

**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): 204422-21X

Remark: Remark: The "X" stands for different CCT as bellow: 1=3000K, 2=3500K,  
3=4000K, 5=5000K.Representative (Tested) Model: 204422-211  
204422-215

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

Test &amp; Report By:

*Vicky Sun*

Engineer: Vicky Sun

Date: Jul.09,2018

Review By:

*John Li*

Manager: John Li

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

**Laboratory: Standard-Tech Co., Ltd. Testing Center**  
**NVLAP CODE: 201011-0**

Report Format Number STD/QR4909-A/2

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<http://www.standard-tech.com>

**1.1 Product Information:**

Organization Name	Revolution Lighting Technologies, Inc.	
Brand Name	Revolution Lighting Technologies	
Model Number	204422-21X	
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	12W	
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)	
Test Ballast	N/A	
Sample Number	JBE180607-F1,F2, F3(3000K), F4(5000K)	
Lamp Length	1200	mm
Lamp Width	--	mm
Number of Units (modular products)	N/A	s

**Photo**



**1.2 Test Specifications:**

Date of Receipt	Jun.21, 2018
Date of Test	Jun.22, 2018
Test item	<ol style="list-style-type: none"> <li>1. Total Luminous Flux</li> <li>2. Luminous Distribution Intensity</li> <li>3. Luminous Efficacy</li> <li>4. Correlated Color Temperature</li> <li>5. Color Rendering Index</li> <li>6. Chromaticity Coordinate</li> <li>7. Electrical Parameters</li> </ol>
Reference Standard	<ol style="list-style-type: none"> <li>1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products</li> <li>2. ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products</li> <li>3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources</li> <li>4. CIE 15-2004 Technical Report Colorimetry</li> <li>5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source</li> <li>6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems</li> </ol>
Reference Work Instruction	QD25

**1.3 Test Methods**

<p><b>1) Photometric and Light Distribution Measurement – Goniophotometer Method:</b>                  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.</p>
<p><b>2) Chromaticity Measurement – Sphere-Spectroradiometer Method:</b>                  Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °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.</p>
<p><b>3) Electrical Measurements:</b>                  Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at 25 °C ± 1 °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.</p>

**2.1 Electrical, Photometric and Chromaticity Measurements**  
 (Refer to Work Instruction QD25)

<b>Test date</b>	2018-06-22	<b>Test Ambient:</b>	25.2 °C
<b>Test Orientation</b>	Horizontal	<b>Stabilization Time (min)</b>	90
<b>Model Number</b>	204422-211		

**Electrical Measurement for Bare-lamp:**

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE180607-	120.0	60	0.1024	12.23	0.9957	3.80
F1	277.0	60	0.0466	12.36	0.9573	6.51
<b>DLC Pass Criteria</b>					>= 0.9(-3%)	<= 20(+5)

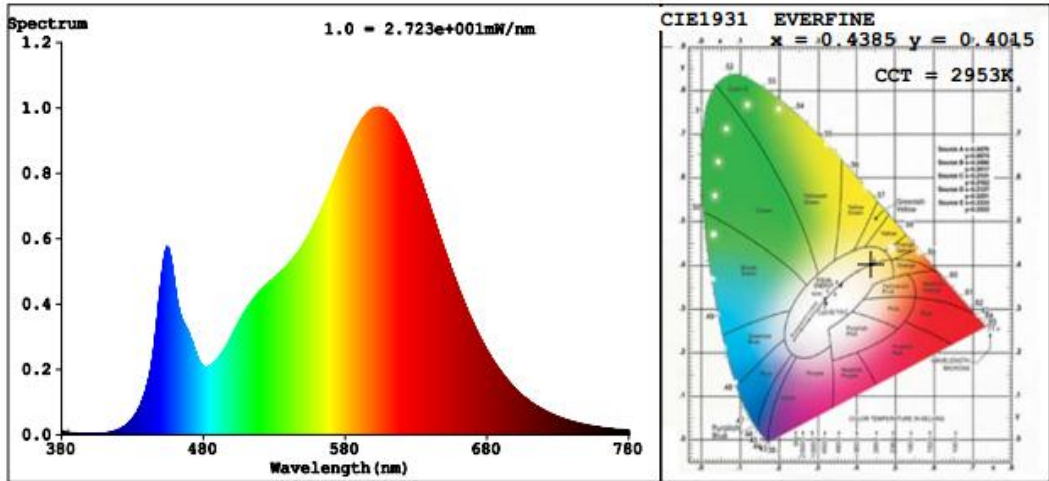
**Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:**

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	5
Frequency (Hz)	60	R2	93	R10	83
CCT (K)	2953	R3	94	R11	78
Duv	-0.0012	R4	79	R12	72
Chromaticity (x, y)	x=0.4385 y=0.4015	R5	82	R13	84
Chromaticity (u', v')	u'=0.2527 v'=0.5206	R6	91	R14	98
Color Rendering Index (CRI)	82.1	R7	81	R15	73
R9	5	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)	1670	1665	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	136.55	134.71	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	134.71		

**Spectral Power Distribution & Chromaticity Diagram**



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**2.2 Electrical, Photometric and Chromaticity Measurements**

*(Refer to Work Instruction QD25)*

<b>Test date</b>	2018-06-22	<b>Test Ambient:</b>	25.2 °C
<b>Test Orientation</b>	Horizontal	<b>Stabilization Time (min)</b>	90
<b>Model Number</b>	204422-211		

**Electrical Measurement for 3-lamp in Lithonia 2GT8 lensed 2x4:**

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE180607-	120.0	60	0.3070	36.66	0.9951	3.83
F1, F2, F3	277.0	60	0.1399	37.06	0.9564	6.55
<b>DLC Pass Criteria</b>					>= 0.9(-3%)	<= 20(+5)

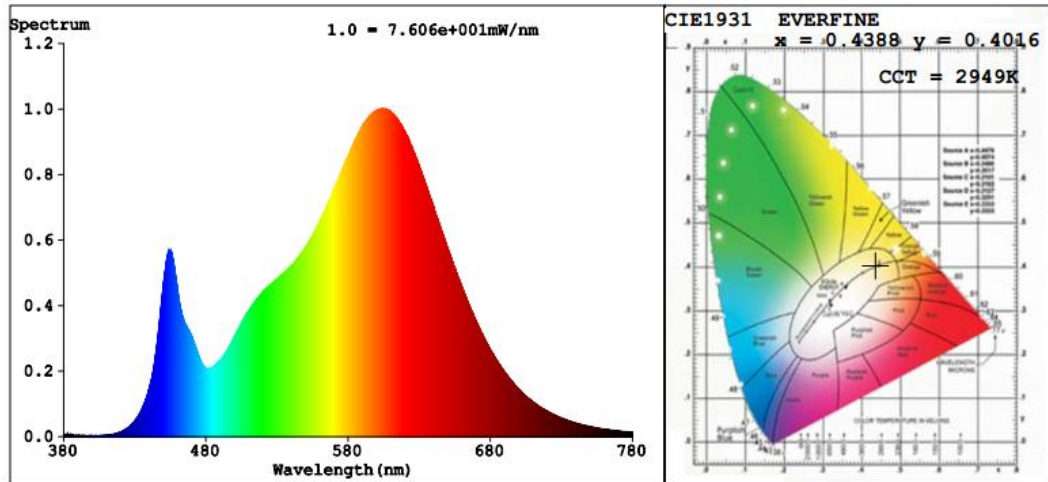
**Chromaticity Measurement for 3-lamp in Lithonia 2GT8 lensed 2x4-  
 Sphere-Spectroradiometer Method:**

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	82	R9	7
Frequency (Hz)	60	R2	93	R10	84
CCT (K)	2949	R3	94	R11	79
Duv	-0.0012	R4	80	R12	73
Chromaticity (x, y)	x=0.4388 y=0.4016	R5	82	R13	85
Chromaticity (u', v')	u'=0.2528 v'=0.5207	R6	92	R14	98
Color Rendering Index (CRI)	82.6	R7	81	R15	74
R9	7	R8	58	--	--

**Photometric Measurement 3-lamp in Lithonia 2GT8 lensed 2x4 –  
 Goniophotometer Method:**

Parameter	Result		DLC V4.3 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	4158.3	4145.5	In luminaire (3 lamps): 4500(-10%)
Luminous Efficacy (lm/W)	113.43	111.86	In luminaire: >= 100(-3%)
Most Worst Luminous/Highest Watts	111.86		
Zonal lumens in the 0-60 ° zone (%)	85	--	>= 75(-3)
SC: 0-180 °(if applicable)	1.27	--	1.0-2.0(±0.1)
SC: 90-270 °(if applicable)	1.18	--	1.0-2.0(±0.1)
Beam Angle ( °)	96.5	--	--
Center Beam Candle Power (cd)	1766	--	--

**Spectral Power Distribution & Chromaticity Diagram**

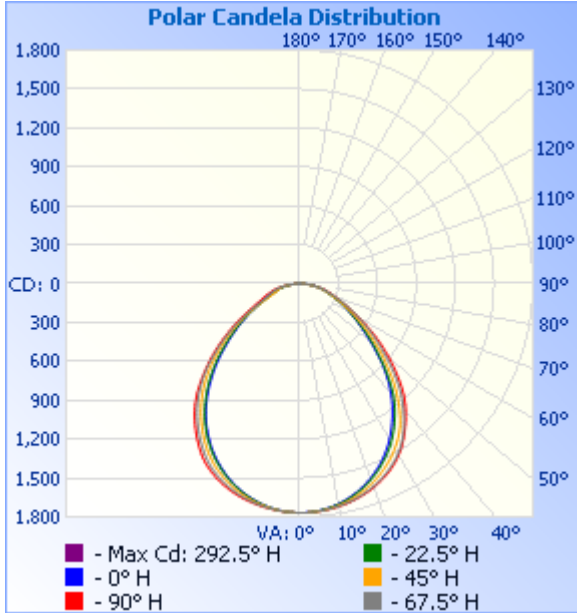


**Zonal Lumen Tabulation**

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,359.6	32.7%
0-40	2,189.0	52.6%
0-60	3,534.5	85%
60-90	614.5	14.8%
70-100	270.3	6.5%
90-120	5.4	0.1%
0-90	4,149.0	99.8%
90-180	8.8	0.2%
0-180	4,157.8	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	167.0	4.0%	90-100	2.8	0.1%
10-20	477.0	11.5%	100-110	1.5	0%
20-30	715.6	17.2%	110-120	1.1	0%
30-40	829.4	19.9%	120-130	0.9	0%
40-50	772.5	18.6%	130-140	0.8	0%
50-60	573.1	13.8%	140-150	0.7	0%
60-70	347.0	8.3%	150-160	0.5	0%
70-80	200.8	4.8%	160-170	0.4	0%
80-90	66.6	1.6%	170-180	0.1	0%

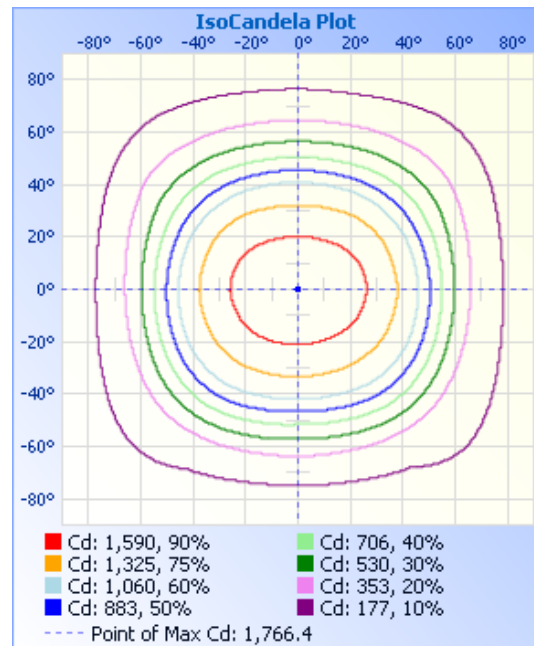
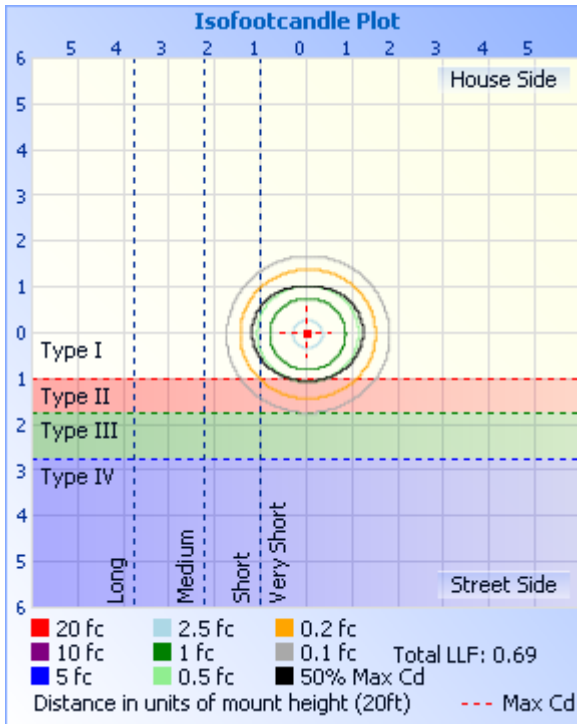
**Photometric Data**



**Illuminance at a Distance**

	Center Beam fc	Beam Width	
17.0ft	6.11 fc	35.3 ft	41.2 ft
34.0ft	1.53 fc	70.6 ft	82.3 ft
51.0ft	0.68 fc	105.9 ft	123.5 ft
68.0ft	0.38 fc	141.3 ft	164.7 ft
85.0ft	0.24 fc	176.6 ft	205.8 ft
102.0ft	0.17 fc	211.9 ft	247.0 ft

■ Vert. Spread: 92.2°  
 ■ Horiz. Spread: 100.9°



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Table--1

UNIT: cd

C (DEG) \ y (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	1766	1766	1766	1766	1766	1766	1766	1766	1766	1766	1766	1766	1766	1766	1766	1766
5	1759	1760	1758	1757	1756	1758	1760	1761	1761	1760	1758	1757	1755	1756	1756	1757
10	1739	1739	1733	1726	1725	1728	1736	1742	1745	1739	1734	1726	1722	1724	1729	1736
15	1710	1706	1691	1675	1672	1678	1695	1711	1714	1704	1693	1677	1669	1673	1686	1701
20	1667	1658	1632	1604	1597	1608	1637	1664	1671	1656	1635	1610	1597	1603	1626	1651
25	1605	1593	1556	1514	1503	1519	1562	1600	1610	1589	1560	1523	1505	1513	1547	1583
30	1515	1505	1460	1406	1386	1411	1467	1516	1528	1498	1463	1416	1392	1405	1445	1485
35	1395	1378	1336	1273	1247	1278	1349	1397	1409	1377	1341	1288	1260	1275	1319	1364
40	1259	1221	1167	1115	1092	1124	1184	1241	1273	1242	1200	1134	1102	1120	1178	1228
45	1085	1038	974	923	919	935	995	1066	1106	1086	1038	965	927	950	1013	1065
50	891	844	790	743	731	751	807	868	910	898	853	783	747	767	825	872
55	691	664	622	587	579	592	636	689	718	696	663	611	579	594	638	671
60	509	511	474	456	452	459	486	533	534	514	481	450	435	434	454	480
65	365	381	351	347	351	352	361	402	388	349	314	307	315	298	293	323
70	279	273	256	257	267	262	264	291	287	252	214	220	232	217	206	247
75	216	195	188	189	200	195	193	201	214	197	172	169	174	168	169	199
80	145	133	127	127	138	133	128	131	142	136	125	120	121	116	127	142
85	57.8	63.0	57.5	64.3	68.7	68.1	59.1	68.1	64.8	66.0	56.7	56.1	59.1	56.3	54.7	60.8
90	1.55	1.55	1.38	1.60	1.71	1.78	1.46	1.49	0.83	0.83	1.79	11.5	14.6	11.3	9.11	0.82
95	0.89	0.78	1.00	1.05	1.05	1.17	1.05	0.89	0.74	0.75	1.10	4.01	11.7	6.68	5.75	0.82
100	0.84	0.80	0.85	1.03	1.07	1.08	0.94	0.84	0.77	0.85	0.94	2.83	8.88	2.08	2.40	0.89
105	0.87	0.94	0.88	1.01	1.03	1.05	0.94	0.88	0.94	0.89	1.01	1.64	6.04	0.96	2.15	1.00
110	0.95	1.00	0.96	0.98	1.00	1.02	0.98	0.92	1.01	1.01	1.03	1.02	3.20	0.96	1.90	1.03
115	1.13	1.12	1.11	0.90	0.97	0.99	1.02	1.03	1.20	1.18	1.04	0.70	0.82	0.76	1.65	1.06
120	1.24	1.25	1.08	0.70	0.76	0.64	1.05	1.18	1.30	1.23	1.06	0.66	0.75	0.73	1.40	1.09
125	1.33	1.24	1.06	0.64	0.82	0.70	1.07	1.17	1.39	1.30	1.05	0.70	0.76	0.71	1.15	1.12
130	1.42	1.24	1.03	0.62	0.80	0.71	1.08	1.15	1.43	1.30	1.04	0.82	0.78	0.70	0.94	1.11
135	1.54	1.22	1.01	0.60	0.72	0.75	1.10	1.13	1.46	1.30	1.02	0.94	0.88	0.95	0.94	1.10
140	1.52	1.20	0.89	0.59	0.82	0.83	1.11	1.12	1.49	1.30	1.01	0.97	1.13	1.05	0.94	1.09
145	1.50	1.18	0.90	0.88	0.94	0.88	0.88	1.10	1.52	1.30	1.01	1.11	1.32	1.20	1.08	1.08
150	1.48	1.13	0.92	0.83	1.06	0.90	0.88	1.08	1.52	1.30	1.02	1.23	1.41	1.46	1.17	1.07
155	1.48	1.04	0.93	0.85	1.09	0.91	0.91	1.06	1.48	1.30	1.03	1.31	1.50	1.52	1.41	1.06
160	1.35	0.98	0.96	0.87	1.08	0.93	0.97	1.03	1.44	1.30	1.04	1.34	1.58	1.59	1.41	1.18
165	1.29	0.97	0.98	0.99	1.17	1.08	1.06	1.02	1.48	1.30	1.05	1.38	1.59	1.71	1.43	1.31
170	1.27	0.96	1.00	1.17	1.40	1.34	1.17	1.07	1.44	1.30	1.05	1.30	1.43	1.74	1.44	1.33
175	1.25	0.95	1.00	1.25	1.55	1.40	1.31	1.11	1.43	1.24	0.95	1.08	1.40	1.57	1.46	1.35
180	1.24	0.94	1.00	1.23	1.57	1.46	1.29	1.12	1.42	1.24	0.94	0.99	1.22	1.57	1.46	1.29

**2.3 Electrical, Photometric and Chromaticity Measurements**

(Refer to Work Instruction QD25)

<b>Test date</b>	2018-05-28	<b>Test Ambient:</b>	25.2 °C
<b>Test Orientation</b>	Horizontal	<b>Stabilization Time (min)</b>	90
<b>Model Number</b>	204422-215		

**Electrical Measurement for Bare-lamp:**

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE180607-	120.0	60	0.1027	12.27	0.9959	3.76
F4	277.0	60	0.0467	12.40	0.9578	6.47
<b>DLC Pass Criteria</b>					>= 0.9(-3%)	<= 20(+5)

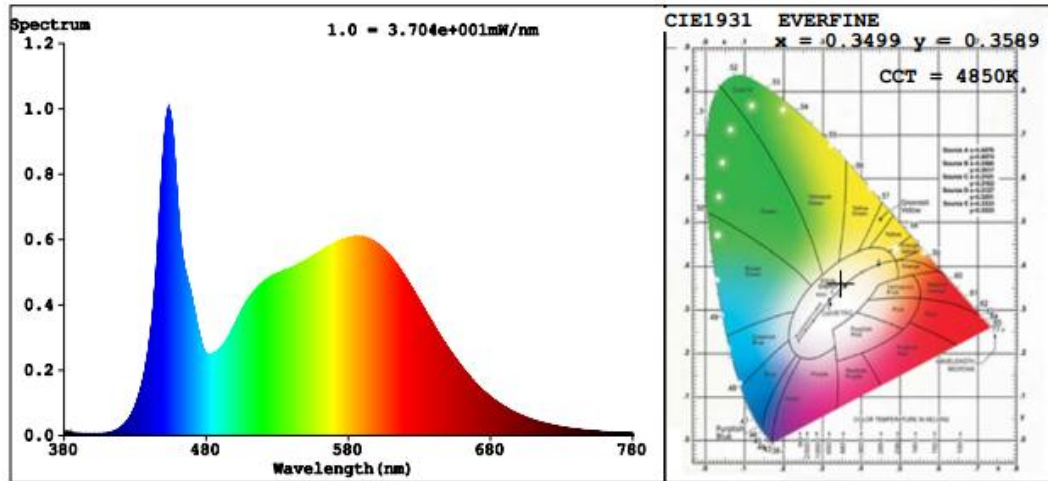
**Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:**

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	5
Frequency (Hz)	60	R2	90	R10	76
CCT (K)	4850	R3	95	R11	79
Duv	0.0017	R4	80	R12	55
Chromaticity (x, y)	x=0.3499 y=0.3589	R5	81	R13	84
Chromaticity (u', v')	u'=0.2118 v'=0.4889	R6	85	R14	98
Color Rendering Index (CRI)	82.7	R7	86	R15	75
R9	5	R8	65	--	--

**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)	1756	1751	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	143.11	141.21	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	141.21		

**Spectral Power Distribution & Chromaticity Diagram**



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<b>2.4 Performance Assessment:</b>
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Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
204422-211	3000K	1670	12.23	136.55
204422-212	3500K	1692 <sup>*1</sup>	12.25 <sup>*2</sup>	138.08 <sup>*3</sup>
204422-213	4000K	1713 <sup>*1</sup>	12.25 <sup>*2</sup>	139.84 <sup>*3</sup>
204422-215	5000K	1756	12.27	143.11

\*1: This value is calculated and the calculation formula is as below:

$$1692=(1756-1670)/4*1+1670$$

$$1713=(1756-1670)/4*2+1670$$

\*2: This value is calculated and the calculation formula is as below:

$$12.25=(12.23+12.27)/2$$

\*3: This value is calculated and the calculation formula is as below:

$$138.08=1692/12.25$$

$$139.84=1713/12.25$$

**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 \*\*\*\*\***