

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 Tube

Model: 15T8/4F/8CCTS/UEB

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ23040022d

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

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Apr. 26, 2023



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Apr. 26, 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	15T8/4F/8CCTS/UEB (3000K Setting)	15T8/4F/8CCTS/UEB (3500K Setting)	15T8/4F/8CCTS/UEB (4000K Setting)
Luminous Efficacy (Lumens /Watt)	145.5	149.9	153.9
Total Luminous Flux (Lumens)	2227.0	2295.7	2330.3
Power (Watts)	15.31	15.32	15.14
Power Factor	0.9794	0.9793	0.9800
CCT (K)	3031	3474	3998
CRI	82.3	84.3	85.3
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins
Note	3000K	3500K	4000K

Tested Model	15T8/4F/8CCTS/UEB (5000K Setting)	15T8/4F/8CCTS/UEB (6500K Setting)
Luminous Efficacy (Lumens /Watt)	153.9	149.3
Total Luminous Flux (Lumens)	2340.3	2280.7
Power (Watts)	15.21	15.28
Power Factor	0.9793	0.9793
CCT (K)	5066	6481
CRI	84.9	82.9
Stabilization Time (Light & Power)	50 mins	50 mins
Note	5000K	6500K

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Apr. 21, 2023
Date of Test	: Apr. 23, 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 ANSI/UL 8750 Light Emitting Diode (LED) Equipment for Use in Lighting Products UL 1993 Self-Ballasted Lamps and Lamp Adapters

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SAMPLE PHOTO



Figure 1- Overview of the sample

Equipment Under Test(EUT)

Name	: LED Tube
Model	: 15T8/4F/8CCTS/UEB
Electrical Ratings	: 120-277V, 50/60Hz, 15W Color- Tunable 3000K/3500K/4000K/5000K/6500K
Product Description	: Manufacturer of light source: Lumileds Holding B.V. Model of LED light source: L128-3080RA35003J3 (3000K) L128-6580RA35003J3 (6500K)
Manufacturer	: GREEN CREATIVE LTD
Address	: Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL, Hong Kong

TEST RESULTS of Model 15T8/4F/8CCTS/UEB (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)	0.130	0.061
Power Factor	0.9794	0.9151
Test Power (W)	15.31	15.43
THD A%	18.83	20.43
Luminous Efficacy (lm/W)	145.5	145.1
Total Luminous Flux (lm)	2227.0	2239.4
Color Rendering Index (CRI)	82.3	
R9	5.6	
Correlated Color Temperature (CCT)(K)	3031	
Chromaticity Chroma x	0.4377	
Chromaticity Chroma y	0.4098	
Chromaticity Chroma u	0.2486	
Chromaticity Chroma v	0.3492	
Duv	0.0022	
Chromaticity Chroma u'	0.2486	
Chromaticity Chroma v'	0.5237	

Special Color Rendering Indices	
R1	80.1
R2	88.8
R3	97
R4	81.7
R5	80.2
R6	86.5
R7	84.3
R8	59.7
R9	5.6
R10	74.9
R11	81.5
R12	68.8
R13	81.9
R14	98.4

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

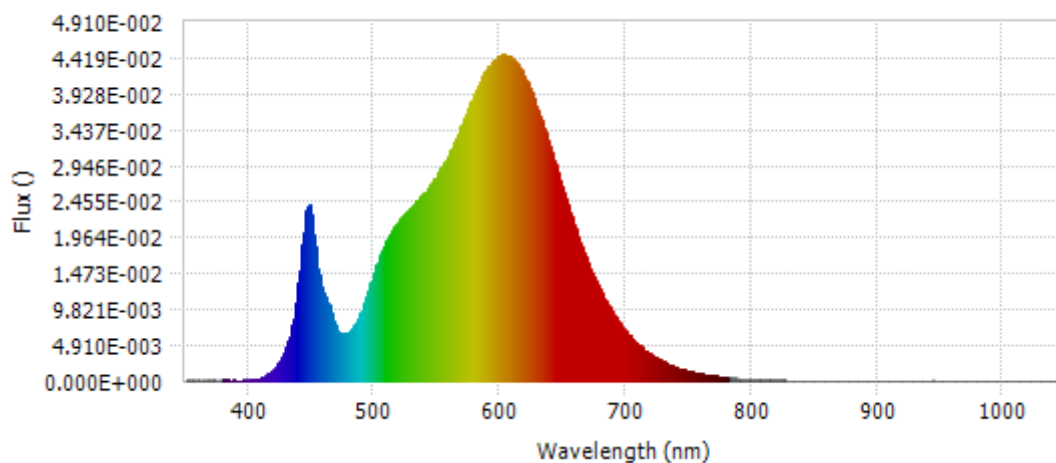
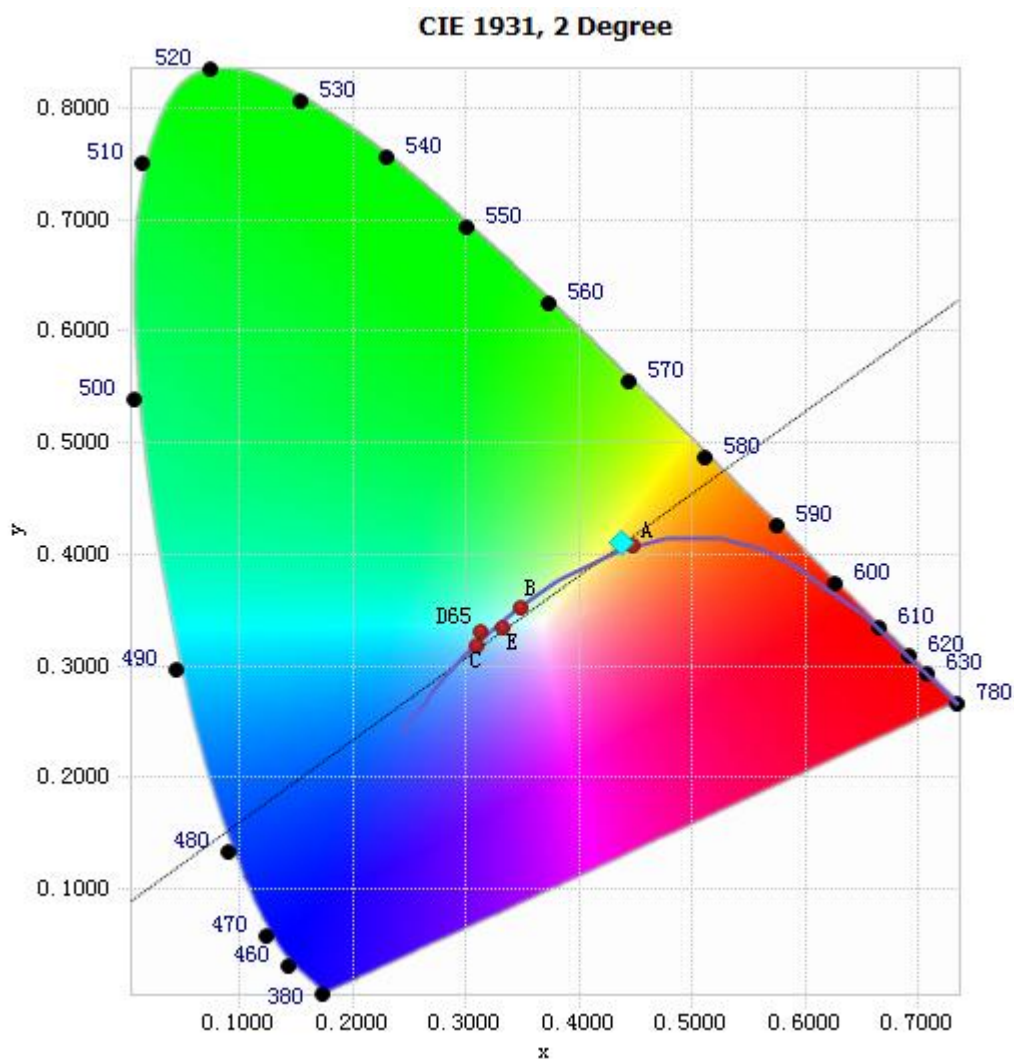


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.51E-04	485	7.78E-03	590	4.27E-02	695	7.91E-03
385	1.29E-04	490	9.68E-03	595	4.38E-02	700	6.80E-03
390	1.16E-04	495	1.22E-02	600	4.45E-02	705	5.83E-03
395	1.04E-04	500	1.48E-02	605	4.45E-02	710	4.95E-03
400	1.45E-04	505	1.72E-02	610	4.40E-02	715	4.24E-03
405	2.14E-04	510	1.91E-02	615	4.30E-02	720	3.62E-03
410	4.28E-04	515	2.09E-02	620	4.13E-02	725	3.10E-03
415	8.34E-04	520	2.19E-02	625	3.95E-02	730	2.64E-03
420	1.55E-03	525	2.30E-02	630	3.71E-02	735	2.26E-03
425	2.68E-03	530	2.39E-02	635	3.47E-02	740	1.90E-03
430	4.55E-03	535	2.47E-02	640	3.20E-02	745	1.64E-03
435	7.59E-03	540	2.57E-02	645	2.90E-02	750	1.38E-03
440	1.34E-02	545	2.69E-02	650	2.62E-02	755	1.19E-03
445	2.19E-02	550	2.81E-02	655	2.35E-02	760	1.03E-03
450	2.27E-02	555	2.95E-02	660	2.09E-02	765	8.60E-04
455	1.54E-02	560	3.12E-02	665	1.85E-02	770	7.39E-04
460	1.19E-02	565	3.31E-02	670	1.61E-02	775	6.30E-04
465	9.80E-03	570	3.51E-02	675	1.41E-02	780	5.27E-04
470	7.23E-03	575	3.72E-02	680	1.23E-02		
475	6.37E-03	580	3.92E-02	685	1.07E-02		
480	6.71E-03	585	4.13E-02	690	9.27E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4377, 0.4098)

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

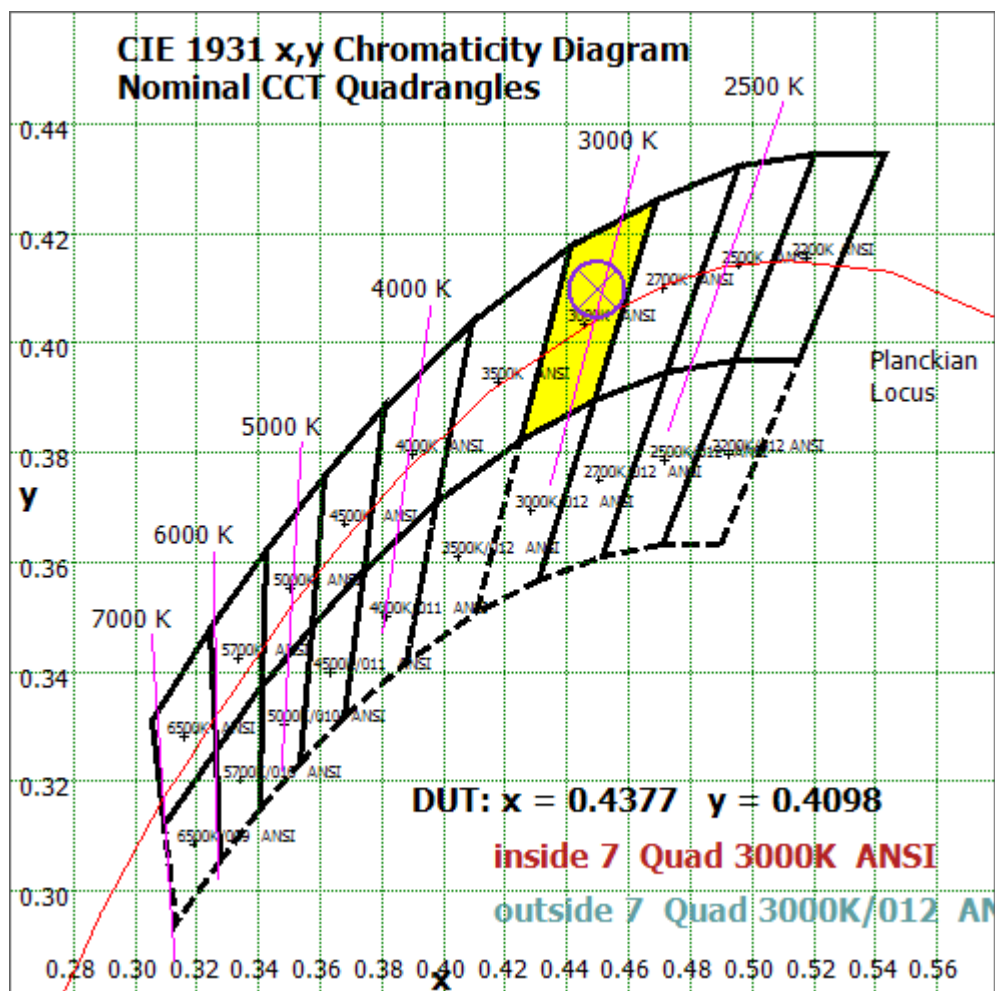


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

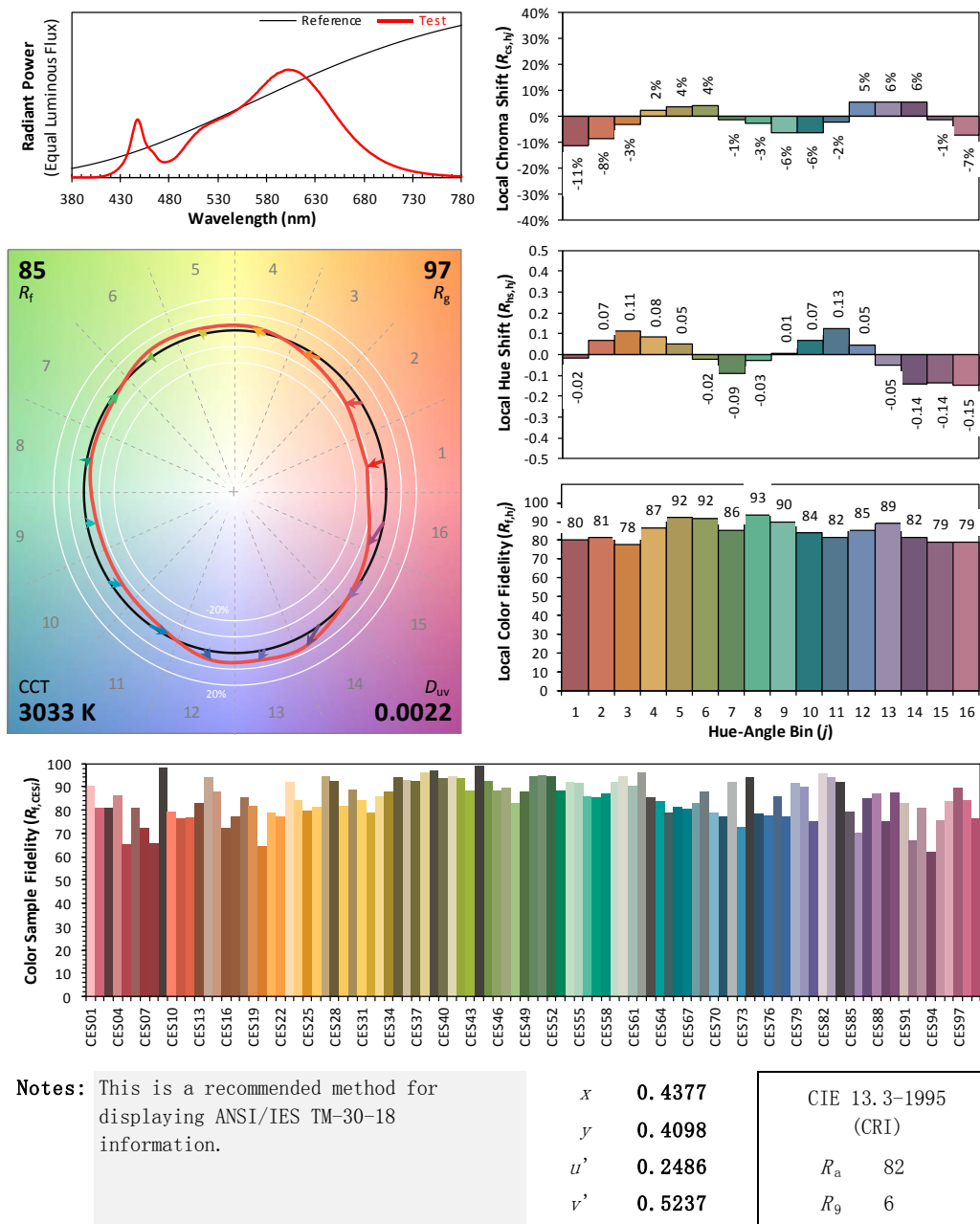
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/04/23

Model: 15T8/4F/8CCTS/UEB



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 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)	0.131
Power Factor	0.9792
Power (W)	15.38
Luminous Efficacy (lm/W)	145.6
Total Luminous Flux (lm)	2239.3
Beam Angle (°)	112.2 (0°-180°) / 204.3 (90°-270°)
Center Beam Candle Power (cd)	400
Maximum Beam Candle Power (cd)	400.6 (At: C=40.0, Gamma=2.5)
Spacing Criteria	1.26 (0°-180°) / 1.40 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	45.20%
Zonal Lumens in the 60 °-90 °Zone	26.97%
Zonal Lumens in the 90 °-120 °Zone	16.93%
Zonal Lumens in the 120 °-180 °Zone	10.89%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	37.932	1.69%
10- 20	109.808	4.90%
20- 30	170.373	7.61%
30- 40	214.132	9.56%
40- 50	238.073	10.63%
50- 60	241.864	10.80%
60- 70	228.24	10.19%
70- 80	202.601	9.05%
80- 90	173.168	7.73%
90-100	147.704	6.60%
100-110	125.812	5.62%
110-120	105.672	4.72%
120-130	86.084	3.84%
130-140	67.117	3.00%
140-150	48.209	2.15%
150-160	29.504	1.32%
160-170	11.234	0.50%
170-180	1.72	0.08%
Total	2239.2	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1012.18	45.20%
60- 90	604.009	26.97%
0-90	1616.19	72.18%
90- 180	623.056	27.82%
0- 180	2239.2	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

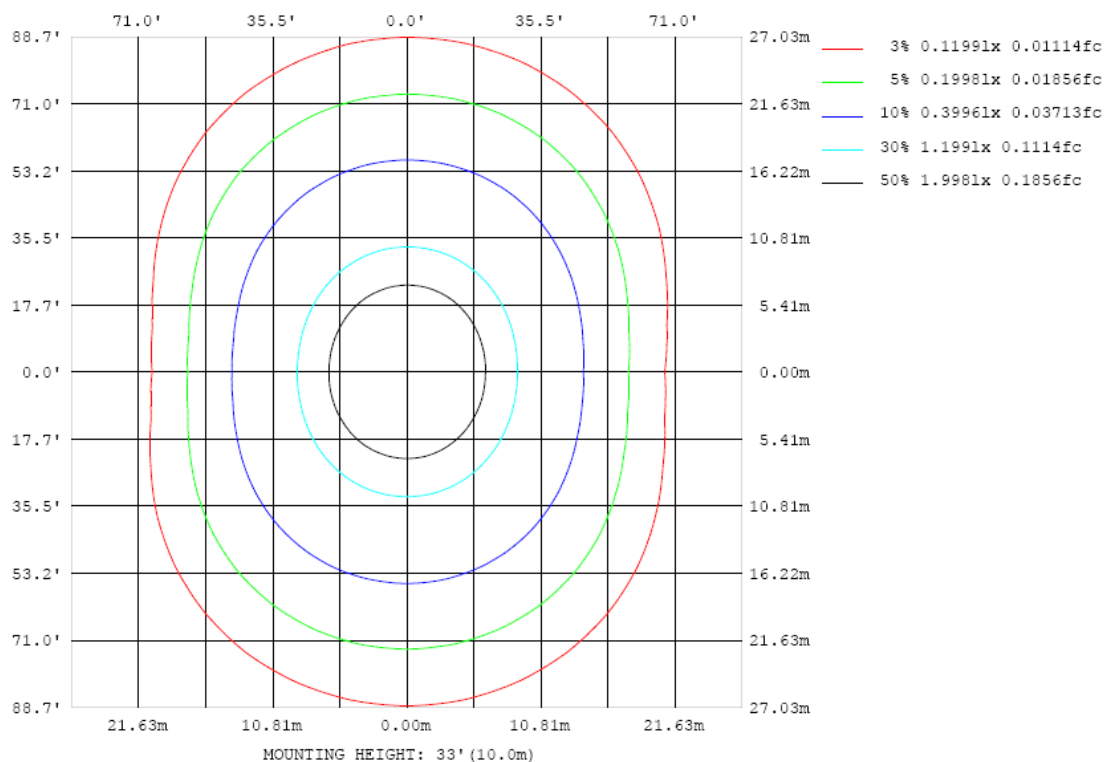


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

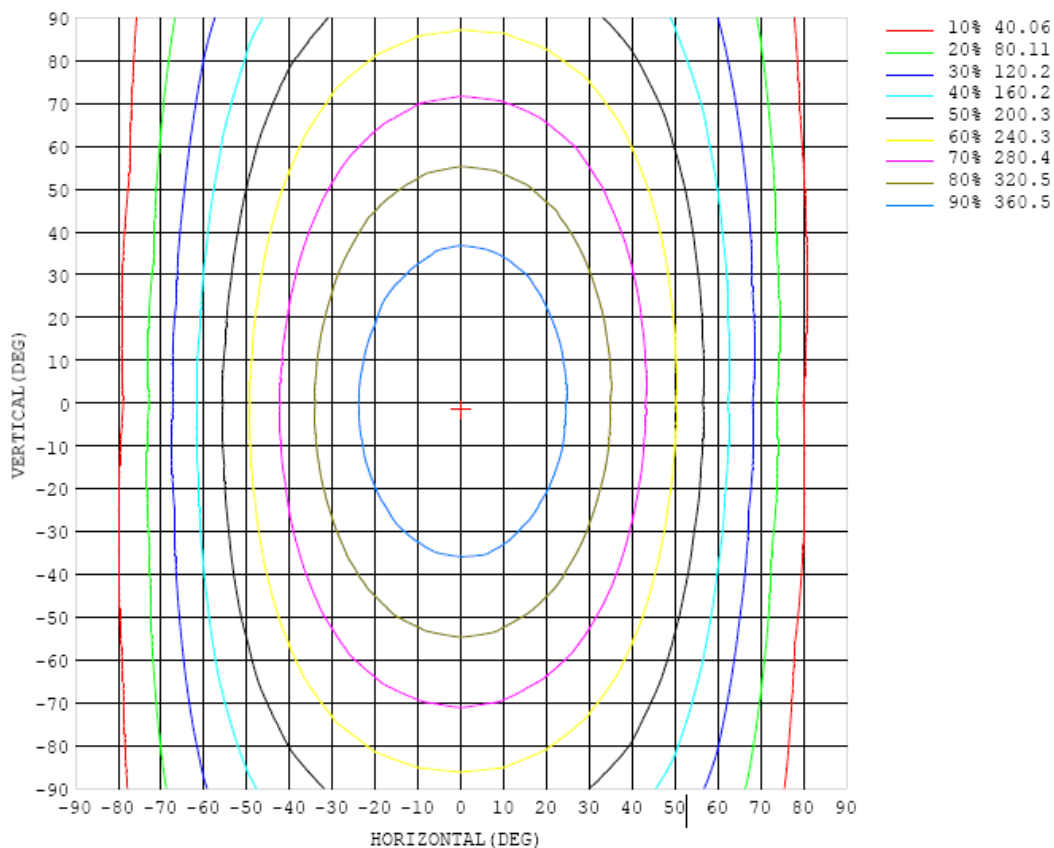


Chart 6: Isocandela Plot

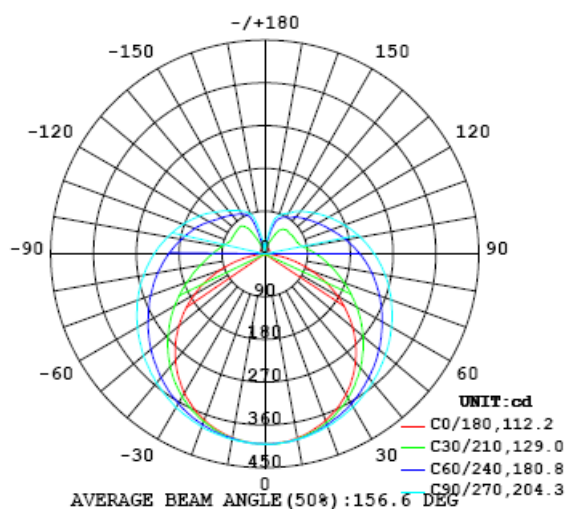


Chart 7: Polar Candela Distribution

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	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
5	398	399	399	400	400	399	399	400	400	400	399	399	398	398	399	398	399	398	398
10	393	394	394	395	396	396	396	397	398	396	396	396	395	395	394	392	393	392	393
15	385	386	387	388	390	389	391	393	393	392	392	391	390	389	387	386	385	383	383
20	373	375	376	378	380	381	383	386	386	387	386	384	382	381	378	376	373	372	372
25	359	360	362	365	369	371	374	378	380	379	379	376	374	370	366	363	359	357	356
30	341	343	346	350	355	359	364	369	372	371	370	368	363	358	352	347	342	339	338
35	320	322	326	333	340	345	353	359	362	362	361	357	352	345	337	330	322	318	317
40	297	299	304	313	323	332	340	348	352	353	351	347	340	331	320	309	301	294	292
45	270	273	280	292	304	316	327	337	341	342	340	336	327	316	303	289	277	268	265
50	242	245	254	270	286	301	313	324	330	331	329	323	313	301	284	267	252	240	235
55	210	215	227	247	267	284	299	311	318	320	317	311	300	284	266	245	225	209	204
60	177	184	200	223	248	268	285	298	306	308	305	298	286	269	247	223	198	178	170
65	142	150	172	200	228	251	271	285	293	295	293	285	271	253	229	201	171	146	136
70	107	116	144	178	210	236	257	272	281	283	280	272	258	238	211	180	145	114	100
75	71.7	84.4	118	157	193	221	243	259	268	270	267	259	244	223	195	161	122	84.2	64.8
80	39.8	56.2	95.9	139	176	206	228	245	255	257	254	245	230	209	180	144	102	59.3	32.9
85	13.0	33.5	77.9	123	161	192	214	231	241	244	241	232	217	195	166	129	86.1	40.6	8.29
90	0.87	20.4	64.6	108	147	177	200	218	227	230	228	219	204	183	154	117	74.8	30.7	0.75
95	2.03	12.1	52.2	94.6	133	163	186	204	214	217	215	207	192	171	142	107	67.9	27.6	2.27
100	5.01	12.7	44.9	83.4	120	150	173	191	200	204	202	194	180	159	132	99.5	63.5	28.6	5.60
105	8.85	15.1	43.4	76.5	109	138	160	177	187	191	189	182	168	149	124	93.5	61.5	31.8	9.74
110	10.3	17.9	43.8	72.7	102	127	148	164	174	178	177	170	157	139	116	88.9	61.1	36.5	10.0
115	11.4	18.7	45.5	71.3	96.5	119	138	154	163	166	165	159	147	131	110	85.8	62.2	41.2	10.4
120	11.6	15.9	48.0	70.1	92.0	112	129	143	151	155	154	148	138	123	105	83.7	64.0	45.4	10.5
125	12.1	9.95	49.9	69.7	88.3	106	121	134	141	144	143	139	129	116	100	82.4	64.8	50.7	11.0
130	12.2	7.10	47.8	67.0	85.9	101	114	125	131	135	134	129	121	110	96.4	79.0	66.7	53.6	10.9
135	12.7	7.18	45.2	68.3	81.1	96.4	108	117	123	125	125	121	114	105	91.7	78.8	67.8	52.4	10.7
140	13.0	7.63	36.6	67.0	79.3	89.4	102	110	115	117	117	114	108	97.7	87.4	79.0	68.3	46.6	11.2
145	13.1	12.6	25.3	63.3	77.7	85.9	93.3	101	107	109	109	105	98.7	92.7	85.9	76.6	66.5	38.3	12.0
150	13.2	13.4	20.4	54.3	73.4	82.9	89.3	94.3	97.5	99.3	98.9	97.3	94.0	89.1	82.3	70.7	59.6	28.0	13.3
155	13.8	14.4	16.8	35.6	65.8	77.5	84.7	89.2	92.0	92.7	93.0	92.0	89.4	84.3	73.5	64.2	45.3	18.1	14.4
160	14.1	18.8	14.0	25.8	43.0	65.6	75.2	81.9	84.6	85.6	85.7	85.6	83.2	74.6	61.7	49.1	29.2	14.7	14.8
165	14.3	19.7	14.3	15.0	26.2	33.9	50.3	62.4	70.6	73.0	73.6	71.0	63.2	53.6	41.7	30.4	16.4	12.2	14.8
170	15.5	18.6	18.7	15.9	17.7	18.5	23.9	29.5	35.7	37.0	37.6	33.2	29.4	24.9	18.9	15.5	18.7	12.0	15.2
175	17.1	16.8	20.5	23.2	20.8	16.8	16.4	17.7	15.0	18.0	9.94	13.1	17.9	18.9	18.1	17.0	14.9	17.2	18.4
180	21.5	21.6	21.3	20.6	19.8	17.6	15.7	12.8	9.17	0.00	8.14	14.7	16.1	16.5	17.3	17.7	17.8	18.4	21.1

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	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400		
5	398	398	399	399	398	398	399	399	399	398	399	398	398	398	399	398	398		
10	393	393	394	394	394	394	396	396	397	396	396	396	395	394	394	394	394		
15	383	385	386	388	388	389	392	393	393	393	391	390	390	388	387	386	386		
20	372	373	376	377	380	383	385	387	388	386	386	384	382	380	377	376	374		
25	358	359	363	367	370	374	378	380	380	380	379	376	373	368	366	362	360		
30	339	342	347	353	358	363	368	372	373	372	370	366	362	356	351	346	343		
35	318	322	329	337	345	352	358	362	364	363	360	355	349	341	334	327	323		
40	294	300	310	321	330	340	348	352	354	353	350	343	335	325	315	306	300		
45	267	275	288	302	315	326	336	342	343	343	338	330	320	308	295	283	274		
50	239	250	265	283	298	312	324	330	333	332	326	317	305	290	274	258	247		
55	208	222	242	263	281	298	311	318	321	319	314	303	289	271	251	232	217		
60	175	194	219	244	265	283	298	306	309	308	301	289	273	252	229	205	186		
65	143	166	196	225	249	269	285	294	297	296	288	275	257	233	206	178	155		
70	110	140	174	207	233	255	271	282	285	283	275	261	242	216	185	153	123		
75	78.6	115	155	190	219	242	259	268	272	270	261	247	227	199	165	128	91.9		
80	50.9	93.4	138	175	205	228	245	255	258	257	248	234	212	183	149	107	64.3		
85	30.7	76.8	123	161	191	215	232	242	246	244	235	220	198	169	133	89.0	42.8		
90	21.1	65.6	111	149	179	202	219	229	233	231	222	207	185	157	120	76.1	30.3		
95	15.0	57.5	100	138	167	190	207	216	220	218	209	194	173	145	109	67.6	25.8		
100	15.9	50.5	91.7	128	157	178	194	204	207	205	197	182	162	135	101	62.4	26.1		
105	18.5	47.0	83.8	118	146	167	182	192	195	193	184	170	152	126	94.0	59.9	29.1		
110	22.5	49.3	78.2	110	136	157	171	179	183	181	173	160	142	118	89.1	59.2	33.5		
115	25.6	51.4	77.1	103	126	146	160	168	171	168	161	150	133	110	85.3	59.6	38.6		
120	18.1	54.0	76.5	98.3	118	135	149	157	159	158	151	140	124	105	82.5	61.4	44.1		
125	12.3	57.1	76.4	95.1	112	126	138	145	148	147	141	130	116	99.4	81.0	63.6	48.8		
130	9.27	57.8	76.8	93.0	107	119	128	134	137	135	131	122	110	95.4	80.4	66.0	49.4		
135	7.24	52.9	77.3	90.8	103	113	121	126	128	127	122	114	104	92.4	80.2	67.5	42.0		
140	10.1	37.0	76.9	89.3	98.6	107	114	117	119	118	114	108	99.6	90.3	79.8	67.3	33.3		
145	12.4	23.6	68.1	87.3	95.3	102	107	110	111	111	107	102	95.8	88.0	76.7	62.4	25.4		
150	14.6	17.1	47.8	81.3	91.1	97.1	101	104	105	104	101	97.6	92.2	83.2	74.2	50.3	17.6		
155	18.7	10.0	23.3	53.2	83.2	90.6	95.2	97.6	98.4	97.8	95.6	91.9	85.6	78.6	61.5	37.4	12.0		
160	16.6	14.3	12.9	21.9	43.1	74.6	84.4	88.1	89.1	88.4	86.5	84.0	77.1	62.7	45.0	27.0	9.70		
165	14.4	19.6	15.5	13.2	17.9	20.1	43.3	61.5	66.8	68.2	65.5	58.8	49.8	41.0	28.9	18.2	9.93		
170	15.3	17.6	20.8	13.7	18.0	13.5	10.6	19.4	31.9	33.4	32.6	29.4	25.5	21.3	17.4	11.6	14.3		
175	18.3	15.8	17.9	22.1	22.4	19.1	14.1	12.2	11.8	15.4	15.5	14.7	15.7	16.1	17.5	17.6	17.1		
180	21.1	21.0	20.9	20.5	19.3	17.9	15.8	12.5	10.2	5.15	8.00	14.8	16.3	16.5	17.3	17.8	18.2		

Table 7: Luminous Intensity Data

TEST RESULTS of Model 15T8/4F/8CCTS/UEB (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)	0.130	0.061
Power Factor	0.9793	0.9151
Test Power (W)	15.32	15.46
THD A%	18.73	20.13
Luminous Efficacy (lm/W)	149.8	149.3
Total Luminous Flux (lm)	2295.7	2308.8
Color Rendering Index (CRI)	84.3	
R9	14.5	
Correlated Color Temperature (CCT)(K)	3474	
Chromaticity Chroma x	0.4063	
Chromaticity Chroma y	0.3905	
Chromaticity Chroma u	0.2365	
Chromaticity Chroma v	0.3409	
Duv	-0.0003	
Chromaticity Chroma u'	0.2365	
Chromaticity Chroma v'	0.5113	

Special Color Rendering Indices	
R1	82.9
R2	90.4
R3	96.1
R4	83.7
R5	83.1
R6	87.5
R7	85.7
R8	64.8
R9	14.5
R10	77.8
R11	83.6
R12	68
R13	84.8
R14	98

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

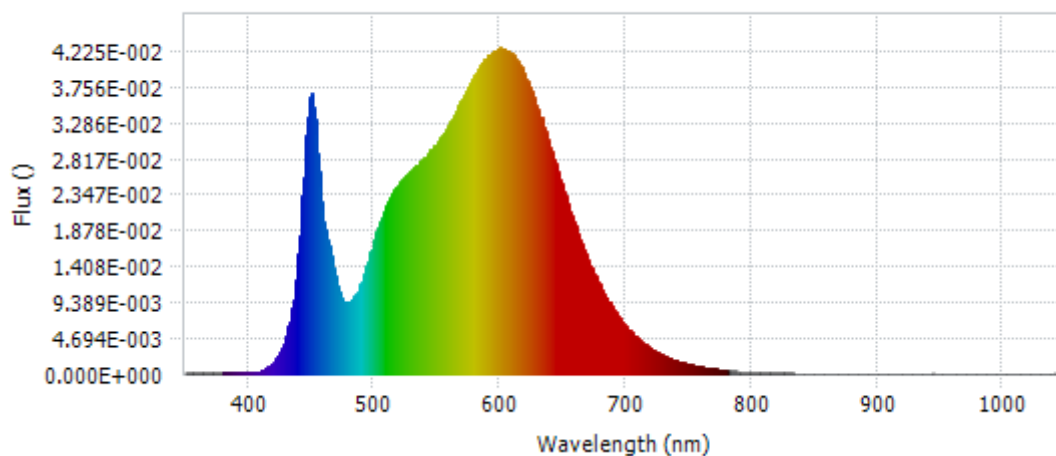
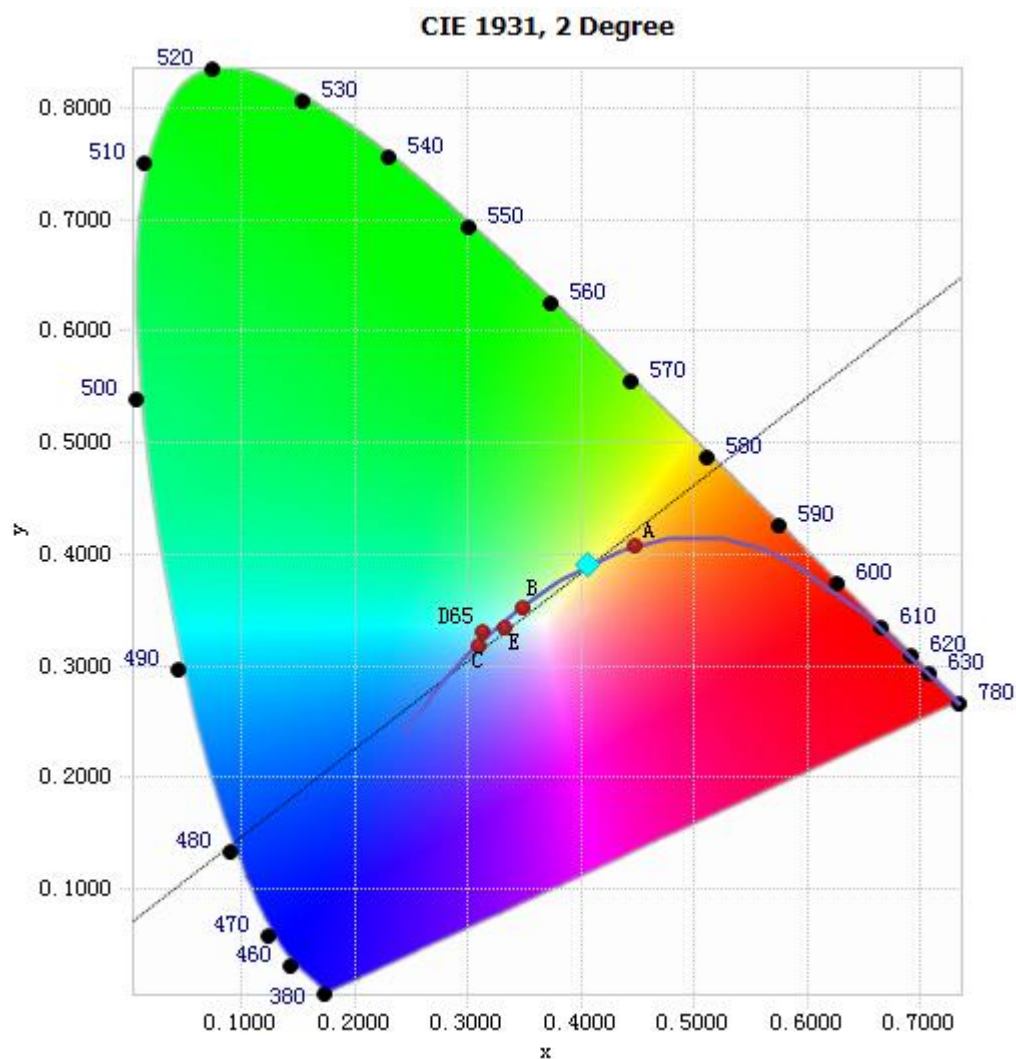


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.96E-04	485	1.03E-02	590	4.16E-02	695	7.32E-03
385	1.63E-04	490	1.21E-02	595	4.22E-02	700	6.26E-03
390	1.90E-04	495	1.47E-02	600	4.27E-02	705	5.38E-03
395	1.93E-04	500	1.75E-02	605	4.23E-02	710	4.58E-03
400	1.41E-04	505	2.00E-02	610	4.16E-02	715	3.91E-03
405	2.15E-04	510	2.20E-02	615	4.05E-02	720	3.33E-03
410	4.29E-04	515	2.38E-02	620	3.88E-02	725	2.85E-03
415	8.39E-04	520	2.48E-02	625	3.69E-02	730	2.42E-03
420	1.55E-03	525	2.58E-02	630	3.47E-02	735	2.06E-03
425	2.81E-03	530	2.67E-02	635	3.23E-02	740	1.77E-03
430	4.89E-03	535	2.73E-02	640	2.97E-02	745	1.49E-03
435	8.68E-03	540	2.82E-02	645	2.70E-02	750	1.27E-03
440	1.58E-02	545	2.92E-02	650	2.42E-02	755	1.08E-03
445	2.85E-02	550	3.01E-02	655	2.18E-02	760	9.30E-04
450	3.66E-02	555	3.14E-02	660	1.93E-02	765	8.01E-04
455	2.87E-02	560	3.27E-02	665	1.71E-02	770	6.82E-04
460	1.99E-02	565	3.42E-02	670	1.49E-02	775	5.83E-04
465	1.62E-02	570	3.58E-02	675	1.31E-02	780	4.98E-04
470	1.21E-02	575	3.74E-02	680	1.14E-02		
475	9.54E-03	580	3.91E-02	685	9.86E-03		
480	9.42E-03	585	4.06E-02	690	8.52E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4063, 0.3905)

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

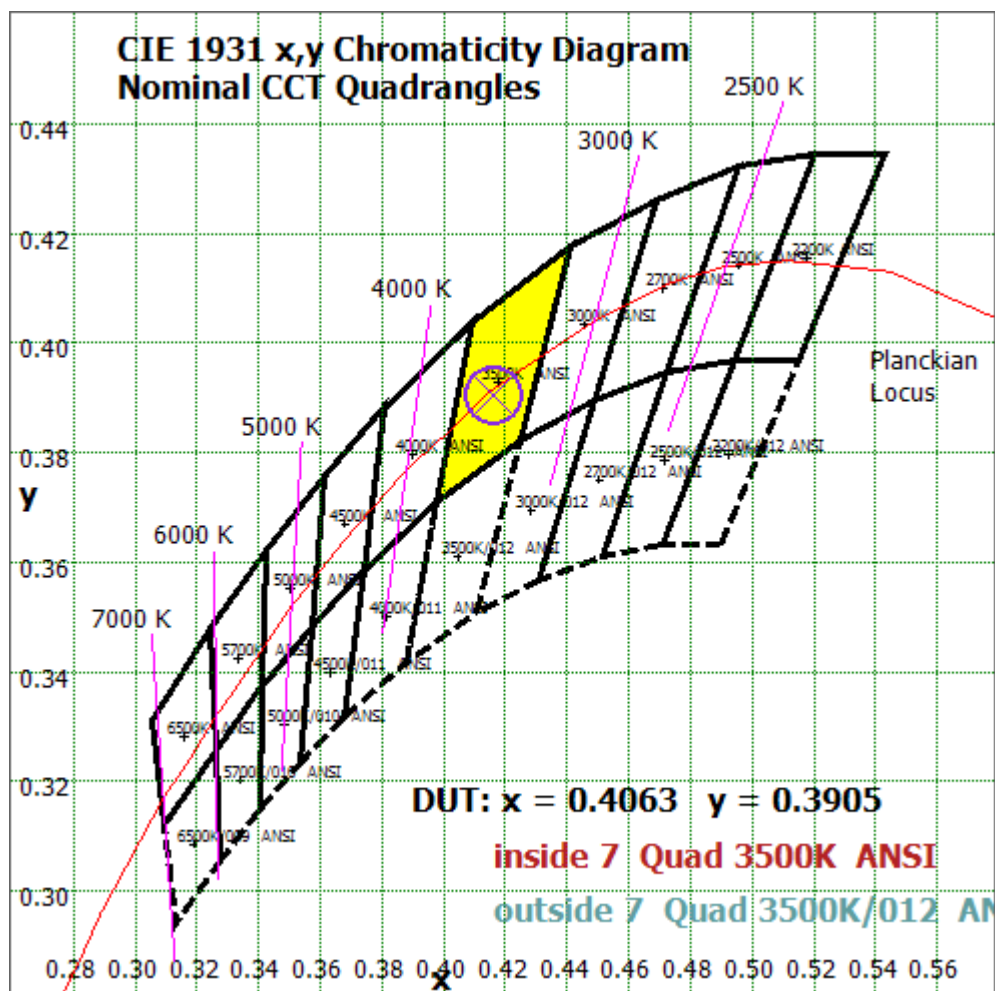


Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

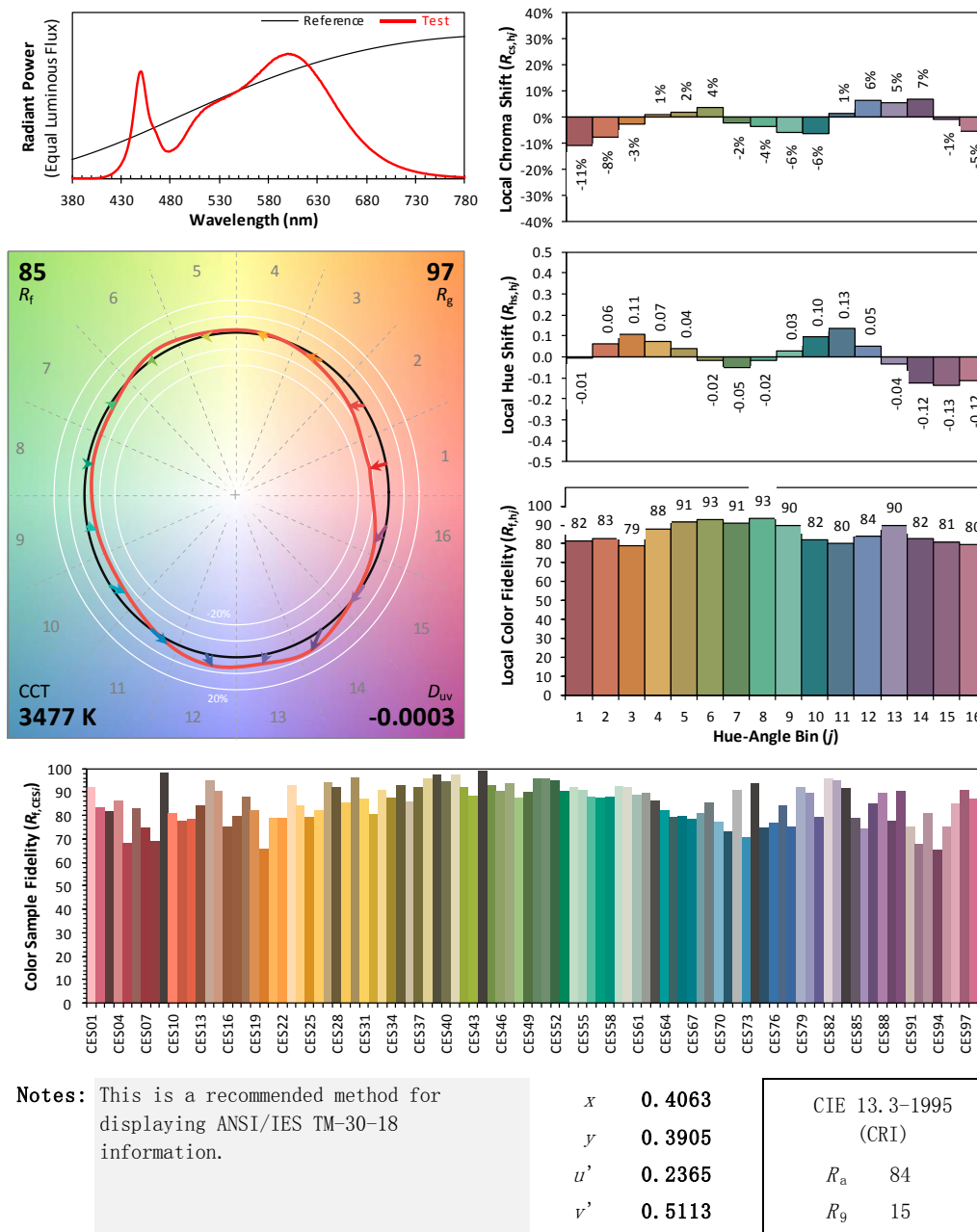
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/04/23

Model: 15T8/4F/8CCTS/UEB



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.

Goniophotometer Method

Test ambient temperature was 24.9 °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)	0.131
Power Factor	0.9793
Power (W)	15.37
Luminous Efficacy (lm/W)	150.0
Total Luminous Flux (lm)	2304.9
Beam Angle (°)	112.1 (0°-180°) / 204.2 (90°-270°)
Center Beam Candle Power (cd)	412
Maximum Beam Candle Power (cd)	412.6 (At: C=40.0, Gamma=3.5)
Spacing Criteria	1.26 (0°-180°) / 1.39 (90°-270°)
Zonal Lumens in the 0°-60° Zone	45.20%
Zonal Lumens in the 60°-90° Zone	26.98%
Zonal Lumens in the 90°-120° Zone	16.93%
Zonal Lumens in the 120°-180° Zone	10.89%

Table 10: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	39.044	1.69%
10- 20	113.031	4.90%
20- 30	175.362	7.61%
30- 40	220.421	9.56%
40- 50	245.04	10.63%
50- 60	248.919	10.80%
60- 70	234.923	10.19%
70- 80	208.568	9.05%
80- 90	178.297	7.74%
90-100	152.072	6.60%
100-110	129.501	5.62%
110-120	108.754	4.72%
120-130	88.6	3.84%
130-140	69.042	3.00%
140-150	49.593	2.15%
150-160	30.344	1.32%
160-170	11.571	0.50%
170-180	1.785	0.08%
Total	2304.9	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1041.82	45.20%
60- 90	621.788	26.98%
0-90	1663.61	72.18%
90- 180	641.262	27.82%
0- 180	2304.9	100%

Table 11: Zonal Lumen

Illuminance Plots- Goniophotometer Method

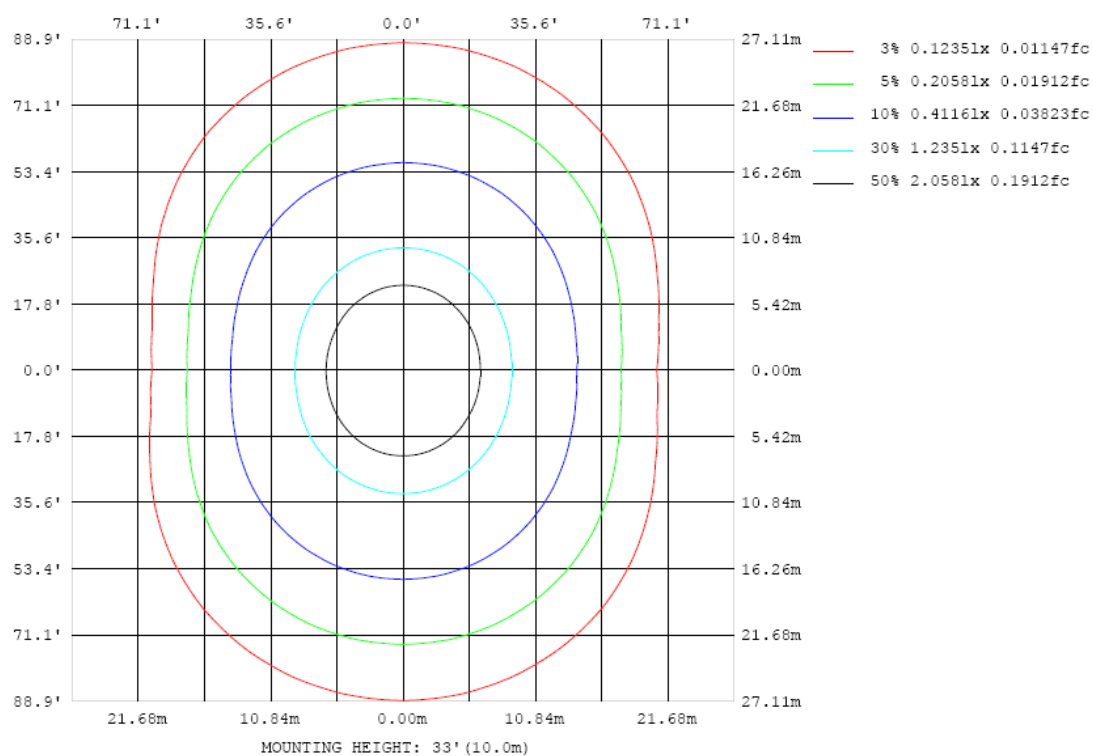


Chart 12: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

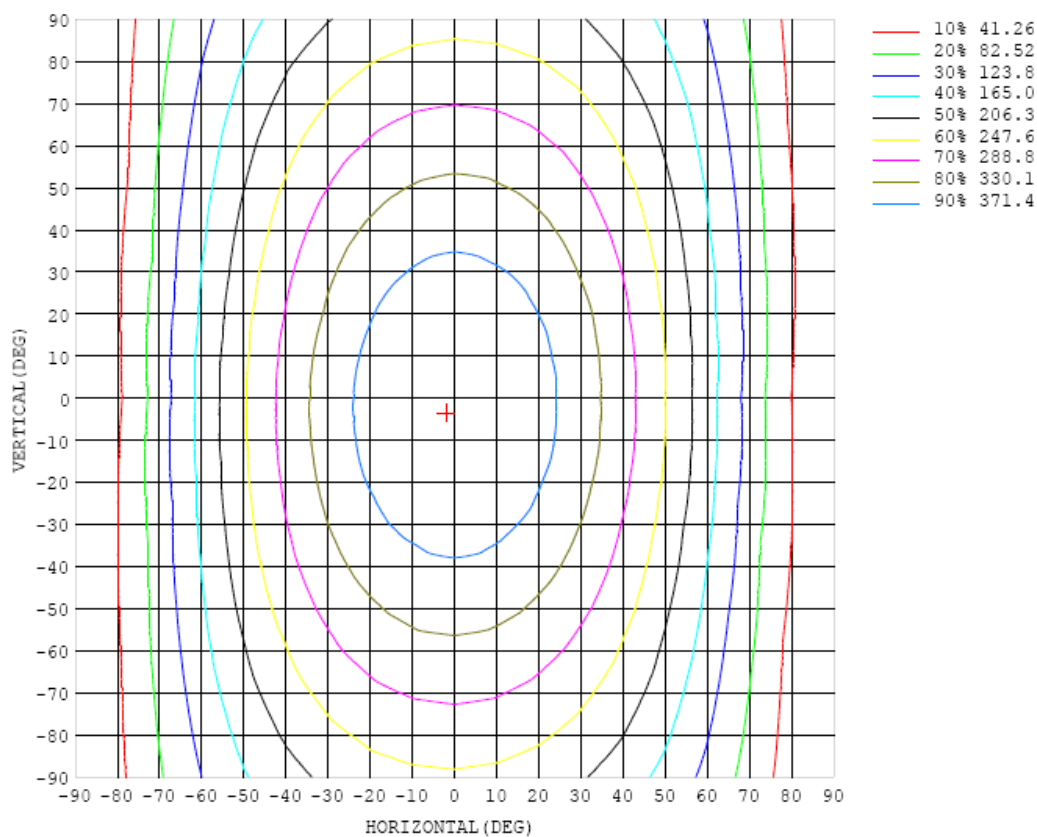


Chart 13: Isocandela Plot

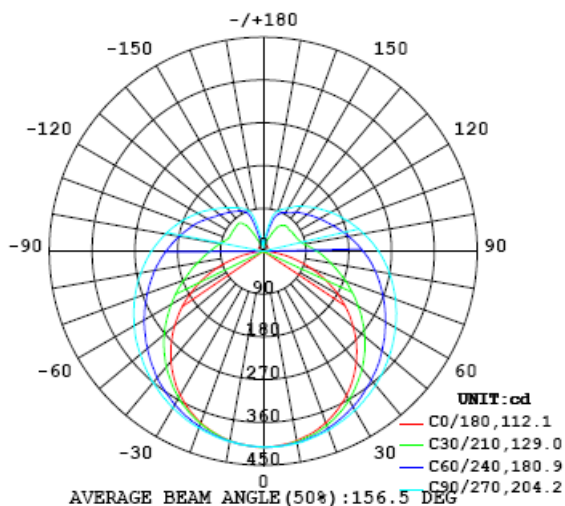


Chart 14: Polar Candela Distribution

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	412	412	412	412	412	412	412	412	412	412	412	412	412	412	412	412	412	412	412
5	409	410	410	411	411	411	411	412	412	412	411	412	411	411	411	410	410	410	410
10	404	405	406	406	407	408	409	410	411	411	409	409	409	408	407	406	406	405	404
15	396	397	398	400	401	402	404	405	406	406	405	405	403	403	401	399	397	397	396
20	384	385	387	390	392	394	397	399	400	400	399	398	396	394	392	389	386	384	384
25	368	370	373	377	380	384	387	391	393	393	392	391	387	383	380	375	372	369	368
30	350	352	356	361	367	372	377	382	385	386	385	382	378	372	366	360	355	351	349
35	329	331	337	342	351	359	366	372	375	377	375	372	366	359	351	342	334	330	327
40	304	307	314	323	333	344	353	361	366	367	365	361	354	344	334	322	312	305	302
45	277	281	289	302	315	328	340	349	355	356	355	350	341	329	316	301	287	278	274
50	247	252	262	279	296	312	326	337	343	345	343	337	327	313	297	278	261	249	243
55	215	221	234	255	276	295	311	324	331	334	332	325	312	297	278	256	234	217	211
60	181	189	206	231	256	279	297	311	319	321	319	311	298	280	258	232	206	185	176
65	146	155	177	207	236	262	282	297	306	309	306	299	284	264	239	209	178	151	141
70	109	120	149	184	218	245	268	283	293	296	293	285	270	249	221	188	152	118	104
75	73.2	86.9	123	163	200	230	253	270	280	283	280	272	256	234	205	168	127	87.4	67.2
80	40.9	58.1	99.8	144	183	215	239	256	266	269	267	258	242	219	189	151	106	61.6	34.0
85	13.3	34.9	81.2	128	168	200	225	242	252	256	253	245	228	205	175	136	90.0	42.2	8.55
90	0.85	21.4	67.4	113	153	186	210	228	238	242	239	231	215	192	162	124	78.5	32.0	0.76
95	1.94	12.9	54.9	99.2	139	171	196	214	224	228	226	218	202	180	150	113	71.1	29.1	2.42
100	4.79	13.6	47.6	87.7	126	158	182	200	210	215	212	205	190	168	140	105	67.4	30.3	6.06
105	8.43	16.2	46.0	80.6	115	145	169	186	196	201	199	192	178	157	131	99.2	65.1	33.9	10.5
110	9.97	19.1	46.5	76.7	108	135	157	174	184	188	187	180	166	148	123	94.4	65.0	38.8	11.0
115	11.0	19.8	48.3	74.6	102	126	146	162	171	176	174	168	156	139	116	90.9	66.0	43.6	11.5
120	11.3	17.0	50.7	73.4	97.0	119	137	151	160	164	163	157	146	131	111	88.7	67.8	48.0	11.5
125	12.2	10.9	52.8	72.7	93.4	112	128	141	149	153	152	147	137	123	106	87.2	68.4	53.3	11.9
130	12.5	7.84	50.5	70.4	90.4	106	121	132	139	142	141	137	128	116	102	83.6	70.4	56.4	11.5
135	13.2	7.66	47.7	71.9	85.3	102	114	123	130	133	132	128	121	111	97.1	83.2	71.3	55.4	11.2
140	13.5	7.87	38.6	70.6	83.2	94.4	107	116	121	123	123	120	114	103	92.4	83.2	71.7	49.7	11.4
145	13.5	12.8	27.2	66.5	81.6	90.2	98.2	106	112	115	115	111	104	97.8	90.8	80.6	69.9	41.5	12.1
150	13.7	13.4	22.2	57.2	76.8	87.1	93.9	99.2	103	104	104	103	99.1	93.9	86.5	74.9	62.9	30.9	13.5
155	14.3	14.7	18.1	37.9	68.3	81.1	88.8	93.8	96.5	97.6	97.6	96.8	94.1	88.6	77.3	67.6	48.4	19.9	14.5
160	14.7	19.0	14.9	28.0	45.6	67.8	78.8	85.7	88.8	89.9	89.8	89.8	86.9	78.1	65.1	52.4	32.1	15.9	15.1
165	15.1	19.9	14.3	16.0	28.2	36.7	53.4	65.6	73.2	77.0	77.6	74.9	65.5	56.9	45.0	33.2	18.0	13.0	15.1
170	16.2	19.4	18.9	16.1	18.8	19.7	26.1	32.1	38.5	39.9	40.4	35.8	32.1	27.4	20.7	16.8	19.3	12.9	15.5
175	17.5	17.6	21.3	23.7	21.2	17.0	16.6	17.9	15.2	18.7	10.7	13.7	18.4	19.4	18.7	17.7	15.6	17.7	18.7
180	21.8	21.9	21.6	20.9	19.9	17.8	16.1	13.2	9.46	0.00	8.27	18.1	17.6	17.5	17.5	18.4	19.0	18.9	21.5

Table 12: 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		412	412	412	412	412	412	412	412	412	412	412	412	412	412	412	412	412	
5		410	410	409	410	409	409	410	410	410	410	409	410	410	410	410	410	410	
10		404	405	405	405	405	406	407	407	406	406	406	406	406	405	405	405	406	
15		395	396	396	398	398	400	401	402	402	401	401	401	399	398	398	397	397	
20		384	385	386	387	390	392	395	395	395	395	395	393	391	389	386	386	384	
25		368	369	372	376	379	383	386	388	389	388	387	384	381	377	373	371	370	
30		350	351	356	361	367	372	376	379	380	379	377	374	369	364	358	354	352	
35		328	331	337	345	353	360	366	369	371	369	367	362	355	349	341	335	331	
40		303	308	317	327	337	347	355	359	361	359	356	349	342	331	322	313	307	
45		276	283	295	309	321	333	342	347	350	348	344	336	326	313	301	288	281	
50		246	256	272	288	305	318	329	336	338	336	331	323	310	295	278	263	253	
55		214	228	248	269	288	304	316	323	326	324	318	308	293	276	255	236	222	
60		181	199	224	249	271	289	303	310	314	312	305	293	277	256	232	209	190	
65		148	171	201	229	254	275	289	298	301	299	292	279	260	237	209	181	158	
70		114	144	178	211	239	260	275	285	288	285	278	264	244	219	188	155	125	
75		80.9	118	158	194	223	246	262	271	275	272	265	250	229	202	167	130	93.3	
80		52.5	95.8	140	177	208	232	249	258	261	259	251	236	214	185	150	108	65.2	
85		31.8	78.7	125	163	195	218	235	244	248	245	237	222	200	170	134	89.8	43.2	
90		21.8	67.0	112	151	181	205	222	231	235	232	224	209	186	158	120	76.4	30.3	
95		15.1	58.2	102	140	169	192	209	218	222	219	211	195	174	146	110	67.5	25.6	
100		15.8	50.8	92.6	129	158	180	196	205	209	206	198	183	162	135	101	62.1	25.7	
105		18.5	47.4	84.2	119	148	168	184	192	196	194	186	171	152	126	93.9	59.3	28.7	
110		22.5	49.4	78.6	110	137	158	172	180	184	181	173	160	142	118	88.8	58.6	33.4	
115		25.4	51.7	77.4	103	127	147	160	168	171	169	162	150	133	110	85.0	59.2	38.5	
120		17.7	54.3	76.8	98.8	119	136	149	157	159	158	152	140	124	104	82.3	61.1	44.3	
125		11.9	57.5	76.8	95.6	112	127	138	146	149	147	141	131	116	99.4	80.8	63.6	49.1	
130		9.12	58.3	77.3	93.2	107	120	129	135	137	136	131	122	110	95.4	80.4	66.2	49.3	
135		7.28	52.5	78.0	91.1	103	113	121	126	128	126	122	114	104	92.5	80.5	67.9	41.6	
140		10.9	36.1	77.7	89.8	99.1	108	114	118	119	118	114	108	99.8	90.6	80.1	67.6	32.8	
145		12.8	23.5	68.2	88.1	96.0	103	108	111	112	111	108	103	96.3	88.6	77.1	61.9	25.0	
150		15.6	16.9	46.8	81.7	92.3	97.8	102	104	105	104	102	98.1	92.7	83.8	74.4	49.7	17.5	
155		19.2	10.6	23.3	52.1	83.5	91.5	95.9	98.4	99.1	98.3	96.3	92.6	86.2	79.0	60.7	36.9	12.4	
160		16.7	14.9	12.9	21.7	42.5	74.4	84.7	88.9	90.0	88.9	87.1	84.4	77.1	62.0	44.6	26.5	10.0	
165		14.6	20.2	16.2	13.3	17.8	20.1	42.5	60.6	66.0	67.2	64.8	58.2	49.5	40.9	28.6	18.6	10.2	
170		15.6	17.8	21.5	14.5	19.0	13.8	10.5	19.1	31.4	33.0	32.2	28.9	25.1	21.7	18.0	11.8	14.2	
175		18.7	16.1	18.2	22.0	22.8	20.1	15.2	13.2	12.5	16.2	15.1	15.8	16.4	16.5	17.6	17.8	17.4	
180		21.4	21.4	21.2	20.8	19.6	18.2	16.1	12.9	10.3	4.75	8.23	15.2	16.9	17.2	17.8	18.4	18.7	

Table 13: Luminous Intensity Data

TEST RESULTS of Model 15T8/4F/8CCTS/UEB (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)	0.129	0.060
Power Factor	0.9800	0.9132
Test Power (W)	15.14	15.25
THD A%	18.48	20.45
Luminous Efficacy (lm/W)	153.9	153.5
Total Luminous Flux (lm)	2330.3	2340.3
Color Rendering Index (CRI)	85.3	
R9	19.9	
Correlated Color Temperature (CCT)(K)	3998	
Chromaticity Chroma x	0.3797	
Chromaticity Chroma y	0.3741	
Chromaticity Chroma u	0.2257	
Chromaticity Chroma v	0.3335	
Duv	-0.0010	
Chromaticity Chroma u'	0.2257	
Chromaticity Chroma v'	0.5003	

Special Color Rendering Indices	
R1	84.3
R2	90.8
R3	95.1
R4	84.9
R5	84.4
R6	86.9
R7	87.3
R8	68.7
R9	19.9
R10	77.9
R11	84.6
R12	64.8
R13	86
R14	97.4

Table 14: 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

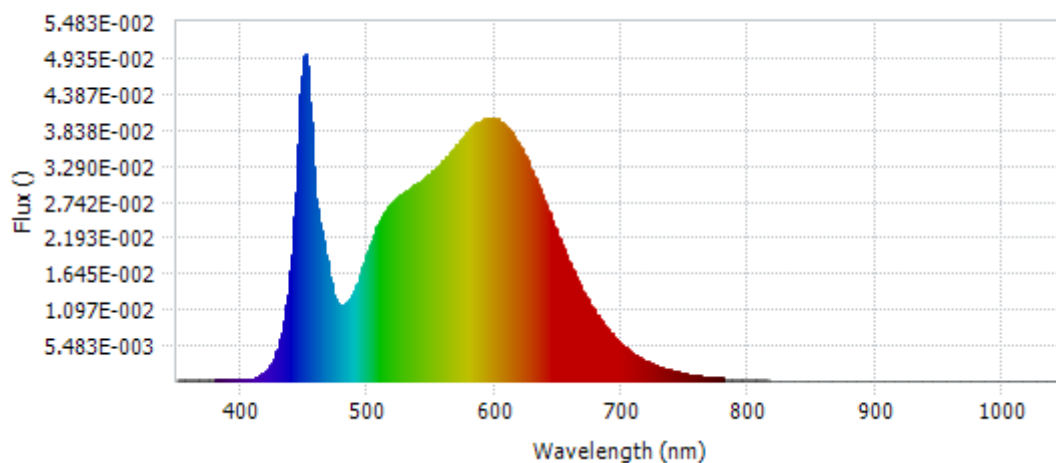
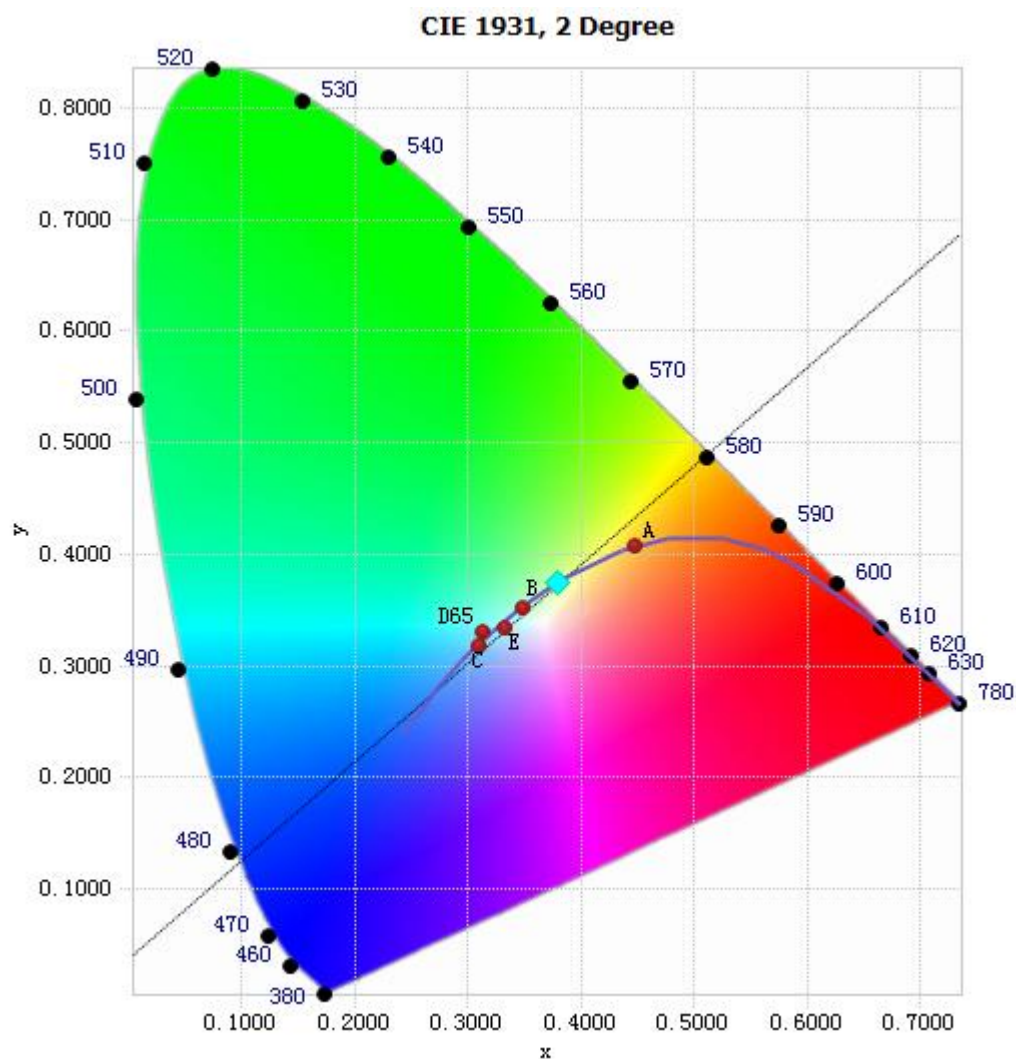


Chart 15: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.12E-04	485	1.25E-02	590	3.98E-02	695	6.59E-03
385	2.41E-04	490	1.42E-02	595	4.01E-02	700	5.66E-03
390	2.13E-04	495	1.69E-02	600	4.01E-02	705	4.86E-03
395	1.97E-04	500	1.99E-02	605	3.96E-02	710	4.13E-03
400	1.72E-04	505	2.25E-02	610	3.87E-02	715	3.52E-03
405	2.42E-04	510	2.46E-02	615	3.75E-02	720	3.02E-03
410	4.25E-04	515	2.64E-02	620	3.58E-02	725	2.58E-03
415	8.94E-04	520	2.73E-02	625	3.40E-02	730	2.20E-03
420	1.64E-03	525	2.83E-02	630	3.18E-02	735	1.87E-03
425	3.14E-03	530	2.91E-02	635	2.95E-02	740	1.58E-03
430	5.67E-03	535	2.96E-02	640	2.71E-02	745	1.34E-03
435	1.03E-02	540	3.03E-02	645	2.46E-02	750	1.15E-03
440	1.92E-02	545	3.11E-02	650	2.21E-02	755	9.94E-04
445	3.62E-02	550	3.18E-02	655	1.98E-02	760	8.49E-04
450	4.96E-02	555	3.28E-02	660	1.75E-02	765	7.23E-04
455	3.94E-02	560	3.38E-02	665	1.54E-02	770	6.09E-04
460	2.63E-02	565	3.49E-02	670	1.35E-02	775	5.22E-04
465	2.15E-02	570	3.61E-02	675	1.18E-02	780	4.50E-04
470	1.59E-02	575	3.72E-02	680	1.02E-02		
475	1.21E-02	580	3.82E-02	685	8.91E-03		
480	1.16E-02	585	3.93E-02	690	7.70E-03		

Table 15: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3797, 0.3741)

Chart 16: 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

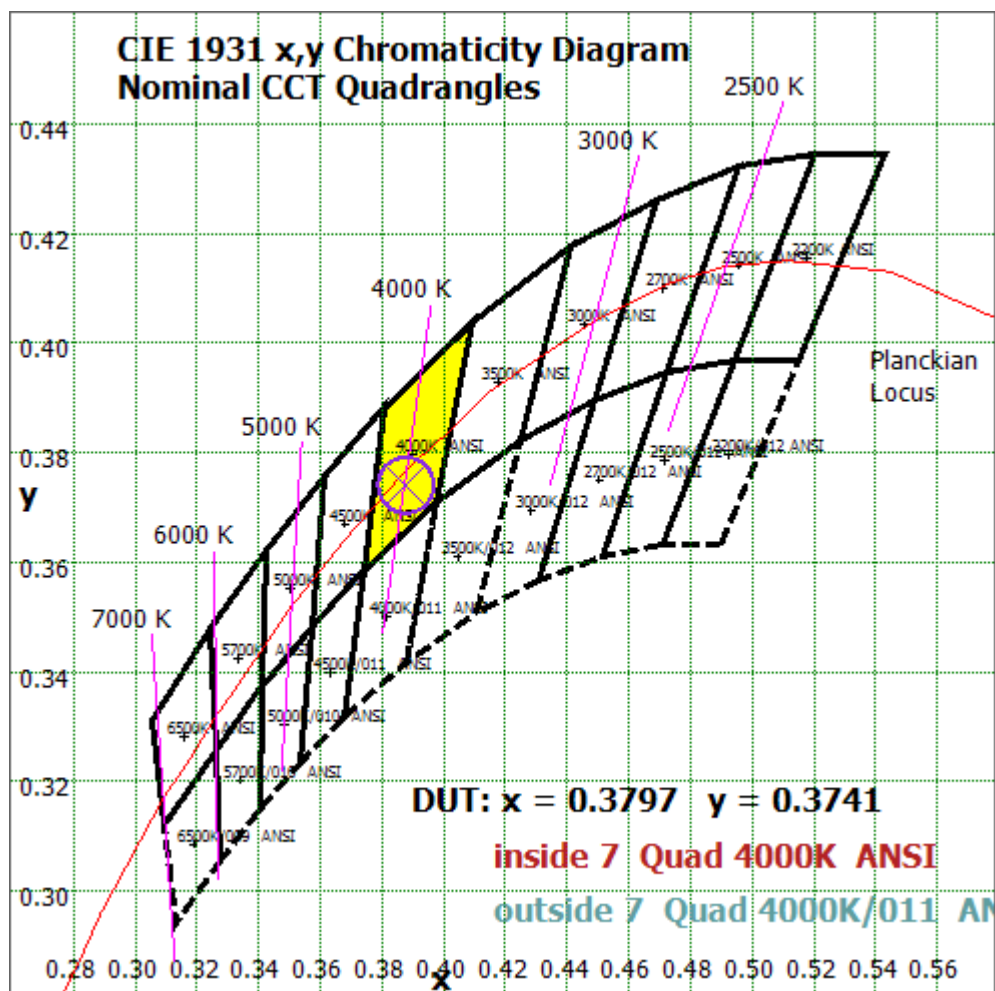


Chart17: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

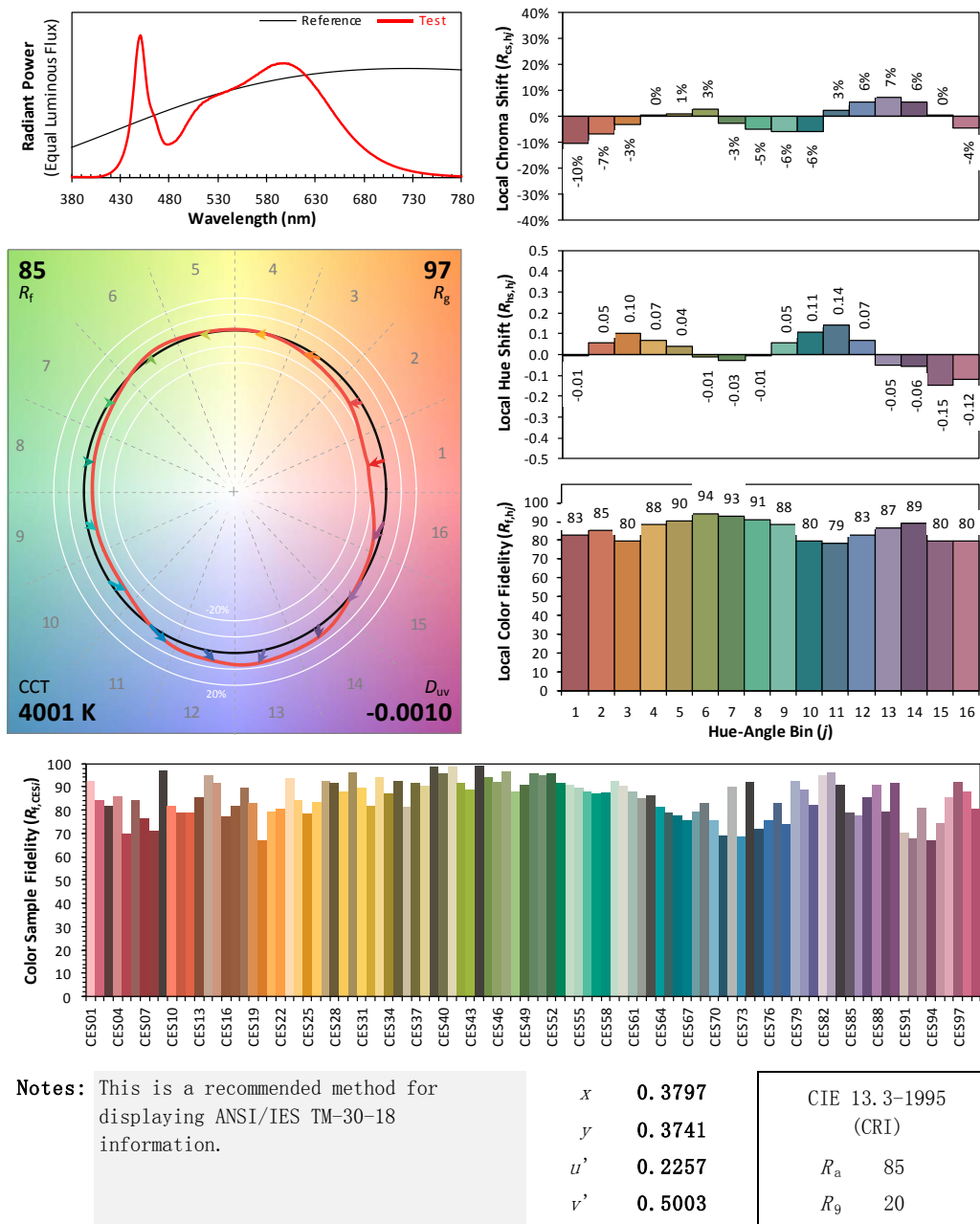
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/04/23

Model: 15T8/4F/8CCTS/UEB



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

Chart 18: 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 14 due to rounding.

Goniophotometer Method

Test ambient temperature was 24.9 °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)	0.129
Power Factor	0.9798
Power (W)	15.16
Luminous Efficacy (lm/W)	155.1
Total Luminous Flux (lm)	2350.7
Beam Angle (°)	112.1 (0°-180°) / 206.5 (90°-270°)
Center Beam Candle Power (cd)	416
Maximum Beam Candle Power (cd)	418.1 (At: C=230.0, Gamma=5.0)
Spacing Criteria	1.31 (0°-180°) / 1.41 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	44.96%
Zonal Lumens in the 60 °-90 °Zone	27.03%
Zonal Lumens in the 90 °-120 °Zone	17.04%
Zonal Lumens in the 120 °-180 °Zone	10.97%

Table 16: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	39.461	1.68%
10- 20	114.262	4.86%
20- 30	177.464	7.55%
30- 40	223.413	9.50%
40- 50	248.851	10.59%
50- 60	253.377	10.78%
60- 70	239.693	10.20%
70- 80	213.244	9.07%
80- 90	182.559	7.77%
90-100	155.673	6.62%
100-110	132.992	5.66%
110-120	111.971	4.76%
120-130	91.164	3.88%
130-140	71.029	3.02%
140-150	50.755	2.16%
150-160	31.051	1.32%
160-170	11.735	0.50%
170-180	2.036	0.09%
Total	2350.7	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1056.83	44.96%
60- 90	635.496	27.03%
0-90	1692.32	71.99%
90- 180	658.406	28.01%
0- 180	2350.7	100%

Table 17: Zonal Lumen

Illuminance Plots- Goniophotometer Method

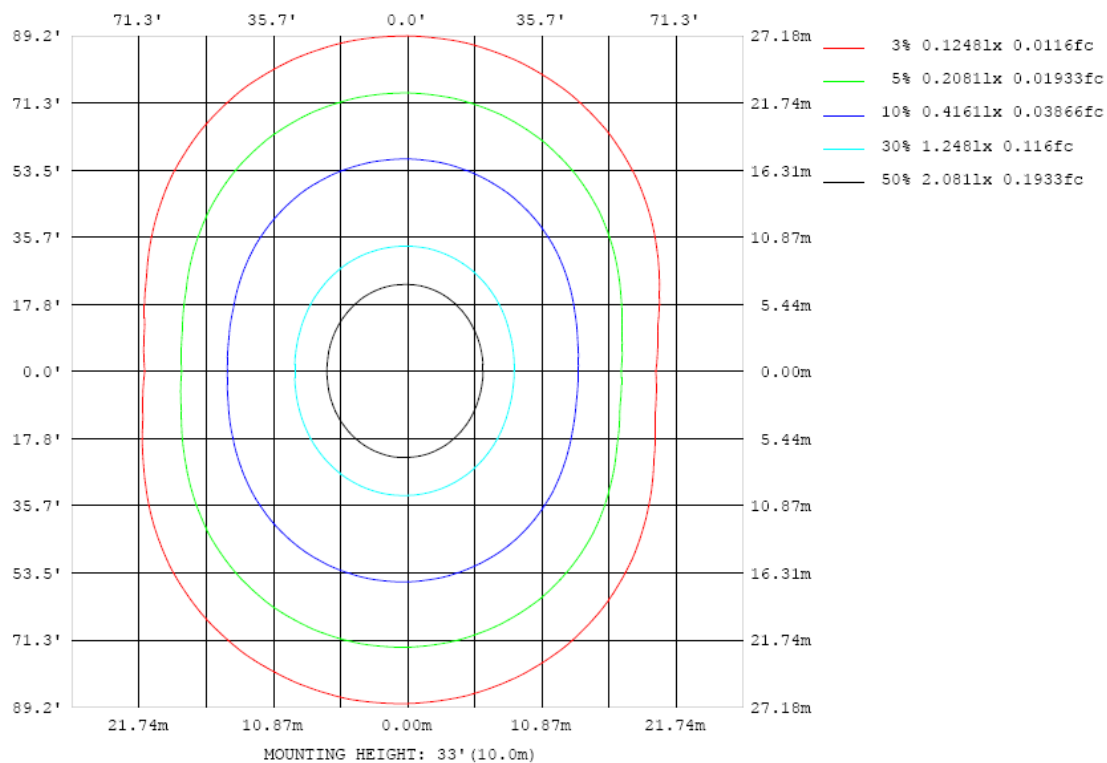


Chart 19: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

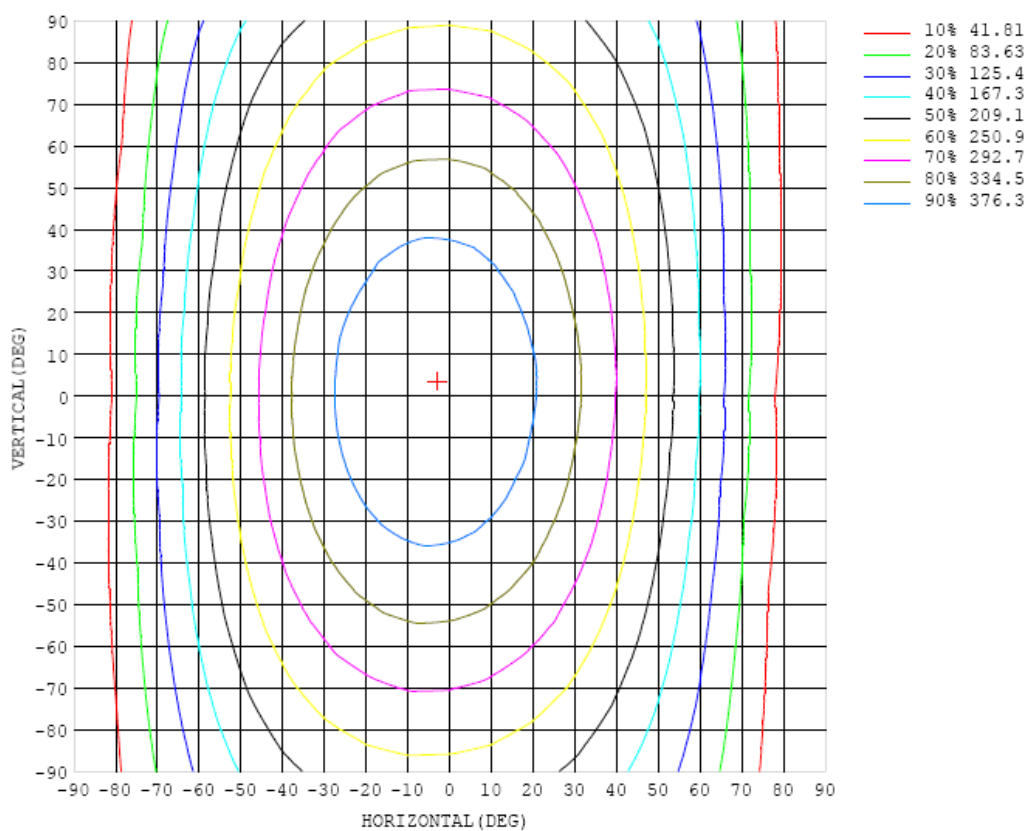


Chart 20: Isocandela Plot

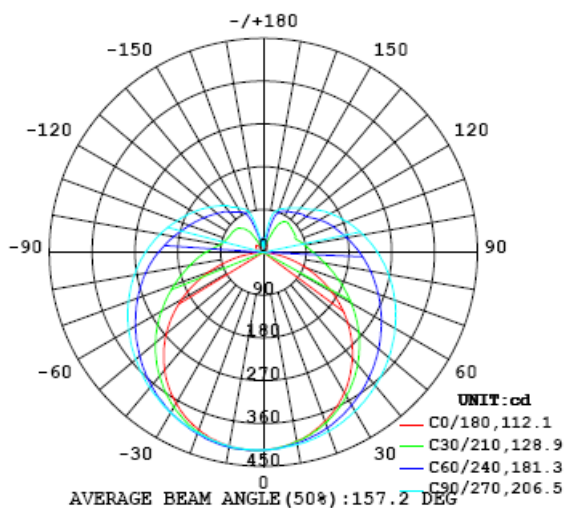


Chart 21: Polar Candela Distribution

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	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416
5	412	412	411	411	412	412	413	413	414	414	415	415	415	416	416	416	416	416	416
10	404	403	404	404	406	407	408	409	410	411	412	412	412	413	413	413	414	414	414
15	393	392	393	395	397	398	401	404	406	406	409	408	408	408	408	408	408	407	407
20	379	378	379	382	386	389	393	396	399	401	403	403	403	401	401	399	398	398	397
25	361	361	363	367	372	377	382	388	391	394	396	396	395	393	391	389	386	385	384
30	340	341	343	349	357	363	371	377	383	385	388	388	386	382	379	375	371	368	367
35	317	318	322	330	339	348	359	366	373	377	379	378	375	370	364	358	353	348	347
40	291	292	298	309	321	332	345	354	362	367	369	367	363	357	349	339	332	326	323
45	263	264	272	286	301	316	331	342	351	356	358	356	351	342	331	319	309	300	297
50	232	234	245	262	281	299	316	329	339	344	347	343	337	326	313	298	283	271	267
55	199	202	216	238	261	282	301	315	327	332	334	331	323	310	294	274	256	241	234
60	165	170	188	213	241	265	287	302	314	320	322	317	308	293	274	251	227	208	199
65	131	137	160	190	221	248	272	288	301	307	309	304	294	277	255	227	198	174	161
70	95.2	104	133	168	203	232	257	275	288	294	296	290	279	260	236	205	170	140	122
75	60.7	71.9	108	149	185	217	243	261	274	281	282	276	264	244	217	183	145	106	83.7
80	30.0	44.8	86.6	131	170	202	229	248	261	267	268	262	249	229	200	164	120	75.0	48.1
85	7.12	25.9	70.6	117	157	188	215	234	248	254	254	248	235	214	184	147	101	50.4	17.5
90	1.24	17.4	60.0	105	145	176	202	221	234	240	241	234	220	199	169	132	85.6	35.3	1.50
95	2.42	12.3	52.9	95.5	134	164	190	208	221	226	227	220	206	185	157	120	75.0	29.0	2.29
100	4.96	15.0	47.7	88.3	124	155	178	195	208	213	213	206	193	172	146	110	68.6	28.4	6.03
105	8.16	18.6	44.6	82.8	116	145	167	184	195	200	200	194	180	161	135	102	64.9	31.3	11.2
110	8.25	23.2	49.4	76.4	109	135	157	172	182	187	187	181	168	151	126	95.9	63.7	36.1	14.8
115	7.95	28.1	52.0	73.8	101	126	147	160	171	175	175	168	157	140	118	91.3	63.8	41.9	16.1
120	7.45	23.7	56.1	76.3	94.1	117	137	151	160	163	163	158	147	131	111	87.8	65.5	48.2	17.2
125	6.86	18.0	60.4	76.9	94.6	108	126	139	148	152	151	146	136	122	105	86.0	67.7	54.6	19.1
130	6.98	17.7	64.0	77.8	92.4	107	117	128	136	140	140	135	126	115	101	85.4	70.5	59.0	20.6
135	7.54	17.2	65.1	79.0	91.1	103	114	121	126	128	129	125	119	109	97.4	85.1	73.7	57.7	21.2
140	9.26	17.7	60.3	80.5	90.1	99.1	108	115	120	122	122	118	112	104	94.9	85.0	76.5	48.3	18.2
145	11.1	12.9	44.5	78.7	89.2	96.3	103	109	112	114	114	111	106	100	93.0	84.7	77.0	40.2	14.7
150	15.5	13.6	29.8	70.7	87.8	93.7	99.1	103	106	107	107	105	101	96.7	91.0	83.2	70.3	35.5	13.3
155	18.2	15.5	20.8	50.2	78.3	89.9	95.4	98.5	101	101	101	99.8	97.4	93.3	87.3	80.9	59.2	26.7	11.1
160	21.7	15.4	11.3	25.3	52.0	76.0	86.5	92.0	94.4	95.5	95.7	94.4	91.2	87.6	82.6	69.6	44.9	20.0	9.40
165	23.7	20.5	14.9	16.2	20.3	36.7	61.3	76.7	86.0	87.4	87.7	86.7	82.9	77.6	66.5	48.1	31.1	19.7	8.65
170	22.6	24.5	16.9	14.9	17.3	17.8	17.7	25.4	41.5	54.2	56.0	54.4	50.6	43.3	33.7	27.9	22.8	13.2	12.6
175	24.9	25.5	23.8	18.1	13.4	13.5	15.2	11.9	10.7	15.6	21.7	23.9	22.0	19.4	16.1	13.4	15.1	20.8	17.7
180	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0

Table 18: Luminous Intensity Data

Table--2		UNIT: cd																	
γ	C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	
	(DEG)																		
0		416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	
5		418	418	417	417	418	417	417	416	416	416	415	414	414	413	412	412	412	
10		414	415	416	415	416	416	415	415	414	413	412	411	409	408	406	406	405	
15		408	409	410	410	410	412	411	411	410	408	406	404	402	399	398	396	394	
20		398	400	402	402	404	406	405	406	404	403	400	396	391	388	385	382	380	
25		385	388	391	393	395	398	398	398	397	395	392	387	381	375	370	366	363	
30		369	372	376	380	384	389	391	391	390	388	382	375	368	360	353	348	343	
35		349	353	359	365	371	378	382	383	381	378	373	364	354	344	334	326	320	
40		326	331	340	349	358	366	370	373	372	369	361	352	340	327	314	303	295	
45		300	307	319	331	342	353	359	362	361	358	349	338	324	309	292	278	268	
50		271	280	296	312	327	340	347	351	350	347	337	325	308	290	270	251	238	
55		239	252	272	292	310	325	335	339	339	335	325	310	292	271	247	225	207	
60		206	223	248	272	293	311	321	327	327	323	312	297	276	252	225	198	175	
65		170	192	223	252	277	296	308	315	315	310	299	282	260	234	203	171	143	
70		133	162	199	232	260	281	294	302	302	297	286	269	245	217	182	146	112	
75		97.0	134	177	214	244	266	280	288	289	284	272	255	231	201	164	123	82.9	
80		65.0	109	156	196	228	252	266	274	276	271	259	242	217	186	148	104	59.4	
85		39.0	88.7	138	180	213	236	252	260	262	258	246	228	204	172	134	89.1	42.2	
90		22.9	71.5	121	163	196	221	237	246	248	244	233	216	191	160	122	78.4	33.3	
95		12.6	57.1	105	147	181	206	222	232	234	231	220	203	179	149	113	71.4	30.8	
100		13.1	49.9	92.5	133	166	192	208	218	220	218	207	191	168	140	105	68.3	31.8	
105		15.7	48.3	86.2	122	153	177	194	204	207	204	195	180	158	131	99.6	66.4	34.9	
110		18.6	48.6	82.1	115	143	166	181	191	194	192	183	169	148	124	95.2	66.3	38.8	
115		17.1	49.7	79.5	109	134	155	170	179	181	179	171	159	140	117	92.1	67.3	42.0	
120		8.33	50.6	78.2	103	126	145	158	167	170	168	161	149	132	112	90.0	68.5	45.4	
125		4.47	50.5	77.6	99.3	119	136	148	156	159	157	150	140	125	107	88.2	69.6	48.2	
130		4.56	48.9	75.3	95.5	113	127	138	145	148	147	141	131	118	103	83.5	70.7	48.7	
135		4.75	38.9	72.5	88.8	107	120	129	136	138	137	132	124	112	96.9	84.9	69.1	41.0	
140		12.0	22.0	65.5	88.7	98.3	110	121	126	128	128	123	114	104	94.5	83.9	65.2	27.1	
145		16.2	13.4	54.8	83.3	95.5	103	110	114	116	115	112	107	99.8	90.5	78.2	57.1	18.3	
150		17.4	16.2	33.7	70.5	89.9	98.2	104	107	109	108	105	101	94.9	84.7	65.6	37.6	12.1	
155		23.0	17.3	16.5	44.3	74.1	91.0	96.8	99.9	101	100	98.3	94.8	82.6	67.3	48.3	18.9	12.7	
160		21.3	22.9	15.9	21.4	40.6	63.8	80.1	86.7	89.7	90.0	86.9	75.8	62.6	44.3	22.0	10.9	14.5	
165		16.1	22.6	19.3	15.6	18.5	27.0	35.0	43.2	48.6	49.6	44.6	35.7	26.4	15.5	15.0	11.9	16.7	
170		16.9	21.2	26.0	25.0	20.2	17.5	13.7	15.6	17.7	14.9	10.1	10.3	15.9	20.1	15.4	19.5	20.7	
175		15.7	21.2	28.0	28.1	24.9	23.4	23.9	21.2	11.2	12.9	18.3	20.2	22.9	27.3	27.1	22.7	23.2	
180		15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	

Table 19: Luminous Intensity Data

TEST RESULTS of Model 15T8/4F/8CCTS/UEB (5000K 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)	0.129	0.060
Power Factor	0.9793	0.9140
Test Power (W)	15.21	15.32
THD A%	18.56	20.46
Luminous Efficacy (lm/W)	153.9	153.5
Total Luminous Flux (lm)	2340.3	2351.1
Color Rendering Index (CRI)	84.9	
R9	18.3	
Correlated Color Temperature (CCT)(K)	5066	
Chromaticity Chroma x	0.3433	
Chromaticity Chroma y	0.3514	
Chromaticity Chroma u	0.2103	
Chromaticity Chroma v	0.3229	
Duv	0.0007	
Chromaticity Chroma u'	0.2103	
Chromaticity Chroma v'	0.4843	

Special Color Rendering Indices	
R1	84
R2	89.4
R3	92.6
R4	85.4
R5	84.6
R6	84.7
R7	87.8
R8	70.9
R9	18.3
R10	74.5
R11	85.3
R12	63.6
R13	85.5
R14	96.1

Table 20: 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

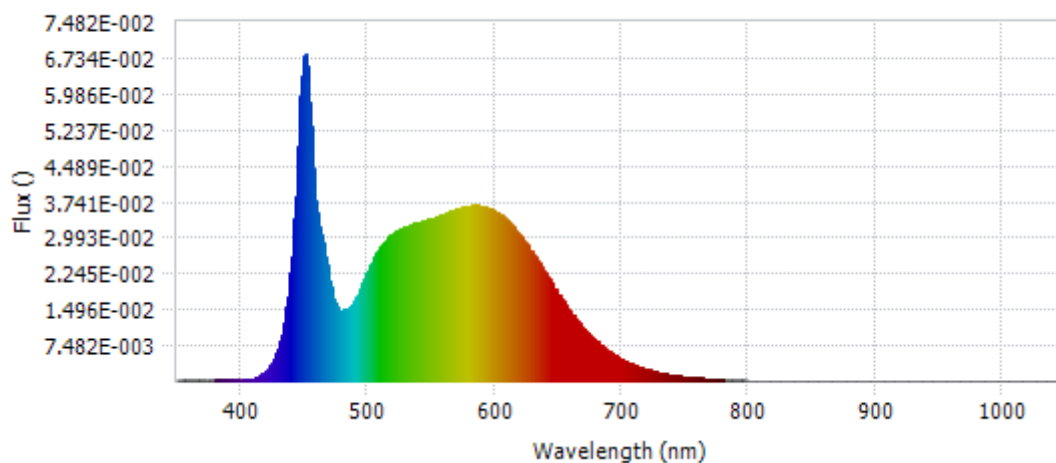


Chart 22: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.67E-04	485	1.54E-02	590	3.66E-02	695	5.39E-03
385	2.50E-04	490	1.70E-02	595	3.61E-02	700	4.64E-03
390	2.68E-04	495	1.99E-02	600	3.55E-02	705	3.98E-03
395	2.33E-04	500	2.30E-02	605	3.46E-02	710	3.38E-03
400	2.14E-04	505	2.58E-02	610	3.36E-02	715	2.89E-03
405	2.82E-04	510	2.79E-02	615	3.21E-02	720	2.46E-03
410	5.31E-04	515	2.98E-02	620	3.03E-02	725	2.11E-03
415	1.10E-03	520	3.06E-02	625	2.86E-02	730	1.80E-03
420	2.12E-03	525	3.15E-02	630	2.66E-02	735	1.53E-03
425	4.06E-03	530	3.22E-02	635	2.46E-02	740	1.31E-03
430	7.60E-03	535	3.25E-02	640	2.25E-02	745	1.11E-03
435	1.39E-02	540	3.29E-02	645	2.03E-02	750	9.61E-04
440	2.57E-02	545	3.36E-02	650	1.82E-02	755	8.13E-04
445	4.89E-02	550	3.39E-02	655	1.62E-02	760	6.97E-04
450	6.77E-02	555	3.44E-02	660	1.44E-02	765	6.02E-04
455	5.33E-02	560	3.48E-02	665	1.27E-02	770	5.09E-04
460	3.53E-02	565	3.54E-02	670	1.10E-02	775	4.32E-04
465	2.86E-02	570	3.58E-02	675	9.63E-03	780	3.77E-04
470	2.11E-02	575	3.62E-02	680	8.40E-03		
475	1.57E-02	580	3.65E-02	685	7.26E-03		
480	1.48E-02	585	3.68E-02	690	6.29E-03		

Table 21: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method

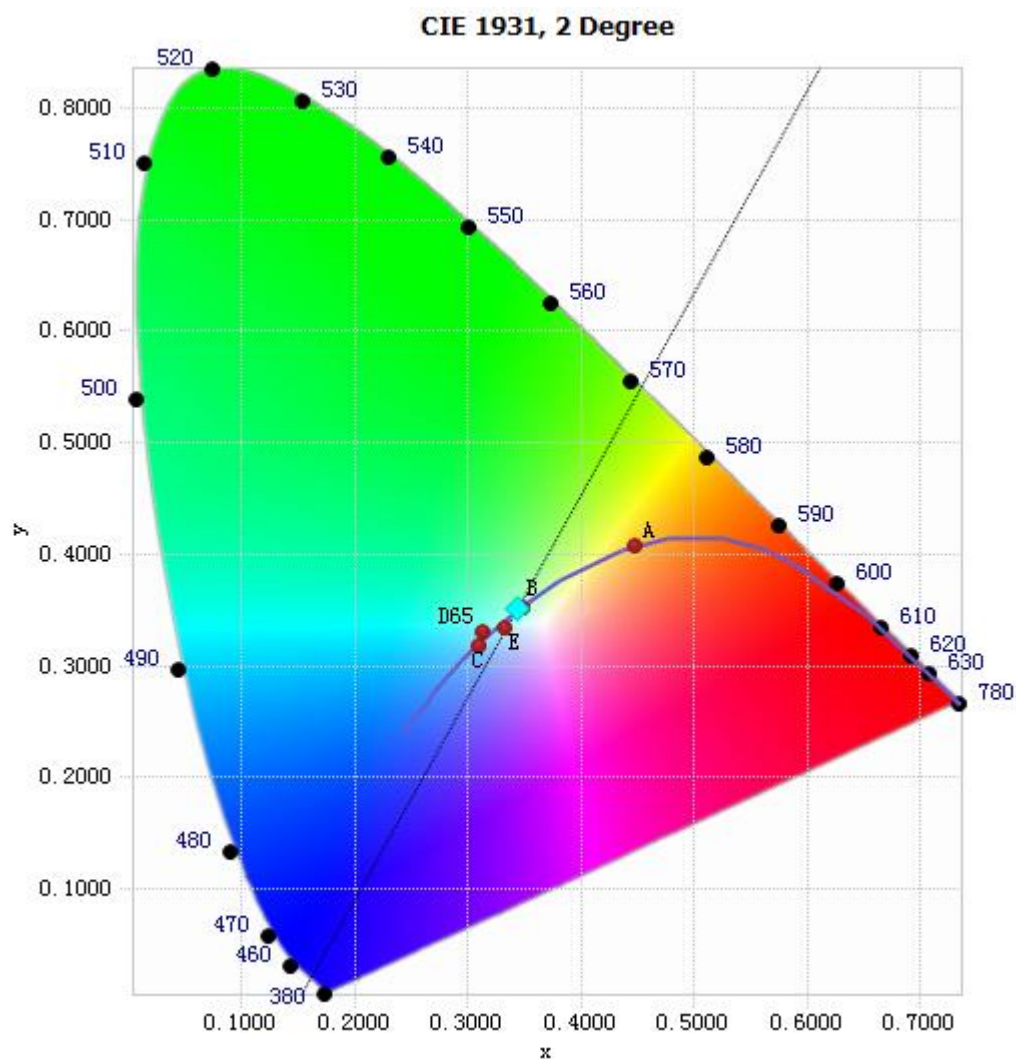


Chart 23: Chromaticity Diagram per Sphere - Spectroradiometer Method

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

Nominal CCT Quadrangles – Sphere Spectroradiometer Method

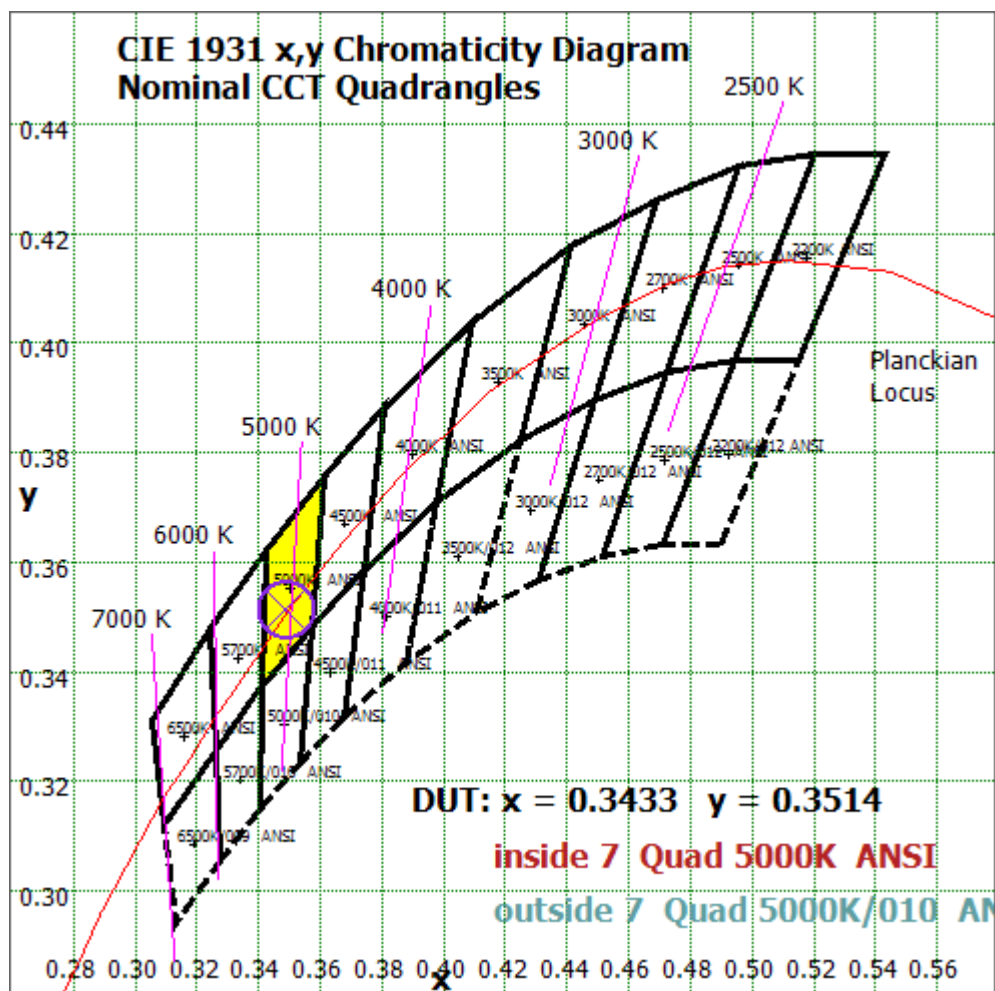


Chart 24: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

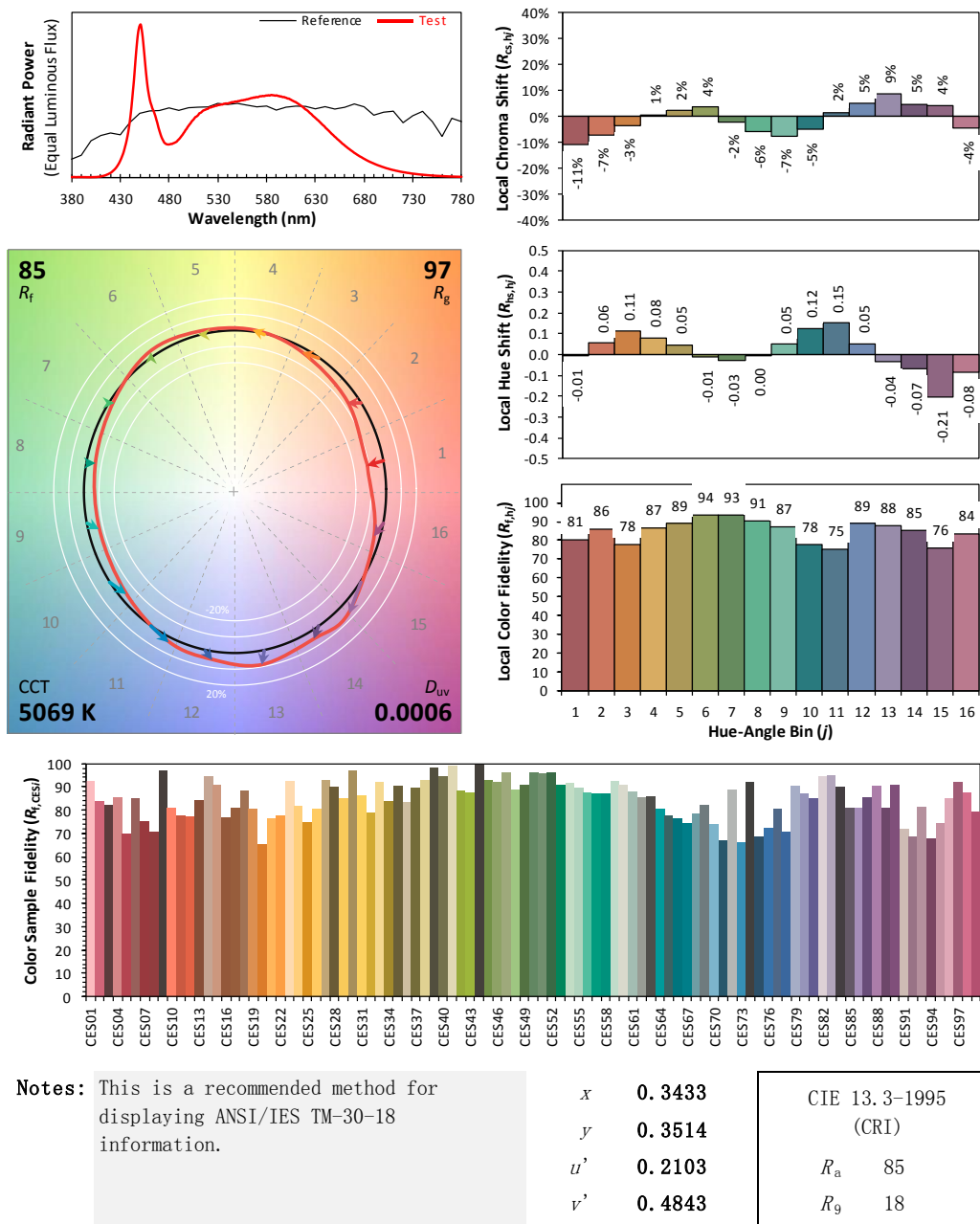
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/04/23

Model: 15T8/4F/8CCTS/UEB



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

Chart 25: 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 20 due to rounding.

Goniophotometer Method

Test ambient temperature was 25.8 °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)	0.130
Power Factor	0.9796
Power (W)	15.27
Luminous Efficacy (lm/W)	154.7
Total Luminous Flux (lm)	2361.7
Beam Angle (°)	112.2 (0°-180°) / 207.4 (90°-270°)
Center Beam Candle Power (cd)	418
Maximum Beam Candle Power (cd)	418.9 (At: C=330.0, Gamma=5.0)
Spacing Criteria	1.22 (0°-180°) / 1.42 (90°-270°)
Zonal Lumens in the 0°-60° Zone	44.95%
Zonal Lumens in the 60°-90° Zone	27.04%
Zonal Lumens in the 90°-120° Zone	17.07%
Zonal Lumens in the 120°-180° Zone	10.94%

Table 22: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	39.591	1.68%
10- 20	114.791	4.86%
20- 30	178.347	7.55%
30- 40	224.476	9.50%
40- 50	249.976	10.58%
50- 60	254.477	10.78%
60- 70	240.731	10.19%
70- 80	214.203	9.07%
80- 90	183.598	7.77%
90-100	156.986	6.65%
100-110	133.885	5.67%
110-120	112.229	4.75%
120-130	91.362	3.87%
130-140	71.549	3.03%
140-150	50.936	2.16%
150-160	30.177	1.28%
160-170	12.004	0.51%
170-180	2.372	0.10%
Total	2361.7	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1061.66	44.95%
60- 90	638.532	27.04%
0-90	1700.19	71.99%
90- 180	661.5	28.01%
0- 180	2361.7	100%

Table 23: Zonal Lumen

Illuminance Plots- Goniophotometer Method

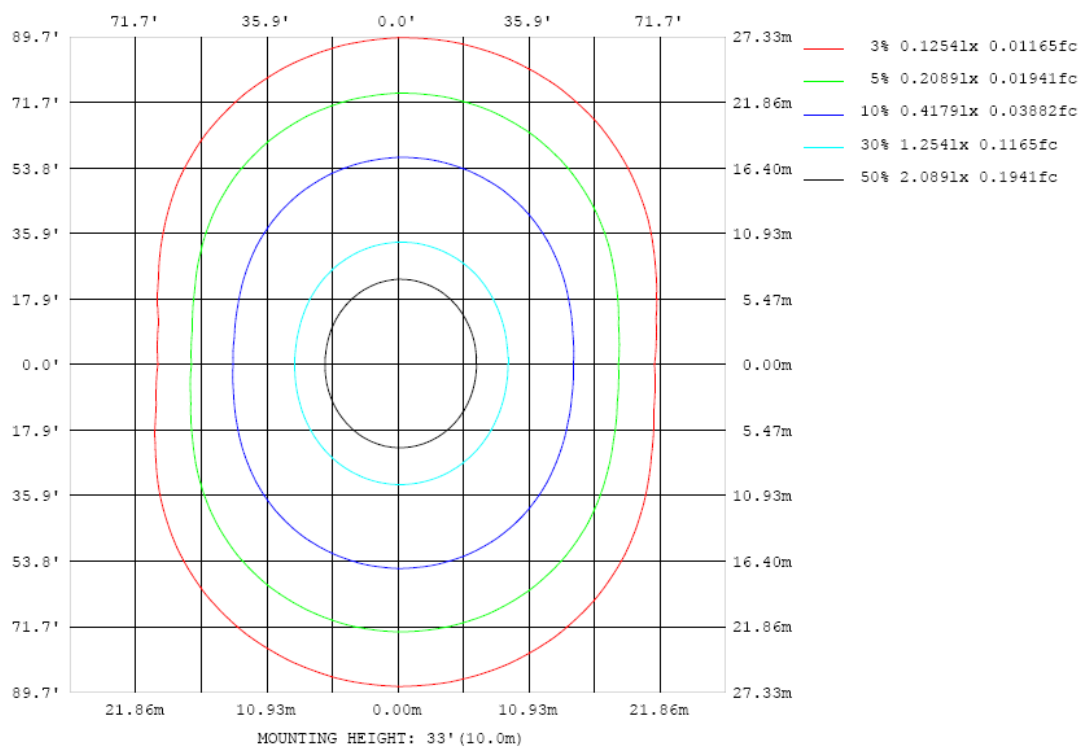


Chart 26: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

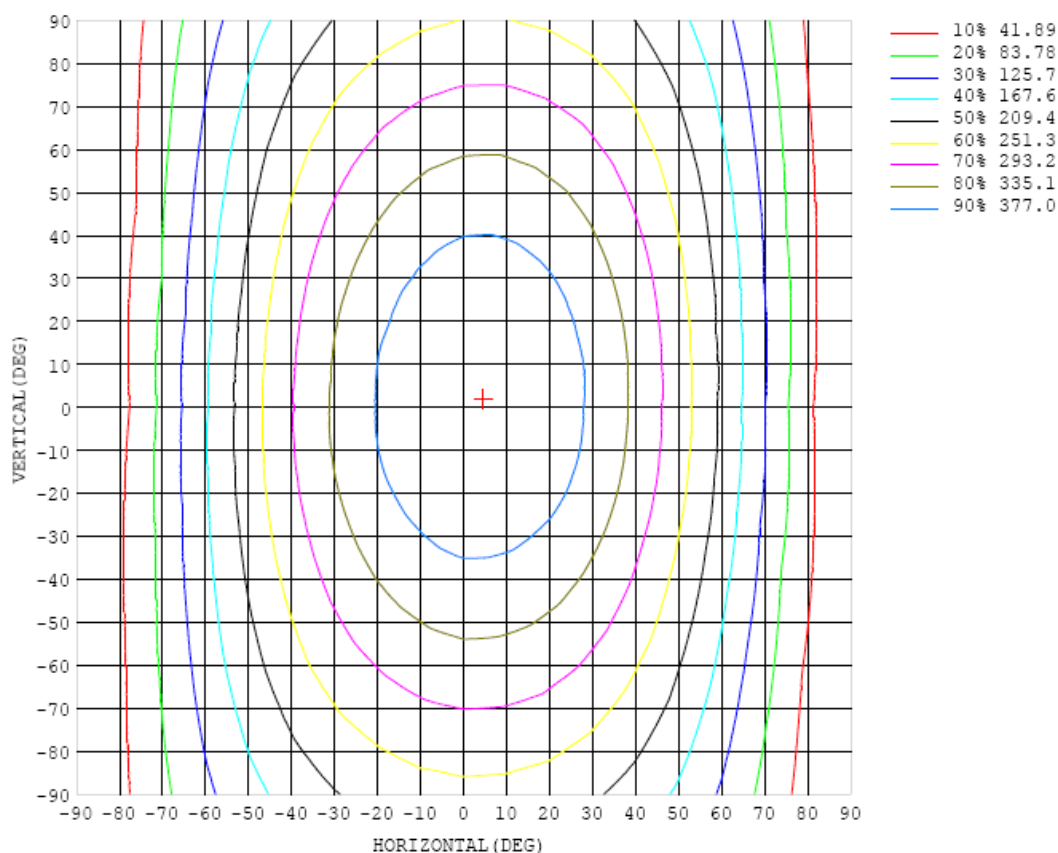


Chart 27: Isocandela Plot

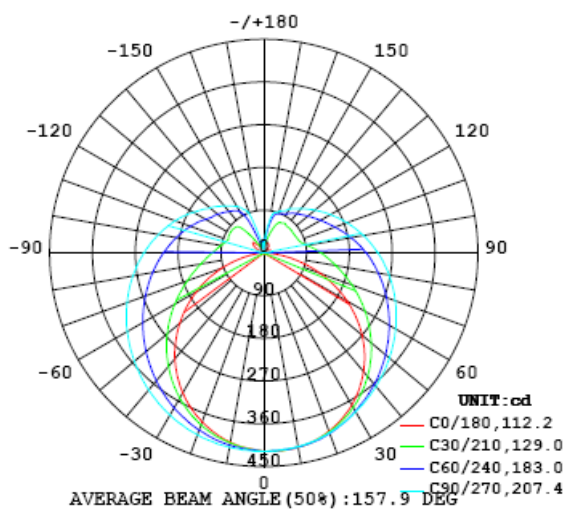


Chart 28: Polar Candela Distribution

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	418	418	418	418	418	418	418	418	418	418	418	418	418	418	418	418	418	418	418
5	418	419	417	417	417	417	417	416	416	416	415	415	415	414	414	413	413	413	412
10	416	416	415	415	416	415	415	415	414	414	412	411	410	408	408	407	405	405	405
15	410	409	409	410	410	411	411	411	410	410	408	406	403	401	399	397	395	394	393
20	400	400	400	401	403	405	405	404	404	403	400	398	395	391	388	384	382	380	379
25	386	387	388	390	393	395	396	396	396	395	392	388	384	379	374	369	365	363	361
30	370	370	372	376	380	383	385	387	388	386	383	378	373	365	358	352	346	343	341
35	350	351	354	359	364	370	374	377	378	377	373	367	360	350	341	332	325	319	317
40	326	327	333	339	347	355	361	366	368	367	362	356	347	335	323	311	301	294	291
45	299	302	309	318	329	340	348	354	357	356	351	343	332	319	304	289	276	266	262
50	270	273	282	295	310	323	334	341	344	344	339	330	319	303	285	266	249	236	231
55	237	241	253	270	290	306	319	328	332	332	327	317	304	286	265	243	222	205	198
60	202	208	223	246	270	289	304	314	319	320	315	304	290	270	246	220	194	173	164
65	165	172	193	221	249	272	289	301	306	307	302	290	276	254	228	198	167	141	129
70	126	135	163	197	229	255	274	287	293	294	289	277	261	239	211	178	142	110	93.3
75	87.5	99.6	134	174	211	239	259	273	280	281	276	264	247	224	194	159	119	80.8	59.0
80	51.2	66.8	108	154	193	223	244	259	266	267	262	250	233	210	179	143	100	57.2	28.3
85	19.7	40.4	87.8	136	176	207	230	245	252	254	248	237	220	196	166	129	85.5	40.2	6.36
90	1.80	24.0	72.2	121	161	193	216	230	238	240	235	224	207	184	154	117	74.8	31.6	1.23
95	2.24	13.1	59.5	106	146	178	201	216	224	226	222	211	195	172	143	108	68.5	29.0	2.95
100	6.25	12.9	48.8	92.9	132	163	186	202	210	213	209	199	183	161	133	100	64.4	30.2	5.82
105	11.4	15.6	46.5	82.9	120	150	172	188	196	199	196	186	171	151	124	94.1	62.3	33.7	9.53
110	14.6	19.1	46.9	78.2	110	137	159	174	183	186	183	174	160	141	117	89.8	62.1	38.9	10.8
115	14.7	21.9	49.2	76.5	103	128	148	162	170	173	171	163	150	133	111	86.9	63.3	44.5	12.9
120	9.86	19.3	52.8	75.1	98.4	120	138	151	158	162	160	152	141	125	106	84.9	65.3	50.3	18.0
125	6.72	21.1	56.7	74.8	94.5	113	129	141	148	151	149	142	132	118	102	84.1	66.9	54.7	24.7
130	5.55	25.7	58.7	75.1	91.4	107	121	131	138	140	139	133	124	112	98.3	83.1	68.4	58.6	30.2
135	5.61	25.7	58.6	75.0	89.3	102	114	123	128	131	129	125	117	107	95.9	81.7	70.2	58.7	31.4
140	13.4	19.5	53.3	74.2	85.6	98.4	108	115	120	122	121	117	111	103	91.9	81.1	73.8	57.7	25.8
145	19.5	15.2	54.5	76.5	83.2	93.0	103	109	112	114	114	110	106	97.4	88.6	81.7	74.2	56.0	19.4
150	20.3	16.4	48.1	72.8	82.7	89.2	94.5	100	105	107	106	103	97.4	92.6	87.5	80.3	70.3	51.8	15.7
155	22.1	13.5	35.3	68.3	80.4	86.4	91.3	94.6	97.2	98.2	97.8	96.0	93.4	90.0	85.6	79.8	63.2	40.0	14.8
160	22.2	16.7	27.3	51.9	75.2	84.0	87.3	90.2	92.0	92.9	92.7	91.3	89.3	86.9	81.2	67.5	53.3	29.4	12.1
165	20.0	14.9	20.5	35.1	55.4	70.9	81.2	86.3	87.7	88.2	88.1	87.5	85.4	78.9	69.0	56.5	38.0	20.3	13.5
170	21.0	15.9	16.7	22.4	29.5	42.6	53.8	60.6	65.5	68.3	68.8	66.5	61.4	54.3	43.3	31.1	21.6	15.0	13.1
175	22.1	18.4	14.7	16.0	19.1	21.5	23.5	25.1	26.4	27.3	27.7	27.0	24.1	19.9	16.4	14.2	11.8	10.6	14.6
180	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4

Table 24: 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		418	418	418	418	418	418	418	418	418	418	418	418	418	418	418	418	418	
5		413	413	413	414	414	415	416	417	417	418	418	418	418	418	419	419	419	
10		405	406	406	408	410	411	412	414	416	417	417	417	417	417	417	416	416	
15		394	396	398	400	402	405	408	410	412	413	414	414	414	413	412	411	411	
20		380	382	386	389	393	397	401	405	408	409	409	409	408	406	403	402	401	
25		362	365	371	375	381	388	394	398	402	403	402	402	400	397	393	391	388	
30		342	346	353	360	369	377	384	389	394	396	395	394	390	385	380	376	372	
35		319	324	334	344	354	364	373	380	386	387	386	383	378	371	364	358	352	
40		293	300	312	325	339	351	362	371	376	378	377	372	365	356	346	337	330	
45		264	274	289	306	322	337	350	360	366	368	365	360	351	339	326	313	304	
50		234	247	265	286	305	323	338	348	355	357	353	347	335	320	304	288	275	
55		202	218	241	265	288	308	325	336	344	345	341	333	319	301	281	261	244	
60		169	189	216	245	271	293	311	324	332	333	328	319	303	281	258	232	211	
65		136	161	193	226	255	279	298	311	319	320	315	304	286	262	234	203	177	
70		102	133	171	208	239	265	284	298	306	307	301	290	270	243	211	175	142	
75		70.8	109	152	190	224	251	271	285	293	294	287	275	254	225	189	148	108	
80		43.9	87.9	134	175	210	237	258	272	279	280	273	260	239	208	170	124	77.0	
85		25.7	72.5	120	162	196	224	244	258	266	266	259	245	223	192	153	104	52.2	
90		16.8	61.7	109	151	184	211	231	245	252	252	245	231	209	177	138	89.4	37.0	
95		12.0	53.8	99.3	140	172	198	218	231	239	238	231	217	195	164	126	79.0	31.1	
100		15.0	48.3	91.9	131	161	187	205	218	225	225	217	203	182	153	116	72.7	30.9	
105		18.0	48.5	85.1	122	153	175	193	205	211	211	204	190	170	143	108	69.3	33.6	
110		19.6	51.3	80.4	112	142	164	181	193	198	197	191	178	159	134	102	68.1	37.4	
115		20.3	52.0	81.9	106	131	153	169	180	185	185	178	166	149	125	97.2	68.7	41.1	
120		11.6	48.2	82.3	104	123	142	157	166	172	171	165	155	138	117	93.6	70.8	44.0	
125		6.13	44.3	82.5	101	119	132	145	154	159	158	153	144	129	112	91.6	73.1	45.4	
130		6.07	38.3	81.1	98.5	114	127	137	144	148	147	143	135	122	107	90.5	74.0	43.3	
135		7.32	30.9	78.7	96.7	109	120	129	135	139	138	134	126	116	103	90.2	68.6	35.4	
140		11.2	18.3	60.1	92.3	105	114	122	127	129	129	125	119	110	99.7	87.9	54.8	23.2	
145		16.1	12.6	33.9	81.0	101	109	115	119	121	120	117	112	105	93.9	80.8	40.4	15.9	
150		18.5	15.7	18.7	50.4	80.0	99.6	108	111	113	113	110	105	97.1	88.1	61.4	22.2	14.0	
155		17.4	18.5	12.1	17.2	40.5	71.2	91.4	99.5	101	101	99.7	96.1	88.2	66.8	34.4	11.1	19.3	
160		13.4	23.5	21.6	15.2	18.6	22.4	34.1	67.2	84.3	85.8	82.8	72.0	55.0	38.8	17.9	8.64	22.9	
165		10.6	18.3	24.9	23.2	15.5	14.1	20.3	17.1	33.3	38.8	37.5	34.1	25.7	13.8	11.8	14.9	21.7	
170		18.1	17.1	21.8	23.5	24.7	25.0	23.9	19.4	12.3	16.7	19.5	20.7	16.7	17.5	19.1	22.8	26.1	
175		20.0	21.7	19.9	18.9	20.5	23.4	25.6	25.2	4.09	26.3	26.7	24.2	22.6	24.9	28.0	27.5	24.3	
180		19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	

Table 25: Luminous Intensity Data

TEST RESULTS of Model 15T8/4F/8CCTS/UEB (6500K 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)	0.130	0.061
Power Factor	0.9793	0.9139
Test Power (W)	15.28	15.39
THD A%	18.72	20.12
Luminous Efficacy (lm/W)	149.3	148.8
Total Luminous Flux (lm)	2280.7	2290.7
Color Rendering Index (CRI)	82.9	
R9	8	
Correlated Color Temperature (CCT)(K)	6481	
Chromaticity Chroma x	0.3126	
Chromaticity Chroma y	0.3324	
Chromaticity Chroma u	0.1965	
Chromaticity Chroma v	0.3134	
Duv	0.0050	
Chromaticity Chroma u'	0.1965	
Chromaticity Chroma v'	0.4701	

Special Color Rendering Indices	
R1	80.8
R2	86.8
R3	90.3
R4	82.9
R5	81.6
R6	81.3
R7	88.6
R8	70.7
R9	8
R10	68.3
R11	82.2
R12	56.9
R13	82.5
R14	95

Table 26: 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

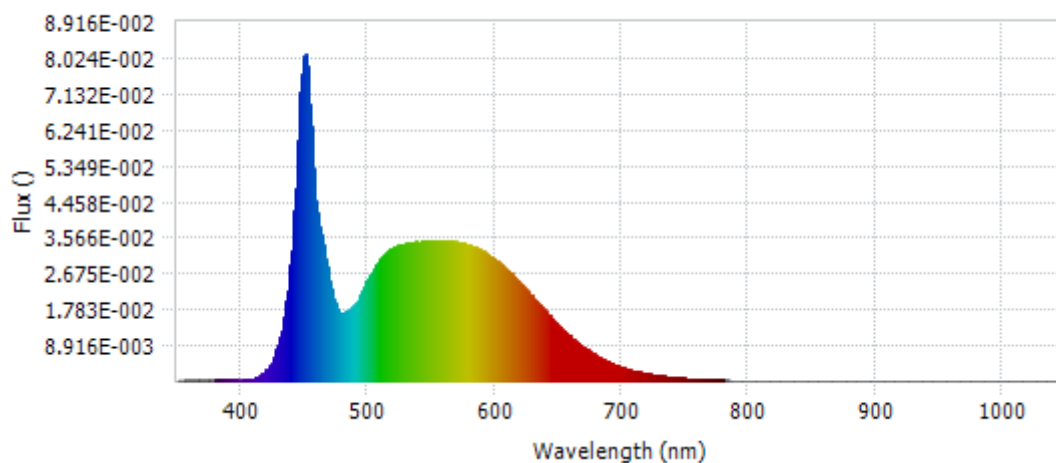


Chart 29: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.39E-04	485	1.75E-02	590	3.23E-02	695	4.11E-03
385	3.05E-04	490	1.91E-02	595	3.13E-02	700	3.52E-03
390	2.83E-04	495	2.20E-02	600	3.02E-02	705	3.02E-03
395	2.81E-04	500	2.53E-02	605	2.89E-02	710	2.60E-03
400	2.51E-04	505	2.81E-02	610	2.75E-02	715	2.22E-03
405	3.54E-04	510	3.02E-02	615	2.60E-02	720	1.89E-03
410	6.76E-04	515	3.21E-02	620	2.43E-02	725	1.63E-03
415	1.45E-03	520	3.30E-02	625	2.26E-02	730	1.38E-03
420	2.78E-03	525	3.37E-02	630	2.08E-02	735	1.19E-03
425	5.41E-03	530	3.42E-02	635	1.92E-02	740	1.02E-03
430	9.95E-03	535	3.44E-02	640	1.74E-02	745	8.80E-04
435	1.78E-02	540	3.46E-02	645	1.56E-02	750	7.47E-04
440	3.25E-02	545	3.48E-02	650	1.39E-02	755	6.42E-04
445	5.98E-02	550	3.49E-02	655	1.25E-02	760	5.51E-04
450	8.08E-02	555	3.49E-02	660	1.10E-02	765	4.77E-04
455	6.33E-02	560	3.49E-02	665	9.65E-03	770	4.12E-04
460	4.21E-02	565	3.48E-02	670	8.42E-03	775	3.57E-04
465	3.38E-02	570	3.45E-02	675	7.32E-03	780	3.03E-04
470	2.47E-02	575	3.42E-02	680	6.37E-03		
475	1.84E-02	580	3.37E-02	685	5.53E-03		
480	1.70E-02	585	3.33E-02	690	4.80E-03		

Table 27: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method

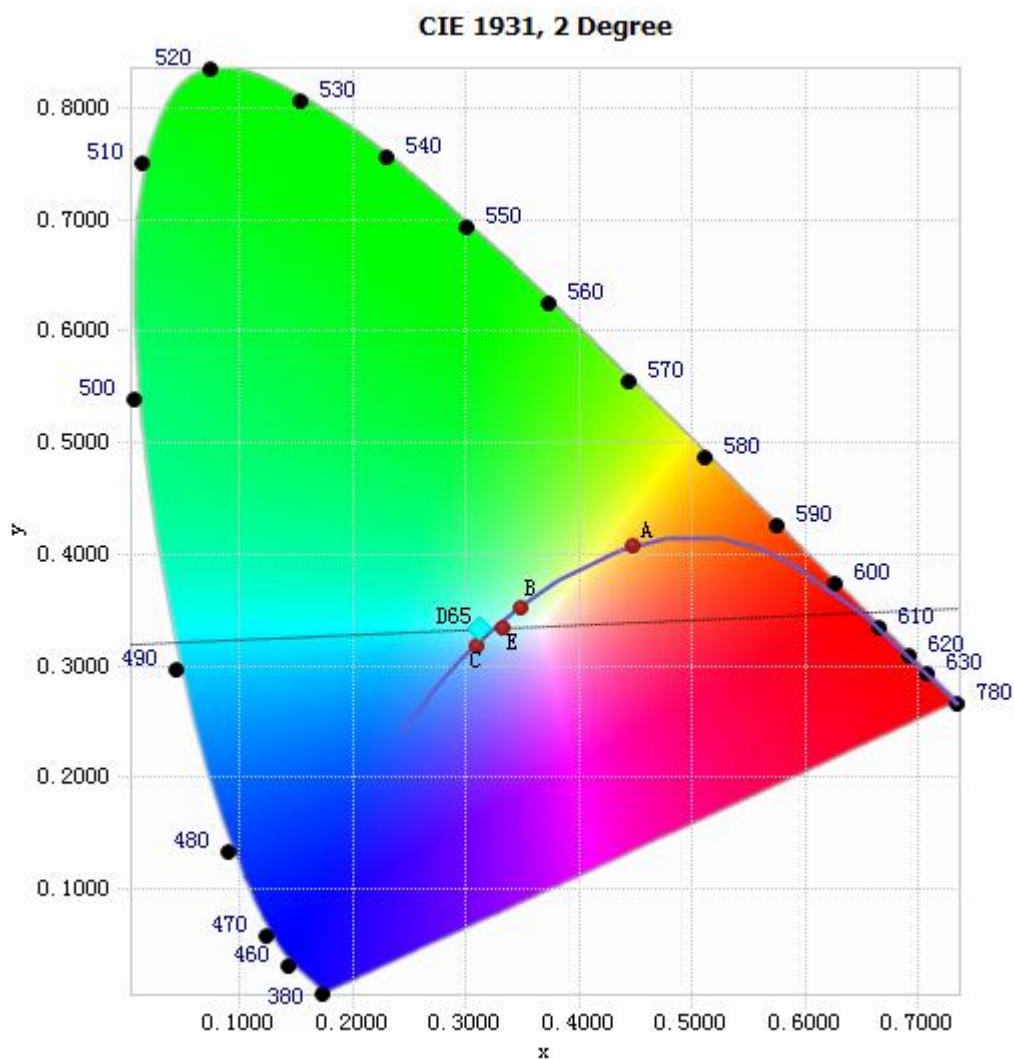


Chart 30: Chromaticity Diagram per Sphere - Spectroradiometer Method

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

Nominal CCT Quadrangles – Sphere Spectroradiometer Method

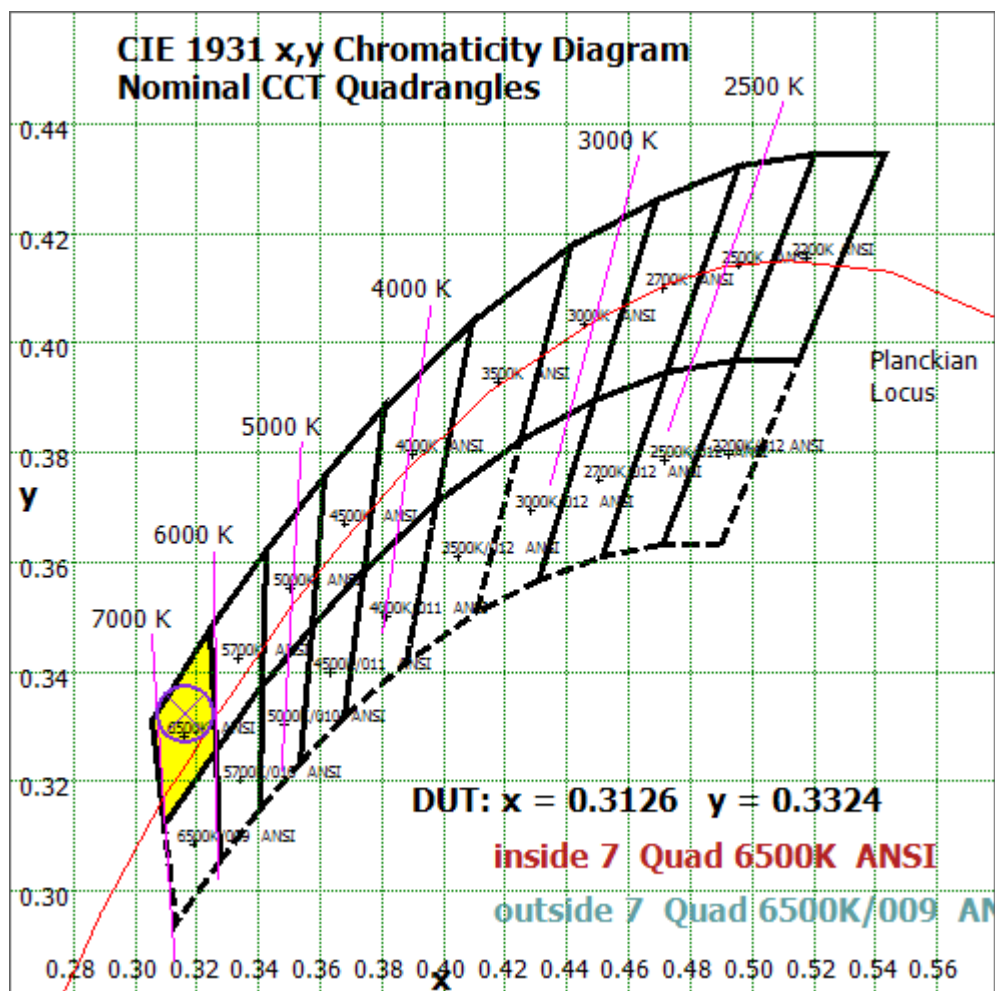


Chart 31: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

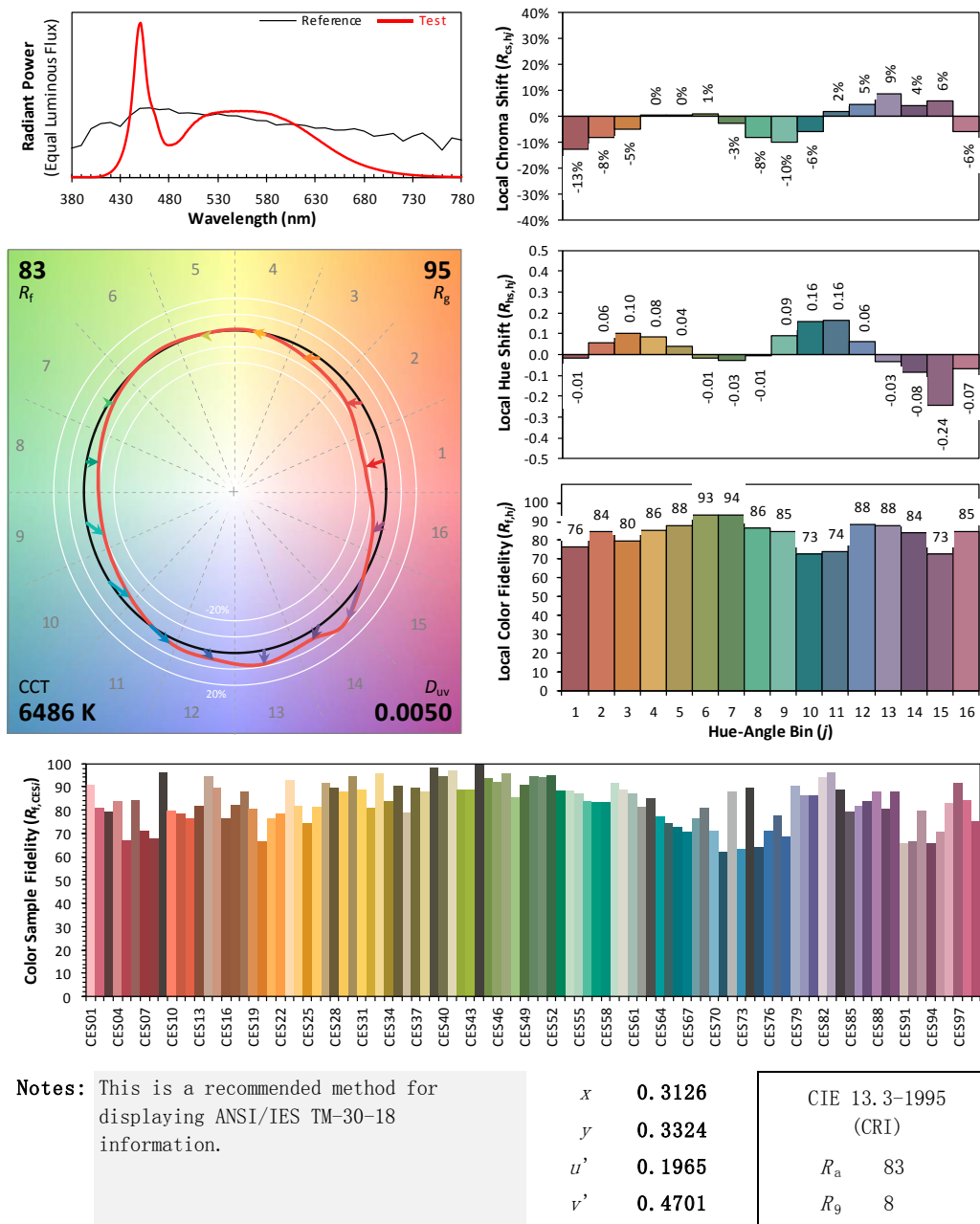
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/04/23

Model: 15T8/4F/8CCTS/UEB



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

Chart 32: 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 26 due to rounding.

Goniophotometer Method

Test ambient temperature was 25.8 °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)	0.130
Power Factor	0.9794
Power (W)	15.31
Luminous Efficacy (lm/W)	150.2
Total Luminous Flux (lm)	2298.9
Beam Angle (°)	112.4 (0°-180°) / 207.8 (90°-270°)
Center Beam Candle Power (cd)	404
Maximum Beam Candle Power (cd)	406.3 (At: C=340.0, Gamma=6.5)
Spacing Criteria	1.22 (0°-180°) / 1.43 (90°-270°)
Zonal Lumens in the 0°-60° Zone	44.84%
Zonal Lumens in the 60°-90° Zone	27.06%
Zonal Lumens in the 90°-120° Zone	17.11%
Zonal Lumens in the 120°-180° Zone	10.99%

Table 28: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	38.399	1.67%
10- 20	111.332	4.84%
20- 30	172.994	7.53%
30- 40	217.894	9.48%
40- 50	242.831	10.56%
50- 60	247.415	10.76%
60- 70	234.266	10.19%
70- 80	208.668	9.08%
80- 90	179.023	7.79%
90-100	153.024	6.66%
100-110	130.61	5.68%
110-120	109.724	4.77%
120-130	89.349	3.89%
130-140	69.887	3.04%
140-150	49.962	2.17%
150-160	30.157	1.31%
160-170	11.41	0.50%
170-180	1.912	0.08%
Total	2298.9	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1030.87	44.84%
60- 90	621.957	27.06%
0-90	1652.82	71.90%
90- 180	646.035	28.10%
0- 180	2298.9	100%

Table 29: Zonal Lumen

Illuminance Plots- Goniophotometer Method

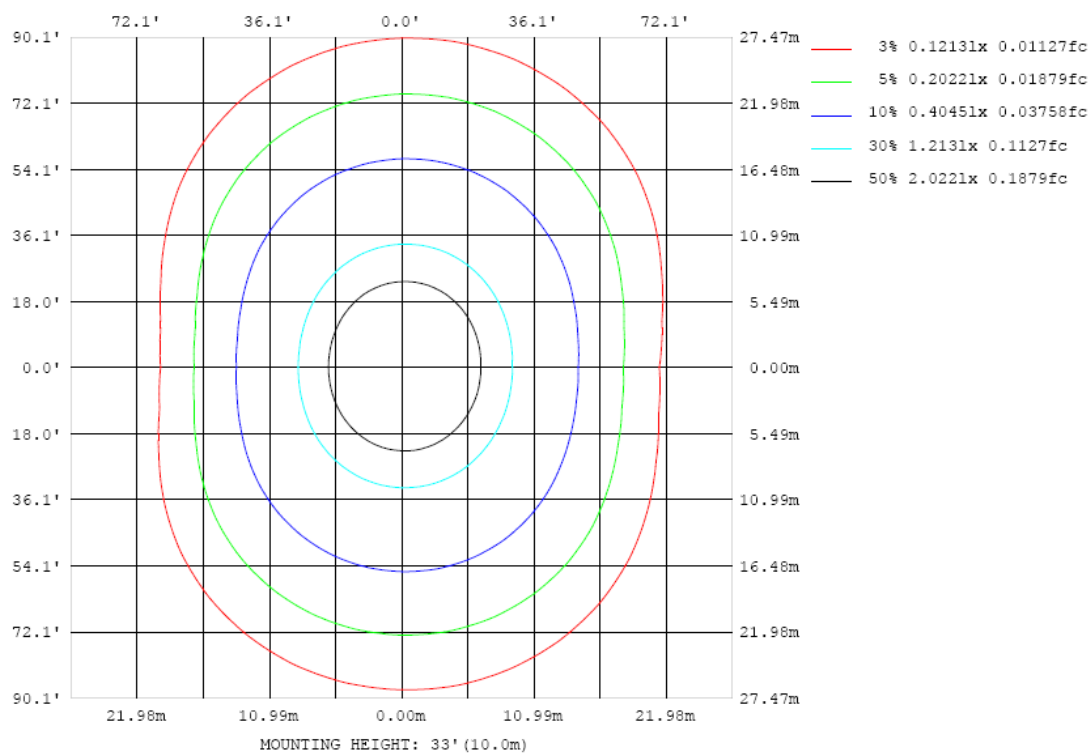


Chart 33: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

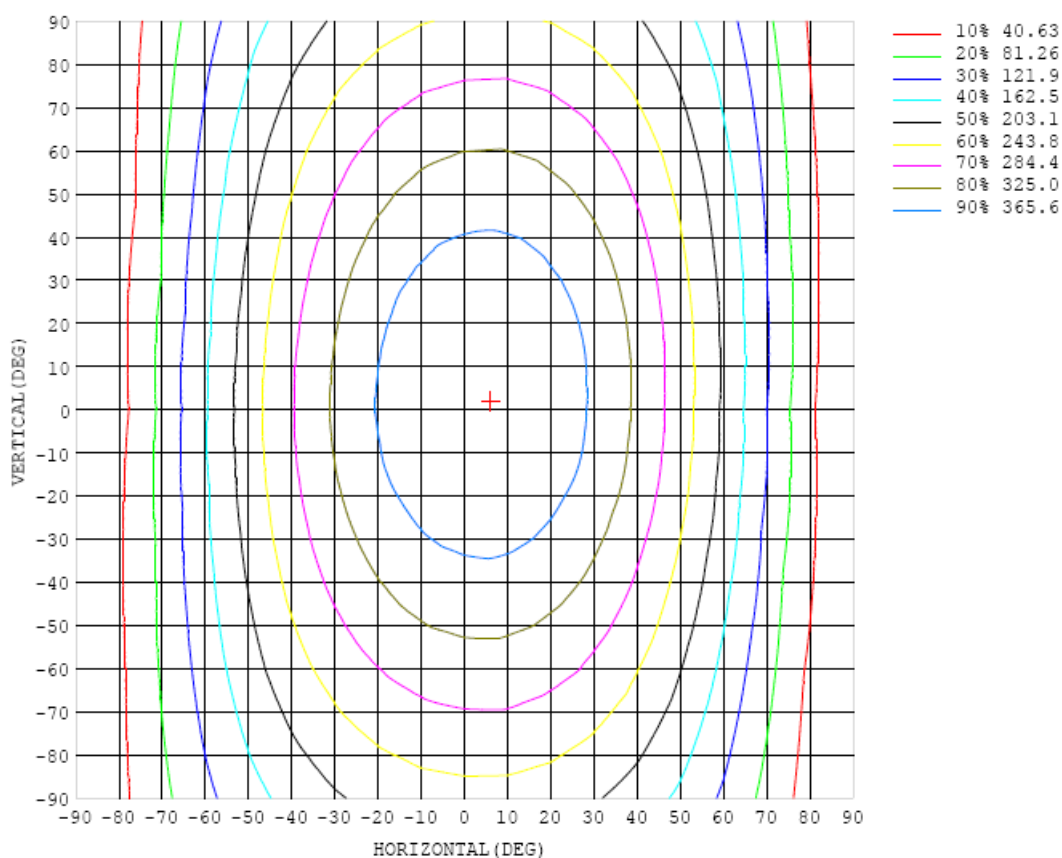


Chart 34: Isocandela Plot

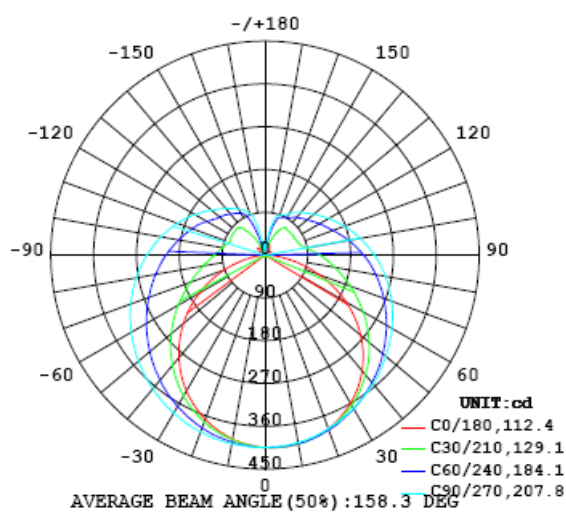


Chart 35: Polar Candela Distribution

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	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404
5	405	405	405	405	405	405	404	404	404	403	403	402	402	401	401	401	401	400	400
10	403	403	403	403	403	402	402	403	402	400	400	398	396	396	394	393	393	393	393
15	397	397	397	398	397	399	398	398	397	396	394	393	391	388	386	383	382	382	382
20	388	388	389	389	390	391	391	391	391	388	387	384	381	378	375	371	368	367	368
25	376	375	377	379	380	381	383	383	384	381	378	375	370	365	361	356	353	351	350
30	360	360	362	365	367	370	373	375	375	372	370	365	359	352	346	339	334	331	330
35	340	341	344	348	353	358	362	365	366	363	360	354	347	338	329	320	313	308	307
40	317	318	323	328	336	344	350	354	356	354	349	343	333	323	311	299	290	284	281
45	292	293	300	308	318	329	337	342	345	343	339	331	320	307	293	278	265	257	254
50	262	265	273	285	300	313	323	330	333	331	327	319	306	292	275	256	240	228	224
55	231	234	246	262	280	297	309	317	321	320	315	306	293	275	256	234	213	198	192
60	196	201	217	238	261	280	294	304	309	308	303	293	278	260	237	212	187	167	159
65	160	167	187	214	241	263	280	291	297	295	290	280	264	244	220	191	161	136	125
70	122	131	158	191	222	247	265	277	284	283	277	267	251	230	203	171	137	106	90.8
75	84.1	95.7	130	169	204	231	251	263	270	270	265	254	238	215	187	153	115	77.8	57.5
80	49.3	63.9	105	149	186	215	236	250	257	257	252	241	224	202	173	137	96.7	55.3	27.8
85	18.4	38.5	85.0	131	170	200	223	236	243	244	239	228	211	189	160	124	82.2	38.9	6.29
90	1.66	22.8	69.7	116	155	185	208	222	230	230	226	215	199	176	148	112	71.9	30.4	1.20
95	2.30	12.0	55.9	101	140	170	193	208	216	217	213	203	187	165	137	103	65.7	27.8	2.72
100	6.31	12.1	46.3	87.6	126	156	179	193	202	203	200	190	175	154	128	95.8	61.5	28.8	5.37
105	11.6	14.5	44.3	78.9	113	143	165	180	188	191	187	179	164	144	119	90.1	59.5	32.1	8.68
110	14.9	17.7	44.7	74.5	105	131	152	167	175	178	175	167	154	135	112	85.9	59.4	36.8	8.93
115	15.6	19.0	46.8	73.1	99.2	122	141	155	163	166	163	156	144	127	106	83.1	60.4	41.7	9.54
120	12.5	14.0	50.1	71.7	94.3	115	132	145	152	154	153	146	135	119	101	81.3	62.4	47.1	12.4
125	10.3	13.3	53.2	71.6	90.5	109	124	135	142	144	142	136	126	113	97.5	80.5	63.6	51.4	16.4
130	8.93	15.8	54.9	71.1	87.6	103	116	126	132	134	133	128	119	107	94.3	77.9	65.3	54.3	19.7
135	8.49	14.9	51.0	71.0	84.0	98.4	109	118	123	125	124	120	112	103	91.4	77.7	67.7	51.4	21.2
140	13.3	14.8	38.4	71.1	81.2	93.3	104	111	115	117	116	112	106	98.3	86.6	77.8	70.3	44.7	19.1
145	17.2	15.1	33.0	70.8	80.2	87.7	96.1	104	108	109	109	106	98.8	91.5	85.2	77.3	68.2	37.8	16.4
150	18.0	16.9	28.2	61.0	79.6	85.7	91.0	95.4	98.6	99.7	98.9	96.8	93.5	88.9	83.1	74.1	60.3	30.4	14.1
155	23.5	16.2	16.7	45.7	73.6	83.1	87.2	91.2	93.6	94.1	93.6	92.0	89.7	85.9	80.0	67.9	47.8	21.1	13.0
160	24.5	20.1	17.8	29.8	53.4	73.9	84.0	86.5	87.9	88.1	87.7	87.0	85.6	80.3	68.5	52.9	32.2	13.5	11.3
165	21.5	19.8	15.0	20.3	29.2	46.1	61.0	70.8	76.6	79.1	79.2	77.4	71.1	60.6	47.0	32.0	18.2	13.1	9.80
170	24.3	23.9	18.5	15.9	17.5	22.4	27.5	33.5	39.2	42.9	43.6	40.7	34.6	27.0	20.5	15.0	12.7	16.7	16.6
175	25.8	27.6	24.8	21.5	20.3	17.1	15.0	16.0	17.4	17.8	16.4	13.7	10.8	10.5	13.5	18.1	21.0	20.0	18.7
180	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Table 30: 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	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404		
5	401	401	401	402	402	403	404	405	404	405	405	406	406	406	406	406	406		
10	393	393	394	396	398	400	401	402	403	404	405	405	405	405	405	405	404	404	
15	382	383	385	388	391	394	397	399	400	402	403	402	402	401	400	399	398		
20	368	371	374	377	382	387	391	394	396	398	399	398	396	395	394	391	390		
25	351	354	359	365	371	378	383	388	391	393	393	392	390	387	383	380	377		
30	332	336	342	350	359	368	375	381	384	386	386	384	380	376	371	366	362		
35	309	315	323	334	345	356	365	372	375	378	378	375	369	363	356	349	343		
40	284	292	303	316	330	343	354	362	367	370	368	364	357	348	338	329	321		
45	257	266	280	298	314	330	343	352	357	360	358	352	343	332	319	307	296		
50	227	240	257	278	298	316	330	341	347	350	347	340	329	314	298	282	269		
55	196	212	234	259	281	302	318	330	336	339	336	327	314	296	275	255	239		
60	165	184	210	239	265	288	305	318	324	326	323	313	298	277	253	227	207		
65	132	157	188	220	249	274	293	306	312	315	310	299	282	259	230	199	173		
70	100	130	167	202	234	260	280	294	300	302	297	285	266	240	208	172	140		
75	69.2	106	148	186	219	246	267	281	288	289	284	271	251	223	187	146	107		
80	43.1	86.0	132	172	206	233	254	268	275	276	270	257	236	206	167	123	75.9		
85	25.3	71.0	118	160	193	221	241	255	261	262	256	243	221	191	152	104	51.7		
90	17.0	61.0	107	148	181	208	228	242	248	249	243	229	207	176	138	88.9	36.8		
95	12.2	53.4	98.0	138	169	196	216	229	235	235	229	215	193	164	126	78.9	31.0		
100	15.2	48.5	91.1	129	160	184	203	216	222	222	216	202	181	153	116	72.8	30.9		
105	18.4	46.8	84.6	121	151	173	191	203	209	209	202	189	169	143	108	69.6	33.7		
110	21.3	51.3	79.9	112	141	163	180	191	196	196	190	177	159	134	102	68.4	37.9		
115	23.7	53.2	80.0	105	131	153	168	179	183	183	177	165	149	125	97.3	68.5	42.6		
120	15.1	53.3	80.8	101	122	142	157	166	171	170	165	155	139	118	93.6	70.3	47.1		
125	8.30	53.2	81.0	99.6	116	132	145	155	159	158	154	144	129	111	91.4	72.4	50.9		
130	7.14	51.5	81.1	96.9	112	125	134	143	147	146	142	133	122	107	90.1	74.1	51.8		
135	5.91	46.6	80.6	95.2	108	119	128	134	137	137	133	126	115	103	89.6	73.7	46.3		
140	7.22	34.8	73.6	93.4	104	113	121	126	128	128	124	118	110	99.7	88.8	67.4	33.1		
145	11.2	18.9	55.6	88.4	100	108	114	118	119	119	116	111	105	95.7	85.0	59.1	22.7		
150	16.5	14.3	37.5	74.4	94.1	102	107	110	112	112	110	106	99.1	91.1	76.4	43.0	15.1		
155	18.2	13.5	14.4	38.2	70.6	89.5	98.4	103	104	104	102	97.6	92.0	83.1	58.1	24.5	10.4		
160	20.7	21.7	13.4	16.5	25.5	51.6	77.3	90.6	93.3	93.6	92.0	88.1	78.4	59.3	39.2	14.6	9.98		
165	18.7	23.6	20.1	12.9	18.8	20.1	21.2	37.2	58.0	60.6	58.6	52.3	41.9	34.2	19.4	10.3	13.7		
170	18.1	21.2	22.9	24.4	18.0	12.1	14.1	12.0	14.5	25.8	23.5	19.3	14.7	15.3	14.0	16.2	17.5		
175	19.3	24.7	26.5	24.1	24.0	23.3	23.6	23.3	14.7	16.3	18.5	18.8	21.5	24.4	26.7	23.9	21.9		
180	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		

Table 31: Luminous Intensity Data

ISTMT Test Results of Model 15T8/4F/8CCTS/UEB (3000K Setting)

Test ambient temperature was 24.7 °C.

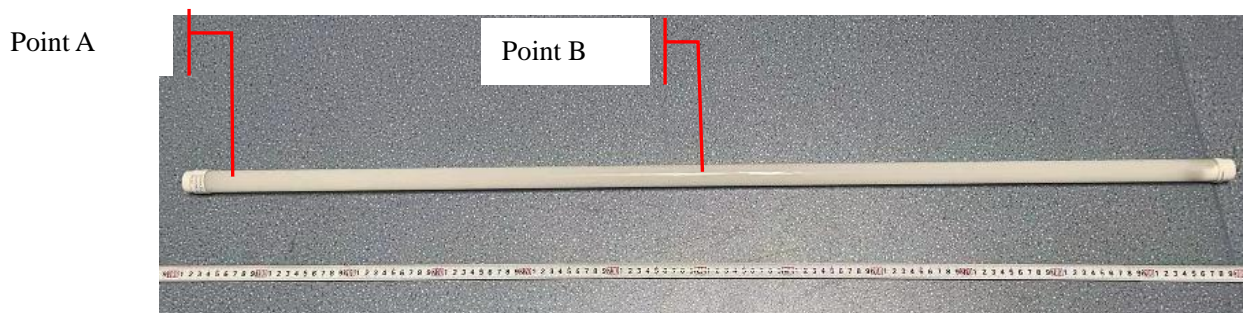
Test orientation was light down.

Model of light source: L128-3080RA35003J3

The stabilization time of the sample was 7.5 hours.



View of In-Situ Point- Ts



Location of In-Situ Point from overall view

Input Voltage (V)	Input Power (W)	Tested LED source current (mA)	Measured In-Situ Maximum Temperature(Corrected to Ta=25°C)	
			Point A	Point B
120.0	15.31	45.2	43.7	45.7
277.0	15.43	45.6	44.6	44.6

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
Multi-Meter	FLUKE15B	HZTE020-01	Aug. 05, 2022	Aug. 04, 2023

Table 32: 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 expanded 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 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.

ISTMT Measurements

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

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

The tests were conducted in an ambient temperature of 25 ± 5 °C. Ambient temperature variations above or

below 25 °C were respectively subtracted from or added to temperatures recorded at points on the luminaire. Temperatures recorded at points on a luminaire were measured by means of thermocouples.

The thermocouples had conductors no larger than No. 24 AWG (0.21mm²) and no smaller than No. 30 AWG (0.05mm²). Thermocouples complied with the requirements specified in ASTM MNL 12 and thermocouples as listed in the table of the limits of error specified in NIST ITS 90, or ISA MC96.1.

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

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

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

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

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

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

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

*** End of Report ***

This report is considered invalidated without the Special Seal for Inspection of the LTL. This report shall not be altered, increased or deleted. The results shown in this test report refer only to the sample(s) tested. Without written approval of LTL, this test report shall not be copied except in full and published as advertisement.