



## LM-79-08 Test Report

for

### GREEN CREATIVE LTD

756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

### LED Lamp

**Model: 17A21DIM/830/GU24**

#### Laboratory: Leading Testing Laboratories

**NVLAP CODE: 200960-0**

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Report No.: HZ15090034b

The laboratory that conducted the testing detailed in this report has been accredited for SSL by NVLAP.

Review by:

Engineer: April Zou  
Sep. 23, 2015

Approved by:



Manager: Jim Zhang  
Sep. 23, 2015

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## Test Summary

Sample Tested: 17A21DIM/830/GU24

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
102.0	1665.4	16.33	0.9359
CCT (K)	CRI	Stabilization Time (Light & Power)	
3081	83.1	65	

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

### Test specifications:

<b>Date of Receipt</b>	: Sep. 30, 2014
<b>Date of Test</b>	: Oct. 10, 2014 to Oct. 11, 2014
<b>Test item</b>	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
<b>Reference Standard</b>	: IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

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## Sample Photo



Figure 1- Overview of the sample

### Equipment Under Test (EUT)

<b>Name</b>	: LED Lamp
<b>Model</b>	: 17A21DIM/830/GU24
<b>Electrical Ratings</b>	: 120V, 60Hz, 17W
<b>Product Description</b>	: E26 base, 3000K, Dimmable Manufacturer of light source: Seoul Model of light source: STW8Q14C Quantity of light source: 60pcs
<b>Manufacturer</b>	: GREEN CREATIVE LTD
<b>Address</b>	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

## TEST RESULTS

Test ambient temperature was 24.9°C.

Base orientation was Base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 65 minutes, and the total operating time including stabilization was 70 minutes.

### Sphere-Spectroradiometer Method

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.145
Power Factor	0.9359
Test Power (W)	16.33
Luminous Efficacy (lm/W)	102.0
THD A%	33.31
Total Luminous Flux (lm)	1665.4
Color Rendering Index (CRI)	83.1
R9	14.7
Correlated Color Temperature (CCT) (K)	3081
Chromaticity Chroma x	0.4286
Chromaticity Chroma y	0.3964
Chromaticity Chroma u	0.2485
Chromaticity Chroma v	0.3447
Duv	0.0019
Chromaticity Chroma u'	0.2485
Chromaticity Chroma v'	0.5171

Special Color Rendering Indices	
R1	81.7
R2	91.3
R3	96.2
R4	79.9
R5	81.2
R6	88
R7	84
R8	62.5
R9	14.7
R10	79.1
R11	77.9
R12	70.6
R13	84
R14	98.4

Table 2: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 ( $u'$ ,  $v'$ ) diagram,  $u' = u = 4x/(-2x+12y+3)$ ,  $v' = 3v/2 = 9y/(-2x+12y+3)$ .

## Goniophotometer Method

Test ambient temperature was 25.2°C.

The photometric distance is 2.475m.

Luminous data was taken at 0.5°vertical intervals and 22.5°horizontal intervals.

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.145
Power Factor	0.9357
Test Power (W)	16.23
Luminous Efficacy (lm/W)	104.3
Total Luminous Flux (lm)	1692.8
Beam Angle (°)	314.3
Center Beam Candle Power (cd)	119
Maximum Beam Candle Power (cd)	163.7 (At: C=247.5, Gamma=76.5)
Spacing Criteria	1.76 (0°-180°)/ 1.78 (90°-270°)
Zonal Lumens in the 0°-60°Zone	25.72%
Zonal Lumens in the 60°-90°Zone	29.26%
Zonal Lumens in the 90°-120°Zone	27.51%
Zonal Lumens in the 120°-180°Zone	17.51%

Table 3: Test data per Goniophotometer Method

### Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total	$\gamma(^{\circ})$	Lumens	% Total
0~5	2.859	0.17%	90~95	85.609	5.06%
5~10	8.599	0.51%	95~100	83.776	4.95%
10~15	14.41	0.85%	100~105	80.899	4.78%
15~20	20.335	1.20%	105~110	76.931	4.54%
20~25	26.41	1.56%	110~115	72.08	4.26%
25~30	32.66	1.93%	115~120	66.461	3.93%
30~35	39.07	2.31%	120~125	60.206	3.56%
35~40	45.581	2.69%	125~130	53.429	3.16%
40~45	52.102	3.08%	130~135	46.324	2.74%
45~50	58.498	3.46%	135~140	39.1	2.31%
50~55	64.597	3.82%	140~145	31.934	1.89%
55~60	70.229	4.15%	145~150	25.005	1.48%
60~65	75.23	4.44%	150~155	18.454	1.09%
65~70	79.438	4.69%	155~160	12.387	0.73%
70~75	82.757	4.89%	160~165	6.814	0.40%
75~80	85.075	5.03%	165~170	2.372	0.14%
80~85	86.331	5.10%	170~175	0.337	0.02%
85~90	86.498	5.11%	175~180	0.007	0.00%

$\gamma(^{\circ})$	Lumens	% Total
0-135	1556.394	91.94%
135-180	136.41	8.06%
0-180	1692.8	100%

Table 4: Zonal Lumen Data

## Illuminance Plots- Goniophotometer Method

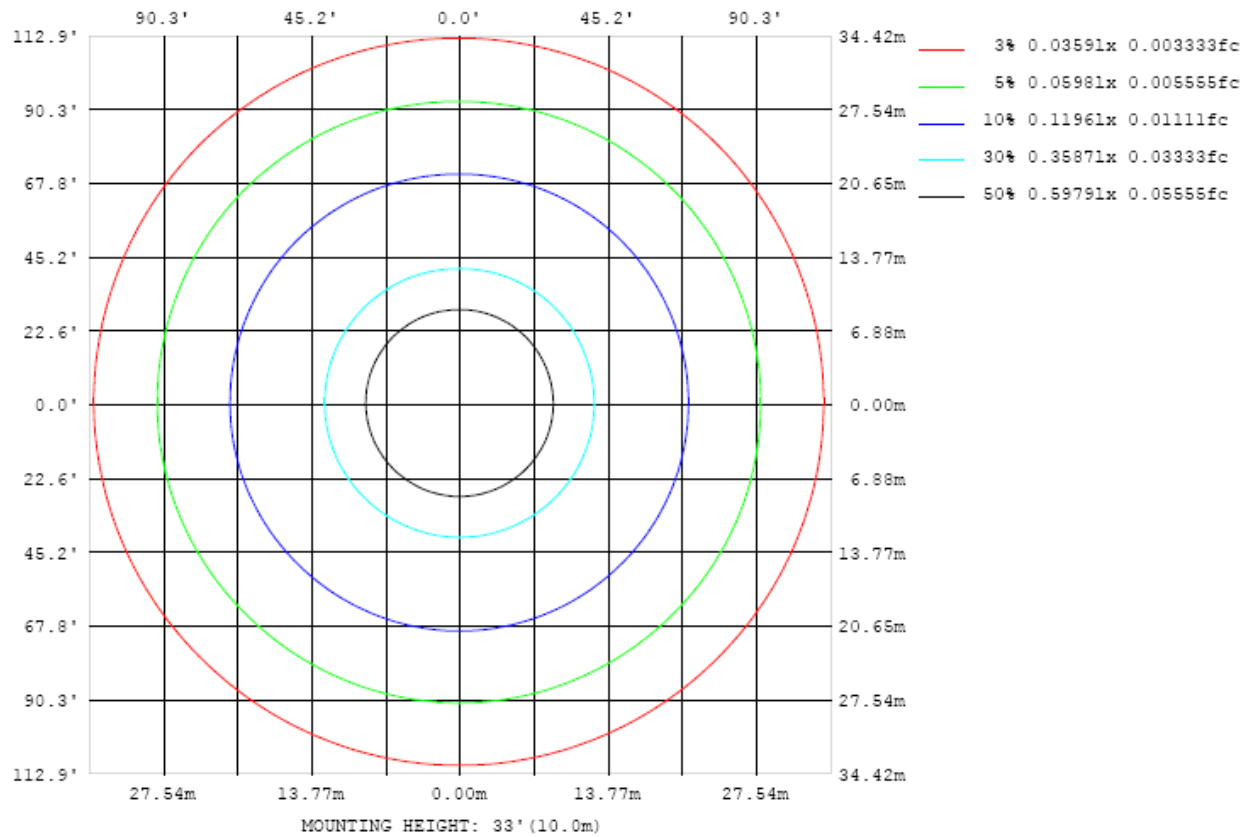


Chart 1: Illuminance Plot (Footcandles)



## Luminous Intensity Distribution Plots- Goniophotometer Method

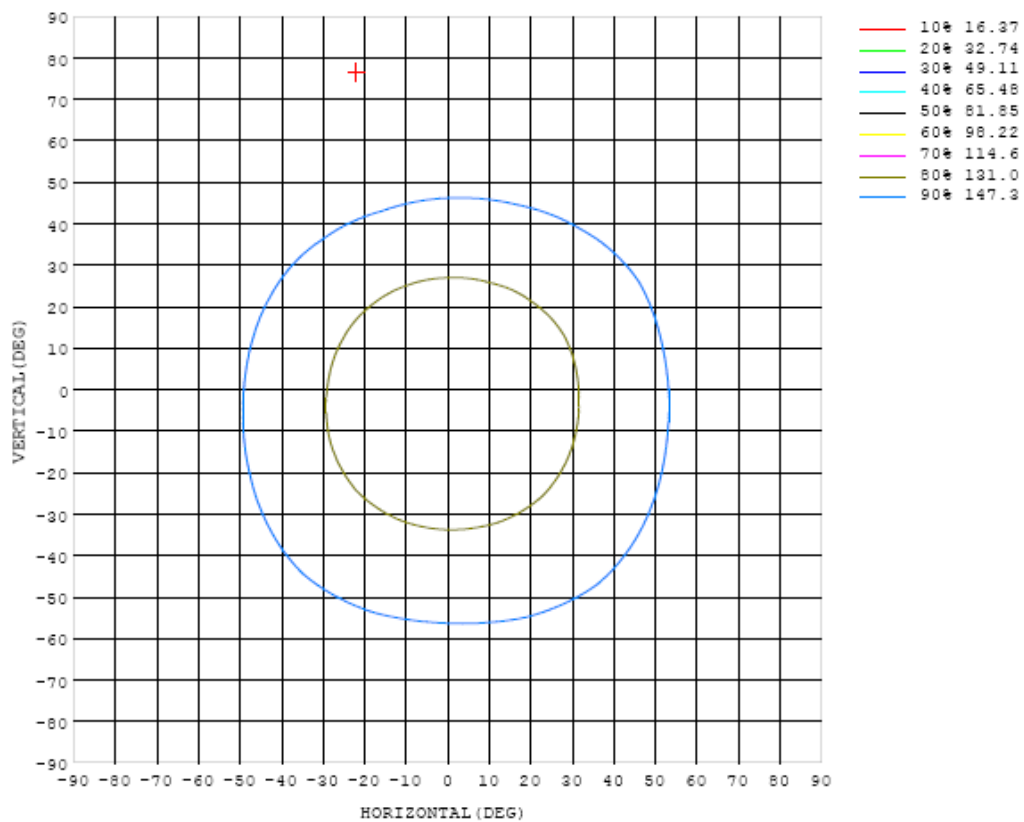


Chart 2: Isocandela Plot

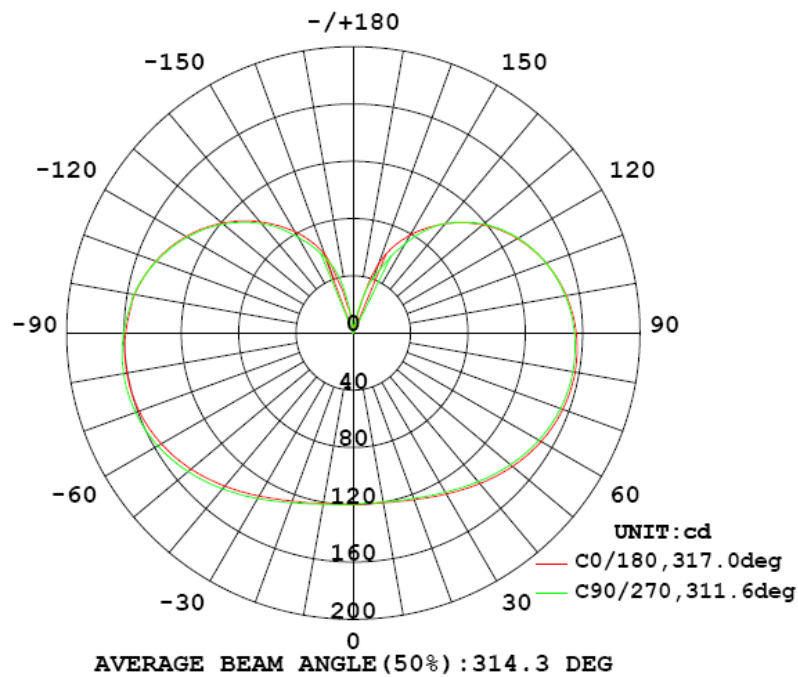


Chart 3: Polar Candela Distribution

## Luminous Intensity Data- Goniophotometer Method

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338			
0	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119			
5	120	119	119	119	119	119	120	120	120	120	120	120	120	120	120	120			
10	120	120	120	120	120	120	120	121	121	121	121	122	121	121	121	121			
15	122	121	121	121	121	121	122	122	123	123	123	124	123	123	123	122			
20	124	123	123	123	123	123	124	124	125	126	126	126	126	126	126	125	124		
25	127	126	125	125	125	126	126	127	128	129	129	130	130	129	128	127			
30	130	129	128	128	128	129	129	131	132	133	133	134	133	133	132	131			
35	133	132	132	132	132	132	133	134	135	137	138	138	138	137	136	134			
40	137	136	135	135	135	136	137	138	139	141	142	143	142	141	140	138			
45	141	140	139	139	139	140	141	142	144	145	147	147	146	146	144	142			
50	145	144	143	143	143	143	145	146	148	149	151	151	151	150	149	146			
55	148	147	146	146	147	147	148	150	152	153	155	155	154	154	152	150			
60	151	150	149	149	150	150	151	153	155	156	158	159	158	157	155	153			
65	154	153	152	151	152	152	153	156	157	159	161	161	160	159	158	156			
70	156	155	154	153	154	154	155	158	159	161	163	163	162	161	160	157			
75	157	156	155	155	155	155	157	159	160	162	163	164	163	162	161	158			
80	157	156	155	155	155	156	157	159	161	162	163	164	163	162	161	159			
85	157	156	155	155	155	156	157	159	160	161	162	163	162	161	160	158			
90	155	154	154	154	154	155	156	158	159	160	160	161	160	159	158	157			
95	154	153	152	153	153	153	155	156	157	158	158	158	158	157	156	156			
100	151	150	150	150	150	151	152	153	155	155	155	156	156	154	154	153			
105	147	147	147	147	147	148	149	150	151	151	151	151	151	150	150	150			
110	143	142	143	143	143	144	145	146	147	146	146	146	146	146	145	146			
115	138	137	139	138	138	140	140	141	141	141	140	140	141	140	139	140			
120	132	132	133	133	133	134	135	135	135	134	134	134	134	134	133	134			
125	125	125	126	126	126	127	128	128	128	127	127	127	127	126	126	127			
130	118	117	119	118	118	120	120	120	120	119	119	118	118	118	118	120			
135	109	109	111	110	110	111	111	111	111	111	110	110	109	110	110	111			
140	99.7	100	101	100	99.9	101	101	101	101	102	101	100	99.9	100	100	102			
145	89.7	90.3	90.1	90.3	87.6	90.9	90.8	89.7	91.7	91.9	91.4	90.4	89.2	89.7	89.9	91.9			
150	78.9	80.3	79.1	77.8	72.0	78.2	79.8	77.3	81.8	81.8	81.6	80.3	77.3	77.8	79.1	81.2			
155	66.8	69.0	67.6	64.4	55.9	60.7	63.2	63.1	71.0	71.4	71.0	70.3	66.4	64.1	65.9	67.7			
160	51.2	55.2	52.3	49.5	41.2	39.7	40.1	46.5	58.1	58.6	59.3	59.7	54.7	50.1	49.8	48.6			
165	25.1	26.6	26.8	26.0	25.1	21.4	21.4	30.5	33.2	32.4	42.7	45.4	42.4	33.0	25.1	22.3			
170	2.48	2.40	3.81	5.49	6.63	6.10	7.96	13.4	15.4	14.0	20.4	21.2	19.8	13.3	5.75	1.87			
175	0.34	0.23	0.41	0.52	0.45	0.37	0.47	1.11	0.90	0.999	1.08	1.45	0.62	0.39	0.38	0.30			
180	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.12	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15			

Table 5: Luminous Intensity Data

## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Sep. 18, 2014	Sep. 17, 2015
Digital Power Meter	PF2010A	HZTE028-01	Sep. 18, 2014	Sep. 17, 2015
AC Power Supply	PCR 500L	HZTE001-08	Sep. 18, 2014	Sep. 17, 2015
DC Power Supply	WY12010	HZTE004-03	Sep. 18, 2014	Sep. 17, 2015
Temperature Meter	TES1310	HZTE017-01	Sep. 18, 2014	Sep. 17, 2015
Standard source	D908	HZTE012-01	Sep. 18, 2014	Sep. 17, 2015
Integrate Sphere system	2M	HZTE015-01	Sep. 18, 2014	Sep. 17, 2015
Digital Power Meter	WT210	HZTE008-01	Sep. 18, 2014	Sep. 17, 2015
AC Power Supply	PCR 500L	HZTE001-07	Sep. 18, 2014	Sep. 17, 2015
DC Power Supply	6154	HZTE004-04	Sep. 18, 2014	Sep. 17, 2015
Temperature and humidity recorder	JR900	HZTE018-01	Sep. 18, 2014	Sep. 17, 2015
Standard source	SCL-1400	HZTE012-02	Sep. 18, 2014	Sep. 17, 2015

Table 6: Test Equipment List

## TEST METHODS

### Seasoning of SSL Product

For the purpose of rating new SSL products, SSL products shall be tested with no seasoning. Therefore, no seasoning was performed.

### Sphere-Spectroradiometer Method- Photometric and Electrical Measurements

A Labsphere Model CDS 2100 Spectroradiometer and Two Meter Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit. The coating reflectance of each sphere is 98%. The measure geometry is  $4\pi$ . Self-absorption correction is conducted in testing. Bandwidth of spectroradiometer is 350nm-1050nm.

Ambient temperature was measured at a position inside the sphere. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation.

The stabilization time typically ranges from 30 min (small integrated LED lamps) to 2 or more hours for large SSL luminaires). It can be judged that stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 30 min, taken 15 minutes apart, is less than 0.5 %.

Electrical measurements including voltage, current, and power were measured using the Yokogawa Power Analyzer.

The standard reference of the integrated sphere system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Standards and Technology.

The uncertainty of integrating sphere system reported in this document is expanded uncertainty is 1.06% with a coverage factor  $k=2$ .

## **Goniophotometer Method**

### **Photometric and Electrical Measurements**

An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.

Ambient temperature was measured at the same height of the sample mounted on the Goniophotometer equipment. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation.

The stabilization time typically ranges from 30 min (small integrated LED lamps) to 2 or more hours for large SSL luminaires). It can be judged that stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 30 min, taken 15 minutes apart, is less than 0.5 %.

Electrical measurements including voltage, current, and power were measured using the Everfine Digital Power Meter.

Some graphics were created with Photometric Plus software.

The standard reference of the Goniophotometer system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Metrology P.R. China.

The uncertainty of goniophotometer system reported in this document is expanded uncertainty is 1.94% with a coverage factor  $k=2$ .

### **Color Characteristics Measurements**

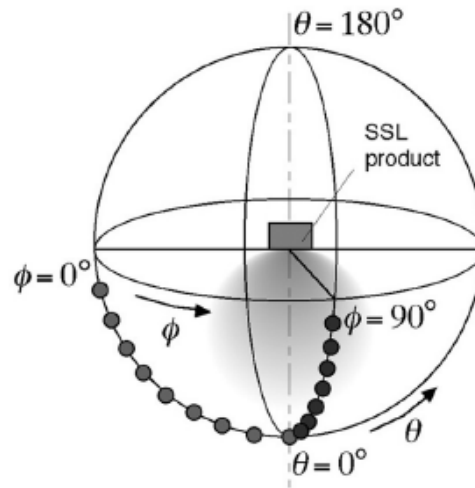
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as values that are spatially average, weighted to intensity, over the angular range where light is intentionally emitted from the SSL product. The color characteristics measurements are using gonio-spectroradiometer.

### **Color Spatial Uniformity**

The characteristics of SSL products may be spatially non-uniform, the chromaticity coordinate shall be measured at two vertical planes ( $C=0^\circ/180^\circ$  and  $C=90^\circ/270^\circ$ ) and at  $10^\circ$  or less intervals for vertical angle until the light output dropped to below 10% of the peak intensity. The averaged weighted chromaticity coordinate was calculated from these points. The data was then analyzed to check for delta color differences of the  $u'$ ,  $v'$  chromaticity coordinates. The spatial non-uniformity of chromaticity,  $\Delta u'v'$ , is determined as the maximum deviation (distance on the CIE ( $u'$ ,  $v'$ ) diagram) among all measured points from the spatially averaged

chromaticity coordinate.

The geometry for the chromaticity measurement using gonio-spectroradiometer is shown as following.



\*\*\* End of Report \*\*\*

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