

Test Report

Report No. : HA0123NB073354EM
Applicant : Ningbo Zhongdi Industry & Trade Co., Ltd.
Address : Jishigang Industry Zone, Haishu District, Ningbo 315171, P. R. China
Trade Mark(s) : ZD
Manufacturer : Same as the applicant
Address : Same as the applicant
Manufacturing site : Same as the applicant
Address : Same as the applicant

Equipment Under Test (EUT):

EUT Name : Magnifying Lamp
Model/Type No. : ZD-10M, ZD-10MB, ZD-126-1, ZD-126-2
Standards : Refer to page 2
Date of Receipt : July 25, 2023
Date of Test : July 26, 2023 to August 01, 2023
Date of Issue : August 02, 2023
Test Result : **PASS***

Prepared By:

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Reviewed By



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*The test results have been reviewed against the Directives above and found to meet their essential requirement. The results shown in this test report refer only to the sample(s) tested. This document cannot be reproduced except in full, without prior written approval of HATEK.

1 Test Summary

1.1 Test Items

Test Items	Result
Harmonics on AC Mains	N/A
Voltage changes, voltage fluctuations and flicker on AC mains	N/A
Mains Terminal Continuous Disturbance Voltage	N/A
Radiated Electromagnetic Disturbance	P
Radiated disturbance	P
Electrostatic Discharge (ESD)	P
Radio Frequency Electromagnetic Field	P
Power-frequency magnetic field	N/A
Fast Transients (EFT)	N/A
Injected Current	N/A
Surges	N/A
Voltage dips and interruptions to AC Power Port	N/A
Remark:	P: Pass/ F: Fail/ N/A: Not Applicable

1.2 Test Specification

The equipment comply with the requirements according to the following standards:

EN IEC 55015:2019+A11:2020: Limit and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment.

EN 61547:2009: Equipment for general lighting purpose-EMC immunity requirements.

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2 General Information

2.1 Client Information

Applicant : Ningbo Zhongdi Industry & Trade Co., Ltd.

Address : Jishigang Industry Zone, Haishu District, Ningbo 315171, P. R. China

2.2 General Description of E.U.T

Rated input voltage : DC 4.5V by Battery

Protection class : Class III

2.3 Identifies and differences:

All models are the same, just different in appearance.

Therefore, we test ZD-10M and the worst test data is listed in the report as representative.

2.4 Environment

- Residential (domestic) environment
- Commercial and light-industrial environment
- Industrial environment
- Medical environment.

2.5 Submitted Documents

Circuit diagram, Construction Drawings,
BOM, User's Manual and Labels etc.

3 Test Facility and Instrument list

3.1 Test Facility

All the tests done in this report are subcontracted to Shenzhen Most Technology Service Co., Ltd. (No.5, 2nd Langshan Road, North District, Hi-tech Industrial Park, Nanshan, Shenzhen, Guangdong, China)

3.2 Instrument list

Table 1: List of Test and Measurement Equipment of Laboratory

Equipment	Manufacturer	Model	Serial No.	Due Date
Receiver	R&S	ESR3	102043	08/25/2023
LISN	R&S	ENV216	102058	08/25/2023
3-Loop Antenna	R&S	HM020	100984	08/25/2023
CDN	R&S	CDN M2/M3	051/044	08/25/2023
ESD Simulator	EM-TEST	ESD 30N	P1526159867	08/25/2023
3M Chamber & Accessory Equipment	TDK	SAC-3	----	---
Signal Generator	R&S	SMB100A	179680	08/25/2023
Stacked double Log.-Per. Antenna	R&S	HL046E	-----	N/A
Power Amplifier	R&S	BBA150-BC1000	102131	08/25/2023
Power Amplifier	BONN	1060-400/100D	1610682	N/A
Stacked Double Log-Per Antenna	SCHWARZBEC K	STLP9149	9149435	N/A
Compact Generator	EM-TEST	UCS500N7	P1608172945	08/25/2023
coupling/decoupling network	EM-TEST	CNI503B7	P1626181212	08/25/2023
Motorized Variac	EM-TEST	MV2616	P1532162313	08/25/2023
Signal Generator	R&S	SMC100A	105636	08/25/2023
Power Amplifier	R&S	BBA150A200B250	102124	08/25/2023
Attenuator	Bird	300-A-FFN-06	1617	08/25/2023
CDN	FCC	FCC-801-M2/M3-16A	170209	08/25/2023
Harmonic & Flicker System	EM-TEST	DPA 503N& AIF 503N32.1	P1545166605 & P1613178045	08/25/2023
Muitifunction AC/DC Power Source	EM-TEST	NetWave 30-400	P1613178144	08/25/2023

3.3 Measurement Uncertainty

Conducted Emission (9-150KHz)	:	U = 3.6 dB
Radiated Emission (30-1000MHz)	:	U = 4.5 dB
Expanded Measurement Uncertainty (K=2)		



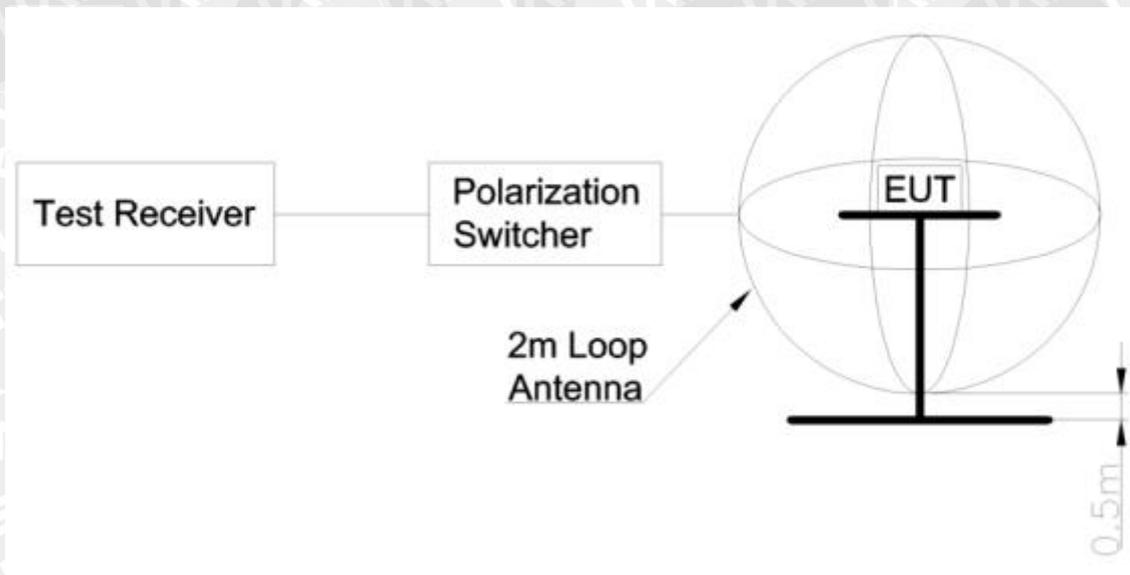
4 Test Results EMISSION

4.1.1 Radiated Electromagnetic Disturbance

General test information

Basic Standard	:	EN IEC 55015:2019+A11:2020
Port	:	Enclosure
Frequency range	:	9 kHz-30MHz
Kind of test site	:	EMC Chamber
Temperature	:	20-25°C
Relative Humidity	:	45-50 %RH
Input Voltage	:	4.5V
Operational condition	:	Illumine
Test result	:	Pass

Block Diagram of Test Set up



Test Procedure

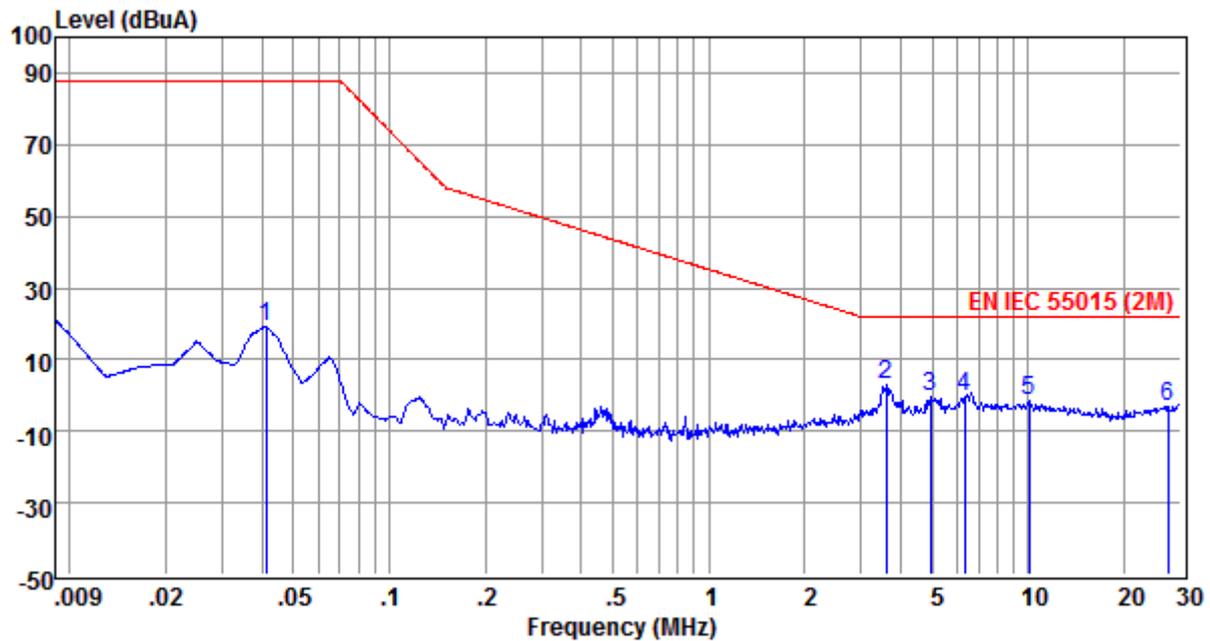
The measurement equipment like test received, loop antenna and coaxial switch are in compliance with the CISPR 16-1 series standards. The test setup was made according to Clause 9 of EN IEC 55015:2019+A11:2020.

The EUT operated in ON mode and at its rated voltage. The EUT is put on a wooden table in the center of the loop antenna. Before a measurement the EUT was operated for about 20 min.

Induced current in the loop antenna was measured by means of a current probe (1V/A) according to clause 9 of EN IEC 55015:2019+A11:2020. The three field components were measured in sequence by means of a coaxial switch (loop antenna controller). The current in the three large loop antennas, originating from the three mutually orthogonal magnetic field components, were measured in sequences. Each value was fulfill the requirements given. The following figures were those measured.



Figure 1: Graphic description of radiated electromagnetic disturbances, X direction

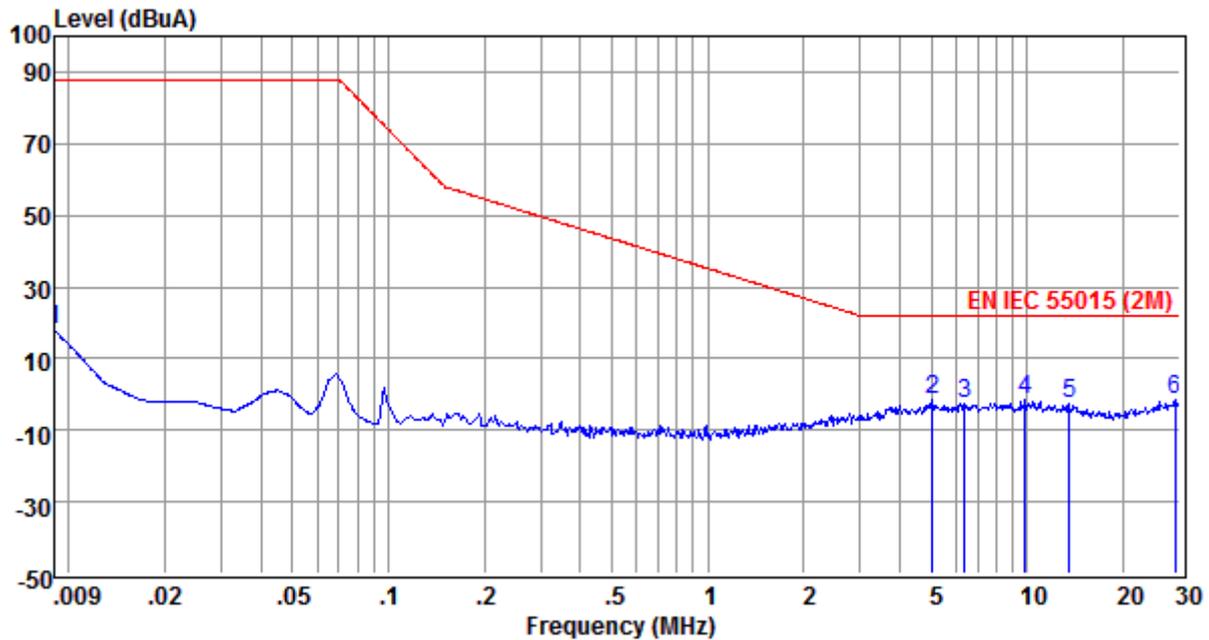


Pol: X

	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBpW	dB	dB	dBpW	dBpW	dB	
1	0.04	20.51	0.00	-1.19	19.32	88.00	-68.68	Peak
2	3.58	0.49	0.00	2.51	3.00	22.00	-19.00	Peak
3	4.95	-2.11	0.00	1.98	-0.13	22.00	-22.13	Peak
4	6.32	-1.74	0.00	1.62	-0.12	22.00	-22.12	Peak
5	10.04	-2.56	0.00	0.83	-1.73	22.00	-23.73	Peak
6	27.44	-3.04	0.00	0.13	-2.91	22.00	-24.91	Peak

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss.
 2. The emission levels that are 20dB below the official limit are not reported.

Figure 2: Graphic description of radiated electromagnetic disturbances, Y direction

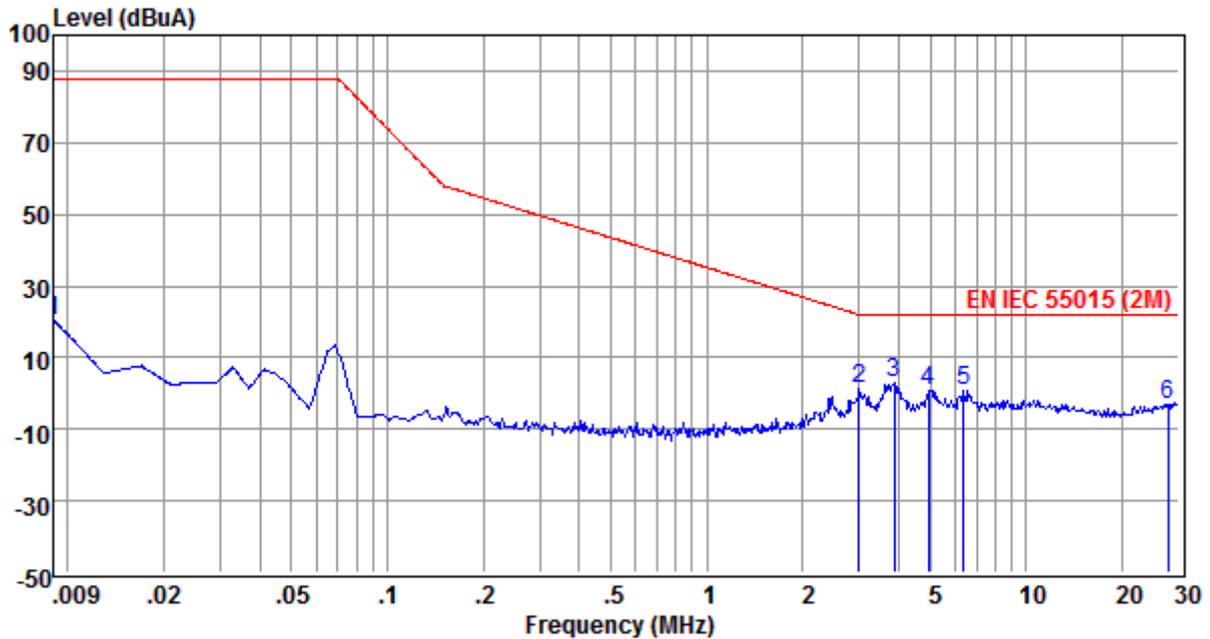


Pol: Y

	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBpW	dB	dB	dBpW	dBpW	dB	
1	0.01	19.96	0.00	-2.10	17.86	88.00	-70.14	Peak
2	5.04	-1.88	0.00	0.16	-1.72	22.00	-23.72	Peak
3	6.37	-2.11	0.00	-0.27	-2.38	22.00	-24.38	Peak
4	9.87	-1.90	0.00	0.58	-1.32	22.00	-23.32	Peak
5	13.55	-4.74	0.00	2.22	-2.52	22.00	-24.52	Peak
6	29.04	0.10	0.00	-1.45	-1.35	22.00	-23.35	Peak

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss.
 2. The emission levels that are 20dB below the official limit are not reported.

Figure 3: Graphic description of radiated electromagnetic disturbances, Z direction



Pol: Z

	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBpW	dB	dB	dBpW	dBpW	dB	
1	0.01	23.36	0.00	-2.90	20.46	88.00	-67.54	Peak
2	3.00	1.71	0.00	-0.22	1.49	22.01	-20.52	Peak
3	3.85	3.42	0.00	-0.55	2.87	22.00	-19.13	Peak
4	4.95	1.98	0.00	-1.02	0.96	22.00	-21.04	Peak
5	6.37	2.18	0.00	-1.38	0.80	22.00	-21.20	Peak
6	27.89	-1.16	0.00	-1.84	-3.00	22.00	-25.00	Peak

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss.
 2. The emission levels that are 20dB below the official limit are not reported.

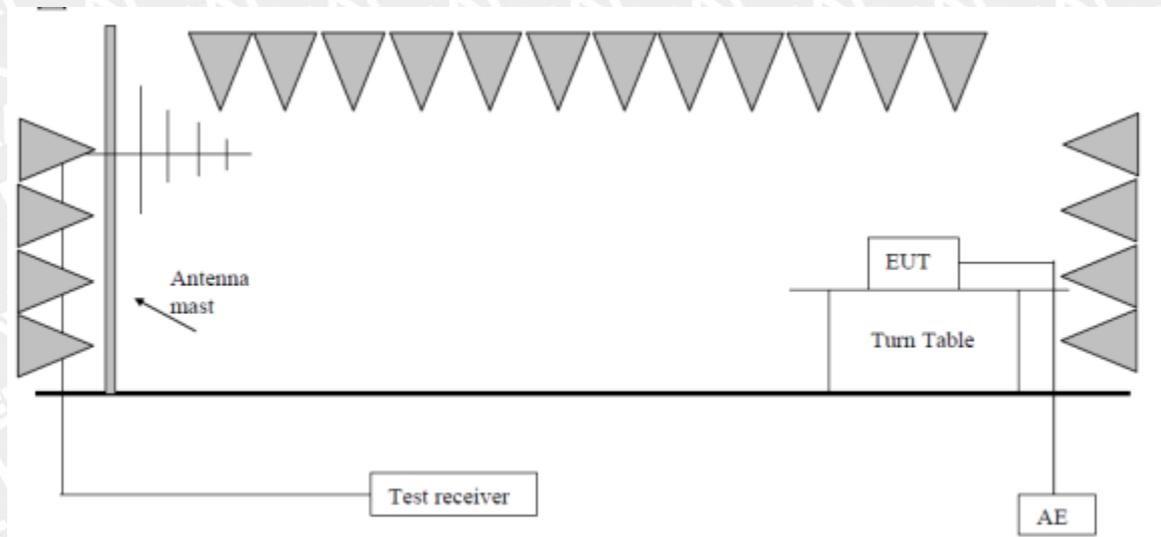
4.2 Emission in the Frequency Range above 30 MHz

4.2.1 Radiated disturbance

General test information

Frequency Range	: 30 - 1000MHz
Kind of test site	: Semi-anechoic Chamber
Port	: Enclosure
Measurement Distance	: 3 m
Polarization of Antenna	: Both horizontal and vertical
Temperature	: 20-25°C
Relative Humidity	: 45-50 %RH
Input Voltage	: 4.5V
Operational condition	: Illumine
Limit	: EN IEC 55015:2019+A11:2020, clause 4 table 3b
Test result	: Pass

Block Diagram of Test Set up



- For table top equipment, wooden support is 0.8m height.
- For floor standing equipment, wooden support is 0.1m height.

Test Procedure

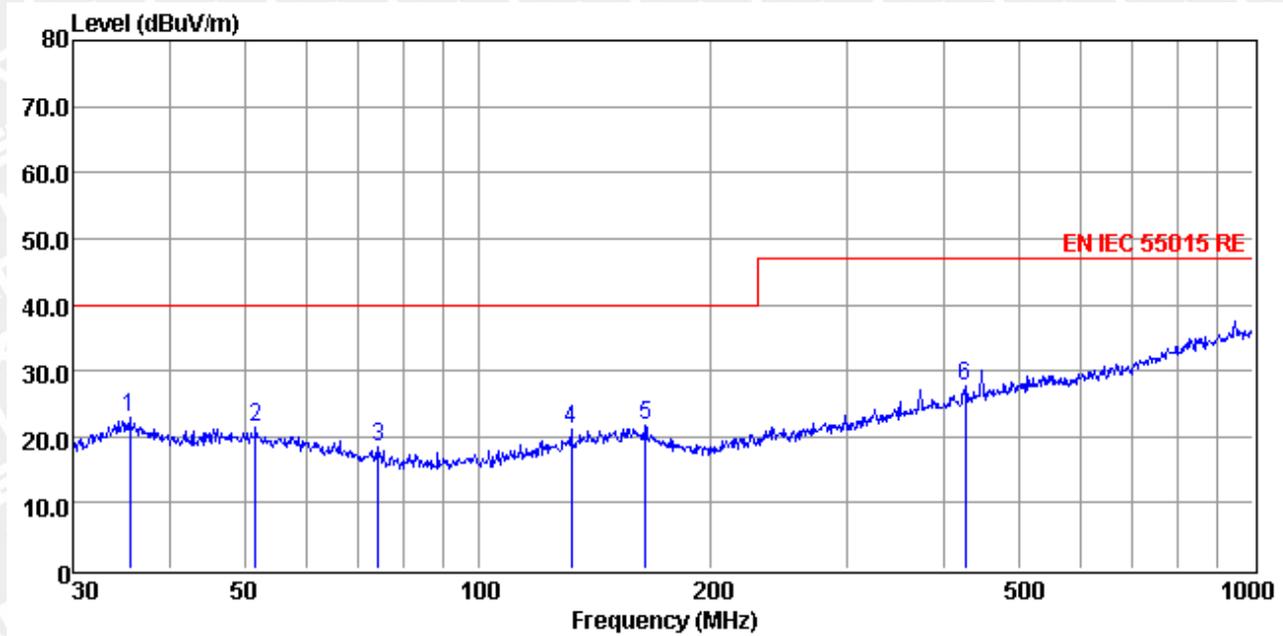
The radiated disturbance was measured in the frequency range from 30MHz to 300MHz according to EN IEC 55015:2019+A11:2020. The measurement was performed in accordance with the method specified in Clause10 of CISPR 22.

The radiated disturbance test was performed in a 3m semi-anechoic chamber. The test distance is 3m. The 10m radiated emission limits are converted to 3m radiated emission limits by an inverse proportionality of 20 dB per decade. The normalized site attenuation of the semi-anechoic chamber is regularly calibrated to ensure the radiated disturbance test results are valid. During the test, the EUT was placed on a 0.8m high wooden support above the reference ground plane. The turntable was rotated 360° around and the antenna was varied from 1m to 4m to find the maximum disturbance. The test was performed with the antenna both in its horizontal and vertical polarizations.

The following figures were those measured and recorded by a test receiver. The curves in the figure were those measured with a Peak detector. The symbol “x” in the figures are those of QP value which were measured in final measurement. Quasi-peak measurements were only performed at those critical frequencies obtained during the test with Peak Detector.

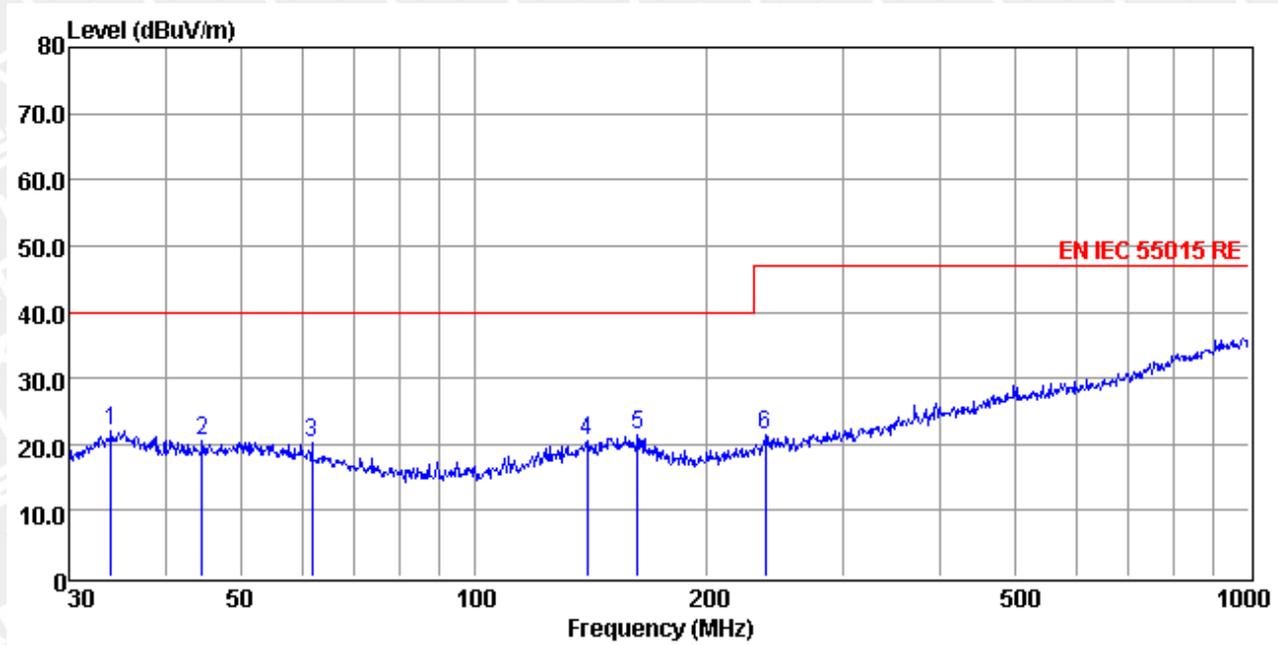
Remark: AC mode and DC mode were both tested, and most unfavorable test data of AC mode is recorded. And all the tests were carried out using AC/DC transformer for power supply.

Figure 4: Spectral Diagrams, Radiated Emission, 30MHz-1000MHz, Horizontal



	Freq	Read	CableAntenna	Preamp	Limit	Over		
	MHz	Level	Loss	Factor	Line	Limit	Remark	
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dB	
1	35.50	34.80	2.18	15.43	29.64	22.77	40.00	-17.23 Peak
2	51.66	35.36	2.44	13.30	29.61	21.49	40.00	-18.51 Peak
3	74.40	35.81	2.77	9.75	29.77	18.56	40.00	-21.44 Peak
4	131.76	35.45	3.36	12.09	29.86	21.04	40.00	-18.96 Peak
5	164.33	35.12	3.69	12.59	29.83	21.57	40.00	-18.43 Peak
6	425.03	36.45	5.37	16.33	30.38	27.77	47.00	-19.23 Peak

Figure 5: Spectral Diagrams, Radiated Emission, 30MHz-1000MHz, Vertical



	Read Freq	Read Level	Cable Loss	Antenna Factor	Preamplifier	Level	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	34.04	34.29	2.15	15.10	29.65	21.89	40.00	-18.11	Peak
2	44.59	34.44	2.33	13.35	29.61	20.51	40.00	-19.49	Peak
3	61.78	35.43	2.60	12.00	29.69	20.34	40.00	-19.66	Peak
4	139.85	34.23	3.44	12.59	29.85	20.41	40.00	-19.59	Peak
5	162.61	34.86	3.67	12.83	29.83	21.53	40.00	-18.47	Peak
6	237.48	35.25	4.30	11.65	29.93	21.27	47.00	-25.73	Peak

5 Test Results IMMUNITY

Performance criterion:

The performance criteria are based on the general criteria of the standard and derived from the product specification

Performance criterion A: The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed.

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, or by any operation specified in the instructions for use.

Room temperature : 20-25°C
Relative Humidity : 45-50 %RH

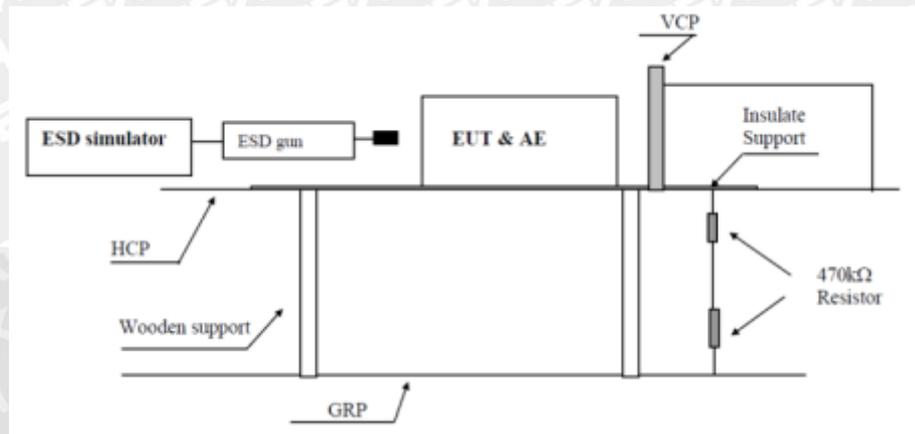
Conclusion: Pass

5.1 Enclosure

5.1.1 Electrostatic Discharge

Charge voltage	: $\pm 4.0\text{kV}$ (Conducted Discharge) $\pm 8.0\text{kV}$ (Air Discharge)
Polarity	: positive / negative
Number of discharges	: >10
Performance criteria	: B

Block Diagram of Test Set up



Test Procedure

The immunity against electrostatic discharge was tested in accordance with EN 61547:2009. Test setup and ESD-Generator are according to EN 61000-4-2 which is specified by EN 61547:2009.

The EUT is placed on 0.8 m wood table above the ground plane. And the minimum distance between the EUT and all other conductive structures except the ground plane beneath the EUT is more than 0,5m. The reference ground plane is an aluminium sheet of 0,25mm minimum thickness. The reference ground plane is connected to the protective earth. The size of the ground plane is 2m x 2m.

A horizontal coupling plane (HCP), 1,6m x 0,8m, is placed on the table and isolated from the EUT and cables by an insulating support 0,5mm thick. Vertical coupling plane (VCP) of dimensions 0,5m x 0,5m is placed parallel to and positioned at a distance of 0,1m from the EUT.

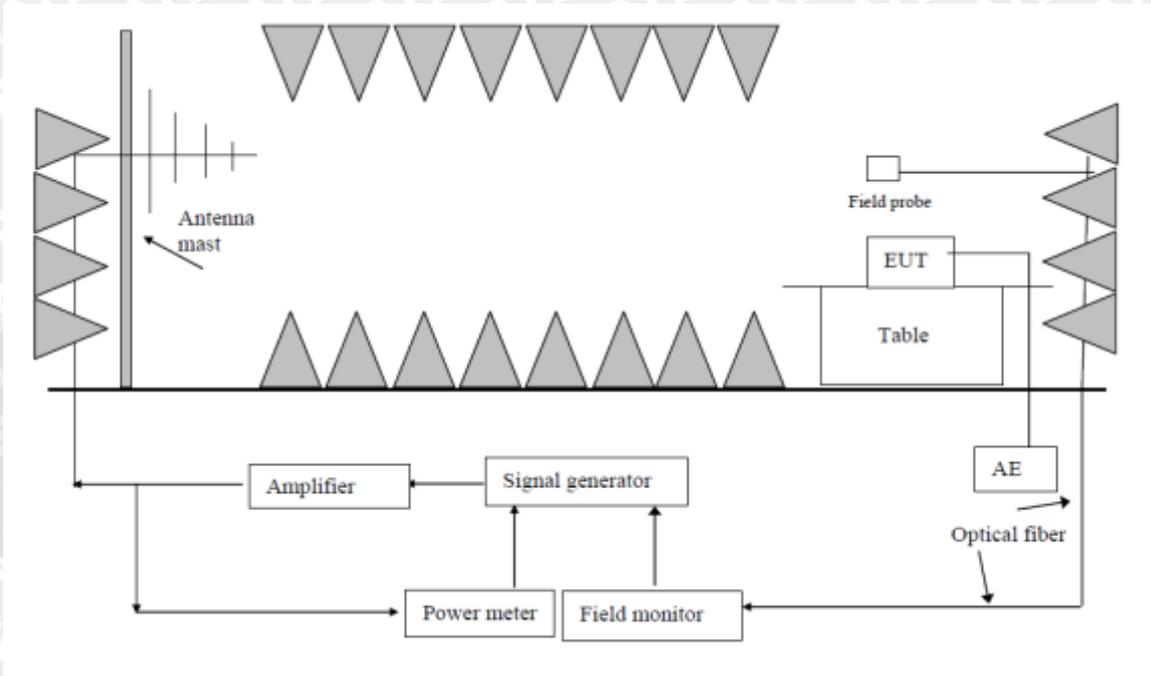
Table 2: ESD, Positive / Negative Polarity

Position	Kind of Discharge	Remarks	Result
Accessible nonmetal Enclosure	Air discharge $\pm 8\text{kV}$	No change of luminous intensity	Pass
Metal Enclosure	Contact discharge $\pm 4\text{kV}$	No change of luminous intensity	Pass
Coupling plane (Both HCP and VCP)	Contact discharge $\pm 4\text{kV}$	No change of luminous intensity	Pass

5.1.2 Radio Frequency Electromagnetic Field

Test Level	:	3V/m
Frequency Range	:	80-1000MHz
Modulation	:	80%AM, 1kHz
Frequency Sweep Speed	:	≤0.005 octave/s (1.5×1E-3 decades/s)
Performance Criteria	:	A

Block Diagram of Test Set up



Test Procedure

The immunity against radio-frequency electromagnetic fields in the frequency range between 80MHz and 1000MHz was tested in accordance to IEC 61000-4-3 which is specified by clause 4.2.3.1 in EN 61547:2009.

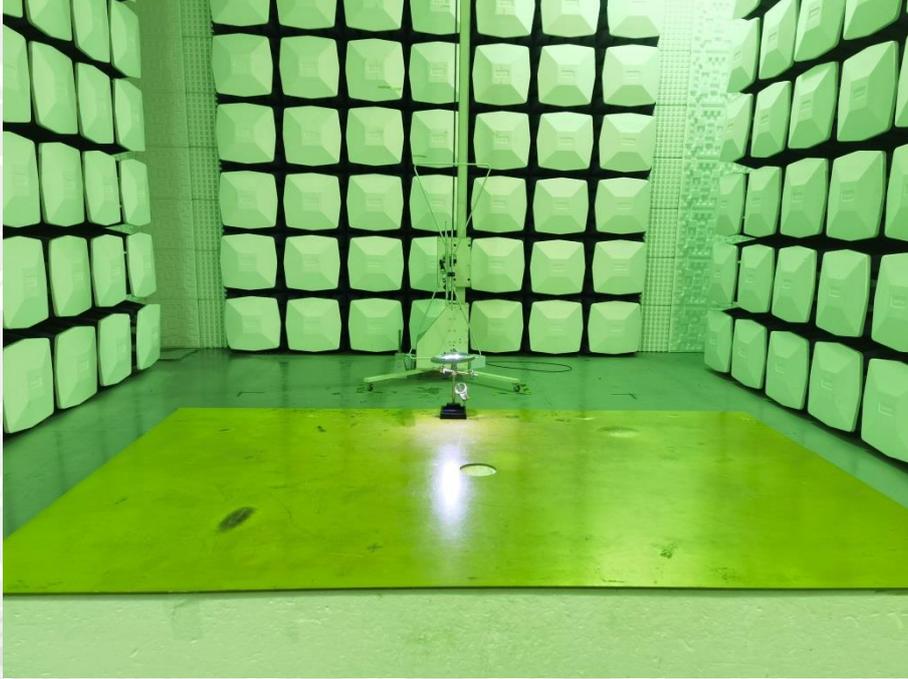
The test was performed inside a 3m modified semi-anechoic chamber. During the test the part of the ground plane between the field generating antenna and the equipment under test was covered by absorbing material. The distance between the tip of the antenna and the side of the system tested is 3m. The field uniformity of the 1.5mx1.5m plane where the surface of the EUT tested coincides with is regularly calibrated to ensure the 0-6dB field uniformity criterion as specified by IEC 61000-4-3 is met.

Table 3: Radiated Susceptibility, Field Strength 3V/m

Position	Remarks	Result
EUT in vertical orientation	No change of luminous intensity	Pass
EUT in horizontal orientation	No change of luminous intensity	Pass

6 Photographs of the EUT and Test Set-Up

Photograph 1: Set-up for Radiated Emission



Photograph 2: Overall view of EUT (ZD-10MB)



Photograph 3: Overall view of EUT (ZD-126-1)



Photograph 4: Overall view of EUT (ZD-126-2)



Photograph 5: Overall view of EUT (ZD-10M)



Photograph 6: Overall view of EUT (ZD-10M)



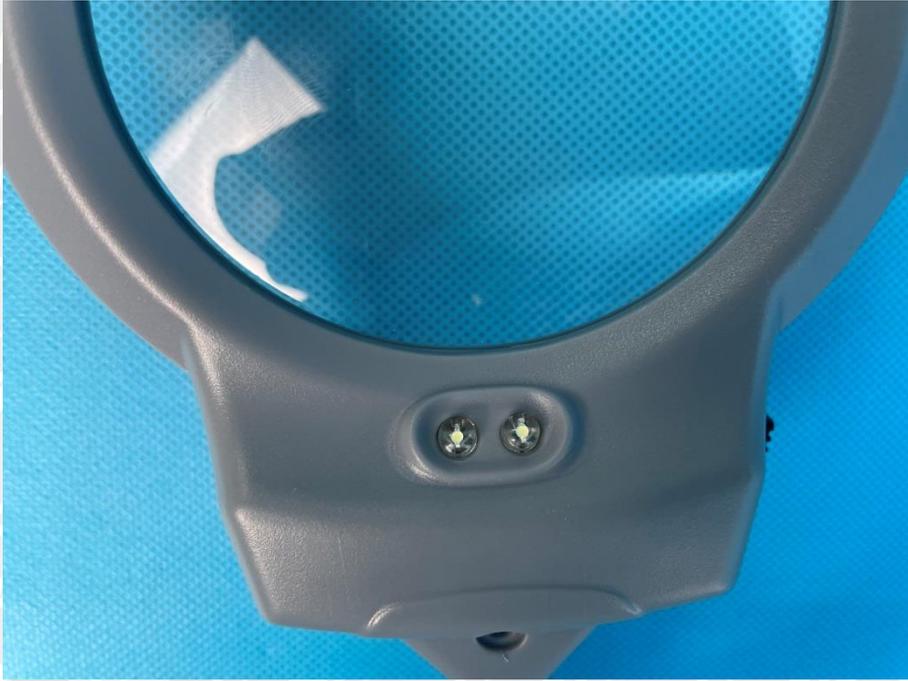
Photograph 7: Overall view of EUT (ZD-10M)



Photograph 8: Overall view of EUT (ZD-10M)



Photograph 9: Overall view of EUT (ZD-10M)



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