

FCC Test Report

Client Name : Cermate Technologies Inc.

Client Address : 7F.-1, No.168, Liancheng Rd. Zhonghe
Dist., New Taipei City 235, Taiwan

Product Name : Human machine interface

Report Date : Jul. 13, 2023

Shenzhen Anbotech Compliance Laboratory Limited



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TEST REPORT

Applicant : Cermate Technologies Inc.
Manufacturer : Cermate Technologies Inc.
Product Name : Human machine interface
Test Model No. : PM204
Reference Model No. : See Chapter 1.9 for model list
Trade Mark : N.A.
Rating(s) : Input: 12V~24V, 0.8A
Battery: DC3V 240mAh

Test Standard(s) : FCC 47 CFR Part 15 Subpart B: 2022
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 47 CFR Part 15 Subpart 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:

Jun. 19, 2023

Date of Test:

Jun. 19~Jul. 04, 2023

Prepared By:

We Zeng

(We Zeng)

Approved & Authorized Signer:

KingKong Jin

(KingKong Jin)



1. General Information

1.1. Client Information

Applicant	:	Cermate Technologies Inc.
Address	:	7F.-1, No.168, Liancheng Rd. Zhonghe Dist.,New Taipei City 235, Taiwan
Manufacturer	:	Cermate Technologies Inc.
Address	:	7F.-1, No.168, Liancheng Rd. Zhonghe Dist.,New Taipei City 235, Taiwan
Factory	:	Cermate Technologies Inc.
Address	:	7F.-1, No.168, Liancheng Rd. Zhonghe Dist.,New Taipei City 235, Taiwan

1.2. Description of Device (EUT)

Product Name	:	Human machine interface
Test Model No.	:	PM204
Reference Model No.	:	See Chapter 1.9 for model list (Note: All samples are the same except the model number & appearance, so we prepare "PM204" for test only.)
Trade Mark	:	N.A.
Test Power Supply	:	DC 24V
Test Sample No.	:	1-1-1
Product Description	:	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

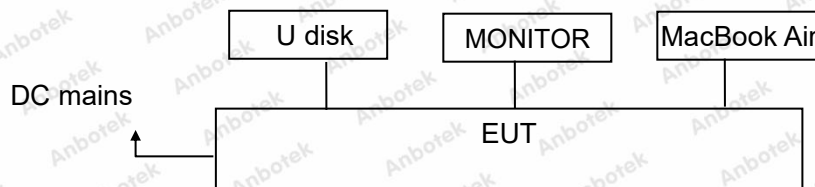
Notebook	:	MacBook Air
		Model: A1466 Input: 14.85V/3.05A CMIIT ID:C02HXB48DRVC



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	Mode 1	P
Radiated Emission Test (Below 1 GHz)	Mode 1	P
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 Test

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	345	Oct. 23, 2022	3 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.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	345	Oct. 23, 2022	3 Year
3.	Pre-amplifier	SONOMA	310N	186860	Oct. 23, 2022	1 Year
4.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A
5.	EMI Preamplifier	SKET Electronic	LNPA-0118G-45	SKET-PA-002	Oct. 13, 2022	1 Year
6.	Double Ridged Horn Antenna	SCHWARZBECK	BBHA 9120D	02555	Oct. 16, 2022	3 Year

1.7. 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



1.8. Description of Test Facility

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

FCC-Registration No.: 184111

Shenzhen Anbotech 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 Anbotech 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 Anbotech Compliance Laboratory Limited.

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

1.9. Model List

PM204-xxx0, FM204-xxx0, RM204-xxx0, KM204-xxx0, GM204-xxx0, KSM-204, Xpm204-xxx0, AST-204CHS-0, LCM204-xxx0, IPM204-xxx0, PMM204-xxx0, LKM204-xxx0, SM204-xxx0, HM204-xxx0, WM204-xxx0, UM204-xxx0, CM204-xxx0, VM204-xxx0, MHM204-xxx0, GPM204-xxx0, SPM204-xxx0

(The first x represents the number 0 or 1, "0" means LCM 480*272, "1" means LCM 800*480; The second x represents the letters A,B,C or D, "A" represents the work gauge screen LCM (-30~70°C), "B" represents the work gauge screen LCM (-10~60°C), "C" represents the business gauge LCM (0-50°C), "D" represents the custom specification LCM; The third x represents the number 22 or 33, "22" for serial port 2, "33" for serial port 3)



2. Power Line Conducted Emission Test

2.1. Test Standard and Limit

Test Standard:	FCC 47 CFR Part 15 Subpart B
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☒ Limits for conducted emission at the AC mains power ports of Class A equipment

Frequency (MHz)	Limits (dB μ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	79.0	66.0
0.50 ~ 30.00	73.0	60.0

Remark: The lower limit shall apply at the transition frequencies.

☐ Limits for conducted emission at the AC mains power ports of Class B equipment

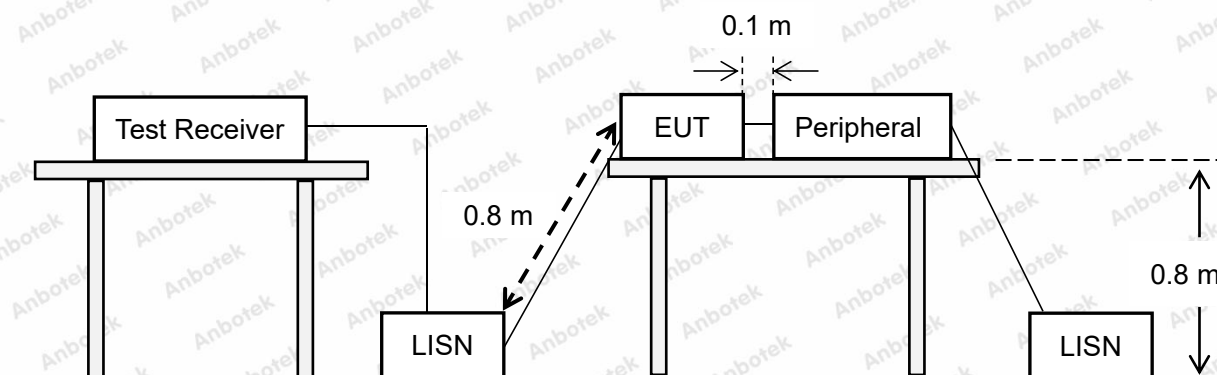
Frequency (MHz)	Limits (dB μ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0

Remark:

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

(2) The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

2.2. Test Setup



2.3. Test Procedure

The table-top EUT is placed on a non-conductive table 0.8 m above the horizontal ground reference plane, and the back of the EUT is 0.4 m away from the vertical ground reference plane, and at least 0.8 m from any other metal surface or ground plane. The floor-standing EUT is placed on an insulating support 0.1 m above the horizontal ground reference plate, at least 0.8 m away from other metal objects.

Connect EUT to the power mains through an LISN. Where the mains cable supplied by the manufacturer is longer than 1 m, the excess should be folded at the center into a bundle no longer than 0.4 m, so that its length is shortened to 1 m. All the peripherals are connecting to the other LISN.

The initial testing identified the frequency that has the highest disturbance relative to the limit while operating the EUT in typical modes of operation and cable positions in a test setup representative of typical system configuration.

The identification of the frequency of highest disturbance with respect to the limit was found by investigating disturbances at a number of significant frequencies. The probable frequency of maximum disturbance had been found and that the associated cable and EUT configuration and mode of operation had been identified.

Set the test-receiver to quasi peak detect function and average detect function, and to measure the conducted emissions values.

2.4. Test Results

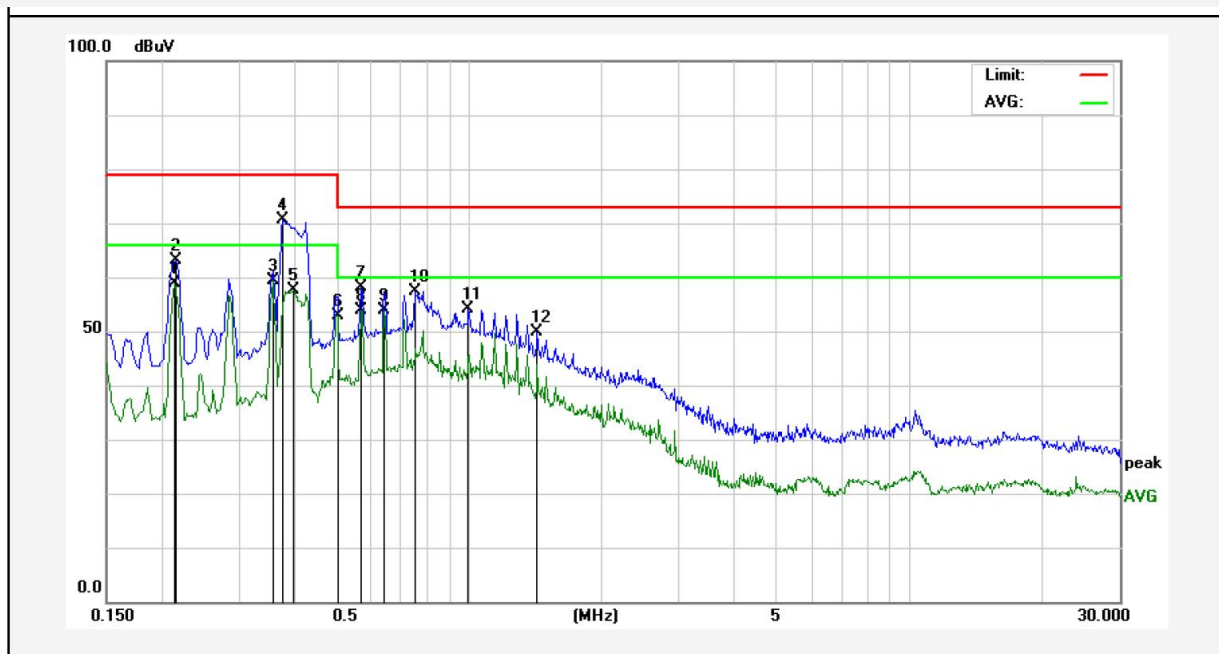
PASS

The test curves are shown in the following pages.



Power Line Conducted Test Data

Test Site: 1# Shielded Room
Test Specification: DC 24V
Comment: +
Temp.: 24.3°C Hum.: 61%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.2139	39.16	19.82	58.98	66.00	-7.02	AVG	
2	0.2162	43.38	19.82	63.20	79.00	-15.80	QP	
3	0.3577	39.50	19.82	59.32	66.00	-6.68	AVG	
4	0.3769	50.73	19.81	70.54	79.00	-8.46	QP	
5	0.3976	37.85	19.81	57.66	66.00	-8.34	AVG	
6	0.5020	32.92	19.86	52.78	60.00	-7.22	AVG	
7	0.5670	38.15	19.86	58.01	73.00	-14.99	QP	
8	0.5670	34.01	19.86	53.87	60.00	-6.13	AVG	
9	0.6403	34.12	19.87	53.99	60.00	-6.01	AVG	
10	0.7508	37.46	19.87	57.33	73.00	-15.67	QP	
11	0.9941	34.29	19.86	54.15	73.00	-18.85	QP	
12	1.4254	30.06	19.86	49.92	73.00	-23.08	QP	

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



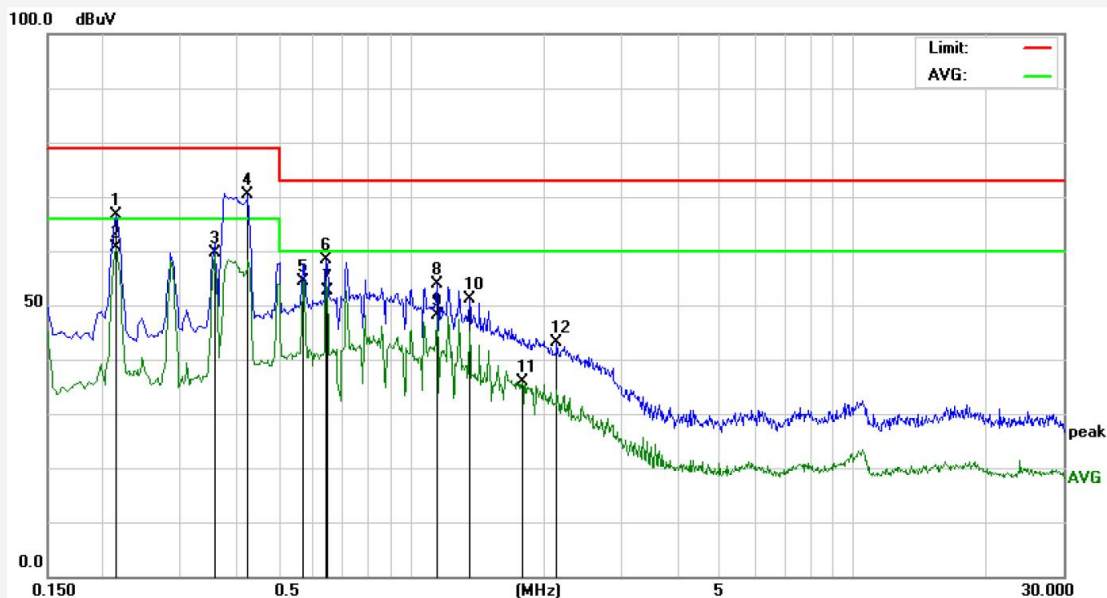
Power Line Conducted Test Data

Test Site: 1# Shielded Room

Test Specification: DC 24V

Comment: -

Temp.: 24.3°C Hum.: 61%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.2139	46.89	19.82	66.71	79.00	-12.29	QP	
2	0.2139	40.71	19.82	60.53	66.00	-5.47	AVG	
3	0.3577	39.88	19.82	59.70	66.00	-6.30	AVG	
4	0.4259	50.46	19.82	70.28	79.00	-8.72	QP	
5	0.5670	34.52	19.86	54.38	60.00	-5.62	AVG	
6	0.6402	38.41	19.87	58.28	73.00	-14.72	QP	
7	0.6440	32.85	19.87	52.72	60.00	-7.28	AVG	
8	1.1411	33.98	19.86	53.84	73.00	-19.16	QP	
9	1.1411	28.30	19.86	48.16	60.00	-11.84	AVG	
10	1.3521	31.24	19.86	51.10	73.00	-21.90	QP	
11	1.7806	16.10	19.86	35.96	60.00	-24.04	AVG	
12	2.1326	23.34	19.85	43.19	73.00	-29.81	QP	

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



3. Radiated Emission Test (Below 1 GHz)

3.1. Test Standard and Limit

Test Standard	FCC 47 CFR Part 15 Subpart B
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☒ Limit for radiated emissions at frequencies up to 1 GHz for class A equipment

Test Limit	Frequency (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT	
			μV/m	(dBμV/m)
	30 ~ 88	3	300	49.5
	88 ~ 216	3	500	54.0
	216 ~ 960	3	700	56.9
	960 ~ 1000	3	1000	60.0

Remark: (1) Emission level (dB)μV = 20 log Emission level μV/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.

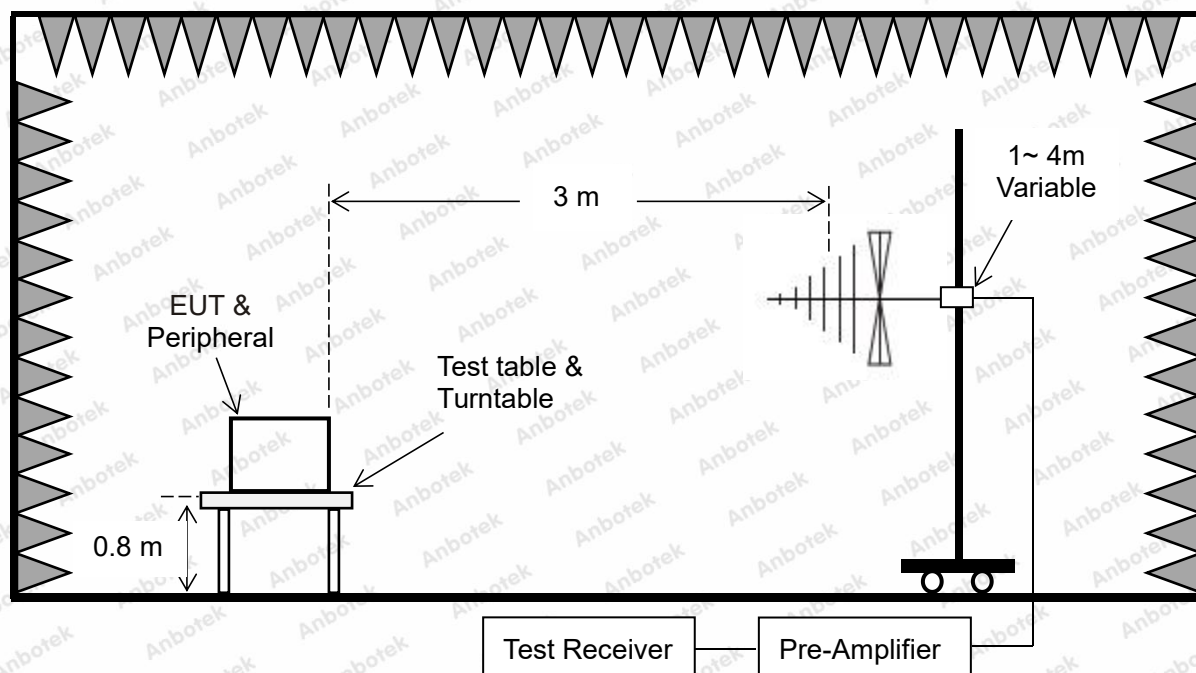
☐ Limit for radiated emissions at frequencies up to 1 GHz for class B equipment

Test Limit	Frequency (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT	
			μV/m	(dBμV/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 μV/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. Test Procedure

The table-top EUT is placed on a non-conductive table 0.8 m above the horizontal ground reference plane. The floor-standing EUT is placed on an insulating support 0.1 m above the horizontal ground reference plane.

The EUT was set 3 m away from the receiving antenna that was mounted on a non-conductive mast. The antenna can move up and down between 1 to 4 m to find out the maximum emission level.

The turntable can rotate 360 degree to determine the position of the maximum emission level.

The initial testing identified the frequency that has the highest disturbance relative to the limit while operating the EUT in typical modes of operation and cable positions in a test setup representative of typical system configuration.

The identification of the frequency of highest emission with respect to the limit was found by investigating emissions at a number of significant frequencies. The probable frequency of maximum emission had been found and that the associated cable and EUT configuration and mode of operation had been identified.

The bandwidth of the Receiver is set at 120 kHz.



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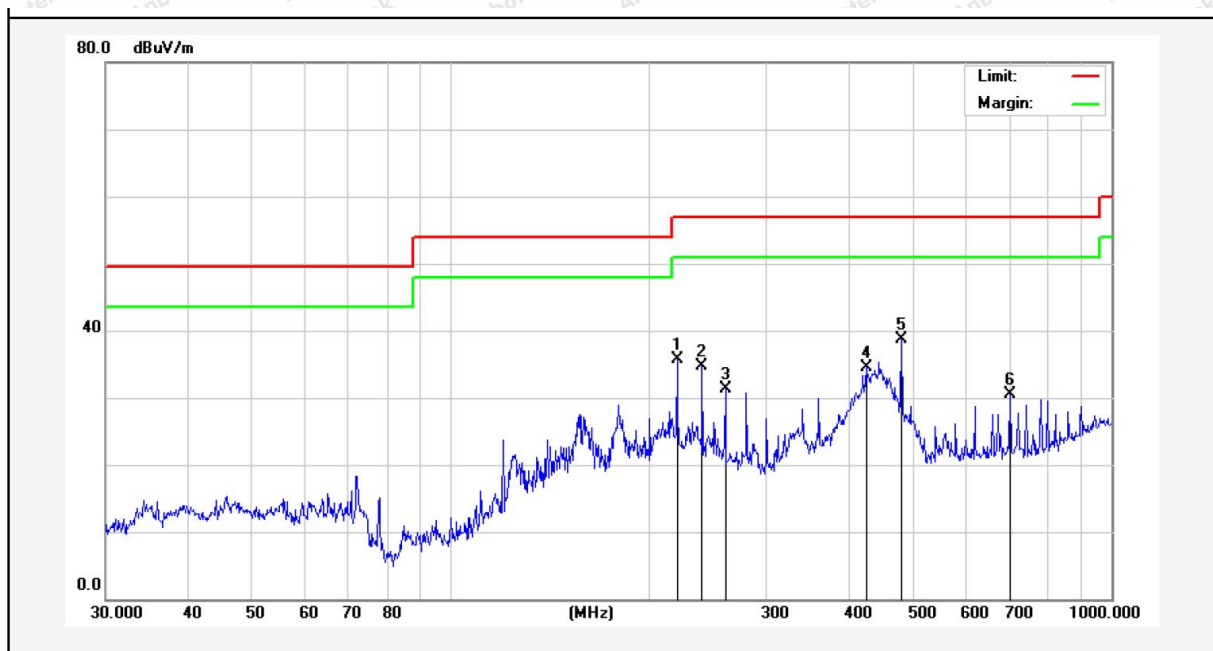
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3.4. Test Results**PASS**

The test curves are shown in the following pages.



Test item: Radiation Test Polarization: Horizontal
Standard: (RE)FCC 47 CFR Part 15 Subpart B Power Source: DC 24V
Frequency Range: 30MHz ~ 1000MHz Temp.(°C)/Hum.(%RH): 22.3(°C)/46%RH
Distance: 3m



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	219.8449	57.79	-22.00	35.79	56.90	-21.11	QP			
2	239.9874	56.33	-21.66	34.67	56.90	-22.23	QP			
3	260.1444	51.92	-20.62	31.30	56.90	-25.60	QP			
4	425.0280	50.41	-15.81	34.60	56.90	-22.30	QP			
5	480.5276	53.11	-14.43	38.68	56.90	-18.22	QP			
6	701.7610	40.34	-9.89	30.45	56.90	-26.45	QP			

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



Test item: Radiation Test

Polarization:

Vertical

Standard: (RE)FCC 47 CFR Part 15
Subpart B

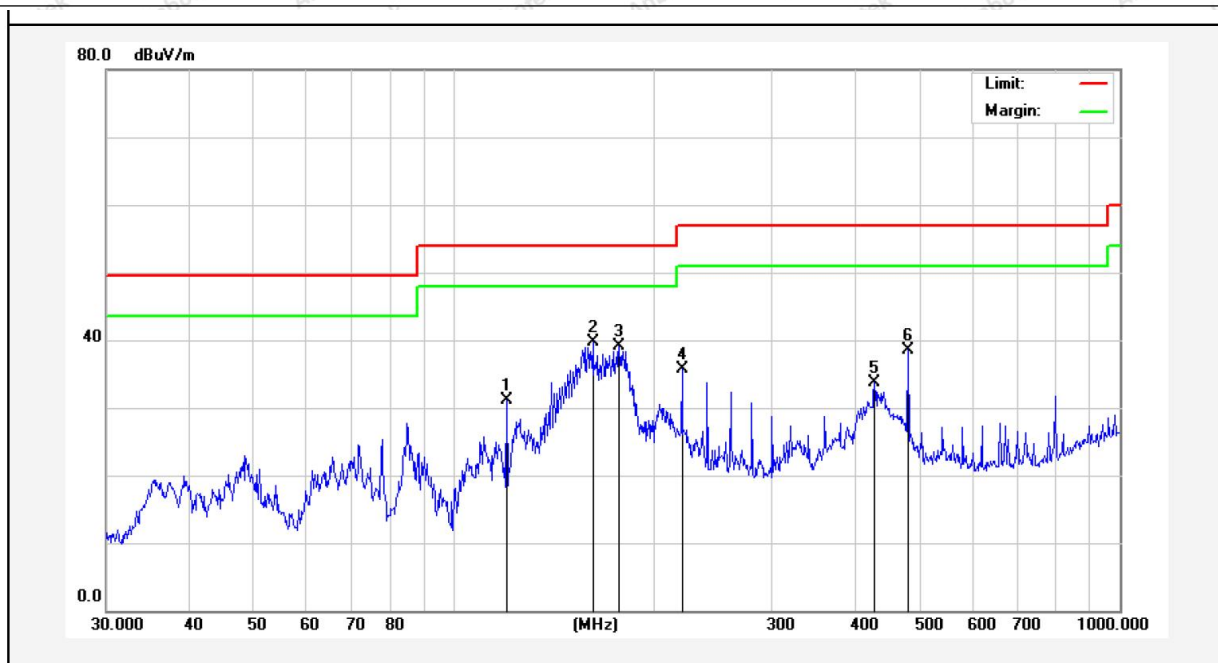
Power Source:

DC 24V

Frequency Range: 30MHz ~ 1000MHz

Temp.(°C)/Hum:(%RH): 22.3(°C)/46%RH

Distance: 3m



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	119.8556	50.93	-19.90	31.03	54.00	-22.97	QP			
2	161.4742	61.27	-21.59	39.68	54.00	-14.32	QP			
3	176.8878	59.94	-20.76	39.18	54.00	-14.82	QP			
4	219.8449	54.72	-18.98	35.74	56.90	-21.16	QP			
5	428.0193	47.69	-14.01	33.68	56.90	-23.22	QP			
6	480.5276	51.34	-12.79	38.55	56.90	-18.35	QP			

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



4. Radiated Emission Test (Above 1GHz)

4.1. Test Standard and Limit

Test Standard	FCC 47 CFR Part 15 Subpart B
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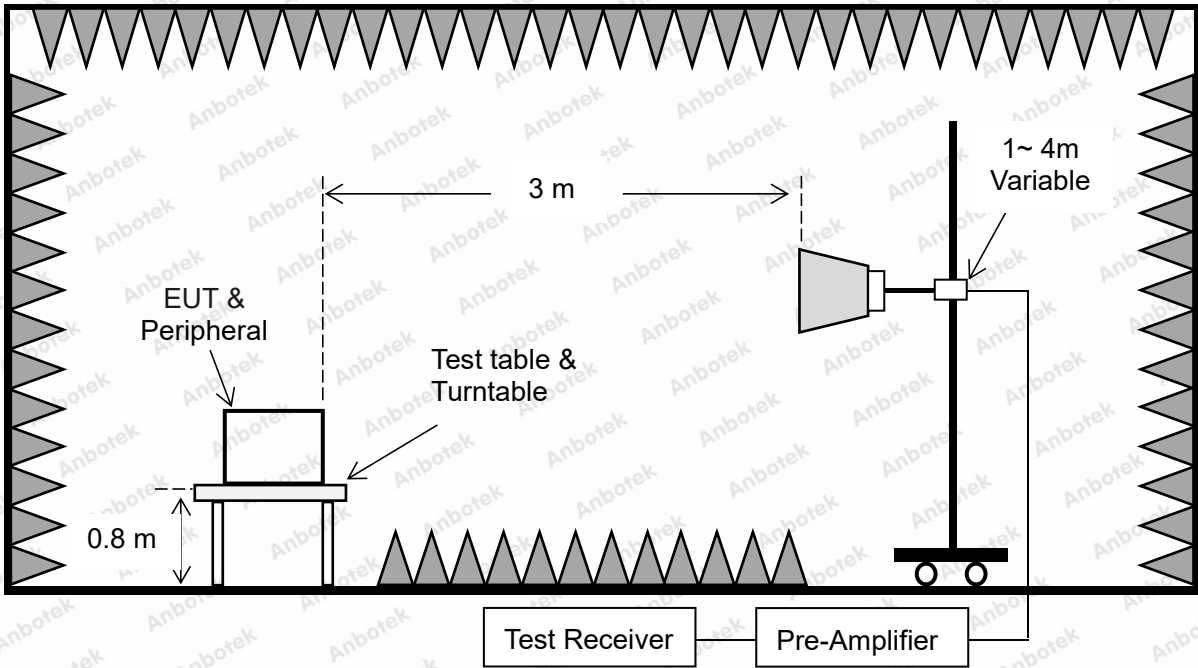
☒ Limit for radiated emissions at frequencies above 1 GHz for class A equipment

Frequency (MHz)	Distance (Meters)	Field Strengths Limit (dBμV/m)	
		Peak	Average
1000 ~ 6000	3	79.5	59.5
Remark: N/A			

☐ Limit for radiated emissions at frequencies above 1 GHz for class B equipment

Frequency (MHz)	Distance (Meters)	Field Strengths Limit (dBμV/m)	
		Peak	Average
1000 ~ 6000	3	74	54
Remark: N/A			

4.2. Test Setup



4.3. Test Procedure

The table-top EUT is placed on a non-conductive table 0.8 m above the horizontal ground reference plane. The floor-standing EUT is placed on an insulating support 0.1 m above the horizontal ground reference plane.

The EUT was set 3 m away from the receiving antenna that was mounted on a non-conductive mast. The antenna can move up and down between 1 to 4 m to find out the maximum emission level.

The turntable can rotate 360 degree to determine the position of the maximum emission level.

The initial testing identified the frequency that has the highest disturbance relative to the limit while operating the EUT in typical modes of operation and cable positions in a test setup representative of typical system configuration.

The identification of the frequency of highest emission with respect to the limit was found by investigating emissions at a number of significant frequencies. The probable frequency of maximum emission had been found and that the associated cable and EUT configuration and mode of operation had been identified.

The test receiver is set to peak and average detects function.

The bandwidth of the test receiver is set at 1MHz.

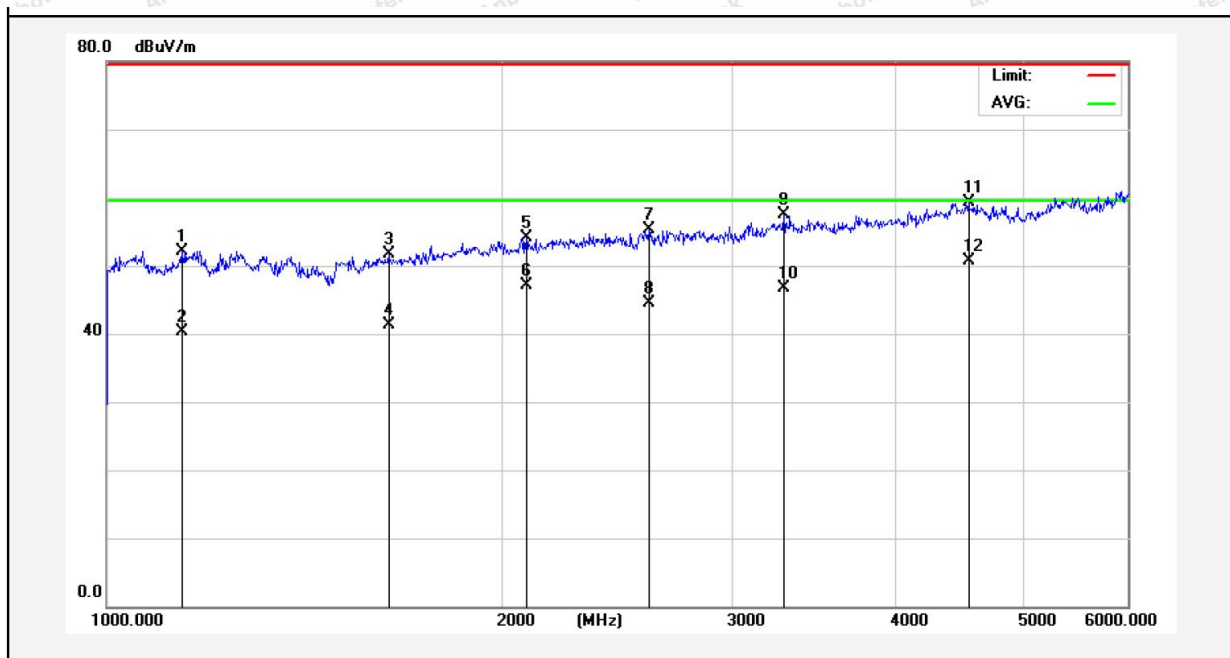
4.4. Test Results

PASS

The test curves are shown in the following pages.



Test item: Radiation Test Polarization: Horizontal
Standard: (RE)FCC 47 CFR Part 15 Power Source: DC 24V
Subpart B
Frequency Range: 1GHz ~ 6GHz Temp.(°C)/Hum.(%RH): 21.9(°C)/49%RH
Distance: 3m



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	1141.782	79.65	-27.51	52.14	79.50	-27.36	peak			
2	1141.782	67.87	-27.51	40.36	59.50	-19.14	AVG			
3	1639.720	78.48	-26.79	51.69	79.50	-27.81	peak			
4	1639.720	68.02	-26.79	41.23	59.50	-18.27	AVG			
5	2088.431	79.22	-25.08	54.14	79.50	-25.36	peak			
6	2088.431	72.18	-25.08	47.10	59.50	-12.40	AVG			
7	2589.395	79.17	-23.85	55.32	79.50	-24.18	peak			
8	2589.395	68.30	-23.85	44.45	59.50	-15.05	AVG			
9	3280.305	79.03	-21.62	57.41	79.50	-22.09	peak			
10	3280.305	68.37	-21.62	46.75	59.50	-12.75	AVG			
11	4536.905	77.49	-18.26	59.23	79.50	-20.27	peak			
12	4536.905	68.92	-18.26	50.66	59.50	-8.84	AVG			

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



Test item: Radiation Test

Polarization:

Vertical

Standard: (RE)FCC 47 CFR Part 15
Subpart B

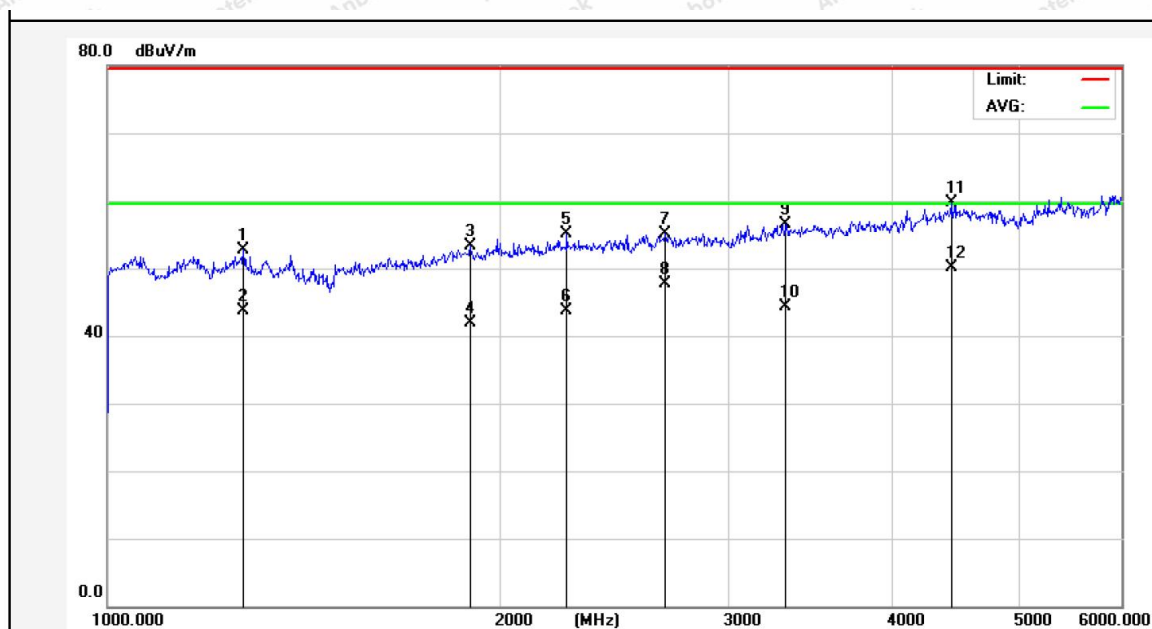
Power Source:

DC 24V

Frequency Range: 1GHz ~ 6GHz

Temp.(°C)/Hum.(%RH): 21.9(°C)/49%RH

Distance: 3m



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	1271.371	79.87	-27.17	52.70	79.50	-26.80	peak			
2	1271.371	70.84	-27.17	43.67	59.50	-15.83	AVG			
3	1899.233	78.98	-25.59	53.39	79.50	-26.11	peak			
4	1899.233	67.54	-25.59	41.95	59.50	-17.55	AVG			
5	2251.659	79.68	-24.59	55.09	79.50	-24.41	peak			
6	2251.659	68.26	-24.59	43.67	59.50	-15.83	AVG			
7	2679.065	78.92	-23.73	55.19	79.50	-24.31	peak			
8	2679.065	71.47	-23.73	47.74	59.50	-11.76	AVG			
9	3315.761	78.18	-21.60	56.58	79.50	-22.92	peak			
10	3315.761	65.86	-21.60	44.26	59.50	-15.24	AVG			
11	4440.397	78.01	-18.34	59.67	79.50	-19.83	peak			
12	4440.397	68.48	-18.34	50.14	59.50	-9.36	AVG			

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 (Below 1 GHz)

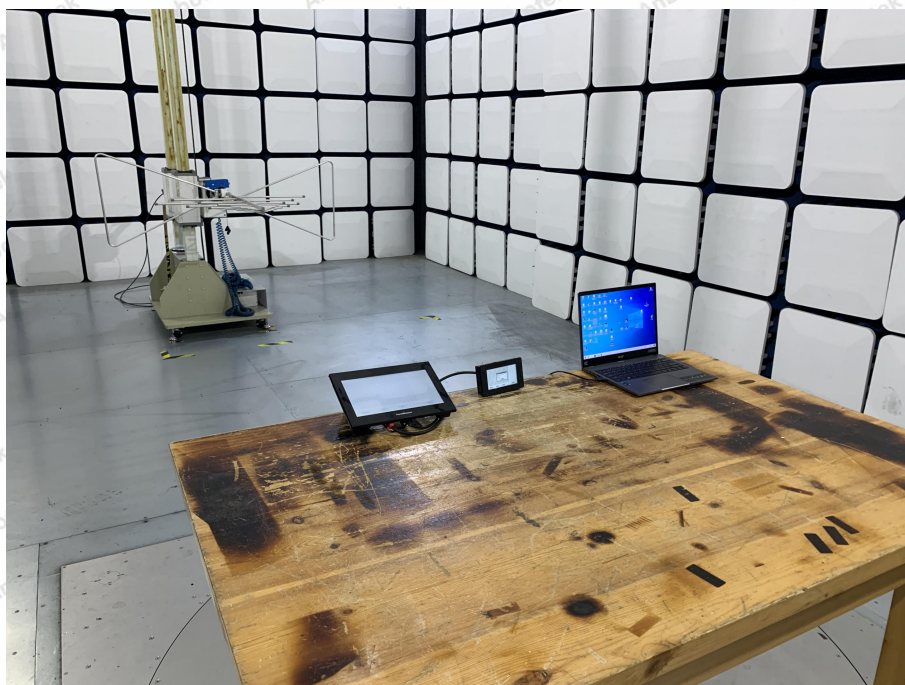
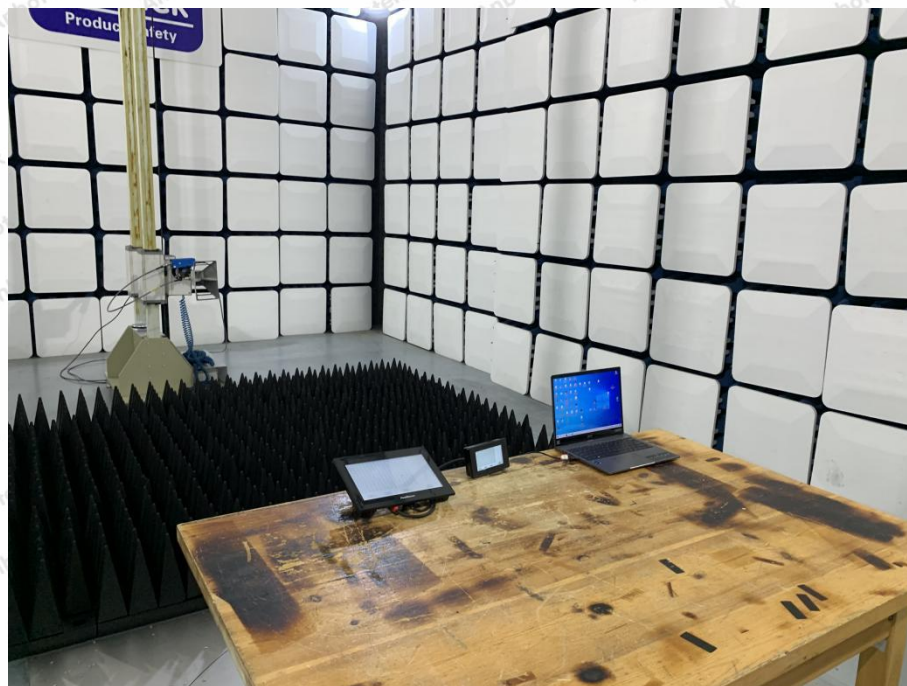
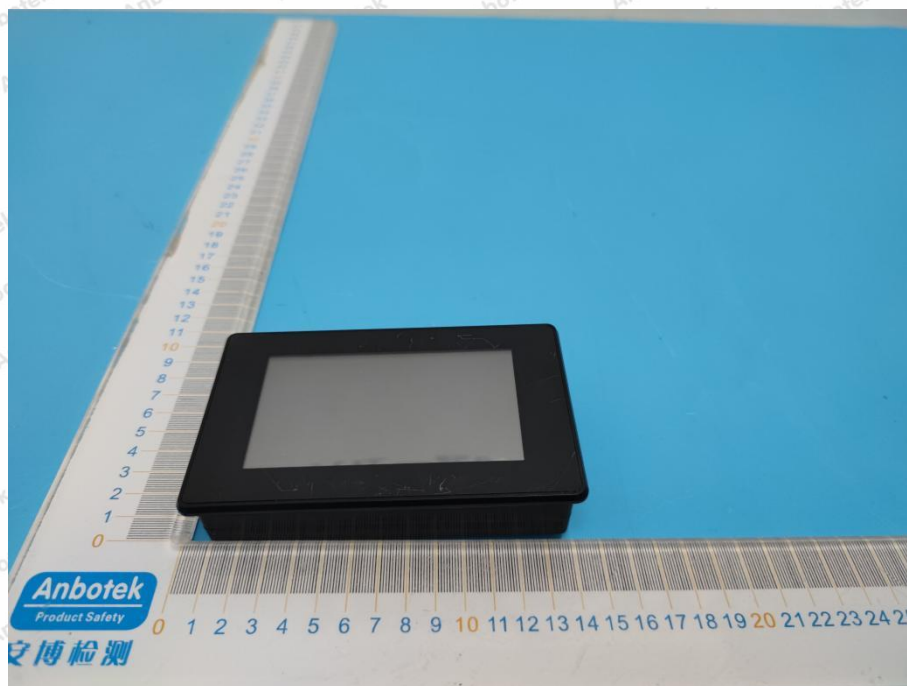
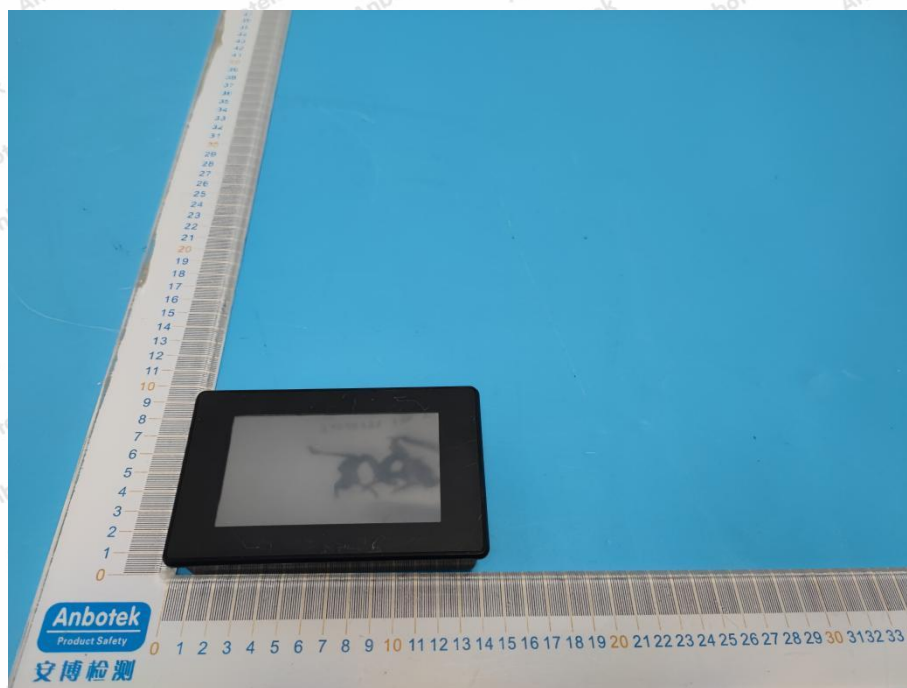


Photo of Radiated Emission Test (Above 1GHz)



APPENDIX II -- EXTERNAL PHOTOGRAPH



APPENDIX III -- INTERNAL PHOTOGRAPH

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

