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 22, 2013

Product Name:	LED MR16
Model No:	7MR16G3DIM/824FL36
Test Engineer:	David Zhang
Report No.:	BTR66.181.13.1491.24
Sample Received Date:	Oct 22, 2013
Test Performed Date:	Oct 22, 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 MR16
Model No	:	7MR16G3DIM/824FL36
Brand	:	GREEN CREATIVE
SKU	:	T.B.D
12 NC Code	:	T.B.D
Nominal Operation Voltage	:	AC 12V/60Hz
Nominal Power	:	7W
Nominal CCT	:	2400K
Nominal CRI	:	78
Nominal Lumen Output	:	475Lumens
Nominal Life Time	:	30000Hours
Number of hours operated prior to measurement for new sample	:	0 Hours
Stabilization Time	:	1.0 hours
Total operating time for measurement include stabilization time	:	2.5 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 22, 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

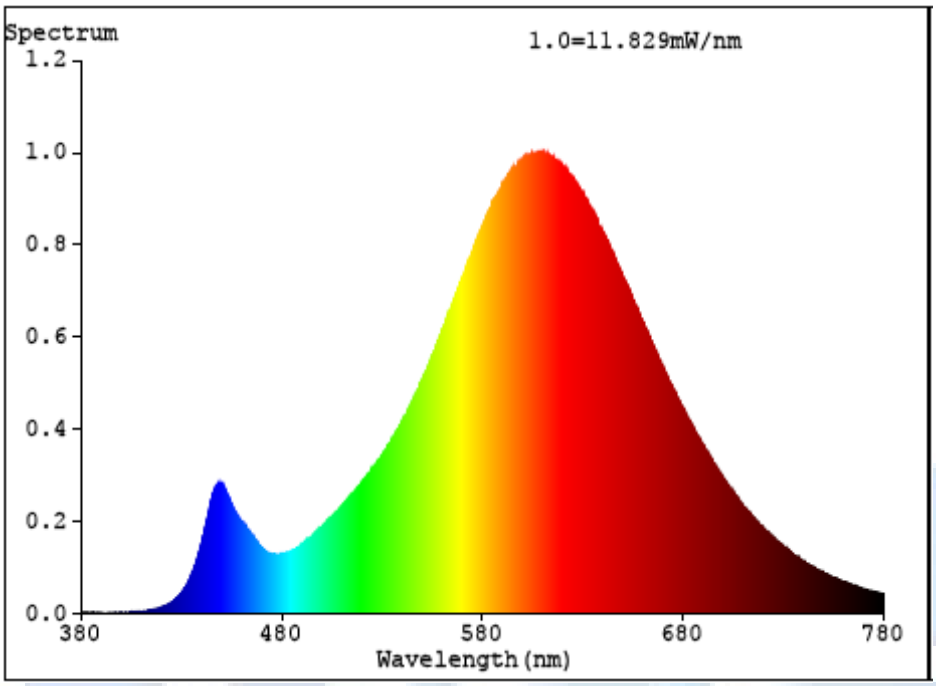
	Item	Test Result		Accreditation
Required Fields	Lumen Output (Lumens)	519.15		NVLAP/EPA
	Luminous Efficacy (lm/w)	76.75		NVLAP/EPA
	Correlated Color Temperature (CCT)	2412		NVLAP/EPA
	Color Rendering Index– CRI	78.2		NVLAP/EPA
	Input Power (W)	6.76		NVLAP/EPA
Optional Fields	Power Type	☒AC	☐DC	/
	Input Voltage (V)	12.0		NVLAP/EPA
	Input Current (A)	0.6032		NVLAP/EPA
	Power Factor	0.9289		NVLAP/EPA
	x(CIE 1931)	0.4828		NVLAP/EPA
	y(CIE 1931)	0.4110		NVLAP/EPA
	u' (CIE 1976)	0.2772		NVLAP/EPA
	v' (CIE 1976)	0.5310		NVLAP/EPA
	Duv(CIE 1976)	0.0011		NVLAP/EPA
	Beam Angle: (Degree)	36.0		NVLAP/EPA
	Center beam candlepower: (cd)	1109		NVLAP/EPA
	Zonal lumen density (0-60°):	95.9%		NVLAP/EPA
	Zonal lumen density (60-90°):	4.1%		NVLAP/EPA
	Zonal lumen density (90-120°):	0%		NVLAP/EPA
	Zonal lumen density (120-180°):	0%		NVLAP/EPA

	CRI (R1)	76	NVLAP/EPA
	CRI (R2)	89	NVLAP/EPA
	CRI (R3)	95	NVLAP/EPA
	CRI (R4)	72	NVLAP/EPA
	CRI (R5)	75	NVLAP/EPA
	CRI (R6)	86	NVLAP/EPA
	CRI (R7)	80	NVLAP/EPA
	CRI (R8)	54	NVLAP/EPA
	CRI (R9)	5	NVLAP/EPA
	CRI (R10)	76	NVLAP/EPA
	CRI (R11)	67	NVLAP/EPA
	CRI (R12)	70	NVLAP/EPA
	CRI (R13)	78	NVLAP/EPA
	CRI (R14)	98	NVLAP/EPA

Lumen summary:

[OTHER] Gamma(deg)	Fz(lm)	Ft(lm)	%Lum	%Lamp
[OTHER] 0- 10	92.33	92.33	17.78	17.78
[OTHER] 10- 20	182.40	274.72	52.92	52.92
[OTHER] 20- 30	127.79	402.51	77.53	77.53
[OTHER] 30- 40	52.42	454.94	87.63	87.63
[OTHER] 40- 50	26.08	481.01	92.65	92.65
[OTHER] 50- 60	16.64	497.65	95.86	95.86
[OTHER] 60- 70	11.23	508.89	98.02	98.02
[OTHER] 70- 80	7.41	516.30	99.45	99.45
[OTHER] 80- 90	2.77	519.07	99.98	99.98
[OTHER] 90-100	0.05	519.11	99.99	99.99
[OTHER] 100-110	0.00	519.11	99.99	99.99
[OTHER] 110-120	0.00	519.11	99.99	99.99
[OTHER] 120-130	0.00	519.11	99.99	99.99
[OTHER] 130-140	0.00	519.11	99.99	99.99
[OTHER] 140-150	0.00	519.11	99.99	99.99
[OTHER] 150-160	0.01	519.13	100.00	100.00
[OTHER] 160-170	0.02	519.14	100.00	100.00
[OTHER] 170-180	0.01	519.15	100.00	100.00

4 – Spectral Flux Plots



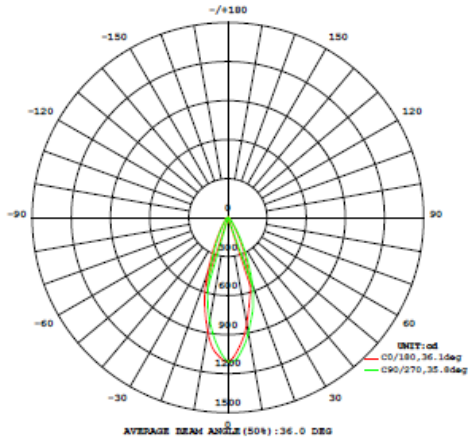
5 – EUT Photos

6 – Luminous Intensity Distribution Test Plots (CIE Chromaticity)

LAMP PHOTOMETRIC REPORT

Electrical: Voltage:12.00V Current:0.6032A Power:6.764W Factor:0.9289		
MODEL: 7MR16G3DIM/824FL36		
POWER: 7W	VOLTAGE: 12V	WORKING VOLTAGE: 12V
MANUFACTURER: Green Creative		Eff.: 76.75 lm/W

TOTAL FLUX: 519.15 lm



γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%
10	893.8	836.0	805.0	797.9	828.6	861.6	898.4	922.3	0- 10	92.33	92.33	17.8
20	459.1	396.6	377.4	408.7	480.9	520.0	547.1	525.3	10- 20	182.4	274.7	52.9
30	133.2	114.2	109.0	120.1	156.6	181.0	194.9	170.2	20- 30	127.8	402.5	77.5
40	46.66	41.46	39.98	41.79	46.98	53.44	58.42	53.73	30- 40	52.42	454.9	87.6
50	23.41	21.53	21.29	21.92	24.16	26.49	28.19	26.40	40- 50	26.08	481.0	92.7
60	13.34	12.65	13.05	13.33	14.49	15.63	16.35	15.09	50- 60	16.64	497.7	95.9
70	7.964	7.777	8.196	8.409	8.930	10.00	10.29	9.390	60- 70	11.23	508.9	98
80	4.065	3.691	3.973	4.286	5.200	6.350	6.637	5.718	70- 80	7.410	516.3	99.5
90	0.0002	0	0	0	0.2396	1.152	1.387	0.5554	80- 90	2.770	519.1	100
100	0	0	0	0	0	0	0	0	90-100	0.0456	519.1	100
110	0	0	0	0	0	0	0	0	100-110	0	519.1	100
120	0	0	0	0	0	0	0	0	110-120	0	519.1	100
130	0	0	0	0	0	0	0	0	120-130	0	519.1	100
140	0	0	0	0	0	0	0	0	130-140	0	519.1	100
150	0.0156	0.0195	0.0215	0.0186	0.0075	0.0052	0.0039	0.0048	140-150	0.0019	519.1	100
160	0.0480	0.0518	0.0550	0.0543	0.0324	0.0302	0.0254	0.0266	150-160	0.0115	519.1	100
170	0.0713	0.0727	0.0749	0.0743	0.0575	0.0573	0.0546	0.0537	160-170	0.0150	519.1	100
180	0.0503	0.0505	0.0500	0.0516	0.0521	0.0523	0.0511	0.0507	170-180	0.0056	519.1	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 V2.0.287
Humidity:62.7%
Test Distance:2.467m [K=1.0000]

LUMINOUS DISTRIBUTION INTENSITY DATA

Electrical: Voltage:12.00V Current:0.6032A Power:6.764W Factor:0.9289		
MODEL: 7MR16G3DIM/824FL36		
POWER: 7W	VOLTAGE: 12V	WORKING VOLTAGE: 12V
MANUFACTURER: Green Creative		Eff.: 76.75 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	1109	1108	1108	1108	1107	1106	1105	1105	1109	1108	1108	1108	1107	1106	1105	1105
5	1047	1033	1020	1003	981	985	989	983	999	1011	1024	1039	1053	1066	1065	1060
10	894	867	836	813	805	795	798	802	829	845	862	884	898	926	922	920
15	693	663	629	613	605	604	611	632	648	666	680	701	736	733	740	723
20	459	421	397	383	377	388	409	433	481	498	520	545	547	548	525	501
25	258	232	216	209	207	212	230	255	291	315	337	349	347	336	317	294
30	133	123	114	109	109	111	120	135	157	169	181	192	195	181	170	158
35	74.9	68.9	64.2	62.0	60.9	61.7	65.8	71.0	80.8	86.5	94.2	99.3	102	96.8	90.0	83.2
40	46.7	43.4	41.5	40.5	40.0	40.3	41.8	43.4	47.0	50.4	53.4	56.8	58.4	57.4	53.7	50.1
45	31.9	31.0	29.3	28.6	28.6	28.8	29.5	31.1	32.5	34.6	35.8	37.8	38.9	38.1	36.9	35.2
50	23.4	22.7	21.5	21.0	21.3	21.4	21.9	23.3	24.2	25.8	26.5	27.4	28.2	27.3	26.4	25.4
55	17.7	17.1	16.2	16.0	16.4	16.5	16.8	17.9	18.7	19.7	20.0	20.7	21.0	20.4	19.6	18.9
60	13.3	13.3	12.6	12.4	13.1	12.8	13.3	14.2	14.5	15.5	15.6	16.0	16.4	15.5	15.1	14.5
65	10.2	10.6	9.97	9.67	10.4	10.1	10.6	11.5	11.2	12.4	12.4	12.5	12.9	12.0	11.8	11.5
70	7.96	8.43	7.78	7.44	8.20	7.86	8.41	9.31	8.93	10.1	10.0	9.97	10.3	9.47	9.39	9.24
75	6.15	6.60	5.85	5.51	6.25	5.79	6.45	7.39	7.18	8.33	8.19	8.00	8.41	7.62	7.61	7.41
80	4.06	4.37	3.69	3.30	3.97	3.60	4.29	5.19	5.20	6.34	6.35	6.11	6.64	5.79	5.72	5.43
85	1.65	1.63	1.09	0.82	1.18	1.12	1.66	2.49	2.79	3.85	3.93	3.82	4.32	3.49	3.22	2.82
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.88	1.15	1.15	1.39	0.80	0.56	0.11
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	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01
155	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.02
160	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
165	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04
170	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05
175	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
180	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

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

γ Range: 0 - 180DEG
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