



# REPORT

Dialight, 1501 Route 34 South, Farmingdale, NJ 07727

Project No. G101359867CRT-001

Date: January 27, 2014

INTERTEK REPORT NO. G101359867CRT-001  
DIALIGHT REPORT NO. L13028

TEST OF ONE LSA ATEX ZONE LINEAR - 4 FOOT

MODEL NO. LSA3C4M2G  
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 500500507.

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 LSA3C4M2G. The sample was received by Intertek on December 12, 2013, in undamaged condition and one sample was tested as received. The sample designation was L13028.

DATES OF TESTS: December 12, 2013 through December 18, 2013.

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SUMMARY

Model No.:	LSA3C4M2G
Description:	LSA ATEX Zone Linear - 4 foot

Criteria	Result	
	Sphere	Goniometer
Total Lumen Output (Lumens)	5851	6003
Total Power (W)	67.19	67.21
Luminaire Efficacy (LPW)	87.08	89.32

Criteria	Result
Power Factor	0.991
Current ATHD %	11.86
Correlated Color Temperature (CCT - K)	6695
Color Rendering Index (CRI - Ra)	73.1
Color Rendering Index (CRI - R9)	-20.5
DUV	0.005
Chromaticity Coordinate (x)	0.309
Chromaticity Coordinate (y)	0.329
Chromaticity Coordinate (u')	0.196
Chromaticity Coordinate (v')	0.312
Maximum In-Situ Source Temperature Point (°C)	50.7

EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Last Date Calibrated	Calibration Due Date
Elgar AC Power Supply	CW1251P	OP-014	VBU	VBU
Instrument System Spectrometer	CAS140B-151	OB-006	VBU	VBU
Sorensen DC Power Supply	XHR150-7	OP-016	VBU	VBU
Delta Elektronika DC Power Supply	SM300-5	OP-013	VBU	VBU
Volttech Universal Breakout Box	PM1000+	OP-012	03/06/13	03/06/14
Instrument System Lamps (Osram Sylvar	STD-20WF-3	OP-007	10/22/13	10/22/14
Instrument System Sphere	ISP1500	OP-010	VBU	VBU
Digital Thermometer 342	TPI 343	OP-011	03/06/13	03/06/14
Instek AC Power Supply	APS-9501	N/A	VBU	VBU
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	VBU	VBU
Elgar AC Power Supply	CW1251P	N/A	VBU	VBU
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	11/04/13	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**

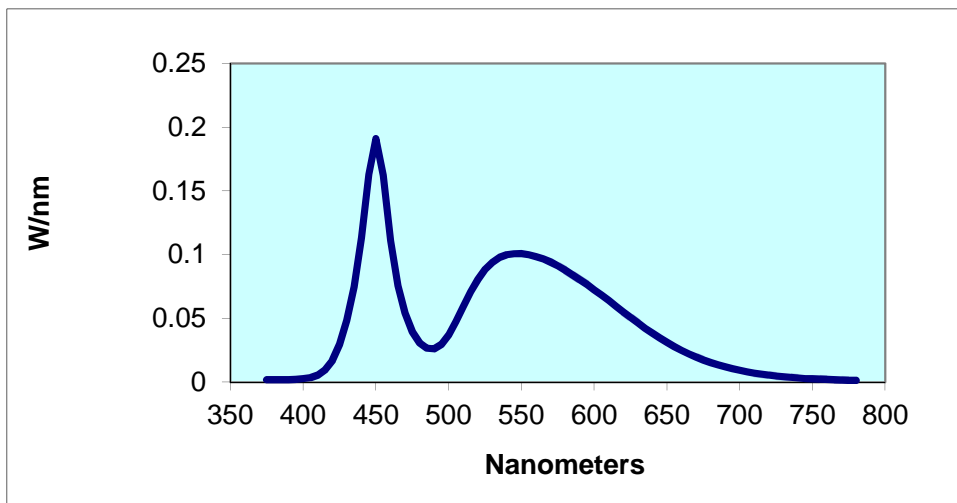
Intertek Sample No.	Base Orientation	Input Voltage {Vac}	Input Current (mA)	Input Power (Watts)	Input Power Factor	Current ATHD (%)	Luminous Flux (Lumens)	Lumen Efficacy (LPW)
L13028	UP	120.0	0.563	67.19	0.991	11.86	5851	87.08

Correlated Color Temperature (K)	CRI -Ra	CRI -R9	DUV	CIE 31' Chromaticity Coordinate	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')
6695	73.1	-20.5	0.005	0.309	0.329	0.196	0.312

**Spectral Distribution over Visible Wavelengths**

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
375	0.002	465	0.0757	555	0.1	645	0.0347	735	0.00371
380	0.002	470	0.0544	560	0.0986	650	0.0312	740	0.01456
385	0.002	475	0.0394	565	0.0967	655	0.0279	745	0.01456
390	0.002	480	0.0306	570	0.0942	660	0.0249	750	0.01456
395	0.002	485	0.0266	575	0.0912	665	0.0222	755	0.01456
400	0.003	490	0.0262	580	0.0879	670	0.0197	760	0.01456
405	0.004	495	0.0297	585	0.0843	675	0.0174	765	0.01456
410	0.006	500	0.0371	590	0.0805	680	0.0154	770	0.01456
415	0.01	505	0.0476	595	0.0765	685	0.0136	775	0.01456
420	0.017	510	0.0594	600	0.0724	690	0.012	780	0.01456
425	0.03	515	0.0708	605	0.0683	695	0.0106		
430	0.049	520	0.0807	610	0.064	700	0.0093		
435	0.075	525	0.0885	615	0.0596	705	0.0082		
440	0.113	530	0.094	620	0.0551	710	0.0072		
445	0.163	535	0.0979	625	0.0507	715	0.0063		
450	0.191	540	0.0999	630	0.0465	720	0.0055		
455	0.162	545	0.1008	635	0.0423	725	0.0048		
460	0.111	550	0.1008	640	0.0384	730	0.0042		

**Spectral Data Over Visible Wavelengths**



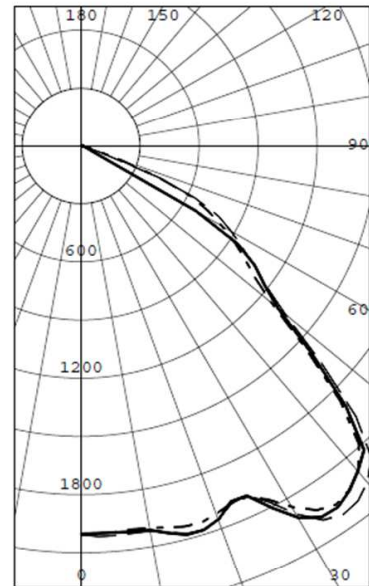
RESULTS OF TEST (cont'd)

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)
L13028	UP	120.0	0.575	67.21	0.991	6003	89.32

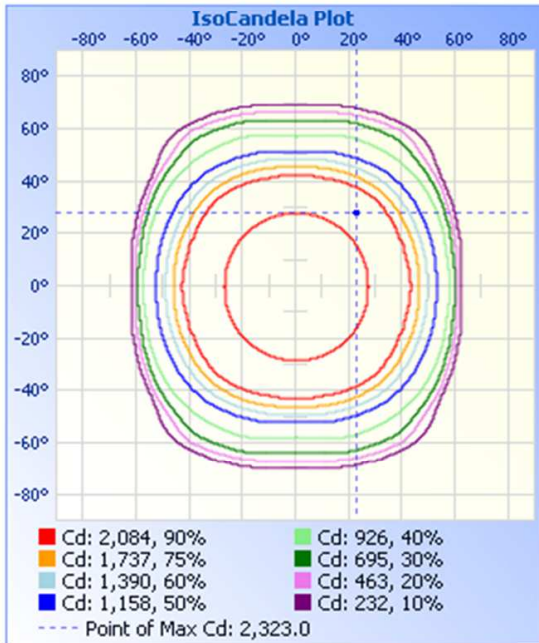
Intensity (Candlepower) Summary at 25°C - Candelas

INTENSITY (CANDLEPOWER) SUMMARY						OUTPUT LUMENS
ANGLE	ALONG	22.5	45	67.5	ACROSS	
0	2003	2003	2003	2003	2003	
5	2001	1988	2019	2003	2004	194
15	2034	2028	2071	2076	2078	579
25	1999	1986	1992	1988	1993	947
35	2260	2275	2323	2266	2276	1414
45	1863	1922	1976	1892	1907	1425
55	1015	1072	1068	1071	1076	952
65	613	696	639	53	42	446
75	42	44	18	14	12	40
85	8	4	4	5	5	5
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	1720	28.66
0-40	3134	52.21
0-60	5511	91.81
0-90	6003	100.00
40-90	2869	47.79
60-90	492	8.19
90-180	0	0.00
0-180	6003	100.00



RESULTS OF TEST (cont'd)

In-Situ Maximum Measured LED Source Temperature

Manufacturer Supplied Documentation:

LED identified as CREE XTE



**PRODUCT CHARACTERISTICS**

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point	$^{\circ}\text{C}/\text{W}$		5	
Viewing angle (FAWM) - white	degrees		115	
Viewing angle (FAWM) - royal blue	degrees		140	
Temperature coefficient of voltage	$\text{mV}/^{\circ}\text{C}$		-2.5	
ESD classification (HBM per MIL-STD-883C)			Class 2	
DC forward current	mA			1500
Reverse voltage	V			5
Forward voltage (@ 350 mA, 85 $^{\circ}\text{C}$ )	V		2.85	3.4
LED junction temperature	$^{\circ}\text{C}$			150

**CASE TEMPERATURE (T<sub>c</sub>) MEASUREMENT POINT**

XLamp XT Family LED case temperature (T<sub>c</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.

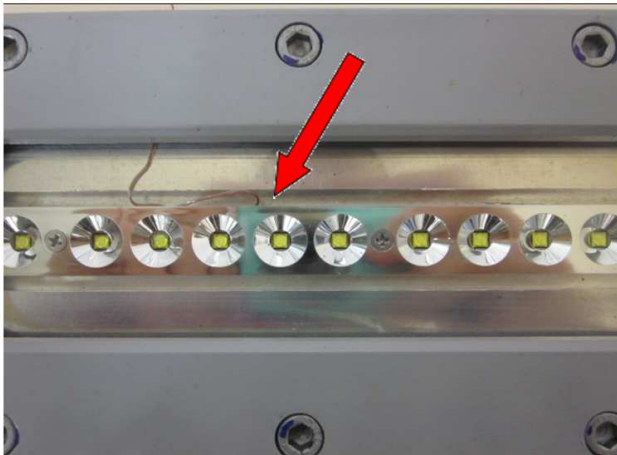


Maximum Junction Temperature from LED specification (T<sub>J</sub>) = 150°  
 Thermal Resistance Formula from LED specification = 5°C/W  
 Maximum Forward Voltage (V<sub>f</sub>) from LED specification = 3.4V  
 Measured LED Current = 305mA  
 Calculated LED Wattage = V<sub>f</sub> x Measured LED Current = 1.037W  
 Maximum Source Temperature (T<sub>s</sub>) = T<sub>J</sub> - (LED Wattage x Thermal Resistance) = 144.8°C

Maximum Measured Manufacturer Designated Source Temperature

Sample No.	Maximum Measured Source Temperature (°C)	Location	Maximum Rated Source Temperature (°C)
L13028	50.7	Per diagram	144.8

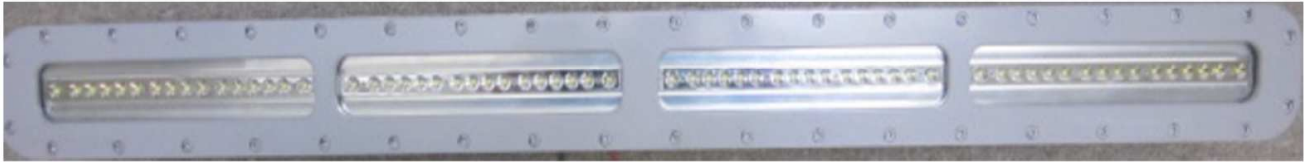
In-Situ Picture – T<sub>s</sub>



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:

Report Reviewed By:

Richard Huegi  
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Lighting Division

Cecil Thomas  
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Attachment: None

Report Reviewed By:

Jeff Davis  
Engineering Manager  
Photometricks - Intertek