APPLICATION FOR ELECTROMAGNETIC COMPATIBILITY DIRECTIVE

On Behalf of

SHENZHEN AIMOMETER CO.,LTD.

DUAL MODE DETECTOR&MULTIMETER

Model No.: A1, A2, A3, A40, A50, A5, A5X, A4, A6, A7, A8, A9, HDM-2001, GD113A

Prepared for	:	SHENZHEN AIMOMETER CO.,LTD.
Address	:	Store No. 123-125, Zhenye City Comprehensive Building, Shenfeng Road No. 2, Hongmian Community, Henggang Street, Longgang District, Shenzhen

Prepared By	:	Shenzhen Alpha Product Testing Co., Ltd.
Address	:	Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

Report Number	:	A2212132-C01-R01
Date of Receipt	:	January 4 2023
Date of Test	:	January 5 2023
Date of Report	:	January 6 2023
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TEST REPORT DECLARATION

Applicant	:	SHENZHEN AIMOMETER CO.,LTD.
Address	:	Store No. 123-125, Zhenye City Comprehensive Building, Shenfeng Road No. 2, Hongmian Community, Henggang Street, Longgang District, Shenzhen
Manufacturer	:	SHENZHEN AIMOMETER CO.,LTD.
Address	:	Store No. 123-125, Zhenye City Comprehensive Building, Shenfeng Road No. 2, Hongmian Community, Henggang Street, Longgang District, Shenzhen
EUT Description	:	DUAL MODE DETECTOR&MULTIMETER
(A) Model No.	:	A1, A2, A3, A40, A50, A5, A5X, A4, A6, A7, A8, A9, HDM-2001, GD113A
(B) Trademark	:	BSIDE, MAXRIENY, AIMOMETER, SUETTLA, DHH, HPT, GVDA

Measurement Standard Used:

EN IEC 61326-1:2021

EN IEC 61326-2-2:2021

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with the EN IEC 61326-1, EN IEC 61000-3-2, EN 61000-3-3 and EN IEC 61326-2-2 requirements.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....: Jerry Yin
Project Engineer

Approved by (name + signature).....: Jack Xu
Project Manager

Date of issue.....: January 6 2023

Revision History

Revision	Issue Date	Revisions	Revised By
V0	January 6 2023	Initial released Issue	Jerry Yin

1. Summary Of Standards And Results

1.1. Description of Standards and Results

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

EMISSION			
Description of Test Item	**Standard**	**Limits**	**Results**
Radiated Emissions	EN IEC 61326-1:2021	Section 7.2	P
Conducted Emissions From The AC Mains Power Ports	EN IEC 61326-1:2021	Section 7.2	N/A
Conducted disturbance at telecommunication port	EN IEC 61326-1:2021	Section 7.2	N/A
Harmonic current emissions	EN IEC 61000-3-2:2019+A1:2021	Section 7	N/A
Voltage fluctuations & flicker	EN 61000-3-3:2013+A2:2021	Section 5	N/A

IMMUNITY (EN IEC 61326-2-2:2021)				
Description of Test Item	**Standard**	**Performance Criteria**	**ObservationCriteria**	**Results**
Electrostatic discharge (ESD)	IEC 61000-4-2:2008	B	A	P
Radio-frequency, Continuous radiated disturbance	IEC 61000-4-3:2006+ A1:2007 + A2:2010	A	A	P
Electrical fast transient (EFT)	IEC 61000-4-4:2012	B	A	N/A
Surge (AC/DC port)	IEC 61000-4-5:2014+ A1:2017	B	A	N/A
Surge(I/O signal/control)		B	N/A	N/A
Radio-frequency, Continuous conducted disturbance	IEC 61000-4-6:2013	A	A	N/A
Power frequency magnetic field	IEC 61000-4-8:2009	A	N/A	N/A
Voltage dips, 100% reduction	IEC 61000-4-11:2020	B	B	N/A
Voltage dips, 100% reduction		B	B	N/A
Voltage dips, 30% reduction		C	B	N/A
Voltage interruptions 100% reduction		C	B	N/A

Note: 1. P is an abbreviation for Pass.

2. F is an abbreviation for Fail.

3. N/A is an abbreviation for Not Applicable.

4. Decision rules for the conclusion of this test report: decision by actual test data without considering measurement uncertainty.

2. General Information

2.1. Description of Device (EUT)

Description	:	DUAL MODE DETECTOR&MULTIMETER
Model Number	:	A1, A2, A3, A40, A50, A5, A5X, A4, A6, A7, A8, A9, HDM-2001, GD113A
Diff	:	There is no difference except the name of the model. All tests are made with the A1 model.
Test Voltage	:	DC 3V From Battery
EUT information	:	/
Highest frequency	:	Less than 108MHz
Trademark	:	BSIDE, MAXRIENY, AIMOMETER, SUETTLA, DHH, HPT, GVDA
Software version	:	N/A
Hardware version	:	N/A

2.2. Accessories of Device (EUT)

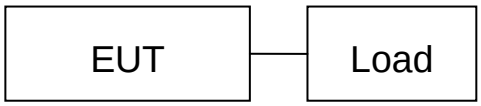
Power Source	:	/

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number
1	Load	N/A	N/A	N/A

2.4. Block Diagram of connection between EUT and simulators

For Tests



Signal Cable Description of the above Support Units					
No.	**Port Name**	**Cable**	**Length**	**Shielded (Yes or No)**	**Detachable (Yes or No)**
(a)	N/A	N/A	N/A	N/A	N/A

EUT: DUAL MODE DETECTOR&MULTIMETER

2.5. Test Mode Description

For Tests		
Mode No.	Test Mode	Test Voltage
Mode 1	Working	DC 3V From Battery
Mode 2	Lighting	DC 3V From Battery
Mode 3	Working and Lighting	DC 3V From Battery
Note: Mode 3 is worst case mode tests, so this report only reflected the worst mode in this part.		

2.6. Test Facility

Shenzhen Alpha Product Testing Co., Ltd.

Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

2.7. Measurement Uncertainty

Test Item	Uncertainty	U_{cispr}
Uncertainty for Conduction emission test	1.63dB	3.8 dB
Uncertainty for Radiation Emission test (<1G)	3.74 dB (Distance: 3m Polarize: V)	5.2 dB
	3.76 dB (Distance: 3m Polarize: H)	
Uncertainty for Radiation Emission test(>1G)	3.77 dB (Distance: 3m Polarize: V)	5.2 dB
	3.80 dB (Distance: 3m Polarize: H)	
(95% confidence levels, k=2)		

2.8. Test Equipment List

For Power Line Conducted Emission Test Equipment:

Item	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Last Cal.	Cal.Interval
1.	Test Receiver	Rohde&Schwarz	ESCI	101165	4.42 SP1	2022.08.22	1 Year
2.	L.I.S.N.#1	Schwarz beck	NSLK8126	8126-466	/	2022.08.22	1 Year
3.	L.I.S.N.#2	Rohde&Schwarz	ENV216	101043	/	2022.08.22	1 Year
4.	Pulse Limiter	Schwarz beck	9516F	9618	/	2022.08.22	1 Year
5.	ISN	SCHWARZBECK	CAT5 8158	00316	/	2022.08.22	1 Year
6.	ISN	SCHWARZBECK	NTFM 8158	00273	/	2022.08.22	1 Year
7.	ISN	SCHWARZBECK	CAT3 8158	CAT3 8158 #167	/	2022.08.22	1 Year

For Frequency Range 30MHz~1GHz Radiated Emission Test Equipment:

Item	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Last Cal.	Cal. Interval
1	Test Receiver	Rohde&Schwarz	ESR	1316.3003K03-102082-Wa	2.28 SP1	2022.08.22	1 Yea r
3	Bilog Antenna	Schwarz beck	VULB 9168	VULB 9168#627	/	2021.08.30	2 Year

For Frequency Range above 1GHz Radiated Emission Test Equipment:

Item	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Last Cal.	Cal. Interval
1	Spectrum Analyzer	Rohde&Schwarz	FSU	200002	4.71.SP5	2022.08.22	1 Year
2	Horn Antenna	Schwarz beck	BBHA 9120 D	02106	/	2021.08.30	2 Year
3	Amplifier	Agilent	8449B	3008A02664	/	2022.08.22	1 Yea

For Harmonic Current Test & Voltage Fluctuations & Flicker Test Equipment:

Item	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Last Cal.	Cal. Interval
1.	Harmonics Flicker Analyser	Voltech	PM6000	200006700495	/	2022.08.22	1 Year
2.	HARMINICS&FLICKER MEASUREMENT SYSTEM	EVERFINE	HFM300_V200	P630850TD1411113	/	2022.03.30	1Year

For Electrostatic Discharge Test Equipment:

Item	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Last Cal.	Cal. Interval
1.	ESD Tester	HAEFELY	PESD1610	H310546	/	2022.08.22	1 Year.

For RF Field Strength Susceptibility Test Equipment:

Item	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Last Cal.	Cal. Interval
1.	vector Signal Generator	Agilent	E4438C	US44271917	/	2022.08.22	1 Year
2.	Power meter	Agilent	E4419B	GB40202122	/	2022.08.22	1 Year
3.	Power Sensor	Agilent	E9300A	MY41496625s	/	2022.08.22	1 Year
4.	RF power Amplifier	OPHIR	5225R	1045	/	2022.08.22	1 Year
5.	RF power Amplifier	OPHIR	5273R	1018	/	2022.08.22	1 Year
6	RF power Amplifier	Micotop	MPA-3000-6000-100	MPA1811348	/	2022.08.22	1 Year
7.	Antenna	SCHWARZBECK	STLP9128E-special	STLP9128Es#139	/	N/A	NCR
8.	Antenna	SCHWARZBECK	STLP 9149	STLP 9149 #456	/	N/A	NCR

For Electrical Fast Transient/Burst Immunity, Surge, Power Frequency Magnetic Field Immunity, Voltage dips and interruptions test Equipment:

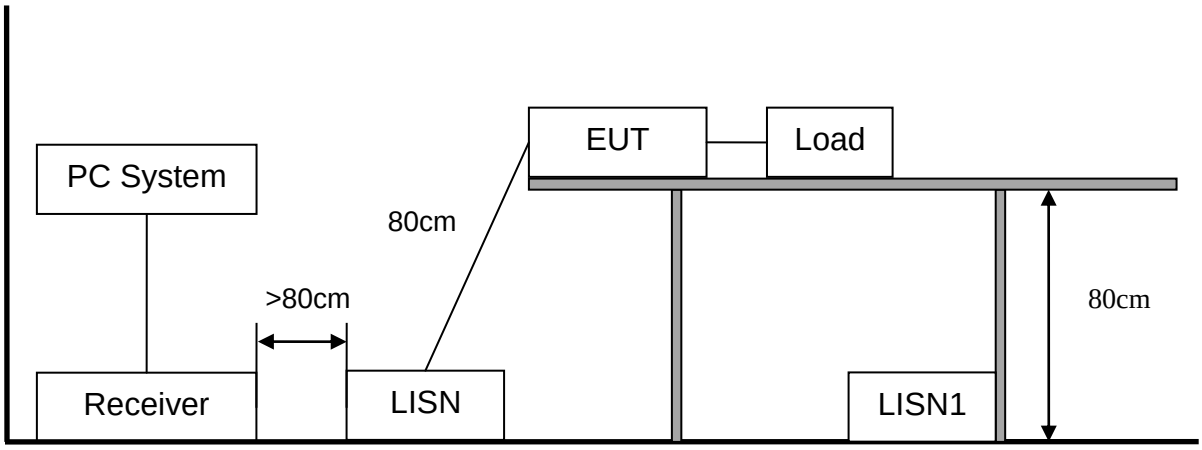
Item	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Last Cal.	Cal. Interval
1.	Multifunctional Compact Immunity Test system	3ctest	CCS 600	ES0801655	CCS V4.0.9	2022.08.22	1 Year
2.	Surge & EFT Coupling Decoupling Network	3ctest	SEPN 3832T	ES0951601	/	2022.08.22	1 Year
3.	Voltage variation and PF magnetic field regulating device	3ctest	VMT2216S	ES0441601	/	2022.08.22	1 Year
4.	Capacitive Coupling Clamp	3ctest	CCC 100	EC0441660	/	2022.08.22	1 Year

For Injected currents susceptibility test Equipment:							
Item	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Last Cal.	Cal. Interval
1.	Conducted Immunity test System	SKET	CITS_150K230M	SK20191010001_CITS	/	2022.08.22	1 Year
2.	Fixed Coaxial Attenuator (6dB Attenuation)	CD	ATT-0675	120540086	/	2022.08.22	1 Year
3.	coupling-decoupling network (CDN)	CD	CDN M2/M3	2302	/	2022.08.22	1 Year
4.	Electromagnetic Injection Clamp (EMC-Clamp)	CD	EM-Clamp	0513A031201	/	2022.08.22	1 Year

ForTest Software Information			
Item	Software Name	Manufacturer	Version
RE	EZ-EMC	Farad	Alpha-3A1
CE	EZ-EMC	Farad	Alpha-3A1

3. Conducted Disturbance At mains Terminals Test

3.1. Block Diagram of Test Setup



3.2. Power Line Conducted Emission Test Limits

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. Emission level=Read level + LISN factor-Preamp factor + Cable loss

2. *Decreasing linearly with logarithm of frequency.

3. The lower limit shall apply at the transition frequencies.

3.3. Configuration of EUT on Test

The following equipment are installed on conducted disturbance at mains terminals to meet the EN 55014-1 requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.4. Operating Condition of EUT

（1） Setup the EUT as shown as Section 3.1.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode and 15 minutes before taking the test.

3.5. Test Procedure

（1） The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#). This provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N.#2). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to EN 61326-1on Conducted Disturbance at Mains Terminals test.

（2） The frequency range from 150kHz to 30MHz is checked, the bandwidth of test receiver (R&S TEST RECEIVER ESCI) is set at 9kHz.

（3） The test results are reported on Section 3.6.

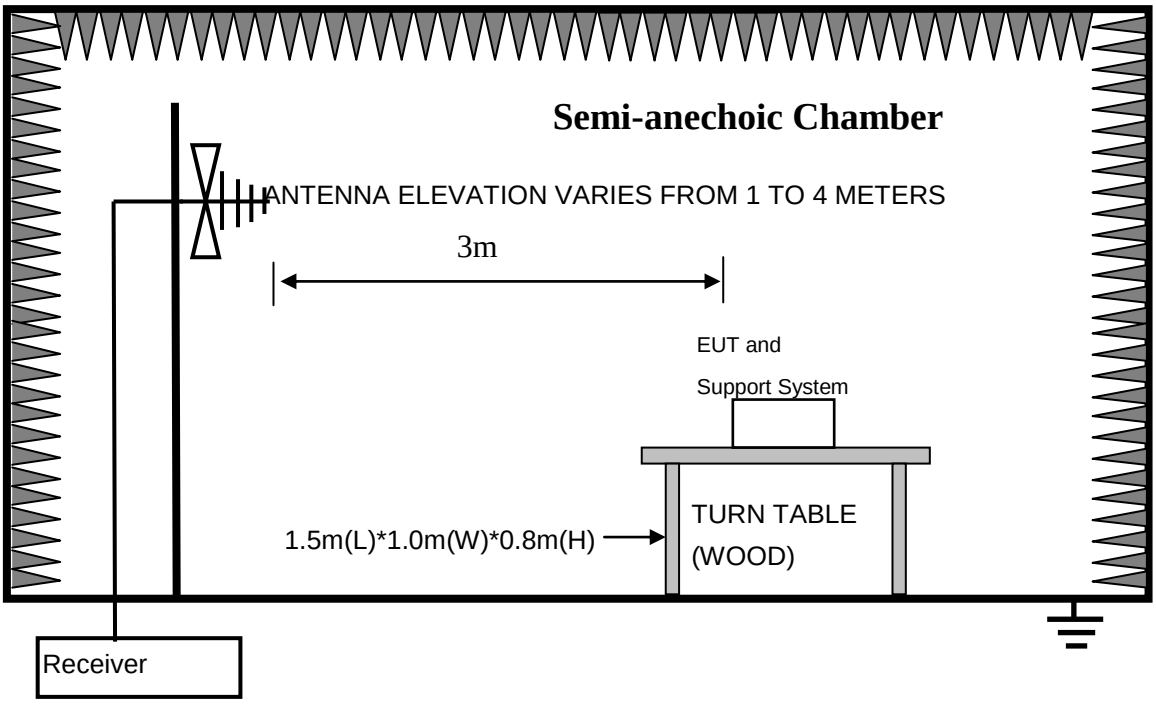
3.6. Conducted Disturbance at Mains Terminals Test Results

EUT	:	DUAL MODE DETECTOR&MULTIMETER	Test Date	:	N/A
M/N	:	A1	Temperature	:	N/A
Test Engineer	:	N/A	Humidity	:	N/A
Test Voltage	:	N/A	Pressure	:	N/A
Test Mode	:	N/A			
Test Results	:	N/A			
Note: The EUT is supplied by Battery, so this item does not applicable.					

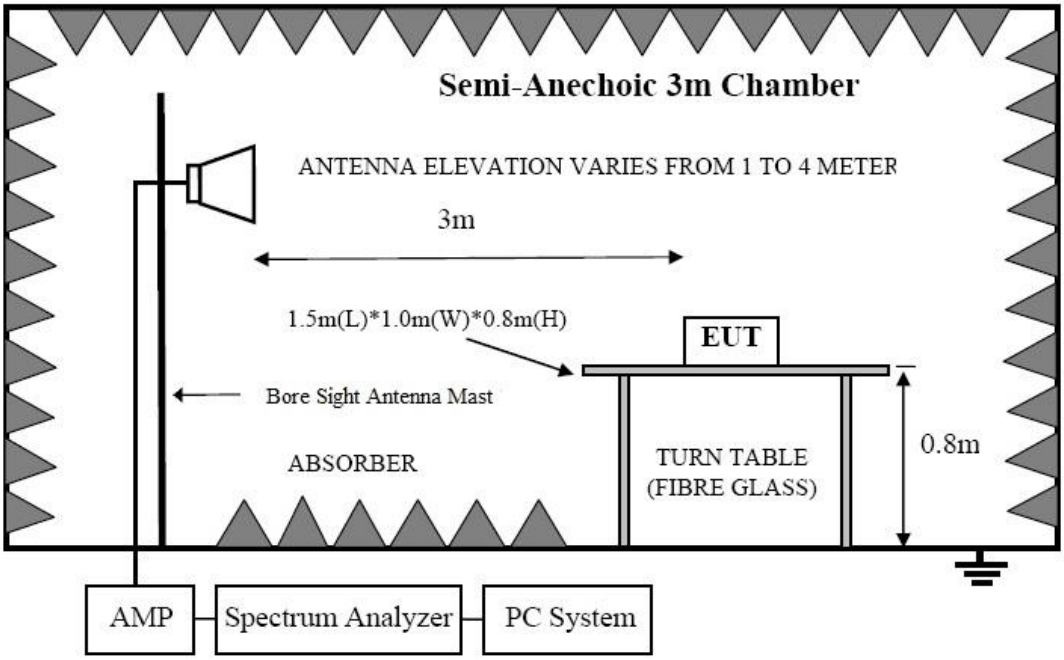
4. Radiated Disturbance Test

4.1. Block Diagram of Test Setup

In Semi Anechoic Chamber (3m) Test Setup Diagram for 30MHz~1000MHz



In Semi Anechoic Chamber (3m) Test Setup Diagram for Above 1GHz



4.2. Test Limit

Frequency MHz	Distance (Meters)	Field Strengths Limits dB(μV)/m
30 ~ 230	3	40
230 ~ 1000	3	47
1000 ~ 3000	3	70(Peak) 50(Average)
3000 ~ 6000	3	74(Peak) 54(Average)

Notes: 1. Emission level = Read level + Antenna Factor - PreampFactor +Cable Loss

2. The smaller limit shall apply at the cross point between two frequency bands.

3. Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

4. Frequency range of radiated measurements:

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 108	1000
108-500	2000
500-1000	5000
Above 1000	5th harmonic of the highest frequency or 6 GHz, whichever is lower.

4.3. Configuration of EUT on Test

The following equipment are installed on Radiated Emission Test to meet theEN 61326-1 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

4.4. Operating Condition of EUT

（1） Setup the EUT as shown as Section 4.1.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode and 15 minutes before taking the test.

4.5. Test Procedure

（1） The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. An antenna was located 3m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all the interface cables were changed according to EN 61326-1 on Radiated Disturbance test.

（2） The frequency range from 30MHz to 1000MHz is checked, the bandwidth of test receiver (R&S TEST RECEIVER ESR) is set at 120kHz.

（3） The frequency range from 30MHz to 1000MHz was pre-scanned with a peak detector and all final readings of measurement from Test Receiver are Quasi-Peak values, all measurement distance is 3m in 3m semi anechoic chamber.

（4） The test results are reported on Section 4.6.

4.6. Radiated Disturbance Test Results

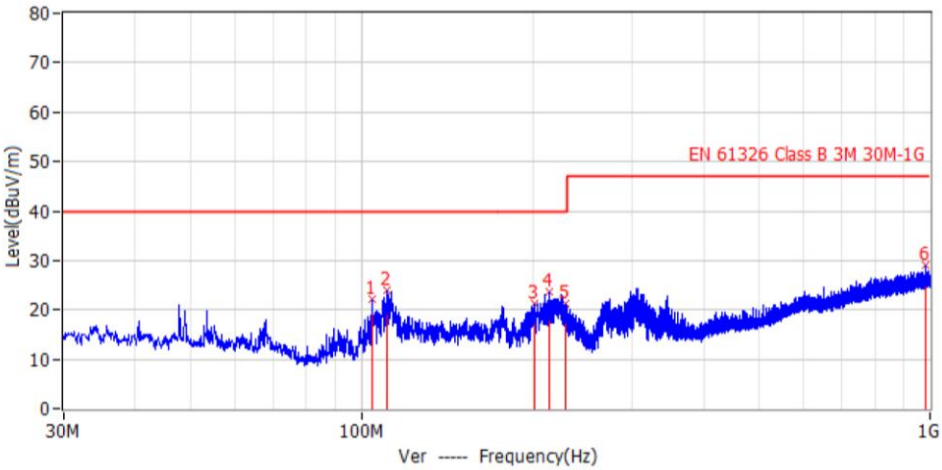
EUT	:	DUAL MODE DETECTOR&MULTIMETER	Test Date	:	2023.01.05
M/N	:	A1	Temperature	:	24℃
Test Engineer	:	Jerry Yin	Humidity	:	56 %
Test Voltage	:	DC 3V From Battery	Pressure	:	101.6kPa
Test Mode	:	Working and Lighting			
Test Results	:	**Pass**			

Note: 1. The test results are listed in next pages.

2. This mode is worst case mode, so this report only reflected the worst mode.

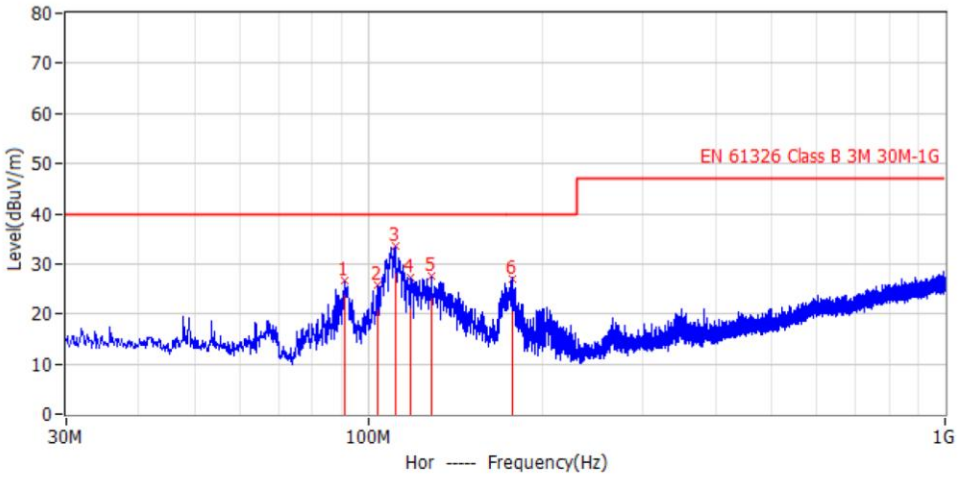
3. If the limits for the measurement with the quasi-peak detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the quasi-peak detector need not be carried out.

Antenna Polarity: Vertical



No.	Frequency	Level dBuV/m	Factor dB/m	Limit dBuV/m	Margin dB	Detector	Height cm	Height cm	Angle deg
1*	104.690MHz	22.2	13.9	40.0	-17.8	PK	Ver	100.0	280.0
2*	111.238MHz	23.9	14.5	40.0	-16.1	PK	Ver	100.0	86.0
3*	202.054MHz	21.3	13.5	40.0	-18.7	PK	Ver	100.0	0.0
4*	214.421MHz	23.8	13.3	40.0	-16.2	PK	Ver	100.0	0.0
5*	228.486MHz	21.3	13.6	40.0	-18.7	PK	Ver	100.0	0.0
6*	981.206MHz	29.1	27.4	47.0	-17.9	PK	Ver	100.0	153.0

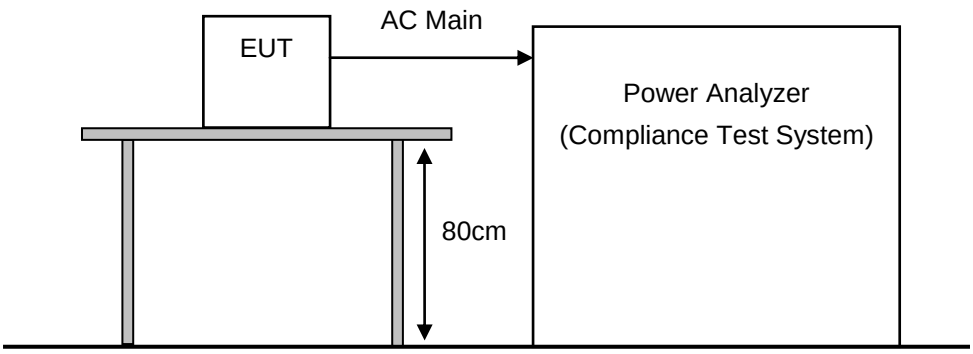
Antenna Polarity: Horizontal



No.	Frequency	Level dBuV/m	Factor dB/m	Limit dBuV/m	Margin dB	Detector	Height cm	Height cm	Angle deg
1*	90.868MHz	26.8	12.9	40.0	-13.2	PK	Hor	100.0	0.0
2*	103.963MHz	25.8	13.8	40.0	-14.2	PK	Hor	200.0	359.0
3*	111.480MHz	33.6	14.5	40.0	-6.4	PK	Hor	200.0	182.0
4*	118.876MHz	27.3	15.2	40.0	-12.7	PK	Hor	167.0	0.0
5*	128.698MHz	27.6	15.9	40.0	-12.4	PK	Hor	195.0	0.0
6*	178.046MHz	27.1	15.6	40.0	-12.9	PK	Hor	200.0	247.0

5. Harmonic Current Test

5.1. Block Diagram of Test Setup



5.2. Harmonic Current Test Limits

For Class A equipment:

Harmonic order n	Maximum permissible harmonic current A
Odd harmonics	
3	2,30
5	1,14
7	0,77
9	0,40
11	0,33
13	0,21
$15 \le n \le 39$	$0{,}15\frac{15}{n}$
Even harmonics	
2	1,08
4	0,43
6	0,30
$8 \le n \le 40$	$0{,}23\frac{8}{n}$

for Class B equipment:

The harmonics of the input current shall not exceed the values given in Class A equipment limit multiplied by a factor of 1,5.

5.3. Configuration of EUT on Test

The following equipment are installed on Harmonic Current Test to meet the EN61000-3-2 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

5.4. Operating Condition of EUT

（1） Setup the EUT as shown as Section 5.2.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode and 15 minutes before taking the test.

5.5. Test Procedure

（1） The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the necessary for the EUT to be exercised.

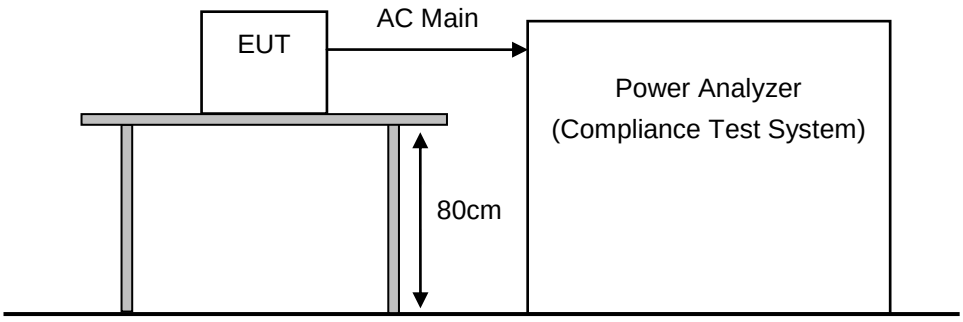
（2） The test results are reported on Section 5.7.

5.6. Harmonic Current Test Results

EUT	:	DUAL MODE DETECTOR&MULTIMETER	Test Date	:	N/A
M/N	:	A1	Temperature	:	N/A
Test Engineer	:	N/A	Humidity	:	N/A
Test Voltage	:	N/A	Pressure	:	N/A
Test Mode	:	N/A			
Test Results	:	N/A			
Note: The EUT is supplied by Battery, so this item does not applicable.					

6. Voltage Fluctuations & Flicker Test

6.1. Block Diagram of Test Setup



6.2. Voltage Fluctuation and FlickerTest Limits

Test Item	Limit	Note
P_{st}	1.0	P_{st} means Short-term flicker indicator
P_{lt}	0.65	P_{lt} means long-term flicker indicator
T_{dt}	0.2	T_{dt} means maximum time that dt exceeds 3%
d_{max}(%)	4%	d_{max} means maximum relative voltage change.
d_c(%)	3.3%	d_c means relative steady-state voltage change.

6.3. Configuration of EUT on Test

The following equipment are installed on Harmonic Current Test to meet the EN61000-3-3 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

6.4. Operating Condition of EUT

（1） Setup the EUT as shown as Section 6.2.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode and 15 minutes before taking the test.

6.5. Test Procedure

（1） The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal conditions During the flick measurement; the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

（2） The test results are reported on Section 6.7.

6.6. Voltage Fluctuation and Flicker Test Results

EUT	:	DUAL MODE DETECTOR&MULTIMETER	Test Date	:	N/A
M/N	:	A1	Temperature	:	N/A
Test Engineer	:	N/A	Humidity	:	N/A
Test Voltage	:	N/A	Pressure	:	N/A
Test Mode	:	N/A			
Test Results	:	N/A			
Note: The EUT is supplied by Battery, so this item does not applicable.					

7. Immunity Performance Criteria

Performance Level

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance level by its manufacturer or the requestor of the test, or the agreed between the manufacturer and the purchaser of the product.

Definition related to the performance level:

1. Based on the used product standard

2.Based on the declaration of the manufacturer, requestor or purchaser

Electromagnetic environment:

☑Basic electromagnetic environment

☐Industrial electromagnetic environment

☐Controlled electromagnetic environment

Performance criterion A

The equipment shall continue to operate as intended during and after the test. 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 preplaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Performance criterion B

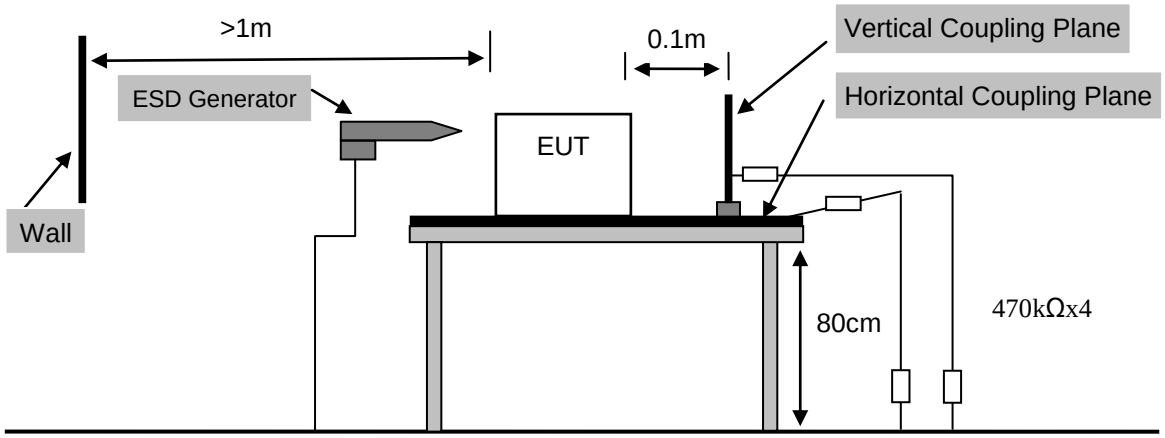
The equipment shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

8. Electrostatic Discharge Test

8.1. Block Diagram of Test Setup



8.2. Electrostatic DischargeTest Limits

Test Type	Test Level	Performance Criterion
AirDischarge	4KV	B
Contact Discharge	8KV	B

Notes: 1. Test set-up reference IEC 61000-4-2:2008

8.3. Configuration of EUT on Test

The following equipment are installed on Electrostatic Discharge Test to meet the IEC 61000-4-2 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

8.4. Operating Condition of EUT

（1） Setup the EUT as shown as Section 8.2.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode and 15 minutes before taking the test.

8.5. Test Procedure

（1） Air Discharge**:**

The test was applied on non-conductive surfaces of EUT. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the discharge electrode was removed from the EUT. The generator was re-triggered for a new single discharge and least repeated 20 times (10 with positive and 10negative with positive) for each pre-selected test point. This procedure was repeated until all the air discharge completed.

（2） Contact Discharge:

All the procedure was same as Section 8.6.1.The tip of the discharge electrode was touching the EUT before the discharge switch was operated.

（3） Indirect discharge for horizontal coupling plane:

At least 20 single discharges (10 with positive and 10negative with positive)were 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.

（4） Indirect discharge for vertical coupling plane:

At least 20 single discharge (10with positive and 10negative with positive)were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

8.6. Electrostatic Discharge Test Results

EUT	:	DUAL MODE DETECTOR&MULTIMETER	Test Date	:	2023.01.05
M/N	:	A1	Temperature	:	24℃
Test Engineer	:	Jerry Yin	Humidity	:	56%
Test Voltage		DC 3V From Battery	Pressure		101.6kPa
Test Mode	:	Working and Lighting			
Test Results	:	**PASS**			

Discharge Voltage (kV)	**Type Of Discharge**	**Dischargeable Points**	**Performance**	
			Required	**Observation**
±4	Contact	N/A	B	N/A
±8	Air	1, 2, 3	B	A
±4	HCP-Bottom	Edge of the HCP	B	A
±4	VCP-Front	Center of the VCP	B	A
±4	VCP-Left	Center of the VCP	B	A
±4	VCP-Back	Center of the VCP	B	A
±4	VCP-Right	Center of the VCP	B	A

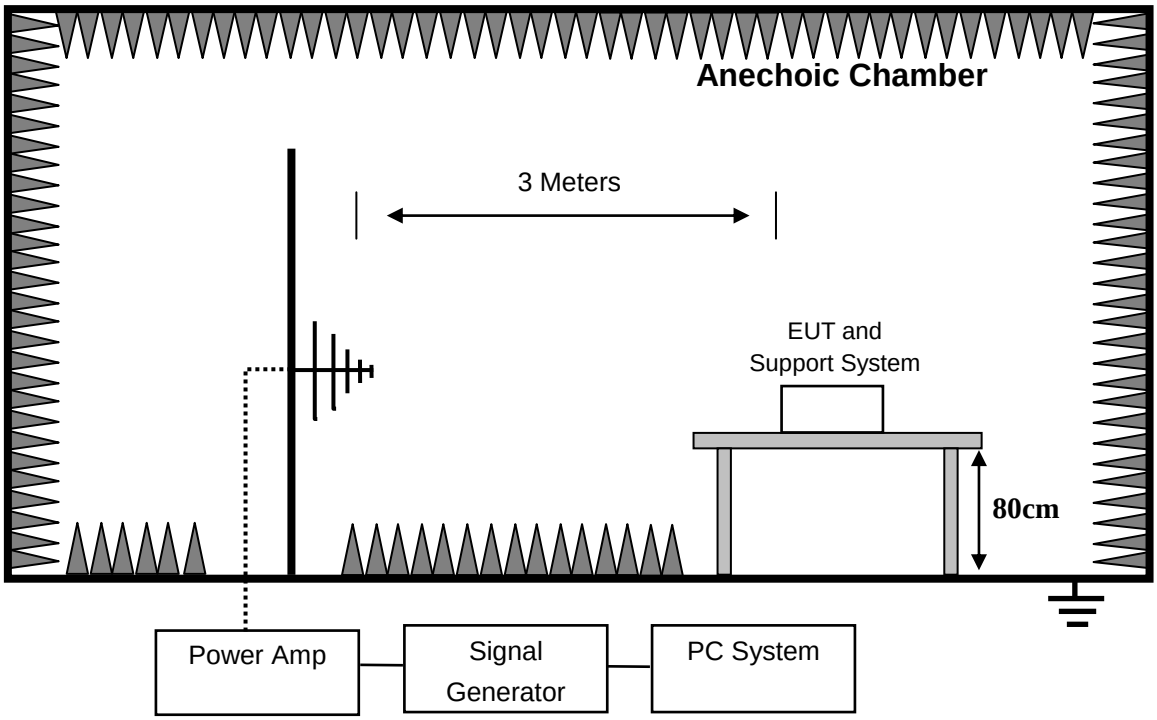
Discharge Points Description

1	Button	4	
2	Display	5	
3	Gap	6	

Note:
1. For the time interval between successive single discharges an initial value of one second.
2. For Air Discharge each Point Positive 10 times and negative 10 times discharge.
3. For Contact Discharge each point positive 25 times and negative 25 timesdischarge.
4. EUT does not contain metal contact points, not need to contact discharge measurement.
5. Class A is no function loss.

9. RF field Strength Susceptibility Test

9.1. Block Diagram of Test Setup



9.2. RF Field Strength susceptibility Test Limits

Test Specifications	Test Level	Performance Criterion
80MHz-1GHz	3V/m (r.m.s.)	A
1GMHz-2GMHz	3V/m (r.m.s.)	A
2GHz-2.7GHz	1V/m (r.m.s.)	A

Notes: 1. Test set-up reference IEC 61000-4-3:2006 + A1:2007 + A2:2010

9.3. Configuration of EUT on Test

The following equipment are installed on Electrostatic Discharge Test to meet the IEC 61000-4-3 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

9.4. Operating Condition of EUT

（1） Setup the EUT as shown as Section 9.2.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode and 15 minutes before taking the test.

9.5. Test Procedure

（1） Testing was performed in a Fully anechoic chamber as recommended by IEC 61000-4-3.

（2） The EUT was placed on an 80 cm high non-conductive table located in the area of field uniformity. The radiating antenna was placed 3m in front of the EUT and Support system, and dwell time of the radiated interference was controlled by an automated, computer-controlled system.

（3） The signal source was stepped through the applicable frequency range at a rate no faster than 1% of the fundamental. The signal was amplitude modulated 80% over the frequency range 80 MHz to 1GHz and 1GHz to 2GHz at a level of 3 V/m, 2GHz to 2.7GHz at a level of 1 V/m. The dwell time was set at 3 s. Field presence was monitored during testing via a field probe placed in close proximity to the EUT.

（4） Throughout testing, the EUT was closely monitored for signs of susceptibility. The test was performed with the antennae oriented in both a horizontal and vertical polarization.

（5） All the scanning conditions are as follows:

Condition of Test	Require of Test
Test Fielded Strength	3 V/m, 1V/m
Radiated Signal	80% amplitude modulated with a 1kHz sine wave
Scanning Frequency	80 - 1000 MHz, 1.4 -2 GHz, 2.0 -2.7 GHz
Sweeping time of radiated	0.0015 decade/s
Dwell Time	1 Sec.

9.6. RF Field Strength Susceptibility Test Results

EUT	:	DUAL MODE DETECTOR&MULTIMETER	Test Date	:	2023.01.05
M/N	:	A1	Temperature	:	24℃
Test Engineer	:	Jerry Yin	Humidity	:	56%
Test Voltage		DC 3V From Battery	Pressure		101.6kPa
Test Mode	:	Working and Lighting			
Test Results	:	**PASS**			
Field Strength	:	3V/m			
Modulation:		☑ AM ☐ Pulse ☐ none 1 kHz 80%			

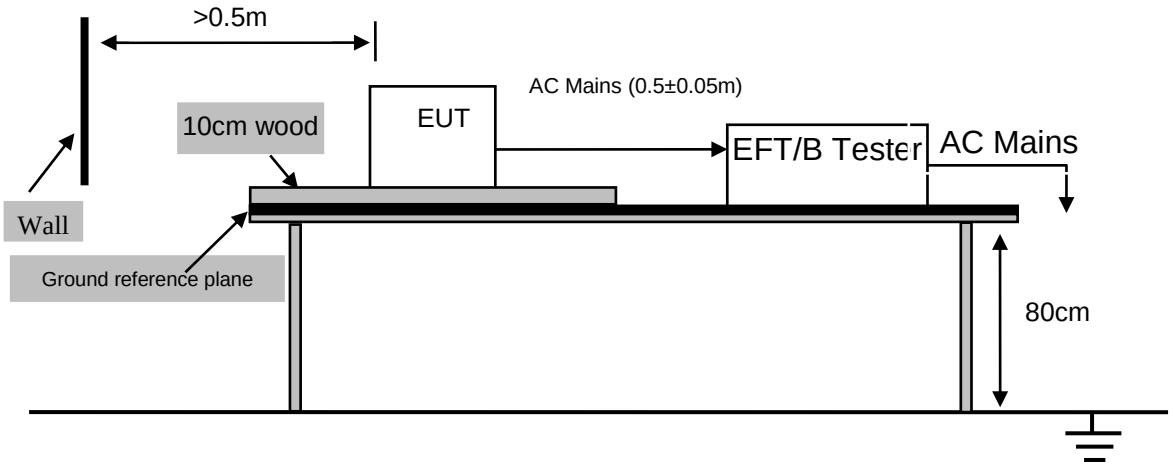
	Frequency Range :80 -1000MHz, 1.4 -2 GHz				
Steps	1%				
	Horizontal		Vertical		Result
	Required	Observation	Required	Observation	(Pass / Fail)
Front	A	A	A	A	Pass
Right	A	A	A	A	Pass
Rear	A	A	A	A	Pass
Left	A	A	A	A	Pass
Remark: Class A is no function loss					

Field Strength	:	1V/m			
Modulation:		☑ AM ☐ Pulse ☐ none 1 kHz 80%			

	Frequency Range :2.0 -2.7 GHz				
Steps	1%				
	Horizontal		Vertical		Result
	Required	Observation	Required	Observation	(Pass / Fail)
Front	A	A	A	A	Pass
Right	A	A	A	A	Pass
Rear	A	A	A	A	Pass
Left	A	A	A	A	Pass
Remark: Class A is no function loss					

10. Electrical Fast Transient/Burst Immunity Test

10.1.Block Diagram of Test Setup



10.2.Electrical Fast Transient/Burst Test Limits

Port	Test Value	Performance Criterion
AC Port	1 kV	B
DC Port	1kV	B
I/O signal/control Port	0.5kV	B
I/O signal/control Port (connected directly to mains supply)	1kV	B

Notes: 1. Test set-up reference IEC 61000-4-4:2012

10.3.Configuration of EUT on Test

The following equipment are installed on Electrostatic Discharge Test to meet the IEC 61000-4-4 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

10.4.Operating Condition of EUT

(1) Setup the EUT as shown as Section 10.1.

(2) Turn on the power of all equipment.

(3) Let the EUT work in test mode and 15 minutes before taking the test.

10.5.Test Procedure

(1) The EUT and its simulators were placed on the ground reference plane and were insulated from it by a wood support 0.1m + 0.01m thick. The ground reference plane was 1m*1m metallic sheet with 0.65mm minimum thickness. This reference ground plane was project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5m. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.

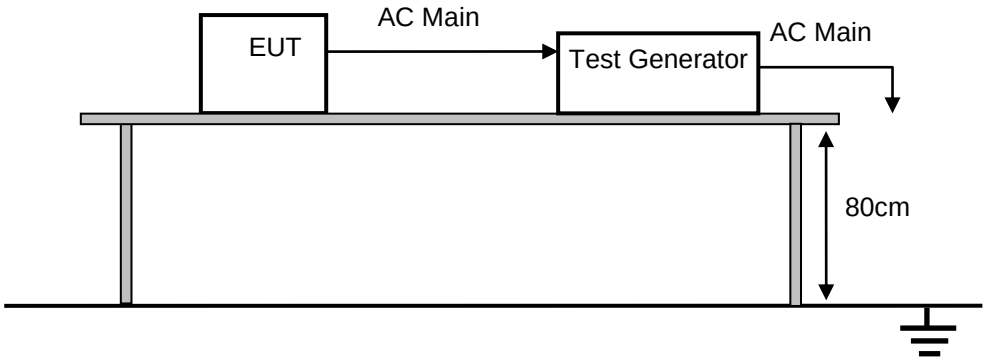
(2) The EUT was connected to the power mains by using a coupling device that couples the EFT interference signal to AC power lines. Both positive transients and negative transients of test voltage were applied during compliance test and the duration of the test can’t less than 1min.

10.6.Electrical Fast Transient/Burst immunity Test Results

EUT	:	DUAL MODE DETECTOR&MULTIMETER	Test Date	:	N/A
M/N	:	A1	Temperature	:	N/A
Test Engineer	:	N/A	Humidity	:	N/A
Test Voltage	:	N/A	Pressure		N/A
Test Mode	:	N/A			
Test Results	:	N/A			
Note: The EUT is supplied by Battery, so this item does not applicable.					

11. Surge Test

11.1.Block Diagram of Test Setup



11.2.Surge Test Limits

Port	Test Value	Performance Criterion
AC Port	Line to line 0.5kV Line to ground1 kV	B
DC Port	Line to line 0.5 kV Line to ground1 kV	B
I/O signal/control Port	Line to ground1 kV	B
I/O signal/control Port (connected directly to mains supply)	Line to line 0.5 kV Line to ground1 kV	B

Notes: 1. Test set-up reference IEC 61000-4-5:2014

11.3.Configuration of EUT on Test

The following equipment are installed on Electrostatic Discharge Test to meet the IEC 61000-4-5 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

11.4.Operating Condition of EUT

(1) Setup the EUT as shown as Section 11.1.

(2) Turn on the power of all equipment.

(3) Let the EUT work in test mode and 15 minutes before taking the test.

11.5.Test Procedure

(1) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are applied during test.

(2) Different phase angles are done individually.

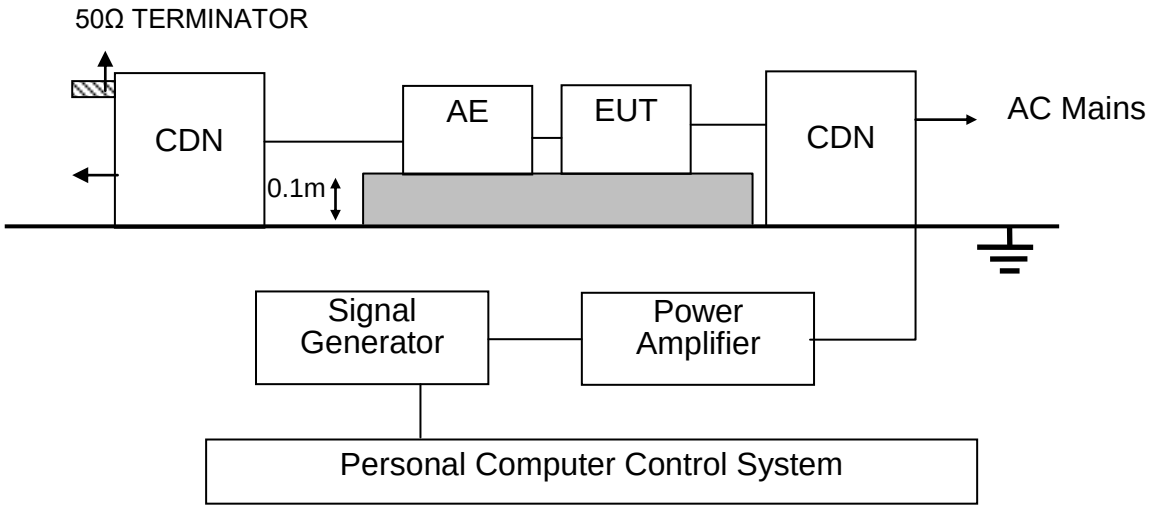
(3) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

11.6.Surge Test Results

EUT	:	DUAL MODE DETECTOR&MULTIMETER	Test Date	:	N/A
M/N	:	A1	Temperature	:	N/A
Test Engineer	:	N/A	Humidity	:	N/A
Test Voltage	:	N/A	Pressure		N/A
Test Mode	:	N/A			
Test Results	:	N/A			
Note: The EUT is supplied by Battery, so this item does not applicable.					

12. Injected Currents Susceptibility Test

12.1.Block Diagram of Test Setup



12.2.Injected currents susceptibility Test Limits

Port	Test Value	Performance Criterion
AC Port	3V	A
DC Port	3V	A
I/O signal/control Port	3V	A
I/O signal/control Port (connected directly to mains supply)	3V	A

Notes: 1. Test set-up reference IEC 61000-4-6:2013

12.3.Configuration of EUT on Test

The following equipment are installed on Electrostatic Discharge Test to meet the IEC 61000-4-6 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

12.4.Operating Condition of EUT

(1) Setup the EUT as shown as Section 12.2.

(2) Turn on the power of all equipment.

(3) Let the EUT work in test mode and 15 minutes before taking the test.

12.5.Test Procedure

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

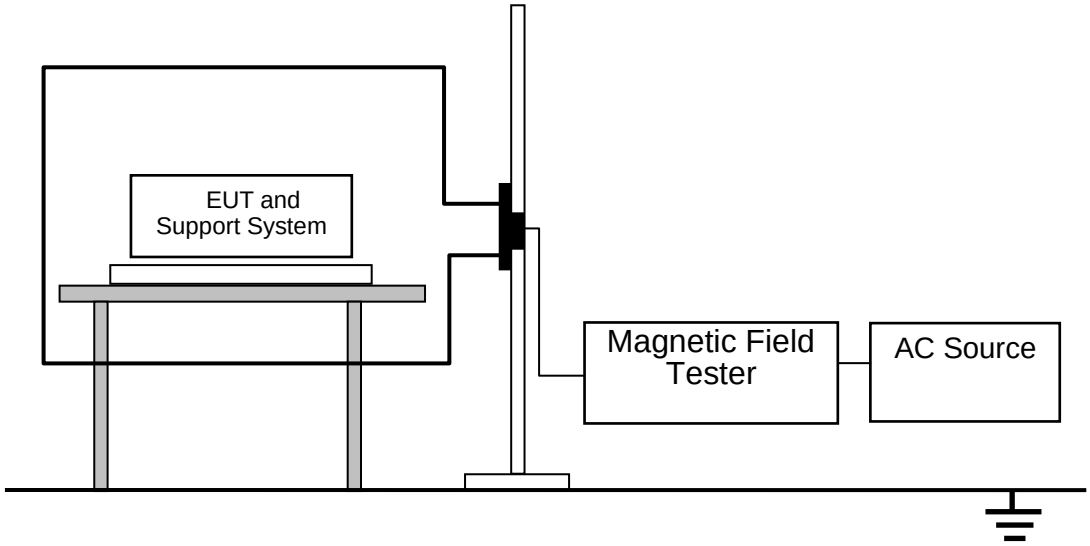
(2)	The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 10 and 30 mm (where possible).
(3)	The disturbance signal described below is injected to EUT through CDN.
(4)	The EUT operates within its operational mode(s) under intended climatic conditions after power on.
(5)	The frequency range is swept from 0.150MHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.
(6)	The rate of sweep shall not exceed 1.5*10-3decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
(7)	Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

12.6.Injected currents susceptibility Test Results

EUT	:	DUAL MODE DETECTOR&MULTIMETER	Test Date	:	N/A
M/N	:	A1	Temperature	:	N/A
Test Engineer	:	N/A	Humidity	:	N/A
Test Voltage	:	N/A	Pressure		N/A
Test Mode	:	N/A			
Test Results	:	**N/A**			
Note: The EUT is supplied by Battery, so this item does not applicable.					

13. Magnetic Field Immunity Test

13.1.Block Diagram of Test Setup



13.2.Magnetic field Test Limits

Test Value	Performance Criterion
3A/m	A

Notes: 1. Test set-up reference IEC 61000-4-8:2009

13.3.Configuration of EUT on Test

The following equipment are installed on Electrostatic Discharge Test to meet the IEC 61000-4-6 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

13.4.Operating Condition of EUT

(1) Setup the EUT as shown as Section 13.2.

(2) Turn on the power of all equipment.

(3) Let the EUT work in test mode and 15 minutes before taking the test.

13.5.Test Procedure

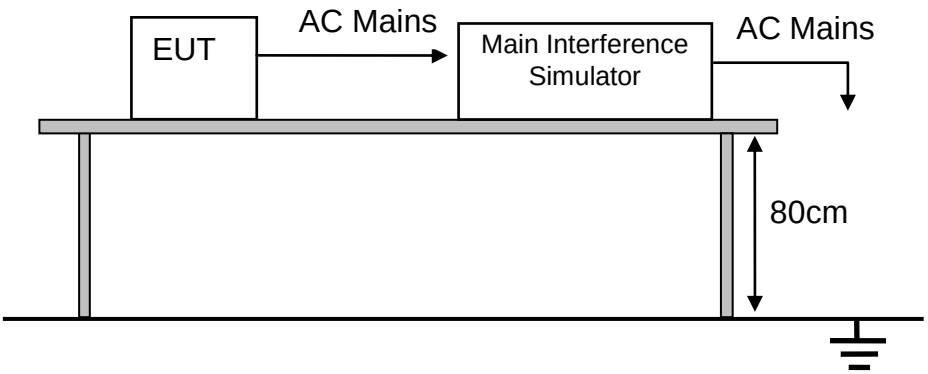
(1) The EUT was subjected to the test magnetic field by using the induction coil of standard dimensions (1m*1m) and shown in Section 13.2. The induction coil was then rotated by 90°in order to expose the EUT to the test field with different orientations.

13.6.Magnetic Field ImmunityTest Results

EUT	:	DUAL MODE DETECTOR&MULTIMETER	Test Date	:	N/A
M/N	:	A1	Temperature	:	N/A
Test Engineer	:	N/A	Humidity	:	N/A
Test Voltage	:	N/A	Pressure	:	N/A
Test Mode	:	N/A			
Test Results	:	N/A			
Note: Only to magnetically sensitive equipment, so the test not applicable.					

14. Voltage Dips And Interruptions Test

14.1.Block Diagram of Test Setup



14.2.Voltage dips and interruptions Test Limits

Test Level %UT	Voltage dip and short interruptions %UT	Performance Criterion	Duration (in period)
0	100	B	0.5
0	100	B	1
70	30	C	25
0	100	C	250

Notes: 1. Test set-up reference IEC 61000-4-11:2004

14.3.Configuration of EUT on Test

The following equipment are installed on Electrostatic Discharge Test to meet the IEC 61000-4-11 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

14.4.Operating Condition of EUT

(1) Setup the EUT as shown as Section 14.2.

(2) Turn on the power of all equipment.

(3) Let the EUT work in test mode and 15 minutes before taking the test.

14.5.Test Procedure

(1) The interruption is introduced at selected phase angles with specified duration.

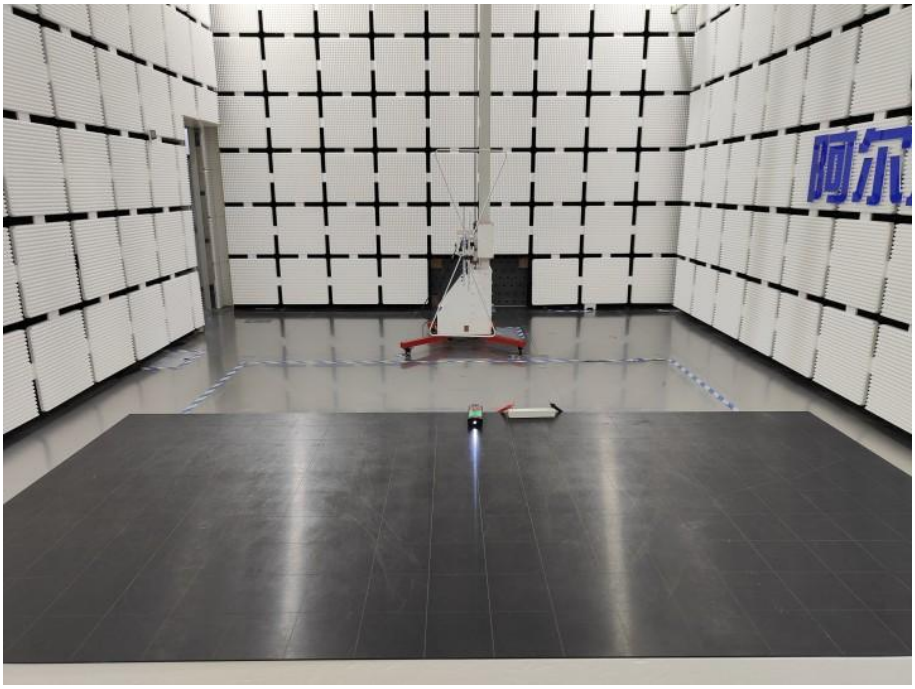
(2) Record any degradation of performance.

14.6.Voltage dips and interruptions Test Results

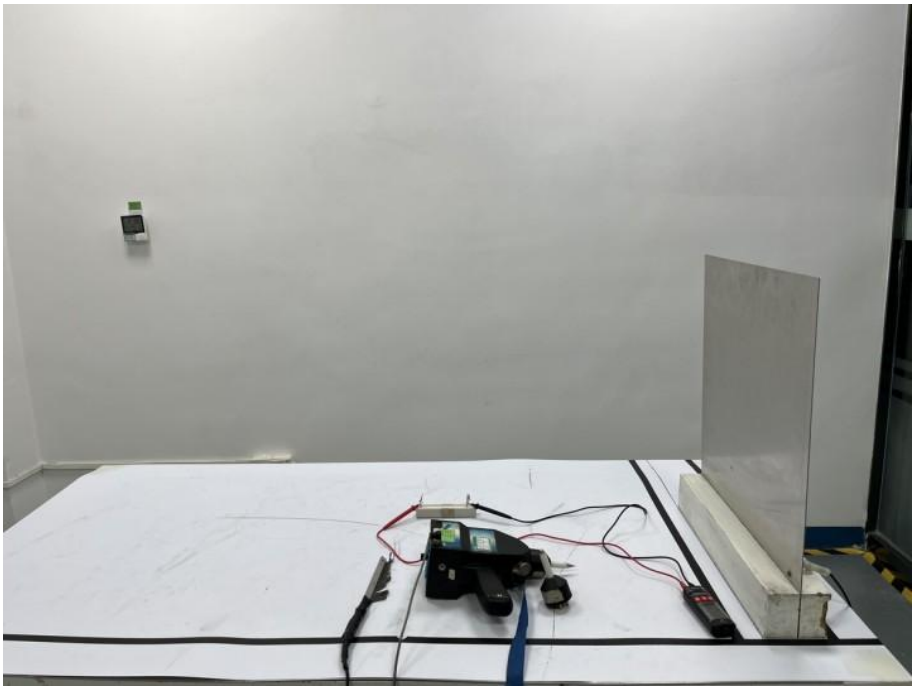
EUT	:	DUAL MODE DETECTOR&MULTIMETER	Test Date	:	N/A
M/N	:	A1	Temperature	:	N/A
Test Engineer	:	N/A	Humidity	:	N/A
Test Voltage	:	N/A	Pressure		N/A
Test Mode	:	N/A			
Test Results	:	**N/A**			
Note: The EUT is supplied by Battery, so this item does not applicable.					

15. Photograph

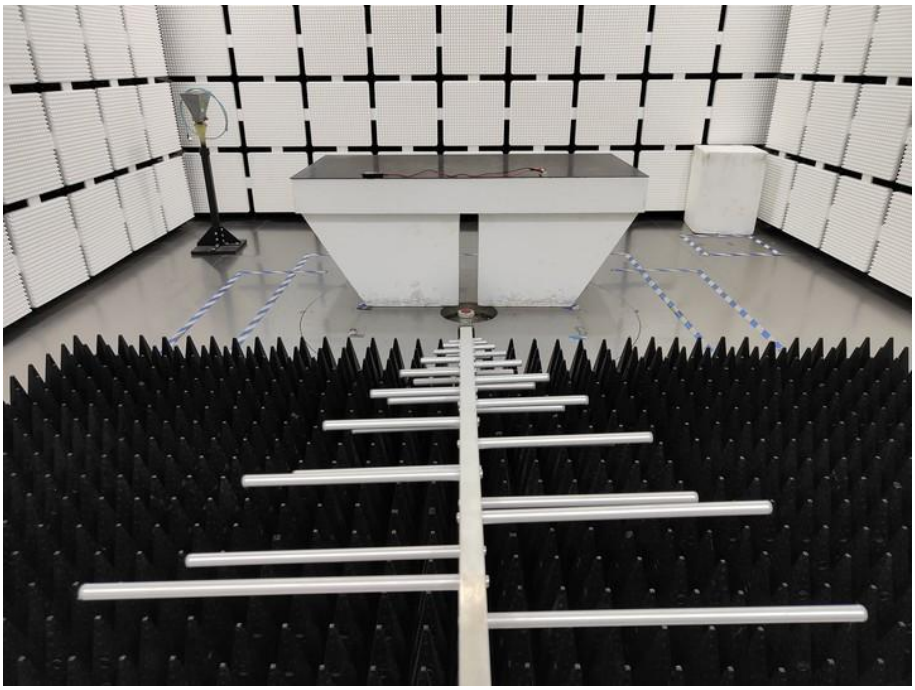
15.1.Photo of Radiated emissions Test (In Semi Anechoic Chamber)



15.2.Photo of Electrostatic Discharge Test



15.3.Photo of RF Field Strength Susceptibility Test



16. Photos Of The EUT

EUT View

EUT View

EUT View

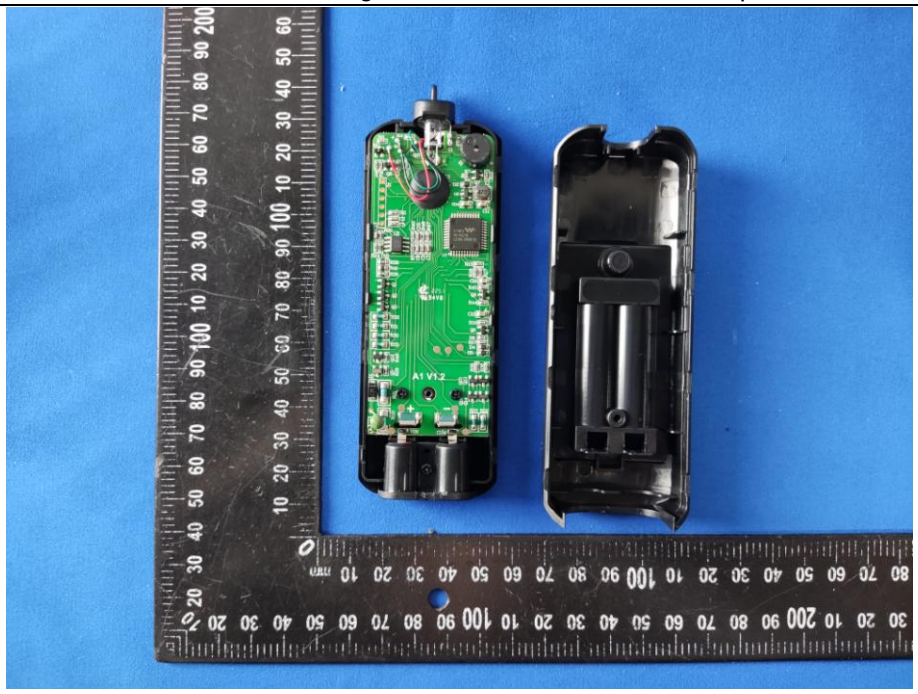
EUT View

EUT View

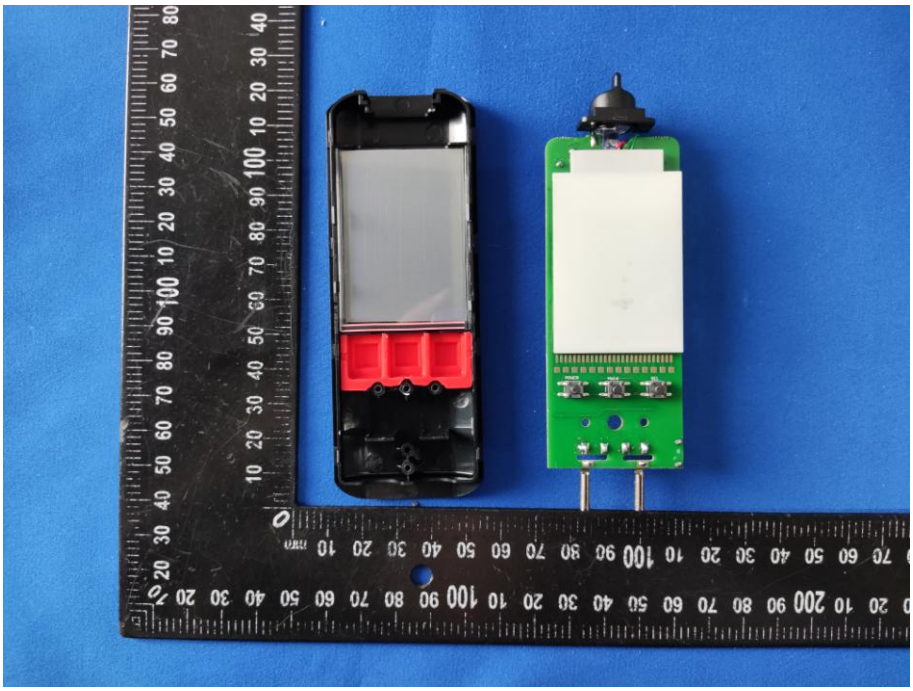
EUT View

EUT View

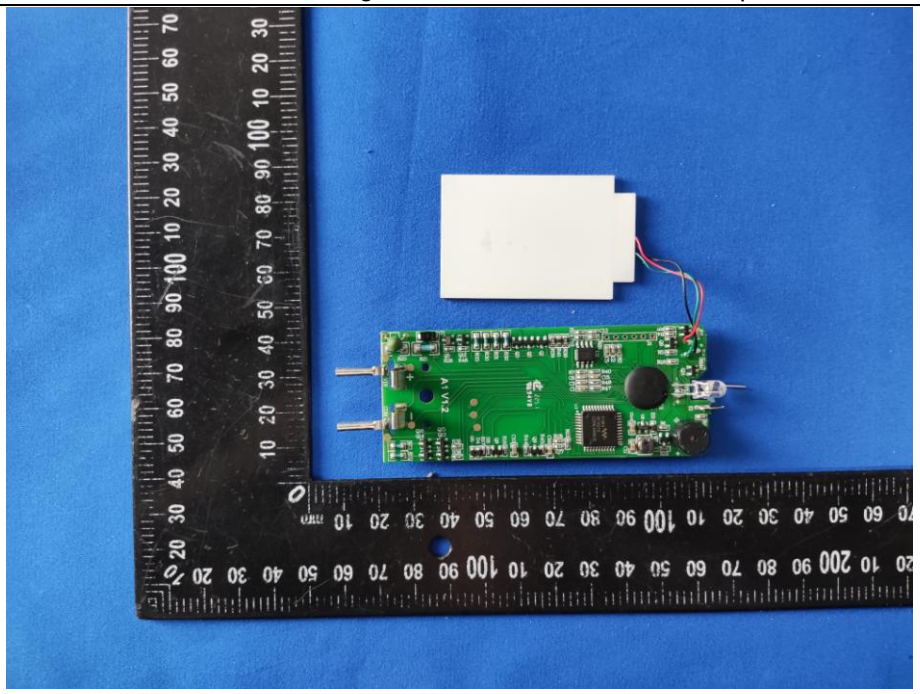
EUT View



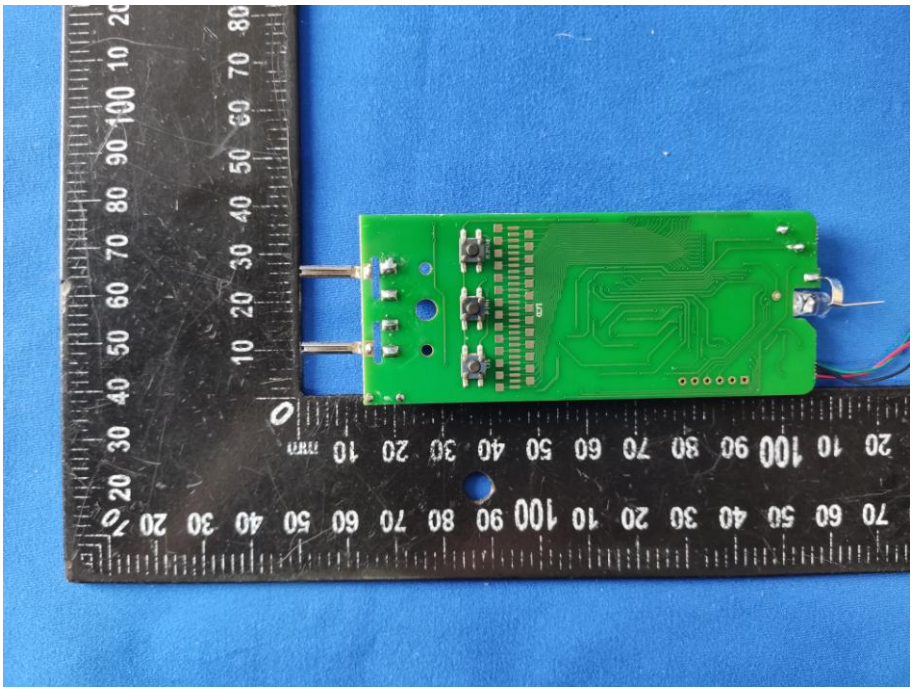
EUT View



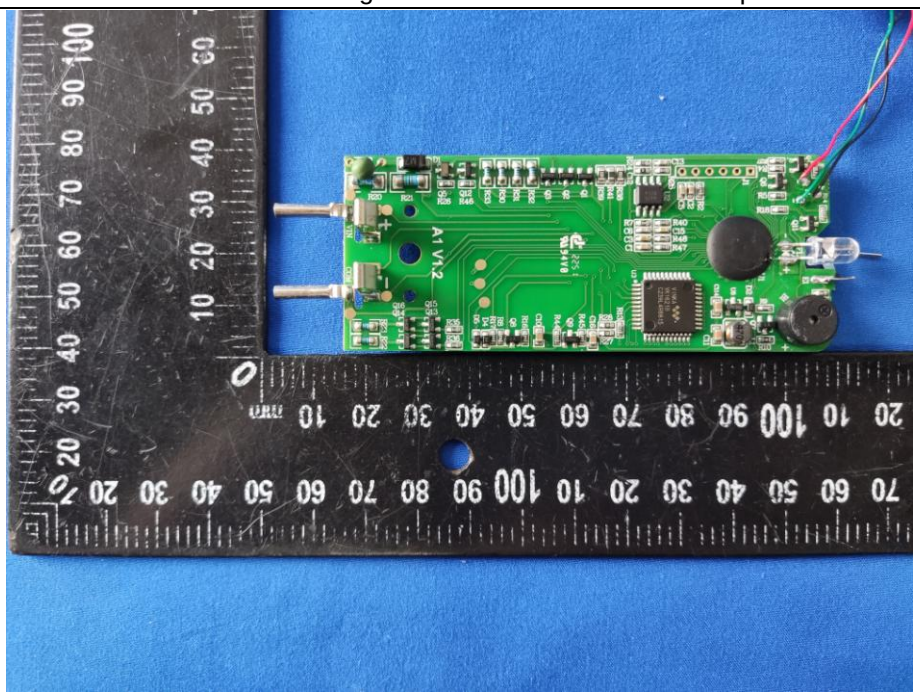
EUT View



EUT View



EUT View



EUT View

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