LM-79-08 TEST REPORT

for

GREEN CREATIVE LTD

756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

LED Tube

Model: 8.5PLL/840/GL/BYP

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ19050037a

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

Review by: April Zou

Engineer: April Zou
May 31, 2019

Approved by: Jim Zhang

Manager: Jim Zhang
May 31, 2019

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: **8.5PLL/840/GL/BYP**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
132.1	1111.0	8.41	0.9767

CCT (K)	CRI	Stabilization Time (Light & Power)
4101	82.2	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 23, 2019

Date of Test : May 28, 2019

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/IES TM-30-18 IES Method for Evaluating Light Source Color Rendition

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SAMPLE PHOTO

Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Tube
Model	: 8.5PLL/840/GL/BYP
Electrical Ratings	: 120-277V, 60Hz, 8.5W
Product Description	: 4000K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 25.0 ℃.

Base orientation was base up. 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	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.072	0.035
Power Factor	0.9767	0.8910
Test Power (W)	8.41	8.69
THD A%	19.53	24.93
Luminous Efficacy (lm/W)	132.1	127.8
Total Luminous Flux (lm)	1111.0	1111.0
Color Rendering Index (CRI)	82.2	
R9	3.4	
Correlated Color Temperature (CCT)(K)	4101	
Chromaticity Chroma x	0.3770	
Chromaticity Chroma y	0.3782	
Chromaticity Chroma u	0.2223	
Chromaticity Chroma v	0.3345	
Duv	0.0012	
Chromaticity Chroma u ’	0.2223	
Chromaticity Chroma v’	0.5017	

Special Color Rendering Indices	
R1	80
R2	88.7
R3	95
R4	80.7
R5	80.2
R6	84.4
R7	85.7
R8	63
R9	3.4
R10	73.3
R11	79.3
R12	61
R13	82.2
R14	97.5

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 25.1 ℃.

The photometric distance is 2.47 m.

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)	0.072
Power Factor	0.9769
Power (W)	8.44
Luminous Efficacy (lm/W)	129.7
Total Luminous Flux (lm)	1094.4
Beam Angle (°)	98.6 (0^o-180^o) / 118.7 (90^o-270^o)
Center Beam Candle Power (cd)	330
Maximum Beam Candle Power (cd)	329.9 (At: C=10.0, Gamma=1.0)
Spacing Criteria	1.18 (0^o-180^o) / 1.30 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	66.79%
Zonal Lumens in the 60 °-90 °Zone	23.06%
Zonal Lumens in the 90 °-120 °Zone	6.82%
Zonal Lumens in the 120 °-180 °Zone	3.33%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

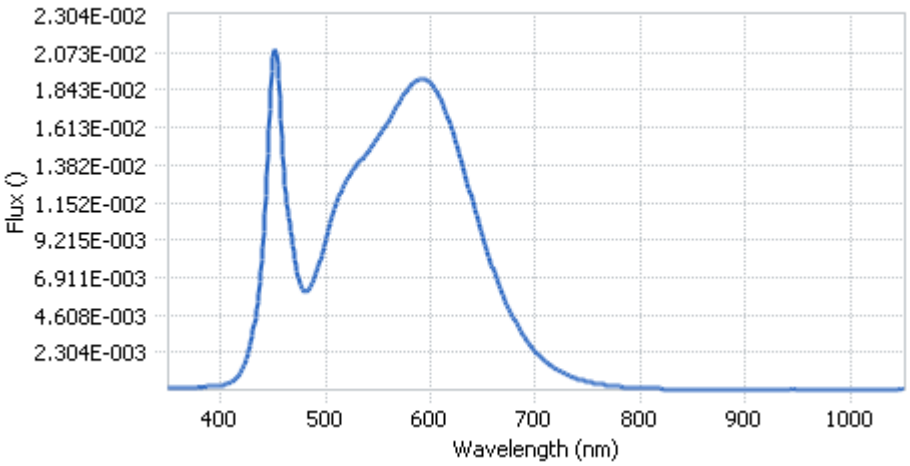
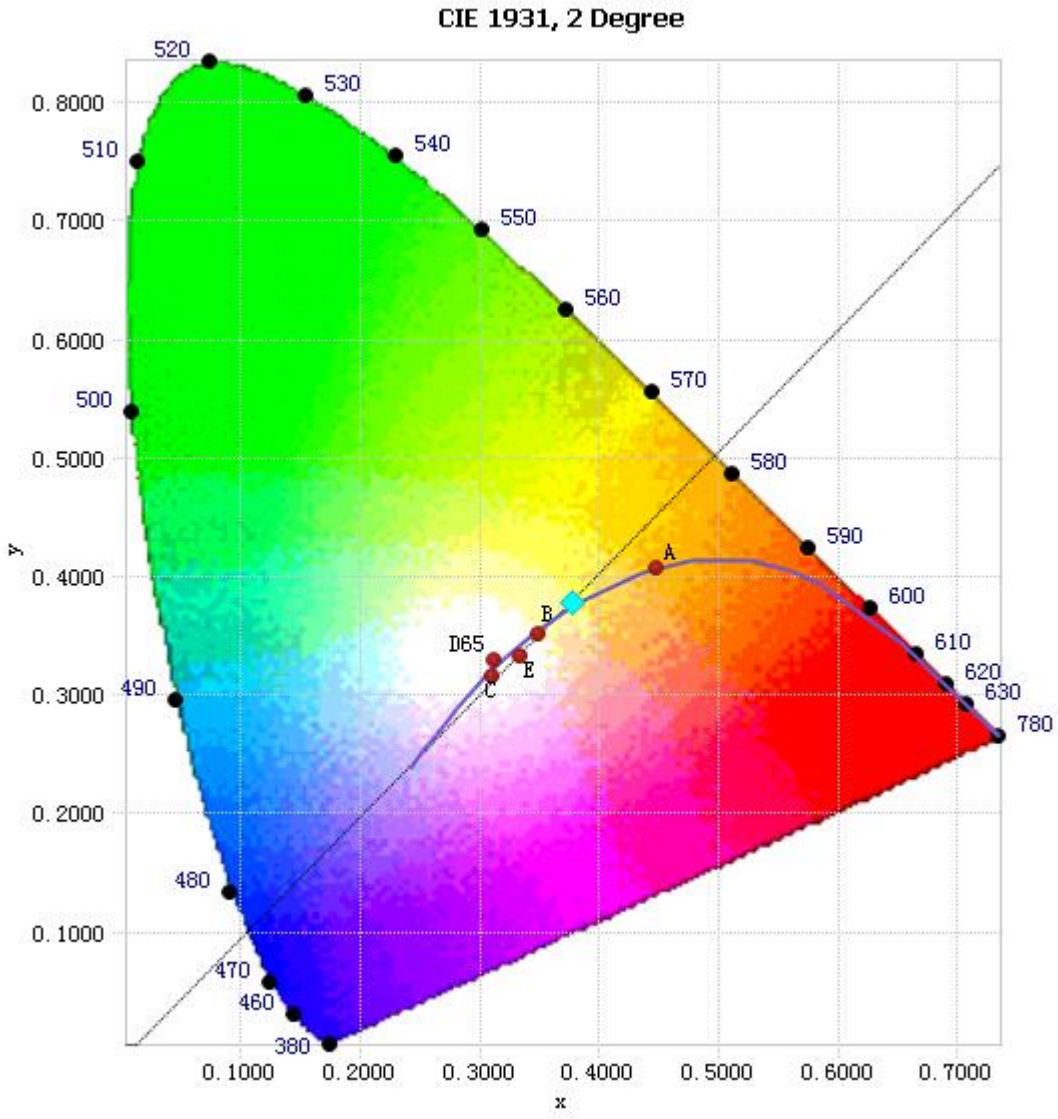


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.02E-04	485	6.31E-03	590	1.91E-02	695	2.75E-03
385	1.87E-04	490	6.99E-03	595	1.91E-02	700	2.36E-03
390	2.27E-04	495	8.01E-03	600	1.89E-02	705	2.03E-03
395	2.46E-04	500	9.27E-03	605	1.84E-02	710	1.73E-03
400	2.79E-04	505	1.05E-02	610	1.78E-02	715	1.49E-03
405	3.51E-04	510	1.14E-02	615	1.70E-02	720	1.28E-03
410	4.98E-04	515	1.23E-02	620	1.60E-02	725	1.10E-03
415	7.54E-04	520	1.29E-02	625	1.50E-02	730	9.44E-04
420	1.22E-03	525	1.34E-02	630	1.39E-02	735	8.05E-04
425	1.97E-03	530	1.39E-02	635	1.27E-02	740	6.88E-04
430	3.30E-03	535	1.42E-02	640	1.16E-02	745	5.89E-04
435	5.42E-03	540	1.47E-02	645	1.04E-02	750	5.07E-04
440	8.79E-03	545	1.51E-02	650	9.35E-03	755	4.34E-04
445	1.45E-02	550	1.55E-02	655	8.31E-03	760	3.81E-04
450	2.04E-02	555	1.60E-02	660	7.35E-03	765	3.24E-04
455	1.90E-02	560	1.65E-02	665	6.45E-03	770	2.81E-04
460	1.34E-02	565	1.71E-02	670	5.63E-03	775	2.42E-04
465	1.06E-02	570	1.77E-02	675	4.91E-03	780	2.10E-04
470	8.47E-03	575	1.82E-02	680	4.27E-03		
475	6.58E-03	580	1.86E-02	685	3.70E-03		
480	6.04E-03	585	1.90E-02	690	3.19E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3770, 0.3782)

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

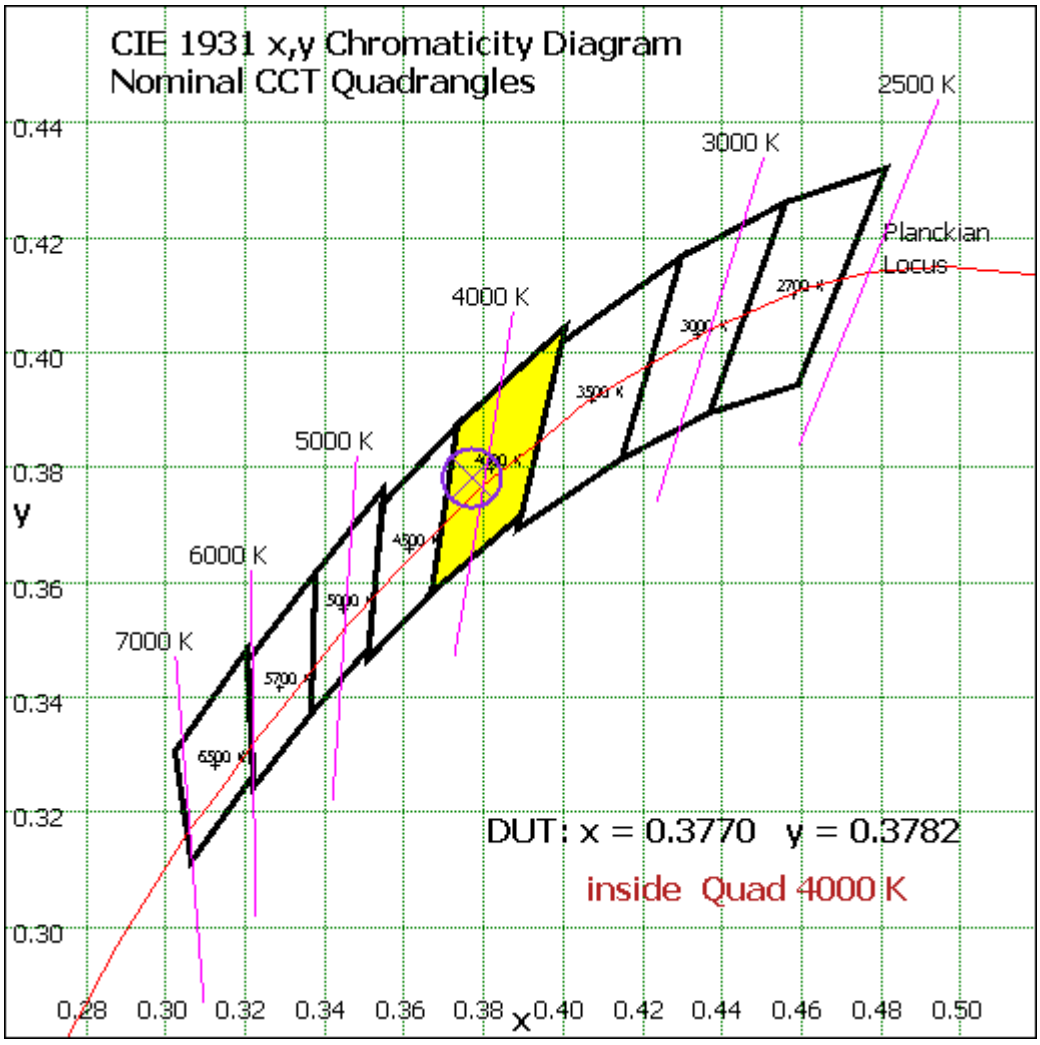
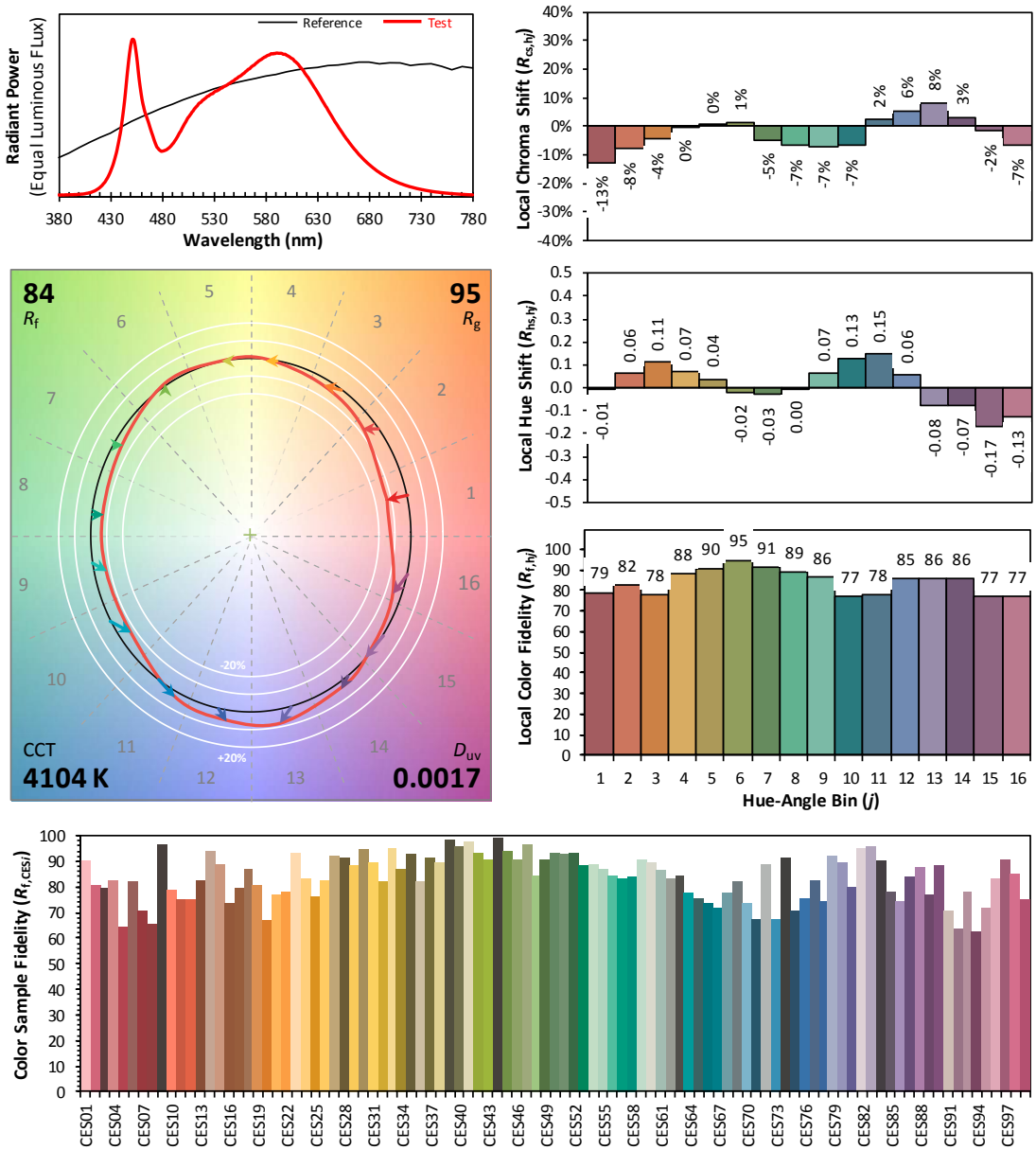


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method



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

x	0.3770
y	0.3782
u'	0.2223
v'	0.5017

Chart 4: Full Report Created with the IES TM-30 Calculator

Note: The values in this diagram might be a little different from the values in Table 2 due to rounding.

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	31.19	2.85%
10- 20	89.175	8.15%
20- 30	134.316	12.27%
30- 40	161.037	14.71%
40- 50	166.306	15.20%
50- 60	148.955	13.61%
60- 70	116.774	10.67%
70- 80	82.694	7.56%
80- 90	52.903	4.83%
90-100	35.014	3.20%
100-110	23.648	2.16%
110-120	15.934	1.46%
120-130	12.183	1.11%
130-140	9.733	0.89%
140-150	7.067	0.65%
150-160	4.442	0.41%
160-170	2.41	0.22%
170-180	0.598	0.05%
Total	1094.4	100%

γ(°)	Lumens	% Total
0- 60	730.979	66.79%
60- 90	252.371	23.06%
0-90	983.35	89.85%
90- 180	111.029	10.15%
0- 180	1094.4	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

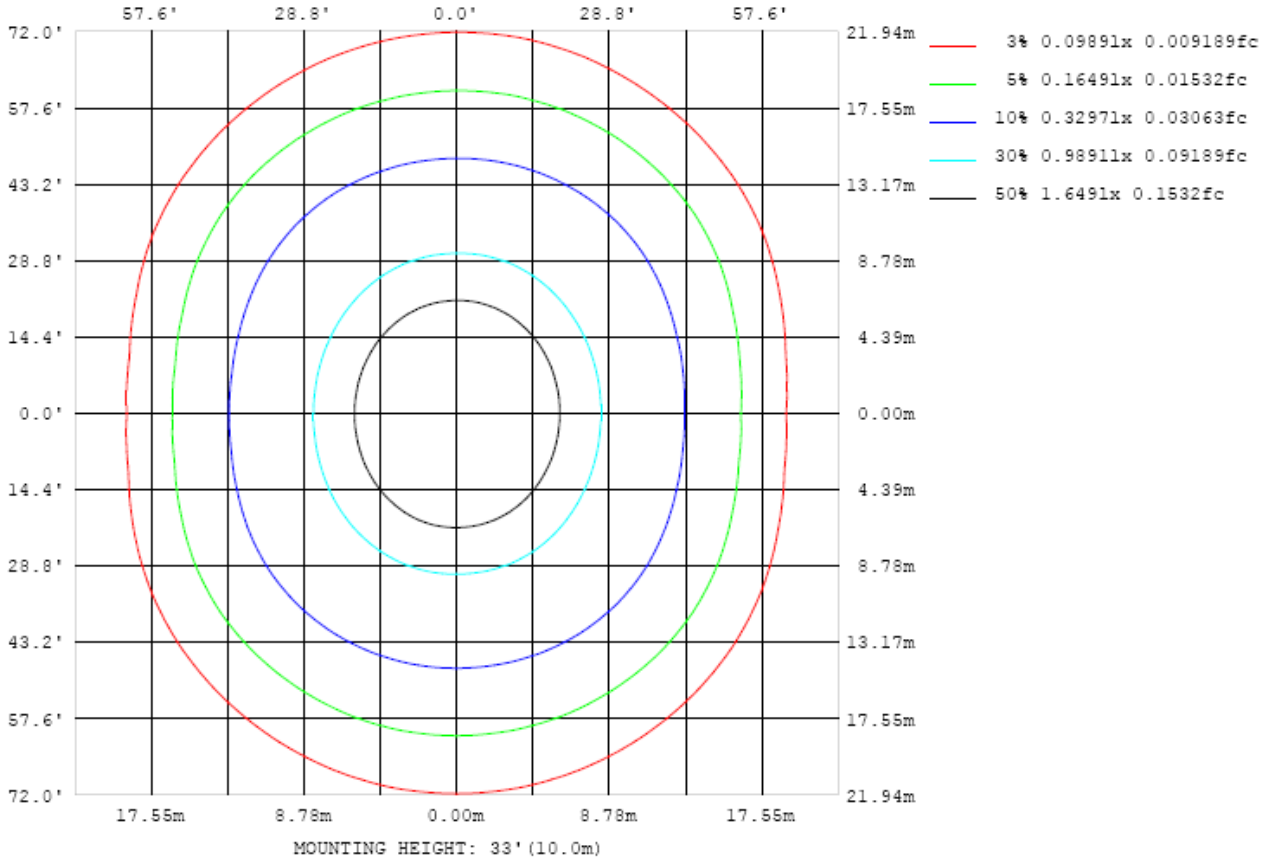


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

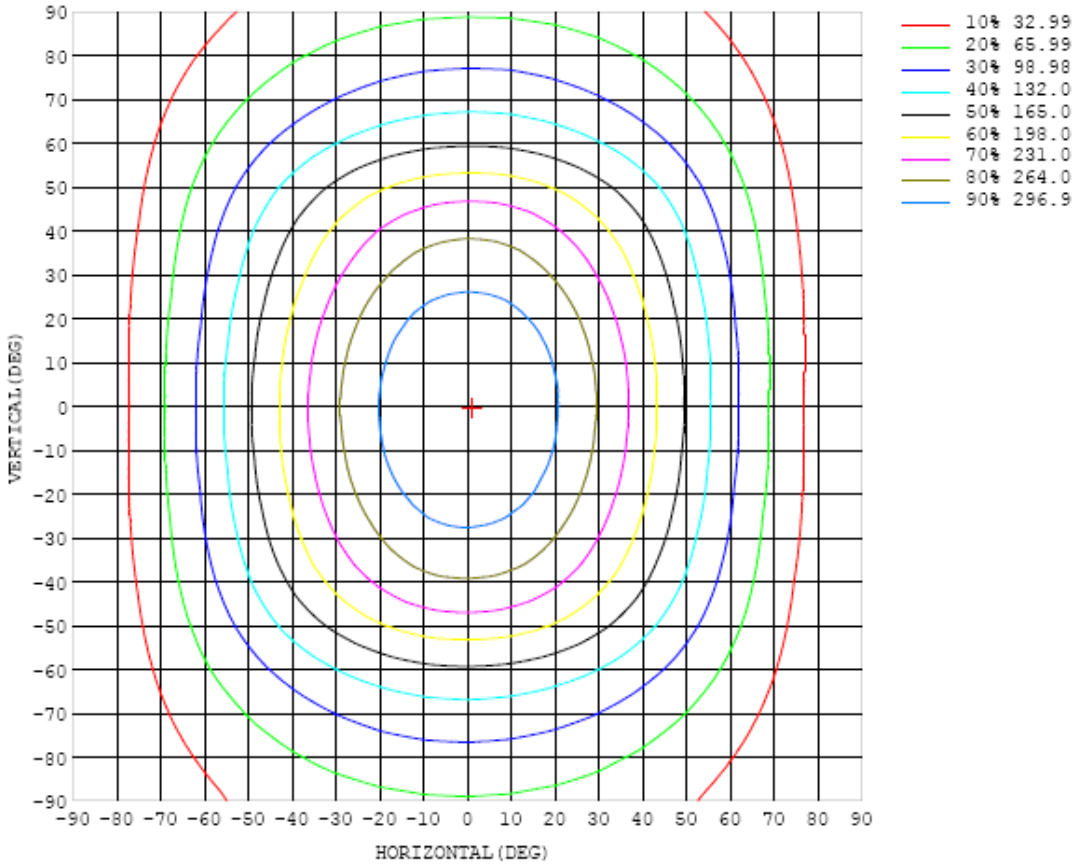


Chart 6: Isocandela Plot

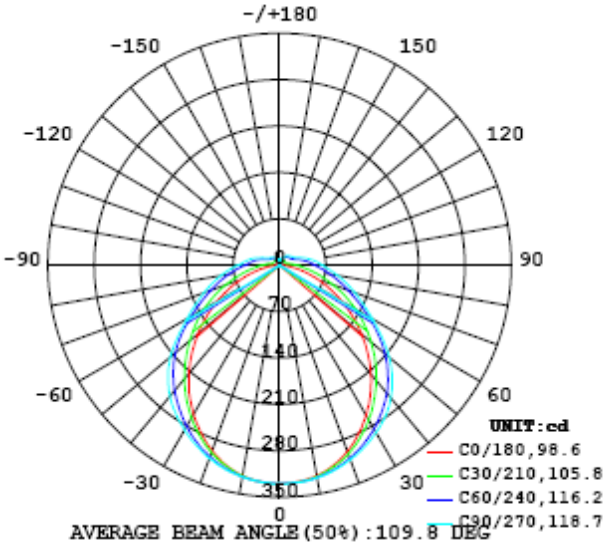


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330
5	328	328	328	328	329	329	329	328	328	329	329	329	329	329	328	329	329	328	328
10	323	323	323	324	324	325	325	325	325	326	326	326	325	325	324	324	323	323	323
15	313	313	314	315	317	318	319	319	320	320	320	320	319	317	316	315	313	312	312
20	299	300	301	303	306	308	310	311	312	312	312	312	310	308	305	302	300	298	298
25	281	282	285	288	291	295	299	300	302	303	303	301	298	295	291	287	283	281	280
30	261	262	265	269	274	280	285	289	290	291	291	289	285	279	274	268	264	260	260
35	239	240	244	249	255	263	269	274	277	278	278	275	269	262	255	248	243	239	238
40	215	216	221	227	235	244	252	258	260	261	261	258	252	244	235	227	220	215	214
45	188	191	196	204	214	223	231	237	239	241	240	237	231	224	215	204	195	189	187
50	162	164	171	181	192	201	208	213	216	216	216	213	208	201	192	181	171	163	161
55	135	138	146	156	167	176	182	186	188	188	188	186	182	176	168	158	146	137	135
60	108	111	121	132	143	150	155	159	161	162	162	159	155	150	143	134	122	112	109
65	83.3	87.0	97.4	108	118	125	131	135	138	139	139	136	131	125	118	110	99.3	88.4	84.3
70	60.4	64.6	75.2	85.6	94.7	103	110	116	119	121	120	116	111	104	96.1	87.3	77.5	66.7	61.4
75	39.4	44.5	55.3	65.5	75.0	84.4	92.4	98.6	103	104	103	99.5	93.4	85.7	76.7	68.0	58.0	47.6	41.1
80	21.7	27.1	37.3	48.2	58.9	68.7	76.8	83.2	87.6	88.9	88.0	84.1	77.9	70.2	61.1	50.8	40.4	30.4	23.6
85	8.27	13.1	23.4	34.5	45.4	55.4	64.0	70.5	73.9	75.2	74.4	70.8	65.0	57.0	47.6	37.1	26.3	16.2	9.97
90	0.25	5.20	14.9	25.4	35.7	45.3	53.5	59.4	63.4	64.6	63.8	60.3	54.7	47.1	38.0	27.9	17.4	7.54	0.53
95	0.39	3.07	10.6	20.0	29.8	38.8	46.6	52.3	56.0	57.3	56.5	53.5	48.0	40.7	31.9	22.2	12.3	4.73	0.86
100	0.61	2.05	6.75	14.7	23.5	31.9	39.0	44.3	47.7	49.2	48.5	45.6	40.7	34.0	25.9	17.1	8.42	3.72	1.11
105	1.00	2.08	5.42	10.9	18.4	25.7	32.1	36.9	40.0	41.2	40.6	38.1	33.7	27.8	20.7	13.3	7.37	3.58	1.57
110	1.59	2.54	5.60	9.93	15.0	21.1	26.4	30.4	33.0	34.2	33.7	31.5	27.8	22.8	17.0	12.3	7.46	3.81	2.41
115	2.33	3.21	5.96	9.55	13.3	18.2	22.2	25.5	27.6	28.6	28.1	26.3	23.2	19.7	16.0	12.0	8.29	4.58	3.26
120	2.87	3.49	5.89	9.43	12.5	16.9	20.2	22.5	24.0	24.7	24.3	23.1	21.1	18.6	15.4	12.1	8.64	5.41	4.05
125	3.35	3.90	6.01	9.70	12.4	15.9	19.0	21.0	22.3	22.8	22.5	21.5	19.9	17.7	15.0	12.2	8.72	5.71	4.59
130	3.89	4.62	6.81	9.89	12.9	15.5	18.2	19.9	21.0	21.5	21.2	20.3	18.9	17.1	14.7	11.7	8.37	5.60	4.79
135	4.51	5.26	7.50	9.72	12.7	15.4	17.5	18.9	19.8	20.3	20.0	19.2	18.0	16.2	13.8	11.0	7.94	5.63	5.12
140	5.02	5.60	7.80	9.70	11.8	14.4	16.5	17.9	18.7	19.1	18.9	18.1	17.0	15.1	12.9	10.5	7.87	5.91	5.54
145	5.10	4.31	5.64	7.03	9.78	13.1	14.9	16.2	17.1	17.5	17.2	16.5	15.3	13.8	12.0	10.0	8.13	6.43	5.95
150	5.19	4.75	5.43	5.57	7.62	10.6	13.4	14.5	15.1	15.4	15.2	14.5	13.4	12.4	11.2	9.74	8.38	7.03	6.32
155	5.27	5.54	7.21	7.92	8.50	10.1	12.3	13.1	13.5	13.6	13.3	11.5	9.43	8.74	9.30	9.46	8.46	7.39	6.47
160	5.79	5.90	7.11	8.25	9.11	10.2	11.4	11.9	12.2	12.2	11.8	9.58	7.49	6.85	6.68	7.12	7.06	6.63	6.27
165	6.40	5.61	6.41	7.63	8.58	9.96	10.7	11.0	11.1	11.1	10.8	9.69	8.03	6.93	6.96	6.37	6.36	6.27	6.29
170	4.62	5.37	5.66	6.92	7.21	8.71	9.69	9.95	10.2	10.2	10.1	9.66	8.91	8.11	7.21	6.28	5.65	5.86	5.90
175	4.01	4.12	3.63	3.97	4.36	4.48	4.50	4.51	4.34	5.55	4.83	4.87	5.18	5.15	5.12	5.10	5.08	5.06	5.06
180	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38

Table 6: Luminous Intensity Data

Table--2 UNIT: cd

γ (DEG) \ C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330		
5	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328		
10	322	322	323	323	324	324	324	324	324	324	324	324	324	324	323	323	323		
15	312	313	314	315	316	317	318	318	318	318	318	317	316	316	314	314	313		
20	298	299	301	303	305	307	309	309	310	310	309	308	306	305	303	301	300		
25	280	282	285	288	292	295	298	299	299	299	298	296	294	290	287	284	283		
30	260	262	266	271	276	280	284	287	287	287	285	282	278	273	269	265	263		
35	238	241	246	251	258	264	269	272	273	273	271	266	260	254	248	244	241		
40	214	218	224	231	239	247	253	257	258	258	255	249	241	234	227	221	217		
45	188	193	201	210	220	227	233	237	239	238	235	229	222	213	204	196	191		
50	162	168	177	188	198	206	211	214	215	215	213	207	200	191	180	171	165		
55	137	144	155	165	174	181	185	187	188	188	186	182	177	168	158	147	139		
60	111	120	131	142	150	155	159	161	162	162	160	156	152	145	134	122	113		
65	87.2	97.5	109	118	125	131	136	139	140	140	137	132	127	120	111	99.7	88.8		
70	65.4	76.4	86.5	95.3	103	110	116	120	122	121	117	112	105	97.3	88.4	78.0	66.5		
75	46.1	56.8	66.6	75.9	85.1	93.1	99.6	104	106	105	101	94.6	86.9	77.8	68.1	57.9	46.8		
80	29.4	39.4	49.6	59.8	69.4	77.7	84.4	88.6	90.1	89.5	85.5	79.2	71.1	61.5	51.0	40.1	29.6		
85	15.5	25.2	35.9	46.3	55.9	64.1	70.5	74.4	75.9	75.1	71.5	65.6	57.5	47.9	37.1	25.9	15.5		
90	6.22	16.0	25.8	35.6	44.7	52.4	58.0	61.6	62.7	62.3	59.0	53.6	46.2	37.2	27.2	16.8	6.72		
95	3.82	11.3	20.7	29.9	38.2	45.2	50.3	53.4	54.6	53.9	51.0	46.1	39.4	31.2	21.9	12.3	4.26		
100	2.97	7.65	16.2	24.8	32.8	39.3	43.9	46.8	47.8	47.1	44.6	40.1	34.0	26.2	17.3	8.20	2.65		
105	2.82	5.99	12.0	19.6	26.6	32.5	37.0	39.8	40.7	40.1	37.6	33.4	27.6	20.5	12.6	5.85	2.44		
110	3.17	5.95	10.3	15.4	21.3	26.3	30.1	32.5	33.3	32.7	30.6	27.0	22.0	15.9	9.82	5.56	2.75		
115	3.86	6.65	9.76	13.5	17.4	21.4	24.6	26.5	27.2	26.7	24.9	21.8	17.6	12.8	8.68	5.97	3.41		
120	4.99	7.00	9.75	12.6	15.8	18.3	20.4	21.9	22.6	22.0	20.6	18.3	15.3	11.5	8.41	5.78	3.85		
125	5.63	7.44	9.92	12.2	14.6	16.7	18.3	19.3	19.7	19.4	18.3	16.6	14.1	11.1	8.93	6.00	4.27		
130	5.96	7.72	9.82	12.0	13.9	15.5	16.8	17.7	18.0	17.7	16.8	15.3	13.4	11.4	9.13	6.67	4.81		
135	6.00	7.75	9.53	11.6	13.3	14.6	15.6	16.3	16.6	16.3	15.6	14.4	13.2	11.3	9.05	7.31	5.23		
140	6.22	7.83	9.28	10.9	12.5	13.8	14.6	15.1	15.4	15.2	14.6	13.8	12.5	10.8	9.11	7.77	5.70		
145	6.72	7.91	9.21	10.4	11.6	12.7	13.6	14.2	14.5	14.3	13.7	12.8	11.7	10.4	9.18	8.12	6.46		
150	6.94	7.29	8.58	9.42	10.8	11.7	12.3	12.8	13.0	12.8	12.4	11.8	10.9	10.2	9.14	8.16	6.95		
155	6.97	7.72	8.73	9.19	9.61	10.7	11.2	11.5	11.7	11.7	11.4	11.0	10.2	8.91	8.59	7.21	6.34		
160	6.87	7.57	8.50	8.73	8.93	9.54	10.3	10.6	10.7	10.7	10.6	10.4	9.82	8.91	7.76	7.29	6.78		
165	7.16	8.03	8.59	8.79	9.07	8.65	9.27	9.85	10.0	10.1	10.00	9.87	9.59	9.14	8.14	7.42	7.11		
170	6.79	7.86	8.64	8.55	7.68	7.60	8.29	9.06	9.64	9.50	9.45	9.29	9.15	9.00	8.15	6.47	4.95		
175	5.06	5.05	5.05	5.19	5.79	6.88	7.72	7.93	7.84	7.81	7.35	7.09	6.73	6.00	4.69	3.87	3.49		
180	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 14, 2018	Aug. 13, 2019
Digital Power Meter	PF2010A	HZTE028-01	Sep. 12, 2018	Sep. 11, 2019
AC Power Supply	DPS1060	HZTE001-06	Aug. 09, 2018	Aug. 08, 2019
DC Power Supply	WY12010	HZTE004-03	Aug. 09, 2018	Aug. 08, 2019
Temperature recorder	JM624U	HZTE018-08	Aug. 09, 2018	Aug. 08, 2019
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 09, 2018	Aug. 08, 2019
Standard source	D908	HZTE012-01	Aug. 14, 2018	Aug. 13, 2019
Integrate Sphere system	3M	HZTE015-04	Aug. 16, 2018	Aug. 15, 2019
Digital Power Meter	WT210	HZTE008-01	Aug. 02, 2018	Aug. 01, 2019
AC Power Supply	PCR 500L	HZTE001-07	Aug. 09, 2018	Aug. 08, 2019
DC Power Supply	IT6154	HZTE004-04	Aug. 09, 2018	Aug. 08, 2019
Standard source	SCL-1400	HZTE012-02	Aug. 16, 2018	Aug. 15, 2019
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 09, 2018	Aug. 08, 2019
Temperature Meter	TES1310	HZTE017-01	Aug. 09, 2018	Aug. 08, 2019

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 4π. 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 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.

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The uncertainty of integrating sphere system reported in this document is expended uncertainty is 2.1% 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 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 expended uncertainty is 2.3% with a coverage factor k=2.

Color Characteristics Measurements

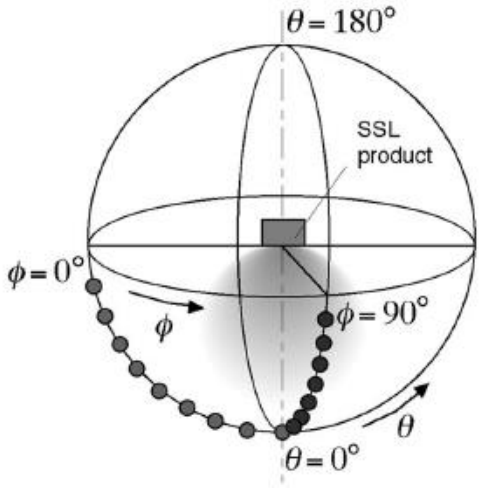
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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°/180° and C=90°/270°) 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, Δu'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 ***