EMC COMPLIANCE REPORT

For

Acrox Technologies Co., Ltd.

Gaming Mouse

Prepared for : Acrox Technologies Co., Ltd.
Address : 4F., No.89, Minshan St., Neihu Dist., Taipei City 114, Taiwan, R.O.C

Prepared by : EST Technology Co., Ltd.
Address : Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China

Tel: 86-769-83081888
Fax: 86-769-83081878

Report No. : ESTE-E2107031
Date of Report : Jul. 12, 2021

TABLE OF CONTENTS

EST Technology Co., Ltd.

Applicant: **Address:**	Acrox Technologies Co., Ltd. 4F., No.89, Minshan St., Neihu Dist., Taipei City 114, Taiwan, R.O.C		
Manufacturer: **Address:**	TPV Electronics (Fujian) Co., Ltd Rongqiao Economic and Technological Development Zone, Fuqing City, Fujian Province, P.R. China		
E.U.T:	Gaming Mouse		
Model Number:	GM510 *******(*=A~Z, a~z, 0~9,/ or blank)		
Trade Name:	AOC	**Serial No.:**	------
Date of Receipt:	Jul. 02, 2021	**Date of Test:**	Jul. 05~09, 2021
Test Specification:	EN 55032:2015+A11:2020 / BS EN 55032:2015+A11:2020 EN 55035:2017+A11:2020 / BS EN 55035:2017+A11:2020		
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied.		

Issue Date: Jul. 12, 2021

Prepared by:	Reviewed by:	Approved by:
Lena / Assistant	Sean/ Engineer	Iceman Hu / Manager

Other Aspects:

None.

Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested

This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of EST Technology Co., Ltd. The statement of compliance in this report is based on the limit in the test standard, the measurement uncertainty is not considered.

1. GENERAL PRODUCT INFORMATION

1.1. Product Function

Refer to Technical Construction Form and User Manual.

1.2. Description of Device (EUT)

Description	:	Gaming Mouse
Model No.	:	GM510
System Input Voltage	:	DC 5V By USB
USB Line	:	Unshielded, Detachable 1.9 m

1.3. Difference between Model Numbers

Note: The products are different model number.

1.4. Independent Operation Modes

The basic operation modes are:

1.4.1. Working

2. TEST STANDARDS AND SITES

2.1.Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION(EN 55032:2015+A11:2020)				
Description of Test Item	**Standard**	**Limits**		**Results**
Conducted disturbance at mains terminals	EN 55032:2015+A11:2020	Class B		PASS
		Minimum passing margin is 15.21dB at 1.92MHz		
Asymmetric mode conducted emissions	EN 55032:2015+A11:2020	Class B		N/A
		More than *** dB below the limit line.		
Radiated disturbance	EN 55032:2015+A11:2020	Class B		PASS
		Minimum passing margin is 10.62dB at 38.73MHz		
Harmonic current emissions	EN IEC 61000-3-2:2019	------		N/A
Voltage fluctuations & flicker	EN 61000-3-3:2013+A1:2019	------		N/A
IMMUNITY (EN 55035:2017+A11:2020)				
Description of Test Item	**Basic Standard**	**Performance Criteria**	**Observation Criteria**	**Results**
Electrostatic discharge (ESD)	EN 61000-4-2:2009	B	B	PASS
Radio-frequency, Continuous radiated disturbance	EN 61000-4-3:2006+ A1:2008+A2:2010	A	A	PASS
Electrical fast transient (EFT)	EN 61000-4-4:2012	B	*	N/A
Surge (Input a.c. power port)	EN 61000-4-5:2014	B	*	N/A
Radio-frequency,Continuous conducted disturbance	EN 61000-4-6:2014	A	*	N/A
Power frequency magnetic field	EN 61000-4-8:2010	A	A	PASS
Voltage dips, >95% reduction	EN 61000-4-11:2004	B	*	N/A
Voltage dips, 30% reduction		C	*	N/A
Voltage interruptions		C	*	N/A
N/A is an abbreviation for Not Applicable.				

2.2. Test Facilities

EMC Lab : Certificated by CNAS, CHINA
Registration No.: L5288
This Certificate is valid until: November 12, 2023

Certificated by FCC, USA
Designation Number: CN1215
This Certificate is valid until: January 31, 2022

Certificated by A2LA, USA
Registration No.: 4366.01
This Certificate is valid until: January 31, 2022

Certificated by Industry Canada
CAB identifier No.: CN0035
This Certificate is valid until: January 31, 2022

Certificated by VCCI, Japan
Registration No.:C-14103; T-20073; R-13663;
R-20103; G-20097
Date of registration: Apr. 20, 2020
This Certificate is valid until: Apr. 19, 2023

Certificated by TUV Rheinland, Germany
Registration No.: UA 50413872 0001
Date of registration: July 31, 2018

Certificated by Intertek
Registration No.: 2011-RTL-L2-64
Date of registration: November 08, 2018

Name of Firm : EST Technology Co., Ltd.

Site Location : Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China

2.3.List of Test and Measurement Instruments

2.3.1. For conducted emission at the mains terminals test (2# conduction)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESPR3	EST-E070	June 13,21	1 Year
Artificial Mains Network	Rohde & Schwarz	ENV216	EST-E048	June 13,21	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A

2.3.2. For radiated emission test (2# 966 radiation)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESCI3	EST-E071	June 13,21	1 Year
Bilog Antenna	Teseq	CBL 6111D	EST-E053	June 13,21	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A

2.3.3. For electrostatic discharge immunity test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
ESD Generator	HAEFELY	ONYX16	EST-E013	June 13,21	1 Year

2.3.4. Radio Frequency Electromagnetic Field Immunity (R/S) Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Signal Generator	Agilent	N5181A	EST-E060	June 13,21	1 Year
Power Amplifier	SKET	HAP801000M-250W	EST-E061	N/A	N/A
Power Amplifier	SKET	HAP0103G-75W	EST-E062	N/A	N/A
Power Amplifier	SKET	HAP0306G-50W	EST-E063	N/A	N/A
Power Meter	Agilent	E4419B	EST-E064	June 13,21	1 Year
Power sensor	Agilent	E9301A	EST-E065	June 13,21	1 Year
Power sensor	HP	E9301A	EST-E066	June 13,21	1 Year
Antenna	Schwarzbeck	STLP 9129	EST-E059	N/A	N/A
E-Field Probe	Narda	EP-601	EST-E067	June 13,21	1 Year
Test Software	SKET	EMC-S	V1.2.0.48	N/A	N/A

2.3.5.For power frequency magnetic field immunity test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Magnetic Field Tester	HAEFELY	MFS 100	EST-E018	June 13,21	1 Year

Note: All calibration reports of the equipment were provided by LiSai calibration and Testing

3. TEST SET-UP AND OPERATION MODES

3.1. Principle of Configuration Selection

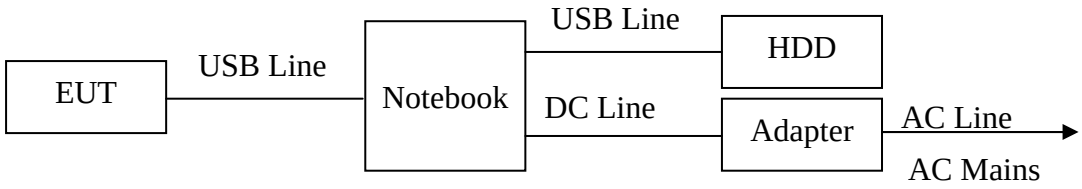
Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

Immunity: The equipment under test (EUT) was configured to the representative operating mode and conditions.

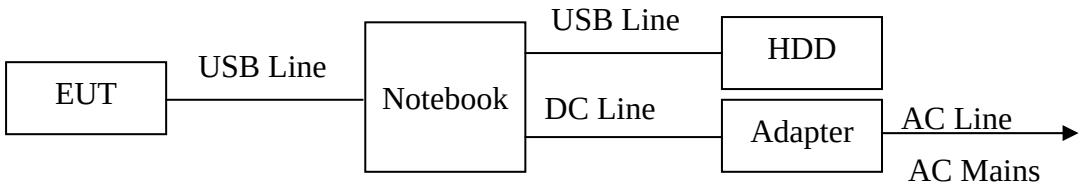
3.2. Block Diagram of Test Set-up

System Diagram of Connections Between EUT and Simulators

EMI



EMS



(EUT: Gaming Mouse)

3.3. Test Operation Mode and Test Software

Refer to Test Setup in clause 4 & 5.

3.4. Special Accessories and Auxiliary Equipment

3.4.1.U Disc

M / N	:	SDCZ7-4096
S / N	:	BH0701AGOB
Manufacturer	:	SanDisk

3.4.2.HDD

M / N	:	iPod/A1238
S / N	:	8K044D2Z9ZU
Manufacturer	:	Apple

3.4.3.Notebook

M / N	:	Thinkpad X280
S / N	:	SL10P97711
Manufacturer	:	Lenovo

3.5. Countermeasures to Achieve EMC Compliance

None.

4. EMISSION TEST RESULTS

4.1. Conducted Emission at The Mains Terminals Test

RESULT	**:**	**Pass**
Test procedure	:	EN 55032:2015+A11:2020
Frequency range	:	0.15 ~ 30MHz
Test Site	:	2# Conduction Shielded Room
Limits	:	EN 55032:2015+A11:2020 Class B

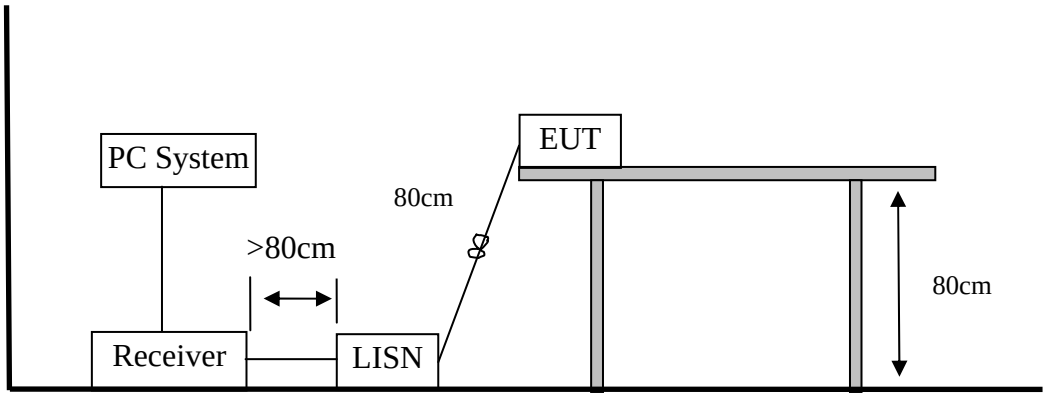
Test Setup

Date of test	:	Jul. 06, 2021
Model No.	:	GM510
Input Voltage	:	DC 5V From PC
Operation Mode	:	Working

The frequency range from 150 kHz to 30 MHz was investigated.

The bandwidth of the test receiver was set at 9 kHz.

The test data of the worst case condition(s) was reported on the following page.

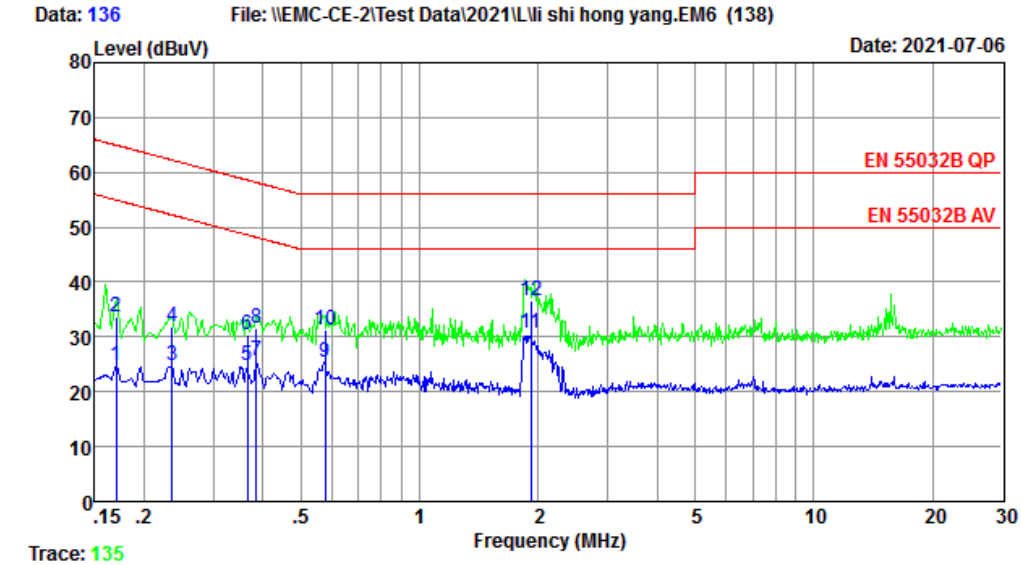


Note: Test uncertainty: ±3.40dB at a level of confidence of 95%.(2#CE)

Test Data

EST Technology

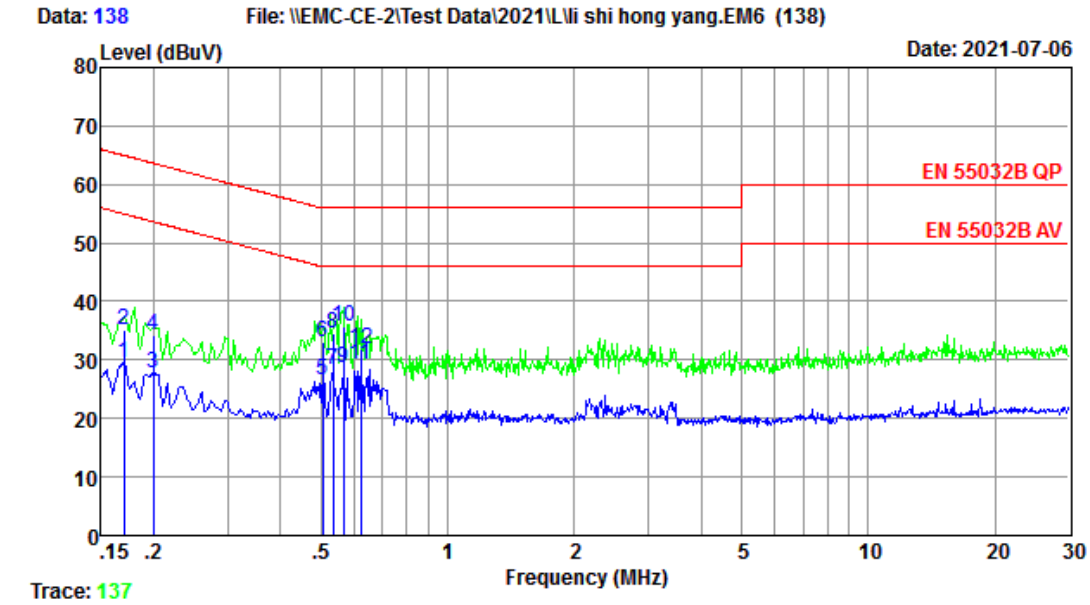
Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878



Site no : 2#CE Shield Room Data no. : 136
Env. / Ins. : Temp:22.8℃ Humi:58% Press:101.30kPa LINE Phase : LINE
Limit : EN 55032B QP
Engineer : ZSX
EUT : Gaming Mouse
Power : DC 5V From PC
M/N : GM510
Test Mode : Working

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuv)	Limits (dBuv)	Margin (dB)	Remark
1	0.17	9.68	9.69	5.41	24.78	54.94	30.16	Average
2	0.17	9.68	9.69	14.28	33.65	64.94	31.29	QP
3	0.24	9.71	9.92	5.03	24.66	52.26	27.60	Average
4	0.24	9.71	9.92	12.37	32.00	62.26	30.26	QP
5	0.37	9.75	9.92	5.09	24.76	48.61	23.85	Average
6	0.37	9.75	9.92	10.67	30.34	58.61	28.27	QP
7	0.39	9.76	9.92	6.01	25.69	48.17	22.48	Average
8	0.39	9.76	9.92	11.82	31.50	58.17	26.67	QP
9	0.58	9.81	9.92	5.74	25.47	46.00	20.53	Average
10	0.58	9.81	9.92	11.65	31.38	56.00	24.62	QP
11	1.92	9.84	9.96	10.99	30.79	46.00	15.21	Average
12	1.92	9.84	9.96	16.76	36.56	56.00	19.44	QP

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.



Site no : 2#CE Shield Room Data no. : 138
Env. / Ins. : Temp:22.8℃ Humi:58% Press:101.30kPa LINE Phase : NEUTRAL
Limit : EN 55032B QP
Engineer : ZSX
EUT : Gaming Mouse
Power : DC 5V From PC
M/N : GM510
Test Mode : Working

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuv)	Limits (dBuv)	Margin (dB)	Remark
1	0.17	9.64	9.69	10.22	29.55	54.94	25.39	Average
2	0.17	9.64	9.69	15.89	35.22	64.94	29.72	QP
3	0.20	9.65	9.77	8.36	27.78	53.62	25.84	Average
4	0.20	9.65	9.77	14.87	34.29	63.62	29.33	QP
5	0.50	9.70	9.92	6.98	26.60	46.00	19.40	Average
6	0.50	9.70	9.92	13.58	33.20	56.00	22.80	QP
7	0.53	9.70	9.92	8.67	28.29	46.00	17.71	Average
8	0.53	9.70	9.92	14.95	34.57	56.00	21.43	QP
9	0.56	9.70	9.92	9.07	28.69	46.00	17.31	Average
10	0.56	9.70	9.92	16.17	35.79	56.00	20.21	QP
11	0.62	9.71	9.92	9.66	29.29	46.00	16.71	Average
12	0.62	9.71	9.92	12.14	31.77	56.00	24.23	QP

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

4.2. Radiated Emission Test

RESULT	**:**	**Pass**
Test procedure	:	EN 55032:2015+A11:2020
Frequency range	:	30 ~ 1000MHz
Test Site	:	2#966 Chamber
Limits	:	EN 55032:2015+A11:2020 Class B

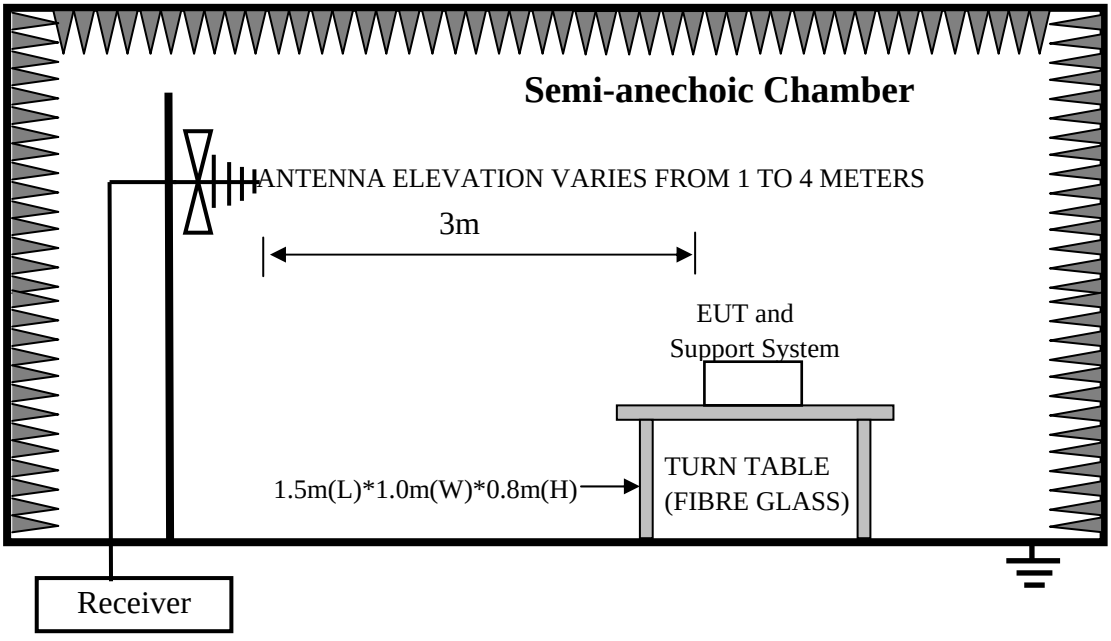
Test Setup

Date of test	:	Jul. 05, 2021
Model No.	:	GM510
Input Voltage	:	DC 5V From PC
Operation Mode	:	Working

The EUT was placed on a turn table which was 0.8 m above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m distance from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The EUT was tested in the Chamber Site. It was pre-scanned with a Peak detector from the spectrum, and all the final readings from the test receiver were measured with the Quasi-Peak detector.

The bandwidth setting on the test receiver was 120 kHz.

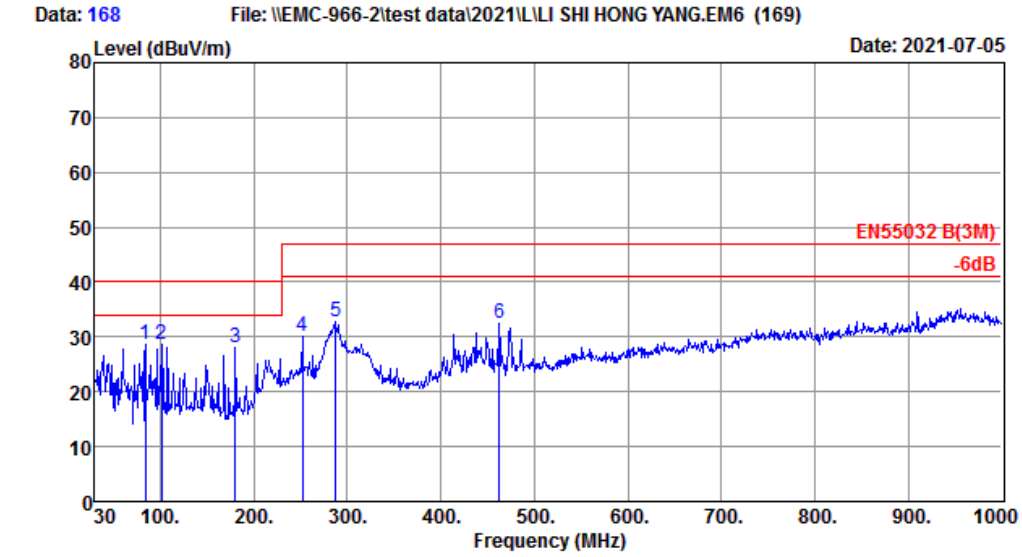


Note:
Test uncertainty: ±4.26 dB (H);±4.74 dB (V) at a level of confidence of 95%.(2#966)

Test Data

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

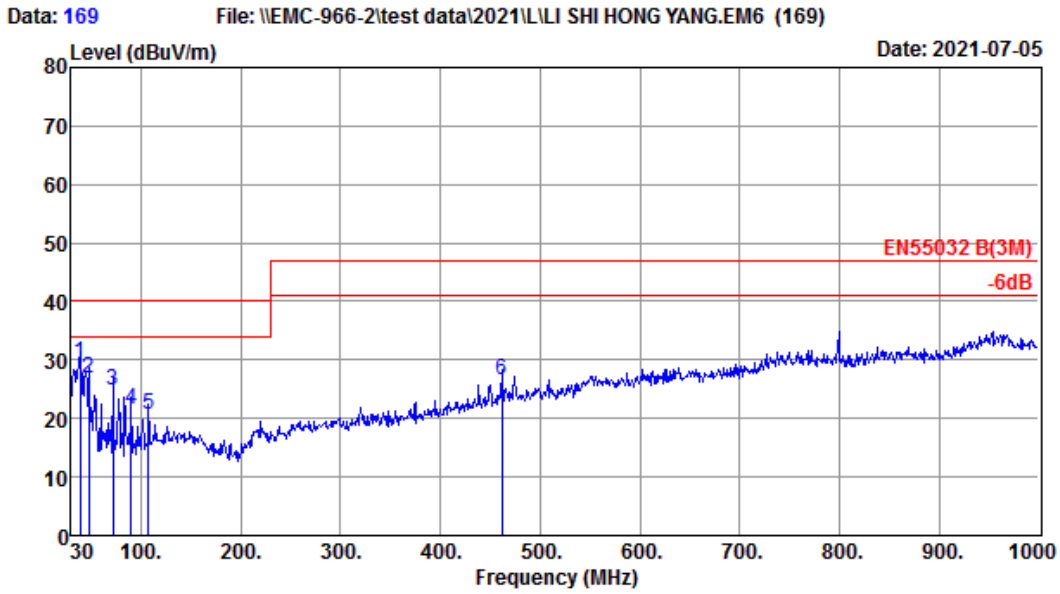


Site no. : 2# 966 chamber Data no. : 168
Dis. / Ant. : 3m 47018 Ant. pol. : HORIZONTAL
Limit : EN55032 B(3M)
Env. / Ins. : Temp:20.8℃;Humi:46.7%;Press:101.52kPa
Engineer : XJ
EUT : Gaming Mouse
Power : DC 5V From PC
M/N : GM510
Test Mode : Working

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	84.32	7.73	0.66	20.34	28.73	40.00	11.27	QP
2	101.78	9.99	0.81	17.75	28.55	40.00	11.45	QP
3	180.35	8.76	1.08	18.06	27.90	40.00	12.10	QP
4	252.13	12.42	1.44	16.36	30.22	47.00	16.78	QP
5	288.02	12.69	1.57	18.60	32.86	47.00	14.14	QP
6	462.62	17.22	2.24	12.92	32.38	47.00	14.62	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878



Site no. : 2# 966 chamber Data no. : 169
Dis. / Ant. : 3m 47018 Ant. pol. : VERTICAL
Limit : EN55032 B(3M)
Env. / Ins. : Temp:20.8℃;Humi:46.7%;Press:101.52kPa
Engineer : XJ
EUT : Gaming Mouse
Power : DC 5V From PC
M/N : GM510
Test Mode : Working

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	38.73	12.13	0.25	17.00	29.38	40.00	10.62	QP
2	47.46	7.70	0.27	18.81	26.78	40.00	13.22	QP
3	71.71	6.03	0.50	18.37	24.90	40.00	15.10	QP
4	90.14	8.50	0.70	12.49	21.69	40.00	18.31	QP
5	107.60	10.70	0.82	9.00	20.52	40.00	19.48	QP
6	461.65	17.20	2.24	7.05	26.49	47.00	20.51	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

5. IMMUNITY TEST RESULT

5.1. Description of Performance Criteria:

Performance criteria A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

For audio output device: The measured acoustic interference ratio and/or the measured electrical interference during the test shall be -20dB or better(see note1)

Performance criteria B

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.

After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criteria 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. A reboot or re-start operation is allowed.

Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Note 1: This performance criterion only using for Continuous inducted RF disturbances and Continuous RF electromagnetic field disturbances item.

5.2. Electrostatic Discharge Immunity Test

RESULT	**:**	**Pass**
Test procedure	:	EN 55035:2017+A11:2020
Basic standard	:	EN 61000-4-2:2009
Test specification	:	+/-4.0kV(Contact discharge) +/-8.0kV(Air discharge)
Number of discharges	:	≥ 10(Air discharge for single polarity discharge) ≥ 10 (Contact discharge for single polarity discharge)
Polarity	:	Positive/Negative
Performance criterion	:	B

Test Setup

Date of test	:	Jul. 09, 2021
Model No.	:	GM510
Input Voltage	:	DC 5V From PC
Operation Mode	:	Working
Temperature	:	22.1℃
Humidity	:	52%
Pressure	:	101.10kPa

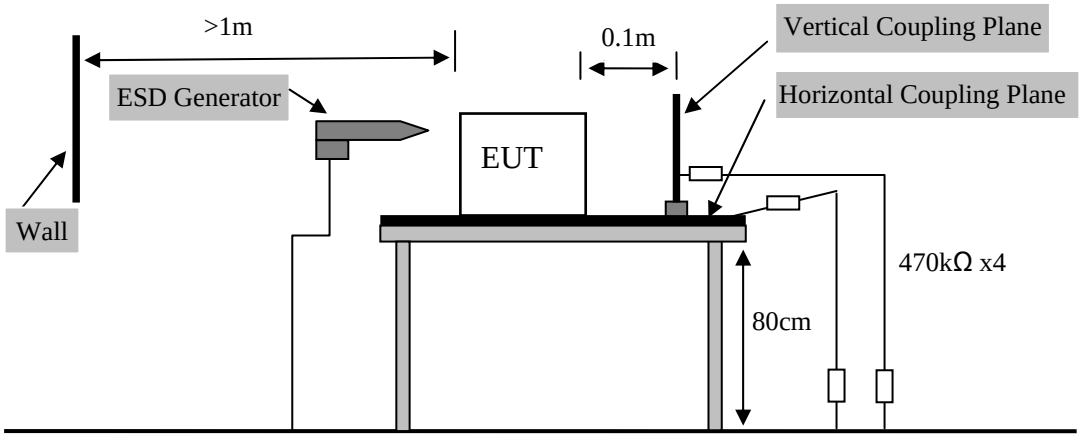


Table 1: Electrostatic Discharge Immunity Test Result

Discharge Location		**Type of discharge**	**Result**
HCP	4 points	Contact	Pass
VCP	4 points	Contact	Pass
USB Port	1 point	Air	Pass
Slot	4 points	Air	Pass

Remark: 1. The EUT was Stopped during the test, but self-recoverable after the test.
2. Discharge should be considered on Contact and Air and Horizontal Coupling Plane (HCP) and Vertical Coupling Plane (VCP).

5.3. Radio Frequency Electromagnetic Field Immunity Test

RESULT	**:**	**Pass**
Test procedure	:	EN 55035:2017+A11:2020
Basic standard	:	EN 61000-4-3:2006+A1:2008+A2:2010
Frequency Range	:	80-1000MHz,1800MHz, 2600MHz, 3500MHz, 5000MHz
Performance criterion	:	A
Test site	:	866 Chamber

Test Setup

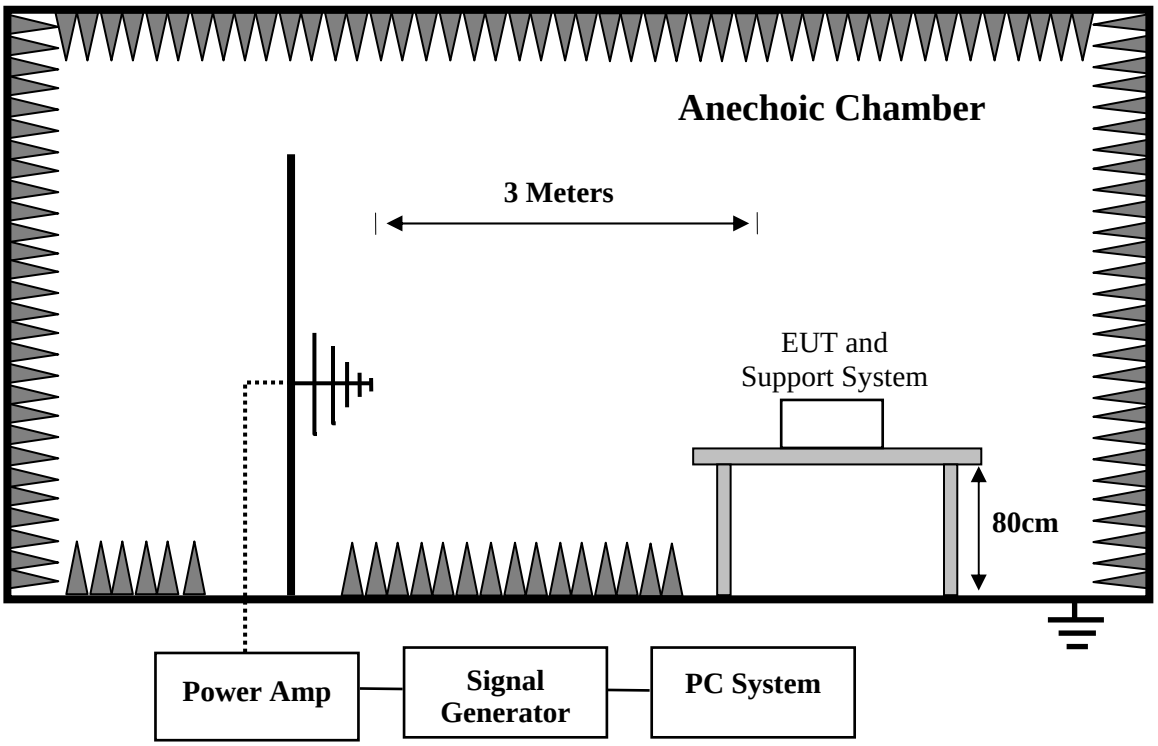
Date of test	:	Jul. 09, 2021
Model No.	:	GM510
Input Voltage	:	DC 5V From PC
Operation Mode	:	Working
Temperature	:	22.7℃
Humidity	:	52%
Pressure	:	101.10kPa

The EUT and its simulators were placed on a turn table which was 0.8 meter above the ground. The EUT was set 3 m away from the transmitting antenna which was mounted on an antenna tower. Both horizontal and vertical polarization of the antenna were 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 was used to monitor EUT screen.

All the scanning conditions were as follows**:**

Condition of Test	Remarks
1. Field 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	at least 3 seconds



	Condition of Test	Remarks
6.	Field Strength	3 V/m (Severity Level 2)
7.	Radiated Signal	Modulated
8.	Scanning Frequency	1800MHz,2600MHz,3500MHz,5000MHz
9.	Sweeping time of radiated	0.0015 decade/s
10.	Dwell Time	at least 3 seconds

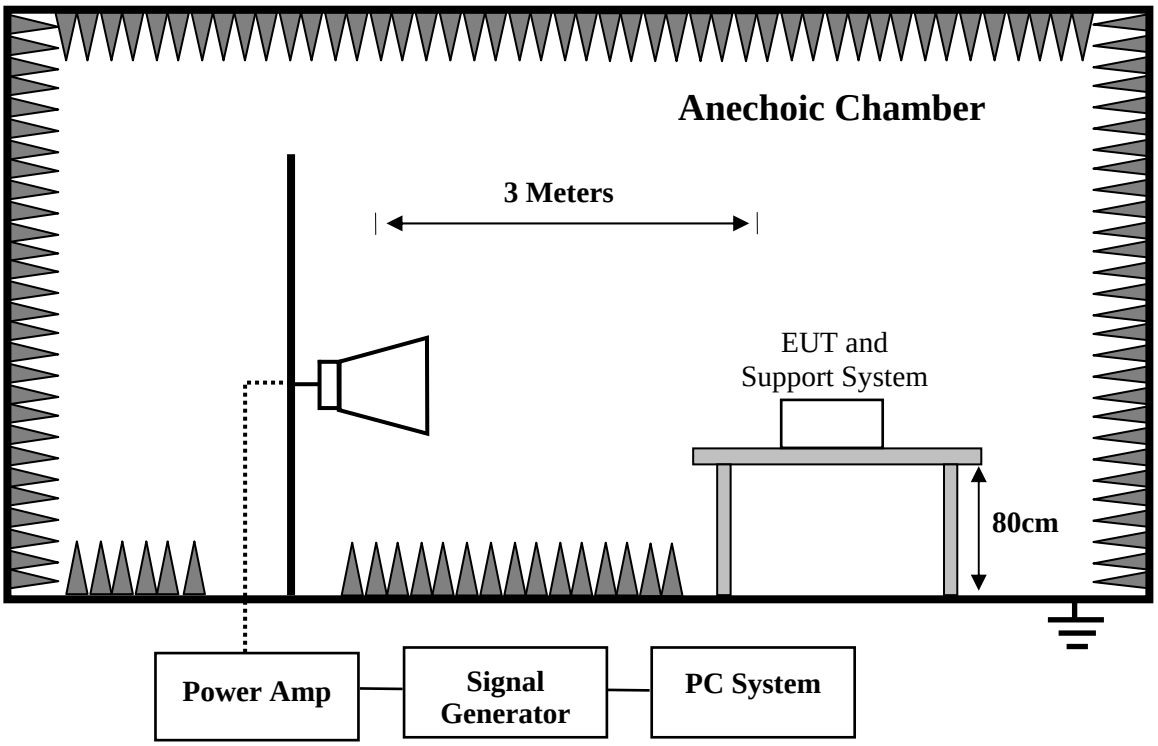


Table 2: Radio Frequency Electromagnetic Field Immunity Test Result

Position	Frequency Range	Test Level	Modulated Signal	Freq. Step	Dwell Time	Result
Front	80 to 1000 MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz	3 V/m	AM 80%, 1kHz sine wave	1%	3 s	Pass
Right						
Rear						
Left						
Remark: There was no change compared with initial operation during the test.						

5.4. Power Frequency Magnetic Field Immunity Test

RESULT	**:**	**Pass**
Test procedure	:	EN 55035:2017+A11:2020
Basic standard	:	EN 61000-4-8:2010
Test specification	:	1 A/m
Performance criterion	:	A

Test Setup

Date of test	:	Jul. 09, 2021
Model No.	:	GM510
Input Voltage	:	DC 5V From PC
Operation Mode	:	Working
Temperature	:	22.5℃
Humidity	:	53%
Pressure	:	101.10kPa

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

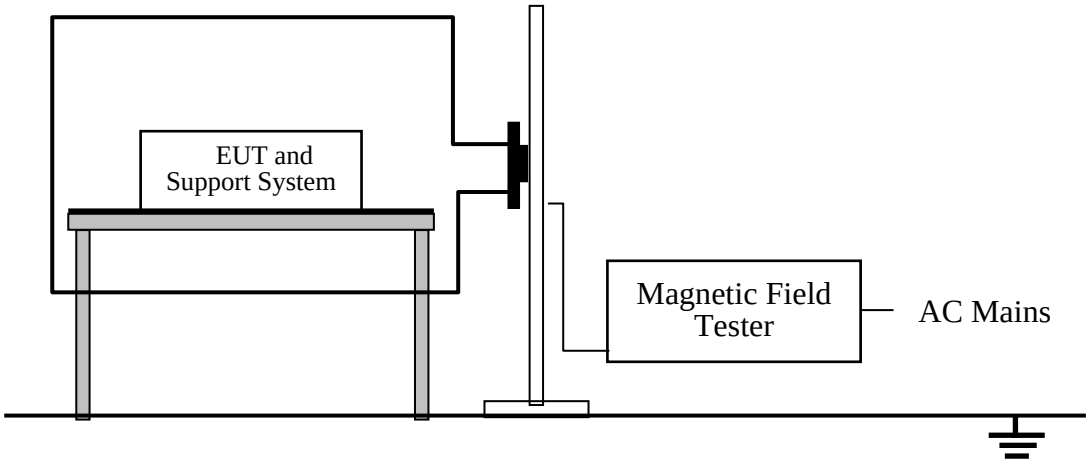


Table 3: Power Frequency Magnetic Field Immunity Test Result

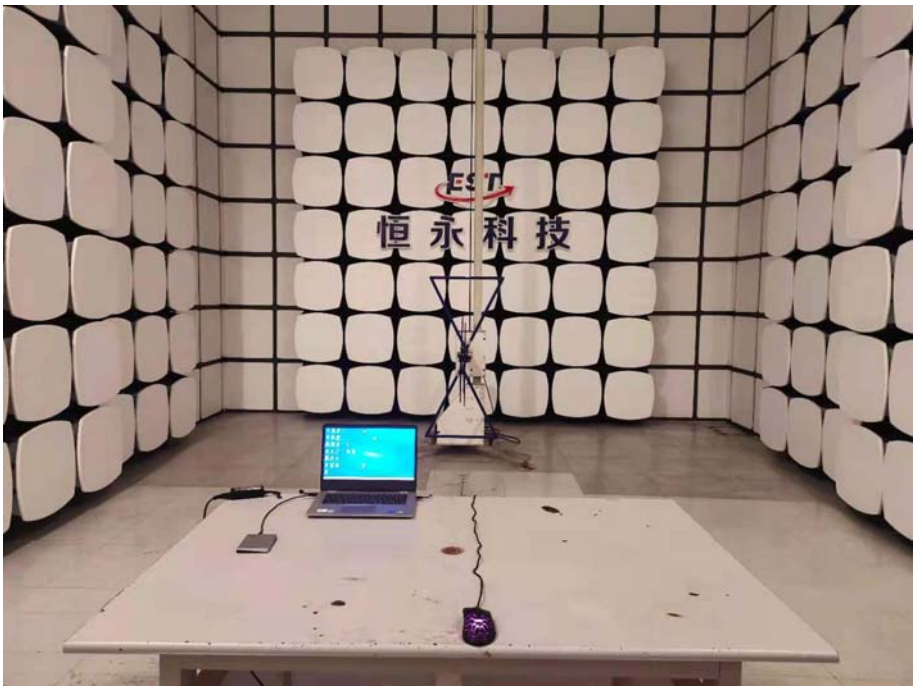
Test Level	Testing Duration	Coil Orientation	Criterion	Result
1A/m	5 mins	X	A	Pass
1A/m	5 mins	Y	A	Pass
1A/m	5 mins	Z	A	Pass

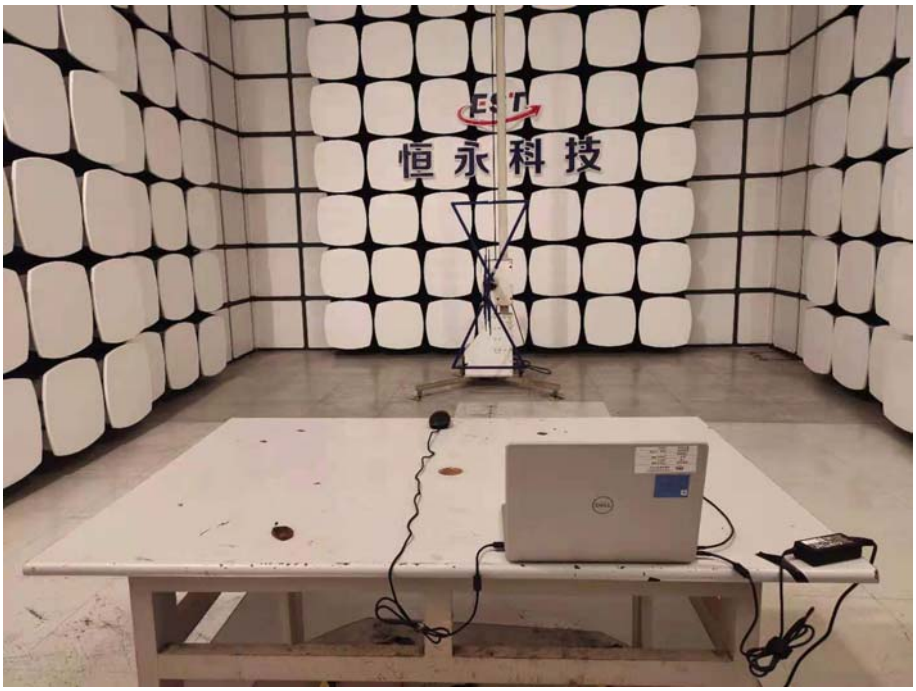
Remark: There was no change compared with initial operation during the test

6. PHOTOGRAPHS OF TEST SET-UP

6.1.Set-up for Conducted Emission at the Mains Terminals Test

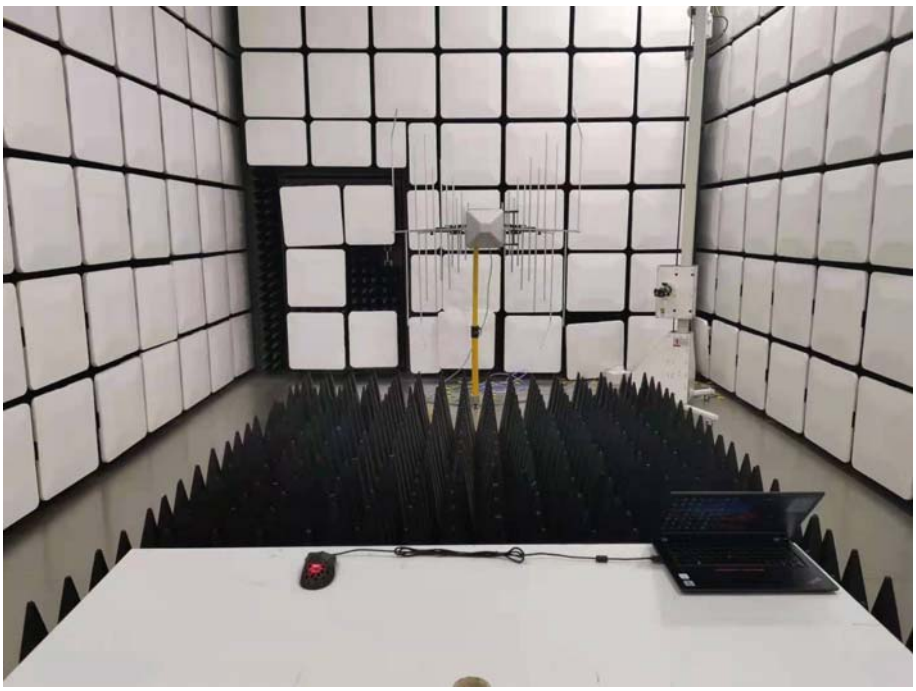
6.2.Set-up for Radiated Emission Test



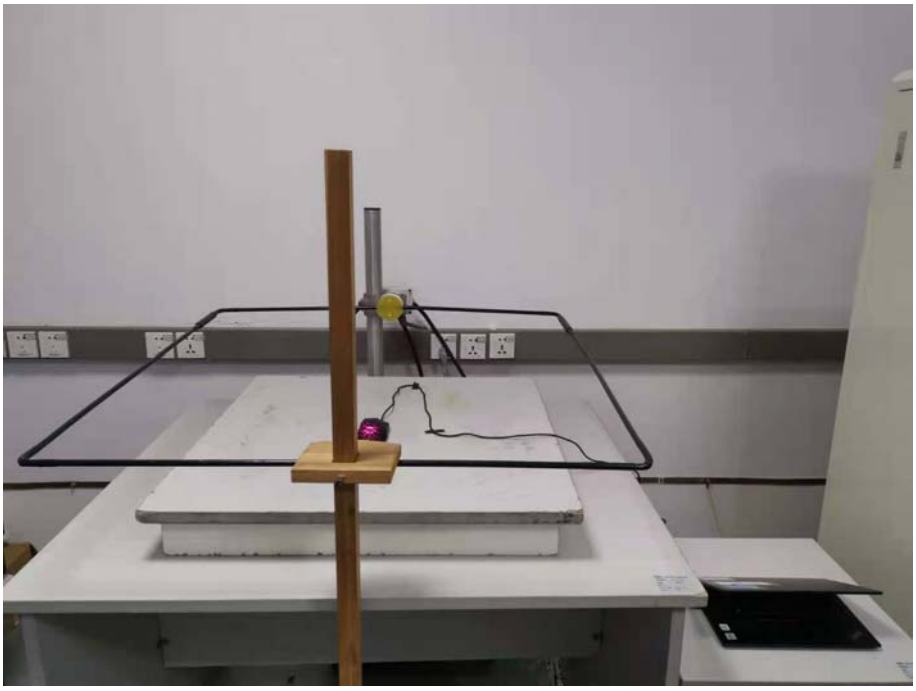


6.3.Set-up for Electrostatic Discharge Immunity Test

6.4.Set-up for Radio Frequency Electromagnetic Field Immunity Test



6.5.Set-up for Power Frequency Magnetic Field Immunity Test



7. PHOTOGRAPHS OF THE EUT

Figure 1
General Appearance of the EUT

Figure 2
General Appearance of the EUT

Figure 3
Inside View of the EUT

Figure 4
Inside View of the EUT

Figure 5
Inside View of the EUT

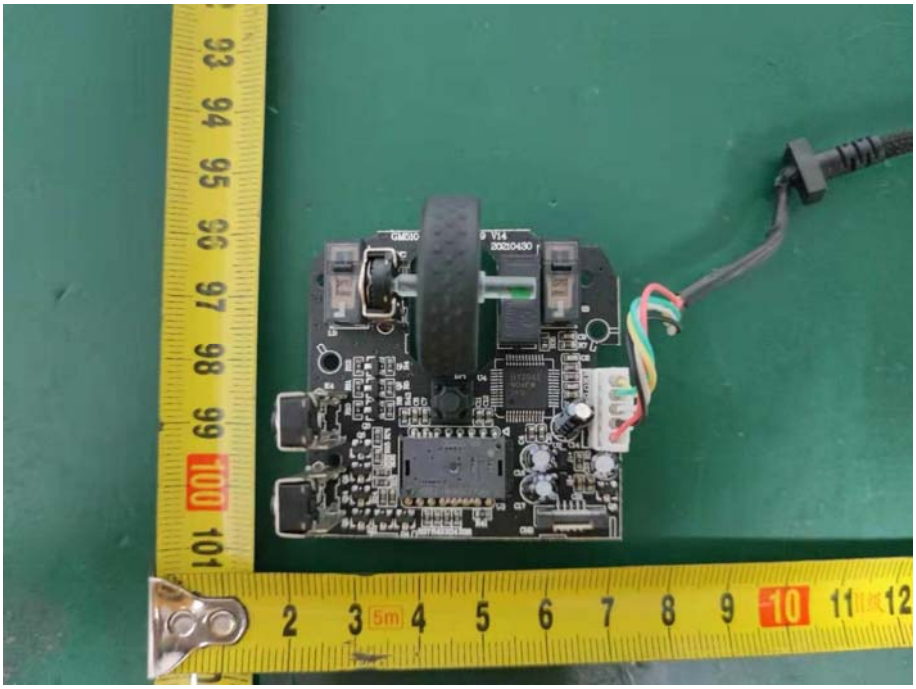
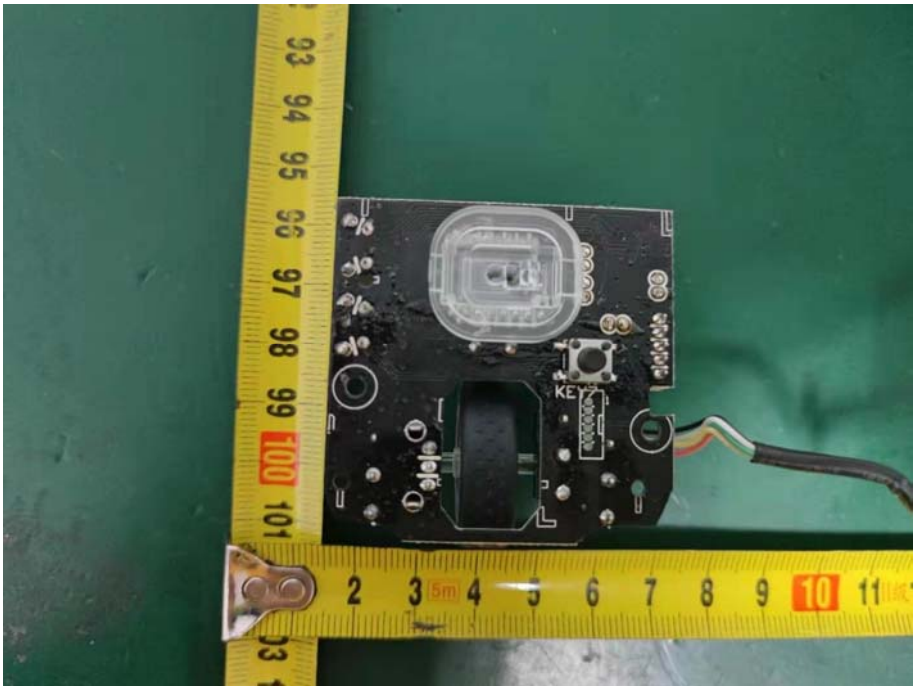


Figure 6
Inside View of the EUT



End of Test Report