



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

REPORT

3933 US ROUTE 11 CORTLAND, NEW YORK 13045

Project No. G100403050

Original Issue Date: June 27, 2011

Revision Date: July 12, 2011

REPORT NO. 100403050CRT-001

TEST OF ONE LED PARKING LOT LAMP

MODEL NO. PL-50

RENDERED TO

INTENCITY LIGHTING, INC.
22922 NORTH HIGHWAY 7
DARDANELLE, AR 72834

Revision Note July 12, 2011: This report was revised to add off-state power results.

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 500299188.

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 NEMA ANSLG C78.377: 2008 Specifications of the Chromaticity of Solid State Lighting Products

ENERGY STAR MANUFACTURER'S GUIDE Version 2.0 (2009): Guide for Qualifying Solid State Lighting Luminaires

DESCRIPTION OF SAMPLE: The client submitted one sample of model number PL-50. The sample was received by Intertek on April 19, 2011, in undamaged condition, and one sample was tested as received. The sample designation was F11554L.

DATES OF TESTS: May 26, 2011 through July 12, 2011

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SUMMARY

Model No.: PL-50
Description: LED Parking Lot Lamp

Criteria	Result
Total Lumen Output	5259 Lumens
Total Power	88.23 W
Luminaire Efficacy	59.61
Power Factor	0.995
Current ATHD	8.63%
Correlated Color Temperature (CCT)	6493 K
Color Rendering Index (CRI) - Ra	76.9
Color Rendering Index (CRI) - R9	-0.8
Duv	0.003
Chromaticity Coordinate (x)	0.313
Chromaticity Coordinate (y)	0.328
Chromaticity Coordinate (u')	0.198
Chromaticity Coordinate (v')	0.468
Maximum In-Situ Source Temperature	62.3 °C
Off State Power	0.0 W

EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Last Calibration Date	Calibration Due Date
Leeds & Northup Standard Resistor	Manganin	Y089	02/17/11	02/17/12
Data Precision Digital Voltmeter	3600	V124	02/17/11	02/17/12
Fluke Multimeter	45	M133	02/17/11	02/17/12
Fluke Temperature Meter	53	T1318	02/25/11	02/25/12
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
Yokogawa Power Analyzer	WT1600	E462	06/11/10	06/11/11
ITS 3 Meter Sphere	W/ CDS 1100	N307	w/use	w/use
Fluke Temp Meter	53 II	T1318	02/25/11	02/25/12
Elgar AC Power Supply	CW1251	--	--	--
Yokogawa Power Meter	WT210	E464	04/19/11	04/19/12
LSI High Speed Mirror Goniometer	6440	--	w/use	w/use
Cole Parmer Hygro Thermometer	445703	T1357	10/12/10	10/12/11
Fluke Multimeter	87V	D589	03/14/11	03/14/12
Xitron Power Analyzer	2503AH	E235	04/20/11	04/20/12



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 DAS 1100 Diode 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.

Maximum In-Situ LED Source Point Temperature

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 hours before measurements were made. Source temperature measurements were measured at the $T_{MP_{PS}}$ or T_S point as indicated by the included diagram in accordance with manufacturers declared hot spot location. The maximum temperature was recorded for the sample. A simulated ceiling or other enclosure may be used in accordance to UL 1598 as applicable. Ambient temperature was 25°C.

Off-State Power

A power analyzer is used to record the electrical data during normal operation and again while the unit is switched off.

Estimated Total Operating Time

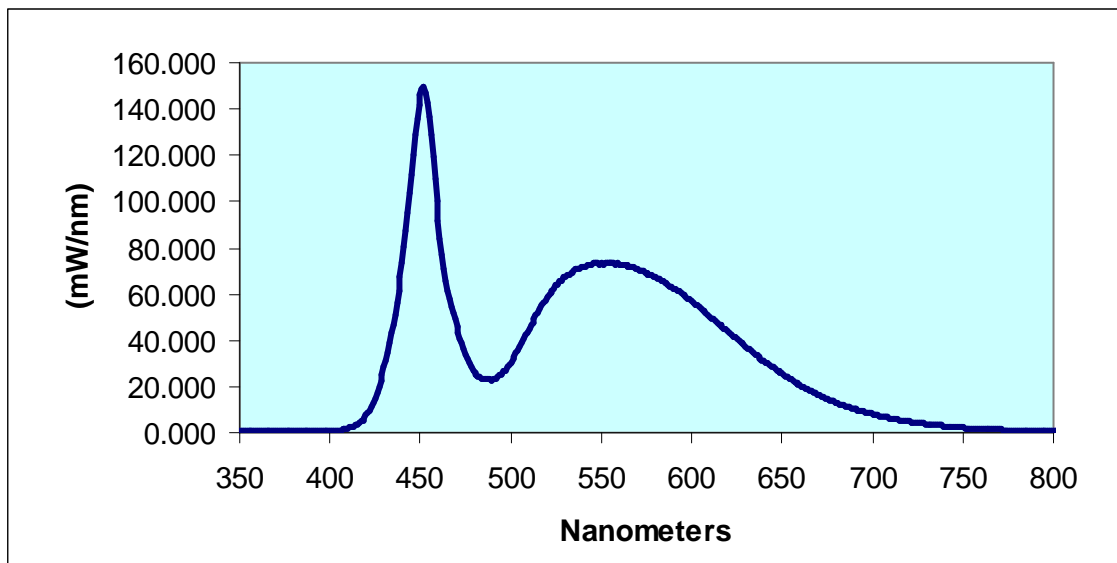
<u>Model No.</u>	<u>Total Hours</u>
PL-50	27

RESULTS OF TESTS

Spectral Distribution over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
PL-50							
350	0.597	460	91.681	570	70.591	680	13.096
355	0.681	465	61.382	575	69.221	685	11.582
360	0.647	470	46.201	580	67.220	690	10.293
365	0.630	475	33.827	585	65.073	695	9.120
370	0.679	480	26.056	590	62.665	700	8.002
375	0.588	485	23.335	595	59.849	705	7.092
380	0.677	490	23.132	600	57.026	710	6.259
385	0.636	495	25.410	605	53.589	715	5.513
390	0.674	500	30.627	610	50.324	720	4.832
395	0.725	505	37.377	615	47.039	725	4.277
400	0.863	510	44.934	620	43.888	730	3.743
405	1.175	515	52.088	625	40.461	735	3.299
410	1.953	520	58.383	630	37.193	740	2.914
415	3.710	525	63.681	635	34.031	745	2.564
420	7.526	530	67.358	640	30.974	750	2.243
425	15.112	535	70.312	645	28.235	755	1.973
430	28.314	540	72.108	650	25.564	760	1.750
435	46.853	545	73.043	655	22.951	765	0.000
440	73.423	550	73.430	660	20.630	770	1.331
445	111.946	555	73.424	665	18.494	775	1.191
450	146.501	560	73.039	670	16.432	780	1.051
455	136.589	565	72.036	675	14.636		

IntenCity
Sample No. F11554L
Model No. PL-50
Spectral Data Over Visible Wavelengths



RESULTS OF TESTS (cont'd)

Photometric Measurements at 25°C – Integrating Sphere Method

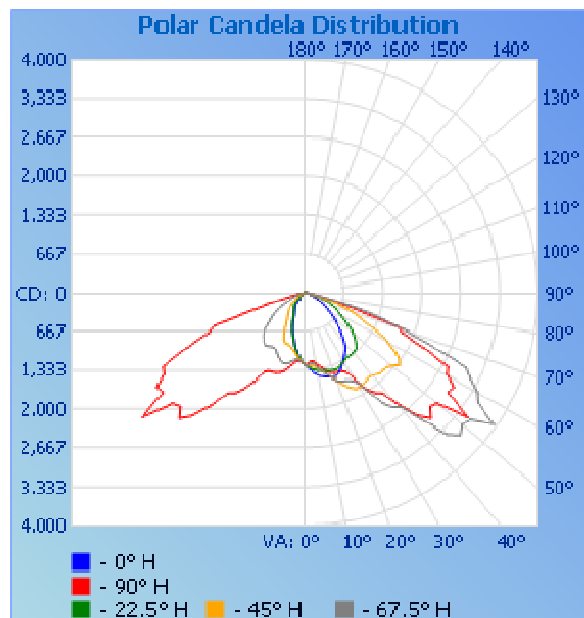
Intertek Sample No.	Correlated Color			Current ATHD (%)	CIE 31' Chromaticity Coordinate (x)	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')	
	Temperature (K)	CRI -Ra	CRI -R9						
PL-50									
F11554L	6493	76.9	-0.8	0.003	8.63	0.313	0.328	0.198	0.468

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)
F11554L	UP	120.0	739.1	88.23	0.995	5259	59.61

Intensity (Candlepower) Summary at 25°C - Candelas

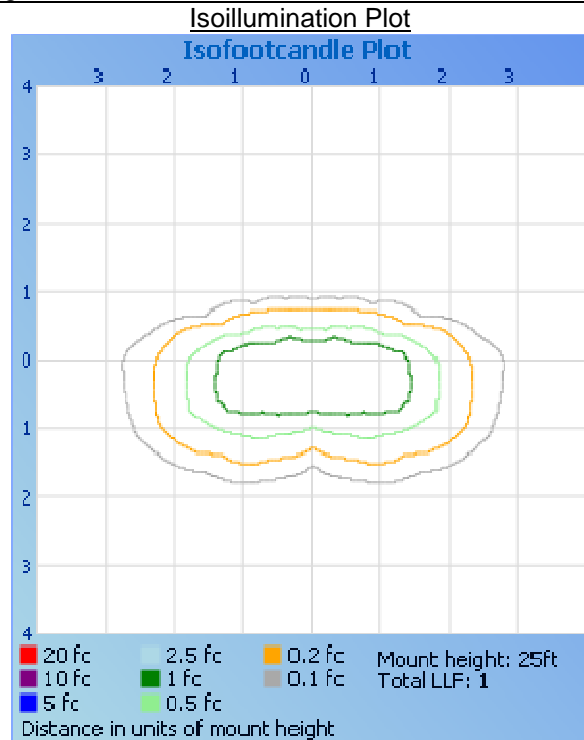
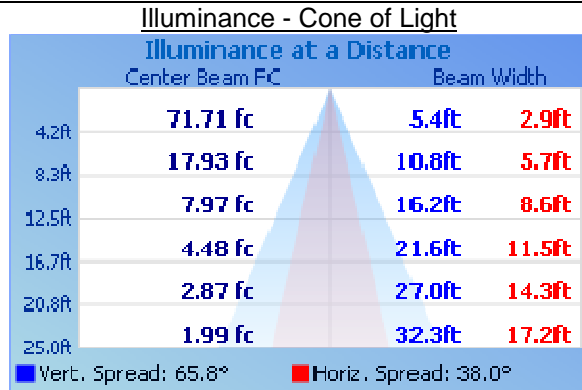
Angle	0	22.5	45	67.5	90
PL-50					
0	1251	1251	1251	1251	1251
5	1348	1317	1272	1224	1187
10	1454	1356	1323	1324	1273
15	1507	1389	1472	1465	1387
20	1528	1426	1621	1643	1464
25	1456	1439	1807	1689	1491
30	1333	1412	1874	1792	1786
35	1217	1405	1827	2344	2120
40	1045	1394	1817	2581	2560
45	809	1299	1855	3434	3056
50	606	1108	1901	3462	3016
55	432	915	1894	3819	3026
60	308	725	1554	3327	2825
65	208	550	1019	2948	2267
70	126	355	600	1616	1559
75	69	147	165	491	328
80	24	33	59	88	63
85	5	6	10	17	12
90	0	0	0	0	0



RESULTS OF TESTS (cont'd)

Illumination Plots

Model No.: PL-50
Mounting Height: 25 ft.



Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
	PL-50	
0-30	1029	19.6
0-40	1834	34.9
0-60	4118	78.3
60-90	1142	21.7
0-90	5259	100.0
90-180	0.0	0.0
0-180	5259	100.0

RESULTS OF TESTS (cont'd)

In-Situ Maximum Measured LED Source Point Temperature

Manufacturer Supplied Documentation:

LED identified as: Luxeon Rebel DS61

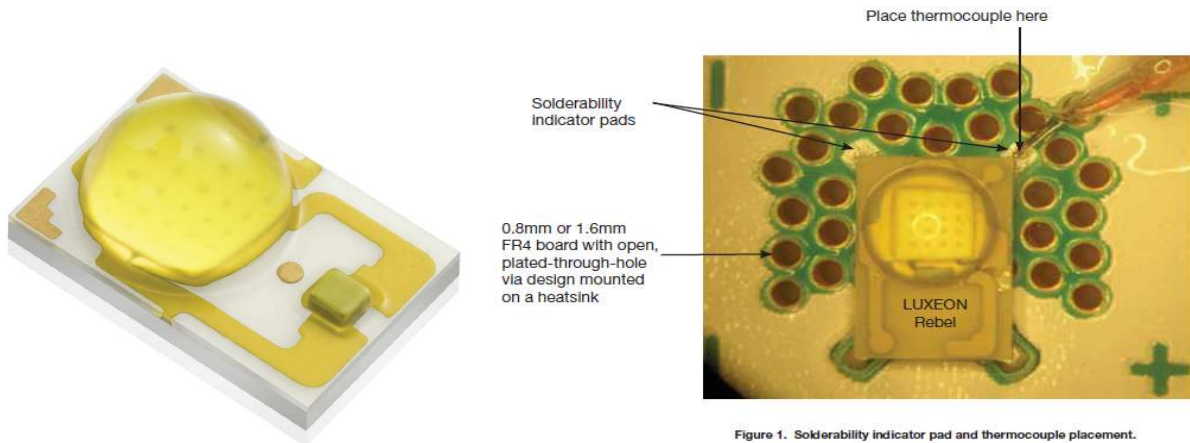


Figure 1. Solderability indicator pad and thermocouple placement.

Table 4.

Color	Forward Voltage V_f [1]			Typical Temperature Coefficient of Forward Voltage [2]	Typical Thermal Resistance Junction to Thermal Pad ($^{\circ}\text{C}/\text{W}$)
	Min.	Typ. (V)	Max.	$\Delta V_f / \Delta T_j$ (mV/ $^{\circ}\text{C}$)	$R\theta_{j-c}$
Neutral-White	2.5	3.0	3.5	-2.0 to -4.0	6
Cool-White	2.5	3.0	3.5	-2.0 to -4.0	6

Table 5.

Parameter	Cool-White / Neutral-White
DC Forward Current (mA)	1000 mA
Peak Pulsed Forward Current (mA) [2]	1200 mA
Average Forward Current (mA)	1000 mA
ESD Sensitivity	< 8000V Human Body Model (HBM) Class 3B JESD22-A114-E
LED Junction Temperature [1]	150 $^{\circ}\text{C}$
Operating Case Temperature at 350 mA	-40 $^{\circ}\text{C}$ - 135 $^{\circ}\text{C}$
Storage Temperature	-40 $^{\circ}\text{C}$ - 135 $^{\circ}\text{C}$
Soldering Temperature	JEDEC 020c 260 $^{\circ}\text{C}$
Allowable Reflow Cycles	3
Autoclave Conditions	121 $^{\circ}\text{C}$ at 2 ATM 100% Relative Humidity for 96 Hours Maximum
Reverse Voltage (V_r)	LUXEON Rebel ES LEDs are not designed to be driven in reverse bias

RESULTS OF TESTS (cont'd)

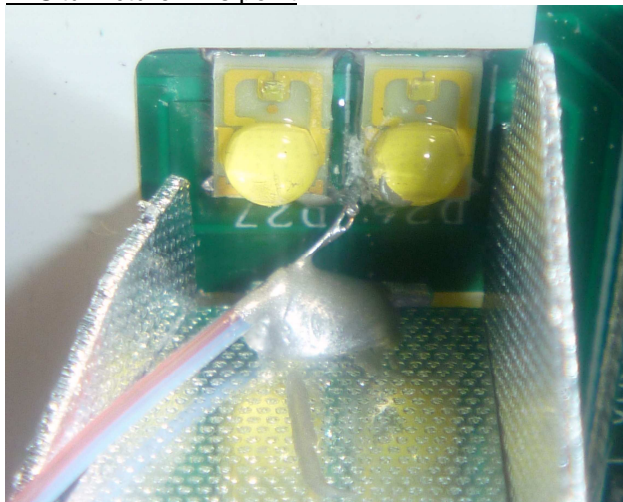
In-Situ Maximum Measured LED Source Point Temperature

Maximum Junction Temperature from LED specification (T_j) = 150C°
 Thermal Resistance Formula from LED specification = 6C°/W
 Maximum Forward Voltage (V_f) from LED specification = 3.5 V
 Measured LED Current = 813 mA
 Calculated LED Wattage = $V_f \times$ Measured LED Current = 2.85 W
 Maximum Source Temperature (T_s) = $T_j - (\text{LED Wattage} \times \text{Thermal Resistance}) = 133\text{C}^\circ$

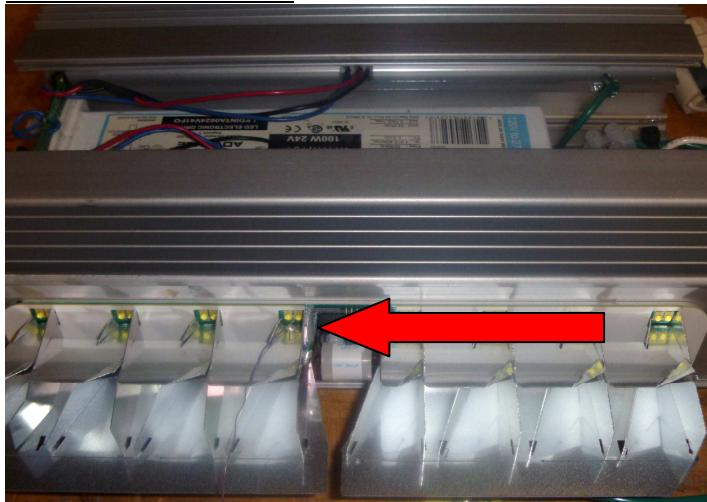
Maximum Measured Manufacturer Designated Source Temperature

Sample No.	Model	Maximum Measured Source Temperature (C°)	Location	Maximum Rated Source Temperature (C°)
F11554L	PL-50	62.3	Per diagram above	133.0

In-Situ Picture – T_s point



In-Situ Picture – location

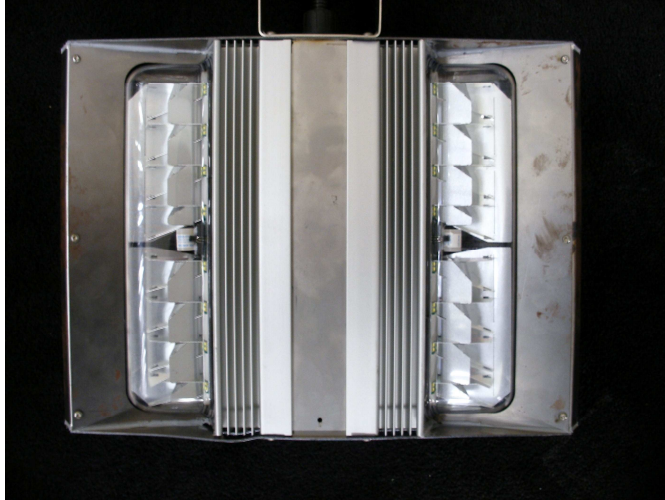


RESULTS OF TESTS (cont'd)

Off State Power

Sample No.	Input Power in Off State (Watts)
	PL-50
F11554L	0.0

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:



Kenda Branch
Engineer
Lighting Division

Attachment: None

Report Reviewed By:



FOR:
Jacki Swiernik
Engineering Team Leader
Lighting Division