



# **C-Tick EMC TEST REPORT**

For

**LED BULB**

**Model: BQP01, BQP02, BQP03, BSD01, BSD02, BLZ01**

**Trademark: Berdis**

**Test Report Number: GST1403240148C**

**Issued Date: March 28, 2014**

**Issued for**

**Zhong Shan Berdis Lighting Co.,LTD.**

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Guzhen Town, Zhongshan City, Guangdong Province, China**

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## TABLE OF CONTENTS

<b>1 TEST RESULT CERTIFICATION</b>	<b>3</b>
<b>2 EUT DESCRIPTION</b>	<b>4</b>
<b>3 TEST METHODOLOGY</b>	<b>5</b>
3.1. DECISION OF FINAL TEST MODE	5
3.2. EUT SYSTEM OPERATION	5
<b>4 TEST INSTRUMENTS</b>	<b>6</b>
<b>5 SETUP OF EQUIPMENT UNDER TEST</b>	<b>7</b>
5.1. DESCRIPTION OF SUPPORT UNITS	7
5.2. CONFIGURATION OF SYSTEM UNDER TEST	7
<b>6 CONDUCTED EMISSION MEASUREMENT</b>	<b>8</b>
6.1. LIMITS OF CONDUCTED EMISSION MEASUREMENT	8
6.2. TEST PROCEDURES	8
6.3. TEST SETUP	9
6.4. TEST RESULTS:	9
<b>7 RADIATED EMISSION MEASUREMENT</b>	<b>12</b>
7.1. LIMITS OF RADIATED EMISSION MEASUREMENT	12
7.2. TEST PROCEDURES	12
7.3. TEST SETUP	13
7.4. TEST RESULTS:	14
<b>8 RADIATED ELECTROMAGNETIC DISTURBANCE</b>	<b>17</b>
8.1. LIMITS	17
8.2. TEST PROCEDURE	17
8.3. TEST SETUP	18
8.4. TEST RESULTS	18
<b>9 PHOTOGRAPHS OF THE TEST CONFIGURATION</b>	<b>22</b>
<b>10 PHOTOGRAPHS OF EUT</b>	<b>23</b>

# 1 TEST RESULT CERTIFICATION

**Product:** LED BULB

**Model:** BQP01, BQP02, BQP03, BSD01, BSD02, BLZ01

**Applicant:** **Zhong Shan Berdis Lighting Co.,LTD.**  
5F, No.10-12, South 2nd Lane, Huasheng East Road, Caosan Industrial Park  
Guzhen Town, Zhongshan City, Guangdong Province, China

**Factory:** **Zhong Shan Berdis Lighting Co.,LTD.**  
5F, No.10-12, South 2nd Lane, Huasheng East Road, Caosan Industrial Park  
Guzhen Town, Zhongshan City, Guangdong Province, China

**Test Voltage:** AC 240V/50Hz

EMISSION			
Standard	Item	Result	Remarks
AS/NZS CISPR 15: 2009	Conducted (Main Port)	PASS	Meet Requirement
	Radiated	PASS	Meet Requirement
	Radiated Electromagnetic Disturbance	PASS	Meet Requirement

Note: 1. The test result judgment is decided by the limit of measurement standard  
2. The information of measurement uncertainty is available upon the customer's request.

Deviation from Applicable Standard
<b>Note:</b> According to ACMA announcement "ACMA will accept test reports where proof of compliance with radiated emissions testing above 1 GHz is not required until such testing is required by the AS/NZS, CISPR and EN versions."

The above equipment has been tested by Global-Standard Testing Service Co., Ltd. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

**Tested By:** \_\_\_\_\_  
Jerry Hu

**Date:** March 25, 2014

**Approved By:** \_\_\_\_\_  
Kevin Liu

**Date:** March 28, 2014

## 2 EUT DESCRIPTION

<b>Product</b>	LED BULB
<b>Model</b>	BQP01, BQP02, BQP03, BSD01, BSD02, BLZ01
<b>Applicant</b>	Zhong Shan Berdis Lighting Co.,LTD.
<b>Housing material</b>	Plastic and Metal
<b>EUT Type</b>	<input checked="" type="checkbox"/> Engineering Sample. <input type="checkbox"/> Product Sample, <input type="checkbox"/> Mass Product Sample.
<b>Serial Number</b>	N/A
<b>Rating Voltage</b>	Input: AC85-265V, 50-60Hz, 9W.
<b>AC Line</b>	N/A

### Model List.

Model No.		
BQP01	BQP02	BQP03
BSD01	BSD02	BLZ01
<p>Note: 1. There are 6 models in the report, all models see model list.</p> <p>2. All models have same diagram circuit, PCB layout, except different model names and components.</p> <p>3. All test are carried out on BQP02.</p>		

### 3 TEST METHODOLOGY

#### 3.1. DECISION OF FINAL TEST MODE

The EUT was tested together with the thereafter additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

The following test mode(s) were scanned during the preliminary test:

Pre-Test Mode		
Emission	Conducted Emission	Mode: Normal Operating
	Radiated Emission	Mode: Normal Operating
	Radiated Electromagnetic Disturbance	Mode: Normal Operating

After the preliminary scan, the following test mode was found to produce the highest emission level.

The Worst Test Mode		
Emission	Conducted Emission	Mode: Normal Operating
	Radiated Emission	Mode: Normal Operating
	Radiated Electromagnetic Disturbance	Mode: Normal Operating

Then, the EUT configuration and cable configuration of the above highest emission mode was chosen for all final test items.

#### 3.2. EUT SYSTEM OPERATION

1. Set up EUT with the relative support equipments.
2. Make sure the EUT worked normally during the test.

## 4 TEST INSTRUMENTS

Immunity shielded room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMC PARTNER TRANSIENT 2000	EMC PARTNER	TRA2000	881	09/27/2014
Power-frequency Magnetic field	SCHAFFNER	CCN 1000-1	72046	09/27/2014
Induction Coil Interface	SCHAFFNER	INA2141	6003	09/27/2014
Signal Generator	Maconi	2022D	119246/003	09/27/2014
Power Amplifier	M2S	A00181-1000	9801-112	09/27/2014
CDN	MEB	M3-8016	003683	09/27/2014
Power Amplifier	M2S	AC8113/ 800-250A	9801-179	09/27/2014
Power Antenna	SCHAFFNER	CBL6140A	1204	09/27/2014
ESD 2000	EMC PARTNER	ESD2000	182	09/27/2014
Harmonic & Flicker Tester	California instruments	PACS-3	SB2588/01	09/27/2014
AC Power Source	California instruments	5001iX-CTS-40	SB2588	09/27/2014
EMI Test Receiver	R&S	ESCI	100005	09/27/2014
Spectrum Analyzer	R&S	FSU	100114	09/27/2014
Pre Amplifier	H.P.	HP8447E	2945A02715	09/27/2014
Bilog Antenna	SUNOL Sciences	JB3	A021907	09/27/2014
Cable	TIME MICROWAVE	LMR-400	N-TYPE04	09/27/2014
System-Controller	CCS	N/A	N/A	N.C.R
Turn Table	CCS	N/A	N/A	N.C.R
Antenna Tower	CCS	N/A	N/A	N.C.R
Triple-Loop Antenna	EVERFINE	LLA-2	N/A	09/27/2014
LISN	AFJ	LS16	16010222119	09/27/2014
LISN(EUT)	Mestec	AN3016	04/10040	09/27/2014

### NOTE:

- (1) The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).
- (2). N.C.R = No Calibration Request.

## 5 SETUP OF EQUIPMENT UNDER TEST

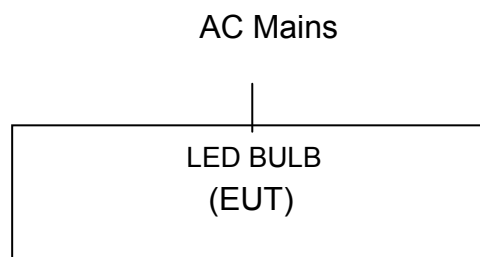
### 5.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

**Note:**

- 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

### 5.2. CONFIGURATION OF SYSTEM UNDER TEST



## 6 CONDUCTED EMISSION MEASUREMENT

### 6.1. LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY (MHz)	LIMITS(dBuV)	
	Quasi-peak	Average
0.009-0.05	110	N/A
0.05-0.15	90 - 80	N/A
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

**NOTE:**

- (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### 6.2. TEST PROCEDURES

#### Procedure of Preliminary Test

The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.

The EUT through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane. All support equipment power received from a second LISN.

The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 9kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in Item 3.1 were scanned during the preliminary test.

After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.

The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

#### Procedure of Final Test

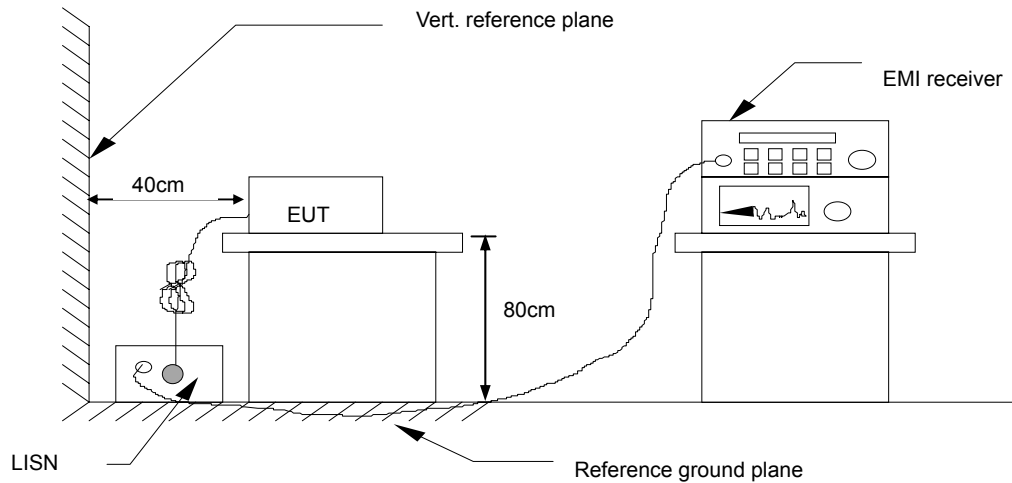
EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.



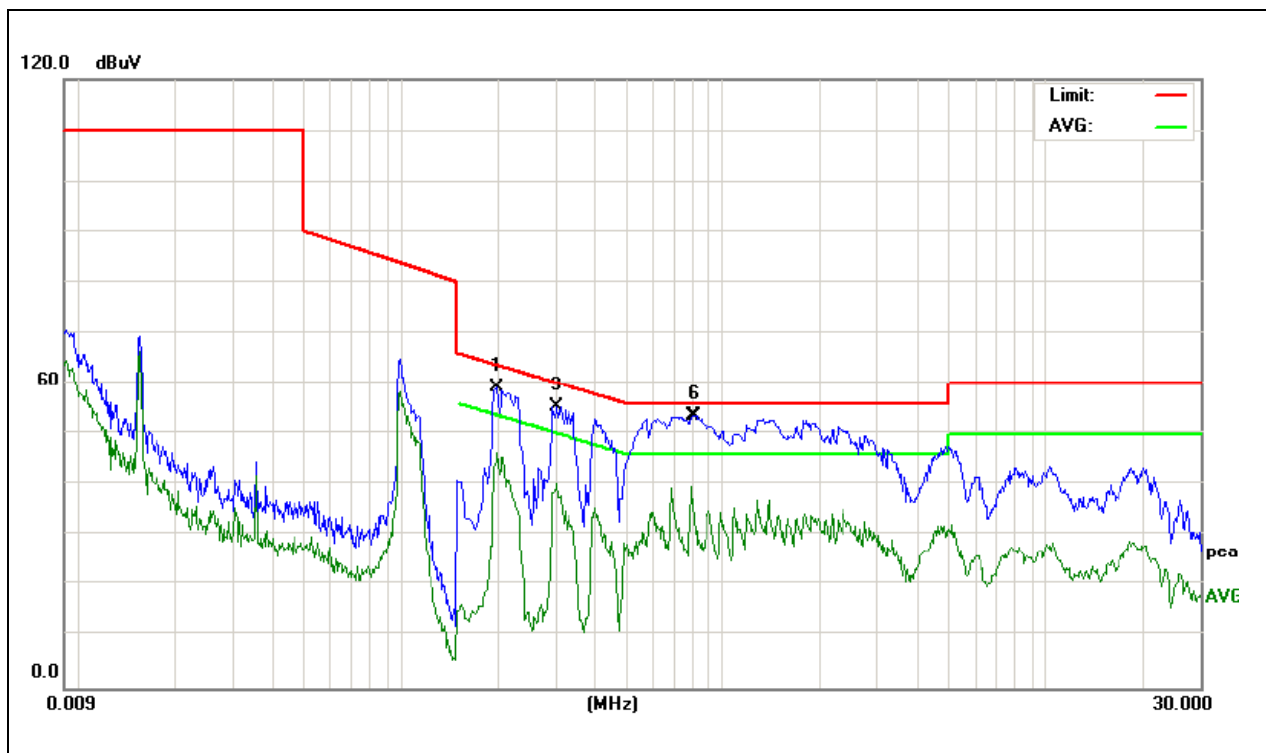
### 6.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 6.4. TEST RESULTS:

Temperature ( °C )	22~28
Humidity ( %RH )	50~58
Barometric Pressure ( mbar )	950~1000
EUT	LED BULB
M/N	BQP02
Operating Mode	Normal Operating
Test Results	PASS

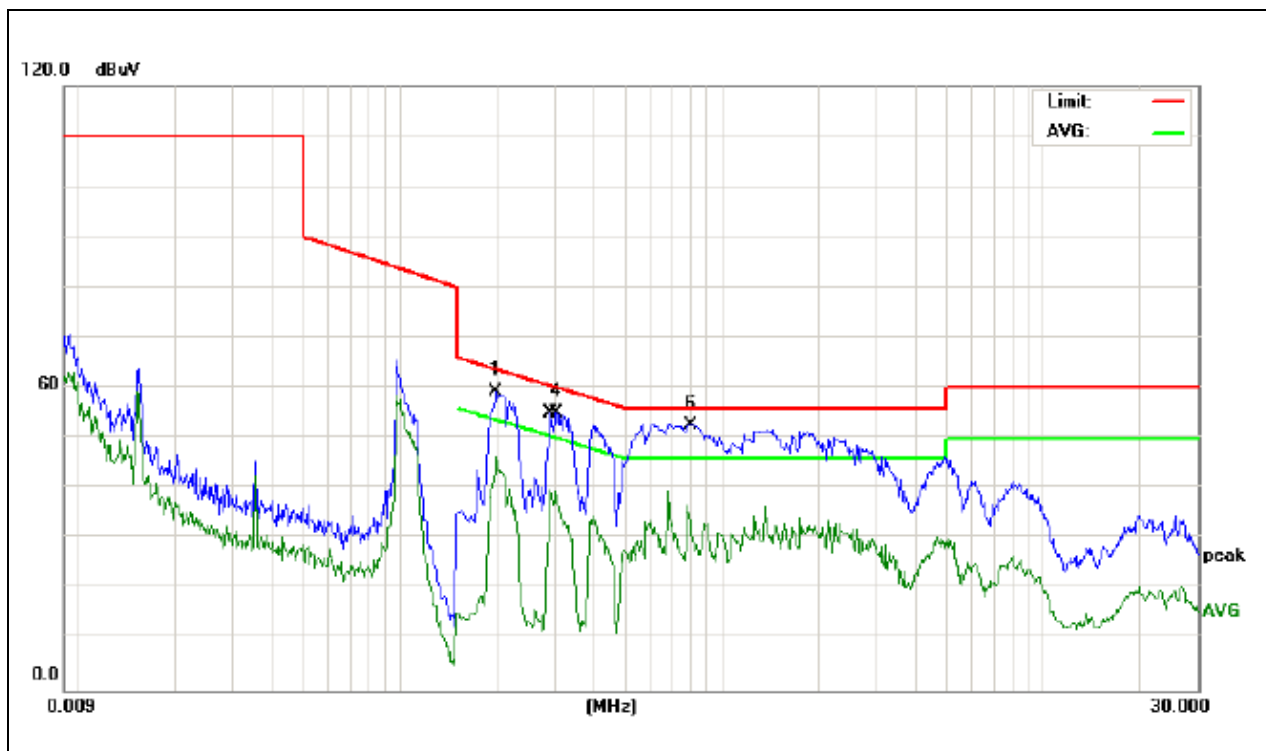


EUT :	LED BULB	Model Name :	BQP02
Temperature :	24°C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	March 25, 2014
Test Mode :	Normal Operating	Polarization :	L1
Test Power :	AC 240V/50Hz		

	Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector
1	0.1980	49.84	9.51	59.35	63.69	-4.38	QP
2	0.1980	36.69	9.51	46.20	53.69	-9.20	AV
3	0.3020	45.90	9.51	55.41	60.19	-4.78	QP
4	0.3020	30.78	9.51	40.29	50.19	-5.78	AV
5	0.7860	38.19	10.42	48.61	56.00	-7.39	QP
6	0.8059	26.28	10.42	36.70	46.00	-9.30	AV

**Remark:**

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit



EUT :	LED BULB	Model Name :	BQP02
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	March 25, 2014
Test Mode :	Normal Operating	Polarization :	N
Test Power :	AC 240V/50Hz		

	Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector
1	0.1980	49.63	9.51	59.14	63.69	-4.38	QP
2	0.1980	36.89	9.51	46.40	53.69	-9.20	AV
3	0.2940	30.12	9.51	39.63	50.41	-10.78	AV
4	0.3060	45.61	9.51	55.15	60.08	-4.96	QP
5	0.8059	43.21	9.54	36.72	46.00	-9.28	AV
6	0.7860	41.21	9.54	52.75	56.00	-5.25	QP

**Remark:**

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit

## 7 RADIATED EMISSION MEASUREMENT

### 7.1. LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	dBuV/m (At 3m)
	Class B
30 ~ 230	40
230 ~ 300	47

**NOTE:** (1) The lower limit shall apply at the transition frequencies.  
 (2) Emission level (dBuV/m) = 20 log Emission level (uV/m).

### 7.2. TEST PROCEDURES

#### Procedure of Preliminary Test

The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.

Support equipment, if needed, was placed as per AS/NZS CISPR 15.

All I/O cables were positioned to simulate typical usage as per AS/NZS CISPR 15.

The EUT received from the outlet socket under the turntable. All support equipment power received from another socket under the turntable.

Mains cables, telephone lines or other connections to auxiliary equipment located outside the test are shall drape to the floor, be fitted with ferrite clamps or ferrite tubes placed on the floor at the point where the cable reaches the floor and then routed to the place where they leave the turntable. No extension cords shall be used to mains receptacle.

The antenna was placed at 3 meter away from the EUT as stated in AS/NZS CISPR 15.

The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.

The Analyzer / Receiver quickly scanned from 30MHz to 300MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

The test mode(s) described in Item 3.1 were scanned during the preliminary test:

After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

### **Procedure of Final Test**

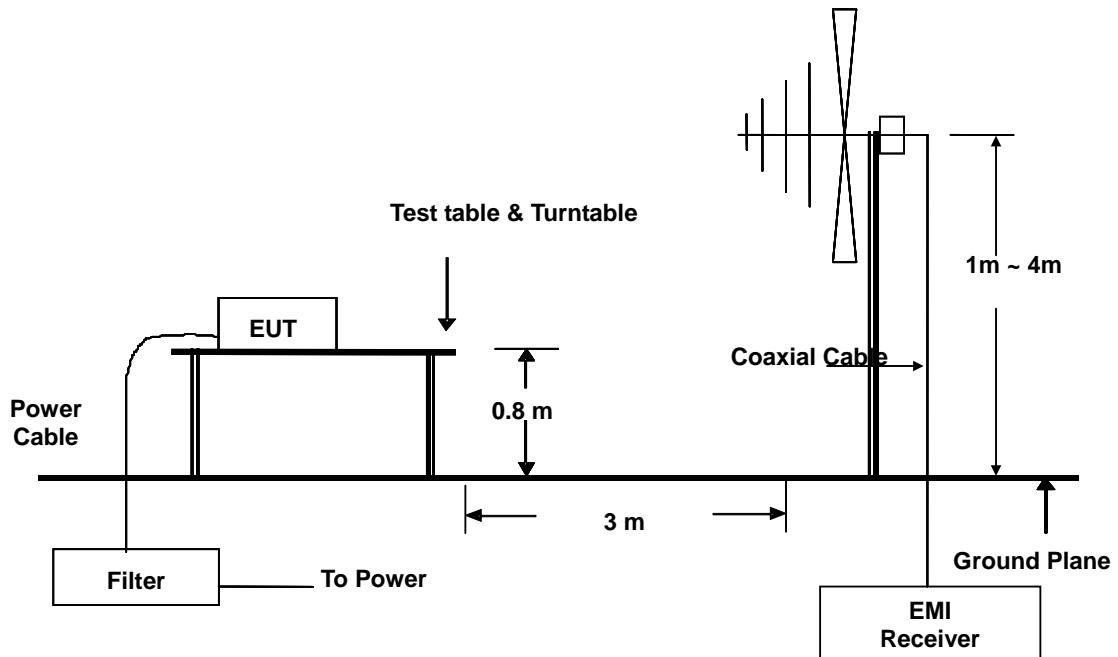
EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.

The Analyzer / Receiver scanned from 30MHz to 300MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.

The test data of the worst-case condition(s) was recorded.

### **7.3. TEST SETUP**



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### 7.4. TEST RESULTS:

Temperature ( °C )	22~28
Humidity ( %RH )	50~58
Barometric Pressure ( mbar )	950~1000
EUT	LED BULB
M/N	BQP02
Operating Mode	Normal Operating
Test Results	PASS



EUT :	LED BULB	Model Name :	BQP02
Temperature :	24℃	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	March 25, 2014
Test Mode :	Normal Operating	Polarization :	Vertical
Test Power :	AC 240V/50Hz		

	Freq.	Reading	Factor	Measurement	Limit	Over	Detector
	(MHz)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	
1	30.0692	15.40	18.30	33.70	40.00	-6.30	QP
2	54.9694	22.54	6.09	28.63	40.00	-11.37	QP
3	92.9226	17.38	9.75	27.13	40.00	-12.87	QP
4	139.9978	23.33	11.93	35.26	40.00	-4.74	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Antenna Factor + Cable Loss.
3. N/A means All Data have pass Limit



EUT :	LED BULB	Model Name :	BQP02
Temperature :	24°C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	March 25, 2014
Test Mode :	Normal Operating	Polarization :	Horizontal
Test Power :	AC 240V/50Hz		

	Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector
1	139.3546	12.82	11.93	24.75	40.00	-15.25	QP
2	224.9683	18.68	10.28	28.96	40.00	-11.04	QP
3	265.5347	21.33	13.84	35.17	47.00	-11.83	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Antenna Factor + Cable Loss.
3. N/A means All Data have pass Limit



## 8 RADIATED ELECTROMAGNETIC DISTURBANCE

### 8.1. LIMITS

Frequency	Limits for loop diameter dB(uA)*		
	2m	3m	4m
9KHz-70KHz	88	81	75
70KHz-150KHz	88-58**	81-51**	75-45**
150KHz-2.2MHz	58-26**	51-22**	45-16**
2.2MHz-3.0MHz	58	51	45
3.0MHz-30MHz	22	15-16***	9-12***
<p>* At the transition frequency, the lower limit applies.</p> <p>** Decreasing linearly with the logarithm of the frequency.</p> <p>*** Increasing linearly with the logarithm of the frequency.</p>			
Note: In Japan, the limits for frequencies 9KHz to 150KHz do not apply.			

### 8.2. TEST PROCEDURE

In the frequency range 9KHz to 30MHz the interference capability of the magnetic field component of the radiation of Equipment Under Test (EUT) can be determined by using a special Loop Antenna System(LAS). In the LAS, this capability is measured in terms of the currents induced by the magnetic field in the loop antennas of the LAS. The LAS allows indoor measurement.

The LAS consists of three circular, mutually perpendicular Large-Loop Antennas (LLAs), having a diameter of 2 m, supported by a non-metallic base. A 50Ω coaxial cable between the current probe of an LLA and the coaxial switch, and between this switch and the measuring equipment, shall have a surface transfer impedance smaller than 10mΩ/m at 100KHz and 1mΩ/m at 10MHz.

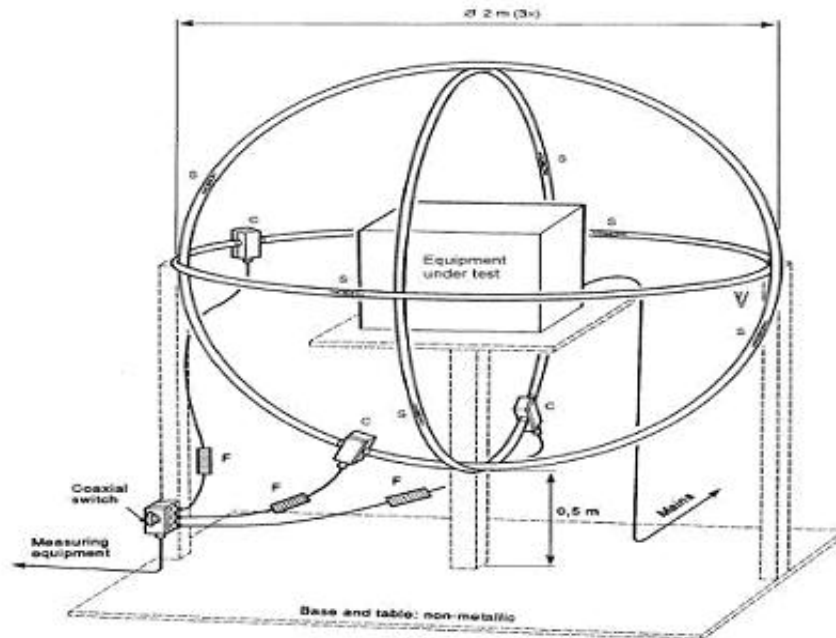
The distance between the outer diameter of the loop antenna system and nearby objects, such as floor and walls, shall be at least 0.5m as per AS/NZS CISPR 15.

The EUT is positioned in the center of the LAS (To avoid unwanted capacitive coupling between the EUT and the LAS, the maximum dimensions of the EUT are limited so that the distance between the EUT and an LLA is at least 0.2m). Cables should be routed together and leave the loop volume in the same octant of the cell, no closer than 0.4m to the LAS loops.

The induced current in the loop antenna is measured by means of a current probe(1V/A) and the CISPR measuring receiver(or equivalent). By means of a coaxial switch, the three field direction(X, Y, Z) can be measured in sequence, and recorded at least the six highest emission. Each value shall fulfill the requirement given.

The test data of the worst-case condition(s) was recorded.

### 8.3. TEST SETUP



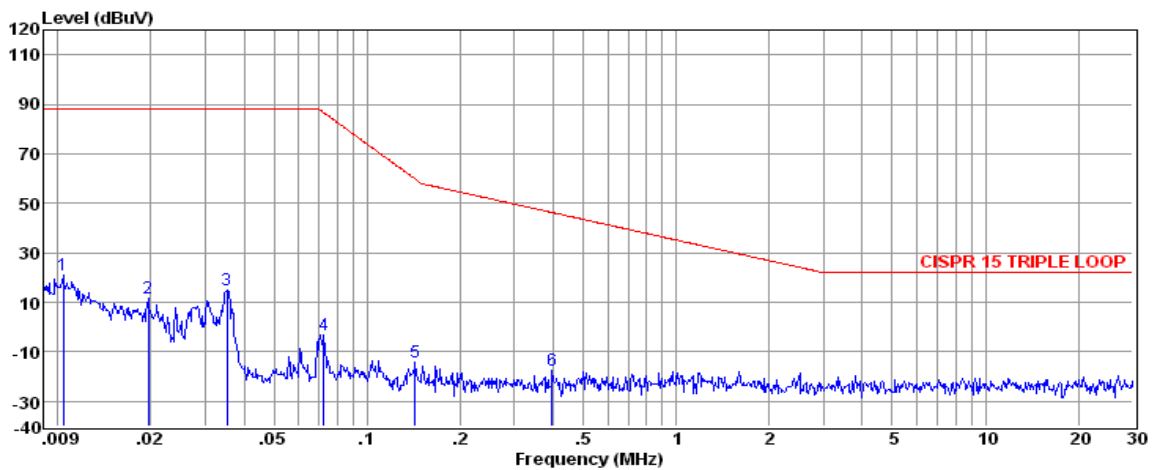
For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 8.4. TEST RESULTS

Temperature ( °C )	22~28
Humidity ( %RH )	50~58
Barometric Pressure ( mbar )	950~1000
EUT	LED BULB
M/N	BQP02
Operating Mode	Normal Operating
Test Results	PASS

## Magnetic Emission Test Result

EUT :	LED BULB	Model Name :	BQP02
Temperature :	24°C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	March 25, 2014
Test Mode :	Normal Operating	Polarization :	X
Test Power :	AC 240V/50Hz		

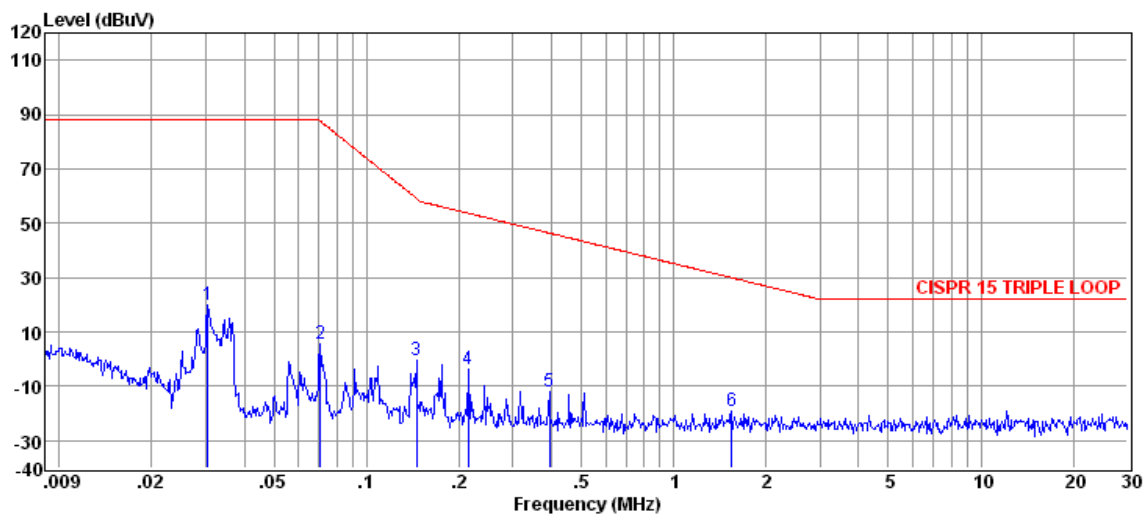


Item (Mark)	Freq (MHz)	Read Level (DBμA)	Cable Loss (dB)	Result Level (DBμA)	Limit Line (DBμA)	Over Limit (dB)	Detector	Phase
1	0.01	21.19	0.07	21.26	88.00	-66.74	Peak	X
2	0.02	11.67	0.13	11.80	88.00	-76.20	Peak	X
3	0.04	14.88	0.18	15.06	88.00	-72.94	Peak	X
4	0.07	-3.50	0.25	-3.25	86.68	-89.93	Peak	X
5	0.14	-14.44	0.31	-14.13	59.86	-73.99	Peak	X
6	0.40	-17.88	0.41	-17.47	46.29	-63.76	Peak	X

Note: Result comply with AV limit, AV Result is deemed to comply with AV limit

## Magnetic Emission Test Result

EUT :	LED BULB	Model Name :	BQP02
Temperature :	24℃	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	March 25, 2014
Test Mode :	Normal Operating	Polarization :	Y
Test Power :	AC 240V/50Hz		

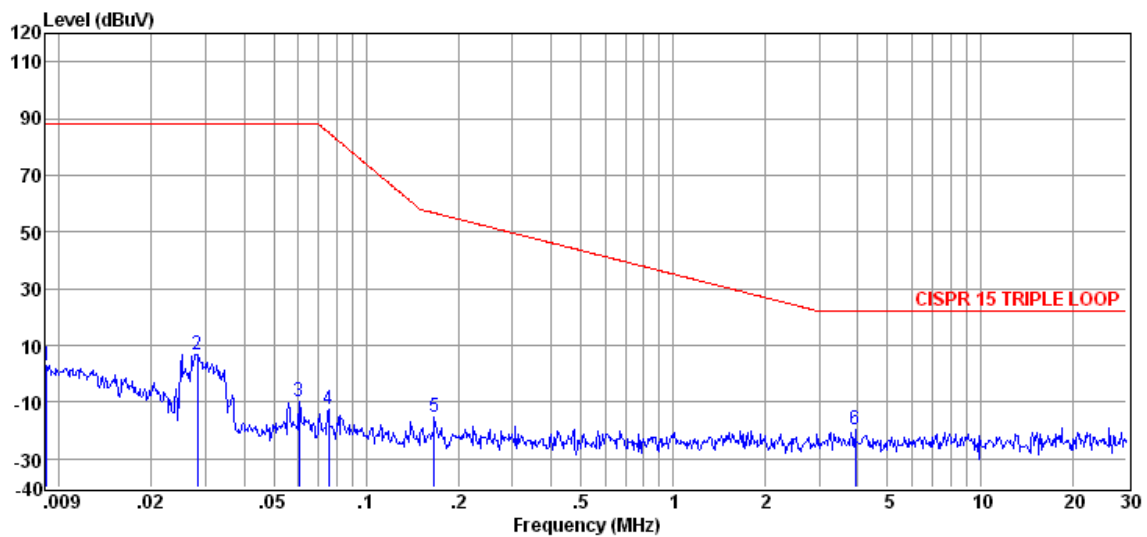


Item (Mark)	Freq (MHz)	Read Level (DBμA)	Cable Loss (dB)	Result Level (DBμA)	Limit Line (DBμA)	Over Limit (dB)	Detector	Phase
1	0.03	19.55	0.17	19.72	88.00	-68.28	Peak	Y
2	0.07	5.55	0.25	5.80	87.64	-81.84	Peak	Y
3	0.15	-0.53	0.31	-0.22	59.22	-59.44	Peak	Y
4	0.21	-4.33	0.35	-3.98	53.69	-57.67	Peak	Y
5	0.39	-12.49	0.40	-12.09	46.38	-58.47	Peak	Y
6	1.54	-19.37	0.53	-18.84	30.01	-48.85	Peak	Y

Note: Result comply with AV limit, AV Result is deemed to comply with AV limit

## Magnetic Emission Test Result

EUT :	LED BULB	Model Name :	BQP02
Temperature :	24°C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	March 25, 2014
Test Mode :	Normal Operating	Polarization :	Z
Test Power :	AC 240V/50Hz		

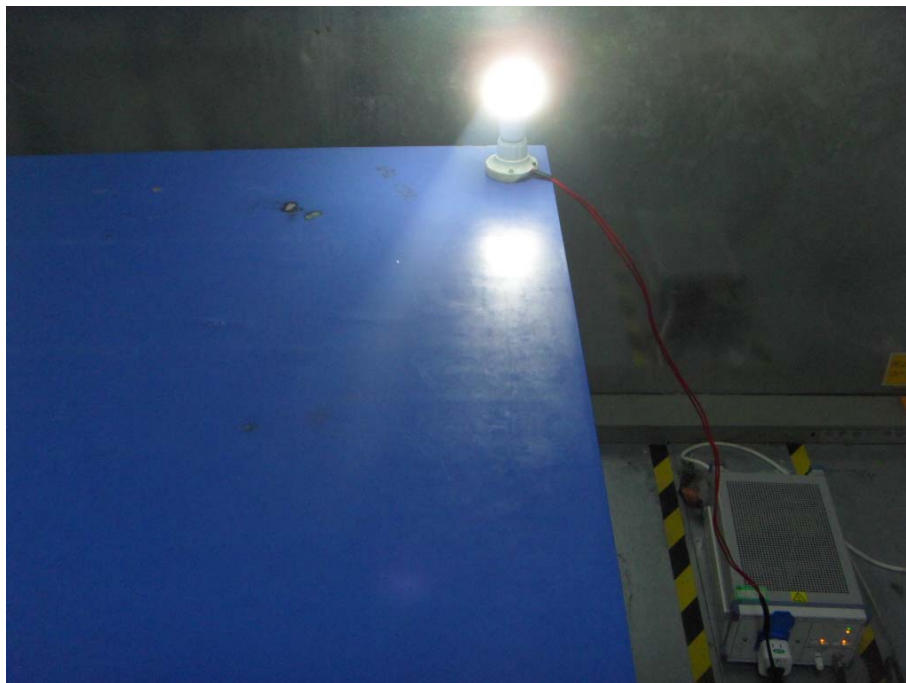


Item (Mark)	Freq (MHz)	Read Level (DBμA)	Cable Loss (dB)	Result Level (DBμA)	Limit Line (DBμA)	Over Limit (dB)	Detector	Phase
1	0.01	2.71	0.06	2.77	88.00	-85.2	Peak	Z
2	0.03	6.80	0.16	6.96	88.00	-81.0	Peak	Z
3	0.06	-10.03	0.23	-9.80	88.00	-97.8	Peak	Z
4	0.08	-12.77	0.25	-12.52	85.09	-97.6	Peak	Z
5	0.17	-15.37	0.33	-15.04	56.72	-71.7	Peak	Z
6	3.92	-20.51	0.61	-19.90	22.00	-41.9	Peak	Z

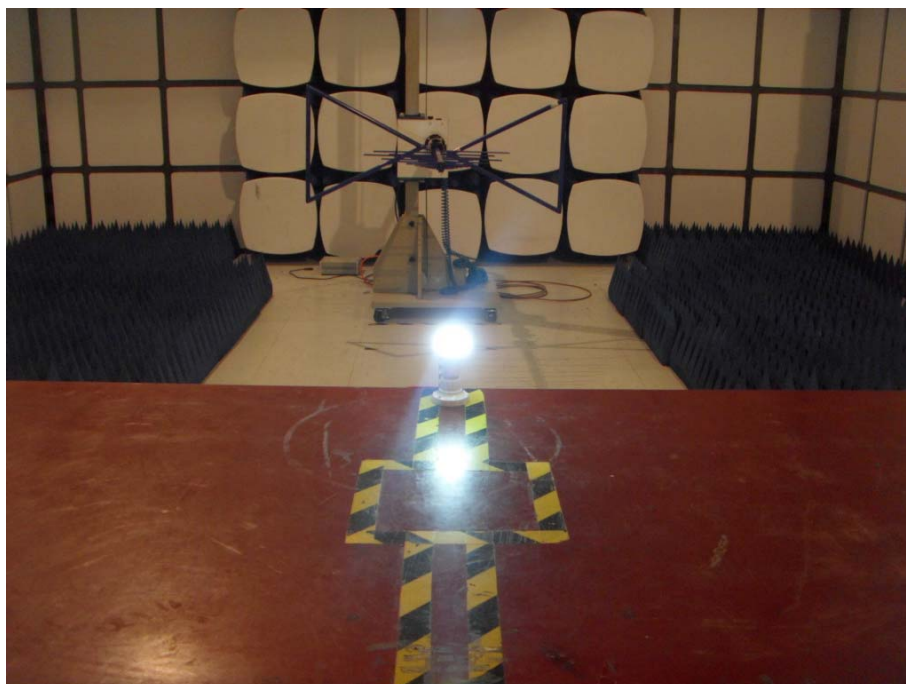
Note: Result comply with AV limit, AV Result is deemed to comply with AV limit

## 9 PHOTOGRAPHS OF THE TEST CONFIGURATION

**Conducted (Main Port)**



**Radiated**





## 10 PHOTOGRAPHS OF EUT

Photo 1

View:

- ☒ Front
- ☐ Rear
- ☐ Right side
- ☐ Left side
- ☐ Top
- ☐ Bottom
- ☐ Internal



Photo 2

View:

- ☐ Front
- ☒ Rear
- ☐ Right side
- ☐ Left side
- ☐ Top
- ☐ Bottom
- ☐ Internal



Photo 3

View:

- ☐ Front
- ☐ Rear
- ☐ Right side
- ☐ Left side
- ☐ Top
- ☐ Bottom
- ☐ Internal
- ☒ LED



Photo 4

View:

- ☐ Front
- ☐ Rear
- ☐ Right side
- ☐ Left side
- ☒ Top
- ☐ Bottom
- ☐ Internal

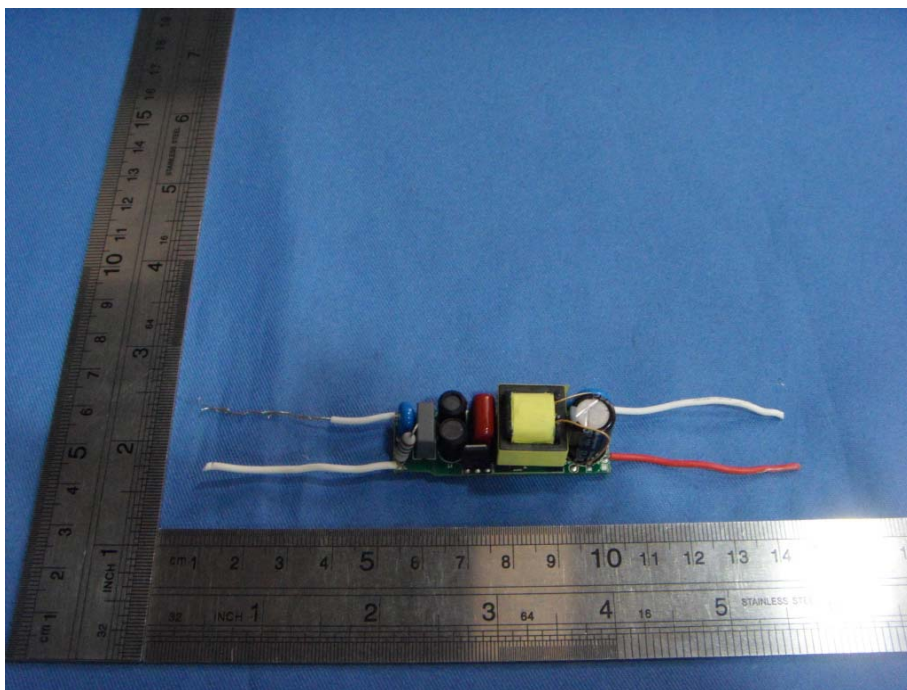
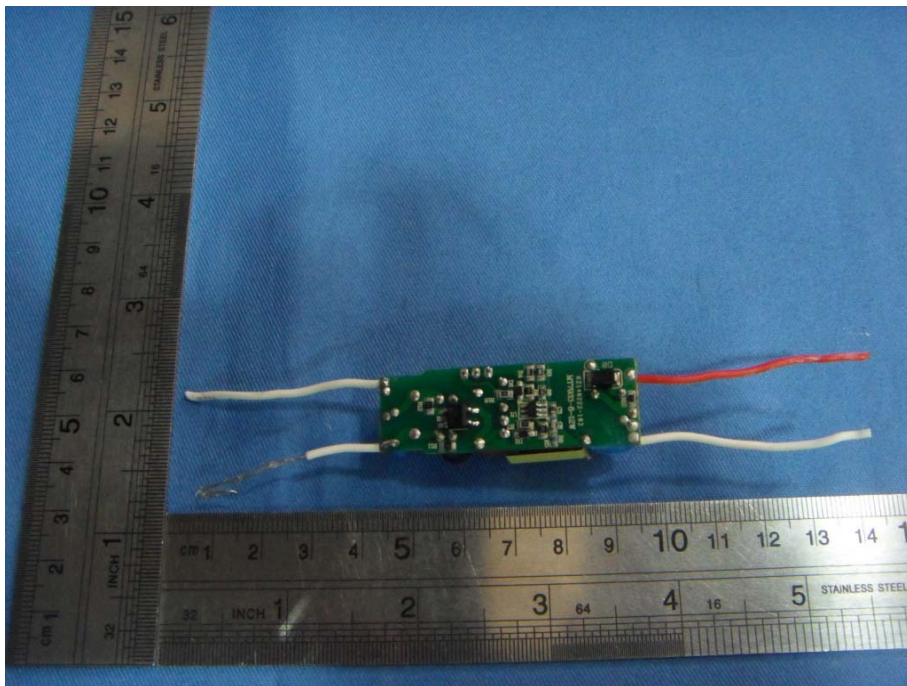




Photo 5

View:

- ☐ Front
- ☐ Rear
- ☐ Right side
- ☐ Left side
- ☐ Top
- ☒ Bottom
- ☐ Internal
- ☐ PCB



---END---