APPLICATION FOR VERIFICATION
On behalf of
MATRIX LIGHTING LTD.

LED spot light

Model No.:	50-45GUS	50-45EUS
Serial No.:	E1103090-01/02	E1103090-02/02

Prepared For : MATRIX LIGHTING LTD.
ROOM 223-231, 2ND FL, EAST WING TSIM SHA
TSUI CENTRE, 66 MODY RD, KOWLOON TST EAST,
HONG KONG

Report Number : 11CA09254
Date of Test : Mar 18 – 23, 2011
Date of Report : Apr 01, 2011

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TEST REPORT FOR VERIFICATION

Applicant : MATRIX LIGHTING LTD.

Manufacturer : Zhong Shan Ban Fu Micami Toys Factory

EUT Description : LED spot light

(A) Model Number :	50-45GUS	50-45EUS
(B) Serial Number :	E1103090-01/02	E1103090-02/02
(C) Power Supply :	AC 100-120V, 60Hz	
(D) Test Voltage :	AC 120V/60Hz	

Test Procedure Used:

FCC RULES AND REGULATIONS PART 15 SUBPART B CLASS B OCTOBER 2009 AND ANSI C63.4-2003

The device described above is tested by UL-CCIC Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart B (Class B) limits both radiated and conducted emissions.

The test results are contained in this test report and UL-CCIC Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (M/N: refer to 2.1; S/N: refer to 2.1), which was tested in 3m anechoic chamber on Mar 18 – 23, 2011 to be technically compliant with the FCC official limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of UL-CCIC Co., Ltd.

This 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.

Date of Test : Mar 18 – 23, 2011

Prepared By:

Jissea Liu/Engineer

Approved Signatory:

Linda Ni / Project Engineer

1 SUMMARY OF STANDARDS AND RESULTS

1.1 Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Description / Test Item	Test Standard	Results	Meets Limit
EMISSION			
Conducted Disturbance At main terminal	FCC RULES AND REGULATIONS PART 15 SUBPART B OCTOBER 2009 AND ANSI C63.4-2003	Pass	15.107(a) Class B
Radiated Disturbance	FCC RULES AND REGULATIONS PART 15 SUBPART B OCTOBER 2009 AND ANSI C63.4-2003	Pass	15.109(a) Class B

2 GENERAL INFORMATION

2.1 Description of Equipment Under Test

Description : LED spot light

Type of EUT : ☑ Production ☐ Pre-product ☐ Pro-type

Model Number :	50-45GUS	50-45EUS
Serial Number :	E1103090-01/02	E1103090-02/02

Note : The above two models are different in lamp holder and LED driver, the LED and power are the same.
After pre-test, we selected 50-45EUS to be tested and recorded in the report for it cause the worse emission than 50-45GUS.

Rated Power : 4.5W

Applicant : MATRIX LIGHTING LTD.
ROOM 223-231, 2ND FL, EAST WING TSIM SHA TSUI CENTRE, 66 MODY RD, KOWLOON TST EAST, HONG KONG

Manufacturer : Zhong Shan Ban Fu Micami Toys Factory
Sha Guo Industrial Zone, Ban Fu County ZhongShan City Guangdong Province, China

2.2 Description of Test Facility

Site Description (Semi-Anechoic Chamber) : Sept. 17, 1998 file on
Apr 29, 2009 Renewed
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046, USA

Name of Firm : Audix Technology (Shanghai) Co., Ltd.

Site Location : 3F 34Bldg 680 Guiping Rd,
Caohejing Hi-Tech Park,
Shanghai 200233, China

NVLAP Lab Code : 200371-0

2.3 Measurement Uncertainty

Conducted Emission Expanded Uncertainty : U = 3.38dB
Radiated Emission Expanded Uncertainty (30MHz - 200MHz):
U = 4.58dB (Horizontal)
U = 4.70dB (Vertical)
Radiated Emission Expanded Uncertainty (200MHz - 1GHz):
U = 4.84dB (Horizontal)
U = 4.70dB (Vertical)

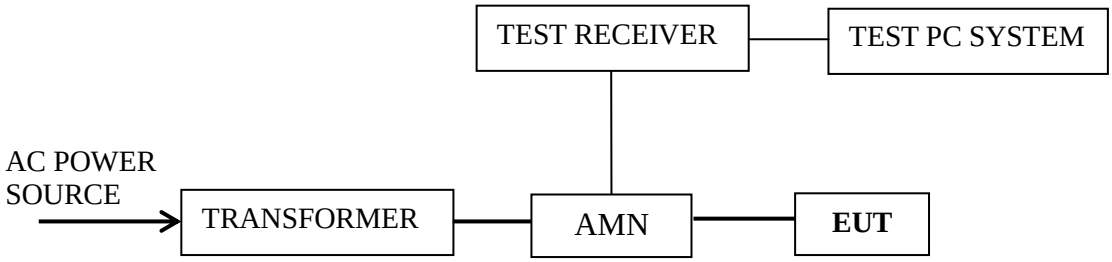
3 CONDUCTED EMISSION TEST

3.1 Test Equipment

The following test equipment are used during the conducted emission test in a shielded room:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R&S	ESCI	100841	Oct 15, 2010	Oct 15, 2011
2.	Artificial Mains Network (AMN)	R&S	ESH2-Z5	843890/011	Apr 02, 2010	Apr 02, 2011
3.	50Ω Coaxial Switch	ANRITSU	MP59B	6200426389	Sep 19, 2010	Mar 19, 2011
4.	Software	Audix	E3	SET00200 9804M592	--	--

3.2 Block Diagram of Test Setup



—— : SIGNAL LINE
▬▬ : POWER LINE

3.3 Conducted Emission Limits [FCC Part 15 Subpart B 15.107(a)]

Frequency Range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	66~56	56~46
0.5 ~ 5	56	46
5 ~ 30	60	50

NOTE 1 – The lower limit shall apply at the transition frequencies.

NOTE 2 – The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz~0.50 MHz

3.4 Test Configuration

The EUT (listed in Sec.2.1) was installed as shown on Sec.3.2 to meet FCC requirement and operating in a manner which tends to maximize its emission level in a normal application.

3.5 Operating Condition of EUT

3.5.1 Setup the EUT as shown in Sec.3.2.

3.5.2 Turn on the power of the EUT and then test.

3.6 Test Procedures

The EUT was placed upon a non-metallic table, which is 0.8 m above the horizontal conducting ground plane and 0.4 m from a vertical reference plane. The EUT was connected to the power mains through an Artificial Mains Network (AMN) to provide a 50 Ω coupling impedance for the measuring equipment. Both sides of AC line (Line & Neutral) were checked to find out the maximum conducted emission according to FCC Part 15:2009 (CLASS B) regulations during conducted disturbance test.

The I.F. bandwidth of Test Receiver ESCI was set at 9 kHz.

The frequency range from 150 kHz to 30 MHz was checked.

The test mode (Lighting) was done on conducted disturbance test and all the test results are listed in Sec. 3.7.

3.7 Test Results

< PASS >

The frequency and amplitude of the highest conducted emission relative to the limit is reported. All emissions not reported below are too low against the prescribed limits.

NOTE 1 - “QP” means “Quasi-Peak” values, “AV” means “Average” values.
NOTE 2 – The worst emission is detected at 0.158 MHz (Average Value), with corrected signal level of 50.22 dB(μV) (limit is 55.59 dB(μV)), when the Neutral of the EUT is connected to AMN.

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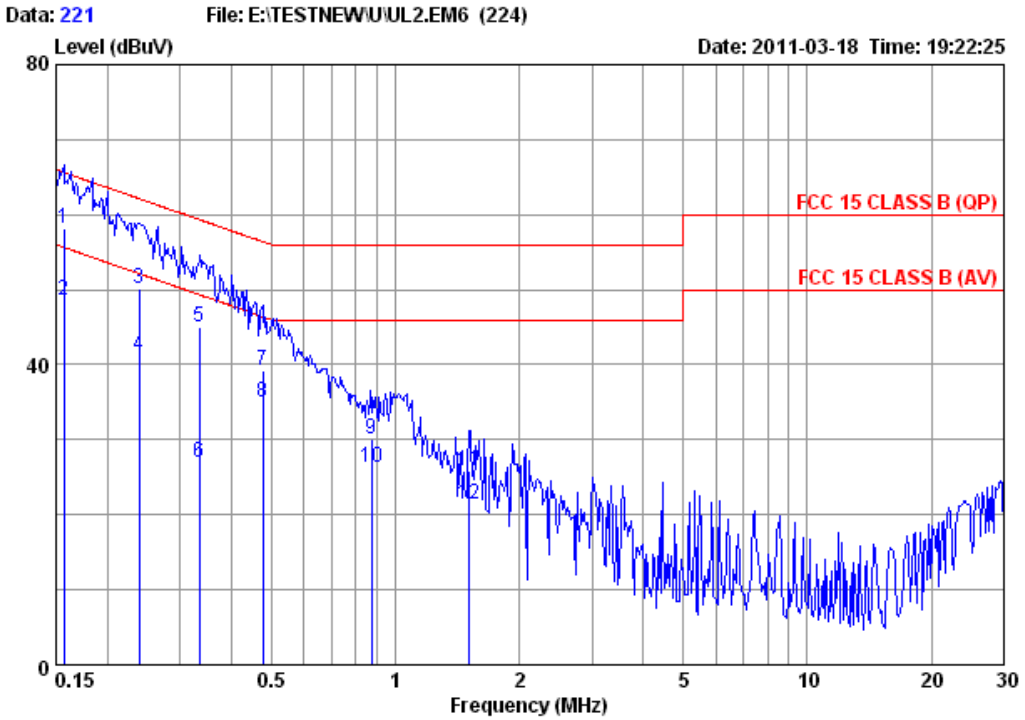

Site no : Audix(Shanghai) Shielded1 Data no :221
AMN : ESH2-Z5-10.04.02 AMN Phase :LINE
Limit : FCC 15 CLASS B (QP)
Env/Ins : 23'C 52%RH / ESCI Engineer :Wency
EUT : LED spot light
M/N : 50-45EUS
S/N : E1103090-02/02
Power Rating : 120V/60Hz
Test Mode : Lighting

	Freq (MHz)	AMN. Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.156	0.32	0.05	57.81	58.18	65.65	7.47	QP
2	0.156	0.32	0.05	48.31	48.68	55.65	6.97	Average
3	0.239	0.30	0.11	49.70	50.11	62.13	12.02	QP
4	0.239	0.30	0.11	40.72	41.13	52.13	11.00	Average
5	0.335	0.29	0.16	44.51	44.96	59.34	14.38	QP
6	0.335	0.29	0.16	26.54	26.99	49.34	22.35	Average
7	0.477	0.29	0.22	38.80	39.31	56.39	17.08	QP
8	0.477	0.29	0.22	34.40	34.91	46.39	11.48	Average
9	0.874	0.30	0.24	29.49	30.03	56.00	25.97	QP
10	0.874	0.30	0.24	25.69	26.23	46.00	19.77	Average
11	1.510	0.32	0.25	25.20	25.77	56.00	30.23	QP
12	1.510	0.32	0.25	20.90	21.47	46.00	24.53	Average

Remarks:1.Emission Level= AMN Factor + Cable Loss + Reading.
2.If the average limit is met when using a quasipeak detector the EUT shall be deemed to meet both limits and measurement with averavge detector is unnecessary.

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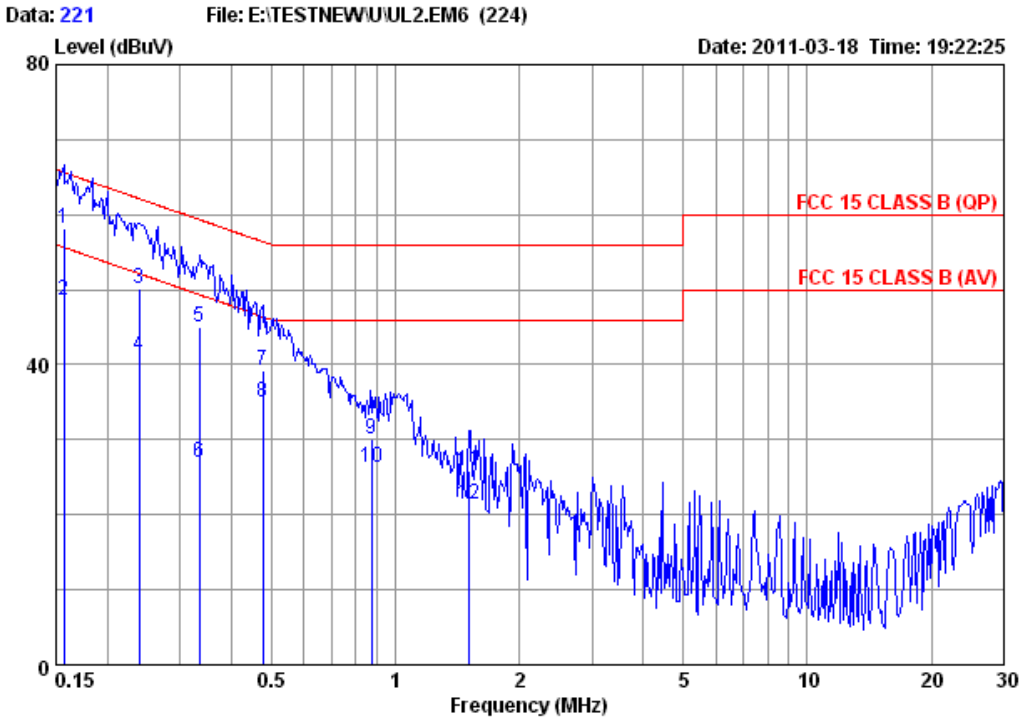


Site no : Audix(Shanghai) Shielded1 Data no :221
AMN : ESH2-Z5-10.04.02 AMN Phase :LINE
Limit : FCC 15 CLASS B (QP)
Env/Ins : 23'C 52%RH / ESCI Engineer :Wency
EUT : LED spot light
M/N : 50-45EUS
S/N : E1103090-02/02
Power Rating : 120V/60Hz
Test Mode : Lighting

	Freq (MHz)	AMN. Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.156	0.32	0.05	57.81	58.18	65.65	7.47	QP
2	0.156	0.32	0.05	48.31	48.68	55.65	6.97	Average
3	0.239	0.30	0.11	49.70	50.11	62.13	12.02	QP
4	0.239	0.30	0.11	40.72	41.13	52.13	11.00	Average
5	0.335	0.29	0.16	44.51	44.96	59.34	14.38	QP
6	0.335	0.29	0.16	26.54	26.99	49.34	22.35	Average
7	0.477	0.29	0.22	38.80	39.31	56.39	17.08	QP
8	0.477	0.29	0.22	34.40	34.91	46.39	11.48	Average
9	0.874	0.30	0.24	29.49	30.03	56.00	25.97	QP
10	0.874	0.30	0.24	25.69	26.23	46.00	19.77	Average
11	1.510	0.32	0.25	25.20	25.77	56.00	30.23	QP
12	1.510	0.32	0.25	20.90	21.47	46.00	24.53	Average

Remarks:1.Emission Level= AMN Factor + Cable Loss + Reading.
2.If the average limit is met when using a quasipeak detector the EUT shall be deemed to meet both limits and measurement with averavge detector is unnecessary.

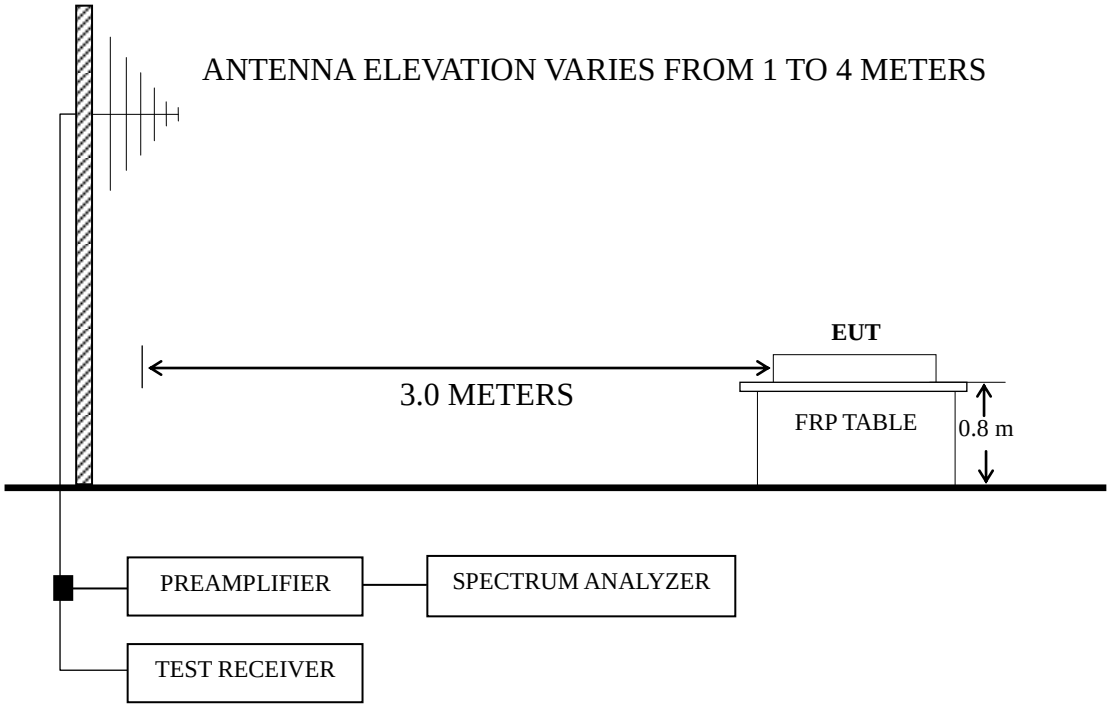
RADIATED EMISSION TEST

4.1 Test Equipment

The following test equipments are used during the radiated emission test in a semi-anechoic chamber:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R&S	ESVS10	844594/001	Mar 07, 2011	Mar 07, 2012
2.	Preamplifier	Agilent	8447D	2944A10548	Sep 19, 2011	Mar 19, 2011
3.	Bi-log Antenna	TESEQ	CBL6112D	23192	Dec 01, 2011	Dec 01, 2012
4.	Spectrum	Agilent	E7405A	MY45106600	May 19, 2010	May 19, 2011
5.	50Ω Coaxial Switch	ANRITSU	MP59B	6200426389	Mar 19, 2011	Sep 19, 2012
6.	Software	Audix	E3	SET00200 9912M295-2	--	--

4.2 Block Diagram of Test Setup



■: 50 ohm Coaxial Switch

4.3 Radiated Emission Limit [FCC Part 15 Subpart B 15.109(a)]

Frequency (MHz)	Distance (m)	Field strength limits (μV/m)	
		(μV/m)	dB(μV/m)
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0

NOTE 1 - Emission Level dB(μV/m) = 20 lg Emission Level (μV/m)
NOTE 2 - The tighter limit applies at the band edges.
NOTE 3 - Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.4 Test Configuration

The EUT (listed in Sec.2.1) was installed as shown on Sec.4.2 meet FCC requirement and operating in a manner which tends to maximize its emission level in a normal application.

4.5 Operating Condition of EUT

4.5.1 Set up the EUT as shown in Sec.4.2.

4.5.2 Turn on the power of all equipments.

4.5.3 Operate the EUT on the test mode (Lighting) and then test.

4.6 Test Procedures

The EUT was placed on a FRP turntable that is 0.8 meter above ground. The FRP turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (Calibrated Bilog Antenna) was used as receiving antenna. Both horizontal and vertical polarizations of the antenna were set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to ANSI C63.4:2003 requirements during radiated emission test.

The bandwidth of Test Receiver R&S ESVS10 was set at 120 kHz.

The frequency range from 30 MHz to 1000 MHz was checked.

The test mode (Lighting) was done on radiated disturbance test and all the test results are listed in Sec.4.7.

4.7 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative to the limit is reported. All the emissions not reported below are too low against the FCC limit.

NOTE 1 – All reading are Quasi-Peak values.

NOTE 2 – 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

NOTE 3 – The worst emission at horizontal polarization was detected at 434.490 MHz with corrected signal level of 32.01 dB (μV/m) (limit is 46.00 dB (μV/m)), when the antenna was 1.03 m height and the turn board was at 320°. The worst emission at vertical polarization was detected at 58.130 MHz with corrected signal level of 29.74 dB (μV/m) (limit is 40.00 dB (μV/m)), when the antenna was 1.00 m height and the turn board was at 77°.

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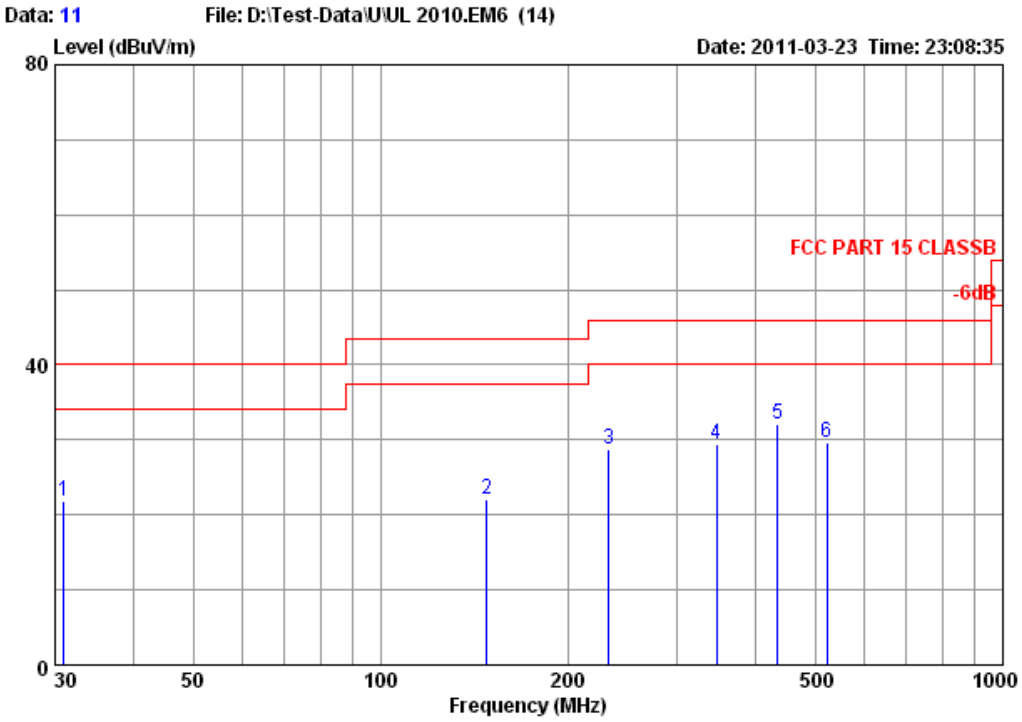

Site no :Audix ACI (3m Chamber)
Dis. / Ant. :3m /CBL 6112D-2010.12.01
Limit :FCC PART 15 CLASSB
Env. / Ins. :22'C 60%RH/ ESVS 10
EUT :LED spot light
M/N :50-45EUS
S/N :E1103090-02/02
Power Rating:120V/60Hz
Test Mode :Lighting

Data no. :11
Ant. pol. :HORIZONTAL
Engineer :Raven

	Freq. (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
1	30.970	17.78	0.81	3.17	21.76	40.00	18.24
2	148.340	10.44	2.22	9.38	22.04	43.50	21.46
3	232.730	11.19	2.55	15.02	28.76	46.00	17.24
4	347.190	15.04	2.88	11.51	29.43	46.00	16.57
5	434.490	16.74	3.08	12.19	32.01	46.00	13.99
6	521.790	17.73	3.31	8.58	29.62	46.00	16.38

Remarks: 1.Emission Level= Antenna Factor + Cable Loss + Reading.
2.The emission levels that are 20dB below the offical limits are not report.

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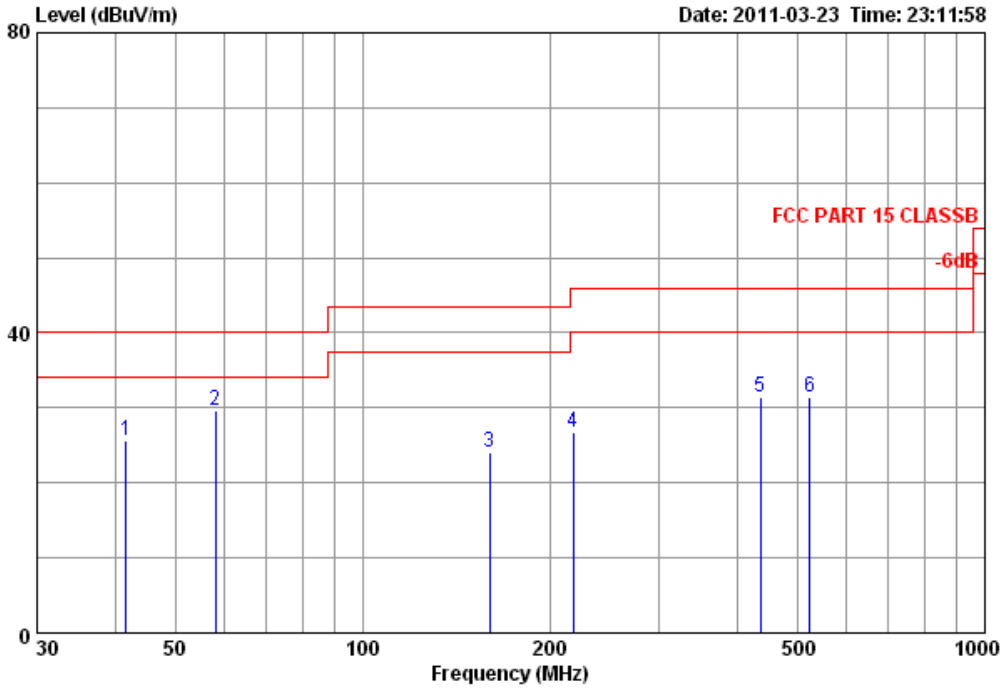


Site no :Audix ACI (3m Chamber)
Dis. / Ant. :3m /CBL 6112D-2010.12.01
Limit :FCC PART 15 CLASSB
Env. / Ins. :22'C 60%RH/ ESVS 10
EUT :LED spot light
M/N :50-45EUS
S/N :E1103090-02/02
Power Rating:120V/60Hz
Test Mode :Lighting

Data no. :12
Ant. pol. :VERTICAL
Engineer :Raven

	Freq. (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
1	41.640	11.78	0.88	12.91	25.57	40.00	14.43
2	58.130	9.02	1.14	19.58	29.74	40.00	10.26
3	159.980	10.25	2.27	11.51	24.03	43.50	19.47
4	218.180	10.52	2.50	13.81	26.83	46.00	19.17
5	436.430	16.79	3.09	11.53	31.41	46.00	14.59
6	523.730	17.74	3.31	10.40	31.45	46.00	14.55

Remarks: 1.Emission Level= Antenna Factor + Cable Loss + Reading.
2.The emission levels that are 20dB below the offical limits are not report.

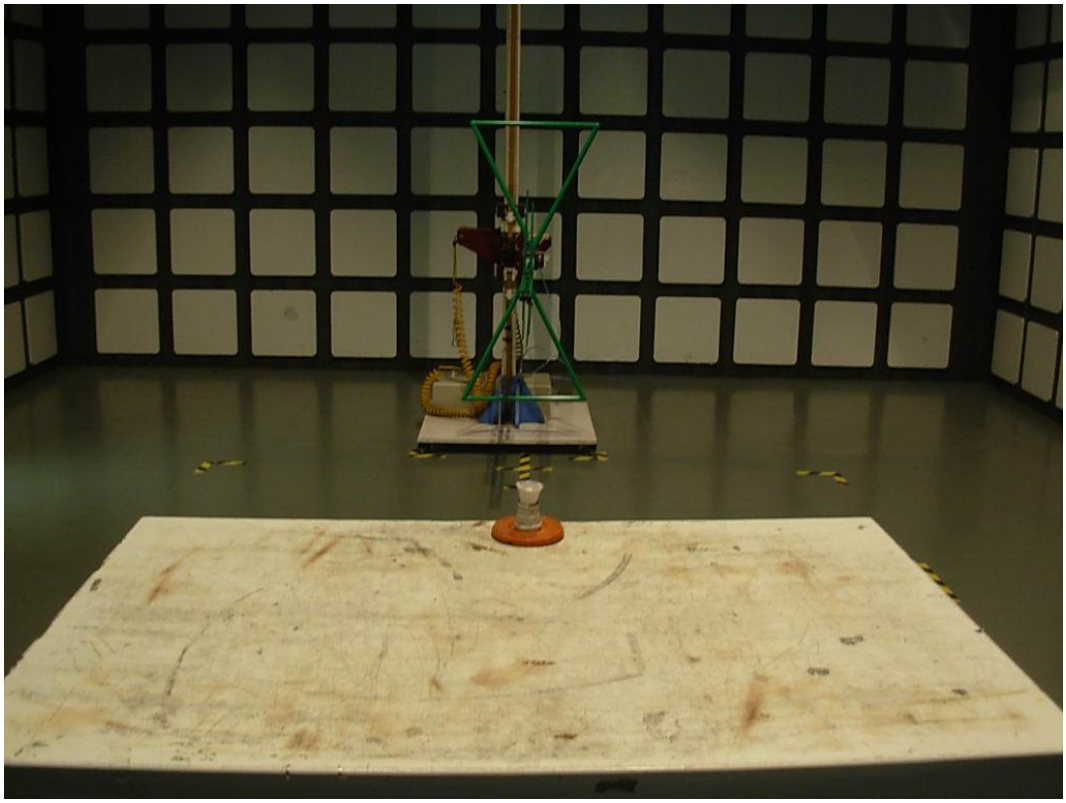
DEVIATION TO TEST SPECIFICATIONS

None.

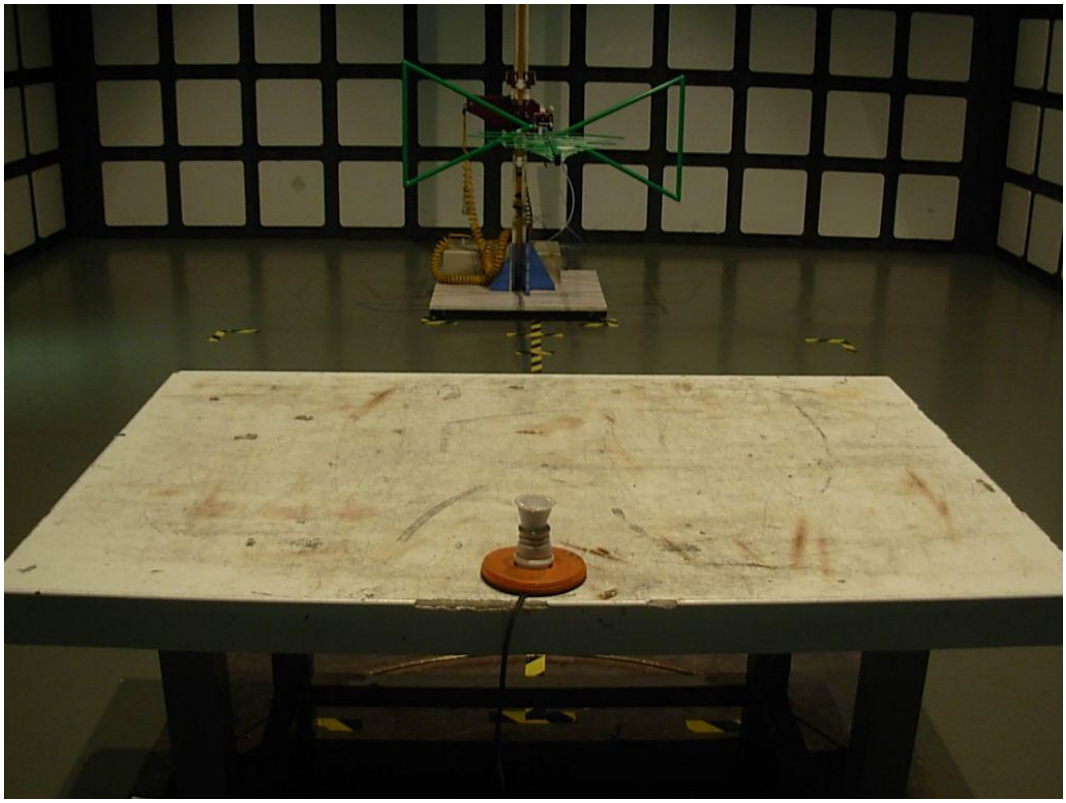
6 PHOTOGRAPHS

6.1 Conducted Emission Test

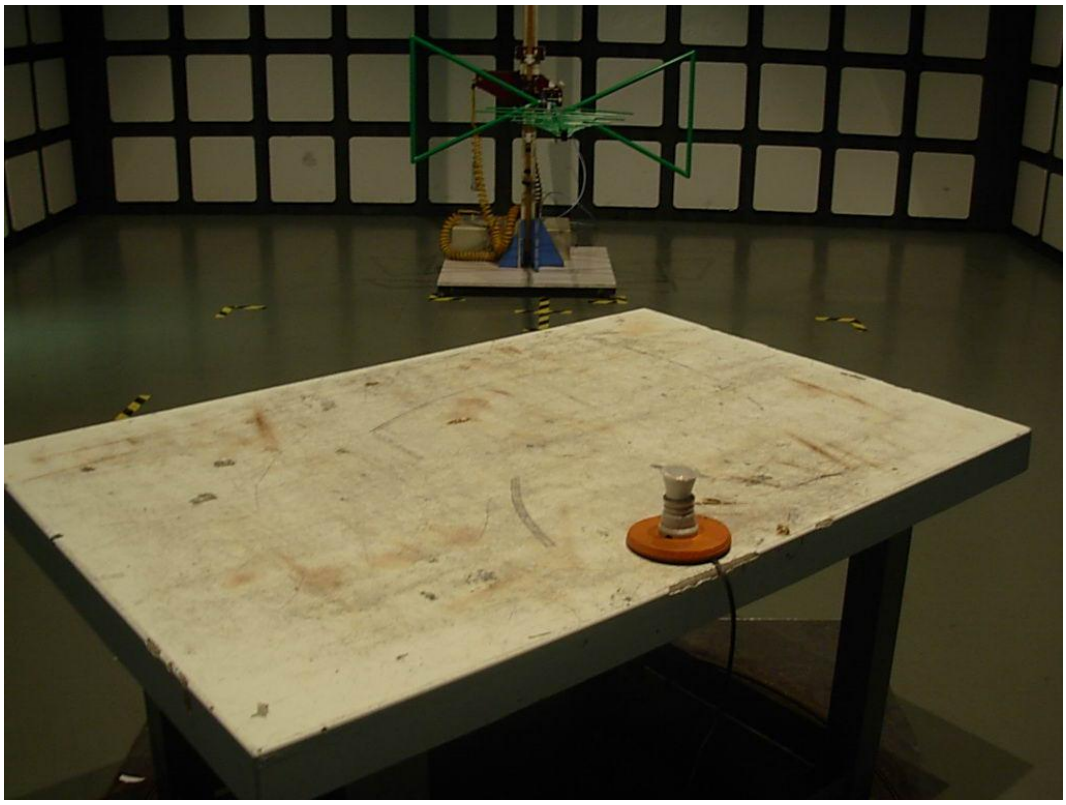
6.2 Radiated Emission Test



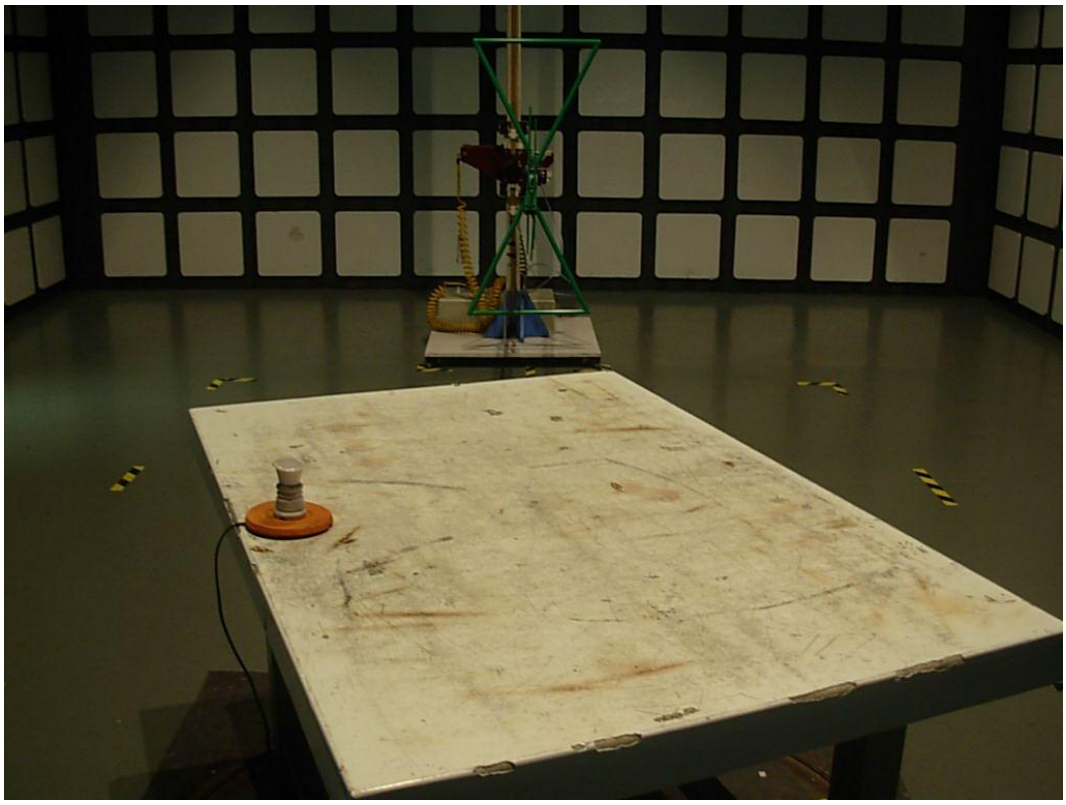
FRONT VIEW OF RADIATED EMISSION



BACK VIEW OF RADIATED EMISSION



SETUP WITH MAXIMUM DETECTED EMISSION AT HORIZONTAL POLARIZATION



SETUP WITH MAXIMUM DETECTED EMISSION AT VERTICAL POLARIZATION

APPENDIX

PHOTOGRAPHS OF EUT

FIGURE 1.
LED SPOT LIGHT (M/N: 50-45GUS)
GENERAL APPEARANCE

FIGURE 2.
LED SPOT LIGHT (M/N: 50-45GUS)
COVER REMOVED

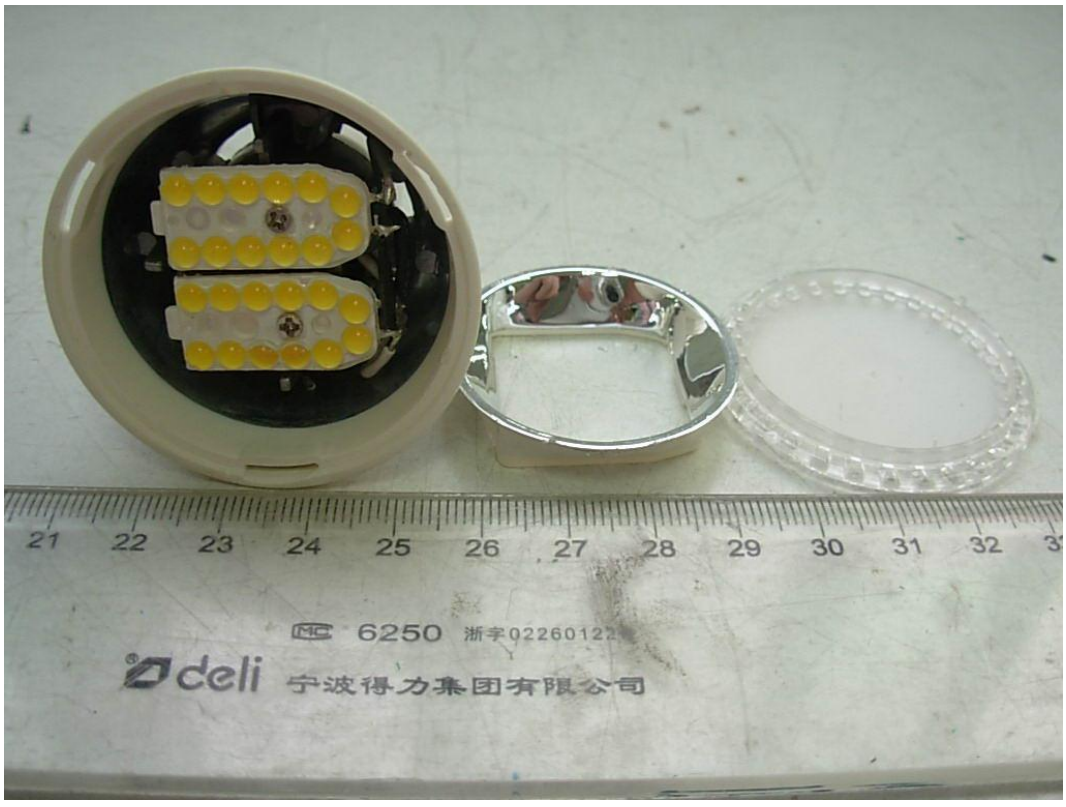


FIGURE 3.
LED SPOT LIGHT (M/N: 50-45GUS)
LED PCB

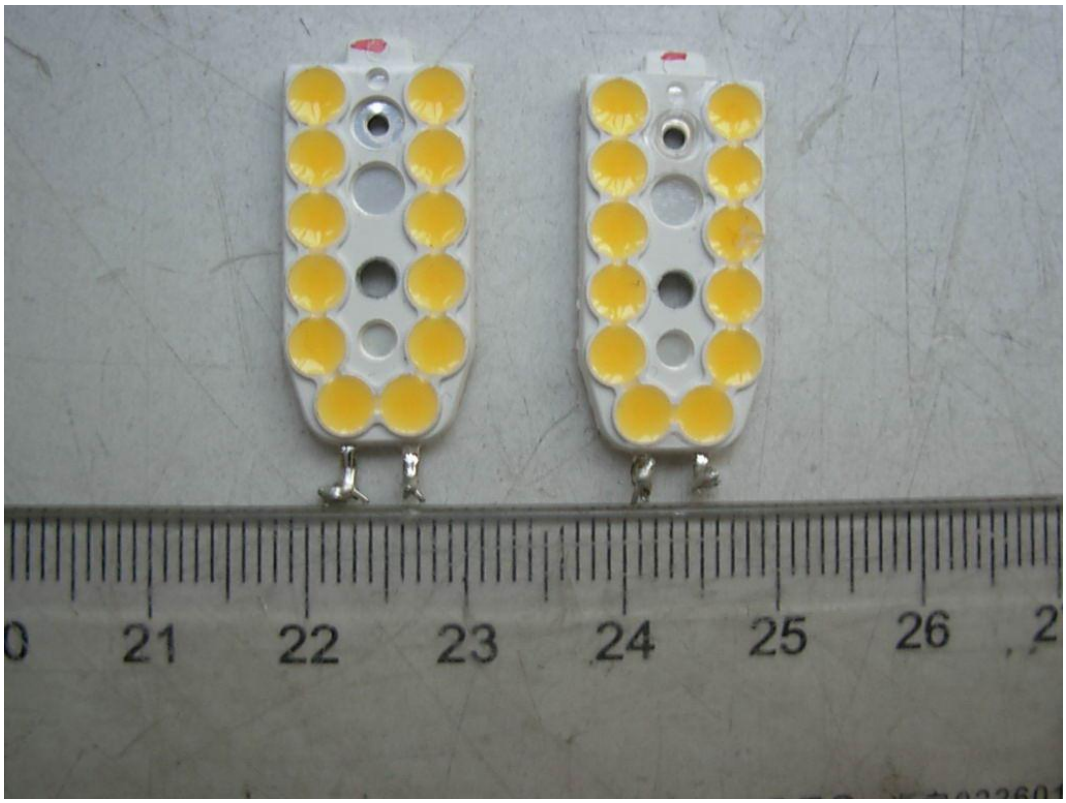


FIGURE 4.
LED SPOT LIGHT (M/N: 50-45GUS)
MAIN BOARD REMOVED

FIGURE 5.
LED SPOT LIGHT (M/N: 50-45GUS)
MAIN BOARD (COMPONENT VIEW)

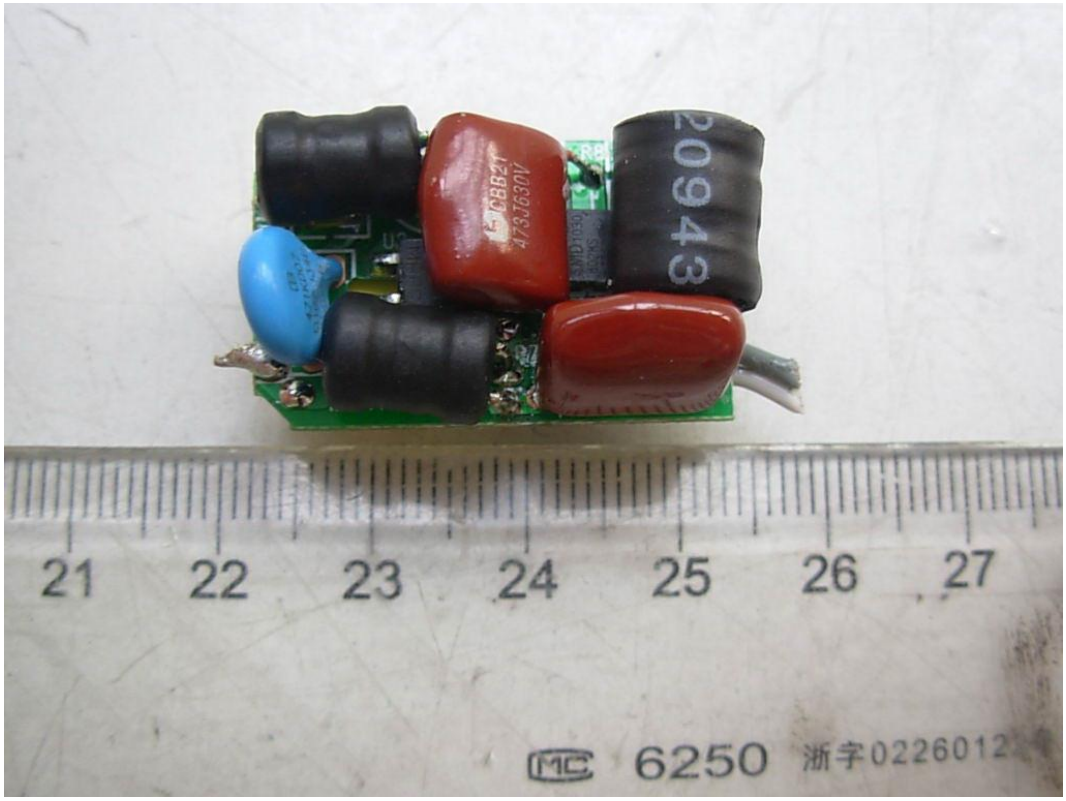


FIGURE 6.
LED SPOT LIGHT (M/N: 50-45GUS)
MAIN BOARD (SOLDERED VIEW)

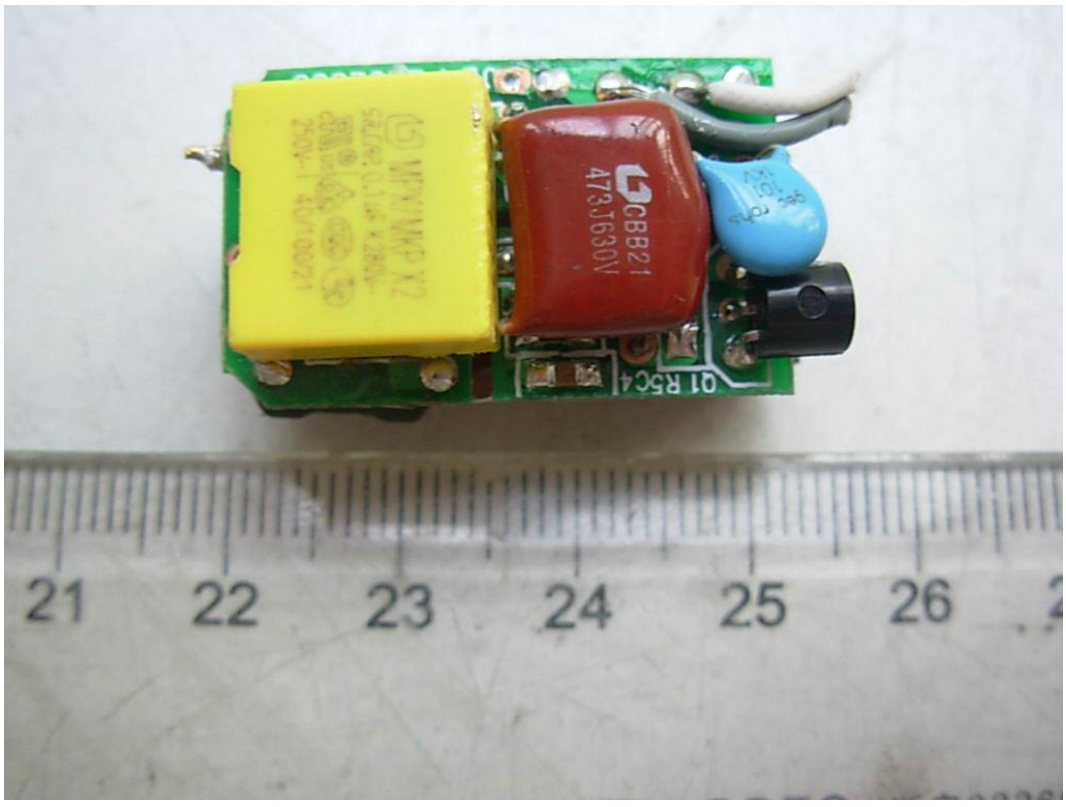


FIGURE 7.
LED SPOT LIGHT (M/N: 50-45EUS)
GENERAL APPEARANCE

FIGURE 8.
LED SPOT LIGHT (M/N: 50-45EUS)
COVER REMOVED

FIGURE 9.
LED SPOT LIGHT (M/N: 50-45EUS)
LED PCB

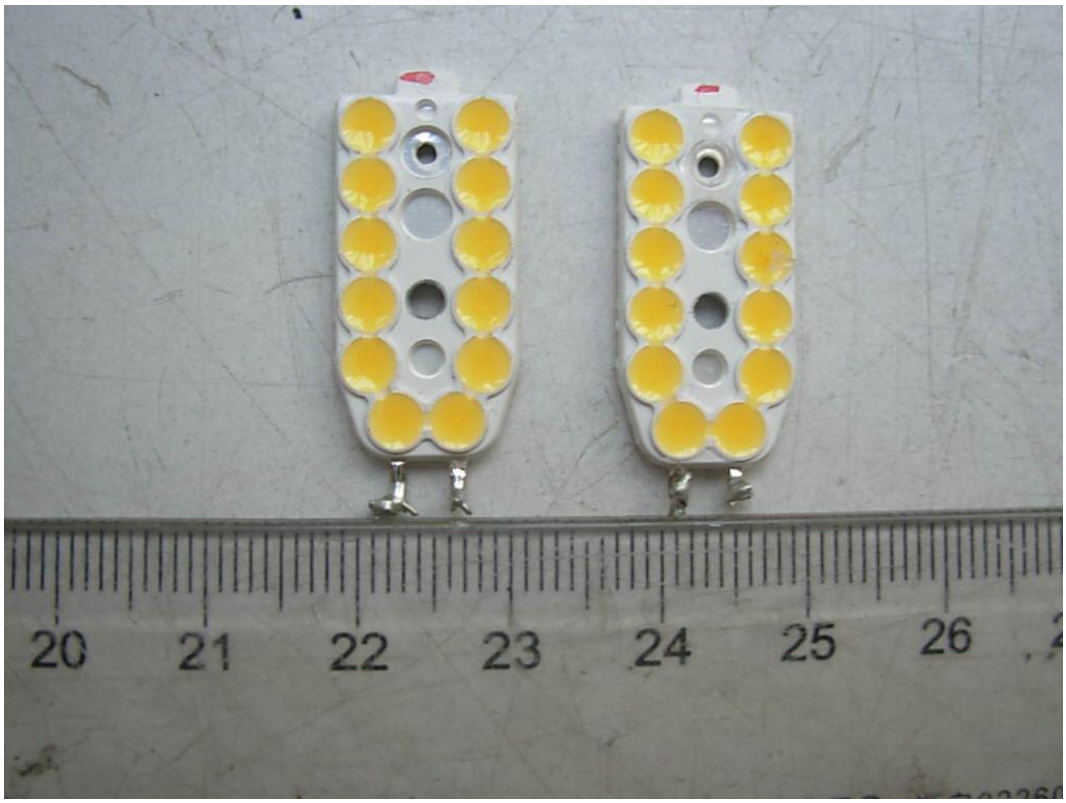


FIGURE 10.
LED SPOT LIGHT (M/N: 50-45EUS)
MAIN BOARD REMOVED

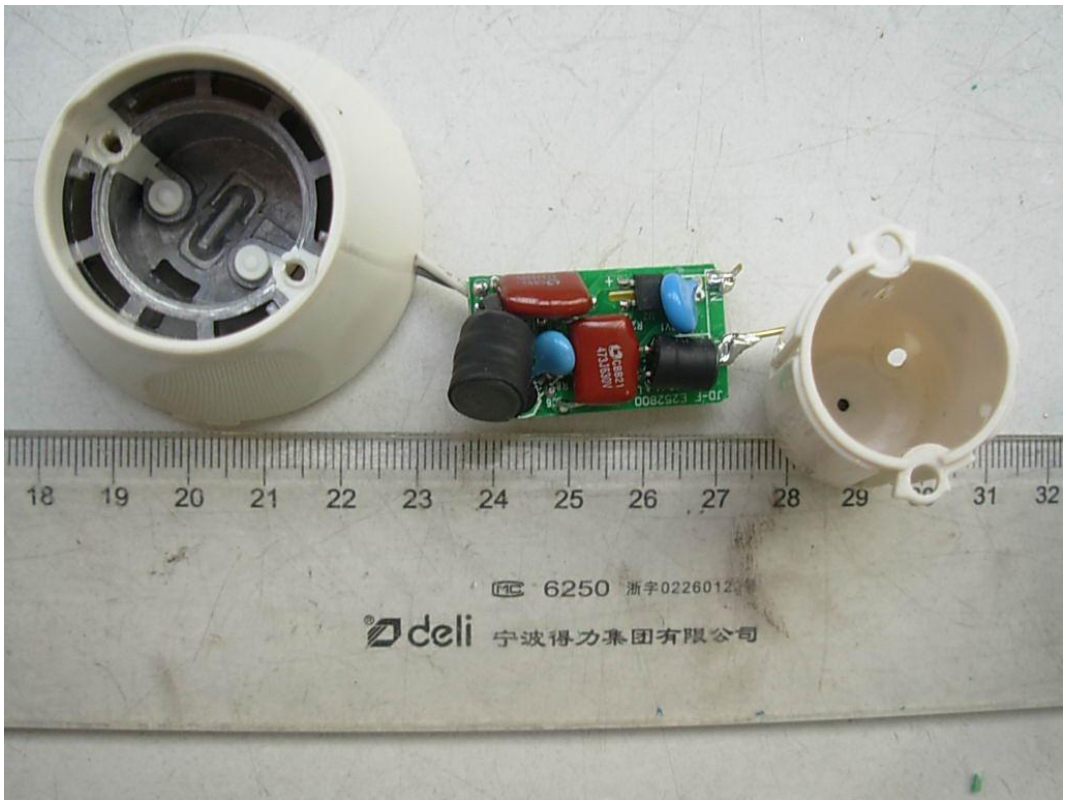


FIGURE 11.
LED SPOT LIGHT (M/N: 50-45EUS)
MAIN BOARD (COMPONENT VIEW)

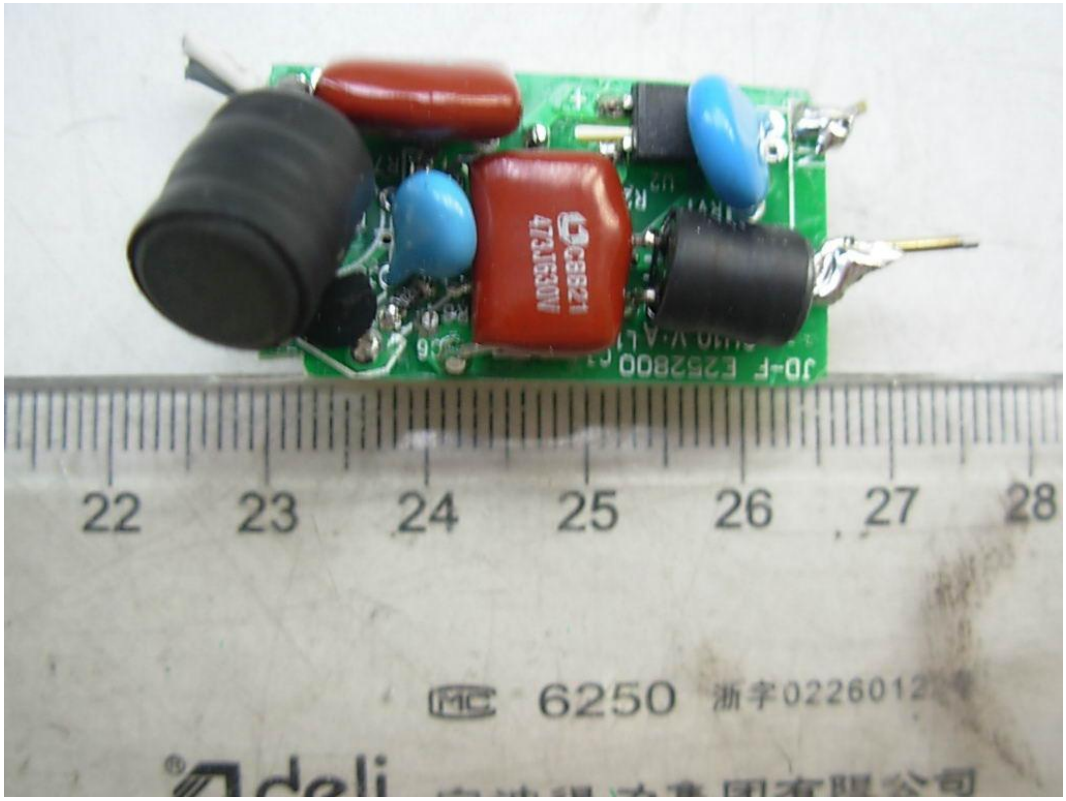


FIGURE 12.
LED SPOT LIGHT (M/N: 50-45EUS)
MAIN BOARD (SOLDERED VIEW)