Test Report

Verified code: 537725

Report No.: E202201244425-2-G1

Customer:	Key Technology (China) Limited
Address:	Floor 7, Building S8, Fenggang Tianan Cyber Park, No. 208 Fenggang Section, Dongshen Road, Fenggang Town, DongGuan City, Guang Dong Province, P.R. China.Zip Code: 523703
Sample Name:	IEC60945 keyboard and mouse mouse
Sample Model:	K-TEK-M440-OTB-FN-BL-NV-EMC-DWP
Receive Sample Date:	Mar.03,2022
Test Date:	Mar.08,2022 ~ Mar.10,2022
Reference Document:	**IEC 60945:2002<Maritime navigation and radiocommunication equipment and systems–General requirements–Methods of testing and required test results>** §9.2 Conducted emissions §9.3 Radiated emissions from enclosure port §10.9 Immunity to electrostatic discharge §10.4 Immunity to radiated radiofrequencies §10.5 Immunity to fast transients §10.6 Immunity to surges §10.3 Immunity to conducted radio frequency disturbance §10.8 Power Supply Failure §11.2 Compass safe distance
Test Result:	Refer to the following report

Prepared by: Fang Yz Reviewed by: Shibo Liang Approved by:

GUANGZHOU GRG METROLOGY & TEST CO., LTD.

Issued Date: 2022-04-22

GUANGZHOU GRG METROLOGY & TEST CO., LTD.
Address: No.163, Pingyun Road, West of Huangpu Avenue, Guangzhou, Guangdong, China
Tel：（+86）400-602-0999 FAX：（+86）020-38698685 Web：http://www.grgtest.com

Statement

1. The report is invalid without "special seal for inspection and testing"; some copies are invalid; The report is invalid if it is altered or missing; The report is invalid without the signature of the person who prepared, reviewed and approved it.

2. The sample information is provided by the client and responsible for its authenticity; The content of the report is only valid for the samples sent this time.

3. When there are reports in both Chinese and English, the Chinese version will prevail when the language problems are inconsistent.

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5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.

6. The test report without CMA approval mark is only used for scientific research, teaching, internal quality control and other purposes.

7.This report E202201244425-1-G1 is the modification of report E202201244425-1. On the basis of the original report, the content of " Electronics Factory： Room 702, Building 8, Fenggang Tianan Cyber City, No. 208, Fenggang Section, Dongshen Road, Fenggang Town, Dongguan City, Guangdong Province "in page 1&6 of the report is modified to " Floor 7, Building S8, Fenggang Tianan Cyber Park, No. 208 Fenggang Section, Dongshen Road, Fenggang Town, DongGuan City, Guang Dong Province, P.R. China.Zip Code: 523703 ", Add " The head office of the applicant (Name: Key Technology (China) Limited, Address: B703, Building 1, Tianan Cyber Park, Huang Ge North Rd, Longcheng Subdistrict, Long Gang District, ShenZhen, Guang Dong, P.R.China.Zip Code: 518172) " content to page 6 and section 2.3,and the original report E202201244425-1 is invalid.

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1. TEST RESULT SUMMARY

Test Item	Test mode	Test Requirement	Test Method	Class / Severity	Test Result
Conducted Emission Measurement	Mode1	IEC 60945:2002 Chapter 9.2	IEC 60945:2002 Chapter 9.2	Table 5	Pass
Radiated Electromagnetic Disturbance Measurement	Mode1	IEC 60945:2002 Chapter 9.3	IEC 60945:2002 Chapter 9.3	IACS UR E10 Rev.7: 0.15 MHz-0.3 MHz, QP: 80 - 52 dBμV/m; 0.3 MHz-30 MHz, QP: 52 - 34 dBμV/m; 30MHz-1000MHz, QP: 54 dBμV/m; 156MHz-165MHz, QP: 24 dBμV/m; 1000MHz-6000MHz, AVG: 54 dBμV/m	Pass
Electrostatic Discharge (ESD)	Mode1	IEC 60945:2002 Chapter 10.9	IEC 61000-4-2:2008	Contact: ±6kV Air: ±8kV Performance Criterion: B	Pass
Radiated Radio-Frequency Electromagnetic Field (RS)	Mode1	IEC 60945:2002 Chapter 10.4	IEC 61000-4-3:2010	IACS UR E10 Rev.7: 80MHz-6GHz ,10V/m 80%AM(400Hz) Performance Criterion: A	Pass
Electrical Fast Transient/Burst Immunity Test	Mode1	IEC 60945:2002 Chapter 10.5	IEC 61000-4-4:2012	AC port: ±2kV Impulse Frequency: 2.5kHz Duration time: 5min performance criterion: B	Pass
Surge Immunity Test	Mode1	IEC 60945:2002 Chapter 10.6	IEC 61000-4-5:2014+AMD1:2017	AC port: line to line: ±0.5kV line to ground: ±1kV Performance Criterion: B	Pass
Injected Currents Susceptibility Test	Mode1	IEC 60945:2002 Chapter 10.3	IEC 61000-4-6:2013	0.15 MHz -80MHz, 80%AM(400Hz) AC port:3Vr.m.s. Designated frequency point (MHz), 2,3,4,6.2, 8.2,12.6,16.5,18.8,22,25, 80%AM(400Hz) AC port: 10Vr.m.s. Performance Criterion: A	Pass
Power Supply Failure	Mode1	IEC 60945:2002 Chapter 10.8	IEC 61000-4-11:2020	Power outage duration:60s Repeat times:3 times Performance Criterion: C	Pass
Compass Safe Distance	Mode1	IEC 60945:2002 Chapter 11.2	IEC 60945:2002 Chapter 11.2	IEC 60945:2002 Chapter 11.2	See the results in 8.1.4 test results

NOTE: The test level shall be carried out in accordance with the "Technical Notice on the Implementation of IACS UR E10 Rev.7 Relevant Type Approval Test Procedures".

2. GENERAL DESCRIPTION OF TUT

2.1 APPLICANT

Name:	Key Technology (China) Limited
Address:	Floor 7, Building S8, Fenggang Tianan Cyber Park, No. 208 Fenggang Section, Dongshen Road, Fenggang Town, DongGuan City, Guang Dong Province, P.R. China.Zip Code: 523703

2.2 MANUFACTURER

Name:	Key Technology (China) Limited
Address:	Floor 7, Building S8, Fenggang Tianan Cyber Park, No. 208 Fenggang Section, Dongshen Road, Fenggang Town, DongGuan City, Guang Dong Province, P.R. China.Zip Code: 523703

2.3 THE HEAD OFFICE OF THE APPLICANT

Name:	Key Technology (China) Limited
Address:	B703, Building 1, Tianan Cyber Park, Huang Ge North Rd, Longcheng Subdistrict, Long Gang District, ShenZhen, Guang Dong, P.R.China. Zip Code: 518172

2.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment:	IEC60945 keyboard and mouse mouse
Model No.:	K-TEK-M440-OTB-FN-BL-NV-EMC-DWP
Trade Name:	/
Test Power Supply:	Adapter input port for auxiliary laptop: AC 220V/50Hz Auxiliary laptop USB output port to EUT: DC 5V
Sample submitting way:	■Provided by customer □Sampling
Laboratory sample No.:	E202201244425-0001
Note:	/

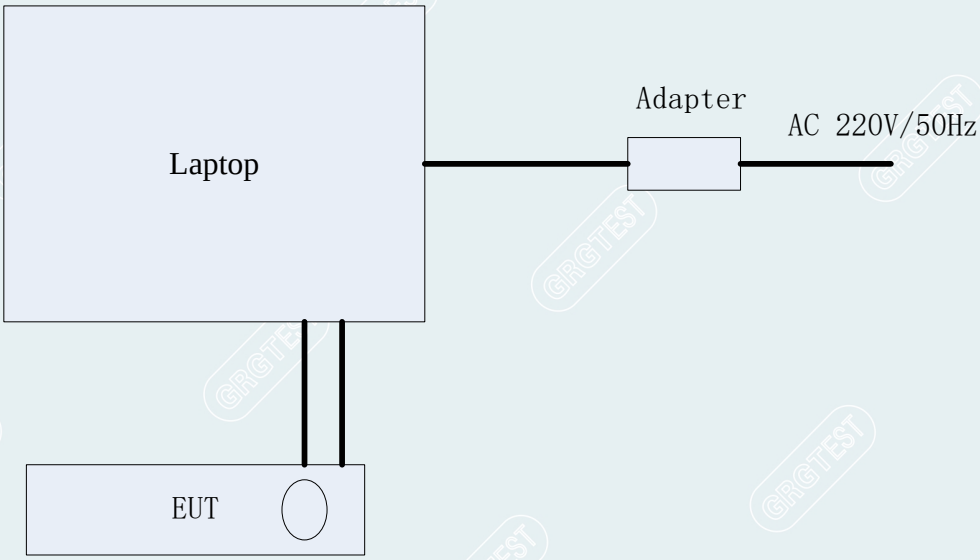
2.5 TEST MODE

Mode No.	Description of the modes
Mode 1	The EUT is connected to the laptop and works normally; On the word document of the laptop, the keyboard input function and the mouse control function of the EUT are monitored normally.

2.6 PERFORMANCE MONITORING METHOD

monitor method	Description of monitoring method
1	Visual the display of the laptop, the keyboard input function and the mouse control function of the EUT are monitored normally.

2.7 SAMPLE CONNECTION DIAGRAM



2.8 LIST OF AUXILIARY EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Note
Laptop	DELL	Latitude3400	BHZBMW2	/
Adapter	DELL	/	/	/

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3. LABORATORY

The tests & measurements refer to this report were performed by GuangzhouEMC Laboratory of Guangzhou GRG Metrology & Test Co.,Ltd.

Add : No.163,Pingyun Road,WestofHuangpu Avenue,Guangzhou,Guangdong, China.

P.C. : 510656

Tel : 020-38699960

Fax : 020-38696680

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4. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement		Frequency	Uncertainty
Conducted Emission(CE)		9 kHz ~ 150 kHz	3.3 dB
		150 kHz ~ 30 MHz	3.4 dB
Radiated emissions from enclosure port(RE)	Horizontal	30 MHz ~ 1000 MHz	4.4 dB
	Vertical	30 MHz ~ 1000 MHz	4.5 dB
	Horizontal	1000 MHz ~ 6000MHz	5.7 dB
	Vertical	1000 MHz ~ 6000 MHz	5.7 dB
Immunity to Electrostatic Discharge(ESD)		/	1)
Immunity to radiated radiofrequencies (RS)		/	1)
Immunity to fast transients (EFT)		/	1)
Immunity to surges		/	1)
Immunity to conducted radio frequency disturbance (CS)		/	1)
Power Supply Failure		/	1)
Compass safe distance		/	1)

1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% .
This uncertainty represents an expanded uncertainty factor of k=2.

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5. LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Conducted Emission Measurement				
Shielded room	ETS	RFD-100	3728	2022-09-19
L.I.S.N	SCHWARZBECK	NSLK 8127	8127450	2022-04-11
EMI testing software	FALA	EZ_EMC	1.1.4.2	/
EMI Receiver	ROHDE&SCHWARZ	ESR26	101758	2022-11-02
Radiated Electromagnetic Disturbance Measurement				
EMI Receiver	ROHDE&SCHWARZ	ESW8	101360	2022-09-01
Composite antenna	SCHWARZBECK	VULB 9168	01303	2022-08-20
Horn antenna	SCHWARZBECK	BBHA 9120 D	752	2022-09-28
Loop antenna	ROHDE&SCHWARZ	HFH2-Z2E	4110.2002.02-100968-JM	2022-08-20
Semi-anechoic chamber	ETS	966(RFD-F/A-100)	3730	2022-09-19
EMI testing software	FALA	EZ_EMC	1.1.4.2	/
Preamplifier	SCHWARZBECK	BBV 9718 C	00073	2022-07-27
Electrostatic Discharge (ESD)				
ESD generator	EMTEST	esd NX30.1	11837	2022-04-14
Radiated Radio-Frequency Electromagnetic Field (RS)				
Log-periodic antenna	SCHWARZBECK	STLP 9128 E	#174	2022-10-14
Signal generator	Agilent	N5171B-501	MY53050042	2022-05-10
Amplifier	rflight	NTWPA-0081020001000E	19103302	2022-11-07
Horn antenna	SCHWARZBECK	BBHA 9120 E	318	2023-02-14
Semi-anechoic chamber	SAEMC	ALSE965	GRGTEMC2013001	2022-09-19
Power probe	Agilent	N1912A	MY53160011	2022-08-12
Power probe	Agilent	N1914A	MY53160018	2022-05-13
Signal generator	Agilent	N5183A-540	MY50142096	2022-09-13
Amplifier	rflight	NTWPA-2560250	12083134	2022-06-28
Amplifier	rflight	NTWPA-1025250P	19103305	2022-11-07
EMS testing software	AR	emcwarre	3.8.4	/
Electrical Fast Transient/Burst Immunity Test (EFT)				
EFT Generator	EMC PARTNER	TRA2000	853	2022-09-14
Surge Immunity Test				
Surge Generator	EMC PARTNER	TRA2000	852	2022-09-14
Injected Currents Susceptibility Test				
Power probe	ROHDE&SCHWARZ	NRP6A	101566	2022-05-12

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Power probe	ROHDE&SCHWARZ	NRP6A	101567	2022-05-12
Signal generator	ROHDE&SCHWARZ	SMC 100A	106757	2023-03-01
CDN	Frankonia	CDN-M2+3	A2210394	2022-08-05
EMS testing software	ROHDE&SCHWARZ	EMC 32	10.30	/
Amplifier	rflight	NTWPA- 4k04100	19073201	2023-01-02
Power Supply Failure				
Programmable Power Supply	California lnstruments	5001 ix	57549、57550、57551	2023-02-09
Testing software	California lnstruments	CIGuiSII	3.02	/
Compass Safe Distance				
Hand-held single component Magnetometer	Shanghai Maritime University	9200D	CCXT-15-5D	2022-11-17
Tape measure	BOSI	20m	BS2009	2022-09-17
Magnetic field generator	Shanghai TinDun	GMMF1000	TD85103	2023-02-10
Programmable Power Supply	California lnstruments	5001 ix	57549、57550、57551	2023-02-09

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6. EMISSION TEST

6.1 CONDUCTED EMISSION MEASUREMENT

6.1.1 LIMITS

Frequency range (MHz)	Limits (dBμV) Quasi-peak
0.01~0.15	96~50
0.15~0.35	60~50
0.35~30	50

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

(2) The limit decreases in line with the logarithm of the frequency in the range of 0.01MHz~0.15MHz and 0.15MHz~0.35MHz.

6.1.2 TEST PROCEDURES

Set the bandwidth of receiver

Frequency (MHz)	Receiver Bandwidth(Hz)
0.01~0.15	200
0.15~0.35	9k
0.35~30	9k

6.1.3 EXPERIMENT PROCEDURE

1) The EUT should be placed on a non-metallic table top with a table height of 0.8m.
2) The EUT should be 0.4m from the vertical reference ground plane.
3) The distance between the EUT and the artificial power network is 0.8m. If the power cable provided by the manufacturer is longer than 1 m, fold it back and forth in the middle of the cable to form a 1 m long cable with a folding length of no more than 0.4 m.
4) The distance between all units of the system under test (including the EUT and peripherals, auxiliary equipment or devices connected to the EUT) is 0.1 m. The cable between the units hangs from the edge of the test table. The distance between the drooping cable and the horizontal grounding plate is less than 0.4 m. The long part of the cable is folded back and forth at its center and bundled into a wire harness of no more than 0.4 m in a figure-eight manner. It is at least 0.4 m above the horizontal reference ground plane.
5) Perform interference voltage test on the neutral and phase lines of the EUT power supply.

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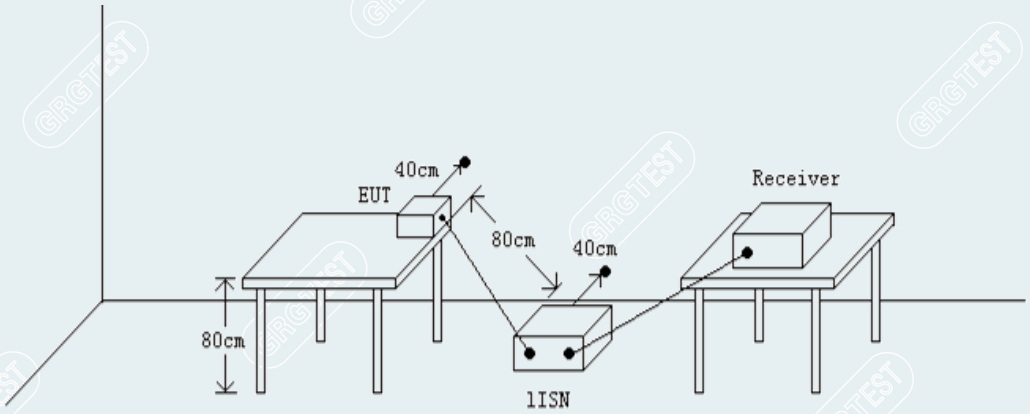
6.1.4 TEST SETUP



6.1.5 PHOTOGRAPH OF THE TEST ARRANGEMENT

Test setup

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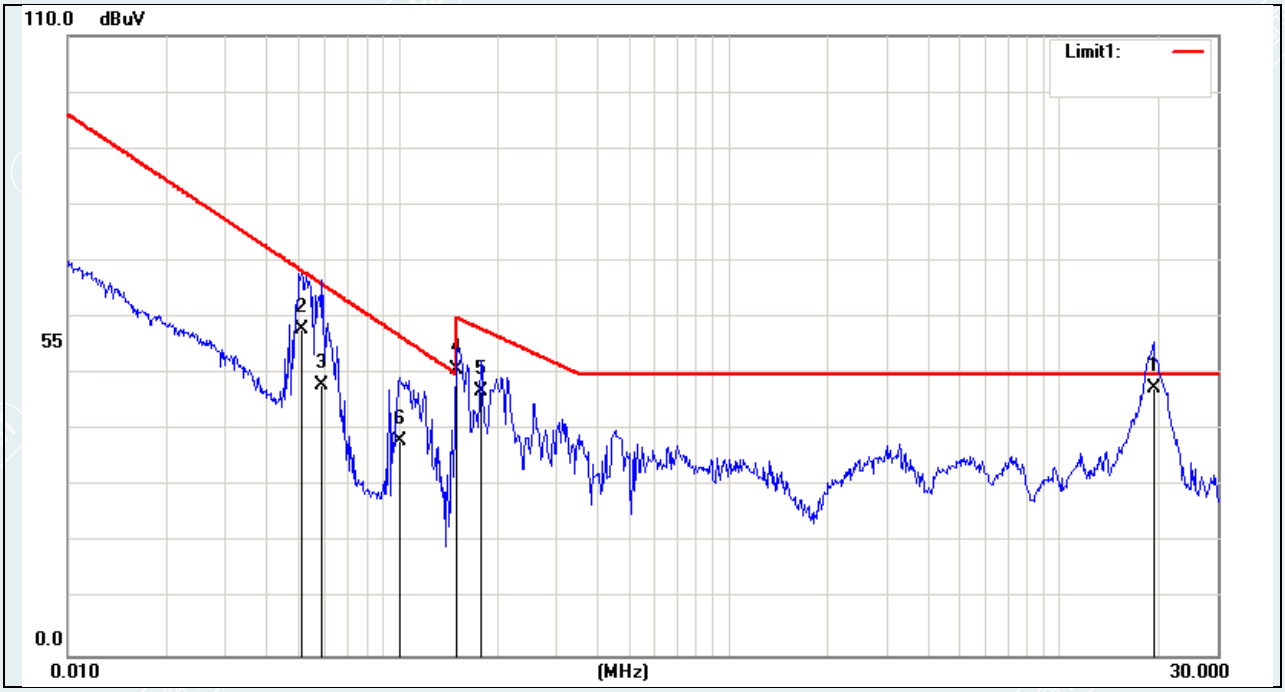
6.1.6 TEST RESULTS

Test Result:	**Pass**	**Probe:**	**L**
Standard:	**IEC 60945:2002**	**Power Source:**	**AC 220V/50Hz**
Test item:	**Conducted Emission**	**Date:**	**2022-03-08**
Temp./Hum.(%RH):	**25.9℃/48%RH**	**Mode**	**Mode 1**
EUT:	**IEC60945 keyboard and mouse**	**Test by**	**Rongde xie**
Model:	**K-TEK-M440-OTB-FN-BL-NV-EM C-DWP**		
Note:	/		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	19.2501	36.02	11.48	47.50	50.00	-2.50	QP
2	0.0510	47.42	10.38	57.80	68.32	-10.52	QP
3	0.0590	37.55	10.35	47.90	65.84	-17.94	QP
4	0.1501	40.49	10.21	50.70	59.98	-9.28	QP
5	0.1781	36.60	10.30	46.90	57.97	-11.07	QP
6	0.1008	27.65	10.35	38.00	56.74	-18.74	QP

NOTE: Result = Reading + Correction factor

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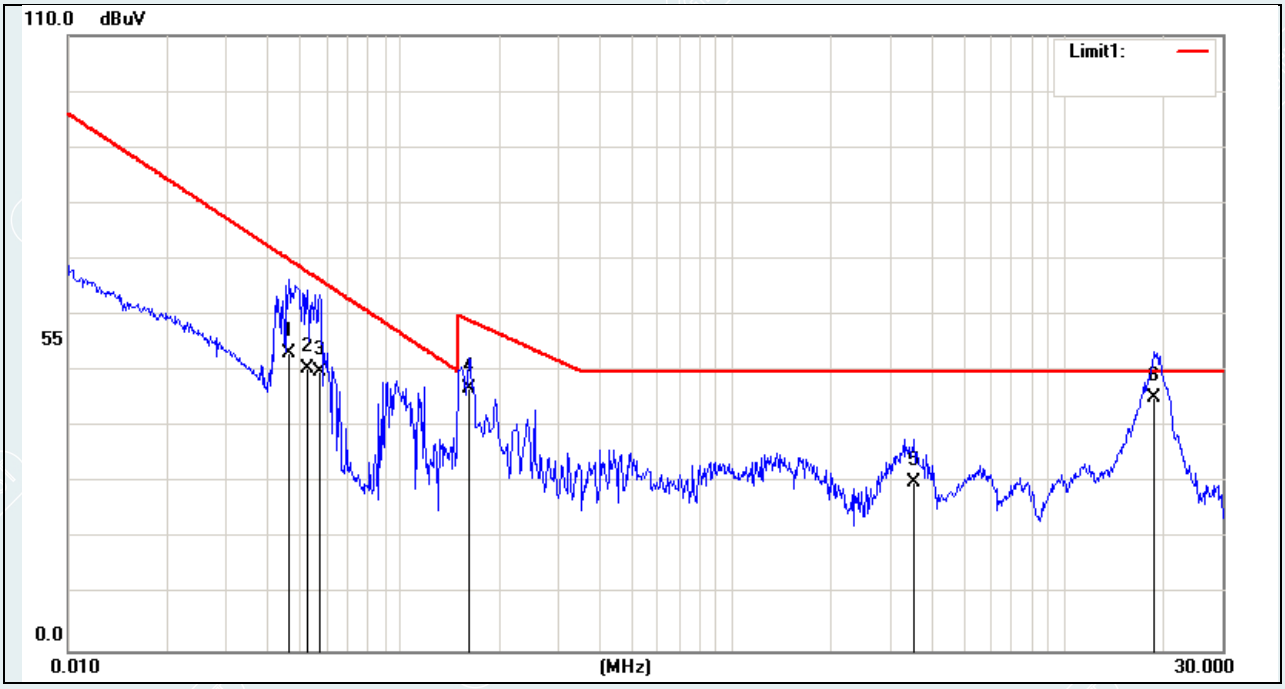
Test Result:	Pass	Probe:	N
Standard:	IEC 60945:2002	Power Source:	AC 220V/50Hz
Test item:	Conducted Emission	Date:	2022-03-08
Temp./Hum.(%RH):	25.9℃/48%RH	Mode	Mode 1
EUT:	IEC60945 keyboard and mouse	Test by	Rongde xie
Model:	K-TEK-M440-OTB-FN-BL-NV-EMC-DWP		
Note:	/		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.0465	42.84	10.36	53.20	69.89	-16.69	QP
2	0.0526	40.09	10.31	50.40	67.79	-17.39	QP
3	0.0575	39.50	10.30	49.80	66.28	-16.48	QP
4	0.1621	36.76	10.24	47.00	59.08	-12.08	QP
5	3.5581	19.80	10.40	30.20	50.00	-19.80	QP
6	18.5901	34.01	11.29	45.30	50.00	-4.70	QP

NOTE: Result = Reading + Correction factor

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6.2 RADIATED ELECTROMAGNETIC DISTURBANCE MEASUREMENT

6.2.1 LIMITS

0.15MHz~1000MHz:

FREQUENCY (MHz)	QP Limits (3m) dB（μV/m）
0.15~0.3	80~52
0.3~30	52~34
30~1000	54
156~165	24

1000MHz~6000MHz:

FREQUENCY (MHz)	AVG Limits (3m) dB（μV/m）
1000~6000	54

NOTE: (1) The lower limit shall apply at the transition frequencies.
(2) The limit decreases in line with the logarithm of the frequency in the range of 150kHz to 0.3MHz and 0.3MHz to 30MHz.

6.2.2 TEST PROCEDURE

Set the bandwidth of receiver

Frequency(MHz)	Bandwidth kHz
0.15~30	9
30~156	120
156~165	9
165~1000	120
1000~6000	1000

6.2.3 EXPERIMENT PROCEDURE

1) The radiated disturbance test is carried out in a semi-anechoic chamber, and the distance between the EUT and the receiving antenna is 3 m.

2) The EUT should be placed on a non-metallic table top with a table height of 0.8 m. The power cable hangs down to the reference ground plane and is then connected to a power outlet.

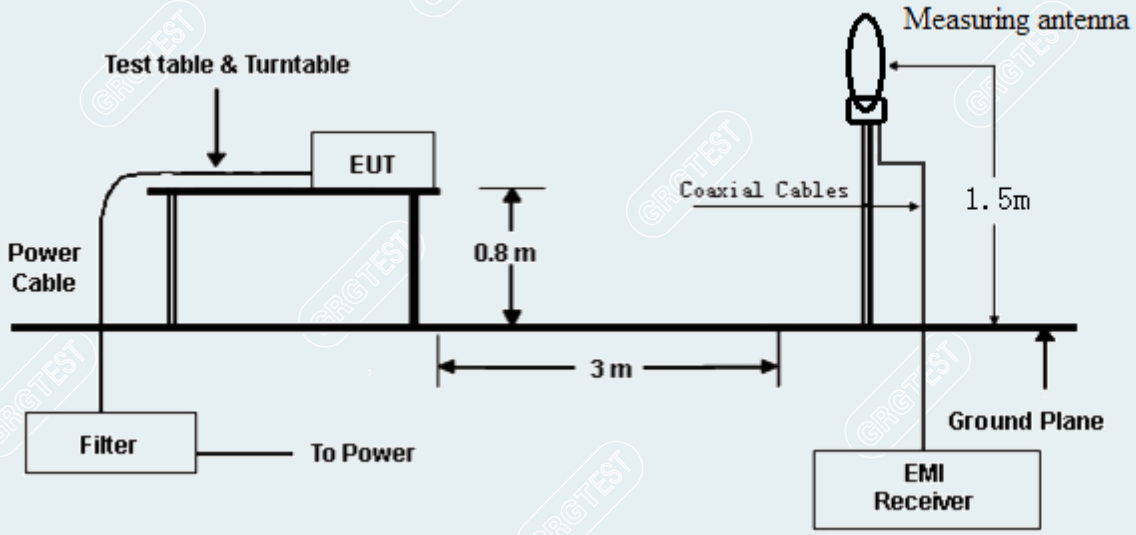
3) The distance between all units of the system under test (including the EUT and peripherals, auxiliary equipment or devices connected to the EUT) is 0.1 m. The cable between the units hangs from the edge of the test table. The distance between the drooping cable and the horizontal grounding plate is less than 0.4 m. The long part of the cable is folded back and forth at its center and bundled into a wire harness of no more than 0.4 m in a figure-eight manner. It is at least 0.4 m above the horizontal reference ground plane.

4) At each test frequency, the antenna adjusts the height of the antenna within the range of 1m~4m above the ground plane (the antenna height is fixed at 1.5m when the loop antenna is tested from 150kHz to 30MHz) to obtain the maximum indication value.

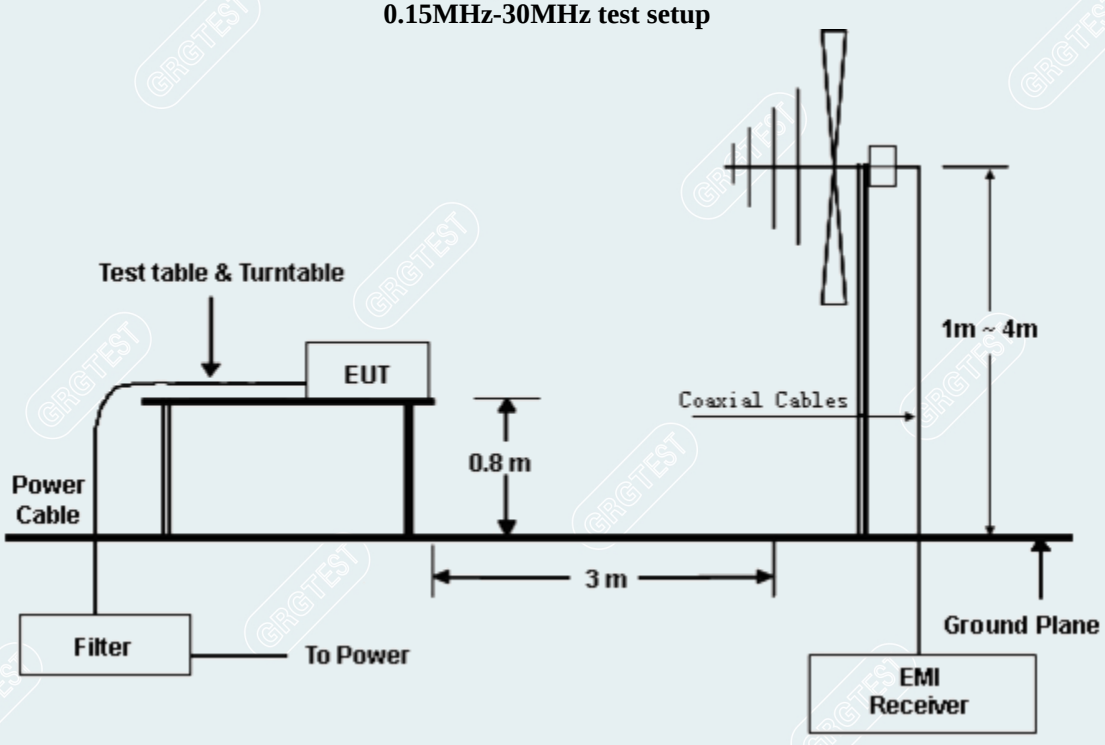
5) Turn the turret 360 ° and change the azimuth between the antenna and the EUT to find the maximum field strength reading.

6) The EUT shall be tested under horizontal and vertical polarization of the antenna (except for loop antennas).

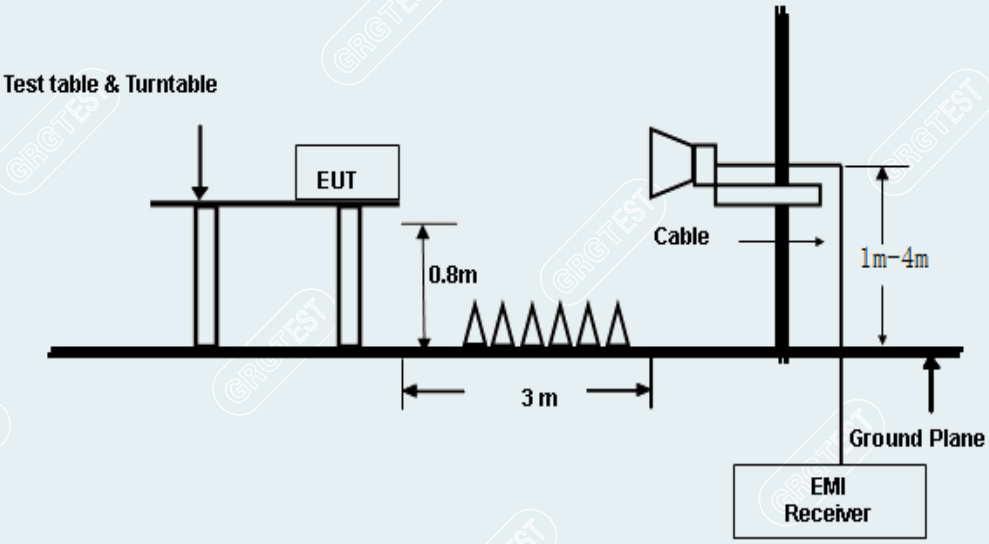
6.2.4 TEST SETUP



0.15MHz-30MHz test setup



30MHz-1000MHz test setup



1000MHz-6000MHz test setup

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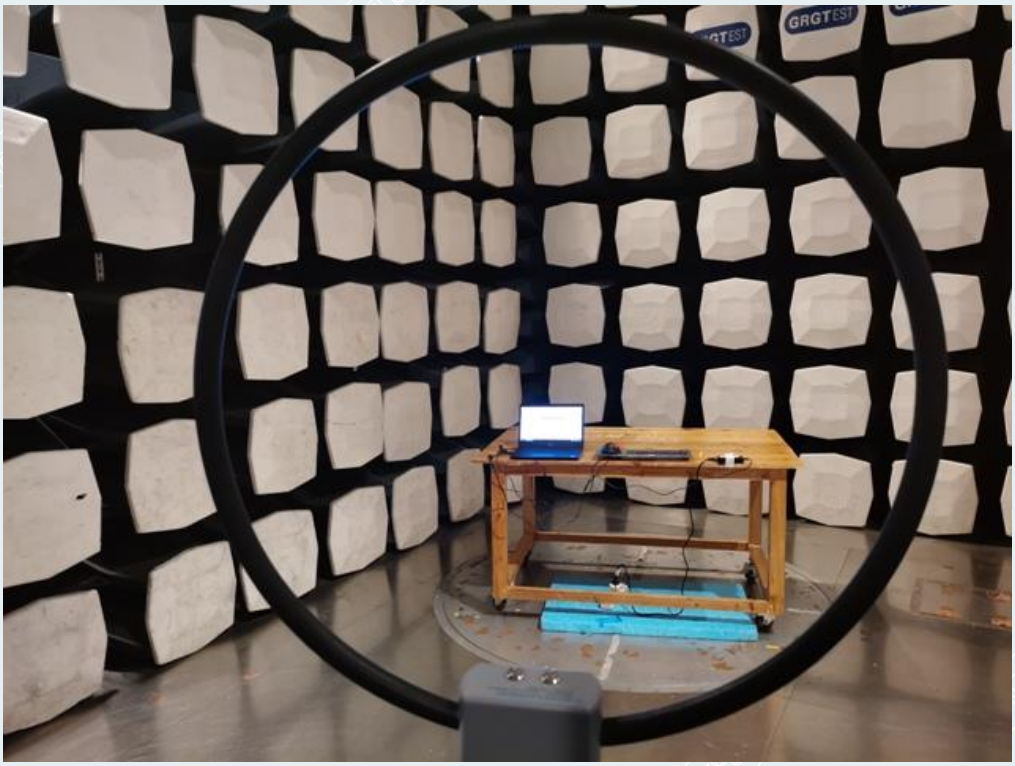
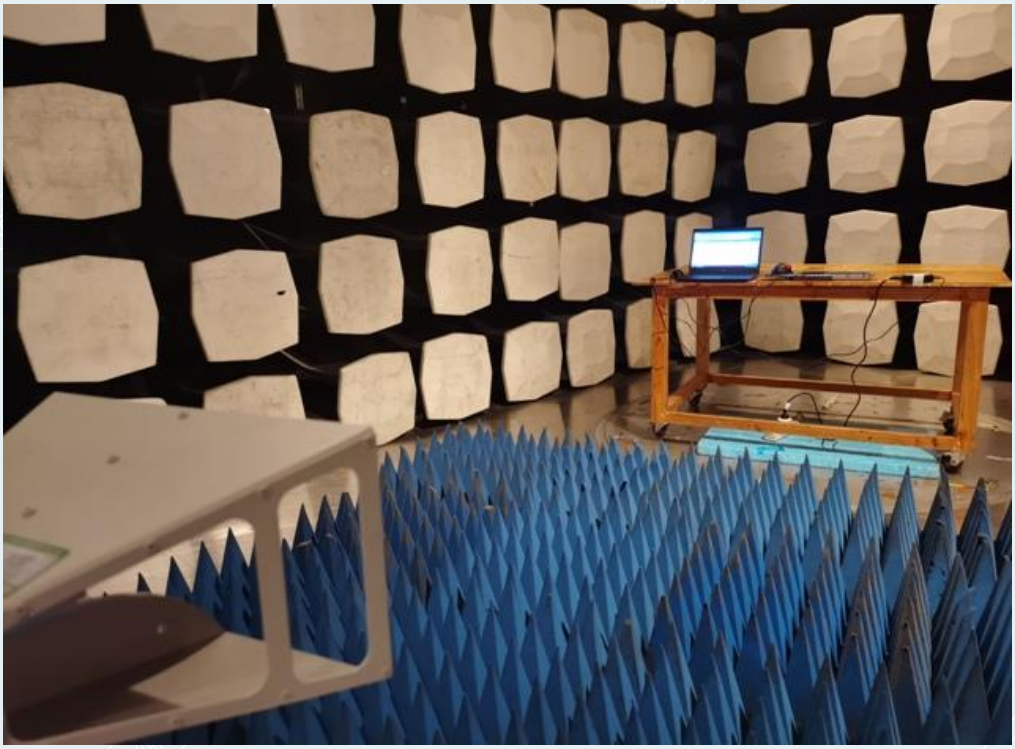
6.2.5 PHOTOGRAPH OF THE TEST ARRANGEMENT



0.15MHz-30MHz Test setup

30MHz-1000MHz Test setup



1000MHz-6000MHz Test setup

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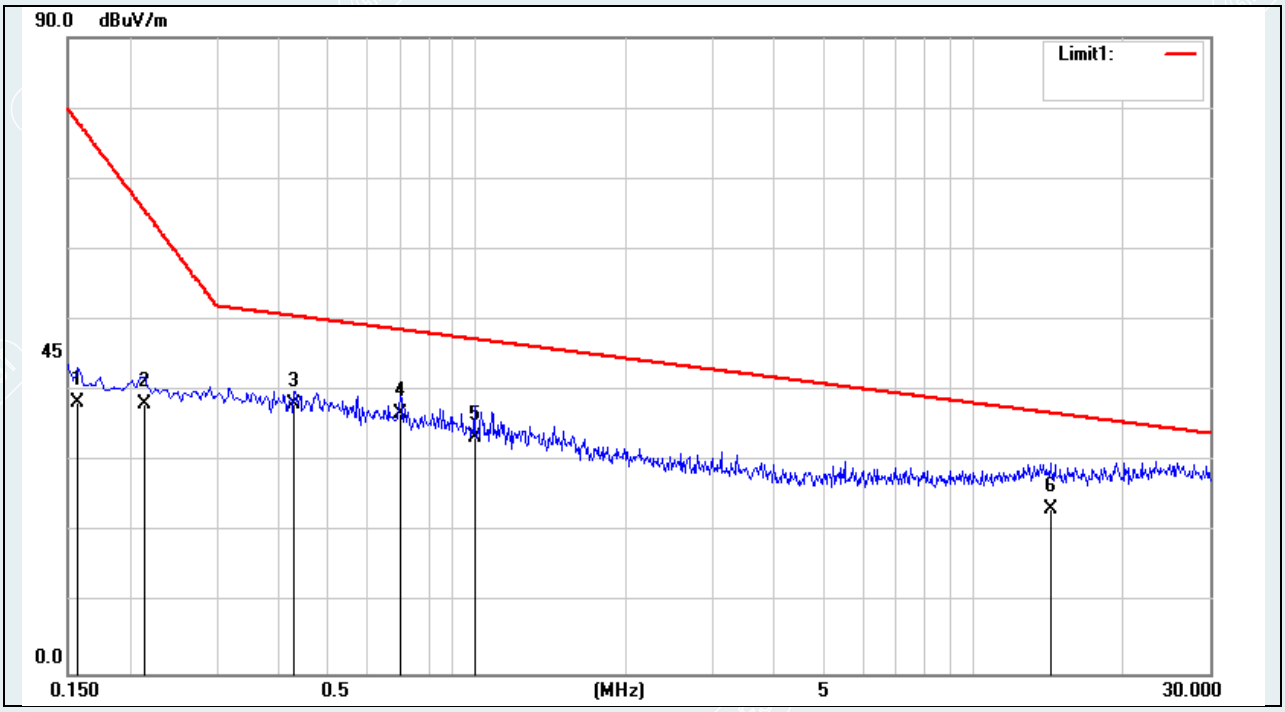
6.2.6 TEST RESULTS

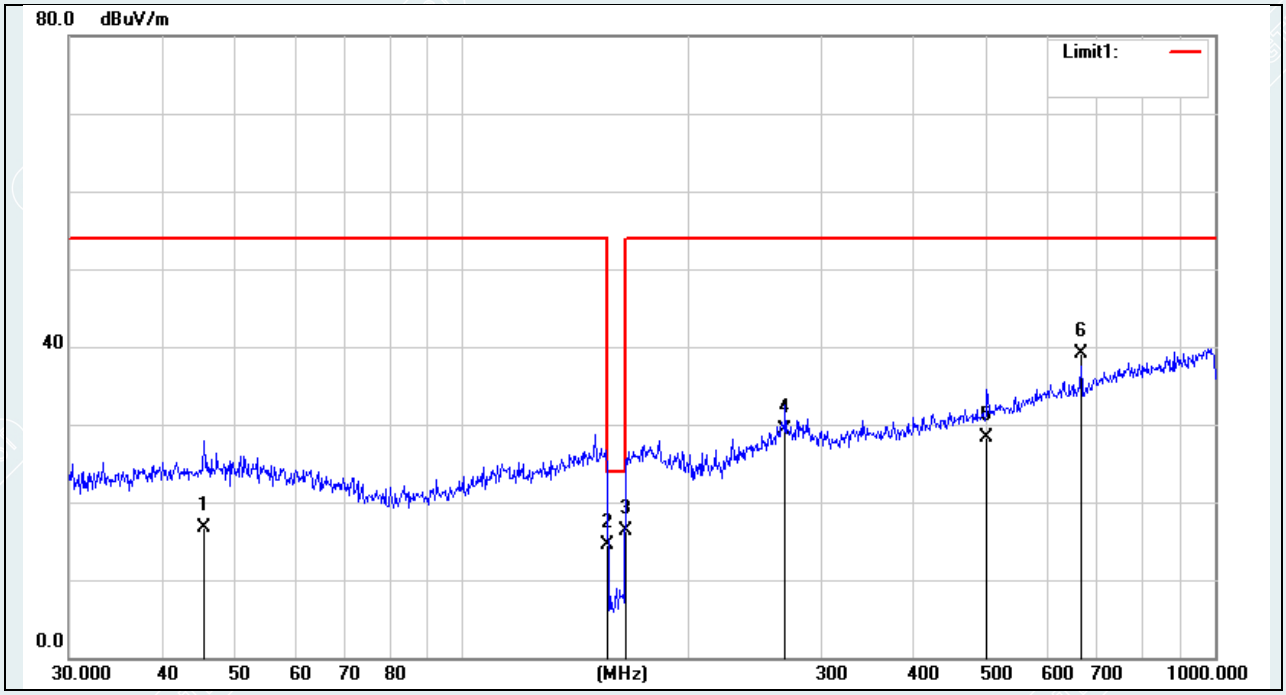
Test Result:	Pass	Probe:	Vertical
Standard:	IEC 60945:2002	Power Source:	AC 220V/50Hz
Test item:	Radiated emissions from enclosure port	Date:	2022-3-9
Temp./Hum.(%RH):	22.2℃/48%RH	Distance:	3m
EUT:	IEC60945 keyboard and mouse	Mode	Mode 1
Model:	K-TEK-M440-OTB-FN-BL-NV-EMC-DWP	Test by	Rongde xie
Note:	/		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1580	18.33	20.07	38.40	77.88	-39.48	QP
2	0.2140	18.15	20.05	38.20	65.63	-27.43	QP
3	0.4300	18.13	19.97	38.10	50.59	-12.49	QP
4	0.7019	16.63	20.17	36.80	48.68	-11.88	QP
5	0.9900	12.72	20.68	33.40	47.33	-13.93	QP
6	14.3340	2.71	20.69	23.40	36.89	-13.49	QP

NOTE: Result = Reading + Correction factor

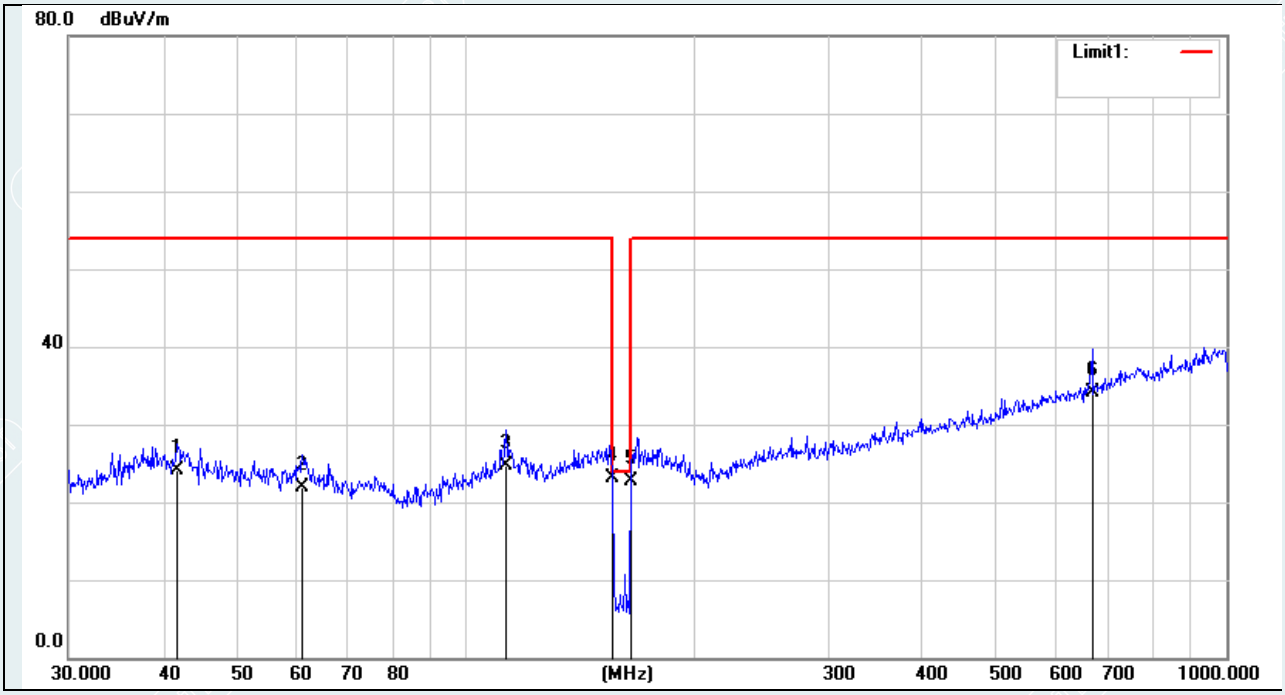
Test Result:	Pass	Probe:	Horizontal
Standard:	IEC 60945:2002	Power Source:	AC 220V/50Hz
Test item:	Radiated emissions from enclosure port	Date:	2022-3-9
Temp./Hum.(%RH):	22.2℃/48%RH	Distance:	3m
EUT:	IEC60945 keyboard and mouse	Mode	Mode 1
Model:	K-TEK-M440-OTB-FN-BL-NV-EMC-DWP	Test by	Rongde xie
Note:	/		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	45.4000	3.05	13.65	16.70	54.00	-37.30	QP
2	156.0000	0.35	14.25	14.60	24.00	-9.40	QP
3	165.0000	2.22	14.08	16.30	24.00	-7.70	QP
4	268.7640	14.97	14.33	29.30	54.00	-24.70	QP
5	498.5640	9.46	18.84	28.30	54.00	-25.70	QP
6	663.6840	17.67	21.53	39.20	54.00	-14.80	QP

NOTE: Result = Reading + Correction factor

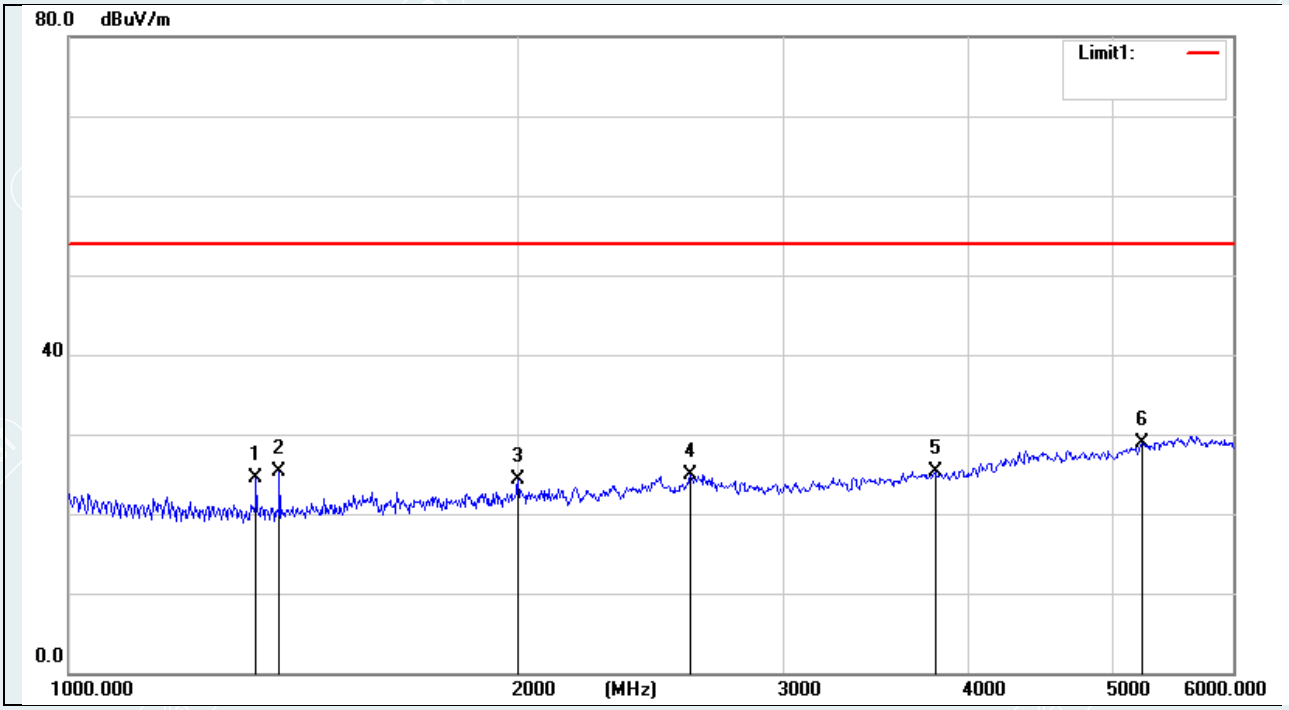
Test Result:	Pass	Probe:	Vertical
Standard:	IEC 60945:2002	Power Source:	AC 220V/50Hz
Test item:	Radiated emissions from enclosure port	Date:	2022-3-9
Temp./Hum.(%RH):	22.2℃/48%RH	Distance:	3m
EUT:	IEC60945 keyboard and mouse	Mode	Mode 1
Model:	K-TEK-M440-OTB-FN-BL-NV-EMC-DWP	Test by	Rongde xie
Note:	/		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	41.8000	10.56	13.64	24.20	54.00	-29.80	QP
2	61.0000	9.46	12.54	22.00	54.00	-32.00	QP
3	112.9200	12.43	12.27	24.70	54.00	-29.30	QP
4	156.0000	8.95	14.25	23.20	24.00	-0.80	QP
5	165.0000	8.62	14.08	22.70	24.00	-1.30	QP
6	666.4440	12.50	21.60	34.10	54.00	-19.90	QP

NOTE: Result = Reading + Correction factor

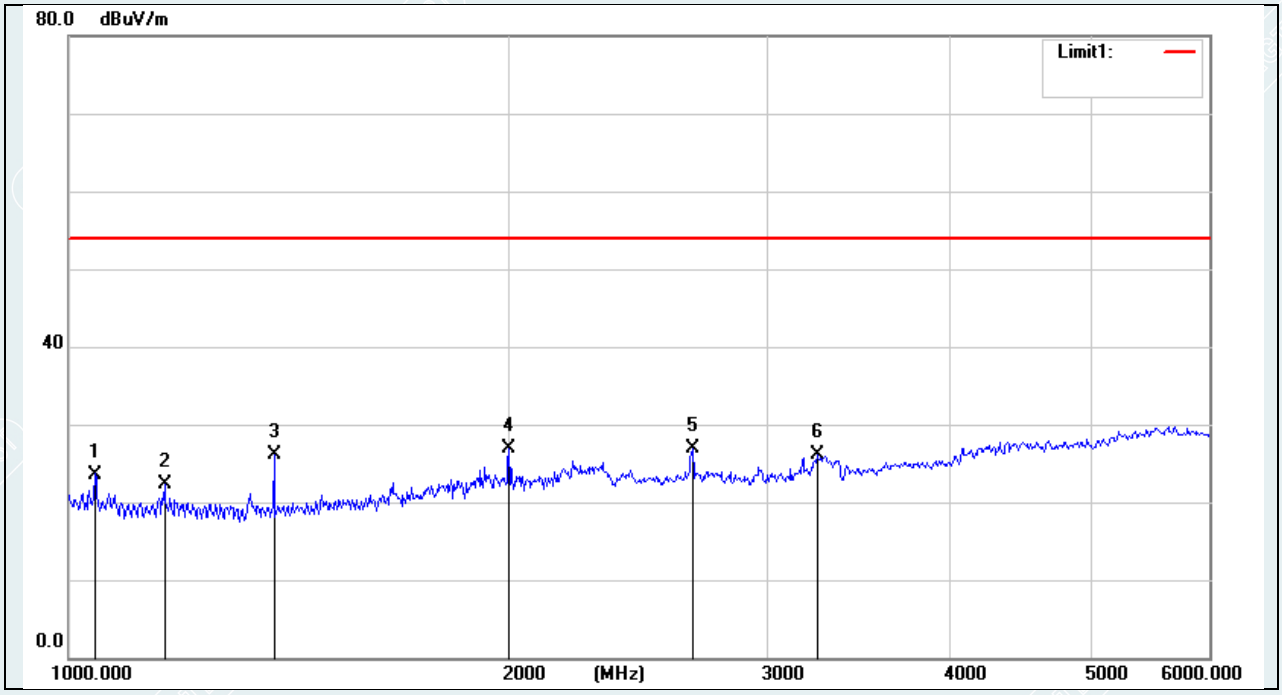
Test Result:	Pass	Probe:	Horizontal
Standard:	IEC 60945:2002	Power Source:	AC 220V/50Hz
Test item:	Radiated emissions from enclosure port	Date:	2022-3-9
Temp./Hum.(%RH):	22.2℃/48%RH	Distance:	3m
EUT:	IEC60945 keyboard and mouse	Mode	Mode 1
Model:	K-TEK-M440-OTB-FN-BL-NV-EMC-DWP	Test by	Rongde xie
Note:	/		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1335.200	34.00	-9.45	24.55	54.00	-29.45	AVG
2	1384.400	34.69	-9.34	25.35	54.00	-28.65	AVG
3	1997.600	30.11	-5.81	24.30	54.00	-29.70	AVG
4	2607.600	29.15	-4.29	24.86	54.00	-29.14	AVG
5	3792.800	26.48	-1.25	25.23	54.00	-28.77	AVG
6	5217.600	26.91	1.92	28.83	54.00	-25.17	AVG

NOTE: Result = Reading + Correction factor

Test Result:	Pass	Probe:	Vertical
Standard:	IEC 60945:2002	Power Source:	AC 220V/50Hz
Test item:	Radiated emissions from enclosure port	Date:	2022-3-9
Temp./Hum.(%RH):	22.2℃/48%RH	Distance:	3m
EUT:	IEC60945 keyboard and mouse	Mode	Mode 1
Model:	K-TEK-M440-OTB-FN-BL-NV-EMC-DWP	Test by	Rongde xie
Note:	/		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1042.400	35.36	-11.76	23.60	54.00	-30.40	AVG
2	1162.800	33.55	-11.34	22.21	54.00	-31.79	AVG
3	1382.000	36.66	-10.47	26.19	54.00	-27.81	AVG
4	1999.200	33.20	-6.30	26.90	54.00	-27.10	AVG
5	2666.400	31.15	-4.33	26.82	54.00	-27.18	AVG
6	3244.400	28.77	-2.63	26.14	54.00	-27.86	AVG

NOTE: Result = Reading + Correction factor

7. IMMUNITY TEST

7.1 GENERAL DESCRIPTION

Basic Standard	IEC 60945:2002	
	Test Type	**Level Requirement**
IEC 61000-4-2:2008	Electrostatic Discharge (ESD)	Contact: ±6kV Air: ±8kV Performance Criterion: B
IEC 61000-4-3:2010	Radiated Radio-Frequency Electromagnetic Field (RS)	IACS UR E10 Rev.7: 80MHz-6GHz ,10V/m 80%AM(400Hz) Performance Criterion: A
IEC 61000-4-4:2012	Electrical Fast Transient/Burst Immunity Test	AC port: ±2kV Impulse Frequency: 2.5kHz Duration time: 5min performance criterion: B
IEC 61000-4-5:2014+AMD1: 2017	Surge Immunity Test	AC port: line to line: ±0.5kV line to ground: ±1kV Performance Criterion: B
IEC 61000-4-6:2013	Injected Currents Susceptibility Test	0.15 MHz -80MHz, 80%AM(400Hz) AC port:3Vr.m.s. Designated frequency point (MHz)，2,3,4,6.2, 8.2,12.6,16.5,18.8,22,25, 80%AM(400Hz) AC port: 10Vr.m.s. Performance Criterion: A
IEC 61000-4-11:2020	Power Supply Failure	Power outage duration:60s Repeat times:3 times Performance Criterion: C

---------- The following blanks ----------

7.2 GENERAL PERFORMANCE CRITERIA DESCRIPTION

Criteria A	During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT 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 EUT if used as intended.
Criteria B	After the test, the EUT 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 EUT is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. 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 EUT if used as intended.
Criteria C	During and after testing, a temporary loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

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7.3 ELECTROSTATIC DISCHARGE (ESD)

7.3.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-2:2008
Discharge Impedance	330 ohm / 150 pF
Discharge Voltage	Contact Discharge : ±6 kV Air Discharge : ±8 kV
Polarity	Positive & Negative
Number of Discharge	Minimum 10 times at each test point
Discharge Mode	Single Discharge 1 second

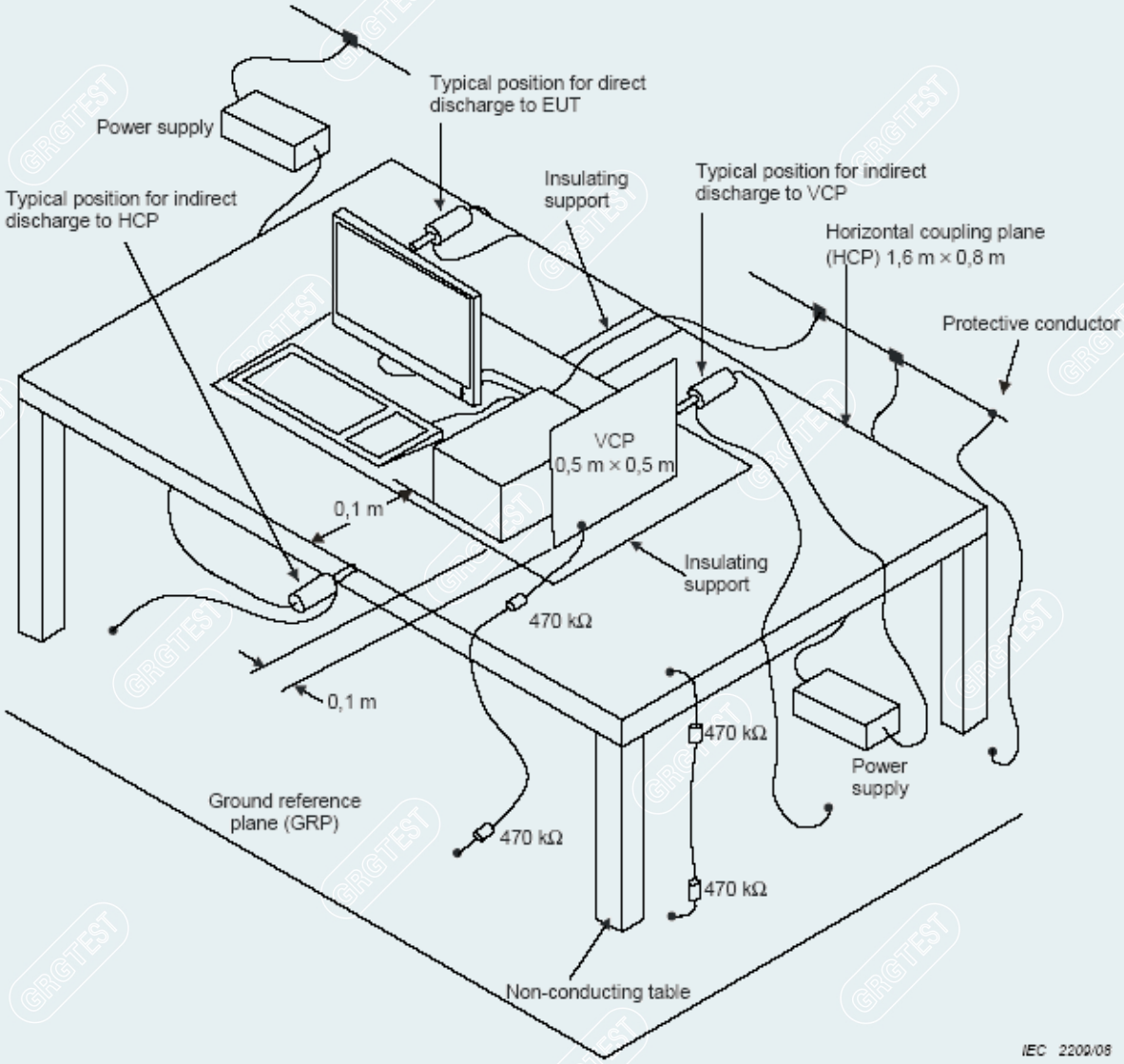
7.3.2 TEST PROCEDURE

The basic test procedure was in accordance with IEC 61000-4-2:

1) EUT is a desktop device, which is placed on a wooden table with a height of 0.8m, at least 0.1m from each side of the horizontal coupling plate (area 1.6m x 0.8m).
2) supporting units should be placed on another table with a distance of EUT30cm, but the direct supporting units should be placed on the same horizontal coupling plate with a distance of 10cm from EUT.
3) the time interval of 2 single discharges is 1 second.
4) in the case of air discharge, discharge electrode circle dateline should as soon as possible to close and to touch the test equipment (don't cause mechanical damage), every time after discharge, discharge electrode electrostatic discharge generator should be from the test equipment, and then to trigger generator, a new single discharge, the program should be repeated until complete discharge.
5) at least 10 single discharges (at the most sensitive polarity) were applied at the edge of the 0.1m horizontal coupling plate in front of the center point of each EUT unit. When discharging, the long axis of the discharge electrode should be in the plane of the horizontal coupling plate and perpendicular to its front edge.
6) apply at least 10 times of single discharge (in the most sensitive polarity) to the center of a vertical side of the vertical coupling plate, and place the 0.5m x 0.5m coupling plate parallel to EUT and keep a distance of 0.1m from it. The discharge should be applied on the coupling plate. By adjusting the position of the coupling plate, the four different positions of EUT are subjected to the discharge test.

---------- **The following blanks** ----------

7.3.3 TEST SETUP



---------- **The following blanks** ----------

7.3.4 PHOTOGRAPH OF THE TEST ARRANGEMENT

Test setup

---------- **The following blanks** ----------

7.3.5 TEST RESULTS

EUT Name:	IEC60945 keyboard and mouse	Model:	K-TEK-M440-OTB-FN-BL-NV-EMC-DWP
Environmental Conditions:	22.6℃/49%RH/101.1kPa	Test Mode:	Mode1
Power supply	AC 220V/50Hz	Tested By:	Rongde xie
Test Date:	2022-03-08	Sample No.	E202201244425-0001

Discharge point	Discharge voltage	Number of discharges	C-Contact A-Air	Required Performance	Actual performance	Result
Metal shell	±2kV、±4 kV、±6 kV	Each 10 times	C	B	A[1)]	Pass
Metal screw	±2kV、±4 kV、±6 kV	Each 10 times	C	B	A[1)]	Pass
Plastic shell	±2kV、±4 kV、±8 kV	Each 10 times	A	B	A[1)]	Pass
gap	±2kV、±4 kV、±8 kV	Each 10 times	A	B	A[1)]	Pass
Horizontal coupling plate	±2kV、±4 kV、±6 kV	Each 10 times	C	B	A[1)]	Pass
Vertical coupling plate	±2kV、±4 kV、±6 kV	Each 10 times	C	B	A[1)]	Pass
NOTE: [1)] Before, during, and after the test, the EUT is working normally, the keyboard input function and the mouse control function of the EUT are normal.						

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7.4 RADIATED RADIO-FREQUENCY ELECTROMAGNETIC FIELD (RS)

7.4.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-3:2010
Frequency Range	80 MHz ~6000 MHz
Field Strength	10V/m
Modulation	400Hz Sine Wave, 80%, AM Modulation
Frequency Step	1 % of preceding frequency value
Dwell time	1s
Polarity of Antenna	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.55m

7.4.2 TEST PROCEDURE

1) The test is carried out in a full anechoic chamber with a distance of 3 m from the EUT.

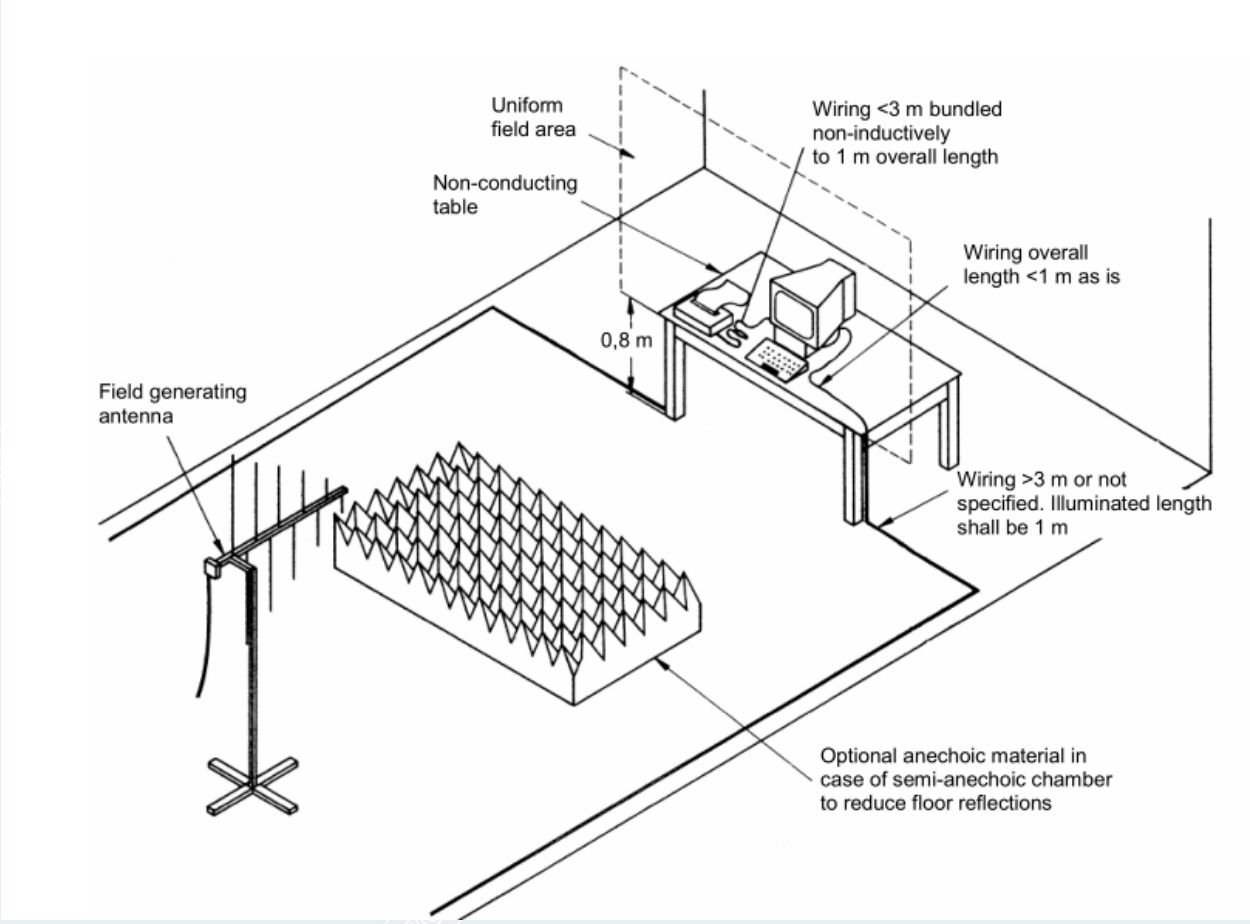
2) From the frequency range of 80MHz to 6000MHz, scan with a 400Hz, 80% amplitude modulated sine wave, the scan step is 1% of the previous frequency value. Should be scanned at a sufficiently low rate, the rate in the frequency range 80MHz to 1GHz should be ≤1.5 × 10-3 decades/s, and the rate in the frequency range 1GHz to 6GHz should be ≤0.5 × 10-3 decades/s, so that it can be found Test any malfunction of the equipment.

3) Test the 4 faces of the EUT under horizontal and vertical polarization.

4) If the manufacturer does not specify the connection cable of the equipment under test, an unshielded parallel conductor shall be used and the connection from the equipment under test shall be exposed to an electromagnetic field at a distance of 1 m.

---------- **The following blanks** ----------

7.4.3 TEST SETUP



NOTE:

TABLETOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

---------- **The following blanks** ----------

7.4.4 PHOTOGRAPH OF THE TEST ARRANGEMENT

80MHz-1000MHz test setup

1000MHz-6000MHz test setup

7.4.5 TEST RESULTS

EUT Name:	IEC60945 keyboard and mouse	Model:	K-TEK-M440-OTB-FN-BL-NV-EMC-DWP
Environmental Conditions:	22.6℃/49%RH/101.1kPa	Test Mode:	Mode1
Power supply	AC 220V/50Hz	Tested By:	Rongde xie
Test Date:	2022-03-10	Sample No.	E202201244425-0001

Frequency	Field Strength (V/m)	Polarity	Azimuth	Required Performance	Actual performance	Result
80MHz ~6000MHz	10V/m	V&H	Front	A	A [1)]	Pass
	10V/m	V&H	Left	A	A [1)]	Pass
	10V/m	V&H	Right	A	A [1)]	Pass
	10V/m	V&H	Rear	A	A [1)]	Pass
NOTE: [1)] Before, during, and after the test, the EUT is working normally, the keyboard input function and the mouse control function of the EUT are normal.						

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7.5 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

7.5.1 TEST SPECIFICATION

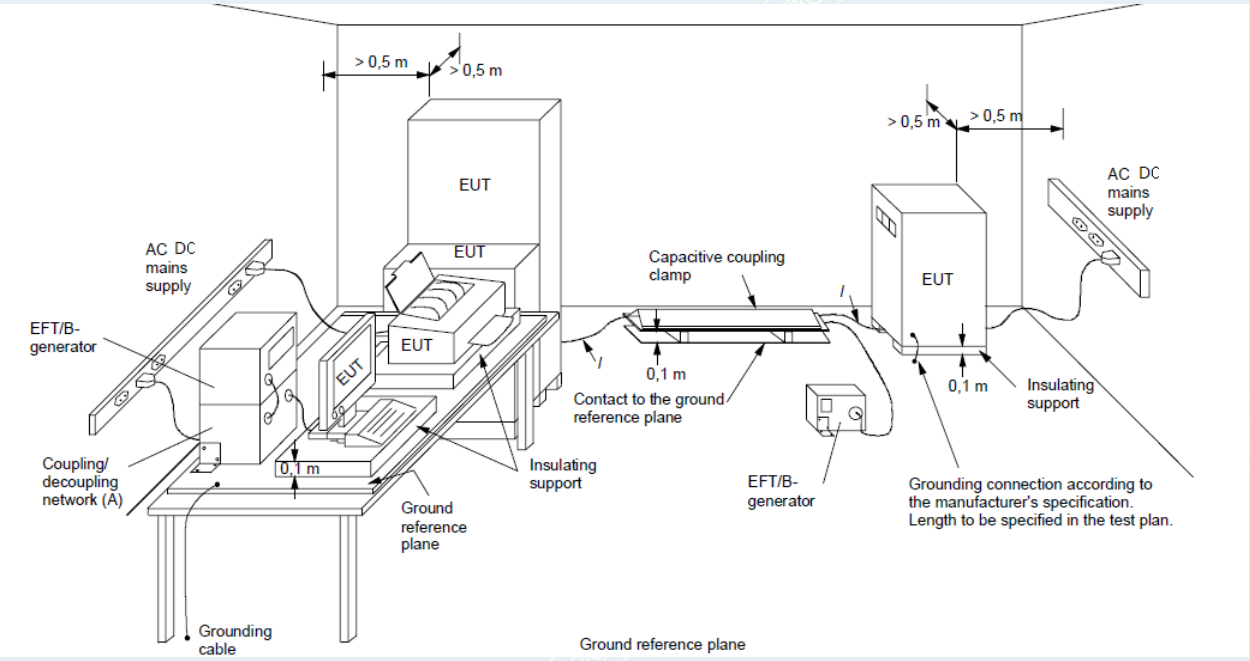
Basic Standard	IEC 61000-4-4:2012
Test Voltage	AC port: ±2kV
Polarity	Positive and Negative
Impulse Frequency	2.5 kHz
Impulse Wave-shape	5 ns/50ns
Burst Duration	15 ms
Burst Period	300 ms
Test Duration	5min.

7.5.2 TEST PROCEDURE

1) Test of the power port: The device under test is placed on an insulating plate with a height of 0.1 m on the ground plane. The distance from other conductors is greater than 0.5 m, the distance from the coupling device is 0.5 m, and the power cable is folded over 0.5 m. On the insulating plate. The test voltage is simultaneously applied to each of the wires of the power line.

2) The duration of each polarity test is 5 minutes.

7.5.3 TEST SETUP



NOTE:

TABLETOP EQUIPMENT

The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

7.5.4 PHOTOGRAPH OF THE TEST ARRANGEMENT

AC port

---------- The following blanks ----------

7.5.5 TEST RESULTS

EUT Name:	IEC60945 keyboard and mouse	Model:	K-TEK-M440-OTB-FN-BL-NV-EMC-DWP
Environmental Conditions:	22.6℃/49%RH/101.1kPa	Test Mode:	Mode1
Power supply	AC 220V/50Hz	Tested By:	Rongde xie
Test Date:	2022-03-08	Sample No.	E202201244425-0001

Test Point	Test level	Inject Time(ms)	Impulse Frequency	Inject method	Test Duration	Required Performance	Actual performance	Result
AC port	±2 kV	15/300	2.5kHz	Direct	5min	B	A[1)]	Pass
NOTE: [1)] Before, during, and after the test, the EUT is working normally, the keyboard input function and the mouse control function of the EUT are normal.								

---------- The following blanks ----------

7.6 SURGE IMMUNITY TEST

7.6.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-5:2014+AMD1:2017
Wave-Shape	Combination Wave 1.2/50 μs Open Circuit Voltage 8/20 μs Short Circuit Current
Test Voltage	AC port: line-line: ±0.5kV line to ground: ±1kV
Generator Source Impedance	AC power port: Line to line 2ohm; line to PE 12ohm
Polarity	Positive and Negative
Phase Angle	0 °90 °180 °270 °
Pulse Repetition Rate	1 minute
Number of Tests	5 times for each phase angel

7.6.2 TEST PROCEDURE

1) For EUT power supply:

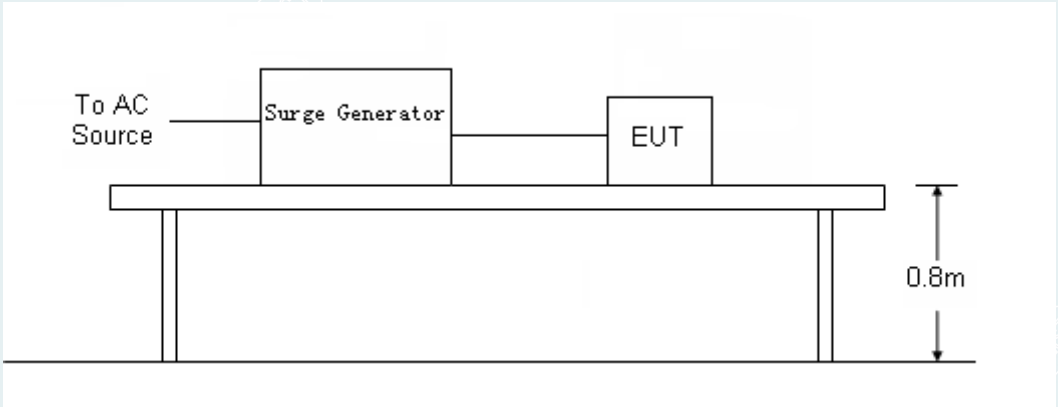
The surge is applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

2) For test applied to unshielded un-symmetrically operated interconnection lines of EUT:

The surge was applied to the lines via the capacitive coupling. The coupling / decoupling networks didn't influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

3) For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT.

7.6.3 TEST SETUP



7.6.4 PHOTOGRAPH OF THE TEST ARRANGEMENT

AC port

---------- The following blanks ----------

7.6.5 TEST RESULTS

EUT Name:	IEC60945 keyboard and mouse	Model:	K-TEK-M440-OTB-FN-BL-NV-EMC-DWP
Environmental Conditions:	22.8℃/50%RH/101.1kPa	Test Mode:	Mode1
Power supply	AC 220V/50Hz	Tested By:	Rongde xie
Test Date:	2022-03-08	Sample No.	E202201244425-0001

Test Point	Polarity	Phase	Test Level (kV)	Repeat the number	Required Performance	Actual performance	Result
AC port L-N	±	0 °	0.5	Each 5 times	B	A[1)]	Pass
	±	90 °	0.5	Each 5 times	B	A[1)]	Pass
	±	180 °	0.5	Each 5 times	B	A[1)]	Pass
	±	270 °	0.5	Each 5 times	B	A[1)]	Pass
AC port L-PE	±	0 °	0.5,1	Each 5 times	B	A[1)]	Pass
	±	90 °	0.5,1	Each 5 times	B	A[1)]	Pass
	±	180 °	0.5,1	Each 5 times	B	A[1)]	Pass
	±	270 °	0.5,1	Each 5 times	B	A[1)]	Pass
AC port N-PE	±	0 °	0.5,1	Each 5 times	B	A[1)]	Pass
	±	90 °	0.5,1	Each 5 times	B	A[1)]	Pass
	±	180 °	0.5,1	Each 5 times	B	A[1)]	Pass
	±	270 °	0.5,1	Each 5 times	B	A[1)]	Pass
NOTE: [1)] Before, during, and after the test, the EUT is working normally, the keyboard input function and the mouse control function of the EUT are normal.							

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7.7 INJECTED CURRENTS SUSCEPTIBILITY TEST

7.7.1 TEST SPECIFICATION

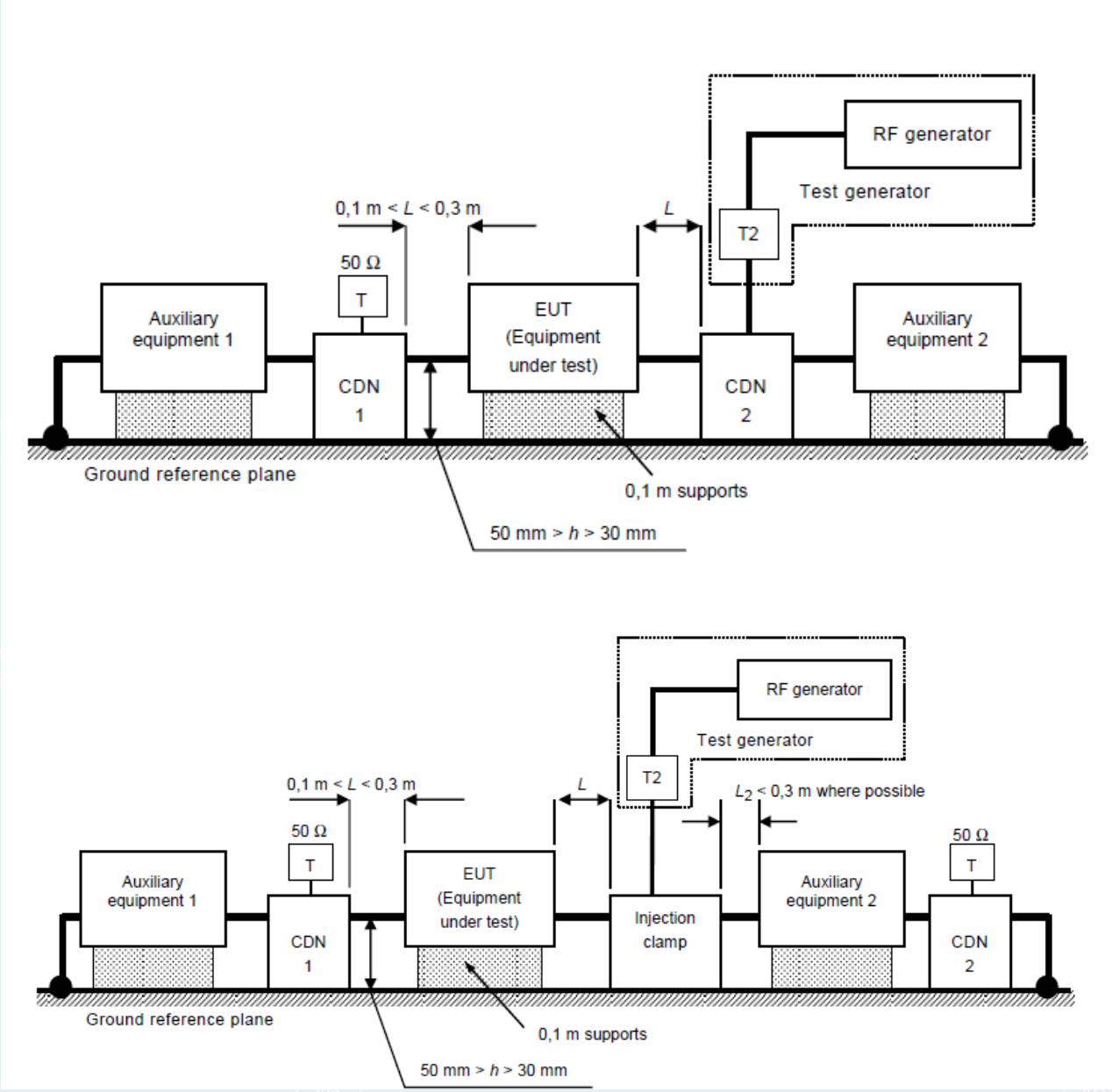
Basic Standard	IEC 61000-4-6:2013
Frequency Range	0.15 MHz～80 MHz Designated frequency point （MHz）:2,3,4,6.2,8.2,12.6,16.5, 18.8,22,25,
Field Strength	3V,the designated frequency point is 10V
Modulation	400Hz, 80% AM
Frequency Step	1% (Designated frequency point:/)
Dwell Time	1s(Designated frequency point: 3s)
Coupling device	CDN

7.7.2 TEST PROCEDURE

The EUT is tested under normal operating conditions and environmental conditions using a 400 Hz modulated sine wave signal in the frequency range of 150 kHz to 80 MHz and the specified frequency (MHz): 2, 3, 4, 6.2, 8.2, 12.6, 16.5, 18.8, 22,25 scanning, dwell time in the frequency range of 150 kHz to 80 MHz is 1 s, at the specified frequency (MHz): 2, 3, 4, 6.2, 8.2, 12.6, 16.5, 18.8, 22, 25 dwell time for 3s.

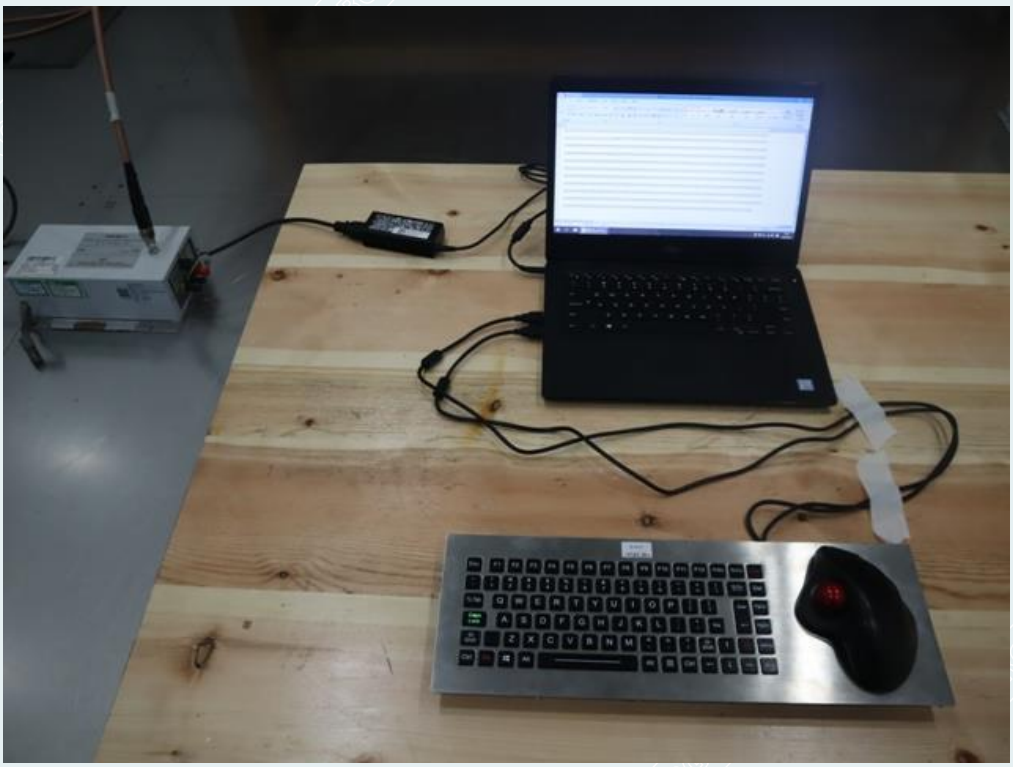
---------- **The following blanks** ----------

7.7.3 TEST SETUP



Note: 1. The EUT is setup 0.1m above Ground Reference Plane.
2. The CDNs and / or EM clamp used for real test depends on ports and cables configuration of EUT.

7.7.4 PHOTOGRAPH OF THE TEST ARRANGEMENT



AC port

---------- The following blanks ----------

7.7.5 TEST RESULTS

EUT Name:	IEC60945 keyboard and mouse	Model:	K-TEK-M440-OTB-FN-BL-NV-EMC-DWP
Environmental Conditions:	21.1℃/48%RH/101.1kPa	Test Mode:	Mode1
Power supply	AC 220V/50Hz	Tested By:	Rongde xie
Test Date:	2022-03-09	Sample No.	E202201244425-0001

Frequency (MHz)	Injection position	Voltage	time	Inject method	Required Performance	Actual performance	Result
0.15-80	AC port	3V	1% and 1s	CDN	A	A[1)]	Pass
2、3、4、6.2、8.2、12.6、16.5、18.8、22、25	AC port	10V	3s	CDN	A	A[1)]	Pass
NOTE: [1)] Before, during, and after the test, the EUT is working normally, the keyboard input function and the mouse control function of the EUT are normal.							

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7.8 POWER SUPPLY FAILURE

7.8.1 TEST SPECIFICATION

Basic standard:	IEC 61000-4-11:2020
Test duration time:	60s
Requirement:	Voltage Reduction 100%
Phase Angle:	0 °
Test cycle:	3

7.8.2 TEST PROCEDURE

1) Connect the power cable to the test equipment correctly, so that the EUT is in normal working condition;

2) Set the programmable software of the test equipment to make the output voltage test conditions consistent;

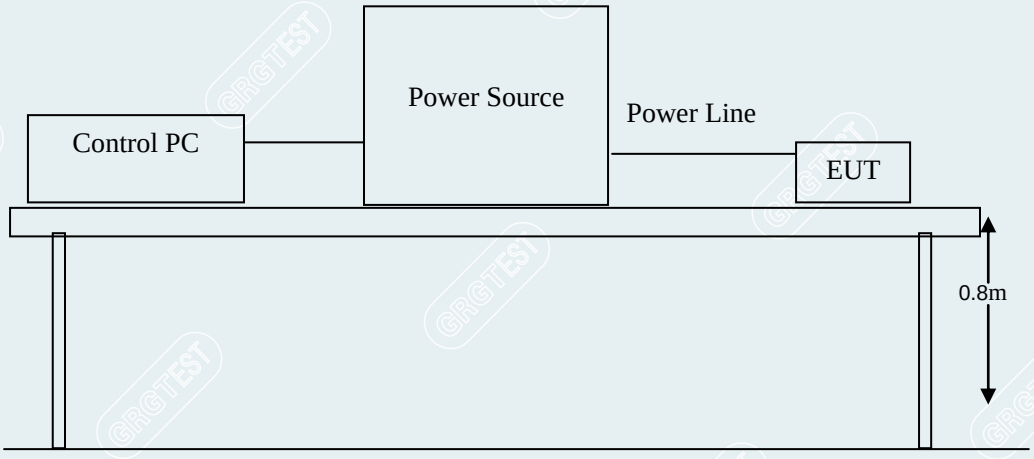
3) The EUT shall be subjected to three breaks in power supply of duration 60 s each;

4) Record the test results on the record sheet.

7.8.3 TEST RESULT REQUIREMENTS

Temporary reduction or loss of function or performance as specified in the relevant equipment standards and technical conditions established by the manufacturer may be permitted during and after the test, but its function shall be self-recoverable or may be subject to the above-mentioned standards and technical conditions. Some of the control operations are restored. If the requirements are met, the test project is judged as qualified, otherwise the test project is judged as unqualified.

7.8.4 TEST SETUP



7.8.5 PHOTOGRAPH OF THE TEST CONFIGURATION

Test setup

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7.8.6 TEST RESULTS

EUT Name:	IEC60945 keyboard and mouse	Model:	K-TEK-M440-OTB-FN-BL-NV-EMC-DWP
Environmental Conditions:	22.8℃/49%RH/101.1kPa	Test Mode:	Mode1
Power supply	AC 220V/50Hz	Tested By:	Feng YZ
Test Date:	2022-03-09	Sample No.	E202201244425-0001

Test project	Test requirements	Required Passing Performance	Actual performance	Result
Power Supply Failure	Duration of power failure: 60s Repeat 3 times.	C	A[1)]	Pass
NOTE: [1)] Before, during, and after the test, the EUT is working normally, the keyboard input function and the mouse control function of the EUT are normal.				

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8. SPECIAL PURPOSE TESTS

8.1 COMPASS SAFE DISTANCE

8.1.1 TEST SPECIFICATIONS

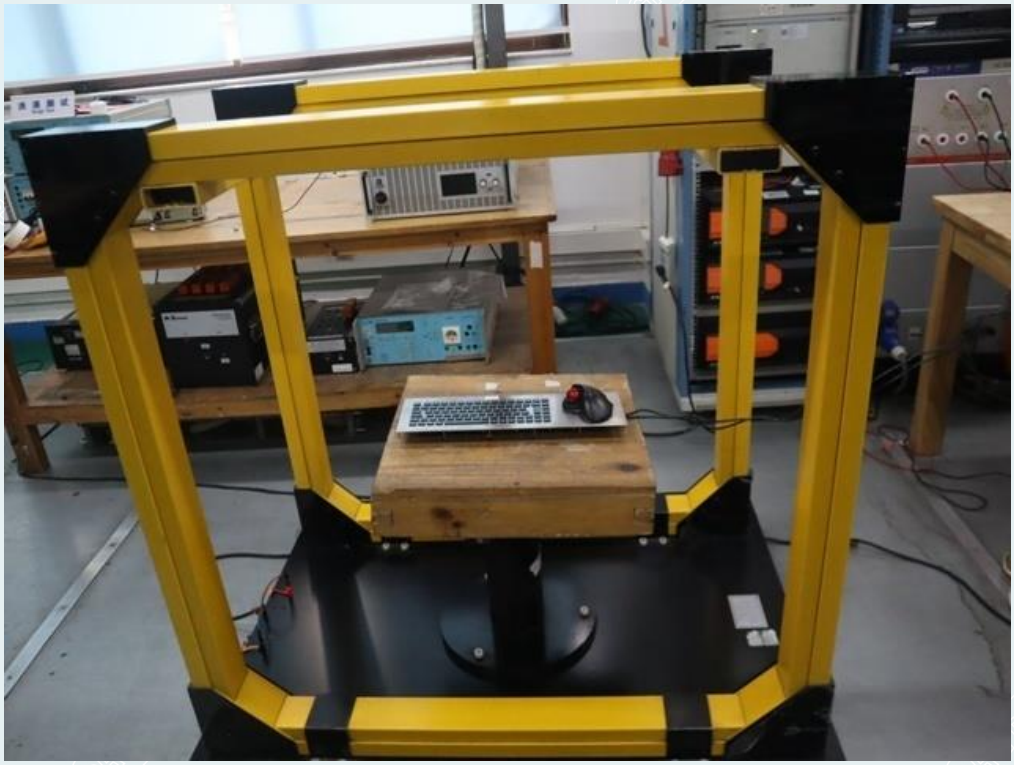
Test according to:	IEC 60945:2002 Clause 11.2

8.1.2 TEST PROCEDURE

1. Measure the horizontal component of the geomagnetic field strength in the area where there is no other magnetic field interference.
2. Calculate the maximum affected angle and magnetic field strength allowed by the standard compass and steering compass.
3. Place the sample in the normal state on the test surface 80cm away from the ground, rotate the sample, find the orientation to maximize the reading of the magnetometer, then move the sample straight and close to the magnetometer, when the magnetometer reading and standard When the maximum affected magnetic field strength allowed by the compass or steering compass is the same, the movement is stopped, and the linear distance between the sample and the magnetometer is measured with a tape measure.
4. According to the above method, repeat the above test when the sample is energized, not energized, magnetized (DC and AC separately magnetized), and non-magnetized, find the maximum measured distance, And repair it to 50mm or 100mm, which is the minimum safe distance between the sample and the compass.
The magnetic field intensity:
AC：1000／4π A/m（1GS）
DC：18000／4π A/m（18GS）

8.1.3 PHOTOGRAPH OF THE TEST ARRANGEMENT

Test setup



Magnetization Test setup

---------- The following blanks ----------

8.1.4 TEST RESULTS

EUT Name:	IEC60945 keyboard and mouse	Model:	K-TEK-M440-OTB-FN-BL-NV-EMC-DWP
Environmental Conditions:	21.9℃/44%RH/101.1kPa	Test Mode:	Mode1
Power supply	AC 220V/50Hz	Tested By:	Feng YZ
Test Date:	2022-03-09	Sample No.	E202201244425-0001

Accessories name	Test condition	Compass type	Result （unit：mm）
IEC60945 keyboard and mouse	In the unmagnetized condition with EUT unpowered	Standard compass	24
		steering compass	4
	In the unmagnetized condition with EUT powered	Standard compass	153
		steering compass	14
	In the DC magnetic condition with EUT unpowered	Standard compass	66
		steering compass	6
	In the DC magnetic condition with EUT powered	Standard compass	132
		steering compass	25
	In the AC magnetic condition with EUT unpowered	Standard compass	47
		steering compass	11
	In the AC magnetic condition with EUT powered	Standard compass	124
		steering compass	31
Result	The max value for Standard compass: 153mm The max value for steering compass: 66mm		

Result（rounded up to the nearest 50mm and 100mm）	
IEC60945 keyboard and mouse	The max value for Standard compass: 200mm
	The max value for steering compass: 100mm

---------- The following blanks ----------

APPENDIX A: PHOTOGRAPH OF THE EUT

EUT- Behind the EUT

EUT- Above the EUT

EUT- Right side of the EUT

EUT- Front of the EUT

EUT- Left side of the EUT

EUT- Below the EUT

APPENDIX B: PHOTOGRAPH OF THE EUT AND AUXILIARY EQUIPMENT

Photo of the eut and auxiliary equipment

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