



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

# REPORT

3933 US ROUTE 11 CORTLAND, NEW YORK 13045

Project No. G101027299

Date: January 17, 2013

REPORT NO. 101027299CRT-001

TEST OF ONE LED LOW BAY

FIXTURE MODEL NO. LBW1N1A  
LED MODEL NO. CREE XT-E

RENDERED TO

DIALIGHT CORPORATION  
1501 ROUTE 34 SOUTH  
FARMINGDALE, NJ 07727

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 500426696.

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 LBW1N1A. The samples were received by Intertek on January 10, 2013, in undamaged condition, and both samples were tested as received. The sample designations were 260931 and 260932.

DATES OF TESTS: January 10, 2013 through January 16, 2013.

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

SUMMARY

Model No.:	LBW1N1A
Description:	LED Low Bay

Criteria	Result
Total Lumen Output	3528 Lumens
Total Power	46.52 W
Luminaire Efficacy	75.84
Power Factor (at 120 Vac)	0.991
Power Factor (at 277 Vac)	0.935
Current ATHD (at 120 Vac)	7.31%
Current ATHD (at 277 Vac)	13.61%
Correlated Color Temperature (CCT)	4205 K
Color Rendering Index (CRI) - Ra	77.2
Color Rendering Index (CRI) - R9	0.8
Duv	0.001
Chromaticity Coordinate (x)	0.373
Chromaticity Coordinate (y)	0.375
Chromaticity Coordinate (u')	0.221
Chromaticity Coordinate (v')	0.500
Maximum In-Situ Source Temperature Point	38.2°C

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
Yokogawa Power Analyzer	WT1600	E462	07/06/12	07/06/13
LABSPHERE 3M	W/ CDS 1100	N307	VBU	VBU
Fluke Temp Meter	53 II	T1318	03/12/12	03/12/13
Extech Hygro-Thermometer	445703	T1366	11/08/12	11/08/13
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

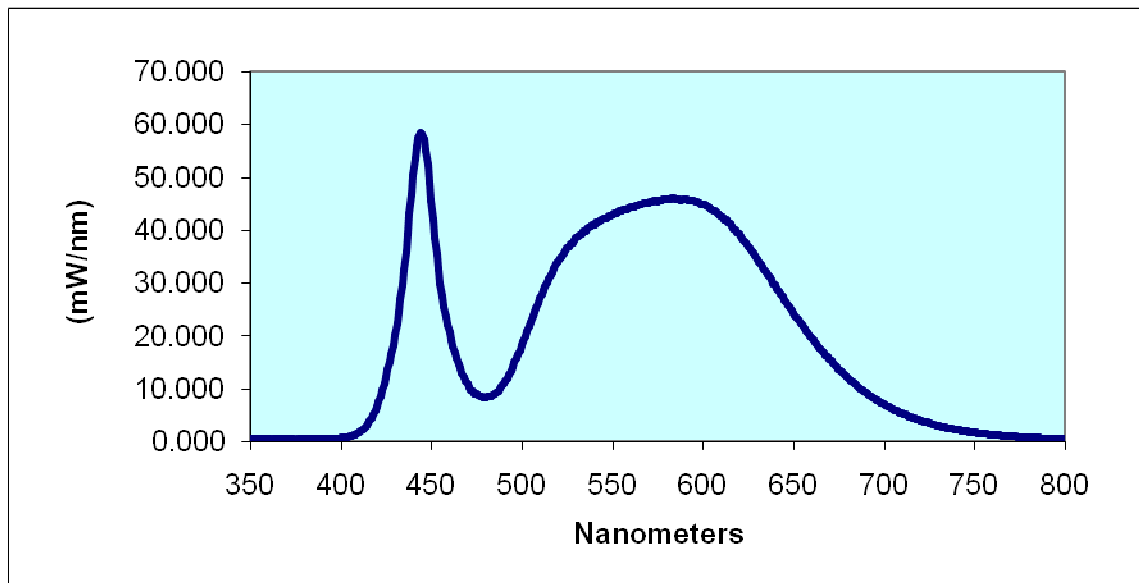
Power supply case and/or LED source operating temperature measurements were taken on one test sample per model with a thermocouple and Fluke 87 temperature meter. The SSL sample was allowed to reach thermal equilibrium for seven and a half hours before measurements were taken. Power supply or source 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.

**RESULTS OF TESTS**

Spectral Distribution over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	0.329	460	20.507	570	45.140	680	12.019
355	0.431	465	14.643	575	45.353	685	10.577
360	0.447	470	10.848	580	45.721	690	9.260
365	0.471	475	8.854	585	45.867	695	8.020
370	0.444	480	8.369	590	45.732	700	6.992
375	0.375	485	8.956	595	45.441	705	6.093
380	0.461	490	10.836	600	44.832	710	5.320
385	0.457	495	14.005	605	43.854	715	4.591
390	0.418	500	18.187	610	42.621	720	3.954
395	0.479	505	22.541	615	41.234	725	3.427
400	0.628	510	27.091	620	39.255	730	2.985
405	0.908	515	30.774	625	36.887	735	2.538
410	1.648	520	33.944	630	34.486	740	2.203
415	3.314	525	36.553	635	31.964	745	1.919
420	6.672	530	38.538	640	29.450	750	1.676
425	12.179	535	39.848	645	26.757	755	1.444
430	19.996	540	41.044	650	24.193	760	1.249
435	32.526	545	42.096	655	22.003	765	0.000
440	50.401	550	42.888	660	19.667	770	0.947
445	58.246	555	43.612	665	17.451	775	0.846
450	45.491	560	44.256	670	15.497	780	0.709
455	29.705	565	44.761	675	13.677		

**Sample No. 260932**  
**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 (Vac)	Input Current (mA)	Input Power (Watts)	Input Power Factor	Current ATHD (%)
260932	UP	120.0	391.9	46.63	0.991	7.31

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')
260932	4205	77.2	0.8	0.001	0.373	0.375	0.221	0.500

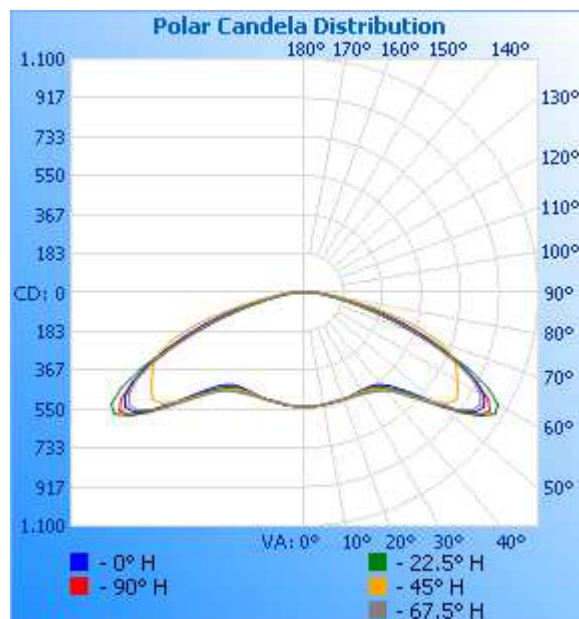
Intertek Sample No.	Input Voltage (Vac)	Input Power (Watts)	Input Power Factor	Current ATHD (%)
260932	277.0	45.60	0.935	13.61

### 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)
260932	UP	120.0	390.6	46.52	0.992	3528	75.84

### Intensity (Candlepower) Summary at 25°C - Candelas

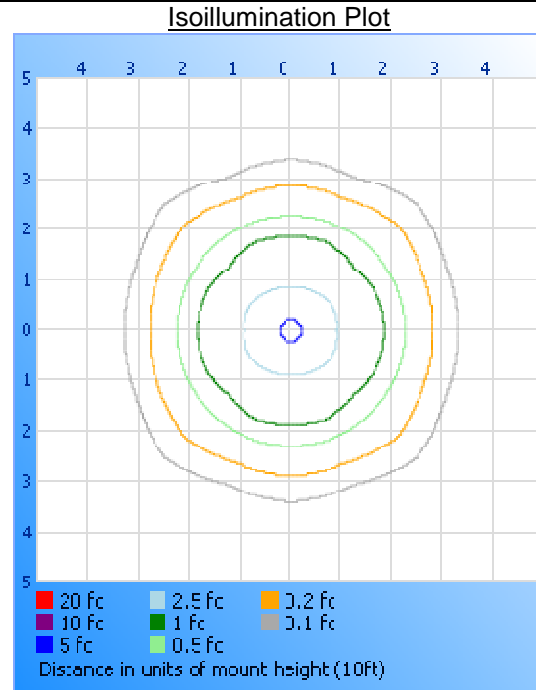
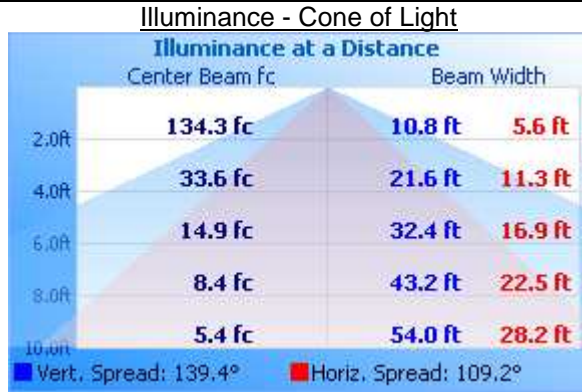
Angle	0	22.5	45	67.5	90
0	537	537	537	537	537
5	536	536	537	536	536
10	536	536	536	535	534
15	533	534	533	532	531
20	535	534	534	535	533
25	533	534	535	541	537
30	533	537	542	551	545
35	540	550	558	570	560
40	566	584	597	605	594
45	645	663	680	690	673
50	810	817	804	832	830
55	982	1011	874	964	1005
60	978	1052	832	956	999
65	828	856	784	807	799
70	606	570	675	567	549
75	389	321	464	343	326
80	217	163	241	181	177
85	112	84	115	94	96
90	62	46	63	53	55
95	32	24	35	28	29
100	17	12	19	14	15
105	6	4	8	5	6
110	0	0	1	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	451.1	12.8
0-40	804.0	22.8
0-60	2175	61.6
60-90	1312	37.2
0-90	3487	98.8
90-180	41.2	1.2
0-180	3528	100.0

### Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	51.2	1.5
10-20	151.2	4.3
20-30	248.7	7.0
30-40	352.9	10.0
40-50	533.2	15.1
50-60	837.7	23.7
60-70	792.0	22.4
70-80	401.3	11.4
80-90	118.8	3.4
90-100	34.4	1.0
100-110	6.8	0.2
110-120	0.0	0.0

RESULTS OF TESTS (cont'd)

In-Situ Maximum Measured LED Source Temperature

Manufacturer Supplied Documentation:

LED identified as: CREE XT-E



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)

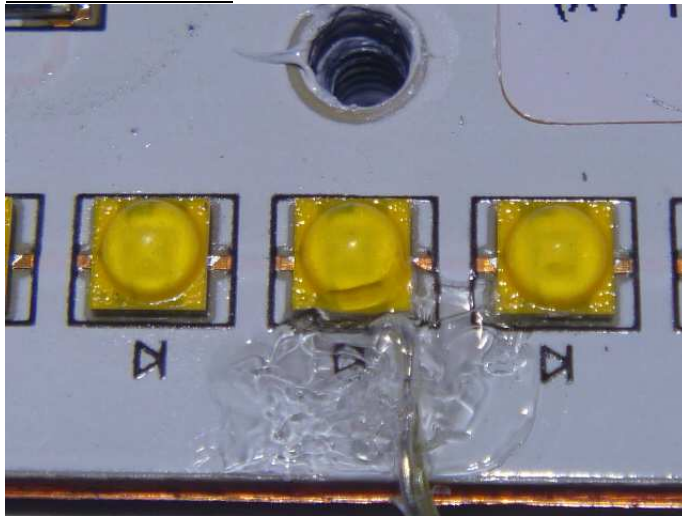
In-Situ Maximum Measured LED Source Temperature

Maximum Junction Temperature from LED specification ( $T_j$ ) = 150°C  
 Thermal Resistance Formula from LED specification = 5°C/W  
 Maximum Forward Voltage ( $V_f$ ) from LED specification = 3.4 V  
 Measured LED Current = 194 mA  
 Calculated LED Wattage =  $V_f \times \text{Measured LED Current}$  = 0.660 W  
 Maximum Source Temperature ( $T_s$ ) =  $T_j - (\text{LED Wattage} \times \text{Thermal Resistance})$  = 147°C

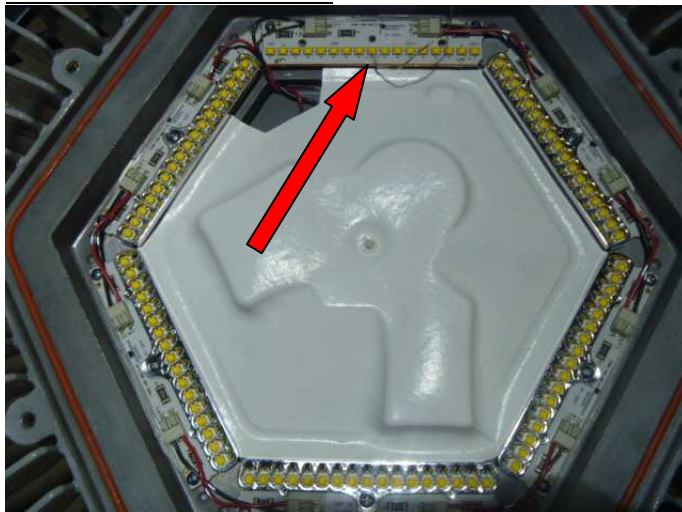
Maximum Measured Manufacturer Designated Source Temperature

Intertek Sample No.	Maximum Measured Source Temperature (°C)	Location	Maximum Rated Source Temperature(°C)
260931	38.2	Per diagram above	147

In-Situ Picture –  $T_s$



In-Situ Picture –  $T_s$  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 "Joseph Schledorn". The signature is fluid and cursive.

Joseph Schledorn  
Engineer  
Lighting Division

Report Reviewed By:

A handwritten signature in black ink, appearing to read "Kenda Branch". The signature is fluid and cursive.

Kenda Branch  
Engineer  
Lighting Division

Attachment:  
260932Q.IES