LM-79-19 TEST REPORT

for

RAB Lighting Inc

408 W 14th St New York, NY 10014, USA (888) 722-1000

Model: BT01(SBR10)

Report No.: 24010041a/Rl

This report is replaced the old report No. 24010041a dated Mar. 01, 2024

TEST SUMMARY

Tested Model	BT01(SBR10) 3500K Setting	BT01(SBR10) 4000K Setting	BT01(SBR10) 5000K Setting
Luminous Efficacy (Lumens /Watt)	128.6	137.7	132.5
Total Luminous Flux (Lumens)	1903.5	1989.1	1978.1
Power (Watts)	14.80	14.45	14.93
Power Factor	0.9929	0.9925	0.9930
CCT (K)	3454	3990	4863
CRI	83.7	85.0	83.7
Stabilization Time(Light & Power)	50	50	50
Note	3500K	4000K	5000K

Table 1: Executive Data Summary

Test specifications:

Date of Receipt : Jan. 26, 2024

Date of Test : Feb. 29, 2024

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)	
Name	: LED Lamp
Model	: RT01(SBR10)
Electrical Ratings	: 120-277V, 60Hz, 15W
Product Description	: Color- Tunable 3500K/4000K/5000K
Manufacturer	: RAB lighting INC
Address	: 408 W 14th St New York, NY 10014, USA (888) 722-1000

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)	0.124	0.062
Power Factor	0.9929	0.9036
Test Power (W)	14.80	15.43
THD A%	8.59	17.86
Luminous Efficacy (lm/W)	128.6	127.9
Total Luminous Flux (lm)	1903.5	1973.5
Color Rendering Index (CRI)	83.7	
R9	10.8	
Correlated Color Temperature (CCT)(K)	3454	
Chromaticity Chroma x	0.4071	
Chromaticity Chroma y	0.3902	
Chromaticity Chroma u	0.2371	
Chromaticity Chroma v	0.3409	
Duv	-0.0006	
Chromaticity Chroma u ’	0.2371	
Chromaticity Chroma v’	0.5113	

Special Color Rendering Indices	
R1	83.3
R2	94.5
R3	93.3
R4	79.9
R5	83.4
R6	92.1
R7	81.9
R8	60.8
R9	10.8
R10	86.7
R11	79.5
R12	68.8
R13	86.7
R14	97

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

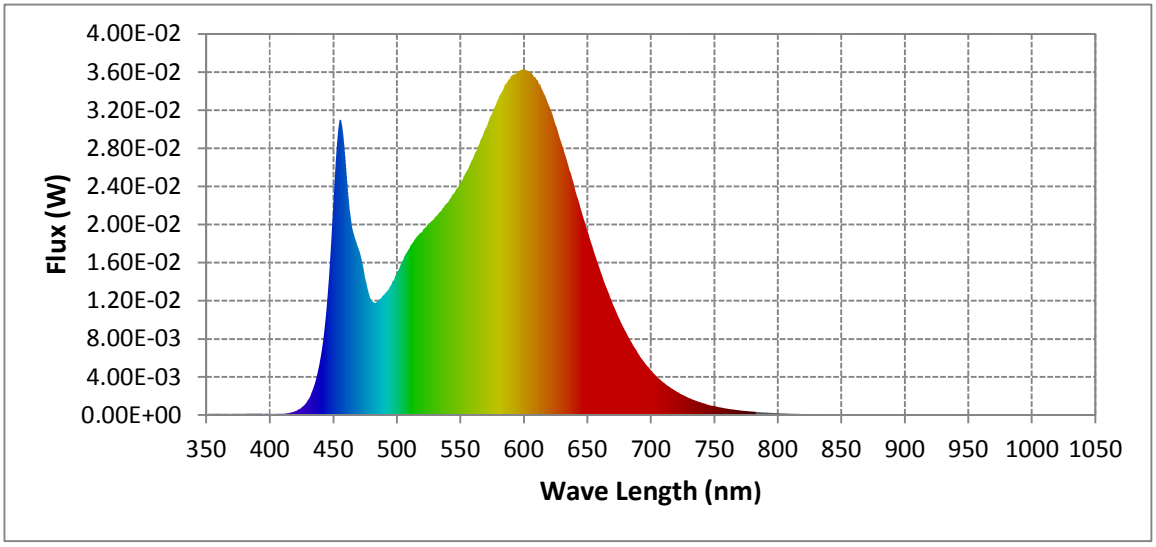
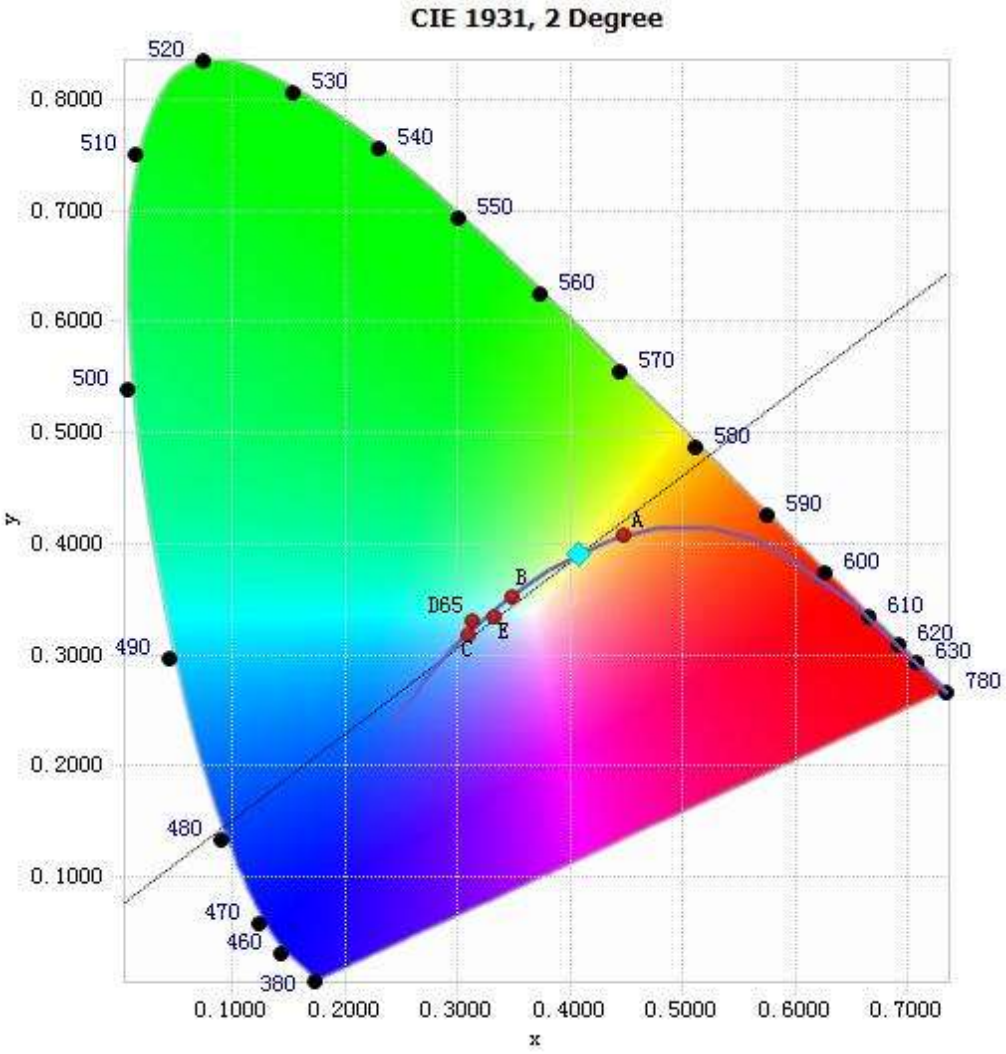


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.65E-04	485	1.20E-02	590	3.56E-02	695	5.58E-03
385	1.58E-04	490	1.26E-02	595	3.62E-02	700	4.75E-03
390	1.59E-04	495	1.35E-02	600	3.64E-02	705	4.04E-03
395	1.62E-04	500	1.49E-02	605	3.60E-02	710	3.44E-03
400	1.43E-04	505	1.63E-02	610	3.52E-02	715	2.93E-03
405	1.21E-04	510	1.75E-02	615	3.41E-02	720	2.50E-03
410	1.37E-04	515	1.86E-02	620	3.24E-02	725	2.13E-03
415	2.26E-04	520	1.92E-02	625	3.05E-02	730	1.82E-03
420	4.22E-04	525	2.01E-02	630	2.84E-02	735	1.53E-03
425	8.06E-04	530	2.08E-02	635	2.62E-02	740	1.31E-03
430	1.59E-03	535	2.14E-02	640	2.40E-02	745	1.11E-03
435	3.05E-03	540	2.22E-02	645	2.16E-02	750	9.50E-04
440	5.91E-03	545	2.32E-02	650	1.94E-02	755	8.07E-04
445	1.15E-02	550	2.43E-02	655	1.73E-02	760	6.87E-04
450	2.19E-02	555	2.55E-02	660	1.53E-02	765	5.88E-04
455	3.10E-02	560	2.69E-02	665	1.34E-02	770	5.01E-04
460	2.64E-02	565	2.84E-02	670	1.17E-02	775	4.30E-04
465	1.97E-02	570	3.01E-02	675	1.01E-02	780	3.72E-04
470	1.75E-02	575	3.16E-02	680	8.78E-03		
475	1.44E-02	580	3.32E-02	685	7.57E-03		
480	1.21E-02	585	3.47E-02	690	6.51E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4071, 0.3902)

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

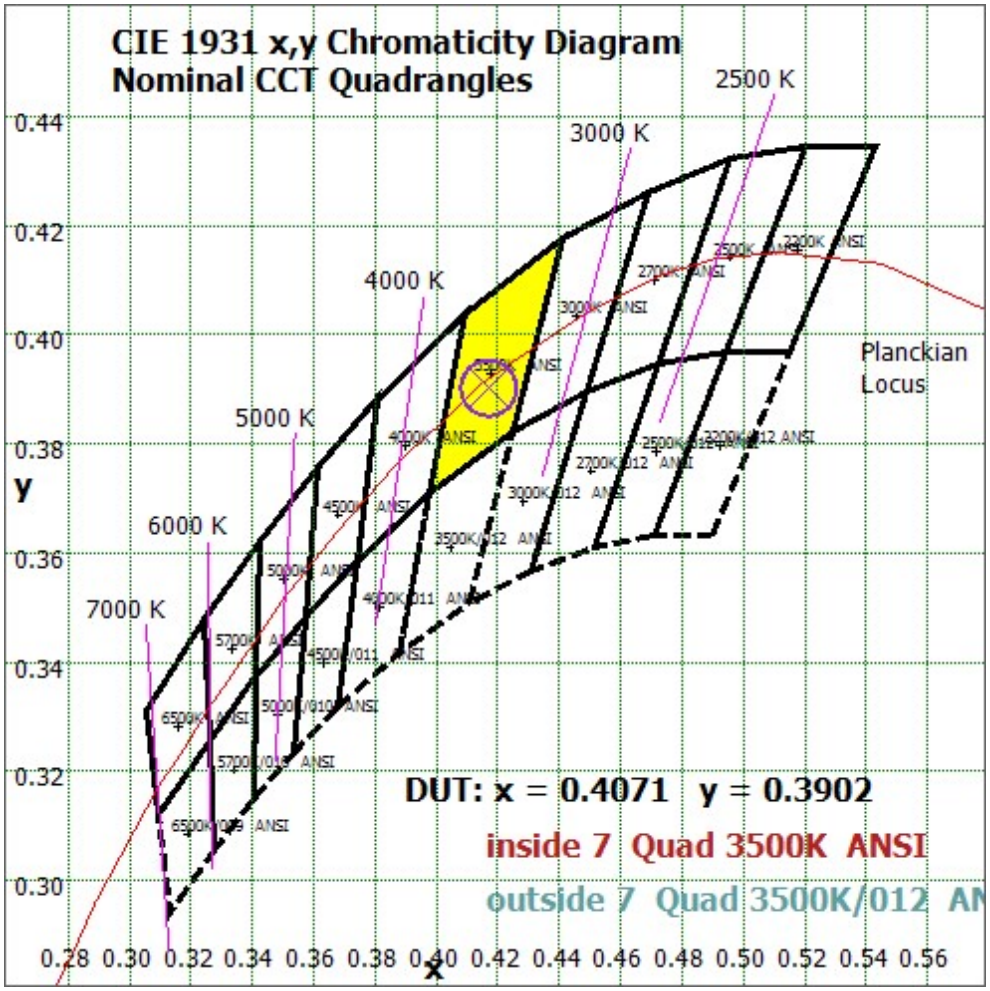


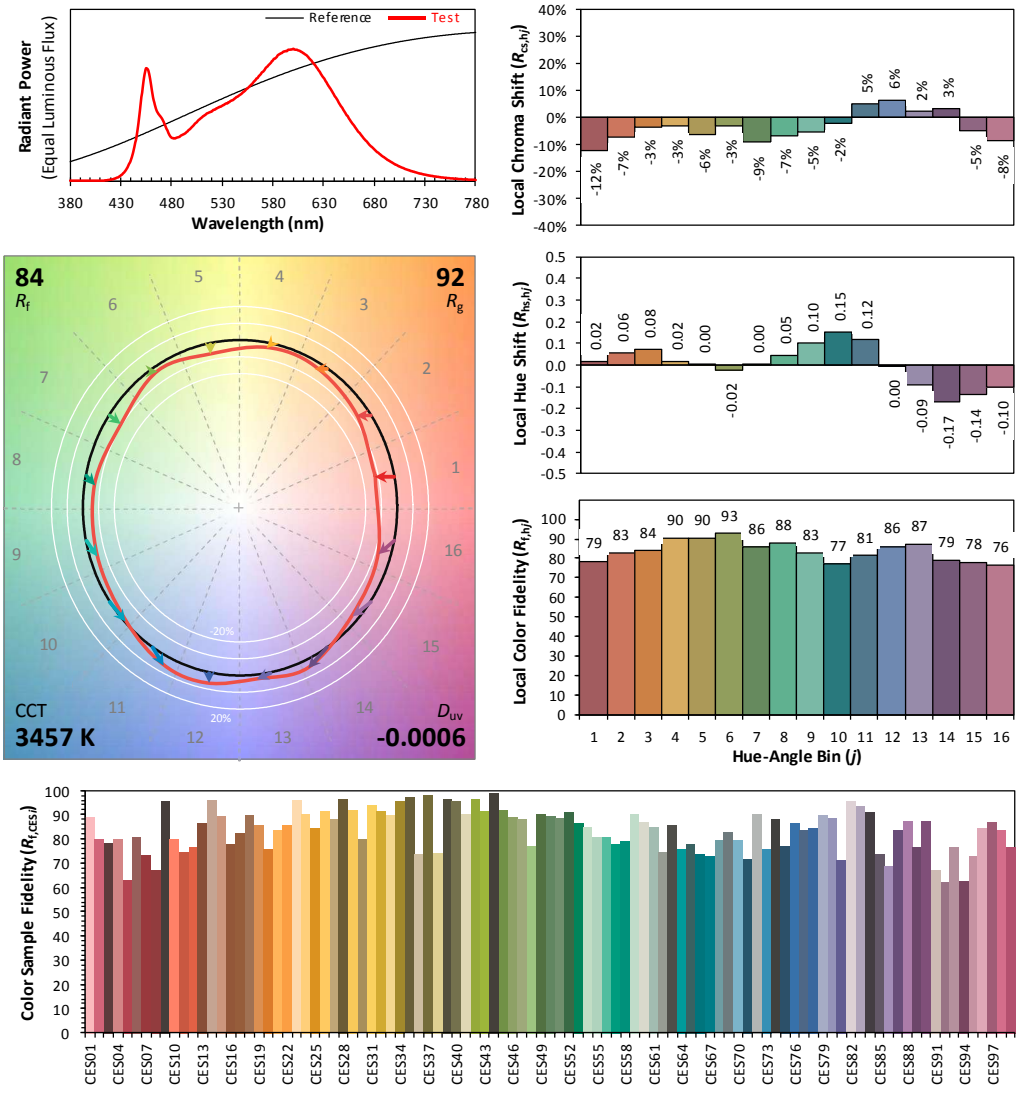
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

Source: LED **Manufacturer:** RAB lighting INC

Date: 2024/02/29 **Model:** BT01(SBR10)



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

x	0.4071
y	0.3902
u'	0.2371
v'	0.5113

CIE 13.3-1995 (CRI)

R_a	84
R_9	11

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 25.0°C.
The photometric distance is 30 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)	0.125
Power Factor	0.9926
Power (W)	14.88
Luminous Efficacy (lm/W)	130.1
Total Luminous Flux (lm)	1936.0
Beam Angle (°)	114.6 (0^o-180^o) / 135.6 (90^o-270^o)
Center Beam Candle Power (cd)	521
Maximum Beam Candle Power (cd)	522.1 (At: C=130.0, Gamma=3.0)
Spacing Criteria	1.30 (0^o-180^o) / 1.31 (90^o-270^o)
Zonal Lumens in the 0°-60°Zone	64.41%
Zonal Lumens in the 60°-90°Zone	27.93%
Zonal Lumens in the 90°-120°Zone	7.17%
Zonal Lumens in the 120°-180°Zone	0.49%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	49.381	2.55%
10- 20	142.365	7.35%
20- 30	218.692	11.30%
30- 40	269.523	13.92%
40- 50	289.441	14.95%
50- 60	277.582	14.34%
60- 70	238.557	12.32%
70- 80	180.824	9.34%
80- 90	121.362	6.27%
90-100	77.533	4.00%
100-110	45.399	2.34%
110-120	15.846	0.82%
120-130	5.521	0.29%
130-140	2.534	0.13%
140-150	0.968	0.05%
150-160	0.261	0.01%
160-170	0.151	0.01%
170-180	0.057	0.00%
Total	1936.0	100%

γ(°)	Lumens	% Total
0- 60	1246.98	64.41%
60- 90	540.743	27.93%
0-90	1787.73	92.34%
90- 180	148.27	7.66%
0- 180	1936.0	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

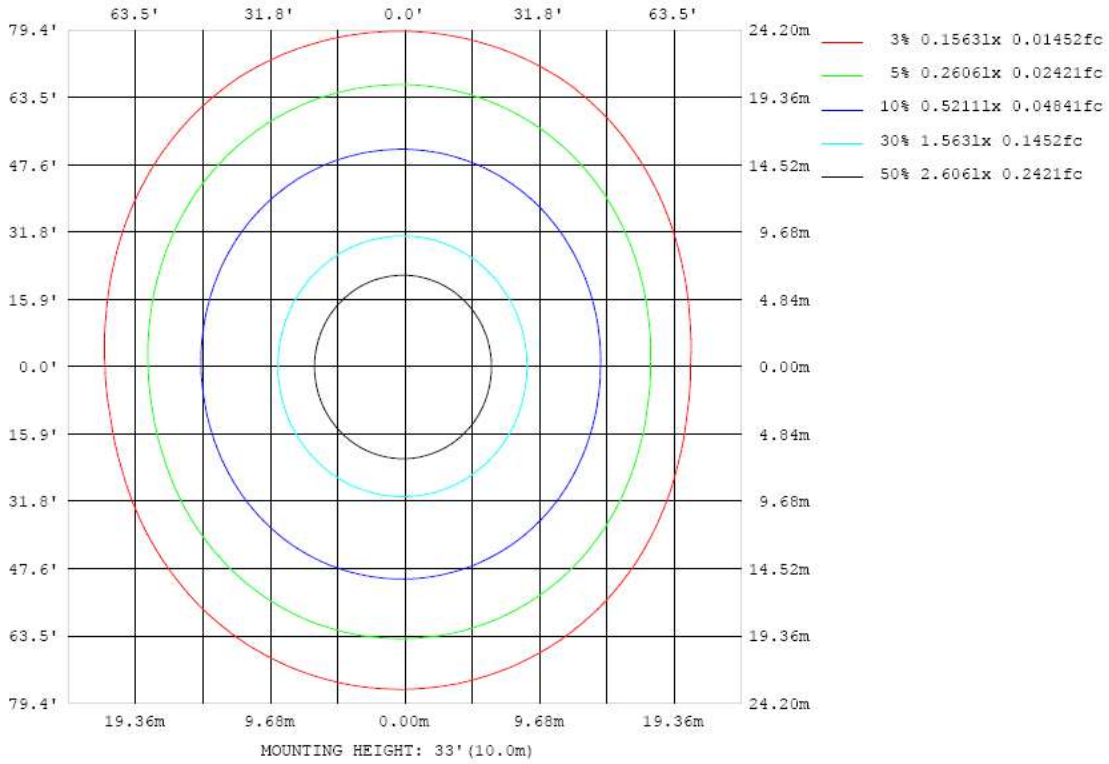


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

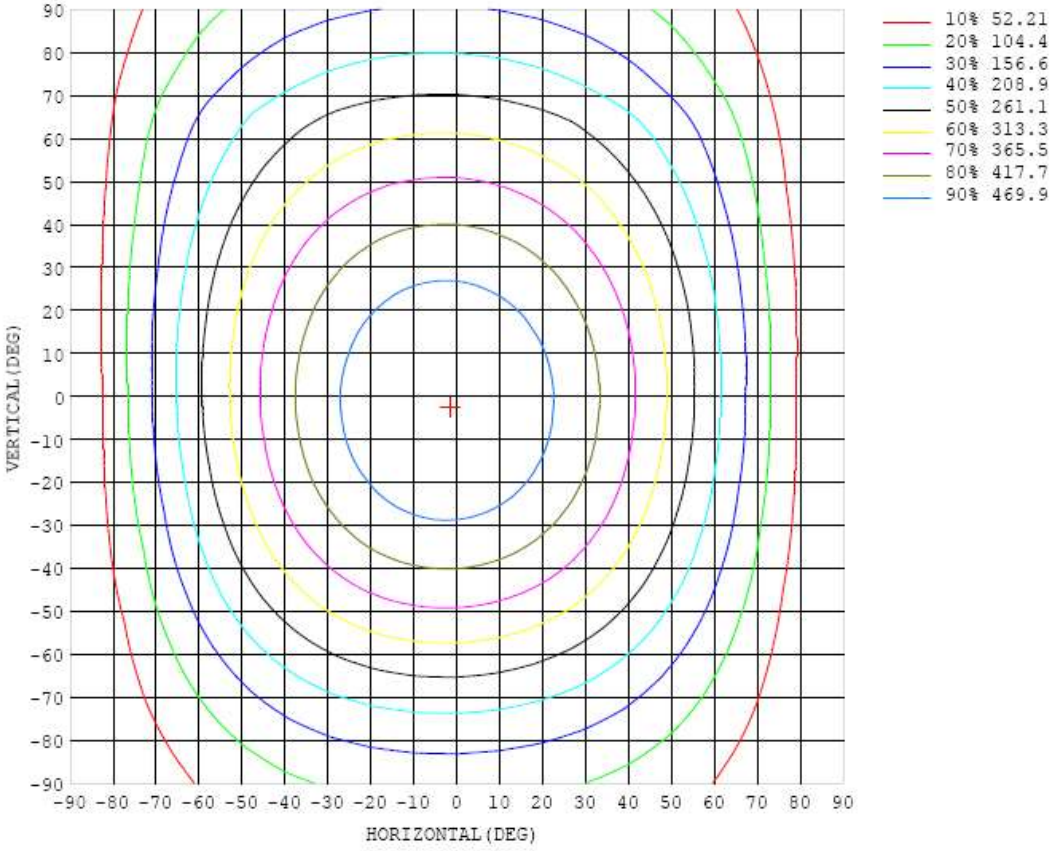


Chart 6: Isocandela Plot

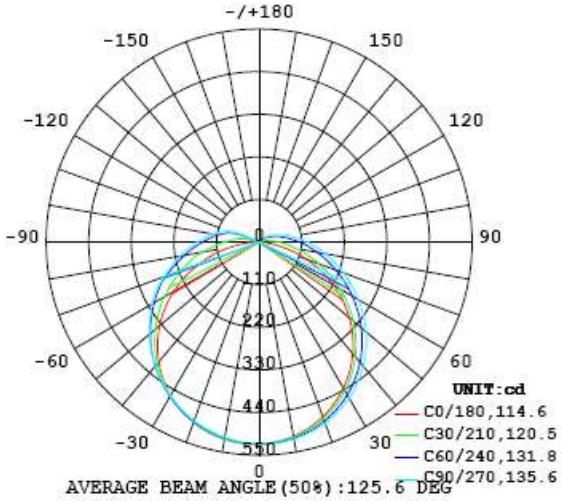


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

γ (DEG) \ C(DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	521	521	521	521	521	521	521	521	521	521	521	521	521	521	521	521	521	521	521
5	517	517	518	518	518	520	520	520	521	521	521	521	522	522	522	521	521	522	521
10	509	509	510	511	512	512	514	515	516	517	517	517	518	518	517	517	517	517	517
15	496	497	498	500	502	504	505	507	508	509	510	510	511	510	510	510	509	509	509
20	480	480	483	484	486	489	492	494	497	498	499	500	500	499	499	497	497	496	495
25	459	461	463	465	468	472	476	478	481	483	484	485	485	484	482	481	480	479	479
30	435	436	439	442	446	451	455	459	463	464	466	466	466	465	463	461	459	458	457
35	407	408	412	416	420	426	432	436	440	443	444	445	444	441	439	436	434	433	432
40	376	377	381	386	392	399	405	411	415	418	420	419	418	416	412	408	405	404	403
45	342	342	347	353	360	368	376	382	388	390	392	391	390	385	382	377	373	371	371
50	304	305	310	317	326	336	345	351	357	361	362	361	358	354	348	342	337	335	335
55	264	265	270	280	290	302	311	319	325	329	330	329	326	319	312	304	298	295	297
60	221	223	230	241	254	266	277	286	292	296	297	295	291	284	275	265	257	253	255
65	177	179	188	202	217	232	243	253	260	263	264	262	256	247	236	224	214	209	211
70	131	134	147	164	182	197	211	221	228	231	232	229	222	211	198	183	170	162	165
75	85.8	91.3	108	128	149	166	180	191	198	201	201	197	190	178	162	144	127	116	119
80	44.1	53.3	74.0	97.6	119	138	152	163	170	173	173	169	160	147	130	109	87.3	70.8	73.1
85	10.9	24.3	47.9	71.5	93.7	112	127	138	145	148	147	142	133	119	101	78.7	55.3	33.3	32.4
90	0.07	8.62	28.7	51.3	71.7	90.0	104	115	122	124	123	118	109	94.9	76.5	54.9	31.0	9.33	6.52
95	0.08	3.04	16.7	35.7	54.9	71.3	85.1	95.3	102	104	103	97.7	88.1	74.4	57.2	36.8	16.2	1.83	0.40
100	0.10	1.39	9.80	24.5	41.0	56.4	68.5	78.0	84.0	86.3	84.7	79.4	70.3	57.9	41.9	24.1	8.44	0.58	0.13
105	0.12	0.77	6.03	16.8	30.3	43.7	55.2	63.1	68.6	70.6	69.0	64.0	56.1	44.3	30.1	15.8	4.68	0.16	0.14
110	0.14	0.16	3.93	11.6	22.1	33.3	43.2	51.0	55.9	57.5	56.1	51.4	43.6	33.2	21.5	10.4	2.84	0.12	0.16
115	0.17	0.17	2.68	8.13	16.1	25.0	33.3	39.9	44.2	45.6	44.2	40.0	33.2	24.6	15.2	7.05	1.81	0.15	0.17
120	0.20	0.20	1.82	5.73	11.6	18.6	25.2	30.6	34.2	35.3	34.1	30.5	24.9	18.0	10.8	4.84	1.01	0.19	0.19
125	0.24	0.24	0.49	4.06	8.38	13.6	18.7	23.0	25.8	26.8	25.7	22.8	18.3	13.0	7.64	3.32	0.23	0.23	0.23
130	0.28	0.28	0.28	2.81	5.93	9.76	13.6	16.9	19.0	19.8	18.9	16.6	13.2	9.21	5.30	2.16	0.27	0.27	0.28
135	0.32	0.32	0.32	1.00	4.11	6.85	9.66	12.0	13.7	14.2	13.5	11.8	9.31	6.39	3.62	0.34	0.31	0.31	0.34
140	0.36	0.36	0.35	0.36	2.44	4.63	6.60	8.31	9.46	9.82	9.35	8.11	6.32	4.26	1.75	0.35	0.35	0.35	0.39
145	0.39	0.38	0.38	0.38	0.39	2.58	4.24	5.41	6.22	6.46	6.13	5.25	4.01	2.07	0.38	0.38	0.38	0.38	0.45
150	0.42	0.41	0.41	0.41	0.41	0.41	1.12	2.92	3.63	3.81	3.55	2.73	0.79	0.40	0.40	0.41	0.41	0.41	0.49
155	0.46	0.45	0.44	0.44	0.44	0.44	0.44	0.43	0.44	0.45	0.44	0.44	0.44	0.44	0.44	0.44	0.45	0.45	0.51
160	0.50	0.49	0.48	0.48	0.47	0.48	0.47	0.46	0.47	0.47	0.46	0.47	0.48	0.48	0.48	0.48	0.48	0.49	0.54
165	0.54	0.53	0.53	0.52	0.52	0.52	0.51	0.51	0.50	0.50	0.51	0.53	0.53	0.52	0.52	0.52	0.52	0.53	0.55
170	0.59	0.59	0.59	0.58	0.58	0.58	0.58	0.58	0.56	0.56	0.58	0.59	0.59	0.58	0.57	0.57	0.58	0.59	0.59
175	0.62	0.63	0.63	0.63	0.63	0.64	0.64	0.65	0.62	0.61	0.64	0.63	0.62	0.61	0.61	0.61	0.61	0.62	0.60
180	0.61	0.61	0.61	0.61	0.62	0.63	0.63	0.63	0.62	0.63	0.62	0.63	0.61	0.61	0.60	0.60	0.60	0.61	0.61

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	521	521	521	521	521	521	521	521	521	521	521	521	521	521	521	521	521		
5	521	521	521	520	519	519	519	519	518	518	517	517	517	516	516	516	517		
10	516	516	516	514	515	514	513	513	512	511	511	510	509	509	509	508	509		
15	508	507	507	506	505	505	504	504	503	502	500	500	499	497	496	496	496		
20	495	494	494	494	494	494	493	492	491	489	487	486	484	482	480	480	480		
25	478	478	478	477	478	478	478	478	475	474	472	469	467	464	462	460	460		
30	457	457	458	459	460	461	461	460	458	456	453	450	446	442	439	437	436		
35	432	433	435	437	439	440	441	441	439	436	432	428	424	419	414	411	409		
40	404	406	409	412	415	417	419	419	417	414	410	404	398	392	385	381	378		
45	373	376	380	385	390	394	395	396	394	391	386	379	371	363	355	349	344		
50	338	343	349	356	362	367	371	371	370	366	359	352	343	333	322	314	308		
55	301	307	316	325	334	340	344	346	344	341	334	324	313	301	288	277	269		
60	261	271	282	294	305	313	318	320	319	315	307	297	284	268	253	239	228		
65	219	232	247	263	275	286	293	295	294	290	282	270	255	237	217	200	186		
70	176	194	214	232	248	256	261	263	262	258	250	240	227	207	184	161	142		
75	134	157	182	201	213	224	231	235	234	229	220	208	192	175	153	125	100		
80	94.1	125	147	166	183	196	204	208	208	203	194	181	163	142	118	92.9	60.9		
85	60.1	88.2	116	139	157	170	179	183	183	178	169	156	139	117	89.5	59.6	30.7		
90	31.2	61.8	90.5	115	134	147	156	160	160	155	147	134	117	94.0	67.5	38.4	11.2		
95	15.1	42.7	69.9	93.6	113	126	136	140	140	136	127	115	96.9	75.3	50.0	23.5	1.20		
100	0.90	24.7	52.3	74.9	93.5	107	116	121	121	117	109	96.3	80.0	59.0	31.5	0.86	0.23		
105	0.17	0.28	19.9	55.8	75.6	89.5	98.7	103	103	99.5	91.8	79.6	61.0	26.3	0.19	0.17	0.15		
110	0.16	0.18	0.20	1.72	41.9	64.8	77.9	83.9	84.1	78.9	67.1	45.6	7.07	0.22	0.20	0.18	0.17		
115	0.18	0.19	0.21	0.23	0.24	1.42	22.9	33.5	34.7	23.9	2.34	0.24	0.23	0.22	0.21	0.19	0.19		
120	0.20	0.21	0.22	0.24	0.25	0.26	0.27	0.27	0.26	0.26	0.25	0.25	0.24	0.23	0.22	0.21	0.21		
125	0.23	0.24	0.25	0.26	0.27	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.26	0.25	0.25	0.24	0.24		
130	0.27	0.28	0.29	0.30	0.31	0.32	0.32	0.32	0.31	0.31	0.31	0.30	0.30	0.29	0.29	0.29	0.29		
135	0.33	0.33	0.34	0.35	0.37	0.37	0.37	0.37	0.36	0.36	0.36	0.35	0.35	0.35	0.34	0.34	0.35		
140	0.39	0.39	0.40	0.40	0.42	0.42	0.43	0.42	0.41	0.41	0.41	0.40	0.40	0.40	0.40	0.40	0.40		
145	0.44	0.44	0.44	0.45	0.46	0.47	0.47	0.47	0.46	0.46	0.46	0.46	0.46	0.45	0.44	0.45	0.45		
150	0.48	0.48	0.48	0.49	0.50	0.50	0.50	0.51	0.50	0.49	0.49	0.50	0.49	0.48	0.48	0.48	0.49		
155	0.51	0.50	0.50	0.51	0.52	0.52	0.52	0.53	0.51	0.51	0.51	0.50	0.49	0.50	0.50	0.51	0.52		
160	0.53	0.53	0.53	0.53	0.54	0.54	0.53	0.54	0.53	0.52	0.51	0.52	0.53	0.53	0.53	0.53	0.54		
165	0.56	0.55	0.55	0.55	0.56	0.56	0.56	0.54	0.54	0.53	0.53	0.55	0.55	0.55	0.55	0.55	0.56		
170	0.59	0.58	0.58	0.59	0.59	0.59	0.60	0.58	0.57	0.57	0.57	0.58	0.58	0.59	0.58	0.59	0.59		
175	0.60	0.60	0.59	0.60	0.61	0.61	0.61	0.60	0.60	0.61	0.59	0.61	0.61	0.61	0.60	0.60	0.59		
180	0.60	0.61	0.61	0.61	0.61	0.62	0.63	0.63	0.61	0.62	0.62	0.62	0.61	0.61	0.60	0.60	0.60		

Table 7: Luminous Intensity Data

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)	0.121	0.061
Power Factor	0.9925	0.8989
Test Power (W)	14.45	15.07
THD A%	8.72	18.12
Luminous Efficacy (lm/W)	137.7	137.2
Total Luminous Flux (lm)	1989.1	2067.4
Color Rendering Index (CRI)	85.0	
R9	15.5	
Correlated Color Temperature (CCT)(K)	3990	
Chromaticity Chroma x	0.3803	
Chromaticity Chroma y	0.3753	
Chromaticity Chroma u	0.2256	
Chromaticity Chroma v	0.3339	
Duv	-0.0006	
Chromaticity Chroma u ’	0.2256	
Chromaticity Chroma v’	0.5009	

Special Color Rendering Indices	
R1	84.2
R2	93.3
R3	95.7
R4	82.4
R5	84.2
R6	89.8
R7	85
R8	65.5
R9	15.5
R10	83.6
R11	82.2
R12	65.7
R13	87
R14	98.4

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

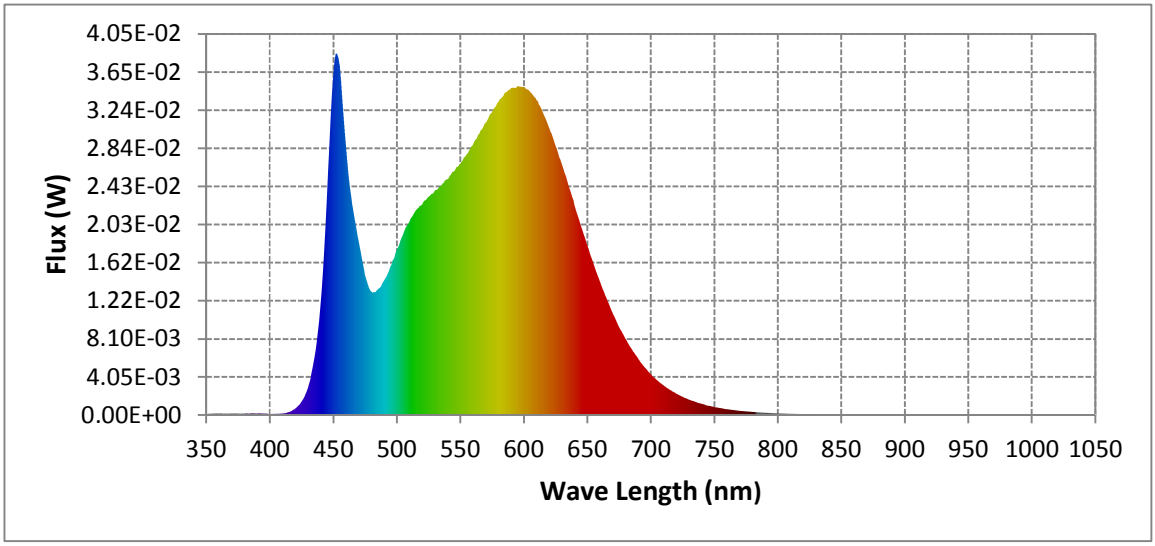
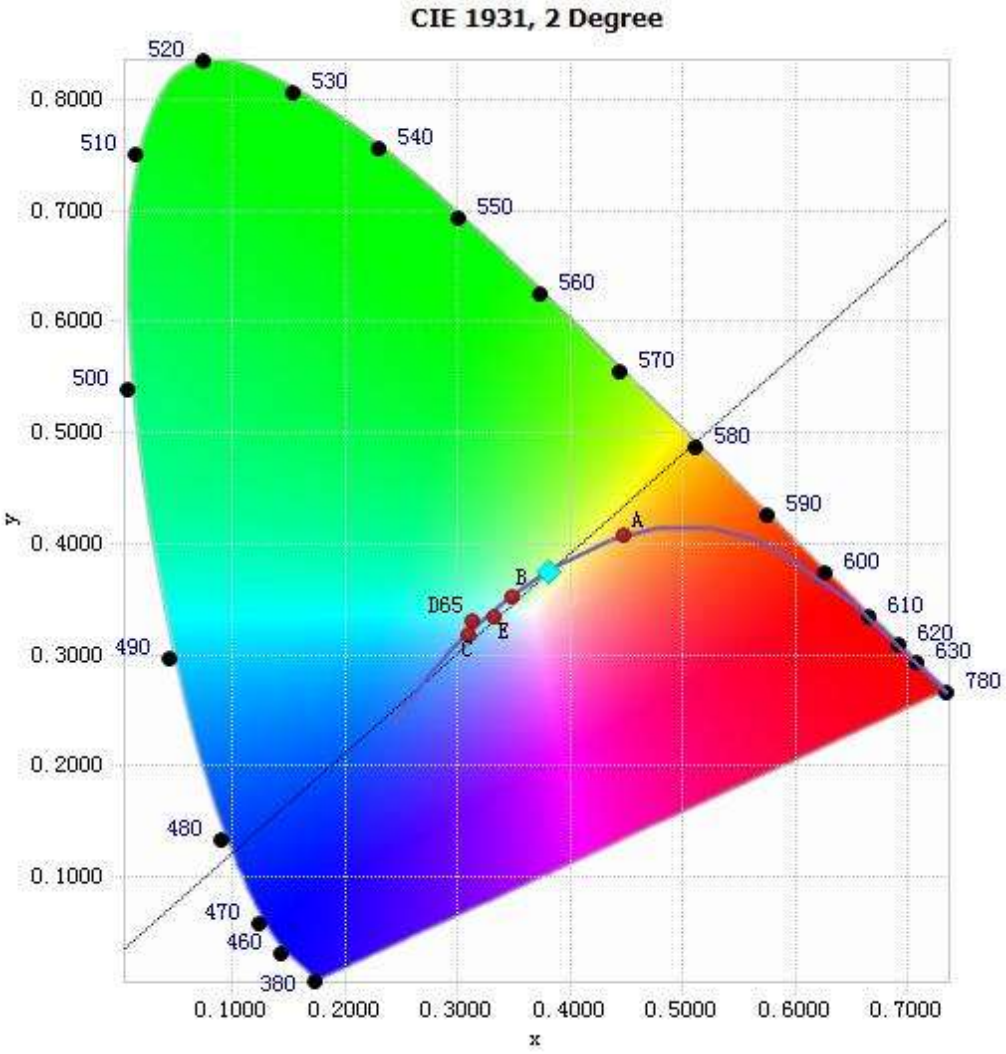


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.99E-04	485	1.33E-02	590	3.48E-02	695	5.14E-03
385	1.82E-04	490	1.43E-02	595	3.50E-02	700	4.39E-03
390	1.80E-04	495	1.57E-02	600	3.49E-02	705	3.73E-03
395	1.80E-04	500	1.76E-02	605	3.43E-02	710	3.17E-03
400	1.46E-04	505	1.92E-02	610	3.35E-02	715	2.71E-03
405	1.34E-04	510	2.06E-02	615	3.22E-02	720	2.31E-03
410	1.75E-04	515	2.18E-02	620	3.06E-02	725	1.97E-03
415	3.30E-04	520	2.24E-02	625	2.87E-02	730	1.67E-03
420	6.97E-04	525	2.32E-02	630	2.66E-02	735	1.42E-03
425	1.45E-03	530	2.39E-02	635	2.45E-02	740	1.21E-03
430	2.92E-03	535	2.44E-02	640	2.24E-02	745	1.03E-03
435	5.86E-03	540	2.51E-02	645	2.02E-02	750	8.74E-04
440	1.16E-02	545	2.59E-02	650	1.81E-02	755	7.48E-04
445	2.29E-02	550	2.67E-02	655	1.61E-02	760	6.40E-04
450	3.61E-02	555	2.77E-02	660	1.42E-02	765	5.42E-04
455	3.72E-02	560	2.87E-02	665	1.25E-02	770	4.62E-04
460	2.88E-02	565	2.99E-02	670	1.08E-02	775	3.98E-04
465	2.24E-02	570	3.11E-02	675	9.39E-03	780	3.40E-04
470	1.85E-02	575	3.22E-02	680	8.13E-03		
475	1.49E-02	580	3.33E-02	685	7.00E-03		
480	1.31E-02	585	3.43E-02	690	6.01E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3803, 0.3753)

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

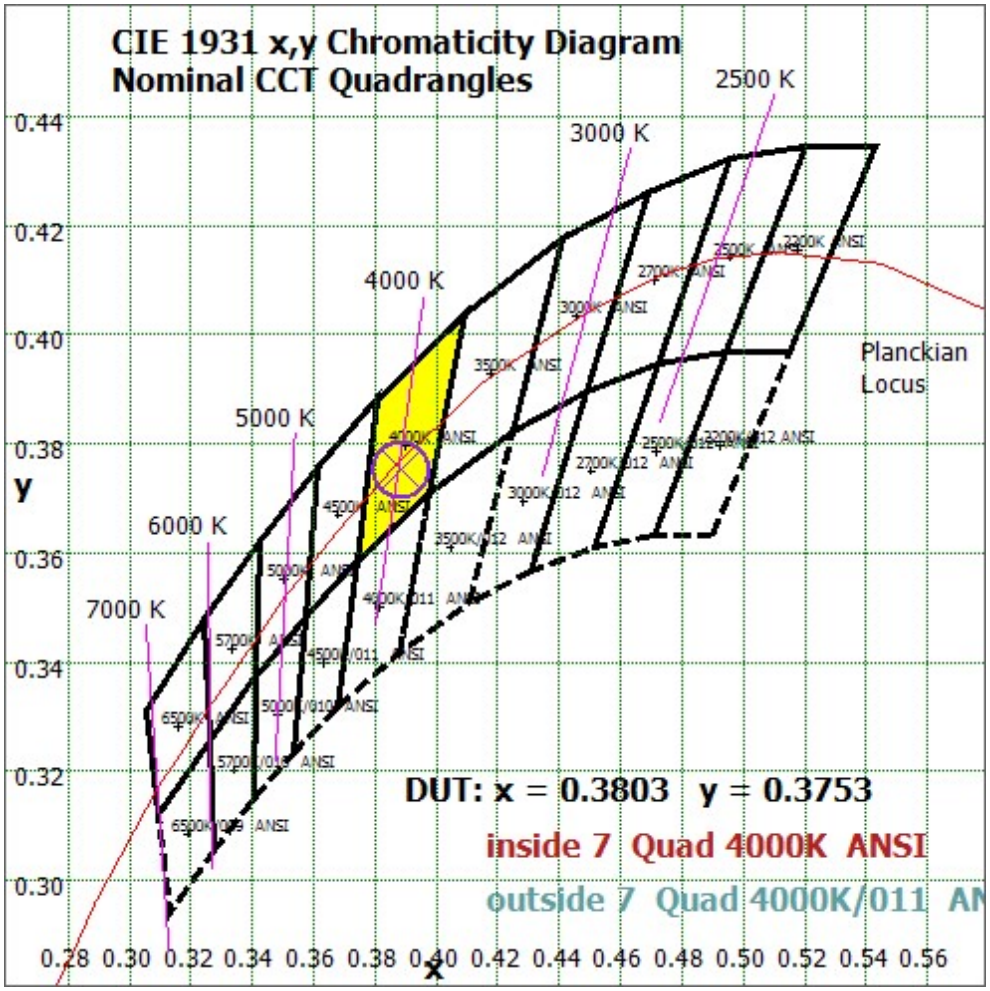


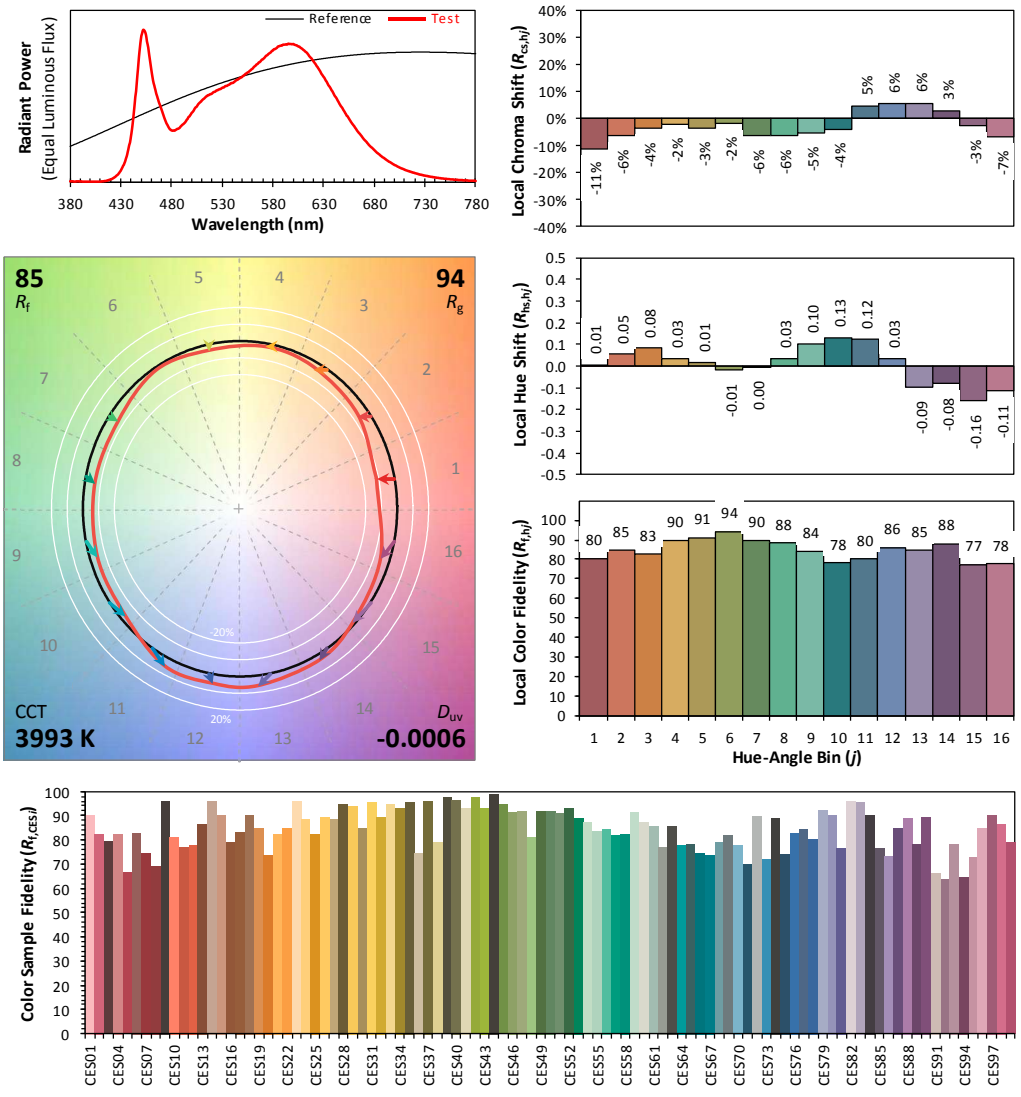
Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

Source: LED **Manufacturer:** RAB lighting INC

Date: 2024/02/29 **Model:** BT01(SBR10)



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

x	0.3803
y	0.3753
u'	0.2256
v'	0.5009

CIE 13.3-1995 (CRI)

R_a	85
R_9	16

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 (5000K Setting)

Test ambient temperature was26.0°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)	0.125	0.062
Power Factor	0.9930	0.9047
Test Power (W)	14.93	15.55
THD A%	8.72	17.87
Luminous Efficacy (lm/W)	132.5	131.9
Total Luminous Flux (lm)	1978.1	2051.4
Color Rendering Index (CRI)	83.7	
R9	9.8	
Correlated Color Temperature (CCT)(K)	4863	
Chromaticity Chroma x	0.3495	
Chromaticity Chroma y	0.3597	
Chromaticity Chroma u	0.2113	
Chromaticity Chroma v	0.3261	
Duv	0.0023	
Chromaticity Chroma u ’	0.2113	
Chromaticity Chroma v’	0.4892	

Special Color Rendering Indices	
R1	81.7
R2	89.1
R3	94.2
R4	82.8
R5	82
R6	84.3
R7	87.8
R8	67.7
R9	9.8
R10	74
R11	82.1
R12	59.3
R13	83.7
R14	97.1

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

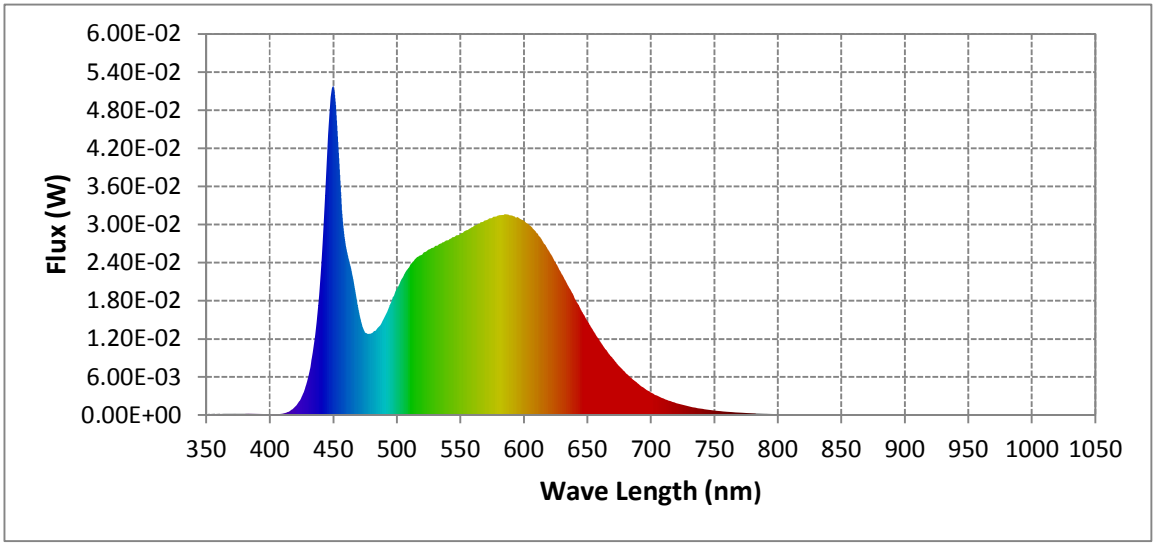
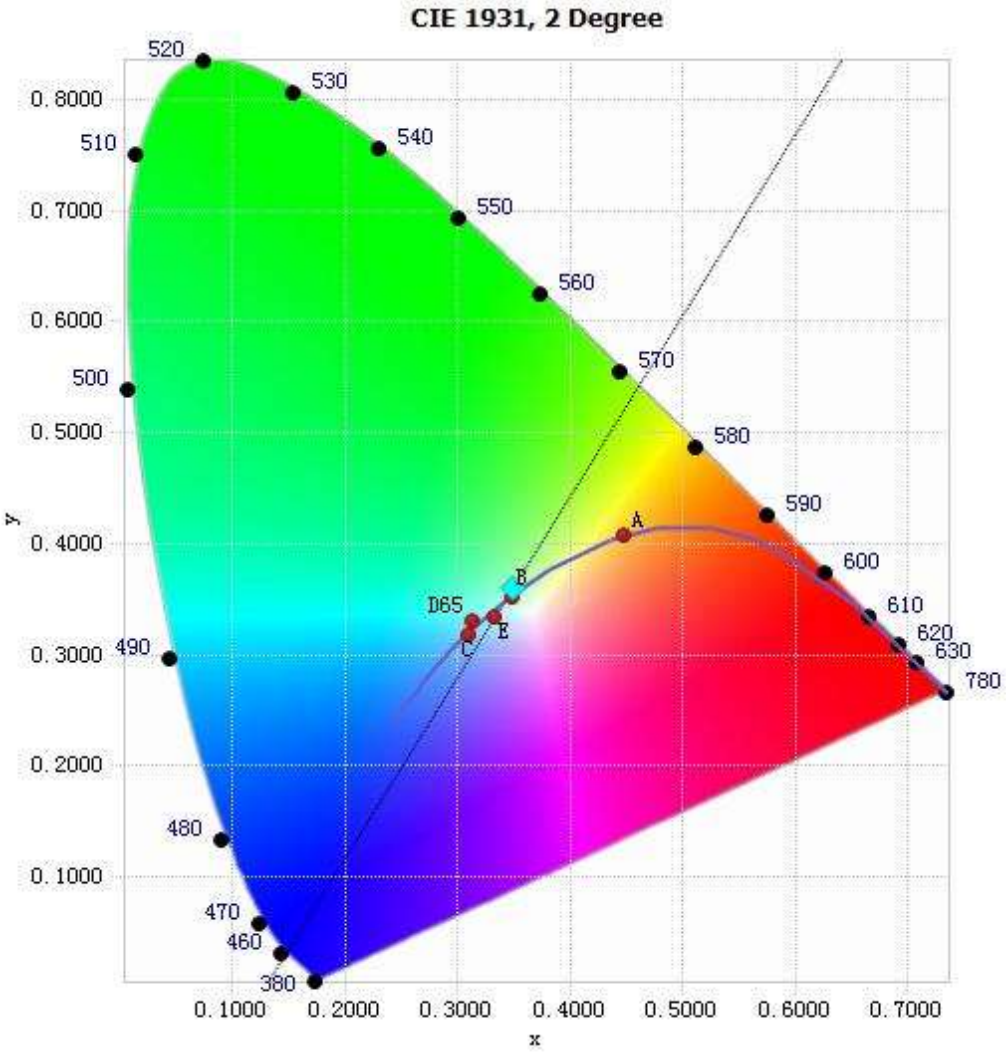


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.50E-04	485	1.37E-02	590	3.15E-02	695	4.24E-03
385	2.09E-04	490	1.52E-02	595	3.12E-02	700	3.62E-03
390	1.98E-04	495	1.75E-02	600	3.07E-02	705	3.08E-03
395	1.74E-04	500	1.99E-02	605	2.98E-02	710	2.63E-03
400	1.34E-04	505	2.18E-02	610	2.87E-02	715	2.25E-03
405	1.33E-04	510	2.34E-02	615	2.74E-02	720	1.92E-03
410	2.39E-04	515	2.47E-02	620	2.58E-02	725	1.63E-03
415	5.67E-04	520	2.53E-02	625	2.40E-02	730	1.39E-03
420	1.34E-03	525	2.61E-02	630	2.22E-02	735	1.18E-03
425	2.83E-03	530	2.66E-02	635	2.04E-02	740	1.01E-03
430	5.82E-03	535	2.70E-02	640	1.85E-02	745	8.55E-04
435	1.13E-02	540	2.75E-02	645	1.67E-02	750	7.34E-04
440	2.16E-02	545	2.80E-02	650	1.49E-02	755	6.28E-04
445	4.00E-02	550	2.84E-02	655	1.33E-02	760	5.35E-04
450	5.18E-02	555	2.91E-02	660	1.17E-02	765	4.60E-04
455	3.87E-02	560	2.96E-02	665	1.03E-02	770	3.92E-04
460	2.67E-02	565	3.01E-02	670	8.91E-03	775	3.38E-04
465	2.22E-02	570	3.07E-02	675	7.72E-03	780	2.86E-04
470	1.66E-02	575	3.10E-02	680	6.69E-03		
475	1.30E-02	580	3.14E-02	685	5.75E-03		
480	1.29E-02	585	3.17E-02	690	4.97E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3495, 0.3597)

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

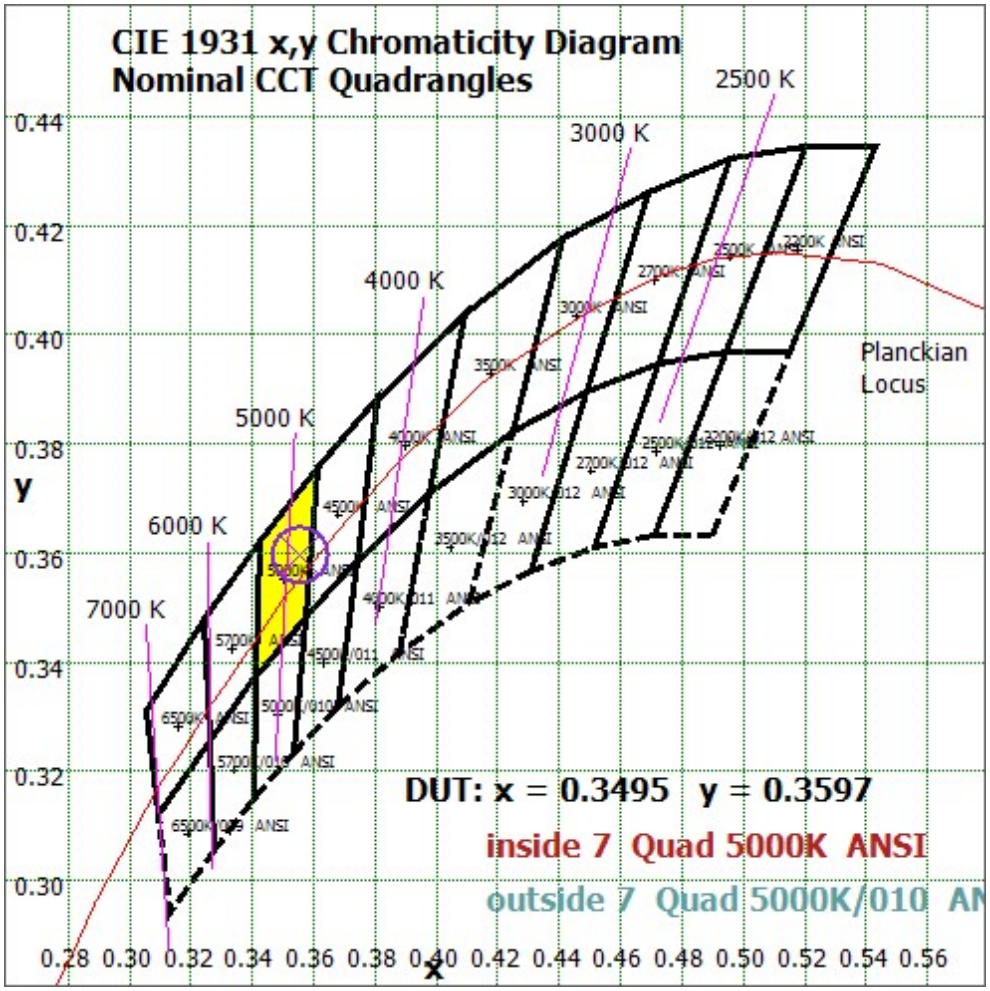


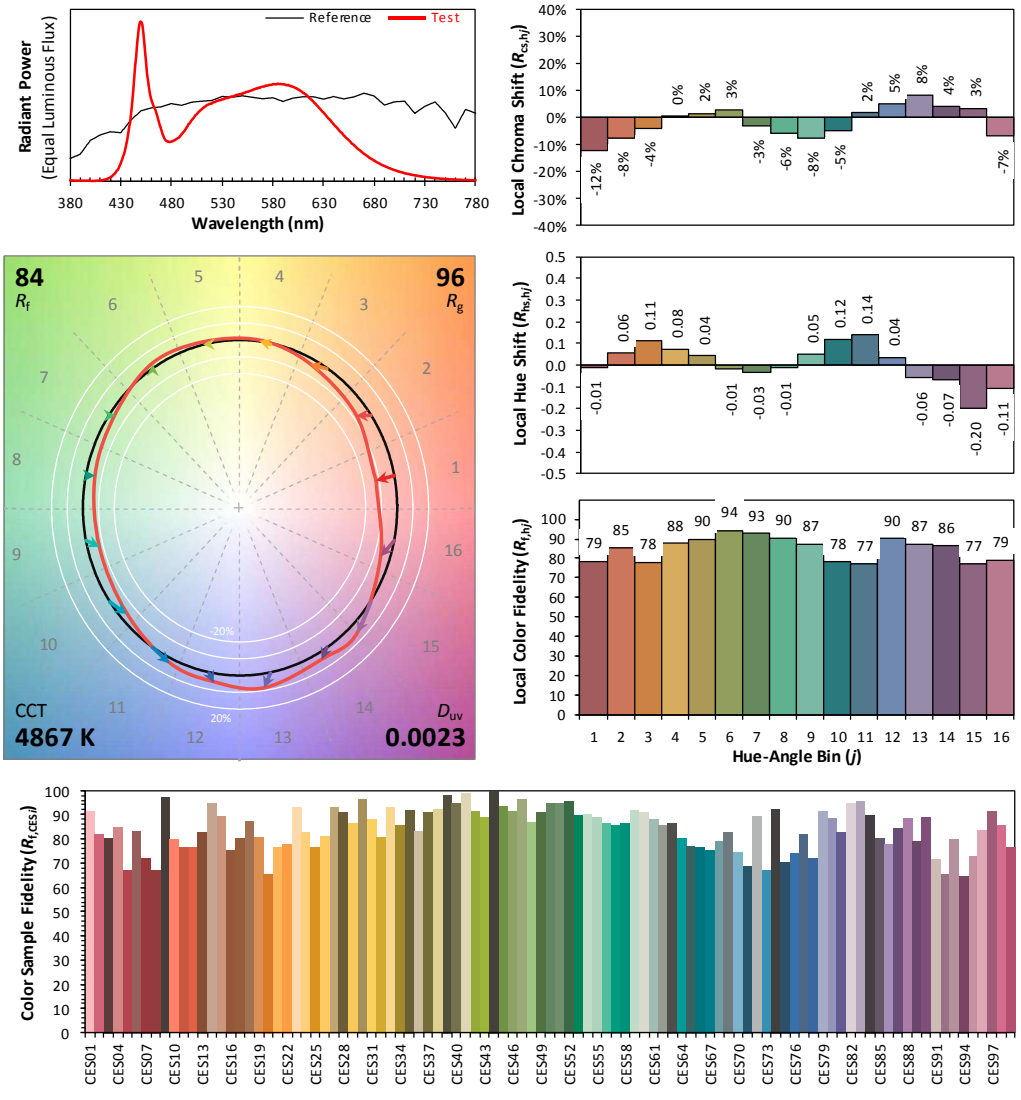
Chart 14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

Source: LED **Manufacturer:** RAB lighting INC

Date: 2024/02/29 **Model:** BT01(SBR10)



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

x	0.3495
y	0.3597
u'	0.2113
v'	0.4892

CIE 13.3-1995 (CRI)

R_a	84
R_9	10

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.

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Feb. 18, 2024	-
Digital Power Meter	PF2010A	HZTE028-01	Aug. 01, 2023	Jul. 31, 2024
AC Power Supply	DPS1060	HZTE001-06	Aug. 01, 2023	Jul. 31, 2024
DC Power Supply	WY12010	HZTE004-03	Aug. 01, 2023	Jul. 31, 2024
Temperature recorder	JM624U	HZTE018-08	Aug. 04, 2023	Aug. 03, 2024
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 04, 2023	Aug. 03, 2024
Standard source	D908	HZTE012-01	Aug. 14, 2018	-
Integrate Sphere system	3M	HZTE015-04	Feb. 18, 2024	-
Digital Power Meter	WT210	HZTE008-01	Aug. 01, 2023	Jul. 31, 2024
AC Power Supply	PCR 500L	HZTE001-07	Aug. 01, 2023	Jul.31, 2024
DC Power Supply	IT6154	HZTE004-04	Aug. 01, 2023	Jul. 31, 2024
Standard source	SCL-1400	HZTE012-06	Nov. 04, 2021	-
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 04, 2023	Aug. 03, 2024
Temperature Meter	TES1310	HZTE017-01	Aug. 04, 2023	Aug. 03, 2024

Table 12: 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 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 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 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 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 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.

*** End of Report ***