IESNA LM-79: 2008

Measurement and Test Report

for

Green Creative Ltd.

Room 1206-7, New Victory House, 93-103 Wing Lok Street, Central, HONG KONG

Oct 21, 2013

Product Name:	LED PAR38
Model No:	16PAR38G3DIM/830NF25
Test Engineer:	David Zhang
Report No.:	BTR66.181.13.1491.07
Sample Received Date:	Oct 16, 2013
Test Performed Date:	Oct 16, 2013 to Oct 21, 2013
Reviewed By:	Steven Hsu
Prepared By:	**BEST Test Service Shenzhen Co., Ltd.** 1st Floor, 1st Building, Weitai Industrial Park, Yingrenshi, Shiyan, Baoan, Shenzhen, China TEL: +86-755-28236006 FAX: +86-755-23467087-811 Email: certification@bestcert.cn

NVLAP LAB CODE 200770-0

Efficient Lighting Initiative

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

Applicant	:	Green Creative Ltd.
Product Name	:	LED PAR38
Model No	:	16PAR38G3DIM/830NF25
Brand	:	GREEN CREATIVE
SKU	:	T.B.D
12 NC Code	:	T.B.D
Nominal Operation Voltage	:	AC 120V/60Hz
Nominal Power	:	16W
Nominal CCT	:	3000K
Nominal CRI	:	82
Nominal Lumen Output	:	1050Lumens
Nominal Life Time	:	40000Hours
Number of hours operated prior to measurement for new sample	:	0 Hours
Stabilization Time	:	1.5 hours
Total operating time for measurement include stabilization time	:	3.5 hours
Nominal Shape of Bulb(Designation)	:	☒Standard ☐ Non Standard ☐Omnidirectional A, BT, P, PS, S, T ☐Decorative B, BA, C, CA, DC, F, G ☒Directional R, BR, ER, PAR, MR, K
Date of Receiving Sample	:	Oct 16, 2013
Measurement quantities measured	:	1 pcs
Orientation During Testing	:	Base Up
Test Requested	:	Electrical and Photometric Test Luminous Intensity Distribution Test

1.2 Objective

The following test report is prepared on behalf of Green Creative Ltd. in accordance with IESNA LM-79-08, used the following American National Standards or illumination Engineering Society of North America test guides:

ANSI C78.377-2008: Specifications for the Chromaticity of Solid State Lighting Products;

ANSI C79.1– 2002: American National Standard for Electric Lamps – Nomenclature for Glass Bulbs Intended for Use with Electric Lamps;

ANSI C78.20 – 2003: American National Standard for Electric Lamps – A, G, PS, and Similar Shapes with E26 Medium Screw Bases;

ANSI C78.21 – 2011: American National Standard for Electric Lamps – PAR and R Shapes;

ANSI C78.24 – 2001: American National Standard for Electric Lamps – Two-inch (51 mm);

Integral-reflector Lamps with Front Covers and GU5.3 or GX 5.3 Bases;

ANSI/IEC C81.61-2003: American National Standard for Electric Lamp Bases;

ANSI/IEEE C62.41 – 1991 (01-May-1991): Surge Voltages in Low-Voltage AC Power Circuits, Recommended Practice for;

CIE Publication No. 13.3 – 1995: Method of Measuring and Specifying Color Rendering of Light Sources;

CIE Publication No. 18.2 – 1983: The Basis of Physical Photometry;

IESNA LM-16-1993: Practical Guide to Colorimetry of Light Sources;

IESNA LM-28-89 – 1989: Guide for the Selection, Care, and Use of Electrical Instruments in the Photometric Laboratory;

IESNA LM-79-08 Electrical and Photometric Measurement of Solid State Lighting Products

UL 1993 – 1999: Standard for Self-Ballasted Lamps and Lamp Adapters;

UL 8750 – 2009: Light Emitting Diode (LED) Equipment for Use in Lighting Products.

1.3 Test Facility Description

The Energy Efficiency Lab used by BEST to collect energy efficiency measurement data is located in 1st Floor, 1st Building, Weitai Industrial Park, Yingrenshi, Shiyan, Baoan, Shenzhen, China. BEST Test Service Shenzhen Co., Ltd is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200770-0). BEST Test Service Shenzhen Co., Ltd is also an ELI accredited lab for lighting products (ELI Certificate No. ELI-L04-2010) and UL accredited lab for lighting products

1.4 Test Equipment List

Apparatus List	Device	Cal. Date	Cal Due Date
1	Integral Sphere+ Spectrophotometer System	Mar 10, 2013	Mar 09, 2014
2	Digital Power Meter	Oct 18, 2013	Oct 17, 2014
3	Goniophotometer+ Spectrophotometer System	Nov 20, 2012	Nov 19, 2013
4	Standard Light Source	Sep 17, 2013	Sep 16, 2014
5	Standard Light Source	Sep 17, 2013	Sep 16, 2014
6	Digital Storage Oscilloscope	Oct 18, 2013	Oct 17, 2014
7	Ultra Compact Simulator	Oct 20, 2013	Oct 20, 2014
8	Temperature Chamber	Oct 20, 2013	Oct 20, 2014
9	Digital Caliper	Nov 20, 2012	Nov 19, 2013
10	Digital CC&CV DC Power Supply(30V 5A)	N/A	N/A
11	5 1/2 Digital Multimeter	Oct 18, 2013	Oct 17, 2014
12	Digital CC&CV DC Power Supply(120V 10A)	N/A	N/A
13	6 1/2 Digital Multimeter	Oct 18, 2013	Oct 17, 2014
14	Digital Multimeter	Oct 18, 2013	Oct 17, 2014
15	Temperature Recorder+Thermocouple	Nov 20, 2012	Nov 19, 2013
16	Timer Controller	Nov 20, 2012	Nov 19, 2013

Statement of Traceability: BEST Test Service Shenzhen Co., Ltd. certifies that all calibration has been performed using suitable standards traceable to the NIM China.

2 - Test Method

2.1 Photometric and Electrical Measurement (Integrated Sphere Method)

Total light output (luminous flux) for the 25℃ ±1℃ ambient temperature conditions is measured using a 1.6m 4∏ geometry integrating sphere. Temperature is measured at a position inside the sphere. Spectral radiant flux measurements are made using Lab sphere to the detector port of the integrating sphere. Each lamp is operated at rated voltage in its designated orientation. Each lamp should be stable before measurements are made. The determining method of stable is as follows:

Step 1 Take 3 measurements of the lamp light output at 15 minute interval (total time=30mintues.)This time period is in addition to the recommended pre-burning time.

Step 2 Calculate the percent difference between the maximum measured value and the minimum measured value for the three consecutive measurements.

Step 3 if the value calculated in Step 2 does not exceed 0.5 percent, the lamp is considered stable.
Luminous flux, chromaticity coordinates, correlated color temperature and color rendering index for each lamp are calculated from the spectral radiant flux measurements taken at 2 nm intervals over the range 350 to 1050 nm. The calibration of the sphere photometer-spectrometer system is traceable to the NIST USA. Lamp efficacy (lumens per watts) for each lamp model is computed based on the revised luminous flux result. Electrical measurements including voltage, current, power and power factor are measured using the digital power Meter.

The total uncertainty of the light output measurements is estimated, at the 95% confidence level, not to exceed ±1.12% over the wavelength range 350-1050 nm.

2.2 Photometric and Electrical Measurement (GonioPhotometer Method)

A Goniometer was used to measure the intensity (candelas) at each angle of distribution for each sample; the photometric distance is 24m. Ambient temperature was measured equal to the height of the sample mounted on the Goniometer equipment. Each sample was operated at input rated voltage in its designated orientation. Each sample was allowed to be stable before measurement was made. Electrical measurements including voltage, current, power and power factor were measured using the Power Analyzer

Before each measurement, the method below should be used to determine the lamp is stable or not.

Step 1 Take 3 measurements of the lamp intensity at 15 minute interval (total time=30mintues.)This time period is in addition to the recommended pre-burning time.

Step 2 Calculate the percent difference between the maximum measured value and the minimum measured value for the three consecutive measurements.

Step 3 if the value calculated in Step 2 does not exceed 0.5 percent, the lamp is considered stable.

Some graphics were created with Photometric Plus software.

2.3 Deviation from standard operating procedure

None.

3 – Summary of Test Result

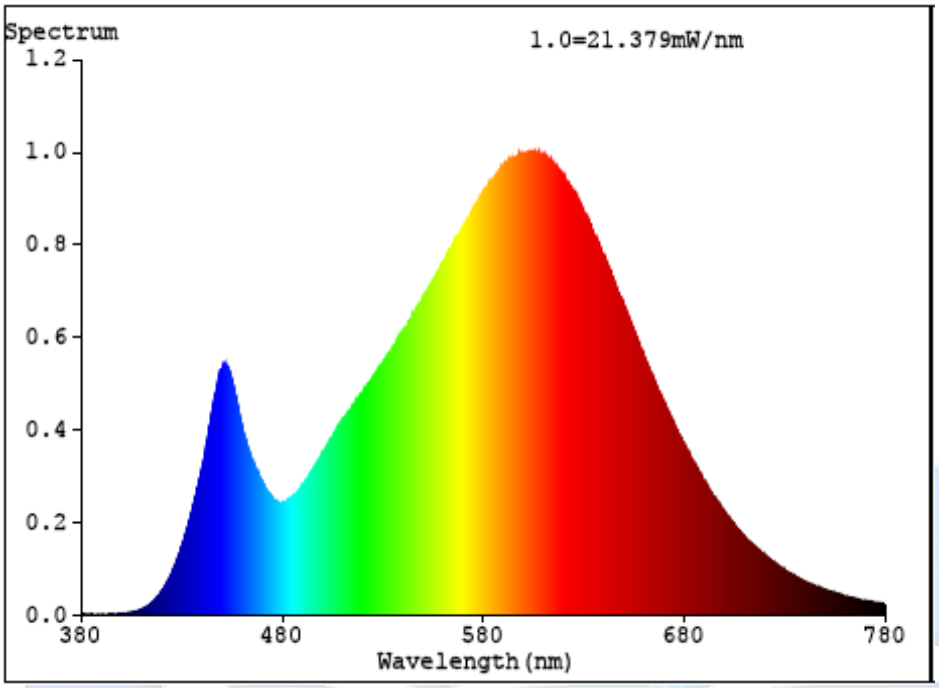
	Item	Test Result		Accreditation
Required Fields	Lumen Output (Lumens)	1118.20		NVLAP/EPA
	Luminous Efficacy (lm/w)	64.91		NVLAP/EPA
	Correlated Color Temperature (CCT)	3133		NVLAP/EPA
	Color Rendering Index– CRI	83.9		NVLAP/EPA
	Input Power (W)	17.23		NVLAP/EPA
Optional Fields	Power Type	☒AC	☐DC	/
	Input Voltage (V)	120.0		NVLAP/EPA
	Input Current (A)	0.1522		NVLAP/EPA
	Power Factor	0.9437		NVLAP/EPA
	x(CIE 1931)	0.4266		NVLAP/EPA
	y(CIE 1931)	0.3982		NVLAP/EPA
	u' (CIE 1976)	0.2464		NVLAP/EPA
	v' (CIE 1976)	0.5175		NVLAP/EPA
	Duv(CIE 1976)	0.0009		NVLAP/EPA
	Beam Angle: (Degree)	21.9		NVLAP/EPA
	Center beam candlepower: (cd)	4390		NVLAP/EPA
	Zonal lumen density (0-60°):	95.1%		NVLAP/EPA
	Zonal lumen density (60-90°):	4.9%		NVLAP/EPA
	Zonal lumen density (90-120°):	0%		NVLAP/EPA
	Zonal lumen density (120-180°):	0%		NVLAP/EPA

	CRI (R1)	82	NVLAP/EPA
	CRI (R2)	91	NVLAP/EPA
	CRI (R3)	97	NVLAP/EPA
	CRI (R4)	81	NVLAP/EPA
	CRI (R5)	82	NVLAP/EPA
	CRI (R6)	88	NVLAP/EPA
	CRI (R7)	85	NVLAP/EPA
	CRI (R8)	65	NVLAP/EPA
	CRI (R9)	19	NVLAP/EPA
	CRI (R10)	78	NVLAP/EPA
	CRI (R11)	79	NVLAP/EPA
	CRI (R12)	72	NVLAP/EPA
	CRI (R13)	84	NVLAP/EPA
	CRI (R14)	98	NVLAP/EPA

Lumen summary:

[OTHER] Gamma(deg)	Fz(lm)	Ft(lm)	%Lum	%Lamp
[OTHER] 0- 10	315.46	315.46	28.21	28.21
[OTHER] 10- 20	387.42	702.89	62.86	62.86
[OTHER] 20- 30	182.22	885.11	79.16	79.16
[OTHER] 30- 40	80.84	965.95	86.39	86.39
[OTHER] 40- 50	55.65	1021.59	91.36	91.36
[OTHER] 50- 60	42.17	1063.77	95.14	95.14
[OTHER] 60- 70	30.37	1094.14	97.85	97.85
[OTHER] 70- 80	18.25	1112.39	99.48	99.48
[OTHER] 80- 90	5.75	1118.14	100.00	100.00
[OTHER] 90-100	0.01	1118.15	100.00	100.00
[OTHER] 100-110	0.00	1118.15	100.00	100.00
[OTHER] 110-120	0.00	1118.15	100.00	100.00
[OTHER] 120-130	0.00	1118.15	100.00	100.00
[OTHER] 130-140	0.00	1118.15	100.00	100.00
[OTHER] 140-150	0.00	1118.15	100.00	100.00
[OTHER] 150-160	0.00	1118.15	100.00	100.00
[OTHER] 160-170	0.00	1118.15	100.00	100.00
[OTHER] 170-180	0.00	1118.16	100.00	100.00

4 – Spectral Flux Plots



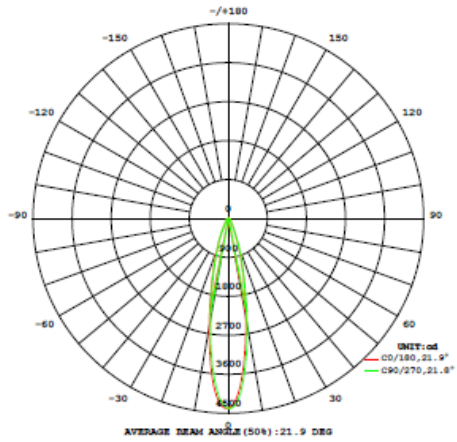
5 – EUT Photos

6 – Luminous Intensity Distribution Test Plots (CIE Chromaticity)

LAMP PHOTOMETRIC REPORT

Electrical: Voltage:120.0V Current:0.1522A Power:17.23W Factor:0.9437		
MODEL: 16PAR38G3DIM/830NF25		
POWER: 16W	VOLTAGE: 120V	WORKING VOLTAGE: 120.0V
MANUFACTURER: Green Creative		Eff.: 64.91 lm/W

TOTAL FLUX: 1118.2 lm



γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%
10	2549	2532	2386	2326	2324	2397	2474	2614	0- 10	315.5	315.5	28.2
20	778.7	779.2	740.0	704.1	672.1	701.7	729.0	827.0	10- 20	387.4	702.9	62.9
30	221.2	215.5	215.6	192.1	183.6	186.2	186.7	198.5	20- 30	182.2	885.1	79.2
40	97.15	93.29	93.86	85.32	90.56	90.74	90.05	88.20	30- 40	80.84	965.9	86.4
50	59.84	57.66	57.58	54.04	57.57	57.64	59.01	57.85	40- 50	55.65	1022	91.4
60	39.00	38.34	37.17	36.47	37.45	38.43	39.07	39.38	50- 60	42.17	1064	95.1
70	23.81	23.78	22.37	22.46	22.67	24.10	24.39	24.89	60- 70	30.37	1094	97.9
80	11.46	11.20	10.31	10.21	10.66	11.64	11.82	12.19	70- 80	18.25	1112	99.5
90	0.1190	0.0068	0.0035	0.0012	0	0.1122	0.3412	0.4585	80- 90	5.749	1118	100
100	0	0	0	0	0	0	0	0	90-100	0.0076	1118	100
110	0	0	0	0	0	0	0	0	100-110	0	1118	100
120	0	0	0	0	0	0	0	0	110-120	0.0000	1118	100
130	0	0	0	0	0	0	0	0	120-130	0	1118	100
140	0	0	0	0	0	0	0	0	130-140	0	1118	100
150	0	0	0	0	0	0	0	0	140-150	0	1118	100
160	0.0005	0.0007	0.0024	0.0024	0.0050	0.0052	0.0036	0.0025	150-160	0.0001	1118	100
170	0.0303	0.0323	0.0330	0.0344	0.0380	0.0373	0.0339	0.0339	160-170	0.0043	1118	100
180	0	0	0	0	0	0	0	0	170-180	0.0033	1118	100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

C Range: 0 - 360DEG
C Interval: 22.5DEG
Test Speed: HIGH
Temperature:25.2DEG
Operators:David

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.265
Humidity:62.7%
Test Distance:2.463m [K=1.0000]

LUMINOUS DISTRIBUTION INTENSITY DATA

Electrical: Voltage:120.0V Current:0.1522A Power:17.23W Factor:0.9437		
MODEL: 16PAR38G3DIM/830NF25		
POWER: 16W	VOLTAGE: 120V	WORKING VOLTAGE: 120.0V
MANUFACTURER: Green Creative		Eff.: 64.91 lm/W

Table--1 UNIT: cd

γ (DEG) \ C(DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338			
0	4389	4390	4389	4389	4389	4388	4387	4385	4389	4390	4389	4389	4389	4388	4387	4385			
5	3887	3887	3857	3793	3727	3683	3648	3620	3658	3666	3693	3752	3814	3848	3875	3911			
10	2549	2581	2532	2447	2386	2359	2326	2291	2324	2354	2397	2425	2474	2561	2614	2605			
15	1437	1465	1437	1374	1345	1344	1313	1283	1313	1319	1338	1367	1385	1462	1518	1493			
20	779	794	779	754	740	725	704	678	672	678	702	715	729	779	827	807			
25	408	418	412	411	397	372	361	344	339	339	348	351	360	384	400	401			
30	221	223	216	228	216	193	192	185	184	184	186	181	187	199	198	204			
35	135	133	129	137	131	117	117	116	120	119	120	116	119	122	119	123			
40	97.1	95.5	93.3	96.5	93.9	86.2	85.3	85.3	90.6	89.9	90.7	89.1	90.1	90.3	88.2	92.2			
45	75.1	73.4	72.1	73.1	72.4	68.0	66.5	67.2	71.5	70.8	71.6	71.7	72.6	71.9	70.7	73.4			
50	59.8	58.4	57.7	57.9	57.6	55.3	54.0	54.5	57.6	56.9	57.6	58.3	59.0	58.4	57.9	59.4			
55	48.3	47.3	47.1	46.7	46.3	45.0	44.6	44.8	46.5	46.4	47.2	47.8	48.2	48.0	48.0	48.7			
60	39.0	38.5	38.3	37.7	37.2	36.6	36.5	36.4	37.5	37.6	38.4	38.7	39.1	39.3	39.4	39.5			
65	31.2	30.9	30.8	30.0	29.4	29.1	29.2	29.1	29.8	30.2	31.0	31.2	31.5	31.8	31.9	31.7			
70	23.8	23.8	23.8	22.9	22.4	22.4	22.5	22.2	22.7	23.3	24.1	24.2	24.4	24.8	24.9	24.5			
75	17.4	17.5	17.5	16.7	16.4	16.2	16.4	16.1	16.6	17.3	17.9	17.9	18.0	18.3	18.4	18.1			
80	11.5	11.3	11.2	10.6	10.3	10.2	10.2	10.2	10.7	11.1	11.6	11.7	11.8	12.0	12.2	11.9			
85	5.51	5.30	5.02	4.72	4.50	4.36	4.29	4.33	4.86	5.17	5.44	5.69	5.89	6.00	6.02	5.92			
90	0.12	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.11	0.23	0.34	0.42	0.46	0.44			
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00			
165	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01			
170	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03			
175	0.04	0.03	0.04	0.04	0.04	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04			
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			

C Range: 0 - 360DEG
C Interval: 22.5DEG
Test Speed: HIGH
Temperature:25.2DEG
Operators:David

γ Range: 0 - 180DEG
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Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.265
Humidity:62.7%
Test Distance:2.463m [K=1.0000]