EN 55015:2006+A1:2007
EN 61547: 1995+A1: 2000

EMC MEASUREMENT AND TEST REPORT

For

Goal Zero, LLC

151 East 3450 North Spanish Fork, UT 84660

Dec 13, 2009

Product Name:	Estrella 3W
Model No:	14001
Test Engineer:	David Zhang 
Report No.:	BTR09120902-2
Sample Received Date:	Dec 10, 2009
Test Performed Date:	Dec 10, 2009 to Dec 12, 2009
Reviewed By:	Steven Hsu 
Prepared By:	**BEST Test Service Shenzhen Co., Ltd.** C, 310-316, Huameiju Business Center, 82 Block, Baoan District, Shenzhen, China TEL: +86-755-28236006 FAX: +86-755-28236249 Email: certification@bestcert.cn

TABLE OF CONTENTS

1 - GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The Goal Zero, LLC's model 14001 for the "EUT" as referred to in this report is Estrella 3W, rated input voltage: DC12V. 14001 had been tested EMS and EMI items and all the results are included in this report.

The test data was only good for the test sample. It may have deviation for other test sample.

1.2 Objective

The following test report is prepared on behalf of Goal Zero, LLC in accordance with EN 55015:2006+A1: 2007, Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment; EN 61547: 1995+A1: 2000, Equipment for general lighting purposes - EMC immunity requirements.

The objective of the manufacturer is to demonstrate compliance with EN 55015/ EN 61547 for Lighting Equipment.

1.3 Related Submittal(s)/Grant(s)

No related submittal(s).

1.4 Test Methodology

All measurements contained in this report were conducted with CISPR 16-1: 2002, CISPR16-2: 2002, Method of measurement of disturbances and immunity.

All radiated and conducted emissions measurements were performed at BEST Test Service (Shenzhen) Co., Ltd.

1.5 Test Facility

The 3 meters standard chamber used by BEST Test Service (Shenzhen) Co., Ltd to collect radiated electromagnetic disturbance. Test site at BEST Test Service (Shenzhen) Co., Ltd has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules and Article 8 of the VCCI regulations. The facility also complies with the radiated and AC line conducted test site criteria set forth in CISPR 16-1: 2002, CISPR16-2: 2002.
Additionally, BEST Test Service (Shenzhen) Co., Ltd is a National Institute of Standards and Technology (NIST) accredited laboratory, under the NVLAP, The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/EN 55022/24, and AS/NZS EN 55022/24: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods.

1.6 Test Equipment List

Manufacturer	Description	Model	Serial Number	Cal. Date	Cal. Due. Date
R/S	EMI Test Receiver	ESCI	100028	08/05/2009	08/05/2010
R/S	L.I.S.N	ESH2-Z5	100038	08/05/2009	08/05/2010
R/S	EMI Test Receiver	ESI 26	100009	08/05/2009	08/05/2010
R/S	Ultra-Broadband Antenna	HL562	100035	08/05/2009	08/05/2010
R/S	Triple-Loop Antenna	HM020	30279854	08/05/2009	08/05/2010
ETS	Chamber	3 meter	12164	08/05/2009	08/05/2010
EM Test	Ultra Compact Generator	UCS500-M4	303279	08/05/2009	08/05/2010
EM Test	Dips Tester	V4070S2	303281	08/05/2009	08/05/2010
EM Test	Power Analyzer	DPA500	308276	08/05/2009	08/05/2010
EM Test	AC Source	CWS 500	307716	08/05/2009	08/05/2010
EM Test	ESD Tester	N/A	302105	08/05/2009	08/05/2010
EM Test	M/F Tester	RFTVS BV 113-97	301873	08/05/2009	08/05/2010
EM Test	Loop Antenna	N/A	303298	08/05/2009	08/05/2010
EM Test	CDN	M3	303288	08/05/2009	08/05/2010
Amplifier Research	Field Monitor	FM5004	302149	08/05/2009	08/05/2010
Amplifier Research	Amplifier	150w1000	302657	08/05/2009	08/05/2010
Amplifier Research	Tripod	TP1000A	302623	08/05/2009	08/05/2010
Amplifier Research	Biconilog	AT1080	301902	08/05/2009	08/05/2010
Amplifier Research	Sensor	FP5000	301825	08/05/2009	08/05/2010
EM Test	C/S Tester	CWS 500	303277	08/05/2009	08/05/2010
HP	Signal Generator	8657A	2849u00982	08/05/2009	08/05/2010

*** Statement of Traceability: BEST attests that all calibrations have been performed per the CNAL /NVLAP requirements, traceable to NIM China**

1.7 External Cable

Cable Description	Length (M)	From/Port	To
Unshielded Undetectable AC Power Cable	1.5	AC Mains	EUT

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

2.2 EUT Exercise Software

N/A

2.3 Special Accessories

N/A

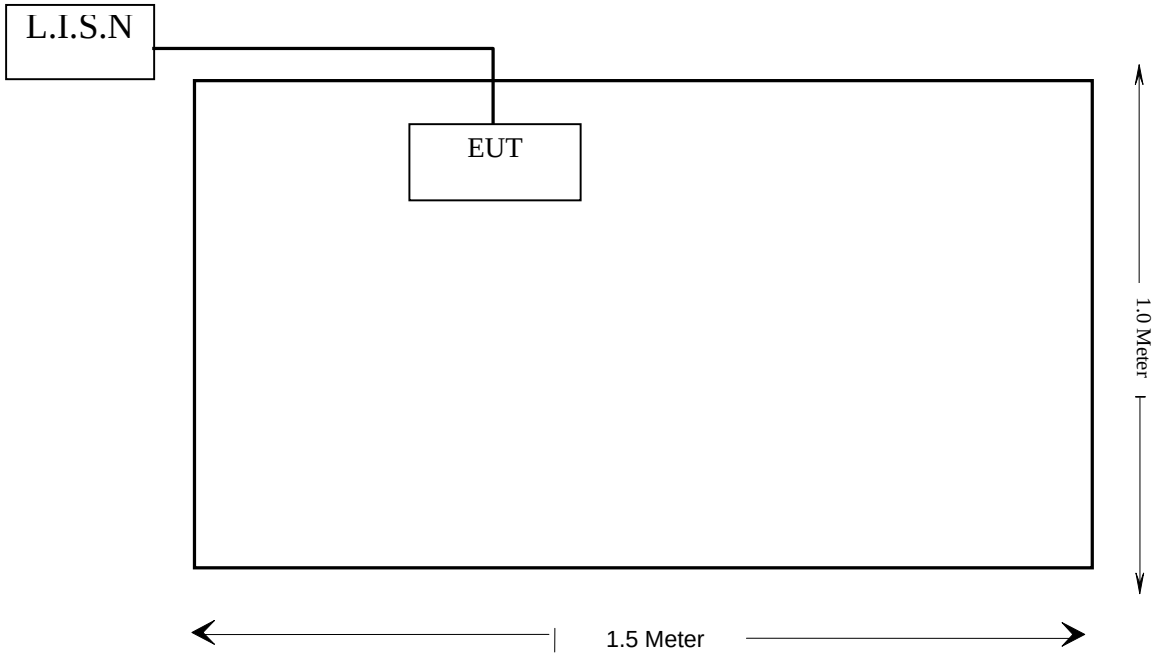
2.4 Schematics / Block Diagram

N/A

2.5 Equipment Modifications

No modification was made by BEST Test Service (Shenzhen) Co., Ltd. to ensure that EUT is compliant with applicable limits and requirements.

2.6 Test Setup Block Diagram



3 - RADIATED ELECTROMAGNETIC DISTURBANCE TEST DATA

3.1 Standard Applicable

The lower limit applies at the band edges:

Frequency Range (MHz)	Radiated Electromagnetic Disturbance Limit (2M)
	Quais-Peak (dBuA)
0.009 -0.07	88
0.07 – 0.15	88 - 58
0.15-2.2	58 - 26
2.2 – 3.0	58
3.0 – 30.0	22

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna factor frequency interpolation, measurement distance variation, mismatch (average), and system repeatability.
Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, and the best estimate of the uncertainty of a radiation emissions measurement at BEST TEST SERVICE (SHENZHEN) CO., LTD is ±2.2dB.

3.3 EUT Setup

The radiated Electromagnetic Disturbance tests were performed in the center of a three loop antenna, the setup accordance with the CISPR 16-1: 2002, CISPR16-2: 2002. The specification used was EN 55015 limits. The EUT was connected to a DC 12V power source.

3.4 Test Procedure

For the radiated electromagnetic test, the EUT was put on the table which was in the center of triple-loop antenna; the power cords were connected to the AC floor outlet and turned on to stability. EMI Test receiver scan from 0.009MHz to30MHz and Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within 4 dB of specification limit), and are distinguished with a "Qp" in the data table. The final test data for this configuration is recorded in the section 4.7 of this report.

3.5 Corrected Amplitude & Margin Calculation

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Class B Limit - Level.

3.6 Summary of Test Results

According to the data in section 4.7, the EUT complied with the EN 55015 standards

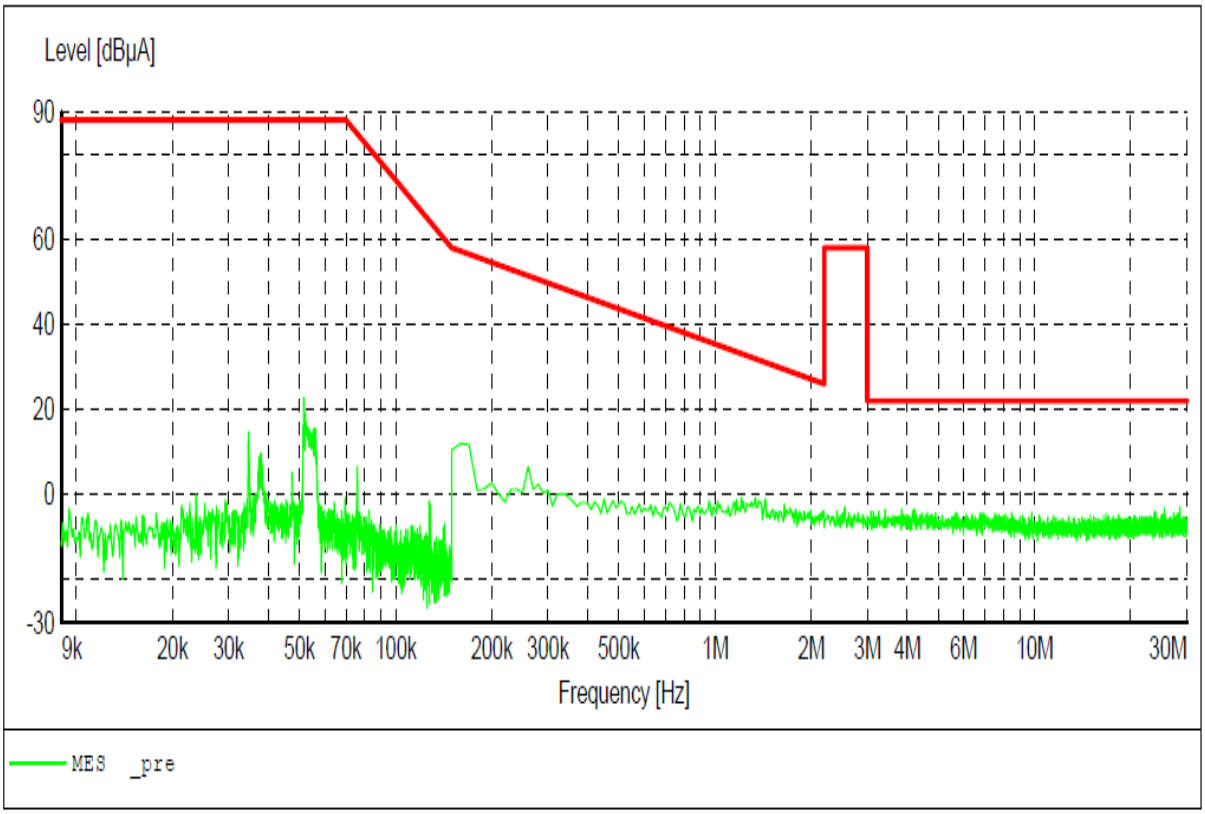
3.7 Radiated Emissions Test Result Data and plots

BEST TEST SERVICE SHENZHEN CO., LTD

Magnetic Field Strength EN55015

EUT: Estrella 3W Model:14001
Manufacturer: Goal Zero, LLC
Operating Condition: ON
Test Site: 3 SHIELDING ROOM
Operator: Andy
Test Specification: DC 12V X
Comment:
Start of Test: 12/12/2009

SCAN TABLE: "Magnetic test fin"
Short Description: EN55015 Triple Loop



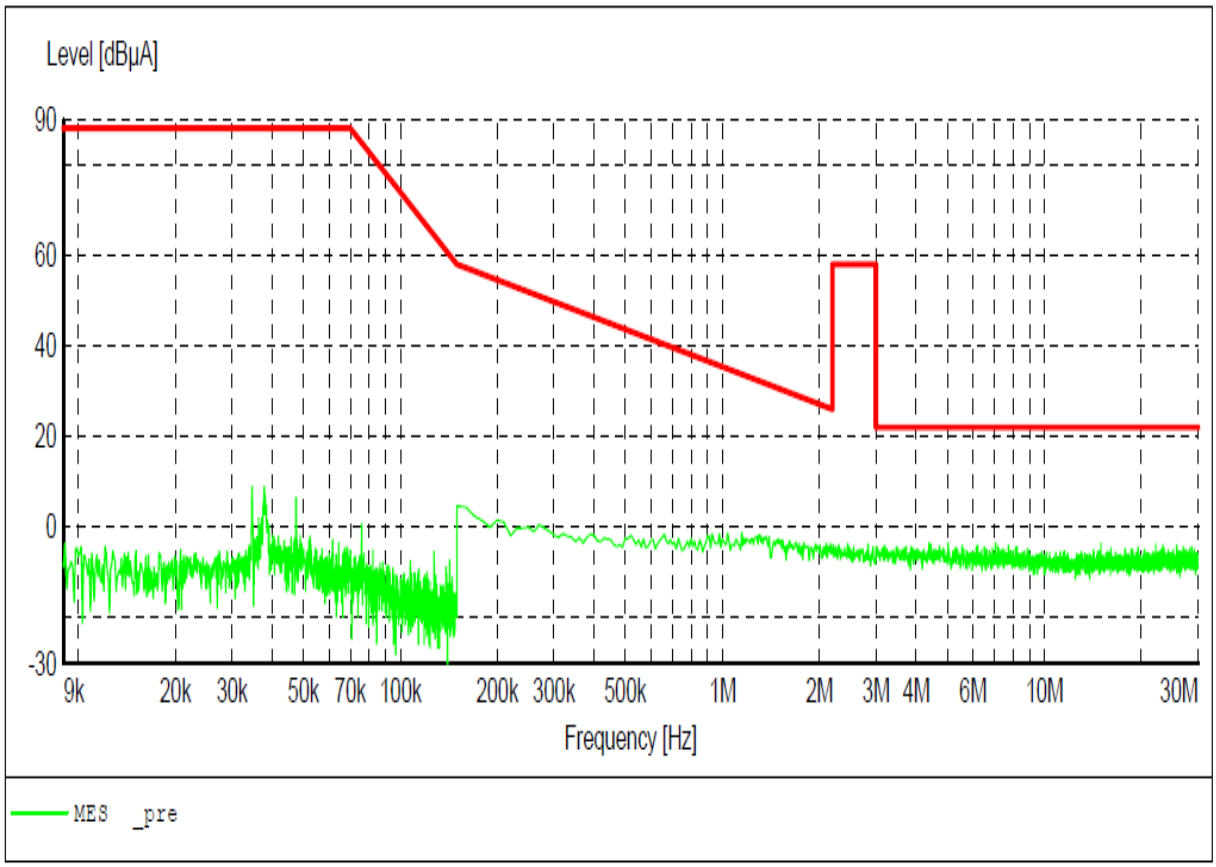
BEST TEST SERVICE SHENZHEN CO., LTD

Magnetic Field Strength EN55015

EUT: Estrella 3W Model:14001
Manufacturer: Goal Zero, LLC
Operating Condition: ON
Test Site: 3 SHIELDING ROOM
Operator: Andy
Test Specification: DC 12V Y
Comment:
Start of Test: 12/12/2009

SCAN TABLE: "Magnetic test fin"

Short Description: EN55015 Triple Loop



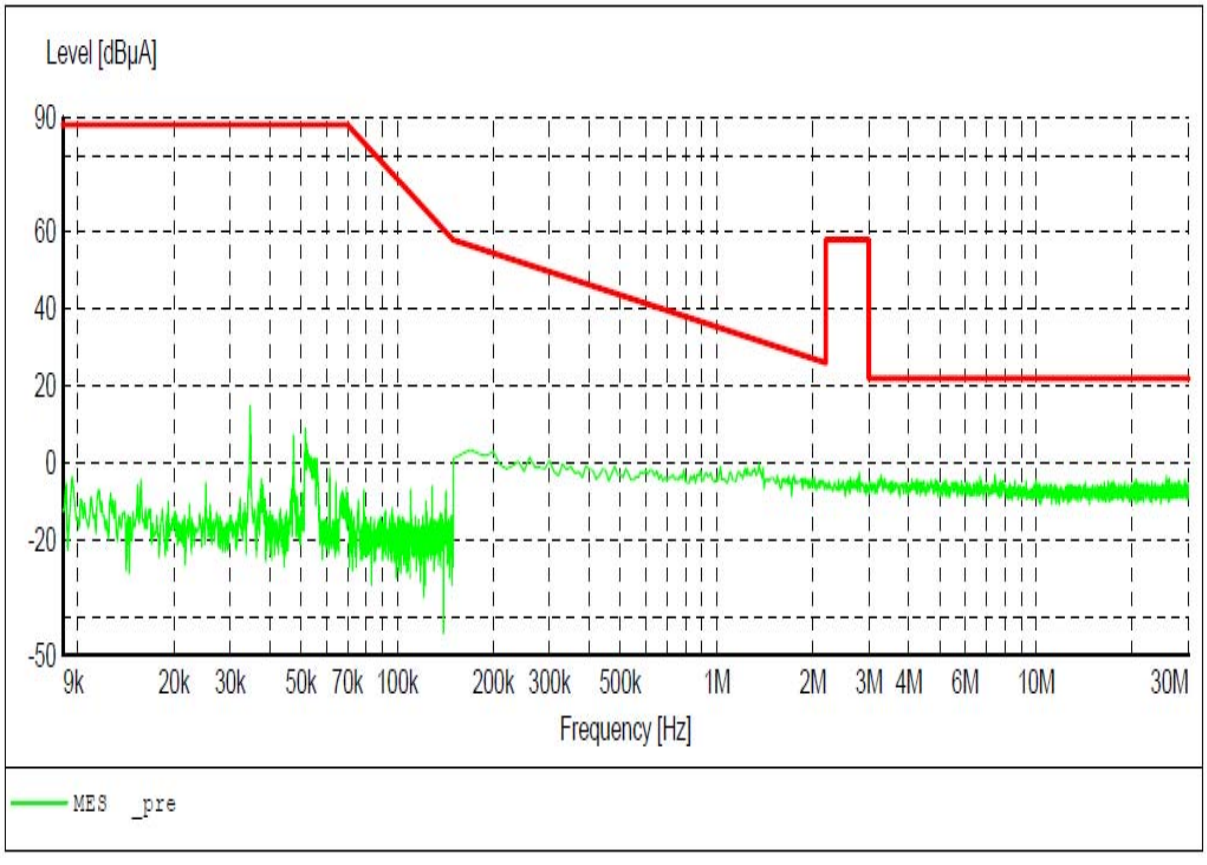
BEST TEST SERVICE SHENZHEN CO., LTD

Magnetic Field Strength EN55015

EUT:	Estrella 3W Model:14001
Manufacturer:	Goal Zero, LLC
Operating Condition:	ON
Test Site:	3 SHIELDING ROOM
Operator:	Andy
Test Specification:	DC 12V Z
Comment:	
Start of Test:	12/12/2009

SCAN TABLE: "Magnetic test fin"

Short Description: EN55015 Triple Loop



4 - ELECTRONIC DISCHARGE IMMUNITY TEST

4.1 Test Standard

EN 61547: 1995+A1: 2000 (EN61000-4-2: 1995+A1: 1998+A2: 2001)
(Severity Level 3 for Air Discharge at 8KV)
(Severity Level 2 for Contact Discharge at 4KV)

4.2 Severity Levels and Performance Criterion

Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1	2	2
2	4	4
3	6	8
4	8	15
X	Special	Special

Performance criterion: B

4.3 EUT Configuration

The configuration of EUT is listed in Section 3.4.

4.4 Operating Condition of EUT

Same as conducted emission test, which is listed in Section 3.5.

4.5 Test Procedure

Air Discharge:

This test is done on a non-conductive surface, which is 0.8 meter high above the reference ground. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

Contact Discharge:

All the procedure shall be same as Air Discharge. Except that the generator is then re-triggered for a new single discharge and repeated 50 times for each pre-selected test point. the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

4.6 Environmental Conditions

Table 1: Electrostatic Discharge Immunity (Air Discharge)

EN 61000-4-2 Test Points		Test Levels							
		-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Slot	8 Points	A	A	A	A	A	A	A	A
Glass	4 Points	A	A	A	A	A	A	A	A

Table 2: Electrostatic Discharge Immunity (Direct Contact)

EN 61000-4-2 Test Points		Test Levels							
		-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Lamp Base	2 Points	A	A	A	A	/	/	/	/

Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

EN 61000-4-2 Test Points		Test Levels							
		-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	6 Points	A	A	A	A	/	/	/	/
Back Side	6 Points	A	A	A	A	/	/	/	/
Left Side	6 Points	A	A	A	A	/	/	/	/
Right Side	6 Points	A	A	A	A	/	/	/	/

Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

EN 61000-4-2 Test Points		Test Levels							
		-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	6 Points	A	A	A	A	/	/	/	/
Back Side	6 Points	A	A	A	A	/	/	/	/
Left Side	6 Points	A	A	A	A	/	/	/	/
Right Side	6 Points	A	A	A	A	/	/	/	/

5 - RF FIELD STRENGTH SUSCEPTIBILITY TEST

5.1 Test Standard

EN 61547: 1995+A1: 2000 (EN 61000-4-3: 2006)

(Severity Level 2: 3V / M)

5.2 Severity Levels and Performance Criterion

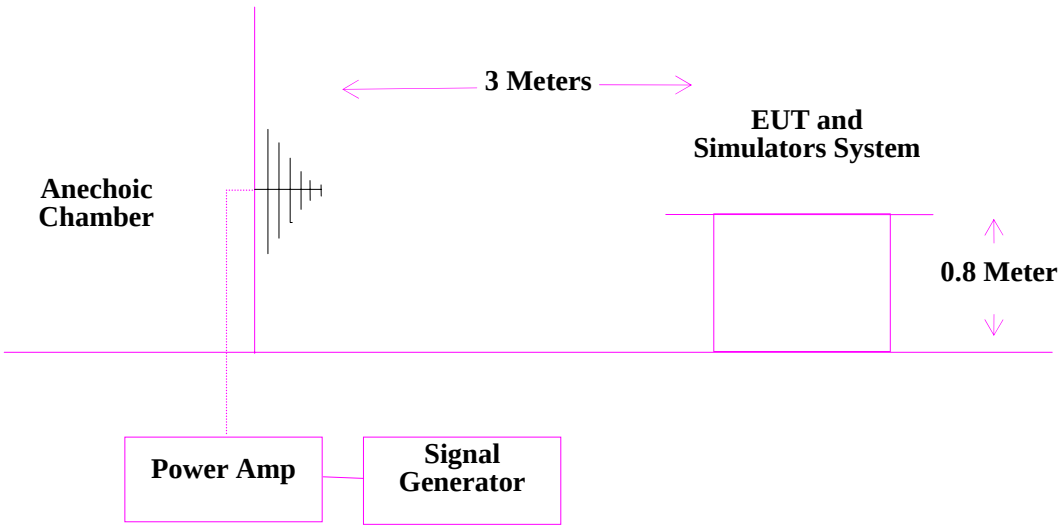
Severity level

Level	Field Strength V/m
1	1
2	3
3	10
X	Special

Performance criterion: A

5.3 EUT Configuration

The configuration of EUT is listed in Section 3.4.



5.4 Operating Condition of EUT

Same as conducted emission test, which is listed in Section 3.5.

5.5 Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter above ground. EUT is set 3 meter away from the transmitting antenna, which is mounted, on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of EUT must be faced this transmitting antenna and measured individually.
In order to judge the EUT performance, a CCD camera is used to monitor EUT screen.
All the scanning conditions are as follows:

Condition of Test	Remarks
Fielded Strength	3 V/m (Severity Level 2)
Radiated Signal	Modulated 1KHz 80% Depth
Scanning Frequency	80 - 1000 MHz
Sweeping time of radiated	0.0015 decade/s
Dwell Time	2 Sec.

5.6 Test Data

Frequency Range (MHz)	Front (3 V/m)		Rear (3 V/m)		Left Side (3 V/m)		Right Side (3 V/m)	
80-1000	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
	A	A	A	A	A	A	A	A

Remark: Field strength of 0.4 meter above the ground below the EUT is 2.9V/m.

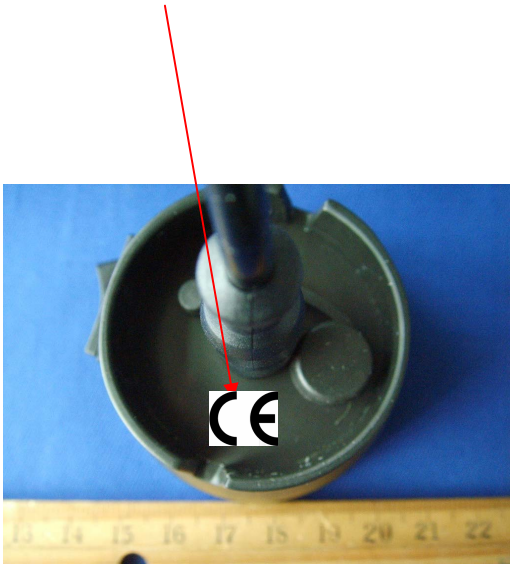
APPENDIX A - CE PRODUCT LABELING

CE Mark Label Specification

Specifications: Text is Black or white in color and is left justified. Labels are printed in indelible ink on permanent adhesive backing or silk-screened onto the EUT or shall be affixed at a conspicuous location on the EUT, the mark should not small than 5mm.

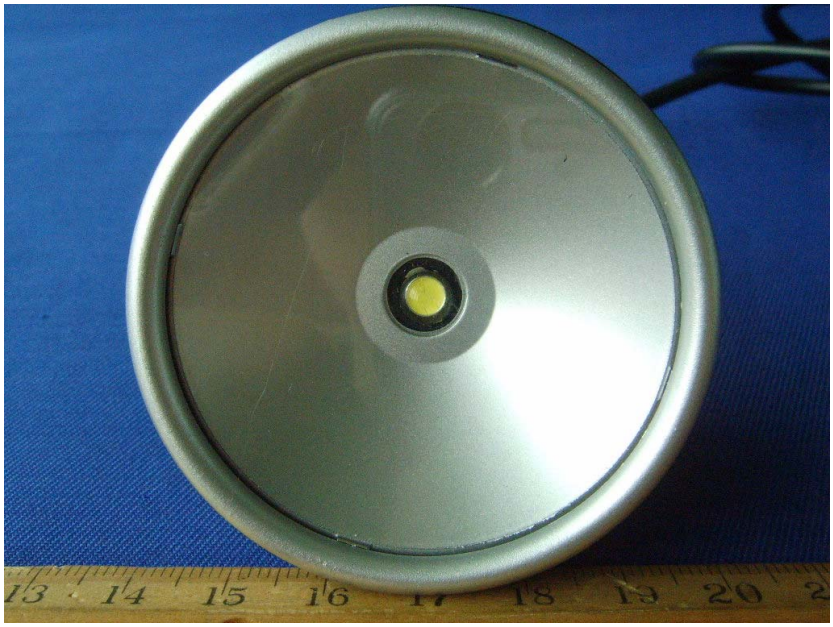
Proposed Label Location on EUT

Rear View of EUT CE Mark Location



APPENDIX B - EUT PHOTOGRAPHS

EUT - Front View



EUT- Side View