

SUMMARY

Test Condition: 15V 60Hz for SL21

Setting: 1 (Max light output)

Criteria	Result
Total Lumen Output (lm)	876.874
Total Power(W)	9.8125
Lamp Luminaire Efficacy (lm/W)	89.36
Power Factor	0.7131
Field Angle (°)	64.2
Correlated Color Temperature (CCT)	3070
Color Rendering Index (CRI)	98
Color Rendering Index (R ₉)	94
Fidelity Index (R _f)	95
Gamut Index (R _g)	102
Chromaticity Coordinate (x)	0.4324
Chromaticity Coordinate (y)	0.4031
Chromaticity Coordinate (u')	0.2481
Chromaticity Coordinate (v')	0.5203
In-situ Case Temperature of LED/COB (°C)	41.5
Drive Current of LED/COB (mA)	255
Projection Life Time, Reported L70 (hours)	>66000

Test Condition: 15V 60Hz for SL21

Setting: 2 (Medium light output)

Criteria	Result
Total Lumen Output (lm)	731.22
Total Power(W)	7.9077
Lamp Luminaire Efficacy (lm/W)	92.47
Power Factor	0.7034
Correlated Color Temperature (CCT)	3065
Color Rendering Index (CRI)	98
Color Rendering Index (R ₉)	95
Fidelity Index (R _f)	95
Gamut Index (R _g)	102
Chromaticity Coordinate (x)	0.4325
Chromaticity Coordinate (y)	0.4026
Chromaticity Coordinate (u')	0.2483
Chromaticity Coordinate (v')	0.5201

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

SUMMARY (Cont'd)

Test Condition: 15V 60Hz for SL21

Setting: 3 (Medium light output)

Criteria	Result
Total Lumen Output (lm)	604.757
Total Power(W)	6.3870
Lamp Luminaire Efficacy (lm/W)	94.69
Power Factor	0.6803
Correlated Color Temperature (CCT)	3058
Color Rendering Index (CRI)	98
Color Rendering Index (R ₉)	96
Fidelity Index (R _f)	95
Gamut Index (R _g)	102
Chromaticity Coordinate (x)	0.4327
Chromaticity Coordinate (y)	0.4023
Chromaticity Coordinate (u')	0.2486
Chromaticity Coordinate (v')	0.5201

Test Condition: 15V 60Hz for SL21

Setting: 4 (Medium light output)

Criteria	Result
Total Lumen Output (lm)	500.509
Total Power(W)	5.1944
Lamp Luminaire Efficacy (lm/W)	96.35
Power Factor	0.6880
Correlated Color Temperature (CCT)	3052
Color Rendering Index (CRI)	98
Color Rendering Index (R ₉)	96
Fidelity Index (R _f)	95
Gamut Index (R _g)	102
Chromaticity Coordinate (x)	0.4330
Chromaticity Coordinate (y)	0.4021
Chromaticity Coordinate (u')	0.2489
Chromaticity Coordinate (v')	0.5200

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SUMMARY (Cont'd)

Test Condition: 15V 60Hz for SL21

Setting: 5 (Medium light output)

Criteria	Result
Total Lumen Output (lm)	376.949
Total Power(W)	3.8609
Lamp Luminaire Efficacy (lm/W)	97.63
Power Factor	0.6914
Correlated Color Temperature (CCT)	3044
Color Rendering Index (CRI)	98
Color Rendering Index (R ₉)	97
Fidelity Index (R _f)	95
Gamut Index (R _g)	102
Chromaticity Coordinate (x)	0.4332
Chromaticity Coordinate (y)	0.4016
Chromaticity Coordinate (u')	0.2492
Chromaticity Coordinate (v')	0.5198

Test Condition: 15V 60Hz for SL21

Setting: 6 (Minimum light output)

Criteria	Result
Total Lumen Output (lm)	261.383
Total Power(W)	2.6767
Lamp Luminaire Efficacy (lm/W)	97.65
Power Factor	0.6922
Correlated Color Temperature (CCT)	3037
Color Rendering Index (CRI)	98
Color Rendering Index (R ₉)	98
Fidelity Index (R _f)	95
Gamut Index (R _g)	102
Chromaticity Coordinate (x)	0.4333
Chromaticity Coordinate (y)	0.4010
Chromaticity Coordinate (u')	0.2495
Chromaticity Coordinate (v')	0.5196

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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 total light output (luminous flux) were measured using a Go-R5000 Type-C Rotating Mirror Goniophotometer. Temperature 25°C 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 stabilize 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 SL21

Setting: 1 (Max light output)

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')
SL21							
0231201-15-017	N/A	3070	98	0.4324	0.4031	0.2481	0.5203

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)
SL21							
0231201-15-017	N/A	15.0	0.9203	9.8125	0.7131	876.874	89.36

Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens (lm)	% Luminaire (%)
SL21		
0-30	752.4	85.8
0-40	839.7	95.8
0-60	873.6	99.6
0-90	876.9	100.00
0-180	876.9	100.00

Beam Angle

	Horizontal Spread (°)	Vertical Spread (°)
SL21		
Beam (50%)	33.0	32.9
Beam Angle	33.0	

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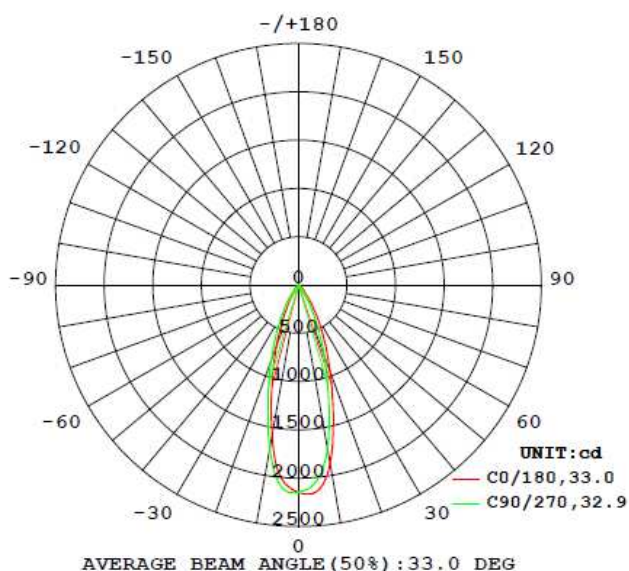
RESULTS OF TESTS (cont'd)

Intensity (Candlepower) Summary at 25°C – Candelas

Test Condition: 15V 60Hz for SL21

Setting: 1 (Max light output)

G \ C(°)	0	22.5	45	67.5	90
0	2144.1	2144.1	2144.1	2144.1	2144.1
5	2145.4	2124.1	2096.5	2069.1	2045.7
10	1877.3	1841.1	1802.4	1756.9	1716.4
15	1382.8	1351.8	1292.3	1238.0	1195.4
20	950.7	911.5	862.6	809.3	775.8
25	630.7	584.7	536.0	492.2	452.8
30	392.9	352.2	312.2	274.7	237.1
35	219.9	193.2	116.0	59.4	45.8
40	103.5	72.8	32.9	19.6	16.2
45	62.8	36.4	9.6	6.0	5.5
50	33.8	11.6	4.4	2.9	2.7
55	18.1	4.9	2.3	1.0	0.7
60	7.0	2.7	0.7	0.1	0.0
65	3.9	1.4	0.1	0.0	0.0
70	2.2	0.5	0.0	0.0	0.0
75	0.9	0.1	0.0	0.0	0.0
80	0.2	0.0	0.0	0.0	0.0
85	0.0	0.0	0.0	0.0	0.0
90	0.0	0.0	0.0	0.0	0.0



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RESULTS OF TESTS (cont'd)

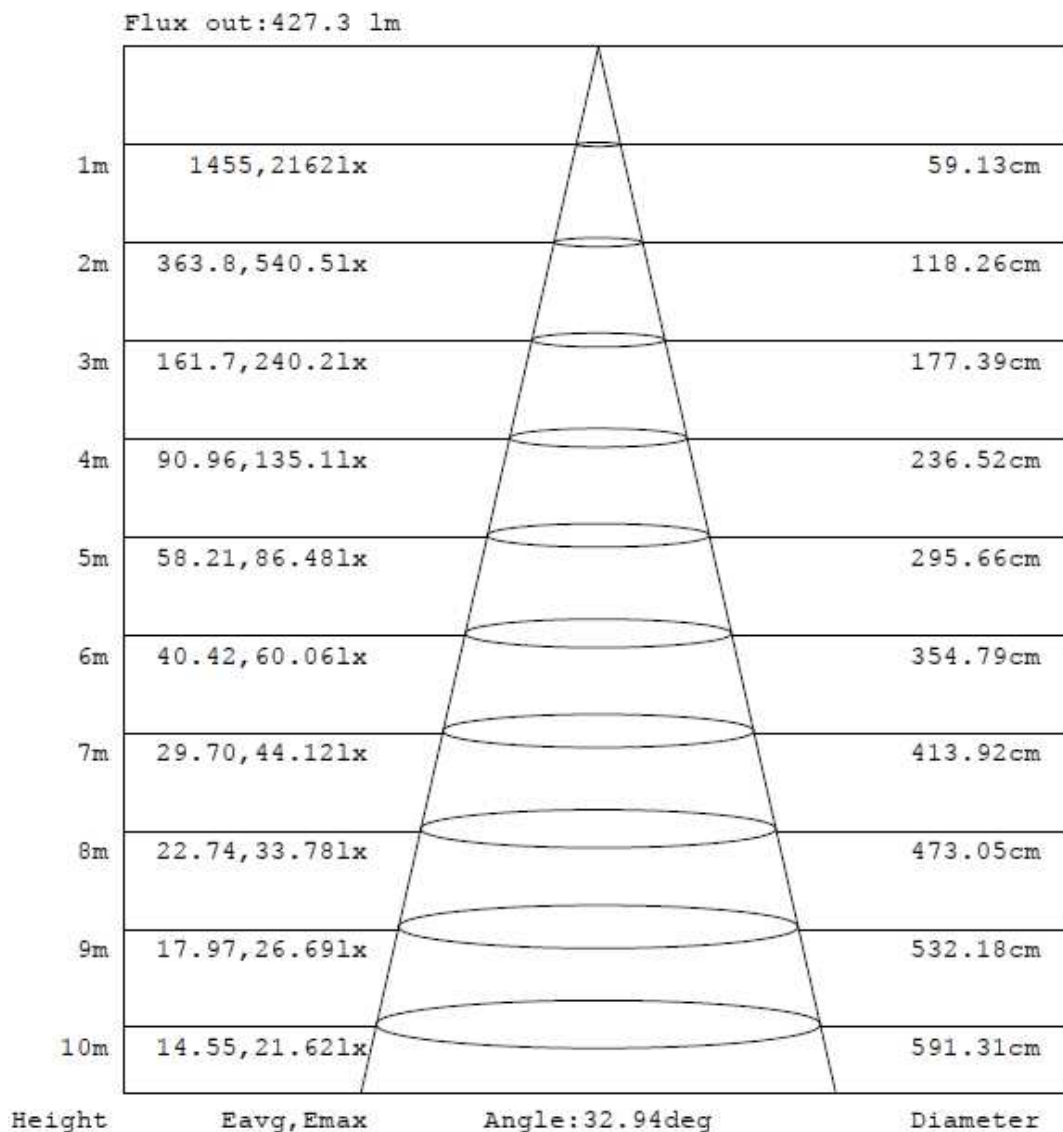
Test Condition: 15V 60Hz for SL21

Setting: 1 (Max light output)

Illumination Plots

Model No.: SL21
Mount Height: 10 m

Illuminance - Cone of Light



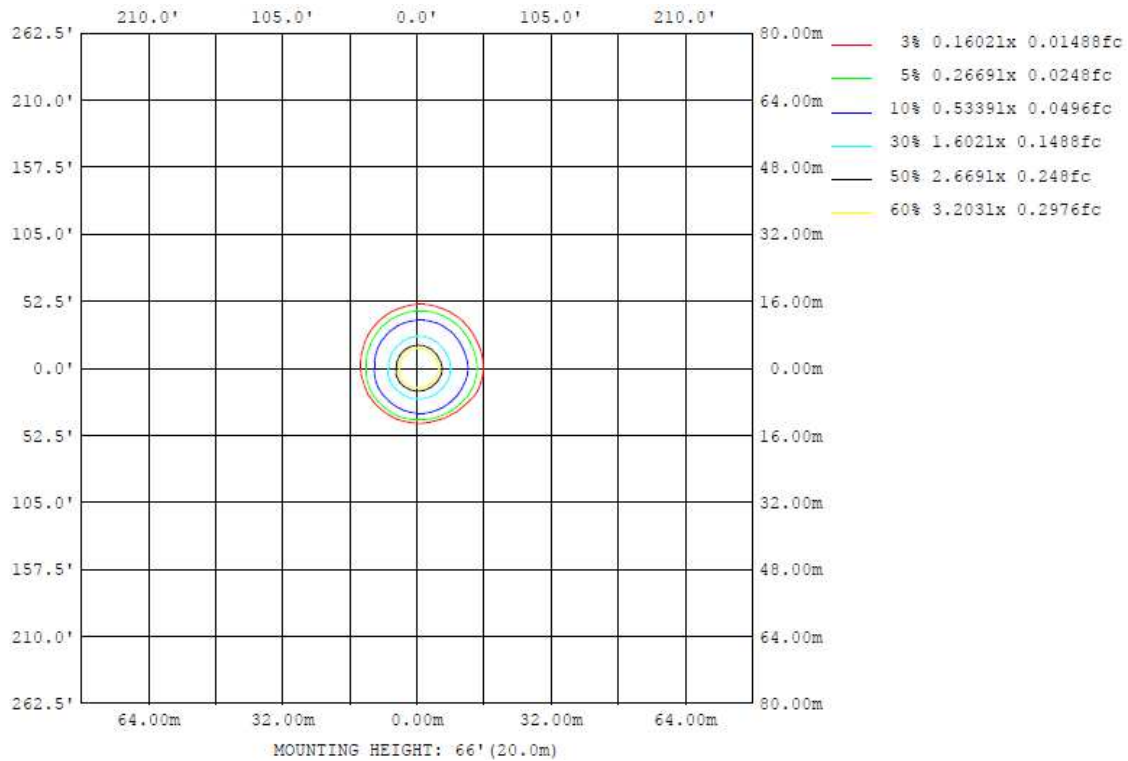
Note: The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

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RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21
Setting: 1 (Max light output)

Model No.: SL21
Mount Height: 20 m
Isoillumination Plot



RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21
Setting: 1 (Max light output)

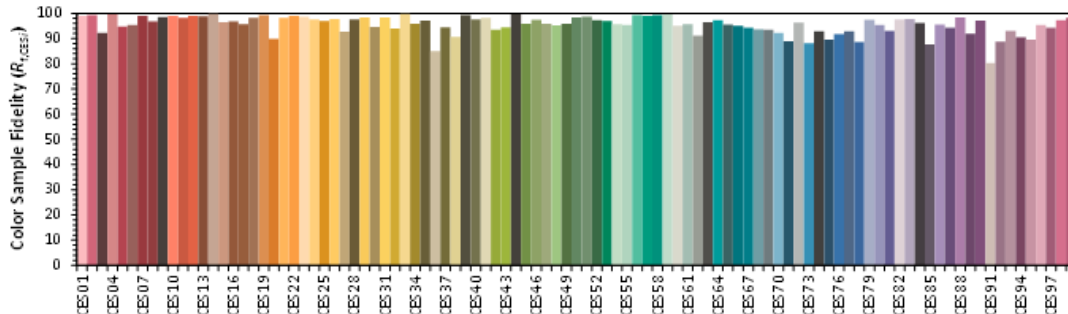
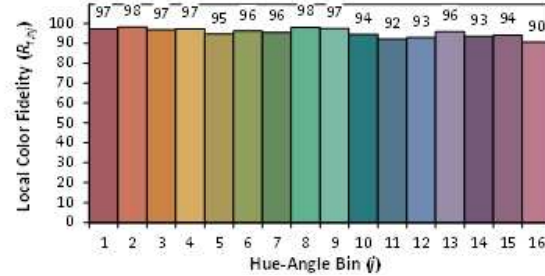
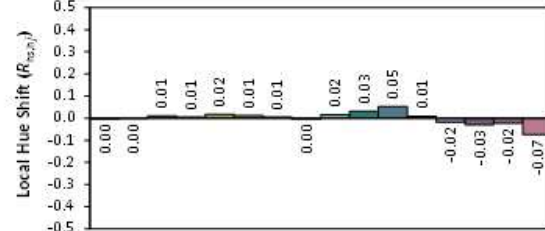
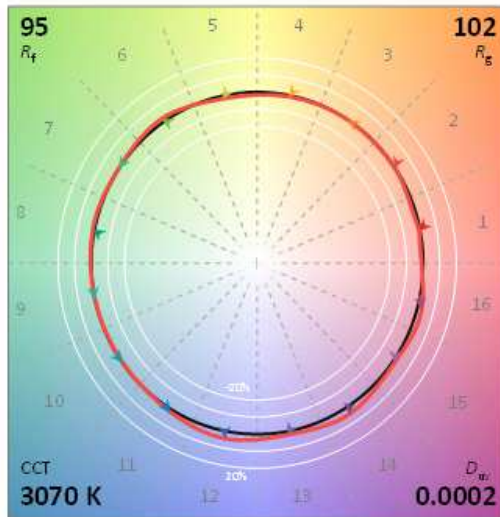
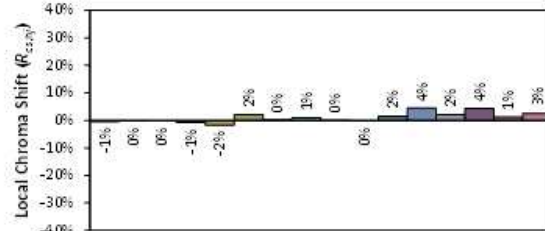
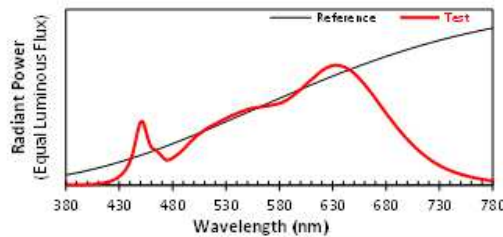
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: STERLING LIGHTING LLC

Date: 12/18/2023

Model: SL21



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

x 0.4324
y 0.4031
u' 0.2481
v' 0.5203

CIE 13.3-1995
(CRI)

R_a 98
R_g 94

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

RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21

Setting: 2 (Medium light output)

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')
SL21							
0231201-15-017	N/A	3065	98	0.4325	0.4026	0.2483	0.5201

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)
SL21							
0231201-15-017	N/A	15.0	0.7610	7.9077	0.7034	731.22	92.47

Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens (lm)	% Luminaire (%)
SL21		
0-30	629.4	86.1
0-40	702.1	96.0
0-60	728.7	99.7
0-90	731.2	100.00
0-180	731.2	100.00

Beam Angle

	Horizontal Spread (°)	Vertical Spread (°)
SL21		
Beam (50%)	33.0	33.0
Beam Angle	33.0	

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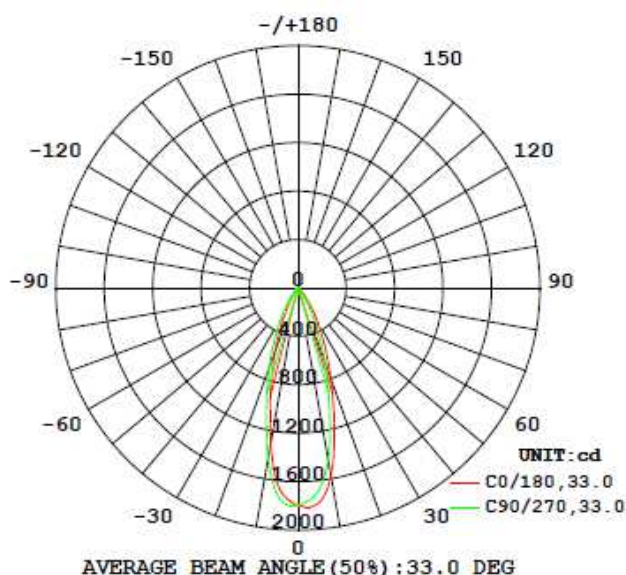
RESULTS OF TESTS (cont'd)

Intensity (Candlepower) Summary at 25°C – Candelas

Test Condition: 15V 60Hz for SL21

Setting: 2 (Medium light output)

G \ C(°)	0	22.5	45	67.5	90
0	1793.7	1793.7	1793.7	1793.7	1793.7
5	1793.9	1774.6	1751.1	1727.3	1708.6
10	1575.6	1544.6	1511.8	1468.1	1438.6
15	1163.9	1132.9	1084.4	1038.7	1003.9
20	797.1	763.7	719.3	677.0	651.0
25	522.2	489.0	445.0	406.6	372.2
30	325.6	288.9	256.5	225.1	198.4
35	178.4	155.8	78.2	46.2	38.9
40	85.8	41.9	22.9	13.1	11.7
45	47.6	23.6	6.4	4.8	4.6
50	24.8	6.5	3.2	2.4	2.3
55	9.2	3.0	1.5	0.7	0.6
60	4.5	1.6	0.1	0.0	0.0
65	2.5	0.6	0.0	0.0	0.0
70	1.3	0.1	0.0	0.0	0.0
75	0.4	0.0	0.0	0.0	0.0
80	0.1	0.0	0.0	0.0	0.0
85	0.0	0.0	0.0	0.0	0.0
90	0.0	0.0	0.0	0.0	0.0



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RESULTS OF TESTS (cont'd)

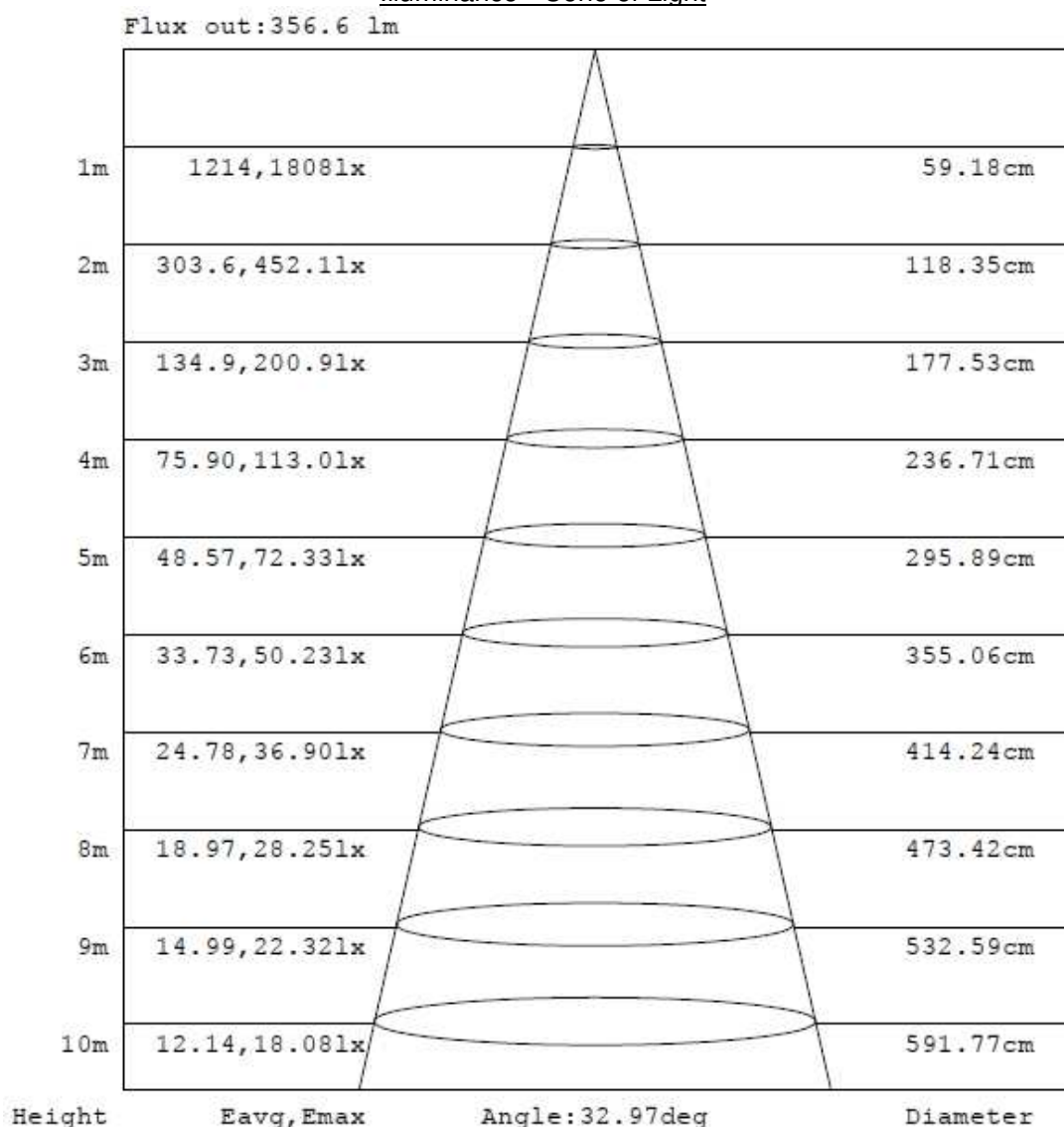
Test Condition: 15V 60Hz for SL21

Setting: 2 (Medium light output)

Illumination Plots

Model No.: SL21
Mount Height: 10 m

Illuminance - Cone of Light



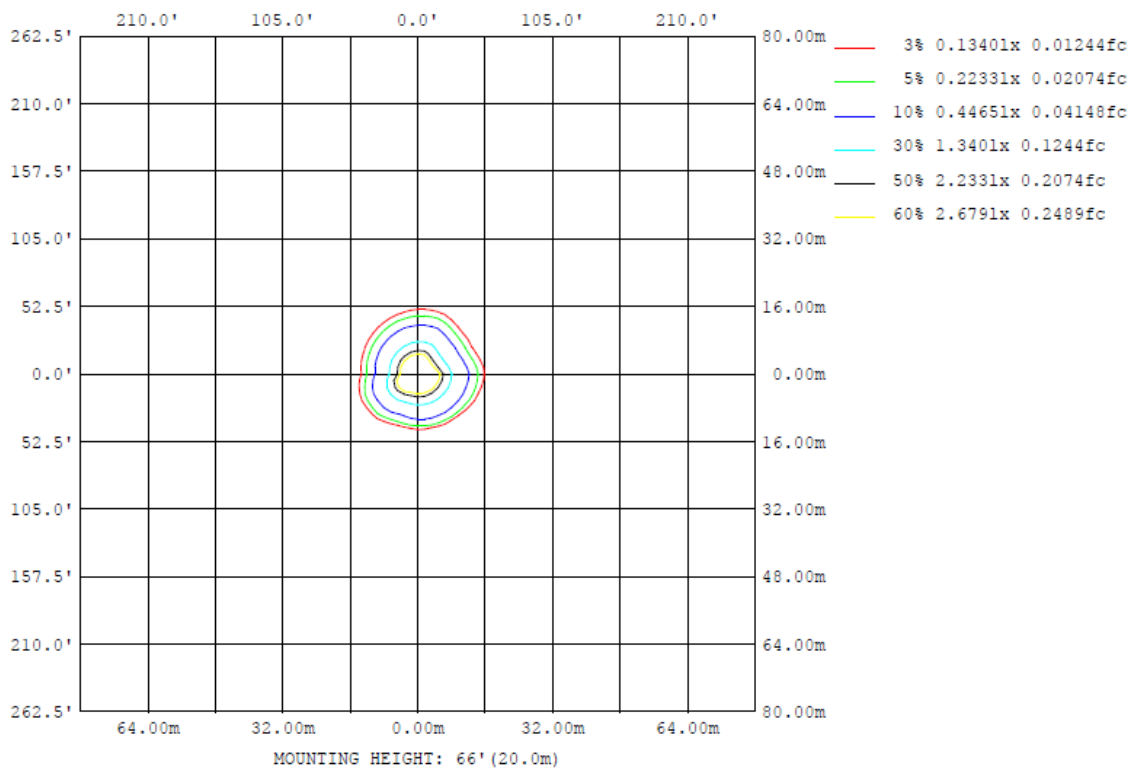
Note: The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

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RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21
Setting: 2 (Medium light output)

Model No.: SL21
Mount Height: 20 m
Isoillumination Plot



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RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21

Setting: 2 (Medium light output)

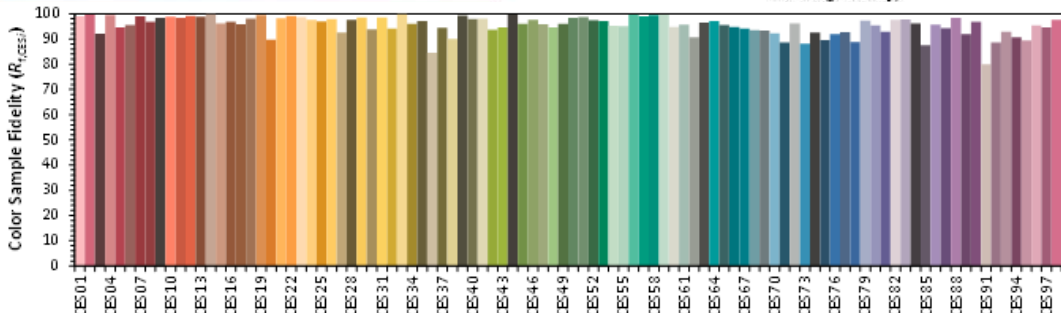
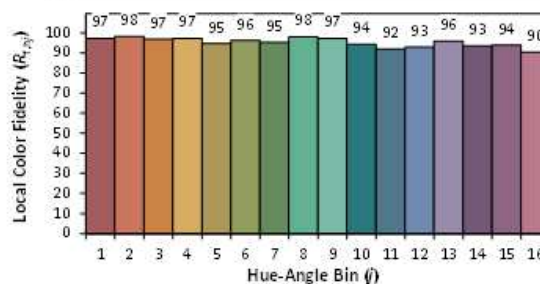
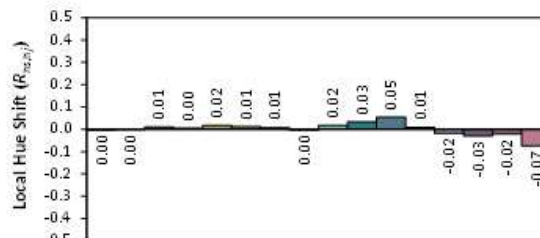
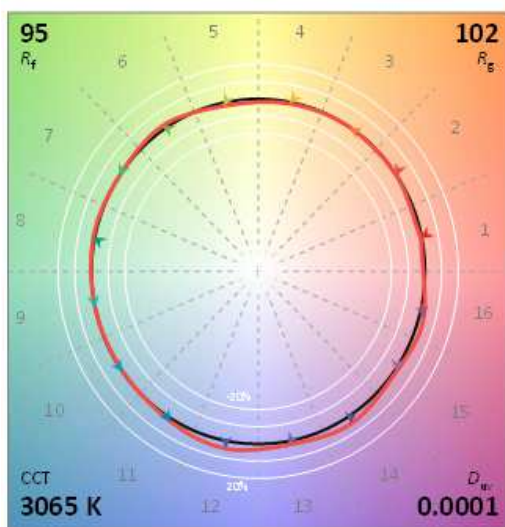
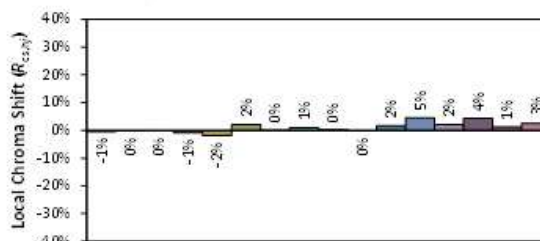
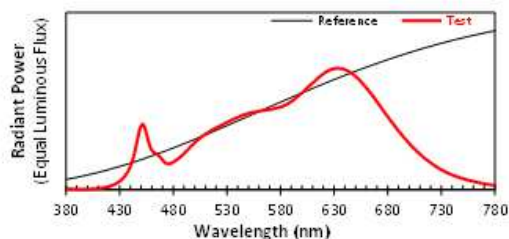
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: STERLING LIGHTING LLC

Date: 12/18/2023

Model: SL21



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

x 0.4325

y 0.4026

u' 0.2483

v' 0.5201

CIE 13.3-1995
(CRI)

R_a 98

R_s 95

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

RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21

Setting: 3 (Medium light output)

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')
SL21							
0231201-15-017	N/A	3058	98	0.4327	0.4023	0.2486	0.5201

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)
SL21							
0231201-15-017	N/A	15.0	0.6186	6.3870	0.6803	604.757	94.69

Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens (lm)	% Luminaire (%)
SL21		
0-30	519.6	85.9
0-40	579.5	95.8
0-60	602.6	99.6
0-90	604.8	100.00
0-180	604.8	100.00

Beam Angle

	Horizontal Spread (°)	Vertical Spread (°)
SL21		
Beam (50%)	32.9	33.0
Beam Angle	32.9	

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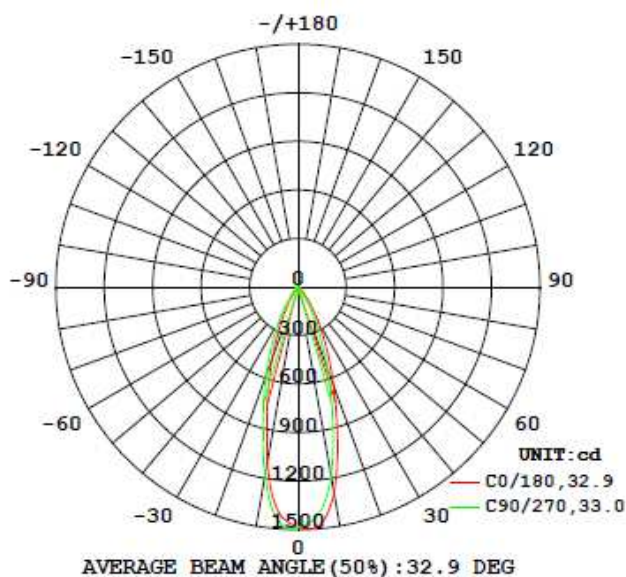
RESULTS OF TESTS (cont'd)

Intensity (Candlepower) Summary at 25°C – Candelas

Test Condition: 15V 60Hz for SL21

Setting: 3 (Medium light output)

G \ C(°)	0	22.5	45	67.5	90
0	1483.3	1483.3	1483.3	1483.3	1483.3
5	1479.0	1463.7	1445.2	1427.5	1413.1
10	1289.2	1264.8	1240.7	1208.8	1189.1
15	946.3	923.8	886.3	852.7	828.1
20	647.6	620.7	587.6	555.9	536.9
25	424.5	396.5	362.4	334.2	307.8
30	264.6	236.4	207.9	183.7	164.4
35	143.6	125.4	62.0	37.1	32.0
40	68.8	34.1	20.1	10.1	9.4
45	38.6	18.7	5.2	3.9	3.8
50	20.1	5.4	2.7	1.9	1.9
55	7.3	2.5	1.2	0.5	0.5
60	3.7	1.3	0.1	0.0	0.0
65	2.0	0.5	0.0	0.0	0.0
70	1.0	0.1	0.0	0.0	0.0
75	0.3	0.0	0.0	0.0	0.0
80	0.0	0.0	0.0	0.0	0.0
85	0.0	0.0	0.0	0.0	0.0
90	0.0	0.0	0.0	0.0	0.0



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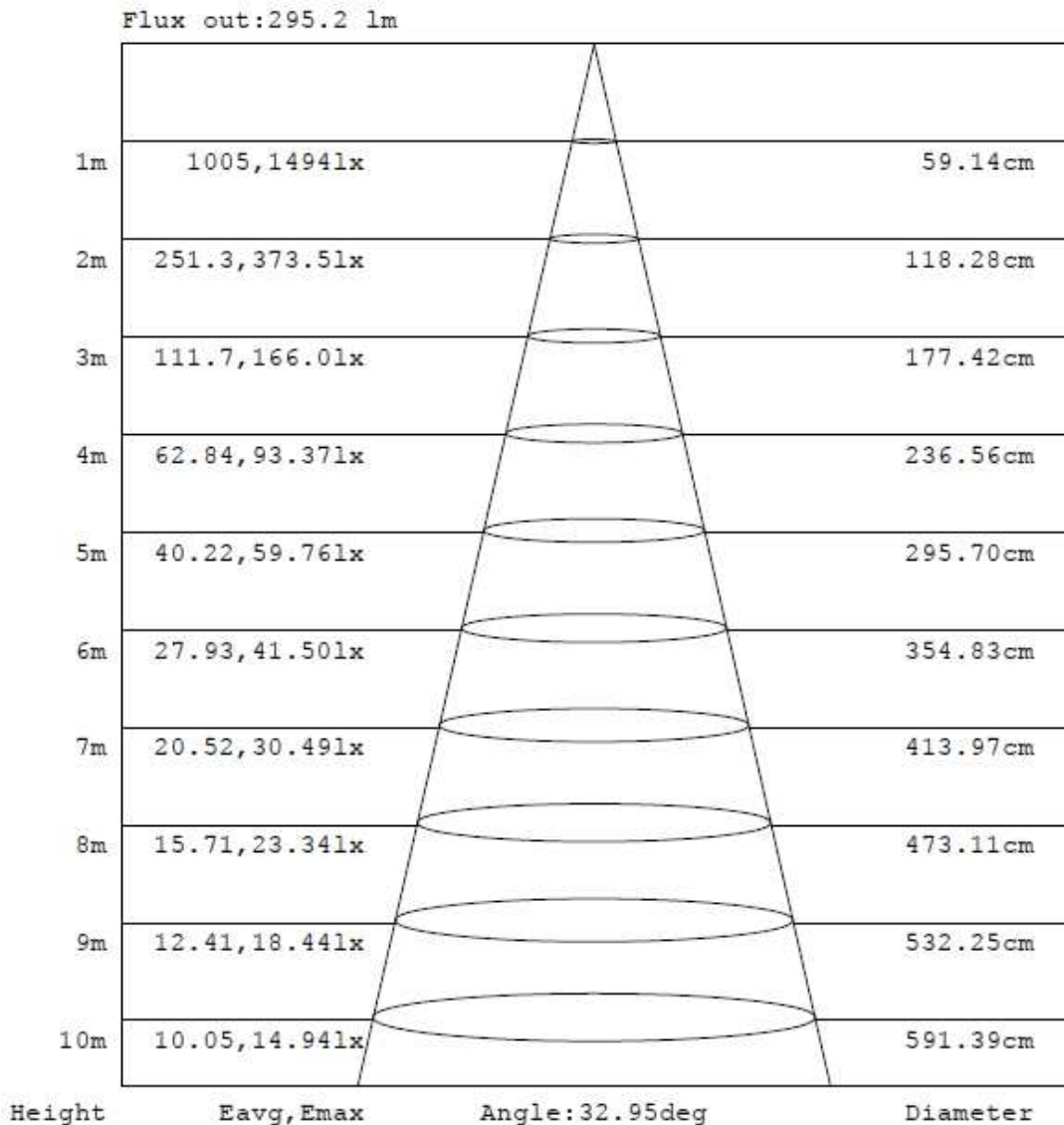
RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21
Setting: 3 (Medium light output)

Illumination Plots

Model No.: SL21
Mount Height: 10 m

Illuminance - Cone of Light



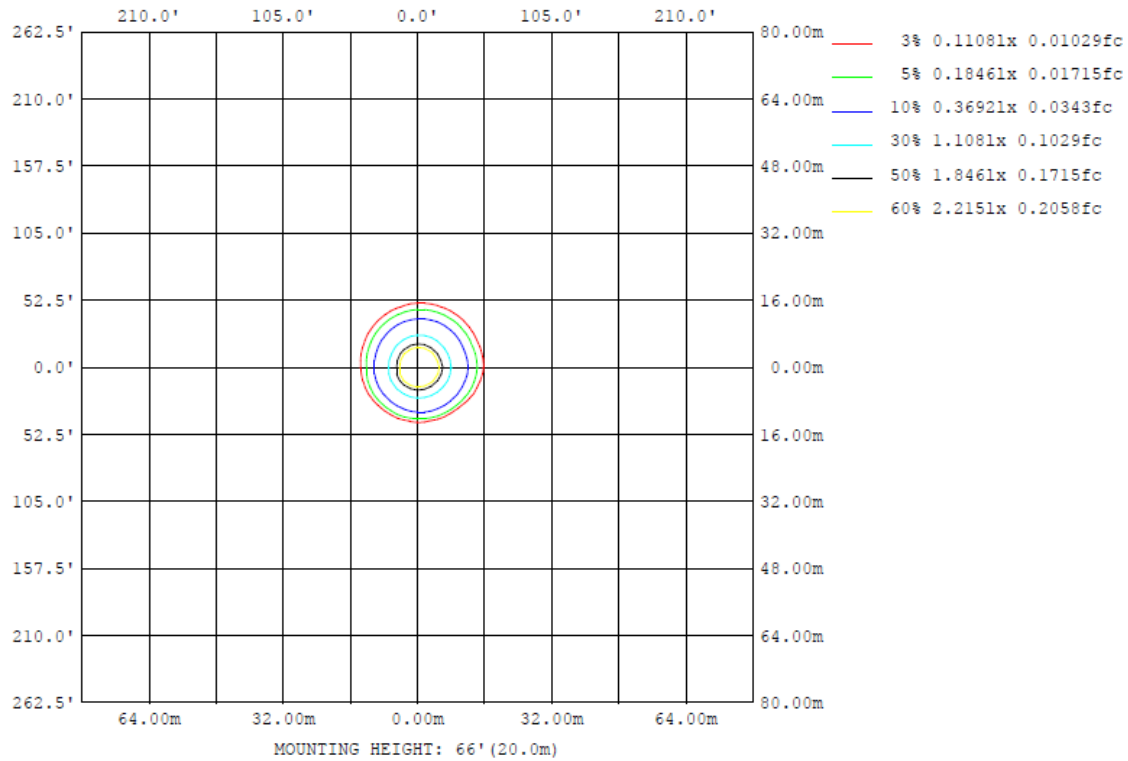
Note: The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

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RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21
Setting: 3 (Medium light output)

Model No.: SL21
Mount Height: 20 m
Isoillumination Plot



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RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21

Setting: 3 (Medium light output)

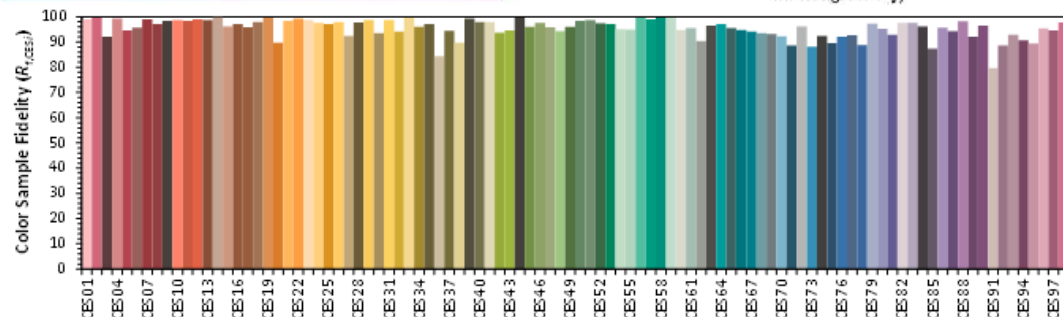
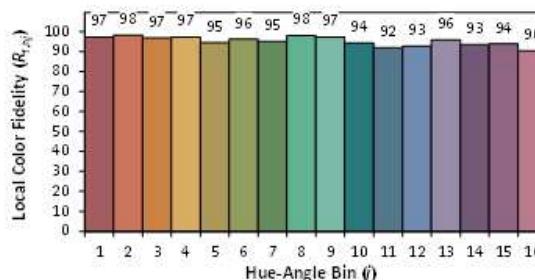
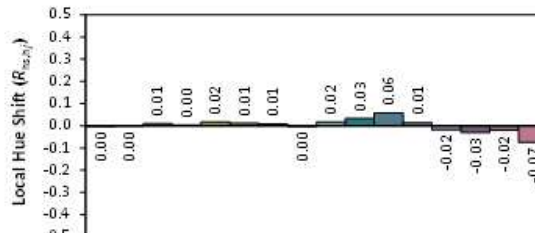
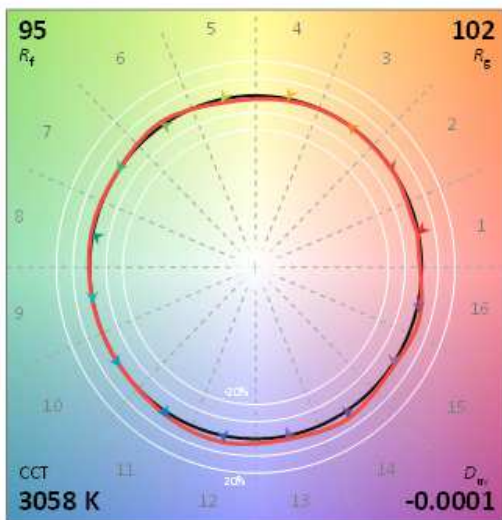
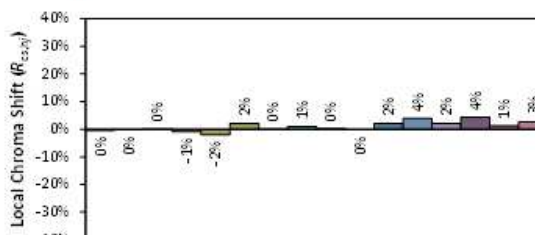
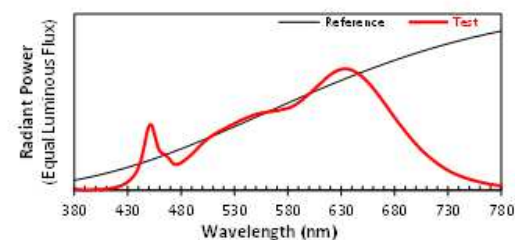
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: STERLING LIGHTING LLC

Date: 12/18/2023

Model: SL21



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

x 0.4327

y 0.4023

u' 0.2486

v' 0.5201

CIE 13.3-1995
(CRI)

R_a 98

R_g 96

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

RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21

Setting: 4 (Medium light output)

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')
SL21							
0231201-15-017	N/A	3052	98	0.4330	0.4021	0.2489	0.5200

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)
SL21							
0231201-15-017	N/A	15.0	0.4981	5.1944	0.6880	500.509	96.35

Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens (lm)	% Luminaire (%)
SL21		
0-30	430.8	86.1
0-40	480.9	96.1
0-60	498.9	99.7
0-90	500.5	100.00
0-180	500.5	100.00

Beam Angle

	Horizontal Spread (°)	Vertical Spread (°)
SL21		
Beam (50%)	33.0	33.0
Beam Angle	33.0	

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

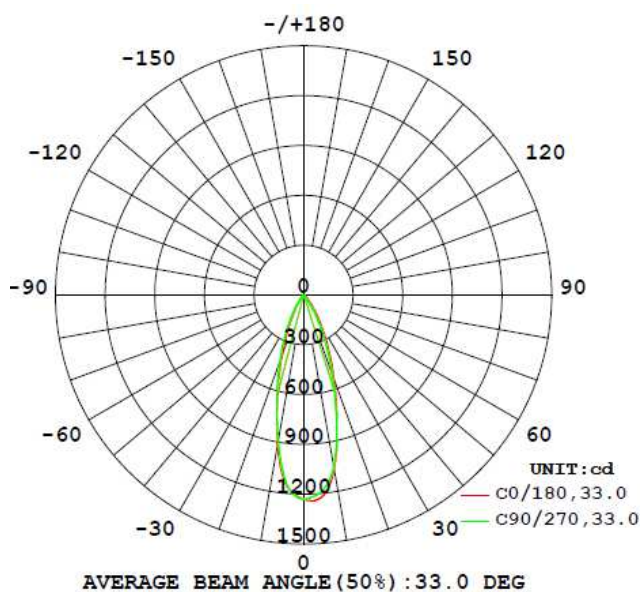
RESULTS OF TESTS (cont'd)

Intensity (Candlepower) Summary at 25°C – Candelas

Test Condition: 15V 60Hz for SL21

Setting: 4 (Medium light output)

G \ C(°)	0	22.5	45	67.5	90
0	1229.3	1229.3	1229.3	1229.3	1229.3
5	1223.5	1214.1	1201.7	1204.0	1191.9
10	1064.0	1052.4	1040.0	1066.4	1050.0
15	779.2	771.2	749.1	786.9	768.5
20	533.3	518.4	497.6	519.5	505.2
25	349.5	332.2	308.2	322.2	302.6
30	216.5	196.0	177.5	179.1	162.0
35	118.2	107.1	57.9	57.7	49.8
40	56.7	30.5	17.3	15.5	14.8
45	32.2	17.1	4.5	4.1	4.0
50	16.9	5.0	2.3	2.0	2.0
55	6.5	2.1	1.1	0.8	0.7
60	3.1	1.1	0.1	0.0	0.0
65	1.7	0.4	0.0	0.0	0.0
70	0.9	0.1	0.0	0.0	0.0
75	0.2	0.0	0.0	0.0	0.0
80	0.0	0.0	0.0	0.0	0.0
85	0.0	0.0	0.0	0.0	0.0
90	0.0	0.0	0.0	0.0	0.0



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

RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21

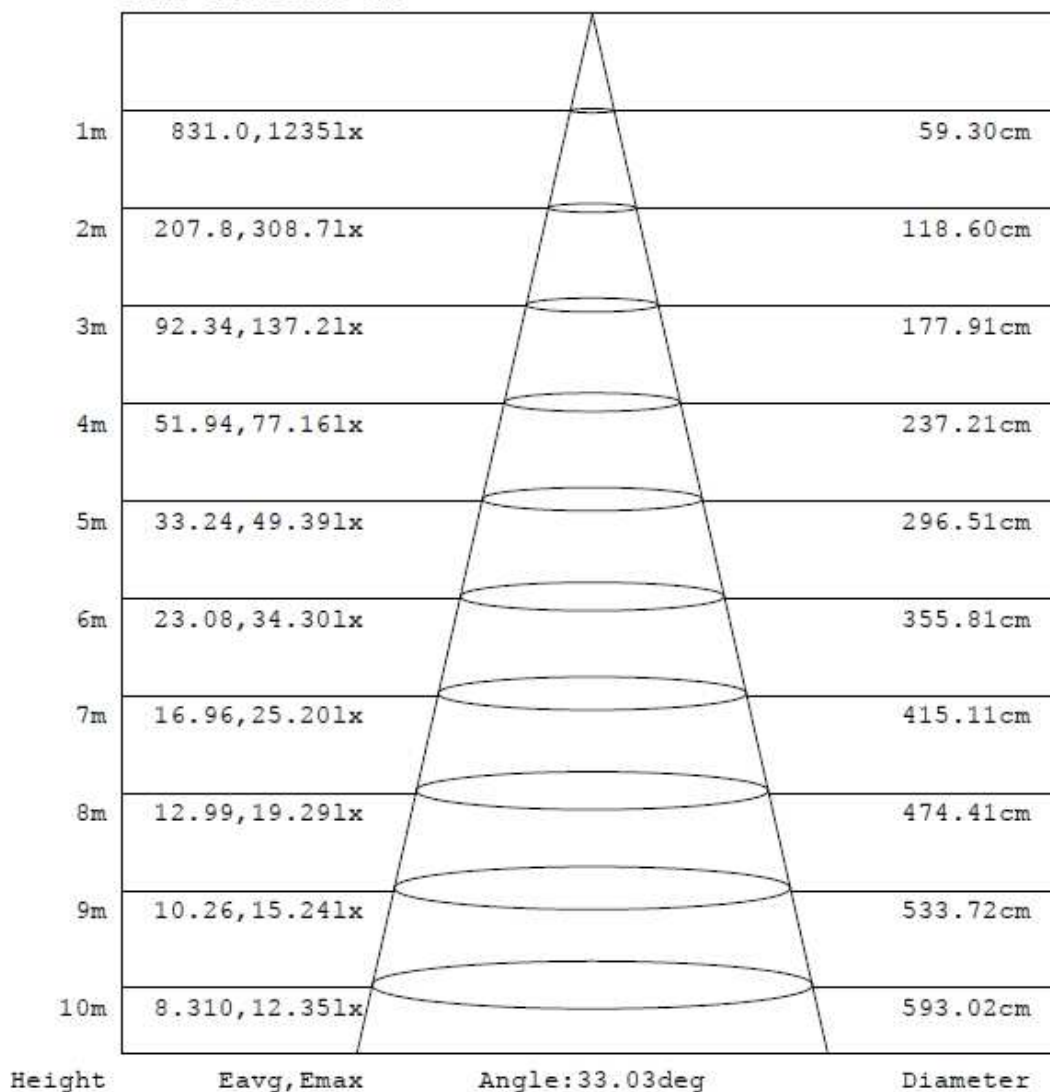
Setting: 4 (Medium light output)

Illumination Plots

Model No.: SL21
Mount Height: 10 m

Illuminance - Cone of Light

Flux out: 244.0 lm



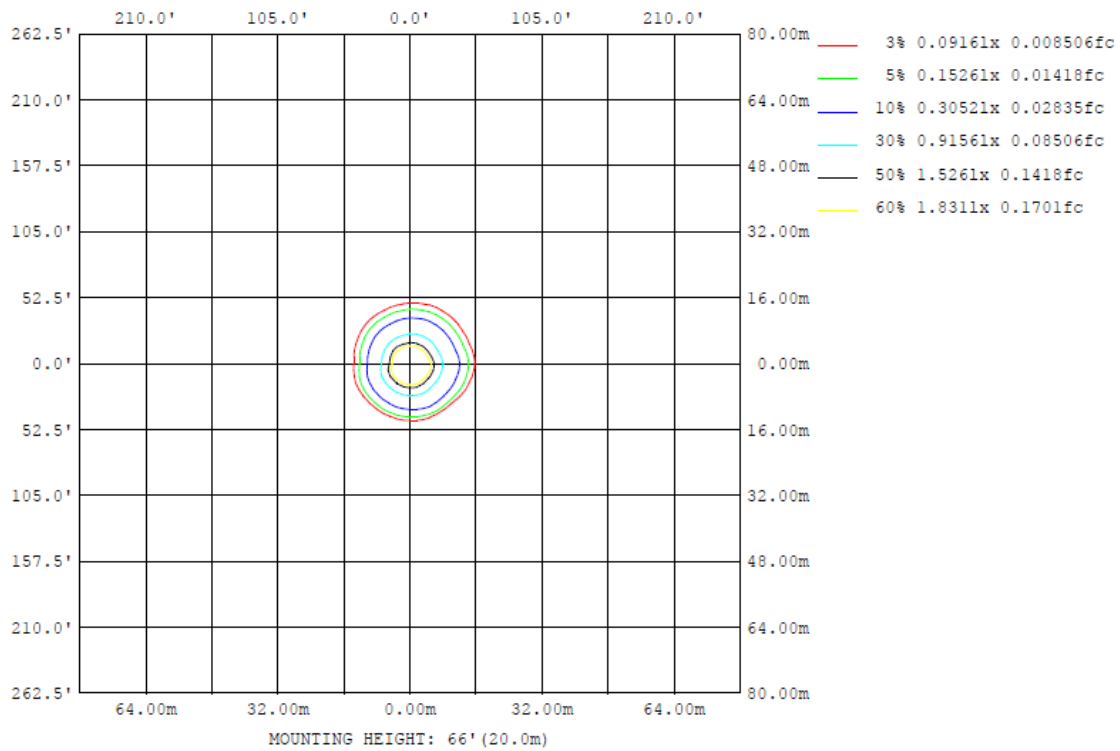
Note: The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

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

RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21
Setting: 4 (Medium light output)

Model No.: SL21
Mount Height: 20 m
Isoillumination Plot



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

RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21

Setting: 4 (Medium light output)

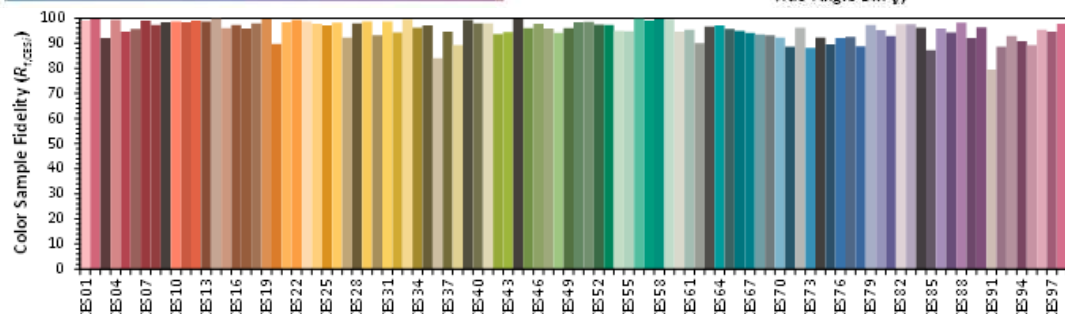
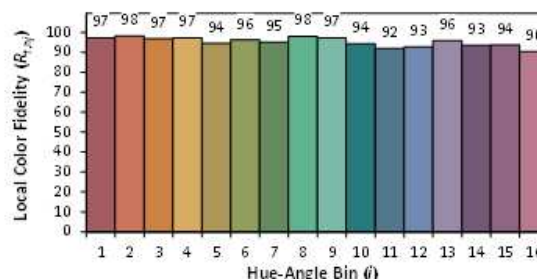
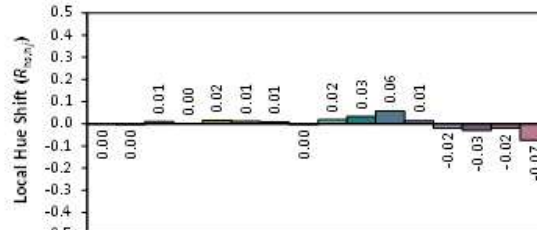
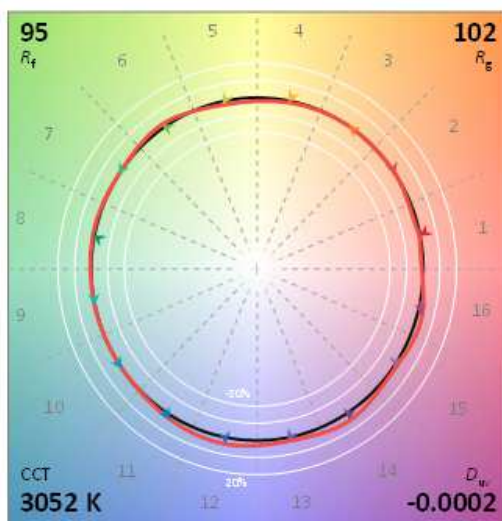
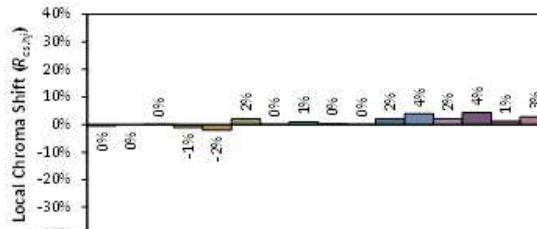
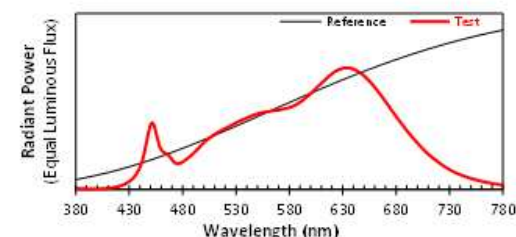
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: STERLING LIGHTING LLC

Date: 12/18/2023

Model: SL21



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

x 0.4330

y 0.4021

u' 0.2489

v' 0.5200

CIE 13.3-1995
(CRI)

R_a 98

R_g 96

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

RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21

Setting: 5 (Medium light output)

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')
SL21							
0231201-15-017	N/A	3044	98	0.4332	0.4016	0.2492	0.5198

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)
SL21							
0231201-15-017	N/A	15.0	0.3718	3.8609	0.6914	376.949	97.63

Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens (lm)	% Luminaire (%)
SL21		
0-30	323.9	85.9
0-40	361.3	95.9
0-60	375.6	99.6
0-90	376.9	100.00
0-180	376.9	100.00

Beam Angle

	Horizontal Spread (°)	Vertical Spread (°)
SL21		
Beam (50%)	33.0	33.0
Beam Angle	33.0	

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

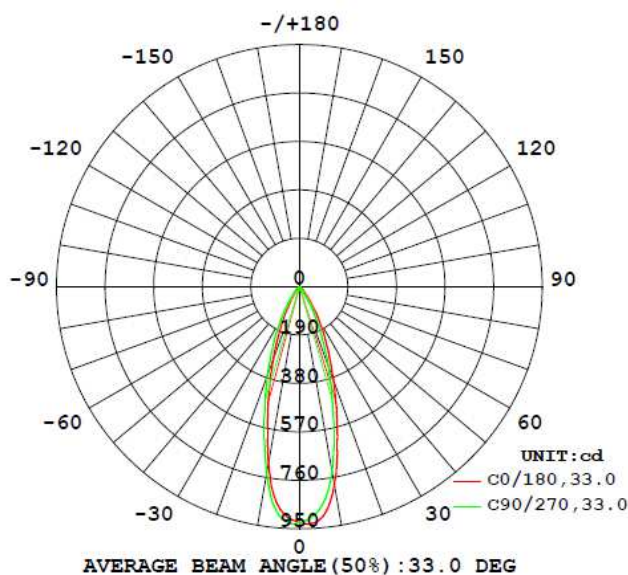
RESULTS OF TESTS (cont'd)

Intensity (Candlepower) Summary at 25°C – Candelas

Test Condition: 15V 60Hz for SL21

Setting: 5 (Medium light output)

G \ C(°)	0	22.5	45	67.5	90
0	925.0	925.0	925.0	925.0	925.0
5	917.1	906.6	895.9	886.7	879.7
10	789.1	773.4	760.1	744.0	737.3
15	573.0	557.7	537.4	521.0	511.9
20	389.5	372.5	354.1	338.3	331.3
25	255.6	237.5	216.4	200.9	188.5
30	156.0	138.9	123.9	110.6	100.8
35	84.6	70.9	32.7	26.0	23.9
40	40.8	22.6	11.7	5.8	5.7
45	22.7	9.0	3.0	2.4	2.4
50	11.6	2.9	1.5	1.1	1.1
55	3.8	1.4	0.7	0.3	0.2
60	2.1	0.7	0.0	0.0	0.0
65	1.1	0.2	0.0	0.0	0.0
70	0.5	0.0	0.0	0.0	0.0
75	0.1	0.0	0.0	0.0	0.0
80	0.0	0.0	0.0	0.0	0.0
85	0.0	0.0	0.0	0.0	0.0
90	0.0	0.0	0.0	0.0	0.0



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

RESULTS OF TESTS (cont'd)

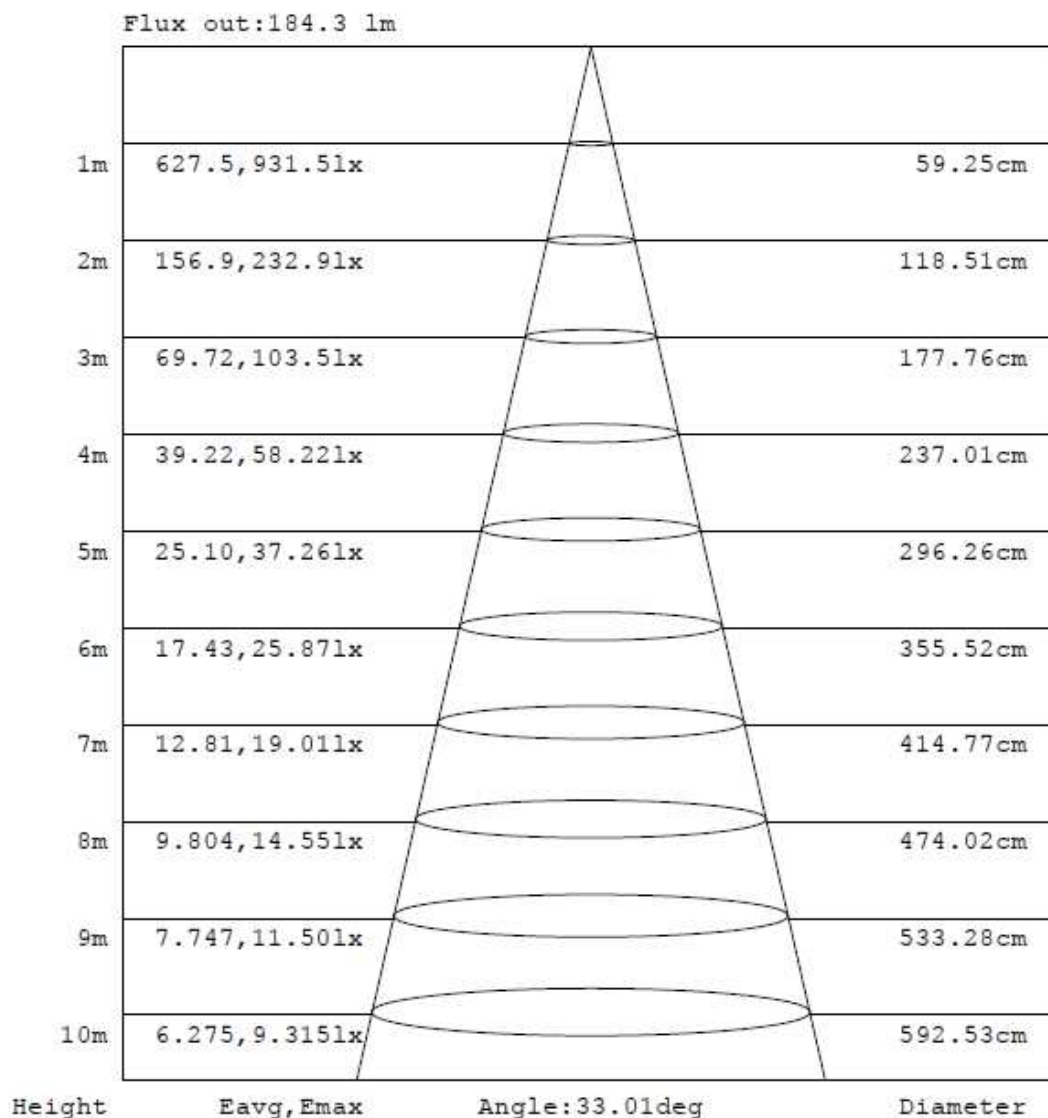
Test Condition: 15V 60Hz for SL21

Setting: 5 (Medium light output)

Illumination Plots

Model No.: SL21
Mount Height: 10 m

Illuminance - Cone of Light



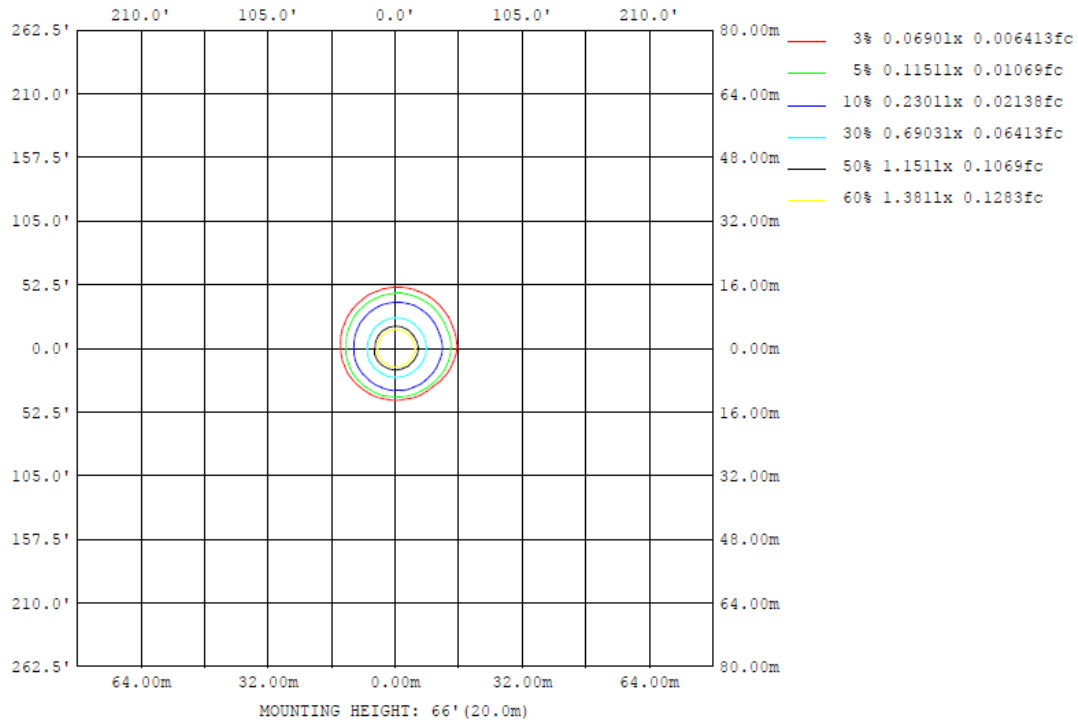
Note: The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

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

RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21
Setting: 5 (Medium light output)

Model No.: SL21
Mount Height: 20 m
Isoillumination Plot



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

RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21

Setting: 5 (Medium light output)

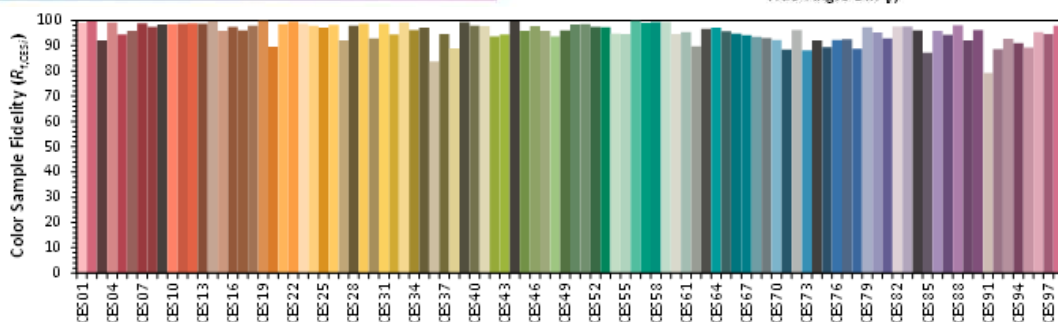
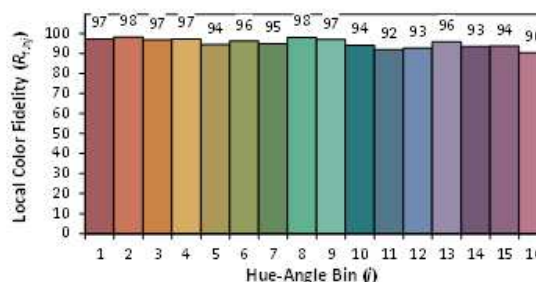
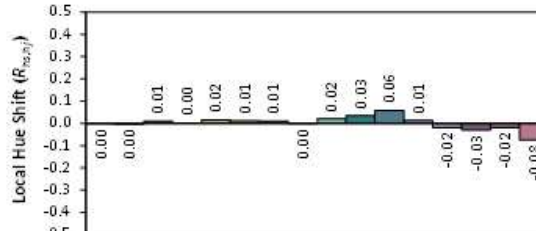
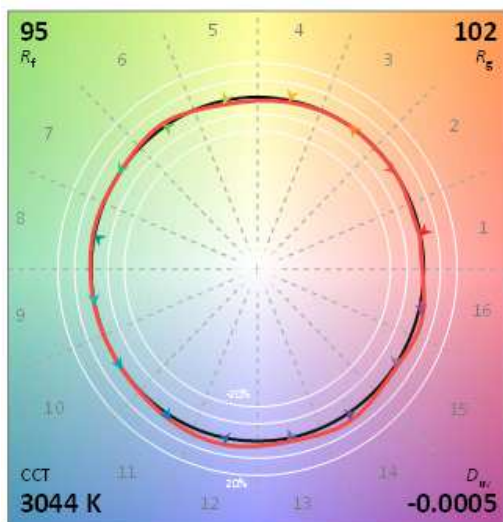
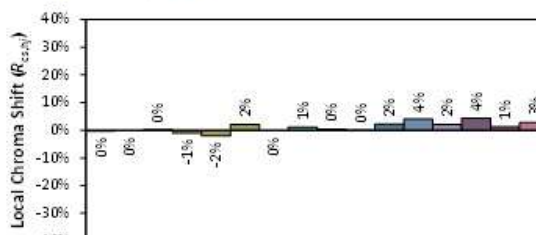
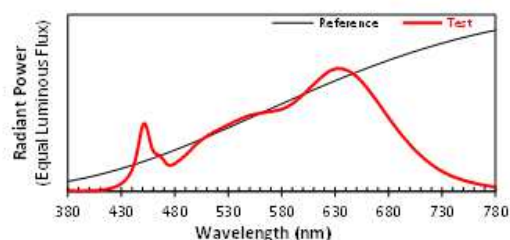
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: STERLING LIGHTING LLC

Date: 12/18/2023

Model: SL21



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

x 0.4332

y 0.4016

u' 0.2492

v' 0.5198

CIE 13.3-1995
(CRI)

R_a 98

R_g 97

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

RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21
Setting: 6 (Minimum light output)

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')
SL21							
0231201-15-017	N/A	3037	98	0.4333	0.4010	0.2495	0.5196

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)
SL21							
0231201-15-017	N/A	15.0	0.2584	2.6767	0.6922	261.383	97.65

Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens (lm)	% Luminaire (%)
SL21		
0-30	225.2	86.1
0-40	251.2	96.1
0-60	260.6	99.7
0-90	261.4	100.00
0-180	261.4	100.00

Beam Angle

	Horizontal Spread (°)	Vertical Spread (°)
SL21		
Beam (50%)	33.0	33.0
Beam Angle	33.0	

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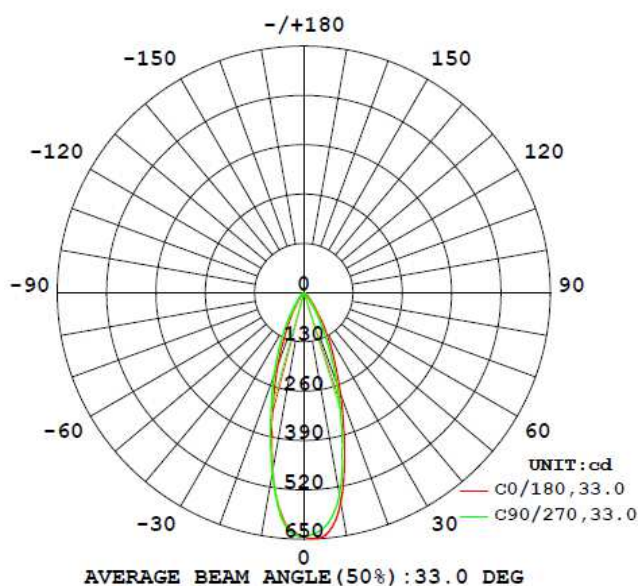
RESULTS OF TESTS (cont'd)

Intensity (Candlepower) Summary at 25°C – Candelas

Test Condition: 15V 60Hz for SL21

Setting: 6 (Minimum light output)

G \ C(°)	0	22.5	45	67.5	90
0	643.8	643.8	643.8	643.8	643.8
5	642.4	635.3	627.3	627.2	621.0
10	561.4	550.5	539.9	549.6	540.7
15	412.6	401.7	385.4	400.6	390.0
20	281.5	269.2	256.1	265.5	256.4
25	183.8	171.9	157.3	161.7	149.8
30	114.0	101.2	89.9	89.2	79.9
35	62.4	53.2	26.4	25.2	25.6
40	30.0	13.8	8.3	7.6	7.3
45	16.1	6.7	2.3	2.0	2.0
50	8.2	2.3	1.1	1.0	0.9
55	2.7	1.0	0.5	0.3	0.3
60	1.5	0.5	0.0	0.0	0.0
65	0.8	0.1	0.0	0.0	0.0
70	0.4	0.0	0.0	0.0	0.0
75	0.1	0.0	0.0	0.0	0.0
80	0.0	0.0	0.0	0.0	0.0
85	0.0	0.0	0.0	0.0	0.0
90	0.0	0.0	0.0	0.0	0.0



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

RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21

Setting: 6 (Minimum light output)

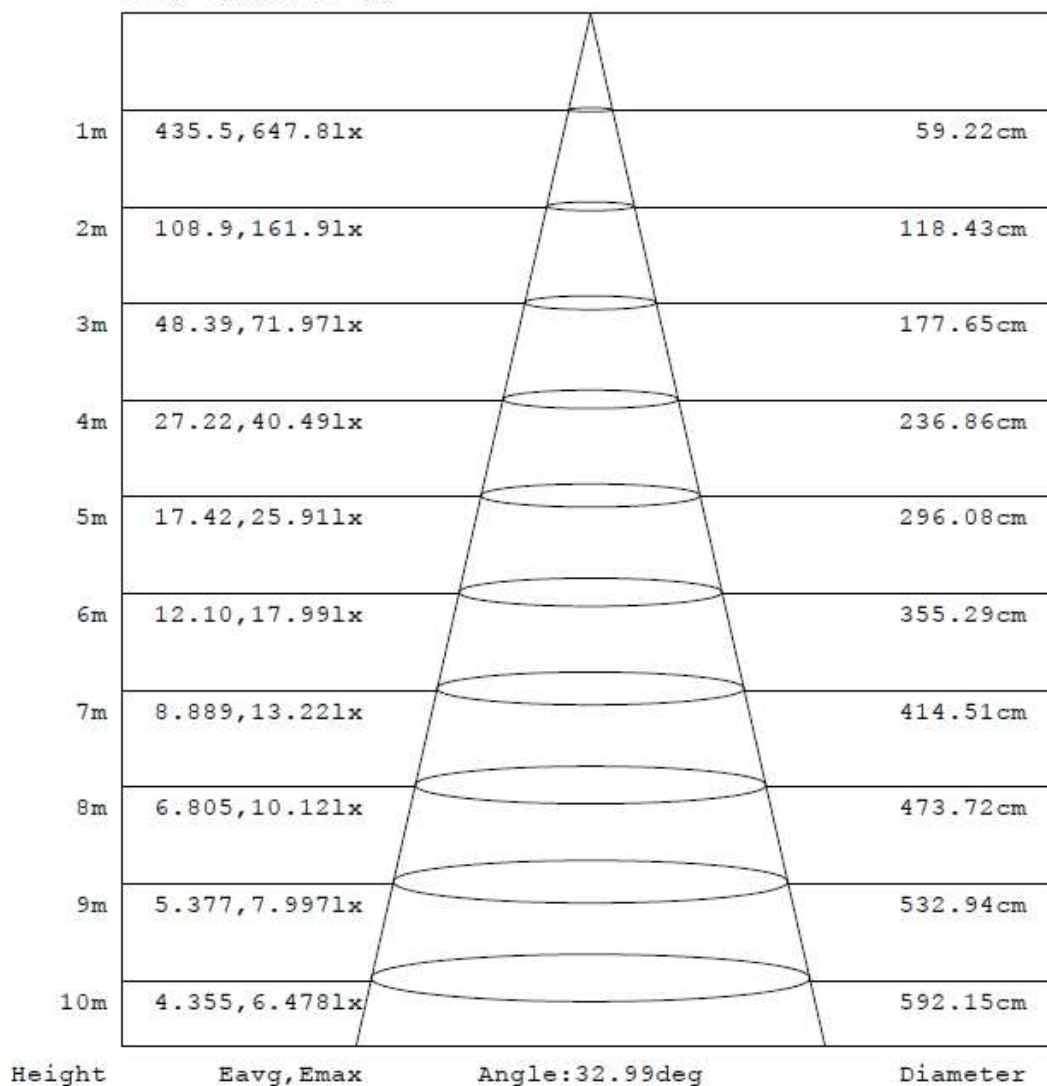
Illumination Plots

Model No.: SL21

Mount Height: 10 m

Illuminance - Cone of Light

Flux out: 127.9 lm



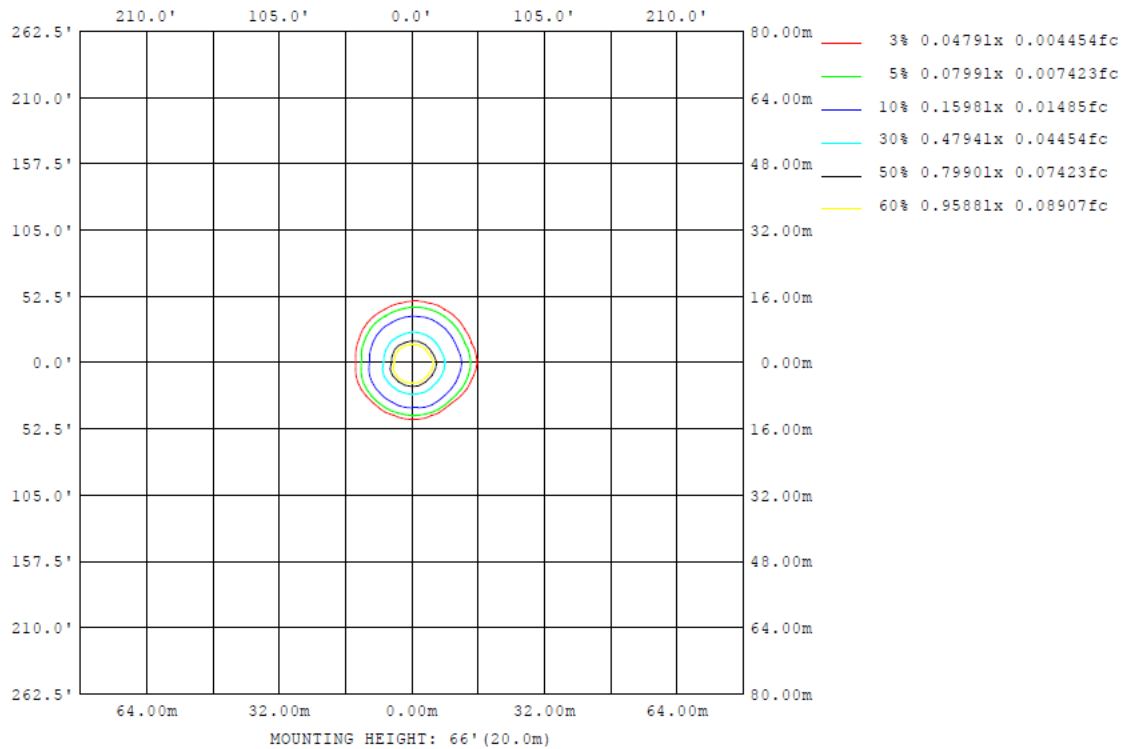
Note: The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

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

RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21
Setting: 6 (Minimum light output)

Model No.: SL21
Mount Height: 20 m
Isoillumination Plot



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

RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL21

Setting: 6 (Minimum light output)

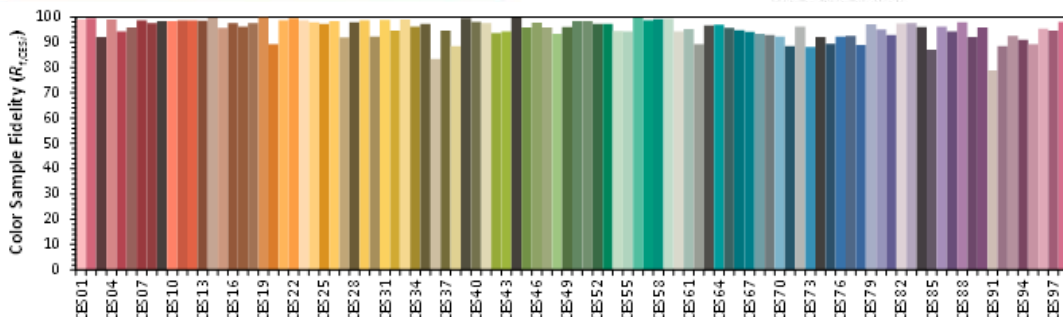
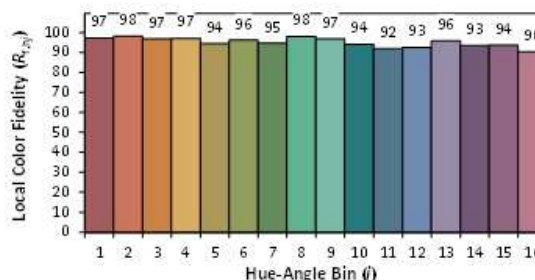
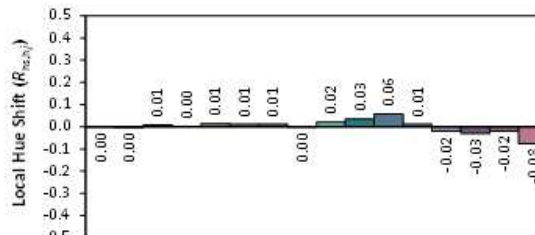
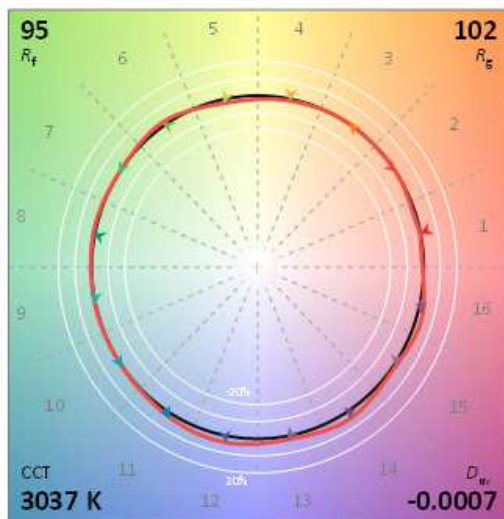
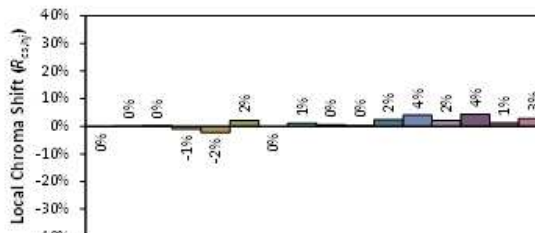
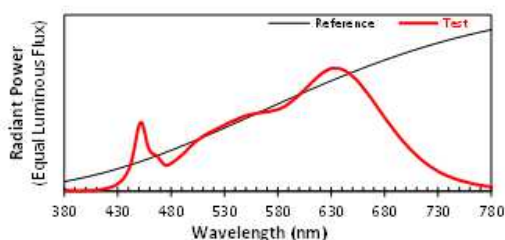
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: STERLING LIGHTING LLC

Date: 12/18/2023

Model: SL21



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

x 0.4333
y 0.4010
u' 0.2495
v' 0.5196

CIE 13.3-1995
(CRI)

R_a 98
R_g 98

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

RESULTS OF TESTS (cont'd)

IN SITU TEMPERATURE MEASUREMENT TEST

Test Results of LED chip temperature and current

TMP led: CMB1510-0000-000N0U0A30G	
In-situ case temperature of LED source (°C)	Limit single led chip temperature(°C)
41.5	105
Measured Drive current for each LED package/array/module (mA)	Limit single led chip current (mA)
255	465

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

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

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: CREE LED Model: CMB1510-0000-000N0U0A30G Report Number: CLD-AP250 REV14 Issued: Mar. 10, 2023			
Test Condition 1 - 105°C Case Temp					
Sample size	13	Sample size	-	Sample size	-
Number of failures	0	Number of failures	-	Number of failures	-
DUT drive current used in the test (mA)	465	DUT drive current used in the test (mA)	-	DUT drive current used in the test (mA)	-
Test duration (hours)	12,000	Test duration (hours)	-	Test duration (hours)	-
Test duration used for projection (hour to hour)	6,000 - 12,000	Test duration used for projection (hour to hour)	-	Test duration used for projection (hour to hour)	-
Tested case temperature (°C)	105	Tested case temperature (°C)	-	Tested case temperature (°C)	-
α	2.593E-06	α	-	α	-
B	1.002	B	-	B	-
Reported L70(12k) (hours)	>66000	Reported L70(12k) (hours)	-	Reported L70(12k) (hours)	-

Table 2: Interpolation Report (projection based on in-situ temperature entered)	
$T_{s,1}$ (°C)	105.00
$T_{s,1}$ (K)	378.15
α_1	2.593E-06
B_1	1.002
$T_{s,2}$ (°C)	-
$T_{s,2}$ (K)	-
α_2	-
B_2	-
E_0/k_0	-
A	-
B_0	1.002
$T_{s,i}$ (°C)	41.50
$T_{s,i}$ (K)	314.65
α_i	2.593E-06
Reported L70(12k) at 41.5°C (hours)	>66000

In-Situ Inputs	
Drive current for each LED package/array/module (mA):	255
In-situ case temperature (T_c , °C):	41.5
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):	60,000
Lumen maintenance at time (t) (%):	85.79%
Reported L70 (hours):	>66000

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