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检测
TESTING
CNAS L7728

FCC EMC TEST REPORT

JCBG(E)20220826012-F-2-R1

Applicant : UNICORN PRODUCTS LTD
South Barn, Crockham Park, Edenbridge, Kent TN8 6UP, UK

Manufacturer : Zhejiang Zhonghe Technology Co., Ltd.
Room 303, Building 4, 413Tongyun Street, Liangzhu Street,
Yuhang District, Hangzhou City, Zhejiang Province.

Product Name : Smartboard Commercial Version

Type/Model : 79700P

Test Result : PASS

SUMMARY

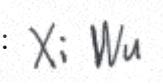
The equipment complies with the requirements according to the following standard(s):

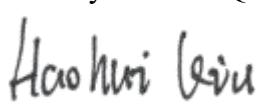
FCC CFR 47 part15 B
ANSI C63.4-2014

Date of issue : November 18,
2022

Prepared by : Xi Wu

Reviewed by: Haohui Qiu

Signature : 



Issued by: Ning Zhang
(Technical Manager)





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1. GENERAL INFORMATION

1.1 Description of equipment under Test (EUT)

Product Name	:	Smartboard Commercial Version
Model	:	79700P
Packing Model	:	79700P-W
Sample Identification No	:	EUT-1#:220825022-2
I/O Port	:	USB port
Category of EUT	:	Class B
Rating	:	4.5V
EUT type	:	Wall-mounted
Highest operating frequency	:	12MHZ
Sample received date	:	2022.08.25
Date of test	:	2022.08.26~2022.11.17
Remark	:	Packing model provided by the customer has not been tested; The customer is responsible for the authenticity of the information. This test result is only for the test model. The packing model is different from the test model only in model, and is completely consistent in material and appearance structure.



1.2 Description of Client

Applicant : UNICORN PRODUCTS LTD
South Barn, Crockham Park, Edenbridge, Kent TN8
6UP, UK

Person of contact : Jianbin Fu

Telephone : +8618158180200

E-mail : 99066079@qq.com

Manufacturer : Zhejiang Zhonghe Technology Co., Ltd.
Room 303, Building 4, 413 Tongyun Street,
Liangzhu Street, Yuhang District, Hangzhou City,
Zhejiang Province.



1.3 Description of Test Facility

<input checked="" type="checkbox"/> Name	Hangzhou TDT Technologies Co., Ltd.
Address	Room 101, Building 3, No. 12, Binwen Road, Xixing Street, Binjiang district, Hangzhou, Zhejiang, China
Telephone	+86571-88317620
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A2LA Certification number	4037.01
CNAS Certification number	CNAS L7728
VCCI Site registration number	C-14683, G-10832, R-14200, T-12223
FCC Site registration number	645845



2. TEST SPECIFICATIONS

2.1 Standards

FCC CFR 47 part15 B: Radio frequency devices

ANSI C63.4-2014: American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz.

2.2 Mode of operation during the test / Test peripherals used

2.2.1 Description of the EUT

The scoring and forwarding circuit of Smartboard Commercial Version is UART to USB conversion communication circuit, which communicates with Android host or PC through USB connection cable to transmit dart scoring information, while the host or PC supplies power to the dart target through the USB cable.

2.2.2 System Configuration during EMC Test

The Equipment under Test (EUT) was functioning correctly during all tests. The auxiliary equipment detailed as below.

Auxiliary Equipment Used during Test

Name	Model	Manufacturer
PC	LX6100	LENOVO



2.2.3 Description of Test modes

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of EUT operation TC1&TC2.

TC1			
Product Name	Smartboard Commercial Version	Model Name	79700P
SW Version	-	HW Version	-
Sample Number	EUT-1#	Highest operating frequency	-
Description of Test mode	The steel wire sensor is installed around the edge of each recording area. When the dart shoots into a recording area, the two ends of the corresponding steel wire sensor will generate weak electrical signals. The electrical signals are amplified by the amplification circuit and sent to the AD of ARM for conversion and calculation, so as to obtain the score of the dart impact point, which is then forwarded to the intelligent device through the communication channel for scoring and display.		

2.2.4 Block of Test Configurations

The PC was connected to ancillary in order to simulate normal operating conditions.

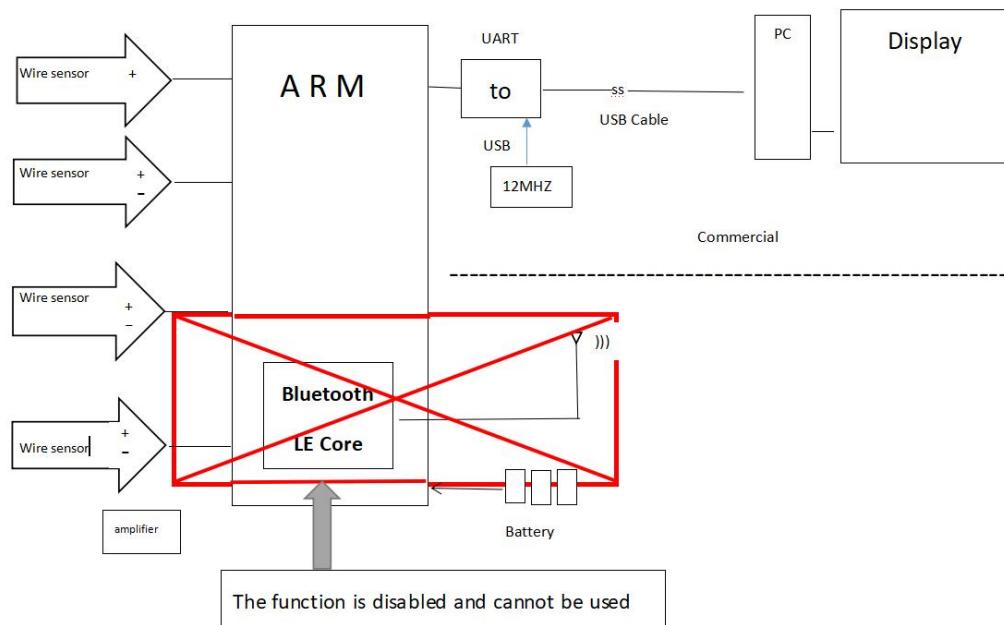


Figure 1 TC1 Test configuration



2.3 Instrument list

Test item	Test Instrument	Model	Manufacturer	Serial No.	Next cal-Date
Radiated Emission (RE)	Chamber	9*6*6	Yu Cheng	4#	May.30, 2025
	EMI Test receiver	ESR 26	R & S	101617	Oct.18, 2023
	Bi-conical and log-periodic Antenna	VULB 9168	Schwarzbeck	01316	Aug.31, 2024
	Coaxial RF Cable	SUCOFLEX 106	Hubersuhner	NA	Jun.05, 2023
Conducted Emission (CE)	EMI Test receiver	ESI 7	R & S	100052	Oct.18, 2023
	Artificial Mains Network	ENV216	R & S	101111	Oct.18, 2023
	Coaxial RF Cable	SPARE 5M	Hubersuhner	1#	Jun.13, 2023
	50Ω Terminator	T50	/	2#	Jun.5, 2023

Automatic test software			
Test item	Manufacturer	Software name	Software version
Radiated emission	TONSCEND	TS+	V4.0.0
Conducted emission	TONSCEND	TS+	V2.1



2.4. Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Hangzhou TDT Technologies Co., Ltd.

TEST ITEM	RESULT	NOTE
Radiated emission	PASS	-
Conducted disturbance voltage at mains terminals	PASS	-

Note 1: NA =Not Applicable

Note 2: This report applies to tested sample only. The test results have been compared directly with the limits, and the measurement uncertainty is recorded. This report shall not be reproduced in part without written approval of Hangzhou TDT Technologies Co., Ltd.



3. Conducted disturbance voltage at mains terminals

Test result: PASS

3.1 Limits

3.1.1 Limits for conducted disturbance voltage at the mains ports of class A device

Frequency range (MHz)	Limits dB(μ V)	
	Quasi-peak	Average
0.15 ~ 0.5	79	66
0.5 ~ 30	73	60

Note: If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

3.2 Test setup

For table top equipment

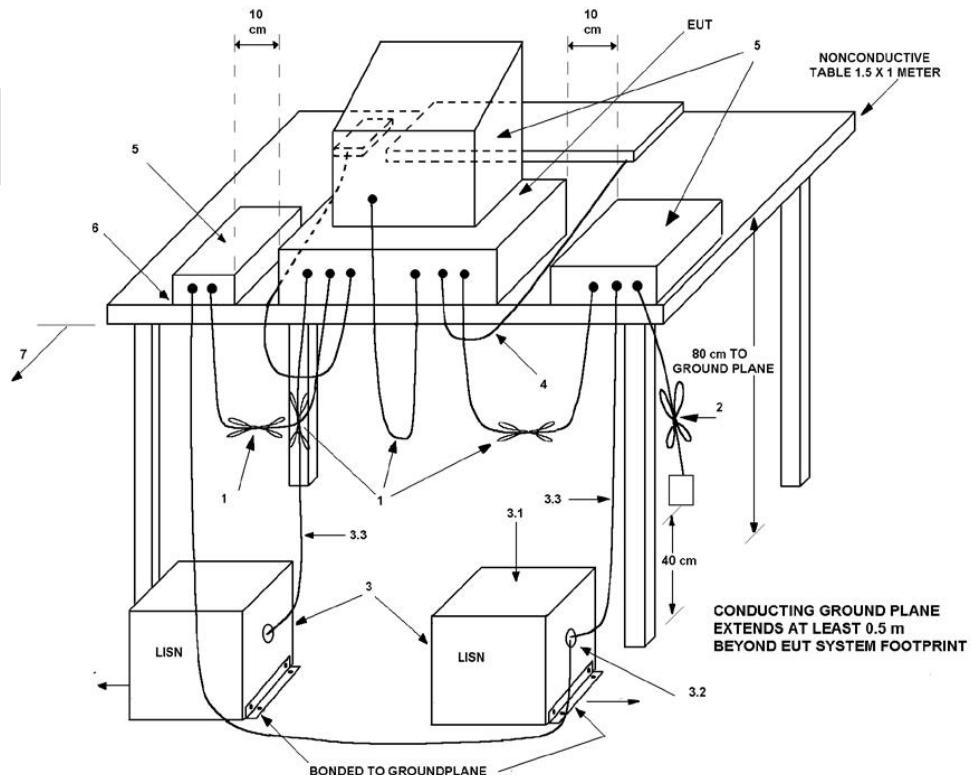


Figure 5



3.3 Test Setup and Test Procedure

Measurement was performed in shielded room, and instruments used were following clause 4 and clause 5 of ANSI C63.4-2014.

Detailed test procedure was following clause 7.2 of ANSI C63.4-2014.

EUT arrangement and operation conditions were according to clause 6 and clause 7 of ANSI C63.4-2014.

Frequency range 150kHz – 30MHz was checked and EMI receiver measurement bandwidth was set to 9 kHz.



3.4 Test Protocol

Temperature 23.0°C
Relative Humidity 49.0%RH
Atmospheric Pressure 100.2kPa

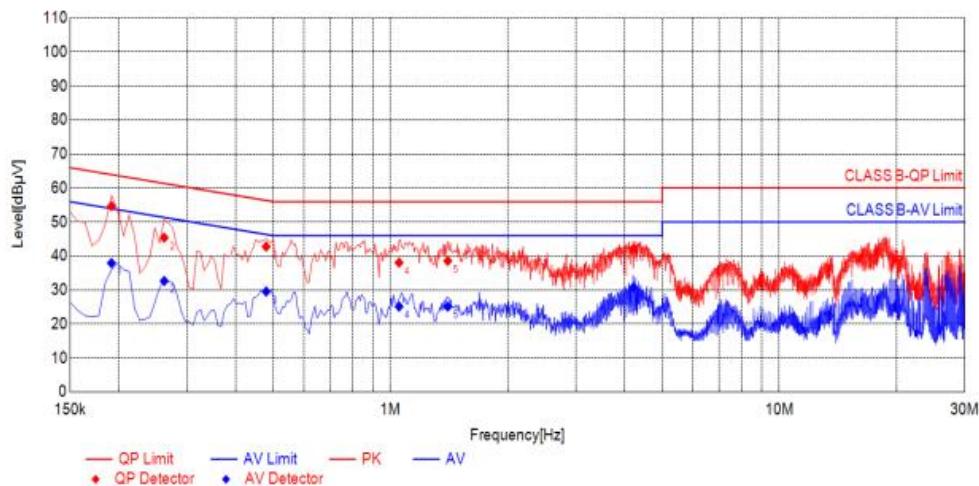
TC1:

79700P(79700P-W)-AC120V60Hz-(0.15M-30MHz)-POWER-L

Test Report

Project Information						
Customer:	UNICORN PRODUCTS LTD	EUT:	79700P/79700P-W			
Model:	NA	SN:	NA			
Mode:	NA	Voltage:	AC120V60Hz			
Environment:	Temp: 21°C; Humi: 49%	Engineer:	LKZ			
Date:	2022-11-17 10:10:45					
Standard:FCC PART 15						
Remark: Level(dBuV)=Reading(dBuV)+Corr. (dB) Margin(dB)=Limit(dBuV)-Level(dBuV)						

Test Graph



Final Data List

NO.	Freq [MHz]	QP Reading [dBµV]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.1918	34.96	54.70	63.96	9.26	18.19	37.93	53.96	16.03	PASS
2	0.2621	25.66	45.41	61.36	15.95	12.92	32.67	51.36	18.69	PASS
3	0.4793	23.06	42.78	56.35	13.57	9.85	29.57	46.35	16.78	PASS
4	1.0526	18.24	38.06	56.00	17.94	5.32	25.14	46.00	20.86	PASS
5	1.4042	18.78	38.57	56.00	17.43	5.32	25.11	46.00	20.89	PASS
6	4.2133	22.18	42.12	56.00	13.88	10.83	30.77	46.00	15.23	PASS

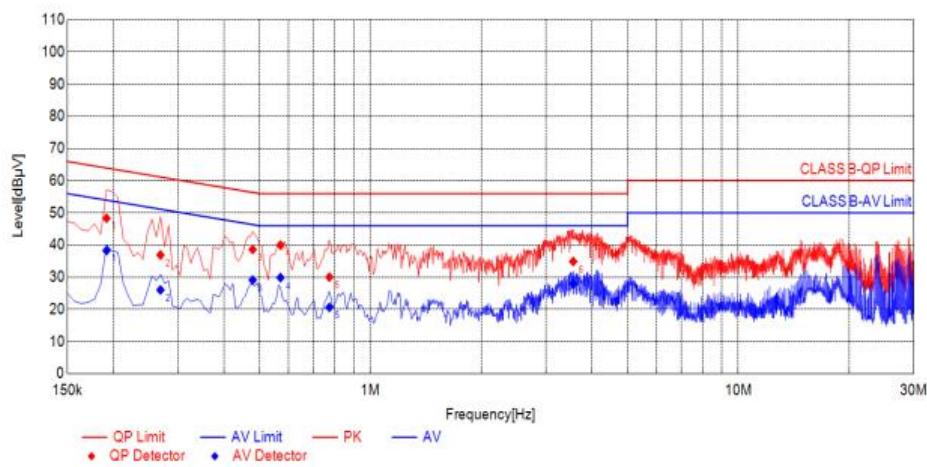


79700P(79700P-W)-AC120V60Hz-(0.15M-30MHz)-POWER-N

Test Report

Project Information			
Customer:	UNICORN PRODUCTS LTD	EUT:	79700P/79700P-W
Model:	NA	SN:	NA
Mode:	NA	Voltage:	AC120V60Hz
Environment:	Temp: 21°C; Humi:49%	Engineer:	LKZ
Date:	2022-11-17 10:15:02		
Standard:	FCC PART 15		
Remark:	Level(dBuV)=Reading(dBuV)+Corr. (dB)	Margin(dB)=Limit(dBuV)-Level(dBuV)	

Test Graph



Final Data List

NO.	Freq. [MHz]	QP Reading [dBuV]	QP Value [dBuV]	QP Limit [dBuV]	QP Margin [dB]	AV Reading [dBuV]	AV Value [dBuV]	AV Limit [dBuV]	AV Margin [dB]	Verdict
1	0.1919	28.48	48.32	63.96	15.64	18.46	38.30	53.96	15.66	PASS
2	0.2689	17.11	36.91	61.15	24.24	6.26	26.06	51.15	25.09	PASS
3	0.4788	18.89	38.61	56.36	17.75	9.40	29.12	46.36	17.24	PASS
4	0.5699	20.24	39.97	56.00	16.03	10.14	29.87	46.00	16.13	PASS
5	0.7738	10.28	30.04	56.00	25.96	0.88	20.64	46.00	25.36	PASS
6	3.5581	14.94	34.89	56.00	21.11	8.06	28.01	46.00	17.99	PASS

Notes:

1. All possible modes of operation were investigated. Only the worst case emissions measured.



3.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty at mains terminal: $\pm 3.12\text{dB}$.

The measurement uncertainty is given with a confidence of 95%, $k=2$.

The measurement uncertainty is traceable to internal procedure CXWJ22.

TD



4. Radiated emission

Test result: PASS

4.1 Radiated emission limits

4.1.1 Limits for radiated disturbance of class A device

Frequency (MHz)	Permitted limit in dB μ V/m (Quasi-peak)
30 – 88	49
88 – 216	53.5
216 – 960	56.4
Above 960	59.5

Note:

1. For the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.



4.2 Block diagram and test set up

For table top equipment

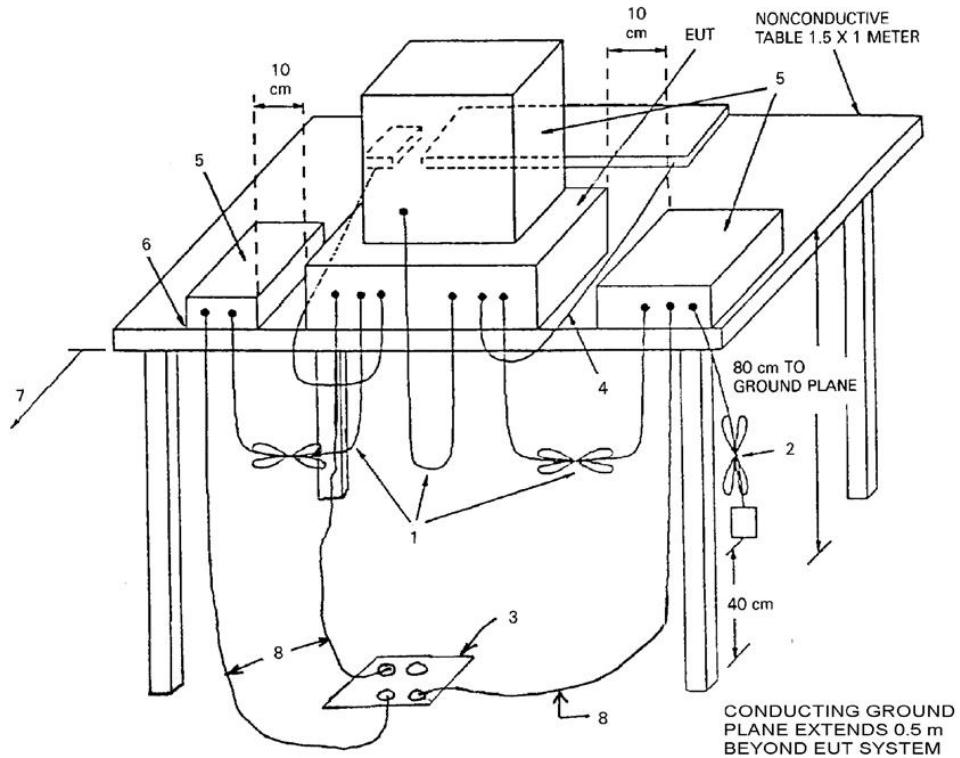


Figure 6

4.3 Test Setup and Test Procedure

The measurement was performed in a semi-anechoic chamber below 1GHz.

The distance from EUT to receiving antenna is 3 meter.

Measurement was performed according to clause 4 and clause 5 of ANSI C63.4-2014.

Test procedure was according to clause 8.3 of ANSI C63.4-2014.

EUT arrangement and operate condition were according to clause 6 and clause 8 of ANSI C63.4-2014.

The radiated emission was measured using the test receiver with the resolutions bandwidth set as:

$$\text{RBW} = 120 \text{ kHz}, \text{VBW} = 300 \text{ kHz} (30\text{MHz} \sim 1\text{GHz})$$



4.4 Test Protocol

Temperature 23.0°C
Relative Humidity 49.0%RH
Atmospheric Pressure 100.2kPa

TC1

30MHz-1GHz (3m):

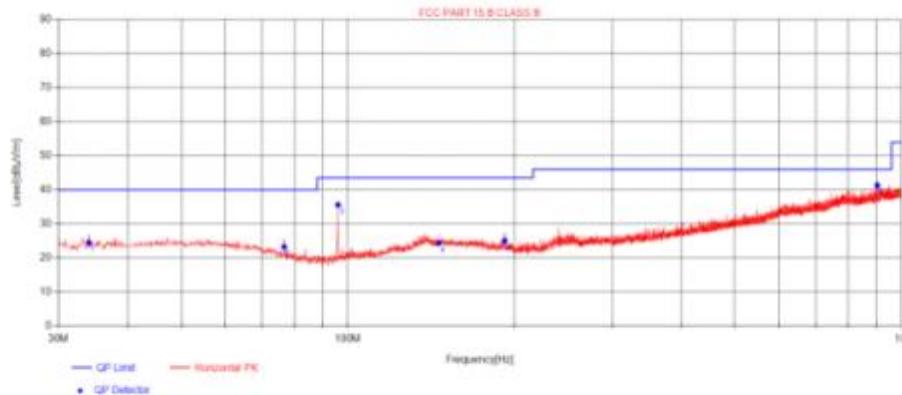
79700P-TC1-USB5V-(30MHz-1GHz)-H

Test Report

Project Information			
Customer:	UNICORN PRODUCTS LTD	EUT:	79700P
Model:	NA	SN:	NA
Mode:	NA	Voltage:	4.5V
Environment:	Temp: 25°C; Humi:60%	Engineer:	LJJ
Remark:	NA		
Test Standard: FCC PART 15B			

Start of Test: 2022-10-08 14:52:41

Test Graph



Final Data List									
NO.	Freq [MHz]	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	34.0012	19.26	24.50	40.00	15.50	200	7	Horizontal	PASS
2	76.6812	16.80	23.27	40.00	16.73	200	327	Horizontal	PASS
3	95.96	15.01	35.61	43.50	7.89	200	231	Horizontal	PASS
4	146.036	20.41	24.37	43.50	19.13	100	158	Horizontal	PASS
5	191.99	17.52	25.08	43.50	18.42	100	336	Horizontal	PASS
6	904.333	32.72	41.32	46.00	4.68	100	299	Horizontal	PASS

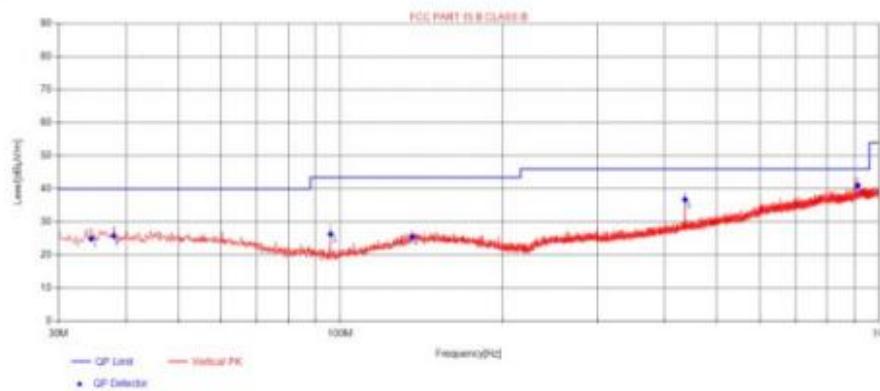


79700P-TC1-USB5V-(30MHz-1GHz)-V

Test Report

Project Information			
Customer:	UNICORN PRODUCTS LTD	EUT:	79700P
Model:	NA	SN:	NA
Mode:	NA	Voltage:	4.5V
Environment:	Temp: 25°C; Humi:60%	Engineer:	LJJ
Remark:	NA		
Test Standard: FCC PART 15B			

Start of Test: 2022-10-08 14:55:14

Test Graph

Final Data List										
NO.	Freq. [MHz]	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict	
1	34.4862	19.29	24.91	40.00	15.09	100	33	Vertical	PASS	
2	38.0025	19.73	25.76	40.00	14.24	100	11	Vertical	PASS	
3	95.96	15.01	26.31	43.50	17.19	200	296	Vertical	PASS	
4	135.972	19.76	25.56	43.50	17.94	200	188	Vertical	PASS	
5	436.308	24.78	36.73	46.00	9.27	100	150	Vertical	PASS	
6	913.185	33.07	41.08	46.00	4.92	200	2	Vertical	PASS	

Remark:

1. Emission level (dB μ V/m) = Raw Value (dB μ V) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. Margin value = Limit value - Emission level.



4.5 Measurement uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty of semi-anechoic chamber radiated emission is: $\pm 6.28\text{dB}$.

The measurement uncertainty is given with a confidence of 95%, $k=2$.

The measurement uncertainty is traceable to internal procedure CXWJ22.

TD

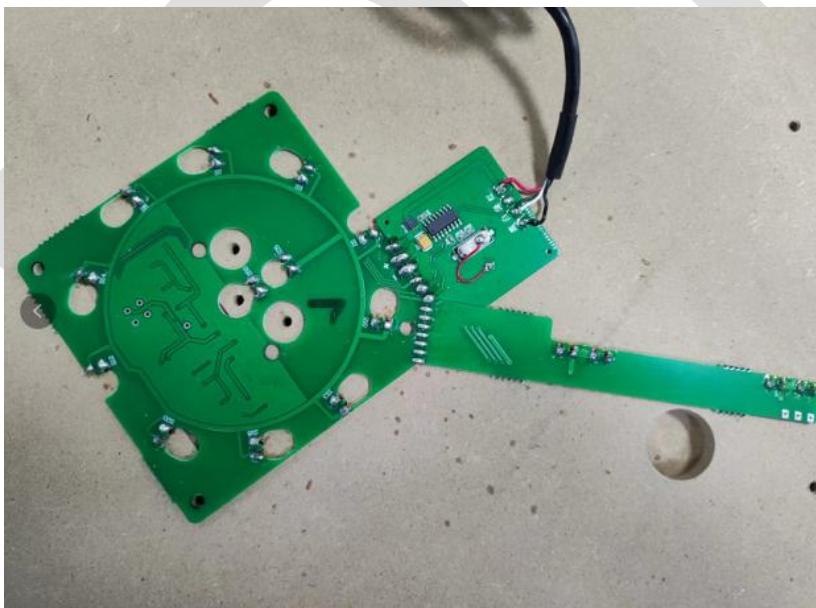
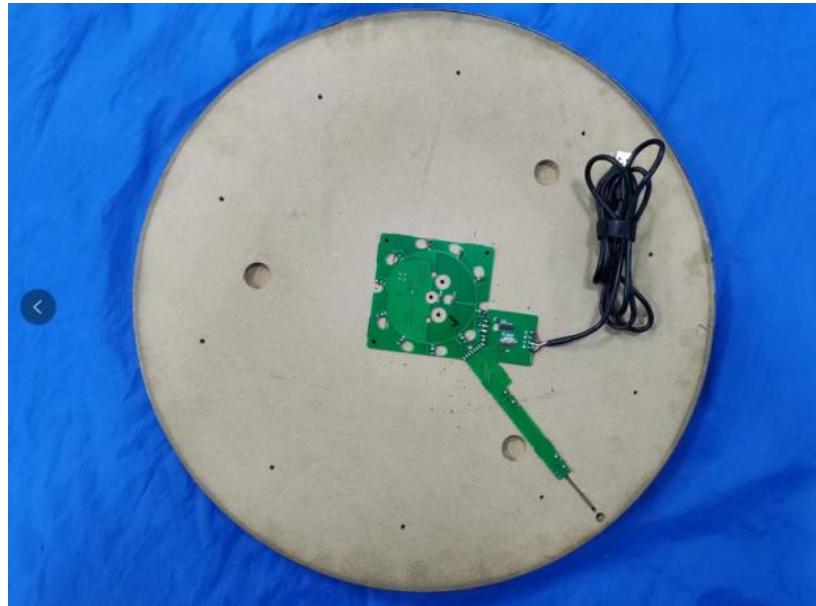


Appendix I: Photograph of EUT





Test report No.: JCBG(E)20220826012-F-2-R1





Appendix II: Photograph of test arrangement

TC1



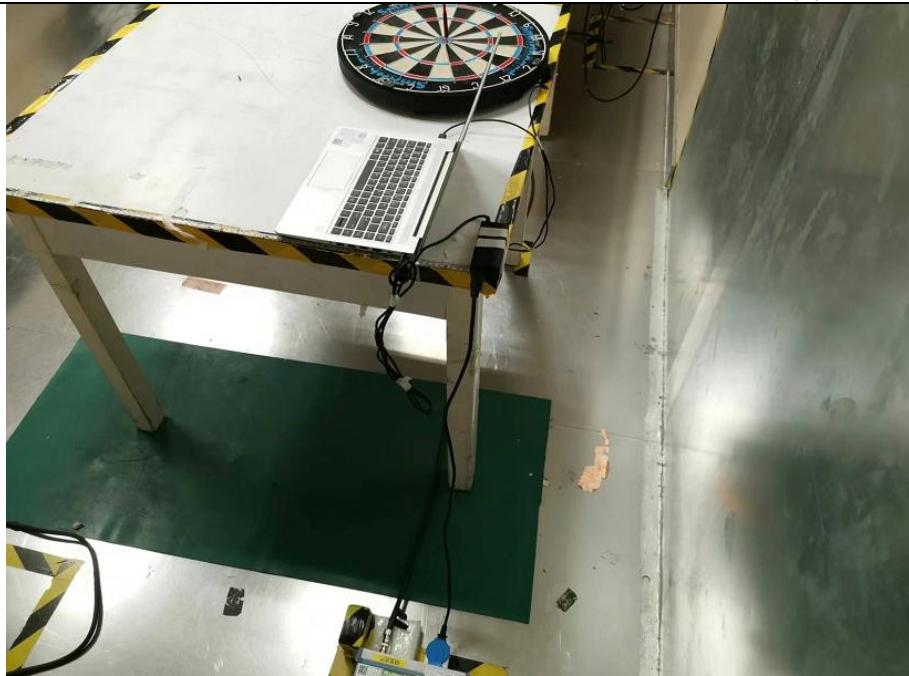
Radiated emission(30M-1GHz)(3m)

TC1





Test report No.: JCBG(E)20220826012-F-2-R1



Conducted emission



Appendix III: Revision history

Date	Versions	Revision content
2022.10.13	V1.0	First Draft.
2022.11.17	V2.0	1. Add Conducted Emission test data. 2. JCBG(E)20220826012-F-2-R1 to void.



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10. The right of interpretation belongs to Hangzhou Taiding Testing Technology Co., Ltd.

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