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	:	**Mar. 23, 2023**

Shenzhen Anbotek 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.	:	PM210
Reference Model No.	:	See Chapter 1.9 for model list
Trade Mark	:	N.A.
Rating(s)	:	Input: 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: Nov. 09, 2022

Date of Test: Nov. 09~Dec. 07, 2022

Prepared By: We Zeng

(We Zeng)

Approved & Authorized Signer: KingKongJin

(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.	:	PM210
Reference Model No.	:	See Chapter 1.9 for model list (Note: All samples are the same except the model number & appearance, so we prepare “PM210” 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. (2)The test report 18250EC20110301-M1 supersedes the test report 18250EC20110301 which is withdrawn.		

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	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.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Oct. 23, 2022	1 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 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

1.9. Model List

WOP-110E-SAE, KSM-210, AST-207CHS-0, PM210-xxx0, PM210-C20, FM210-xxxx0, RM210-xxx0, KM210-xxx0, GM210-xxx0, Xpm210-xxx0, LCM210-xxx0, IPM210-xxx0, PMM210-xxx0, LKM210-xxx0, SM210-xxx0, HM210-xxx0, WM210-xxx0, UM210-xxx0, CM210-xxx0, VM210-xxx0, MHM210-xxx0, GPM210-xxx0, SPM210-xxx0, PM210-xxx1, SPM210-xxx1
(The first x represents the number 0 or 1, "0" means LCM 800*480, "1" means LCM 1024*600; The second x represents the letters A,B,C or D, "A" represents the work gauge screen LCM (-30~70℃), "B" represents the work gauge screen LCM (-10~60℃), "C" represents the business gauge LCM (0~50℃), "D" represents the custom specification LCM; The third X represents the number 2 for build-in 2 serial ports / 3 for build-in 3 serial ports / 4 for build-in 2 serial ports & extension bus / 5 for build-in 3 serial ports & extension bus)

2. Power Line Conducted Emission Test

2.1. Test Standard and Limit

Test Standard:	FCC 47 CFR Part 15 Subpart B

☒ **Limits for conducted emission at the AC mains power ports of Class A equipment**

Frequency (MHz)	Limits (dBμV)	
	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 (dBμV)	
	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.: 23.9℃ Hum.: 45%

No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1500	46.63	9.82	56.45	79.00	-22.55	peak	
2	0.1500	46.38	9.82	56.20	66.00	-9.80	AVG	
3	0.2260	42.35	9.82	52.17	79.00	-26.83	peak	
4	0.2260	41.74	9.82	51.56	66.00	-14.44	AVG	
5	0.3020	34.45	9.84	44.29	79.00	-34.71	peak	
6	0.3020	34.24	9.84	44.08	66.00	-21.92	AVG	
7	0.5260	28.80	9.86	38.66	73.00	-34.34	peak	
8	0.5260	28.23	9.86	38.09	60.00	-21.91	AVG	
9	0.6020	26.40	9.87	36.27	60.00	-23.73	AVG	
10	2.7380	28.43	9.85	38.28	73.00	-34.72	peak	
11	2.7380	25.62	9.85	35.47	60.00	-24.53	AVG	
12	16.2300	27.39	10.18	37.57	73.00	-35.43	peak	

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

Power Line Conducted Test Data

Test Site:	1# Shielded Room
Test Specification:	DC 24V
Comment:	-
	Temp.: 23.9℃ Hum.: 45%

No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1500	45.98	9.82	55.80	79.00	-23.20	peak	
2	0.1500	45.51	9.82	55.33	66.00	-10.67	AVG	
3	0.2260	40.99	9.82	50.81	79.00	-28.19	peak	
4	0.2260	40.20	9.82	50.02	66.00	-15.98	AVG	
5	0.3020	37.51	9.84	47.35	79.00	-31.65	peak	
6	0.3020	37.09	9.84	46.93	66.00	-19.07	AVG	
7	0.5260	28.49	9.86	38.35	73.00	-34.65	peak	
8	0.5299	27.31	9.86	37.17	60.00	-22.83	AVG	
9	0.6020	28.38	9.87	38.25	73.00	-34.75	peak	
10	0.6020	27.51	9.87	37.38	60.00	-22.62	AVG	
11	2.7380	28.81	9.85	38.66	73.00	-34.34	peak	
12	2.7380	25.62	9.85	35.47	60.00	-24.53	AVG	

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

☒ **Limit for radiated emissions at frequencies up to 1 GHz for class A equipment**

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

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

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.(℃)/Hum.(%RH):	24.3(℃)/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	350.4768	57.34	-16.00	41.34	57.50	-16.16	QP			
2	400.4319	62.24	-16.14	46.10	57.50	-11.40	QP			
3	451.1350	58.90	-15.44	43.46	57.50	-14.04	QP			
4	501.1790	56.92	-13.72	43.20	57.50	-14.30	QP			
5	550.9480	56.58	-11.74	44.84	57.50	-12.66	QP			
6	601.4265	49.77	-10.53	39.24	57.50	-18.26	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.(℃)/Hum.(%RH):	24.3(℃)/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	52.5753	52.18	-16.73	35.45	49.00	-13.55	QP			
2	150.0108	60.14	-22.09	38.05	53.50	-15.45	QP			
3	400.4319	59.29	-14.43	44.86	57.50	-12.64	QP			
4	451.1350	57.98	-13.65	44.33	57.50	-13.17	QP			
5	501.1790	55.63	-12.22	43.41	57.50	-14.09	QP			
6	550.9480	54.19	-11.74	42.45	57.50	-15.05	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

☒ **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 Subpart B	Power Source:	DC 24V
Frequency Range:	1GHz ~ 6GHz	Temp.(℃)/Hum.(%RH):	23.6(℃)/47%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	1117.495	64.15	-27.60	36.55	79.50	-42.95	peak			
2	1117.495	51.91	-27.60	24.31	59.50	-35.19	AVG			
3	1393.022	63.96	-26.92	37.04	79.50	-42.46	peak			
4	1393.022	53.23	-26.92	26.31	59.50	-33.19	AVG			
5	1986.241	63.82	-25.40	38.42	79.50	-41.08	peak			
6	1986.241	54.51	-25.40	29.11	59.50	-30.39	AVG			
7	2862.693	60.19	-23.13	37.06	79.50	-42.44	peak			
8	2862.693	48.92	-23.13	25.79	59.50	-33.71	AVG			
9	3833.659	59.04	-20.37	38.67	79.50	-40.83	peak			
10	3833.659	46.70	-20.37	26.33	59.50	-33.17	AVG			
11	5851.364	60.59	-14.39	46.20	79.50	-33.30	peak			
12	5851.364	49.79	-14.39	35.40	59.50	-24.10	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.(℃)/Hum.(%RH):	23.6(℃)/47%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	1113.497	63.09	-27.62	35.47	79.50	-44.03	peak			
2	1113.497	52.28	-27.62	24.66	59.50	-34.84	AVG			
3	1678.362	62.67	-26.69	35.98	79.50	-43.52	peak			
4	1678.362	50.43	-26.69	23.74	59.50	-35.76	AVG			
5	2440.728	64.49	-24.37	40.12	79.50	-39.38	peak			
6	2440.728	54.38	-24.37	30.01	59.50	-29.49	AVG			
7	2898.824	65.34	-22.93	42.41	79.50	-37.09	peak			
8	2898.824	54.57	-22.93	31.64	59.50	-27.86	AVG			
9	3745.394	62.51	-20.77	41.74	79.50	-37.76	peak			
10	3745.394	51.32	-20.77	30.55	59.50	-28.95	AVG			
11	4496.441	59.89	-18.35	41.54	79.50	-37.96	peak			
12	4496.441	48.49	-18.35	30.14	59.50	-29.36	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 ----------