SUMMARY

Test Condition: 15V 60Hz for SL02

Criteria	Result
Total Lumen Output (lm)	46.2268
Total Power(W)	1.1259
Lamp Luminaire Efficacy (lm/W)	41.06
Power Factor	0.6370
Field Angle (°)	163.9
Correlated Color Temperature (CCT)	3104
Color Rendering Index (CRI)	96
Color Rendering Index (R_9)	90
Fidelity Index (Rf)	95
Gamut Index (Rg)	99
Chromaticity Coordinate (x)	0.4343
Chromaticity Coordinate (y)	0.4115
Chromaticity Coordinate (u')	0.2458
Chromaticity Coordinate (v')	0.5239
In-situ Case Temperature of LED/COB (ºC)	31.7
Drive Current of LED/COB (mA)	5
Projection Life Time, Reported L70 (hours)	>54000

********** End of Page **********

EQUIPMENT LIST

Equipment Used	Model Number	Control Number
Fluke Temperature Meter	52	EC2357
Everfine- DC Power Supply	WY12010	EC4753-7
Everfine- AC power source for Integrating Sphere System	VPS1010 PWM	EC4760-12
Everfine - AC power source for Goniophotometer System	VPS1060 PWM	EC4753-8
Two meter integrating sphere unit	Everfine – 2M	EC4760
Everfine - Digital Power Meter	PF2010A	EC4760-10
YOKOGAWA - Digital Power Meter	WT210	EC4553
Everfine – Goniophotometer	Go-R5000	EC4753
Draught-proof enclosure	N/A	EC2201
Agilent - Data Acquisition Unit	34970A	EC2043
QINGZHI - Power Meter	8770A	EC2652
YOKOGAWA - Digital Power Meter	WT-210	EC4553

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TEST METHOD

Seasoning in Sample Orientation – LED Products

No seasoning was performed in accordance with IESNA LM-79

Light Distribution and Output Measurements

Light Distribution and totel light output (luminous flux) were measured using a Go-R5000 Type-C Rotating Mirror Goniophotometer. Temperature 25ºC and relative humidity of 60% was measured at a position in the testing laboratory.

The lamp rotates only around the fixed vertical axle in the prescribed burning position. The lamp and mirror permit the measurement of luminous intensity at the direction of any horizontal or vertical angle without tilting the lamp. The lamp was allowed to stabilize before measurements were made.

Chromaticity Measurements

Chromaticity was measured using a 2 meters integrating sphere spectral lamp measurement system. Temperature was measured at a position inside the sphere shielded from direct light. Relative humidity of 65% was measured at a position in the testing laboratory.

Spectral radiant flux measurements were made using spectroradiometer attached to the detector port of the integrating sphere. Each lamp was allowed to stabilise before measurements were made. The calibration of the integrating sphere spectroradiometer system is by the reference/standard lamps which are traceable to National Institute of Metrology P.R. CHINA. Lamp efficacy (lumens per watt) for each lamp model was then computed based on the luminous flux result. Electrical measurements including voltage, power and power factor were measured using YOKOGAWA - Digital Power Meter., model WT210.

Standard lamp used:
Model: Labsphere SCL-1400
Current: 2.679A

Temperature Measurement Test

The sample was operated at 25±5°C until constant temperatures were obtained. A temperature was considered constant if sample was operating for at least three hours and upon three successive readings-taken at 15 minutes intervals- were within one degree and were not rising.

Thermocouples were attached at locations described in the results by means of epoxy.

Driver current Measurement Test

During the temperature measurement test, measure the forward current for each LED package/array/module.

********** End of Page **********

RESULTS OF TESTS

Test Condition: 15V 60Hz for SL02

Total operation burning time: 70 min
Stabilization time: 60 min

Photometric Measurements at 25°C

Intertek Sample No.	Base Orientation	Correlated Color Temperature (K)	CRI	CIE 31' Chromaticity Coordinate (x)	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')
SL02							
A240906-22-003	N/A	3104	96	0.4343	0.4115	0.2458	0.5239

Photometric and Electrical Measurements at 25°C

Intertek Sample No.	Base Orientation	Input Voltage (Vac)	Input Current (A)	Lamp Input Power (Watts)	Input Power Factor	Absolute Luminous Flux (Lumens)	Lumen Efficacy (Lumens Per Watt)
SL02							
A240906-22-003	N/A	15.0	0.1175	1.1259	0.6370	46.2268	41.06

Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens (lm)	% Luminaire (%)
SL02		
0-30	5.777	12.50
0-40	20.144	43.58
0-60	35.795	77.43
0-90	46.170	99.88
0-180	46.227	100.0

Beam Angle

	Horizontal Spread (°)	Vertical Spread (°)
SL02		
Beam (50%)	114.3	113.1
Beam Angle	113.7	

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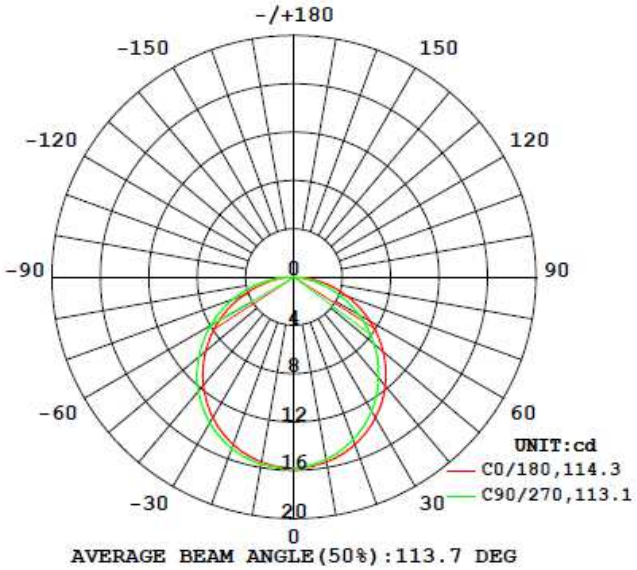
RESULTS OF TESTS (cont'd)

Intensity (Candlepower) Summary at 25°C – Candelas

Test Condition: 15V 60Hz for SL02

G \ C(°)	0	22.5	45	67.5	90
0	15.792	15.792	15.792	15.792	15.792
5	15.735	15.676	15.642	15.623	15.616
10	15.532	15.427	15.358	15.329	15.321
15	15.196	15.057	14.953	14.901	14.869
20	14.737	14.561	14.422	14.345	14.305
25	14.146	13.945	13.762	13.661	13.612
30	13.458	13.211	12.976	12.855	12.805
35	12.649	12.361	12.097	11.968	11.900
40	11.742	11.403	11.108	10.947	10.897
45	10.721	10.366	10.038	9.872	9.809
50	9.617	9.252	8.901	8.710	8.645
55	8.449	8.067	7.705	7.498	7.431
60	7.226	6.826	6.463	6.234	6.169
65	5.969	5.558	5.195	4.967	4.887
70	4.691	4.276	3.920	3.685	3.604
75	3.431	3.019	2.654	2.397	2.327
80	2.186	1.800	1.435	1.164	1.072
85	1.046	0.670	0.181	0.018	0.011
90	0.035	0.002	0.003	0.003	0.003



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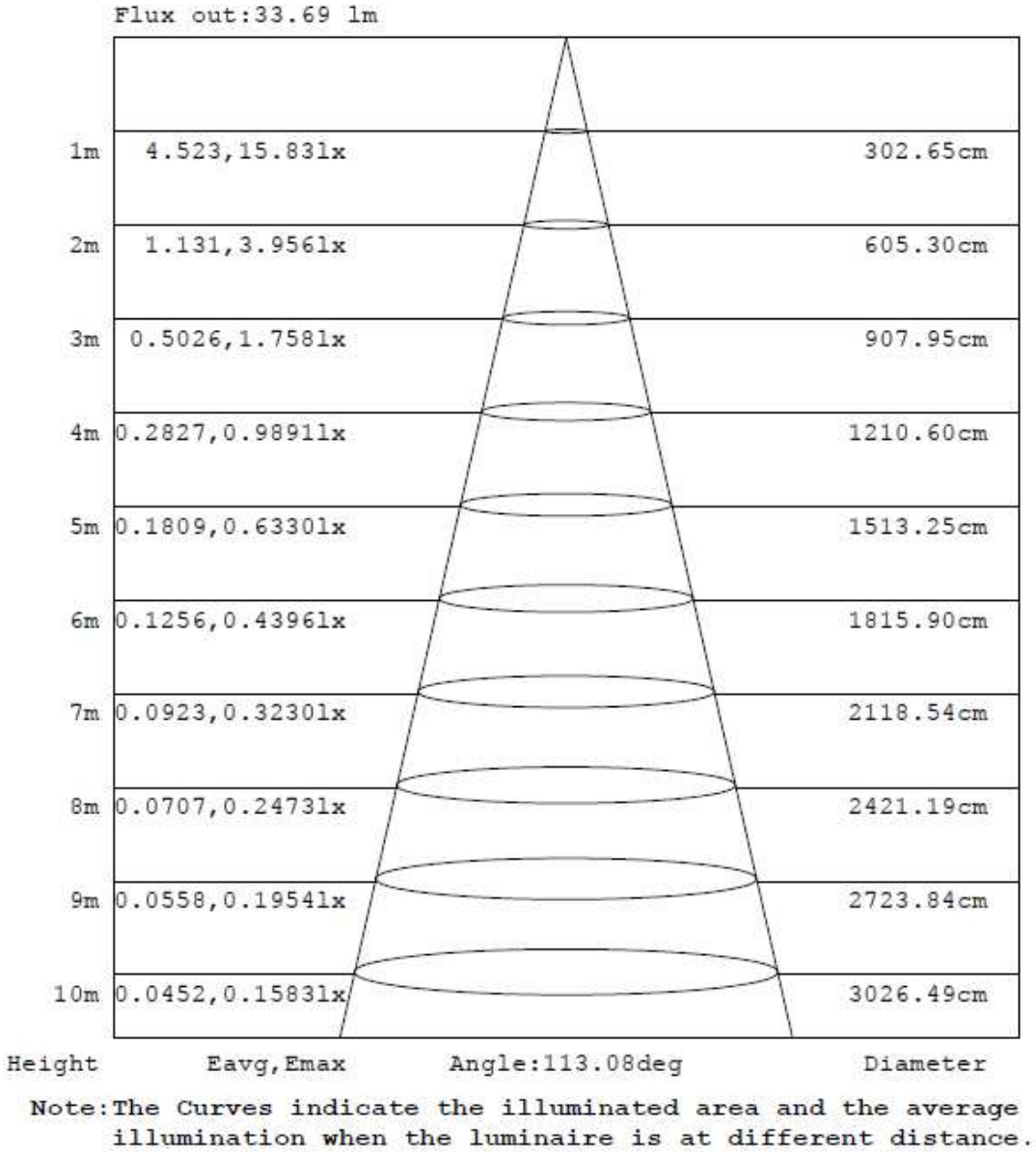
RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL02

Illumination Plots

Model No.: SL02
Mount Height: 10 m

Illuminance - Cone of Light



Note: The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

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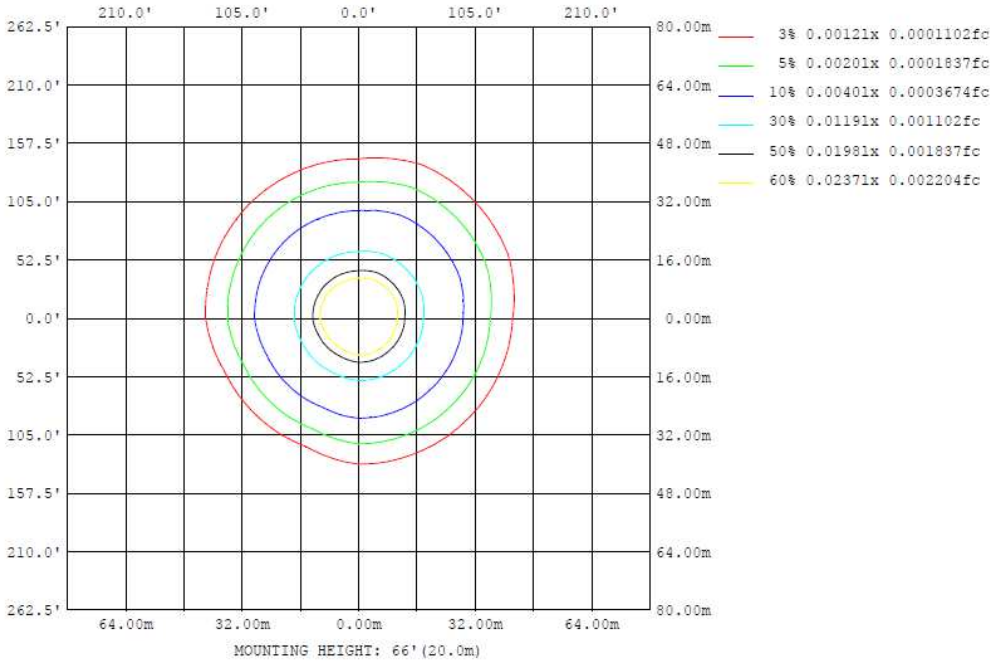
RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL02

Model No.: SL02
Mount Height: 20 m
Isoillumination Plot



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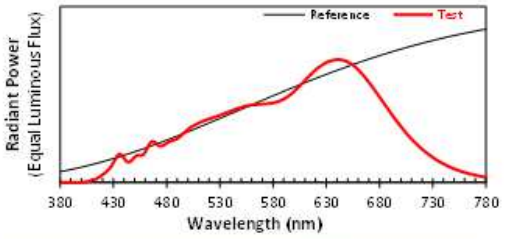
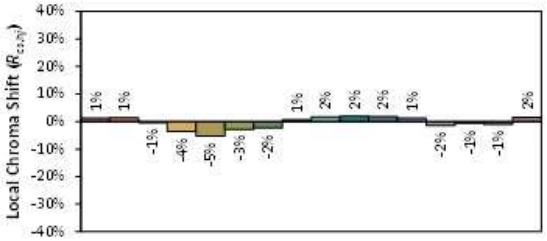
RESULTS OF TESTS (cont'd)

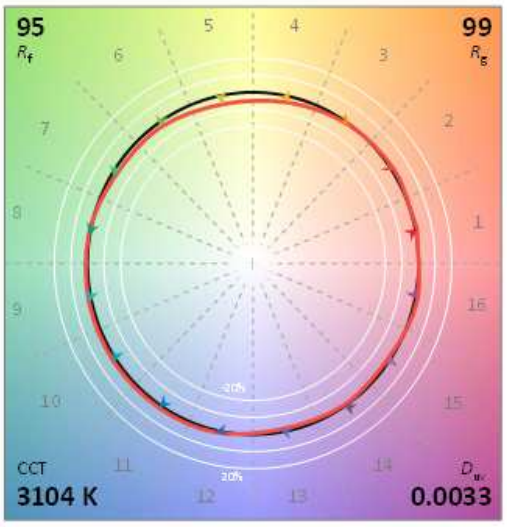
Test Condition: 15V 60Hz for SL02

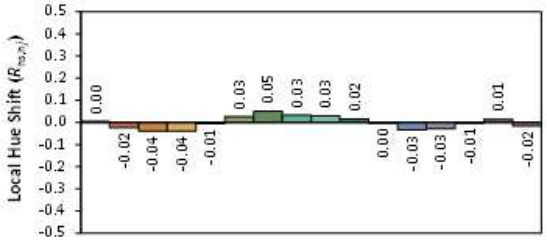
ANSI/IES TM-30-18 Color Rendition Report

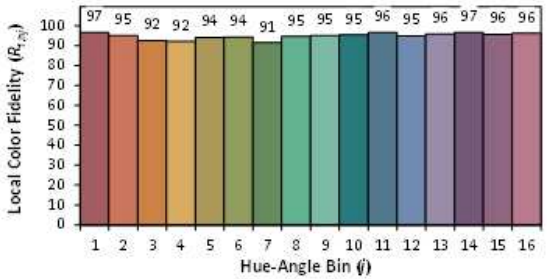
Source:	LED	**Manufacturer:**	STERLING LIGHTING LLC
Date:	9/6/2024	**Model:**	SL02

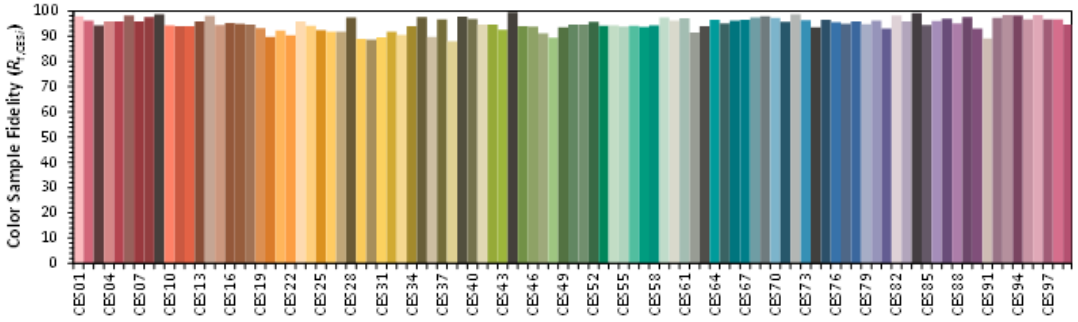












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.4343
y	0.4115
u'	0.2458
v'	0.5239

CIE 13.3-1995 (CRI)	
R_a	96
R_9	90

********** End of Page **********

RESULTS OF TESTS (cont'd)

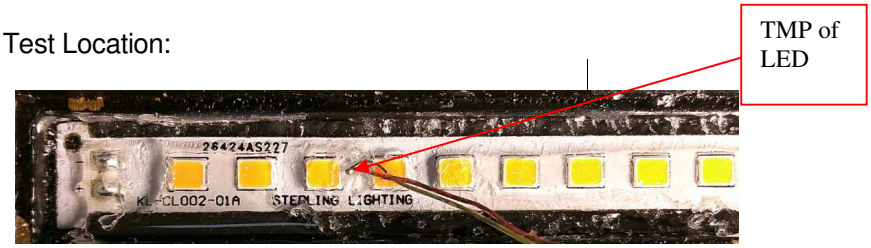
IN SITU TEMPERATURE MEASUREMENT TEST

Test condition Input Voltage - 15Vac 60Hz

Ambient temperature: 25±5°C, Relative Humidity: 50%

Test Model: SL02
LED model name: BXEN-27S-13H-9C
LED manufacturer: Bridgelux Inc.

Test Location:



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RESULTS OF TESTS (cont'd)

IN SITU TEMPERATURE MEASUREMENT TEST

Test Results of LED chip temperature and current

TMP led: BXEN-27S-13H-9C	
In-situ case temperature of LED source (°C)	Limit single led chip temperature(℃)
31.7	105
Measured Drive current for each LED package/array/module (mA)	Limit single led chip current (mA)
100	120

Note: In-situ case temperature was corrected to ambient temperature at 25°C in above table.

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RESULTS OF TESTS (cont'd)

IN SITU TEMPERATURE MEASUREMENT TEST

Lumen Maintenance Life Projection (Cont'd) - led chip point 1

The Calculation is based on the Illumination Engineering Society's TM-21-11: Projecting Long Term Lumen Maintenance of LED Light Sources.

Table 1: Report at each LM-80 Test Condition					
Description of LED Light Source Tested (manufacturer, model, catalog number)	Manufacturer: Bridgelux Inc. Model: BXEN-27S-13H-9C Report Number: RA2018101101-A1 Issued: Nov. 13, 2020				
Test Condition 1 - 55ºC Case Temp		**Test Condition 2 - 85ºC Case Temp**		**Test Condition 3 - 105ºC Case Temp**	
Sample size	20	Sample size	20	Sample size	20
Number of failures	0	Number of failures	0	Number of failures	0
DUT drive current used in the test (mA)	120	DUT drive current used in the test (mA)	120	DUT drive current used in the test (mA)	120
Test duration (hours)	9,000	Test duration (hours)	9,000	Test duration (hours)	9,000
Test duration used for projection (hour to hour)	4,000 - 9,000	Test duration used for projection (hour to hour)	4,000 - 9,000	Test duration used for projection (hour to hour)	4,000 - 9,000
Tested case temperature (ºC)	55	Tested case temperature (ºC)	85	Tested case temperature (ºC)	105
α	9.312E-07	α	2.053E-06	α	2.890E-06
B	1.000	B	1.000	B	1.000
Reported L70(9k) (hours)	>54000	Reported L70(9k) (hours)	>54000	Reported L70(9k) (hours)	>54000

Table 2: Interpolation Report (projection based on *in-situ* temperature entered)	
$T_{s,1}$ (ºC)	55.00
$T_{s,1}$ (K)	328.15
α_1	9.312E-07
B_1	1.000
$T_{s,2}$ (ºC)	-
$T_{s,2}$ (K)	-
α_2	-
B_2	-
E_a/k_b	-
A	-
B_0	1.000
$T_{s,i}$ (ºC)	31.70
$T_{s,i}$ (K)	304.85
α_i	9.312E-07
Reported L70(9k) at 31.7ºC (hours)	>54000

***In-Situ* Inputs**	
Drive current for each LED package/array/module (mA):	100
In-situ case temperature (T_c, ºC):	31.7
Percentage of initial lumens to project to (e.g. for L_{70}, enter 70):	70

Results

Time (t) at which to estimate lumen maintenance (hours):	50,000
Lumen maintenance at time (t) (%):	95.46%
Reported L70 (hours):	>54000

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