SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

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1 Cover Page

TEST REPORT

Application No.:	SHEM1604002258LM
Applicant:	Ningbo BEC Lighting CO., LTD.
Equipment Under Test (EUT): **NOTE:** The following sample(s) submitted was/were identified on behalf of the client as	
EUT Name:	Solar Outdoor Lamp
Model No.:	303247-T, 303247-F, 303247-T-H, 303247-F-H¤
¤	Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade mark:	BEC
Standards:	EN 55015:2013+A1:2015 EN 61547:2009
Date of Receipt:	2016-04-22
Date of Test:	2016-04-22 to 2016-05-06
Date of Issue:	2016-05-09
Test Result :	**Pass***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.
.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives.

CE

Parlam Zhan
E&E Section Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.
If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

2 Test Summary

Item	Standard	Method	Class	Result
RE(30M-300M)	EN 55015:2013+A1:2015	CISPR 32:2015	N/A	Pass
RE Loop(9K-30M)	EN 55015:2013+A1:2015	EN 55015:2013+A1:2015	N/A	Pass
ESD	EN 61547:2009	EN 61000-4-2:2009	4kV Contact Discharge 8kV Air Discharge	Pass
RI(80M-1G)	EN 61547:2009	EN 61000-4-3:2006+A1:2008+A2:2010	3V/m, 80%, 1kHz Amp. Mod.	Pass

N/A: Not applicable

Declaration of EUT Family Grouping:

There are 4 models mentioned in this report, and they are the similar in electrical and electronic characters. Only the model 303247-T was tested since their differences were the model number, color of the holder, shape of the holder, shape of lamp-house and the position of solar panel .

3 Contents

4 General Information

4.1 Client Information

Applicant:	Ningbo BEC Lighting CO., LTD.
Address of Applicant:	Sanbei Industrial Zone Cixi, Ningbo, Zhejiang, China
Manufacturer:	Ningbo BEC Lighting CO., LTD.
Address of Manufacturer:	Sanbei Industrial Zone Cixi, Ningbo, Zhejiang, China
Factory:	Ningbo BEC Lighting CO., LTD.
Address of Factory:	Sanbei Industrial Zone Cixi, Ningbo, Zhejiang, China

4.2 Details of E.U.T.

Power supply:	Battery Output: DC 3.6V 180mA
Cable:	N/A

4.3 E.U.T Operation Mode

Detail description of the Test mode

a: Lighting mode: Keep the lamp lighting continuously.

4.4 Description of Support Units

The EUT has been tested as an independent unit.

4.5 Standards Applicable for Testing

Table 1 : Tests Carried Out Under EN 55015:2013+A1:2015

Method	Item	Status
EN 55015:2013+A1:2015	Conducted Disturbance at Mains Terminals(9KHz-30MHz)	×
EN 55015:2013+A1:2015	Conducted Disturbance at Load Terminals(150KHz-30MHz)	×
CISPR 32:2015	Radiated Disturbance(30MHz-300MHz)	√
EN 55015:2013+A1:2015	Radiated Disturbance (Magnetic field Induced Current)(9KHz-30MHz)	√
EN 55015:2013+A1:2015	Insertion Loss	×
EN 55015:2013+A1:2015	Conducted Disturbance at Control Terminals(150KHz-30MHz)	×
EN 55015:2013+A1:2015	Conducted RF Emission Test for CDN method	×

Table 2 : Tests Carried Out Under EN 61547:2009

Method	Item	Status
EN 61000-4-2:2009	Electrostatic Discharge	√
EN 61000-4-3:2006+A1:2008+A2:2010	Radiated Immunity(80MHz-1GHz)	√
EN 61000-4-4:2012	Electrical Fast Transients/Burst at Power Port	×
EN 61000-4-4:2012	Electrical Fast Transients/Burst at Signal Port	×
EN 61000-4-5:2014	Surge at Power Port	×
EN 61000-4-6:2014	Conducted Immunity at Power Port(150kHz-80MHz)	×
EN 61000-4-6:2014	Conducted Immunity at Signal Port(150kHz-80MHz)	×
EN 61000-4-11:2004	Voltage Dips and Interruptions	×

× Indicates that the test is not applicable
√ Indicates that the test is applicable

4.6 Test Location

All tests were performed at:
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab
588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China
Tel: +86 21 6191 5666
Fax: +86 21 6191 5678
No tests were sub-contracted.

4.7 Test Facility

• CNAS (No. CNAS L0599)

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• FCC – Registration No.: 402683

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered and fully described in a report filed with the Federal Communications Commission (FCC). The acceptance letter from the FCC is maintained in our files. Registration No.: 402683.

• Industry Canada (IC) – IC Assigned Code: 8617A

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A-1.

• VCCI (Member No.: 3061)

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3868,C-4336,T-2221,G-830 respectively.

4.8 Deviation from Standards

None

4.9 Abnormalities from Standard Conditions

None

4.10 Monitoring of EUT for All Immunity Test

Visual: Working status of the EUT.
Audio: None.

4.11 Measurement Uncertainty

According to CISPR 16-4-2.

Test Item	Frequency Range	Measurement Uncertainty	U_{cispr}
Conducted Emission at mains port using AMN	9kHz-150kHz	3.2 dB	3.8 dB
Conducted Emission at mains port using AMN	150kHz-30MHz	3.0 dB	3.4 dB
Conducted Emission at mains port using VP	9kHz-30MHz	1.9 dB	3.9 dB
Conducted Emission at telecommunication port using AAN	150kHz-30MHz	2.4 dB	5.0 dB
Radiated Emission	30MHz-1000MHz	4.4 dB	6.3 dB
Radiated Emission	1GHz-6GHz	4.6 dB	5.2 dB (1GHz-6GHz)
Radiated Emission	6GHz-18GHz	4.6 dB	5.5 dB (6GHz-18GHz)
Disturbance Power	30MHz-300MHz	3.5 dB	4.5 dB
Remark: AMN – Artificial Mains Network VP – Voltage Probe ANN – Asymmetric Artificial Network			

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

5 Equipment List

RE(30M-300M)					
Item	**Equipment**	**Manufacturer**	**Model No**	**Inventory No**	**Cal Due Date**
1	EMI test receiver	Rohde & Schwarz	ESU40	SHEM051-1	2016-08-04
2	Antenna	SCHWARZBECK	VUBA9117	SHEM008-1	2017-01-15
3	Ultra Antenna	Rohde & Schwarz	HL562	SHEM010-1	2017-01-15
4	Pre Amplifier	Agilent	8447D	SHEM143-1	2016-08-09
5	New Low Amplifier	CLAVIIO	BDLNA-0001-412010	SHEM164-1	2016-10-09
6	High Frequency Filter	LORCH	9BRX-875/X150-SR	SHEM156-1	N/A
7	Multi-device controller	ETS	2090	SHEM005-1	N/A

RE Loop(9K-30M)					
Item	**Equipment**	**Manufacturer**	**Model No**	**Inventory No**	**Cal Due Date**
1	EMI test receiver	Rohde & Schwarz	ESR7	SHEM162-1	2017-01-12
2	3-dimensional large loop antenna,diam.2m.acc	Rohde & Schwarz	HXYZ9170	SHEM017-1	2017-01-12
3	Line impedance stabilization network	EMCO	3816/2	SHEM019-1	2017-01-12
4	Pulse limiter	Rohde & Schwarz	ESH3-Z2	SHEM029-1	2016-08-04
5	"Van der Hoofden" test-head	SCHWARZBECK	VDHH9502	SHEM129-1	2017-01-12

ESD					
Item	**Equipment**	**Manufacturer**	**Model No**	**Inventory No**	**Cal Due Date**
1	Electrostatic Discharge Simulator	TESEQ	NSG 437	SHEM041-1	2016-08-24

RI(80M-1G)					
Item	**Equipment**	**Manufacturer**	**Model No**	**Inventory No**	**Cal Due Date**
1	Antenna	SCHWARZBECK	STLP9128D	SHEM130-1	N/A
2	Antenna	SCHWARZBECK	STLP9149	SHEM131-1	N/A
3	Amplifier	MILMEGA	80RF1000-250	SHEM132-1	2016-08-09
4	Amplifier	MILMEGA	AS0840-55-55	SHEM133-1	2016-08-09
5	Power meter sensor	Rohde & Schwarz	NRP-Z22	SHEM136-1	2016-08-04
6	ElectroMagnetic Field Probe	ETS-Lindgren	HI-6113	SHEM134-1	2016-08-09

General used equipment					
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Due date**
1	Digital pressure meter	YONGZHI	DYM3-01	101012	2017-03-02
2	Temperature& humidity recorder	ShangHai weather meter work	ZJ 1-2B	84320600 803136, F304020153,201 01201FS100A6K ,201106117	2016-08-02
3	Digital Multimeter	FLUKE	17B	19720439	2017-01-13
4	Autoformer regulator	Guangzhou bao de	TDGC2-5KVA-	/	/
5	CLAMP METER	FLUKE	316	2503030971	2017-01-13

6 Emission Test Results

6.1 RE(30M-300M)

Test Requirement:	EN 55015:2013+A1:2015
Test Method:	CISPR 32:2015
Frequency Range:	30MHz to 300MHz
Limit:	
30MHz-230MHz	40dB(μV/m) quasi-peak
230MHz-300MHz	47dB(μV/m) quasi-peak
Detector:	Peak for pre-scan (120kHz resolution bandwidth) 30M to 300MHz

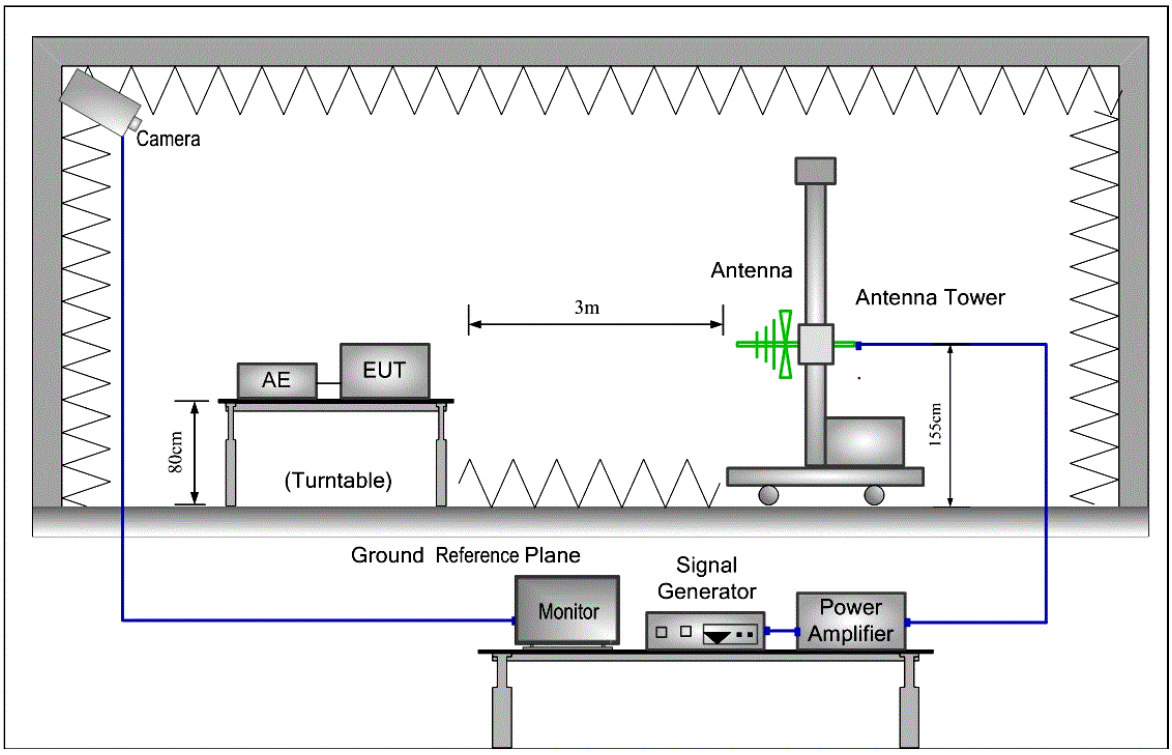
6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity:51 % RH Atmospheric Pressure: 1001 mbar

Test mode a: Lighting mode: Keep the lamp lighting continuously.

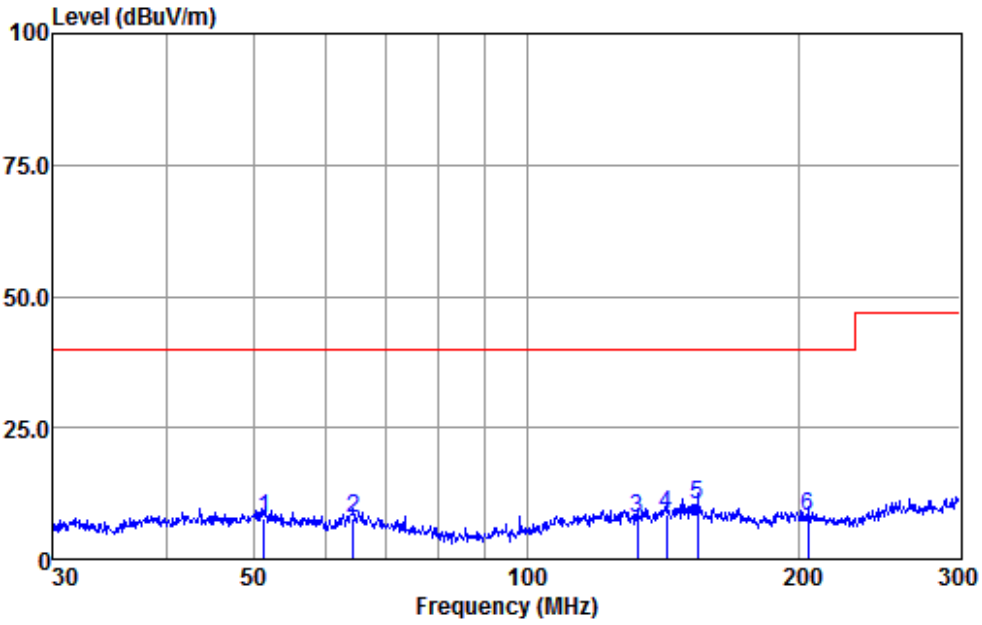
6.1.2 Test Setup



6.1.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

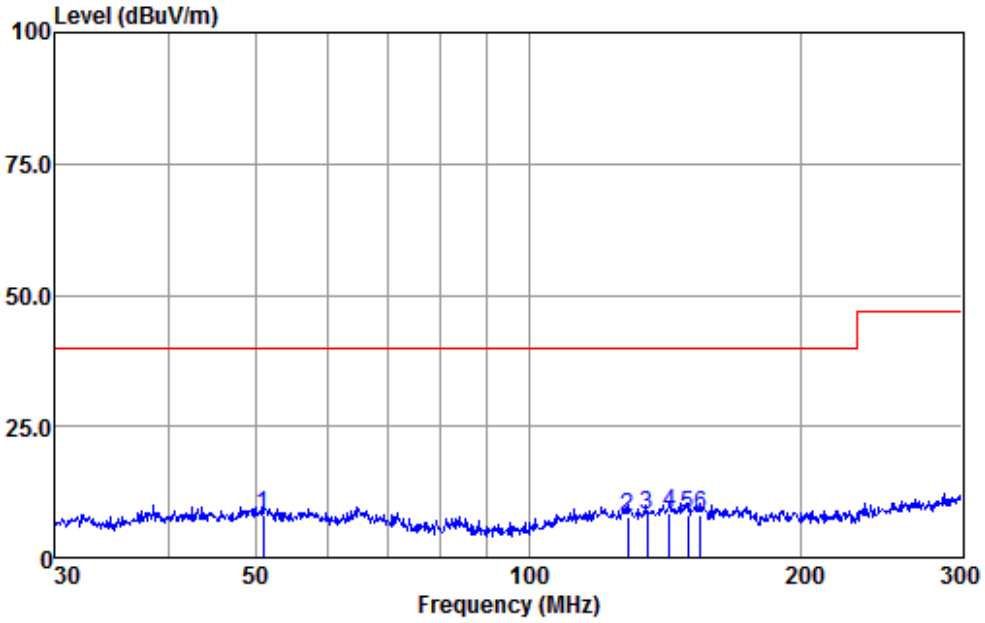
Mode:a;Polarization:Horizontal



Condition : HORIZONTAL
EUT/Project: 2258LM
Test Mode : a

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	51.34	37.21	13.64	0.71	43.76	7.80	40.00	-32.20	QP
2	64.29	37.92	12.61	0.82	43.70	7.65	40.00	-32.35	QP
3	132.49	37.83	12.00	1.28	43.52	7.59	40.00	-32.41	QP
4	142.59	38.38	12.43	1.33	43.50	8.64	40.00	-31.36	QP
5 q	154.52	40.01	12.48	1.39	43.48	10.40	40.00	-29.60	QP
6	204.46	39.27	10.53	1.64	43.41	8.03	40.00	-31.97	QP

Mode:a;Polarization:Vertical



Condition : VERTICAL
EUT/Project: 2258LM
Test Mode : a

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	50.92	37.42	13.69	0.71	43.76	8.06	40.00	-31.94	QP
2	128.67	38.23	11.89	1.26	43.53	7.85	40.00	-32.15	QP
3	135.04	38.05	12.10	1.30	43.51	7.94	40.00	-32.06	QP
4 q	143.04	38.09	12.45	1.34	43.50	8.38	40.00	-31.62	QP
5	149.77	37.54	12.79	1.37	43.49	8.21	40.00	-31.79	QP
6	154.67	37.80	12.47	1.39	43.48	8.18	40.00	-31.82	QP

6.2 RE Loop(9K-30M)

Test Requirement:	EN 55015:2013+A1:2015
Test Method:	EN 55015:2013+A1:2015
Frequency Range:	9kHz to 30MHz
Limit:	
0.009MHz-0.07MHz	88dB(μA) quasi-peak
0.07MHz-0.15MHz	88dB(μA)-58dB(μA) quasi-peak
0.15MHz-3MHz	58dB(μA)-22dB(μA) quasi-peak
3MHz-30MHz	22dB(μA) quasi-peak
Detector:	Peak for pre-scan (200Hz resolution bandwidth) 0.009M to 0.15MHz
	Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

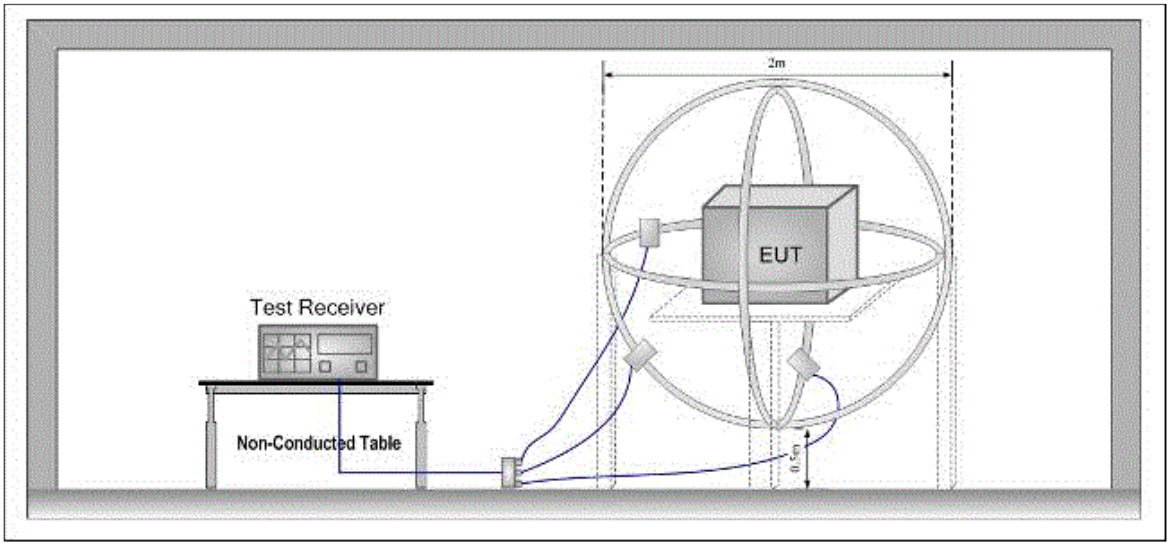
6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity:45 % RH Atmospheric Pressure: 1010 mbar

Test mode a: Lighting mode: Keep the lamp lighting continuously.

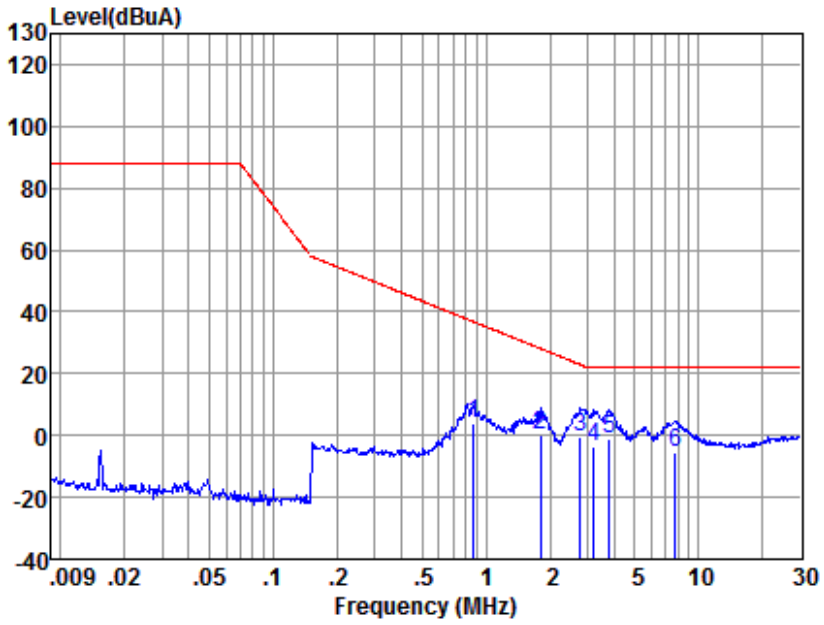
6.2.2 Test Setup



6.2.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

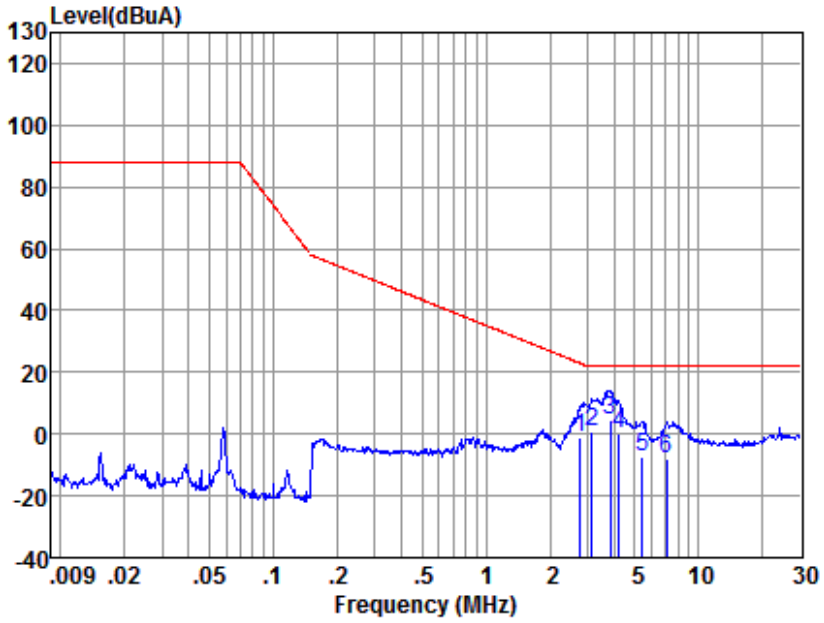
Mode:a;Axial:X



Site : chamber
Condition : 55015_LOOP
EUT/Project No: 2258LM
Test mode : a
: X

	Freq	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuA	dB	dBuA	dBuA	dB	
1	0.871	3.68	0.30	3.98	36.86	-32.88	QP
2	1.800	-0.03	0.30	0.27	28.14	-27.87	QP
3	2.779	-0.82	0.34	-0.48	22.92	-23.40	QP
4	3.207	-4.18	0.35	-3.83	22.00	-25.83	QP
5	3.799	-1.34	0.37	-0.97	22.00	-22.97	QP
6	7.728	-6.29	0.50	-5.79	22.00	-27.79	QP

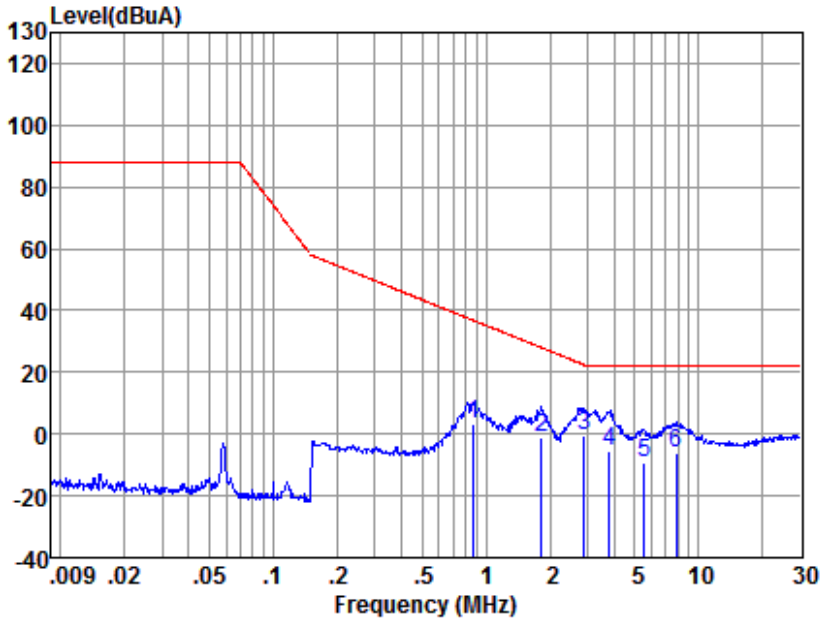
Mode:a;Axial:Y



Site : chamber
Condition : 55015_LOOP
EUT/Project No: 2258LM
Test mode : a
: Y

	Freq	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuA	dB	dBuA	dBuA	dB	
1	2.779	-1.34	0.34	-1.00	22.92	-23.92	QP
2	3.140	0.15	0.35	0.50	22.00	-21.50	QP
3	3.860	4.19	0.37	4.56	22.00	-17.44	QP
4	4.202	-0.29	0.38	0.09	22.00	-21.91	QP
5	5.447	-8.04	0.43	-7.61	22.00	-29.61	QP
6	7.100	-8.69	0.50	-8.19	22.00	-30.19	QP

Mode:a;Axial:Z



Site : chamber
Condition : 55015_LOOP
EUT/Project No: 2258LM
Test mode : a
: Z

	Freq	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuA	dB	dBuA	dBuA	dB	
1	0.876	2.74	0.30	3.04	36.80	-33.76	QP
2	1.819	-1.32	0.30	-1.02	28.01	-29.03	QP
3	2.884	-0.59	0.34	-0.25	22.47	-22.72	QP
4	3.820	-5.59	0.37	-5.22	22.00	-27.22	QP
5	5.535	-9.52	0.43	-9.09	22.00	-31.09	QP
6	7.810	-6.41	0.50	-5.91	22.00	-27.91	QP

7 Immunity Test Results

7.1 Performance Criteria Description in EN 61547:2009

Criterion A 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.

Criterion 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.

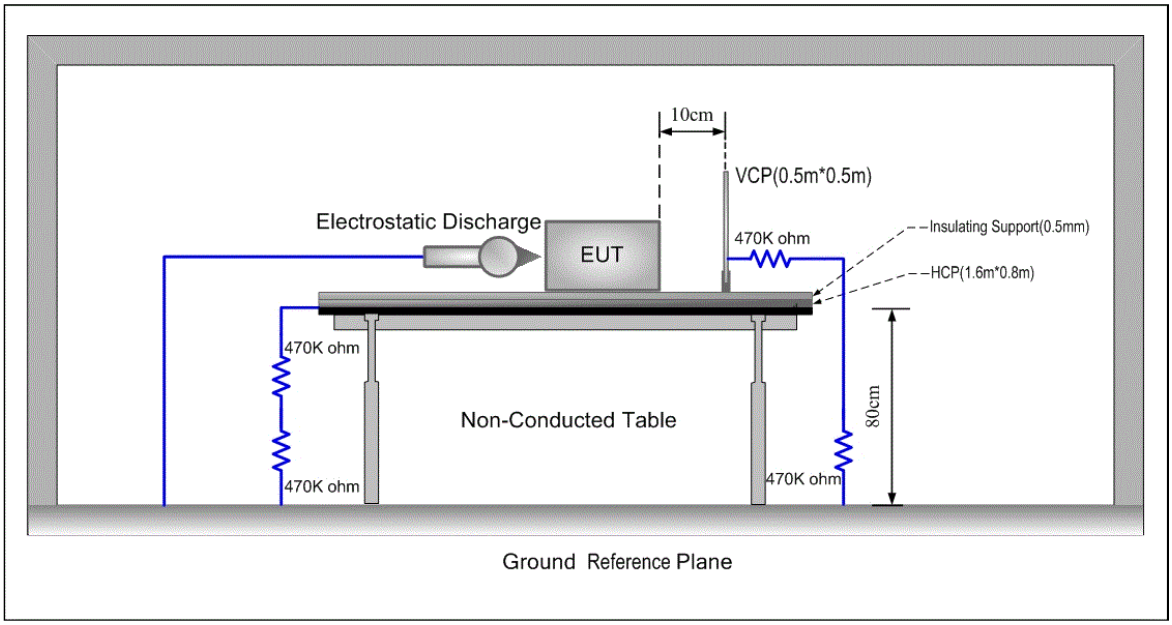
Regulating controls need not function during the test, but after the test the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.

Criterion C 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.

7.2 ESD

Test Requirement: EN 61547:2009
Test Method: EN 61000-4-2:2009
Performance Criterion: B
Discharge Impedance: 330Ω/150pF
Number of Discharge: Minimum 10 times at each test point
Discharge Mode: Single Discharge
Discharge Period: 1 second minimum

7.2.1 Test Setup:



7.2.2 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 55 % RH Atmospheric Pressure: 1010 mbar

Test mode: a: Lighting mode: Keep the lamp lighting continuously.

7.2.3 Test Results:

Observations: Test Point:

1. All insulated enclosure and seams.
2. All accessible metal parts of the enclosure.
3. All side

Discharge type	Level (kV)	Polarity	Test Point	Result / Observations
Air Discharge	2,4,8	+	1	A
Air Discharge	2,4,8	-	1	A
Contact Discharge	4	+	2	A
Contact Discharge	4	-	2	A
Horizontal Coupling	2,4	+	3	A
Horizontal Coupling	2,4	-	3	A

Vertical Coupling	2,4	+	3	A
Vertical Coupling	2,4	-	3	A

Results:

A: No degradation in the performance of the EUT was observed.

7.3 RI(80M-1G)

Test Requirement: EN 61547:2009

Test Method: EN 61000-4-3:2006+A1:2008+A2:2010

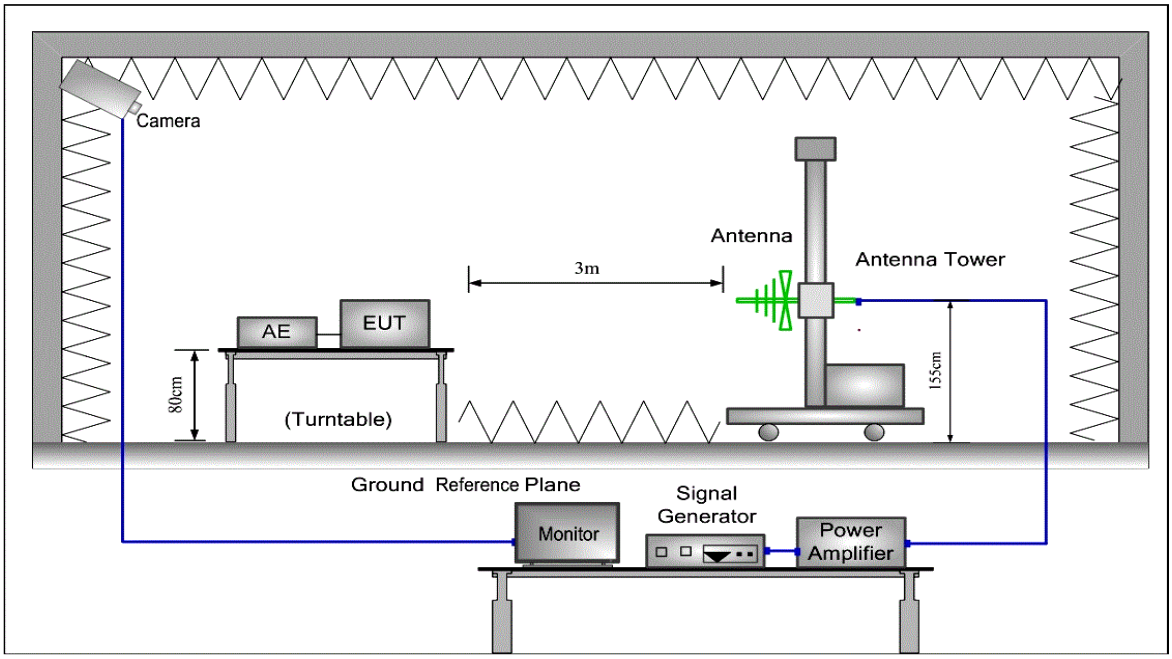
Performance Criterion: A

Frequency Range: 80MHz to 1GHz

Antenna Polarisation: Vertical and Horizontal

Modulation 1kHz,80% Amp. Mod,1% increment

7.3.1 Test Setup:



7.3.2 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity:51 % RH Atmospheric Pressure: 1001 mbar

Test mode: a: Lighting mode: Keep the lamp lighting continuously.

7.3.3 Test Results:

Frequency	Level (V/m)	EUT Face	Dwell time	Result / Observations
80MHz-1GHz	3	Front	3s	A
80MHz-1GHz	3	Back	3s	A
80MHz-1GHz	3	Left	3s	A
80MHz-1GHz	3	Right	3s	A
80MHz-1GHz	3	Top	3s	A
80MHz-1GHz	3	Underside	3s	A

Results:

A: No degradation in the performance of the EUT was observed.

8 Photographs

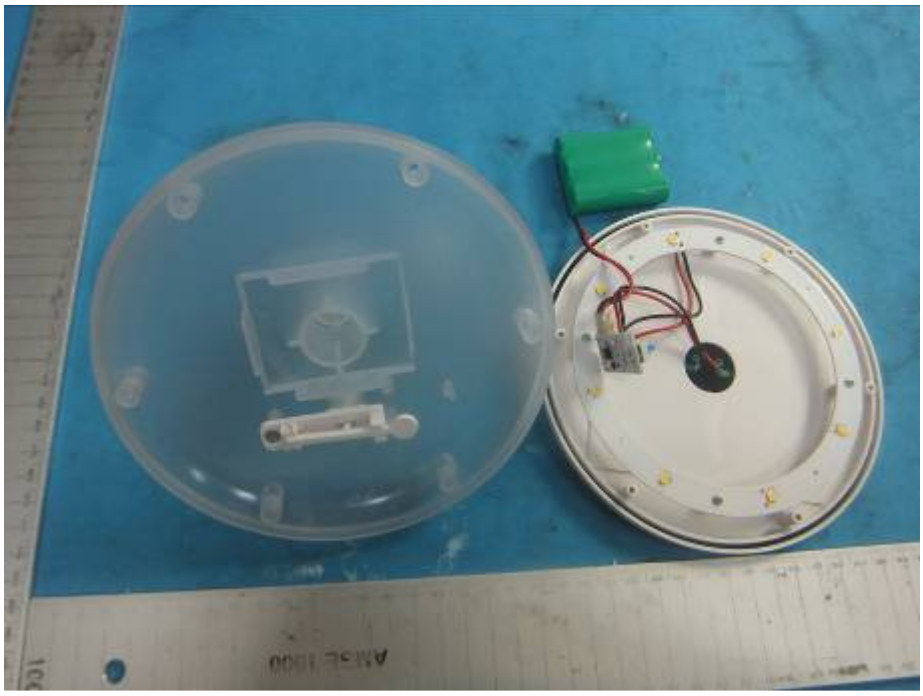
8.1 RE(30M-300M) Test Setup

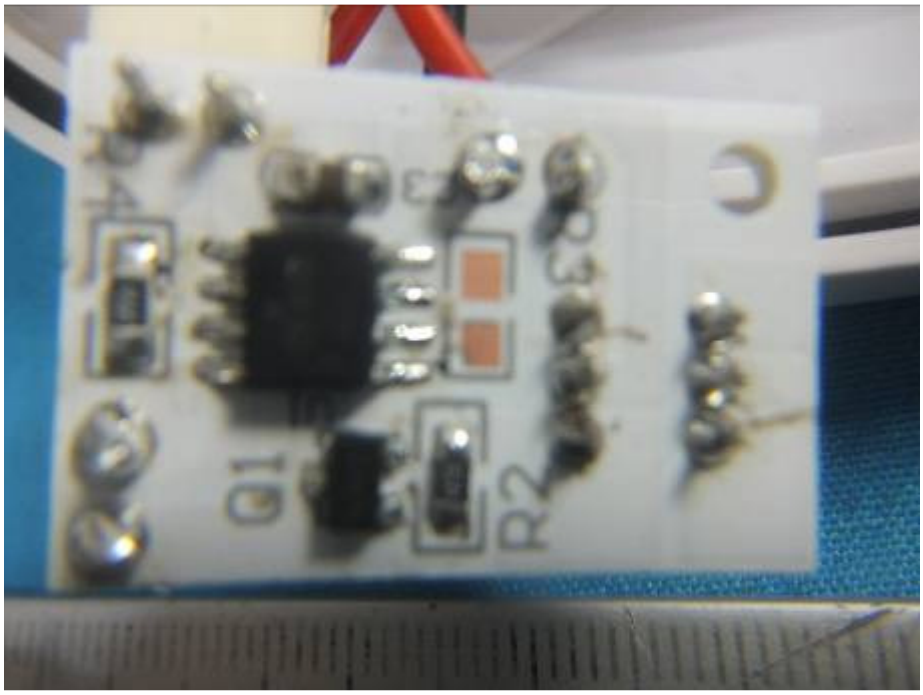
8.2 RE Loop(9K-30M) Test Setup

8.3 ESD Test Setup

8.4 RI(80M-1G) Test Setup

8.5 EUT Constructional Details





--End of the Report--