APPLICATION FOR EMC DIRECTIVE

On Behalf of

Shenzhen Wins Novelty Co.,Ltd

Head Up Display

Trade Name: N/A

Model: T5

Prepared For : **Shenzhen Wins Novelty Co.,Ltd**
2F, NO.30 Building, Chentian Industrial Area, Xixiang Street, Bao an district, Shenzhen, China

Prepared By : **TMC Testing Services (Shenzhen) Co., Ltd**
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Date of Test: November 11, 2022-November 16, 2022
Date of Report: November 17, 2022
Report Number: MK22080024-P01E01

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TEST REPORT DECLARATION

Applicant	:	Shenzhen Wins Novelty Co.,Ltd
Address	:	2F, NO.30 Building, Chentian Industrial Area, Xixiang Street, Bao an district, Shenzhen, China
EUT Description	:	Head Up Display
Model Number	:	T5

Test Standards:

EN 55032:2015+A11:2020

EN 55035:2017 +A11:2020

The EUT described above is tested by TMC Testing Services (Shenzhen) Co., Ltd EMC Laboratory to determine the maximum emissions from the EUT and ensure the EUT to be compliance with the immunity requirements of the EUT. TMC Testing Services (Shenzhen) Co., Ltd EMC Laboratory is assumed full responsibility for the accuracy of the test results. Also, this report shows that the EUT technically complies with the 2014/30/EU directive and its amendment requirements.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Prepared by :

Peishuang Wu/Assistant

Approved & Authorized Signer :

Vivian Wang/Manager

1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	Test Results
Radiated Emission	PASS
Electrostatic Discharge Immunity	PASS
Radiated Electromagnetic Fields Immunity	PASS
Magnetic Field Immunity	PASS

2. GENERAL INFORMATION

2.1. Report information

2.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that TMC approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that TMC in any way guarantees the later performance of the product/equipment.

2.1.2. The sample/s mentioned in this report is/are supplied by Applicant, TMC therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

2.1.3. Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through TMC, unless the applicant has authorized TMC in writing to do so.

2.2. Measurement Uncertainty

Available upon request.

3. PRODUCT DESCRIPTION

3.1. EUT Description

Description	:	Head Up Display
Applicant	:	Shenzhen Wins Novelty Co.,Ltd 2F, NO.30 Building, Chentian Industrial Area, Xixiang Street, Bao an district, Shenzhen, China
Manufacturer	:	Shenzhen Wins Novelty Co.,Ltd 2F, NO.30 Building, Chentian Industrial Area, Xixiang Street, Bao an district, Shenzhen, China
Model Number	:	T5

3.2. Block Diagram of EUT Configuration

3.3. Operating Condition of EUT

Test mode : operating

3.4. Support Equipment List

N/A

3.5. Test Conditions

Temperature: 23-26℃
Relative Humidity: 55-68 %

3.6. Modifications

No modification was made.

3.7. Abbreviations

AC	Alternating Current
AMN	Artificial Mains Network
DC	Direct Current
EM	ElectroMagnetic
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
IF	Intermediate Frequency
RF	Radio Frequency
rms	root mean square
EMI	Electromagnetic Interference
EMS	Electromagnetic Susceptibility

3.8. Performance Criterion

Criterion A: The equipment shall continue to operate as intended without operator intervention. No degradation of performance of loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended.

Criterion B: After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended.

Criterion C: Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.

4. TEST EQUIPMENT USED

4.1. For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration time	Recalibration time
1.	Test Receiver	Rohde&Schwarz	ESC17(9kHz-7GHz)	100336	Nov.09,22	Nov.08,23
2.	Broadband antenna	Schwarzbeck	VULB9168	01222	Nov.06,22	Nov.05,23
3.	Horn antenna	Schwarzbeck	BBHA9120D	02476	Nov.13,22	Nov.12,23
4.	Preamplifier	Schwarzbeck	BBV9745	00250	Nov.08,22	Nov.07,23
5.	Preamplifier	N/A	TRLA-01018G440B	21081001	Nov.08,22	Nov.07,23
6.	3M method semi anechoic chamber	SKET	9m*6m*6m	2021082304	Oct.14,21	Oct.13,24
7.	Pointer hygrometer	M&G	ARC92570	N/A	Oct.28,22	Oct.27,23

4.2. For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Recalibration time
1.	Electrostatic analog generator	LIONCEL	ESD-203B	0210502	Nov.15,22	Nov.16,23

4.3. For RF Strength Susceptibility Test

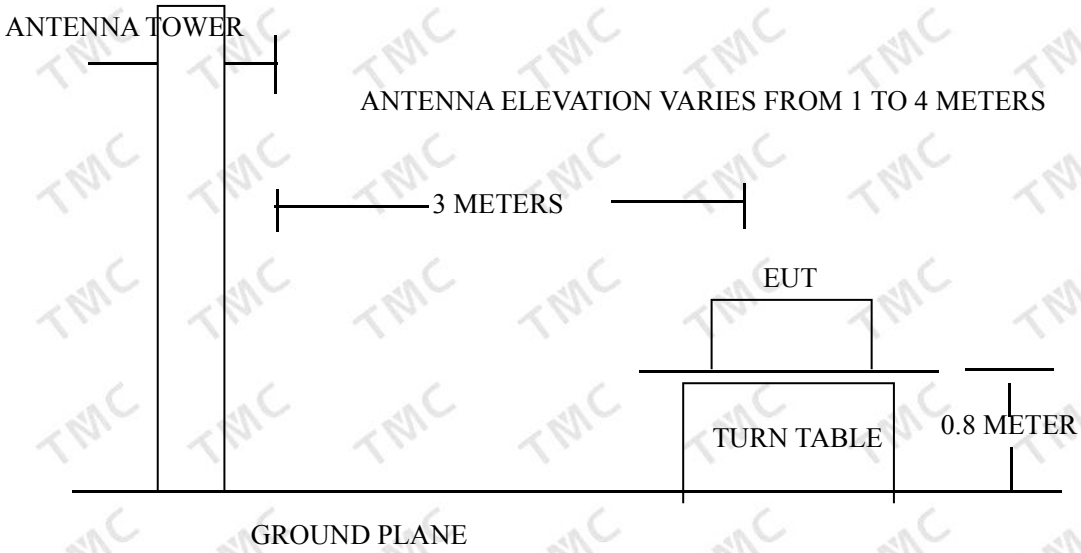
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Recalibration time
1.	Signal Generator	HP	8648A	3633A02081	Apr.20, 22	Apr.20, 23
2.	Amplifier	A&R	500A100	17034	NCR	NCR
3.	Amplifier	A&R	100W/1000M1	17028	NCR	NCR
4.	Isotropic Field Monitor	A&R	FM2000	16829	NCR	NCR
5.	Isotropic Field Probe	A&R	FLW220100	16755	Apr.20, 22	Apr.20, 23
6.	Biconic Antenna	EMCO	3108	9507-2534	NCR	NCR
7.	Log-periodic Antenna	A&R	AT1080	16812	NCR	NCR
8.	PC	N/A	486DX2	N/A	N/A	N/A

4.4. For Magnetic Field Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Power frequency magnetic field testing system	LIONCEL	PMF-801C-C	083858-10	Nov.15,22	Nov.16,23

5. RADIATED EMISSION TEST

5.1. Open Site Setup Diagram



5.2. Test Standard

EN 55032:2015+A11:2020

5.3. Radiated Emission Limit

All emanations from a Class B computing devices or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMITS (dBμV/m)
30 ~ 230	3	40
230 ~ 1000	3	47

Note:(1) The tighter limit shall apply at the edge between two frequency bands.
(2) Distance refers to the distance in meters between the measuring instruments antenna and the closed point of any part of the EUT.

FREQUENCY (GHz)	DISTANCE (Meters)	Average limit (dBμV/m)	Peak limit (dBμV/m)
1 ~ 3	3	50	70
3 ~ 6	3	54	74

Note :The lower limit applies at the transition frequency.

5.4. EUT Configuration on Test

The EN55032 Class B regulations test method must be used to find the maximum emission during radiated emission test.

5.5. Operating Condition of EUT

5.5.1. Setup the EUT as shown on Section 5.1.

5.5.2. Turn on the power of all equipments.

5.5.3. Let the EUT work in test mode and measure it.

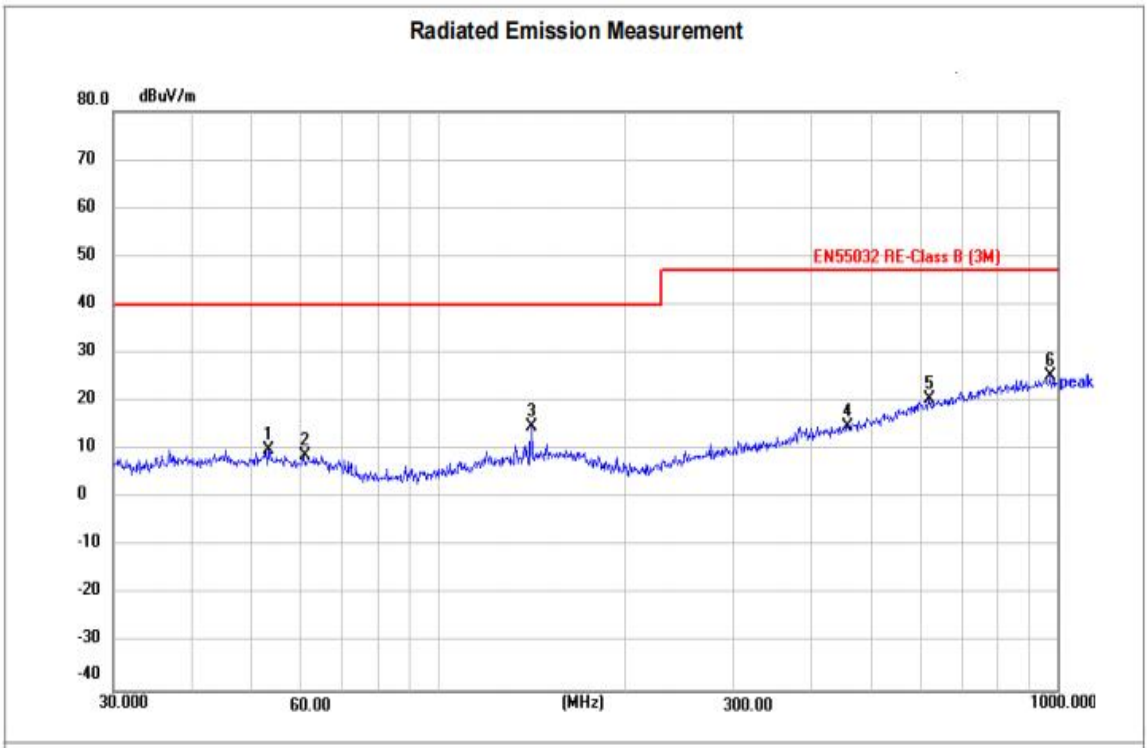
5.6. Test Procedure

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna (calibrated by dipole antenna) are used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on test.
The bandwidth setting on the test receiver (R&S TEST RECEIVER ESCS20) is 120 KHz.
The EUT is tested in Anechoic Chamber

5.7. Test Results

PASS.

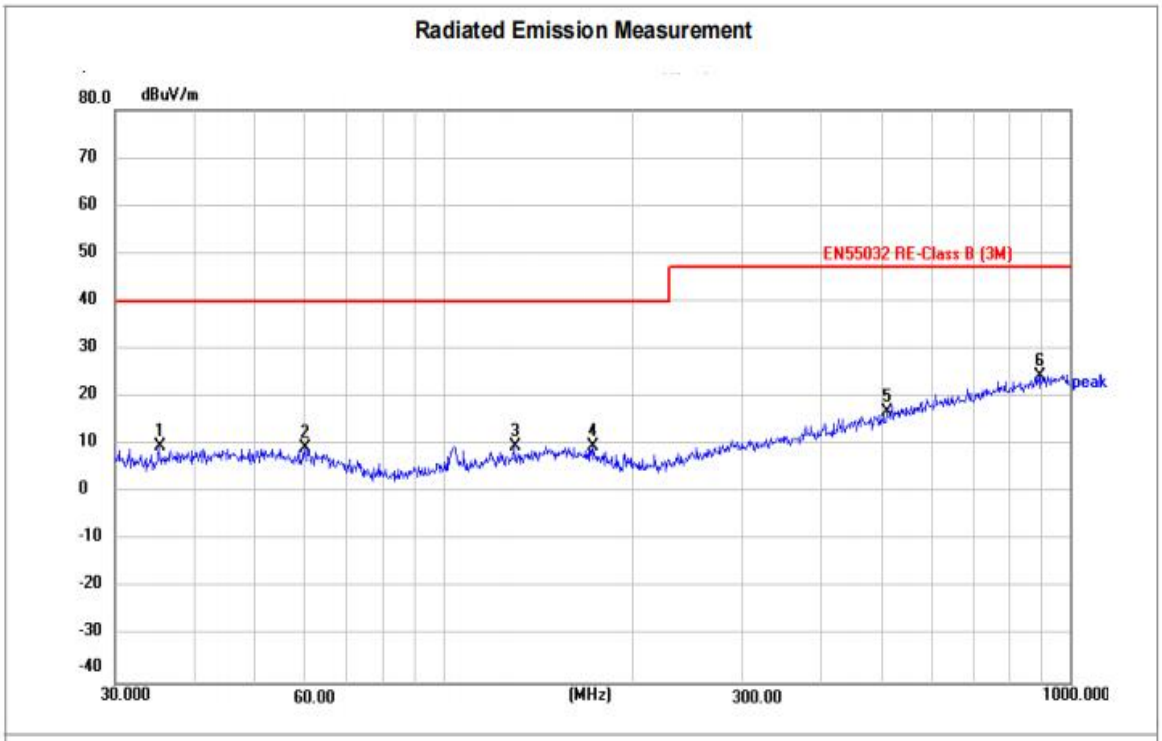
Test Mode: operating



Site LAB Polarization: *Horizontal* Temperature: 26(C)

Limit: EN55032 RE-Class B (3M) Power: Humidity: 54 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	53.3179	26.72	-16.69	10.03	40.00	-29.97	peak	100	0	P	
2	60.9176	25.88	-17.18	8.70	40.00	-31.30	peak	100	0	P	
3	141.8262	31.40	-16.62	14.78	40.00	-25.22	peak	100	0	P	
4	459.1144	26.37	-11.47	14.90	47.00	-32.10	peak	100	0	P	
5	618.5369	27.97	-7.56	20.41	47.00	-26.59	peak	100	0	P	
6 *	972.3374	28.32	-3.12	25.20	47.00	-21.80	peak	100	0	P	



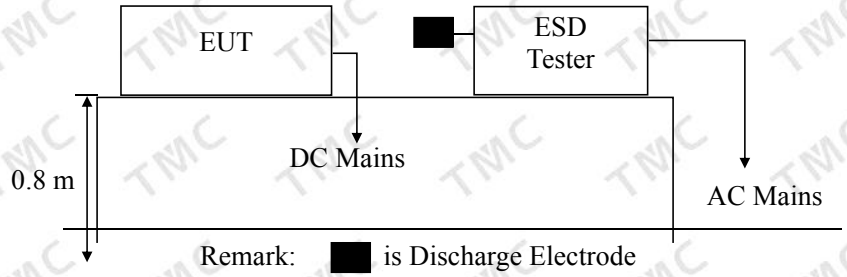
Site LAB Polarization: *Vertical* Temperature: 26(C)

Limit: EN55032 RE-Class B (3M) Power: Humidity: 54 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	35.2512	26.68	-17.03	9.65	40.00	-30.35	peak	100	18	P	
2	60.2801	26.37	-17.08	9.29	40.00	-30.71	peak	100	18	P	
3	129.9226	26.98	-17.21	9.77	40.00	-30.23	peak	100	18	P	
4	173.2051	26.29	-16.66	9.63	40.00	-30.37	peak	100	18	P	
5	510.0436	27.28	-10.40	16.88	47.00	-30.12	peak	100	18	P	
6 *	893.8567	28.15	-3.83	24.32	47.00	-22.68	peak	100	18	P	

6. ELECTROSTATIC DISCHARGE TEST

6.1. Block Diagram of ESD Test Setup



6.2. Test Standard

EN 55035:2017 +A11:2020
Severity Level 3 for Air Discharge at 8KV
Severity Level 2 for Contact Discharge at 4KV

6.3. Severity Levels and Performance Criterion

6.3.1. Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1.	2	2
2.	4	4
3.	6	8
4.	8	15
X.	Special	Special

6.3.2. Performance criterion: B

6.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3.2.

6.5. Operating Condition of EUT

6.5.1. Setup the EUT as shown in Section 9.1.

6.5.2. Turn on the power of all equipments.

6.5.3. Let the EUT work in test mode (full load) and test it.

6.6. Test Procedure

6.6.1. Air Discharge:

This test is done on a non-conductive surfaces. The round discharge tip of the discharge

electrode shall be approached as fast as possible to touch the EUT.
After each discharge, the discharge electrode shall be removed from the EUT.
The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

6.6.2. Contact Discharge:

All the procedure shall be same as Section 9.6.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

6.6.3. Indirect discharge for horizontal coupling plane

At least 20 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

6.6.4. Indirect discharge for vertical coupling plane

At least 20 single discharge shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

6.7. Test Results

PASS.

Please refer to the following page.

Electrostatic Discharge Test Results

TMC Testing Services (Shenzhen) Co., Ltd

Date: November 17, 2022

Applicant :	Shenzhen Wins Novelty Co.,Ltd	Test Date :	November 16, 2022
EUT :	Head Up Display	Temperature :	22℃
M/N :	T5	Humidity :	50%
Power Supply :	DC18V	Test Mode :	Operating
Test Engineer :	Simon		

Air Discharge: ±8KV For each point positive 10 times and negative 10 times discharge.

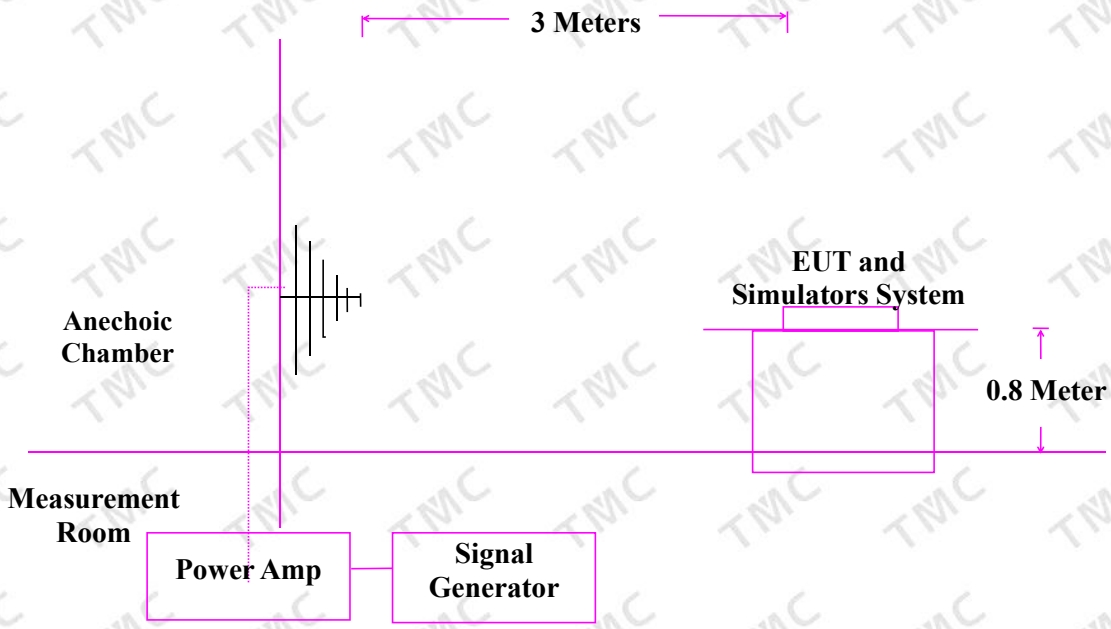
Contact Discharge: ±4KV

Location		**Kind** (A-Air Discharge C-Contact Discharge)	**Result** (PASS)
surface Slots	15 points	Air Discharge	A
interface Slots	6 points	Air Discharge	A
surface	10 points	Air Discharge	A
HCP	8 points	Contact Discharge	A
VCP	8 points	Contact Discharge	A

Discharge should be considered on Contact and Air and Horizontal Coupling Plane (HCP) and Vertical Coupling Plane (VCP).

7. RF FIELD STRENGTH SUSCEPTIBILITY TEST

7.1. R/S Test Setup



7.2. Test Standard

EN 55035:2017 +A11:2020
Severity Level 2 at 3V / m

7.3. Severity Levels and Performance Criterion

7.3.1. Severity level

Level	Field Strength V/m
1.	1
2.	3
3.	10
X.	Special

7.3.2. Performance criterion : A

7.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3.2

7.5. Operating Condition of EUT

Setup the EUT as shown in Section 10.1.. The operating condition of EUT are listed in section 3.3.

7.6. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above the ground. The EUT is set 3 meters away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test. Each of the four sides of EUT must be faced this transmitting antenna and measured individually.
In order to judge the EUT performance, a CCD camera is used to monitor the EUT.
All the scanning conditions are as follows **:**

Condition of Test	Remarks
1.Fielded Strength	3 V/m (Severity Level 2)
2.Radiated Signal	Modulated
3.Scanning Frequency	80 - 1000 MHz
4.Sweeping time of radiated	0.0015 decade/s
5.Dwell Time	1 Sec.

7.7. Test Results

PASS.

Please refer to the following page.

RF Field Strength Susceptibility Test Results

TMC Testing Services (Shenzhen) Co., Ltd

Date: November 17, 2022

Applicant :	Shenzhen Wins Novelty Co.,Ltd	Test Date :	November 16, 2022
EUT :	Head Up Display	Temperature :	22℃
M/N :	T5	Humidity :	50％
Power Supply :	DC18V	Test Mode :	Operating
Test Engineer :	Simon	Frequency Range :	80 MHz to 1000 MHz

Modulation: ☑AM ☐Pulse ☐none 1 KHz 80%

Criterion : A

	Frequency Rang : 80-1000	
Steps	1%	1%
	Horizontal	Vertical
Front	A(pass)	A(pass)
Right	A(pass)	A(pass)
Rear	A(pass)	A(pass)
Left	A(pass)	A(pass)

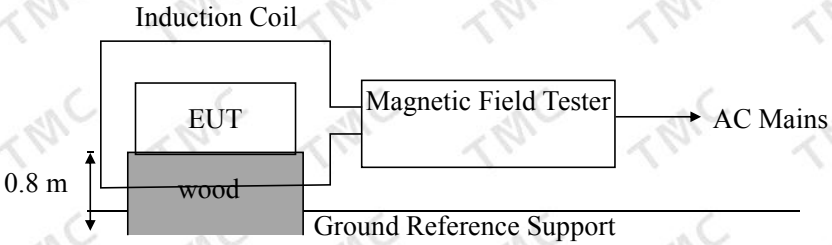
8. MAGNETIC FIELD IMMUNITY TEST

8.1. Block Diagram of Test Setup

8.1.1. Block Diagram of the EUT

(EUT: Head Up Display)

8.1.2. Block Diagram of Test Setup



8.2. Test Standard

EN 55035:2017 +A11:2020
Severity Level 2 at 3V / m

8.3. Severity Levels and Performance Criterion

8.3.1. Severity level

Level	Magnetic Field Strength A/m
1.	1
9.	3
10.	10
11.	30
12.	100
X.	Special

8.3.2 Performance criterion : A

8.4 EUT Configuration on Test

The configuration of EUT are listed in Section 3.2.

8.5 Operating Condition of EUT

8.5.1 Setup the EUT as shown in Section 14.1

8.5.2 Turn on the power of all equipments.

8.5.3 Let the EUT work in test mode (ON) and test it.

8.6. Test Procedure

The EUT shall be subjected to the test magnetic field by using the induction coil of standard dimensions (1m*1m) and shown in Section 14.1. The induction coil shall then be rotated by 90° in order to expose the EUT to the test field with different orientations.

1.7. Test Results

PASS.

Please refer to the following page.

Magnetic Field Immunity Test Results

TMC Testing Services (Shenzhen) Co., Ltd

Applicant: SHENZHEN SYNCO TECHNOLOGY CO.,LTD.	Test Date : November 16, 2022
EUT : Head Up Display	Temperature :26℃
M/N : T5	Humidity : 60%
Power Supply : DC18V	Test Engineer :Davis

Test Model: ON

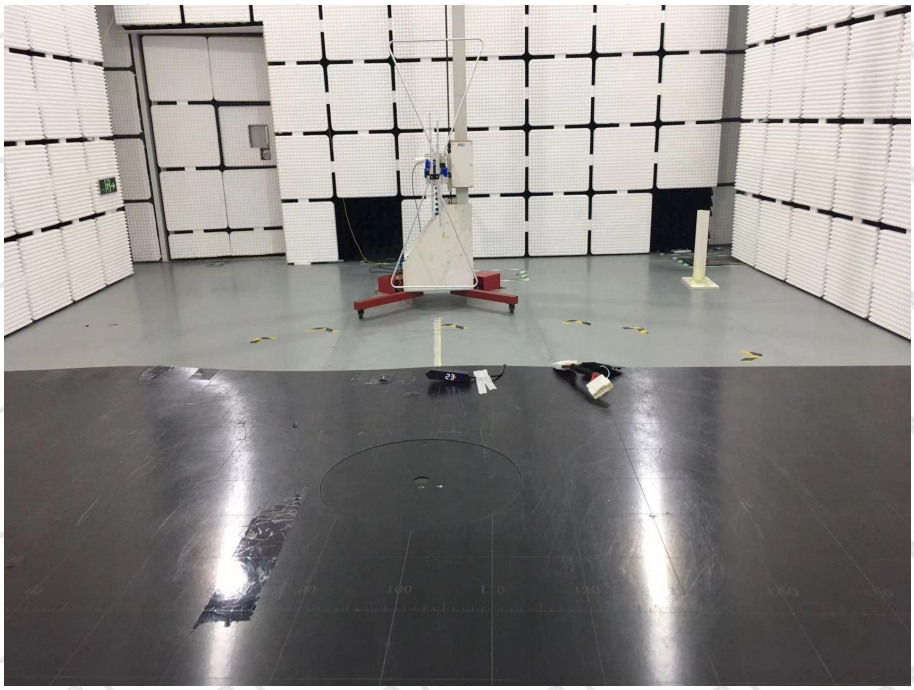
Test Level	Testing Duration	Coil Orientation	Criterion	Result
3A/M	5 mins	Horizontal	A	PASS
3A/M	5 mins	Vertical	A	PASS

Remark:	Test Equipment : Magnetic Field Tester MAG100

APPENDIX I

(TEST SETUP PHOTOGRAPHS)

RADIATED EMISSION MEASUREMENT



ELECTROSTATIC DISCHARGE IMMUNITY

APPENDIX Ⅱ

(Photos of the EUT)

Photo 1 General Appearance of the EUT

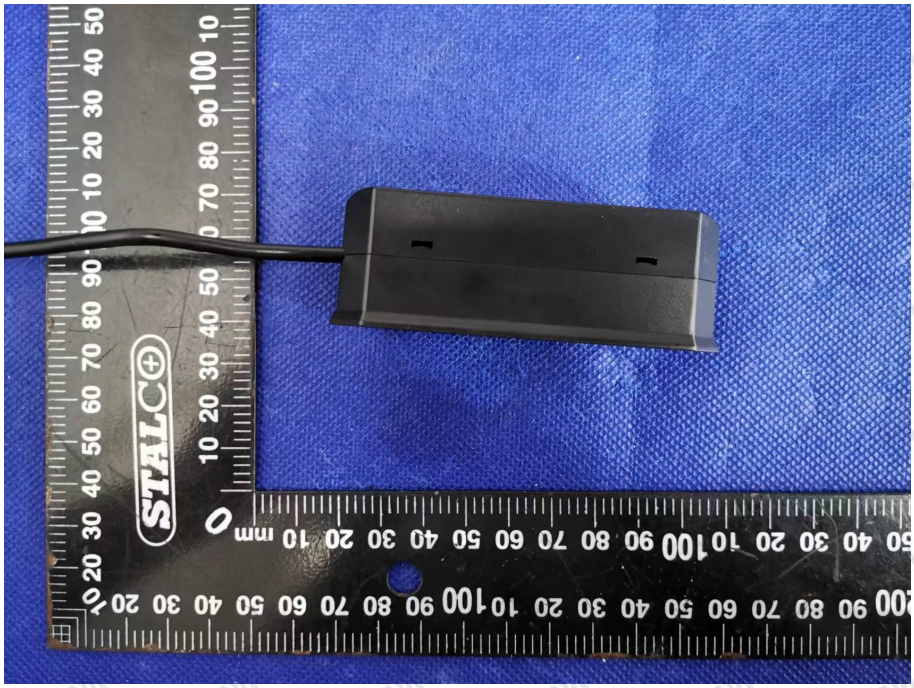


Photo 2 General Appearance of the EUT

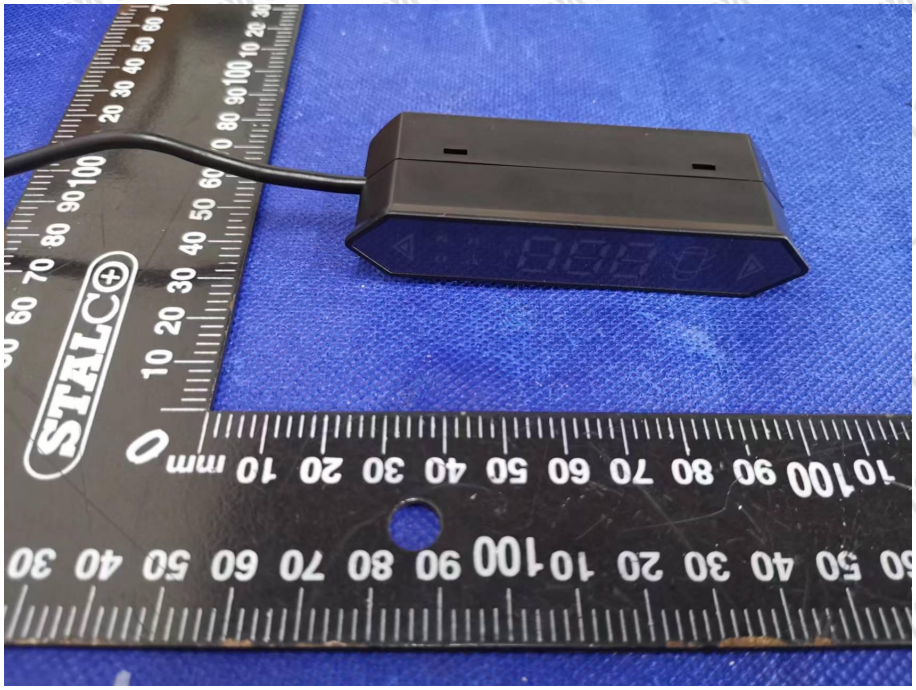


Photo 3 General Appearance of the EUT

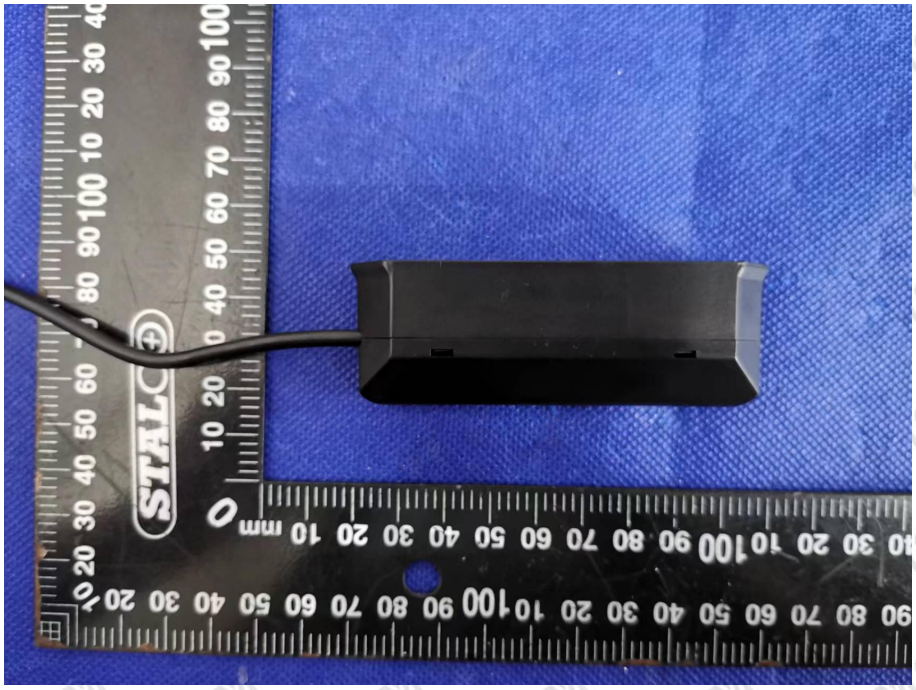
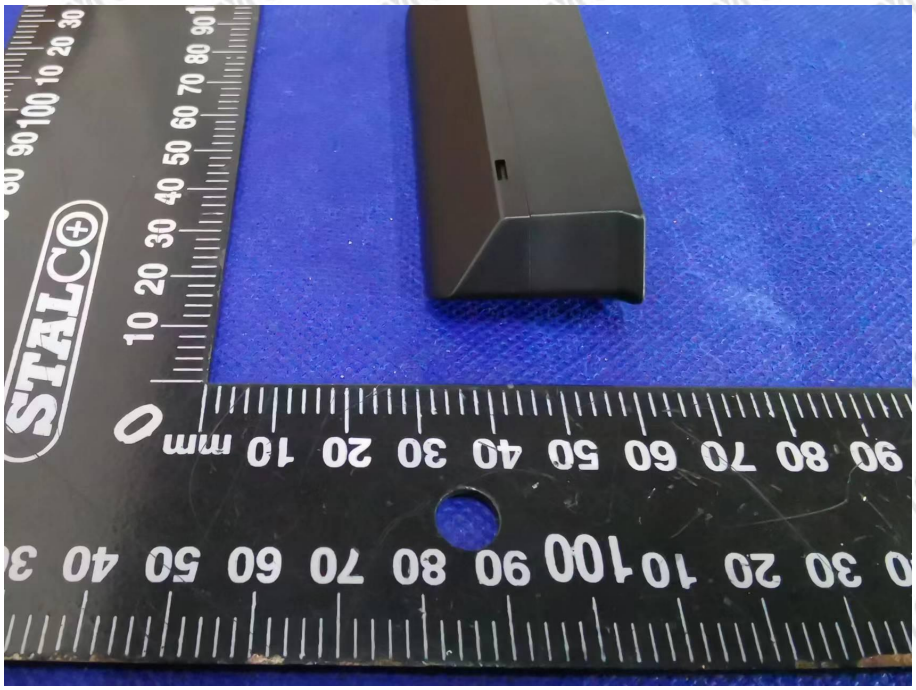


Photo 4 General Appearance of the EUT



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