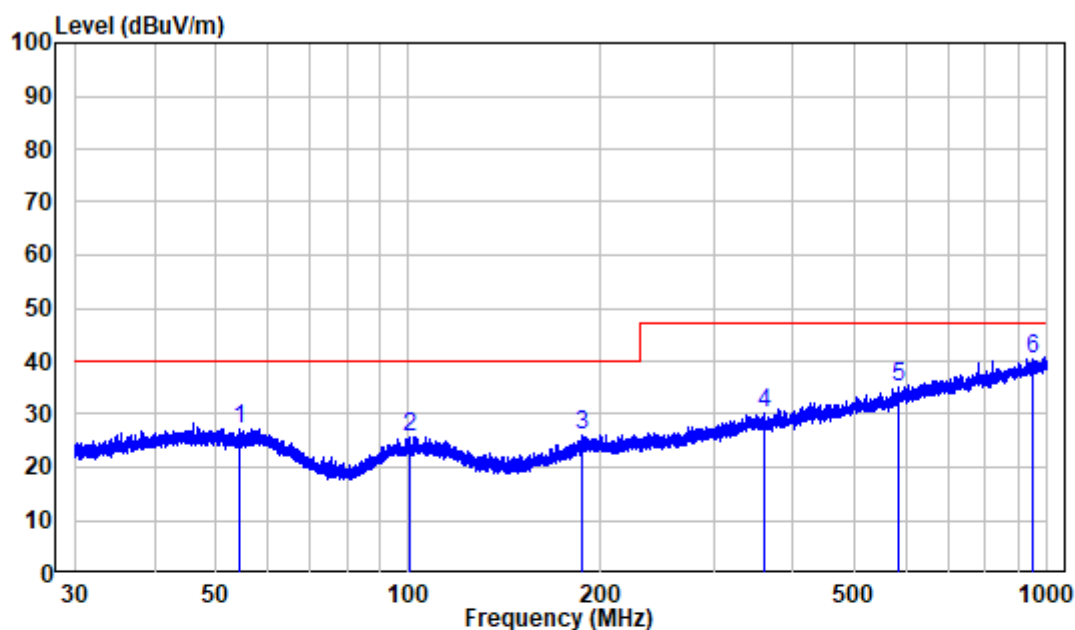
PASS.

Note:

The frequency range from 30MHz to 6000MHz is investigated.

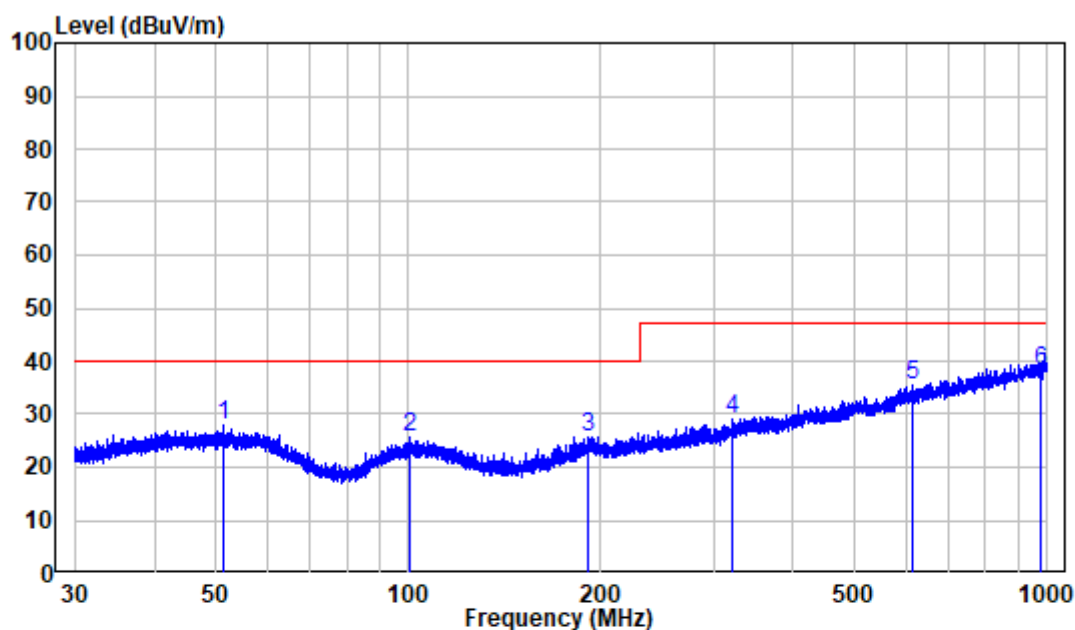
Note: Emissions attenuated more than 20 dB below the permissible value are not reported.

The spectral diagrams are attached as below.



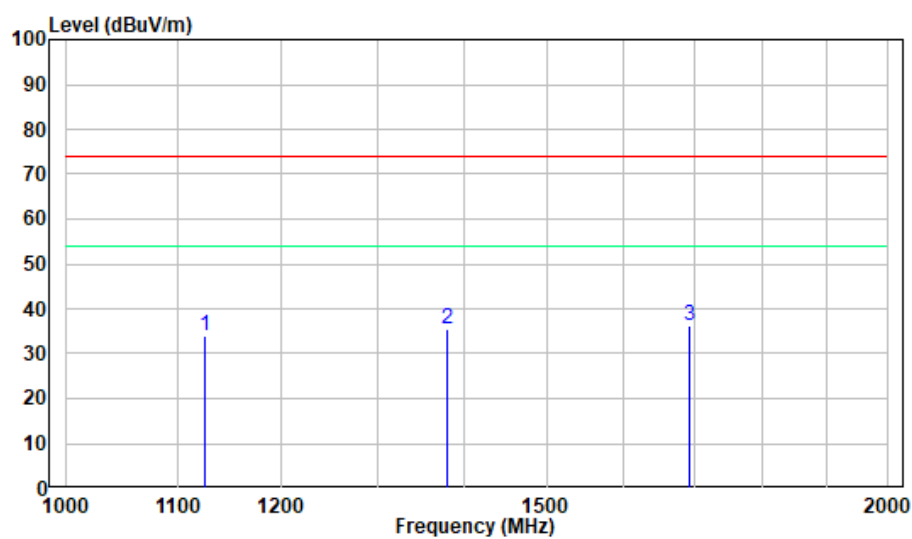
Site : chamber
 Condition: 3m HORIZONTAL
 Job No. : SZNS1220329-11264E-EM
 Test Mode: Normal working

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	54.213	-10.33	37.57	27.24	40.00	-12.76	Peak
2	100.493	-11.74	37.52	25.78	40.00	-14.22	Peak
3	186.850	-11.96	38.12	26.16	40.00	-13.84	Peak
4	360.764	-7.65	37.92	30.27	47.00	-16.73	Peak
5	585.816	-2.96	38.11	35.15	47.00	-11.85	Peak
6	951.260	2.06	38.33	40.39	47.00	-6.61	Peak



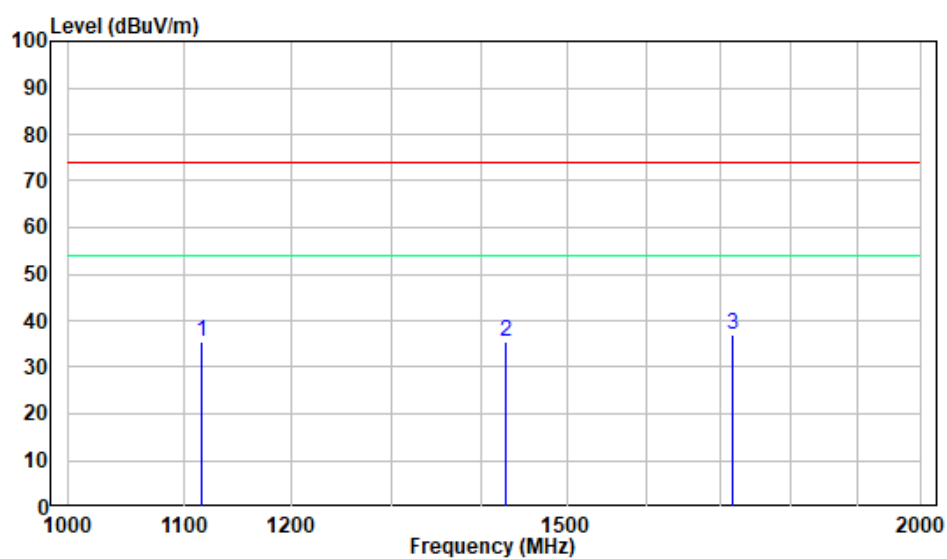
Site : chamber
 Condition: 3m VERTICAL
 Job No. : SZNS1220329-11264E-EM
 Test Mode: Normal working

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	51.256	-9.95	38.04	28.09	40.00	-11.91	Peak
2	100.669	-11.72	37.36	25.64	40.00	-14.36	Peak
3	190.572	-11.48	37.12	25.64	40.00	-14.36	Peak
4	321.624	-8.40	37.47	29.07	47.00	-17.93	Peak
5	616.642	-2.48	37.99	35.51	47.00	-11.49	Peak
6	975.325	2.35	35.86	38.21	47.00	-8.79	Peak



Site : chamber
Condition: 3m HORIZONTAL
Job No. : SZNS1220329-11264E-EM
Test Mode: Normal working

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1125.375	-10.33	44.29	33.96	74.00	-40.04	Peak
2	1379.000	-9.98	45.39	35.41	74.00	-38.59	Peak
3	1691.250	-8.96	45.29	36.33	74.00	-37.67	Peak



Site : chamber
 Condition: 3m VERTICAL
 Job No. : SZNS1220329-11264E-EM
 Test Mode: Normal working

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1114.750	-10.36	45.65	35.29	74.00	-38.71	Peak
2	1427.625	-9.84	45.38	35.54	74.00	-38.46	Peak
3	1715.625	-8.90	45.71	36.81	74.00	-37.19	Peak

6. HARMONIC CURRENT EMISSION TEST

6.1. Block Diagram of Test Setup



(EUT: XIAO RP2040)

6.2. Test Standard and Limit

6.2.1. Test Standard

EN IEC 61000-3-2:2019

6.2.2. Test Limit

Table 1 – Limits for Class A equipment

Harmonic order n	Maximum permissible harmonic current A
Odd harmonics	
3	2,30
5	1,14
7	0,77
9	0,40
11	0,33
13	0,21
$15 \leq n \leq 39$	$0,15 \frac{15}{n}$
Even harmonics	
2	1,08
4	0,43
6	0,30
$8 \leq n \leq 40$	$0,23 \frac{8}{n}$

6.3. Operating Condition of EUT

6.3.1. Setup the EUT and simulator as shown as Section 6.1.

6.3.2. Turn on the power of all equipment.

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

6.4. Test Results

N/A.

The EUT input power is 0.5W, it is less than 75 W, so the harmonic is unnecessary to test

7. VOLTAGE FLUCTUATION AND FLICKER TEST

7.1. Block Diagram of Test Setup



(EUT: XIAO RP2040)

7.2. Test Standard and Limit

7.2.1. Test Standard

EN 61000-3-3:2013+A1:2019

7.2.2. Test Limit

Test items	Limits
P_{st}	1.0
P_{It}	0.65
d_c	3.3%
d_{max}	4.0%
d_t	Not exceed 3.3% for 500ms

7.3. Operating Condition of EUT

7.3.1. Setup the EUT and simulator as shown as Section 7.1.

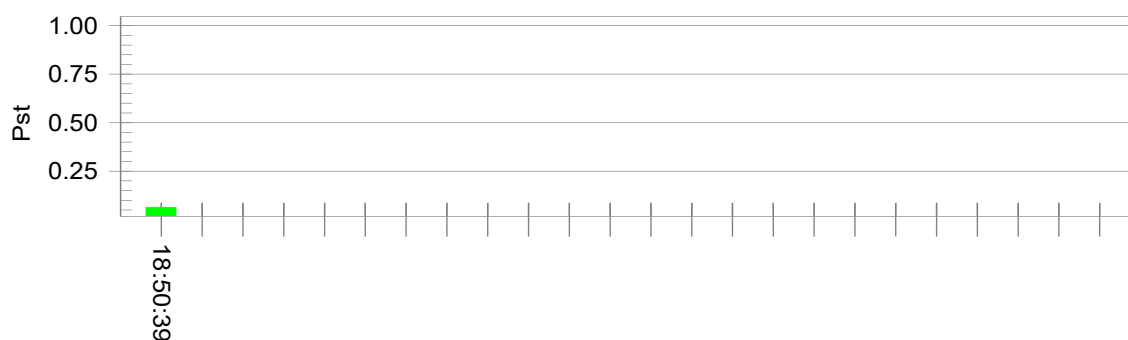
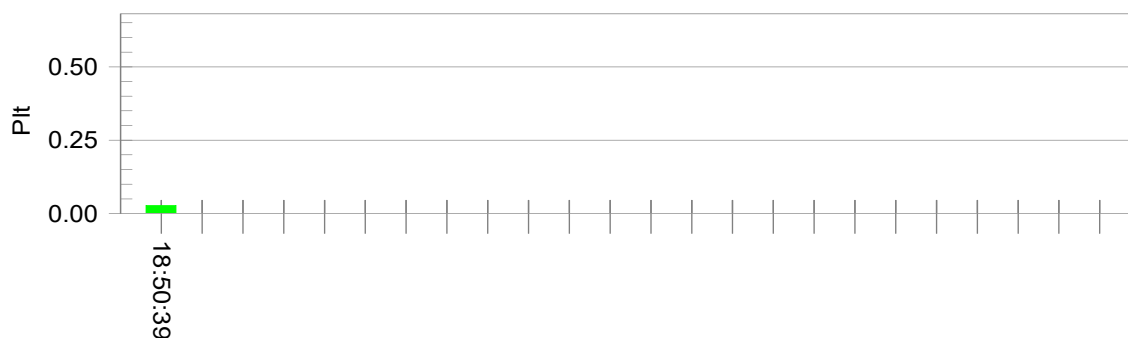
7.3.2. Turn on the power of all equipment.

7.3.3. Let the EUT work in test mode (Record with SD card) and measure it.

7.4. Test Results

Pass

Flicker Test Summary per EN 61000-3-3:2013/AMD1:2019 (Run time)

EUT: XIAO RP2040 M/N:XIAO RP2040**Test category: All parameters (European limits)****Test date: 2022/4/6****Start time: 18:40:18****Tested by: Caro****Test Margin: 100****End time: 18:50:45****Test duration (min): 10****Data file name: F-000109.cts_data****Comment: Normal Working Report:SZNS1220329-11264E-EM****Customer: Seeed Technology Co.,Ltd****Test Result: Pass****Status: Test Completed****Pst_i and limit line****European Limits****Plt and limit line****Parameter values recorded during the test:****Vrms at the end of test (Volt): 229.53****Highest dt (%):****T-max (mS): 0****Highest dc (%): 0.00****Highest dmax (%): 0.00****Highest Pst (10 min. period): 0.064****Highest Plt (2 hr. period): 0.028****Test limit (%):****Test limit (mS): 500.0****Test limit (%): 3.30****Test limit (%): 4.00****Test limit: 1.000****Test limit: 0.650****Pass****Pass****Pass****Pass****Pass**

8. ELECTROSTATIC DISCHARGE IMMUNITY TEST

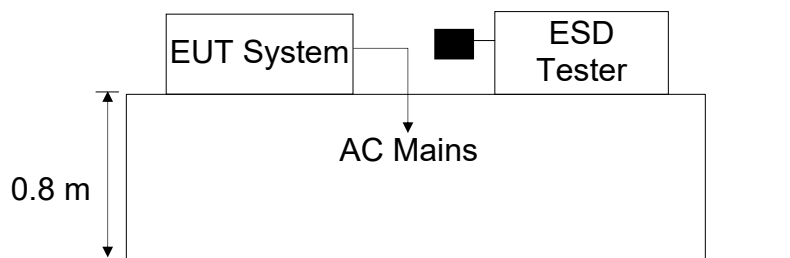
8.1. Block Diagram of Test Setup

8.1.1. Block diagram of connection between the EUT and simulators



(EUT: XIAO RP2040)

8.1.2. Block diagram of ESD test setup



8.2. Test Standard

EN 55035: 2017/A11:2020

(IEC 61000-4-2: 2008 Severity Level: 3 / Air Discharge: ± 8 kV, Level: 2 / Contact Discharge: ± 4 kV)

Testing shall also be satisfied at the lower levels.

8.3. Severity Levels and Performance Criterion

8.3.1. Severity levels

Level	Test Voltage Contact Discharge (kV)	Test Voltage Air Discharge (kV)
1.	± 2	± 2
2.	± 4	± 4
3.	± 6	± 8
4.	± 8	± 15
X	Special	Special

8.3.2. Performance Criterion: **B**

8.4. EUT Configuration

The configuration of the EUT is same as Section 4.5.

8.5.Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.6 except for the test set up replaced by Section 8.1.

8.6.Test Procedure

8.6.1.Air Discharge

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 20 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

8.6.2.Contact Discharge

All the procedure shall be same as Section 8.6.1 except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

8.6.3.Indirect discharge for horizontal coupling plane

At least 20 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

8.6.4.Indirect discharge for vertical coupling plane

At least 20 single discharges shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m * 0.5m, is placed parallel to and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

8.7.Test Results

PASS

Please refer to the following page.

Electrostatic Discharge Test Results

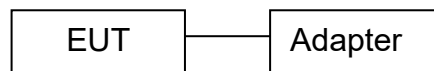
Shenzhen Accurate Technology Co., Ltd.

Manufacturer:	Seeed Technology Co., Ltd	Test Date:	2022-04-08
EUT:	XIAO RP2040	Temperature:	25°C
M/N:	XIAO RP2040	Humidity:	48%
Air discharge:	±2.0kV, ±4.0kV, ±8.0kV	Criterion:	B
Contact discharge:	±4.0kV	Test Engineer:	Caro Hu
Test voltage:	AC 230V50Hz	Test Mode:	Normal Working
Location		Kind A-Air Discharge C-Contact Discharge	Result
HCP		C	PASS
VCP Front		C	PASS
VCP Back		C	PASS
VCP Left		C	PASS
VCP Right		C	PASS
Note:			
Test Equipment: ESD Simulator (TESEQ, NSG 437)			

9. RF FIELD STRENGTH SUSCEPTIBILITY TEST

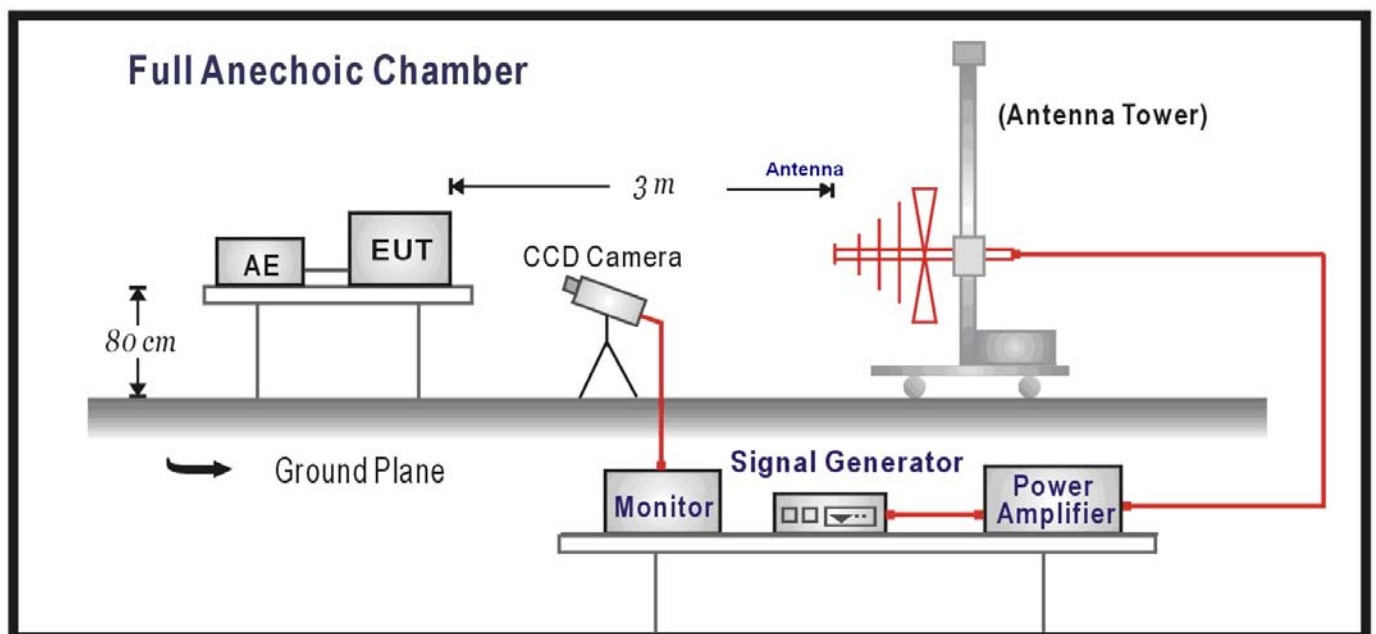
9.1. Block Diagram of Test

9.1.1. Block diagram of connection between the EUT and simulators



(EUT: XIAO RP2040)

9.1.2. Block diagram of R/S test setup



9.2. Test Standard

EN 55035: 2017/A11:2020

(IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010, Severity Level: 2, 3V/m)

9.3. Severity Levels and Performance Criterion

9.3.1. Severity Levels

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

9.3.2. Performance Criterion: **A**

9.4. Manufacturer

The configuration of the EUT is same as Section 4.5.

9.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.6 except the test setup replaced as Section 9.1.

9.6. Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarizations of the antenna are set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually.

In order to judge the EUT performance, a CCD camera is used to monitor its screen.

All the scanning conditions are as following:

Condition of Test	Remark
1. Fielded Strength	3V/m (Severity Level 2)
2. Radiated Signal	AM 80%, 1 kHz Modulation
3. Scanning Frequency	80-1000MHz
	1800, 2600, 3500, 5000MHz
4. Frequency step	1%
5. Dwell Time	1 Sec.

9.7.Test Results

PASS.

Please refer to the following page.

RF Field Strength Susceptibility Test Results

Shenzhen Accurate Technology Co., Ltd.

Manufacturer: Seeed Technology Co., Ltd	Test Date: 2022-04-08
EUT: XIAO RP2040	Temperature: 25°C
M/N: XIAO RP2040	Humidity: 48%
Field Strength: 3 V/m	Criterion: A
Test Mode: Normal Working	Frequency Range: 80 MHz to 1000MHz 1800, 2600, 3500, 5000MHz
Test voltage: AC 230V50Hz	Test Engineer: Caro Hu

Modulation:	<input type="checkbox"/> None	<input type="checkbox"/> Pulse	<input checked="" type="checkbox"/> AM 1kHz	80%
	Frequency Range 1: 80 - 1000MHz		Frequency Range 2: 1800, 2600, 3500, 5000MHz	
Steps	#	/	1 %	
	Horizontal		Vertical	
Front	PASS		PASS	
Right	PASS		PASS	
Rear	PASS		PASS	
Left	PASS		PASS	

Test Equipment :

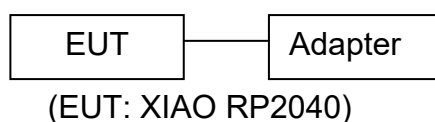
1. RF-Generator: ITS 6006
2. Power Amplifier(80 – 1000MHz): CBA 1G-070
3. Linear Power Amplifier (1.4 – 6GHz): AS0860-40/45
4. Trapezoidal Log Periodic Antenna: ATT700M12G;
5. Log-Periodic Antenna: ATL80M1G;
6. Electric Field Probe: HI - 6005
7. Power Meter: PM6006

Note:

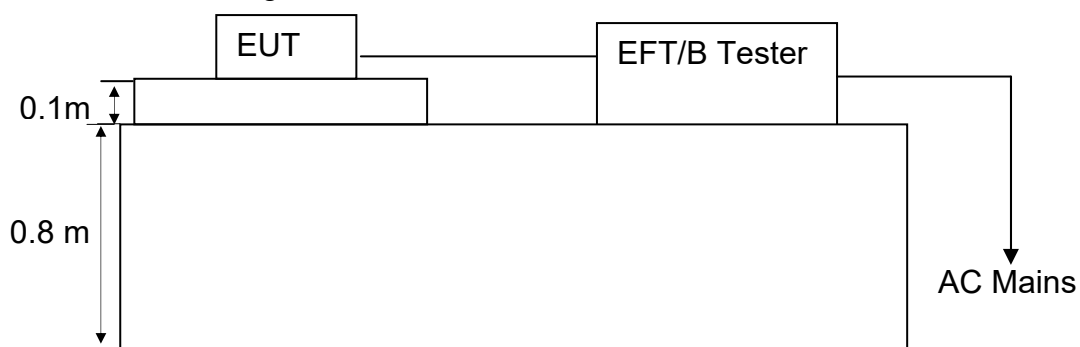
10.ELECTRICAL FAST TRANSIENT/BURST TEST

10.1.Block Diagram of Test Setup

10.1.1.Block diagram of connection between the EUT and simulators



10.1.2.Block Diagram of the AC Mains



10.2.Test Standard

EN 55035: 2017/A11:2020

(IEC 61000-4-4: 2012, Severity Level, Level 2: 1kV for AC mains; 0.5kV for signal port)

10.3.Severity Levels and Performance Criterion

10.3.1.Severity levels

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1.	0.5 kV	0.25 kV
2.	1 kV	0.5 kV
3.	2 kV	1 kV
4.	4 kV	2 kV
X	Special	Special

10.3.2.Performance Criterion: **B**

10.4.EUT Configuration on Measurement

The configuration of the EUT is same as Section 4.5

10.5.Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.6 except the test setup replaced as Section 10.1.

10.6.Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.8m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

10.6.1.For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 minutes.

10.6.2.For signal lines and control lines ports:

It's necessary to test.

10.6.3.For DC output line ports:

DC line length is less than 3 meters, it's unnecessary to test.

10.7.Test Result

PASS.

Please refer to the following page.

Electrical Fast Transient/Burst Test Results

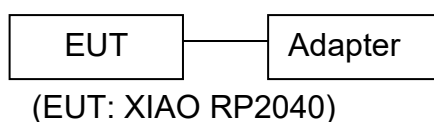
Shenzhen Accurate Technology Co., Ltd.

Manufacturer:	Seed Technology Co., Ltd	Test Date:	2022-04-08
EUT:	XIAO RP2040	Temperature:	25°C
M/N:	XIAO RP2040	Humidity:	48%
Test voltage:	AC 230V50Hz	Criterion:	B
Test Mode:	Normal Working	Test Engineer:	Caro Hu
Line : <input checked="" type="checkbox"/> AC Mains	Line : <input checked="" type="checkbox"/> Signal Line <input type="checkbox"/> DC Output Line		
Coupling : <input checked="" type="checkbox"/> Direct	Coupling : <input checked="" type="checkbox"/> Capacitive		
Test Time : 120s			
Line	Test Voltage	Result(+)	Result(-)
L	1kV	PASS	PASS
N	1kV	PASS	PASS
L-N	1kV	PASS	PASS
Note :			
Test Equipment	Burst Tester Model : ULTRA COMPACT SIMULATOR: UCS 500 N5 (EM TEST)		

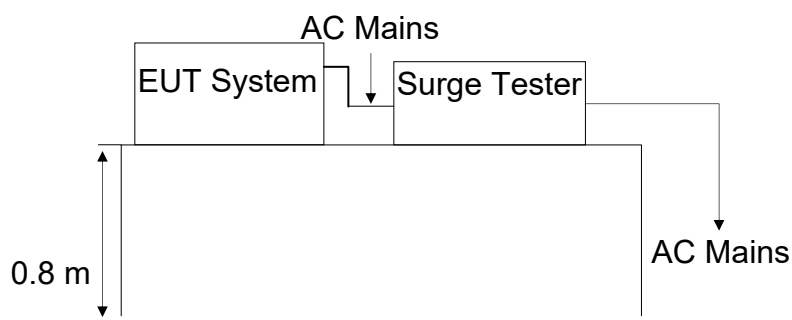
11.SURGE TEST

11.1.Block Diagram of Test Setup

11.1.1.Block diagram of connection between the EUT and simulators



11.1.2.Surge Test Setup



11.2.Test Standard

EN 55035: 2017/A11:2020

(IEC 61000-4-5: 2014 + A1: 2017, Severity Level: Level 2, 1.0kV)

Testing shall also be satisfied at the lower levels.)

11.3.Severity Levels and Performance Criterion

11.3.1.Severity levels

Severity Level	Open-Circuit Test Voltage kV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

11.3.2.Performance Criterion: **B**

11.4.EUT Configuration on Measurement

The configuration of the EUT is same as Section 4.5

11.5.Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.6 except the test setup replaced as Section 11.1.

11.6.Test Procedure

- 1) Set up the EUT and test generator as shown on Section 11.1.2.
- 2) For line to line coupling mode, provide a 1.0 kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
For line to ground coupling mode, provide a 2.0 kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
For signal line coupling mode, provide a 1.0 kV 10/700us voltage surge
- 3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 4) Different phase angles are done individually.
- 5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

11.7.Test Result

PASS.

Please refer to the following page.

Shenzhen Accurate Technology Co., Ltd.

CE-EN 55032

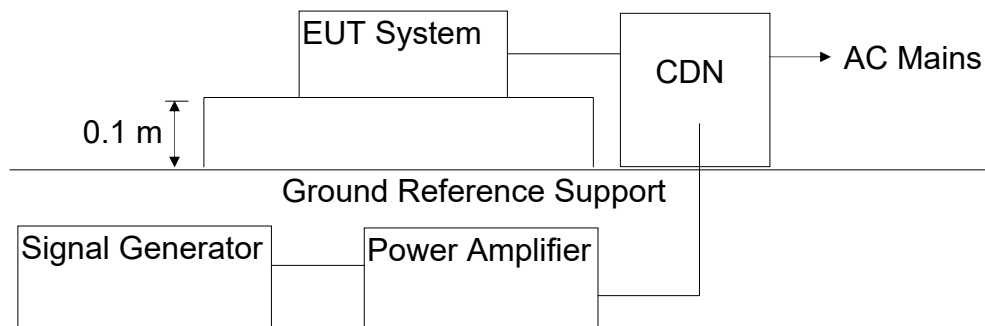
12.1. Block Diagram of Test Setup

```

graph LR
    EUT[EUT] --- Adapter[Adapter]

```

12.1.2. Block Diagram of Test Setup



(IEC 61000-4-6: 2013, Severity Level 2 & 1: 3V & 1V(rms), 0.15MHz- 80MHz)

12.3.1. Severity levels

Level	Field Strength V(rms)
1.	1
2.	3
3.	10
X	Special

12.3.2. Performance Criterion: A

12.4.EUT Configuration on Measurement

The configuration of the EUT is same as Section 4.5

12.5.Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.6 except the test setup replaced as Section 12.1.

12.6.Test Procedure

12.6.1.For AC Mains

- 1) Set up the EUT, CDN and test generators as shown on Section 12.1.2
- 2) Let the EUT work in test mode and measure it.
- 3) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 4) The disturbance signal described below is injected to EUT through CDN.
- 5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 6) The frequency range is swept from 150 kHz to 80MHz using 3V & 1V signal level, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave.
- 7) The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

12.6.2.For signal lines and control lines ports:

It's necessary to test.

12.6.3.For DC output line ports:

DC line length is less than 3 meters, it's unnecessary to test.

12.7.Test Results

PASS.

Please refer to the following page.

Continuous induced RF disturbances Test Results

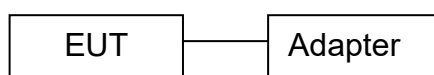
Shenzhen Accurate Technology Co., Ltd.

Manufacturer:		Seeed Technology Co., Ltd		Test Date:	2022-04-08
EUT:		XIAO RP2040		Temperature:	25°C
M/N:		XIAO RP2040		Humidity:	48%
Test voltage:		AC 230V50Hz		Criterion:	A
Test Mode:		Normal Working		Test Engineer:	Caro Hu
Modulation: 80% AM by a sinusoidal signal of 1kHz					
Frequency	Injected Position		Strength	Test Record	Result
0.15 –10MHz	AC		3V	A	PASS
10-30MHz	AC		3V to 1V	A	PASS
30-80MHz	AC		1V	A	PASS
Remark : Measurement Equipment : Conducted Immunity Test System: CIT-10 (FRANKONIA) CDN : CDN-M2/3 (FRANKONIA)			Note:		

13.MAGNETIC FIELD SUSCEPTIBILITY TEST

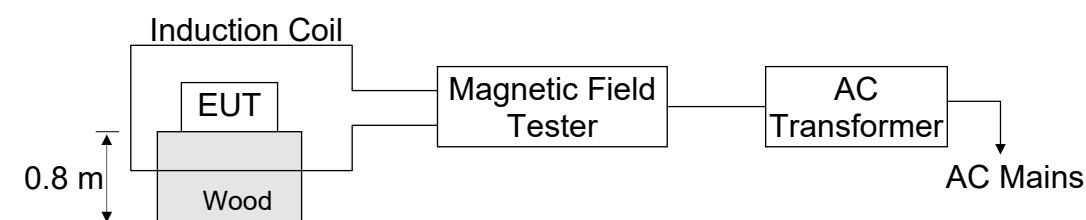
13.1.Block Diagram of Test

13.1.1.Block diagram of connection between the EUT and simulators



(EUT: XIAO RP2040)

13.1.2.Magnetic field test setup



Ground Reference Support
(EUT: BeagleBone AI-64)

13.2.Test Standard

EN 55035: 2017/A11:2020

(IEC 61000-4-8: 2009, Severity Level: Level 1, 1A/m)

13.3.Severity Levels and Performance Criterion

13.3.1.Severity Levels

Level	Field Strength A/m
1	1
2	3
3	10
4	30
5	100
X	Special

13.3.2.Performance Criterion: **A**

13.4.Manufacturer

The configuration of the EUT is same as Section 4.5.

13.5.Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.6 except the test setup replaced as Section 13.1.

13.6.Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. Both horizontal and vertical polarizations of the induction coil are set on test, so that each side of the EUT is affected by the magnetic field. Also it can reach the same aim by change the position of the EUT.

13.7.Test Results

PASS.

Please refer to the following page.

Magnetic Field Immunity Test Result

Shenzhen Accurate Technology Co., Ltd.

Manufacturer : Sseed Technology Co., Ltd

EUT : XIAO RP2040

M/N : XIAO RP2040

Test Voltage: AC 230V/50Hz

Test Date : 2022-04-08

Temperature : 25°C

Humidity : 48%

Test Engineer: Caro Hu

Test Mode : Normal Working

Test Level	Testing Duration	Coil Orientation	Test Record	Result
1A/m	5 mins	X	A	PASS
1A/m	5 mins	Y	A	PASS
1A/m	5 mins	Z	A	PASS

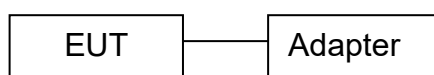
Remark:

Test Equipment:
Magnetic Field Tester: MAG100

14.VOLTAGE DIPS AND INTERRUPTIONS TEST

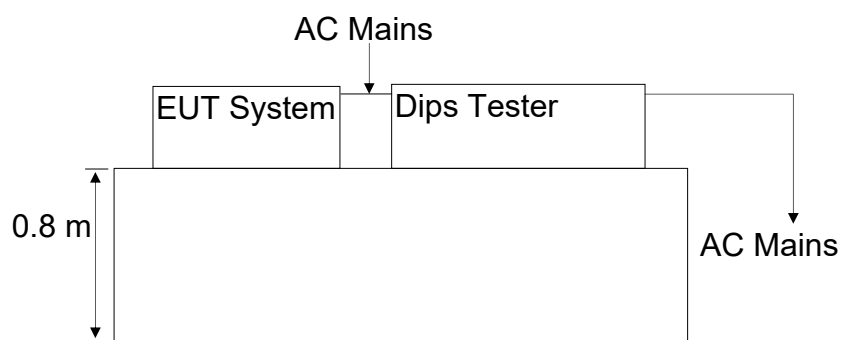
14.1.Block Diagram of Test Setup

14.1.1.Block diagram of connection between the EUT and simulators



(EUT: XIAO RP2040)

14.1.2.Dips Test Setup



14.2.Test Standard

EN 55035: 2017/A11:2020 (IEC 61000-4-11: 2004 +A1: 2017)

14.3.Severity Levels and Performance Criterion

14.3.1.Severity levels

Test Level $\%U_T$	Voltage dip and short interruptions $\%U_T$	Duration (in period)
< 5	100	0.5P
70	30	25P/30P ^a
< 5	100	250P/300P ^a

^a “25P/30P” means “25 cycles for 50Hz test ” and “30 cycles for 60 Hz test”

^a “250P/300P” means “250 cycles for 50Hz test ” and “300 cycles for 60 Hz test”

14.3.2.Performance Criterion: **B&C**

14.4.EUT Configuration on Measurement

The configuration of the EUT is same as Section 4.5

14.5.Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.6 except the test setup replaced as Section 14.1.

14.6.Test Procedure

- 1) Set up the EUT and test generator as shown on Section 14.1.2.
- 2) Changes to occur at 0 degree crossover point of the voltage waveform. If the EUT does not demonstrate compliance when tested with 0 degree switching, the test shall be repeated with the switching occurring at both 90 degrees and 270 degrees. If the EUT satisfies these alternative requirements, then it fulfils the requirements.
- 3) The interruption is introduced at selected phase angles with specified duration.
- 4) Record any degradation of performance.

14.7.Test Result

PASS.

Please refer to the following page.

Voltage Dips and Interruptions Test Results

Shenzhen Accurate Technology Co., Ltd.

Manufacturer:	Seeed Technology Co., Ltd	Test Date:	2022-04-08
EUT:	XIAO RP2040	Temperature:	25°C
M/N:	XIAO RP2040	Humidity:	48%
Test voltage:	AC 230V/50Hz	Test Engineer:	Caro Hu
Test Mode:	Normal Working		
Voltage Dips	Cycles	Test Record	Result
0	0.5	A	PASS
70	25	A	PASS
Voltage Interruptions	Cycles	Criterion	Result
0	250	B	PASS
Remark:	Test Equipment : ULTRA COMPACT SIMULATOR: UCS 500 N5 (EM TEST)		

15.PHOTOGRAPHS

15.1.Photo of Conducted Emission Measurement



15.2.Photos of Radiated Emission Measurement



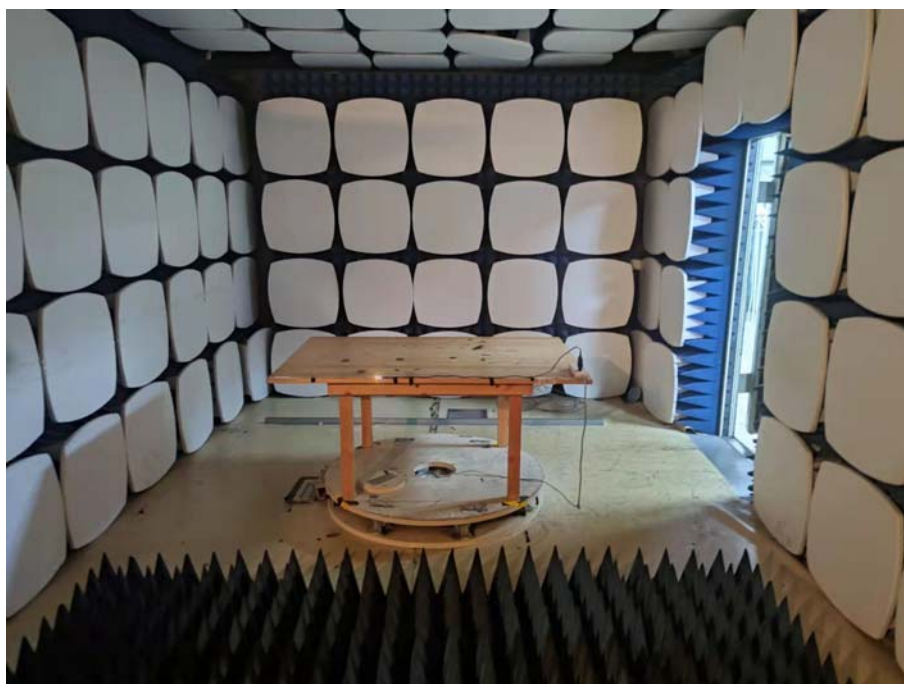
15.3.Photo of set-up for Harmonic/ Flicker Test



15.4.Photo of Electrostatic Discharge Test



15.5.Photo of RF Field Strength Susceptibility Test



15.6.Photo of set-up for EFT/B Test



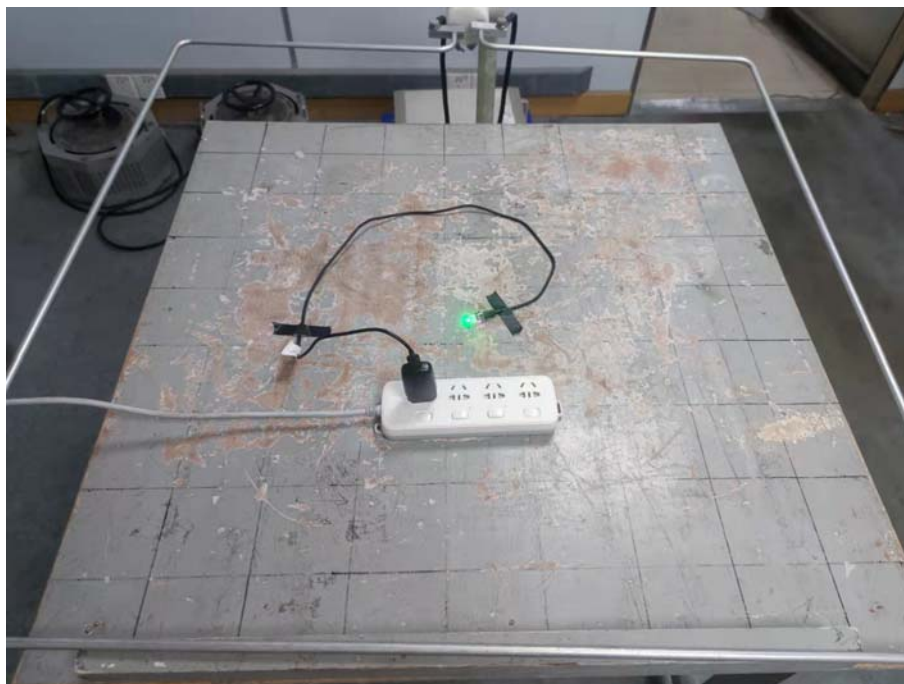
15.7.Photo of set-up for Surge and Voltage Dips Test



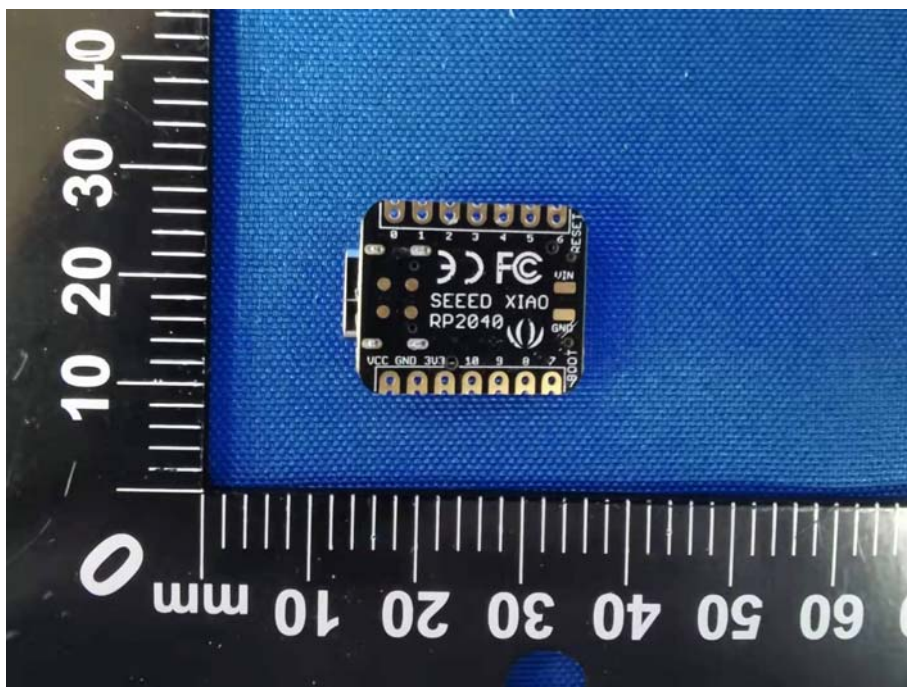
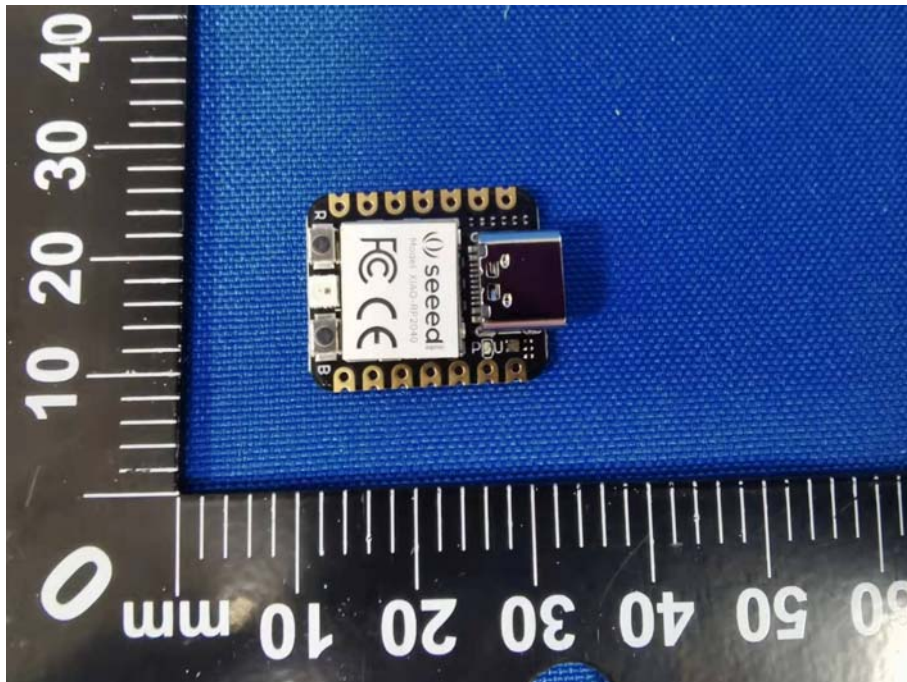
15.8.Photo of set-up for Induced RF Disturbance Test



15.9.Photo of set-up for Magnetic Field Immunity Test



15.10.Photos of EUT



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