



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED Lamp

Model: 17A21DIM/827/GU24

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ15090034a

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

Review by:

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Sep. 23, 2015

Approved by:



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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/827/GU24

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
105.9	1710.8	16.15	0.9341
CCT (K)	CRI	Stabilization Time (Light & Power)	
2638	81.5	65	

Table 1: Executive Data Summary

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

Test specifications:

Date of Receipt	: Sep. 30, 2014
Date of Test	: Oct. 10, 2014 to Oct. 11, 2014
Test item	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
Reference Standard	: 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)

Name	: LED Lamp
Model	: 17A21DIM/827/GU24
Electrical Ratings	: 120V, 60Hz, 17W
Product Description	: E26 base, 2700K, Dimmable Manufacturer of light source: Seoul Model of light source: STW8Q14C Quantity of light source: 60pcs
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 25.1°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)	0.144
Power Factor	0.9341
Test Power (W)	16.15
Luminous Efficacy (lm/W)	105.9
THD A%	33.85
Total Luminous Flux (lm)	1710.8
Color Rendering Index (CRI)	81.5
R9	6.2
Correlated Color Temperature (CCT) (K)	2638
Chromaticity Chroma x	0.4651
Chromaticity Chroma y	0.4119
Chromaticity Chroma u	0.2653
Chromaticity Chroma v	0.3524
Duv	0.0001
Chromaticity Chroma u'	0.2653
Chromaticity Chroma v'	0.5286

Special Color Rendering Indices	
R1	80.5
R2	93.2
R3	92.3
R4	77.2
R5	80.7
R6	92.8
R7	79.6
R8	55.3
R9	6.2
R10	85
R11	75.9
R12	77.2
R13	83.6
R14	96.4

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 25.1°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)	0.144
Power Factor	0.9345
Test Power (W)	16.12
Luminous Efficacy (lm/W)	107.4
Total Luminous Flux (lm)	1731.2
Beam Angle (°)	312.4
Center Beam Candle Power (cd)	126
Maximum Beam Candle Power (cd)	166.8 (At: C=157.5, Gamma=76.0)
Spacing Criteria	1.76 (0°-180°)/ 1.72 (90°-270°)
Zonal Lumens in the 0°-60°Zone	26.17%
Zonal Lumens in the 60°-90°Zone	29.36%
Zonal Lumens in the 90°-120°Zone	27.34%
Zonal Lumens in the 120°-180°Zone	17.13%

Table 3: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total	$\gamma(^{\circ})$	Lumens	% Total
0~5	3.005	0.17%	90~95	87.334	5.04%
5~10	9.035	0.52%	95~100	85.268	4.93%
10~15	15.132	0.87%	100~105	82.292	4.75%
15~20	21.334	1.23%	105~110	78.153	4.51%
20~25	27.67	1.60%	110~115	73.065	4.22%
25~30	34.16	1.97%	115~120	67.187	3.88%
30~35	40.79	2.36%	120~125	60.691	3.51%
35~40	47.503	2.74%	125~130	53.698	3.10%
40~45	54.19	3.13%	130~135	46.414	2.68%
45~50	60.705	3.51%	135~140	39.046	2.26%
50~55	66.894	3.86%	140~145	31.791	1.84%
55~60	72.575	4.19%	145~150	24.849	1.44%
60~65	77.573	4.48%	150~155	18.299	1.06%
65~70	81.749	4.72%	155~160	12.284	0.71%
70~75	84.993	4.91%	160~165	6.841	0.40%
75~80	87.215	5.04%	165~170	2.437	0.14%
80~85	88.354	5.10%	170~175	0.275	0.02%
85~90	88.39	5.11%	175~180	0.011	0.00%

$\gamma(^{\circ})$	Lumens	% Total
0-135	1595.369	92.15%
135-180	135.833	7.85%
0-180	1731.2	100%

Table 4: Zonal Lumen Data

Illuminance Plots- Goniophotometer Method

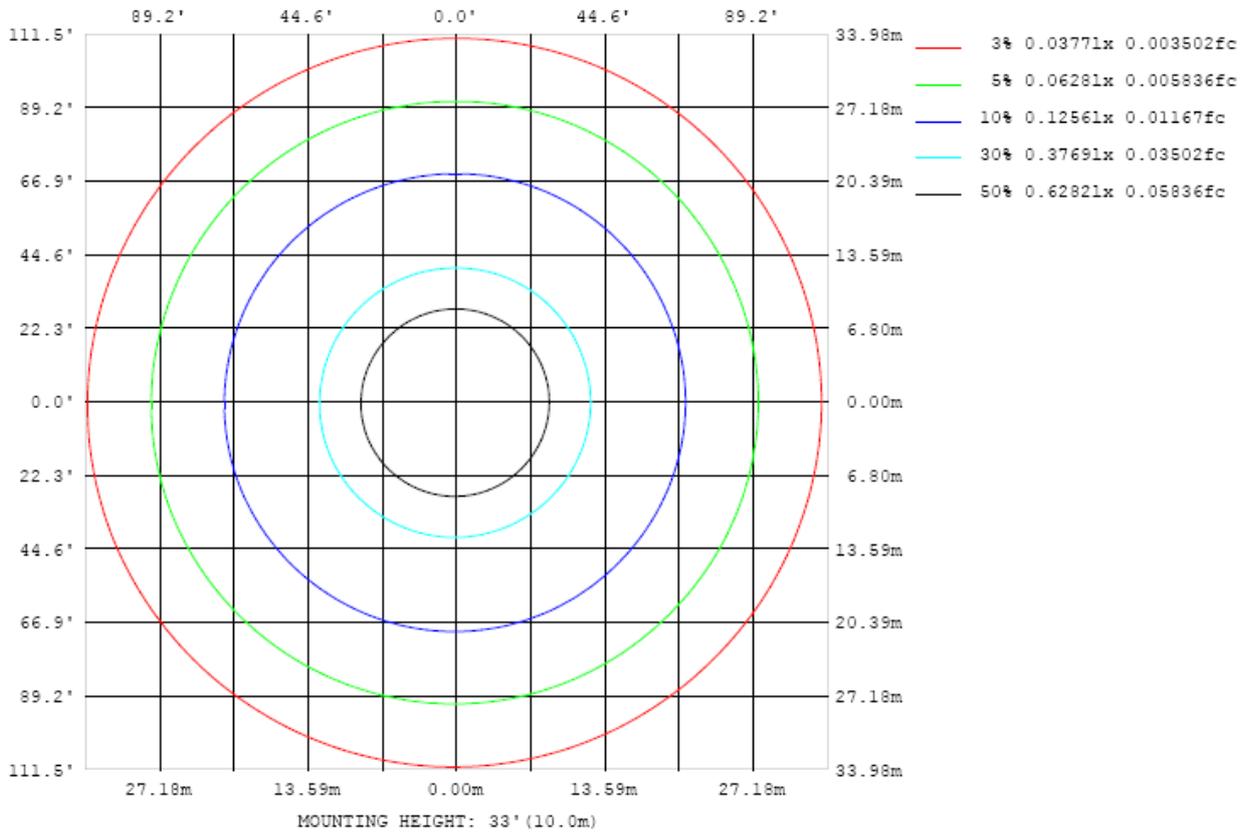


Chart 1: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

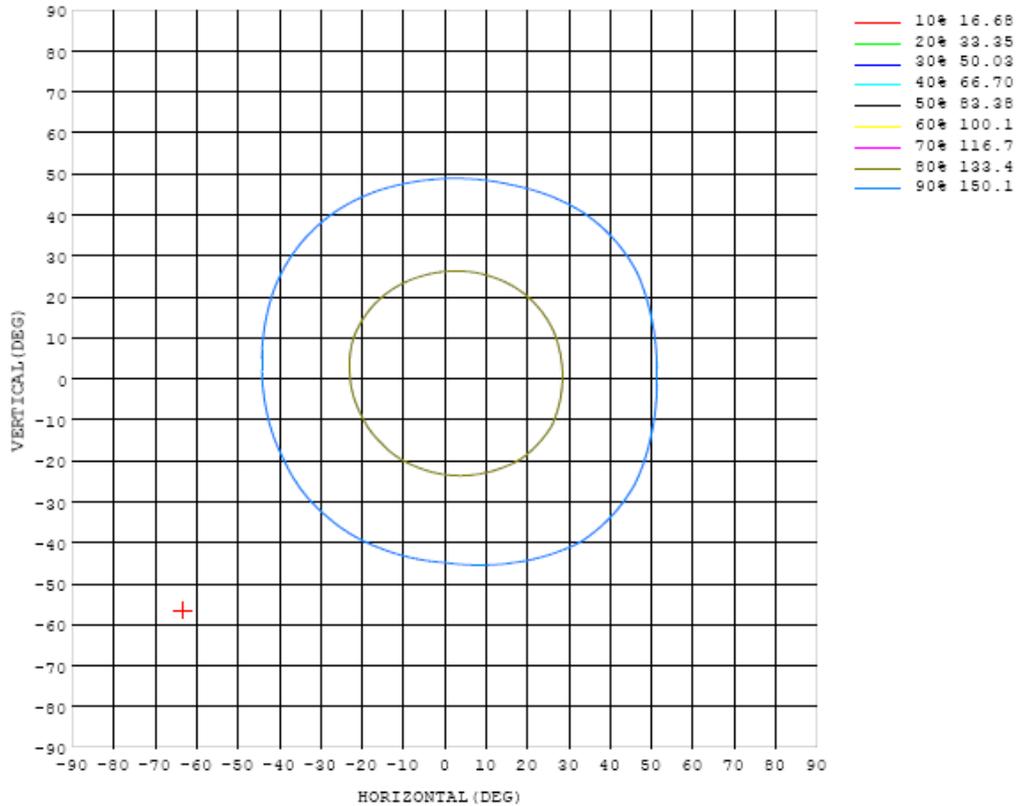


Chart 2: Isocandela Plot

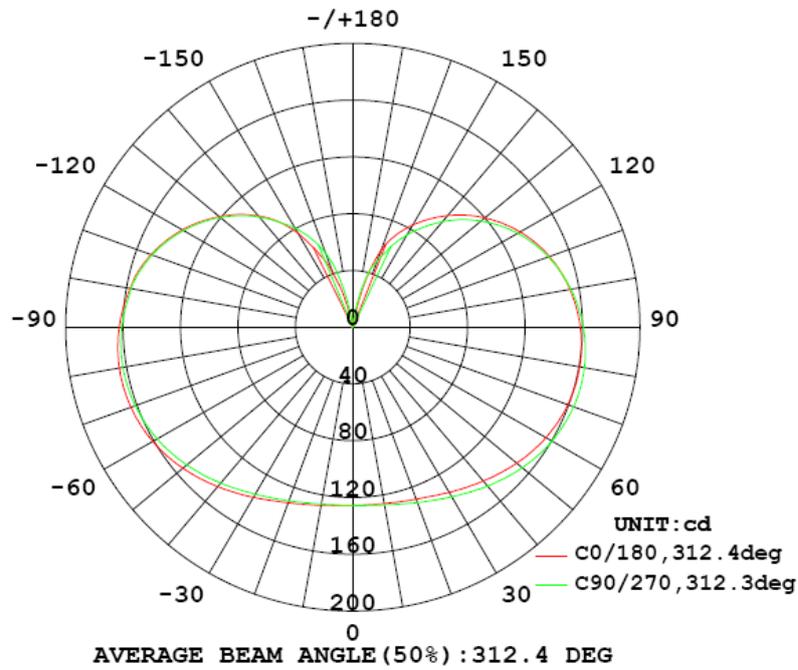


Chart 3: Polar Candela Distribution

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	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126			
5	126	126	126	126	126	126	126	126	126	126	126	126	126	126	125	125			
10	126	126	127	127	127	127	127	128	127	127	127	127	126	126	126	126			
15	127	128	128	128	129	129	130	129	129	129	129	128	128	128	127	127			
20	129	129	130	131	131	132	132	132	132	131	131	130	130	130	129	129			
25	131	132	132	133	134	135	136	135	135	134	134	133	133	132	132	131			
30	134	135	136	137	138	139	139	139	138	138	137	136	136	135	135	134			
35	138	138	139	141	142	143	143	143	142	142	141	140	139	139	138	138			
40	141	142	143	144	146	147	148	148	146	146	145	144	143	143	142	141			
45	145	146	147	148	150	151	152	152	151	149	149	148	147	147	146	145			
50	149	149	150	152	154	155	156	156	155	153	152	151	151	151	150	149			
55	152	153	153	155	157	159	159	159	158	157	156	155	154	154	153	152			
60	155	156	156	158	160	161	162	162	161	160	159	158	157	157	156	155			
65	158	158	158	160	162	163	164	165	163	162	161	160	160	160	159	157			
70	159	159	160	162	164	165	166	166	165	163	162	162	161	161	160	159			
75	160	160	160	162	164	165	166	167	165	164	163	162	162	162	161	160			
80	160	160	160	162	164	165	166	166	165	164	163	163	163	163	162	161			
85	160	159	159	161	163	164	165	165	164	163	162	162	162	162	161	160			
90	158	158	158	159	161	162	163	163	163	162	161	161	161	161	160	159			
95	156	156	156	157	158	159	160	160	160	160	158	158	159	159	158	158			
100	154	153	153	153	154	156	157	157	158	157	156	156	157	156	156	156			
105	150	149	149	149	150	152	152	153	154	154	152	152	154	153	152	152			
110	146	145	145	144	145	147	147	147	150	149	147	148	149	148	147	148			
115	141	140	140	139	139	141	141	141	144	143	141	142	143	142	141	143			
120	134	134	133	132	133	134	135	135	137	137	135	136	136	135	135	137			
125	128	127	126	125	125	127	127	127	130	129	127	129	129	127	127	129			
130	120	119	119	117	117	118	119	119	121	121	119	120	120	119	118	121			
135	112	111	110	108	107	109	109	110	112	112	111	109	111	109	109	113			
140	103	102	100	98.6	97.2	98.5	98.7	99.5	103	102	101	99.2	101	99.9	99.0	103			
145	93.2	92.9	89.9	88.2	86.2	87.1	87.1	88.3	91.1	90.7	91.5	89.0	90.9	90.3	88.7	92.7			
150	83.1	82.9	79.3	77.9	74.8	73.3	71.5	76.2	76.5	78.2	81.4	78.8	80.6	80.0	78.5	81.6			
155	72.2	71.0	67.0	67.7	62.5	59.8	53.2	59.3	58.8	63.9	69.6	69.4	69.2	69.0	67.1	69.9			
160	57.6	56.9	52.7	49.2	49.8	45.9	36.1	39.3	39.9	48.0	56.2	58.1	55.5	54.7	52.3	54.8			
165	32.9	37.0	36.9	36.3	36.7	30.8	24.4	21.6	17.3	17.3	37.1	39.3	35.2	32.4	29.8	27.9			
170	6.89	11.4	12.2	13.1	14.2	14.1	11.0	6.30	6.45	6.82	9.67	11.3	9.96	8.15	6.50	4.34			
175	0.61	0.44	0.56	0.73	0.88	0.89	0.71	0.62	0.63	0.63	0.81	0.66	0.76	0.87	0.65	0.68			
180	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16			

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 4π . 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

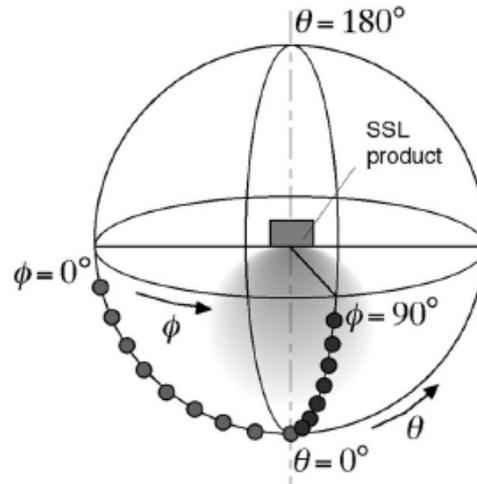
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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° 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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