

FCC Test Report

Client Name : JIANGSU HUAKONG INTELLIGENT TECHNOLOGY CO., LTD.

Address : Intersection of Xuhai Road and Minsheng Road, Xuzhuang Town, Xuzhou City, Jiangsu Province

Product Name : Permanent magnet synchronous controller

Date : May 15, 2023

Shenzhen Anbotek Compliance Laboratory Limited

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TEST REPORT

Applicant : JIANGSU HUAKONG INTELLIGENT TECHNOLOGY CO., LTD
Manufacturer : Intersection of Xuhai Road and Minsheng Road, Xuzhuang Town, Xuzhou
City, Jiangsu Province
Product Name : Permanent magnet synchronous controller
Model No. : 48 MOSFET Controller, KTZ00X00XXX, YCK000000X
Trade Mark : HUAKONG INTELLIGENT
Rating(s) : Rated input voltage range DC 24-144V
Maximum input current range 0-240 A
Rated power 2-6.5kw
Maximum power 4-13kw

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

May 08, 2023

Date of Test

May 08~May 015, 2023

Prepared By



(Ella Liang)

Approved & Authorized Signer



(Kingkong Jin)

1. General Information

1.1. Client Information

Applicant	:	JIANGSU HUAKONG INTELLIGENT TECHNOLOGY CO., LTD
Address	:	Intersection of Xuhai Road and Minsheng Road, Xuzhuang Town, Xuzhou City, Jiangsu Province
Manufacturer	:	JIANGSU HUAKONG INTELLIGENT TECHNOLOGY CO., LTD
Address	:	Intersection of Xuhai Road and Minsheng Road, Xuzhuang Town, Xuzhou City, Jiangsu Province
Factory	:	JIANGSU HUAKONG INTELLIGENT TECHNOLOGY CO., LTD
Address	:	Intersection of Xuhai Road and Minsheng Road, Xuzhuang Town, Xuzhou City, Jiangsu Province

1.2. Description of Device (EUT)

Product Name	:	Permanent magnet synchronous controller
Model No.	:	48 MOSFET Controller, KTZ00X00XXX, YCK000000X
Trade Mark	:	HUAKONG INTELLIGENT
Test Power Supply	:	Rated input voltage range DC 24-144V Maximum input current range 0-240 A Rated power 2-6.5kw Maximum power 4-13kw
Test Sample No.	:	1-2-1(Normal Sample)
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.		

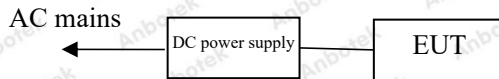
1.3. Auxiliary Equipment Used During Test

N/A

1.4. Description of Test Mode

Pretest Mode	Description
Mode 1	On Mode

For Mode 1 Block Diagram of Test Setup



1.5. Test Summary

Standard Section	Test Items	Test Mode	Status
§15.107	Power Line Conducted Emission Test	Mode 1	N
§15.109	Radiated Emission Test (Below 1 GHz)	Mode 1	P
§15.109	Radiated Emission Test (Above 1GHz)	Mode 1	P

P) Indicates "PASS".
 F) Indicates "Fail".
 N) Indicates "Not applicable".

1.6. Test Equipment List

Power Line 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	Oct. 23, 2022	1 Year
2.	Three Phase V-type Artificial Power Network	CYBERTEK	EM5040DT	E215040D T001	Jul. 05, 2022	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 13, 2022	1 Year
4.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 22, 2022	1 Year
5.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A

Radiated Emission Test (Below 1 GHz)

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 23, 2022	1 Year
2.	Pre-amplifier	SONOMA	310N	186860	Oct. 23, 2022	1 Year
3.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Oct. 23, 2022	1 Year
4.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A

Radiated Emission Test (Above 1GHz)

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 23, 2022	1 Year
2.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A
3.	EMI Preamplifier	SKET Electronic	LNPA-0118G- 45	SKET-PA-0 02	Oct. 13, 2022	1 Year
4.	Double Ridged Horn Antenna	SCHWARZBECK	BBHA 9120D	02555	Oct. 16, 2022	3 Year

1.7. 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.

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.

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

1.8. Measurement Uncertainty

Radiation Uncertainty(30MHz-1GHz)	:	Ur = 4.46 dB (Horizontal)
	:	Ur = 5.04 dB (Vertical)
Radiation Uncertainty(1GHz-6GHz)	:	Ur = 4.92 dB (Horizontal)
	:	Ur = 4.92 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4 dB
Disturbance Uncertainty	:	Ud = 3.4 dB



2. Power Line Conducted Emission Test

2.1. Test Standard and Limit

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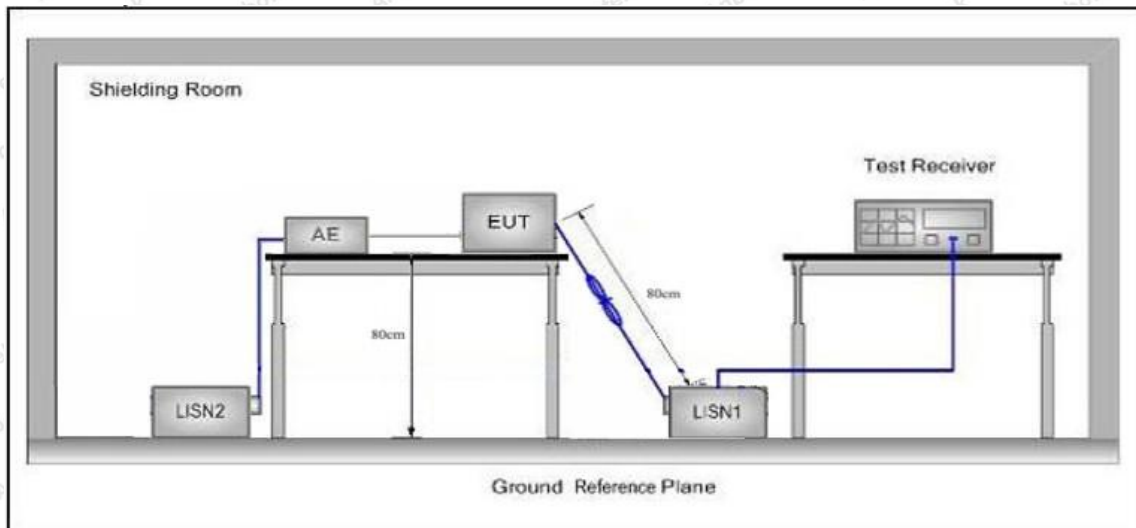
Power Line Conducted Emission Measurement Limits (FCC Part 15 Class B)

Test Limit	Frequency (MHz)	At mains terminals (dB μ V)	
		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

EUT supplies power to DC This project is not applicable



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)

	Frequency (MHz)	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
Test Limit	0.009MHz~0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz~88MHz	100	40.0	Quasi-peak	3
	88MHz~216MHz	150	43.5	Quasi-peak	3
	216MHz~960MHz	200	46.0	Quasi-peak	3
	960MHz~1000MHz	500	54.0	Quasi-peak	3
	Above 1000MHz	500	54.0	Average	3
		-	74.0	Peak	3

Remark:

(1)The lower limit shall apply at the transition frequency.

(2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

3.2. Test Setup

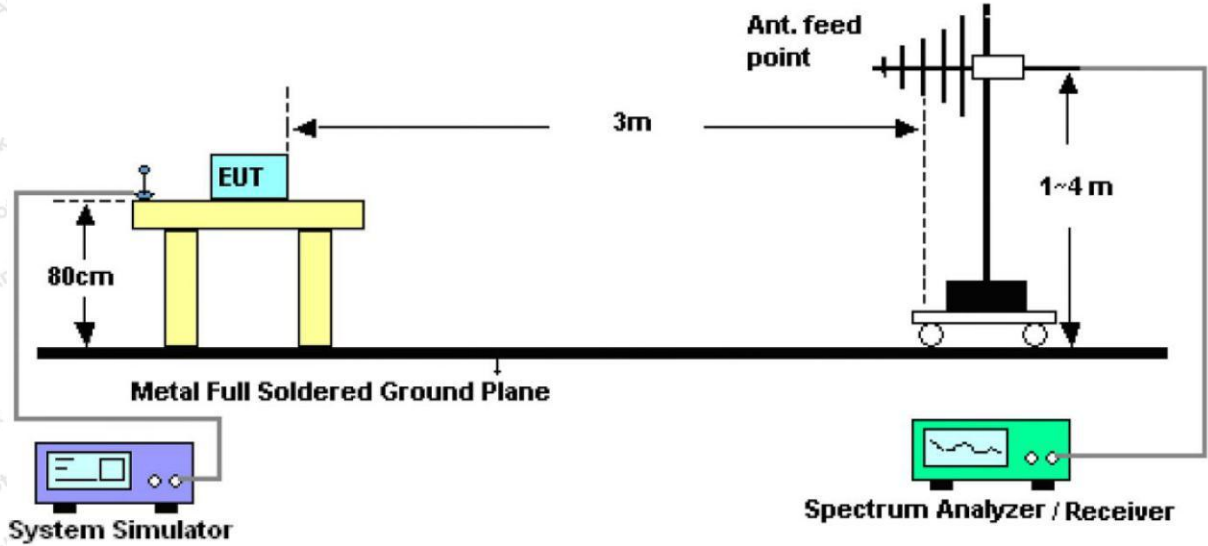


Figure 1. 30MHz to 1GHz

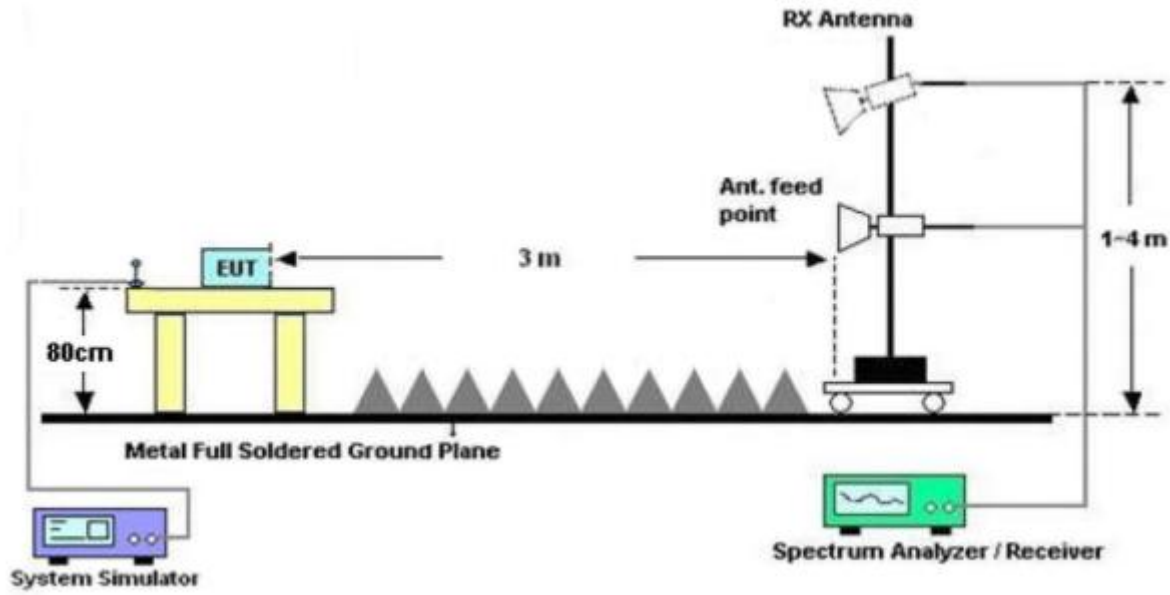


Figure 2. Above 1 GHz

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. Bilog antenna & Double Ridged Horn Antenna is used as a 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 (ESR26) is set at 120kHz.

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

The bandwidth of the EMI test receiver (ESR26) is set at 1MHz.

The frequency range from 1000MHz to 6000MHz is checked.

The test results are listed in Section 3.6.

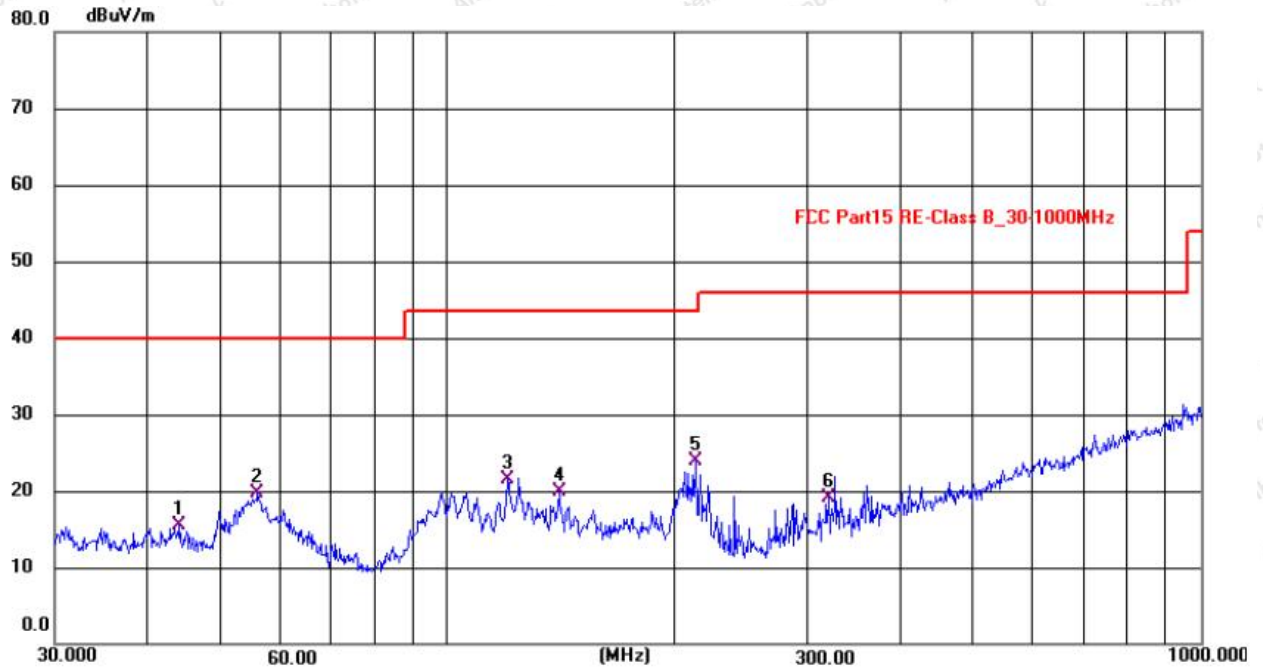
3.6. Test Results

PASS

Only the worst case data was showed in the report, please to see the following pages.

Test Results (30~1000MHz)

Test item:	Radiation Test	Polarization:	Horizontal
Standard:	(RE)FCC Part 15 Subpart B	Power Source:	DC 24V
Test Mode:	Mode 1	Temp.(°C)/Hum.(%RH):	24°C/60%RH

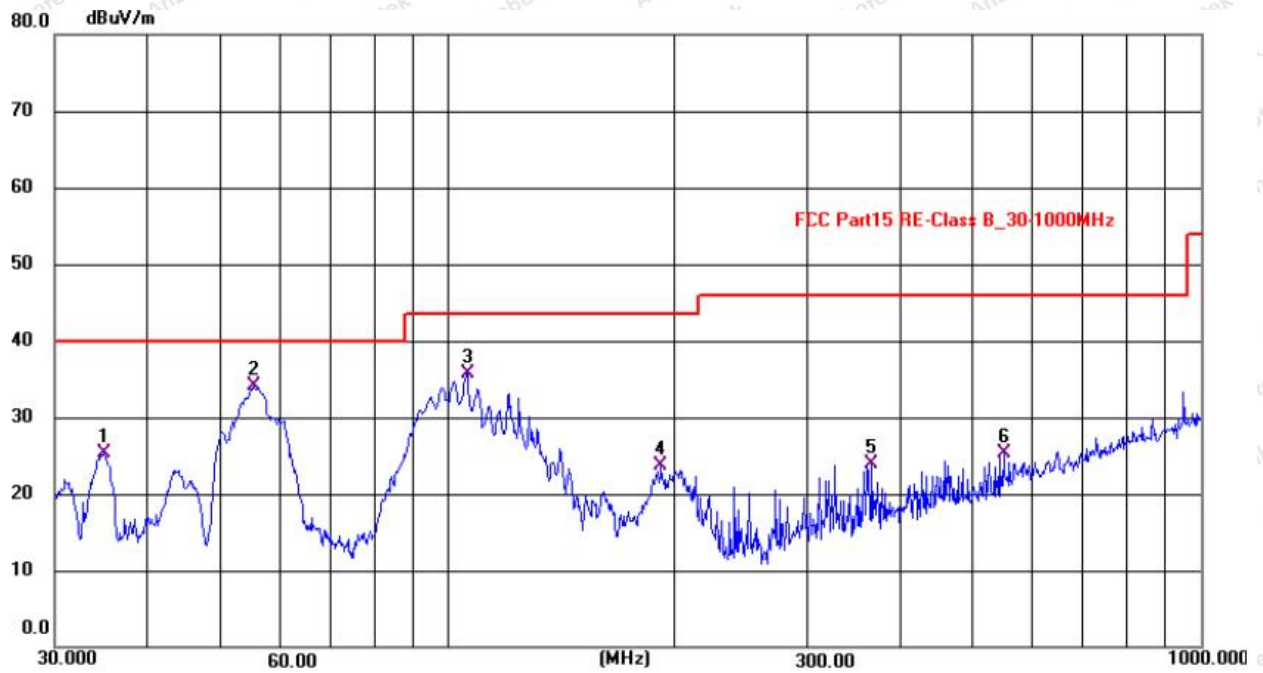


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	44.1202	30.48	-15.07	15.41	40.00	-24.59	QP
2	55.9026	35.33	-15.64	19.69	40.00	-20.31	QP
3	119.8556	38.70	-17.21	21.49	43.50	-22.01	QP
4	140.8351	35.45	-15.59	19.86	43.50	-23.64	QP
5 *	213.0151	42.55	-18.74	23.81	43.50	-19.69	QP
6	321.0608	33.47	-14.46	19.01	46.00	-26.99	QP

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

Test Results (30~1000MHz)

Test item:	Radiation Test	Polarization:	Vertical
Standard:	(RE)FCC Part 15 Subpart B	Power Source:	DC 24V
Test Mode:	Mode 1	Temp.(°C)/Hum.(%RH):	22°C/45%RH

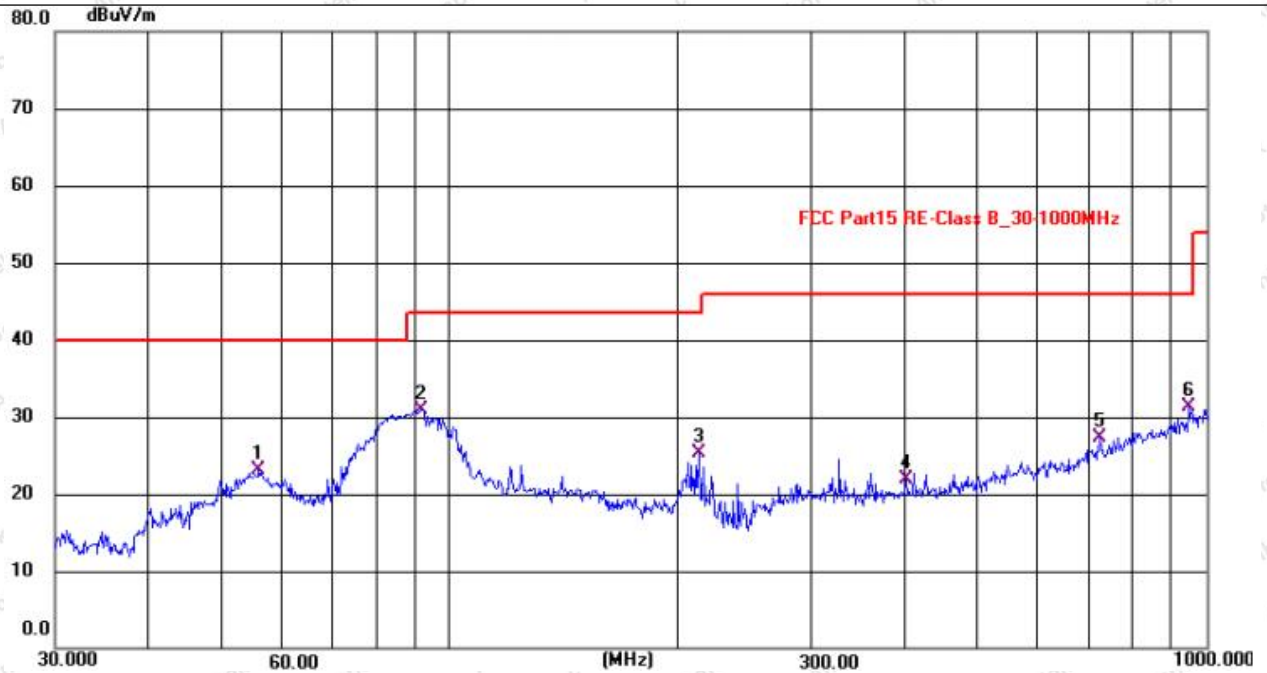


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	34.8823	40.28	-15.03	25.25	40.00	-14.75	QP
2 *	55.3176	49.36	-15.29	34.07	40.00	-5.93	QP
3	106.1987	54.09	-18.40	35.69	43.50	-7.81	QP
4	192.0815	42.25	-18.48	23.77	43.50	-19.73	QP
5	366.1805	37.17	-13.33	23.84	46.00	-22.16	QP
6	549.0195	34.62	-9.22	25.40	46.00	-20.60	QP

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

Test Results (30~1000MHz)

Test item: Radiation Test Polarization: Horizontal
 Standard: (RE)FCC Part 15 Subpart B Power Source: DC 144V
 Test Mode: Mode 1 Temp.(°C)/Hum.(%RH): 24°C/60%RH



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	55.9025	38.83	-15.64	23.19	40.00	-16.81	QP
2 *	91.6554	50.03	-19.18	30.85	43.50	-12.65	QP
3	213.0149	44.05	-18.74	25.31	43.50	-18.19	QP
4	401.8383	34.49	-12.54	21.95	46.00	-24.05	QP
5	722.9923	32.89	-5.62	27.27	46.00	-18.73	QP
6	948.7608	33.15	-1.77	31.38	46.00	-14.62	QP

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

Test Results (30~1000MHz)

Shenzhen Anbotek Compliance Laboratory Limited

Code:AB-EMC-04-a

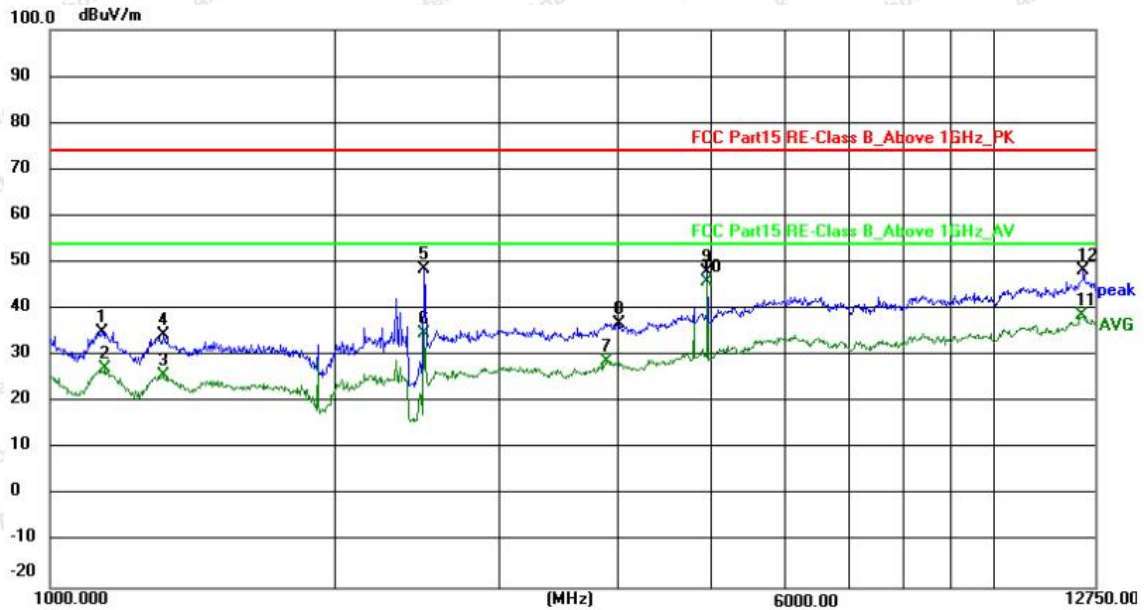
Address: 1/F., Building D, Sogood Science and Technology Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.

Tel:(86) 755-26066440 Fax: (86) 755-26014772 Email: service@anbotek.com

Hotline
 400-003-0500
 www.anbotek.com

Test Results (1GHz-12.75GHz)

Test item:	Radiation Test	Polarization:	Horizontal
Standard:	(RE)FCC Part 15 Subpart B	Power Source:	DC 24V
Test Mode:	Mode 1	Temp.(°C)/Hum.(%RH):	22°C/45%RH

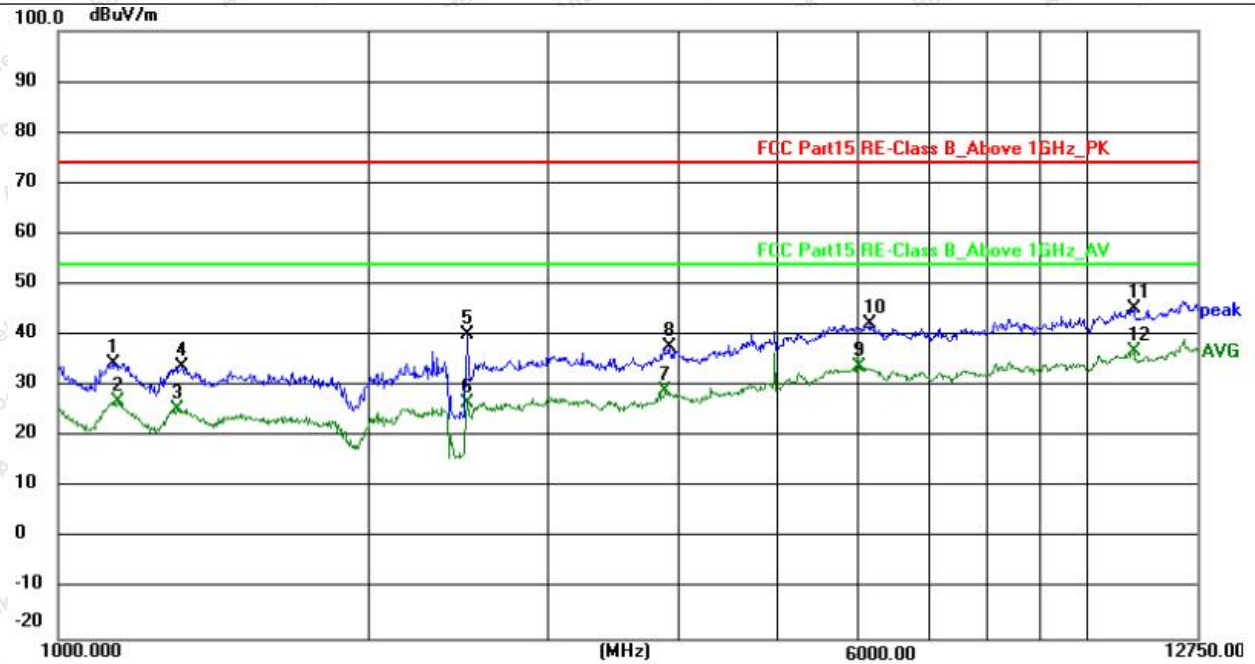


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1136.888	43.13	-7.98	35.15	74.00	-38.85	peak
2	1146.287	35.10	-7.93	27.17	54.00	-26.83	AVG
3	1318.425	33.12	-7.33	25.79	54.00	-28.21	AVG
4	1320.775	41.68	-7.33	34.35	74.00	-39.65	peak
5	2488.725	50.74	-2.24	48.50	74.00	-25.50	peak
6	2488.725	37.01	-2.24	34.77	54.00	-19.23	AVG
7	3883.450	26.73	2.17	28.90	54.00	-25.10	AVG
8	4000.950	34.31	2.67	36.98	74.00	-37.02	peak
9	4960.337	42.04	5.99	48.03	74.00	-25.97	peak
10 *	4960.337	39.88	5.99	45.87	54.00	-8.13	AVG
11	12368.712	23.83	14.77	38.60	54.00	-15.40	AVG
12	12399.850	33.53	14.85	48.38	74.00	-25.62	peak

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

Test Results (1GHz-12.75GHz)

Test item: Radiation Test Polarization: Vertical
 Standard: (RE)FCC Part 15 Subpart B Power Source: DC 24V
 Test Mode: Mode 1 Temp.(°C)/Hum.(%RH): 22°C/45%RH



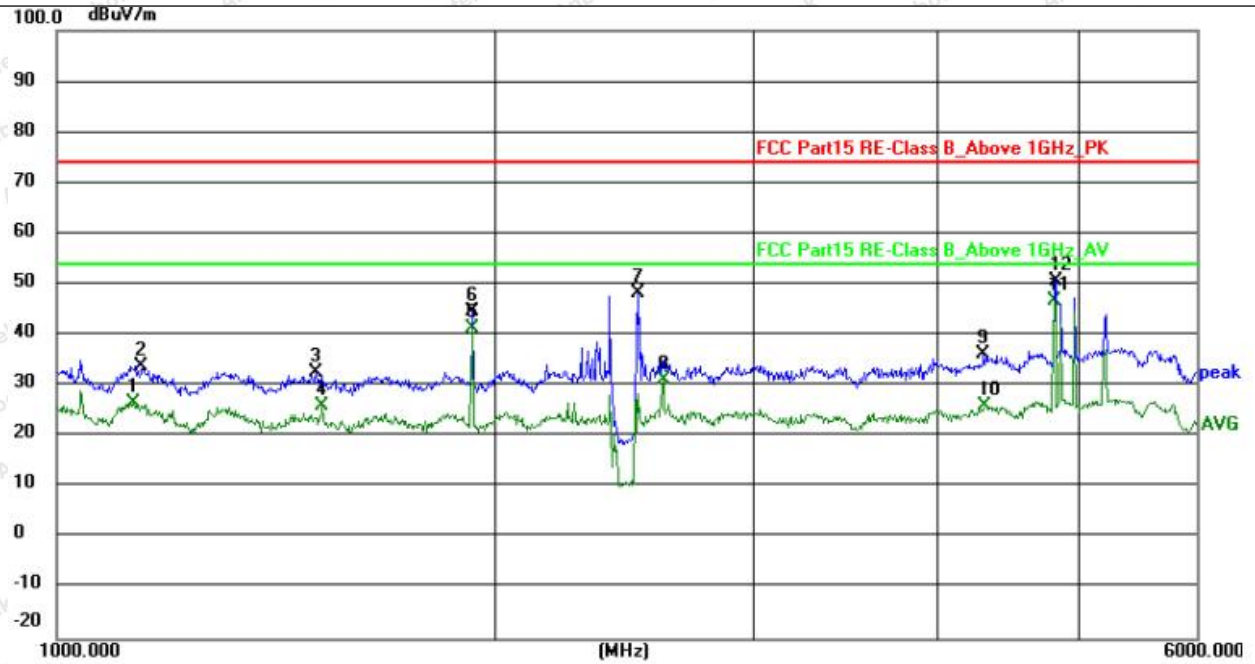
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1131.013	42.57	-7.99	34.58	74.00	-39.42	peak
2	1145.700	34.82	-7.94	26.88	54.00	-27.12	AVG
3	1304.325	32.84	-7.38	25.46	54.00	-28.54	AVG
4	1320.188	41.04	-7.33	33.71	74.00	-40.29	peak
5	2496.950	42.48	-2.20	40.28	74.00	-33.72	peak
6	2496.950	28.77	-2.20	26.57	54.00	-27.43	AVG
7	3884.037	26.81	2.18	28.99	54.00	-25.01	AVG
8	3914.000	35.57	2.30	37.87	74.00	-36.13	peak
9	6000.800	24.03	9.71	33.74	54.00	-20.26	AVG
10	6150.025	32.66	9.71	42.37	74.00	-31.63	peak
11	11062.700	30.63	14.73	45.36	74.00	-28.64	peak
12 *	11062.700	22.21	14.73	36.94	54.00	-17.06	AVG

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



Test Results (1GHz-12.75GHz)

Test item:	Radiation Test	Polarization:	Horizontal
Standard:	(RE)FCC Part 15 Subpart B	Power Source:	DC 144V
Test Mode:	Mode 1	Temp.(°C)/Hum.(%RH):	22°C/45%RH

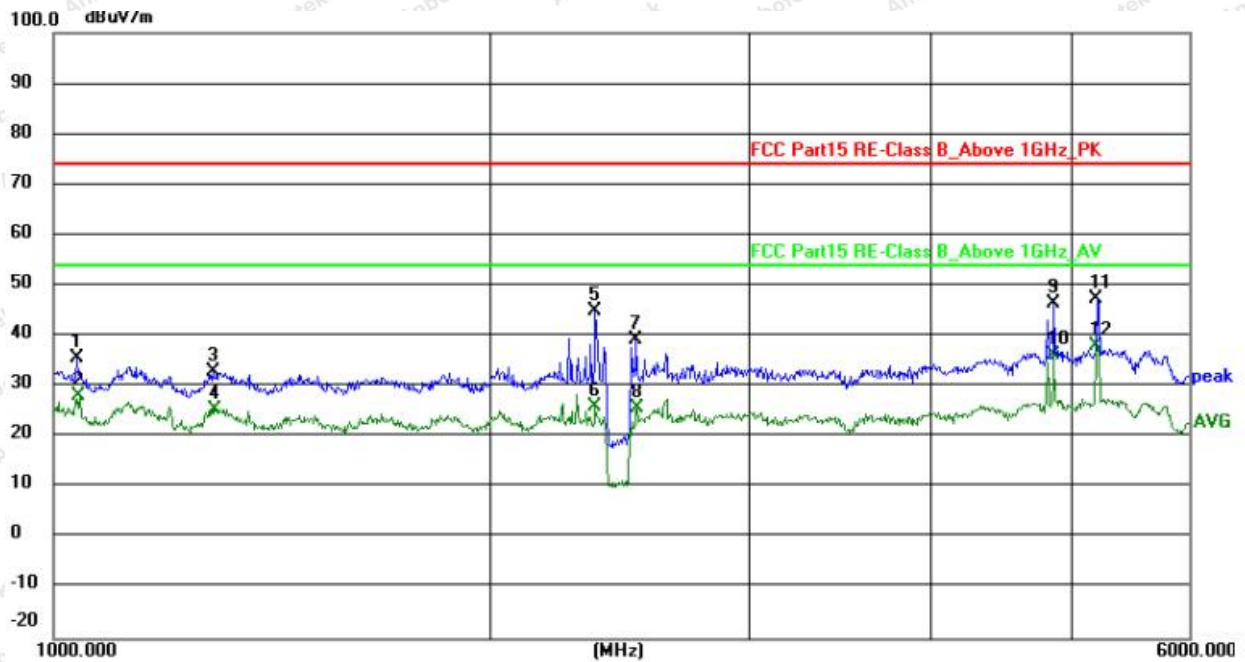


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1128.764	34.64	-8.01	26.63	54.00	-27.37	AVG
2	1146.805	41.86	-7.93	33.93	74.00	-40.07	peak
3	1504.322	39.27	-6.68	32.59	74.00	-41.41	peak
4	1519.083	32.80	-6.61	26.19	54.00	-27.81	AVG
5	1925.100	46.01	-4.67	41.34	54.00	-12.66	AVG
6	1925.444	49.46	-4.67	44.79	74.00	-29.21	peak
7	2494.445	50.57	-2.21	48.36	74.00	-25.64	peak
8	2594.039	32.88	-1.82	31.06	54.00	-22.94	AVG
9	4299.857	32.60	3.52	36.12	74.00	-37.88	peak
10	4312.974	22.54	3.56	26.10	54.00	-27.90	AVG
11 *	4804.206	41.45	5.34	46.79	54.00	-7.21	AVG
12	4804.636	45.35	5.34	50.69	74.00	-23.31	peak

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

Test Results (1GHz-12.75GHz)

Test item: Radiation Test Polarization: Vertical
 Standard: (RE)FCC Part 15 Subpart B Power Source: DC 144V
 Test Mode: Mode 1 Temp.(°C)/Hum.(%RH): 22°C/45%RH

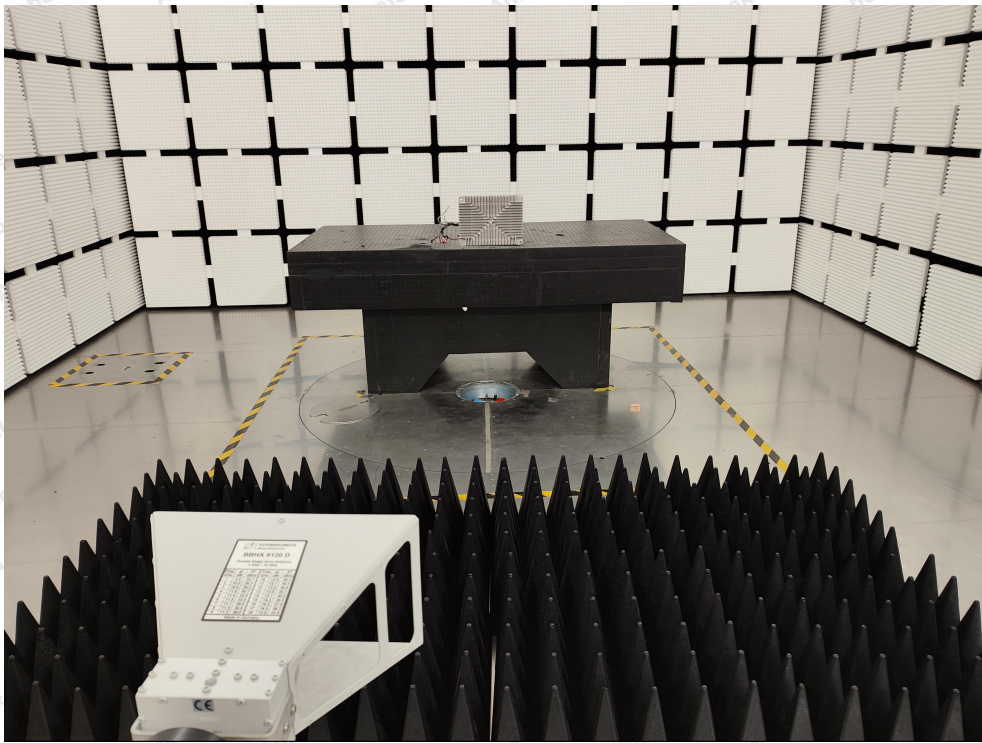
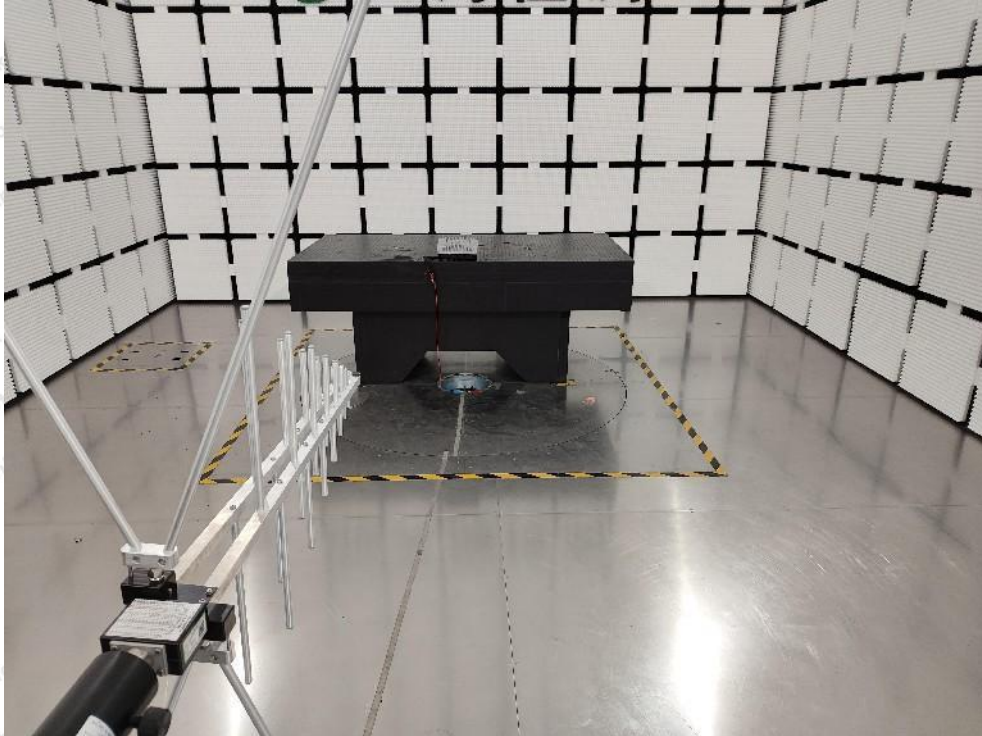


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1038.437	43.86	-8.31	35.55	74.00	-38.45	peak
2	1042.258	36.42	-8.30	28.12	54.00	-25.88	AVG
3	1286.841	40.27	-7.46	32.81	74.00	-41.19	peak
4	1291.576	33.02	-7.43	25.59	54.00	-28.41	AVG
5	2353.758	47.81	-2.82	44.99	74.00	-29.01	peak
6	2353.758	29.00	-2.82	26.18	54.00	-27.82	AVG
7	2511.486	41.48	-2.14	39.34	74.00	-34.66	peak
8	2512.162	28.01	-2.14	25.87	54.00	-28.13	AVG
9	4853.088	40.81	5.55	46.36	74.00	-27.64	peak
10	4853.088	30.61	5.55	36.16	54.00	-17.84	AVG
11	5196.424	40.67	6.62	47.29	74.00	-26.71	peak
12 *	5196.424	31.43	6.62	38.05	54.00	-15.95	AVG

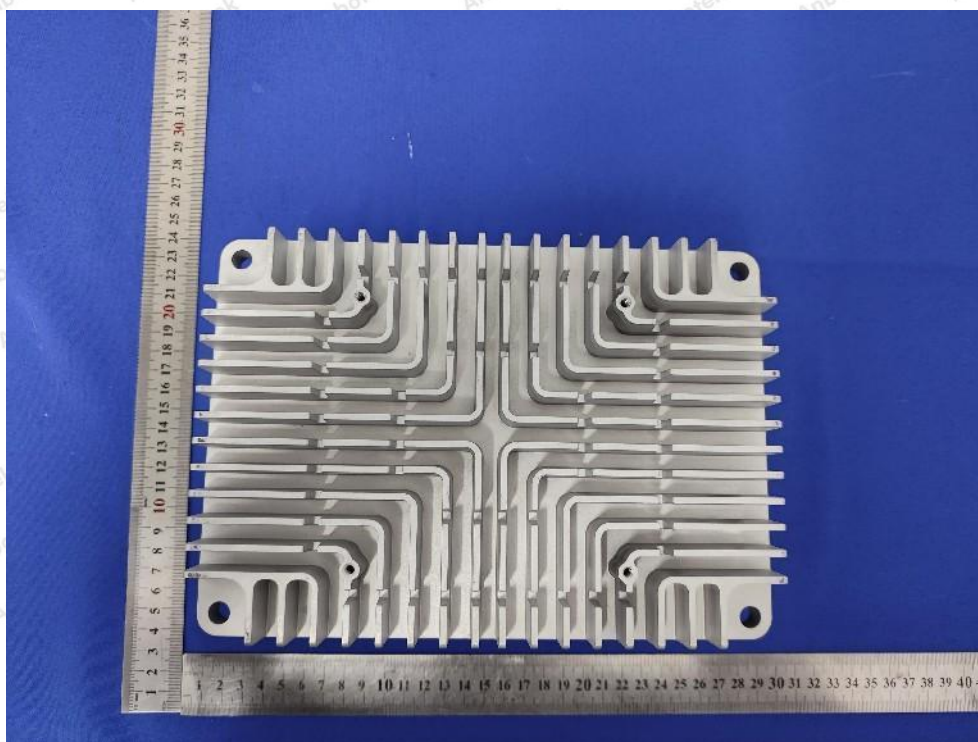
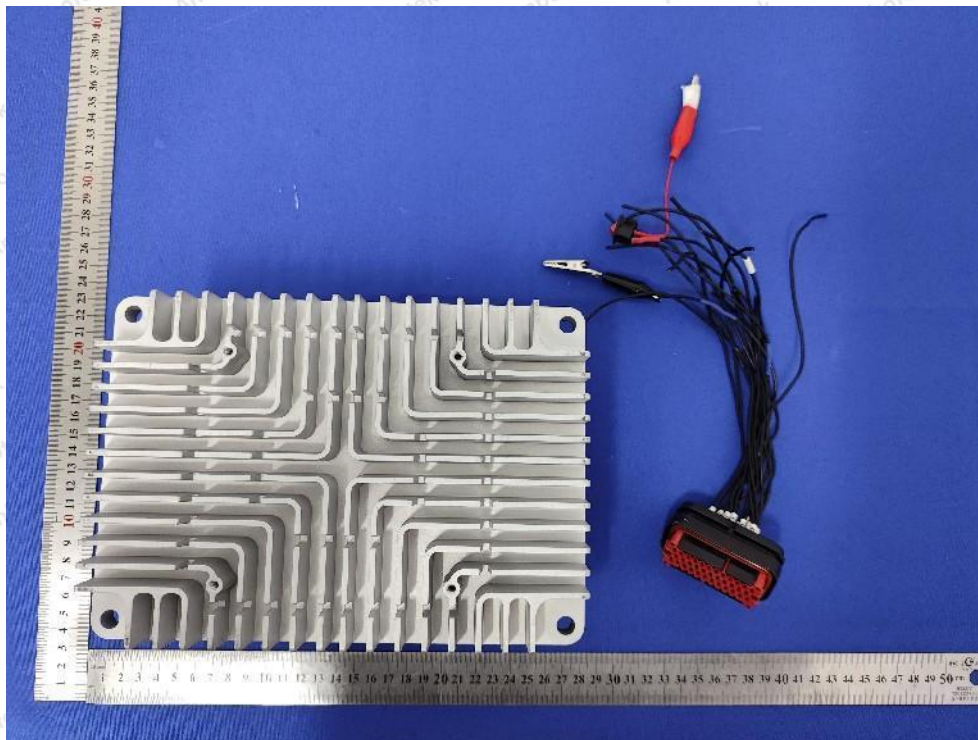
Note: Result=Reading+Factor Over Limit=Result-Limit

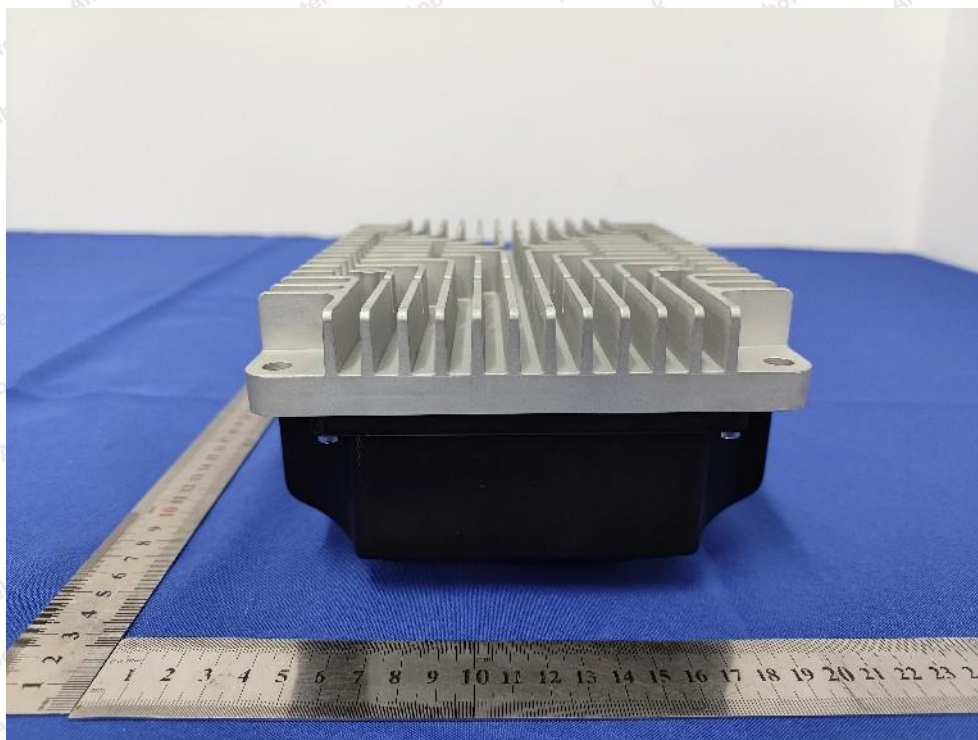
APPENDIX I -- TEST SETUP PHOTOGRAPH

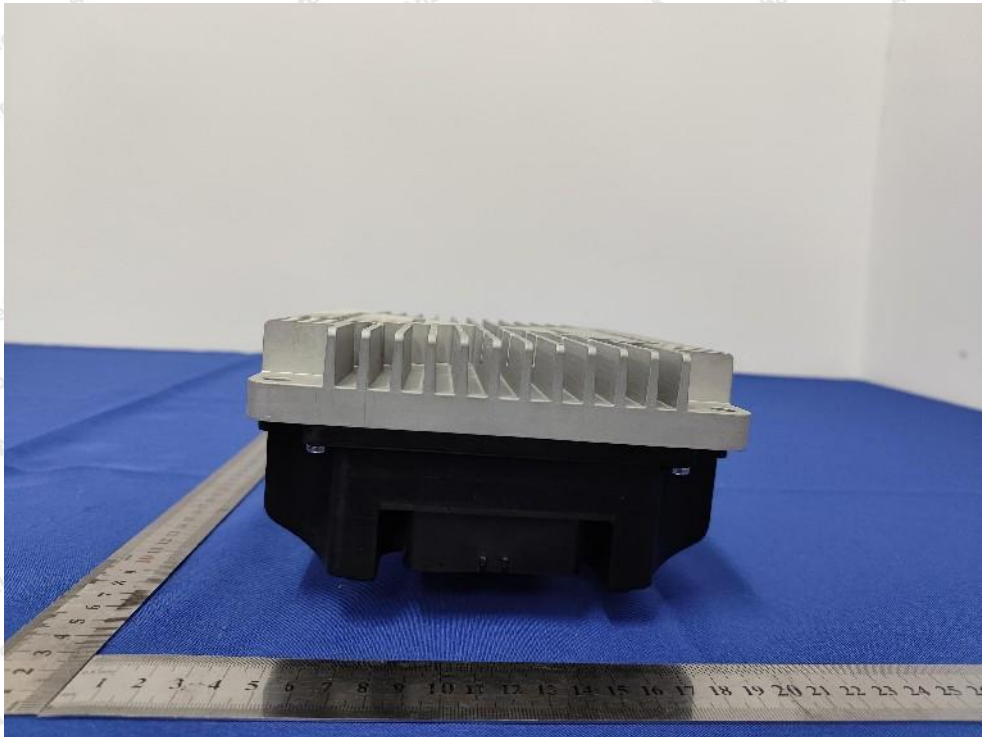
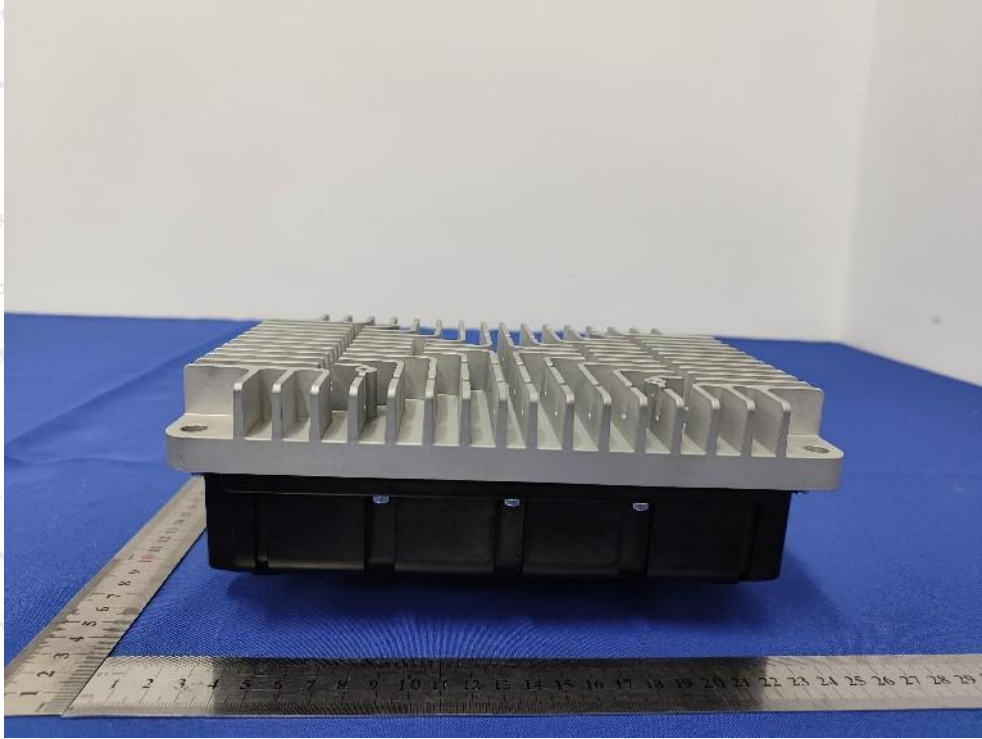
Photo of Radiation Emission Test



APPENDIX II -- EXTERNAL PHOTOGRAPH

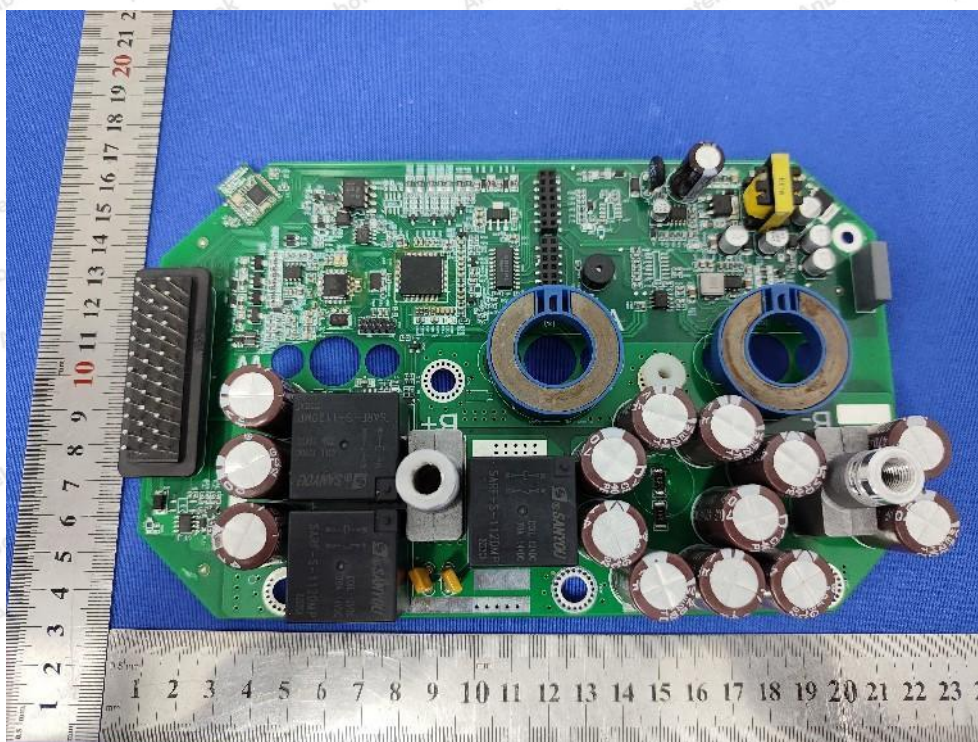
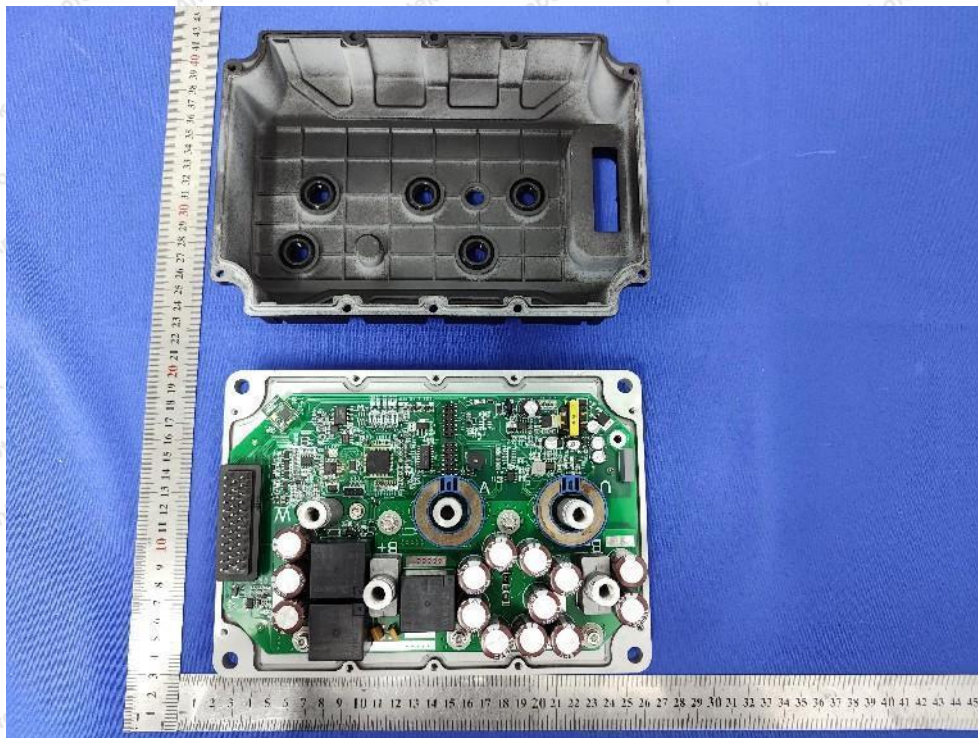


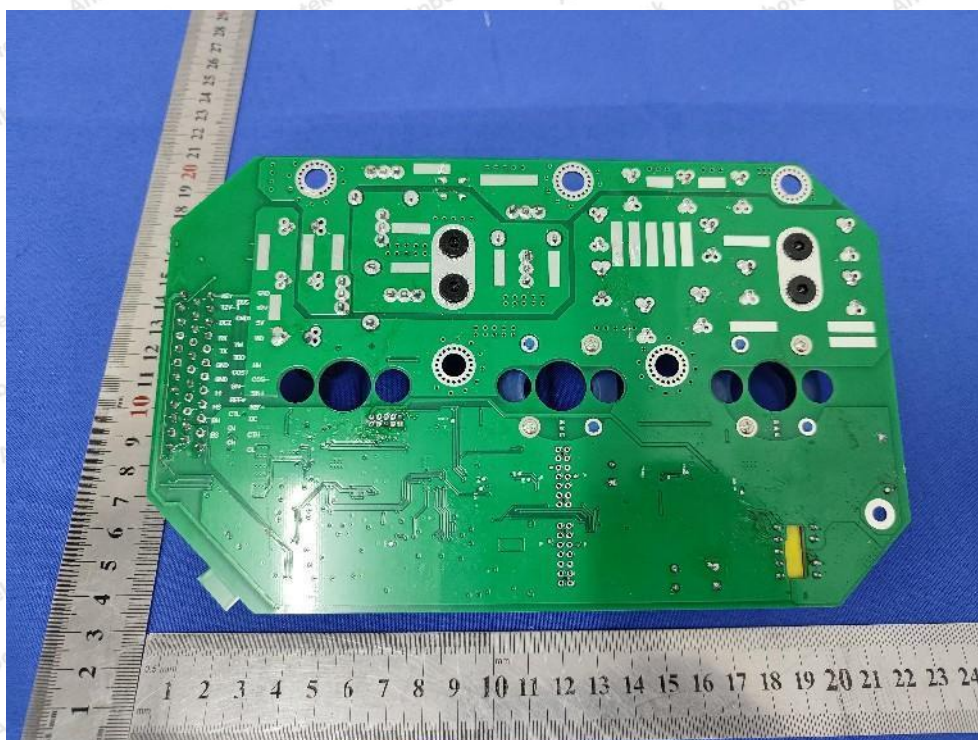
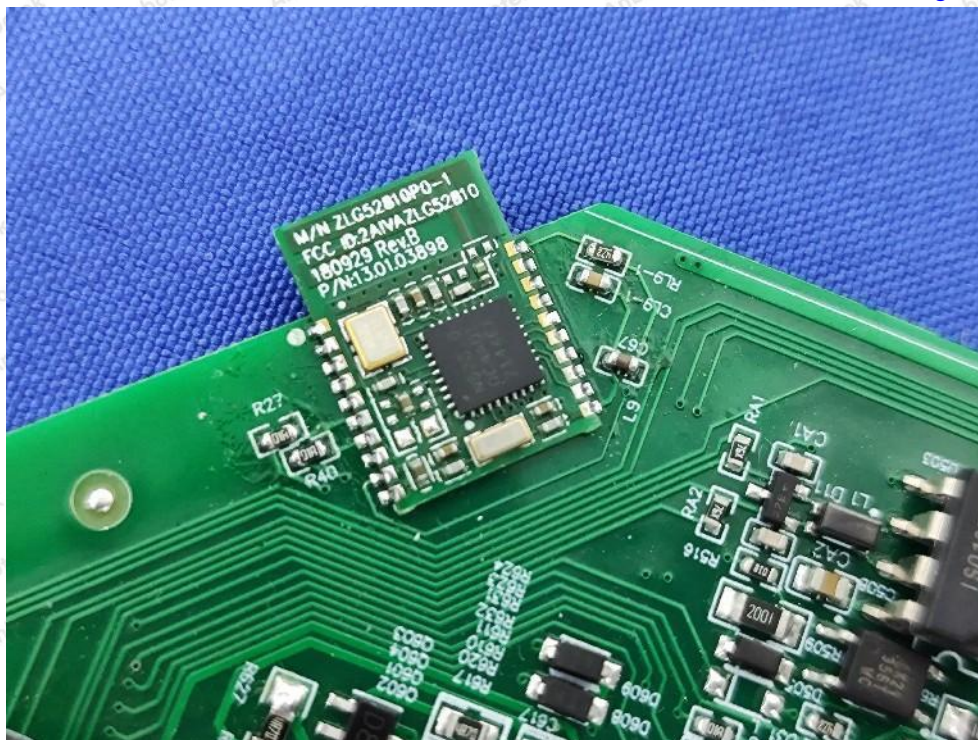






APPENDIX III -- INTERNAL PHOTOGRAPH





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