FCC 47 CFR Part 15 Subpart B

TEST REPORT

For

i.MX93 CoreBoard

MODEL NUMBER: ATK-CLIMX93B

REPORT NUMBER: E04A24040138F00201

ISSUE DATE: April 11, 2024

Prepared for

Guangzhou Xingyi Electronic Technology Co., Ltd
Room 805-808, Room 801, Building 4, No. 1, 3, and 5, Kesheng Road, Guangzhou Private Science and Technology Park, No. 1633 Beitai Road, Baiyun District, Guangzhou City

Prepared by

Guangdong Global Testing Technology Co., Ltd.

Room 101-105, 203-210, Building 1, No.2, Keji 8 Road, Songshan Lake Park, Dongguan city, Guangdong, People's Republic of China, 523808

Revision History

Rev.	Issue Date	Revisions	Revised By
V0	April 11, 2024	Initial Issue	

Summary of Test Results

Emission			
Standard	**Test Item**	**Limit**	**Result**
FCC 47 CFR Part 15 Subpart B	Radiated emissions below 1GHz	FCC Part 15.109	Pass
	Radiated emissions above 1GHz	FCC Part 15.109	Pass

*This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
*The measurement result for the sample received is <Pass> according to <FCC 47 CFR Part 15 Subpart B> when <Accuracy Method> decision rule is applied.

CONTENTS

1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Guangzhou Xingyi Electronic Technology Co., Ltd
Address:	Room 805-808, Room 801, Building 4, No. 1, 3, and 5, Kesheng Road, Guangzhou Private Science and Technology Park, No. 1633 Beitai Road, Baiyun District, Guangzhou City

Manufacturer Information

Company Name:	Guangzhou Xingyi Electronic Technology Co., Ltd
Address:	Room 805-808, Room 801, Building 4, No. 1, 3, and 5, Kesheng Road, Guangzhou Private Science and Technology Park, No. 1633 Beitai Road, Baiyun District, Guangzhou City

Factory Information

Company Name:	Dongguan Zhichen Electronic Technology Co., Ltd
Address:	301, Building 1, No. 16 Xingui Road, Lincun, Tangxia Town, Dongguan City, Guangdong Province

EUT Information

Product Description:	i.MX93 CoreBoard
Model:	ATK-CLIMX93B
Brand:	ALIENTEK
Sample Received Date:	7 April 2024
Sample Status:	Normal
Sample ID:	A24040138 001
Date of Tested:	April 7, 2024 to April 11, 2024

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC 47 CFR Part 15 Subpart B	**Pass**

Prepared By:

Jansen Lin

Project Engineer

Checked By:

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Laboratory Leader

Approved By:

Shawn Wen

Laboratory Manager

Guangdong Global Testing Technology Co., Ltd. ★ CERTIFICATE ★ GTG

2. TEST METHODOLOGY

All tests were performed in accordance with the standard FCC 47 CFR Part 15 Subpart B

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	**A2LA (Certificate No.: 6947.01)** Guangdong Global Testing Technology Co., Ltd. has been assessed and proved to be in compliance with A2LA. **FCC (FCC Designation No.: CN1343)** Guangdong Global Testing Technology Co., Ltd. has been recognized to perform compliance testing on equipment subject to Supplier's Declaration of Conformity (SDoC) and Certification rules **ISED (Company No.: 30714)** Guangdong Global Testing Technology Co., Ltd. has been registered and fully described in a report filed with ISED. The Company Number is 30714 and the test lab Conformity Assessment Body Identifier (CABID) is CN0148.

Note: All tests measurement facilities use to collect the measurement data are located at Room 101-105, 203-210, Building 1, No.2, Keji 8 Road, Songshan Lake Park, Dongguan city, Guangdong, People's Republic of China, 523808

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Measurement Frequency Range	K	U(dB)
Radiated emissions below 1GHz	30 MHz -1 GHz	2	3.79
Radiated emissions above 1GHz	1 GHz - 18 GHz	2	5.62
Note1: This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.			

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name		i.MX93 CoreBoard
Model		ATK-CLIMX93B
EUT Classification		Class B
Ratings		DC12V 1A
Power Supply	AC	DC12V from adapter AC120V/60Hz

5.2. TEST MODE

Test Mode	Description
M01	Normal working

5.3. EUT ACCESSORY

Adapter	
Model No.:	GQ12-120100-CC
Input:	100-240 V~50/60 Hz, 0.4 A Max
Output:	12.0 V/1 A
DC Cable:	1.2 Meter, Shielded without ferrite

5.4. SUPPORT UNITS FOR SYSTEM TEST

The EUT has been tested as an independent unit

6. MEASURING EQUIPMENT AND SOFTWARE USED

Test Equipment of Radiated emissions below 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
Chamber	ETS	9*6*6	Q2146	2022/8/30	2025/8/29
Receiver	R&S	ESCI3	101409	2023/9/18	2024/9/17
Loop Antenna	ETS	6502	243668	2022/3/30	2025/3/30
Pre-Amplifier	HzEMC	HPA-9K0130	HYPA21001	2023/9/18	2024/9/17
Biconilog Antenna	Schwarzbeck	VULB 9168	1315	2022/10/10	2025/10/9
Biconilog Antenna	ETS	3142E	243646	2022/3/23	2025/3/22
Test Software for RE	Farad	EZ-EMC	V1.1.4.2	N/A	N/A

Test Equipment of Radiated emissions above 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
Spectrum Analyzer	R&S	FSV40	101413	2023/9/18	2024/9/17
Pre-Amplifier	HzEMC	HPA-1G1850	HYPA21003	2023/9/18	2024/9/17
Horn antenna	ETS	3117	246069	2022/3/11	2025/3/10
Pre-Amplifier	ETS	HPA-184057	HYPA21004	2023/9/18	2024/9/17
Horn antenna	ETS	3116C	246265	2022/3/29	2025/3/28
Test Software for RE	Farad	EZ-EMC	V1.1.4.2	N/A	N/A

7. EMISSION TEST

7.1. RADIATED EMISSIONS BELOW 1GHZ

LIMITS

Below 1 GHz

CFR 47 FCC Part 15 Subpart B		
Frequency (MHz)	Class A	Class B
	Field strength (dBuV/m) (at 3 m)	Field strength (dBuV/m) (at 3 m)
30 - 88	49.5	40
88 - 216	53.9	43.5
216 - 960	56.9	46
Above 960	60	54

Test Frequency Range of Radiated Disturbance Measurement

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 - 108	1000
108 - 500	2000
500 - 1000	5000
Above 1000	5^{th} harmonic of the highest frequency or 40 GHz, whichever is lower

NOTE:

(1) The limit for radiated test was performed according to FCC Part 15, Subpart B;
(2) The tighter limit applies at the band edges;
(3) Emission level (dBuV/m) = 20log Emission level (uV/m),
3m Emission level = 10 m Emission level + 20log(10 m/3 m);

TEST PROCEDURE

Below 1 GHz and above 30 MHz

The setting of the spectrum analyser

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak and QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.4-2014.

2. 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 was used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80 cm above ground.

4. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

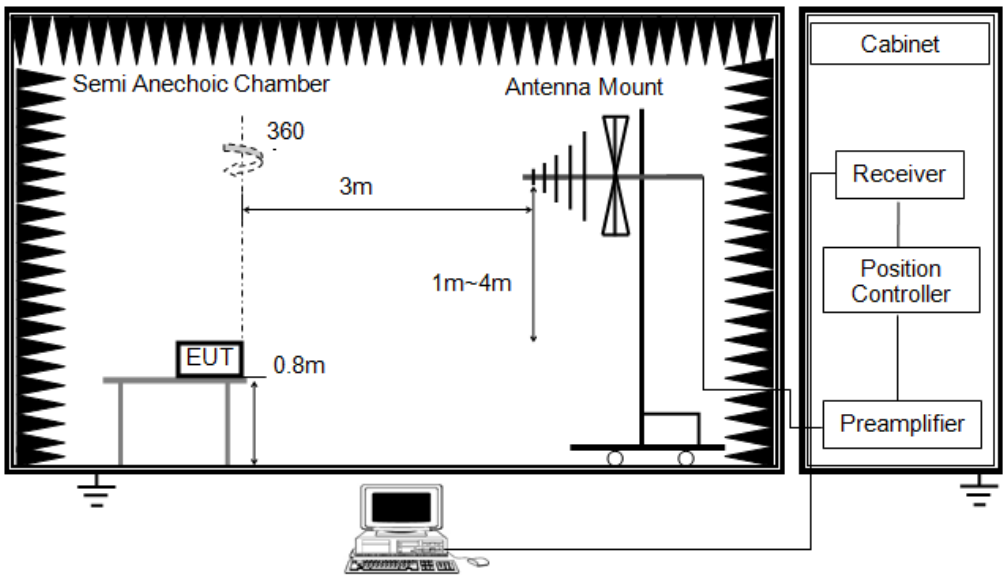
5. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

6. Cables of hand-operated devices, such as keyboards and mice, shall be placed as for normal used.

7. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

8. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

TEST SETUP



TEST ENVIRONMENT

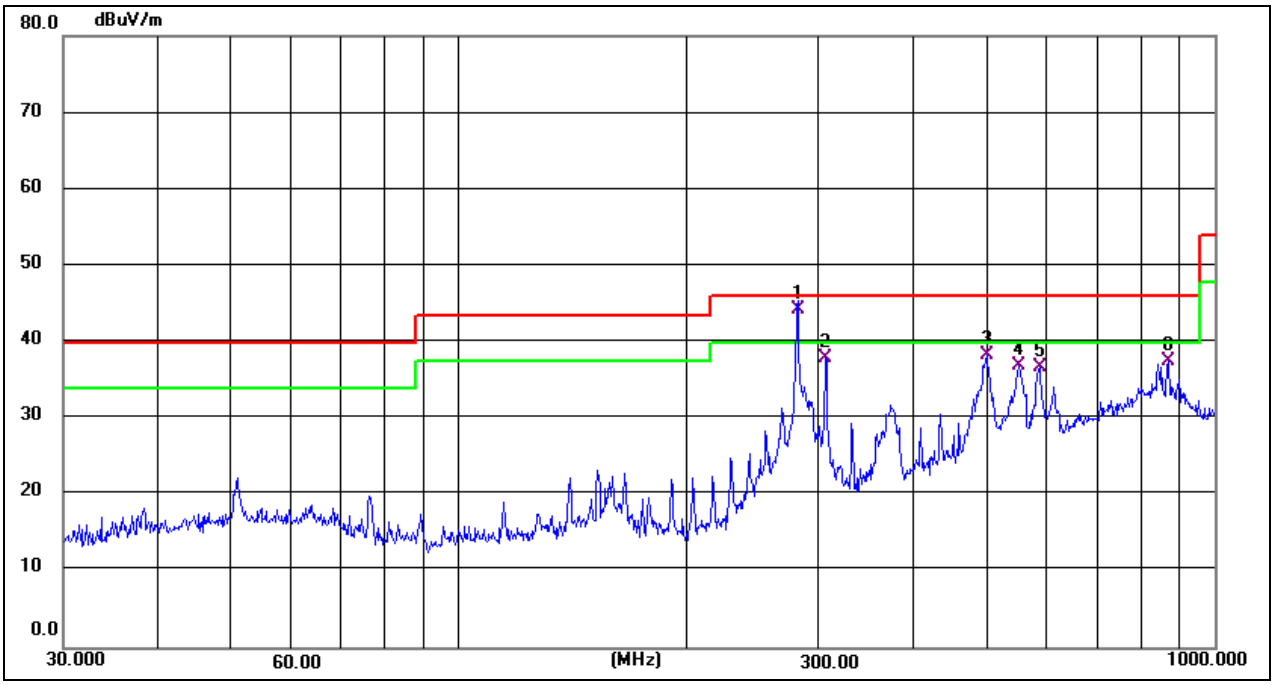
Temperature	21.8℃	Relative Humidity	47%
Atmosphere Pressure	101kPa		

TEST MODE

Pre-test Mode:	M01 ~ M01
Final Test Mode:	M01

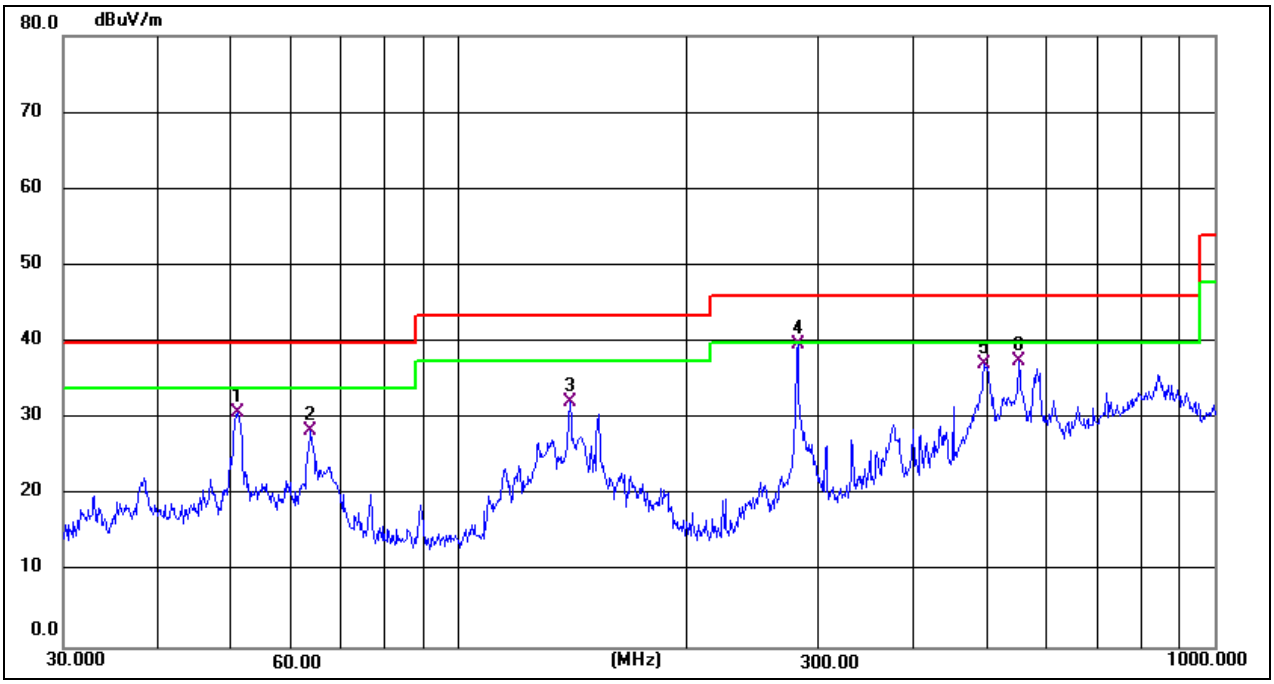
Note: All test modes had been tested, but only the worst data recorded in the report.

TEST RESULTS



Antenna:Horizontal	Mode: M01

No.	Frequency (MHz)	Reading Level(dBuV)	Correct Factor(dB/m)	Measure-ment(dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector	Comment
1 *	281.0075	53.08	-8.78	44.30	46.00	-1.70	QP	
2	305.6800	45.46	-7.63	37.83	46.00	-8.17	QP	
3	499.4247	40.51	-2.20	38.31	46.00	-7.69	QP	
4	550.9480	38.27	-1.25	37.02	46.00	-8.98	QP	
5	586.8437	37.42	-0.64	36.78	46.00	-9.22	QP	
6	869.1302	32.25	5.34	37.59	46.00	-8.41	QP	



Antenna:Vertical	Mode: M01

No.	Frequency (MHz)	Reading Level(dBuV)	Correct Factor(dB/m)	Measure-ment(dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector	Comment
1	51.1209	40.25	-9.40	30.85	40.00	-9.15	QP	
2	63.7588	37.87	-9.53	28.34	40.00	-11.66	QP	
3	140.3421	44.29	-12.03	32.26	43.50	-11.24	QP	
4 *	281.0075	48.48	-8.78	39.70	46.00	-6.30	QP	
5	495.9344	39.54	-2.36	37.18	46.00	-8.82	QP	
6	550.9480	38.68	-1.25	37.43	46.00	-8.57	QP	

Remark: 1. Result = Reading +Correct (Amplifier Factor + Cable Loss + Antenna Factor)
2. Margin = Result - Limit

7.2. RADIATED EMISSIONS ABOVE 1GHZ

LIMITS

Above 1 GHz

CFR 47 FCC Part 15 Subpart B				
Frequency (MHz)	Class A		Class B	
	(dBuV/m) (at 3 m)		(dBuV/m) (at 3 m)	
	Peak	Average	Peak	Average
Above 1000	80	60	74	54

Test Frequency Range of Radiated Disturbance Measurement

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 - 108	1000
108 - 500	2000
500 - 1000	5000
Above 1000	5^{th} harmonic of the highest frequency or 40 GHz, whichever is lower

NOTE:

(1) The limit for radiated test was performed according to FCC Part 15, Subpart B;
(2) The tighter limit applies at the band edges;
(3) Emission level (dBuV/m) = 20log Emission level (uV/m),
3m Emission level = 10 m Emission level + 20log(10 m/3 m);

TEST PROCEDURE

Above 1 GHz

The setting of the spectrum analyser

RBW	1 MHz
VBW	3 MHz
Sweep	Auto
Detector	Peak: Peak AVG: RMS
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.4-2014.

2. 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. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80 cm above ground.

4. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

5. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

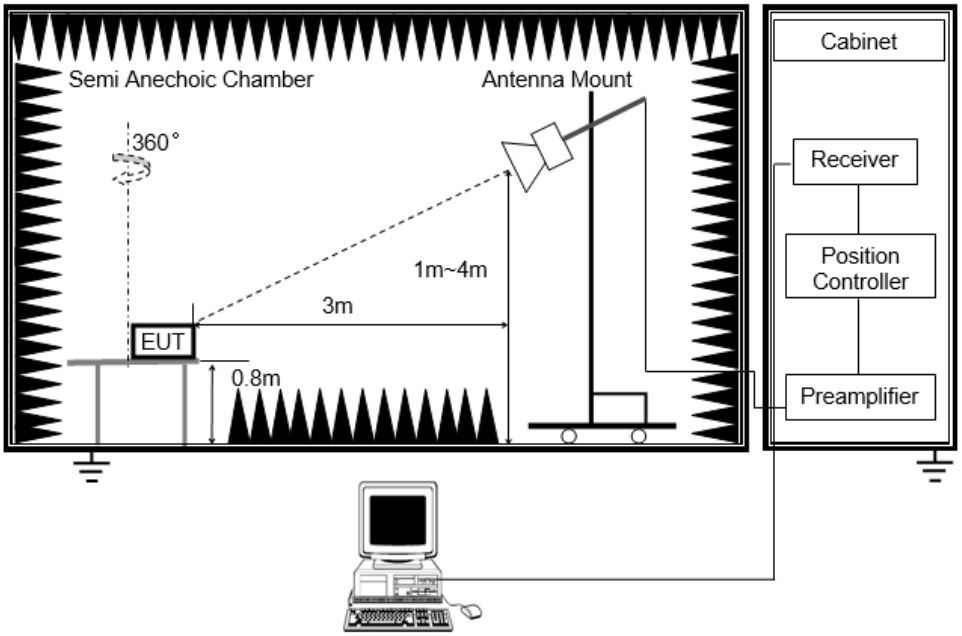
6. Cables of hand-operated devices, such as keyboards and mice, shall be placed as for normal used.

7. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

8. For measurement above 1 GHz, the peak emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the peak limit specified in Section 15.109. If peak result complies with average limit, average result is deemed to comply with average limit.

9. The average emission measurement will be measured by the RMS detector and must comply with the average limit specified in Section 15.109.

TEST SETUP



TEST ENVIRONMENT

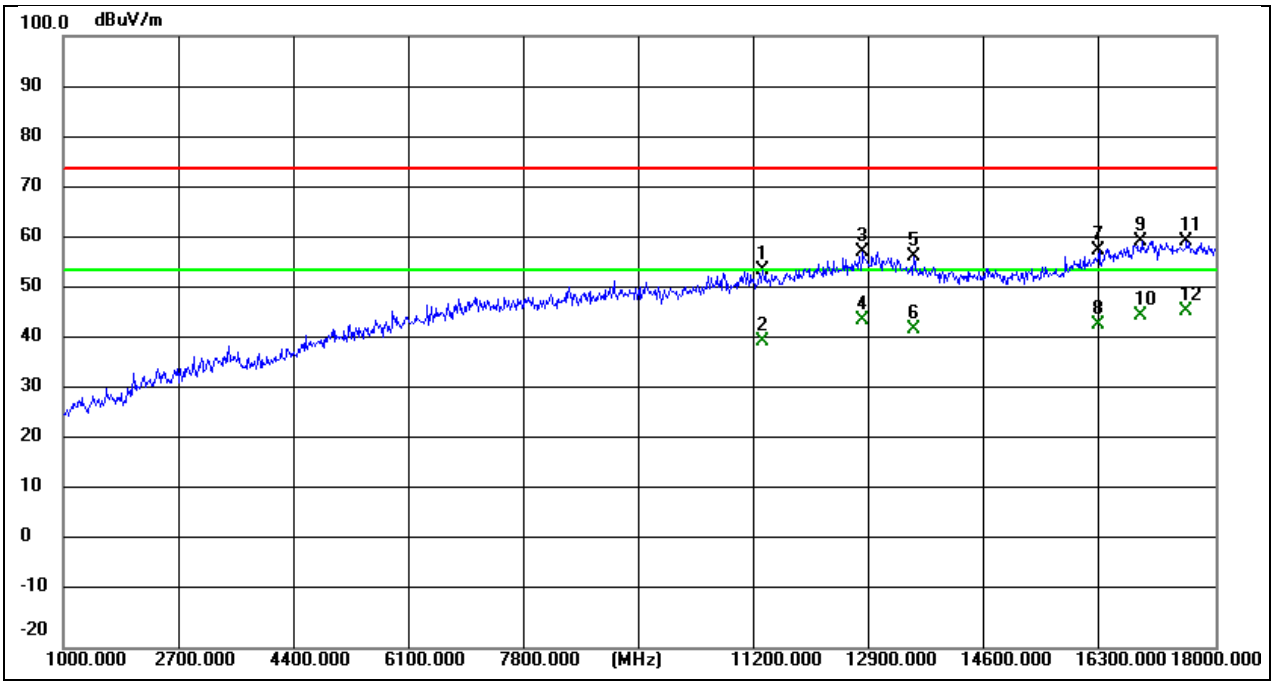
Temperature	24.3℃	Relative Humidity	53%
Atmosphere Pressure	101kPa		

TEST MODE

Pre-test Mode:	M01 ~ M01
Final Test Mode:	M01

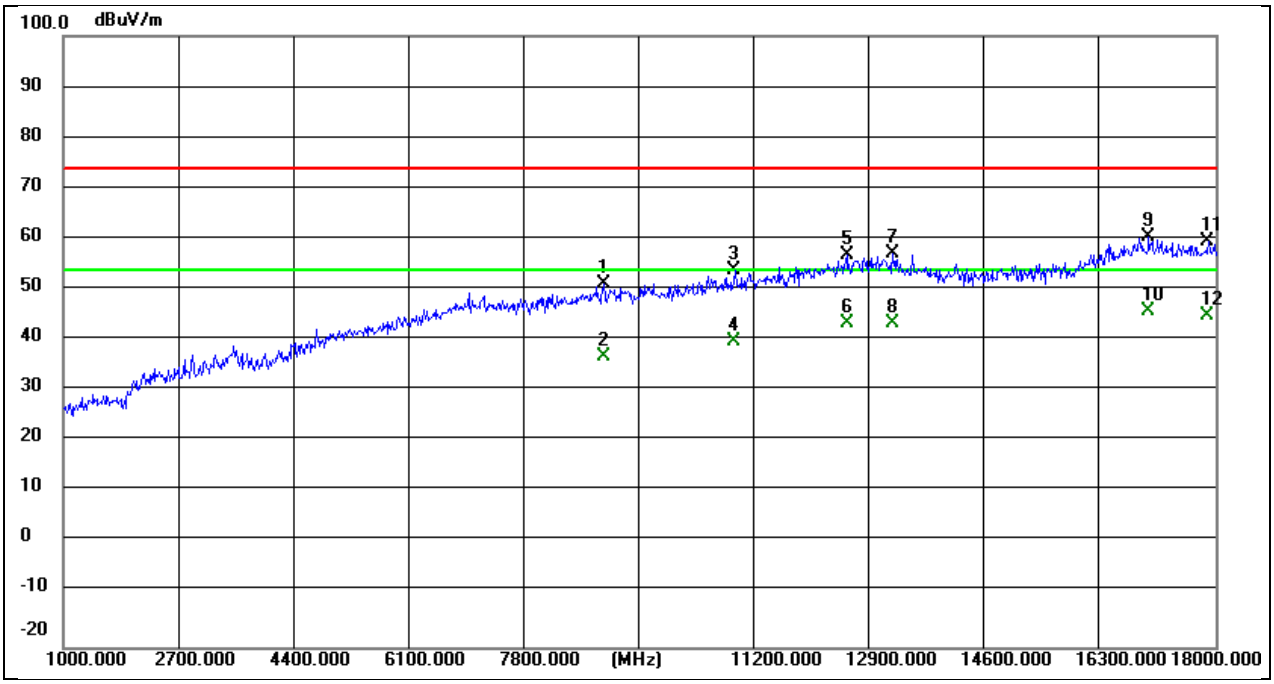
Note: All test modes had been tested, but only the worst data recorded in the report.

TEST RESULTS



Antenna:Vertical	Mode: M01

No.	Frequency (MHz)	Reading Level(dBuV)	Correct Factor(dB/m)	Measure-ment(dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector	Comment
1	11331.467	44.45	9.77	54.22	74.00	-19.78	peak	
2	11331.467	30.38	9.77	40.15	54.00	-13.85	AVG	
3	12805.367	45.71	12.02	57.73	74.00	-16.27	peak	
4	12805.367	32.26	12.02	44.28	54.00	-9.72	AVG	
5	13547.700	44.56	12.16	56.72	74.00	-17.28	peak	
6	13547.700	30.23	12.16	42.39	54.00	-11.61	AVG	
7	16296.033	43.14	14.76	57.90	74.00	-16.10	peak	
8	16296.033	28.62	14.76	43.38	54.00	-10.62	AVG	
9	16923.333	43.17	16.67	59.84	74.00	-14.16	peak	
10	16923.333	28.58	16.67	45.25	54.00	-8.75	AVG	
11	17577.267	41.73	17.91	59.64	74.00	-14.36	peak	
12	17577.267	28.06	17.91	45.97	54.00	-8.03	AVG	



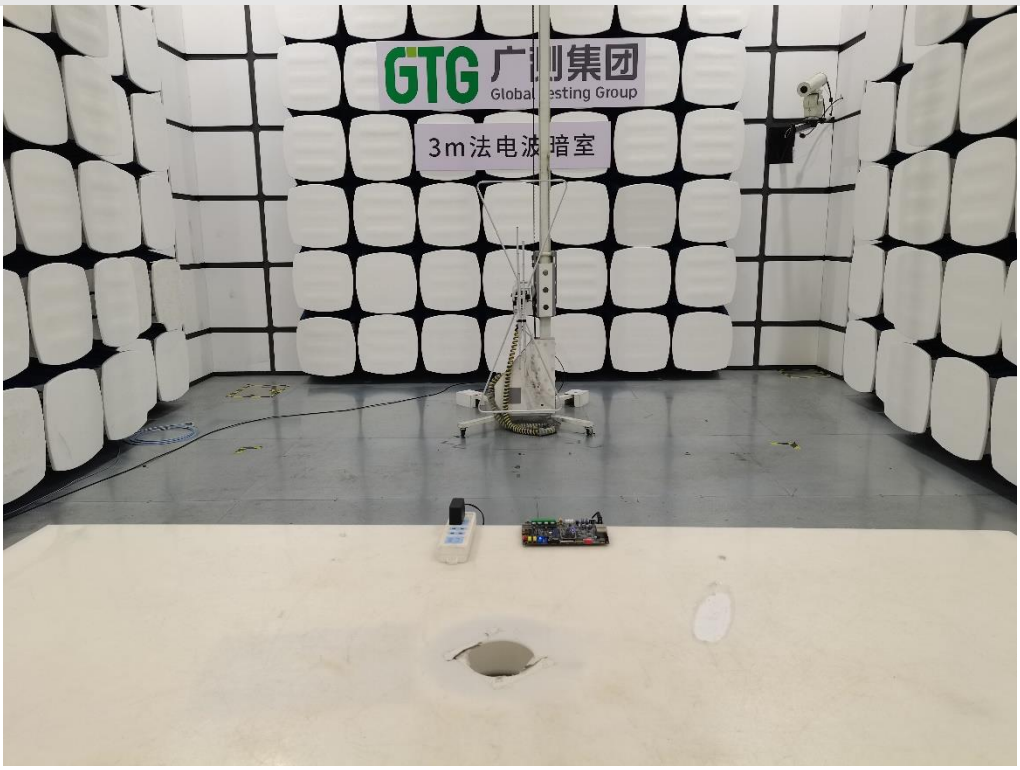
Antenna:Horizontal	Mode: M01

No.	Frequency (MHz)	Reading Level(dBuV)	Correct Factor(dB/m)	Measure-ment(dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector	Comment
1	8987.167	44.30	7.04	51.34	74.00	-22.66	peak	
2	8987.167	30.01	7.04	37.05	54.00	-16.95	AVG	
3	10918.933	45.00	9.08	54.08	74.00	-19.92	peak	
4	10918.933	31.20	9.08	40.28	54.00	-13.72	AVG	
5	12560.567	45.32	11.71	57.03	74.00	-16.97	peak	
6	12560.567	31.92	11.71	43.63	54.00	-10.37	AVG	
7	13242.267	45.23	12.22	57.45	74.00	-16.55	peak	
8	13242.267	31.42	12.22	43.64	54.00	-10.36	AVG	
9	17019.100	43.68	16.94	60.62	74.00	-13.38	peak	
10	17019.100	29.16	16.94	46.10	54.00	-7.90	AVG	
11	17914.433	41.26	18.50	59.76	74.00	-14.24	peak	
12	17914.433	26.78	18.50	45.28	54.00	-8.72	AVG	

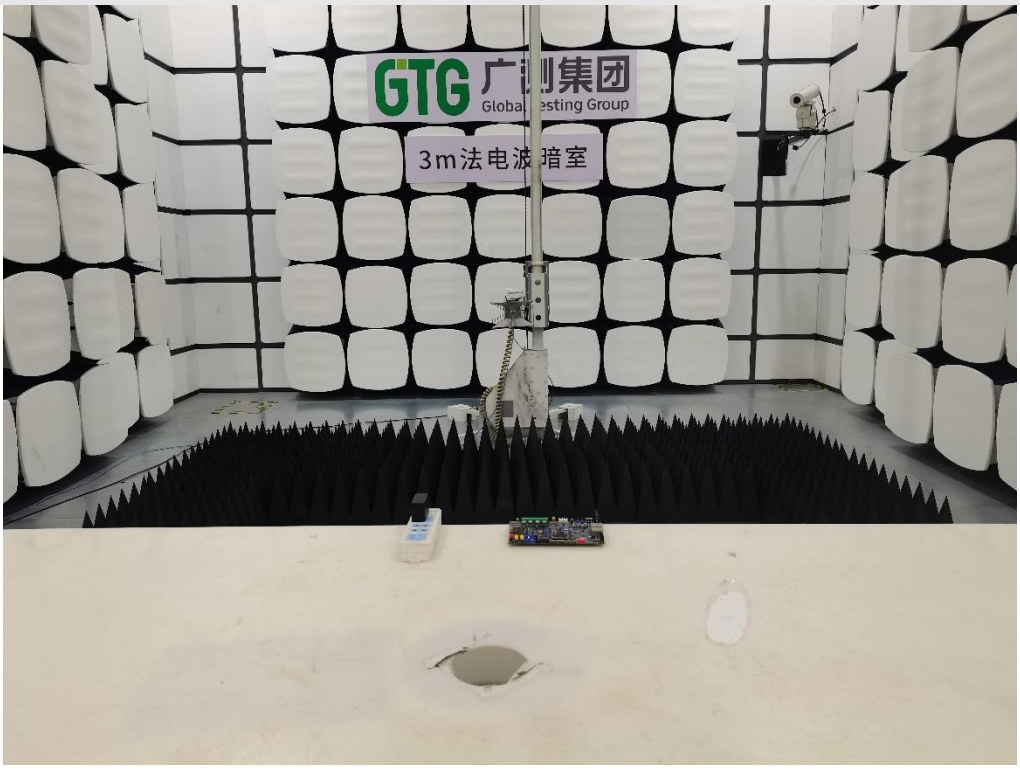
Remark: 1. Result = Reading +Correct (Amplifier Factor + Cable Loss + Antenna Factor)
2. Margin = Result - Limit

APPENDIX: PHOTOGRAPHS OF TEST CONFIGURATION

Radiated emissions below 1GHz

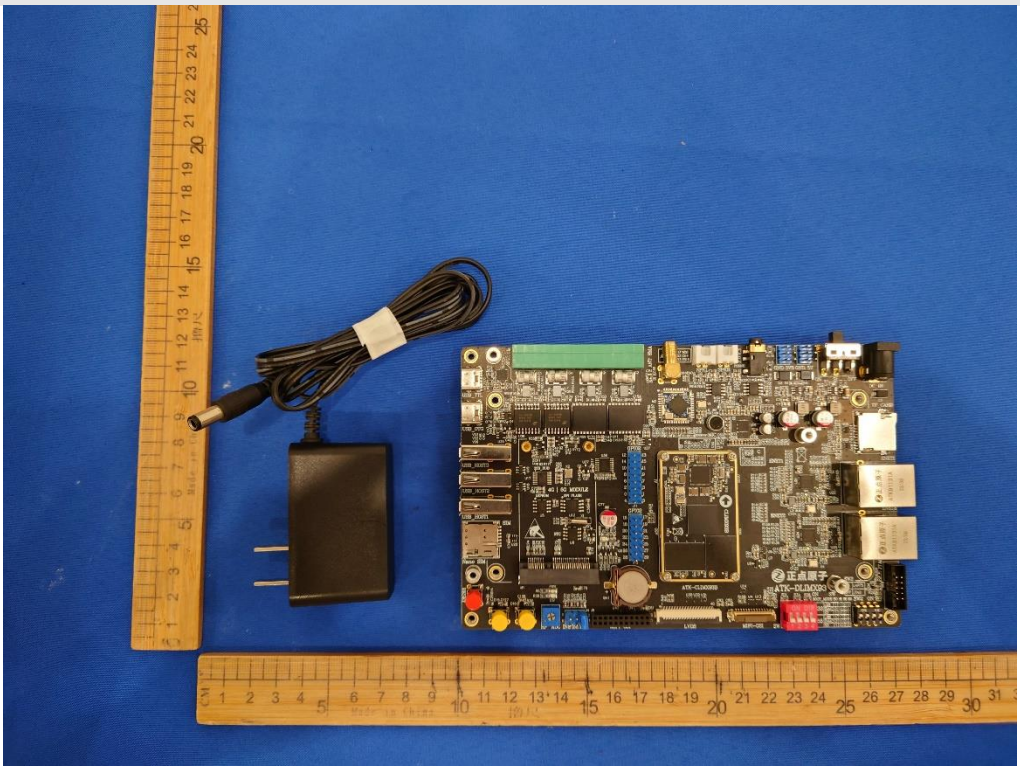


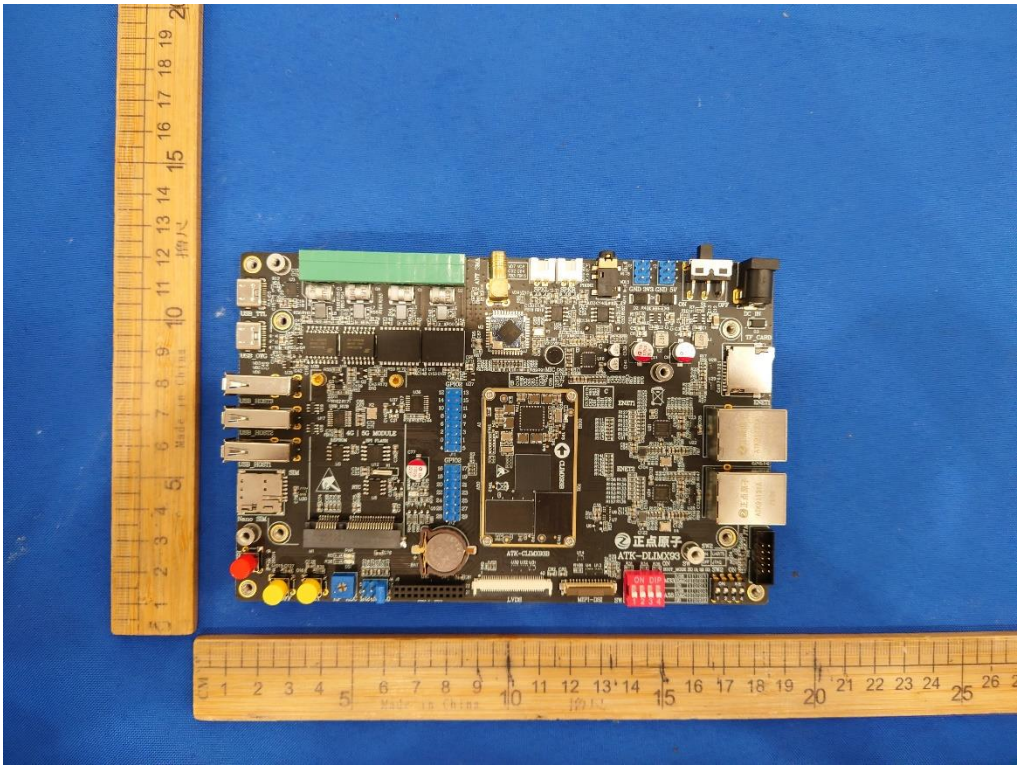
Radiated emissions above 1GHz

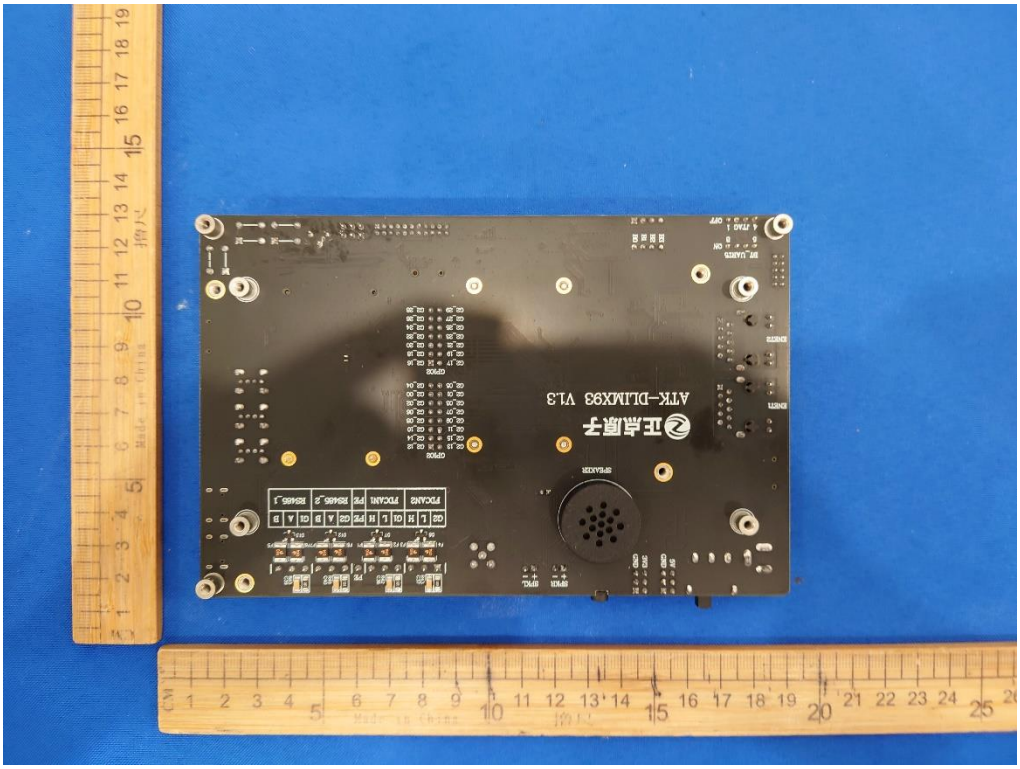


APPENDIX: PHOTOGRAPHS OF THE EUT

External







END OF REPORT