

EMC Measurement and Test Report

For

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 Standard:	<u>AS/NZS CISPR 15:2011</u>	
Product Description:	<u>LED DOWNLIGHT</u>	
Tested Model:	<u>BTD03</u>	
Report No.:	<u>STR15088170C</u>	
Tested Date:	<u>2015-08-17 to 2015-08-21</u>	
Issued Date:	<u>2015-08-21</u>	
Tested By:	<u>Ben Chen / Engineer</u>	<i>Ben Chen</i>
Reviewed By:	<u>Lahm Peng / EMC Manager</u>	<i>Lahm peng</i>
Approved & Authorized By:	<u>Jandy so / PSQ Manager</u>	<i>Jandyso</i>
Prepared By:	Shenzhen SEM.Test Technology Co., Ltd. 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C. (518101) Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn	

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM.Test Technology Co., Ltd.

TABLE OF CONTENTS

1.GENERAL INFORMATION.....3

 1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....3

 1.2 TEST STANDARDS.....4

 1.3 TEST METHODOLOGY4

 1.4 TEST FACILITY4

 1.5 EUT SETUP AND OPERATION MODE5

 1.6 TEST EQUIPMENT LIST AND DETAILS5

2. SUMMARY OF TEST RESULTS6

3. DISTURBANCE VOLTAGES7

 3.1 MEASUREMENT UNCERTAINTY7

 3.2 TEST PROCEDURE.....7

 3.3 BASIC TEST SETUP BLOCK DIAGRAM.....7

 3.4 ENVIRONMENTAL CONDITIONS8

 3.5 SUMMARY OF TEST RESULTS/PLOTS8

 3.6 CONDUCTED EMISSIONS TEST DATA.....8

4. RADIATED ELECTROMAGNETIC DISTURBANCES (9KHZ TO 30MHZ).....11

 4.1 MEASUREMENT UNCERTAINTY11

 4.2 TEST PROCEDURE.....11

 4.3 TEST RESULT.....11

5. RADIATED ELECTROMAGNETIC DISTURBANCES (30MHZ TO 300MHZ).....15

 5.1 MEASUREMENT UNCERTAINTY15

 5.2 TEST PROCEDURE.....15

 5.3 CORRECTED AMPLITUDE & MARGIN CALCULATION.....16

 5.4 ENVIRONMENTAL CONDITIONS16

 5.5 SUMMARY OF TEST RESULTS/PLOTS16

EXHIBIT 1 - PRODUCT LABELING19

 PROPOSED RCM LABEL FORMAT19

 PROPOSED LABEL LOCATION ON EUT19

EXHIBIT 2 - EUT PHOTOGRAPHS.....20

EXHIBIT 3 - TEST SETUP PHOTOGRAPHS.....25

1.GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

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

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

General Description of EUT	
Product Name:	LED DOWNLIGHT
Trade Name:	/
Model No.:	BTD03
Adding Model(s):	BTD01-2.5F, BTD01-3F, BTD02-3F, BTD03-2.5F, BTH01
<p><i>Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model BTD03, but the circuit and the electronic construction do not change, declared by the manufacturer.</i></p>	

Technical Characteristics of EUT	
Rated Voltage:	AC 240V/50Hz
Rated Current:	/
Rated Power:	/
Power Adaptor Model:	/

1.2 Test Standards

The following report is prepared on behalf of the Zhong Shan Berdis Lighting Co.,LTD in accordance with AS/NZS CISPR 15, Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment.

The objective of the manufacturer is to demonstrate compliance with the standards AS/NZS CISPR 15 for general lighting purposes equipment.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with the standards AS/NZS CISPR 15 for general lighting purposes equipment, and all related testing and measurement techniques intentional standards.

1.4 Test Facility

FCC – Registration No.: 934118

Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

CNAS Registration No.: L4062

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101).

1.5 EUT Setup and Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission/immunity level. The test modes were adapted according to the operation manual for use, more detailed description as follows:

Test Mode List:

Test Mode	Description	Remark
TM1	Lighting	Link to the Source

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
Power Cable	1.5	/	/

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

1.6 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Due. Date
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2016-06-16
Amplifier	Agilent	8447F	3113A06717	2016-06-16
Amplifier	C&D	PAP-1G18	2002	2016-06-16
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2016-06-16
Horn Antenna	ETS	3117	00086197	2016-06-16
Loop Antenna	Schwarz beck	FMZB 1516	9773	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2016-06-16
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2016-06-16
AC LISN	Schwarz beck	NSLK8126	8126-224	2016-06-16
Clamp	Schwarz beck	MDS21	3809	2016-06-16
Loop Antenna	EVERFINE	LLA-2	711001	2016-06-16

2. SUMMARY OF TEST RESULTS

Standards	Description of Test Item	Result
AS/NZS CISPR 15	Disturbance Voltages	Compliant
	Radiated Electromagnetic Disturbances (Frequency range 9kHz to 30MHz)	Compliant
	Radiated Electromagnetic Disturbances (Frequency range 30MHz to 300MHz)	Compliant

N/A: not applicable

SEM. Test

3. Disturbance Voltages

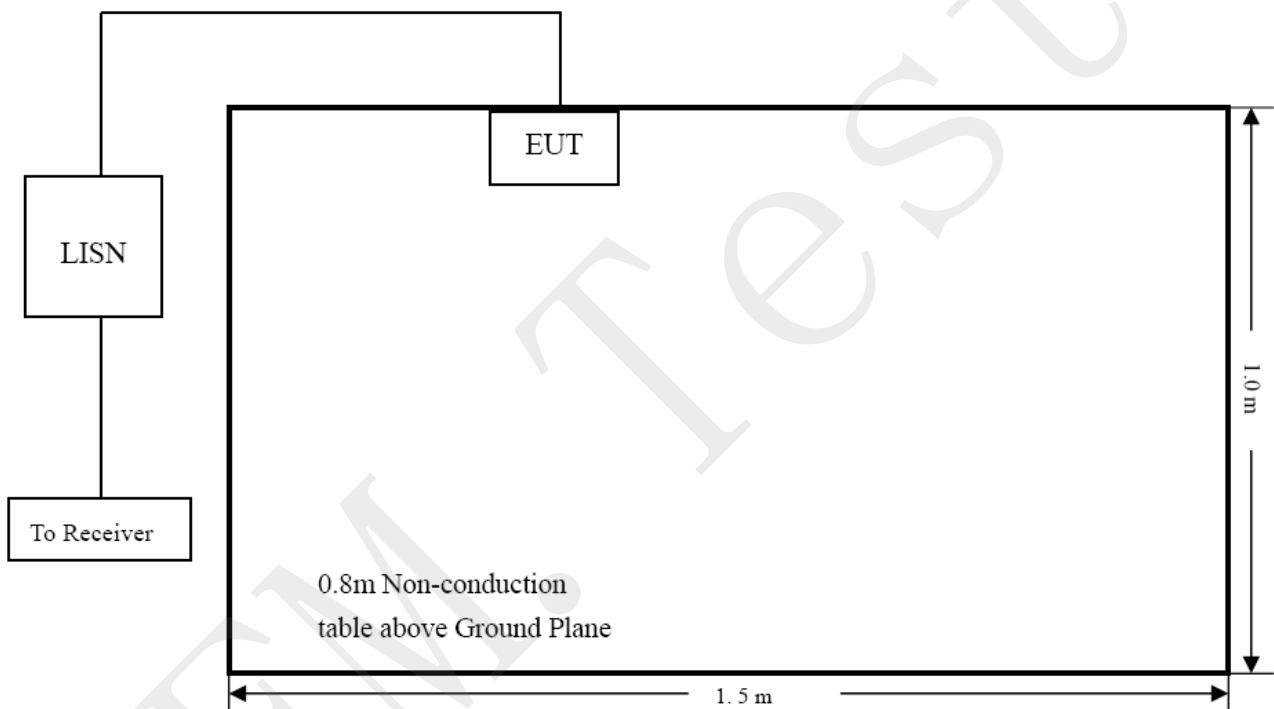
3.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

3.2 Test Procedure

Test is conducting under the description of AS/NZS CISPR 15, According to Clause 5.3.2.2, 6 & 8.3.1.

3.3 Basic Test Setup Block Diagram



3.4 Environmental Conditions

Temperature:	22 ° C
Relative Humidity:	55 %
ATM Pressure:	1015 mbar

3.5 Summary of Test Results/Plots

According to the data in section 3.6, the EUT complied with the AS/NZS CISPR 15 Conducted margin for a lighting device, with the *worst* margin reading of:

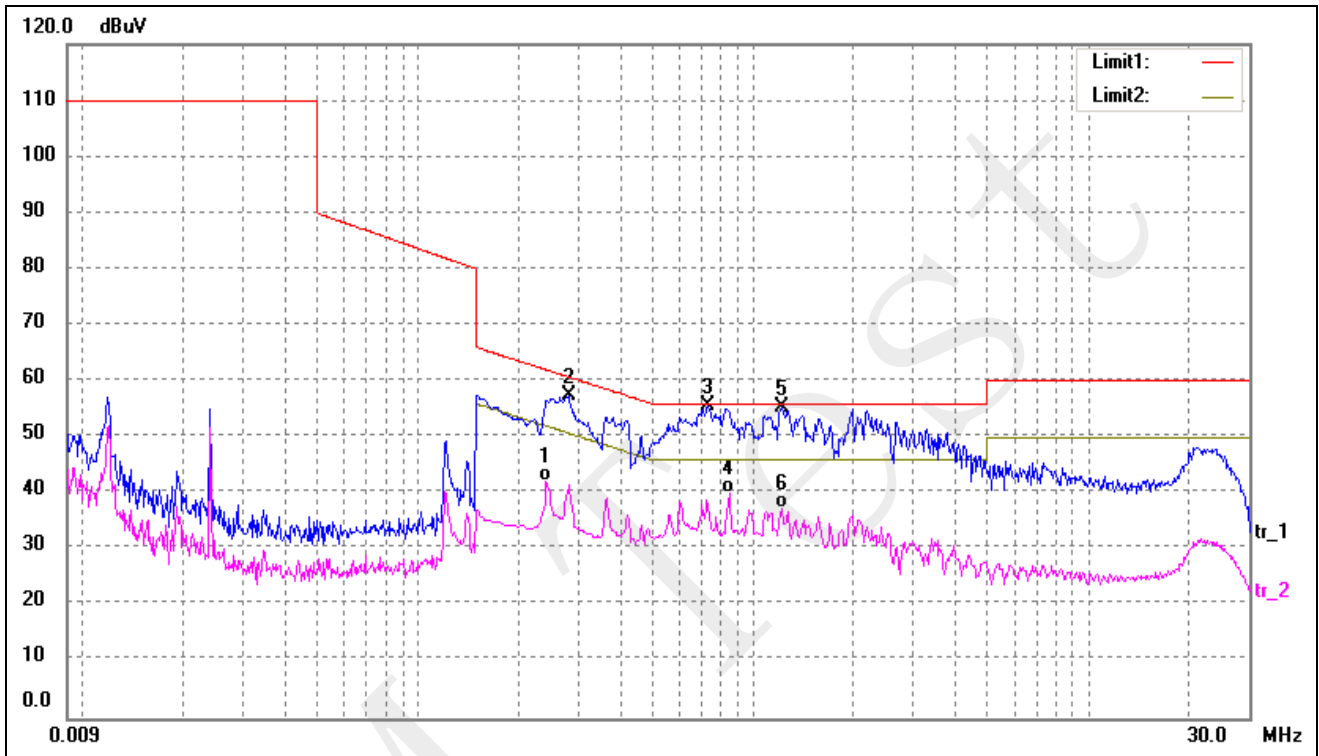
-0.43 dB at 0.7340 MHz in the Line mode, Peak detector, 0.009-30MHz

3.6 Conducted Emissions Test Data

Plot of Disturbance Voltage Test Data

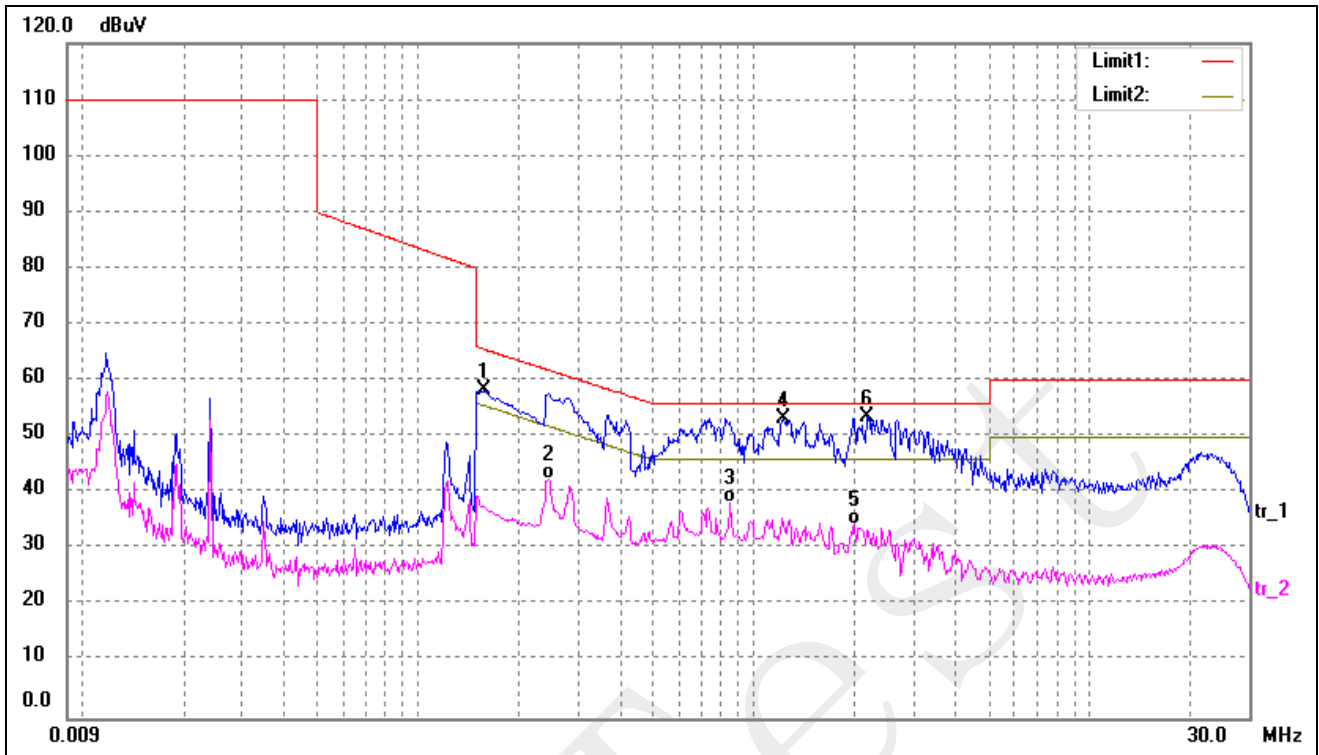
EUT: LED DOWNLIGHT
 Tested Model: BTD03
 Operating Condition: TM1
 Comment: AC 240V/50Hz

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2420	29.58	12.50	42.08	52.03	-9.95	AVG
2	0.2820	44.86	12.50	57.36	60.76	-3.40	peak
3*	0.7340	42.84	12.73	55.57	56.00	-0.43	peak
4	0.8500	27.20	12.85	40.05	46.00	-5.95	AVG
5	1.2180	42.32	13.00	55.32	56.00	-0.68	peak
6	1.2180	24.22	13.00	37.22	46.00	-8.78	AVG

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1580	45.71	12.50	58.21	65.57	-7.36	peak
2	0.2460	29.91	12.50	42.41	51.89	-9.48	AVG
3	0.8540	25.35	12.85	38.20	46.00	-7.80	AVG
4	1.2300	40.23	13.00	53.23	56.00	-2.77	peak
5	1.9980	21.26	13.00	34.26	46.00	-11.74	AVG
6*	2.1980	40.66	13.00	53.66	56.00	-2.34	peak

4. Radiated Electromagnetic Disturbances (9kHz to 30MHz)

4.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is ± 3.6 dB.

4.2 Test Procedure

Test is conducted under the description of AS/NZS CISPR 15, According to Clause 4.4

4.3 Test Result

Testing according to limit table 3b and the emissions below 10dB are not report.

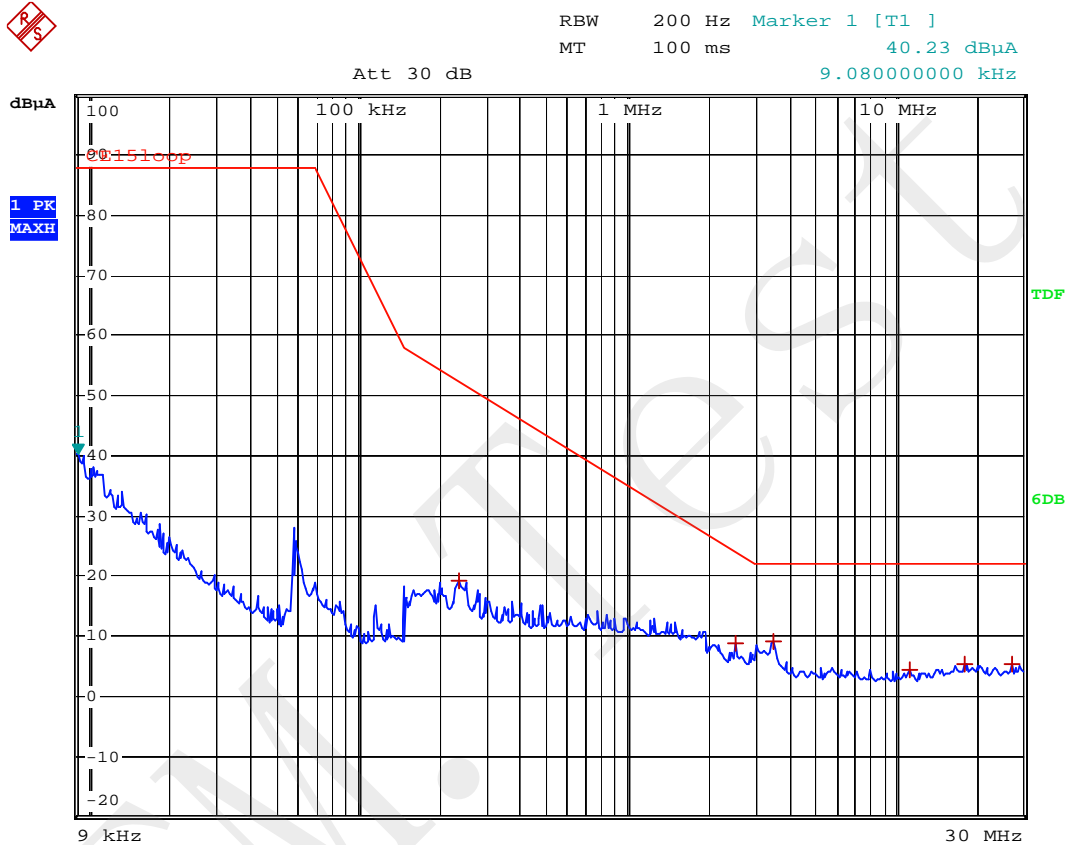
Test Result: Pass

Please refer to the plots:

Plot of Electromagnetic Disturbances Test Data

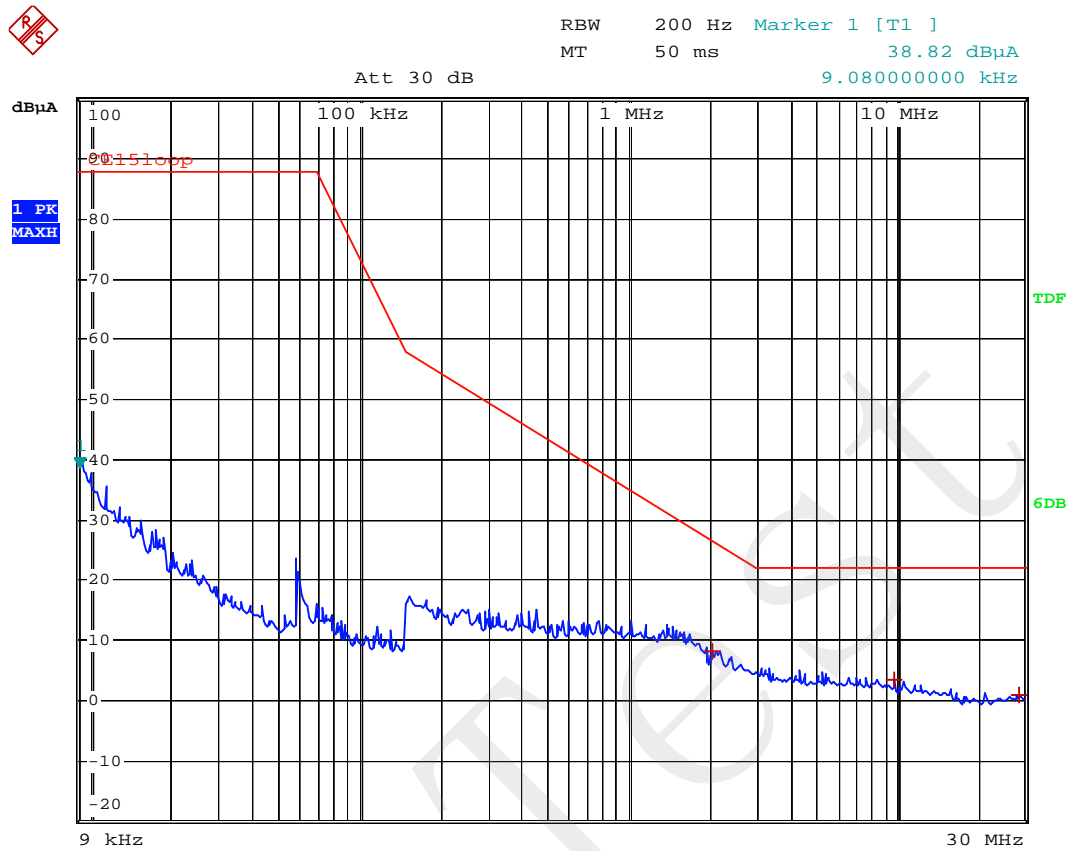
EUT: LED DOWNLIGHT
 Tested Model: BTD03
 Operating Condition: TM1
 Comment: AC 240V/50Hz

Test Specification: X



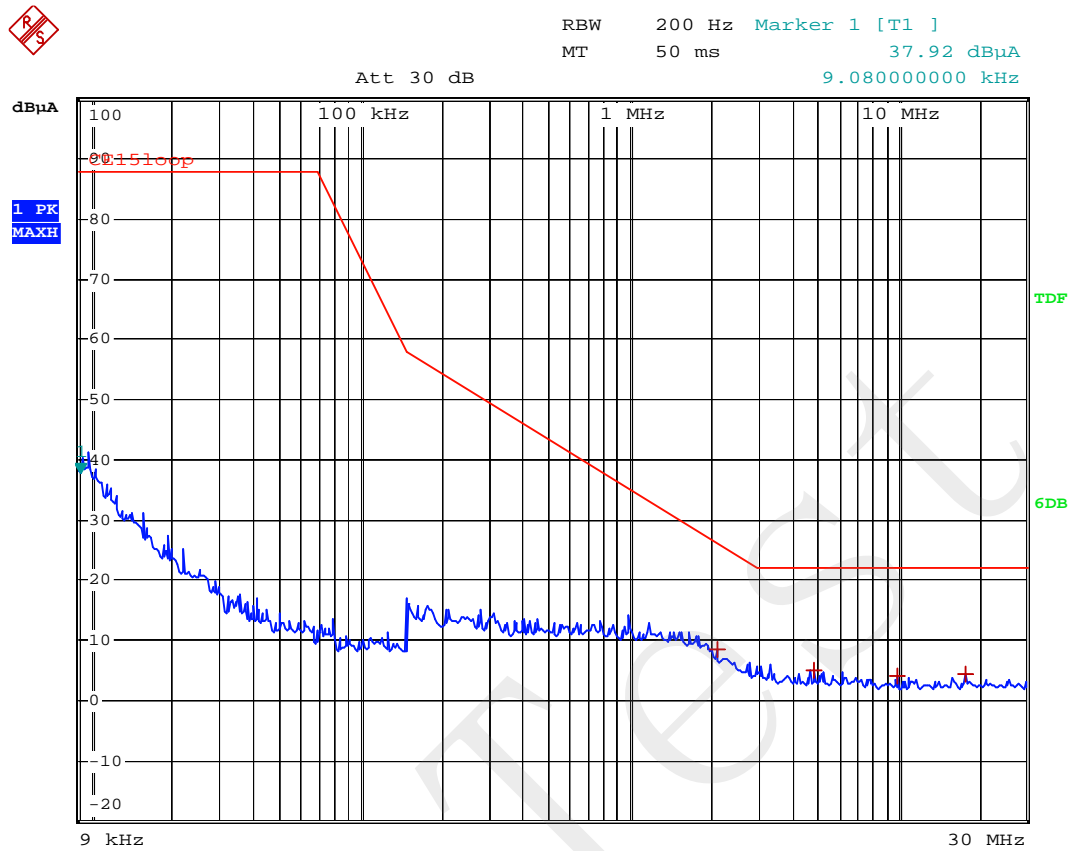
EDIT PEAK LIST (Prescan Results)			
Trace1:	CE15loop		
Trace2:	---		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµA	DELTA LIMIT dB
1 Max Peak	246 kHz	17.83	-34.22
1 Max Peak	2.122 MHz	9.26	-16.90
1 Max Peak	20.202 MHz	5.46	-16.53
1 Max Peak	28.682 MHz	5.41	-16.58

Test Specification: Y



EDIT PEAK LIST (Prescan Results)			
Trace1:	CE15loop		
Trace2:	---		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµA	DELTA LIMIT dB
1 Max Peak	242 kHz	18.12	-34.12
1 Max Peak	2.042 MHz	8.36	-18.25
1 Max Peak	8.894 MHz	3.93	-18.06
1 Max Peak	11.274 MHz	3.55	-18.44
1 Max Peak	19.994 MHz	1.54	-20.45
1 Max Peak	22.69 MHz	1.72	-20.27

Test Specification: Z



EDIT PEAK LIST (Prescan Results)			
Trace1:	CE15loop		
Trace2:	---		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµA	DELTA LIMIT dB
1 Max Peak	210 kHz	15.92	-38.02
1 Max Peak	2.142 MHz	8.32	-17.72
1 Max Peak	11.074 MHz	4.55	-17.44
1 Max Peak	13.522 MHz	4.42	-17.57
1 Max Peak	21.618 MHz	3.77	-18.22
1 Max Peak	28.602 MHz	3.48	-18.51

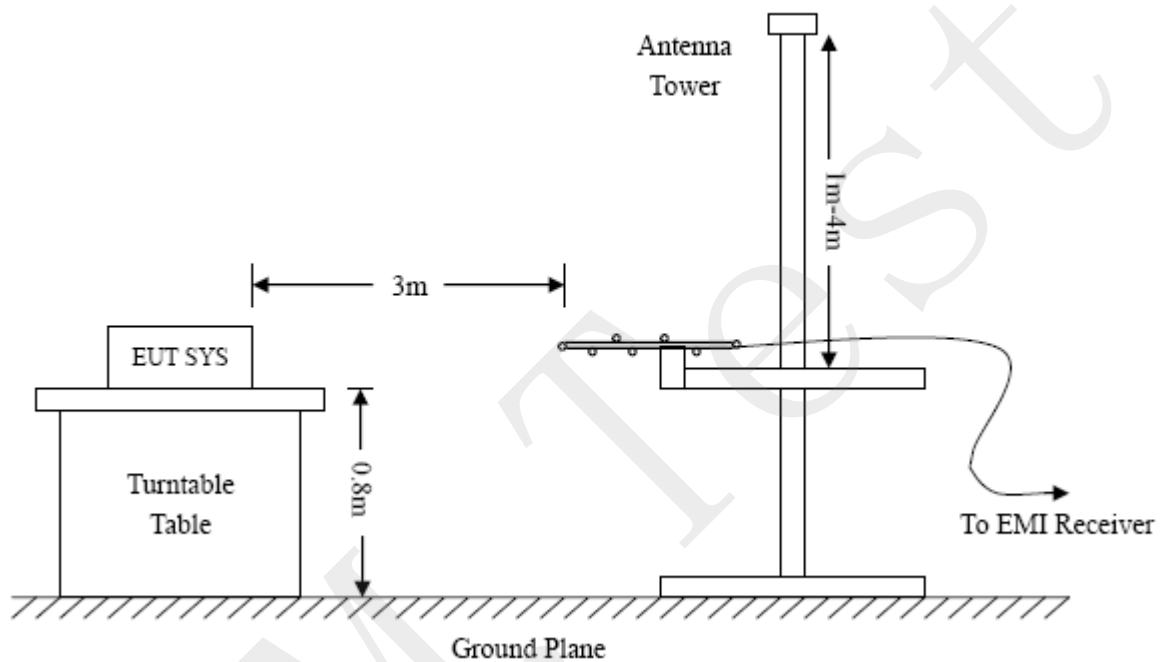
5. Radiated Electromagnetic Disturbances (30MHz to 300MHz)

5.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is ± 5.10 dB.

5.2 Test Procedure

Test is conducting under the description of AS/NZS CISPR 15 According to Clause 4.4.2.



5.3 Corrected Amplitude & Margin Calculation

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

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB μ V means the emission is 6dB μ V below the maximum limit for a lighting device. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{AS/NZS CISPR 15 Limit}$$

5.4 Environmental Conditions

Temperature:	23° C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

5.5 Summary of Test Results/Plots

According to the data in section 5.5, the EUT complied with the AS/NZS CISPR 15 standards, and had the worst margin is:

-3.29 dB at 38.1000 MHz in the Vertical polarization, 30 MHz to 300 MHz, 3Meters

Plot of Radiated Emissions Test Data

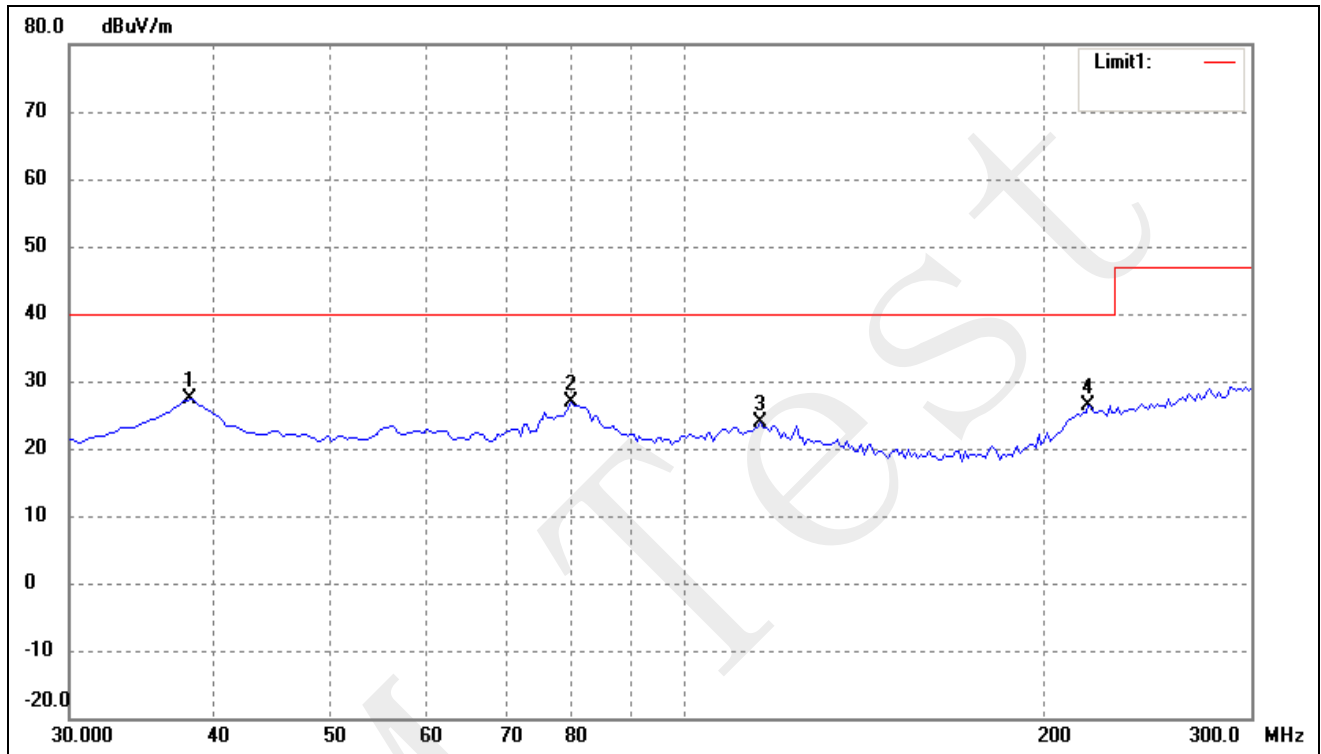
EUT: LED DOWNLIGHT

Tested Model: BTD03

Operating Condition: TM1

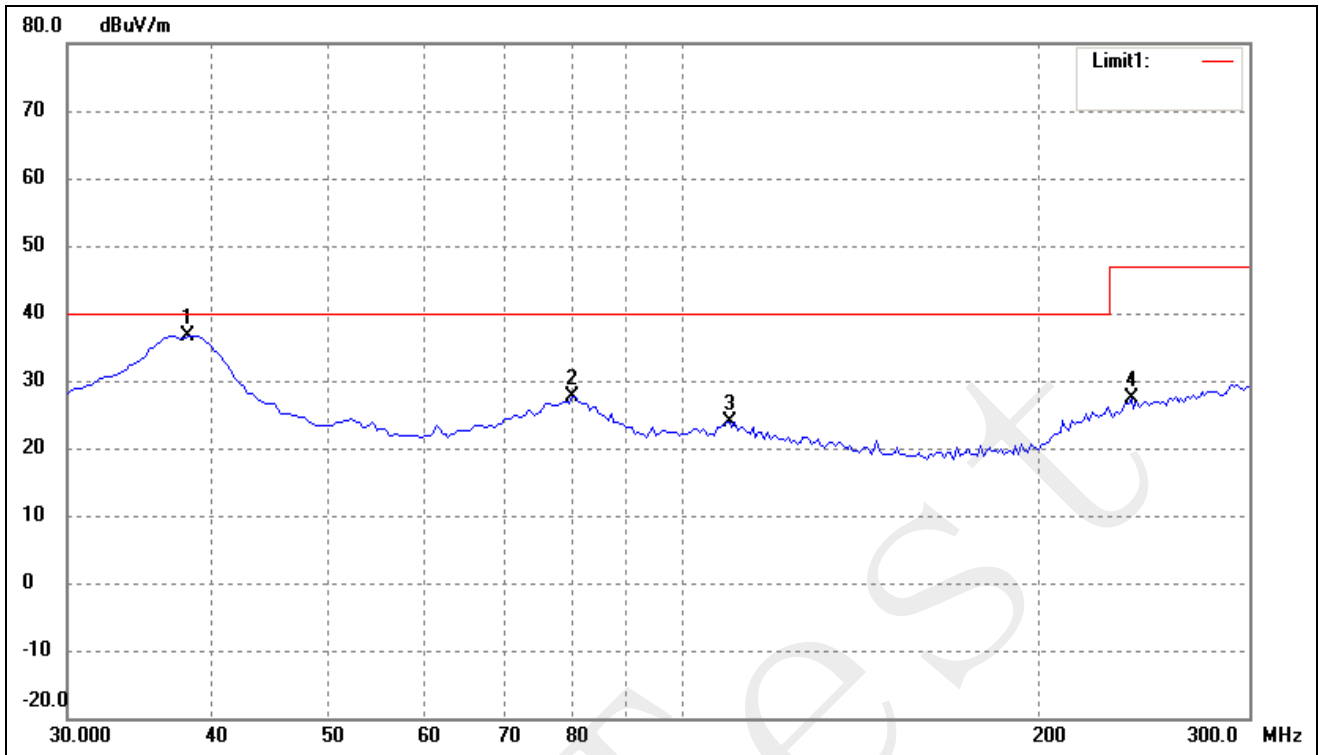
Comment: AC 240V/50Hz

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	38.1000	22.51	4.93	27.44	40.00	-12.56	100	100	peak
2	79.9500	24.77	2.01	26.78	40.00	-13.22	100	100	peak
3	115.7250	18.89	5.04	23.93	40.00	-16.07	100	100	peak
4	219.6750	18.31	8.03	26.34	40.00	-13.66	100	100	peak

Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	38.1000	31.78	4.93	36.71	40.00	-3.29	100	100	peak
2	80.6250	25.54	2.10	27.64	40.00	-12.36	100	100	peak
3	108.9750	18.79	5.08	23.87	40.00	-16.13	100	100	peak
4	238.5750	18.06	9.24	27.30	47.00	-19.70	100	100	peak

EXHIBIT 1 - PRODUCT LABELING

Proposed RCM Label Format



Specifications: Text is Black in color and is 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 supplier code number is needed which it is registered and DoC by the supplier.

Proposed Label Location on EUT

RCM Label Location



EXHIBIT 2 - EUT PHOTOGRAPHS

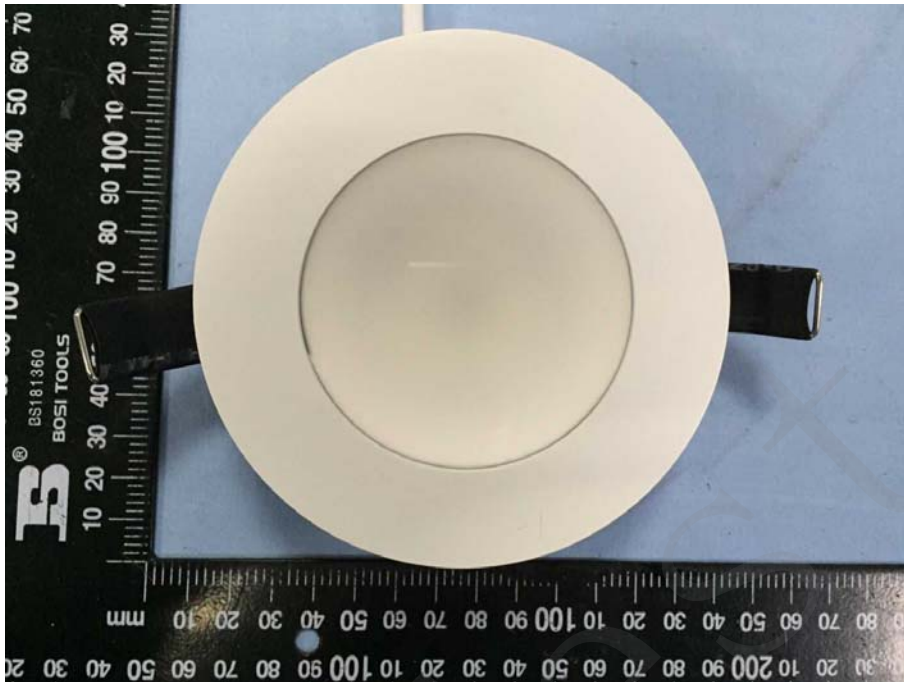
EUT View 1



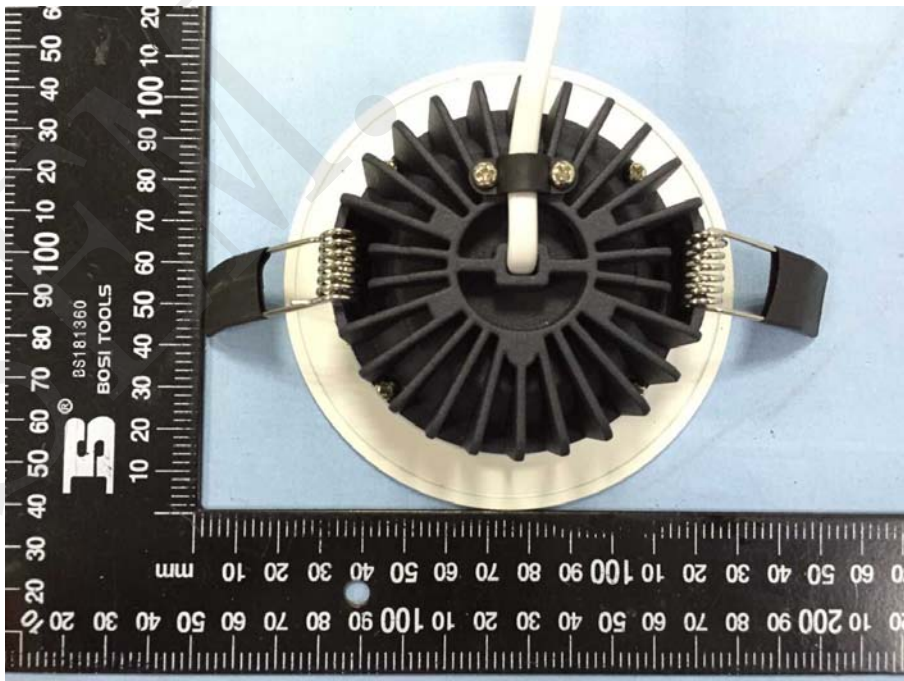
EUT View 2



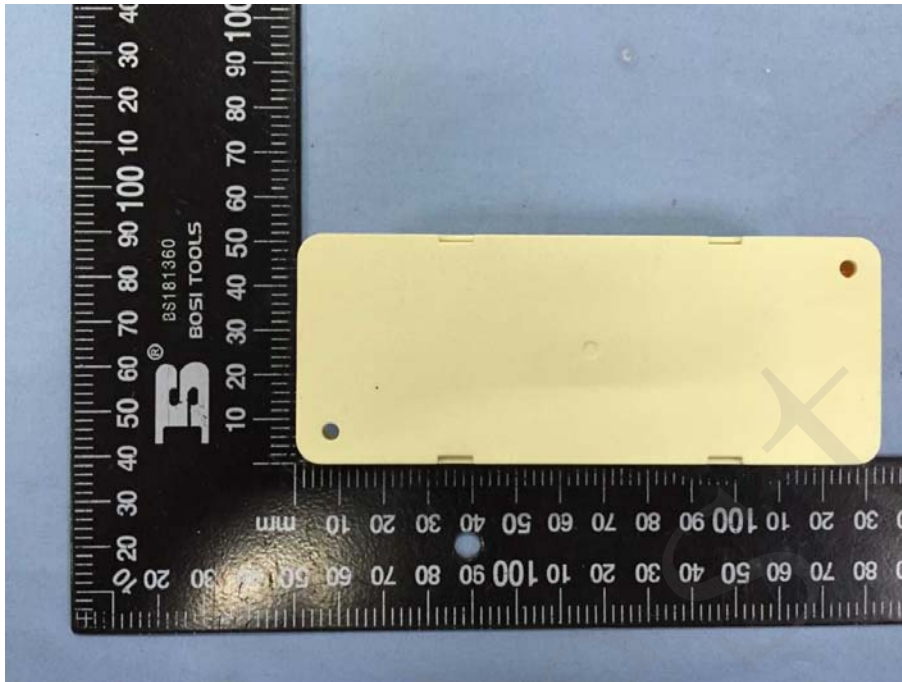
EUT View 3



EUT View 4



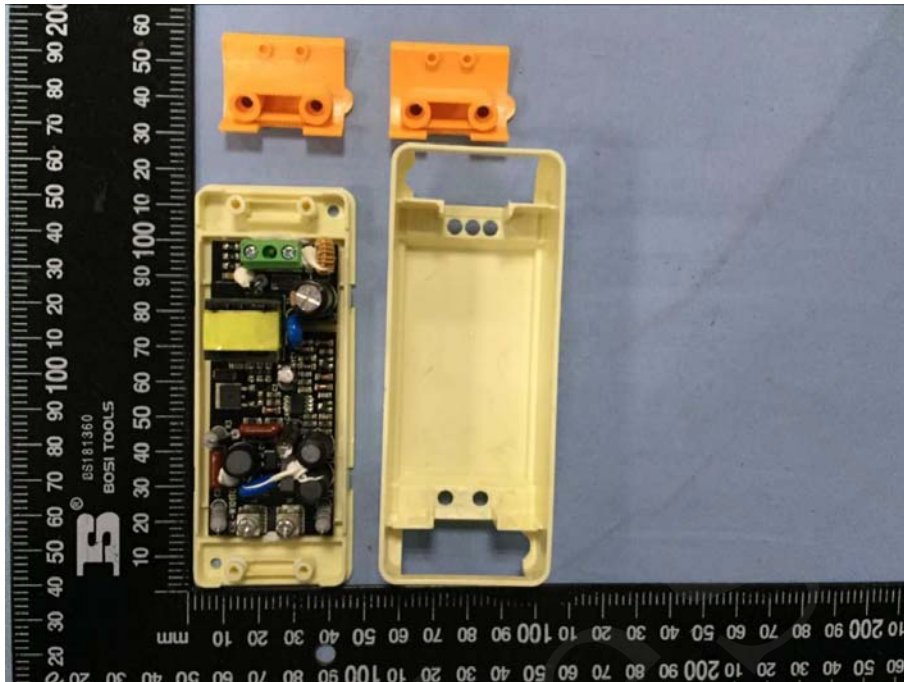
EUT View 5



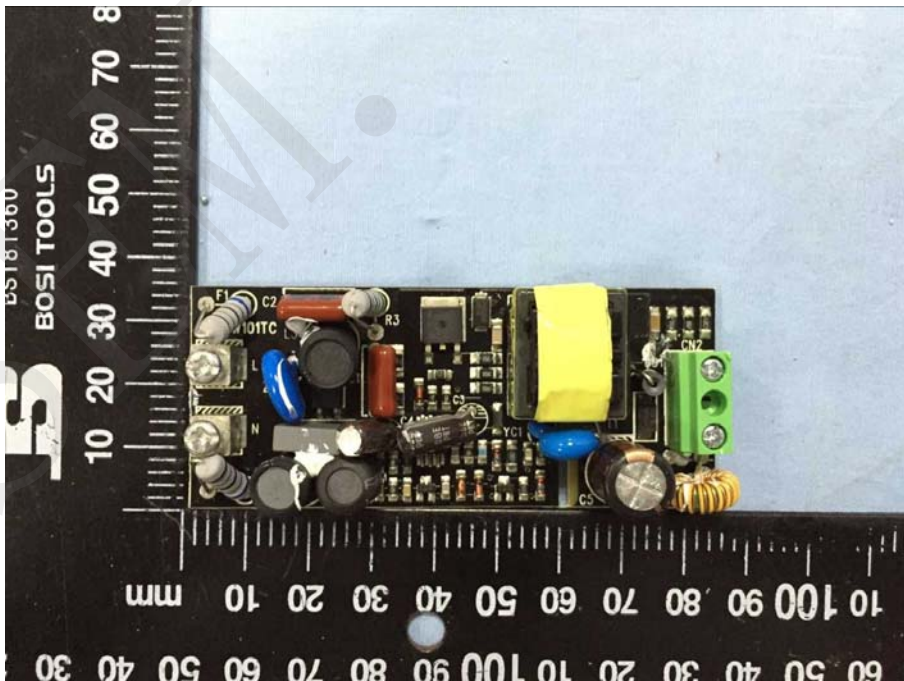
EUT View 6



EUT Housing and Board View 1



Solder Board-Component View 1



Solder Board-Component View 2

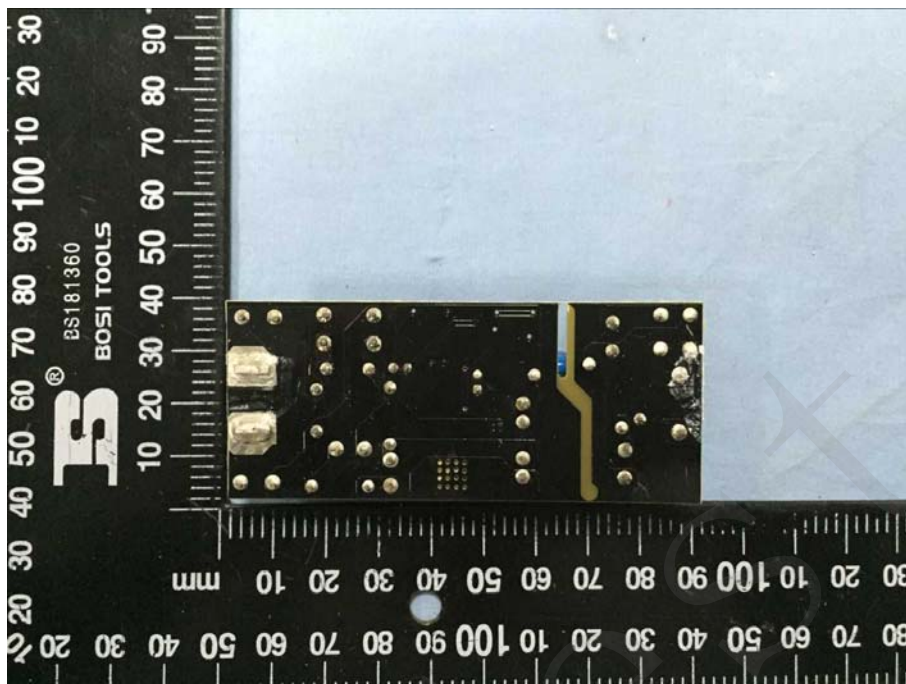
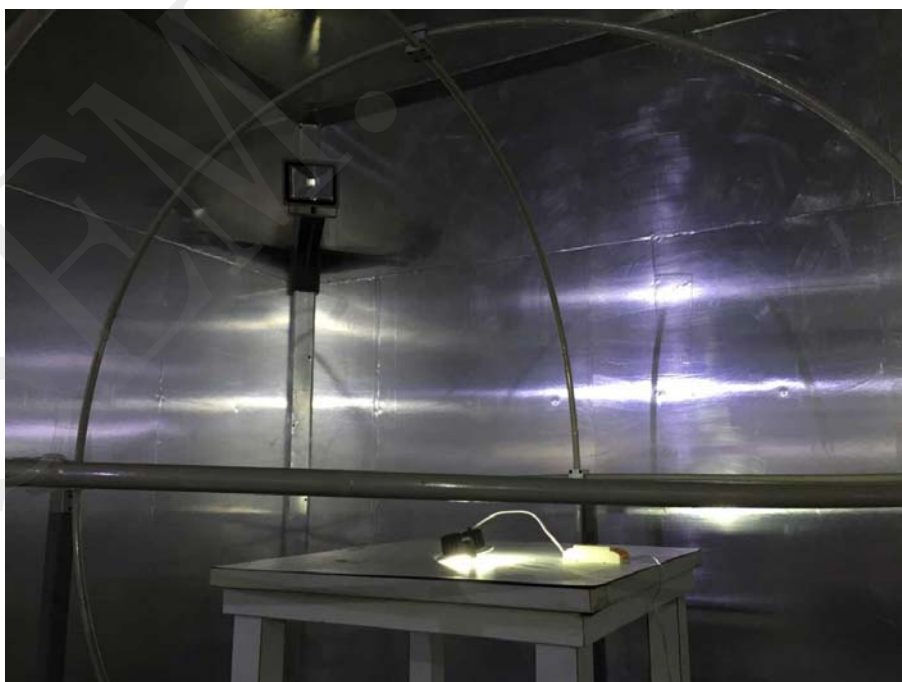


EXHIBIT 3 - TEST SETUP PHOTOGRAPHS

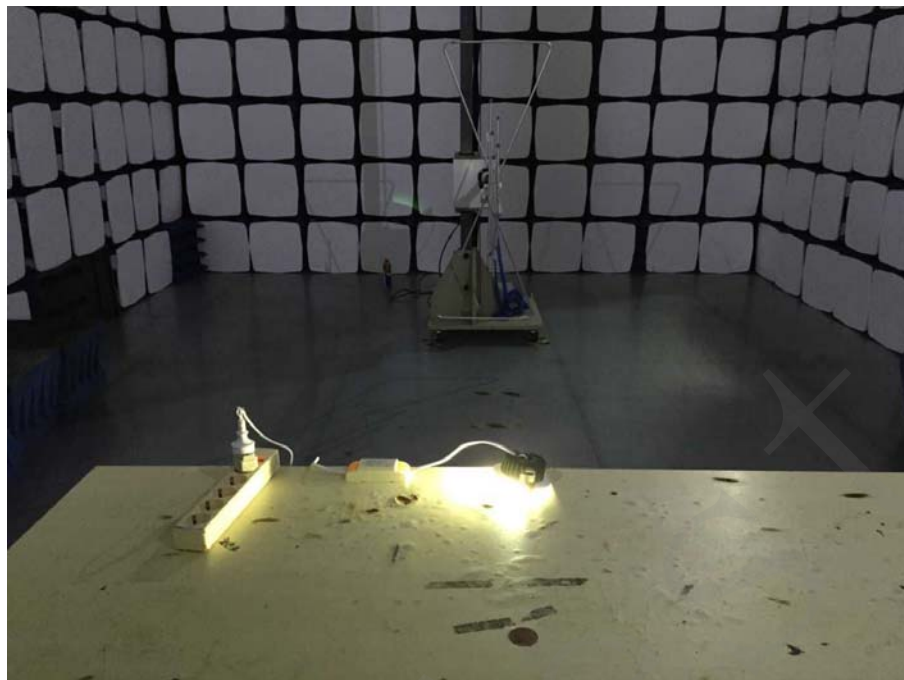
Conduction Emission Test View



Radiation Emission Test View (9kHz to 30MHz)



Radiation Emission Test View (30MHz to 300MHz)



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