

## LM-79-19 TEST REPORT

for

### GREEN CREATIVE LTD

Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL,  
Hong Kong

### LED Lamp

**Model: 8PLH/8CCTS/HYBM**

### Laboratory: Leading Testing Laboratories

**NVLAP CODE: 200960-0**

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Report No.: HZ230700041

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

Review by:

*Wei Fei*

Engineer: Wei Fei  
Jul. 24, 2023

Approved by:



*April Zou*

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Jul. 24, 2023

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

## TEST SUMMARY

Tested Model	8PLH/8CCTS/HYBM 2700K Setting	8PLH/8CCTS/HYBM 3000K Setting	8PLH/8CCTS/HYBM 3500K Setting
Luminous Efficacy (Lumens /Watt)	118.5	127.4	136.7
Total Luminous Flux (Lumens)	900.8	954.0	1037.3
Power (Watts)	7.60	7.49	7.59
Power Factor	0.9713	0.9728	0.9721
CCT (K)	2735	2971	3546
CRI	83.1	84.2	84.9
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins
Note	2700K	3000K	3500K

Tested Model	8PLH/8CCTS/HYBM 4000K Setting
Luminous Efficacy (Lumens /Watt)	136.8
Total Luminous Flux (Lumens)	1056.2
Power (Watts)	7.72
Power Factor	0.9704
CCT (K)	3981
CRI	84.0
Stabilization Time (Light & Power)	50 mins
Note	4000K

Table 1: Executive Data Summary

### Test specifications:

Date of Receipt	: Jul. 06, 2023
Date of Test	: Jul. 18, 2023
Test item	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
Reference Standard	: IESNA LM-79-2019 Approved Method: 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)

<b>Name</b>	: LED Lamp
<b>Model</b>	: 8PLH/8CCTS/HYBM
<b>Electrical Ratings</b>	: 120-277V, 50/60Hz, 8W
<b>Product Description</b>	: Color- Tunable 2700K/3000K/3500K/4000K
<b>Manufacturer</b>	: GREEN CREATIVE LTD
<b>Address</b>	: Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL, Hong Kong

## TEST RESULTS (2700K Setting)

Test ambient temperature was 26.0 °C.

Base orientation was base up Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 50 minutes, and the total operating time including stabilization was 55 minutes.

## Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.065	0.031
Power Factor	0.9713	0.8965
Test Power (W)	7.60	7.72
THD A%	20.31	19.25
Luminous Efficacy (lm/W)	118.5	116.6
Total Luminous Flux (lm)	900.8	900.3
Color Rendering Index (CRI)	83.1	
R9	9.9	
Correlated Color Temperature (CCT)(K)	2735	
Chromaticity Chroma x	0.4564	
Chromaticity Chroma y	0.4089	
Chromaticity Chroma u	0.2610	
Chromaticity Chroma v	0.3508	
Duv	-0.0003	
Chromaticity Chroma u'	0.2610	
Chromaticity Chroma v'	0.5262	

Special Color Rendering Indices	
R1	81.9
R2	92.6
R3	94.7
R4	80.9
R5	82.5
R6	92.2
R7	81.5
R8	58.1
R9	9.9
R10	83.8
R11	81.1
R12	77.5
R13	84.6
R14	97.8

Table 2: Test data per Sphere-Spectroradiometer Method

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

## Spectral Power Distribution - Sphere Spectroradiometer Method

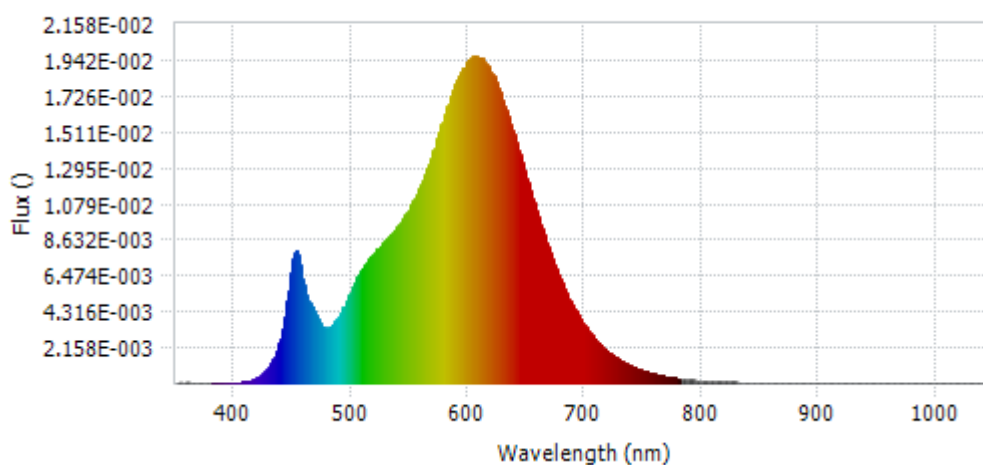
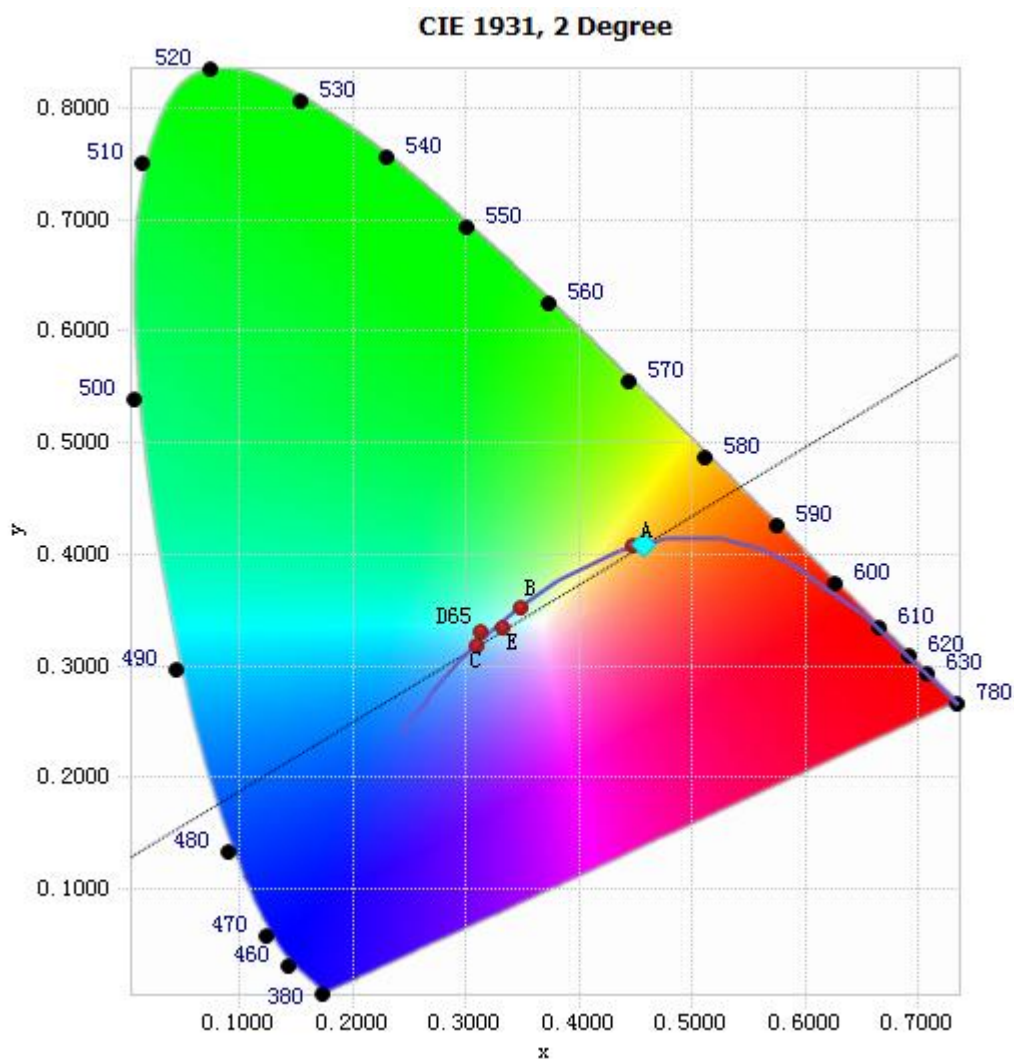


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	5.06E-05	485	3.62E-03	590	1.82E-02	695	3.97E-03
385	4.44E-05	490	4.15E-03	595	1.89E-02	700	3.43E-03
390	4.35E-05	495	4.81E-03	600	1.94E-02	705	2.92E-03
395	4.81E-05	500	5.61E-03	605	1.95E-02	710	2.52E-03
400	4.73E-05	505	6.34E-03	610	1.95E-02	715	2.18E-03
405	6.53E-05	510	6.93E-03	615	1.92E-02	720	1.87E-03
410	1.03E-04	515	7.47E-03	620	1.86E-02	725	1.60E-03
415	1.98E-04	520	7.83E-03	625	1.79E-02	730	1.36E-03
420	3.65E-04	525	8.26E-03	630	1.69E-02	735	1.18E-03
425	6.47E-04	530	8.67E-03	635	1.58E-02	740	1.00E-03
430	1.09E-03	535	8.99E-03	640	1.47E-02	745	8.54E-04
435	1.80E-03	540	9.45E-03	645	1.35E-02	750	7.31E-04
440	2.90E-03	545	9.95E-03	650	1.23E-02	755	6.24E-04
445	4.96E-03	550	1.05E-02	655	1.11E-02	760	5.35E-04
450	7.53E-03	555	1.12E-02	660	9.98E-03	765	4.60E-04
455	7.48E-03	560	1.20E-02	665	8.88E-03	770	3.89E-04
460	5.56E-03	565	1.29E-02	670	7.84E-03	775	3.28E-04
465	4.71E-03	570	1.40E-02	675	6.92E-03	780	2.87E-04
470	4.08E-03	575	1.50E-02	680	6.06E-03		
475	3.40E-03	580	1.62E-02	685	5.27E-03		
480	3.31E-03	585	1.73E-02	690	4.60E-03		

Table 3: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

## Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4564, 0.4089)

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

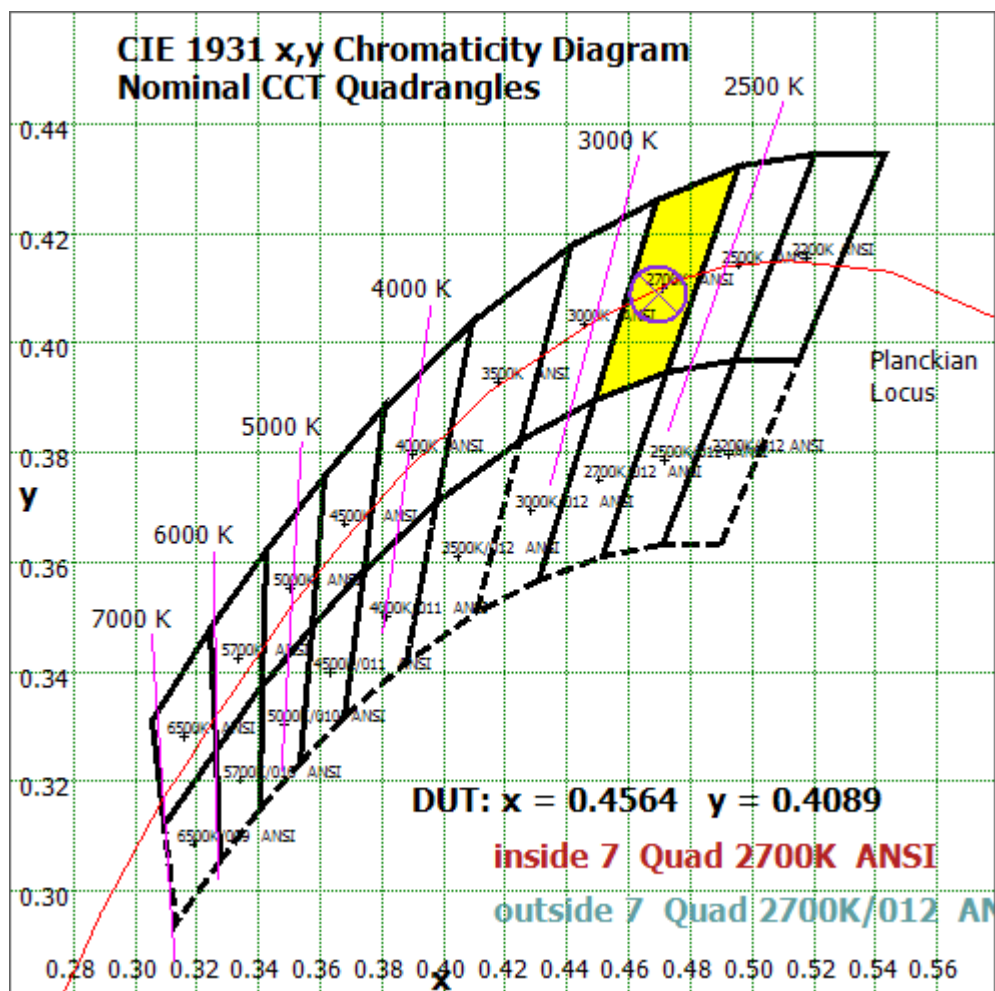


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

# Color Rendition Report – Sphere Spectroradiometer Method

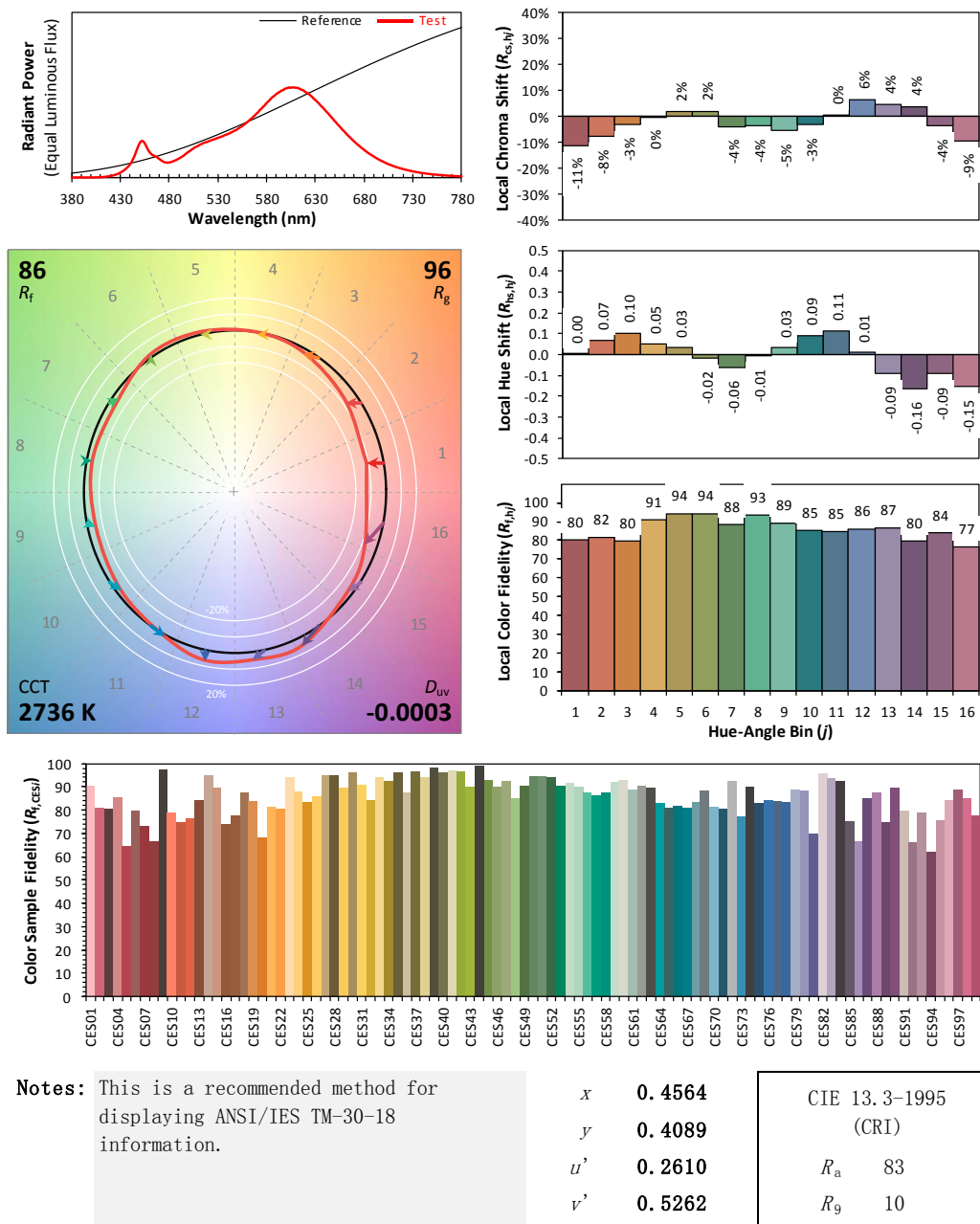
## ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/07/18

Model: 8PLH/8CCTS/HYBM



Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

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.

### Goniophotometer Method

Test ambient temperature was 25.1 °C.

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)	0.065
Power Factor	0.9755
Power (W)	7.62
Luminous Efficacy (lm/W)	118.4
Total Luminous Flux (lm)	902.0
Beam Angle (°)	102.4 (0°-180°) / 122.5 (90°-270°)
Center Beam Candle Power (cd)	274
Maximum Beam Candle Power (cd)	274.6 (At: C=190.0, Gamma=2.0)
Spacing Criteria	1.20 (0°-180°) / 1.24 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	66.87%
Zonal Lumens in the 60 °-90 °Zone	24.72%
Zonal Lumens in the 90 °-120 °Zone	7.00%
Zonal Lumens in the 120 °-180 °Zone	1.42%

Table 4: Test data per Goniophotometer Method

### Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	25.879	2.87%
10- 20	73.641	8.16%
20- 30	110.372	12.24%
30- 40	131.593	14.59%
40- 50	136.072	15.09%
50- 60	125.584	13.92%
60- 70	102.962	11.41%
70- 80	73.714	8.17%
80- 90	46.267	5.13%
90-100	29.932	3.32%
100-110	20.45	2.27%
110-120	12.77	1.42%
120-130	6.937	0.77%
130-140	3.42	0.38%
140-150	1.472	0.16%
150-160	0.639	0.07%
160-170	0.252	0.03%
170-180	0.058	0.01%
Total	902.0	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	603.141	66.87%
60- 90	222.943	24.72%
0-90	826.084	91.58%
90- 180	75.93	8.42%
0- 180	902.0	100%

Table 5: Zonal Lumen

## Illuminance Plots- Goniophotometer Method

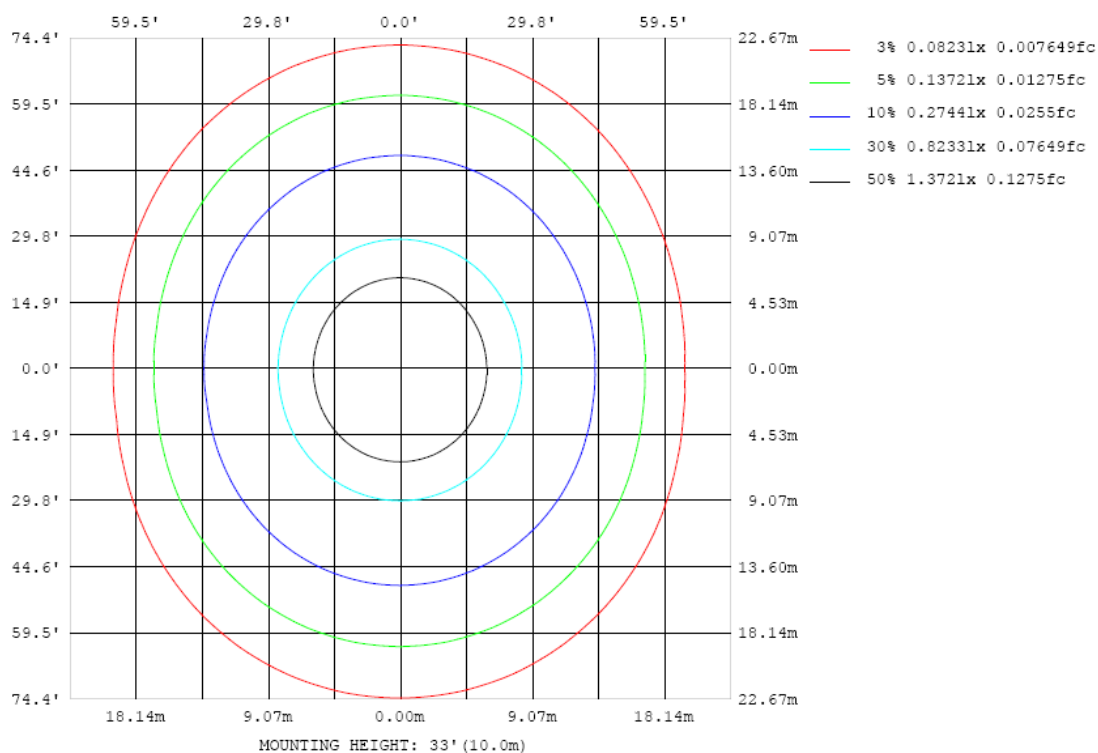


Chart 5: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots- Goniophotometer Method

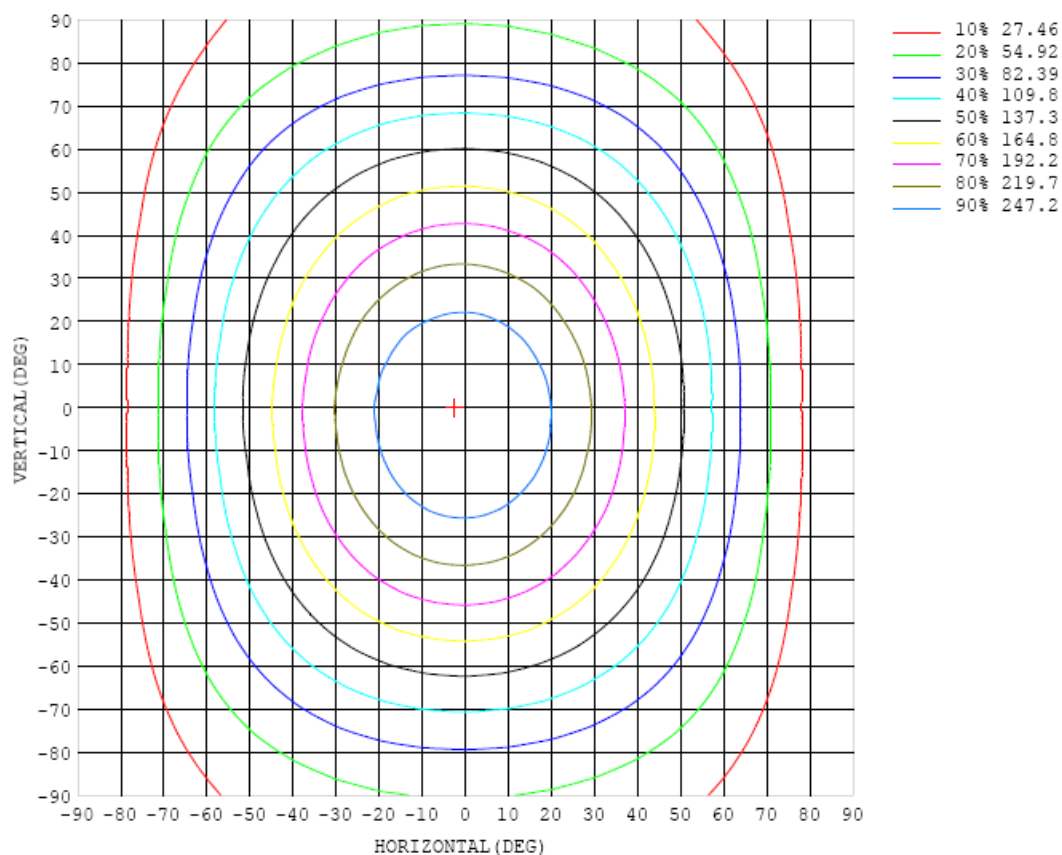


Chart 6: Isocandela Plot

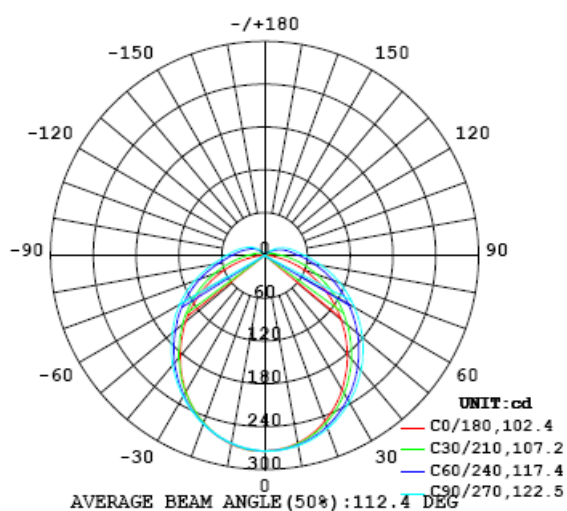


Chart 7: Polar Candela Distribution

## Luminous Intensity Data- Goniophotometer Method

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274
5	272	273	272	272	273	273	273	273	273	273	274	274	273	273	273	273	273	273	274
10	267	267	267	268	269	269	270	270	271	271	271	271	270	270	270	269	269	269	269
15	259	258	260	260	262	263	264	265	265	266	265	266	265	264	263	262	261	261	261
20	247	247	249	250	252	254	255	257	258	258	259	258	257	255	254	252	251	250	249
25	233	234	236	238	240	242	245	247	248	249	248	248	246	244	242	240	238	236	237
30	217	218	220	223	226	229	233	235	236	237	237	236	234	231	228	225	223	221	221
35	199	201	204	207	211	215	218	221	224	224	224	223	220	217	213	209	206	204	203
40	180	182	185	189	194	199	203	207	209	210	210	208	205	201	196	192	187	184	184
45	160	163	166	171	176	182	187	191	194	195	194	192	189	184	178	173	168	165	164
50	140	142	146	152	158	165	170	175	178	179	178	176	172	166	160	154	148	144	145
55	119	121	127	133	140	147	153	158	161	163	161	159	154	148	141	135	128	124	124
60	98.3	101	106	114	122	129	135	141	144	145	145	142	137	130	123	115	108	103	102
65	77.8	80.8	87.1	95.3	104	111	118	124	127	129	128	125	120	113	105	96.8	88.8	82.5	80.9
70	58.2	61.7	68.4	77.3	86.4	94.7	102	107	111	112	111	108	103	95.9	87.6	78.7	69.9	62.9	60.2
75	38.6	43.2	51.8	61.6	70.2	78.6	85.7	91.2	94.6	95.9	95.3	92.0	86.8	79.6	71.1	62.2	52.8	44.1	40.3
80	21.0	26.3	36.0	46.5	56.1	64.7	70.9	76.2	79.5	80.8	79.8	76.8	71.7	65.1	56.8	46.9	36.7	27.1	22.3
85	7.66	13.4	23.3	33.6	43.2	51.5	58.4	63.6	66.2	66.8	66.5	63.9	59.1	52.2	43.6	33.9	23.4	13.6	8.23
90	0.07	5.94	14.7	24.2	33.3	41.2	47.7	52.5	55.4	56.5	55.8	53.1	48.4	41.8	33.7	24.5	14.9	6.13	0.28
95	0.07	2.28	9.95	18.5	26.7	34.1	40.1	44.4	47.1	48.1	47.5	45.0	40.7	34.7	27.2	18.8	10.2	2.97	0.21
100	0.12	0.37	6.90	14.4	21.9	28.6	34.2	38.4	40.9	41.8	41.2	38.9	34.8	29.1	22.3	14.8	7.39	1.89	0.24
105	0.15	0.14	4.12	11.1	17.8	23.9	29.1	33.0	35.4	36.3	35.7	33.4	29.5	23.9	17.4	11.4	5.15	1.18	0.24
110	0.16	0.31	1.16	7.02	13.9	19.0	23.9	27.6	30.1	30.9	30.1	27.8	24.1	18.8	13.1	7.35	2.89	0.66	0.19
115	0.21	0.34	0.20	3.38	8.05	14.2	18.5	22.1	24.4	25.3	24.7	22.6	19.4	14.9	7.99	4.42	1.96	0.55	0.22
120	0.26	0.34	0.34	1.50	4.92	8.76	13.6	17.5	19.5	20.3	19.9	18.0	13.9	8.85	5.31	3.13	1.46	0.51	0.26
125	0.31	0.38	0.79	0.31	3.06	5.99	8.54	10.9	12.7	13.5	12.8	11.0	8.60	5.97	3.82	2.32	1.12	0.49	0.30
130	0.38	0.45	0.84	0.53	1.48	4.17	6.03	7.50	8.54	8.91	8.57	7.60	6.12	4.42	2.87	1.78	0.91	0.49	0.36
135	0.46	0.50	0.79	1.08	0.83	2.42	4.26	5.39	6.09	6.33	6.13	5.45	4.59	3.41	2.22	1.40	0.78	0.50	0.40
140	0.53	0.55	0.74	1.20	1.10	1.21	2.62	3.90	4.47	4.65	4.54	4.09	3.50	2.68	1.77	1.11	0.69	0.50	0.44
145	0.58	0.61	0.72	0.95	1.22	1.04	1.46	2.44	3.20	3.45	3.38	3.08	2.67	2.10	1.42	0.93	0.64	0.50	0.46
150	0.61	0.65	0.72	0.87	1.11	1.10	1.07	1.47	2.00	2.44	2.48	2.29	2.02	1.62	1.22	0.85	0.60	0.50	0.49
155	0.63	0.68	0.70	0.82	0.97	1.16	1.11	1.04	1.22	1.58	1.72	1.65	1.48	1.25	1.02	0.80	0.59	0.51	0.51
160	0.65	0.65	0.69	0.76	0.85	0.98	1.10	1.19	1.20	1.14	1.10	1.11	1.09	0.97	0.83	0.69	0.55	0.53	0.54
165	0.66	0.68	0.69	0.72	0.78	0.84	0.89	0.92	0.93	0.92	0.89	0.85	0.79	0.74	0.69	0.63	0.56	0.54	0.51
170	0.65	0.67	0.68	0.70	0.73	0.76	0.76	0.75	0.74	0.72	0.70	0.68	0.66	0.64	0.60	0.58	0.55	0.53	0.52
175	0.60	0.60	0.59	0.56	0.58	0.62	0.63	0.63	0.62	0.60	0.56	0.50	0.48	0.45	0.46	0.47	0.47	0.47	0.46
180	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33

Table 6: Luminous Intensity Data



Table--2		UNIT: cd																	
C (DEG)	γ (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	
0		274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	
5		273	273	273	272	272	272	272	272	272	272	271	272	271	272	271	271	272	
10		268	268	268	268	268	267	267	267	267	267	267	267	266	266	266	266	266	
15		260	260	261	260	260	260	260	260	260	260	259	259	259	258	258	258	258	
20		249	250	249	250	250	251	251	251	251	251	250	250	249	248	247	247	247	
25		235	236	236	238	239	240	240	241	241	240	239	238	236	235	233	233	233	
30		220	220	222	223	225	226	227	228	228	228	226	225	222	220	218	217	217	
35		203	203	205	207	210	212	214	215	215	214	212	210	207	204	202	200	199	
40		184	185	187	190	193	197	199	200	201	199	197	194	191	187	184	182	180	
45		164	165	168	173	176	180	183	185	185	184	182	178	174	169	165	163	161	
50		145	147	150	154	159	163	167	169	169	168	165	161	157	152	148	144	142	
55		124	126	131	137	142	147	151	153	154	152	150	145	140	134	128	124	121	
60		103	107	112	118	124	130	135	137	138	136	133	128	122	116	109	104	100	
65		82.3	86.9	93.1	100	107	113	118	120	121	120	116	111	105	97.8	90.6	84.3	79.9	
70		62.2	67.8	75.1	83.0	90.2	96.5	101	104	104	103	100.0	94.9	88.4	80.8	72.8	65.5	59.9	
75		43.0	50.1	58.3	66.6	74.2	80.5	85.1	87.9	88.6	87.6	84.4	79.4	72.7	64.7	56.2	47.8	41.0	
80		26.0	34.3	43.3	52.0	59.8	66.2	70.8	73.5	74.2	73.1	70.1	65.1	58.5	50.4	41.6	32.4	24.4	
85		13.2	21.9	31.4	40.3	48.1	54.4	59.0	61.6	62.3	61.5	58.4	53.5	46.8	38.8	29.7	20.4	11.7	
90		5.99	14.3	23.5	32.2	39.8	45.9	50.3	52.8	53.5	52.5	49.6	44.9	38.5	30.7	21.9	12.8	4.78	
95		3.11	10.0	18.4	26.5	33.7	39.5	43.7	46.1	46.8	45.8	43.0	38.5	32.5	25.1	16.9	8.63	2.16	
100		2.16	7.40	14.5	22.0	28.6	34.0	38.0	40.3	41.0	39.9	37.4	33.1	27.4	20.6	13.1	6.09	0.53	
105		1.68	5.71	11.7	18.3	24.3	29.3	33.0	35.1	35.7	34.9	32.3	28.4	23.1	17.0	10.3	4.05	0.29	
110		1.11	4.41	9.58	15.3	20.6	25.1	28.5	30.5	31.1	30.1	27.9	24.3	19.5	13.9	7.95	1.27	0.36	
115		0.72	2.92	7.78	12.7	17.5	21.5	24.6	26.3	26.8	26.1	24.0	20.7	16.5	11.2	4.84	0.63	0.40	
120		0.61	1.94	5.86	10.5	14.6	18.3	21.0	22.6	23.0	22.3	20.5	17.6	13.5	8.13	2.67	0.84	0.42	
125		0.56	1.49	3.79	8.36	12.1	15.3	17.7	19.1	19.5	18.9	17.3	14.6	10.8	5.48	1.65	1.16	0.44	
130		0.53	1.22	2.79	5.57	9.59	12.4	14.5	15.9	16.3	15.7	14.1	11.7	7.82	3.38	1.94	1.29	0.50	
135		0.54	1.05	2.19	3.92	6.36	9.39	11.5	12.7	13.0	12.4	11.1	8.65	4.73	2.60	1.77	1.14	0.54	
140		0.54	0.98	1.76	2.97	4.52	6.08	7.63	8.88	9.24	8.65	7.32	5.50	3.07	1.79	1.53	1.02	0.58	
145		0.54	0.90	1.47	2.27	3.31	4.27	5.12	5.73	5.89	5.61	4.93	3.71	2.28	1.60	1.43	0.93	0.67	
150		0.53	0.79	1.21	1.77	2.42	3.03	3.53	3.93	4.05	3.88	3.47	2.80	2.07	1.56	1.24	0.88	0.69	
155		0.54	0.69	0.97	1.33	1.74	2.14	2.51	2.76	2.83	2.75	2.56	2.25	1.74	1.31	1.08	0.85	0.67	
160		0.57	0.66	0.77	0.97	1.27	1.58	1.82	1.97	2.02	1.98	1.86	1.64	1.37	1.12	0.93	0.84	0.70	
165		0.52	0.60	0.67	0.76	0.92	1.11	1.24	1.31	1.35	1.34	1.30	1.22	1.09	0.95	0.85	0.79	0.74	
170		0.53	0.53	0.58	0.67	0.74	0.85	0.92	0.93	0.94	0.94	0.92	0.88	0.74	0.75	0.78	0.77	0.73	
175		0.45	0.44	0.45	0.44	0.47	0.56	0.58	0.59	0.64	0.66	0.67	0.68	0.68	0.66	0.66	0.63	0.61	
180		0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	

Table 7: Luminous Intensity Data



## TEST RESULTS (3000K Setting)

Test ambient temperature was 26.0 °C.

Base orientation was base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 50 minutes, and the total operating time including stabilization was 55 minutes.

## Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.064	0.031
Power Factor	0.9728	0.8956
Test Power (W)	7.49	7.63
THD A%	19.27	19.26
Luminous Efficacy (lm/W)	127.4	124.9
Total Luminous Flux (lm)	954.0	953.1
Color Rendering Index (CRI)	84.2	
R9	14.2	
Correlated Color Temperature (CCT)(K)	2971	
Chromaticity Chroma x	0.4363	
Chromaticity Chroma y	0.3996	
Chromaticity Chroma u	0.2521	
Chromaticity Chroma v	0.3464	
Duv	-0.0017	
Chromaticity Chroma u'	0.2521	
Chromaticity Chroma v'	0.5195	

Special Color Rendering Indices	
R1	83.3
R2	92.9
R3	95.5
R4	82.5
R5	83.9
R6	91.7
R7	82.8
R8	61.2
R9	14.2
R10	84
R11	82.8
R12	76.7
R13	85.8
R14	98.3

Table 8: Test data per Sphere-Spectroradiometer Method

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

### Spectral Power Distribution - Sphere Spectroradiometer Method

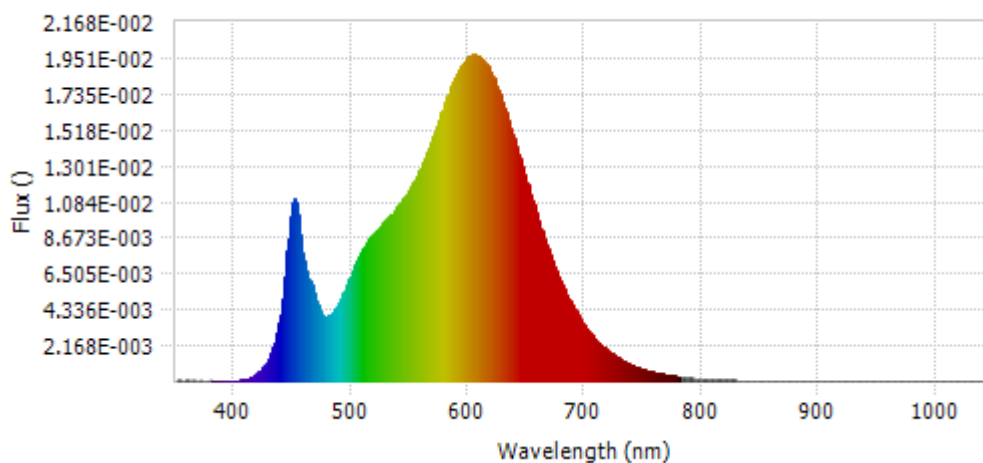


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	5.99E-05	485	4.28E-03	590	1.86E-02	695	3.84E-03
385	6.38E-05	490	4.85E-03	595	1.91E-02	700	3.30E-03
390	6.26E-05	495	5.68E-03	600	1.96E-02	705	2.84E-03
395	6.59E-05	500	6.53E-03	605	1.96E-02	710	2.45E-03
400	6.01E-05	505	7.32E-03	610	1.95E-02	715	2.10E-03
405	6.68E-05	510	7.99E-03	615	1.91E-02	720	1.81E-03
410	1.41E-04	515	8.57E-03	620	1.85E-02	725	1.54E-03
415	2.74E-04	520	8.94E-03	625	1.76E-02	730	1.32E-03
420	5.14E-04	525	9.37E-03	630	1.66E-02	735	1.14E-03
425	9.09E-04	530	9.79E-03	635	1.56E-02	740	9.66E-04
430	1.55E-03	535	1.01E-02	640	1.44E-02	745	8.19E-04
435	2.62E-03	540	1.05E-02	645	1.32E-02	750	7.00E-04
440	4.46E-03	545	1.11E-02	650	1.20E-02	755	6.01E-04
445	7.86E-03	550	1.16E-02	655	1.09E-02	760	5.07E-04
450	1.08E-02	555	1.23E-02	660	9.74E-03	765	4.37E-04
455	9.46E-03	560	1.30E-02	665	8.63E-03	770	3.81E-04
460	6.98E-03	565	1.39E-02	670	7.65E-03	775	3.18E-04
465	5.88E-03	570	1.48E-02	675	6.69E-03	780	2.81E-04
470	4.81E-03	575	1.58E-02	680	5.86E-03		
475	3.96E-03	580	1.68E-02	685	5.11E-03		
480	3.93E-03	585	1.78E-02	690	4.45E-03		

Table 9: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

## Chromaticity Diagram - Sphere Spectroradiometer Method

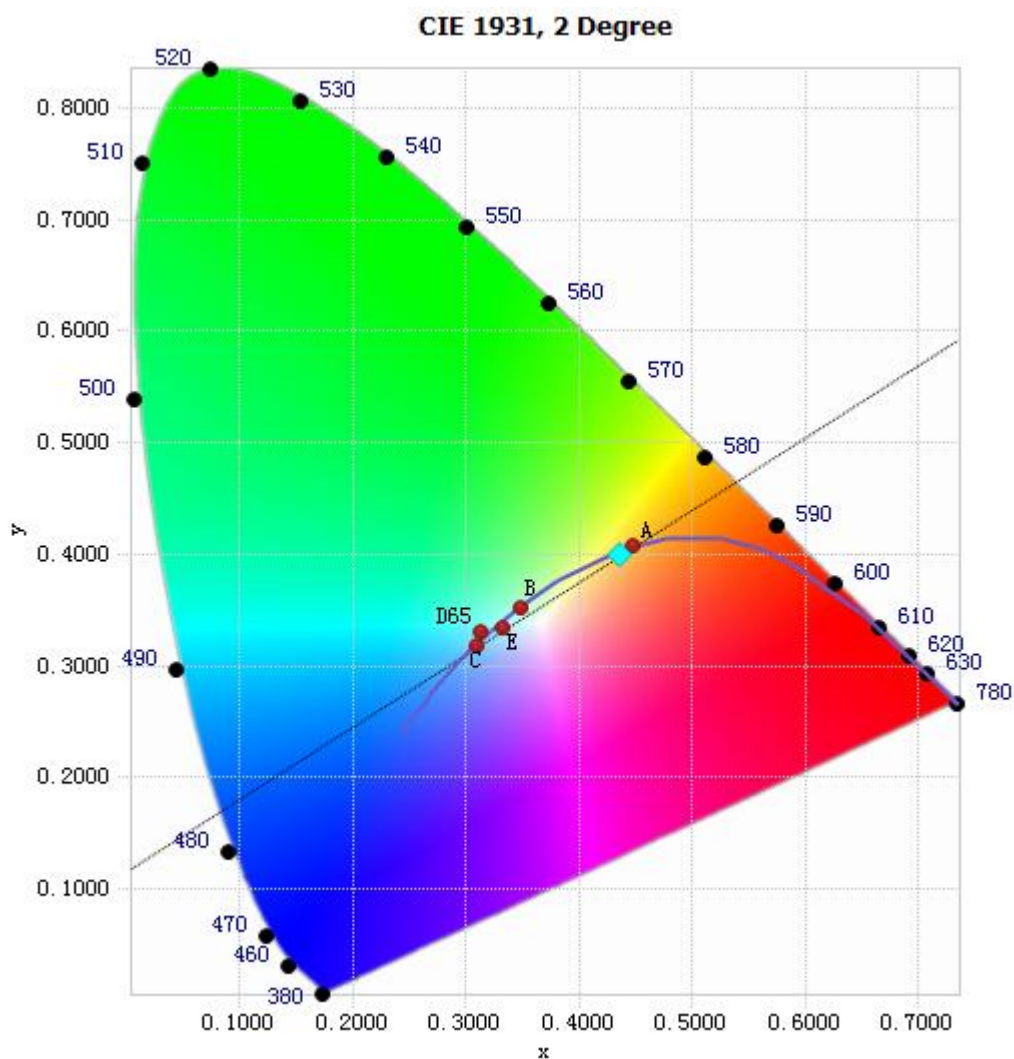


Chart 9: Chromaticity Diagram per Sphere - Spectroradiometer Method

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

# Nominal CCT Quadrangles – Sphere Spectroradiometer Method

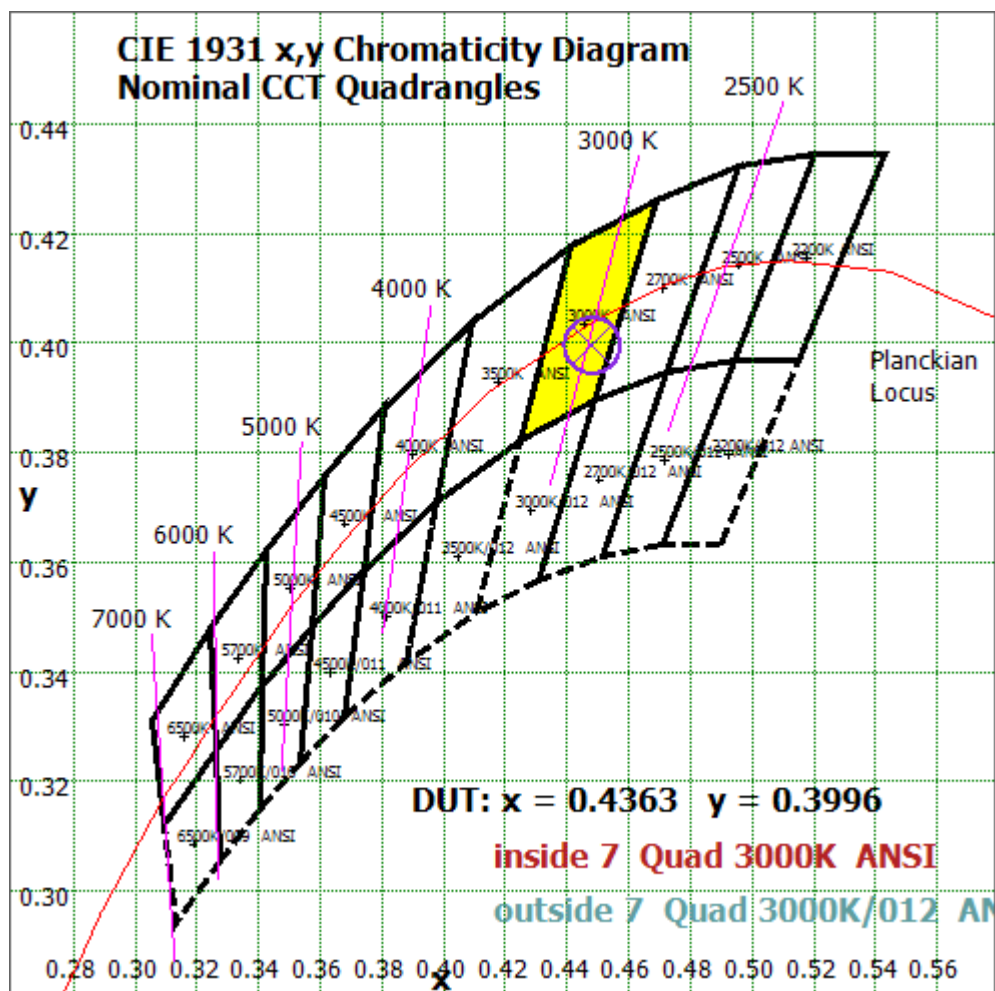


Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

# Color Rendition Report – Sphere Spectroradiometer Method

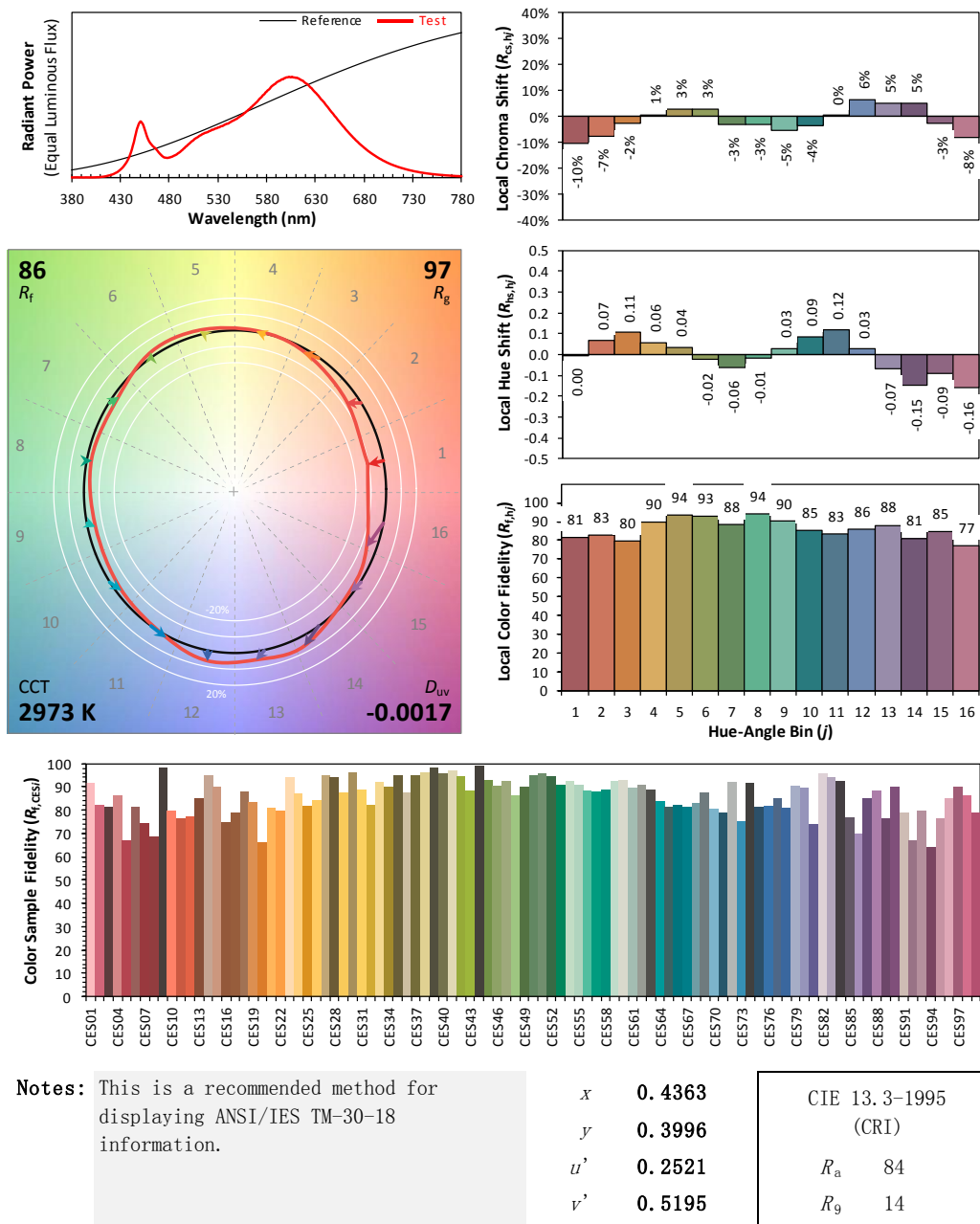
## ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/07/18

Model: 8PLH/8CCTS/HYBM



Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

Chart 11: 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 8 due to rounding.

## TEST RESULTS (3500K Setting)

Test ambient temperature was 26.0 °C.

Base orientation was base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 50 minutes, and the total operating time including stabilization was 55 minutes.

### Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.065	0.031
Power Factor	0.9721	0.8965
Test Power (W)	7.59	7.71
THD A%	19.78	19.21
Luminous Efficacy (lm/W)	136.7	134.2
Total Luminous Flux (lm)	1037.3	1034.7
Color Rendering Index (CRI)	84.9	
R9	16.8	
Correlated Color Temperature (CCT)(K)	3546	
Chromaticity Chroma x	0.4007	
Chromaticity Chroma y	0.3839	
Chromaticity Chroma u	0.2355	
Chromaticity Chroma v	0.3385	
Duv	-0.0020	
Chromaticity Chroma u'	0.2355	
Chromaticity Chroma v'	0.5077	

Special Color Rendering Indices	
R1	83.8
R2	91.3
R3	96.2
R4	84.2
R5	84.2
R6	88.5
R7	85.5
R8	65.6
R9	16.8
R10	79.6
R11	84.1
R12	72.2
R13	85.6
R14	98.2

Table 10: Test data per Sphere-Spectroradiometer Method

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

### Spectral Power Distribution - Sphere Spectroradiometer Method

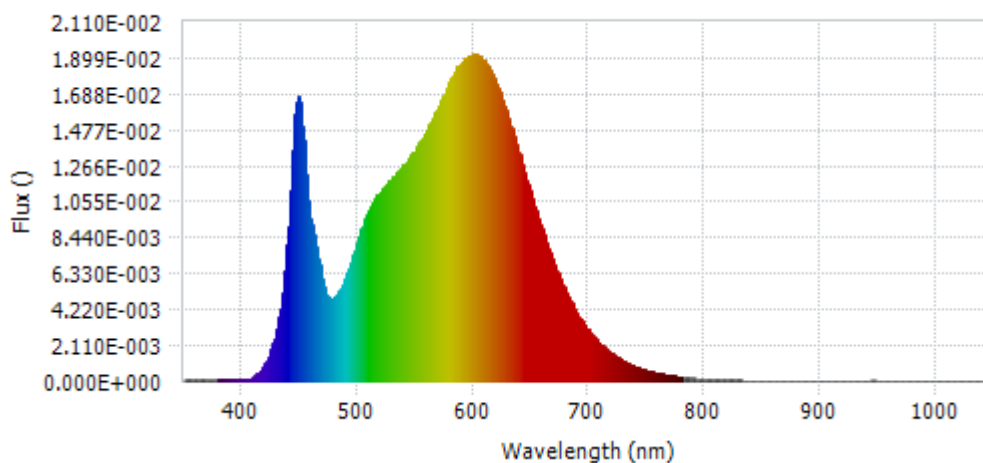


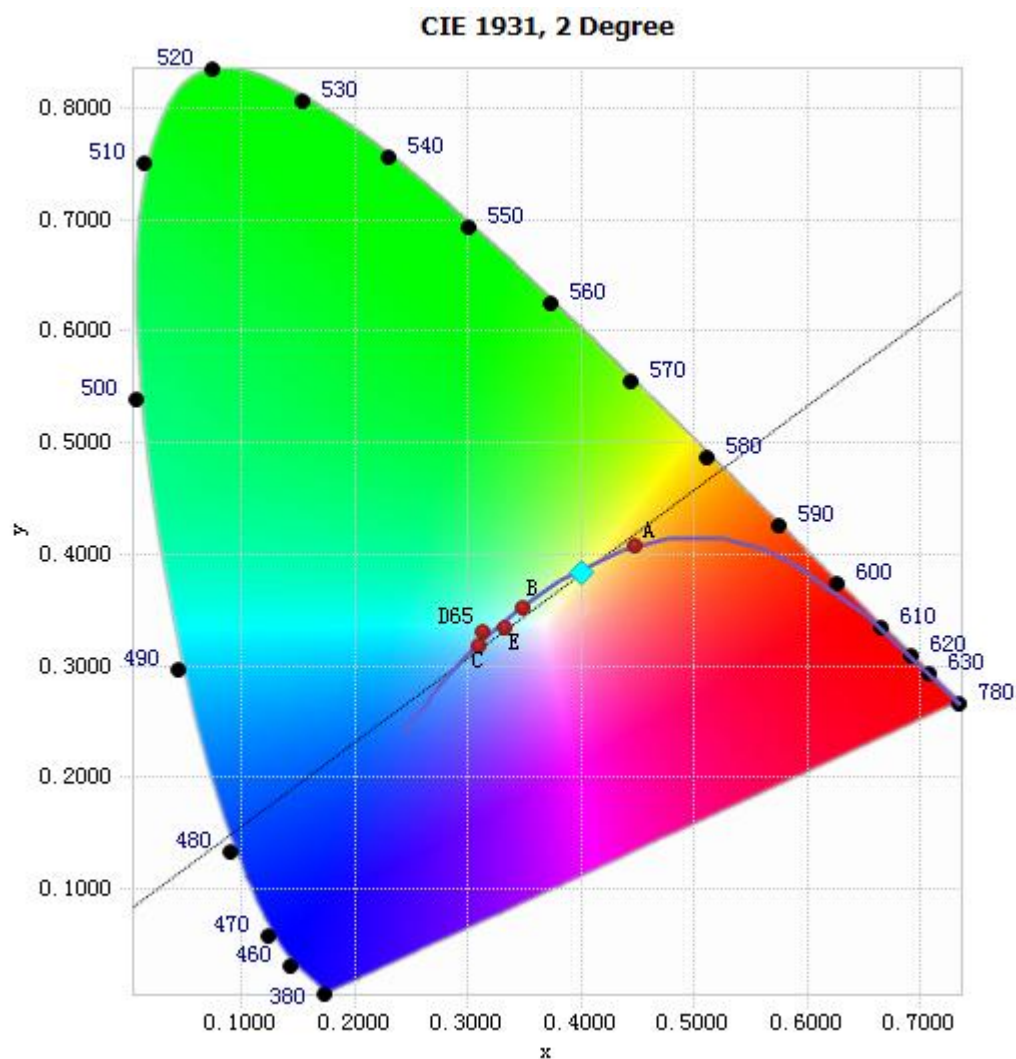
Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	9.15E-05	485	5.38E-03	590	1.88E-02	695	3.39E-03
385	8.77E-05	490	6.15E-03	595	1.90E-02	700	2.92E-03
390	7.43E-05	495	7.25E-03	600	1.92E-02	705	2.51E-03
395	7.79E-05	500	8.33E-03	605	1.90E-02	710	2.15E-03
400	7.55E-05	505	9.29E-03	610	1.87E-02	715	1.84E-03
405	1.08E-04	510	1.00E-02	615	1.82E-02	720	1.60E-03
410	2.55E-04	515	1.07E-02	620	1.74E-02	725	1.36E-03
415	5.36E-04	520	1.11E-02	625	1.65E-02	730	1.16E-03
420	1.02E-03	525	1.16E-02	630	1.54E-02	735	9.90E-04
425	1.84E-03	530	1.20E-02	635	1.44E-02	740	8.44E-04
430	3.09E-03	535	1.23E-02	640	1.33E-02	745	7.21E-04
435	5.20E-03	540	1.27E-02	645	1.21E-02	750	6.22E-04
440	9.02E-03	545	1.31E-02	650	1.09E-02	755	5.31E-04
445	1.47E-02	550	1.36E-02	655	9.83E-03	760	4.57E-04
450	1.63E-02	555	1.42E-02	660	8.77E-03	765	3.90E-04
455	1.22E-02	560	1.48E-02	665	7.78E-03	770	3.36E-04
460	9.20E-03	565	1.55E-02	670	6.81E-03	775	2.84E-04
465	7.56E-03	570	1.62E-02	675	5.99E-03	780	2.41E-04
470	5.78E-03	575	1.69E-02	680	5.23E-03		
475	4.90E-03	580	1.77E-02	685	4.56E-03		
480	4.94E-03	585	1.83E-02	690	3.94E-03		

Table 11: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method



### Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4007, 0.3839)

Chart 13: 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

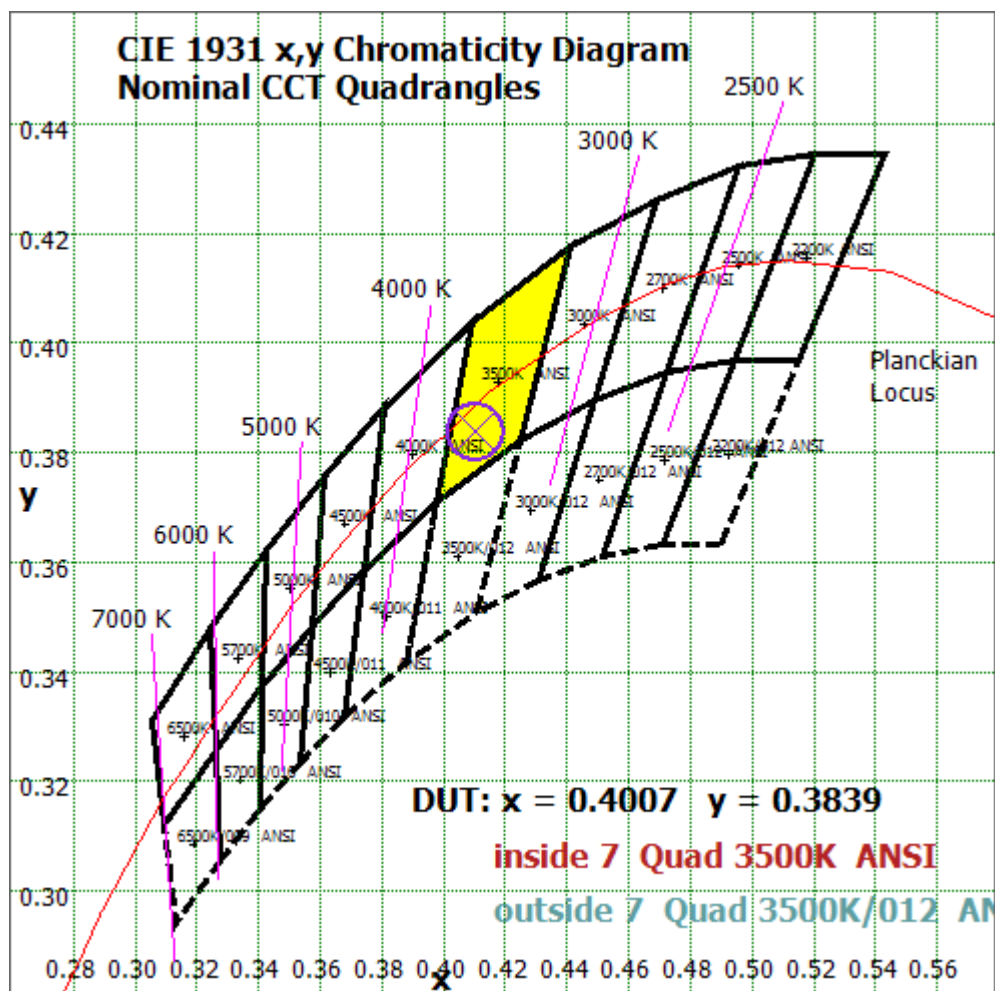


Chart14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

# Color Rendition Report – Sphere Spectroradiometer Method

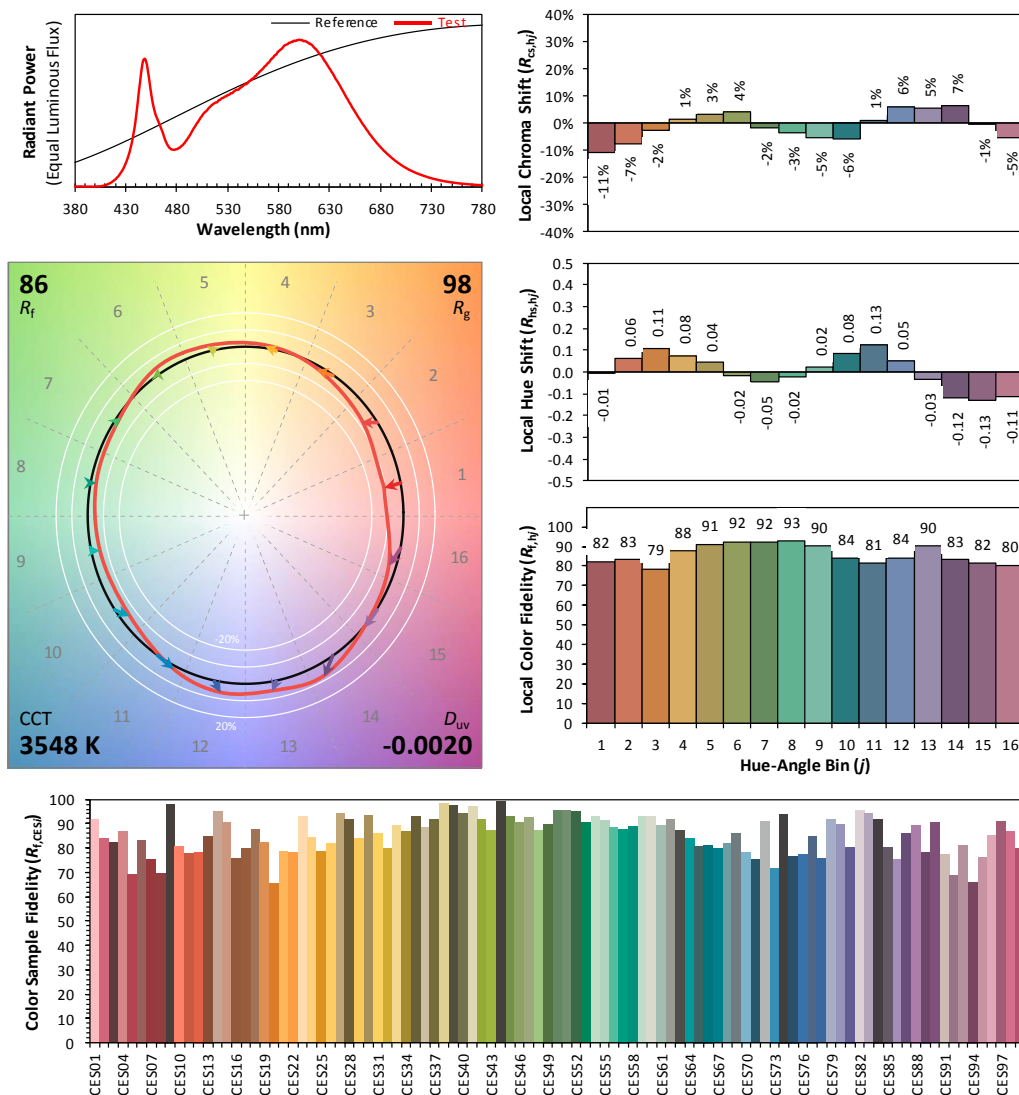
## ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/07/18

Model: 8PLH/8CCTS/HYBM



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

$x$  0.4007  
 $y$  0.3839  
 $u'$  0.2355  
 $v'$  0.5077

CIE 13.3-1995  
(CRI)

$R_a$  85  
 $R_g$  17

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

Chart 15: 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 10 due to rounding.

## TEST RESULTS (4000K Setting)

Test ambient temperature was 26.0 °C.

Base orientation was base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 50 minutes, and the total operating time including stabilization was 55 minutes.

### Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.066	0.032
Power Factor	0.9704	0.8999
Test Power (W)	7.72	7.85
THD A%	20.76	18.68
Luminous Efficacy (lm/W)	136.8	134.3
Total Luminous Flux (lm)	1056.2	1054.3
Color Rendering Index (CRI)	84	
R9	13.3	
Correlated Color Temperature (CCT)(K)	3981	
Chromaticity Chroma x	0.3807	
Chromaticity Chroma y	0.3755	
Chromaticity Chroma u	0.2258	
Chromaticity Chroma v	0.3340	
Duv	-0.0007	
Chromaticity Chroma u'	0.2258	
Chromaticity Chroma v'	0.5010	

Special Color Rendering Indices	
R1	82.5
R2	89.3
R3	94.6
R4	83.9
R5	83
R6	85.6
R7	86.4
R8	66.5
R9	13.3
R10	74.9
R11	83.6
R12	67.9
R13	84
R14	97.1

Table 12: Test data per Sphere-Spectroradiometer Method

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

### Spectral Power Distribution - Sphere Spectroradiometer Method

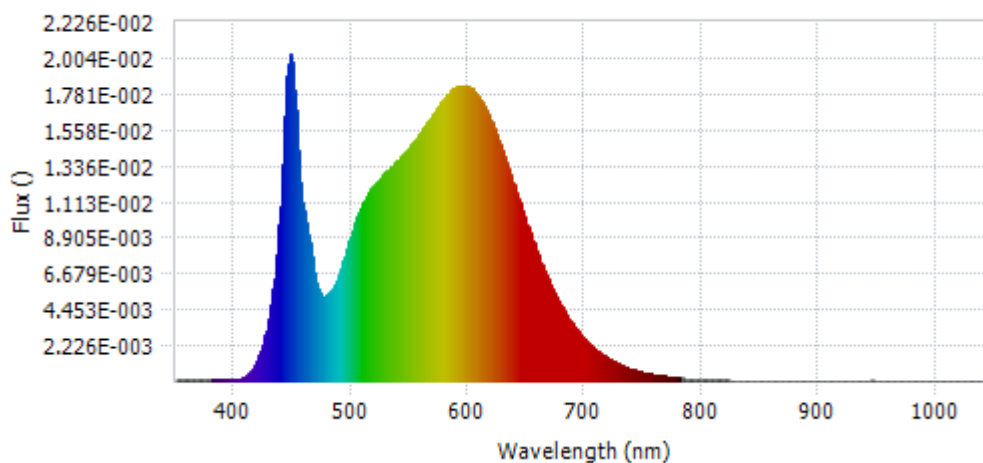
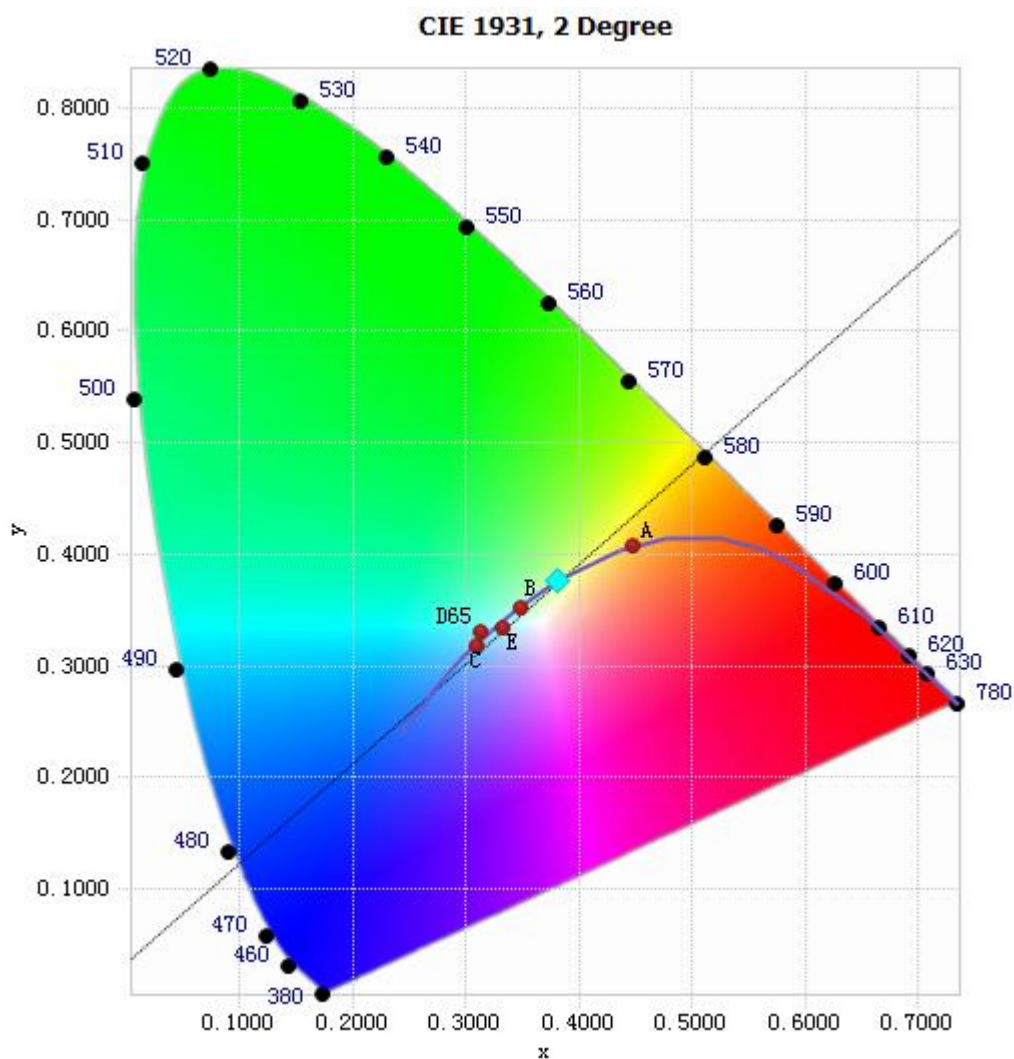


Chart16: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	9.61E-05	485	5.87E-03	590	1.82E-02	695	2.97E-03
385	8.88E-05	490	6.80E-03	595	1.83E-02	700	2.55E-03
390	8.20E-05	495	8.01E-03	600	1.82E-02	705	2.19E-03
395	6.44E-05	500	9.19E-03	605	1.79E-02	710	1.88E-03
400	8.56E-05	505	1.02E-02	610	1.75E-02	715	1.62E-03
405	1.51E-04	510	1.10E-02	615	1.68E-02	720	1.39E-03
410	3.36E-04	515	1.17E-02	620	1.60E-02	725	1.19E-03
415	7.47E-04	520	1.21E-02	625	1.51E-02	730	1.01E-03
420	1.43E-03	525	1.26E-02	630	1.40E-02	735	8.63E-04
425	2.56E-03	530	1.30E-02	635	1.30E-02	740	7.37E-04
430	4.24E-03	535	1.33E-02	640	1.19E-02	745	6.37E-04
435	7.07E-03	540	1.37E-02	645	1.08E-02	750	5.43E-04
440	1.21E-02	545	1.41E-02	650	9.74E-03	755	4.61E-04
445	1.89E-02	550	1.45E-02	655	8.73E-03	760	3.96E-04
450	1.90E-02	555	1.50E-02	660	7.78E-03	765	3.45E-04
455	1.32E-02	560	1.55E-02	665	6.88E-03	770	2.90E-04
460	1.02E-02	565	1.60E-02	670	6.03E-03	775	2.49E-04
465	8.16E-03	570	1.66E-02	675	5.27E-03	780	2.18E-04
470	6.05E-03	575	1.71E-02	680	4.60E-03		
475	5.24E-03	580	1.76E-02	685	4.00E-03		
480	5.40E-03	585	1.80E-02	690	3.45E-03		

Table 13: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

### Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3807, 0.3755)

Chart 17: 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

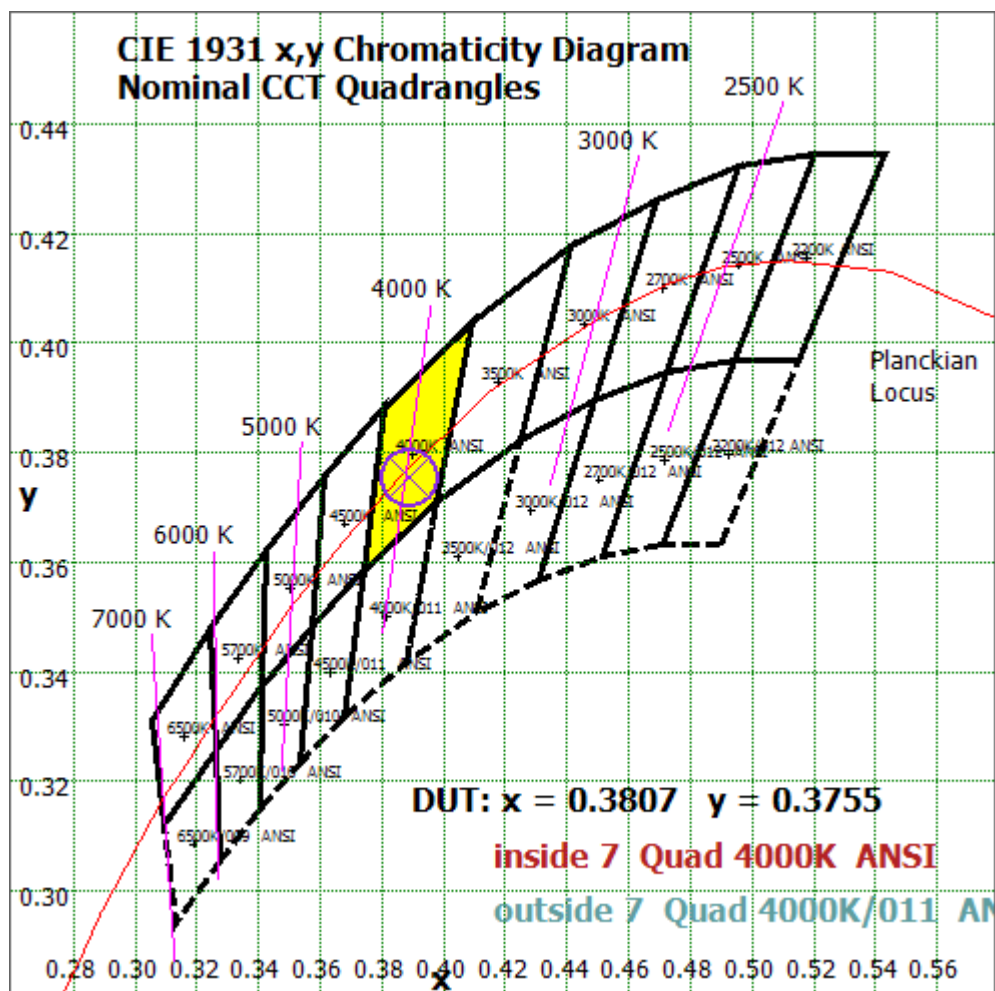


Chart 18: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

# Color Rendition Report – Sphere Spectroradiometer Method

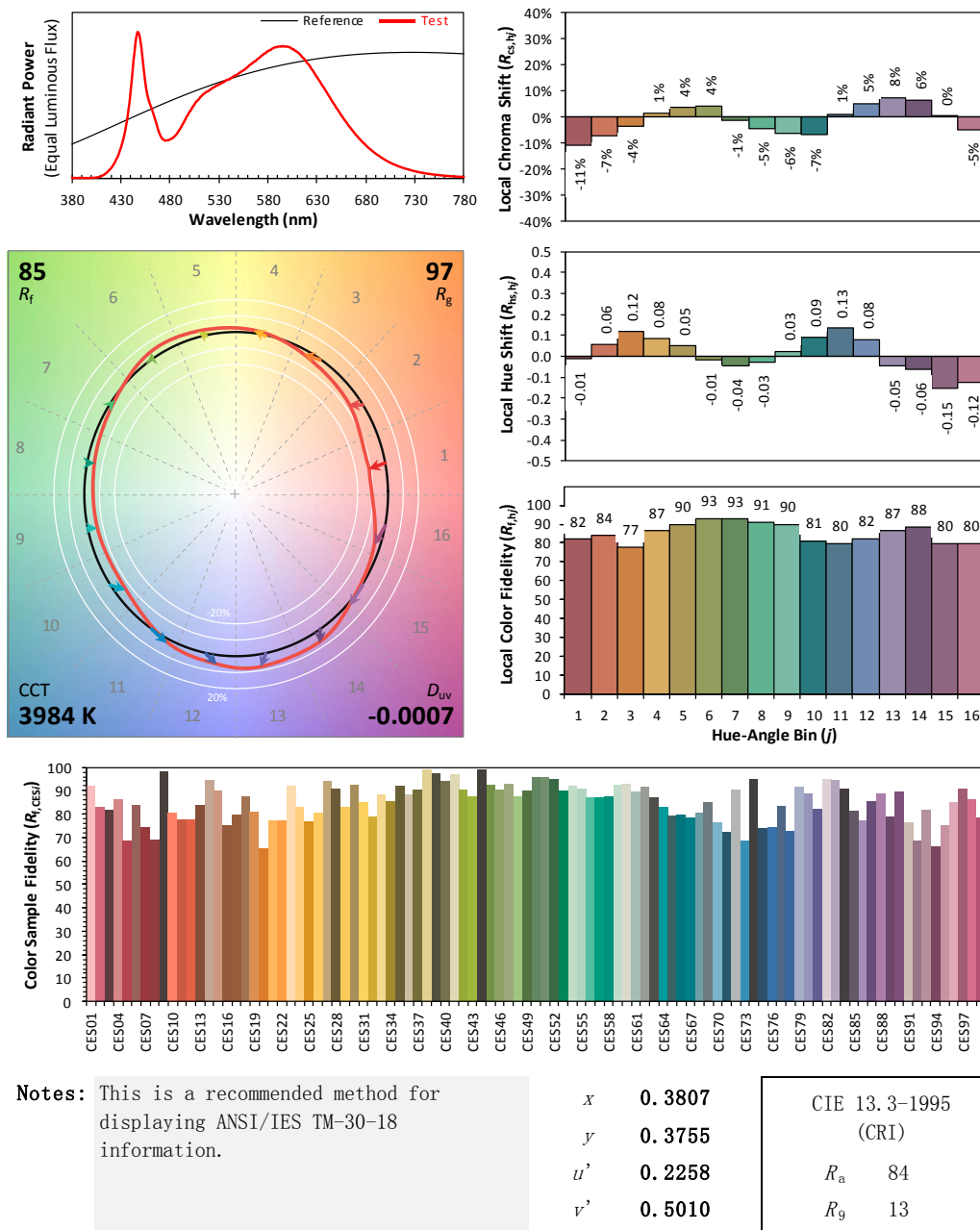
## ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/07/18

Model: 8PLH/8CCTS/HYBM



Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

Chart 19: 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 12 due to rounding.



## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 05, 2022	Aug. 04, 2023
Digital Power Meter	PF2010A	HZTE028-01	Aug. 05, 2022	Aug. 04, 2023
AC Power Supply	DPS1060	HZTE001-06	Aug. 05, 2022	Aug. 04, 2023
DC Power Supply	WY12010	HZTE004-03	Aug. 05, 2022	Aug. 04, 2023
Temperature recorder	JM624U	HZTE018-08	Aug. 05, 2022	Aug. 04, 2023
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 05, 2022	Aug. 04, 2023
Standard source	D908	HZTE012-01	Aug. 05, 2022	Aug. 04, 2023
Integrate Sphere system	3M	HZTE015-04	Aug. 05, 2022	Aug. 04, 2023
Digital Power Meter	WT210	HZTE008-01	Aug. 05, 2022	Aug. 04, 2023
AC Power Supply	PCR 500L	HZTE001-07	Aug. 05, 2022	Aug. 04, 2023
DC Power Supply	IT6154	HZTE004-04	Aug. 05, 2022	Aug. 04, 2023
Standard source	SCL-1400	HZTE012-02	Aug. 05, 2022	Aug. 04, 2023
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 05, 2022	Aug. 04, 2023
Temperature Meter	TES1310	HZTE017-01	Aug. 05, 2022	Aug. 04, 2023

Table 14: 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 3 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 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 20 min, taken 10 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 2.1% with a

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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 20 min, taken 10 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 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.

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

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