LM-79-08 Test Report

For

Revolution Lighting Technologies, Inc.

(Brand Name: Revolution Lighting Technologies)

2280 Ward Ave, Simi Valley, CA 93065

3-lamp External Driver Lamp-Style Retrofit Kits

(UL Type C)

Model name(s): 202422-21X
Remark: The "X" stands for different CCT as bellow: 1=3000K, 2=3500K, 3=4000K, 5=5000K.

Representative (Tested) Model: 202422-211
202422-215

Model Difference: All construction and rating are the same, except CCT

Test & Report By:

Clint Chen

Engineer: Clint Chen
Date: Jul.09,2018

Review By:

Manager: John Li

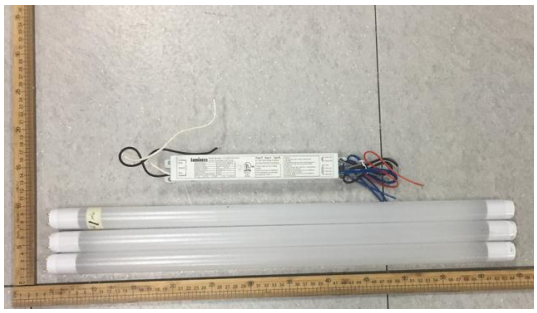
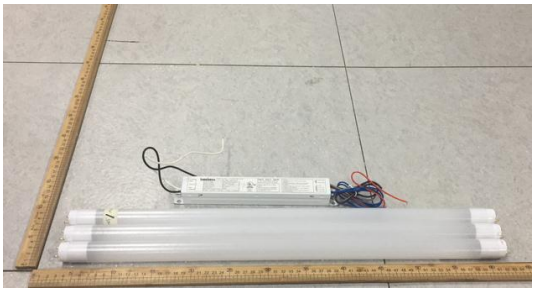
Note: 1.The results contained in this report pertain only to the tested samples.
2.This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

1.1 Product Information:

Organization Name	Revolution Lighting Technologies, Inc.	
Brand Name	Revolution Lighting Technologies	
Model Number	202422-21X	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	3-lamp External Driver Lamp-Style Retrofit Kits (UL Type C)	
Rated Voltage / Frequency	120-277 Vac, 50/60 Hz	
Nominal Power	10.5W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K, 3500K, 4000K, 5000K	
LED Manufacturer	EVERLIGHT ELECTRONICS CO., LTD	
LED Model	67-21S/KK5C-H3030N4P02430Z6/2T(HN), 67-21S/KK5C-H5050N42PA2430Z6/2T(HN)	
Sample Number	JBE180607-B1, B2, B3(3000K), B4(5000K),	
Lamp Length	600	mm
Lamp Width	--	mm
Number of Units (modular products)	N/A	s

Photo



1.2 Test Specifications:

Date of Receipt	Jul.07,2018
Date of Test	Jul.09,2018
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
Reference Work Instruction	QD25

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 25 ºC ±1 ºC. 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 25 ºC ±1 ºC. 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

(Refer to Work Instruction QD25)

Test date	2018-07-09	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	202422-211		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE180607-B1	120.0	60	0.0849	10.13	0.9941	3.83
	277.0	60	0.0393	10.26	0.9424	8.76
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

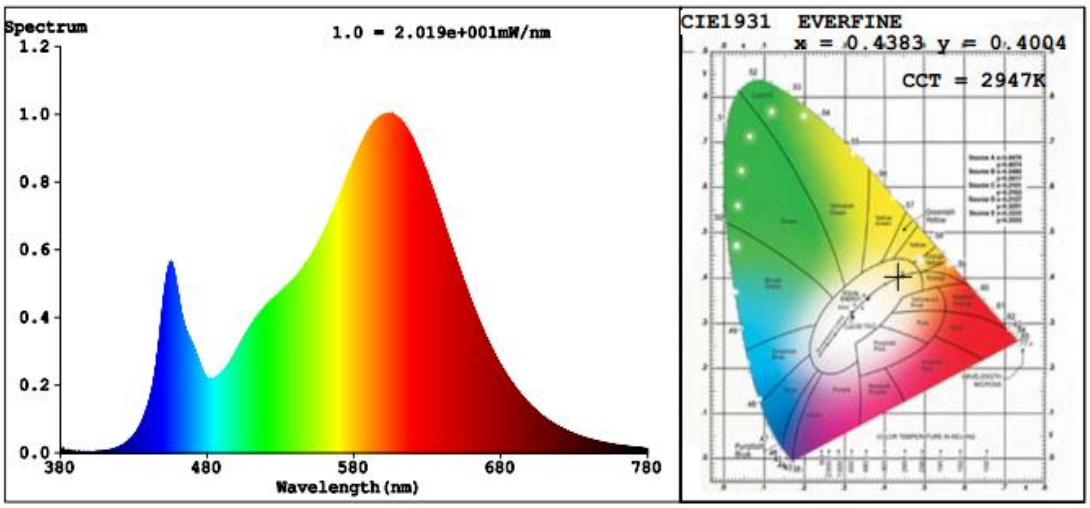
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	2947
Duv	-0.0017
Chromaticity (x, y)	x=0.4383 y=0.4004
Chromaticity (u', v')	u'=0.2531 v'=0.5201
Color Rendering Index (CRI)	82.1
R9	5

Special Color Rendering Indices			
R1	81	R9	5
R2	93	R10	84
R3	93	R11	78
R4	79	R12	73
R5	82	R13	84
R6	92	R14	97
R7	80	R15	74
R8	57	--	--

Photometric Measurement for Bare-lamp –Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.3 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	1349	1337	Bare Lamp: 800(±10%)
Luminous Efficacy (lm/W)	133.17	130.31	Bare lamp: >= 110(-3%)
Most worst Luminous/Highest Watts	130.31		

Spectral Power Distribution & Chromaticity Diagram



2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2018-07-09	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	202422-211		

Electrical Measurement for 3-lamp in Lithonia 2GT8 lensed 2x2:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE180607-B1,B2, B3	120.0	60	0.2526	30.17	0.9953	3.50
	277.0	60	0.1168	30.57	0.9445	8.20
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement for 3-lamp in Lithonia 2GT8 lensed 2x2 - Sphere-Spectroradiometer Method:

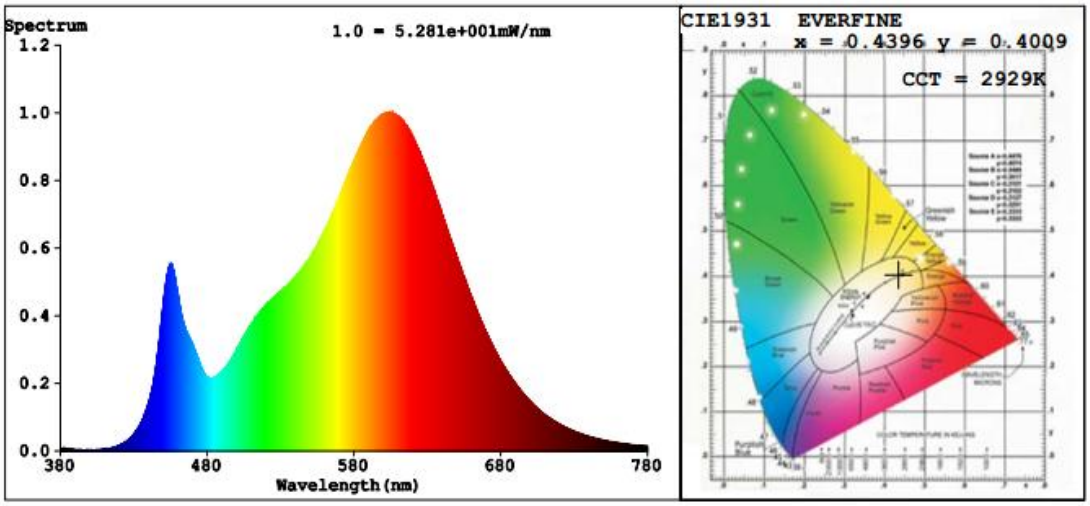
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	2929
Duv	-0.0016
Chromaticity (x, y)	x=0.4396 y=0.4009
Chromaticity (u', v')	u'=0.2537 v'=0.5205
Color Rendering Index (CRI)	82.4
R9	7

Special Color Rendering Indices			
R1	82	R9	7
R2	93	R10	84
R3	94	R11	78
R4	79	R12	74
R5	82	R13	85
R6	92	R14	97
R7	80	R15	74
R8	57	--	--

Photometric Measurement 3-lamp in Lithonia 2GT8 lensed 2x2 – Goniophotometer Method:

Parameter	Result		DLC V4.3 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	3313.0	3282.6	In luminaire (3 lamps): 2000(±10%)
Luminous Efficacy (lm/W)	109.81	107.38	In luminaire: >= 100(-3%)
Most worst Luminous/Highest Watts	107.38		
Zonal lumens in the 0-60 °zone (%)	85.2	--	>= 75(-3)
SC: 0-180 °(if applicable)	1.29	--	1.0-2.0(±0.1)
SC: 90-270 °(if applicable)	1.15	--	1.0-2.0(±0.1)
Beam Angle (°)	95.4	--	--
Center Beam Candle Power (cd)	1435	--	--

Spectral Power Distribution & Chromaticity Diagram

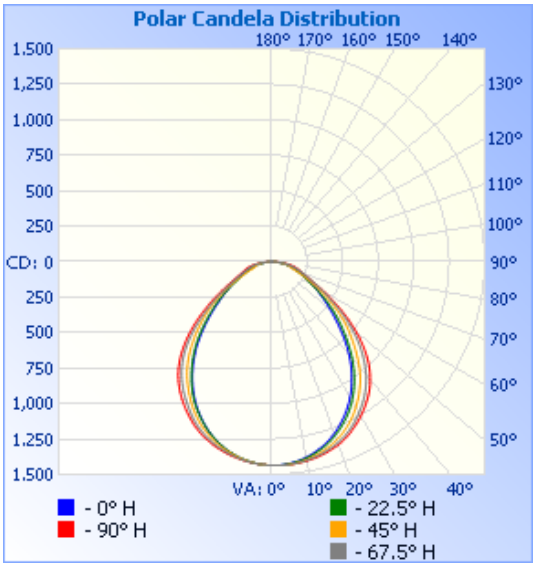


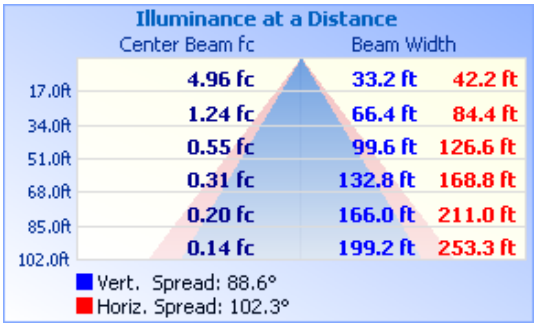
Zonal Lumen Tabulation

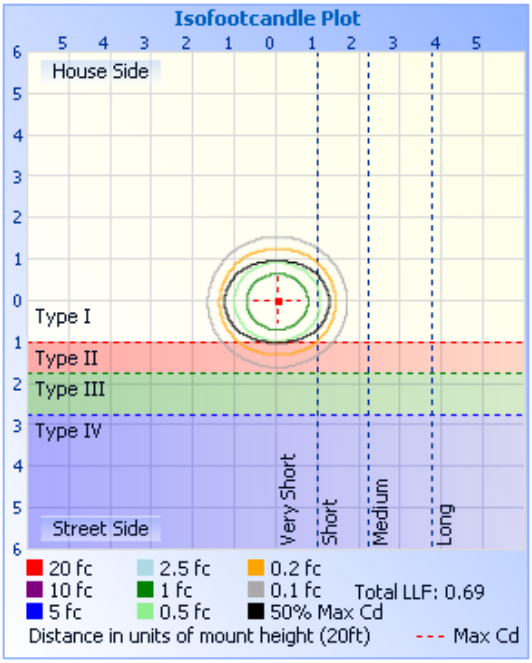
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,095.5	33.1%
0-40	1,756.6	53%
0-60	2,820.7	85.2%
60-90	476.2	14.4%
70-100	213.2	6.4%
90-120	6.6	0.2%
0-90	3,296.9	99.5%
90-180	15.6	0.5%
0-180	3,312.5	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	%Total
0-10	135.5	4.1%	90-100	1.7	0.1%
10-20	385.8	11.6%	100-110	2.2	0.1%
20-30	574.1	17.3%	110-120	2.7	0.1%
30-40	661.1	20.0%	120-130	2.8	0.1%
40-50	615.6	18.6%	130-140	2.4	0.1%
50-60	448.5	13.5%	140-150	1.7	0.1%
60-70	264.8	8.0%	150-160	1.1	0%
70-80	156.2	4.7%	160-170	0.6	0%
80-90	55.2	1.7%	170-180	0.2	0%

Photometric Data







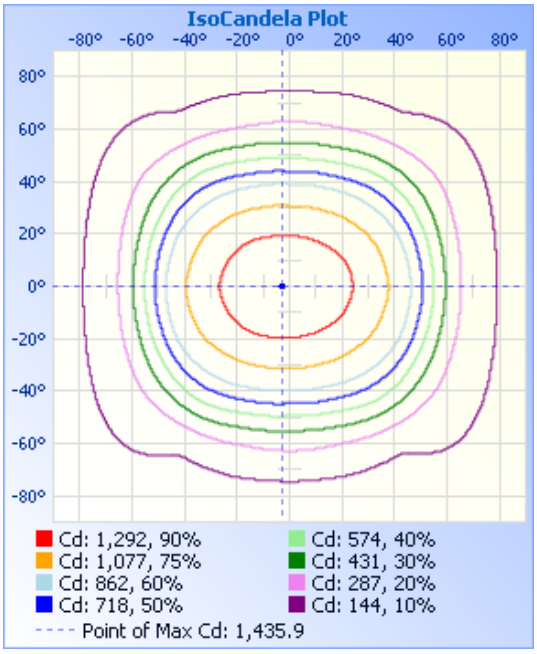


Table--1 UNIT: cd

γ (DEG) \ C (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	1435	1435	1435	1435	1435	1435	1435	1435	1435	1435	1435	1435	1435	1435	1435	1435	
5	1424	1425	1424	1425	1427	1429	1434	1434	1435	1432	1430	1426	1424	1422	1423	1423	
10	1404	1405	1399	1398	1399	1405	1416	1420	1425	1419	1411	1401	1394	1392	1395	1401	
15	1375	1372	1360	1352	1353	1363	1384	1396	1404	1392	1377	1357	1346	1345	1355	1367	
20	1333	1328	1306	1288	1287	1303	1336	1358	1372	1354	1328	1296	1279	1281	1299	1321	
25	1279	1269	1237	1209	1204	1225	1270	1303	1321	1297	1261	1216	1195	1199	1228	1259	
30	1206	1189	1149	1112	1102	1130	1184	1228	1254	1222	1174	1121	1094	1103	1138	1178	
35	1125	1097	1044	995	981	1014	1082	1142	1176	1137	1073	1006	975	987	1036	1090	
40	1025	985	919	860	845	879	957	1034	1079	1038	957	875	841	856	920	987	
45	895	849	779	713	692	732	814	897	949	907	817	731	694	712	781	854	
50	734	697	642	574	552	592	676	741	784	736	668	583	546	568	637	687	
55	561	534	494	442	437	455	523	570	600	557	517	447	424	435	489	520	
60	404	396	361	331	342	336	378	419	432	402	360	325	327	316	341	375	
65	286	293	252	251	263	254	262	308	301	281	234	235	250	229	223	268	
70	220	221	175	190	197	192	179	232	229	209	154	175	186	172	149	202	
75	180	164	131	143	143	143	133	172	184	164	120	133	136	131	119	160	
80	131	112	102	94.8	100	96.8	105	118	134	118	98.4	92.4	95.2	90.7	97.8	116	
85	61.4	57.7	48.2	44.7	46.4	47.7	50.7	60.9	63.4	60.0	49.0	43.7	42.7	42.1	47.5	59.3	
90	1.34	1.40	1.52	1.86	1.15	2.09	1.58	1.41	3.45	1.11	1.50	2.05	1.78	3.91	2.51	1.28	
95	0.88	0.93	0.97	1.22	0.98	1.40	1.06	1.22	1.23	1.56	1.84	2.17	2.11	2.28	2.12	1.56	
100	1.11	1.11	0.95	1.01	0.95	1.14	1.56	1.73	2.23	2.43	2.56	2.78	2.34	2.84	2.96	2.17	
105	2.28	1.61	1.22	1.03	0.95	1.08	1.56	1.81	2.17	2.28	2.73	3.00	2.50	3.11	3.46	2.84	
110	2.82	2.11	1.67	1.05	1.05	1.22	1.73	1.90	2.29	2.51	3.23	3.39	2.78	3.25	4.15	3.57	
115	3.57	3.00	1.84	1.25	1.24	1.39	1.78	2.00	2.52	2.90	3.31	3.30	2.86	3.06	4.51	4.18	
120	4.29	4.06	2.73	1.99	1.27	1.61	1.94	2.28	2.90	3.01	3.34	3.50	3.12	3.60	4.61	4.40	
125	4.68	4.51	2.90	2.17	1.78	1.94	2.02	2.54	3.07	3.02	3.34	3.34	3.32	3.84	4.41	4.36	
130	4.96	4.35	2.45	2.66	2.45	2.38	2.23	2.68	3.19	3.04	3.12	3.23	2.67	3.29	3.27	4.39	
135	4.35	3.47	2.78	2.44	2.73	2.56	2.33	2.78	3.28	3.05	2.95	3.14	3.51	3.45	3.35	3.77	
140	3.45	2.73	2.67	2.23	2.78	2.59	2.35	2.82	3.36	3.06	2.60	2.83	3.39	2.96	2.90	2.80	
145	3.97	3.01	1.90	2.44	2.61	2.56	1.95	2.77	3.06	2.94	2.23	2.67	3.17	3.17	2.84	3.51	
150	3.75	2.45	1.28	2.52	2.66	2.26	1.83	2.74	2.95	2.79	2.14	2.28	2.89	3.10	2.29	3.06	
155	3.29	2.06	1.25	2.22	2.58	2.15	1.74	2.56	2.75	2.67	2.09	2.10	2.66	2.90	2.35	2.17	
160	2.73	1.81	1.39	2.55	2.51	2.10	1.65	2.45	2.65	2.62	2.10	2.07	2.64	2.84	2.85	1.85	
165	2.49	1.78	1.56	2.06	2.45	2.11	1.67	2.12	2.63	2.60	2.11	2.07	2.67	2.93	2.85	2.21	
170	2.40	1.90	1.56	2.55	2.50	2.50	1.73	1.97	2.63	2.54	2.56	2.12	2.98	3.45	2.85	2.40	
175	2.30	1.93	1.62	2.67	2.92	2.64	1.90	2.05	2.70	2.48	2.17	2.00	3.11	3.28	2.90	2.06	
180	2.40	2.12	2.23	2.89	3.06	2.67	2.01	2.12	2.62	2.45	2.12	2.00	2.89	3.00	2.74	2.01	

2.3 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2018-07-09	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	202422-215		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE180607-B4	120.0	60	0.0845	10.05	0.9912	5.62
	277.0	60	0.0407	10.18	0.9037	10.75
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

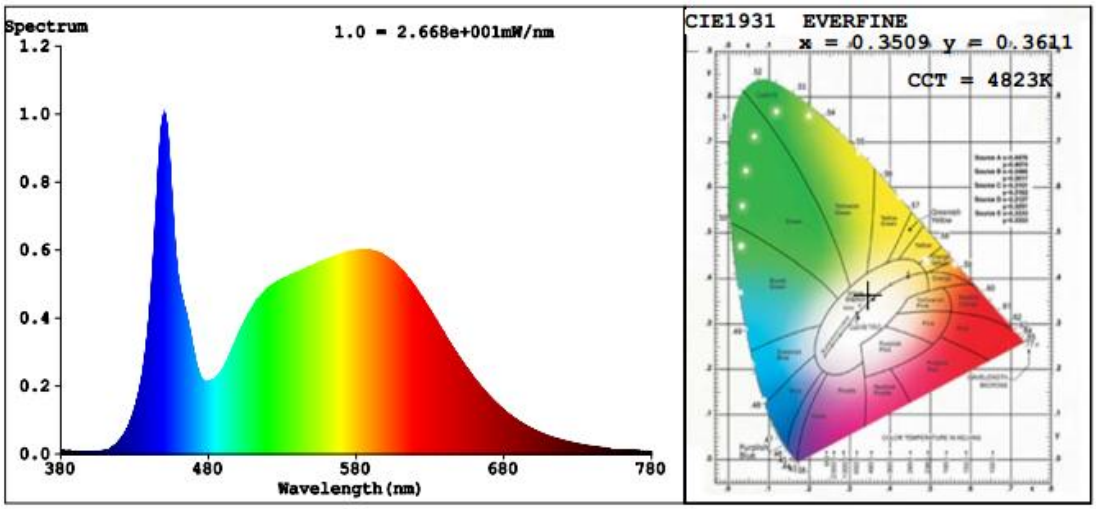
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	4823
Duv	0.0024
Chromaticity (x, y)	x=0.3509 y=0.3611
Chromaticity (u', v')	u'=0.2117 v'=0.4901
Color Rendering Index (CRI)	82.3
R9	6

Special Color Rendering Indices			
R1	80	R9	6
R2	87	R10	69
R3	92	R11	80
R4	82	R12	56
R5	80	R13	82
R6	82	R14	96
R7	88	R15	75
R8	67	--	--

Photometric Measurement for Bare-lamp –Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.3 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	1398	1385	Bare Lamp: 800(±10%)
Luminous Efficacy (lm/W)	139.10	136.05	Bare lamp: >= 110(-3%)
Most worst Luminous/Highest Watts	136.05		

Spectral Power Distribution & Chromaticity Diagram



2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
202422-211	3000K	1349	10.13	133.17
202422-212	3500K	1361*1	10.09*2	134.89*3
202422-213	4000K	1374*1	10.09*2	136.17*3
202422-215	5000K	1398	10.05	139.10

*1: This value is calculated and the calculation formula is as below:
1361= (1398-1349)/4*1+1349
1374= (1398-1349)/4*2+1349

*2: This value is calculated and the calculation formula is as below:
10.09= (10.13+10.05)/2

*3: This value is calculated and the calculation formula is as below:
134.89= 1361/10.05
136.17= 1374/10.05

3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-331	2 meter Integrating Sphere	2018-07-01	2019-06-30
ST-R-327	Spectral analysis system HAAS-2000	2018-07-01	2019-06-30
D204	Standard Lamp	2017-07-12	2018-07-11
PF2010	Power Meter for Integrating Sphere	2018-07-01	2019-06-30
GO-R5000	Goniophotometer system	2018-07-01	2019-06-30
D908S	Standard Lamp	2017-07-12	2018-07-11
PF210	Power Meter for Goniophotometer	2018-07-07	2019-07-06
Expand Uncertainty: Photometric Measurement (Sphere):2.04%, k=2 Chromaticity Measurement(Sphere):28.8K, k=2 Photometric Measurement(Goniophotometer):2.36%, k=2			

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