

LM-79-08 Test Report

For

Revolution Lighting Technologies, Inc. (Brand Name: Revolution Lighting Technologies)

2280 Ward Ave. Simi Valley CA. 93065

4-lamp External Driver Lamp-Style Retrofit Kits (UL Type C)

Model name(s): 204423-21X

Remark: The "X" stands for different CCT as bellow: 1=3000K,
2=3500K, 3=4000K, 5=5000K.

Representative (Tested) Model: 204423-211
204423-215

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

Test & 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

Address: Standard-Tech Building, No.6 Guanhong Road,Guangzhou Science City, Guangzhou 510663, China

Tel: 8620-3229 0320

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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	204423-21X	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	4-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-G1, G2, G3, G4(3000K), G5(5000K)	
Lamp Length	1200	mm
Lamp Width	--	mm
Number of Units (modular products)	N/A	s

Photo



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1.2 Test Specifications:

Date of Receipt	Jun.21, 2018
Date of Test	Jun.22, 2018
Test item	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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

<p>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.</p>
<p>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 °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>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 °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)

Test date	2018-06-22	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	204423-211		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE180607-G1	120.0	60	0.1018	12.17	0.9962	4.47
	277.0	60	0.0461	12.14	0.9503	6.48
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

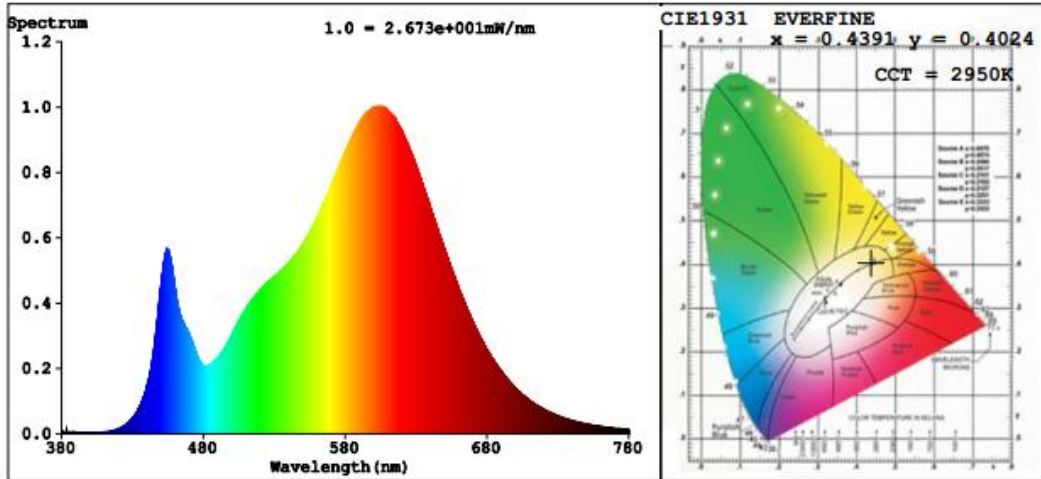
Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	5
Frequency (Hz)	60	R2	93	R10	83
CCT (K)	2950	R3	94	R11	78
Duv	-0.0009	R4	79	R12	72
Chromaticity (x, y)	x=0.4391 y=0.4024	R5	81	R13	84
Chromaticity (u', v')	u'=0.2527 v'=0.5211	R6	91	R14	98
Color Rendering Index (CRI)	82.2	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)	1667	1638	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	136.98	134.93	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	134.59		

Spectral Power Distribution & Chromaticity Diagram



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2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2018-06-22	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	204423-211		

Electrical Measurement for 4-lamp in Lithonia 2GT8 lensed 2x4:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE180607-	120.0	60	0.4036	48.24	0.9961	4.51
G1, G2, G3, G4	277.0	60	0.1829	48.14	0.9502	6.70
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

**Chromaticity Measurement for 4-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)	2948	R3	94	R11	79
Duv	-0.0013	R4	80	R12	73
Chromaticity (x, y)	x=0.4388 y=0.4014	R5	82	R13	85
Chromaticity (u', v')	u'=-0.2529 v'=-0.5206	R6	92	R14	98
Color Rendering Index (CRI)	82.7	R7	81	R15	74
R9	7	R8	58	--	--

**Photometric Measurement 4-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)	5497.9	5401.8	In luminaire (4 lamps): 6000(-10%)
Luminous Efficacy (lm/W)	113.97	112.21	In luminaire: >= 100(-3%)
Most Worst Luminous/Highest Watts	111.98		
Zonal lumens in the 0-60 ° zone (%)	85.1	--	>= 75(-3)
SC: 0-180 °(if applicable)	1.26	--	1.0-2.0(±0.1)
SC: 90-270 °(if applicable)	1.17	--	1.0-2.0(±0.1)
Beam Angle (°)	95.9	--	--
Center Beam Candle Power (cd)	2350	--	--

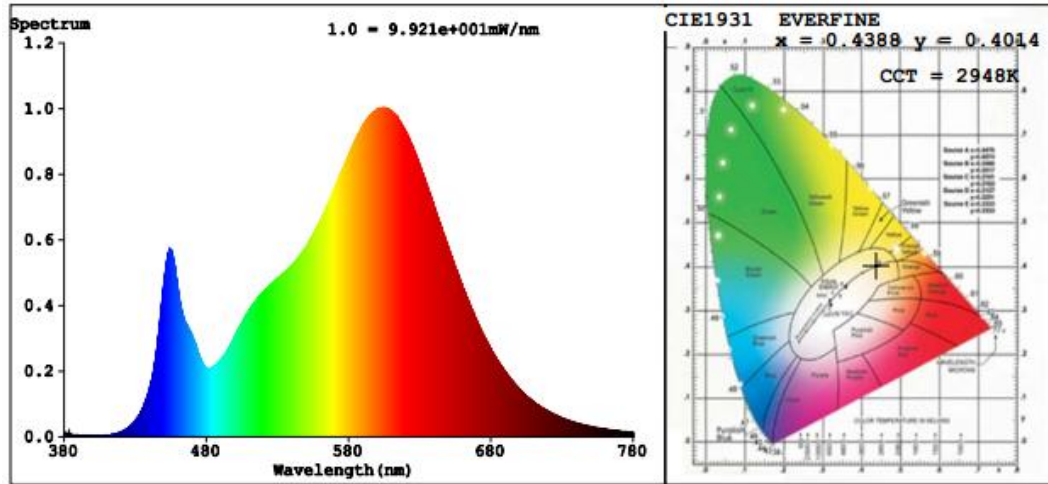
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Spectral Power Distribution & Chromaticity Diagram

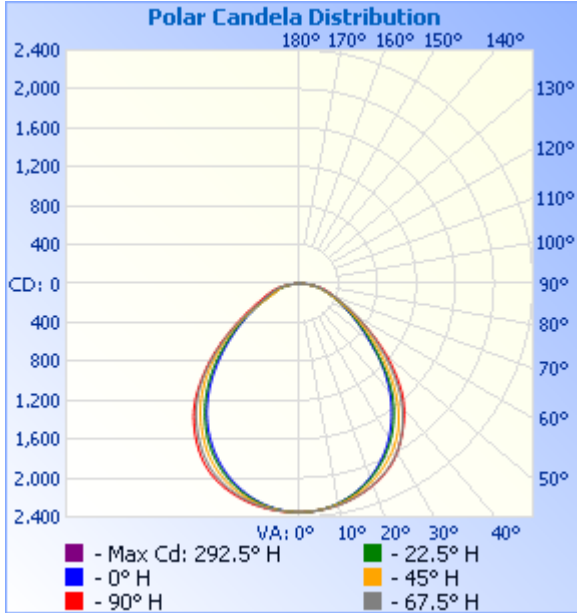


Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,807.8	32.9%
0-40	2,907.8	52.9%
0-60	4,678.9	85.1%
60-90	808.9	14.7%
70-100	358.1	6.5%
90-120	4.4	0.1%
0-90	5,487.9	99.8%
90-180	9.3	0.2%
0-180	5,497.2	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	222.2	4.0%	90-100	1.4	0%
10-20	634.4	11.5%	100-110	1.4	0%
20-30	951.1	17.3%	110-120	1.5	0%
30-40	1,100.1	20.0%	120-130	1.3	0%
40-50	1,020.8	18.6%	130-140	1.2	0%
50-60	750.3	13.6%	140-150	1.0	0%
60-70	452.3	8.2%	150-160	0.8	0%
70-80	266.1	4.8%	160-170	0.5	0%
80-90	90.6	1.6%	170-180	0.2	0%

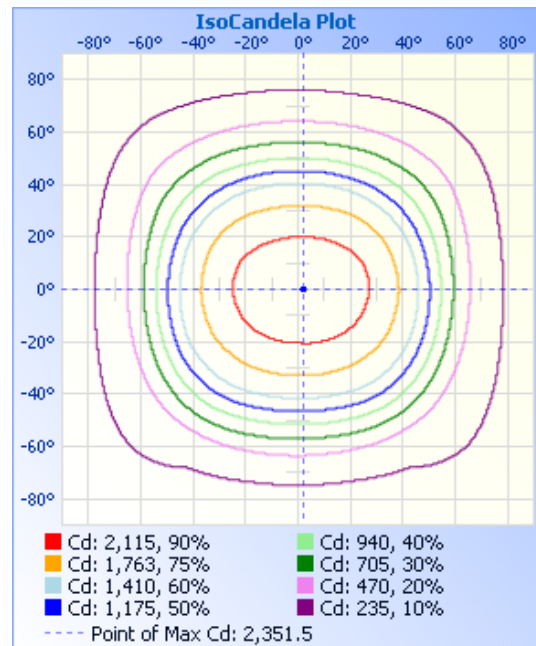
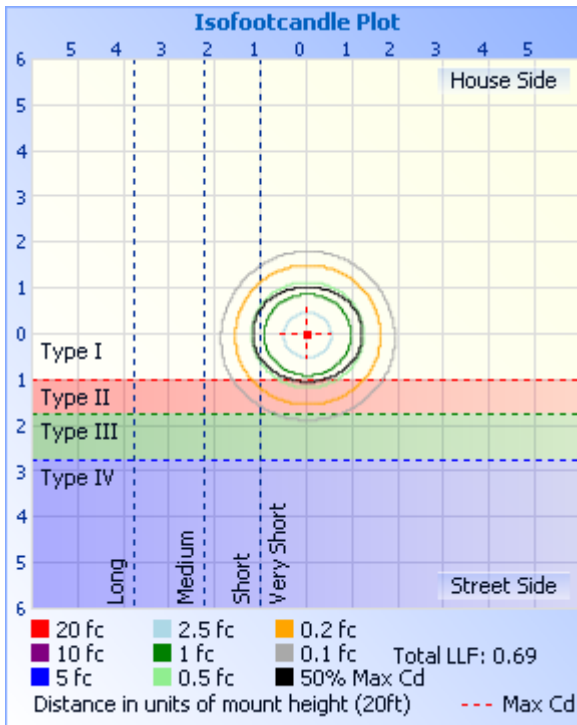
Photometric Data



Illuminance at a Distance

	Center Beam fc	Beam Width	
17.0ft	8.13 fc	35.0 ft	40.7 ft
34.0ft	2.03 fc	70.0 ft	81.3 ft
51.0ft	0.90 fc	105.1 ft	122.0 ft
68.0ft	0.51 fc	140.1 ft	162.6 ft
85.0ft	0.33 fc	175.1 ft	203.3 ft
102.0ft	0.23 fc	210.1 ft	243.9 ft

■ Vert. Spread: 91.7°
 ■ Horiz. Spread: 100.2°



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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	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
5	2347	2348	2343	2340	2336	2337	2337	2339	2337	2334	2334	2333	2334	2337	2341	2344
10	2328	2328	2314	2302	2294	2295	2302	2311	2309	2303	2296	2290	2289	2297	2309	2320
15	2292	2289	2260	2235	2221	2226	2244	2265	2266	2253	2237	2221	2215	2230	2255	2278
20	2237	2230	2182	2142	2120	2131	2165	2201	2205	2186	2156	2128	2116	2137	2175	2215
25	2157	2147	2081	2024	1993	2011	2064	2117	2124	2096	2052	2009	1991	2019	2071	2125
30	2036	2029	1953	1877	1836	1865	1938	2001	2004	1970	1917	1864	1840	1873	1934	1996
35	1878	1857	1780	1696	1649	1688	1773	1837	1846	1812	1753	1691	1663	1699	1767	1836
40	1692	1645	1554	1479	1441	1479	1558	1638	1670	1639	1568	1488	1452	1493	1579	1653
45	1447	1391	1292	1222	1209	1229	1305	1400	1445	1428	1353	1265	1220	1266	1356	1425
50	1176	1123	1042	982	959	987	1060	1140	1184	1171	1108	1024	983	1021	1100	1153
55	900	881	818	772	757	777	834	899	916	905	863	798	759	790	844	879
60	660	675	624	599	592	601	635	689	671	645	617	589	571	577	594	618
65	481	502	462	457	459	460	470	515	487	441	400	403	414	395	388	429
70	368	362	335	340	349	343	343	376	373	332	277	289	305	286	273	329
75	286	259	248	251	262	255	253	269	287	266	226	224	228	222	224	265
80	196	177	167	168	182	175	174	184	200	193	171	159	161	155	170	191
85	80.4	86.6	80.3	87.6	92.3	93.6	83.7	92.7	83.9	87.9	79.7	78.6	79.7	76.5	77.4	84.0
90	1.61	1.74	2.03	2.79	2.50	2.94	2.24	1.91	1.07	1.00	1.24	1.64	1.51	1.29	2.25	1.00
95	0.83	0.95	1.18	1.58	1.76	1.76	1.17	0.95	0.81	0.71	1.03	1.50	1.25	1.29	1.33	0.77
100	0.71	0.89	1.21	1.59	1.66	1.73	1.17	0.85	0.83	0.89	1.12	1.37	1.28	1.29	1.35	0.99
105	0.93	1.07	1.40	1.58	3.71	1.72	1.17	1.06	1.19	1.25	1.48	1.32	1.24	1.29	1.65	1.36
110	1.30	1.37	1.75	1.78	1.94	1.75	1.70	1.29	1.54	1.43	1.82	1.29	1.10	1.29	1.67	1.60
115	1.58	1.72	1.88	1.64	1.70	1.56	1.94	1.74	1.78	1.77	1.77	0.88	0.93	0.88	1.69	1.74
120	0.62	1.85	1.89	1.21	1.47	1.28	1.90	1.85	1.95	1.96	1.75	0.85	0.94	0.85	1.53	1.69
125	1.77	1.85	1.80	1.18	1.48	1.24	1.85	1.85	2.00	1.94	1.59	0.92	0.94	0.82	1.29	1.59
130	1.98	1.83	1.71	1.20	1.50	1.20	1.77	1.84	1.98	1.96	1.37	1.06	1.00	1.05	1.26	1.53
135	1.95	1.82	1.60	1.21	1.52	1.23	1.62	1.82	1.95	1.88	1.30	1.32	1.29	1.26	1.24	1.45
140	1.92	1.80	1.30	1.23	1.53	1.28	1.41	1.80	1.93	1.85	1.30	1.41	1.47	1.46	1.23	1.41
145	1.89	1.90	1.19	1.26	1.55	1.32	1.29	1.78	1.91	1.88	1.30	1.76	1.64	1.69	1.35	1.41
150	1.85	1.72	1.21	1.29	1.57	1.41	1.29	1.71	1.93	1.86	1.44	1.82	1.87	1.93	1.70	1.42
155	1.72	1.53	1.22	1.53	1.70	1.58	1.29	1.60	1.96	1.88	1.48	1.98	1.99	2.03	1.90	1.48
160	1.70	1.47	1.35	1.78	1.84	1.82	1.29	1.54	1.98	1.89	1.52	2.00	2.07	2.24	1.92	1.66
165	1.68	1.44	1.65	1.82	1.99	1.89	1.57	1.66	1.99	1.87	1.61	2.05	2.08	2.26	1.94	1.71
170	1.77	1.60	1.75	1.82	2.05	1.99	1.82	1.77	1.95	1.85	1.64	2.05	2.09	2.28	1.97	0.39
175	1.78	1.63	1.87	1.86	2.09	1.99	1.84	1.71	1.91	1.84	1.61	1.94	2.10	2.23	1.99	1.38
180	1.78	1.60	1.89	1.88	2.10	1.99	1.82	1.60	1.89	1.78	1.59	1.88	1.87	2.11	2.00	1.77

2.3 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2018-05-28	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	204423-215		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE180607-	120.0	60	0.1016	12.15	0.9963	4.41
G5	277.0	60	0.0460	12.12	0.9504	6.42
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

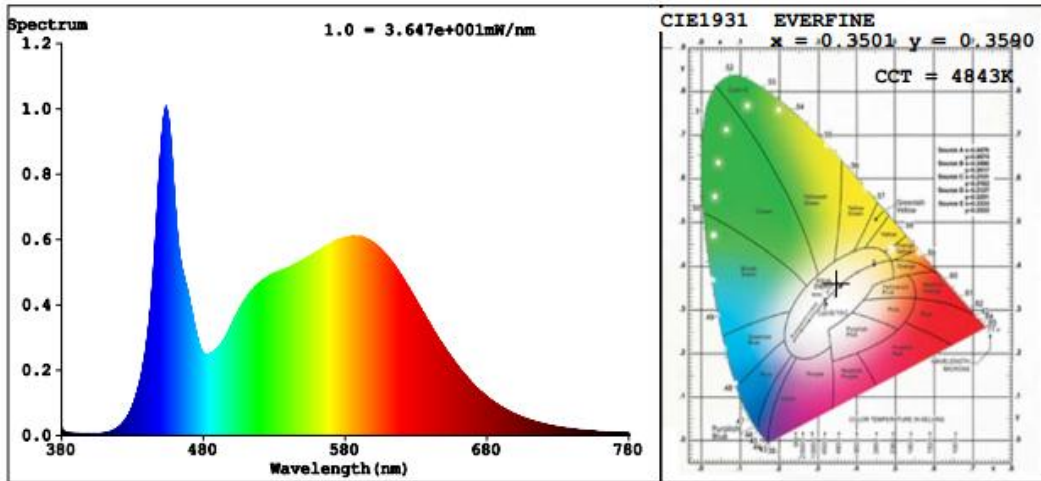
Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	5
Frequency (Hz)	60	R2	90	R10	76
CCT (K)	4843	R3	95	R11	79
Duv	0.0017	R4	80	R12	55
Chromaticity (x, y)	x=0.3501 y=0.3590	R5	81	R13	84
Chromaticity (u', v')	u'=0.2119 v'=0.4890	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)	1743	1712	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	143.46	141.25	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	140.91		

Spectral Power Distribution & Chromaticity Diagram



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2.4 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
204423-211	3000K	1667	12.17	136.98
204423-212	3500K	1686 ^{*1}	12.16 ^{*2}	138.65 ^{*3}
204423-213	4000K	1705 ^{*1}	12.16 ^{*2}	140.21 ^{*3}
204423-215	5000K	1743	12.15	143.46

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

$$1686=(1743-1667)/4*1+1667$$

$$1705=(1743-1667)/4*2+1667$$

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

$$12.16=(12.17+12.15)/2$$

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

$$138.65=1686/12.16$$

$$140.21=1705/12.16$$

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 *******