

## TEST REPORT

Report No. : HA0119090742E

Applicant :

Address :

Brand Name :

Manufacturer :

Address :

### Equipment Under Test (EUT):

EUT Name : Flash Light

Model/Type No. :

Standards : Refer to page 2

Date of Receipt : September 12, 2019

Date of Test : September 12, 2019 to September 18, 2019

Date of Issue : September 19, 2019

Test Result : PASS\*

Prepared By

*Bin Dong*

Engineer

Reviewed By

*[Signature]*

Technical Manager



\*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.

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## 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 on Input and Output AC Power Lines (EFT)	N/A
Injected Current into AC Power Port	N/A
Surges to AC Power Port	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 55015:2013+A1:2015: 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 Henglang Import & Export CO., LTD.

**Address** : 5F, No. 658 Taoyuan North Road, Ninghai, Ningbo, China

### 2.2 General Description of E.U.T

Rated input voltage : DC 5V

Protection class : Class III

### 2.3 Identifies and differences:

A single model.

### 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

**Laboratory** : Centre Testing International (Ningbo) Co., Ltd.

**Address** : 1-2F, Eastern Factory, No.76, Jinghua Road, High-Tech Zone, Ningbo, Zhejiang, China

The tests were conducted by HATEK engineer directly in the above laboratory.

### 3.2 Instrument list

**Table 1: List of Test and Measurement Equipment of Laboratory**

No.	Equipment	Manufacturer	Model	Serial No.	Due Date
1.	Receiver	R&S	ESR3	102043	08/27/2020
2.	3-Loop Antenna	R&S	HM020	100984	07/05/2020
3.	3M Chamber & Accessory Equipment	TDK	SAC-3	---	---
4.	Receiver	R&S	ESU8	100537	08/27/2020
5.	Antenna Towers	---	T-E-TAC-2	MF780208449	---
6.	Microwave Preamplifier	R&S	SCU-08	100748	08/27/2020
7.	Antenna(30MHz~1G Hz)	SCHWARZBECK	VULB9163	9163-965	11/15/2019
8.	ESD Simulator	EM-TEST	ESD 30N	P1526159867	11/20/2019
9.	3M Chamber & Accessory Equipment	TDK	SAC-3	----	---
10.	Signal Generator	R&S	SMB100A	179680	08/27/2020
11.	Stacked double Log.-Per. Antenna	R&S	HL046E	-----	N/A
12.	Power Amplifier	R&S	BBA150-BC1000	102131	08/27/2020
13.	Power Amplifier	BONN	1060-400/100D	1610682	N/A
14.	Stacked Double Log-Per Antenna	SCHWARZBECK	STLP9149	9149435	N/A

## 3.3 Measurement Uncertainty

Conducted Emission (9-150KHz)

:  $U = 3.6 \text{ dB}$

Radiated Emission (30-1000MHz)

:  $U = 4.5 \text{ dB}$

Expanded Measurement Uncertainty (K=2)



## 4 Test Results EMISSION

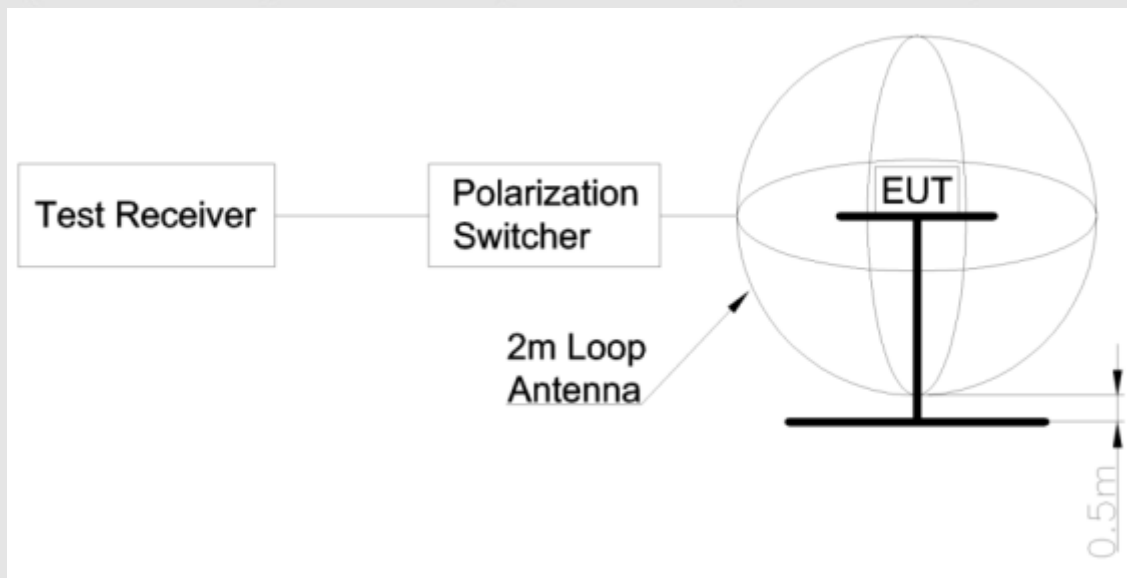
### 4.1 Emission in the Frequency Range from 0 kHz to 30 MHz

#### 4.1.1 Radiated Electromagnetic Disturbance

##### General test information

Basic Standard	:	EN 55015:2013+A1:2015
Port	:	Enclosure
Frequency range	:	9 kHz-30MHz
Kind of test site	:	EMC Chamber
Temperature	:	20-25°C
Relative Humidity	:	45-50 %RH
Input Voltage	:	DC 5V
Operational condition	:	ON
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 55015:2013+A1:2015.

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.

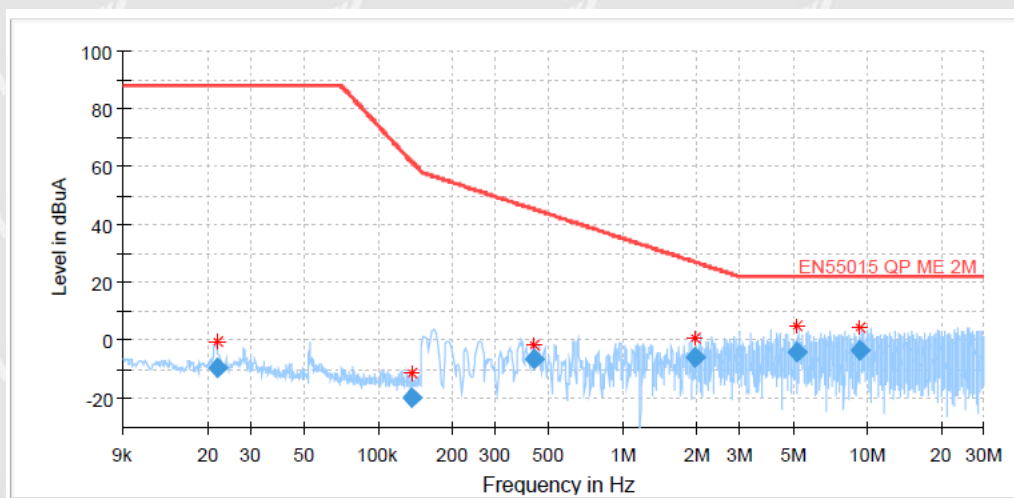
Induced current in the loop antenna was measured by means of a current probe (1V/A) according to clause 9 of EN 55015:2013+A1:2015. The three field components were measured in sequence by means of a coaxial switch (loop antenna controller). The current in the three large loop antennas, originating from the three mutually orthogonal magnetic field components, were measured in sequences. Each value was fulfill the requirements given. The following figures were those measured.



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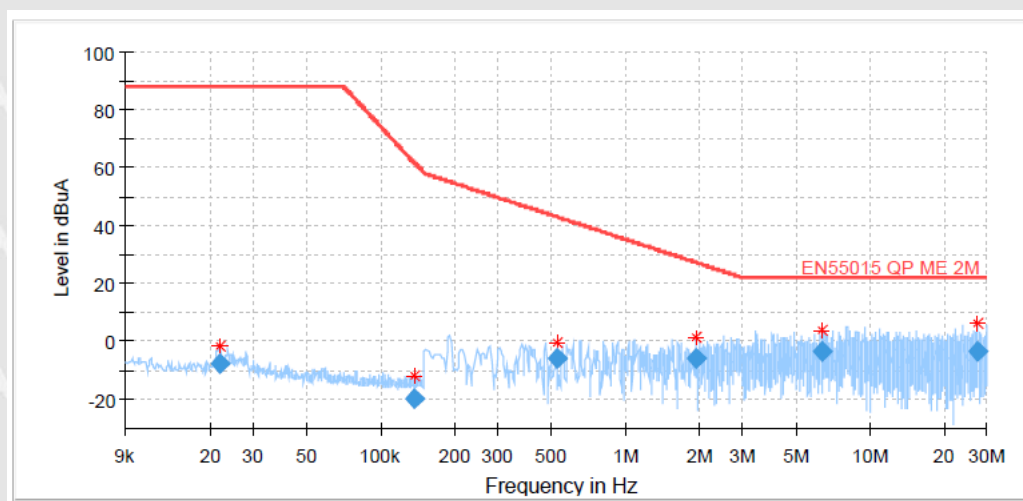
**Figure 1: Graphic description of radiated electromagnetic disturbances, X direction**



## Final Result

Frequency (MHz)	QuasiPeak (dBuA)	Limit (dBuA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.021839	-9.18	88.00	97.18	1000.0	0.200	X	0.0
0.136289	-19.74	61.77	81.51	1000.0	0.200	X	0.0
0.428985	-6.15	45.37	51.52	1000.0	9.000	X	0.0
1.980120	-5.80	26.99	32.79	1000.0	9.000	X	0.1
5.157000	-3.86	22.00	25.86	1000.0	9.000	X	0.1
9.401580	-3.53	22.00	25.53	1000.0	9.000	X	0.1

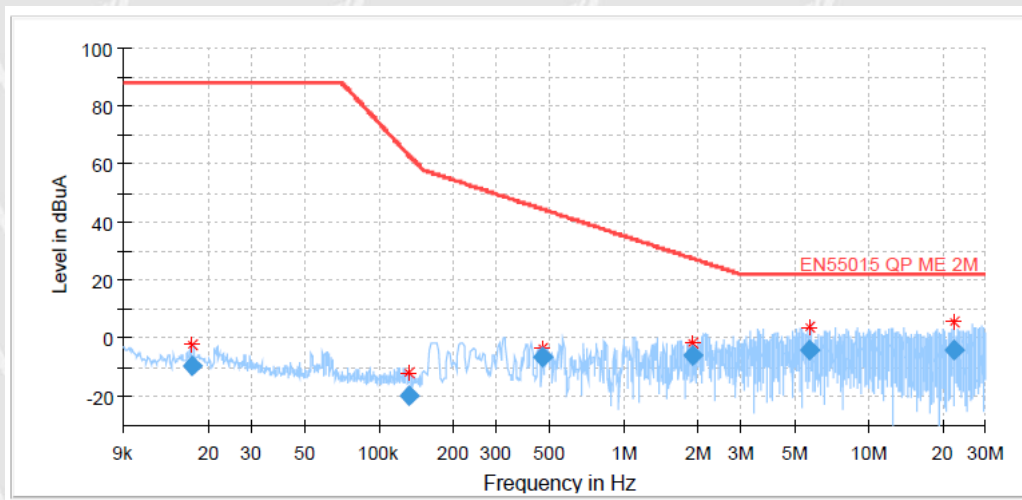
**Figure 2: Graphic description of radiated electromagnetic disturbances, Y direction**



## Final Result

Frequency (MHz)	QuasiPeak (dBuA)	Limit (dBuA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.021842	-7.78	88.00	95.78	1000.0	0.200	Y	0.0
0.135886	-19.63	61.89	81.52	1000.0	0.200	Y	0.0
0.524130	-6.00	42.97	48.97	1000.0	9.000	Y	0.0
1.934985	-5.80	27.27	33.07	1000.0	9.000	Y	0.1
6.391035	-3.54	22.00	25.54	1000.0	9.000	Y	0.1
27.631005	-3.47	22.00	25.47	1000.0	9.000	Y	0.3

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



## Final Result

Frequency (MHz)	QuasiPeak (dBuA)	Limit (dBuA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.017259	-9.18	88.00	97.18	1000.0	0.200	Z	0.0
0.132934	-19.54	62.75	82.29	1000.0	0.200	Z	0.0
0.460305	-6.15	44.53	50.68	1000.0	9.000	Z	0.0
1.914180	-5.59	27.40	32.99	1000.0	9.000	Z	0.1
5.717490	-3.78	22.00	25.78	1000.0	9.000	Z	0.1
22.266975	-4.05	22.00	26.05	1000.0	9.000	Z	0.2

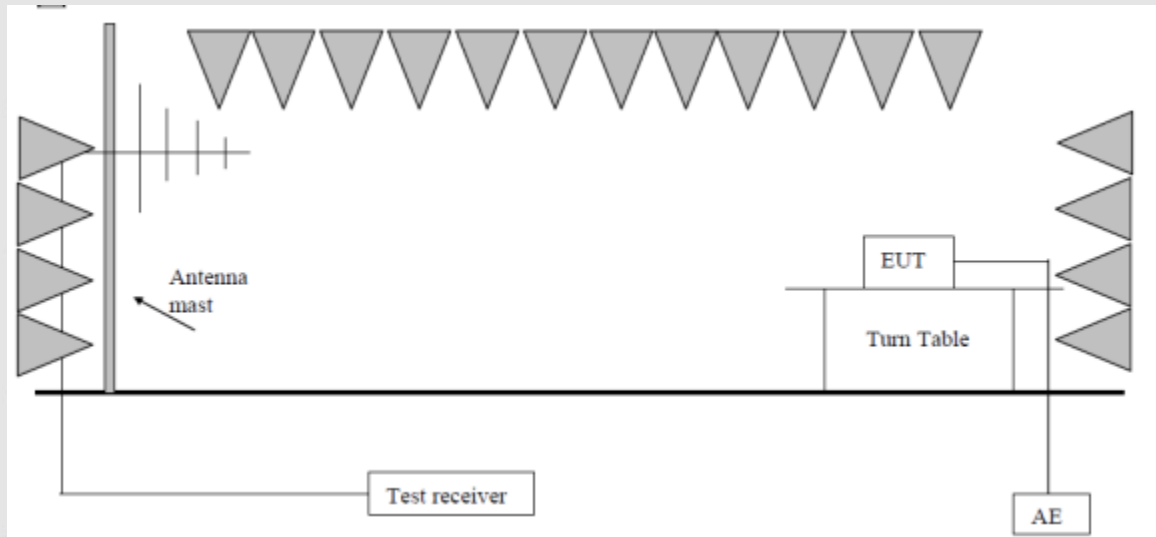
## 4.2 Emission in the Frequency Range above 30 MHz

### 4.2.1 Radiated disturbance

#### General test information

Frequency Range	:	30 - 300MHz
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	:	DC 5V
Operational condition	:	ON
Limit	:	EN 55015:2013+A1:2015, 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**

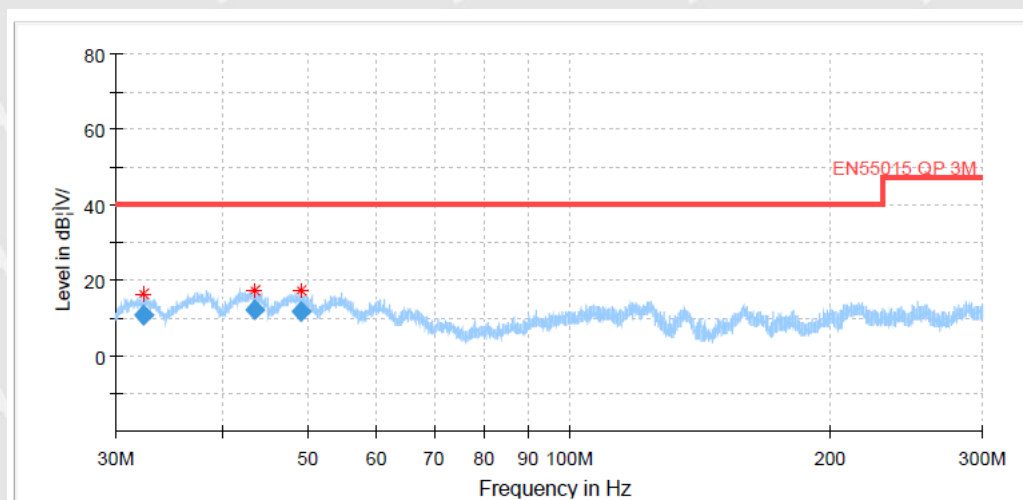
The radiated disturbance was measured in the frequency range from 30MHz to 300MHz according to EN 55015:2013+A1:2015. The measurement was performed in accordance with the method specified in Clause10 of CISPR 22.

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.

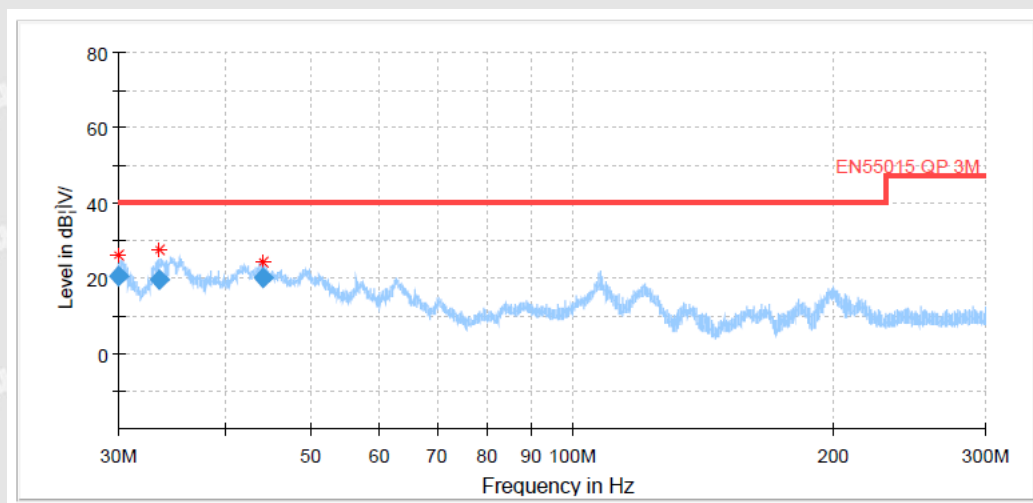
**Figure 4: Spectral Diagrams, Radiated Emission, 30MHz-300MHz, Horizontal**



## Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
32.315000	10.54	40.00	29.46	100.0	H	217.0	-24.5
43.350467	11.99	40.00	28.01	100.0	H	170.0	-21.5
49.003600	11.71	40.00	28.29	100.0	H	314.0	-21.2

**Figure 5: Spectral Diagrams, Radiated Emission, 30MHz-300MHz, Vertical**



## Final Result

Frequency (MHz)	QuasiPeak (dB <sub>i</sub> V/m)	Limit (dB <sub>i</sub> V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.018212	20.55	40.00	19.45	100.3	V	1.0	-24.3
33.389733	19.34	40.00	20.66	100.3	V	10.0	-24.4
43.945933	19.85	40.00	20.15	100.3	V	193.0	-21.5

## 5 Test Results I M M U N I T Y

### 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

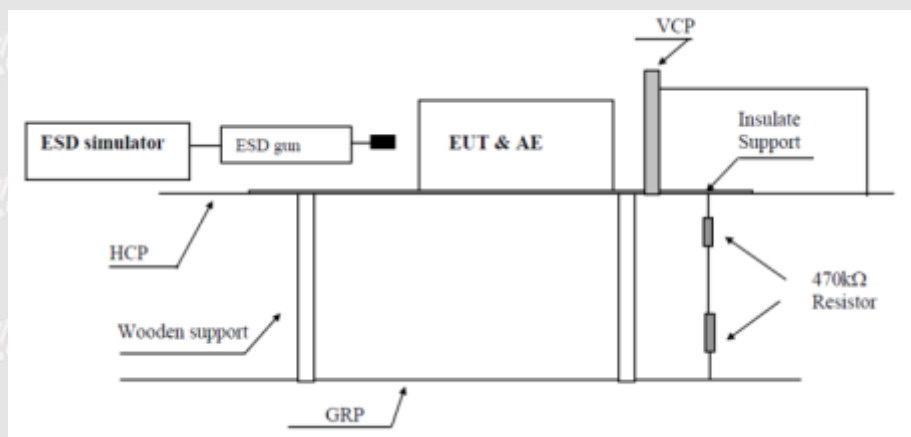
**Conclusion: Pass**



## 5.1 Enclosure

### 5.1.1 Electrostatic Discharge

#### 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 ×2m.

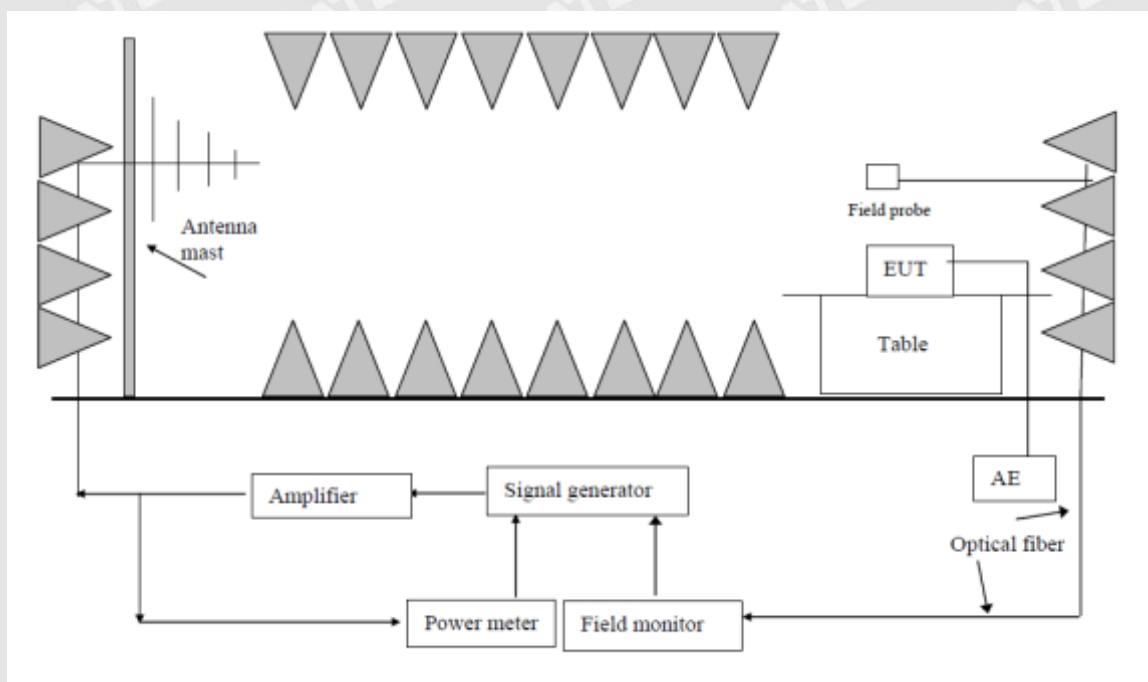
A horizontal coupling plane (HCP), 1,6m × 0,8m, is placed on the table and isolated from the EUT and cables by an insulating support 0,5mm thick. Vertical coupling plane (VCP) of dimensions 0,5m ×0,5m is placed parallel to and positioned at a distance of 0,1m from the EUT.

**Table 2: ESD, Positive / Negative Polarity**

Position	Kind of Discharge	Number of discharges	Performance criteria
Accessible nonmetal Enclosure	Air discharge $\pm 8\text{kV}$	$\geq 10$	B
Metal Enclosure	Contact discharge $\pm 4\text{kV}$	$\geq 10$	B
Coupling plane (Both HCP and VCP)	Contact discharge $\pm 4\text{kV}$	$\geq 10$	B

## 5.1.2 Radio Frequency Electromagnetic Field

### 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	Result	Remarks
EUT in vertical orientation	Pass	No disturbance of function
EUT in horizontal orientation	Pass	No disturbance of function

## 6 Photographs of the EUT and Test Set-Up

Photograph 1: Overall view of EUT



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===== End of Test Report =====