IESNA LM-79: 2008

Measurement and Test Report

For

Verbatim Americas LLC

1200 W.T.Harris Boulevard,Charlotte,NC

Aug 23, 2016

Product Name:	LED
Model No:	99565; 99564
Test Engineer:	David Zhang
Report No.:	BTR66.181.16.0003.12
Sample Received Date:	April 28, 2015
Test Performed Date:	April 28, 2015 to May 05, 2015
Reviewed By:	Steven Huo
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	:	Verbatim Americas LLC
Product Name	:	LED
Model No	:	99565; 99564
Brand	:	Verbatim
Nominal Operation Voltage	:	AC 120V
Nominal Power	:	11W
Nominal CCT	:	4000K
Nominal CRI	:	90
Nominal Lumen Output	:	800Lumens
Nominal Life Time	:	25000Hours
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 PAR, MR, R, BR
Date of Receiving Sample	:	April 28, 2015
Date of Measurement performed	:	April 28, 2015 to May 05, 2015
Measurement quantities measured	:	1 pcs
Orientation During Testing	:	Base Up
Test Requested	:	1. Electrical and Photometric Test 2. Luminous Intensity Distribution Test

Note: These models are all the same except for the beam angle, here we choose 99565 to be tested and the other to share the test data.

1.2 Objective

The following test report is prepared on behalf of Verbatim Americas LLC 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 Incandescent 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: 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, 2015	Mar 09, 2016
2	Digital Power Meter	Oct 18, 2015	Oct 17, 2016
3	Goniophotometer+ Spectrophotometer System	Nov 20, 2014	Nov 19, 2015
4	Standard Light Source	Sep 17, 2015	Sep 16, 2016
5	Standard Light Source	Sep 17, 2015	Sep 16, 2016
6	Digital Storage Oscilloscope	Oct 18, 2015	Oct 17, 2016
7	Ultra Compact Simulator	Oct 20, 2015	Oct 19, 2016
8	Temperature Chamber	Oct 20, 2015	Oct 19, 2016
9	Digital Caliper	Nov 20, 2014	Nov 19, 2015
10	Digital CC&CV DC Power Supply(30V 5A)	N/A	N/A
11	5 1/2 Digital Multimeter	Oct 18, 2015	Oct 17, 2016
12	Digital CC&CV DC Power Supply(120V 10A)	N/A	N/A
13	6 1/2 Digital Multimeter	Oct 18, 2015	Oct 17, 2016
14	Digital Multimeter	Oct 18, 2015	Oct 17, 2016
15	Temperature Recorder+Thermocouple	Nov 20, 2014	Nov 19, 2015
16	Timer Controller	Nov 20, 2014	Nov 19, 2015

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.

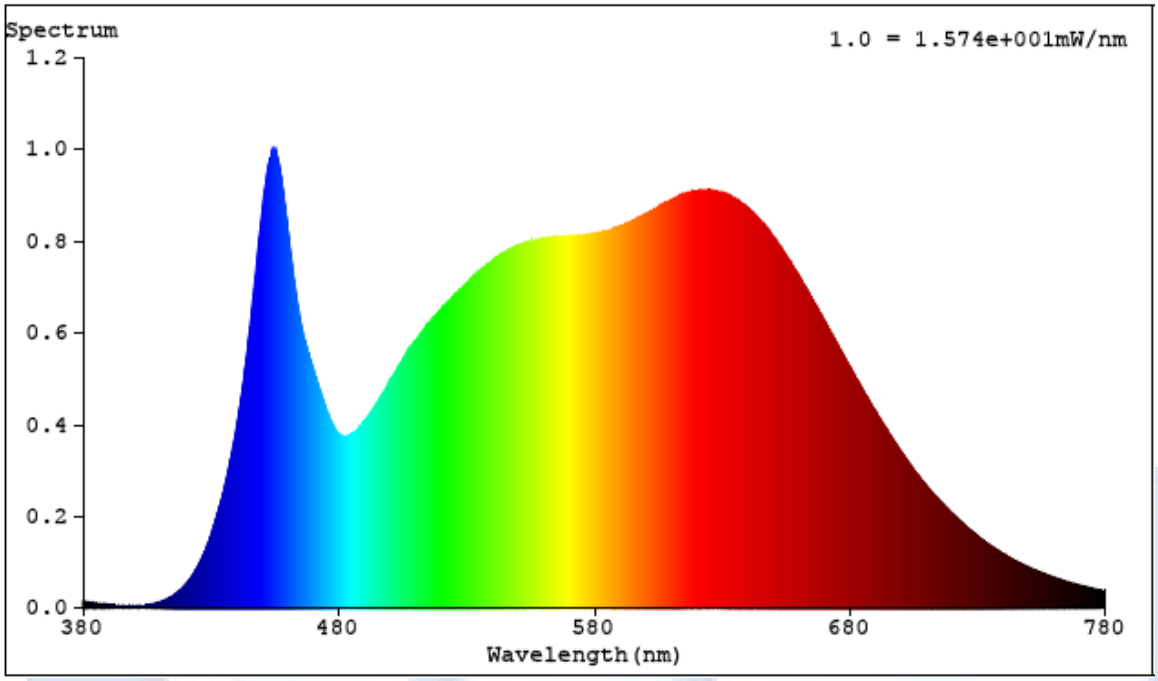
2.3 Deviation from standard operating procedure

None.

3 – Summary of Test Result

	Item	Test Result		Accreditation
Required Fields	Lumen Output (Lumens)	885.61		NVLAP/EPA
	Luminous Efficacy (lm/w)	85.14		NVLAP/EPA
	Correlated Color Temperature (CCT)	3957		NVLAP/EPA
	Color Rendering Index– CRI	94.7		NVLAP/EPA
	Input Power (W)	10.40		NVLAP/EPA
Optional Fields	Power Type	☒AC	☐DC	/
	Input Voltage (V)	120.0		NVLAP/EPA
	Input Current (A)	0.0951		NVLAP/EPA
	Power Factor	0.9106		NVLAP/EPA
	x(CIE 1931)	0.3809		NVLAP/EPA
	y(CIE 1931)	0.3726		NVLAP/EPA
	u' (CIE 1976)	0.2271		NVLAP/EPA
	v' (CIE 1976)	0.4998		NVLAP/EPA
	Duv(CIE 1976)	-0.0021		NVLAP/EPA
	R9	81		NVLAP/EPA
	Beam Angle: (Degree)	37.2		NVLAP/EPA
	Center beam candlepower: (cd)	1491		NVLAP/EPA
	Zonal lumen density (0-60°):	96.0%		NVLAP/EPA
	Zonal lumen density (60-90°):	4.0%		NVLAP/EPA
	Zonal lumen density (90-120°):	0.0%		NVLAP/EPA
	Zonal lumen density (120-180°):	0.0%		NVLAP/EPA

4 – Spectral Flux Plots



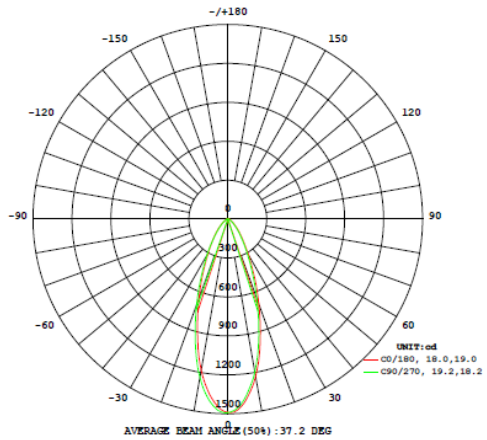
5 – EUT Photos

6 – Luminous Intensity Distribution Test Plots (CIE Chromaticity)

LAMP PHOTOMETRIC REPORT

Electrical: Voltage:120.0V Current:0.0951A Power:10.40W Factor:0.9106		
MODEL: 99565		
POWER: 11W	VOLTAGE: 120.0V	WORKING VOLTAGE: 120.0V
MANUFACTURER: Verbatim		Eff.: 85.14 lm/W

TOTAL FLUX: 885.61 lm



γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%
10	1181	1219	1240	1228	1232	1215	1196	1184	0- 10	128.3	128.3	14.5
20	653.1	685.5	707.8	703.1	696.9	678.3	653.8	648.4	10- 20	259.0	387.4	43.7
30	305.4	317.0	322.4	319.0	315.2	303.4	292.9	296.8	20- 30	214.1	601.5	67.9
40	146.5	142.3	138.8	145.7	145.5	135.5	130.5	141.9	30- 40	132.0	733.5	82.8
50	68.86	64.14	65.32	69.15	69.41	62.53	59.66	67.34	40- 50	75.42	808.9	91.3
60	31.28	29.44	29.92	33.48	33.71	29.55	27.26	30.15	50- 60	40.90	849.8	96
70	15.09	14.73	15.16	16.48	16.92	15.20	14.01	14.66	60- 70	21.67	871.4	98.4
80	5.913	6.151	6.559	6.870	7.112	6.315	5.628	5.785	70- 80	11.16	882.6	99.7
90	0.0078	0.1147	0.2453	0.3019	0.3176	0.1471	0.0360	0.0134	80- 90	3.000	885.6	100
100	0	0	0	0	0	0	0	0	90-100	0.0089	885.6	100
110	0	0	0	0	0	0	0	0	100-110	0	885.6	100
120	0	0	0	0	0	0	0	0	110-120	0	885.6	100
130	0	0	0	0	0	0	0	0	120-130	0	885.6	100
140	0	0	0	0	0	0	0	0	130-140	0	885.6	100
150	0	0	0	0	0	0	0	0	140-150	0	885.6	100
160	0.0018	0.0022	0.0018	0.0022	0.0038	0.0036	0.0043	0.0043	150-160	0.0002	885.6	100
170	0.0117	0.0123	0.0116	0.0119	0.0139	0.0132	0.0135	0.0139	160-170	0.0022	885.6	100
180	0	0	0	0	0	0	0	0	170-180	0.0010	885.6	100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

C Range: 0 - 360DEG
C Interval: 22.5DEG
Test Speed: HIGH
Temperature:25.6DEG
Operators:David

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.287
Humidity:67.1%
Test Distance:2.455m [K=1.0000]

LUMINOUS DISTRIBUTION INTENSITY DATA

Electrical: Voltage:120.0V Current:0.0951A Power:10.40W Factor:0.9106		
MODEL: 99565		
POWER: 11W	VOLTAGE: 120.0V	WORKING VOLTAGE: 120.0V
MANUFACTURER: Verbatim		Eff.: 85.14 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	1489	1490	1490	1490	1491	1491	1491	1491	1489	1490	1490	1490	1491	1491	1491	1491			
5	1392	1401	1415	1425	1430	1429	1424	1420	1424	1418	1412	1406	1402	1396	1393	1396			
10	1181	1197	1219	1232	1240	1241	1228	1221	1232	1225	1215	1204	1196	1188	1184	1191			
15	905	929	951	965	973	973	967	955	965	957	946	934	923	911	905	910			
20	653	671	686	696	708	707	703	690	697	690	678	665	654	649	648	654			
25	450	460	470	479	483	486	484	474	479	468	458	452	441	439	442	448			
30	305	310	317	321	322	321	319	317	315	307	303	299	293	293	297	306			
35	211	213	214	211	212	215	214	213	212	206	202	195	194	198	204	211			
40	147	145	142	137	139	144	146	144	146	141	136	128	130	135	142	148			
45	101	98.5	95.4	92.2	94.6	97.5	99.9	100	100	96.1	91.7	87.1	88.7	92.1	97.7	104			
50	68.9	67.0	64.1	63.4	65.3	66.8	69.1	69.7	69.4	67.0	62.5	59.8	59.7	62.7	67.3	70.3			
55	46.6	45.6	43.3	43.1	44.2	46.4	48.3	47.6	48.2	46.6	42.6	40.6	39.7	41.9	45.5	45.7			
60	31.3	31.1	29.4	29.3	29.9	32.4	33.5	32.4	33.7	32.4	29.6	27.9	27.3	28.6	30.1	29.9			
65	21.5	21.6	20.6	20.6	21.0	22.8	23.4	22.8	23.8	22.9	21.1	19.9	19.4	20.1	20.7	20.7			
70	15.1	15.2	14.7	14.8	15.2	16.2	16.5	16.3	16.9	16.3	15.2	14.4	14.0	14.3	14.7	14.8			
75	10.2	10.3	10.2	10.3	10.6	11.1	11.3	11.3	11.6	11.2	10.5	9.87	9.54	9.61	9.90	9.99			
80	5.91	6.12	6.15	6.35	6.56	6.79	6.87	6.90	7.11	6.80	6.31	5.89	5.63	5.60	5.79	5.86			
85	2.14	2.32	2.47	2.65	2.81	2.90	2.90	2.93	3.04	2.84	2.60	2.36	2.17	2.08	2.13	2.21			
90	0.01	0.04	0.11	0.18	0.25	0.28	0.30	0.28	0.32	0.23	0.15	0.08	0.04	0.01	0.01	0.03			
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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
165	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01			
170	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01			
175	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01			
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:25.6DEG
Operators:David

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.287
Humidity:67.1%
Test Distance:2.455m [K=1.0000]