



# REPORT

Dialight, 1501 Route 34 South, Farmingdale, NJ 07727

Project No. G101359864

Date: December 17, 2013

INTERTEK REPORT NO. 101359864CRT-001  
DIALIGHT REPORT NO. L13024

TEST OF ONE LSA ATEX ZONE 1 LINEAR

MODEL NO. LSA3C4D2G  
DRIVER MODEL NO. INTEGRATED DIALIGHT DRIVER  
LED MODEL NO. CREE XTE

RENDERED TO

DIALIGHT COPORATION  
1501 ROUTE 34 SOUTH  
FARMINDALE, NJ 07727

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

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 500500499.

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: Electrical and Photometric Measurements of Solid State Lighting

ANSI NEMA ANSLG C78.377: 2012: Specifications of the Chromaticity of Solid State Lighting Products

Energy Star Version 1.2 (2012): Program Requirements for Luminaires (Light Fixtures)

Energy Star Manufacturer's Guide Version 2.1 (2010): Guide for Qualifying Solid State Lighting Luminaires

DESCRIPTION OF SAMPLE: The client submitted one production sample of model number LSA3C4D2G. The sample was received by Dialight's lab on December 11, 2013, in undamaged condition and one sample was tested as received. The sample designation was L13024.

DATES OF TESTS: December 11, 2013 through December 17, 2013.

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SUMMARY

Model No.:	LSA3C4D2G
Description:	LSA ATEX Zone 1 Linear

Criteria	Result	
	Sphere	Goniometer
Total Lumen Output (Lumens)	3192	3297
Total Power (W)	35.48	35.64
Luminaire Efficacy (LPW)	89.97	92.51

Criteria	Result
Power Factor at 120Vac	0.990
Power Factor at 277Vac	0.942
Current ATHD % at 120Vac	13.31
Current ATHD % at 277Vac	14.78
Correlated Color Temperature (CCT - K)	6293
Color Rendering Index (CRI - Ra)	68.9
Color Rendering Index (CRI - R9)	-31.2
DUV	-0.004
Chromaticity Coordinate (x)	0.316
Chromaticity Coordinate (y)	0.333
Chromaticity Coordinate (u')	0.197
Chromaticity Coordinate (v')	0.471
Maximum In-Situ Source Temperature Point (°C)	44.2

EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Last Date Calibrated	Calibration Due Date
Elgar AC Power Supply	CW1251P	OP-014	VBV	VBV
Instrument System Spectrometer	CAS140B-151	OB-006	VBV	VBV
Sorensen DC Power Supply	XHR150-7	OP-016	VBV	VBV
Delta Elektronika DC Power Supply	SM300-5	OP-013	VBV	VBV
Volttech Universal Breakout Box	PM1000+	OP-012	03/06/13	03/06/14
Instrument System Lamps (Osram Sylvan STD-20WF-3		OP-007	10/22/13	10/22/14
Instrument System Sphere	ISP1500	OP-010	VBV	VBV
Digital Thermometer 342	TPI 343	OP-011	03/06/13	03/06/14
Instek AC Power Supply	APS-9501	N/A	VBV	VBV
Volttech Power Analyzer	PM1000+	OP-012	02/27/13	02/27/14
Extech Hygro-Thermometer	445703	OP-017	06/01/13	06/01/14
LSI High Speed Mirror Goniometer	6240T	N/A	VBV	VBV
Elgar AC Power Supply	CW1251P	N/A	VBV	VBV
Yokogawa Power Analyzer	760401	OP-004	03/06/13	03/06/14
Omega TC	Dpi8	OP-001	03/06/13	03/06/14
Extech Hygro-Thermometer	445703	OP-018	04/22/13	04/22/14
Fluke 8808A Digital Multimeter	8808A	OP-002	03/06/13	03/06/14
Extech Hygro-Thermometer	445703	OP-017	06/01/13	06/01/14
Fluke Multimeter	PM2525	M127	11/01/13	11/01/14
Digital Thermometer 342	TPI 343	OP-011	03/06/13	03/06/14



## TEST METHODS

### Seasoning in Sample Orientation – LED Products

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

### Photometric and Electrical Measurements – Integrating Sphere Method

A Instrument System CAS 140B Array Spectroradiometer and 1.5 or Five 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 Volttech Power Analyzer.

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

### Photometric and Electrical Measurements – Distribution Method

A LSI Type C High Speed Model 6240T 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.

### 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 TMPPS or TS 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 TEST**

**Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) - Integrating Sphere Method**

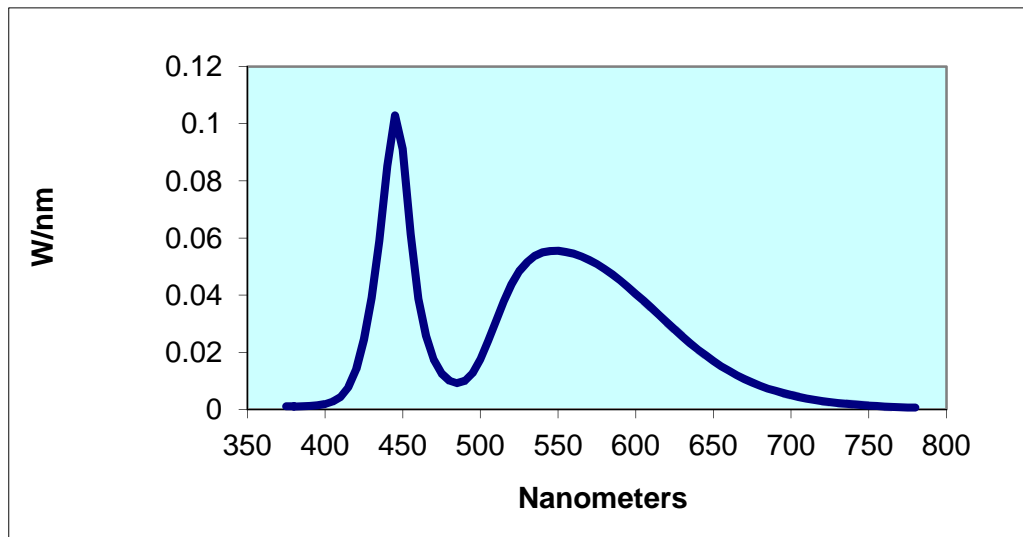
Intertek Sample No.	Base Orientation	Input Voltage {Vac}	Input Current (mA)	Input Power (Watts)	Input Power Factor	Current ATHD (%)	Luminous Flux (Lumens)	Lumen Efficacy (LPW)
L13024	UP	120.0	0.299	35.48	0.990	13.31	3192	89.97
		277.0	0.141	36.90	0.942	14.78		

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')
6293	68.9	-31.2	-0.004	0.316	0.333	0.197	0.471

**Spectral Distribution over Visible Wavelengths**

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
375	0.001	465	0.026	555	0.055	645	0.019	735	0.002
380	0.001	470	0.017	560	0.054	650	0.017	740	0.015
385	0.001	475	0.013	565	0.054	655	0.015	745	0.015
390	0.001	480	0.010	570	0.052	660	0.013	750	0.015
395	0.001	485	0.009	575	0.051	665	0.012	755	0.015
400	0.002	490	0.010	580	0.049	670	0.011	760	0.015
405	0.003	495	0.013	585	0.047	675	0.009	765	0.015
410	0.004	500	0.018	590	0.045	680	0.008	770	0.015
415	0.008	505	0.024	595	0.043	685	0.007	775	0.015
420	0.014	510	0.031	600	0.040	690	0.006	780	0.015
425	0.024	515	0.038	605	0.038	695	0.006		
430	0.039	520	0.044	610	0.036	700	0.005		
435	0.059	525	0.048	615	0.033	705	0.004		
440	0.085	530	0.052	620	0.030	710	0.004		
445	0.103	535	0.054	625	0.028	715	0.003		
450	0.091	540	0.055	630	0.025	720	0.003		
455	0.061	545	0.055	635	0.023	725	0.003		
460	0.039	550	0.056	640	0.021	730	0.002		

**Spectral Data Over Visible Wavelengths**





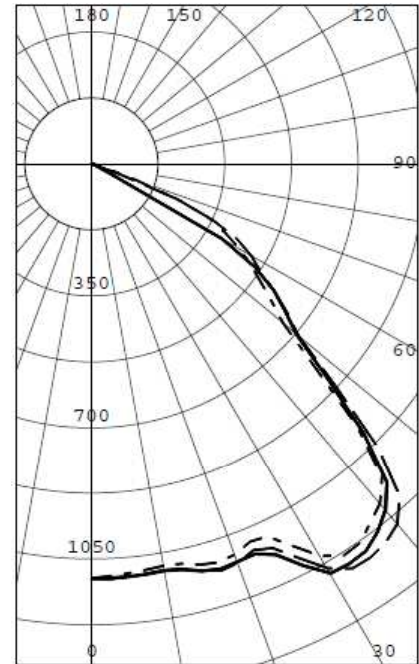
RESULTS OF TEST (cont'd)

Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) – Distribution Method

Intertek Sample No.	Base Orientation	Input Voltage {Vac}	Input Current (A)	Input Power (Watts)	Input Power Factor	Absolute Luminous Flux (Lumens)	Lumen Efficacy (Lumens Per Watt)
L13024	UP	120.0	0.306	35.64	0.992	3297	92.51

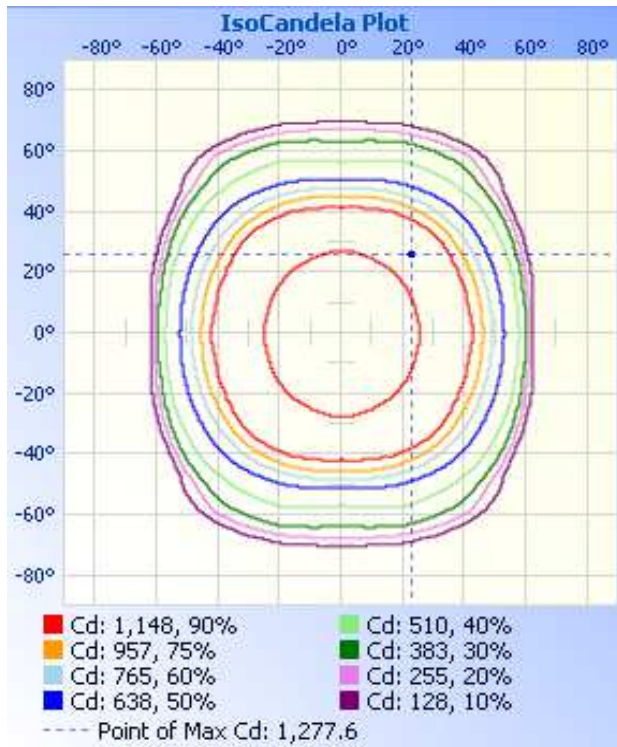
Intensity (Candlepower) Summary at 25°C - Candelas

INTENSITY (CANDLEPOWER) SUMMARY						OUTPUT LUMENS
ANGLE	ALONG	22.5	45	67.5	ACROSS	
0	1102	1102	1102	1102	1102	
5	1093	1094	1101	1091	1102	106
15	1104	1108	1120	1112	1121	315
25	1093	1110	1127	1135	1146	532
35	1230	1260	1278	1239	1256	780
45	989	1045	1062	1007	1010	764
55	540	587	585	587	585	516
65	343	389	352	37	26	252
75	28	28	11	9	7	25
85	5	2	2	3	3	3
90	0	0	0	0	0	
95	0	0	0	0	0	0
105	0	0	0	0	0	0
115	0	0	0	0	0	0
125	0	0	0	0	0	0
135	0	0	0	0	0	0
145	0	0	0	0	0	0
155	0	0	0	0	0	0
165	0	0	0	0	0	0
175	0	0	0	0	0	0
180	0	0	0	0	0	0



RESULTS OF TEST (cont'd)

Isoillumination Plots



Zonal Lumen Summary and Percentages at 25°C

ZONAL LUMENS AND PERCENTAGES

ZONE	LUMENS	% LUMINAIRE
0-30	953	28.94
0-40	1733	52.63
0-60	3013	91.50
0-90	3293	100.00
40-90	1560	47.36
60-90	280	8.50
90-180	0	0.00
0-180	3293	100.00

RESULTS OF TEST (cont'd)

In-Situ Maximum Measured LED Source Temperature

Manufacturer Supplied Documentation:

LED identified as: Cree XTE



CASE TEMPERATURE (T<sub>s</sub>) MEASUREMENT POINT

XLamp XT Family LED case temperature (T<sub>s</sub>) should be measured on the PCB surface, as close to the LED's thermal pad as possible. This measurement point is shown in the picture below.



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

Maximum Junction Temperature from LED specification (T<sub>j</sub>) = 150°C

Thermal Resistance Formula from LED specification = 5°C/W

Maximum Forward Voltage (V<sub>f</sub>) from LED specification = 3.4V

Measured LED Current = 350mA

Calculated LED Wattage = V<sub>f</sub> x Measured LED Current = 1.19W

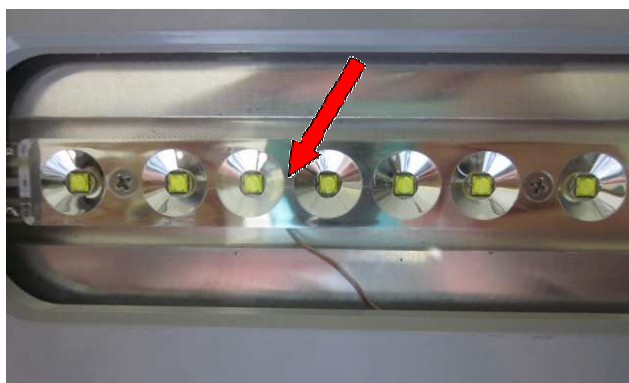
Maximum Source Temperature (T<sub>s</sub>) = T<sub>j</sub> – (LED Wattage x Thermal Resistance) = 144°C

Maximum Measured Manufacturer Designated Source Temperature

Sample No.	Maximum Measured Source Temperature (°C)	Location	Maximum Rated Source Temperature (°C)
L13024	44.2	Per diagram	144

In-Situ Picture – T<sub>s</sub>

In-Situ Picture – T<sub>s</sub> location



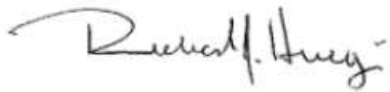
PICTURE (not to scale)



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:



Richard Huegi  
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Senior Optics Technicair  
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