



FOR THE SCOPE OF
ACCREDITATION UNDER NVLAP LAB
CODE 100402-0.

REPORT

3933 US ROUTE 11 CORTLAND, NEW YORK 13045

Project No. G101048185

Date: February 15, 2013

REPORT NO. 101048185CRT-001

TEST OF ONE LED MR16
MODEL NO. LW10-CA1-040-W4000K
LED MODEL NO. CREE XT-E

RENDERED TO

LED WAVES
33 35TH STREET
BROOKLYN NY, 11232

TEST: Electrical and Photometric tests as required to the IESNA test standard.

LABORATORY NOTE: The laboratory that conducted the testing detailed in this report has been Qualified, Verified, and Recognized for LM-79 Testing for ENERGY STAR for SSL by US DOE's CALiPER program.

STATEMENT OF LIMITATION: This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

AUTHORIZATION: The testing performed was authorized by signed quote number 500432095.

STANDARDS USED: The following American National Standards or Illuminating Engineering Society of North America Test Guides were used in part or totally to test each specimen:

IESNA LM-79: 2008 Approved Method for Electrical and Photometric Measurements of Solid-State Lighting Products

ANSI ANSLG C38.377: 2012 Specifications of the Chromaticity of Solid State Lighting Products

DESCRIPTION OF SAMPLE: The client submitted one sample of model number LW10-CA1-040-W4000K. The sample was received by Intertek on January 29, 2013, in undamaged condition, and one sample was tested as received. The sample designation was 261803-1.

DATES OF TESTS: February 6, 2013 through February 11, 2013.

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SUMMARY

Model No.:	LW10-CA1-040-W4000K
Description:	California MR16 LED Light Bulb 7-Watt (4000K, 40°) 12VDC

Criteria	Result	
	Sphere	Goniometer
Total Lumen Output (Lumens)	409.3	400.3
Total Power (W)	6.976	7.015
Luminaire Efficacy (LPW)	58.67	57.06

Criteria	Result
Current ATHD (%)	99.90
Correlated Color Temperature (CCT - K)	4137
Color Rendering Index (CRI) - Ra	85.74
Color Rendering Index (CRI) - R9	24.80
Duv	0.003
Chromaticity Coordinate (x)	0.373
Chromaticity Coordinate (y)	0.367
Chromaticity Coordinate (u')	0.224
Chromaticity Coordinate (v')	0.496

EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Last Calibration Date	Calibration Due Date
Leeds & Northup Standard Resistor	Manganin	Y089	02/24/12	02/24/13
Data Precision Digital Voltmeter	3600	V124	02/24/12	02/24/13
Fluke Multimeter	45	M133	02/24/12	02/24/13
Kikusui DC Power Supply	35-10L	E160	---	---
NIST Spectral Flux Standard Source	RF1024	---	09/18/10	100 hours of use
Sorenson DC Power Supply	DLM150-20E	---	---	---
LSI High Speed Mirror Goniometer	6440	---	01/16/13	02/16/13
Elgar Power Supply	CW1251	---	VBU	VBU
Yokogawa Power Analyzer	WT210	E464	04/19/12	04/19/13
Extech Hygro Thermometer	445703	T1359	11/08/12	11/08/13
Fisher Scientific	---	N1132	04/19/12	04/19/13
Labsphere ITS 2 Meter Sphere (2M5)*	w/ CDS 600	---	02/04/13	02/11/13
Yokogawa Power Analyzer	WT1600	E473	04/20/12	04/20/13
Omega Thermometer	MDSi8	T1383	11/21/12	11/21/13
Extech Hygo-Thermometer	445703	T1357	11/08/12	11/08/13

*Note: Equipment used on 02/06/2013(before calibration due date)

TEST METHODS

Seasoning in Sample Orientation – LED Products

No seasoning was performed in accordance with IESNA LM-79.

Photometric and Electrical measurements – Distribution Method

A LSI Type C High Speed Model 6440 Mirror Goniometer was used to measure the intensity (candelas) at each angle of distribution for each sample.

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 stabilize for at least thirty minutes before measurements were made. Electrical measurements including voltage, current, and power were measured using the Xitron or Yokogawa Power Analyzer.

Some graphics were created with Photometrics Plus software.

Photometric and Electrical Measurements – Integrating Sphere Method

A Labsphere Model CDS 600 CCD Array Spectroradiometer and Two Meter or Ten Foot Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit.

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. Each SSL unit was allowed to stabilize for at least thirty minutes before measurements were made. Electrical measurements including voltage, current, and power were measured using the Xitron or Yokogawa Power Analyzer.

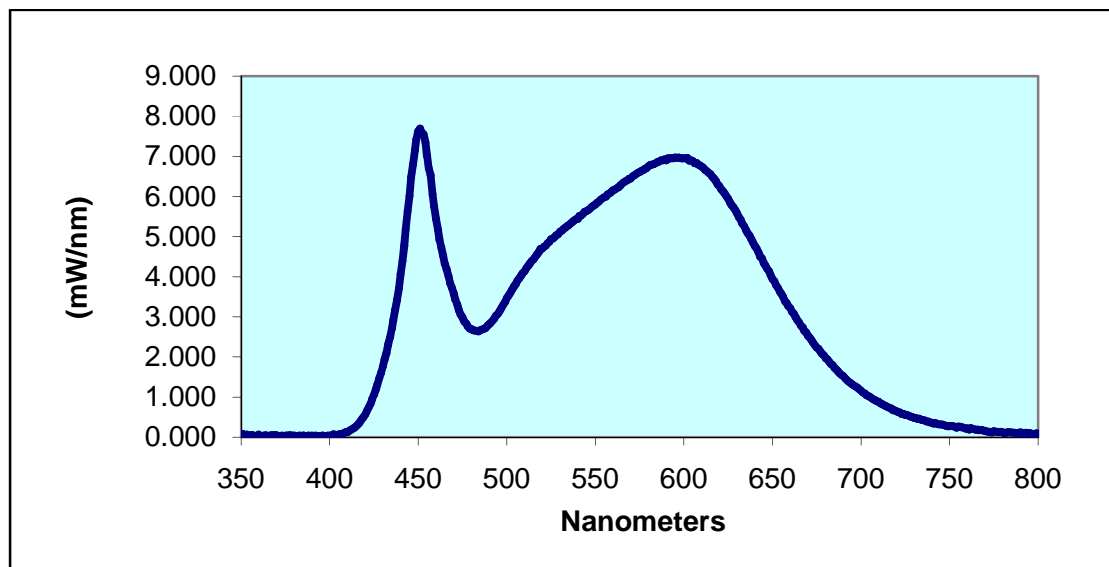
The calibration of the sphere photometer-spectroradiometer system is traceable to the National Institute of Standards and Technology.

RESULTS OF TESTS

Spectral Distribution over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	0.050	460	5.430	570	6.443	680	1.965
355	0.042	465	4.320	575	6.608	685	1.728
360	0.062	470	3.584	580	6.752	690	1.523
365	0.021	475	2.985	585	6.855	695	1.315
370	0.049	480	2.687	590	6.900	700	1.154
375	0.043	485	2.661	595	6.965	705	1.002
380	0.043	490	2.814	600	6.951	710	0.877
385	0.041	495	3.078	605	6.879	715	0.747
390	0.038	500	3.465	610	6.739	720	0.648
395	0.034	505	3.813	615	6.553	725	0.551
400	0.042	510	4.132	620	6.262	730	0.478
405	0.060	515	4.429	625	5.935	735	0.428
410	0.129	520	4.696	630	5.583	740	0.356
415	0.269	525	4.930	635	5.164	745	0.323
420	0.569	530	5.121	640	4.770	750	0.271
425	1.058	535	5.283	645	4.344	755	0.263
430	1.755	540	5.436	650	3.937	760	0.214
435	2.696	545	5.632	655	3.573	765	0.000
440	4.050	550	5.800	660	3.212	770	0.155
445	6.012	555	5.977	665	2.863	775	0.146
450	7.625	560	6.152	670	2.523	780	0.119
455	7.012	565	6.313	675	2.229		

**Sample No. 261803-1
Spectral Data Over Visible Wavelengths**





RESULTS OF TESTS (cont'd)

Photometric and Electrical Measurements at 25°C – Integrating Sphere Method

Intertek Sample No.	Base Orientation	Input Voltage (VDC)	Input Current (mA)	Input Power (Watts)	Current ATHD (%)	Absolute Luminous Flux (Lumens)	Lumen Efficacy (Lumens Per Watt)
261803-1	UP	12.00	581.4	6.976	99.90	409.3	58.67

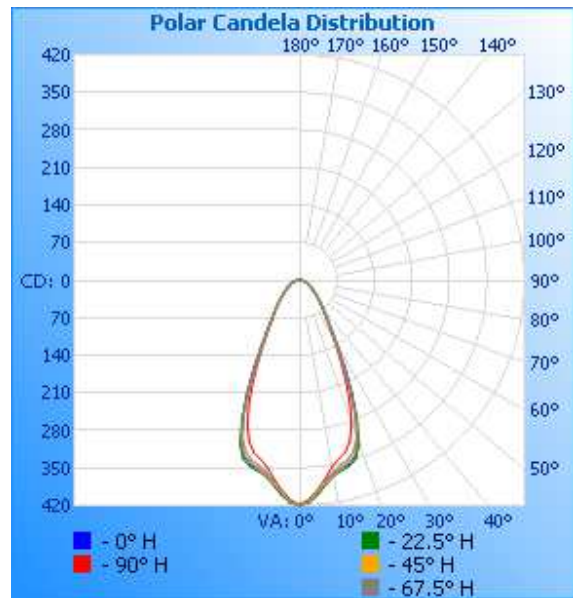
Intertek Sample No.	Correlated Color Temperature (K)	CRI -Ra	CRI -R9	DUV	CIE 31' Chromaticity Coordinate (x)	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')
261803-1	4137	85.74	24.80	0.003	0.373	0.367	0.224	0.496

Photometric and Electrical Measurements – Distribution Method

Intertek Sample No.	Base Orientation	Input Voltage (VDC)	Input Current (mA)	Input Power (Watts)	Absolute Luminous Flux (Lumens)	Lumen Efficacy (Lumens Per Watt)
261803-1	UP	12.00	583.0	7.015	400.3	57.06

Intensity (Candlepower) Summary at 25°C - Candelas

Angle	0	22.5	45	67.5	90
0	419	419	419	419	419
5	400	400	396	392	392
10	365	370	368	362	352
15	355	359	351	347	331
20	316	325	316	312	284
25	230	228	221	221	202
30	144	138	138	141	131
35	94	92	94	94	89
40	69	68	70	70	67
45	52	51	51	53	50
50	40	38	39	40	38
55	31	28	30	31	29
60	25	22	24	24	23
65	21	18	20	19	18
70	18	15	16	16	15
75	14	12	13	12	12
80	10	9	10	9	8
85	6	5	6	5	5
90	0	0	0	0	0

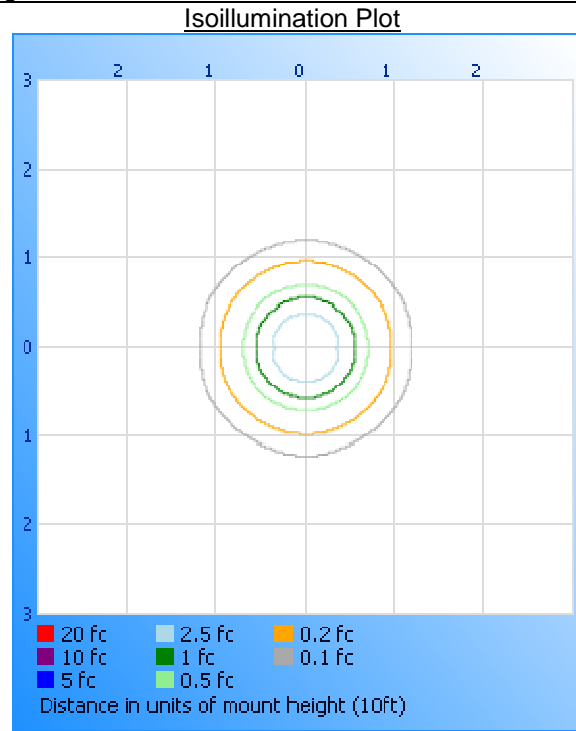
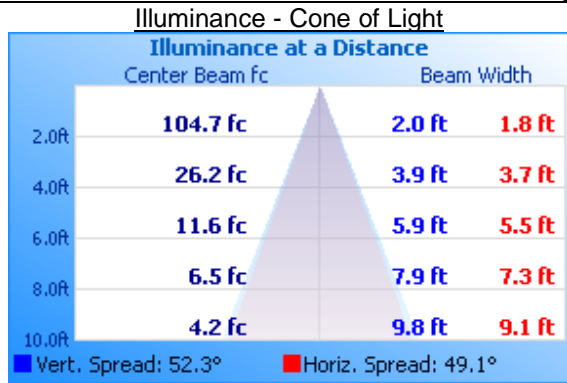




RESULTS OF TESTS (cont'd)

Illumination Plots

Mounting Height: 10 ft.



Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
0-30	234.9	58.7
0-40	294.9	73.7
0-60	362.1	90.5
60-90	38.2	9.5
0-90	400.3	100.0
90-180	0.0	0.0
0-180	400.3	100.0

Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	36.7	9.2
10-20	97.3	24.3
20-30	100.9	25.2
30-40	60.0	15.0
40-50	40.2	10.0
50-60	27.0	6.7
60-70	19.2	4.8
70-80	13.2	3.3
80-90	5.7	1.4

Picture (not to scale)



CONCLUSION

The results tabulated in this report are representative of the actual test samples submitted for this report only. The data is provided to the client for further evaluation. Compliance to the referenced specification requirements was not determined in this report.

In Charge Of Tests:

Handwritten signature of Vladimir Kozak in black ink.

Vladimir Kozak
Associate Engineer
Lighting Division

Attachment: None

Report Reviewed By:

Handwritten signature of Kenda Branch in black ink.

Kenda Branch
Engineer
Lighting Division