



**EUROFINS PRODUCT TESTING SERVICE (SHANGHAI) CO., LTD.**

# **EMC TEST- REPORT**

**TEST REPORT NUMBER: EFSH16090939-IE-02-E01**



Eurofins Product Testing Service (Shanghai) Co., Ltd.  
No.395 West Jiangchang Road, Jing'an District, Shanghai,  
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## 2 General Information

### 2.1 Notes

The results of this test report relate exclusively to the item tested as specified in chapter "Description of test item" and are not transferable to any other test items.

Eurofins Product Testing Service (Shanghai) Co., Ltd. is not responsible for any generalisations and conclusions drawn from this report. Any modification of the test item can lead to invalidity of test results and this test report may therefore be not applicable to the modified test item.

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#### Operator:

2016-10-08

Perry Li / Testing Engineer



Date

Eurofins-Lab.

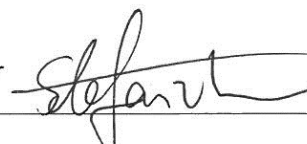
Name / Title

Signature

#### Technical responsibility for area of testing:

2016-10-08

Stefan Zhao / Project Engineer



Date

Eurofins

Name / Title

Signature

Test Report No.: EFSH16090939-IE-02-E01

Eurofins Product Testing Service (Shanghai) Co., Ltd.  
No.395 West Jiangchang Road, Jing'an District, Shanghai, 200436, P.R. China

## 2.2 Testing laboratory

### **Eurofins Product Testing Service (Shanghai) Co., Ltd.**

No.395 West Jiangchang Road, Jing'an District, Shanghai, 200436, P.R. China

Telephone : +86-21-61819181

Telefax : +86-21-61819180

#### **Test location, where different:**

##### Subcontractor

Name : BUREAU VERITAS ADT (SHANGHAI) CORPORATION.

Address : 2F, Building C, No. 1618 Yishan Road SHANGHAI

Telephone : + 86-21-6465 9091

Fax : + 86-21-6465 9092

Radiated emission and Radiated immunity tests were performed at BUREAU VERITAS ADT (SHANGHAI) CORPORATION.

## **2.3 Details of approval holder**

Name : Xindao B.V.  
Address : P.O. Box 3082, 2280 GB, Rijswijk, The Netherlands  
Telephone : ./.  
Fax : ./.

## **2.4 Application details**

Date of receipt of application : 2016-09-13  
Date of receipt of test item : 2016-09-22  
Date of test : 2016-09-22 to 2016-09-30

## **2.5 EUT information**

Product type : Quatro aluminium torch  
Model name : P513.27  
Brand name : ./.  
Serial number : ./.  
Ratings : 4.5Vdc (AAA battery \*3)  
Additional information : The appliance is LED light powered by battery inside.

## **2.6 Test standards**

**EN 55015:2013**

**EN 61547:2009**

### 3 Technical test

#### 3.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.



or

The deviations as specified were ascertained in the course of the tests performed.



#### 3.2 Test environment

**Eurofins Product Testing Service (Shanghai) Co., Ltd.**

Temperature : 20 ... 25°C  
Relative humidity content : 30 ... 60%  
Air pressure : 100 ... 103kPa

**BUREAU VERITAS ADT (SHANGHAI) CORPORATION.**

Temperature : 24°C  
Relative humidity content : 41%  
Air pressure : 101kPa

### 3.3 List of Test equipment

Measurement Equipment List				
No.	Name	Model	Manufacturer	Cal. due date
1	EMI test receiver	ESCI	R&S	2016-11-26
2	Triple Loop Antenna	HXYZ 9170	Schwarzbeck	2016-11-26
3	Ultra Compact Simulator	UCS 500N7	EMTEST	2016-11-26
4	ESD Gun	NSG 437	TESEQ	2016-11-26
5	Current transformer	MC2630	EMTEST	2016-11-26
6	Motorized variac	MV2616	EMTEST	2016-11-26
7	Magnetic field coil	MS100	EMTEST	2016-11-26
8	EMI Test Spectrum	E4403B	Agilent	2017-08-23
9	EMI test receiver	ESCS30	R&S	2017-04-12
10	Broadband Antenna	VULB9168	Schwarzbeck	2017-03-25
11	Amplifier	8447D	Agilent	2016-11-05
12	Signal Generator	MG3692B	Anritsu	2017-04-12
13	Logarithmic Periodic Antenna	STCP9128D	Schwarzbeck	2016-11-21
14	Power Amplifier	MT225	AP32	2016-12-03
15	Power meter	4232A/01/02	Boonton	2017-04-12
16	EMI Test Spectrum	E4403B	Agilent	2017-08-23
17	EMI test receiver	ESCS30	R&S	2017-04-12

### 3.4 Test results

☒ 1st test

☐ test after modification

☐ production test

Test case	Subclause	Required	Test passed	Test failed
Conducted Emission	Clause 4.3 of EN 55015	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated electromagnetic disturbances	Clause 4.4 of EN 55015	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Radiated disturbance	Clause 4.4.2 of EN 55015	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Harmonic Current Emissions	EN 61000-3-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Voltage Changes, Voltage Fluctuations and Flicker	EN 61000-3-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electrostatic Discharge	Clause 5.2 of EN 61547 & IEC 61000-4-2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Radio frequency electromagnetic fields	Clause 5.3 of EN 61547 & IEC 61000-4-3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Power frequency magnetic fields	Clause 5.4 of EN 61547 & IEC 61000-4-8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Electrical Fast Transients	Clause 5.5 of EN 61547 & IEC 61000-4-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Injected currents (RF common mode)	Clause 5.6 of EN 61547 & IEC 61000-4-6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Surge immunity	Clause 5.7 of EN 61547 & IEC 61000-4-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Voltage dips and short interruption	Clause 5.8 of EN 61547 & IEC 61000-4-11	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



## 4 Emission Test

### 4.1 Radiated electromagnetic disturbances

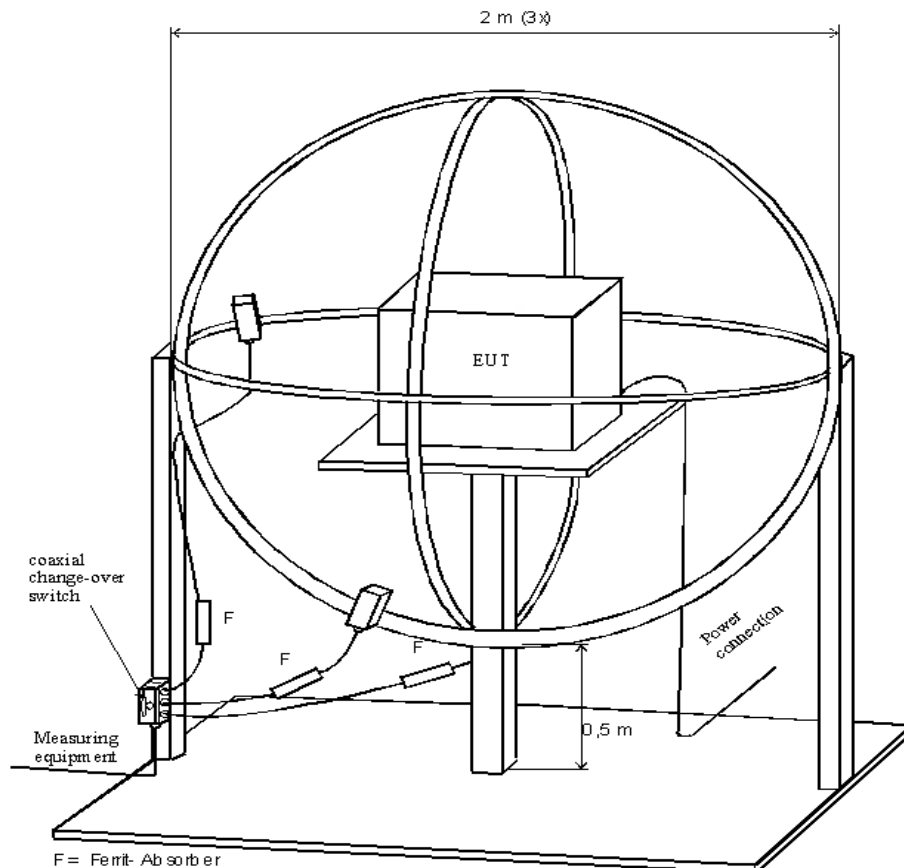
This clause lays down the general requirements for the magnetic component of the radiated disturbance field strength in the frequency range 9 kHz to 30 MHz

#### 4.1.1 limits

Frequency range Hz	Limits for loop diameter dB ( $\mu$ A)
	2 m
9 kHz to 70 kHz	88
70 kHz to 150 kHz	88 to 58
150 kHz to 3 MHz	58 to 22
3 MHz to 30 MHz	22

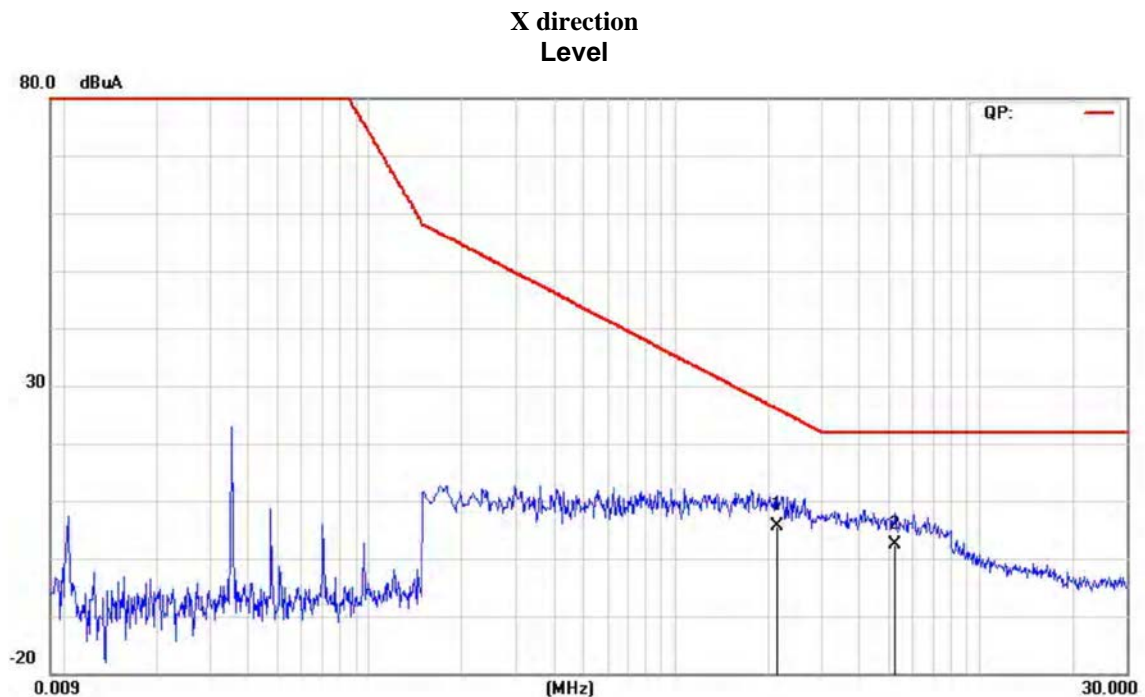
Note: At the transition frequency, the lower limit applies.  
Decreasing linearly with the logarithm of the frequency.  
Increasing linearly with the logarithm of the frequency.

#### 4.1.2 Measurement procedure



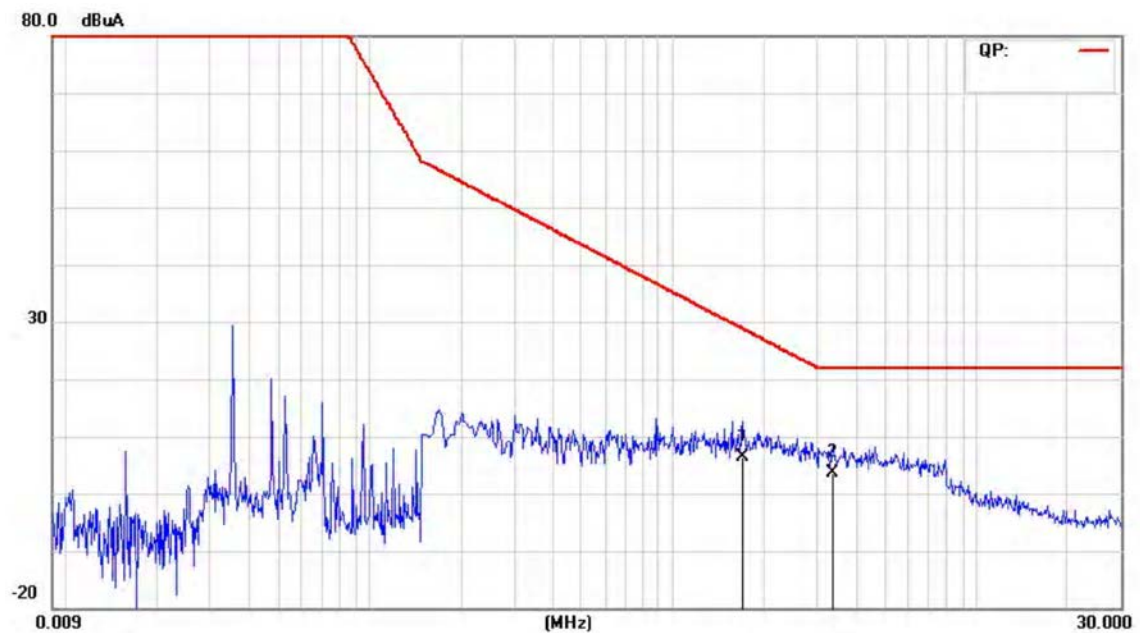
The EUT is placed in the centre of the loop antenna system. The current induced by the magnetic field from the EUT into each of the three large loop antennas of the loop antenna system is measured by connecting the current probe of the large loop antenna to a measuring receiver. During the measurements the EUT remains in a fixed position. Before get the final emission results with quasi-peak(QP) detector, a pre-scan was performed with the peak(PK) to find out the maximum emission data plots of the EUT.

### 4.1.3 Results



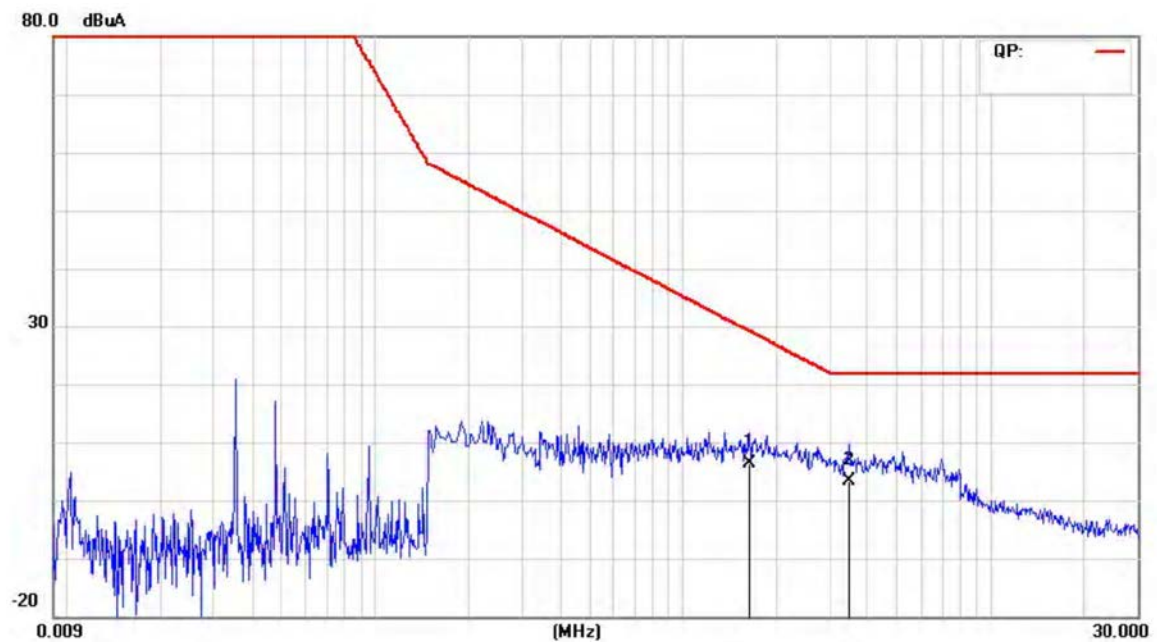
No.	Mk.	Freq. MHz	Reading Level dBuA	Correct Factor dB	Measure- ment dBuA	Limit dBuA	Over dB	Detector
1		2.1620	-39.02	44.68	5.66	25.94	-20.28	QP
2	*	5.2780	-39.27	41.58	2.31	22.00	-19.69	QP

**Y direction  
Level**



No.	Mk.	Freq. MHz	Reading Level dBuA	Correct Factor dB	Measure- ment dBuA	Limit dBuA	Over dB	Detector
1		1.7100	-38.90	45.29	6.39	28.76	-22.37	QP
2	*	3.3620	-39.03	42.64	3.61	22.00	-18.39	QP

**Z direction  
Level**



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuA	dB	dBuA	dBuA	dB	Detector
1		1.6500	-38.98	45.35	6.37	29.18	-22.81	QP
2	*	3.4740	-39.04	42.53	3.49	22.00	-18.51	QP

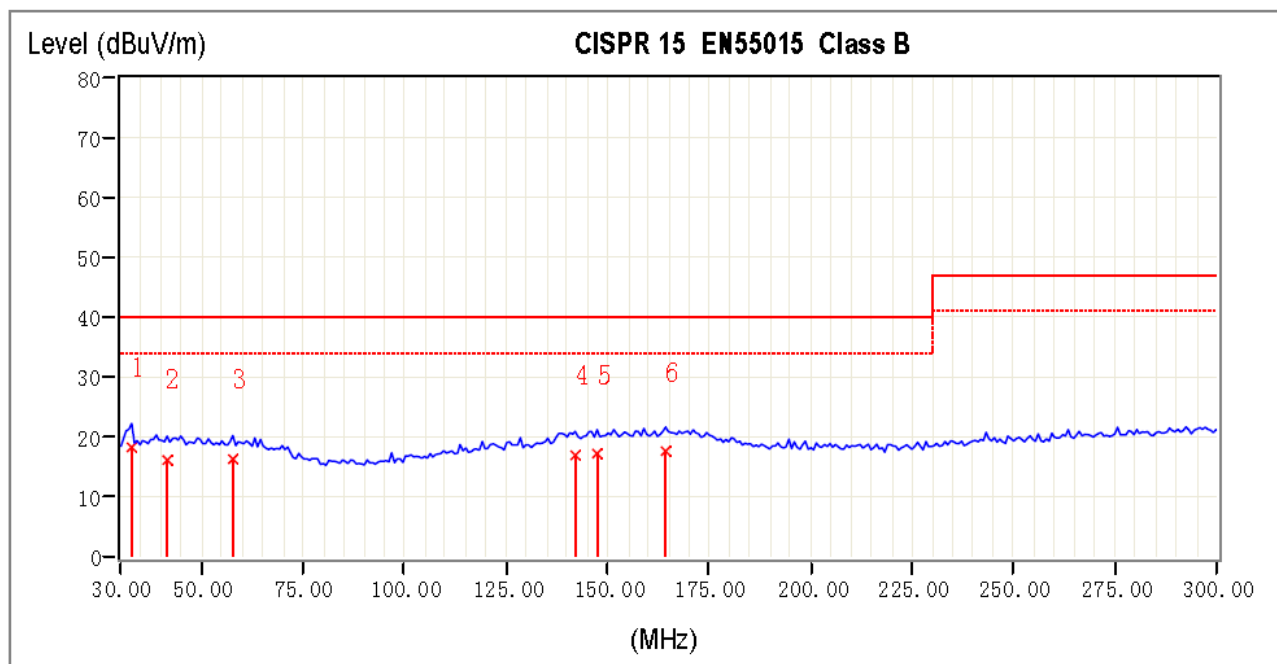


#### 4.2.3 Measurement uncertainty

U<sub>lab</sub>(cond) = 3.22dB at 95% level of confidence, k=2

#### 4.2.4 Results

Horizontal:  
Level

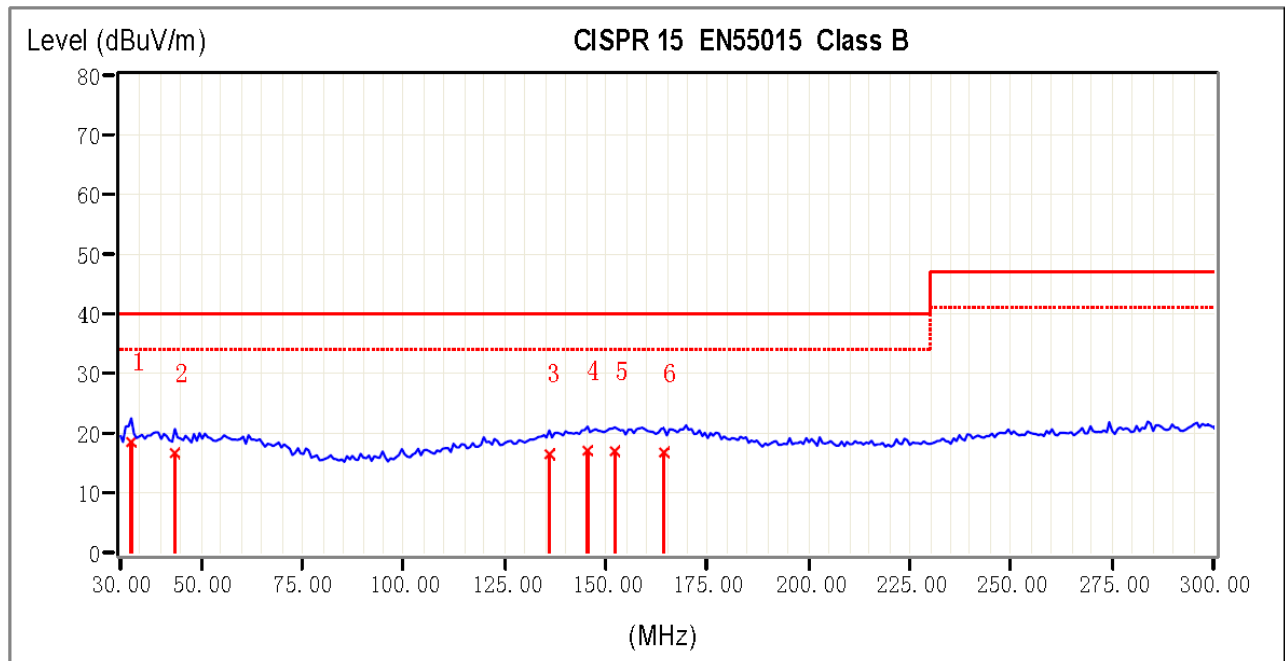


No.		Frequency	Factor	Reading	Emission	Limit	Over Limit	Tower / Table	
		MHz	dB	dBuV/m	dBuV/m	dBuV/m	dB	cm	deg
*	1	32.70	13.46	4.76	18.22	40.00	-21.78	200	275
	2	41.48	14.00	2.08	16.08	40.00	-23.92	200	100
	3	57.67	13.43	2.78	16.21	40.00	-23.79	200	113
	4	142.05	14.14	2.75	16.89	40.00	-23.11	200	108
	5	147.45	14.41	2.77	17.18	40.00	-22.82	200	136
	6	164.32	14.51	3.05	17.56	40.00	-22.44	200	331

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Factor.

Vertical:  
Level



No.		Frequency	Factor	Reading	Emission	Limit	Over Limit	Tower / Table	
		MHz	dB	dBuV/m	dBuV/m	dBuV/m	dB	cm	deg
*	1	32.70	13.46	5.02	18.48	40.00	-21.52	100	169
	2	43.50	13.88	2.78	16.66	40.00	-23.34	100	251
	3	135.97	13.54	2.88	16.42	40.00	-23.58	100	133
	4	145.43	14.31	2.74	17.05	40.00	-22.95	100	106
	5	152.18	14.52	2.42	16.94	40.00	-23.06	100	279
	6	164.32	14.51	2.26	16.77	40.00	-23.23	100	271

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Factor.

## 5 Immunity Test

### 5.1 Performance Criteria Description in Clause 4 of EN 61547

<b>Criterion A:</b>	During the test, no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.
<b>Criterion B:</b>	During the test, the luminous intensity may change to any value. After the test, the luminous intensity shall be restored to its initial value within 1 min. Regulating controls need not function during the test, but after the test, the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.
<b>Criterion C:</b>	During and after the test, any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal, if necessary by temporary interruption of the mains supply and/or operating the regulating control. Additional requirement for lighting equipment incorporating a starting device: After the test, the lighting equipment is switched off. After half an hour, it is switched on again. The lighting equipment shall start and operate as intended.

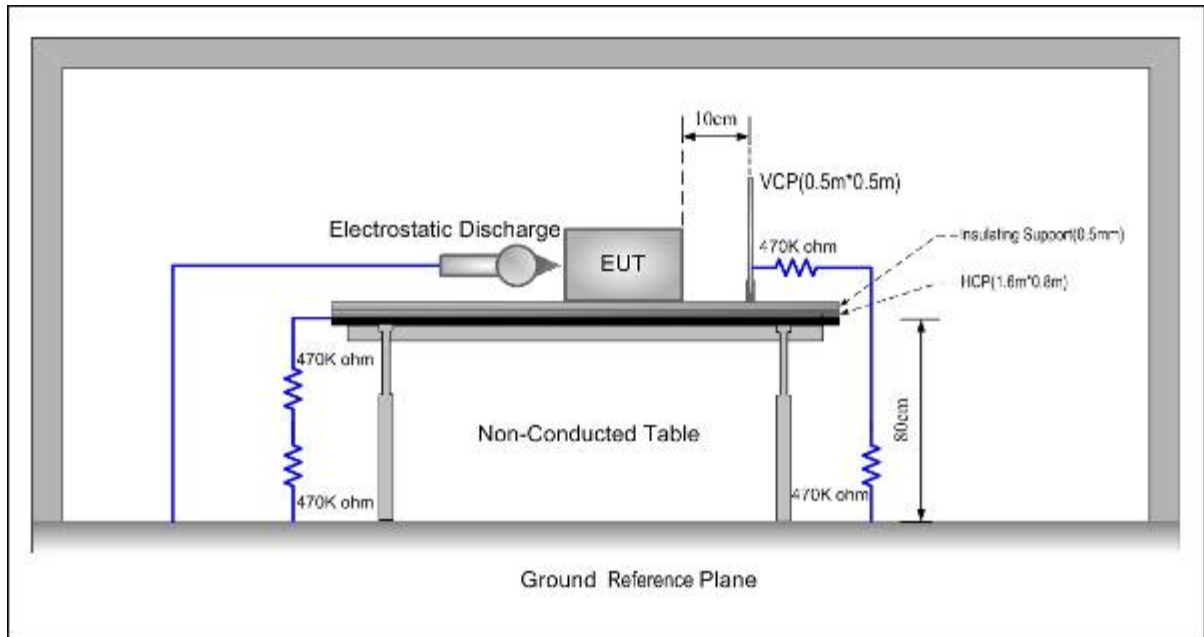
### 5.2 Conditions during testing

The test shall be applied while the equipment is operated as intended under the normal operating conditions as laid down in the relevant product standard at stabilized luminous (radiant) flux and at normal laboratory conditions. Testing is only required at one combination of supply voltage and frequency, as specified by the manufacturer. Equipment including a regulating control shall be tested at a light output level of 50 %  $\pm$  10 %. The lamp load of the equipment under test shall be the maximum allowed. Luminaires and independent auxiliaries shall be tested with lamps for which they are intended. Where equipment can operate with lamps of different wattages, lamps of maximum wattage shall be applied. For independent auxiliaries, the length of the cables between device and lamp shall be 3 m unless the manufacturer prescribes another length.



## 5.3 ESD

### 5.3.1 Test Procedures



1. Contact discharge was applied only to conductive surfaces of the EUT. Air discharge was applied only to non-conducted surfaces of the EUT.
2. The EUT was put on a 0.8m high wooden table for table-top equipment or 0.1m high for floor standing equipment standing on the ground reference plane (GRP).
3. A horizontal coupling plane(HCP) 1.6m by 0.8m in size was placed on the table, and the EUT with its cables were isolated from the HCP by an insulating support thick than 0.5mm. The VCP 0.5m by 0.5m in size while HCP were constructed from the same material type and thickness as that of the GRP, and connected to the GRP via a 470kΩ resistor at each end. The distance between EUT and any of the other metallic surfaces excepted the GRP, HCP and VCP was greater than 1m.
4. During the contact discharges, the tip of the discharge electrode was touching the EUT before the discharge switch is operated. During the air discharges, the round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the ESD generator was removed from the EUT, the generator is then retriggered for a new single discharge. For ungrounded product, a discharge cable with two resistances was used after each discharge to remove remnant electrostatic voltage. 10 times of each polarity single discharge were applied to HCP and VCP.

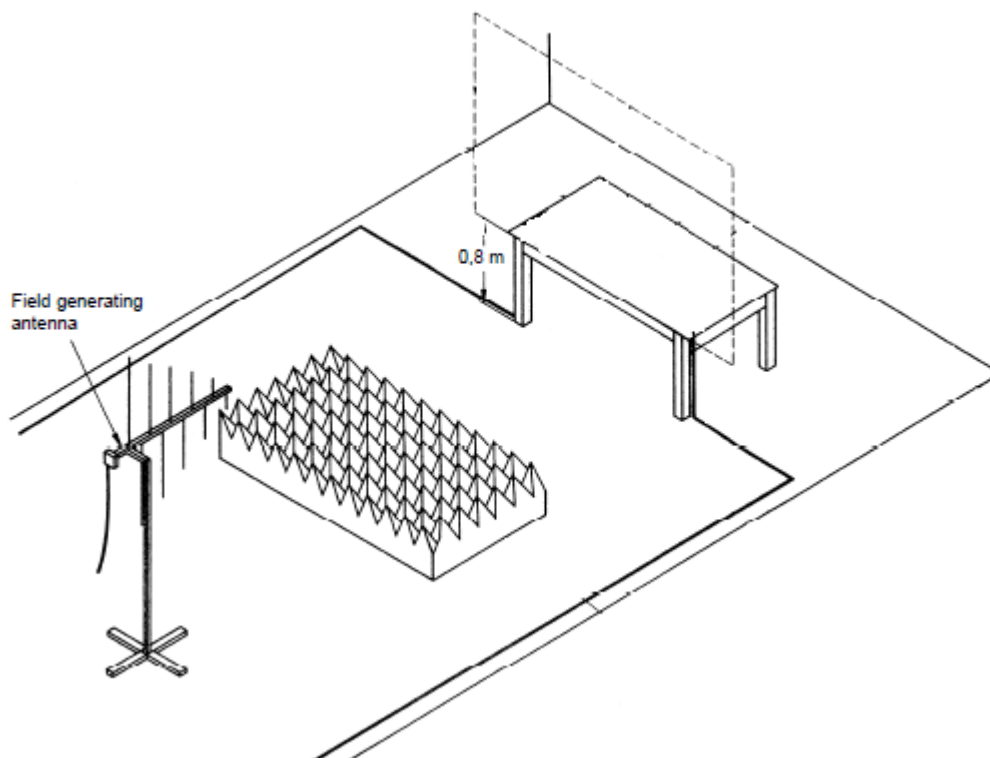
### 5.3.2 Results

Test point	Table (T) Floor (F)	Contact (C) Air (A)	Voltage (kV)	Number of discharge	Polarity (+ / -)	Opinion
Air discharge	T	A	8	20	+ / -	A
Contact discharge	T	C	4	20	+ / -	A
HCP	T	C	4	20	+ / -	A
VCP	T	C	4	20	+ / -	A

A: no loss of function.

## 5.4 Radio frequency electromagnetic fields

### 5.4.1 Measurement procedure



1. The EUT was placed on 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP. The tests normally shall be performed with the generating antenna facing each of four sides of the EUT. When equipment can be used in different orientations (e.g. vertical or horizontal) the test shall be performed on all possible sides of the EUT.
2. The tests are carried out with a field strength by 3 V/m (measured in the unmodulated field) with amplitude modulated signal by a depth of 80 % by a sinusoidal audio signal of 1 kHz. The logarithmic step was 1% and the dwell time was 3s dependent of the EUT cycle time. Test was performed on subcontractor.

### 5.4.2 Results

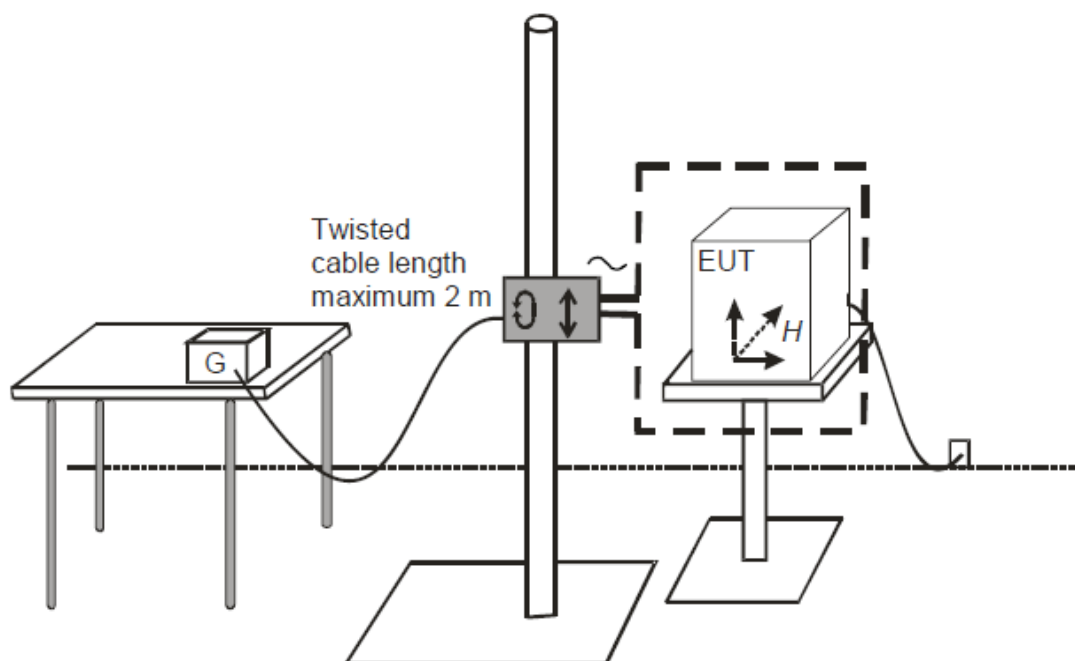
Frequency Range	Field Strength	Modulation	Opinion
80MHz-1GHz	3V/m	80% AM 1kHz	A

A: no loss of function.

## 5.5 Power-frequency magnetic fields

The magnetic fields to which equipment is subjected may influence the reliable operation of equipment and systems.

### 5.5.1 Measurement procedure



The electromagnetic conditions of the laboratory shall be such as to guarantee the correct operation of the EUT in order not to influence the test results; otherwise, the tests shall be carried out in a Faraday cage. The plane of the inductive coil shall then be rotated by 90° in order to expose the EUT to the test field with different orientations.

### 5.5.2 Results

Test Frequency	Field Level (A/m)	Duration (Second)	Axis of Orientation	Opinion
50/60Hz	3	60	X	A
50/60Hz	3	60	Y	A
50/60Hz	3	60	Z	A

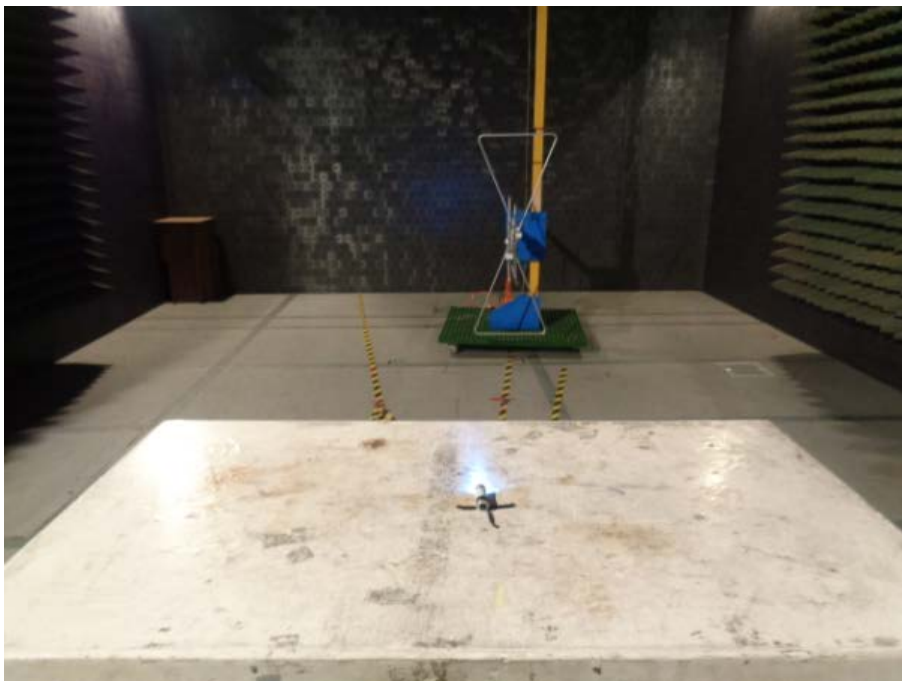
A: no loss of function.

## 6 Test setup Photos

**Radiated electromagnetic disturbances**



**Radiated disturbance**



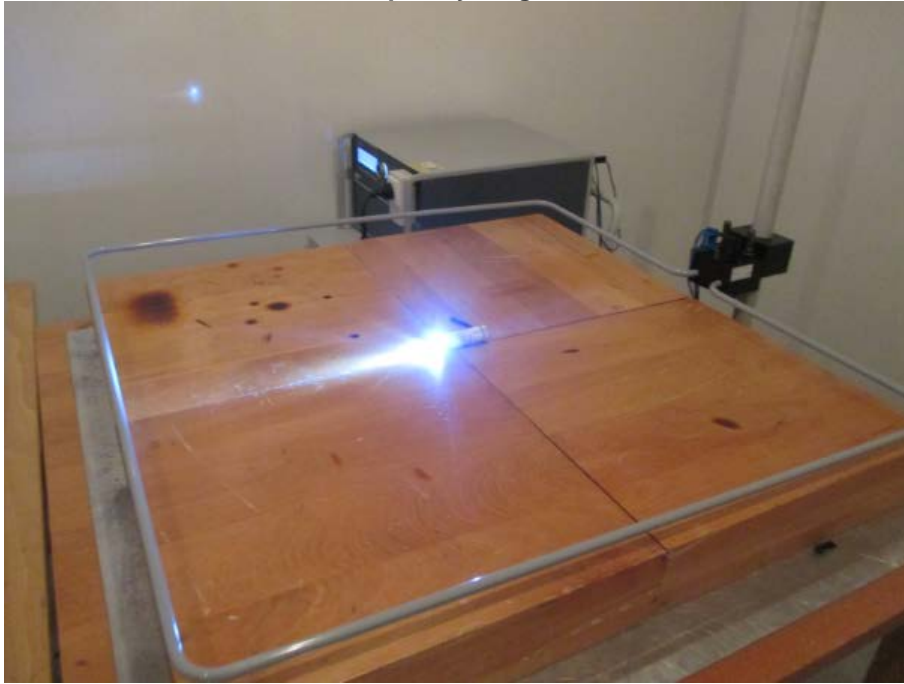
### Electrostatic Discharge



### Radio frequency electromagnetic fields



**Power-frequency magnetic field**





## 7 EUT Photos

Photo 1  
Overall view



Photo 2  
Overall view

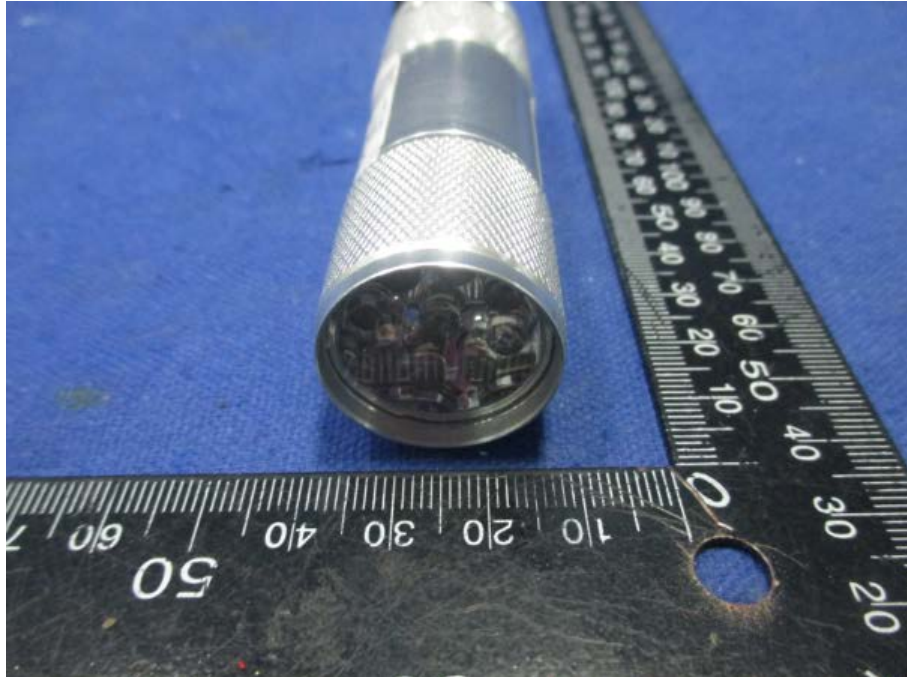


Photo 3  
Overall view



Photo 4  
Internal view





Photo 5  
Battery box view



Photo 6  
PCB view



Photo 7  
LED view

