



LM-79-08 Test Report

for

A.L.P. Lighting Components, Inc.

6333 Gross Point Road, Niles, IL 60714

2FT LED Linear Ambient Luminaire Direct

Model: 31422-3735LW-1

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ15060015a/R1

This report is replaced the old report No. HZ15060015a dated Jun. 24, 2015

The laboratory that conducted the testing detailed in this report has been accredited for SSL by NVLAP.

Review by:

Engineer: April Zou
Aug. 06, 2015

Approved



Manager: Jim Zhang
Aug. 06, 2015

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Test Summary

Sample Tested: 31422-3735LW-1

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
95.5	2741.4	28.71	0.9944
CCT (K)	CRI	Stabilization Time (Light & Power)	
3605	83.5	60	

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Jun. 04, 2015
Date of Test	: Jun. 11, 2015 to Aug. 04, 2015
Test item	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
Reference Standard	: IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products ANSI/UL 8750-2011 Light Emitting Diode (LED) Equipment for Use in Lighting Products ANSI/UL 1598-2010 Standard for Safety of Luminaire

TABLE OF CONTENT

LM-79-08 Test Report.....	1
Test Summary.....	2
Sample Photo.....	4
TEST RESULTS	5
Spectral Power Distribution	6
Zonal Lumen Tabulation- Goniophotometer Method	7
Illuminance Plots.....	8
Luminous Intensity Distribution Plots.....	10
Luminous Intensity Data	11
ISTMT TEST DATA:	13
EQUIPMENT LIST	14
TEST METHODS	14
Seasoning of SSL Product.....	14
Goniophotometer Method	14
Photometric and Electrical Measurements.....	14
Color Characteristics Measurements.....	15
Color Spatial Uniformity	15
ISTMT.....	15

Sample Photo



Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: 2FT LED Linear Ambient Luminaire Direct
Model	: 31422-3735LW-1
Brand Name	: A.L.P Lighting
Electrical Ratings	: AC120~277V, 50/60 Hz, 37W
Product Description	: Wrap 314 base, 3500K, Dimmable Driver: PIFC-C201B Manufacturer of light source: LG INNOTEK Model of light source: LGIT 5630 G2 Quantity of light source: 56 pcs
Manufacturer	: A.L.P. Lighting Components, Inc.
Address	: 6333 Gross Point Road, Niles, IL 60714

TEST RESULTS

Test ambient temperature was 25.1°C.

Sample orientation was light down. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 60 minutes, and the total operating time including stabilization was 95 minutes.

The photometric distance of Goniophotometer is 30m.

Luminous data was taken at 0.5°vertical intervals and 10°horizontal intervals.

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.241	0.113
Power Factor	0.9944	0.9257
Test Power (W)	28.71	29.08
Off-State Power (W)	0	0
THD A%	6.20	18.25
Luminous Efficacy (lm/W)	95.5	94.1
Total Luminous Flux (lm)	2741.4	2735.4
Color Rendering Index (CRI)	83.5	
R9	10	
Correlated Color Temperature (CCT) (K)	3605	
Chromaticity (Chroma x, Chroma y)	(0.3980, 0.3833)	
Chromaticity (Chroma u, Chroma v)	(0.2340, 0.3380)	
Chromaticity (Chroma u', Chroma v')	(0.2340, 0.5070)	
Duv	0.0017	
Average Beam Angle (°)	107.2	
Center Beam Candle Power (cd)	941	
Spacing Criteria	1.20 (0°-180°)/ 1.21 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	73.32%	
Zonal Lumens in the 60°-90°Zone	21.91%	
Zonal Lumens in the 90°-120°Zone	2.92%	
Zonal Lumens in the 120°-180°Zone	1.85%	

Special Rendering Indices	Color
R1	82
R2	92
R3	96
R4	81
R5	83
R6	89
R7	84
R8	62
R9	10
R10	81
R11	80
R12	70
R13	85
R14	98

Table 2 Test data per Goniophotometer Method

Note: According to CIE 1976 (u', v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

Spectral Power Distribution

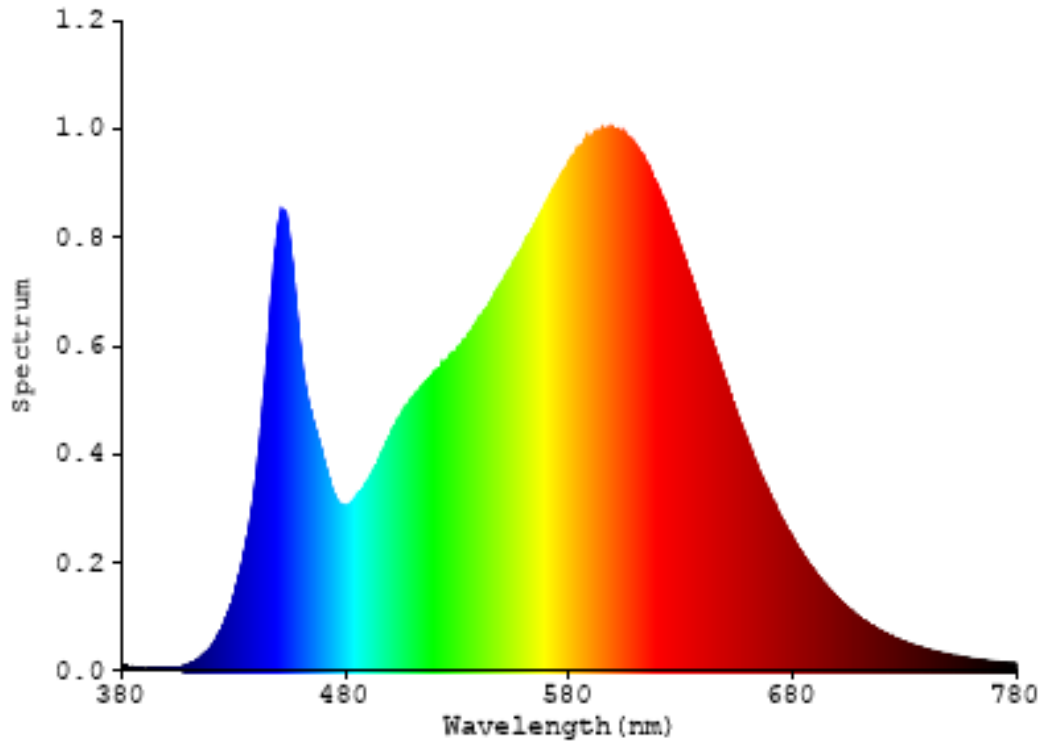


Chart 1: Spectral Power Distribution

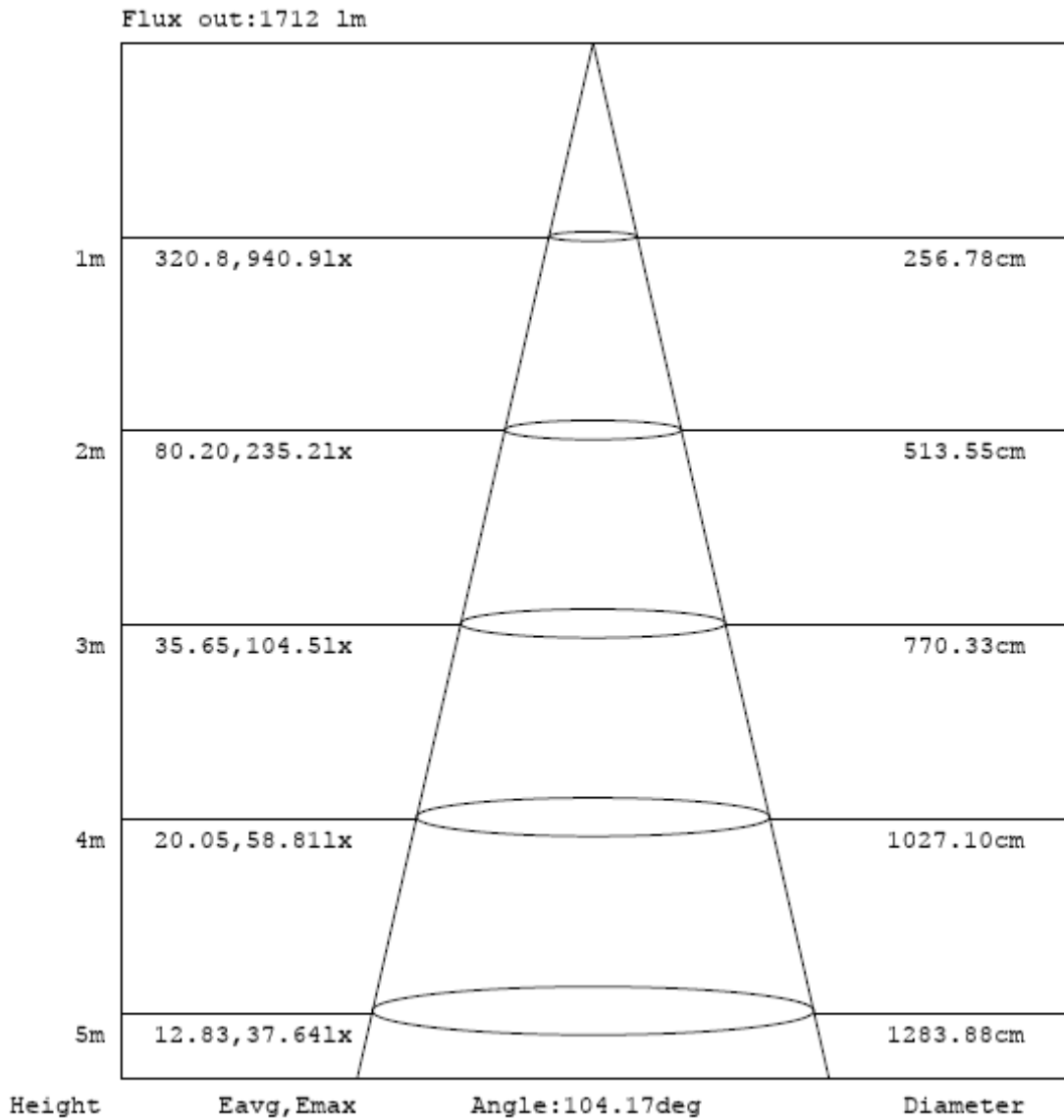
Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	88.755	3.24%
10- 20	251.807	9.19%
20- 30	374.789	13.67%
30- 40	441.191	16.09%
40- 50	448.218	16.35%
50- 60	405.112	14.78%
60- 70	324.7	11.84%
70- 80	213.62	7.79%
80- 90	62.34	2.27%
90-100	22.36	0.82%
100-110	31.337	1.14%
110-120	26.541	0.97%
120-130	20.688	0.75%
130-140	14.592	0.53%
140-150	8.982	0.33%
150-160	4.513	0.16%
160-170	1.578	0.06%
170-180	0.235	0.01%
Total	2741.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2009.872	73.32%
60- 90	600.66	21.91%
0-90	2610.532	95.23%
90- 180	130.826	4.77%
0- 180	2741.4	100%

Table 3: Zonal Lumen Data

Illuminance Plots



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

Chart 2: Beam angle

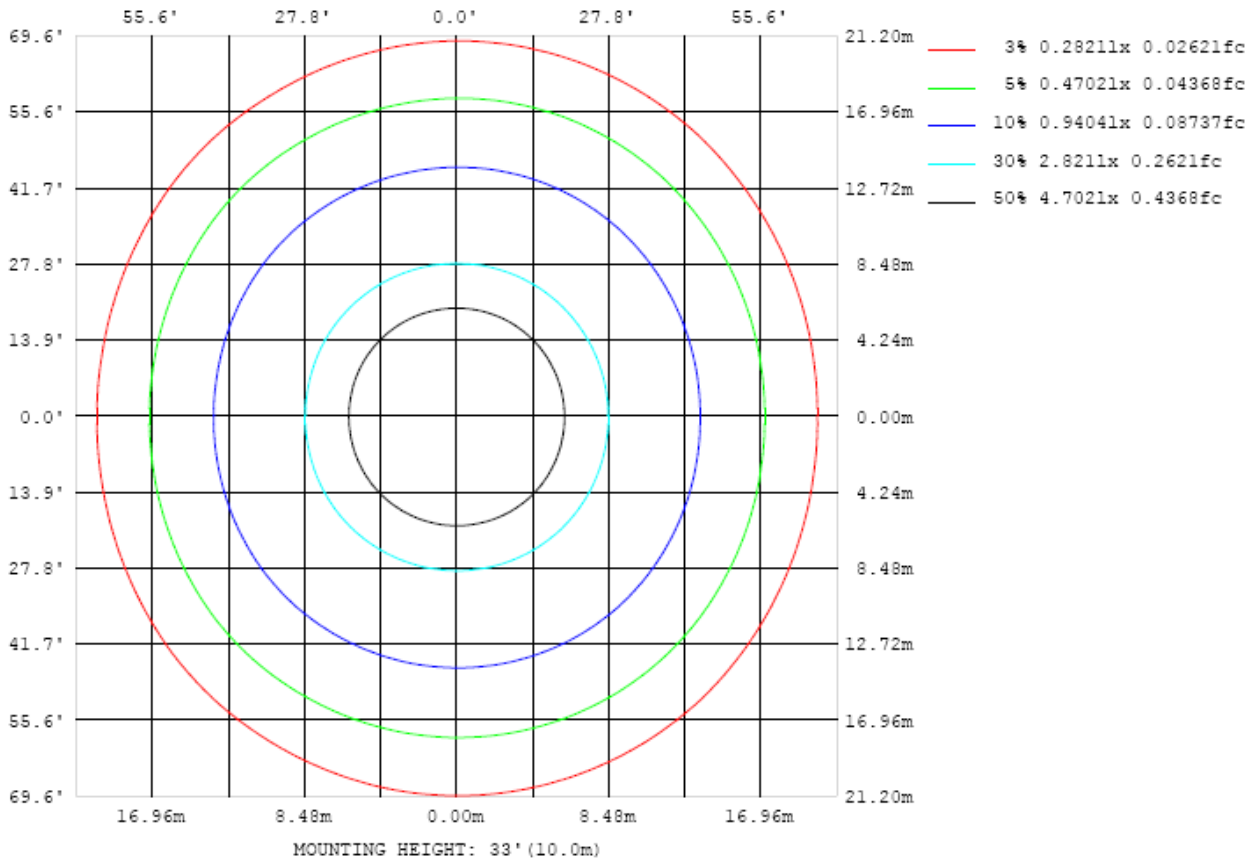


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

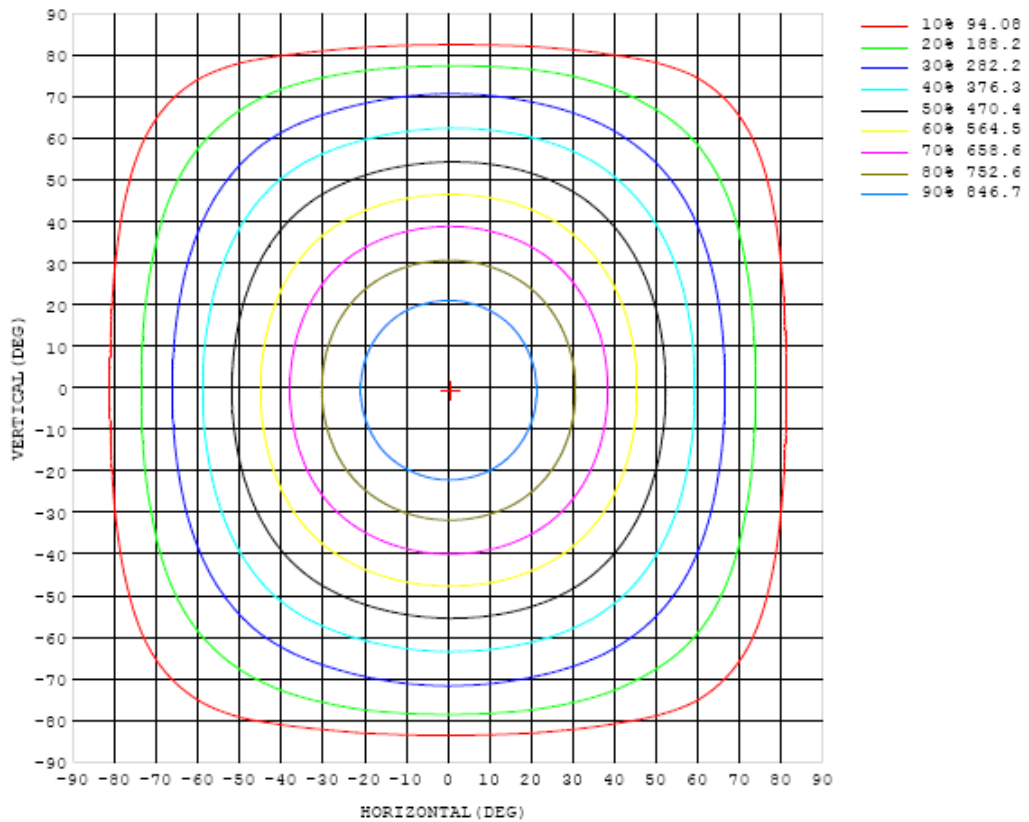


Chart 4: Isocandla Plot

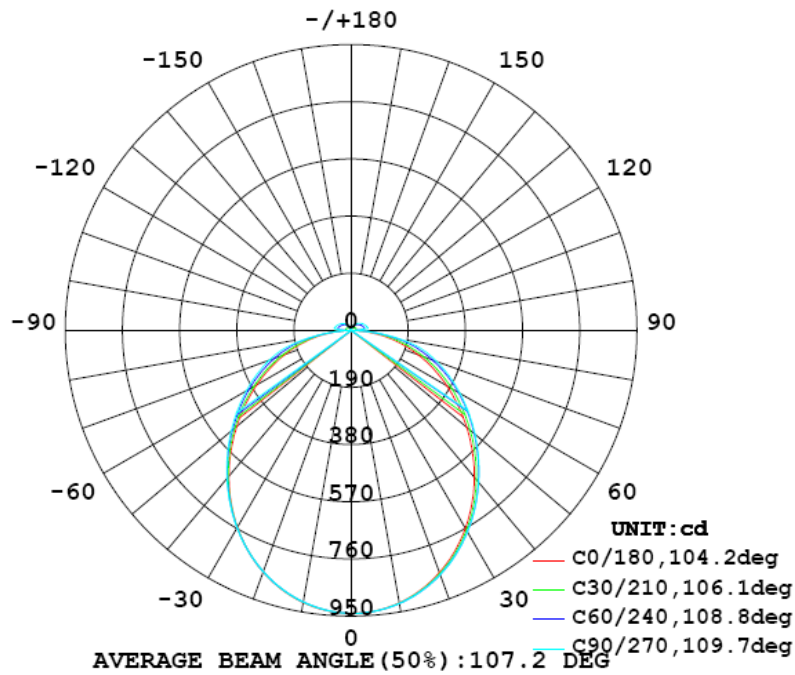


Chart 5: Polar Candela Distribution

Luminous Intensity Data

Table--1 UNIT: cd

C (DEG) \ y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	941	941	941	941	941	941	941	941	941	941	941	941	941	941	941	941	941	941	941
5	936	936	936	936	936	936	936	937	937	936	936	936	936	936	936	935	935	935	935
10	920	920	921	921	921	922	922	922	922	922	922	921	921	921	920	920	919	919	919
15	893	894	895	896	896	897	898	898	898	898	897	897	896	896	895	894	893	892	892
20	857	859	860	861	862	864	864	865	865	864	864	863	862	861	860	858	857	856	855
25	812	814	816	818	820	822	823	823	823	822	822	821	819	818	816	814	812	810	810
30	759	761	764	767	770	772	773	774	774	773	772	771	769	767	765	762	760	757	756
35	701	703	706	709	713	716	718	718	719	718	717	715	713	711	708	705	701	698	697
40	637	639	643	647	652	656	658	659	660	660	658	656	654	651	648	643	638	634	632
45	570	572	577	583	588	593	596	598	599	599	597	595	592	589	584	578	572	567	565
50	501	504	510	516	524	530	534	537	538	537	536	533	529	525	519	512	505	499	496
55	433	436	443	451	460	468	473	476	477	477	474	471	467	462	456	446	438	431	429
60	366	369	377	386	396	405	411	415	418	417	414	410	406	401	393	382	372	365	363
65	301	305	312	321	332	343	350	355	359	360	357	352	345	339	330	318	308	301	298
70	237	240	248	256	267	279	288	295	301	303	300	293	284	276	267	254	244	237	234
75	173	176	184	192	201	214	225	235	242	245	242	234	223	214	203	191	182	174	172
80	109	113	120	129	137	147	152	159	162	163	162	159	153	149	140	129	119	112	110
85	45.6	48.8	54.8	60.7	60.7	59.3	63.7	67.6	69.4	69.5	69.6	67.7	63.9	62.5	64.5	61.8	55.1	48.5	46.3
90	0.16	1.15	1.79	2.20	2.44	2.66	3.29	3.81	4.15	4.08	4.10	3.83	3.43	2.63	2.54	2.29	1.61	0.23	0.24
95	0.30	1.80	7.50	13.8	23.2	27.7	30.8	32.9	33.9	34.2	34.0	33.3	31.2	28.3	24.1	15.0	8.32	2.29	0.45
100	0.55	2.33	9.46	18.3	27.6	36.7	44.9	51.2	54.9	56.1	54.8	51.3	45.1	37.2	28.3	19.2	10.3	2.93	0.71
105	0.84	2.62	9.69	18.6	27.7	36.1	43.4	48.9	52.3	53.4	52.3	49.1	43.7	36.6	28.3	19.4	10.6	3.20	1.00
110	1.17	2.91	9.56	18.1	26.7	34.7	41.5	46.6	49.6	50.7	49.6	46.7	41.9	35.3	27.4	18.9	10.5	3.52	1.30
115	1.40	3.10	9.26	17.3	25.4	32.9	39.2	43.9	46.8	47.7	46.8	44.1	39.5	33.4	26.1	18.2	10.3	3.72	1.48
120	1.69	3.21	8.89	16.2	23.9	30.7	36.6	41.0	43.7	44.6	43.8	41.2	36.9	31.3	24.6	17.2	9.88	3.75	1.76
125	2.00	3.25	8.44	15.1	22.0	28.5	33.8	37.8	40.3	41.1	40.4	38.0	34.2	29.0	22.7	16.1	9.33	4.08	2.03
130	2.25	3.41	8.08	13.9	20.1	25.9	30.7	34.5	36.8	37.5	36.8	34.7	31.1	26.5	20.9	14.7	9.14	3.97	2.45
135	2.51	3.26	7.15	12.8	18.0	23.3	27.7	30.9	32.8	33.5	32.9	31.1	28.1	23.8	18.7	13.8	7.93	3.57	2.72
140	2.65	2.29	6.51	11.5	16.1	20.4	24.2	27.2	28.9	29.6	29.1	27.5	24.7	20.9	16.9	12.4	7.55	1.80	2.68
145	2.91	1.75	6.10	9.66	14.3	17.8	20.8	23.3	24.8	25.4	25.0	23.5	21.3	18.5	14.9	10.4	6.77	1.79	2.74
150	3.04	1.83	5.28	7.98	11.4	15.2	17.7	19.6	20.8	21.3	20.9	19.9	18.2	16.1	12.2	9.06	5.92	2.01	2.95
155	2.95	2.10	4.60	6.95	9.16	11.8	14.0	15.9	17.0	17.4	17.1	16.1	14.4	12.3	10.3	7.81	5.20	1.99	2.94
160	3.22	2.78	1.98	5.75	7.58	9.06	10.4	11.7	12.5	12.8	12.6	11.8	10.7	9.74	8.08	6.26	2.54	2.94	3.57
165	3.33	3.56	2.22	2.57	5.58	6.70	7.73	8.45	8.89	9.17	9.07	8.68	8.00	7.04	6.00	3.46	2.00	3.22	3.23
170	3.15	3.23	2.88	1.95	1.70	2.55	4.69	5.45	5.82	5.82	5.75	5.53	5.09	3.42	1.60	1.70	2.22	3.03	3.04
175	2.73	2.88	2.99	3.11	2.94	2.24	1.66	1.49	1.34	1.34	1.52	1.61	1.70	1.85	2.20	2.71	2.61	2.44	2.42
180	2.66	2.63	2.72	2.79	2.75	2.85	2.97	3.09	3.77	3.88	3.59	3.19	3.04	2.73	2.84	2.75	2.62	2.67	2.67

Table 4: Luminous Intensity Data

Table--2 UNIT: cd

C (DEG) y (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	941	941	941	941	941	941	941	941	941	941	941	941	941	941	941	941	941		
5	935	934	934	934	934	934	934	934	934	934	934	934	934	934	935	935	935		
10	918	918	917	917	917	917	917	917	917	917	917	917	917	918	918	919	919		
15	891	891	890	890	890	890	890	890	890	890	890	890	891	891	892	892	893		
20	854	854	854	854	854	854	854	854	854	854	854	855	855	855	855	856	856		
25	809	809	809	810	810	810	809	809	809	810	810	810	810	811	811	811	811		
30	756	756	757	758	758	758	758	758	758	759	759	759	759	759	759	758	759		
35	696	697	698	700	701	701	701	702	702	702	703	702	702	701	701	700	700		
40	632	633	636	639	640	640	641	642	643	643	643	642	641	640	638	637	637		
45	565	567	571	575	577	579	580	581	582	582	582	581	579	576	574	571	570		
50	497	500	505	510	513	515	518	519	521	521	521	520	517	513	508	505	502		
55	429	433	439	446	451	453	455	458	461	462	462	459	456	449	443	438	434		
60	363	367	374	383	389	392	396	400	403	403	402	399	394	386	379	373	368		
65	298	303	310	320	327	331	337	343	346	345	343	338	331	322	315	308	303		
70	235	239	246	257	265	271	279	286	289	288	283	276	268	258	251	244	239		
75	173	177	183	193	203	210	219	226	228	227	222	214	204	193	187	181	176		
80	110	115	121	130	132	131	136	138	139	140	139	136	134	129	124	118	112		
85	46.9	49.9	51.5	49.6	44.1	44.8	46.4	46.1	45.9	47.9	49.2	47.8	45.4	51.1	54.1	51.1	47.7		
90	0.26	0.38	2.05	3.45	5.40	5.53	6.38	7.15	7.07	6.29	5.56	4.44	3.69	2.22	0.48	0.26	0.24		
95	2.20	8.64	17.0	26.2	34.9	39.7	42.8	44.0	44.5	43.9	42.5	39.1	33.8	25.2	16.2	8.24	2.16		
100	2.55	9.91	19.0	28.3	37.1	44.9	50.8	54.4	55.7	54.6	51.1	45.1	37.2	28.3	19.0	9.97	2.60		
105	2.66	9.80	18.8	27.7	36.0	43.1	48.4	51.6	52.8	51.8	48.6	43.4	36.3	27.9	18.9	9.95	2.65		
110	2.87	9.41	17.9	26.4	34.2	40.9	45.9	48.8	49.8	48.9	46.0	41.1	34.5	26.6	18.0	9.55	2.81		
115	2.93	8.84	16.8	24.8	32.1	38.3	42.9	45.7	46.6	45.8	43.0	38.4	32.3	24.9	16.9	8.92	2.87		
120	3.05	8.35	15.6	23.0	29.8	35.4	39.7	42.3	43.2	42.4	39.8	35.6	29.9	23.1	15.6	8.36	2.82		
125	2.83	7.69	14.1	21.0	27.2	32.5	36.4	38.8	39.5	38.8	36.5	32.6	27.2	21.1	14.1	7.74	3.01		
130	3.06	7.39	13.0	18.9	24.6	29.2	32.9	35.0	35.7	35.1	32.9	29.3	24.6	18.9	12.7	7.11	2.16		
135	3.10	6.68	11.8	16.9	21.8	26.1	29.2	31.0	31.7	31.0	29.2	26.0	21.7	16.8	11.7	5.99	1.80		
140	2.71	5.59	10.3	14.9	19.0	22.6	25.3	27.0	27.6	27.0	25.3	22.6	18.8	14.8	10.1	5.71	1.93		
145	2.11	5.21	8.53	12.6	16.3	19.3	21.5	23.0	23.5	23.0	21.5	19.1	16.3	12.5	8.17	5.00	2.15		
150	2.11	4.43	6.55	10.3	13.5	16.0	17.8	18.9	19.3	18.9	17.8	16.0	13.4	9.62	6.66	4.29	2.35		
155	2.22	3.90	5.73	7.82	9.96	12.3	13.8	14.9	15.3	15.0	14.0	12.5	9.97	8.00	5.80	3.42	2.52		
160	3.13	2.37	4.51	5.90	7.31	8.15	9.31	10.2	10.6	10.4	9.80	8.74	7.62	6.43	5.24	2.30	2.88		
165	3.20	2.32	2.18	4.12	4.92	5.67	6.52	7.09	7.34	7.34	6.98	6.49	5.79	4.98	3.42	2.32	3.16		
170	3.02	2.71	2.01	1.80	1.80	3.19	3.94	4.20	4.34	4.45	4.40	4.15	3.16	1.92	2.02	2.38	3.07		
175	2.42	2.33	2.34	2.13	1.89	1.73	1.69	1.66	1.56	1.37	1.39	1.52	1.77	2.16	2.54	2.65	2.67		
180	2.66	2.67	2.70	2.77	2.79	2.82	2.91	3.09	3.31	3.36	3.31	3.16	2.90	2.79	2.73	2.72	2.68		

Table 5: Luminous Intensity Data

ISTMT TEST DATA:

Sample Tested: **31422-3735LW-1**

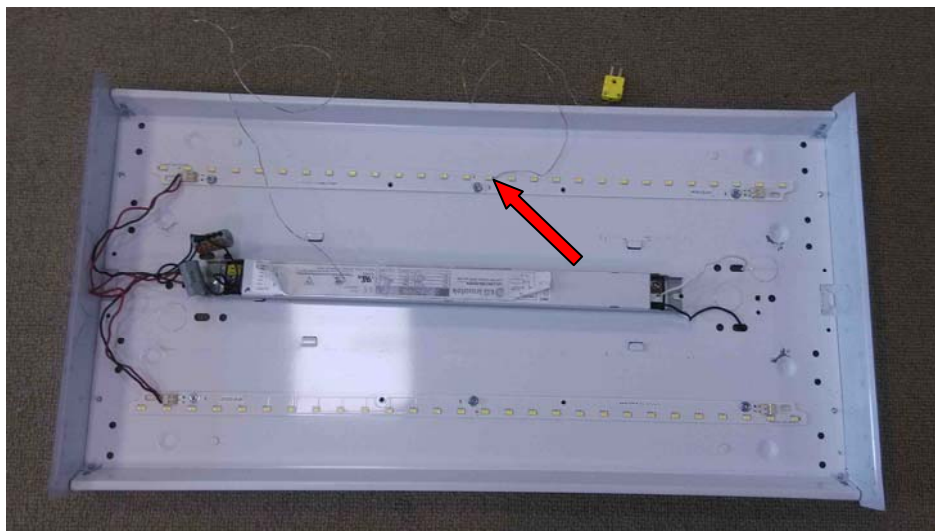
Test ambient temperature was 25.4°C.

Test orientation was Light Down.

The stabilization time of the sample was 7.5 hours.



View of In-Situ Point- Ts



Location of In-Situ Point from overall view

To get the maximum temperature, Ts point is near the internal LED driver.

Input Voltage (V)	Input Power (W)	Tested LED source current (mA)	Measured Driver Temp Maximum Temperature (Corrected to Ta=25°C)	Measured In-Situ Maximum Temperature (Corrected to Ta=25°C)
120.0	28.71	141.5	44.3	52.1
277.0	29.08	141.6	44.5	52.3

Table 6: ISTMT test data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Sep. 18, 2014	Sep. 17, 2015
Digital Power Meter	PF2010A	HZTE028-01	Sep. 18, 2014	Sep. 17, 2015
AC Power Supply	PCR 500L	HZTE001-08	Sep. 18, 2014	Sep. 17, 2015
DC Power Supply	WY12010	HZTE004-03	Sep. 18, 2014	Sep. 17, 2015
Temperature Meter	TES1310	HZTE017-01	Sep. 18, 2014	Sep. 17, 2015
Standard Source	D908	HZTE012-01	Sep. 18, 2014	Sep. 17, 2015
Standard source	SCL-1400	HZTE012-02	Sep. 18, 2014	Sep. 17, 2015

Table 7: Test Equipment List

TEST METHODS

Seasoning of SSL Product

For the purpose of rating new SSL products, SSL products shall be tested with no seasoning. Therefore, no seasoning was performed.

Goniophotometer Method

Photometric and Electrical Measurements

An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.

Ambient temperature was measured at the same height of the sample mounted on the Goniophotometer equipment. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation.

The stabilization time typically ranges from 30 min (small integrated LED lamps) to 2 or more hours for large SSL luminaires). It can be judged that stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 30 min, taken 15 minutes apart, is less than 0.5 %.

Electrical measurements including voltage, current, and power were measured using the Everfine Digital Power Meter.

Some graphics were created with Photometric Plus software.

The standard reference of the Goniophotometer system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Metrology P.R. China.

The uncertainty of goniophotometer system reported in this document is expanded uncertainty is 1.94% with a coverage factor $k=2$.

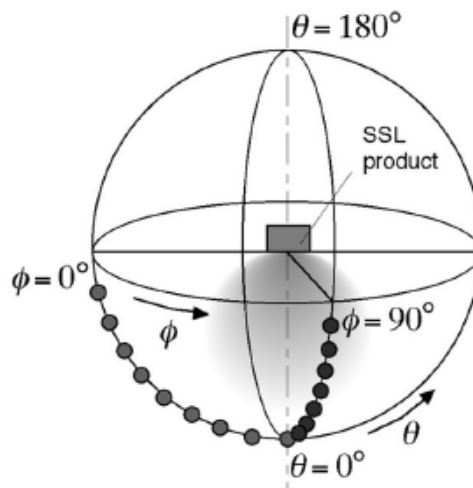
Color Characteristics Measurements

The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as values that are spatially average, weighted to intensity, over the angular range where light is intentionally emitted from the SSL product. The color characteristics measurements are using gonio-spectroradiometer.

Color Spatial Uniformity

The characteristics of SSL products may be spatially non-uniform, the chromaticity coordinate shall be measured at two vertical planes ($C=0^\circ/180^\circ$ and $C=90^\circ/270^\circ$) and at 10° or less intervals for vertical angle until the light output dropped to below 10% of the peak intensity. The averaged weighted chromaticity coordinate was calculated from these points. The data was then analyzed to check for delta color differences of the u' , v' chromaticity coordinates. The spatial non-uniformity of chromaticity, $\Delta u'v'$, is determined as the maximum deviation (distance on the CIE (u' , v') diagram) among all measured points from the spatially averaged chromaticity coordinate.

The geometry for the chromaticity measurement using gonio-spectroradiometer is shown as following.



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The luminaire was installed to simulate intended usage, in accordance with the manufacturer's instructions.

Temperatures were measured after they stabilized, when the test was run for a minimum of 7.5 h.

The tests were conducted in an ambient temperature of 25 ± 5 °C. Ambient temperature variations above or below 25°C were respectively subtracted from or added to temperatures recorded at points on the luminaire. Temperatures recorded at points on a luminaire were measured by means of thermocouples.

The thermocouples had conductors no larger than No. 24 AWG (0.21mm^2) and no smaller than No. 30 AWG (0.05mm^2). Thermocouples complied with the requirements specified in ASTM MNL 12 and thermocouples as listed in the table of the limits of error specified in NIST ITS 90, or ISA MC96.1.

The luminaire was installed in the test box in the configuration that resulted in the highest operating temperatures, considering different trim and maximum lamp wattage combinations, lampholder adjustment heights, and the like.

The test box was constructed of 12mm thick plywood as described below:

The test box was rectangular and had four sides and a bottom.

The four sides of the test box for a ceiling-mounted luminaire were a minimum distance of 8.5 in (215mm) from the nearest part of the lamp housing or heat-producing parts. The top edge of the sides of the test box were a minimum of 8.5 in (215mm) above the highest point of any permanently attached part of the lamp housing.

Thermal insulation of the loose-fill type was poured into the test box through the open top, until level with the top, without applying any compacting procedure.

The thermal insulation was conditioned to the density specified by the insulation manufacturer to obtain a required rated thermal resistance of Rsi 0.56 to 0.678 (R3.2 to R3.85).

All spaces around the luminaire and between it and the sides of the box were filled with the thermal insulation.

*** End of Report ***

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