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

REPORT

3933 US ROUTE 11 CORTLAND, NEW YORK 13045

Project No. G100888297 Date: October 10, 2012

REPORT NO. 100888297CRT-001A

TEST OF ONE LED ROADWAY LUMINAIRE

FIXTURE MODEL NO. SL3N5CLGG

LED MODEL NO. CREE XLAMP XTE

RENDERED TO

DIALIGHT CORPORATION
1501 ROUTE 34 SOUTH
FARMINGDALE, NJ 08005

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 500403100.

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

Energy Star Version 1.1 (2008): Program Requirements for Solid-State Lighting Luminaires

Energy Star Manufacturer's Guide Version 2.0 (2009): Guide for Qualifying Solid State Lighting Luminaires

DESCRIPTION OF SAMPLE: The client submitted two samples of model number SL3N5CLGG. The samples were received by Intertek on September 11, 2012, in undamaged condition, and both samples were tested as received. The sample designations were 254987 and 254988.

DATES OF TESTS: September 20, 2012 through September 27, 2012

SUMMARY

Model No.:	SL3N5CLGG
Description:	LED Roadway Luminaire

Criteria	Result
Total Lumen Output	5442 Lumens
Total Power	64.78 W
Luminaire Efficacy	84.01
Power Factor (at 120 Vac)	0.992
Power Factor (at 277 Vac)	0.930
Current ATHD (at 120 Vac)	9.75%
Current ATHD (at 277 Vac)	15.80%
Correlated Color Temperature (CCT)	4397 K
Color Rendering Index (CRI) - Ra	75.6
Color Rendering Index (CRI) - R9	-10.4
Duv	0.006
Chromaticity Coordinate (x)	0.367
Chromaticity Coordinate (y)	0.380
Chromaticity Coordinate (u')	0.215
Chromaticity Coordinate (v')	0.501
Maximum In-Situ Source Temperature Point	62.2℃
Backlight Rating	B 1
Uplight Rating	U 1
Glare Rating	G 1

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	---	---
Sorenson DC Power Supply	DLM150-20E	---	---	---
NIST Spectral Flux Standard Source	RF1024	---	09/18/10	100 hours of use
LSI High Speed Mirror Goniometer	6440	---	09/10/12	10/10/12
Elgar Power Supply	CW1251	---	VBU	VBU
Yokogawa Power Analyzer	WT210	E464	04/19/12	04/19/13
Extech Hygro-Thermometer	445703	T1359	10/26/11	10/26/12
Yokogawa Power Analyzer	WT1600	E462	07/06/12	07/06/13
LABSPHERE 3M	W/ CDS 1100	N307	VBU	VBU
Fluke Temperature Meter	53 II	T1318	03/12/12	03/12/13
Extech Hygro-Thermometer	445703	T1366	10/26/11	10/26/12
Fluke Multimeter	87 V	D590	03/23/12	03/23/13
Fluke Temperature Meter	53 II	D587	03/12/12	04/13/13

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 1100 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.

In-Situ Maximum Measured Power Supply Case and LED Source Point Temperature

Power supply case and/or LED source operating temperature measurements were taken on one test sample per model with a thermocouple and Fluke 87 temperature meter. The SSL sample was allowed to reach thermal equilibrium for seven and a half hours before measurements were taken. Power supply or source temperature measurements were measured at the TMP_{PS} or T_S point as indicated by the included diagram in accordance with manufacturers declared hot spot location, or at a hot spot location found with a thermal camera when no diagram from the manufacturer is given. The maximum temperature was recorded for the sample. A simulated ceiling or other enclosure may be used in accordance to UL 1598 or UL 153 as applicable.

TEST METHODS (cont'd)

BUG Ratings (Backlight, Uplight, Glare) – for Outdoor Fixtures Only

Zonal Lumens were calculated and grouped using the formula in IESNA TM-15-11 for each zone as defined in the BUG addendum. The maximum lumen rating in each zone was compared against the BUG zonal requirements of Energy Star.

RATING TABLE: BACKLIGHT
NOTE: MAX RATING IN ANY ZONE = RATING FOR LUMINAIRE

	B0	B1	B2	B3	B4	B5
BH	110	500	1000	2500	5000	>5000
BM	220	1000	2500	5000	8500	>8500
BL	110	500	1000	2500	5000	>5000

RATING TABLE: UPLIGHT
NOTE: MAX RATING IN ANY ZONE = RATING FOR LUMINAIRE

	U0	U1	U2	U3	U4	U5
UH	0	10	50	500	1000	>1000
UL	0	10	50	500	1000	>1000

GLARE RATINGS
NOTE: MAX RATING IN ANY ZONE = RATING FOR LUMINAIRE
FOR ASYMMETRICAL LUMINAIRE TYPES (I, II, III, IV)

	G0	G1	G2	G3	G4	G5
FVH	10	100	225	500	750	>750
BVH	10	100	225	500	750	>750
FH	660	1800	5000	7500	12000	>12000
BH	110	500	1000	2500	5000	>5000

FOR QUADRILATERAL SYMMETRICAL LUMINAIRE TYPES (V, VSQUARE)

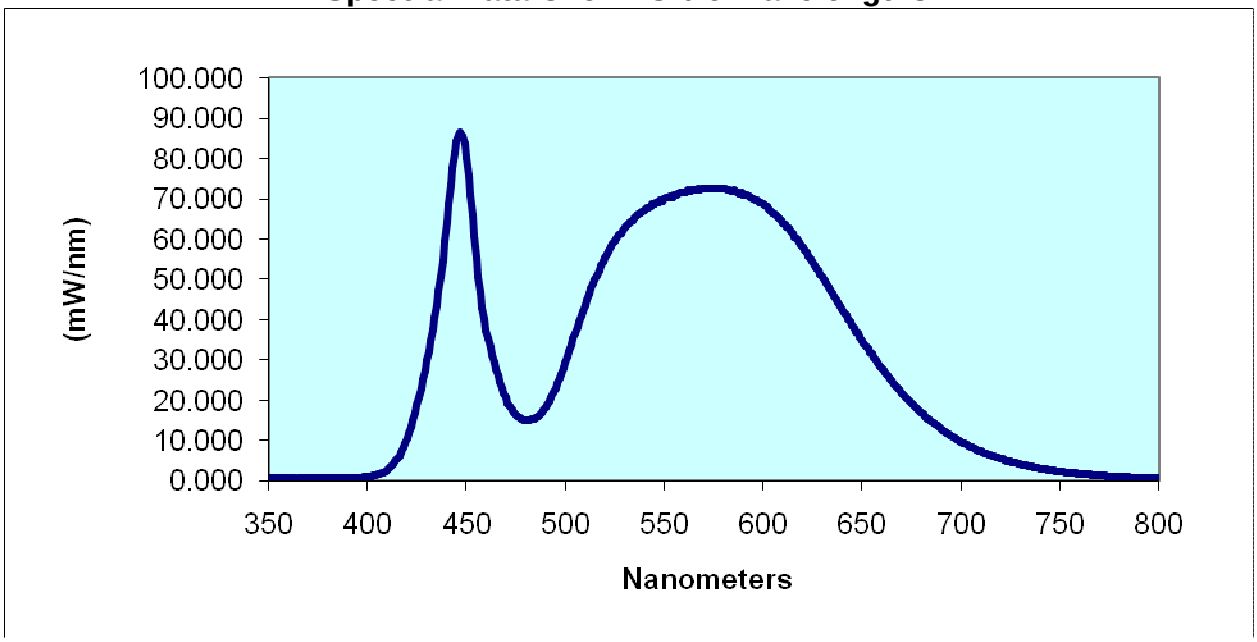
	G0	G1	G2	G3	G4	G5
FVH	10	100	225	500	750	>750
BVH	10	100	225	500	750	>750
FH	660	1800	5000	7500	12000	>12000
BH	660	1800	5000	7500	12000	>12000

RESULTS OF TESTS

Spectral Distribution over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	0.756	460	37.414	570	72.405	680	16.843
355	0.645	465	27.762	575	72.436	685	14.734
360	0.649	470	20.620	580	72.365	690	12.898
365	0.661	475	16.364	585	72.105	695	11.208
370	0.688	480	15.152	590	70.966	700	9.768
375	0.605	485	15.564	595	70.033	705	8.466
380	0.593	490	18.156	600	68.705	710	7.372
385	0.655	495	22.830	605	66.575	715	6.393
390	0.695	500	29.395	610	64.025	720	5.543
395	0.811	505	36.534	615	61.303	725	4.794
400	1.032	510	43.698	620	57.912	730	4.152
405	1.564	515	50.016	625	54.365	735	3.555
410	2.799	520	55.386	630	50.542	740	3.105
415	5.492	525	59.568	635	46.589	745	2.709
420	10.567	530	62.980	640	42.582	750	2.332
425	18.825	535	65.299	645	38.569	755	2.032
430	29.829	540	66.989	650	34.833	760	1.792
435	43.680	545	68.713	655	31.413	765	1.539
440	64.212	550	69.819	660	27.968	770	1.337
445	84.338	555	70.909	665	24.795	775	1.194
450	80.262	560	71.682	670	21.856	780	1.023
455	55.247	565	72.287	675	19.211		

Sample No. 254988
Spectral Data Over Visible Wavelengths



RESULTS OF TESTS (cont'd)

Photometric and Electrical Measurements at 25℃ – Integrating Sphere Method

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')
254988	4397	75.6	-10.4	0.006	0.367	0.380	0.215	0.501

Intertek Sample No.	Base Orientation	Input Voltage (Vac)	Input Current (mA)	Input Power (Watts)	Input Power Factor	Current ATHD (%)
254988	UP	120.0	544.0	64.88	0.992	9.750

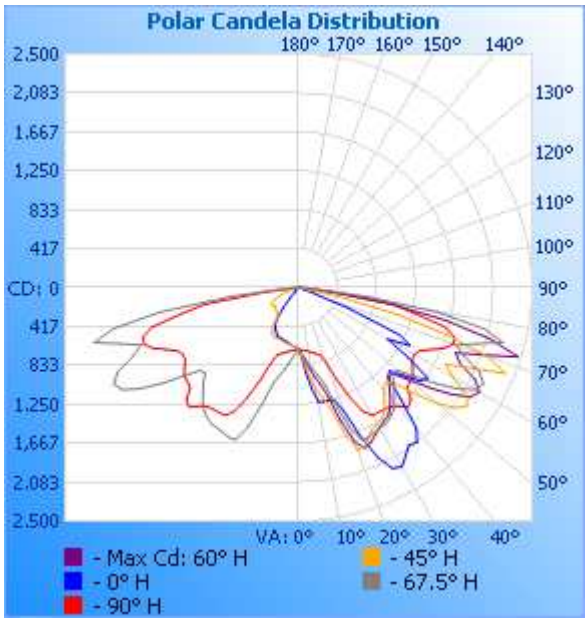
Intertek Sample No.	Input Voltage (Vac)	Input Power (Watts)	Input Power Factor	Current ATHD (%)
254988	277.0	64.50	0.930	15.80

Photometric and Electrical Measurements – Distribution Method

Intertek Sample No.	Base Orientation	Input Voltage (Vac)	Input Current (mA)	Input Power (Watts)	Input Power Factor	Absolute Luminous Flux (Lumens)	Lumen Efficacy (Lumens Per Watt)
254988	UP	120.0	542.8	64.78	0.993	5442	84.01

Intensity (Candlepower) Summary at 25℃ - Candelas

Angle	0	22.5	45	67.5	90
0	663	663	663	663	663
5	921	909	852	753	672
10	1248	1223	1112	892	696
15	1246	1328	1350	1069	730
20	1394	1743	1850	1589	849
25	2008	1790	1772	1770	1295
30	2214	1862	1684	1739	1578
35	2060	1798	1603	1706	1591
40	1958	1539	1418	1597	1658
45	1354	1550	1448	1443	1700
50	1461	1857	1921	1377	1559
55	1689	1772	2204	1784	1490
60	1101	1393	1905	2185	1432
65	1197	1777	2038	2137	1566
70	160	951	2148	1795	1763
75	43	151	1047	2266	1623
80	16	30	134	1518	1021
85	7	11	20	219	14
90	3	6	10	29	3
95	1	2	4	5	3
100	0	0	1	2	2
105	0	0	0	0	1

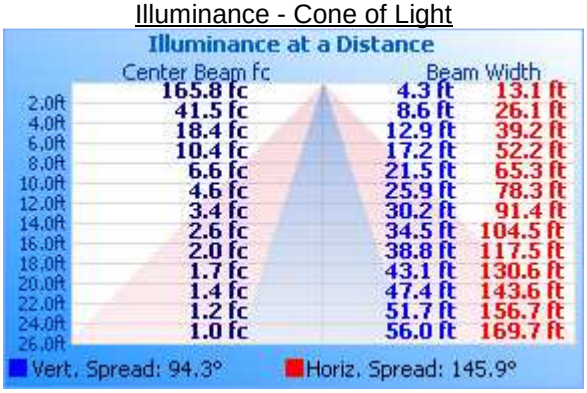


RESULTS OF TESTS (cont'd)

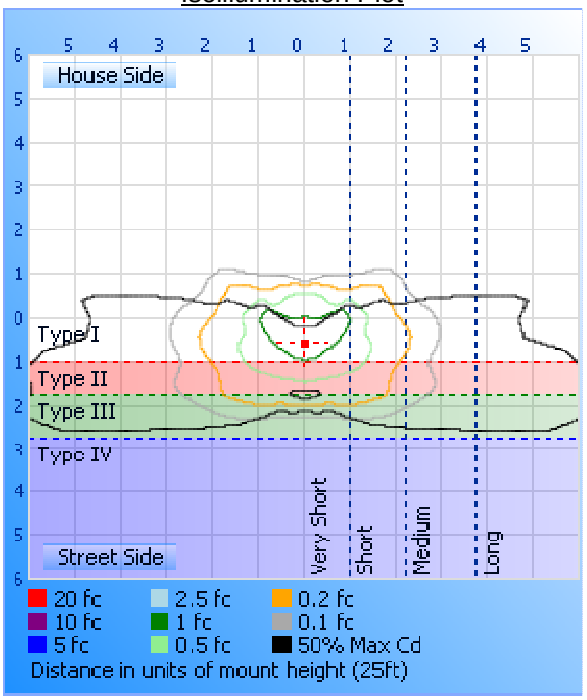
Illumination Plots

Mounting Height: 25 ft.

Illuminance - Cone of Light



Isoillumination Plot



Zonal Lumen Summary and Percentages at 25℃

Zone	Lumens	% Luminaire
0-30	894.6	16.4
0-40	1640	30.1
0-60	3489	64.1
60-90	1949	35.8
0-90	5438	99.9
90-180	3.1	0.1
0-180	5442	100.0

Zonal Lumens and Percentages at 25℃

Zone	Lumens	% Luminaire
0-10	73.6	1.4
10-20	268.0	4.9
20-30	553.1	10.2
30-40	744.9	13.7
40-50	826.1	15.2
50-60	1024	18.8
60-70	1101	20.2
70-80	735.7	13.5
80-90	112.8	2.1
90-100	2.8	0.1
100-110	0.3	0.0

RESULTS OF TESTS (cont'd)

BUG Rating (Backlight, Uplight, Glare)

Zone	Total Lumens	Frontlight Category	Frontlight Lumens	Backlight Category	Backlight Lumens	Uplight Category	Uplight Lumens
0-30	895	FL	630	BL	265	--	--
30-60	2594	FM	1923	BM	671	--	--
60-80	1836	FH	1389	BH	447	--	--
80-90	113	FVH	77	BVH	36	--	--
90-100	3					UL	3
100-180	0					UH	0

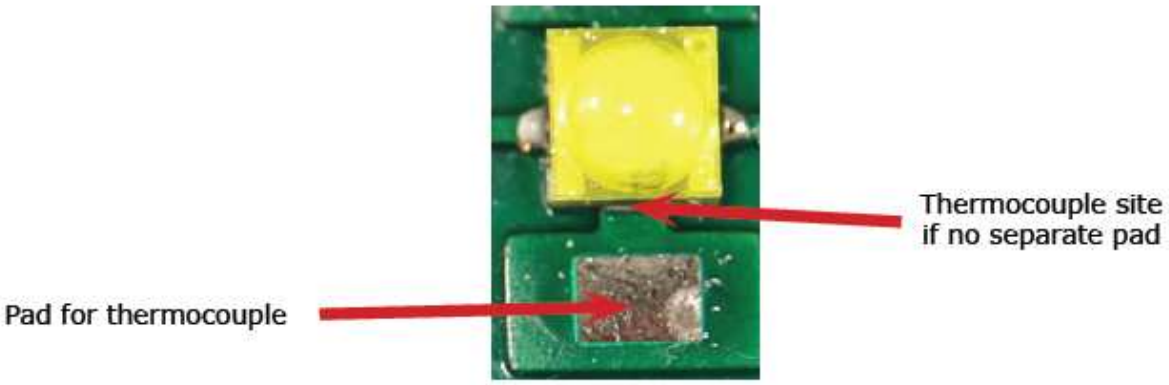
Backlight Rating: B 1
Uplight Rating: U 1
Glare Rating: G 1

RESULTS OF TESTS (cont'd)

In-Situ Maximum Measured LED Source Temperature

Manufacturer Supplied Documentation:

LED identified as: CREE XLAMP XTE



PRODUCT CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point	°C/W		5	
Viewing angle (FWHM) - white	degrees		115	
Viewing angle (FWHM) - royal blue	degrees		140	
Temperature coefficient of voltage	mV/°C		-2.5	
ESD classification (HBM per Mil-Std-883D)			Class 2	
DC forward current	mA			1500
Reverse voltage	V			5
Forward voltage (@ 350 mA, 85 °C)	V		2.85	3.4
LED junction temperature	°C			150

RESULTS OF TESTS (cont'd)

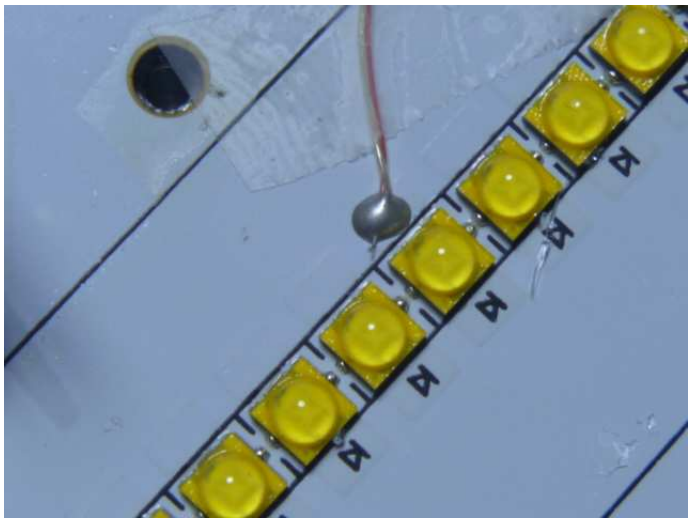
In-Situ Maximum Measured LED Source Temperature

Maximum Junction Temperature from LED specification (Tj) = 150℃
Thermal Resistance Formula from LED specification = 5℃/W
Maximum Forward Voltage (Vf) from LED specification = 3.4 V
Measured LED Current = 345mA
Calculated LED Wattage = Vf x Measured LED Current = 1.173 W
Maximum Source Temperature (Ts) = Tj – (LED Wattage x Thermal Resistance) = 144 ℃

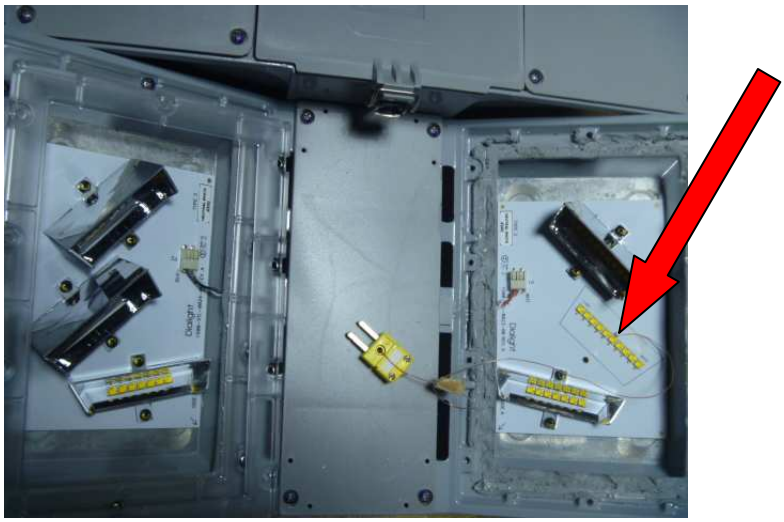
Maximum Measured Manufacturer Designated Source Temperature

Sample No.	Maximum Measured Source Temperature (℃)	Location	Maximum Rated Source Temperature(℃)
254987	62.2	Per diagram above	144

In-Situ Picture – Ts



In-Situ Picture – Ts location



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:

Joe Schledorn
Engineer
Lighting Division

Report Reviewed By:

Dave Ellis
Senior Project Engineer
Lighting Division

Attachment: 254988.IES