

EN 55015:2013
EN 61547:2009
EN 61000-3-2:2006 + A1:2009 + A2:2009
EN 61000-3-3:2013

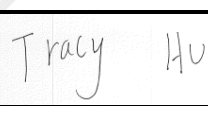
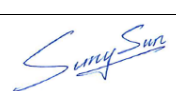
TEST REPORT

For

Guangzhou Hongli Opto-electronic Co.,Ltd.

No.1,Xianke Yi Road,Huadong Town,Huadu District,Guangzhou,China

Model: HL- LE002F9VW-10B1C30(Ra2)

Report Type: Original Report	Product Type: High Power AC LED Module
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Report Number: RSZ160523558-01	
Report Date: 2016-05-31	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Guangzhou Hongli Opto-electronic Co.,Ltd.*'s product, model: HL- LE002F9VW-10B1C30(Ra2) or the "EUT" in this report is a *High Power AC LED Module*, which was measured approximately: 3.0cm (L) x 3.0cm (W) x 0.1cm (H), rate with the input voltage: 100-240V or DC 14.8V from battery. The highest operating frequency is 60kHz.

** All measurement and test data in this report was gathered from production sample serial number: 1605034 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2016-05-23.*

Objective

The following Declaration of Conformity report is prepared on behalf of *Guangzhou Hongli Opto-electronic Co.,Ltd.* in accordance with EN 55015, Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment, EN 61547, Equipment for general lighting purposed – EMC immunity requirements, EN 61000-3-2, Limits – Limits for harmonic current emissions (equipment input current up to and including 16 A per phase), and also in accordance with EN 61000-3-3, Limits Section 3; Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current < 16A.

The objective of the manufacturer is to determine the compliance of the EUT with EN 55015, EN 61547, EN 61000-3-2 and EN 61000-3-3.

Related Submittal(s)/Grant(s)

No related submittal(s).

Test Methodology

All measurements contained in this report were conducted with CISPR 16-1-1:2010, specification for radio disturbance and immunity measuring apparatus and methods P1-1: radio disturbance and immunity measuring apparatus – measuring apparatus. CISPR 16-2-1:2013, Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements. CISPR 16-2-3:2010, specification for radio disturbance and immunity measuring apparatus and methods P2-3 methods of measurement of disturbances and immunity- radiated disturbance measurements. CISPR 16-2-4:2003 Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-4: Methods of measurement of disturbances and immunity – Immunity measurements. CISPR 16-4-2:2011 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modeling – Uncertainty in EMC measurements

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 Meters.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on October 31, 2013. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in normal mode.

EUT Exercise Software

No exercise software was made to the EUT tested.

Equipment Modifications

No modifications were made to the EUT tested.

Support Equipment List and Details

No Support Equipment was made to the EUT tested.

Support Equipment List and Details

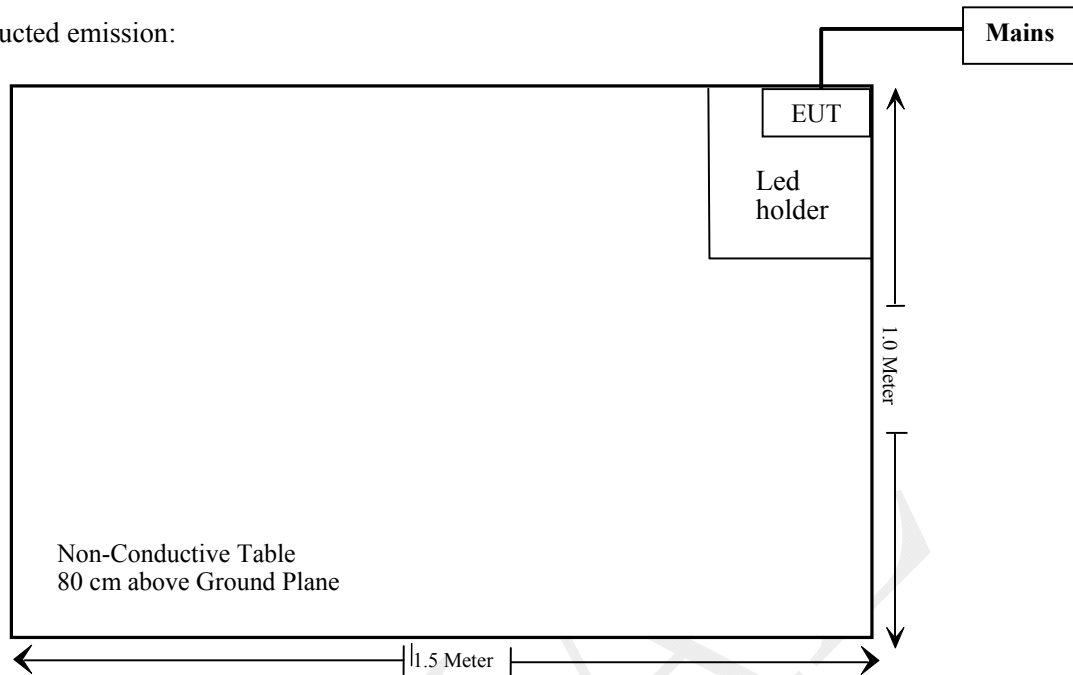
Manufacturer	Description	Model	Serial Number
/	EUT holder	/	/

External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-shielding Detachable AC Cable	1.8	Mains	EUT

Block Diagram of Test Setup

For conducted emission:



Operating condition for lighting equipment

When measurements of disturbances or insertion loss of lighting equipment are being made, the equipment shall be operated under the following conditions

Items	Requirements	Results
on equipment	The lighting equipment is to be tested as delivered by the manufacturer under normal operating conditions, for example, as given in IEC 60598 for luminaires.	Compliance
Supply voltage and frequency	The supply voltage shall be within $\pm 2\%$ of the rated voltage. In the case of a voltage range, measurement shall be carried out within $\pm 2\%$ of each of the nominal supply voltages of that range. The nominal frequency of the mains supply shall be as rated for the equipment.	Compliance
Ambient conditions	Measurements shall be carried out in normal laboratory conditions. The ambient temperature shall be within the range $15\text{ }^{\circ}\text{C}$ to $25\text{ }^{\circ}\text{C}$.	Compliance
Type of lamp used	Terminal disturbance voltage and radiated field measurements shall be carried out with the lamps for which the lighting equipment is designed. Lamps of the highest wattage rating allowed for the lighting equipment shall be used.	Compliance
Ageing time of lamps	Measurements shall be carried out with lamps which have been in operation for at least ☐ 2 h for incandescent lamps ☒ 100 h for fluorescent and other discharge lamps	Compliance
Stabilization time of lamps	Prior to a measurement, the lamp(s) shall be operated until stabilization has been reached. Unless otherwise stated in this standard or specified by the manufacturer, the following stabilization times shall be observed: ☐ 5 min for incandescent lamps ☐ 15 min for fluorescent lamps ☒ 30 min for other discharge lamps	Compliance
Replaceable starters	When IEC 60155 glow-switch starters are used, the capacitor is replaced by a capacitor of $0,005\text{ }\mu\text{F} \pm 5\%$. The starter shall be retained in its socket, unless otherwise specified. Care shall be taken that it maintains its characteristics over the whole frequency range covered by the measurements. If the manufacturer fits a capacitor external to the starter, the luminaire is measured as manufactured including the starter capacitor.	Compliance

SUMMARY OF TEST REPORT**EN 55015**

Rule	Description	Results
§ 4.3.1	Disturbance Voltages (Mains Terminals)	Compliance
§ 4.4.1	Radiated Electromagnetic Disturbances (9 kHz to 30 MHz)	Compliance
§ 4.4.2	Radiated Electromagnetic Disturbances (30 MHz to 300 MHz)	Compliance

EN 61547

Rule	Description	Results
§ 5.2	Electrostatic Discharge, IEC 61000-4-2	Compliance
§ 5.3	Radio Frequency Electromagnetic Fields, IEC 61000-4-3	Compliance
§ 5.4	Power frequency Magnetic Fields, IEC 61000-4-8	Not Applicable
§ 5.5	Fast Transients, IEC 61000-4-4	Compliance
§ 5.6	Injected Currents, IEC 61000-4-6	Compliance
§ 5.7	Surges, IEC 61000-4-5	Compliance
§ 5.8	Voltage Dips and Interruptions, IEC 61000-4-11	Compliance

EN 61000-3-2

Rule	Description	Results
§7	Harmonic Current Emissions	Compliance

EN 61000-3-3

Rule	Description	Results
§5	Voltage Fluctuation and Flicker	Compliance

EN 55015 §4.3.1- DISTURBANCE VOLTAGES (MAINS TERMINALS)

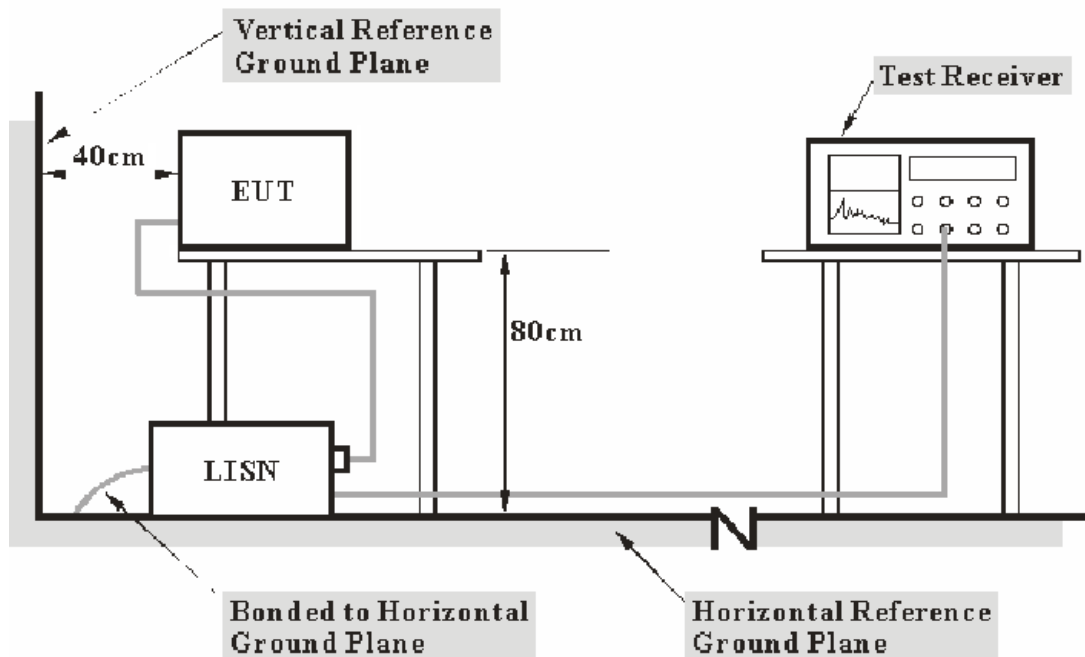
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between LISN and receiver, LISN voltage division factor, LISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report

Port	Expanded Measurement uncertainty
AC Mains	3.34 dB (k=2, 95% level of confidence)

Test System Setup



- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with CISPR 16-2-1:2013 measurement procedure. The specification used was the EN 55015 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver Setup

The EMI Test Receiver was set to investigate the spectrum from 9 kHz to 30 MHz.

During the conducted emission test, the EMI Test Receiver was set with the following configurations:

Frequency Range	IF B/W
9 kHz – 150 kHz	200 Hz
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2015-06-01	2016-05-31
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2015-12-15	2016-12-14
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2016-05-14	2017-05-14
Rohde & Schwarz	CE Test software	EMC 32	V8.53	NCR	NCR

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

During the conducted emission test, the EUT was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination.

All final data was recorded in the Quasi-peak and average detection mode.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

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

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the data in the following table, the worst margin reading as below:

9.3 dB at 0.322000 MHz in the Neutral conducted mode.

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cisp\text{r}}$$

In BACL, $U_{(Lm)}$ is less than $U_{cisp\text{r}}$, if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

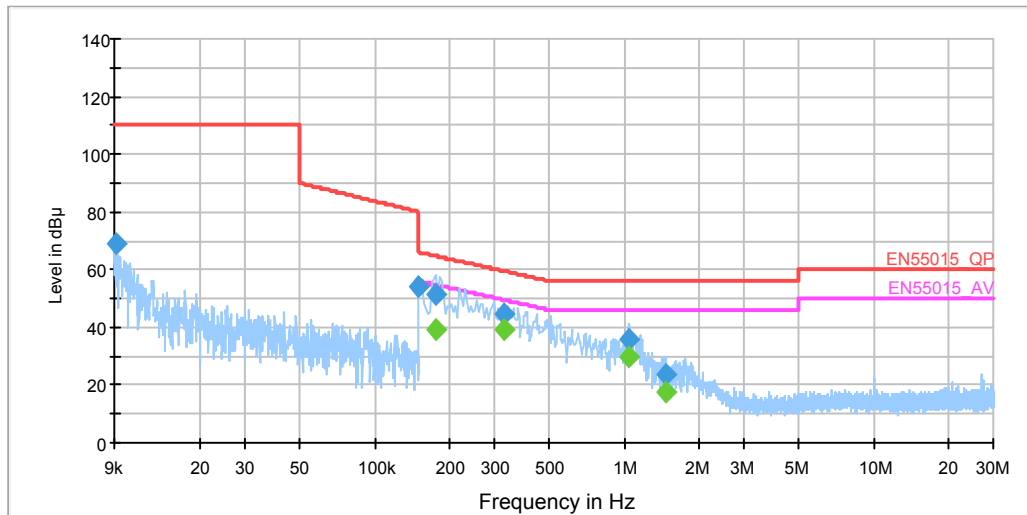
Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Tracy Hu on 2016-05-27.

Test Mode: Lighting

AC 230V/50Hz, Line

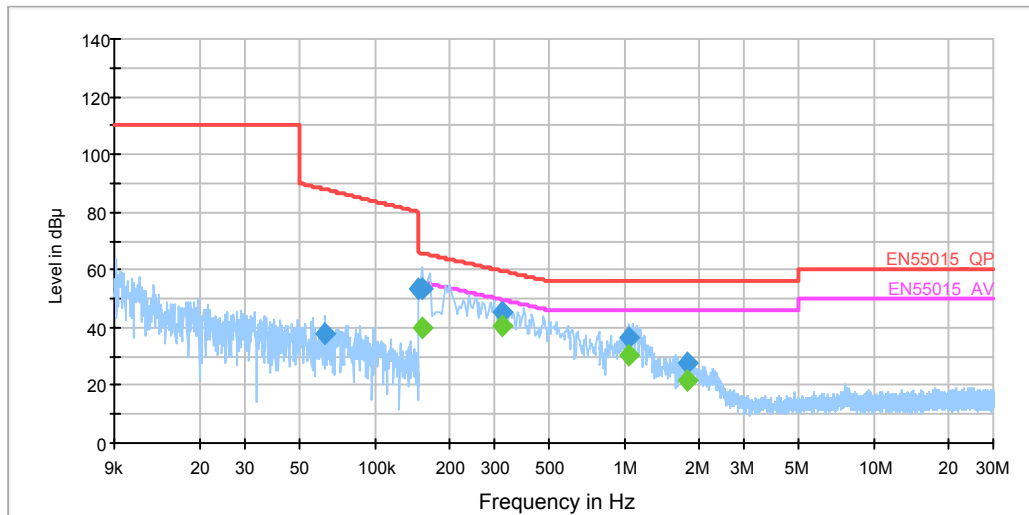
EN55015 L



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.009145	68.7	19.7	110.0	41.3	QP
0.150000	54.2	20.0	66.0	11.8	QP
0.174000	51.6	20.0	64.8	13.2	QP
0.174000	39.2	20.0	54.8	15.6	Ave.
0.326000	44.6	19.9	59.6	15.0	QP
0.326000	39.3	19.9	49.6	10.2	Ave.
1.046000	35.9	20.0	56.0	20.1	QP
1.046000	29.8	20.0	46.0	16.2	Ave.
1.470000	23.8	20.0	56.0	32.2	QP
1.470000	17.5	20.0	46.0	28.5	Ave.

AC 230V/50Hz, Neutral:

EN55015 N



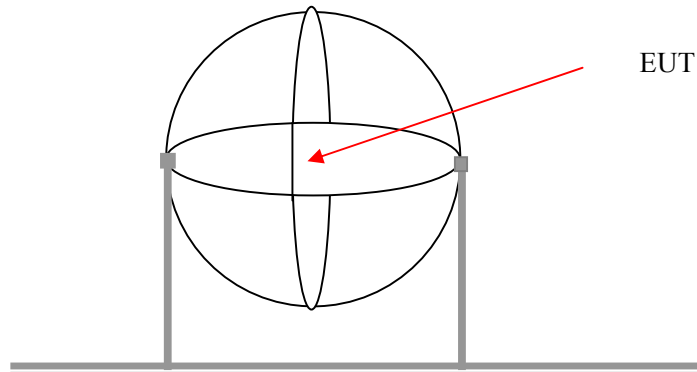
Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.062636	37.6	20.0	87.9	50.3	QP
0.150000	53.6	20.0	66.0	12.4	QP
0.154000	53.3	20.0	65.8	12.5	QP
0.154000	39.7	20.0	55.8	16.1	Ave.
0.322000	45.5	19.9	59.7	14.1	QP
0.322000	40.3	19.9	49.7	9.3	Ave.
1.046000	36.7	20.0	56.0	19.3	QP
1.046000	30.7	20.0	46.0	15.3	Ave.
1.778000	27.5	20.0	56.0	28.5	QP
1.778000	21.5	20.0	46.0	24.5	Ave.

Note:

- 1) Corrected Amplitude = Reading + Correction Factor
- 2) Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation
- 3) Margin = Limit – Corrected Amplitude

EN 55015 §4.4.1 - RADIATED ELECTROMAGNETIC DISTURBANCES

EUT System Setup



EMI Test Receiver Setup

During the radiated emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
9 kHz – 150 kHz	200 Hz
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447E	1937A01046	2015-05-06	2016-05-06
TDK	Chamber	Chamber A	2#	2015-10-15	2018-10-15
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2015-11-03	2016-11-03
ETS	Passive Loop Antenna	6512	00029604	2014-11-30	2017-11-29
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Tracy Hu on 2016-05-28.

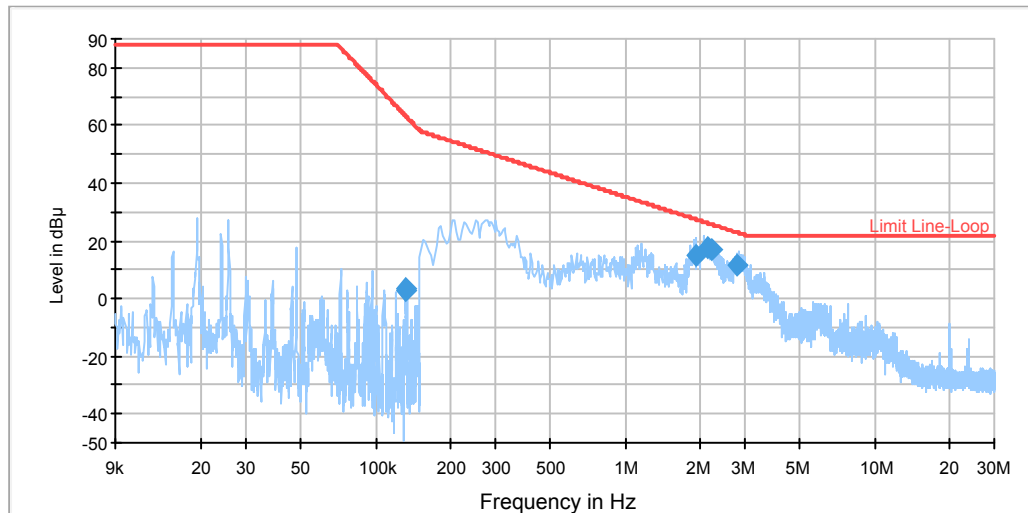
Test Result: Compliance.

Please refer to the following table and spectrum plots.

Test Mode: Lighting

X

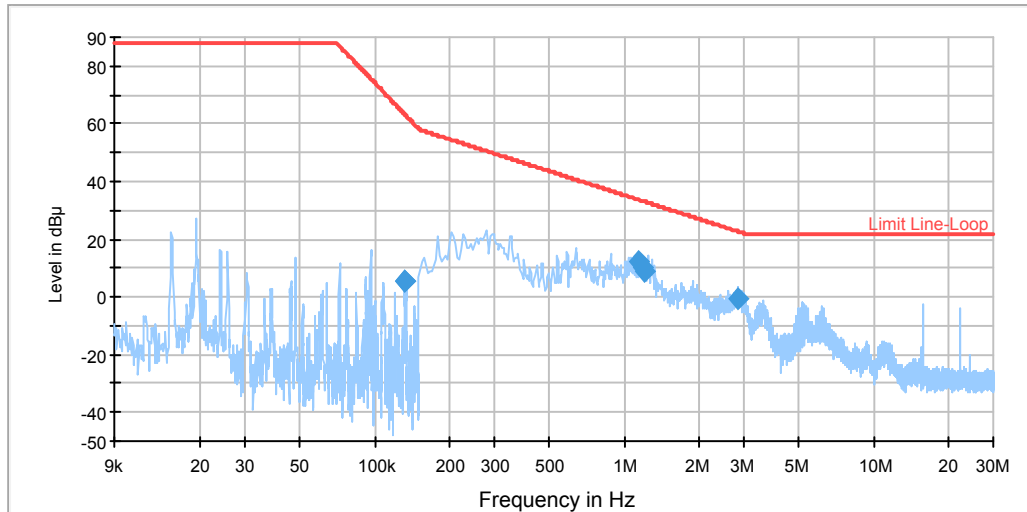
EMI Auto Test Loop



Radiated Electromagnetic Disturbances				EN 55015	
Frequency (MHz)	Amplitude (dBμA)	Correction Factor (dB)	Limit (dBμA)	Margin (dB)	Detector (PK/Ave./QP)
0.131960	2.6	-24.1	63.0	60.5	QP
0.132040	3.3	-24.1	63.0	59.7	QP
1.900000	15.0	-24.0	27.5	12.5	QP
2.136000	17.9	-24.0	26.1	8.2	QP
2.208000	17.0	-24.0	25.7	8.7	QP
2.812000	11.8	-24.0	22.8	11.0	QP

Y

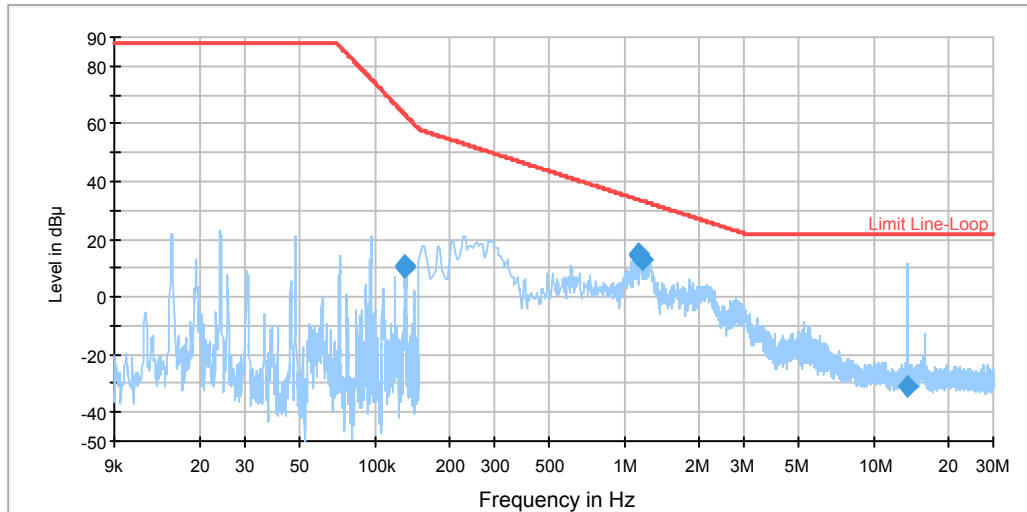
EMI Auto Test Loop



Radiated Electromagnetic Disturbances				EN 55015	
Frequency (MHz)	Amplitude (dBμA)	Correction Factor (dB)	Limit (dBμA)	Margin (dB)	Detector (PK/Ave./QP)
0.131960	5.2	-24.1	63.0	57.8	QP
0.132040	5.3	-24.1	63.0	57.7	QP
1.128000	12.0	-24.0	33.8	21.8	QP
1.188000	10.1	-24.0	33.1	23.1	QP
1.196000	8.7	-24.0	33.1	24.4	QP
2.856000	-0.4	-24.0	22.6	23.0	QP

Z

EMI Auto Test Loop



Radiated Electromagnetic Disturbances				EN 55015	
Frequency (MHz)	Amplitude (dBμA)	Correction Factor (dB)	Limit (dBμA)	Margin (dB)	Detector (PK/Ave./QP)
0.131960	10.7	-24.1	63.0	52.4	QP
0.132040	10.4	-24.1	63.0	52.6	QP
1.128000	14.5	-24.0	33.8	19.3	QP
1.128200	14.7	-24.0	33.8	19.1	QP
1.176000	12.9	-24.0	33.3	20.4	QP
13.628000	-31.1	-23.8	22.0	53.1	QP

EN 55015 §4.4.2 - RADIATED ELECTROMAGNETIC DISTURBANCES

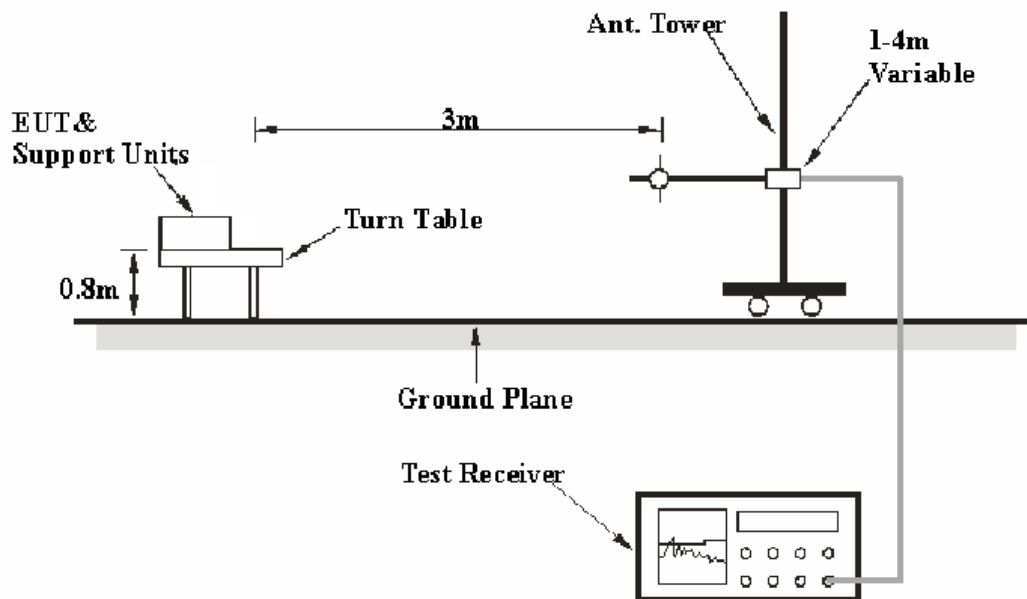
Measurement Uncertainty

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 directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown in below table. And the uncertainty will not be taken into consideration for the test data recorded in the report.

Frequency	Polarity	Measurement uncertainty
30MHz~200MHz	Horizontal	4.04 dB (k=2, 95% level of confidence)
	Vertical	4.52 dB (k=2, 95% level of confidence)
200MHz~1GHz	Horizontal	4.72 dB (k=2, 95% level of confidence)
	Vertical	5.81 dB (k=2, 95% level of confidence)

Test System Setup



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the CISPR16-1-4:2012, CISPR 16-2-3:2010. The specification used was EN 55015.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 300 MHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 300 MHz	100 kHz	300 kHz	120 kHz	QP

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
TDK	Chamber	Chamber A	2#	2015-10-15	2018-10-15
HP	Amplifier	HP8447E	1937A01046	2015-05-06	2016-05-06
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2015-11-03	2016-11-03
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-07	2017-12-06
R&S	Auto test Software	EMC32	V9.10.0.0	NCR	NCR

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detection mode.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the data in the following table, the worst margin reading as below:

8.94dB at 37.096625 MHz in the Vertical polarization

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cisp\text{r}}$$

In BACL, $U_{(Lm)}$ is less than $U_{cisp\text{r}}$, if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

Test Data

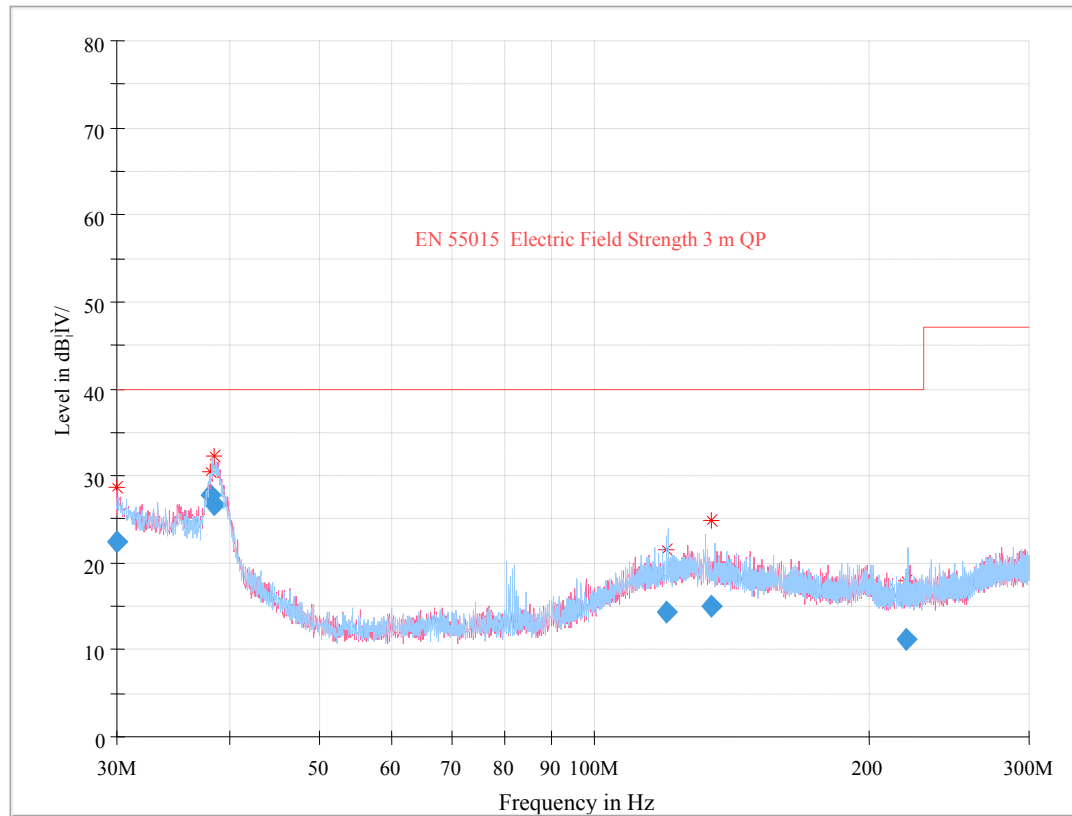
Environmental Conditions

Temperature:	25 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Tracy Hu on 2016-05-27.

Test Mode: Lighting

Full Spectrum



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
30.018266	22.41	216.0	V	103.0	0.1	40.00	17.59
37.911625	27.78	256.0	H	17.0	-6.0	40.00	12.22
38.315625	26.72	368.0	H	297.0	-6.3	40.00	13.28
119.864125	14.36	166.0	H	355.0	-7.1	40.00	25.64
134.823250	15.01	106.0	H	112.0	-6.9	40.00	24.99
220.502000	11.30	236.0	H	0.0	-9.4	40.00	28.70

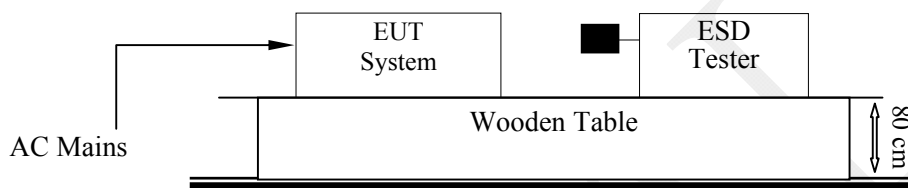
Note:

- 1) Corrected Amplitude = Meter Reading + Correction Factor
- 2) Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain
- 3) Margin = Limit - Corrected Amplitude

EN 61547 §5.2-ELECTROSTATIC DISCHARGE (IEC 61000-4-2)**Test Equipment**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EM Test	ESD Tester	Dito	302105	2015-11-04	2016-11-04

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test System Setup

Remark: ■ is the tip of the electrode

IEC 61000-4-2 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

For tabletop equipment, a 1.6 by 0.8-meter metal sheet (HCP) is placed on the table and connected to the ground plane via a metal strap with two 470 k Ohms resistors in series. The EUT and attached cables are isolated from this metal sheet by 0.5-millimeter thick insulating material. A Vertical Coupling Plane (VCP) grounded on the ground plane through the same configuration as in the HCP is used.

Test Standard

EN 61547:2009 (IEC 61000-4-2:2008)

Air Discharge at ± 2 kV, ± 4 kV, ± 8 kV

Contact Discharge at ± 2 kV, ± 4 kV

Test Level

Level	Test Voltage Contact Discharge ($\pm$ kV)	Test Voltage Air Discharge ($\pm$ kV)
1.	2	2
2.	4	4
3.	6	8
4.	8	15
X.	Special	Special

Performance criterion: B

Test Procedure

Air Discharge:

This test is done on a non-conductive surface. 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 Section 8.3.1 of IEC 61000-4-2, except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

Indirect discharge for horizontal coupling plane

At least 50 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1 m from the EUT and with the discharge electrode touching the coupling plane.

Indirect discharge for vertical coupling plane

At least 50 single discharges shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

Test Data and Setup Photo

Environmental Conditions

Temperature:	26 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Tracy Hu on 2016-05-31.

*Test Mode: Lighting***Table 1: Electrostatic Discharge Immunity (Air Discharge)**

IEC 61000-4-2 Test Points	Test Levels							
	-2Kv	+2Kv	-4Kv	+4Kv	-8Kv	+8Kv	-15Kv	+15Kv
/	/	/	/	/	/	/	/	/

Table 2: Electrostatic Discharge Immunity (Direct Contact)

IEC 61000-4-2 Test Points	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
/	/	/	/	/	/	/	/	/

Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

IEC 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	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/

Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

IEC 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	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/

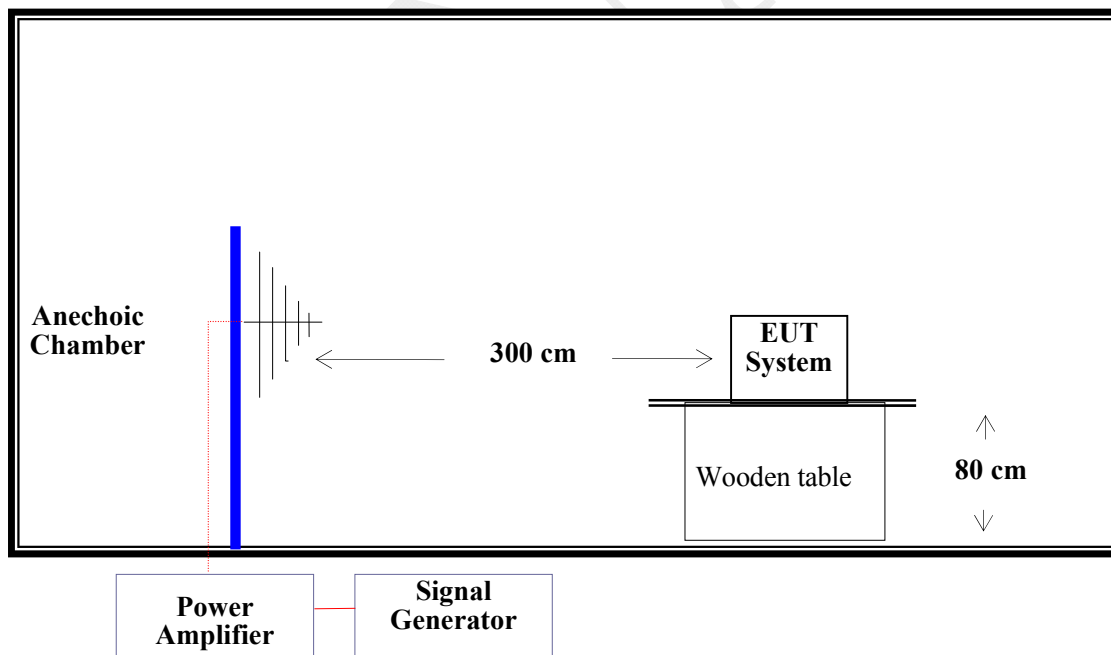


Test Setup Photo

EN 61547 §5.3-RADIO FREQUENCY ELECTROMAGNETIC FIELDS (IEC 61000-4-3)**Test Equipment**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Amplifier Research	Power Amplifier	200W1000/M2	H1004497	2015-11-03	2016-11-03
ETS	Fully Anechoic Chamber	N/A	N/A	2016-05-26	2019-05-26
HP	Signal Generator	8648C	3426A01345	2015-06-09	2016-06-09
Amplifier Research	Field Monitor	FM5004	302149	2016-01-08	2019-01-08
ETS-Lindgreen	Isotropic Field Probe	HI-6005	00069461	2016-01-08	2019-01-08
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-07	2017-12-06
Frank Hoppert	RS test Software	RSUS	2.133	NCR	NCR

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test System Setup

Test Standard

EN 61547:2009 (IEC 61000-4-3:2006+A1:2007)
Test level 2 at 3 V/ m (unmodulated, r.m.s.)

Test Level

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

Performance criterion: A**Test Procedure**

The EUT and its simulators are placed on a turn table which is 0.8 meter above the ground. The EUT is set 3 meters away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarizations of the antenna are 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 the EUT. All the scanning conditions are as follows:

Condition of Test	Remarks
1. Field Strength	3 V/m (Test level 2)
2. Radiated Signal	80% AM (1 kHz)
3. Scanning Frequency	80 – 1000 MHz
4. Sweeping time of radiated	0.0015decade/s
5. Dwell Time	1Sec.

Test Data and Setup Photo**Environmental Conditions**

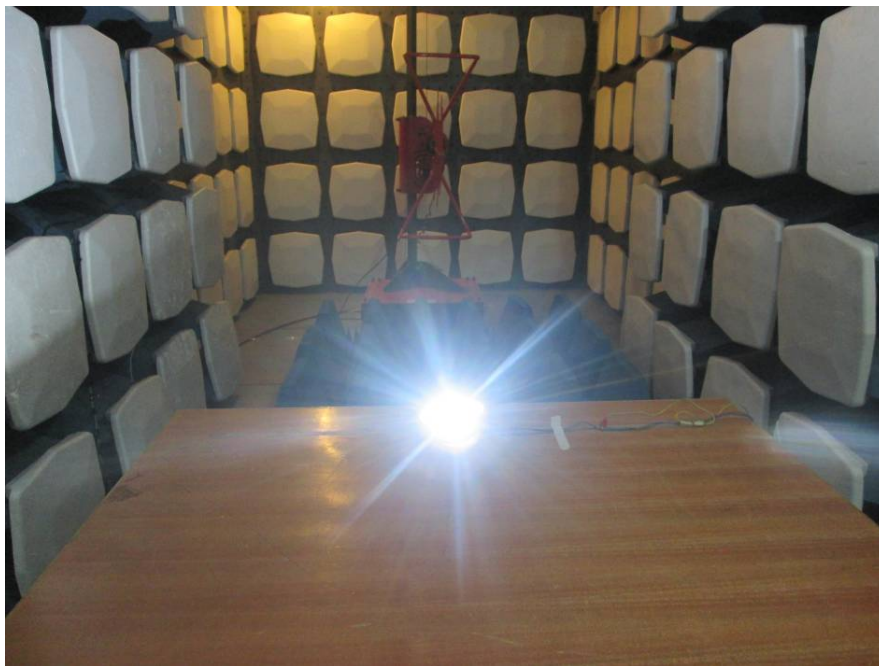
Temperature:	26 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Tracy Hu on 2016-05-27.

Test Mode: Lighting

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

Lighting

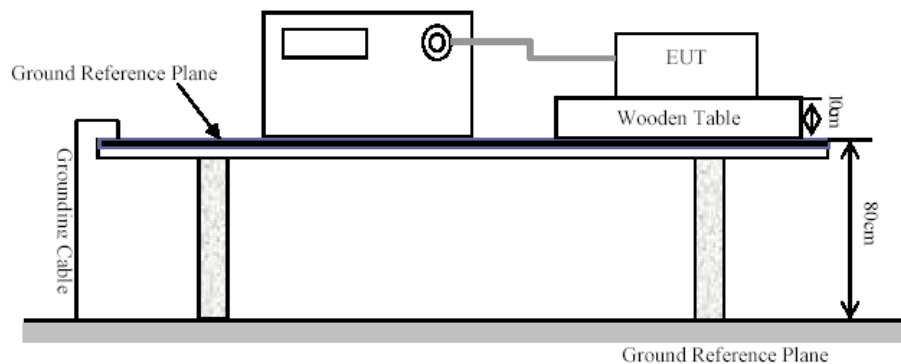


Test Setup Photo

EN 61547 §5.5- FAST TRANSIENTS (IEC 61000-4-4)**Test Equipment**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EM Test	EMS Combination Tester	UCS 500 N5	V0939105172	2015-12-15	2016-12-14
EM Test	AC Source	MV2616	V0939105173	2015-11-03	2016-11-03
EM Test	Auto test Software	Iec Control	V5.0.3.0	NCR	NCR

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test System Setup**Test Stand:**

EN 61547:2009 (IEC 61000-4-4:2004)
Test Level 2 at 1 kV

Test level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special

Performance criterion: B

Test Procedure

The EUT was arranged for Power Line Coupling and for I/O Line Coupling through a capacitive clamp, where applicable. (Note: The I/O coupling test using a capacitive clamp is performed on the I/O interface cables that are longer in length than 3 meters.) A metal ground plane 2.4 meter by 2.0 meter was placed between the floor and the table and is connected to the earth by a 2.0 meter ground rod. The ground rod is connected to the test facility's electrical earth.

Test Data and Setup Photo

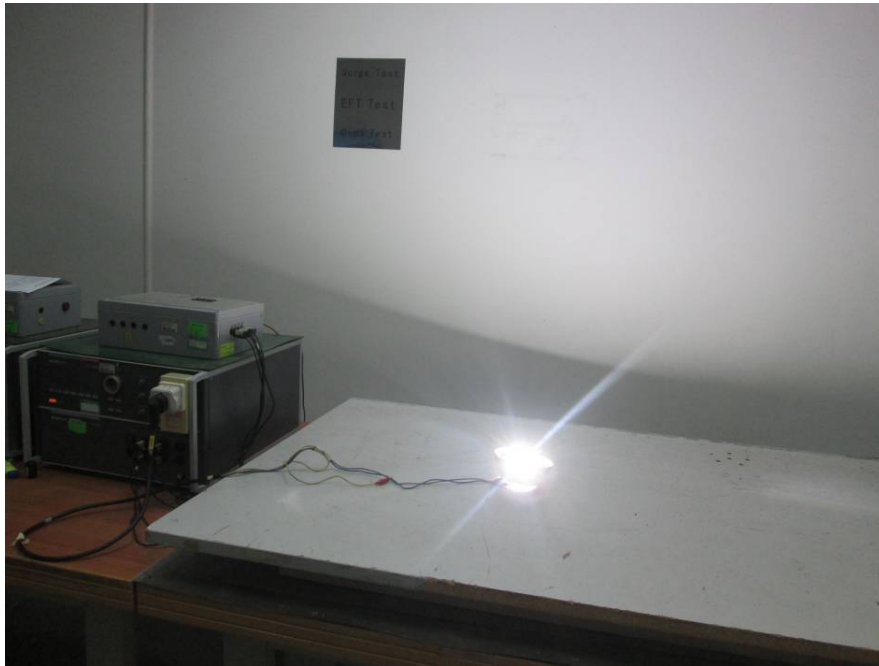
Environmental Conditions

Temperature:	26°C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Tracy Hu on 2016-05-30.

Test Mode: Lighting

IEC 61000-4-4 Test Points		Test Levels (kV)							
		+0.5	-0.5	+1.0	-1.0	+2.0	-2.0	+4.0	-4.0
AC Mains Power Supply Input Port	L1	/	/	/	/	/	/	/	/
	N	/	/	/	/	/	/	/	/
	PE	/	/	/	/	/	/	/	/
	L1/N	/	/	A	A	/	/	/	/
	L1/PE	/	/	/	/	/	/	/	/
	N/PE	/	/	/	/	/	/	/	/
	L1/N/PE	/	/	/	/	/	/	/	/

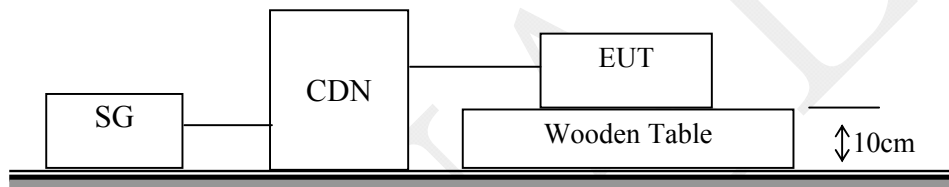


Test Setup Photo

EN 61547 §5.6-INJETED CURRENTS (IEC 61000-4-6)**Test Equipment**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EM Test	CDN	M3	1201-05	2015-11-03	2016-11-03
EM Test	C/S Tester	CWS500	303277	2015-11-03	2016-11-03
Amplifier Research	6dB Attenuator	6dB	303282	2015-11-03	2016-11-03

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test setup**Test Standard**

EN 61547:2009 (IEC 61000-4-6:2008)

Test Level 2 at 3 V r.m.s. (unmodulated), 0.15 MHz ~ 80 MHz

Test level

Level	Voltage Level (r.m.s.)V
1	1
2	3
3	10
X	Special

Performance criterion: A

Test Procedure

- 1) Let the EUT work in test mode and test it.
- 2) The EUT are placed on an insulating support 0.1 m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3 m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 3) The disturbance signal described below is injected to EUT through CDN.
- 4) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 5) The frequency range is swept from 150 kHz to 80 MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave.
- 6) The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 7) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

Test Data and Setup Photo

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Tracy Hu on 2016-05-30.

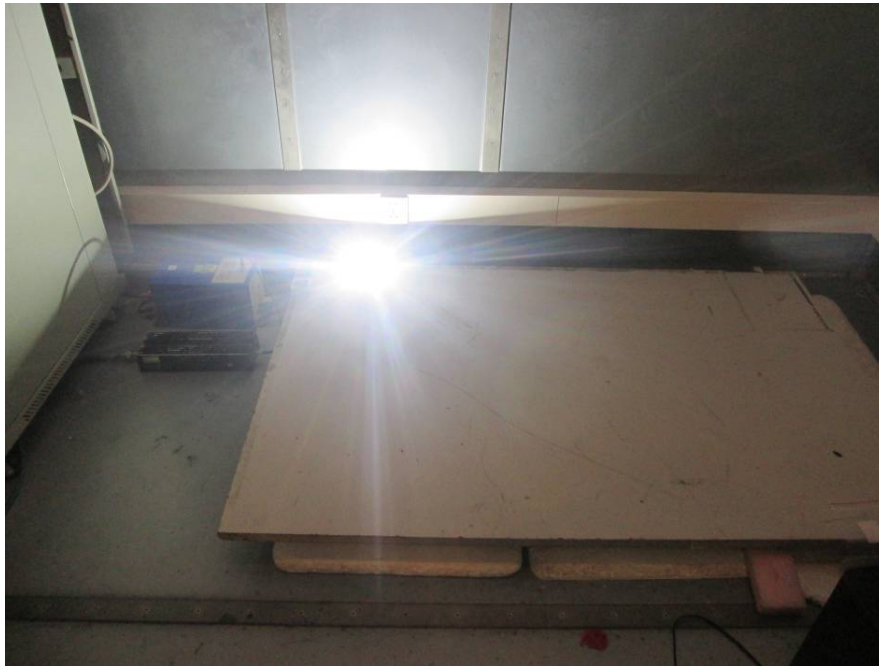
Test Mode: Lighting

Power Supply: AC 230V/50Hz

Modulation: Amplitude 80%, 1 kHz sine wave

Test Level: 3V r.m.s. (unmodulated)

Level	Voltage Level (r.m.s.) U_0	Pass	Fail
1	1	/	/
2	3	A	/
3	10	/	/
X	Special	/	/

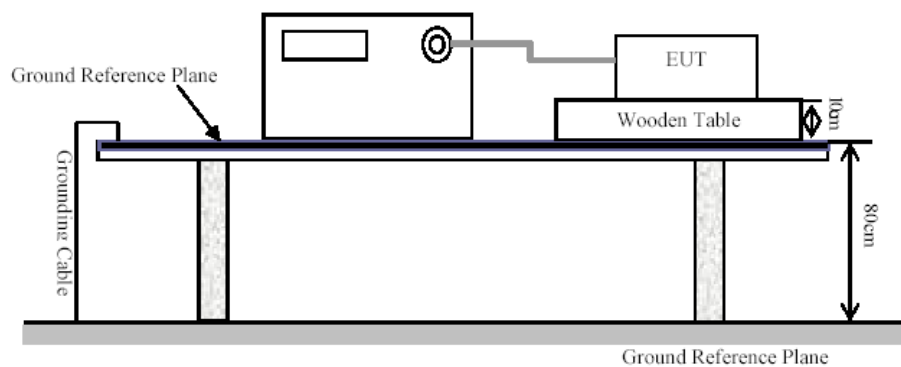


Test Setup Photo

EN 61547 §5.7-SURGES (IEC 61000-4-5)**Test Equipment**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EM Test	EMS Combination Tester	UCS 500 N5	V0939105172	2015-12-15	2016-12-14
EM Test	AC Source	MV2616	V0939105173	2015-11-03	2016-11-03
EM Test	Auto test Software	Iec Control	V5.0.3.0	NCR	NCR

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test system Setup**Test Standard**

EN 61547:2009 (IEC 61000-4-5:2005)

AC mains: Line to Line at 0.5kV, 1kV;

Line to Ground at 0.5kV, 1kV, 2kV.

Test level

Level	Open Circuit Output Test Voltage $\pm 10\%$	Performance Criterion
		AC Mains
1	0.5 kV	C
2	1 kV	C
3	2 kV	C
4	4 kV	C
X	Special	/

Test Procedure

- 1) For line to line coupling mode, provide a 1.2/50 μ s voltage surge (at open-circuit condition) and a 8/20 μ s current surge into a short circuit.
- 2) For telecommunication port, provide a 10/700 μ s voltage surge (at open-circuit condition) and a 5/320 μ s current surge into a short circuit.
- 3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 4) Different phase angles are done individually.
- 5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

Test Data and Setup Photo

Environmental Conditions

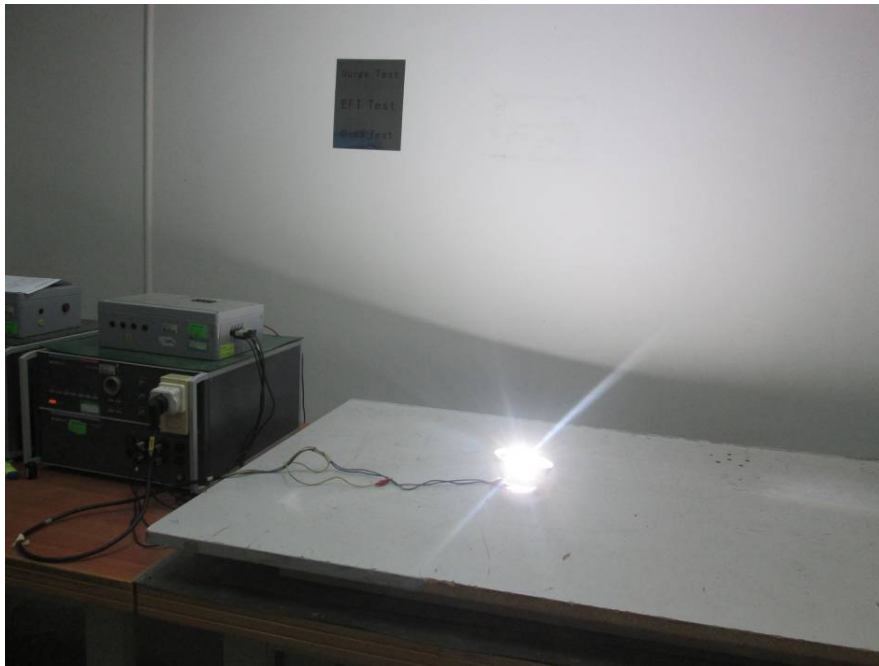
Temperature:	25°C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Tracy Hu on 2016-05-30.

Test Mode: Lighting

Table 1: AC mains power input port

Level	Voltage	Poll	Path	Pass	Fail
1	0.5kV	$\pm$	L1/N	A	/
2	1kV	$\pm$	L1/N,	/	/
3	2kV	$\pm$	L1/PE, N/PE, L1/N/PE	/	/
4	4kV	$\pm$	L1/N /L1/PE, N/PE, L1/N/PE	/	/

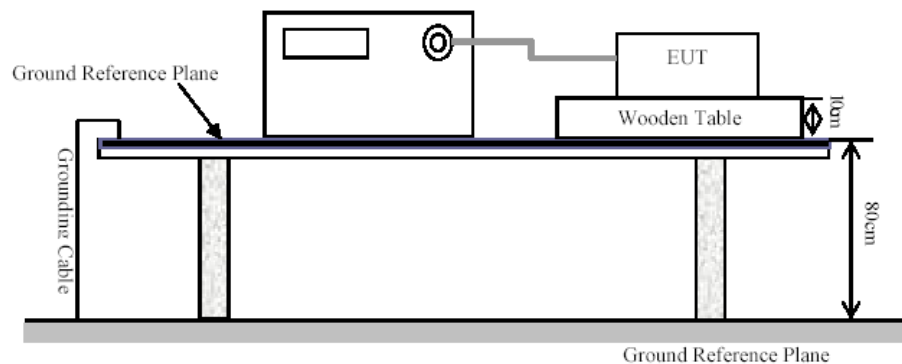


Test Setup Photo

EN 61547 §5.8-VOLTAGE DIPS AND INTERRUPTIONS (IEC 61000-4-11)**Test Equipment**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EM Test	EMS Combination Tester	UCS 500 N5	V0939105172	2015-12-15	2016-12-14
EM Test	AC Source	MV2616	V0939105173	2015-11-03	2016-11-03
EM Test	Auto test Software	Iec Control	V5.0.3.0	NCR	NCR

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test setup**Test Standard**

EN 61547:2009 (IEC 61000-4-11:2004)

Test Levels and Performance Criterion

Level	Voltage dip and short interruptions %UT	Duration (in period)	Performance criterion
1	70	10	C
2	0	0.5	B

Test Procedure

- 1) The interruption is introduced at selected phase angles with specified duration.
- 2) Record any degradation of performance.

Test Data and Setup Photo**Environmental Conditions**

Temperature:	26 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

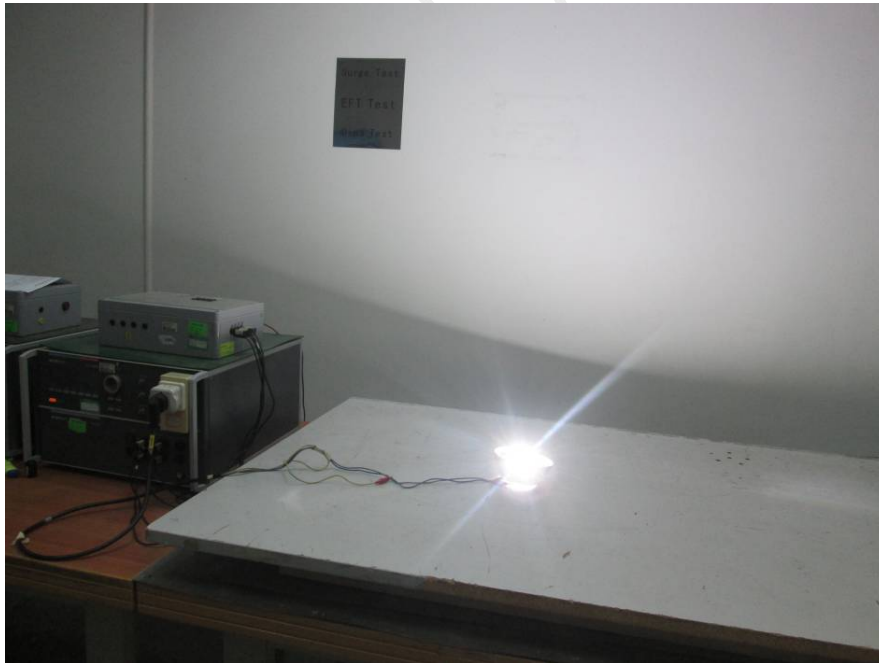
The testing was performed by Tracy Hu on 2016-05-30.

Test Mode: Lighting

Voltage Tips/Interruptions Test

Level	Voltage dip and short interruptions %UT	Number of periods	Phase Angle	N	Pass	Fail
1	0	0.5	0/180	3	B	/
2	70	10	0/180	3	B	/

Note: The EUT can restore by itself when the light was flashing during the testing.



Test Setup Photo

EN 61000-3-2 – HARMONIC CURRENT EMISSIONS

According to EN 61000-3-2:2006 + A1:2009 + A2:2009 section 7: Equipment with a rated power of 25 W or less, other than lighting equipment, are not included in this standard.

FINAL

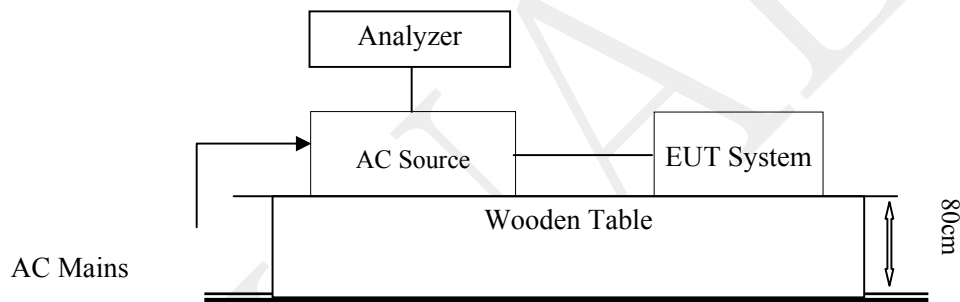
EN 61000-3-3- VOLTAGE FLUCTUATION AND FLICKER

Test Equipment

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EM Test	Harmonic/Flicker Analyzer	DPA 500N	V0939105176	2015-12-15	2016-12-14
EM Test	AC Source	ACS500	303276	2015-11-03	2016-11-03
EM Test	Auto test Software	Dpa Control	V5.1.3.0	NCR	NCR

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test System Setup



Test Standard

EN 61000-3-3:2013

Flicker Test Limits :

The limits shall be applicable to voltage fluctuations and flicker at the supply terminals of the equipment under test, measured or calculated according to clause 4 under test conditions described in clause 6 and annex A. Tests made to prove compliance with the limits are considered to be type tests.

The following limits apply:

- the value of Pst shall not be greater than 1,0;
- the value of Plt shall not be greater than 0,65;
- the value of d(t) during a voltage change shall not exceed 3,3 % for more than 500 ms;
- the relative steady-state voltage change, dc, shall not exceed 3,3 %;
- the maximum relative voltage change dmax, shall not exceed
 - a) 4 % without additional conditions;
 - b) 6 % for equipment which is:

- switched manually, or
- switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

NOTE: The cycling frequency will be further limited by the Pst and Plt limit. For example: a d_{max} of 6 % producing a rectangular voltage change characteristic twice per hour will give a Plt of about 0,65.

c) 7 % for equipment which is

- attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
- switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

In the case of equipment having several separately controlled circuits in accordance with 6.6, limits b) and c) shall apply only if there is delayed or manual restart after a power supply interruption; for all equipment with automatic switching which is energized immediately on restoration of supply after a power supply interruption, limits a) shall apply; for all equipment with manual switching, limits b) or c) shall apply depending on the rate of switching. Pst and Plt requirements shall not be applied to voltage changes caused by manual switching. The limits shall not be applied to voltage changes associated with emergency switching or emergency interruptions.

Test Data and Setup Photo

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

Date of test:	15:23 27.Mai 2016
Tester:	Tracy Hu
Standard used:	EN/IEC 61000-3-3 Flicker
Short time (Pst):	10 min
Observation time:	120 min (12 Flicker measurements)
Flicker meter:	230V / 50Hz
Customer:	Guangzhou Hongli Opto-electronic Co.,Ltd.
E. U. T.:	High Power AC LED Module
Model:	HL- LE002F9VW-10B1C30(Ra2)
Test Mode:	Lighting

Maximum Flicker results

	EUT values	Limit	Result
Plt	0.028	1.00	Pass
Pst	0.028	0.65	Pass
dc [%]	0.015	3.30	Pass
dmax [%]	0.283	4.00	Pass
dt [s]	0.000	0.50	Pass

**Test Setup Photo**

EXHIBIT A - PRODUCT LABELING

Label Specification



Specifications: The marking set out above must be affixed to the apparatus or to its data plate and have a minimum height of 5 mm. The elements should be easily readable and indelible. They may be placed anywhere on the apparatus case or in its battery compartment. No tool should be needed to view the marking.

Proposed Label Location on EUT

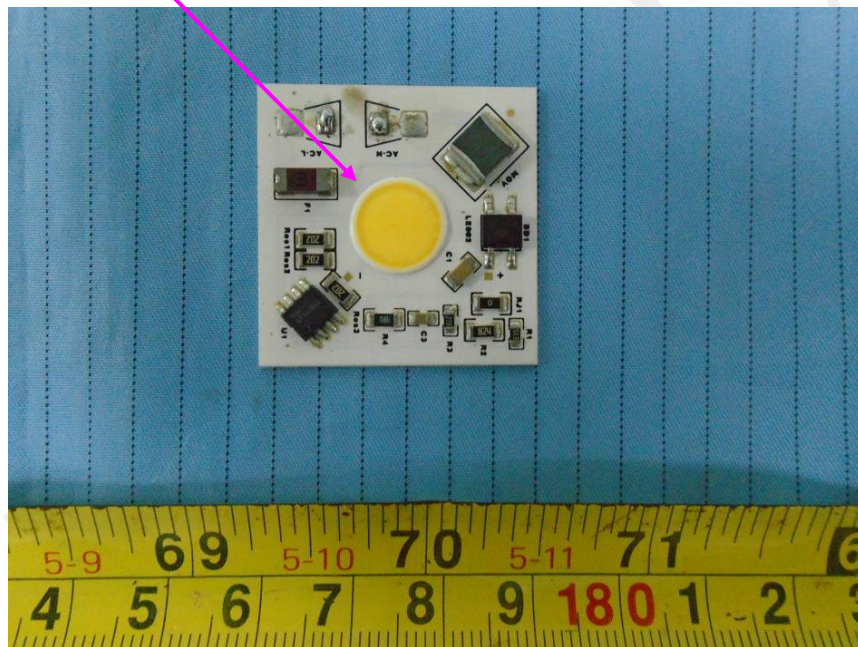
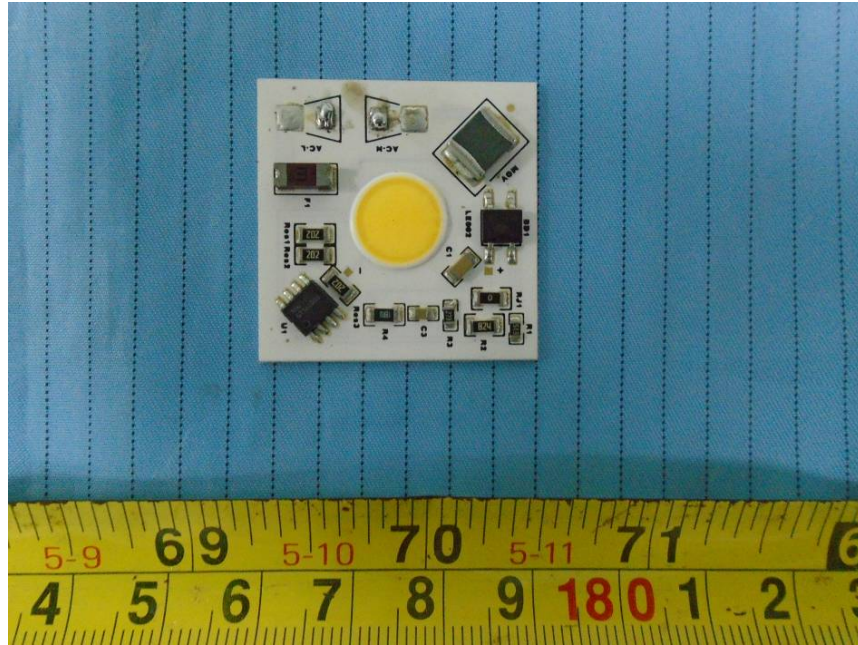


EXHIBIT B - EUT PHOTOGRAPHS

EUT – Top View



EUT – Bottom View

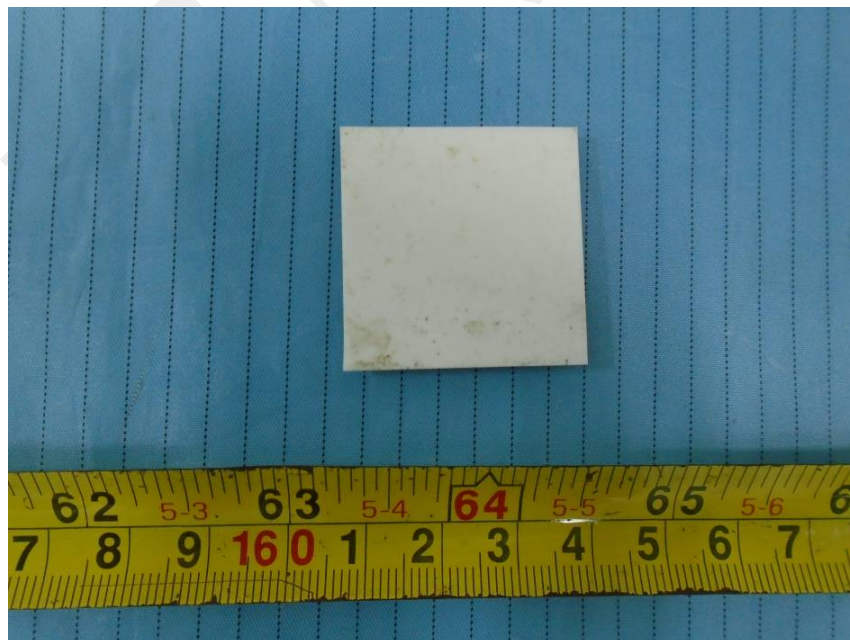


EXHIBIT C - TEST SETUP PHOTOGRAPHS

Conducted Disturbance Front View



Conducted Disturbance Side View



Radiated Disturbance Front View



Radiated Disturbance Rear View



******* END OF REPORT *******