



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

REPORT

3933 US ROUTE 11 CORTLAND, NEW YORK 13045

Project No. G100888297

Original Issue Date: September 28, 2012

Revision Date: October 10, 2012

REPORT NO. 100888297CRT-005

TEST OF ONE LED ROADWAY LUMINAIRE

FIXTURE MODEL NO. SL3N5ILGG

LED MODEL NO. CREE XLAMP XTE

RENDERED TO

DIALIGHT CORPORATION
1501 ROUTE 34 SOUTH
FARMINGDALE, NJ 08005

Revision Note October 10, 2012: Report was revised to correct fixture model number.

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 SL3N5ILGG. The samples were received by Intertek on September 11, 2012, in undamaged condition, and both samples were tested as received. The sample designations were 254992 and 254995.

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

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SUMMARY

Model No.: SL3N5ILGG
Description: LED Roadway Luminaire

Criteria	Result
Total Lumen Output	13353 Lumens
Total Power	165.3 W
Luminaire Efficacy	80.78
Power Factor (at 120 Vac)	0.992
Power Factor (at 277 Vac)	0.931
Current ATHD (at 120 Vac)	9.74%
Current ATHD (at 277 Vac)	15.65%
Correlated Color Temperature (CCT)	4439 K
Color Rendering Index (CRI) - Ra	75.9
Color Rendering Index (CRI) - R9	-9.7
Duv	0.005
Chromaticity Coordinate (x)	0.365
Chromaticity Coordinate (y)	0.377
Chromaticity Coordinate (u')	0.215
Chromaticity Coordinate (v')	0.499
Maximum In-Situ Source Temperature Point	61.5°C
Backlight Rating	B 3
Uplight Rating	U 1
Glare Rating	G 3

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)

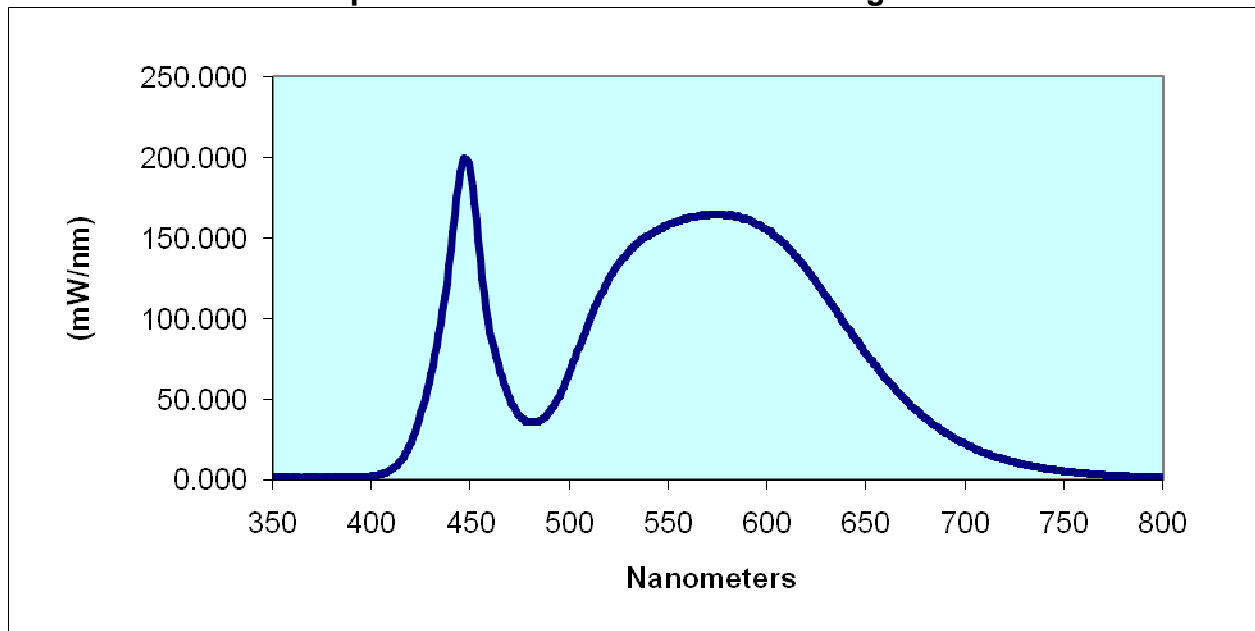
	G0	G1	G2	G3	G4	G5
FVH	10	100	225	500	750	>750
BVH	10	100	225	500	750	>750
FH	660	1800	5000	7500	12000	>12000
BH	660	1800	5000	7500	12000	>12000

RESULTS OF TESTS

Spectral Distribution over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	1.813	460	91.939	570	164.135	680	38.181
355	1.701	465	67.341	575	164.353	685	33.413
360	1.494	470	50.299	580	164.105	690	29.216
365	1.447	475	39.488	585	163.668	695	25.616
370	1.507	480	35.897	590	161.250	700	22.258
375	1.391	485	36.774	595	158.576	705	19.380
380	1.444	490	42.140	600	155.444	710	16.879
385	1.457	495	52.225	605	150.269	715	14.570
390	1.505	500	66.419	610	144.571	720	12.649
395	1.882	505	82.306	615	138.300	725	11.046
400	2.321	510	98.399	620	130.682	730	9.499
405	3.542	515	112.527	625	122.350	735	8.258
410	6.376	520	124.680	630	113.515	740	7.184
415	12.185	525	134.158	635	104.729	745	6.227
420	23.363	530	141.961	640	95.891	750	5.418
425	41.291	535	147.044	645	86.901	755	4.747
430	65.684	540	151.254	650	78.344	760	4.161
435	97.327	545	154.843	655	70.752	765	3.582
440	143.264	550	158.080	660	63.237	770	3.135
445	190.763	555	160.455	665	55.923	775	2.714
450	190.648	560	162.606	670	49.428	780	2.420
455	136.732	565	164.067	675	43.430		

Sample No. 254995
Spectral Data Over Visible Wavelengths



RESULTS OF TESTS (cont'd)

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

Intertek Sample No.	Correlated Color			DUV	CIE 31' Chromaticity Coordinate	CIE 31' Chromaticity Coordinate	CIE 76' Chromaticity Coordinate	CIE 76' Chromaticity Coordinate
	Temperature (K)	CRI -Ra	CRI -R9		(x)	(y)	(u')	(v')
254995	4439	75.9	-9.7	0.005	0.365	0.377	0.215	0.499

Intertek Sample No.	Base Orientation	Input Voltage (Vac)	Input Current (mA)	Input Power (Watts)
254995	UP	120.0	1390	165.6

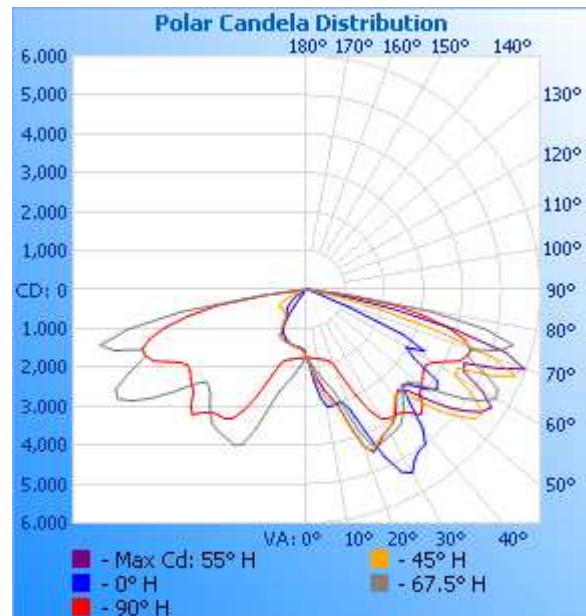
Intertek Sample No.	Input Power Factor 120 Vac	Current ATHD (%) 120 Vac	Input Power Factor 277 Vac	Current ATHD (%) 277 Vac
254995	0.992	9.74	0.931	15.65

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)
254995	UP	120.0	1387	165.3	0.993	13353	80.78

Intensity (Candlepower) Summary at 25°C – Candelas

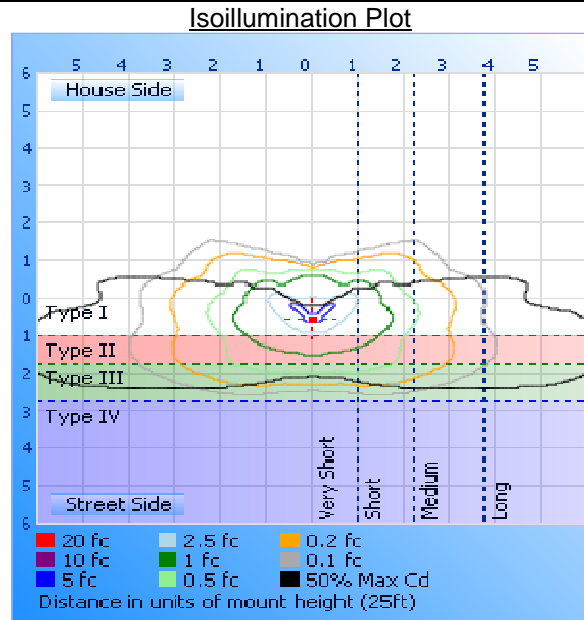
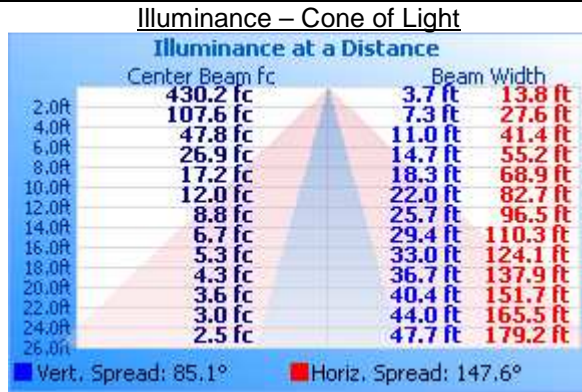
Angle	0	22.5	45	67.5	90
0	1721	1721	1721	1721	1721
5	2413	2368	2219	1990	1762
10	3050	3004	2802	2326	1810
15	3042	3103	3139	2703	1868
20	3286	4026	4302	3789	2069
25	4740	4360	4318	4412	3008
30	5437	4564	4167	4312	3832
35	5050	4383	3892	4210	3941
40	4645	3827	3530	3872	4126
45	3474	4162	4002	3546	4215
50	3958	4754	5057	3767	3848
55	4101	4228	5525	4864	3653
60	2956	3558	4425	5619	3740
65	2726	4268	5246	5018	4337
70	403	1828	5087	4501	4494
75	118	338	1939	5493	3770
80	44	77	313	3256	2334
85	20	29	50	290	49
90	4	13	17	49	10
95	0	3	7	11	8
100	0	0	2	4	6
105	0	0	0	2	4
110	0	0	0	1	2



RESULTS OF TESTS (cont'd)

Illumination Plots

Mounting Height: 25 ft.



Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
0-30	2173	16.3
0-40	3979	29.8
0-60	8648	64.8
60-90	4697	35.2
0-90	13345	99.9
90-180	8.4	0.1
0-180	13353	100.0

Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	186.8	1.4
10-20	647.8	4.9
20-30	1338	10.0
30-40	1806	13.5
40-50	2088	15.6
50-60	2581	19.3
60-70	2706	20.3
70-80	1731	13.0
80-90	260.0	1.9
90-100	6.5	0.0
100-110	1.7	0.0
110-120	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	2173	FL	1526	BL	647	--	--
30-60	6475	FM	4864	BM	1611	--	--
60-80	4436	FH	3340	BH	1096	--	--
80-90	260	FVH	182	BVH	78	--	--
90-100	6					UL	6
100-180	2					UH	2

Backlight Rating: B 3

Uplight Rating: U 1

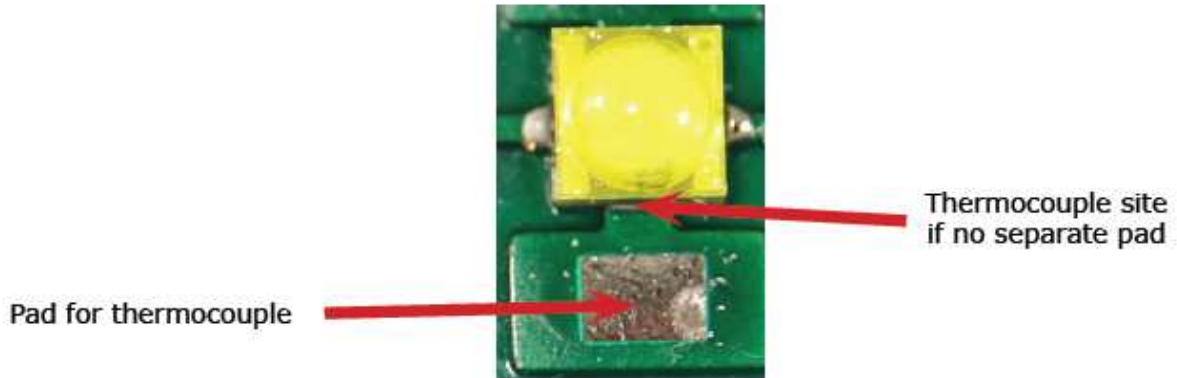
Glare Rating: G 3

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)

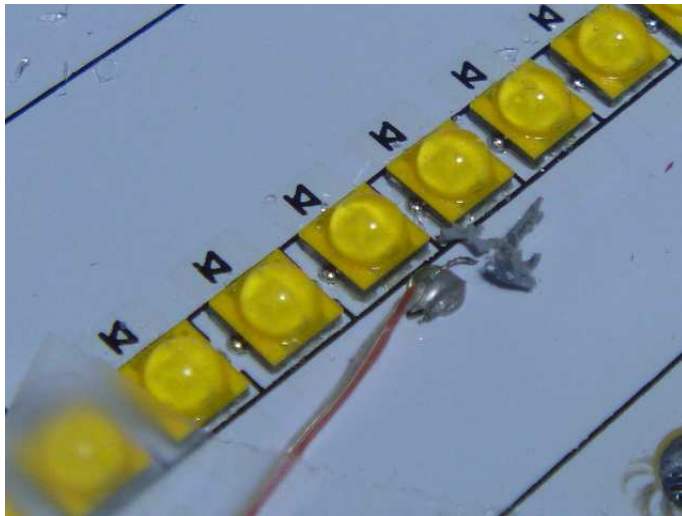
In-Situ Maximum Measured LED Source Temperature

Maximum Junction Temperature from LED specification (Tj) = 150°C
 Thermal Resistance Formula from LED specification = 5°C/W
 Maximum Forward Voltage (Vf) from LED specification = 3.4 V
 Measured LED Current = 461mA
 Calculated LED Wattage = Vf x Measured LED Current = 1.567W
 Maximum Source Temperature (Ts) = Tj – (LED Wattage x Thermal Resistance) = 142°C

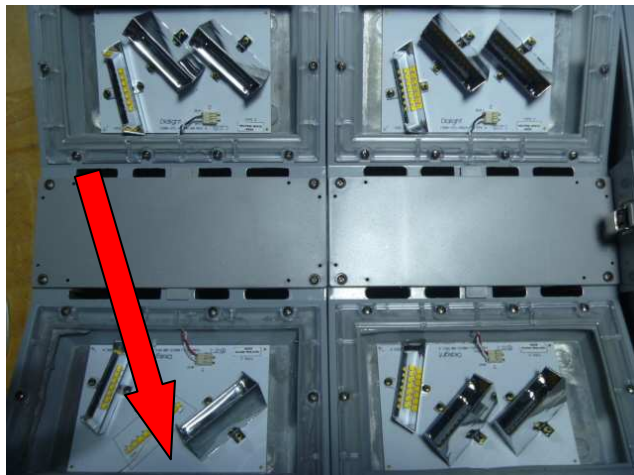
Maximum Measured Manufacturer Designated Source Temperature

Sample No.	Maximum Measured Source Temperature (°C)	Location	Maximum Rated Source Temperature(°C)
254992	61.5	Per diagram above	142

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:

A handwritten signature in black ink, appearing to read 'Joe Schledorn'.

Joe Schledorn
Engineer
Lighting Division

Attachment: 254995.IES

Report Reviewed By:

A handwritten signature in black ink, appearing to read 'Dave Ellis'.

Dave Ellis
Senior Project Engineer
Lighting Division