LM-79-08 Test Report

For

JIANGMEN HHHLED LIGHTING CO.,LTD

(Brand Name: HHHLED)

4th Building, #46 GaoXin East Rd., JiangHai District, JiangMen City, GuangDong Province, China

2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces

Model name(s): HFPL22D-36-XX-XX-PT-S
Remark: The second "XX" can be any letters to represents model color.

Representative (Tested) Model: HFPL22D-36-XX-WH-PT-S(0%,3500K)

Model Different: N/A

Test & Report By:

Garman Mo

Engineer: Garman Mo

Review By:

Johnson Sun

Manager: Johnson Sun

Date: Jan.09,2020

Update:Mar.03,2020

Note: 1.The results contained in this report pertain only to the tested samples.

2.This report does not imply product certification, approval, or endorsement by A2LA, or any agency of the Federal Government.

Revision Details

Report No. Revision	Revised Item: Adding data at all three CCT settings.	Revised Reason	Issue date
JDE190807-K		DLC requirement	Jan.09,2020
JDE190807-K-R			Mar.03,2020

1.1 Product Information:

Organization Name	JIANGMEN HHHLED LIGHTING CO.,LTD	
Brand Name	HHHLED	
Model Number	HFPL22D-36-XX-XX-PT-S	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces	
Rated Voltage / Frequency	120-277Vac, 50/60Hz	
Nominal Power	36W	
Rated Initial Lamp Lumen	--	
Declared CCT	3500K,4000K,5000K	
LED Manufacturer	Samsung Electronics Co., LTD.	
LED Model	SPMWHR22xxx5xxxxxx	
Sample Number	JDE190807-K1	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

Photo

1.2 Test Specifications:

Date of Receipt	Dec.18,2019
Date of Test	Dec.20,2019 & Mar.03,2020
Test item	1. Total Luminous Flux 2. Luminous Distribution Intensity 3. Luminous Efficacy 4. Correlated Color Temperature 5. Color Rendering Index 6. Chromaticity Coordinate 7. Electrical Parameters
Reference Standard	1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products 2. ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products 3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources 4. CIE 15-2004 Technical Report Colorimetry 5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source 6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems

1.3 Test Methods

1) Photometric and Light Distribution Measurement – Goniophotometer Method:

Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at 25° C ± 1° C, measured at a point not more than 1 m from the sample and at the same height as the sample. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals.

2) Chromaticity Measurement – Sphere-Spectroradiometer Method:

Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25º C ± 1º C. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral power distribution taken at 5 nm intervals over the range of 380 to 780 nm.

3) Electrical Measurements:

Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at 25º C ± 1º C. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Voltage, frequency, current, power, power factor and total harmonic distortion were measured by and read from the power meter.

2.1 Electrical, Photometric and Chromaticity Measurements

Test date	2019-12-20 & 2020-03-03	Test Ambient:	25±1 ° C
Test Orientation	As intended	Stabilization Time (min)	60
Model Number	HFPL22D-36-XX-WH-PT-S(0%,3500K)	Total Operating Time (min)	90

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JDE190807-K1	120.0	60	0.3025	35.90	0.9890	7.10
	277.1	60	0.1410	35.53	0.9094	6.90
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method(Self-absorption:1.0443):

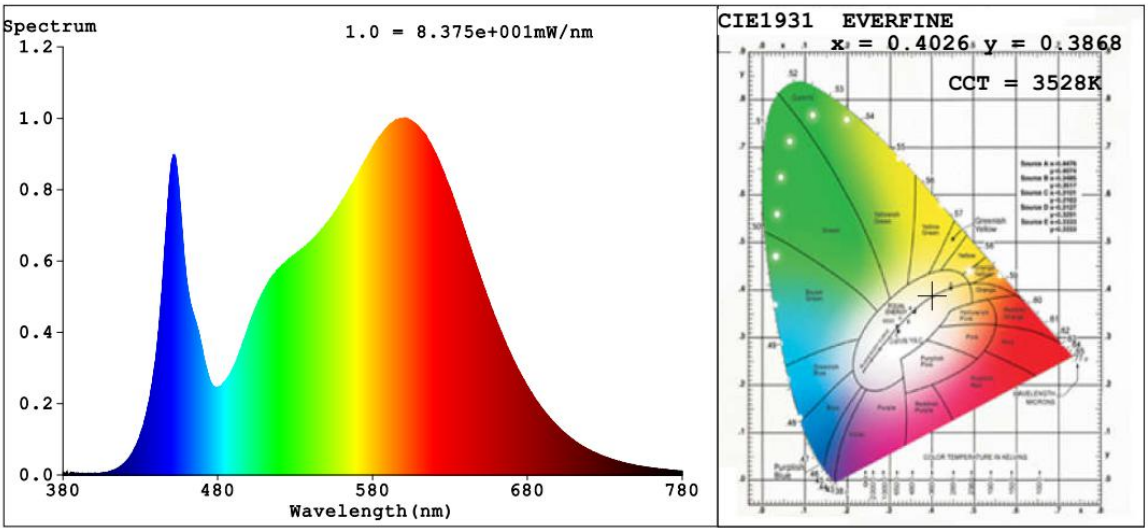
Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3528
Duv	-0.0011
Chromaticity (x, y)	x=0.4026 y=0.3868
Chromaticity (u', v')	u'=0.2355 v'=0.5092
Color Rendering Index (CRI)	84.5
R9	14

Special Color Rendering Indices			
R1	83	R9	14
R2	92	R10	80
R3	96	R11	83
R4	83	R12	69
R5	84	R13	86
R6	89	R14	99
R7	85	R15	77
R8	64	--	--

Photometric Measurement – Goniophotometer Method(Test Distance: 26.000m):

Parameter	Result		DLC V4.4 Pass Criteria	
Test Voltage (V)	120.0	277.1	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	4416.0	4450.9	>=2000 (-10%)	
Luminous Efficacy (lm/W)	123.00	125.28	Standard: >= 100(-3%)	Premium: >= 125(-3%)
Zonal lumens in the 0-60° zone (%)	78.2	--	>= 75(-3)	
SC: 0-180° (if applicable)	1.30	--	1.0-2.0(±0.1)	
SC: 90-270° (if applicable)	1.28	--	1.0-2.0(±0.1)	
Beam Angle (°)	114.6	--	--	
Center Beam Candle Power (cd)	1503	--	--	

Spectral Power Distribution & Chromaticity Diagram

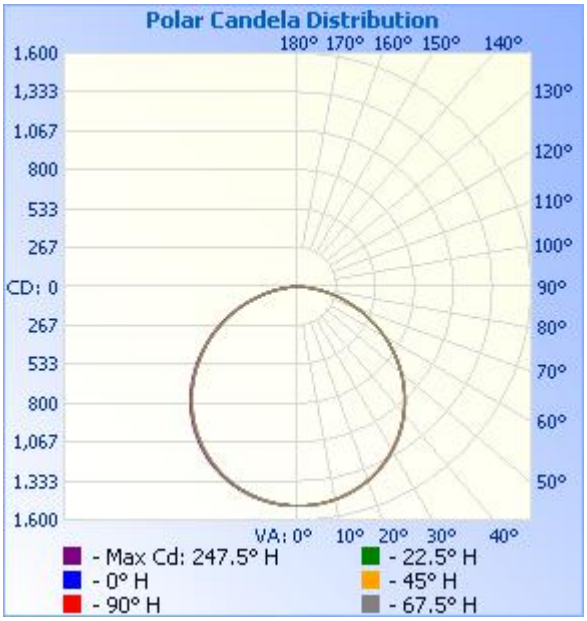


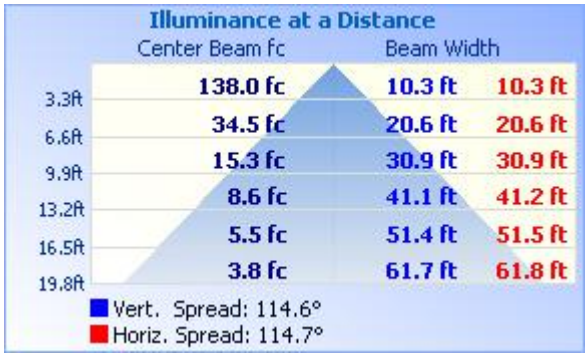
Zonal Lumen Tabulation

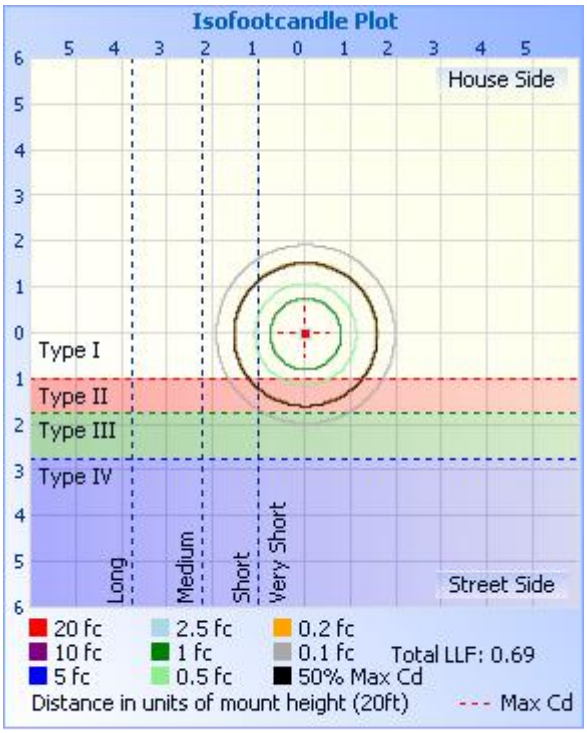
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,176.7	26.6%
0-40	1,936.9	43.9%
0-60	3,453.6	78.2%
60-90	950.2	21.5%
70-100	400.8	9.1%
90-120	5.3	0.1%
0-90	4,403.8	99.7%
90-180	11.8	0.3%
0-180	4,415.6	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	142.3	3.2%	90-100	1.7	0%
10-20	409.4	9.3%	100-110	1.7	0%
20-30	625.0	14.2%	110-120	1.9	0%
30-40	760.1	17.2%	120-130	2.0	0%
40-50	794.9	18.0%	130-140	1.7	0%
50-60	721.8	16.3%	140-150	1.3	0%
60-70	551.1	12.5%	150-160	0.9	0%
70-80	316.8	7.2%	160-170	0.5	0%
80-90	82.3	1.9%	170-180	0.2	0%

Photometric Data







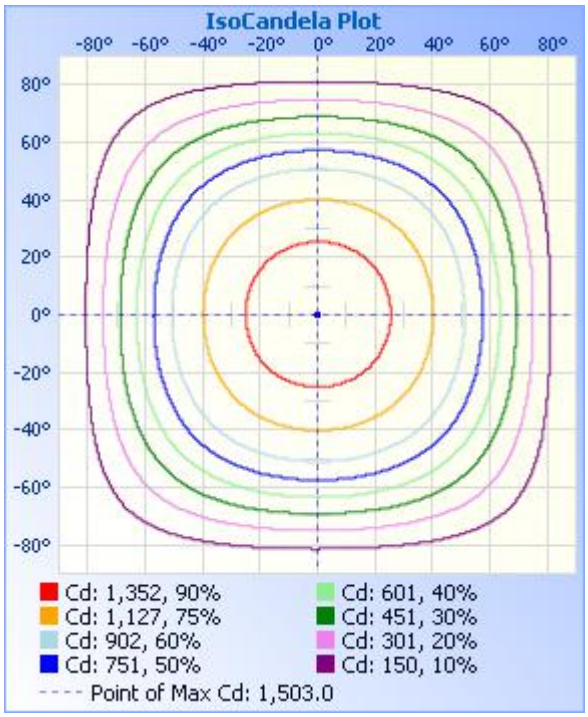


Table--1 UNIT: cd

C(DEG) / γ (DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5
0	1503	1503	1503	1503	1503	1503	1503	1503	1503	1503	1503	1503	1503	1503	1503	1503
5	1496	1497	1498	1498	1498	1498	1498	1498	1497	1496	1496	1496	1495	1495	1496	1497
10	1478	1480	1481	1482	1482	1482	1482	1481	1479	1478	1478	1477	1477	1476	1477	1478
15	1449	1451	1452	1454	1455	1454	1454	1453	1451	1449	1447	1446	1446	1445	1446	1448
20	1408	1410	1412	1414	1415	1415	1414	1413	1409	1407	1405	1405	1404	1403	1404	1406
25	1355	1357	1359	1362	1363	1362	1362	1361	1357	1354	1352	1351	1351	1349	1350	1352
30	1289	1293	1295	1297	1299	1299	1298	1297	1292	1290	1287	1286	1285	1284	1284	1287
35	1213	1217	1220	1222	1224	1223	1222	1221	1217	1213	1211	1210	1209	1208	1208	1210
40	1127	1130	1132	1135	1136	1136	1136	1135	1130	1126	1124	1123	1122	1120	1120	1122
45	1029	1032	1035	1037	1038	1038	1038	1038	1034	1029	1028	1026	1025	1023	1023	1025
50	922	926	928	930	931	931	932	931	926	923	921	919	917	915	917	918
55	806	809	812	814	815	815	819	815	811	808	806	803	800	799	802	803
60	682	685	688	691	692	692	693	692	688	685	684	680	677	676	679	680
65	554	556	560	564	565	564	565	564	560	558	555	552	550	549	550	552
70	423	426	430	434	435	435	434	433	430	428	425	423	421	420	420	422
75	294	297	302	306	308	308	306	303	302	300	297	295	293	292	293	294
80	171	175	182	186	187	188	186	179	177	176	176	175	173	172	171	171
85	66.3	68.3	71.6	76.9	78.5	78.8	74.5	71.5	70.5	68.0	66.9	68.2	67.3	66.4	64.2	65.0
90	2.24	2.22	2.44	2.21	2.41	2.50	2.49	2.26	1.77	1.61	1.62	1.52	1.62	1.57	1.62	1.62
95	1.52	1.57	1.62	1.52	1.52	1.68	1.73	1.52	1.31	1.25	1.36	1.26	1.21	1.31	1.52	1.26
100	1.46	1.52	1.52	1.41	1.41	1.62	1.36	1.42	1.46	1.31	1.46	1.31	1.26	1.41	1.57	1.31
105	1.52	1.67	1.57	1.42	1.62	1.62	1.62	1.68	1.73	1.57	1.78	1.52	1.36	1.52	1.89	1.58
110	1.88	1.88	1.67	1.68	1.78	1.83	1.89	1.73	1.99	1.88	1.78	1.57	1.68	1.68	1.89	1.94
115	2.29	2.45	1.88	1.68	1.99	1.94	2.04	2.25	2.25	2.14	1.78	1.41	1.89	1.62	1.89	2.00
120	2.51	2.56	1.99	1.68	1.94	2.09	2.26	2.41	2.30	2.14	1.78	0.00	2.04	2.09	1.84	1.94
125	2.51	2.56	2.09	2.25	2.67	2.61	2.26	2.47	2.35	2.14	1.73	1.83	2.57	2.46	1.68	1.94
130	2.51	2.56	2.09	2.30	2.67	2.62	2.20	2.57	2.46	2.14	1.67	1.83	2.52	2.46	1.68	1.94
135	2.56	2.40	1.88	2.36	2.67	2.62	2.05	2.57	2.40	2.14	1.67	1.83	2.46	2.35	1.57	1.94
140	2.56	2.30	1.52	2.36	2.67	2.62	1.68	2.31	2.40	2.14	1.20	1.83	1.99	2.09	1.52	1.94
145	2.56	2.14	1.20	2.20	2.31	2.31	1.15	2.10	2.40	2.14	1.20	1.83	2.05	2.15	1.57	1.94
150	2.46	2.09	1.05	2.10	2.51	2.25	1.10	1.94	2.25	2.14	1.36	1.78	2.46	2.36	1.68	1.73
155	2.20	1.83	1.05	2.04	2.46	2.10	1.10	1.89	2.09	2.09	1.57	1.73	2.10	2.25	1.94	1.63
160	1.93	1.68	1.05	1.83	2.31	1.94	1.10	1.84	2.20	2.09	1.67	1.68	1.99	2.25	2.05	1.63
165	1.93	1.77	1.20	1.78	2.20	1.94	1.47	1.73	2.25	2.25	1.88	1.68	2.04	2.25	2.10	1.68
170	2.35	1.72	1.41	2.09	2.20	2.04	1.68	1.78	2.51	2.67	1.88	1.68	2.57	2.51	2.36	1.68
175	2.35	1.72	1.62	2.36	2.46	2.36	1.68	1.78	2.30	2.20	1.83	1.68	2.15	2.51	2.26	1.68
180	2.20	1.72	1.67	2.25	2.62	2.36	1.68	1.78	2.09	2.20	1.73	1.68	2.20	2.46	2.26	1.68

2.2 Electrical, Photometric and Chromaticity Measurements

Test date	2020-03-03	Test Ambient:	25±1 ° C
Test Orientation	As intended	Stabilization Time (min)	60
Model Number	HFPL22D-36-XX-WH-PT-S(50 %,4000K)	Total Operating Time (min)	61

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JDE190807-K1	120.0	60	0.2925	34.75	0.9901	6.33
	277.0	60	0.1356	34.38	0.9153	6.76
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method(Self-absorption:1.0442):

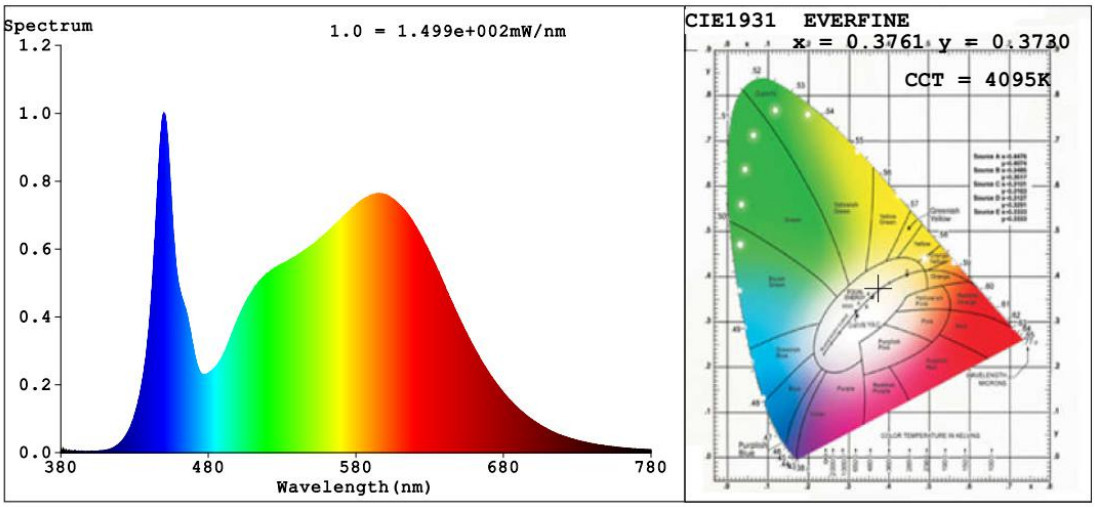
Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	4095
Duv	-0.0004
Chromaticity (x, y)	x=0.3761 y=0.3730
Chromaticity (u', v')	u'=0.2237 v'=0.4993
Color Rendering Index (CRI)	84.8
R9	16

Special Color Rendering Indices			
R1	84	R9	16
R2	90	R10	77
R3	95	R11	84
R4	84	R12	64
R5	84	R13	85
R6	87	R14	98
R7	87	R15	78
R8	68	--	--

Photometric Measurement – Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.4 Pass Criteria	
Test Voltage (V)	120	277	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	4783	4821	>=2000 (-10%)	
Luminous Efficacy (lm/W)	137.64	140.23	Standard: >= 100(-3%)	Premium: >= 125(-3%)

Spectral Power Distribution & Chromaticity Diagram



2.3 Electrical, Photometric and Chromaticity Measurements

Test date	2020-03-03	Test Ambient:	25±1 ° C
Test Orientation	As intended	Stabilization Time (min)	60
Model Number	HFPL22D-36-XX-WH-PT-S(100%,5000K)	Total Operating Time (min)	61

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JDE190807-K1	120.0	60	0.2955	35.13	0.9906	6.21
	277.0	60	0.1361	34.69	0.9203	5.93
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method(Self-absorption:1.0440):

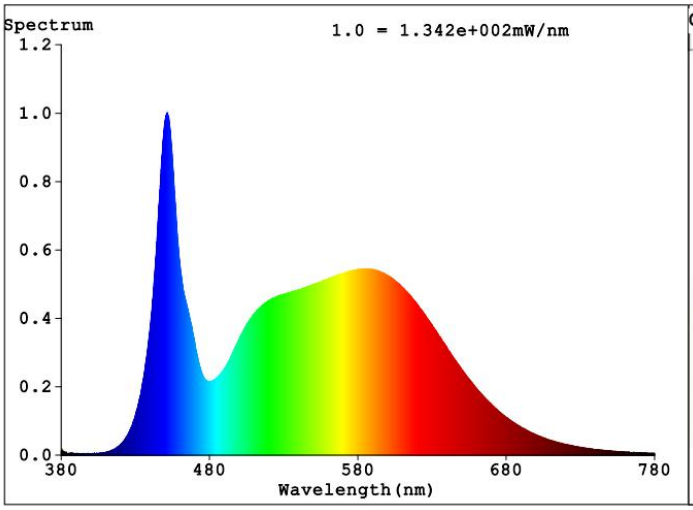
Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	5132
Duv	0.0007
Chromaticity (x, y)	x=0.3416 y=0.3502
Chromaticity (u', v')	u'=0.2096 v'=0.4835
Color Rendering Index (CRI)	84.2
R9	12

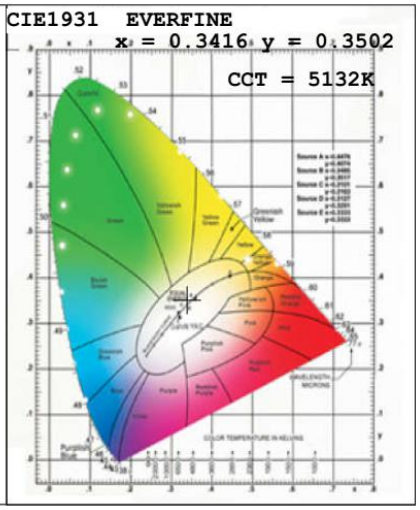
Special Color Rendering Indices			
R1	83	R9	12
R2	89	R10	74
R3	93	R11	84
R4	84	R12	63
R5	84	R13	85
R6	85	R14	96
R7	87	R15	78
R8	69	--	--

Photometric Measurement – Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.4 Pass Criteria	
Test Voltage (V)	120	277	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	4532	4568	>=2000 (-10%)	
Luminous Efficacy (lm/W)	129.01	131.68	Standard: >= 100(-3%)	Premium: >= 125(-3%)

Spectral Power Distribution & Chromaticity Diagram





3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-423	2 meter Integrating Sphere	Verified by D204 standard lamp	
ST-R-327	Spectral analysis system HAAS-2000	Verified by D204 standard lamp	
ST-R-332	Standard Lamp	2019-07-09	2020-07-08
ST-R-333	Power Meter for Integrating Sphere	2019-06-27	2020-06-26
ST-R-405	Temperature Probe for Integrating Sphere	2020-01-23	2021-01-22
ST-R-355	Goniophotometer system	Verified by D908S standard lamp	
ST-R-359	Standard Lamp	2019-07-09	2020-07-08
ST-R-358	Power Meter for Goniophotometer	2019-06-27	2020-06-26
ST-R-354	hygrothermograph for Goniophotometer	2019-06-28	2020-06-27
Expand Uncertainty: Photometric Measurement (Sphere):3.06%, k=2 Chromaticity Measurement(Sphere):43.46K, k=2 Photometric Measurement(Goniophotometer):3.38%, k=2			

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