



TL-749

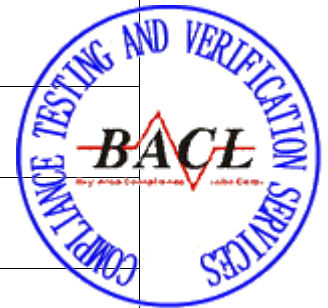


TEST REPORT

For

Beyond LED Technology

Model Number:	BLT-BPLED-2X4-49/D10/U/60/HL	
Report Type:	Electrical, Photometric and ISTMT tests according to the following standards and show the compliance to DLC Program SSL Technical Requirements V4.4	
Standards:	IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products ANSI C82.77-10-2014: Harmonic Emission Limits – Related Power Quality Requirements for Lighting ANSI/UL 1598-2008: Standard for Safety of Luminaires CIE 190:2010 Calculation and presentation of unified glare rating tables for indoor lighting luminaires IES TM-30-18: IES Method for Evaluating Light Source Color Rendition	
Test Engineer:	George Yang	<i>George Yang</i>
Report Number:	RKSB191122028-10	
Sample Size:	One sample was received on 2019-11-22 and used for testing.	
Test Date:	2019-12-26 to 2020-01-13	
Report Date:	2020-01-13	
Reviewed By:	Ray Gao/ EE Engineer	<i>Ray Gao</i>



Note: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Kunshan). This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

1. Product Information and Description

Product Primary Use: 2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces
 Voltage And Frequency: 120-277VAC, 50/60Hz
 LED Source Manufacturer: Lumileds Holding B.V.
 LED Source Model: L128-xx80RC35000Z1
 Driver Model: SDU48CS120V42DN3A
 Auxiliary Ballast Model: NA
 Auxiliary Housing Model: NA
 White Tunable: Yes
 Field-Adjustable Light Output: Yes

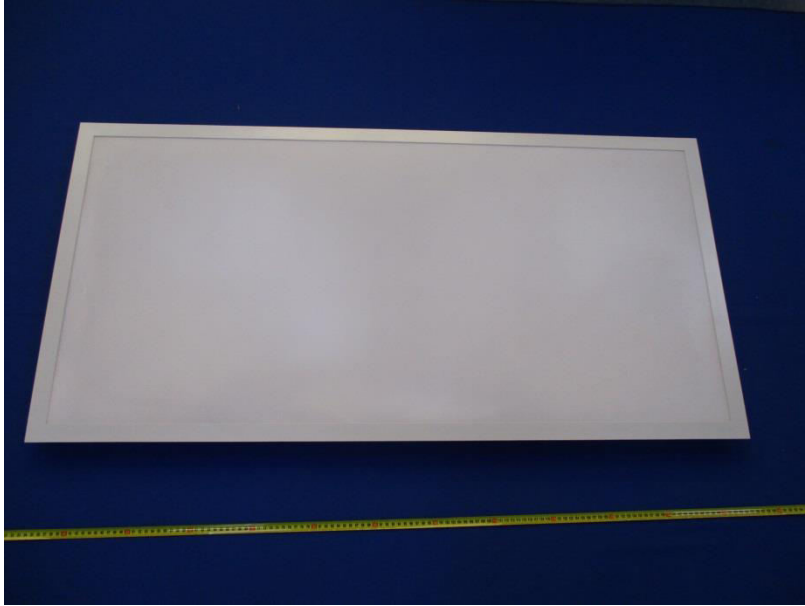
2. Product Rated Values

Test Model	CCT(K)	Light Output (lm)	Power(W)	Luminous Efficacy (lm/W)
BLT-BPLED-2X4-49/D10/U/60/HL	3500	4002	29	138
		4590	34	135
		5187	39	133
		6448.4	49	131.6
	4000	4379	29	151
		5032	34	148
		5694	39	146
		7011.9	49	143.1
	5000	4060	29	140
		4658	34	137
		5265	39	135
		6575.8	49	134.2

3. Test List

Test Model	CCT(K)	Power(W)	Test Item			
			Goniophotometer Test	Integrating Sphere Test	THDi and PF Test	In-Situ Temperature Measurement Test
BLT-BPLED-2X4-49/D10/U/60/HL	3500	49	Yes	Yes	Yes	Yes
	4000	49	NA	Yes	NA	NA
	5000	49	NA	Yes	NA	NA

4. Product Photo



5. Test Result

Control setting: **49W 3500K**

Integrating Sphere Test; Orientation: Downward; Test Voltage: 120V 60Hz;				
Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
Total Efficacy(lm/W)	131.72	≥125	≥121.25	Pass
CCT(K)	3393	3220~3710	3220~3710	Pass
Duv	0.000168	-0.0055~0.0065	-0.0055~0.0065	Pass
R _a	84.1	≥80	≥78	Pass

Goniophotometer Test; Orientation: Downward; Test Voltage: 120V 60Hz;				
Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
Light Output(lm)	6450.5	≥3000	≥2700	Pass
Power(W)	48.94	None.	None.	N/A
Total Efficacy(lm/W)	131.85	≥125	≥121.25	Pass
Zonal Lumen Distribution(0-60°)	82.89%	0-60°≥75%	0-60°≥72%	Pass
SC:0-180°	1.35	1.0≤SC≤2.0	0.9≤SC≤2.1	Pass
SC:90-270°	1.34	1.0≤SC≤2.0	0.9≤SC≤2.1	Pass

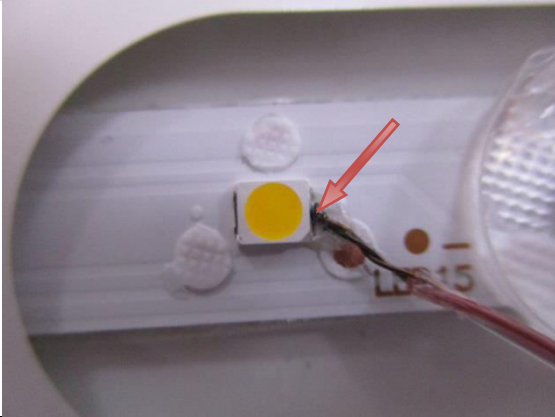
THDi, PF Test; Orientation: Downward;					
Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.9984	≥0.9	≥0.87	Pass
120	THDi	2.72%	≤20%	≤25%	Pass
277	Power Factor	0.9477	≥0.9	≥0.87	Pass
277	THDi	8.24%	≤20%	≤25%	Pass

In-Situ Temperature Measurement Test: Test Voltage: 120V 60Hz;				
Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
TMP _{LED} (°C)	34.8	≤98	With tolerance of ≤ 1.1°C or 0.4%, whichever is greater due to thermocouple tolerance	Pass
TMP _c (°C)	49.7	≤75	With tolerance of ≤ 1.1°C or 0.4%, whichever is greater due to thermocouple tolerance	Pass
Drive Current/Individual LED source(mA)	48.8	≤100	With +5% tolerance	Pass
TM-21 Projected Lumen Maintenance at 50000hours	88.58%	L ₇₀ Life≥50000	L ₇₀ Life≥50000	Pass
L ₇₀ Lumen Maintenance Life (Hours)	>54000			
L ₉₀ Lumen Maintenance Life (Hours)	44000	≥36000	≥36000	Pass

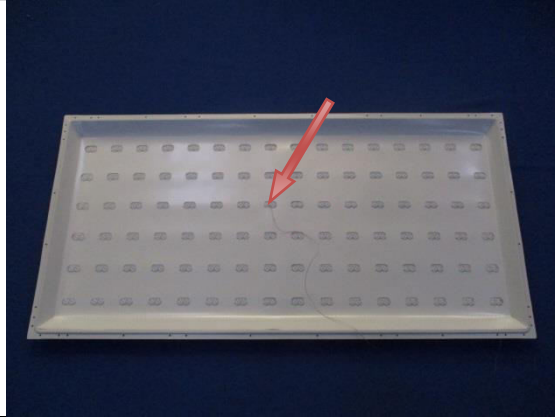
Note:

- The test results were measured directly from the test equipment.
- The DLC requirements were listed according to DLC Technical Requirements V4.4.
- The conclusion is for reference only. Test report that indicate product performance meets DLC Technical Requirements do not represent official DLC product qualification. All decisions regarding product qualification are made by the DLC.

TMP_{LED}(Zoomed-in View)



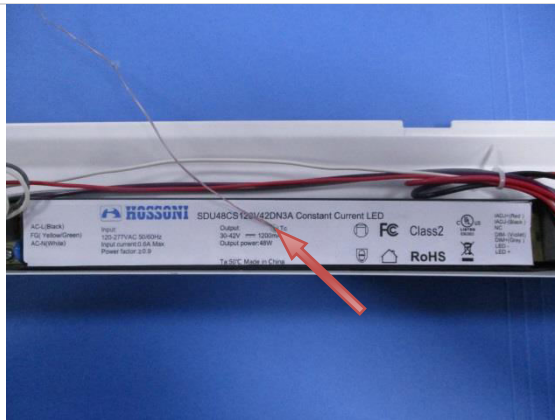
TMP_{LED}(Bird's-eye View)



TMP_c(Zoomed-in View)



TMP_c (Bird's-eye View)



Test Data

[Integrating Sphere System]

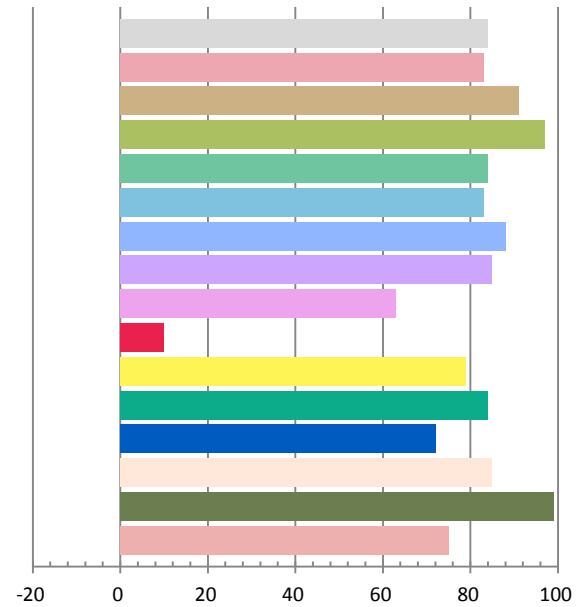
Photometric and Electrical Measurement Result

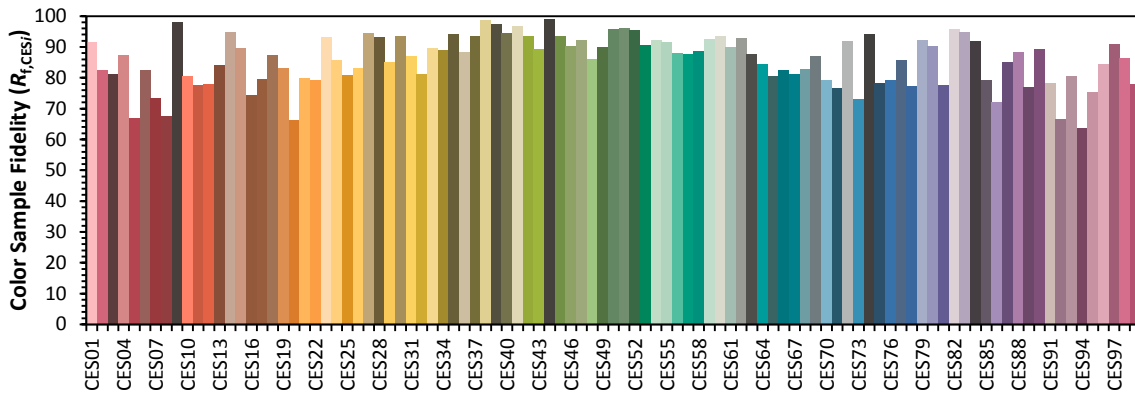
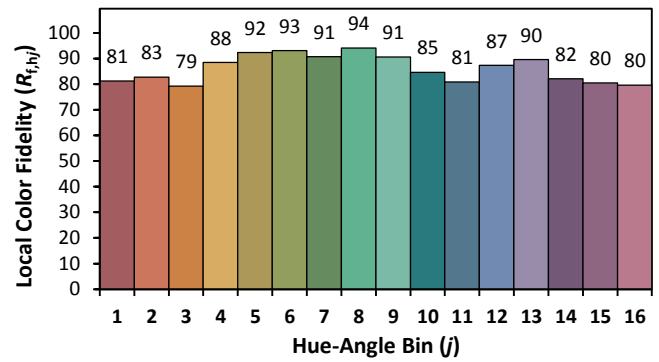
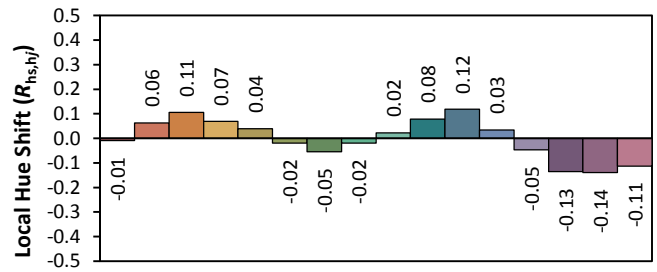
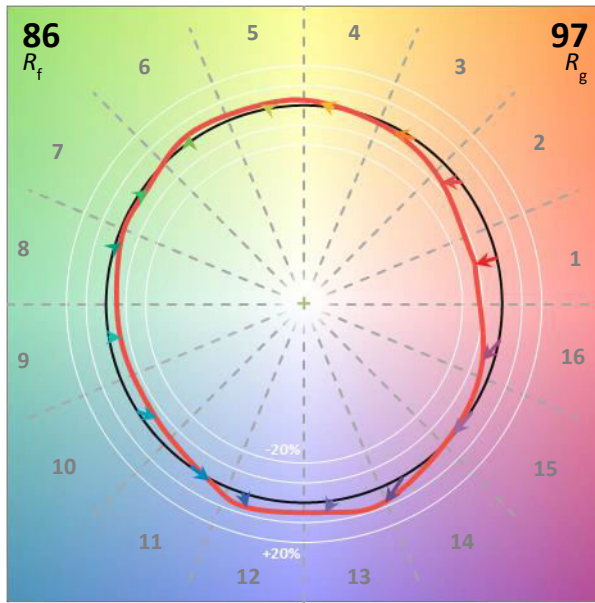
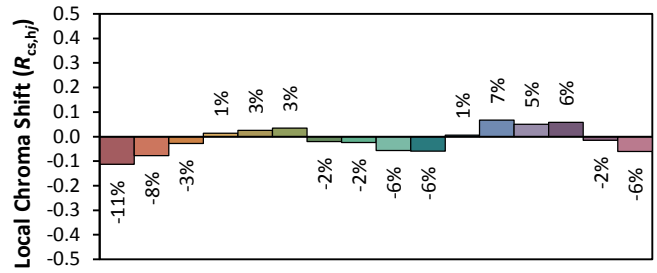
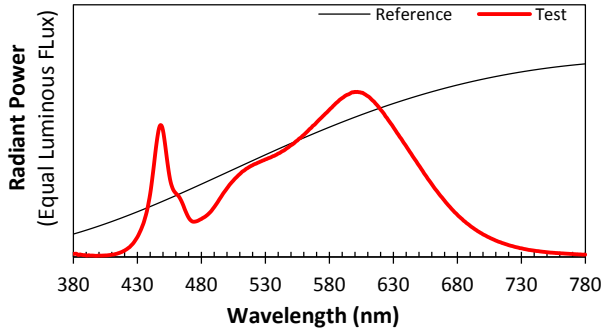
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.4093	48.96	0.9969	6449.6	131.72

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
19.578	3393	0.000168	0.4116	0.3942	0.2384	0.5136

Color Rendering Index

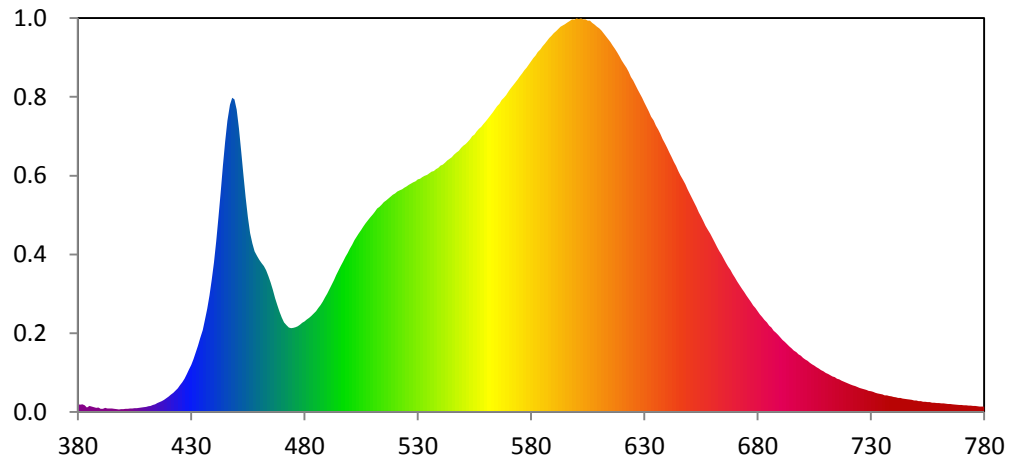
Ra			
84.1			
R1	R2	R3	R4
83	91	97	84
R5	R6	R7	R8
83	88	85	63
R9	R10	R11	R12
10	79	84	72
R13	R14	R15	
85	99	75	



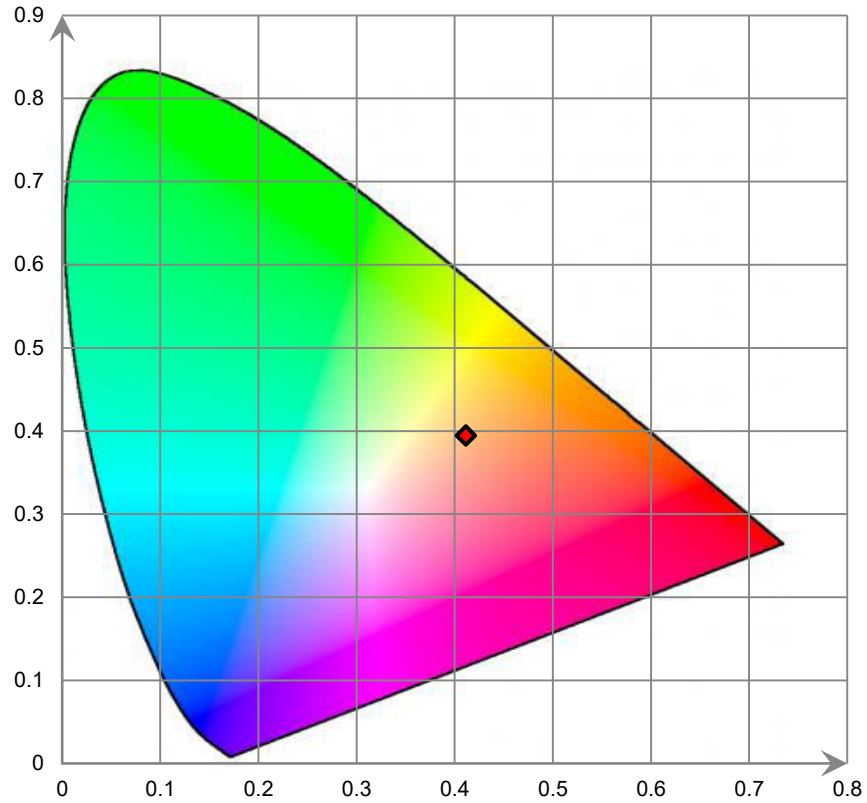


IES R_f	86
IES R_g	97
IES $R_{cs,h1}$	-11%

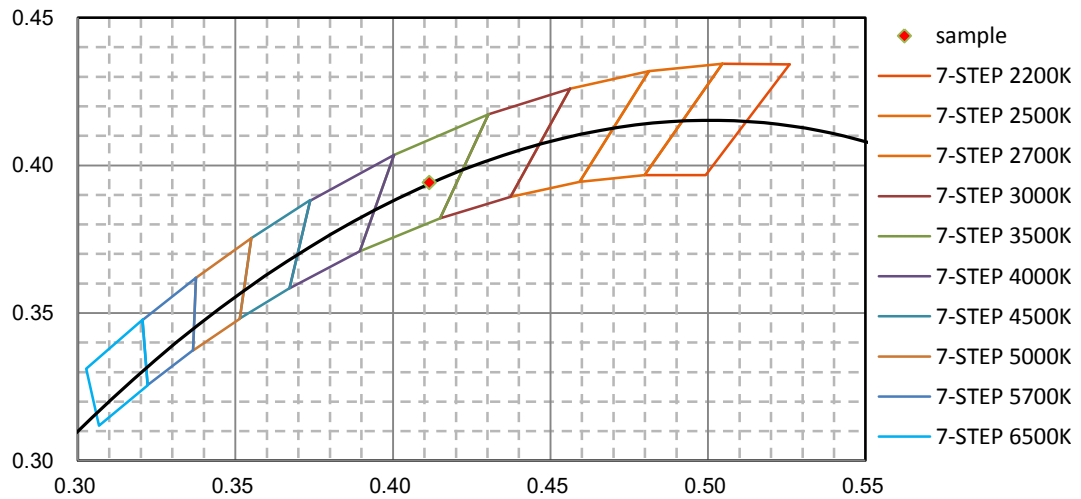
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

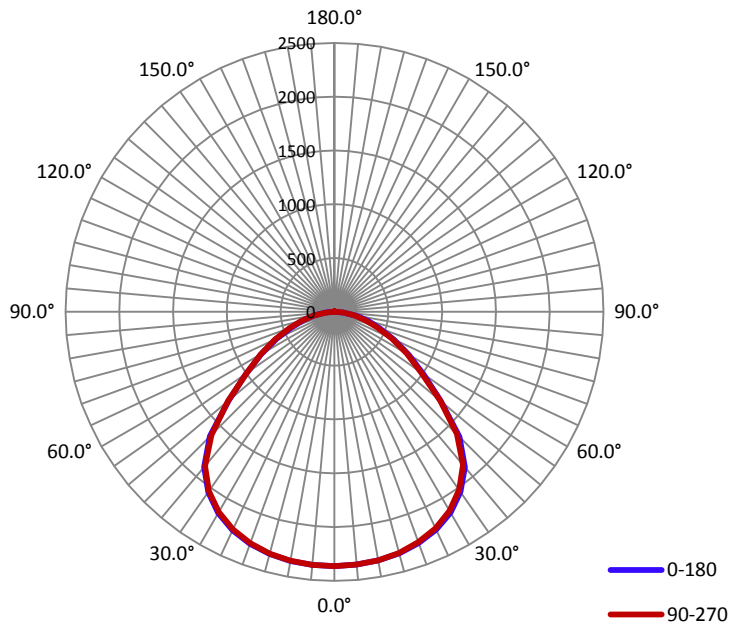
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.409	48.94	0.998

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
6450.5	131.85	2363.6	1.35	1.34

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	103.7	106.2	103.6	105.8	104.8
Field Angle (10% I _{max}):	156.7	158.5	156.0	158.5	157.4

UGR Value

Reflectances:			
Ceiling (cavity)		0.7	
Wall		0.5	
Reference plane		0.2	
Room dimensions		Viewed crosswise	Viewed endwise
X=4H	Y=8H	19.1	18.7

Luminous Intensity (cd) Distribution Data

C \ Y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	2363.6	2363.6	2363.6	2363.6	2363.6	2363.6	2363.6	2363.6
5.0°	2358.1	2358.5	2357.1	2356.3	2358.2	2360.4	2361.4	2361.0
10.0°	2345.1	2343.8	2341.3	2341.6	2344.6	2348.1	2349.3	2350.1
15.0°	2323.9	2319.7	2316.6	2315.0	2320.2	2323.1	2325.3	2328.9
20.0°	2288.3	2281.6	2277.2	2274.3	2278.9	2282.5	2288.0	2293.9
25.0°	2233.9	2224.4	2219.4	2215.1	2219.6	2222.9	2231.0	2238.3
30.0°	2155.6	2144.6	2136.6	2130.6	2137.0	2140.1	2148.5	2155.4
35.0°	2043.2	2033.9	2024.2	2017.5	2019.7	2024.0	2037.3	2044.9
40.0°	1885.0	1869.3	1847.9	1851.5	1857.8	1864.7	1878.7	1889.2
45.0°	1643.1	1613.6	1590.4	1600.4	1607.8	1617.6	1627.2	1650.0
50.0°	1286.5	1312.2	1317.8	1295.9	1284.6	1291.2	1323.6	1322.2
55.0°	1013.3	1031.9	1090.6	1017.9	987.7	1002.0	1080.8	1017.4
60.0°	799.9	816.3	863.3	785.8	773.3	787.8	842.5	790.5
65.0°	610.0	651.0	648.1	625.5	585.0	628.0	626.9	632.6
70.0°	449.5	503.0	488.9	481.7	424.5	479.3	477.9	487.2
75.0°	323.4	355.9	359.8	342.2	295.7	335.1	352.3	347.5
80.0°	210.8	217.1	216.2	202.9	185.1	199.7	208.9	210.2
85.0°	91.1	94.0	95.1	83.0	77.0	80.3	89.0	84.7
90.0°	2.2	5.6	9.0	6.3	4.3	4.1	3.1	0.0
95.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
105.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
110.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
115.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
120.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
125.0°	0.0	0.7	1.3	1.3	0.8	0.8	1.0	1.4
130.0°	1.2	1.7	1.8	1.5	1.5	1.5	2.0	1.7
135.0°	2.4	2.2	2.8	2.4	2.1	2.0	2.2	2.3
140.0°	2.5	3.2	3.1	2.9	3.4	2.8	2.8	2.8
145.0°	3.5	3.9	4.5	4.3	3.7	3.4	3.8	3.9
150.0°	4.2	4.5	5.0	4.6	4.9	4.1	4.3	4.6
155.0°	3.7	4.7	5.4	5.0	5.0	5.0	4.5	4.5
160.0°	4.4	5.2	5.1	5.0	5.3	4.8	4.7	4.4
165.0°	4.5	4.7	5.0	5.5	5.2	5.4	5.4	4.9
170.0°	4.8	5.8	5.6	6.3	5.9	6.0	6.0	5.5
175.0°	4.4	5.2	5.7	5.9	6.1	6.2	6.1	5.7
180.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	2363.6	2363.6	2363.6	2363.6	2363.6	2363.6	2363.6	2363.6
5.0°	2361.7	2362.4	2362.6	2361.2	2361.3	2359.5	2358.0	2357.2
10.0°	2350.5	2353.4	2353.1	2351.3	2348.6	2346.4	2343.8	2343.3
15.0°	2329.7	2332.0	2331.7	2328.9	2326.7	2321.1	2319.2	2319.2
20.0°	2295.2	2296.7	2295.7	2290.9	2288.4	2283.6	2279.9	2280.6
25.0°	2240.1	2242.1	2239.7	2233.7	2231.6	2224.5	2222.8	2222.1
30.0°	2159.6	2160.9	2158.5	2152.1	2149.7	2143.4	2141.2	2140.6
35.0°	2046.0	2047.1	2047.1	2038.9	2035.4	2028.7	2028.4	2027.5
40.0°	1883.2	1887.0	1881.3	1876.9	1869.8	1858.5	1847.9	1858.8
45.0°	1637.1	1643.4	1635.5	1625.1	1616.9	1601.2	1575.2	1585.3
50.0°	1281.8	1327.9	1341.1	1310.6	1294.3	1295.4	1309.5	1287.8
55.0°	1004.9	1020.9	1096.6	1031.7	1001.2	1029.2	1086.8	1015.0
60.0°	788.2	793.6	860.4	812.2	795.5	800.2	864.0	806.2
65.0°	595.6	635.5	644.8	650.2	607.1	640.8	650.3	643.4
70.0°	429.1	491.2	486.2	493.5	443.3	494.4	496.8	495.4
75.0°	297.8	345.7	353.7	344.1	314.1	350.9	367.5	351.3
80.0°	187.6	204.0	214.9	208.6	197.6	210.4	219.8	211.2
85.0°	74.6	83.2	89.6	89.0	86.1	90.5	97.2	90.0
90.0°	0.0	1.0	5.1	6.4	5.6	5.0	4.0	1.0
95.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
105.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
110.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
115.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
120.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
125.0°	0.0	0.8	0.8	0.0	0.0	0.0	0.8	0.0
130.0°	0.0	0.8	0.9	0.8	1.2	0.9	1.2	1.4
135.0°	1.2	1.4	2.0	1.6	2.0	1.5	2.4	2.3
140.0°	1.7	2.2	2.4	2.4	2.9	2.1	2.5	2.6
145.0°	2.8	2.4	2.8	3.3	3.2	3.2	3.6	3.4
150.0°	3.3	3.3	3.9	3.2	3.9	3.9	4.2	3.1
155.0°	3.4	3.7	4.3	4.3	4.7	4.5	4.8	4.9
160.0°	4.0	4.1	5.2	4.1	5.2	4.7	4.9	5.1
165.0°	4.2	4.5	5.6	5.0	5.2	5.2	4.9	5.2
170.0°	4.9	5.5	5.7	5.7	6.3	5.6	6.2	5.8
175.0°	4.6	4.7	5.7	6.2	6.5	6.0	6.7	5.6
180.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Control setting: **49W 4000K**

Integrating Sphere Test; Orientation: <u>Downward</u> ; Test Voltage: <u>120V 60Hz</u> ;				
Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
Light Output(lm)	7013	≥3000	≥2700	Pass
Total Efficacy(lm/W)	143.17	≥125	≥121.25	Pass
CCT(K)	4129	3710~4260	3710~4260	Pass
Duv	-0.000402	-0.005~0.007	-0.005~0.007	Pass
R_a	85.9	≥80	≥78	Pass

Note:

1. The test results were measured directly from the test equipment.
2. The DLC requirements were listed according to DLC Technical Requirements V4.4.
3. The conclusion is for reference only. Test report that indicate product performance meets DLC Technical Requirements do not represent official DLC product qualification. All decisions regarding product qualification are made by the DLC.

Test Data

[Integrating Sphere System]

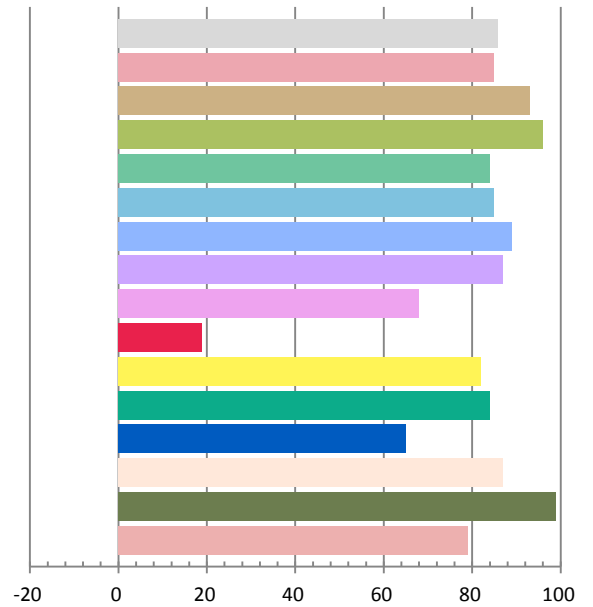
Photometric and Electrical Measurement Result

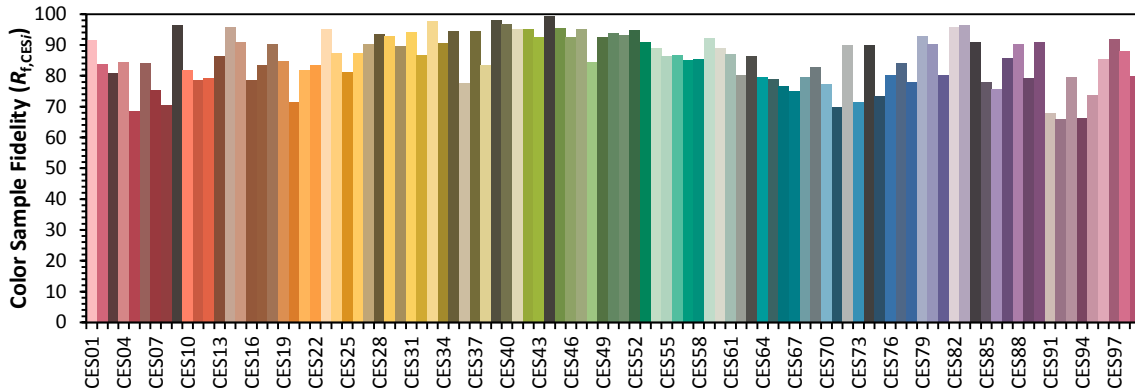
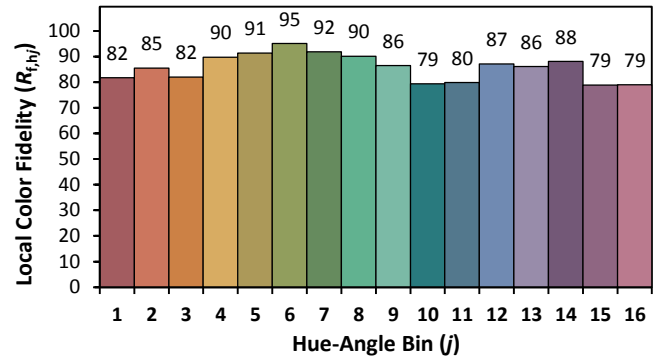
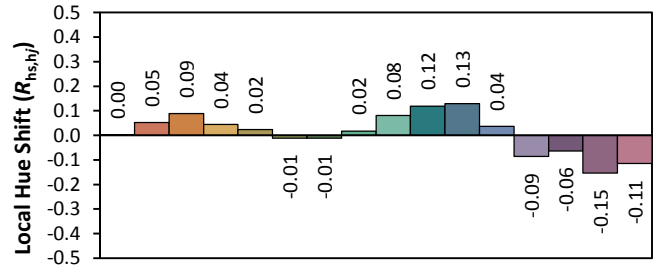
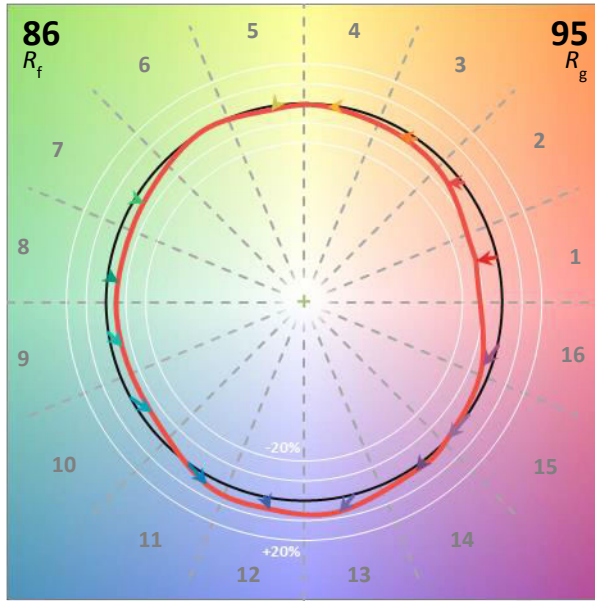
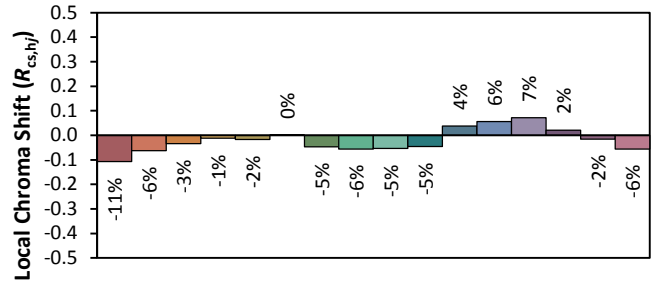
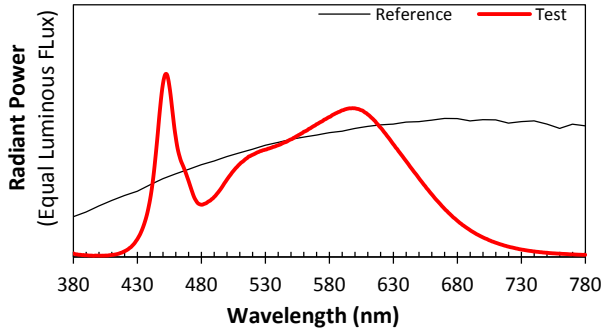
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.4095	48.98	0.9968	7013	143.17

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
21.745	4129	-0.000402	0.3747	0.3722	0.2231	0.4987

Color Rendering Index

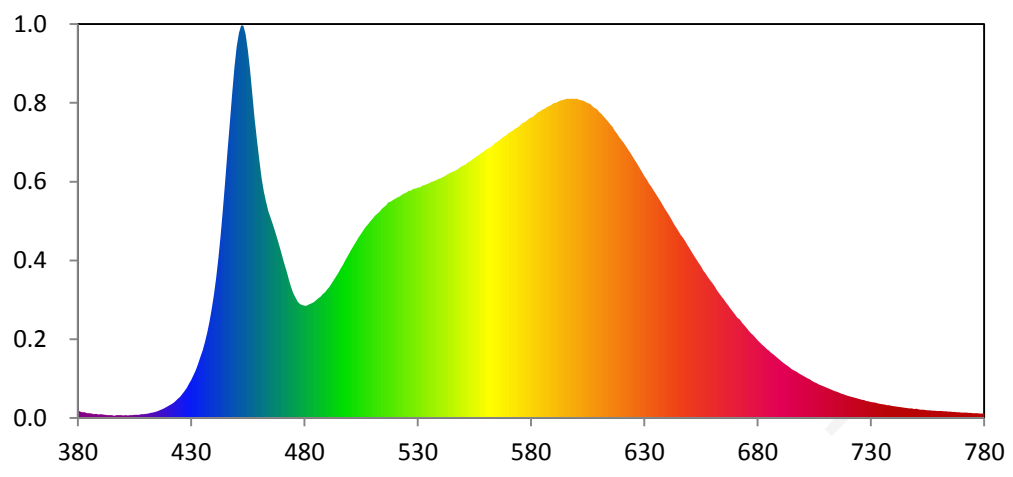
Ra			
85.9			
R1	R2	R3	R4
85	93	96	84
R5	R6	R7	R8
85	89	87	68
R9	R10	R11	R12
19	82	84	65
R13	R14	R15	
87	99	79	



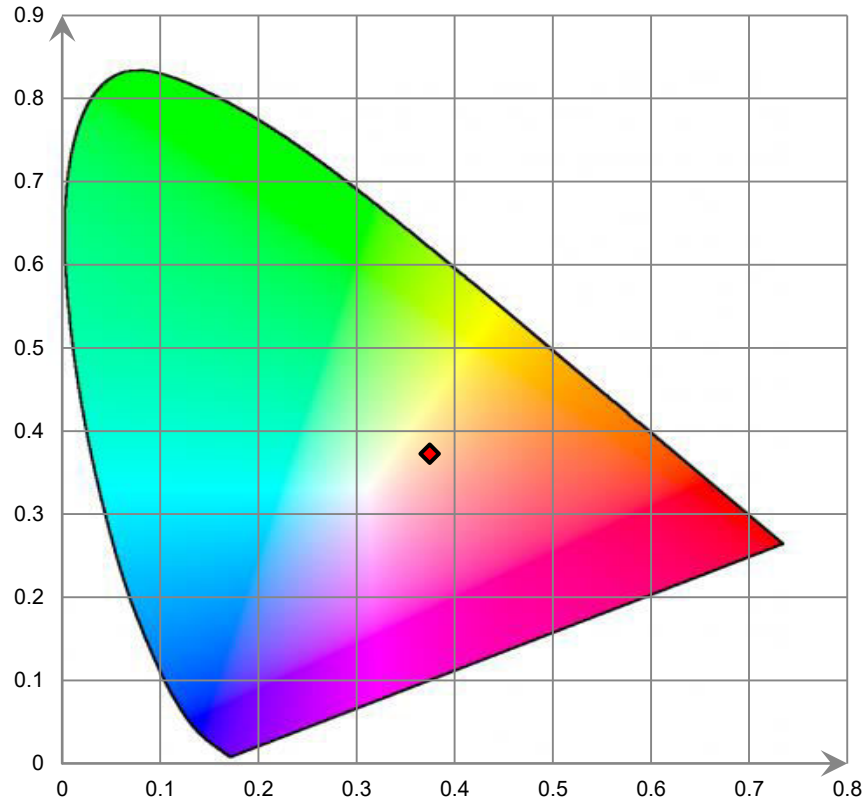


IES R_f	86
IES R_g	95
IES $R_{cs,h1}$	-11%

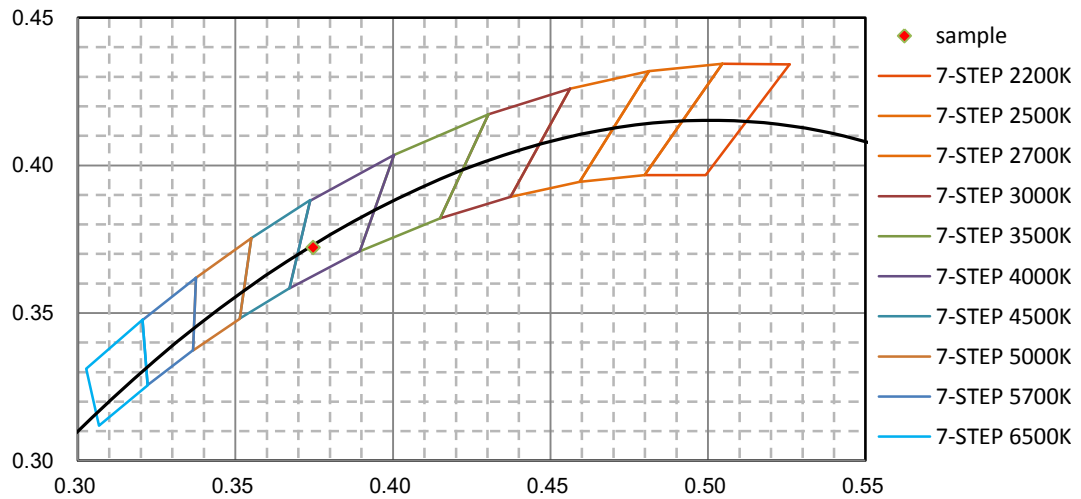
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



Control setting: **49W 5000K**

Integrating Sphere Test; Orientation: <u>Downward</u> ; Test Voltage: <u>120V 60Hz</u> ;				
Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
Light Output(lm)	6576.8	≥3000	≥2700	Pass
Total Efficacy(lm/W)	134.26	≥125	≥121.25	Pass
CCT(K)	4979	4746~5312	4746~5312	Pass
Duv	0.0017	-0.004~0.008	-0.004~0.008	Pass
R_a	85.2	≥80	≥78	Pass

Note:

1. The test results were measured directly from the test equipment.
2. The DLC requirements were listed according to DLC Technical Requirements V4.4.
3. The conclusion is for reference only. Test report that indicate product performance meets DLC Technical Requirements do not represent official DLC product qualification. All decisions regarding product qualification are made by the DLC.

Test Data

[Integrating Sphere System]

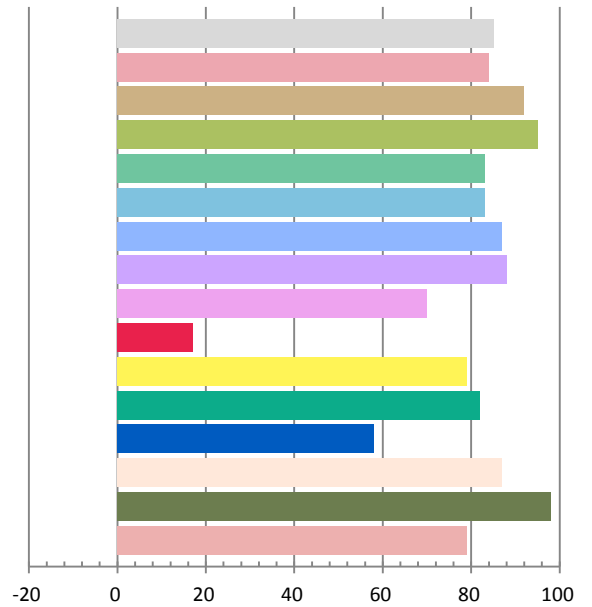
Photometric and Electrical Measurement Result

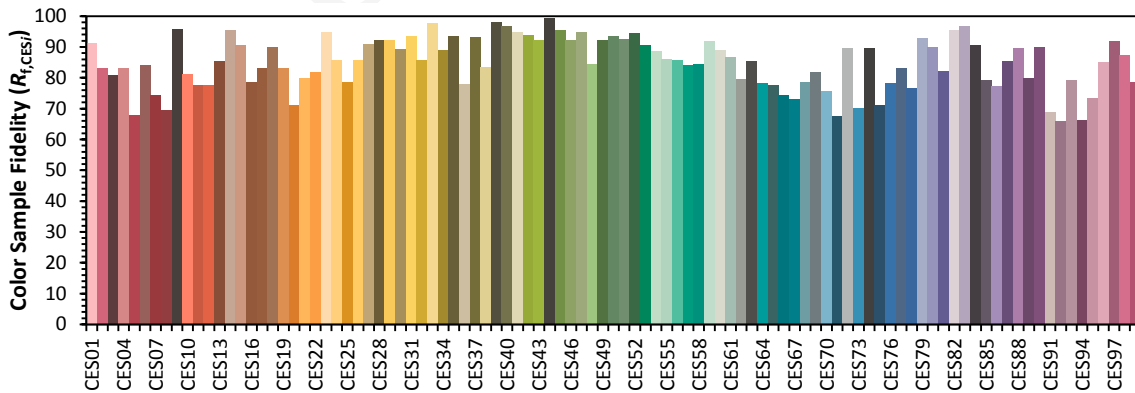
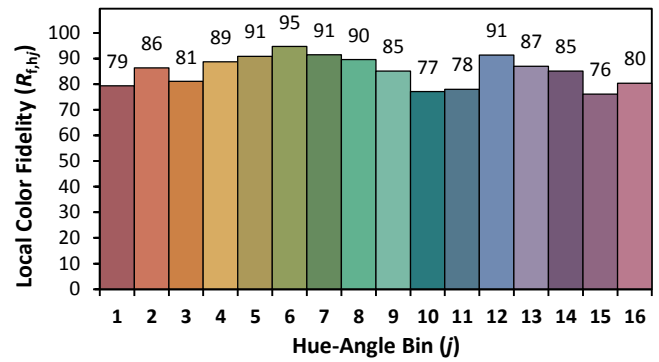
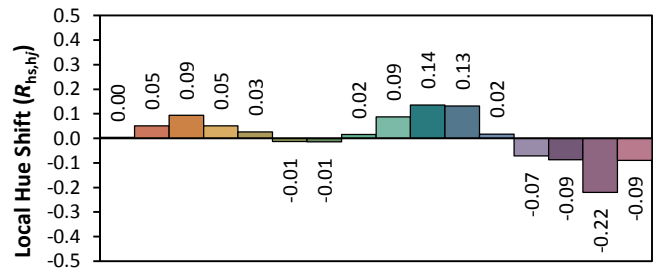
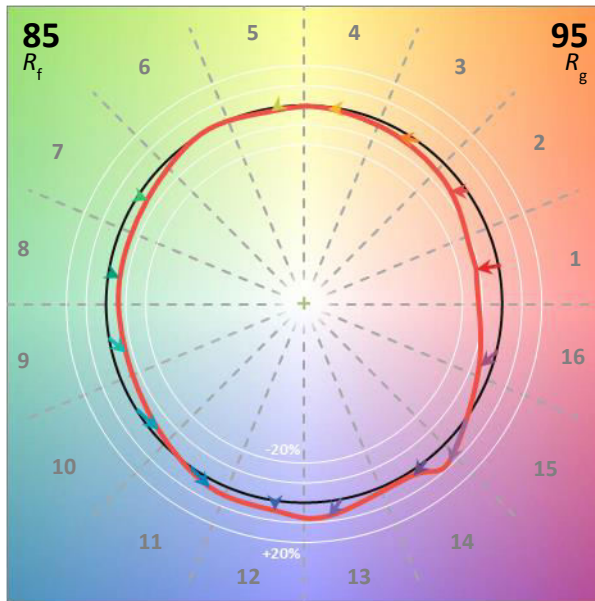
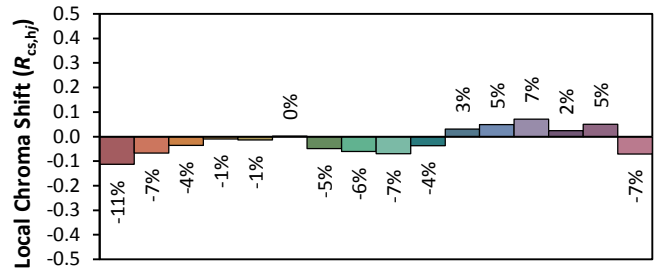
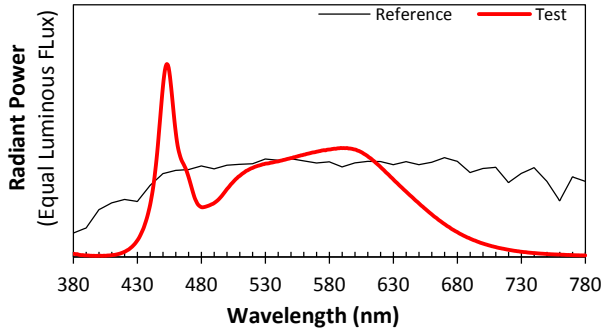
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.4095	48.98	0.9968	6576.8	134.26

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
20.705	4979	0.00170	0.3460	0.3558	0.2104	0.4868

Color Rendering Index

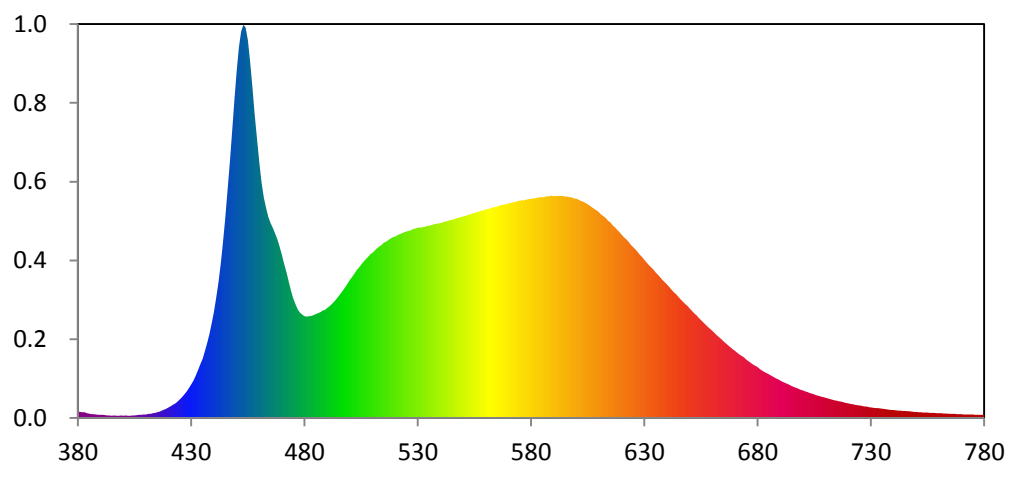
Ra			
85.2			
R1	R2	R3	R4
84	92	95	83
R5	R6	R7	R8
83	87	88	70
R9	R10	R11	R12
17	79	82	58
R13	R14	R15	
87	98	79	



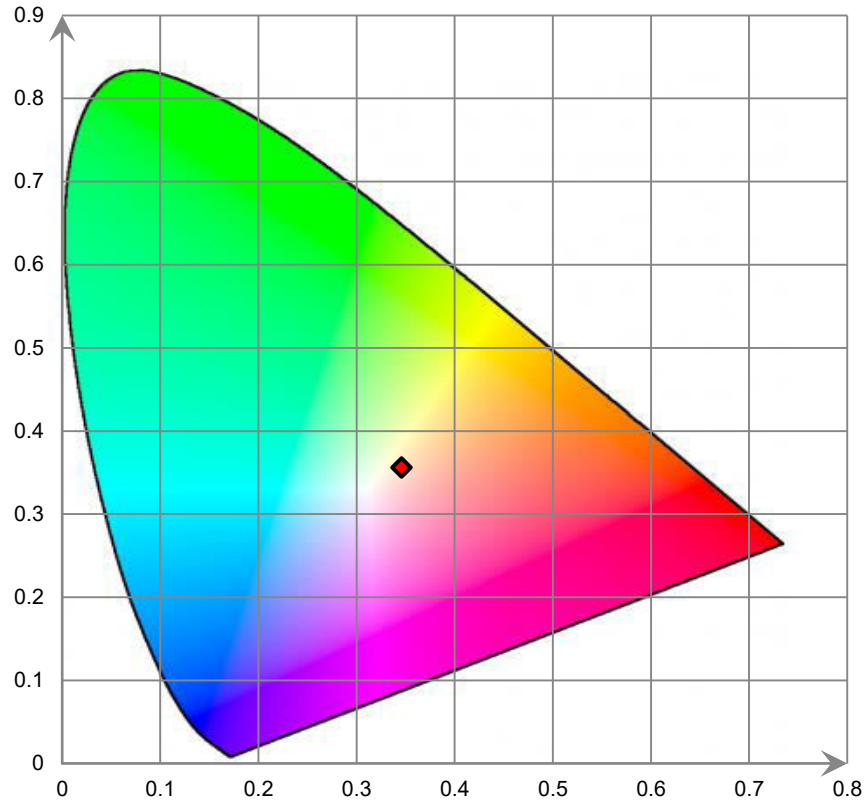


IES R_f	85
IES R_g	95
IES $R_{cs,h1}$	-11%

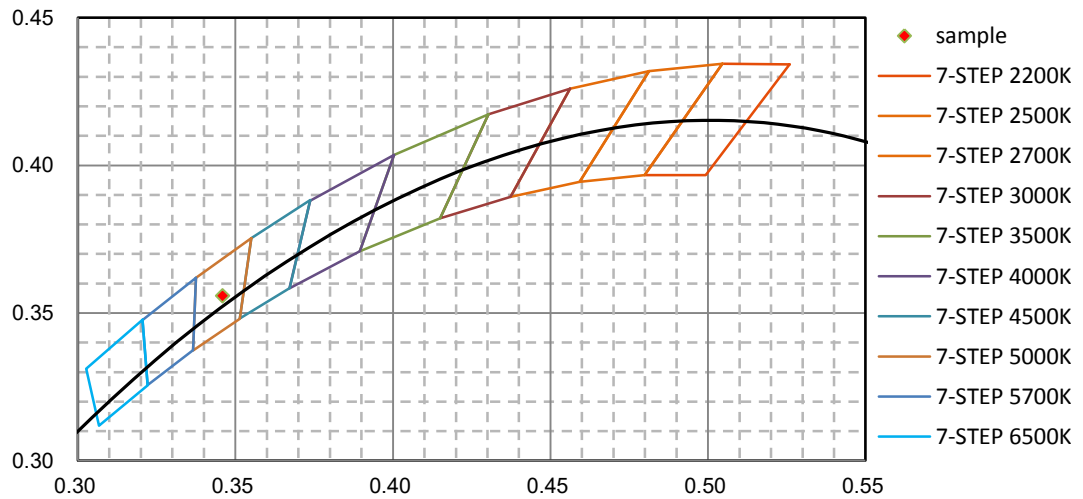
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



6. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
2.0m integrating sphere	EVERFINE	R98	G121960CS1361154D	2019-12-23	2020-12-22
spectroradiometer	EVERFINE	HAAS-2000	M12048CS1361148	2019-12-23	2020-12-22
Digital CC&CV DC Power Supply	EVERFINE	WY305	G115986CN1361134	2019-02-14	2020-02-13
Temperature/humidity/clock	KEJIAN	TA298	EE053	2019-12-02	2020-12-01
Standard Light Source	INVENTFINE	N/A	JWWCR020106	2019-11-19	2020-11-18
Digital Power Meter	YOKOGAWA	WT210	91KB35700	2019-04-23	2020-04-22
Intelligence ac power supply	EVERFINE	DPS1005	G119890CS1361121	2019-02-14	2020-02-13
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2019-04-23	2020-04-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2019-04-23	2020-04-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	2019-04-23	2020-04-22
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	2019-01-24	2020-01-23
Wireless Weather Station	ZHONGXING	KG218	N/A	2019-12-02	2020-12-01
Standard Light Source	INVENTFINE	N/A	JWBYR040008	2019-03-08	2020-03-07
Digital Multimeter	FLUKE	115C	37840512WS	2019-10-08	2020-10-07
Hybrid Recorder	YOKOGAWA	DR230	4TJH0903	2019-04-24	2020-04-23
Power Supply	SC	SC/BP-11003	1608110030553	2019-12-14	2020-12-13

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Kunshan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

7. Test Method

Product was tested with no seasoning. All stabilization and measurements were made in compliance with IES LM-79-08. The ambient temperature of the sample was maintained at 25°C±1°C during measurement. And relative humidity is less than 65%.The product was operated in its intended orientation in application during all testing.

Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, Spectroradiometer, and integrating sphere. The integrating sphere system is calibrated by standard spectrum light source before measurement. 4π geometry was used during measurement.

Goniophotometer System

Type C goniophotometer was used for measuring luminous intensity distribution. The vertical angle (γ) test intervals were set no more than 1 degree while data for 5 degree intervals is reported. The horizontal angle (C plane) test intervals were set no more than 22.5 degree.

ISTMT Test

The LED which has the highest temperature was measured at the location of LED case which is specified by LED source manufacturer and detailed by LM-80 report. The drive current of LED package/module/ array was calculated as the total output current of the driver measured by multimeter, divided by the number of branches in parallel of LEDs.

*****END OF REPORT*****