EMC TEST REPORT

Client Information:

Applicant:	Shenzhen Hongda Electronic Technology Co., Ltd
Applicant add.:	3rd Floor, Building A, Industrial Zone, Yingrenshi Station, Bao'an District, Shenzhen
Brand Name:	N/A

Product Information:

Product Name:	Multimeter
Model No.:	XL830L, MAS830L, DT830B, DT830D, DT9205A, VC830L, DT266, 1AC-D, VC-890DL, DT9205A+
Manufacturer:	Shenzhen Hongda Electronic Technology Co., Ltd
Manufacturer add.:	3rd Floor, Building A, Industrial Zone, Yingrenshi Station, Bao'an District, Shenzhen
Test Standard:	EN IEC 61326-1:2021
Test Date:	Oct. 12, 2023 - Oct. 18, 2023 Issue Date: Oct. 18, 2023
Test Result:	PASS
Issued by:	Shenzhen Huapin Testing Technology Co., Ltd. Add. : Room 302, Comprehensive Building, Songbai Industrial Park, No 4 , Yangyong Industrial Road, Tangxiayong Community, YanluoStreet, Bao'an District , Shenzhen.

Test Engineer	Rose Xiang	Rose Xiang
Reviewed by	Arny Cai	Amy Cai
Approved by	Ken Huang	Ken Huang

Shenzhen Huapin Testing Technology Co., Ltd HPT APPROVED

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(Note: N/A means not applicable)

1. VERSION

Report No.	Issue Date	Description	Approved
HPT-231012L1412E	Oct. 18, 2023	Original	Valid

2. TEST SUMMARY

The Product has been tested according to the following specifications:

EMISSION		
Standard	**Test Item**	**Test result**
EN 61326-1	Conducted disturbance	N/A[1]
EN 61326-1	Radiated disturbance	Pass
EN 61000-3-2	Harmonic current emission(H)	N/A[1]
EN 61000-3-3	Voltage fluctuations & flicker(F)	N/A[1]

IMMUNITY (EN 61326-1))		
Standard	**Test Item**	**Test result**
IEC 61000-4-2	Electrostatic discharge (ESD)	Pass
IEC 61000-4-3	Electromagnetic field(RS)	Pass#
IEC 61000-4-4	Burst (EFT)	N/A[1]
IEC 61000-4-5	Surge	N/A[1]
IEC 61000-4-6	Conducted RF(CS)	N/A[1]
IEC 61000-4-8	Power frequency magnetic field(PFMF)	N/A[2]
IEC 61000-4-11	Voltage dips and voltage interruptions (DIPS)	N/A[1]

Remark:

"#"indicates the testing item(s) was (were) fulfilled by subcontracted lab.

1. The EUT is powered by the DC only , the test item is not applicable
2. The Product doesn't contain any device susceptible to magnetic fields.

3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Value (dB)
Conducted disturbance (150kHz-30MHz)	1.82
Radiated disturbance(30MHz~1GHz)	2.51
Radiated disturbance(1GHz~6GHz)	2.51

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model Difference: All model's the function, software and electric circuit are the same, only with a product color and model named different.

Cable of Product

No.	Cable Type	Quantity	Provider	Length (m)	Specification	Note
1	--	--	--	--	--	--

4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Data Cable	Power Cord
1.	---	---	---	---	---	---

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Test Mode

Test item	Test Mode
Radiated disturbance(30MHz-1GHz)	Working
Electrostatic discharge (ESD) B ☒ Air Discharge: ±2,4,8kV ☒ Contact Discharge: ±4kV ☒ HCP & VCP: ±4kV	Working
Electromagnetic field(RS) A 80MHz-1000MHz&1.4-2GHz,3V, 80%, 2-2.7GHz,1V/m,80%	Working

4.5 Test Environment

Temperature:	25 ℃
Humidity:	55%
Atmospheric Pressure:	101 kpa

5. TEST FACILITY AND TEST INSTRUMENT USED

5.1 Test Facility

All measurement facilities used to collect the measurement data. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

5.2 Test Instrument Used

Radiated disturbance Test (966 chamber)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
966 chamber	ChengYu	966 Room	966	Sep.12, 2023	Sep.11, 2024
Receiver	R&S	ESRP	101154	Sep.12, 2023	Sep.11, 2024
Amplifier	Schwarzbeck	BBV9718	9718-309	Sep.12, 2023	Sep.11, 2024
Amplifier	Schwarzbeck	BBV9744	9744-0037	Sep.12, 2023	Sep.11, 2024
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	VULB9163-942	Sep.12, 2023	Sep.11, 2024
Horn Antenna	SCHWARZBECK	BBHA9120 D	1201	Sep.12, 2023	Sep.11, 2024

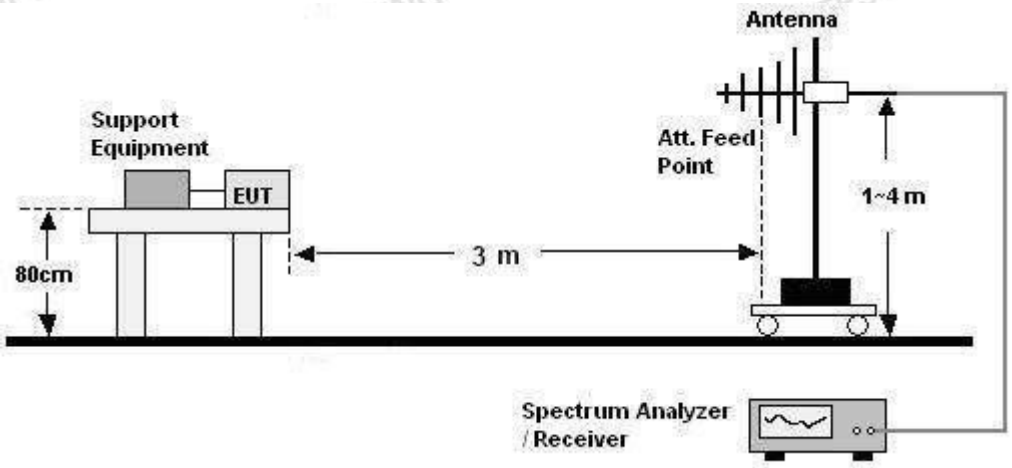
Electrostatic discharge Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
ESD Tester	3C TEST	EDS 30V	ES0121614	Sep.12, 2023	Sep.11, 2024
ESD Tester	KIKISUI	KES4201A	UH002321	Sep.12, 2023	Sep.11, 2024

Electromagnetic field Test (SMQ --- site)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Signal Generator	HP	8648A	3625U00573	Sep.12, 2023	Sep.11, 2024
Amplifier	A&R	500A100	17034	Sep.12, 2023	Sep.11, 2024
Amplifier	A&R	100W/1000M1	17028	Sep.12, 2023	Sep.11, 2024
Audio Analyzer (20Hz~1GHz)	Panasonic	2023B	202301/428	Sep.12, 2023	Sep.11, 2024
Isotropic Field Probe	A&R	FP2000	16755	Sep.12, 2023	Sep.11, 2024
Antenna	EMCO	3108	9507-2534	Sep.12, 2023	Sep.11, 2024
Log-periodic Antenna	A&R	AT1080	16812	Sep.12, 2023	Sep.11, 2024

6. RADIATED DISTURBANCE TEST

6.1 Block Diagram Of Test Setup

30MHz ~ 1GHz:



6.2 Limits

Frequency (MHz)	Quasi-peak limits at 3m dB(μV/m)
30-230	40
230-1000	47

Note: The lower limit shall apply at the transition frequencies.

6.3 Test Procedure

30MHz ~ 1GHz:

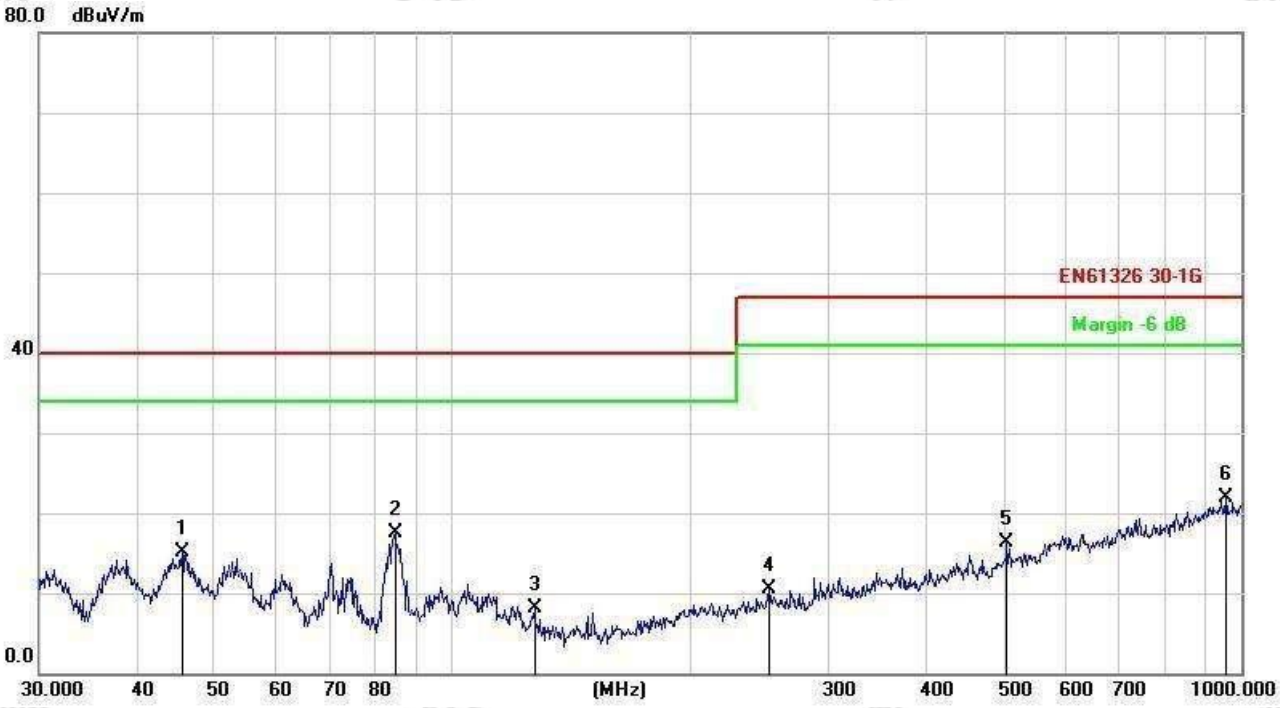
a. The Product was placed on the nonconductive turntable 0.8 m above the ground in a semi anechoic chamber.

b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

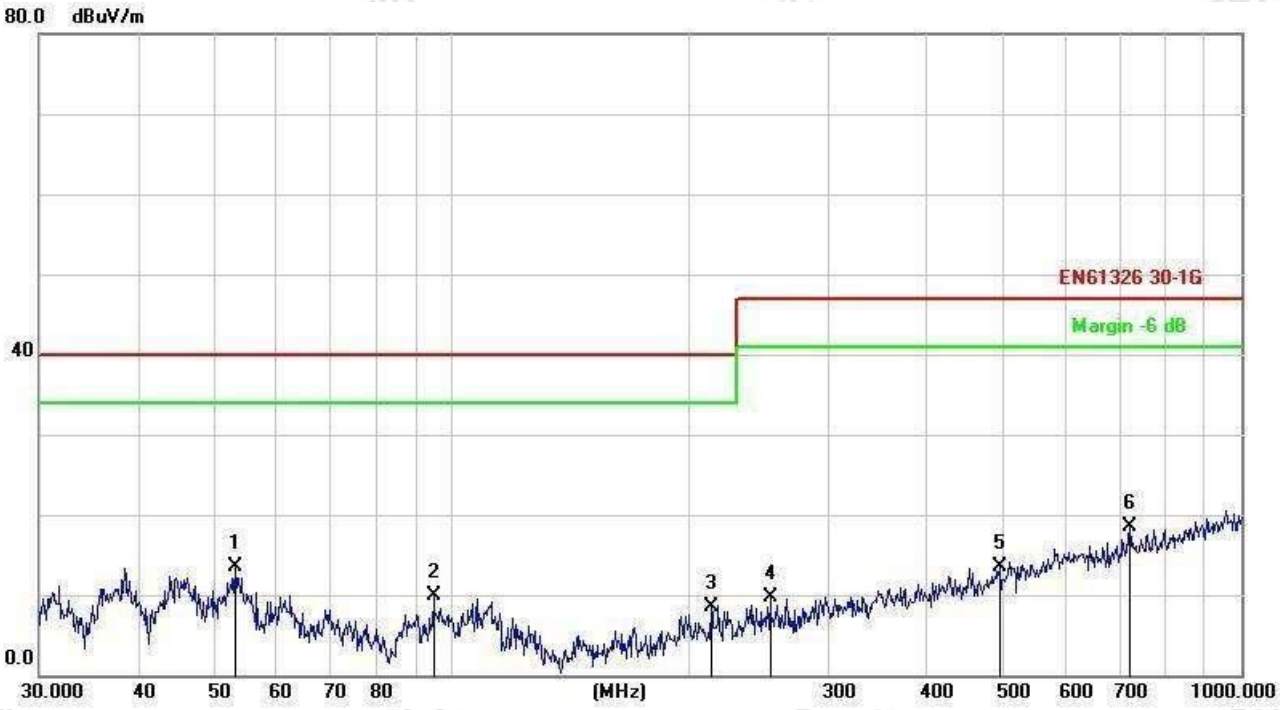
6.4 Test Results

Radiated disturbances Test Data			
Temperature:	26℃	Relative Humidity:	54%
Pressure:	1009hPa	Phase :	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		45.5348	29.11	-14.03	15.08	40.00	-24.92	QP			
2	*	84.7019	36.06	-18.60	17.46	40.00	-22.54	QP			
3		127.2176	26.75	-18.61	8.14	40.00	-31.86	QP			
4		252.0627	25.66	-15.08	10.58	47.00	-36.42	QP			
5		504.7062	25.48	-9.23	16.25	47.00	-30.75	QP			
6		955.4381	23.85	-1.96	21.89	47.00	-25.11	QP			

Radiated disturbances Test Data			
Temperature:	26℃	Relative Humidity:	54%
Pressure:	1009hPa	Phase :	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1	*	53.1313	27.92	-14.46	13.46	40.00	-26.54	QP			
2		94.7601	26.51	-16.53	9.98	40.00	-30.02	QP			
3		213.0151	24.63	-16.21	8.42	40.00	-31.58	QP			
4		252.9482	24.81	-15.08	9.73	47.00	-37.27	QP			
5		494.1984	23.18	-9.59	13.59	47.00	-33.41	QP			
6		721.7259	23.48	-5.03	18.45	47.00	-28.55	QP			

7. IMMUNITY TEST OF GENERAL THE PERFORMANCE CRITERIA

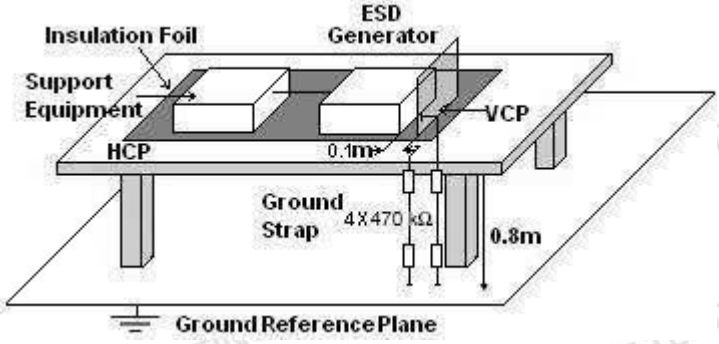
Product Standard	EN IEC 61326-1:2021
CRITERION A	During testing, normal performance within the specification limits.
CRITERION B	During testing, temporary degradation, or loss of function or performance which is self-recovering.
CRITERION C	During testing, temporary degradation, or loss of function or performance which requires operator intervention or system reset occurs.

8. ELECTROSTATIC DISCHARGE (ESD)

8.1 Test Specification

Test Port	:	Enclosure port
Discharge Impedance	:	330 ohm / 150 pF
Discharge Mode	:	Single Discharge
Discharge Period	:	one second between each discharge

8.2 Block Diagram of Test Setup



8.3 Test Procedure

a. Electrostatic discharges were applied only to those points and surfaces of the Product that are accessible to users during normal operation.

b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

c. The time interval between two successive single discharges was at least 1 second.

d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the Product.

e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the Product as fast as possible (without causing mechanical damage) to touch the Product. After each discharge, the ESD generator was removed from the Product and re-triggered for a new single discharge. The test was repeated until all discharges were complete.

g. At least ten single discharges (in the most sensitive polarity) were applied to the Horizontal Coupling Plane at points on each side of the Product. The ESD generator was positioned vertically at a distance of 0.1 meters from the Product with the discharge electrode touching the HCP.

h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the Product were completely illuminated. The VCP (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the Product.

8.4 Test Results

Discharge Method	Discharge Position	Voltage (±kV)	Min. No. of Discharge per polarity (Each Point)	Required Level	Performance Criterion
Contact Discharge	Conductive Surfaces	4	10	B	A
	Indirect Discharge HCP	4	10	B	A
	Indirect Discharge VCP	4	10	B	A
Air Discharge	Slots, Apertures, and Insulating Surfaces	8	10	B	A
Note: N/A					

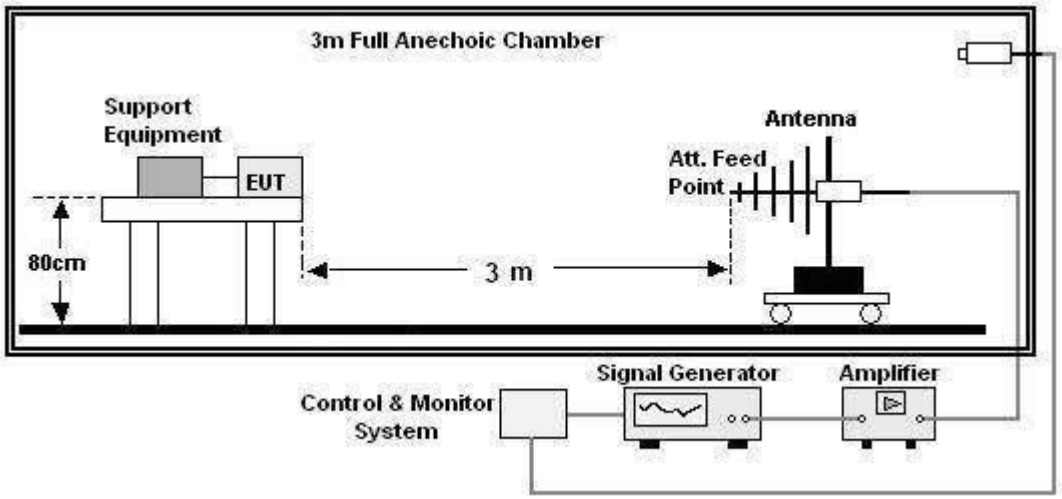
9. ELECTROMAGNETIC FIELD (RS)

9.1 Test Specification

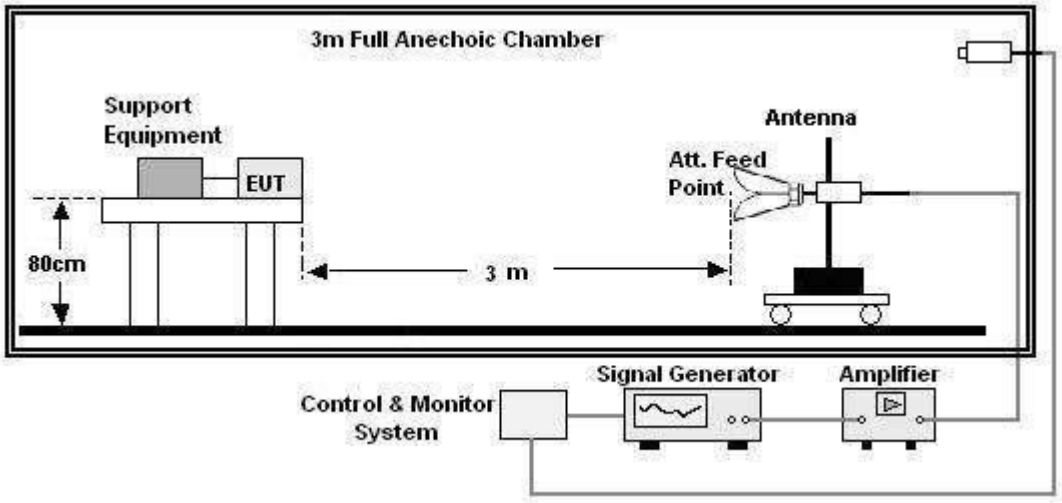
Test Port	:	Enclosure port
Step Size	:	1%
Modulation	:	1kHz, 80% AM
Dwell Time	:	1 second
Polarization	:	Horizontal & Vertical

9.2 Block Diagram of Test Setup

Below 1GHz:



Above 1GHz:



9.3 Test Procedure

a. The testing was performed in a fully-anechoic chamber. The transmit antenna was located at a distance of 3m or 1m from the Product.

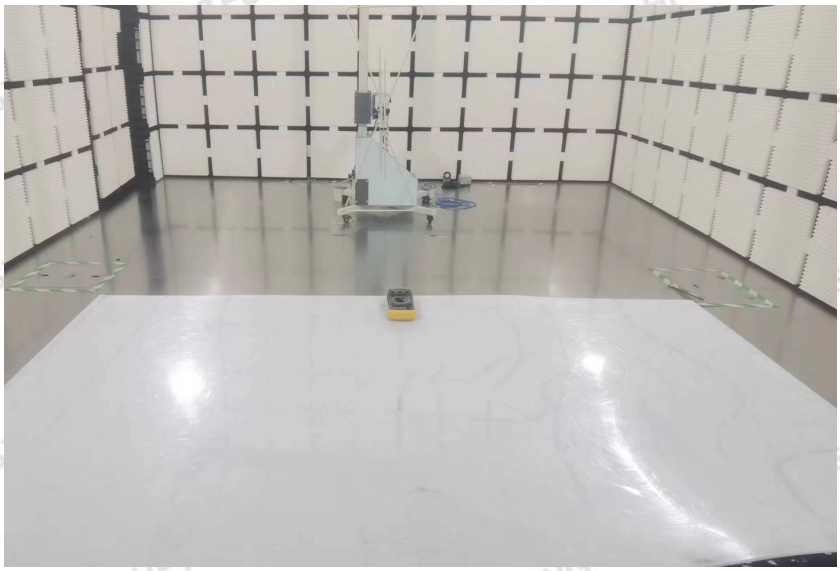
b. The frequency range is swept from 80MHz to 1000MHz and 1400MHz to 2700MHz, with the signal 80% amplitude modulated with a 1 kHz sine wave. The rate of sweep did not exceed 1.5x 10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1%.

c. The test was performed with the Product exposed to both vertically and horizontally polarized fields on each of the four sides.

9.4 Test Results

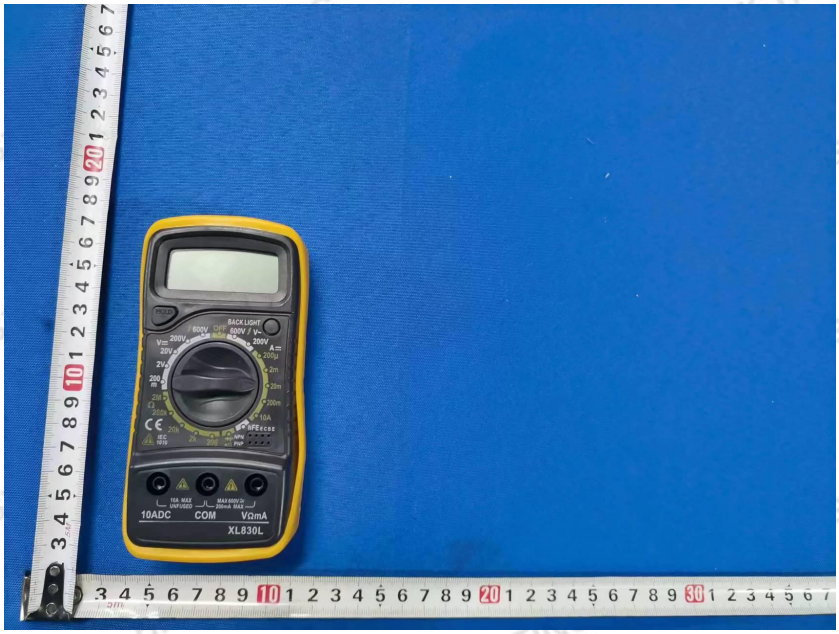
Frequency	Position	Field Strength (V/m)	Required Level	Performance Criterion
80 - 1000	Front, Right, Back, Left	10	A	A
1400 - 2000	Front, Right, Back, Left	3	A	A
2000 - 2700	Front, Right, Back, Left	1	A	A
Note: N/A				

TEST PHOTOS



10. EUT PHOTOGRAPHS

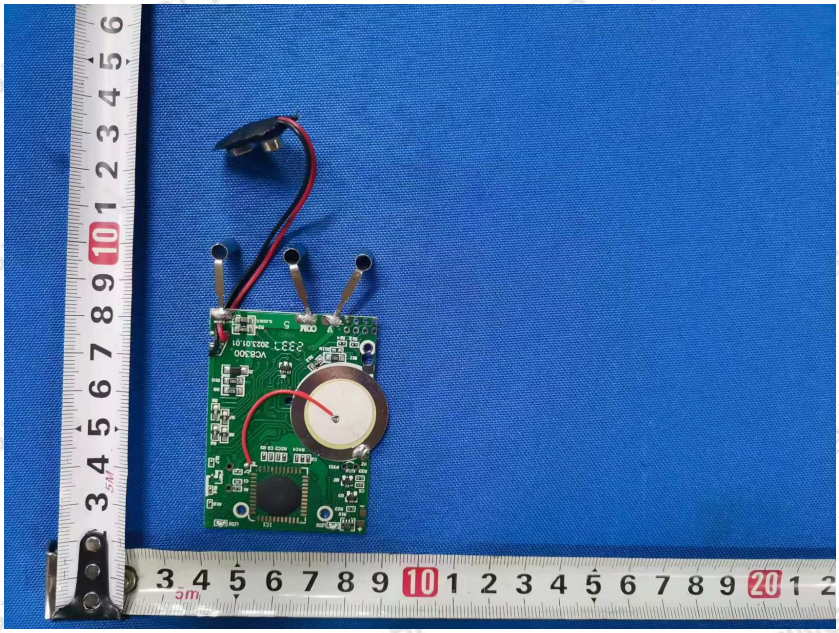
EUT Photo 1



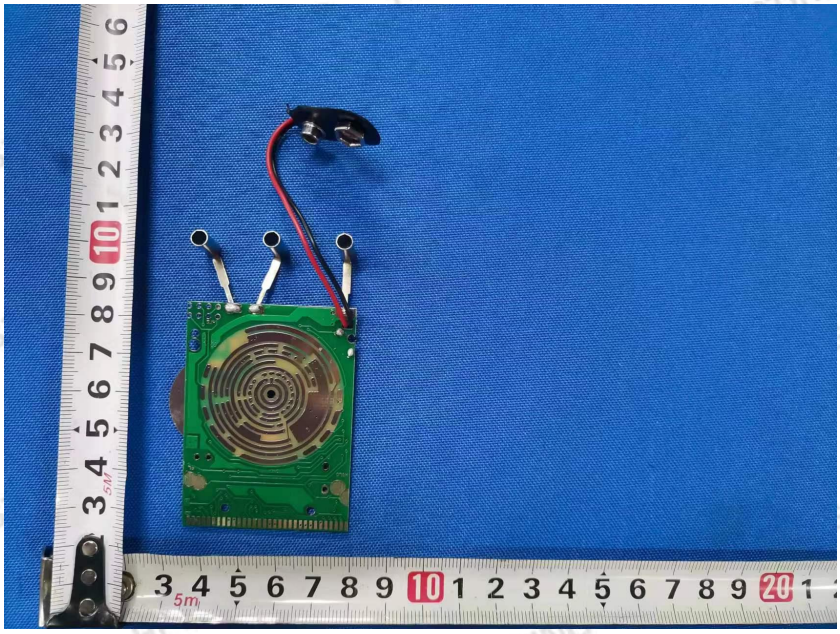
EUT Photo 2

EUT Photo 3

EUT Photo 4



EUT Photo 5



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