



## LM-79-08 Test Report

for

**P.Q.L., Inc.**

2285 Ward Avenue / Simi Valley, CA 93065

**LED REPLACE LAMP**

**Model: 91314**

**Laboratory: Leading Testing Laboratories**

**NVLAP CODE: 200960-0**

No.1805, DongLiu road, BinJiang District, Hangzhou, China

Tel: +86-571-56680806

www.ledtestlab.com

Report No.: HZ16050046c

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

Review by:

Engineer: April Zou  
May 31, 2016

Approved by:



Manager: Jim Zhang  
May 31, 2016

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: 91314

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
130.6	2137.0	32.72	0.9958
CCT (K)	CRI	Stabilization Time (Light & Power)	
3946	82.5	60	

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

### Test specifications:

**Date of Receipt** : May 24, 2016

**Date of Test** : May 26, 2016

**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

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## Sample Photos

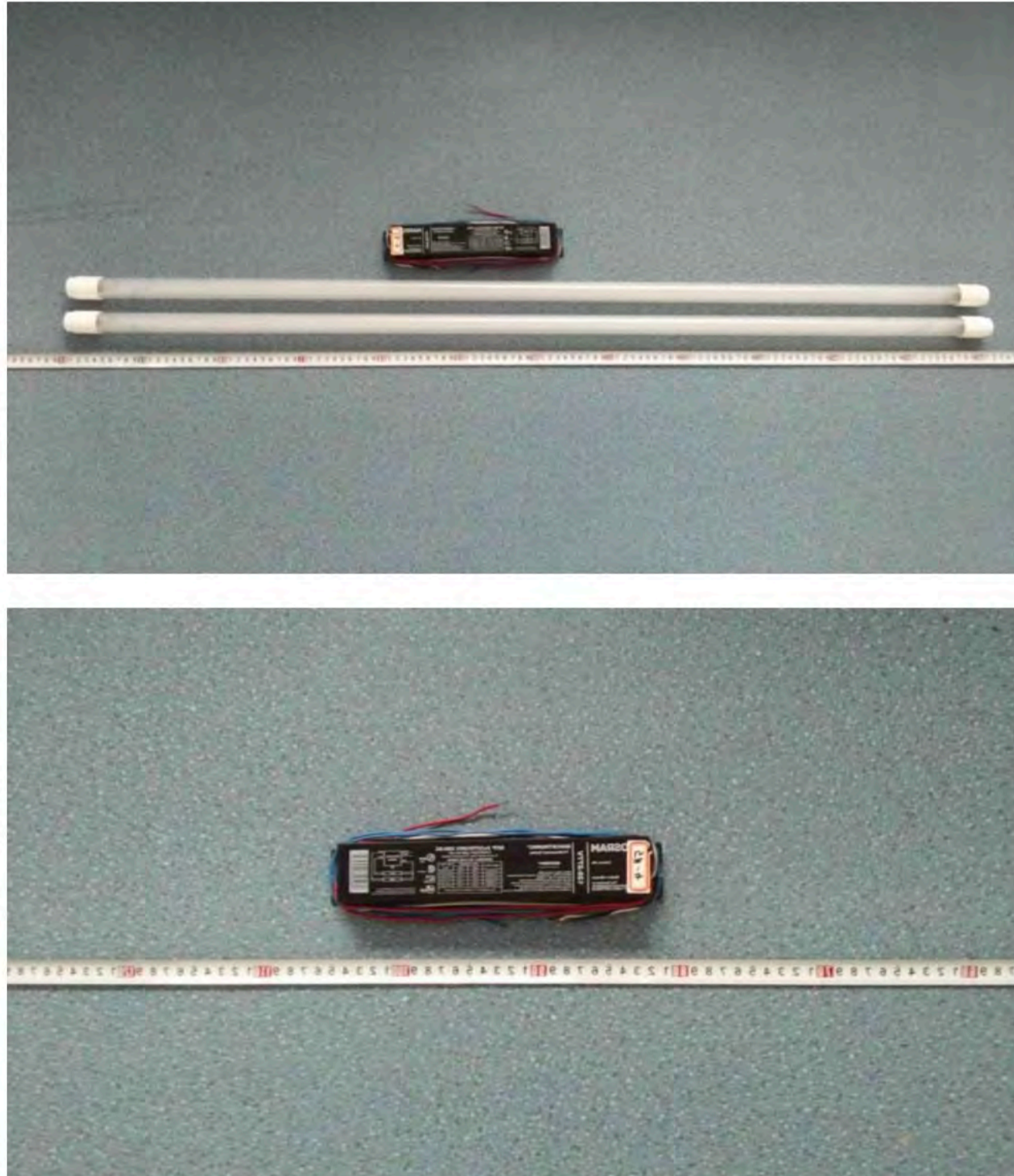


Figure 1- Overview of the sample

### Equipment Under Test (EUT)

<b>Name</b>	: LED REPLACE LAMP
<b>Model</b>	: 91314
<b>Electrical Ratings</b>	: 120-277V, 50/60Hz, 16W
<b>Product Description</b>	: G13 base, fixed end caps, 4000K, Frosted lens LED Replace lamps supplied by a high frequency fluorescent lamp ballast: QTP 2x32T8/UNV ISN-SC
<b>Manufacturer</b>	: P.Q.L., Inc.
<b>Address</b>	: 2285 Ward Avenue Simi Valley, CA 93065

## TEST RESULTS

Test ambient temperature was 24.8°C.

Base orientation was Horizontal. 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 65 minutes.

### Sphere-Spectroradiometer Method

Parameter	Result	
	Test Voltage (V)	120.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.274	0.123
Power Factor	0.9958	0.9632
Test Power (W)	32.72	32.91
THD A%	5.67	12.51
Luminous Efficacy (lm/W)	130.6	129.7
Total Luminous Flux (lm)	2137.0	2135.0
Color Rendering Index (CRI)	82.5	
R9	6.4	
Correlated Color Temperature (CCT)(K)	3946	
Chromaticity Chroma x	0.3843	
Chromaticity Chroma y	0.3838	
Chromaticity Chroma u	0.2249	
Chromaticity Chroma v	0.3368	
Duv	0.0021	
Chromaticity Chroma u'	0.2249	
Chromaticity Chroma v'	0.5052	

Special Color Rendering Indices	
R1	80.4
R2	89.2
R3	95.4
R4	80.5
R5	80.3
R6	84.8
R7	86
R8	63.5
R9	6.4
R10	74.1
R11	79
R12	60
R13	82.6
R14	97.6

Table 2: Test data per Sphere-Spectroradiometer Method

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

### Goniophotometer Method

Test ambient temperature was 24.4°C.

The photometric distance is 30m.

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

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.269
Power Factor	0.9962
Test Power (W)	32.15
Luminous Efficacy (lm/W)	131.9
Total Luminous Flux (lm)	2119.7
Beam Angle (°)	116.1
Center Beam Candle Power (cd)	579
Spacing Criteria	1.26 (0°-180°)/ 1.33 (90°-270°)
Zonal Lumens in the 0°-60°Zone	62.86%
Zonal Lumens in the 60°-90°Zone	23.20%
Zonal Lumens in the 90°-120°Zone	8.23%
Zonal Lumens in the 120°-180°Zone	5.72%

Table 3: Test data per Goniophotometer Method

### Spectral Power Distribution - Sphere Spectroradiometer Method

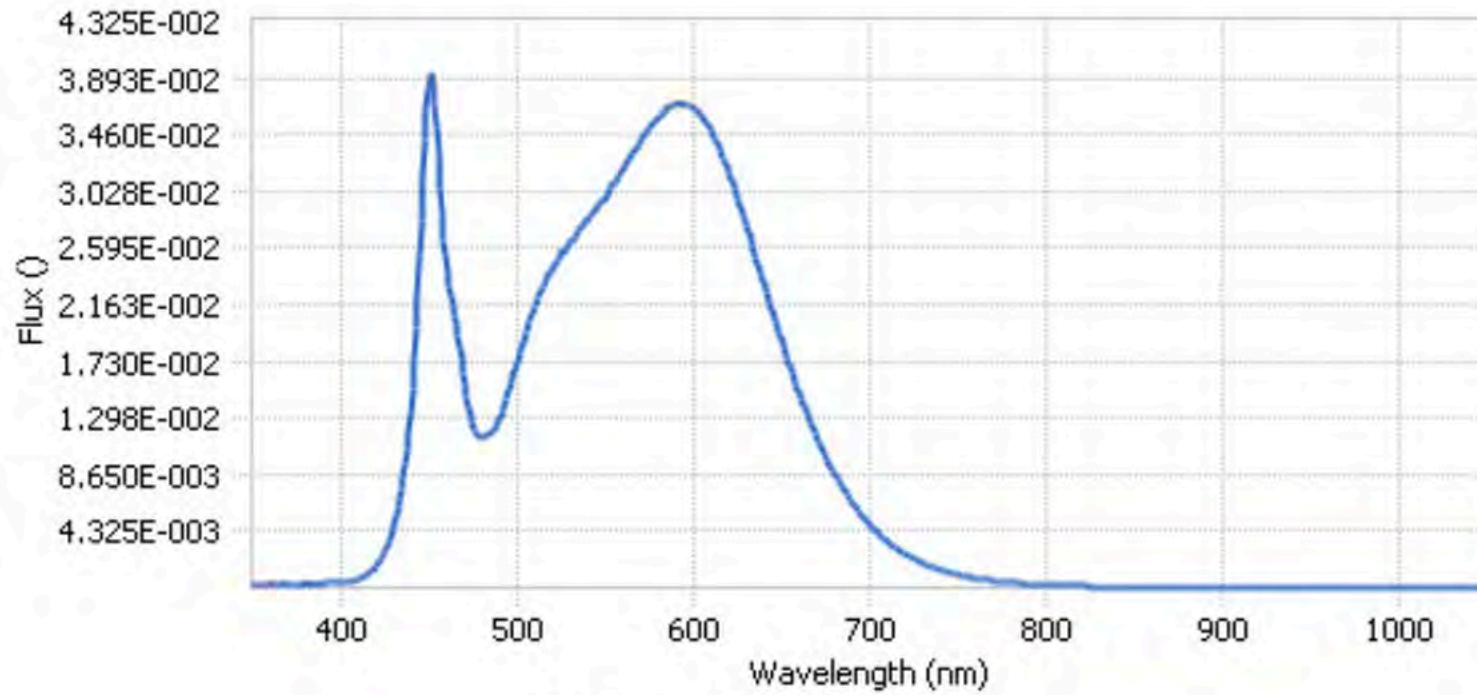
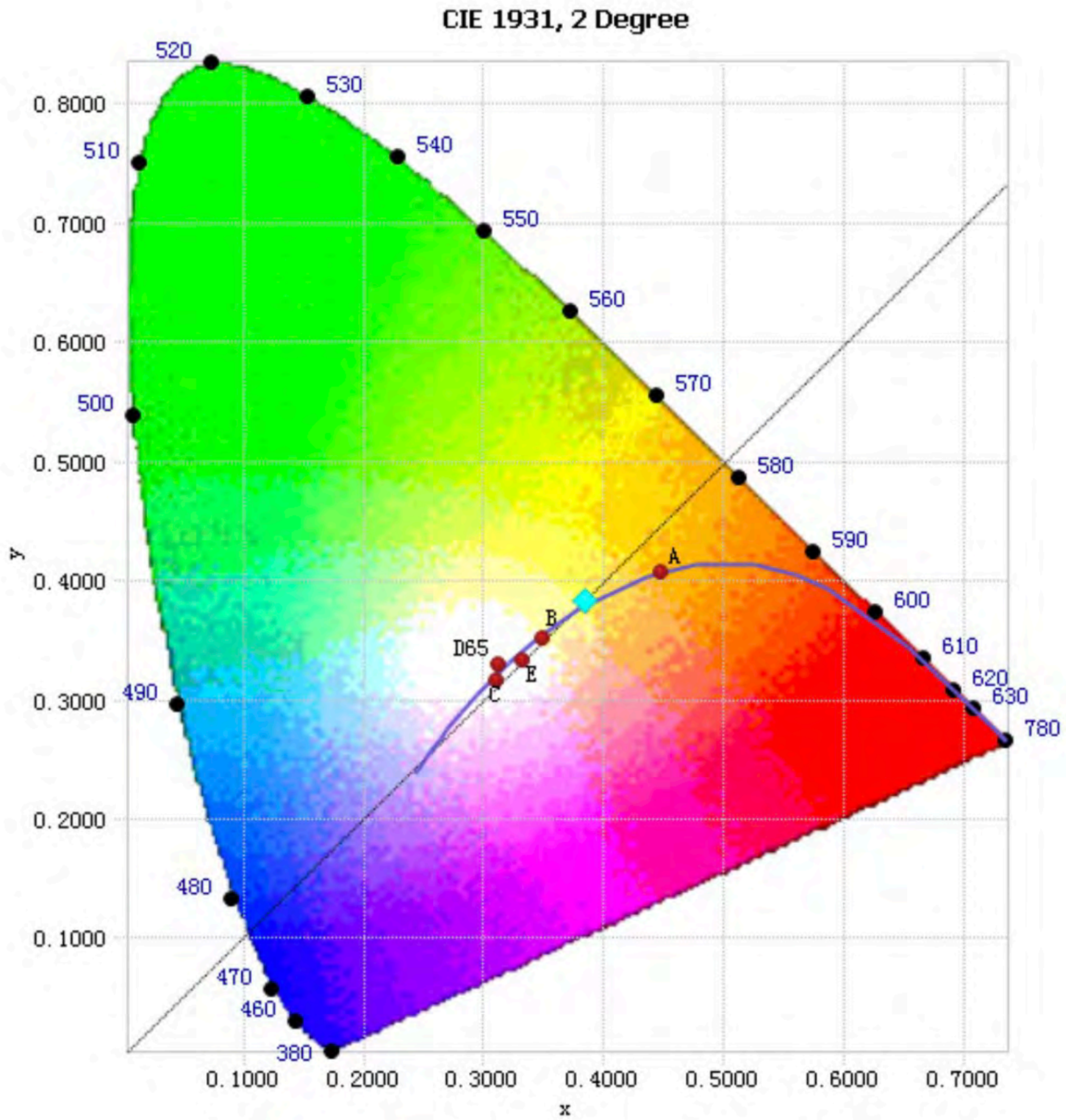


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.45E-04	485	1.17E-02	590	3.70E-02	695	5.71E-03
385	3.41E-04	490	1.29E-02	595	3.70E-02	700	4.90E-03
390	3.29E-04	495	1.46E-02	600	3.66E-02	705	4.20E-03
395	3.51E-04	500	1.71E-02	605	3.60E-02	710	3.61E-03
400	3.97E-04	505	1.93E-02	610	3.51E-02	715	3.09E-03
405	4.90E-04	510	2.14E-02	615	3.37E-02	720	2.64E-03
410	6.42E-04	515	2.31E-02	620	3.19E-02	725	2.26E-03
415	9.32E-04	520	2.42E-02	625	3.01E-02	730	1.93E-03
420	1.51E-03	525	2.53E-02	630	2.79E-02	735	1.64E-03
425	2.59E-03	530	2.62E-02	635	2.57E-02	740	1.40E-03
430	4.44E-03	535	2.71E-02	640	2.35E-02	745	1.20E-03
435	7.57E-03	540	2.81E-02	645	2.13E-02	750	1.03E-03
440	1.33E-02	545	2.89E-02	650	1.92E-02	755	8.87E-04
445	2.53E-02	550	2.97E-02	655	1.71E-02	760	7.54E-04
450	3.83E-02	555	3.08E-02	660	1.51E-02	765	6.48E-04
455	3.50E-02	560	3.19E-02	665	1.33E-02	770	5.58E-04
460	2.53E-02	565	3.30E-02	670	1.17E-02	775	4.81E-04
465	2.07E-02	570	3.39E-02	675	1.02E-02	780	4.19E-04
470	1.64E-02	575	3.50E-02	680	8.84E-03		
475	1.26E-02	580	3.58E-02	685	7.68E-03		
480	1.15E-02	585	3.66E-02	690	6.65E-03		

Table 4: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

### Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3843, 0.3838)

Chart 2: Chromaticity Diagram per Sphere - Spectroradiometer Method

Note: The location on the diagram of the tristimulus coordinates are indicated by the blue diamond.



**Nominal CCT Quadrangles – Sphere Spectroradiometer Method**

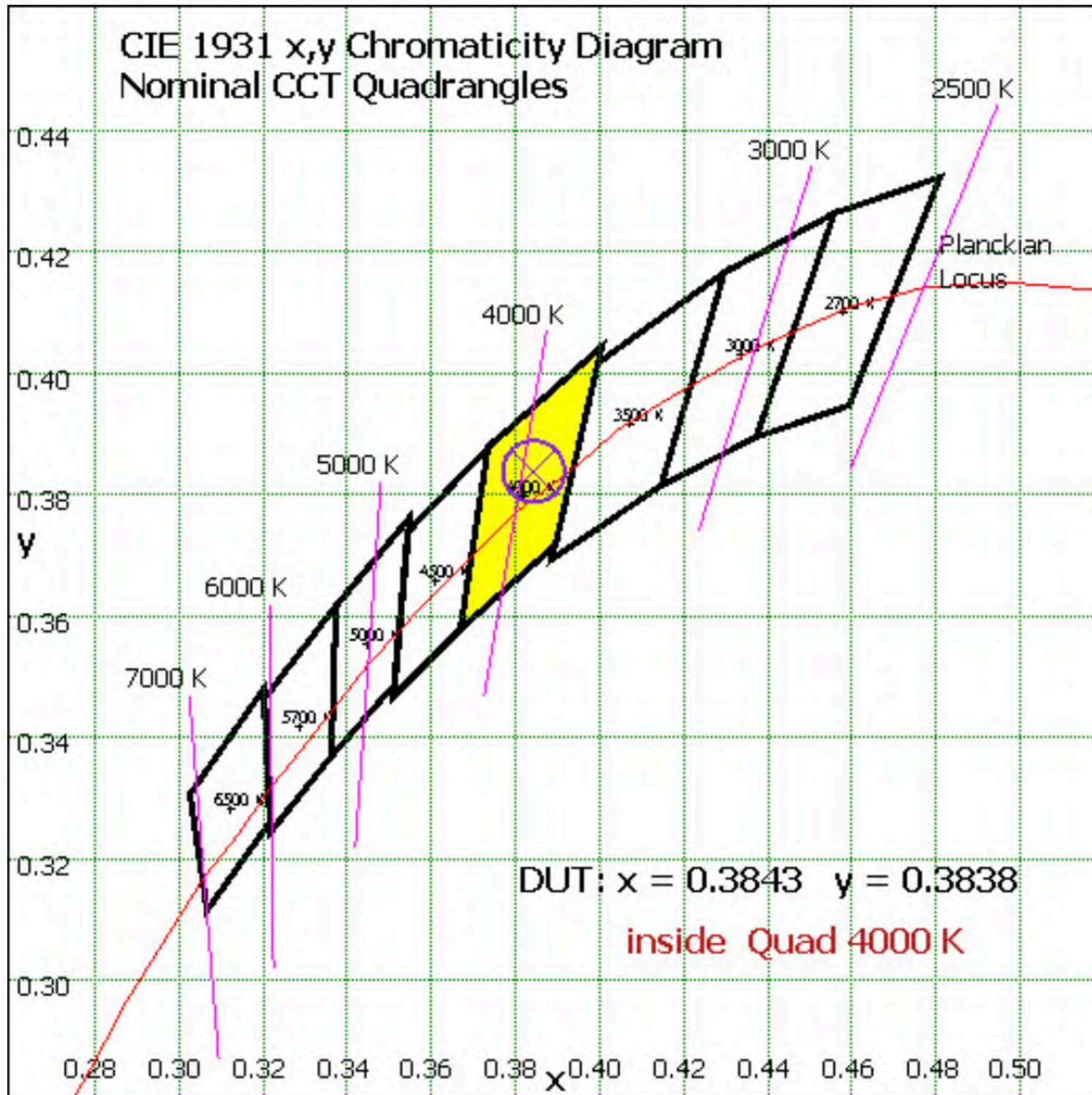


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

### Zonal Lumen Tabulation- Goniophotometer Method

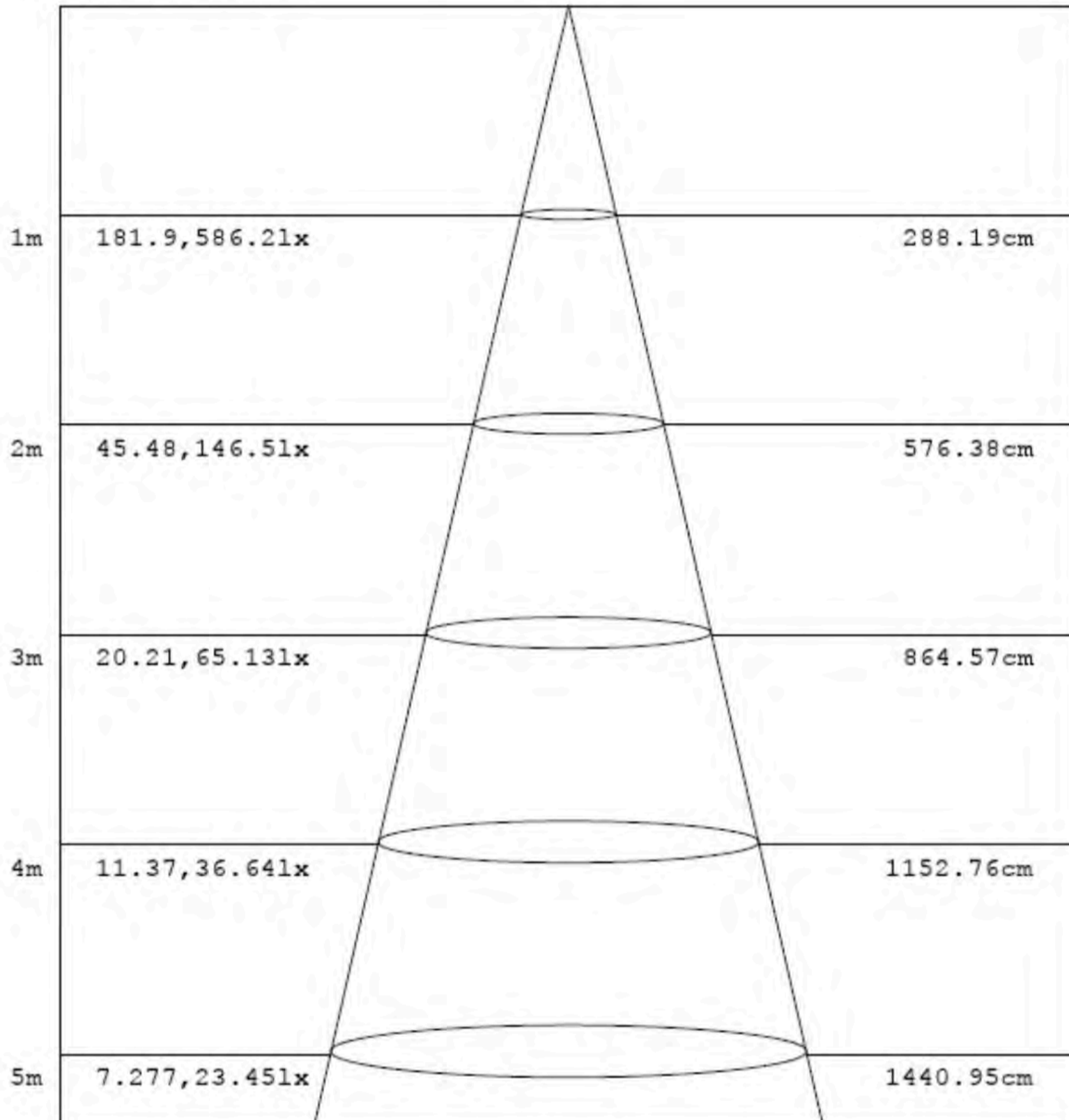
$\gamma(^{\circ})$	Lumens	% Total
0- 10	54.72	2.58%
10- 20	157.052	7.41%
20- 30	240.328	11.34%
30- 40	291.814	13.77%
40- 50	305.492	14.41%
50- 60	282.943	13.35%
60- 70	228.524	10.78%
70- 80	160.337	7.56%
80- 90	102.829	4.85%
90-100	70.522	3.33%
100-110	56.268	2.65%
110-120	47.592	2.25%
120-130	40.262	1.90%
130-140	32.754	1.55%
140-150	24.354	1.15%
150-160	15.11	0.71%
160-170	6.971	0.33%
170-180	1.825	0.09%
Total	2119.7	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1332.349	62.86%
60- 90	491.69	23.20%
0-90	1824.039	86.05%
90- 180	295.658	13.95%
0- 180	2119.7	100%

Table 5: Zonal Lumen Data

### Illuminance Plots- Goniophotometer Method

Flux out:1210 lm



Height

Eavg, Emax

Angle:110.48deg

Diameter

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

Chart 4: Beam Angle

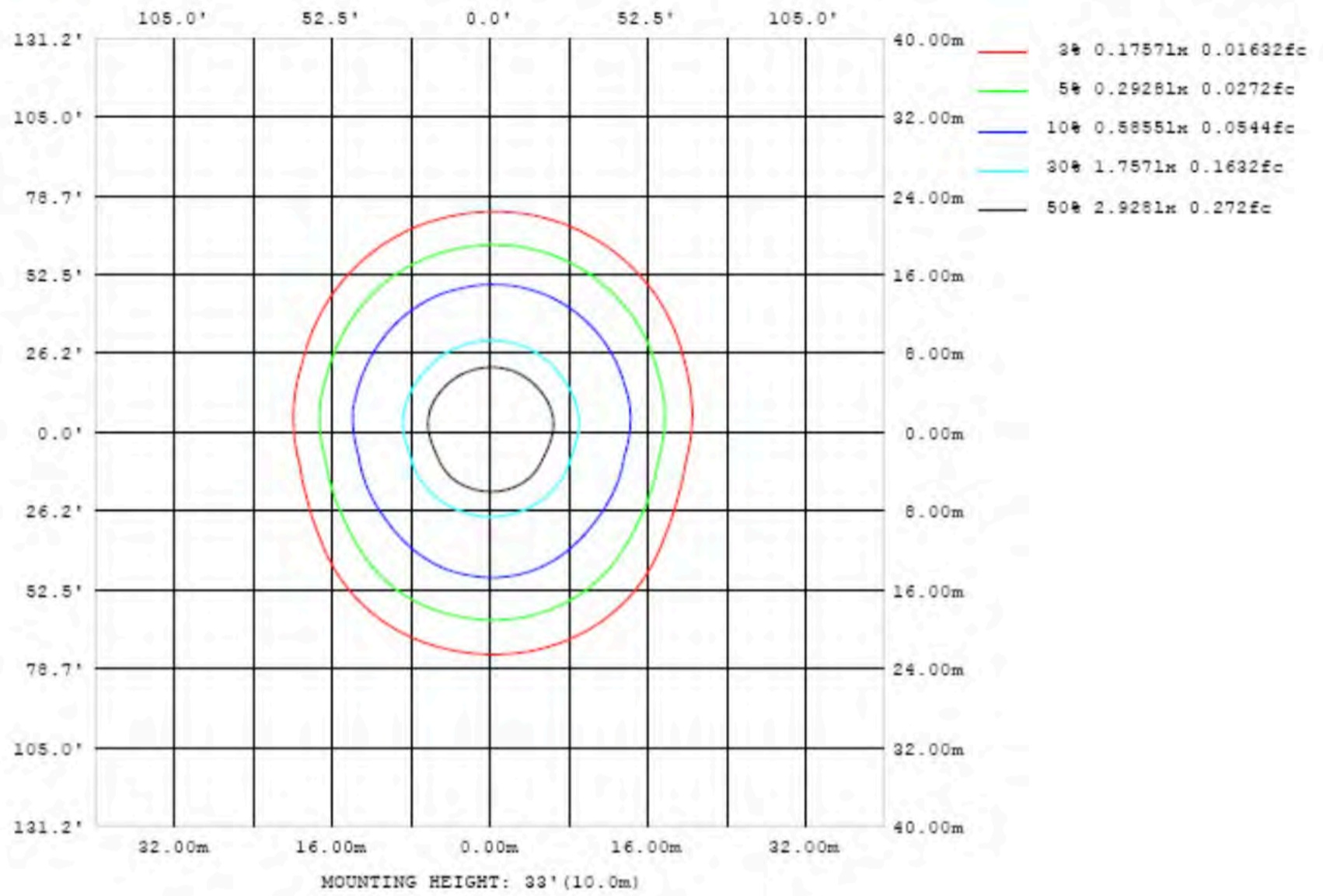


Chart 5: Illuminance Plot (Footcandles)

### Luminous Intensity Distribution Plots- Goniophotometer Method

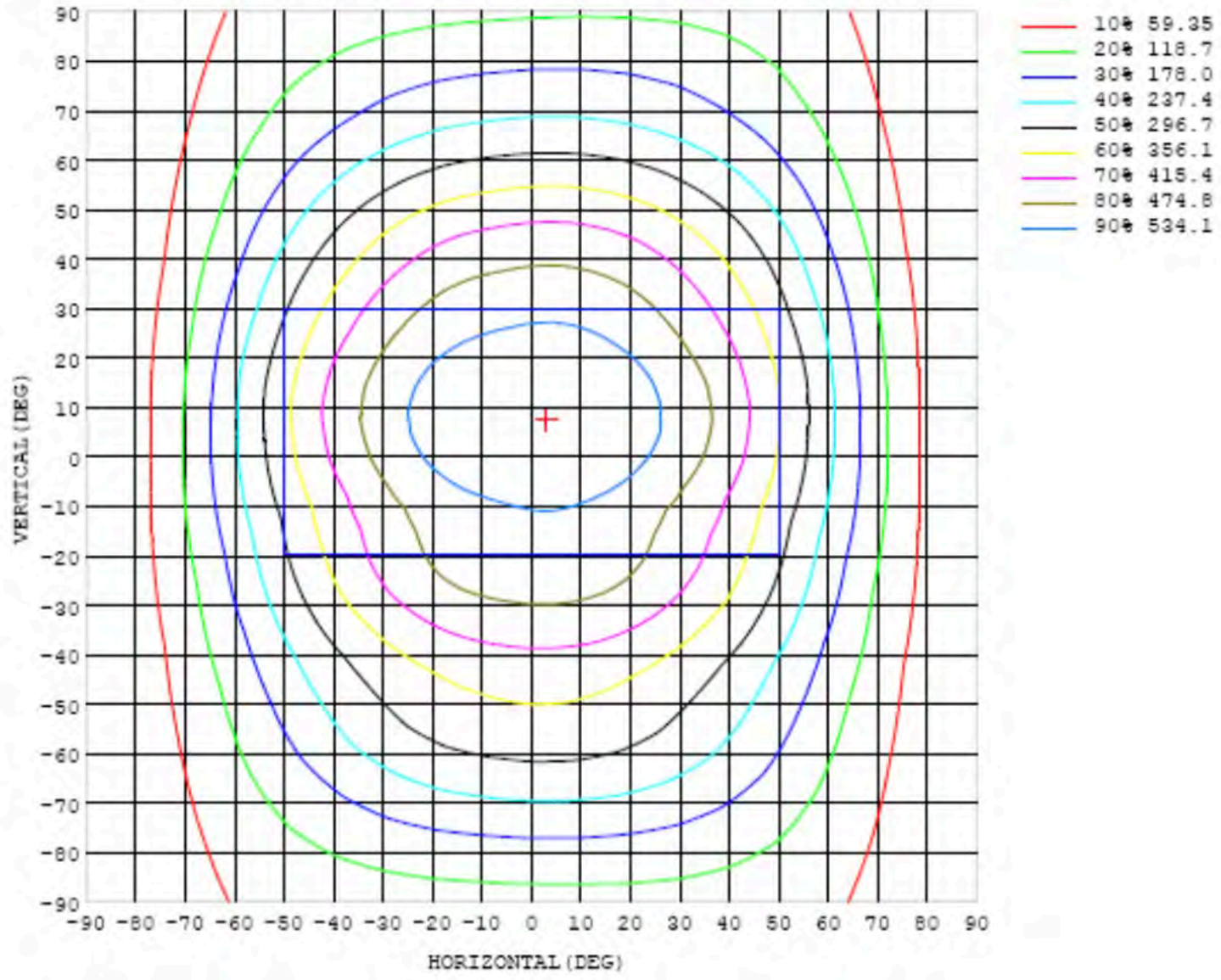


Chart 6: Isocandela Plot

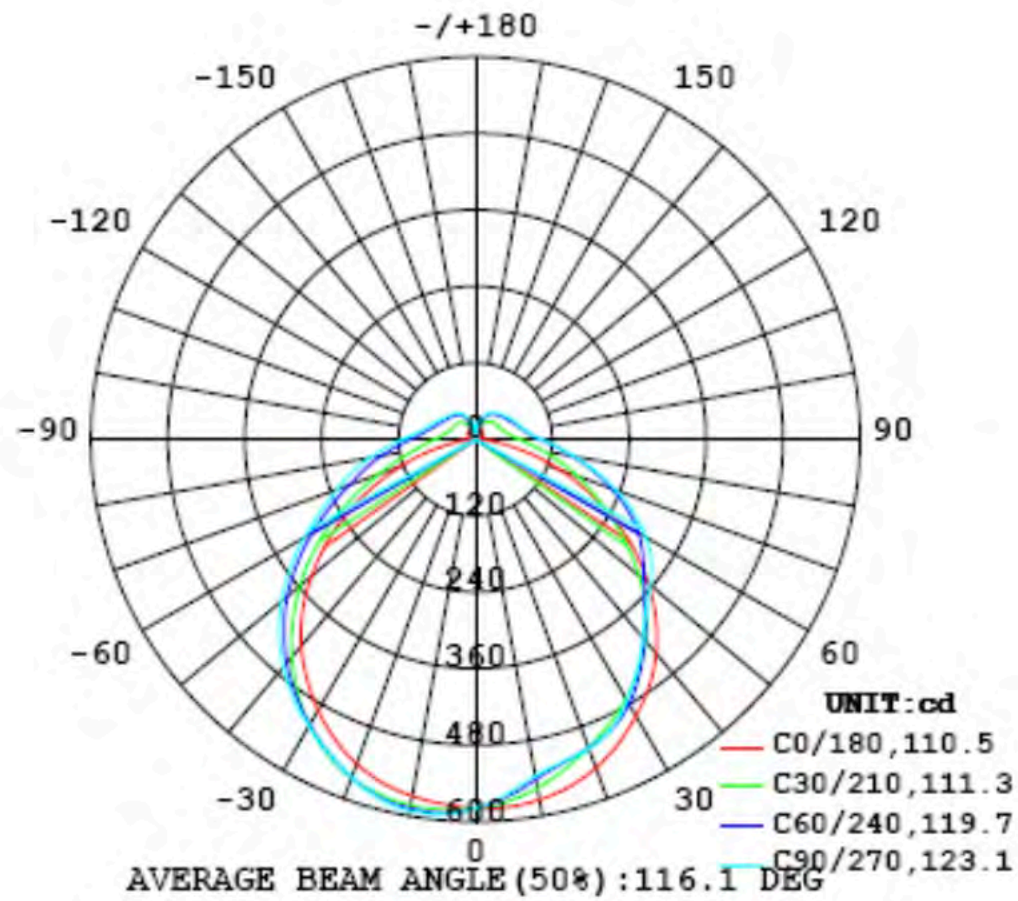


Chart 7: Polar Candela Distribution

**Luminous Intensity Data- Goniophotometer Method**

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	579	579	579	579	579	579	579	579	579	579	579	579	579	579	579	579	579	579	579
5	580	577	573	570	568	565	563	561	560	559	559	559	560	562	564	566	569	572	575
10	574	568	562	556	550	545	542	540	538	536	536	536	537	540	544	550	556	562	569
15	565	555	545	536	530	527	526	526	525	524	523	521	521	521	524	530	539	549	558
20	549	536	524	515	513	513	515	517	518	517	515	513	510	508	507	509	517	529	542
25	527	512	498	494	496	500	502	503	503	501	499	498	498	495	490	487	490	503	519
30	501	483	469	470	476	479	480	478	475	473	472	473	475	474	470	462	461	473	491
35	473	452	440	444	449	450	447	445	442	440	439	440	442	444	442	436	429	438	459
40	439	416	409	413	414	413	412	410	407	406	404	405	406	406	407	404	396	400	423
45	398	375	373	377	374	374	374	376	378	377	374	371	368	367	365	366	360	359	382
50	352	330	332	334	333	335	344	352	356	356	353	347	339	328	323	321	318	313	334
55	302	283	285	288	292	305	319	330	335	335	331	325	313	297	282	275	271	265	283
60	249	233	236	243	258	277	294	304	308	307	303	298	287	269	248	230	221	216	230
65	194	182	187	204	228	248	262	270	273	272	268	263	254	237	216	192	173	166	176
70	139	132	143	169	195	214	226	233	235	233	230	226	217	202	182	157	131	118	124
75	89.2	87.6	108	137	162	179	189	194	195	194	191	187	180	167	149	124	96.8	76.9	77.0
80	47.0	53.7	79.3	108	131	145	153	157	158	157	154	151	145	135	119	96.8	69.6	46.0	38.1
85	15.8	31.0	58.7	85.1	105	117	123	126	127	126	124	121	116	108	95.2	75.9	51.3	25.8	11.0
90	0.60	18.7	45.0	68.9	85.4	95.6	101	103	104	103	102	99.6	95.8	89.0	78.2	62.0	39.7	15.7	0.38
95	1.33	13.7	37.0	58.3	72.9	81.8	86.6	88.7	89.3	88.9	87.8	86.1	82.8	77.2	68.1	53.5	33.4	12.0	1.57
100	3.54	13.0	32.6	51.8	65.3	73.1	77.6	79.7	80.4	80.2	79.4	77.7	74.8	69.9	61.5	48.3	30.1	12.3	3.61
105	6.21	14.4	30.5	47.3	59.9	67.7	71.9	73.8	74.6	74.5	73.8	72.4	69.8	64.9	56.8	44.5	28.8	14.2	6.03
110	9.03	16.4	30.0	44.1	55.5	63.0	67.6	70.0	71.0	71.0	70.3	68.6	65.7	60.8	53.1	42.1	29.0	16.5	8.60
115	11.6	18.3	30.1	42.2	52.0	59.2	63.6	66.2	67.3	67.4	66.7	65.0	62.0	57.3	50.2	40.9	29.7	18.6	10.9
120	13.8	20.0	30.5	41.0	49.6	55.9	60.2	62.8	64.1	64.2	63.6	61.9	59.0	54.5	48.3	40.2	30.6	20.5	12.8
125	15.2	21.6	30.9	40.2	47.8	53.5	57.4	59.8	61.1	61.3	60.6	59.1	56.4	52.5	46.9	39.8	31.2	22.0	14.4
130	15.9	22.7	30.5	39.5	46.4	51.5	55.1	57.3	58.5	58.8	58.2	56.8	54.3	50.7	45.8	39.4	31.2	22.7	15.3
135	16.2	23.5	29.6	38.5	45.0	49.7	52.9	55.1	56.3	56.5	56.0	54.7	52.4	49.1	44.5	38.6	30.2	23.5	15.8
140	16.2	24.3	28.8	36.4	43.3	47.7	50.9	53.0	54.1	54.3	53.9	52.7	50.5	47.4	43.2	37.0	29.2	24.4	15.9
145	16.0	24.2	28.2	33.4	40.5	45.4	48.5	50.6	51.7	51.9	51.5	50.2	48.1	45.3	40.8	34.0	28.3	23.9	15.8
150	15.7	23.9	27.6	31.0	36.1	41.7	45.3	47.5	48.7	49.0	48.4	47.4	45.3	41.9	36.2	31.2	27.4	23.6	15.7
155	15.2	21.1	27.0	29.1	32.2	35.9	39.9	42.8	44.3	44.7	44.2	42.9	40.3	36.3	32.3	29.1	25.3	21.7	15.1
160	14.5	17.4	24.9	28.0	29.5	31.8	33.7	35.6	36.9	37.5	37.0	35.7	33.8	31.4	27.8	25.0	22.0	19.2	14.7
165	13.8	13.7	20.3	24.3	25.0	28.3	30.0	31.0	31.4	31.6	31.3	30.4	27.4	24.5	22.5	20.5	18.2	16.2	14.2
170	14.8	13.7	15.5	20.8	22.3	22.7	22.2	26.8	28.2	28.2	26.8	22.2	19.9	19.2	19.2	18.2	18.4	14.7	15.0
175	18.5	18.2	17.6	17.7	19.4	19.7	20.3	20.0	15.5	5.98	13.7	14.0	17.6	19.6	19.2	19.6	18.4	18.8	19.1
180	2.45	2.44	2.42	2.39	2.35	2.29	2.24	2.18	2.12	2.06	2.18	2.30	2.42	2.53	2.62	2.70	2.76	2.80	2.81

Table 6: 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	579	579	579	579	579	579	579	579	579	579	579	579	579	579	579	579	579		
5	578	580	583	585	587	589	590	591	592	592	592	592	591	590	588	585	583		
10	574	579	583	585	587	588	589	591	592	593	593	593	592	591	589	585	580		
15	567	574	577	580	581	581	581	581	583	584	586	587	587	585	582	579	573		
20	554	561	566	568	567	565	563	563	565	567	569	570	571	573	571	567	560		
25	533	541	546	546	545	542	541	541	543	545	547	548	550	552	552	548	541		
30	507	516	518	518	518	518	517	517	520	523	524	524	524	525	525	523	516		
35	476	484	484	484	487	490	491	492	495	498	499	498	496	494	493	494	489		
40	441	446	446	448	453	458	461	462	466	469	470	469	465	460	458	460	456		
45	401	404	404	409	415	423	427	429	433	436	437	435	431	424	420	420	416		
50	352	355	358	365	375	383	389	390	395	398	399	398	392	385	378	373	370		
55	299	301	309	319	331	340	346	348	353	356	356	355	349	342	333	323	319		
60	242	245	258	271	284	294	302	305	309	312	312	309	303	295	283	269	263		
65	184	190	208	224	238	250	258	262	266	268	268	264	257	247	232	215	205		
70	128	141	162	181	197	210	219	225	229	230	228	223	213	200	183	162	148		
75	81.1	99.3	124	146	163	178	189	195	199	201	198	190	177	162	140	115	96.3		
80	46.9	70.0	95.8	118	136	149	158	164	167	169	167	161	150	132	108	80.0	55.8		
85	26.7	51.7	76.5	96.7	111	122	130	135	138	139	138	134	124	109	86.0	57.6	30.1		
90	16.9	40.9	63.5	80.8	92.8	101	107	110	113	114	113	110	103	90.3	70.5	44.3	17.4		
95	13.1	34.9	55.2	70.4	80.5	87.0	91.1	93.8	95.4	96.2	95.6	93.1	87.3	76.8	59.8	36.7	12.7		
100	13.0	30.7	49.3	62.9	71.6	77.7	81.1	83.2	84.4	84.8	84.1	81.7	76.6	67.4	52.3	31.4	12.0		
105	14.6	29.2	44.6	57.0	65.6	70.3	74.1	75.9	76.8	77.0	76.1	73.7	68.8	60.1	46.3	29.2	13.7		
110	16.7	29.3	42.0	52.5	60.1	65.3	68.7	70.6	71.3	71.3	70.3	67.5	62.4	54.4	42.9	29.0	16.0		
115	18.7	29.7	40.9	49.7	56.2	60.7	62.8	65.8	66.5	66.3	65.0	62.3	57.7	50.7	41.3	29.8	17.8		
120	19.9	30.3	39.9	48.1	53.8	57.5	59.5	61.7	62.3	62.1	60.9	58.5	54.6	48.7	40.5	30.4	19.1		
125	20.8	30.6	39.3	46.3	51.9	55.4	57.2	58.2	59.2	59.0	58.0	56.0	52.4	47.1	39.9	30.6	20.3		
130	21.7	29.7	38.6	45.0	49.8	53.4	55.5	56.2	57.2	57.0	55.8	53.8	50.4	45.7	39.3	29.4	21.3		
135	22.1	28.0	37.6	43.7	48.0	51.1	53.3	54.1	55.1	54.8	53.7	51.7	48.6	44.4	38.0	27.5	22.2		
140	22.6	26.9	34.9	41.9	46.2	49.0	51.1	51.6	52.6	52.5	51.5	49.6	46.8	42.6	34.9	26.4	22.6		
145	23.0	26.1	30.8	38.8	43.9	46.9	48.8	49.2	49.8	50.2	49.2	47.4	44.4	38.9	31.4	26.4	22.3		
150	23.4	25.4	27.9	33.6	39.4	43.5	45.7	46.9	47.1	47.3	46.2	43.9	39.8	33.9	28.4	26.0	21.7		
155	21.1	23.8	25.7	27.8	33.3	37.0	40.1	41.5	42.2	42.2	41.0	37.8	34.0	30.4	27.3	25.8	20.0		
160	17.0	21.0	22.8	23.9	27.2	31.3	33.1	34.5	34.4	34.3	33.3	32.0	30.0	28.2	27.0	25.8	17.5		
165	14.6	16.8	18.6	19.8	21.6	23.6	29.1	29.9	30.0	29.7	29.5	28.8	28.6	26.8	26.6	24.6	15.6		
170	15.0	15.4	17.4	17.7	17.9	18.2	20.0	24.0	27.8	27.8	28.0	27.6	25.5	25.6	23.8	17.3	15.2		
175	19.1	19.2	19.0	19.0	18.4	17.6	15.4	14.1	17.9	23.9	24.3	21.8	20.7	17.0	17.4	17.2	18.0		
180	2.80	2.76	2.70	2.62	2.53	2.42	2.30	2.18	2.06	2.12	2.18	2.24	2.29	2.35	2.39	2.42	2.44		

Table 7: Luminous Intensity Data

## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jul. 17, 2015	Jul. 16, 2016
Digital Power Meter	PF2010A	HZTE028-01	Jul. 17, 2015	Jul. 16, 2016
AC Power Supply	PCR 500L	HZTE001-08	Jul. 17, 2015	Jul. 16, 2016
DC Power Supply	WY12010	HZTE004-03	Jul. 17, 2015	Jul. 16, 2016
Temperature Meter	TES1310	HZTE017-01	Jul. 17, 2015	Jul. 16, 2016
Standard source	D908	HZTE012-01	Jul. 23, 2015	Jul. 22, 2016
Integrate Sphere system	2M	HZTE015-01	Jul. 16, 2015	Jul. 15, 2016
Digital Power Meter	WT210	HZTE008-01	Jul. 17, 2015	Jul. 16, 2016
AC Power Supply	PCR 500L	HZTE001-07	Jul. 17, 2015	Jul. 16, 2016
DC Power Supply	6154	HZTE004-04	Jul. 17, 2015	Jul. 16, 2016
Temperature and humidity recorder	JR900	HZTE018-01	Jul. 21, 2015	Jul. 20, 2016
Standard source	SCL-1400	HZTE012-02	Oct. 21, 2015	Oct. 20, 2016

Table 8: 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.

### Sphere-Spectroradiometer Method- Photometric and Electrical Measurements

A Labsphere Model CDS 2100 Spectroradiometer and Two Meter Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit. The coating reflectance of each sphere is 98%. The measure geometry is  $4\pi$ . Self-absorption correction is conducted in testing. Bandwidth of spectroradiometer is 350nm-1050nm.

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.

The stabilization time typically ranges from 30 min (small integrated LED REPLACE 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 Yokogawa Power Analyzer.

The standard reference of the integrated sphere system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Standards and Technology.

The uncertainty of integrating sphere system reported in this document is expanded uncertainty is 1.06% with a coverage factor  $k=2$ .



## 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 REPLACE 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

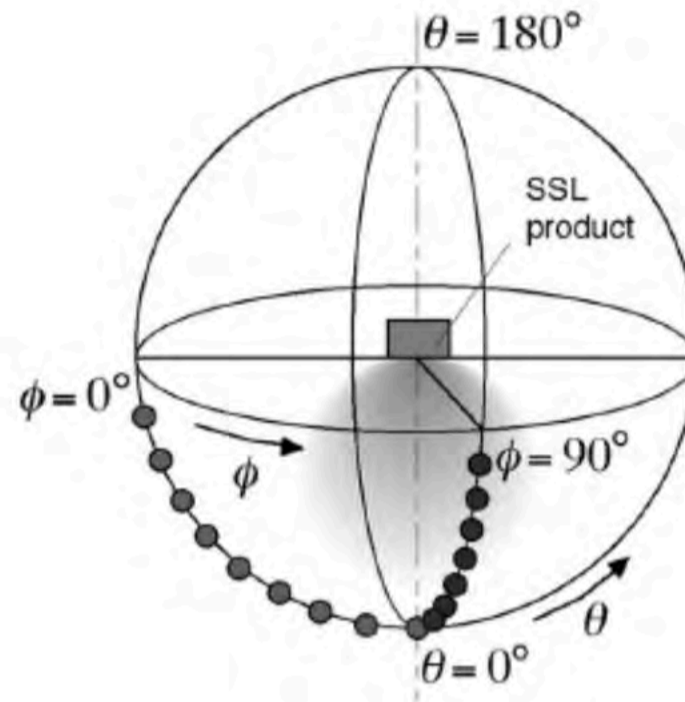
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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  $10^\circ$  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.



**\*\*\* End of Report \*\*\***

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