EMC Test Report

For

SHENZHEN ZOTEK INSTRUMENTS CO., LTD.

Digital Multimeter

Model No.: ZT-X

Prepared For	:	SHENZHEN ZOTEK INSTRUMENTS CO., LTD.
Address	:	2F, 2nd Building, Hejing Industrial Zone, Fuyuan 1 Road, Fuyong Town, BaoAn District, Shenzhen, China
Prepared By	:	Shenzhen Anbotek Compliance Laboratory Limited
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Report Number	:	SZAHE180523002-01
Date of Test	:	May 24~Jun. 06, 2018
Date of Report	:	Jun. 06, 2018

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TEST REPORT

Applicant	:	SHENZHEN ZOTEK INSTRUMENTS CO., LTD.
Manufacturer	:	SHENZHEN ZOTEK INSTRUMENTS CO., LTD.
Product Name	:	Digital Multimeter
Model No.	:	ZT-X
Trade Mark	:	ZOTEK, ZOYI, 众仪电测
Rating(s)	:	DC 3V, 20mA, 1700mAh CAT III, 600V, CAT II, 1000V
Test Standard(s)	**:**	**EN 61326-1: 2013;** **(IEC 61000-4-2; IEC 61000-4-3)**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the EN 61326-1 requirements. The Project in IEC 61000-4-3 was tested in Shenzhen EMTEK Co., Ltd.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test: May 24~Jun. 06, 2018

Prepared By: Lucy Xu
(Engineer / Lucy Xu)

Reviewer: Baron Wen
(Supervisor / Baron Wen)

Approved & Authorized Signer: Tom Chen
(Manager / Tom Chen)

1. General Information

1.1. Client Information

Applicant	:	SHENZHEN ZOTEK INSTRUMENTS CO., LTD.
Address	:	2F, 2nd Building, Hejing Industrial Zone, Fuyuan 1 Road, Fuyong Town, BaoAn District, Shenzhen, China
Manufacturer	:	SHENZHEN ZOTEK INSTRUMENTS CO., LTD.
Address	:	2F, 2nd Building, Hejing Industrial Zone, Fuyuan 1 Road, Fuyong Town, BaoAn District, Shenzhen, China
Factory	:	SHENZHEN ZOTEK INSTRUMENTS CO., LTD.
Address	:	2F, 2nd Building, Hejing Industrial Zone, Fuyuan 1 Road, Fuyong Town, BaoAn District, Shenzhen, China

1.2. Description of Device (EUT)

Product Name	:	Digital Multimeter	
Model No.	:	ZT-X	
Trade Mark	:	ZOTEK, ZOYI, 众仪电测	
Test Power Supply	:	DC 3V	
Product Description	:	Adapter:	N/A
Remark: (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.			

1.3. Auxiliary Equipment Used During Test

N/A		

1.4. Description of Test Mode

Pretest Mode	Description
Mode 1	ON

For Mode 1 Block Diagram of Test Setup

EUT

1.5. Test Summary

Test Items	Test Mode	Status
Power Line Conducted Emission Test (150KHz To 30MHz)	/	N
Radiated Emission Test (30MHz To 1000MHz)	Mode 1	P
Electrostatic Discharge immunity Test	Mode 1	P
RF Field Strength susceptibility Test	Mode 1	P
Electrical Fast Transient/Burst Immunity Test	/	N
Surge Immunity Test	/	N
Injected Currents Susceptibility Test	/	N
Magnetic Field Susceptibility Test	/	N
Voltage Dips and Interruptions Test	/	N
P) Indicates that the through the test. N) Don't test.		

1.6. Test Equipment List

Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Nov. 17, 2017	1 Year
2.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	May 31, 2017	1 Year
3.	Pre-amplifier	SONOMA	310N	186860	May 27, 2017	1 Year
4.	Software Name EZ-EMC	Ferrari Tcchnology	ANB-03A	N/A	N/A	N/A

Electrostatic Discharge Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Simulators	3Ctest	ESD-30T	ES0131505	May 27, 2017	1 Year

R/S Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	RF Power Meter. Dual Channel	BOONTON	4232A	10539	May 19, 2018	1 year
2	50ohm Diode Power Sensor	BOONTON	51011EMC	34236/36164	May 19, 2018	1 year
3	Broad-Band Horn Antenna	SCHWARZBECK	BBHA9120 L3F	332	May 19, 2018	1 year
4	Power Amplifier (0.08-1G)	MILMEGA	80RF1000-175	1059345	May 19, 2018	1 year
5	Power Amplifier (1-2G)	MILMEGA	AS0102-55	1018770	May 19, 2018	1 year
6	Power Amplifier (2-6G)	MILMEGA	AS1860-50	1059346	May 19, 2018	1 year
7	Signal Generator	Agilent	N5181A	MY50145187	May 19, 2018	1 year
8	Field Strength Meter	HOLADAY	HI-6005	N/A	May 19, 2018	1 year
9	RS232 Fiber Optic Modem	HOLADAY	HI-4413P	N/A	May 19, 2018	1 year
10	Log.-Per. Antenna	SCHWARZBECK	VULP 9118E	N/A	May 19, 2018	1 year

1.7. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 3.9 dB (Horizontal)
		Ur = 3.8 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4 dB
Disturbance Uncertainty	:	Ud = 2.6 dB

1.8. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registed and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111, July 31, 2017.

ISED-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A-1, June 13, 2016.

Test Location

All Emissions tests were performed at Shenzhen Anbotek Compliance Laboratory Limited.
1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102

1.9. EMS Performance Criteria

√ A: Normal performance within the specification limits
√ B: Temporary degradation or loss of function or performance which is self-recoverable
√ C: Temporary degradation or loss of function or performance which requires operator intervention or system reset
√ D: Degradation or loss of function which is not recoverable due to damage of equipment (components) or software, or loss of data

Note: The manufacturer's specification may define effects on the EUT which may be considered insignificant, and therefore acceptable.

This classification may be used as a guide in formulating performance criteria, by committees responsible for generic, product and product-family standards, or as a framework for the agreement on performance criteria between the manufacturer and the purchaser, for example where no suitable generic, product or product-family standard exists.

2. Radiated Emission Test

2.1. Test Standard and Limit

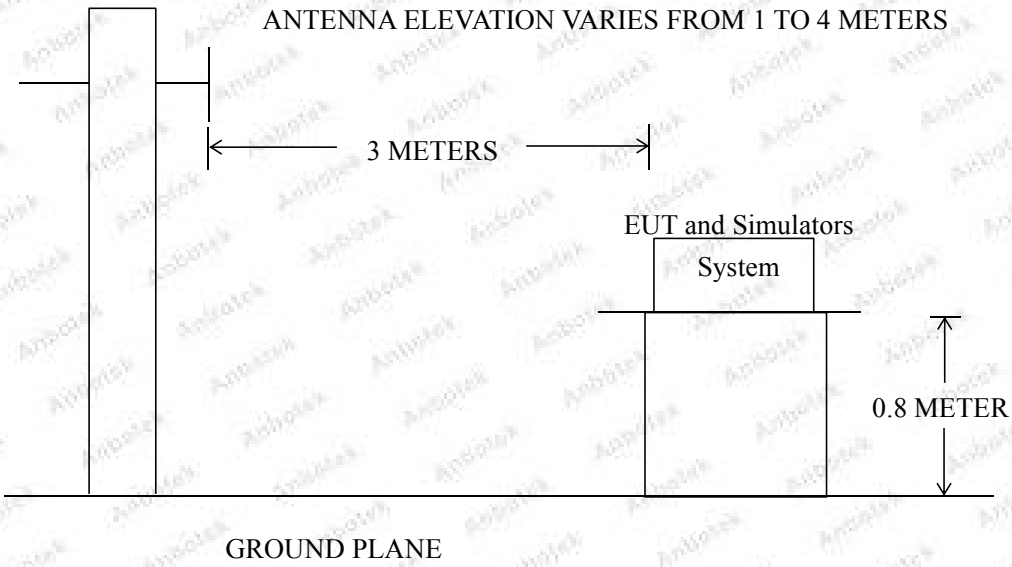
Test Standard	EN 61326-1

Radiated Emission Test Limit

Test Limit	Frequency (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dBμV/m)
	30 ~ 230	3	40
	230 ~ 1000	3	47

Remark: (1) The smaller limit shall apply at the combination point between two frequency bands.
(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

2.2. Test Setup



2.3. EUT Configuration on Measurement

The EN 61326-1 regulations test method must be used to find the maximum emission during radiated emission measurement.

2.4. Operating Condition of EUT

2.4.1. Setup the EUT as shown in Section 2.2.

2.4.2. Turn on the power of all equipments.

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

2.5. Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the 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 an antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on test.

The bandwidth of the Receiver (ESCI) is set at 120kHz.

The EUT is tested in Chamber.

The test results are listed in Section 2.6.

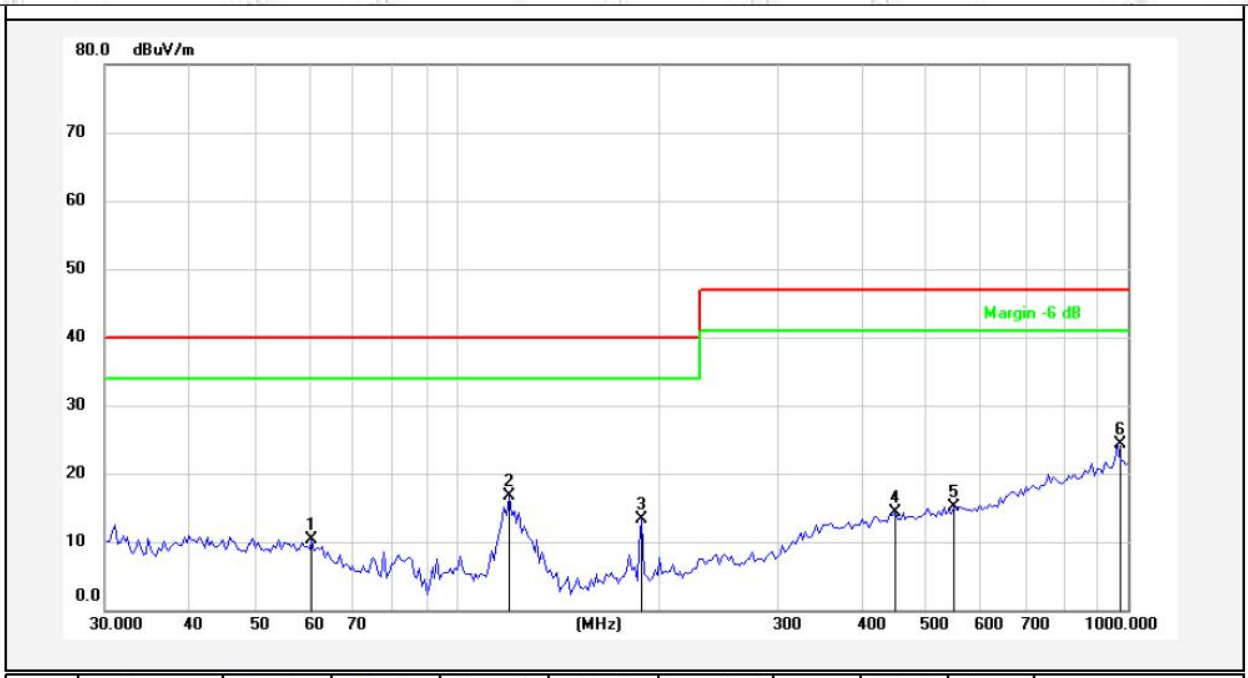
2.6. Test Results

PASS

The frequency range from 30MHz to 1000MHz is investigated.

The test curves are shown in the following pages.

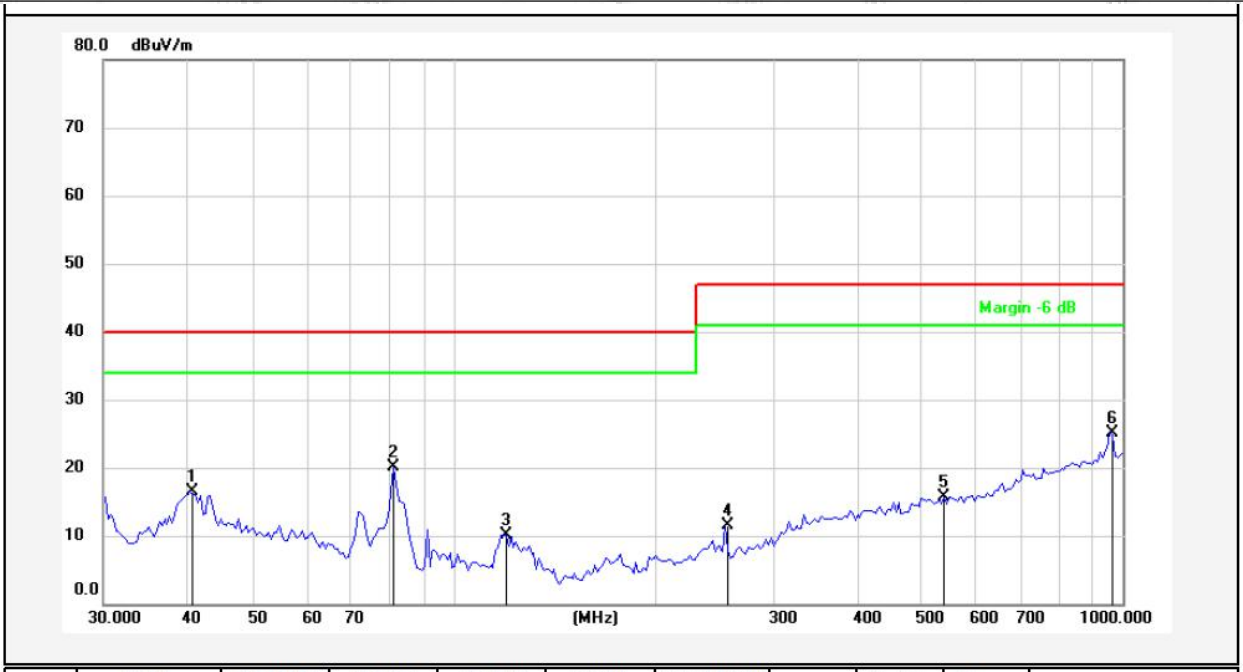
Test item:	**Radiation Test**	**Polarization:**	**Horizontal**
Standard:	**(RE)EN61326-1**	**Power Source:**	**DC 3V**
Distance:	**3m**	**Temp.(℃)/Hum.(%RH):**	**24.3(℃)/55%RH**



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	61.0245	26.84	-16.62	10.22	40.00	-29.78	peak			
2	119.8556	39.78	-22.99	16.79	40.00	-23.21	peak			
3	189.0743	34.78	-21.53	13.25	40.00	-26.75	peak			
4	450.3447	28.53	-14.19	14.34	47.00	-32.66	peak			
5	550.9480	28.09	-12.92	15.17	47.00	-31.83	peak			
6	965.5421	31.10	-6.71	24.39	47.00	-22.61	peak			

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

Test item:	**Radiation Test**	**Polarization:**	**Vertical**
Standard:	**(RE)EN61326-1**	**Power Source:**	**DC 3V**
Distance:	**3m**	**Temp.(℃)/Hum.(%RH):**	**24.3(℃)/55%RH**



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	40.4172	30.99	-14.51	16.48	40.00	-23.52	peak			
2	81.4970	38.80	-18.68	20.12	40.00	-19.88	peak			
3	119.8556	27.17	-16.99	10.18	40.00	-29.82	peak			
4	254.7284	26.27	-14.74	11.53	47.00	-35.47	peak			
5	541.3725	27.75	-12.12	15.63	47.00	-31.37	peak			
6	957.1148	30.90	-5.82	25.08	47.00	-21.92	peak			

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

3. Electrostatic Discharge Immunity Test

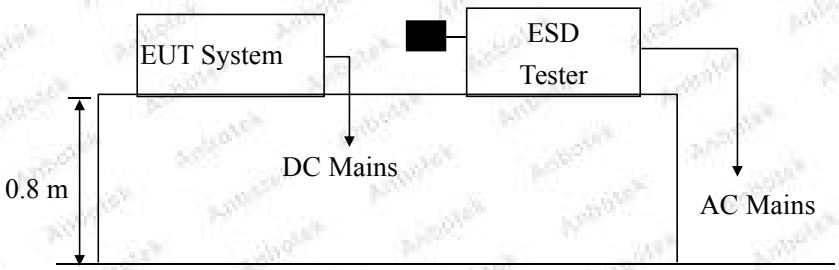
3.1. Test Standard and Level

Test Standard:	EN 61326-1 (IEC 61000-4-2)
Performance Criterion:	B
Severity Level: 3 / Air Discharge: ±8kV, Level: 2 / Contact Discharge: ±4kV	

Test 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

3.2. Test Setup



3.3. EUT Configuration on Measurement

The following equipments are installed on Electrostatic Discharge immunity Measurement to meet EN 61326-1 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

3.4. Operating Condition of EUT

3.4.1. Setup the EUT as shown on Section 3.2.

3.4.2. Turn on the power of all equipments.

3.4.3. After that, let the EUT work in test mode measure it.

3.5. Test Procedure

3.5.1. Air Discharge:

This test is done on a non-conductive surface. 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.

3.5.2. Contact Discharge:

All the procedure shall be same as Section 3.5.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

3.5.3. 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.

3.5.4. 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 × 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.

3.6. Test Results

PASS

Please refer to the following page.

Electrostatic Discharge Test Results

Shenzhen Anbotek Compliance Laboratory Limited

Air discharge :	±8.0kV	Temperature :	24℃
Contact discharge :	±4.0kV	Humidity :	53%
Power Supply :	DC 3V	Criterion required :	B
Test Result :	☒ Pass ☐ Fail		
# For each point positive 10 times and negative 10 times discharge			

Location		**Kind** A-Air Discharge C-Contact Discharge	**Result**
Slot of the EUT	10 points	A	☑ A ☐ B ☐ C ☐ D
Others	6 points	A	☑ A ☐ B ☐ C ☐ D
Screen	4 points	A	☑ A ☐ B ☐ C ☐ D
Function Keys	4 points	A	☑ A ☐ B ☐ C ☐ D
Metal surface of EUT	8 points	C	☑ A ☐ B ☐ C ☐ D
Screws	2 points	C	☑ A ☐ B ☐ C ☐ D
HCP	4 points	C	☑ A ☐ B ☐ C ☐ D
VCP of the front	4 points	C	☑ A ☐ B ☐ C ☐ D
VCP of the rear	4 points	C	☑ A ☐ B ☐ C ☐ D
VCP of the left	4 points	C	☑ A ☐ B ☐ C ☐ D
VCP of the right	4 points	C	☑ A ☐ B ☐ C ☐ D

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

4. RF Field Strength Susceptibility Test

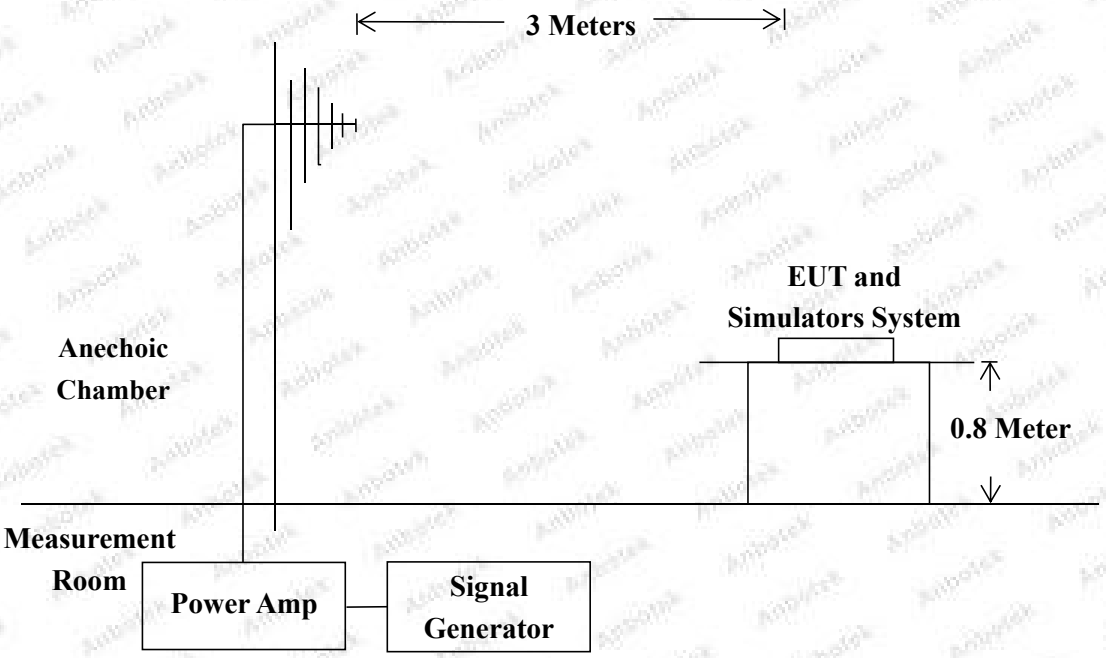
4.1. Test Standard and Level

Test Standard:	EN 61326-1 (IEC 61000-4-3)
Performance criterion:	A
Severity Level 2: 3V/m	

Test Level

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

4.2. Test Setup



4.3. EUT Configuration on Measurement

The following equipments are installed on RF Field Strength susceptibility Measurement to meet EN 61326-1 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

4.4. Operating Condition of EUT

4.4.1. Setup the EUT as shown on Section 4.2.

4.4.2. Turn on the power of all equipments.

4.4.3. After that, let the EUT work in test mode measure it.

4.5. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. EUT is set 3 meter 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 EUT screen.
All the scanning conditions are as follow:

Condition of Test	Remarks
Fielded Strength	3 V/m (Severity Level 2)
Radiated Signal	Unmodulated
Scanning Frequency	80 - 1000 MHz
Dwell time of radiated	0.0015 decade/s
Waiting Time	Remarks

4.6. Measuring Results

PASS

Please refer to the following page.

RF Field Strength Susceptibility Test Results

Shenzhen Anbotek Compliance Laboratory Limited

Field Strength :	3V/m	Temperature :	25℃			
Criterion required :	A	Humidity :	54%			
Power Supply :	DC 3V	Frequency Range :	80	MHz to	1000	MHz
Test Result :	☒ Pass ☐ Fail					

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

Azimuth	Horizontal	Vertical	Result
Front	3V/m	3V/m	☑ A ☐ B ☐ C ☐ D
Right	3V/m	3V/m	☑ A ☐ B ☐ C ☐ D
Rear	3V/m	3V/m	☑ A ☐ B ☐ C ☐ D
Left	3V/m	3V/m	☑ A ☐ B ☐ C ☐ D

Remark: The Project was tested in Shenzhen EMTEK Co., Ltd.

APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Radiated Emission Test

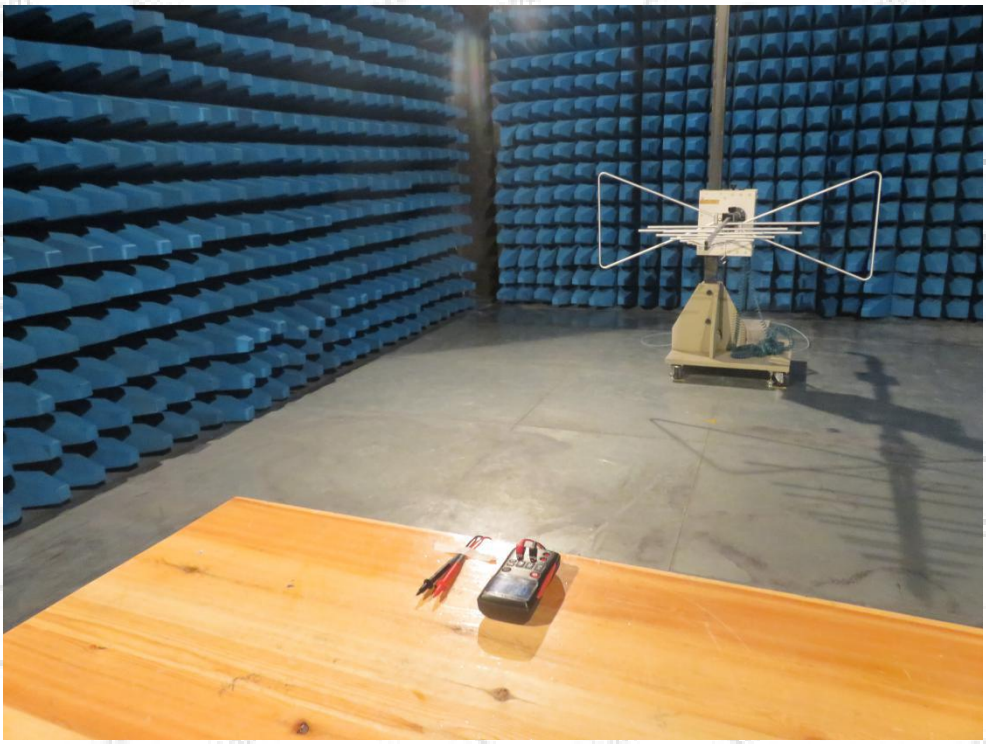
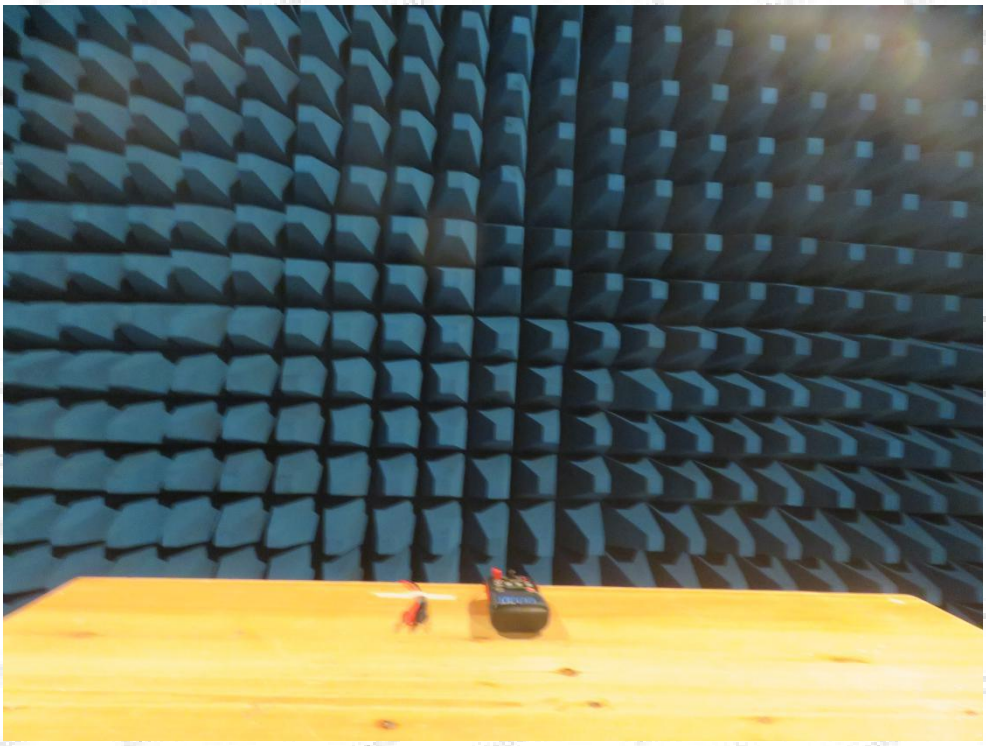


Photo of Electrostatic Discharge Immunity Test



Photo of RF Field Strength susceptibility Test



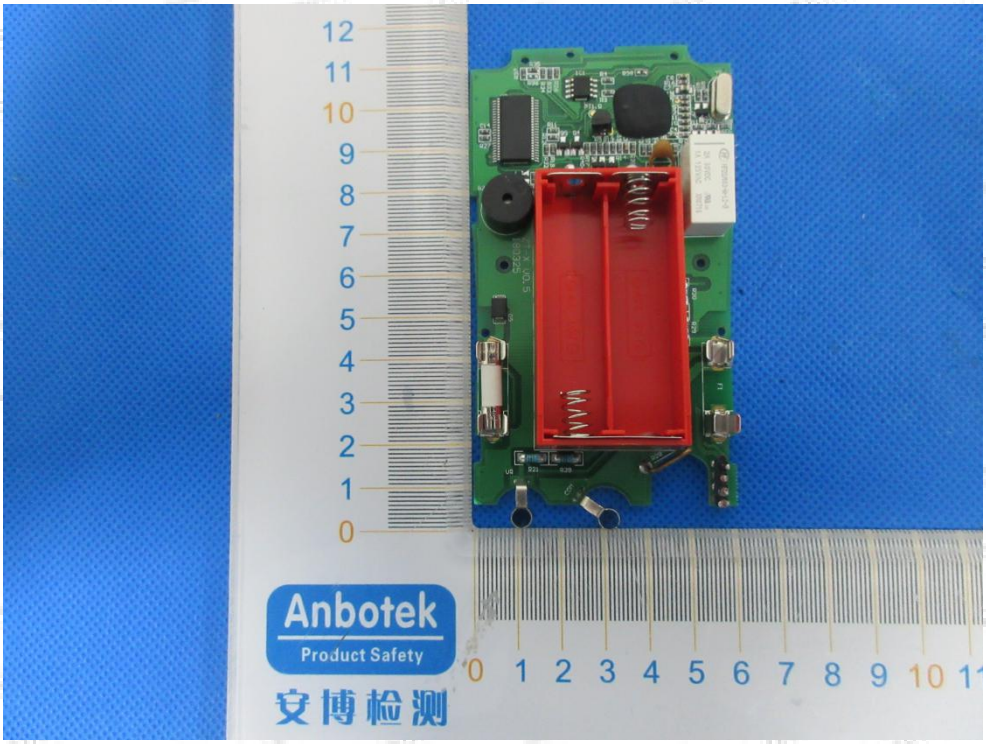
APPENDIX II -- EXTERNAL PHOTOGRAPH

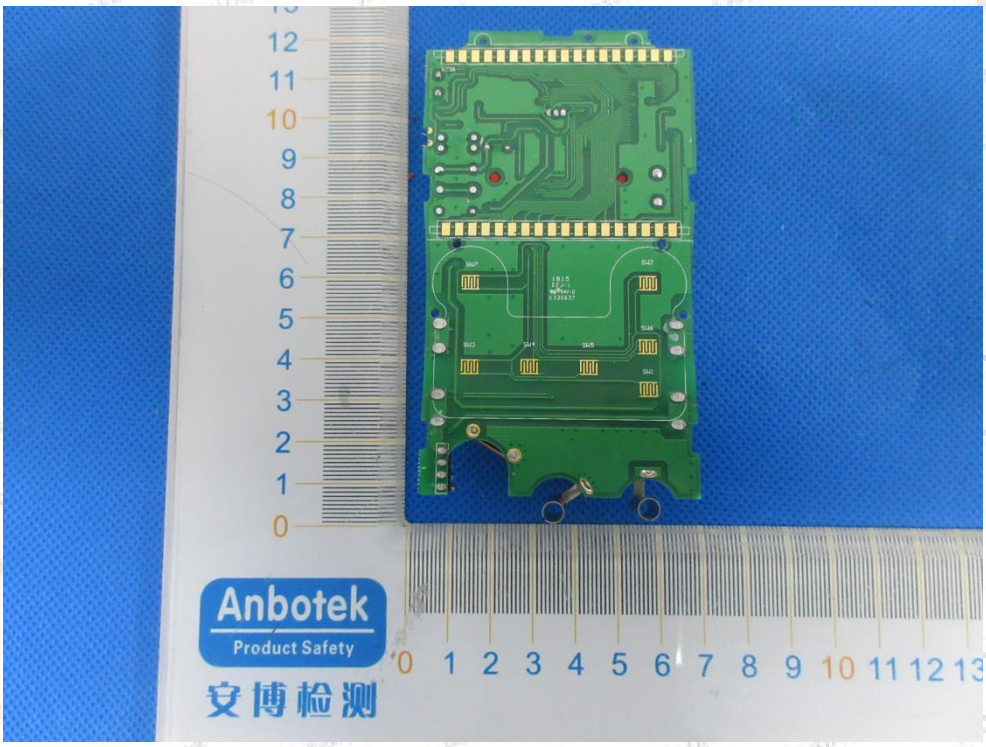




APPENDIX III -- INTERNAL PHOTOGRAPH






Anbotek
Product Safety
安博检测

CE Label

1. The CE conformity marking must consist of the initials 'CE' taking the following form:

   If the CE marking is reduced or enlarged, the proportions given in the above graduated drawing must be respected.

2. The CE marking must have a height of at least 5 mm except where this is not possible on account of the nature of the apparatus.

3. The CE marking must be affixed to the product or to its data plate. Additionally it must be affixed to the packaging, if any, and to the accompanying documents.

4. The CE marking must be affixed visibly, legibly and indelibly.

   It must have the same height as the initials 'CE'.

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