

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): 205423-21X

Remark: The "X" stands for different CCT as bellow: 1=3000K,
2=3500K, 3=4000K, 5=5000K.Representative (Tested) Model: 205423-211
205423-215

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:

Univ Xie

Manager: Univ Xie

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

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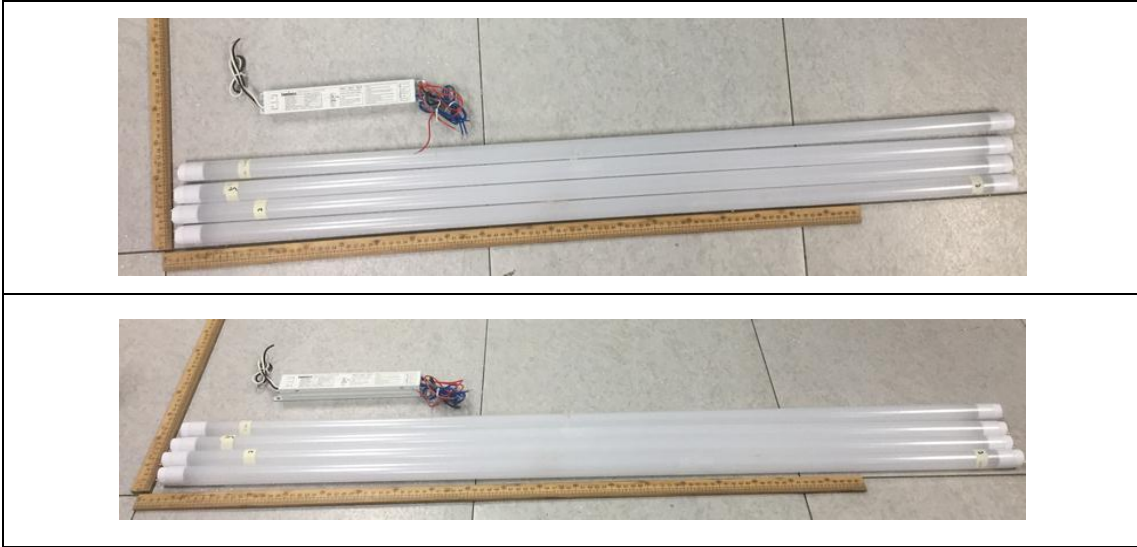
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1.1 Product Information:

Organization Name	Revolution Lighting Technologies, Inc.	
Brand Name	Revolution Lighting Technologies	
Model Number	205423-21X	
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	15.5W	
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)	
Test Ballast	N/A	
Sample Number	JBE180607-J1,J2, J3, J4(3000K), J5(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	Jul.07, 2018
Date of Test	Jul.09, 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	2018-07-09	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	205423-211		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE180607-	120.0	60	0.1270	15.15	0.9942	5.82
J1	277.0	60	0.0564	14.97	0.9576	6.93
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

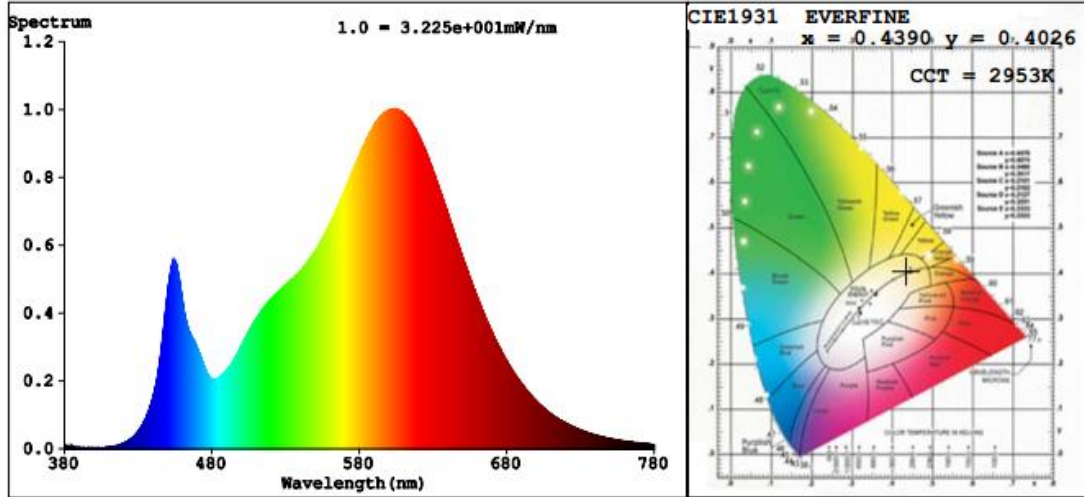
Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	4
Frequency (Hz)	60	R2	92	R10	83
CCT (K)	2953	R3	94	R11	78
Duv	-0.0009	R4	79	R12	72
Chromaticity (x, y)	x=0.4390 y=0.4026	R5	81	R13	84
Chromaticity (u', v')	u'=0.2525 v'=0.5211	R6	91	R14	98
Color Rendering Index (CRI)	82.0	R7	81	R15	73
R9	4	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)	2077	2023	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	137.10	135.14	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	133.53		

Spectral Power Distribution & Chromaticity Diagram



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

Test date	2018-07-09	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	205423-211		

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	0.5032	60.18	0.9967	4.35
J1, J2, J3, J4	277.0	60	0.2233	59.48	0.9616	5.77
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

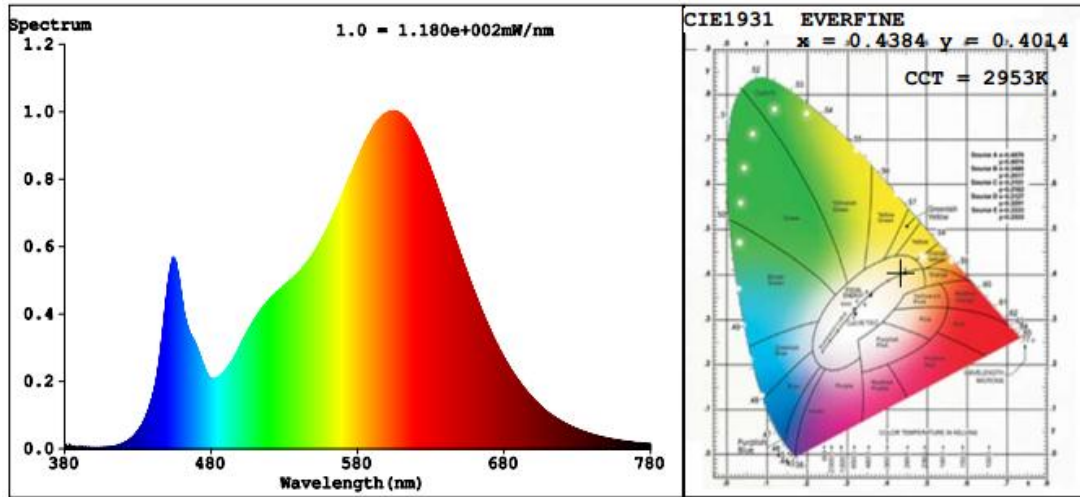
**Chromaticity Measurement for 4-lamp in Lithonia 2GT8 lensed 2x4-
 Sphere-Spectroradiometer Method:**

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	82	R9	7
Frequency (Hz)	60	R2	93	R10	84
CCT (K)	2953	R3	94	R11	79
Duv	-0.0013	R4	80	R12	73
Chromaticity (x, y)	x=0.4384 y=0.4014	R5	82	R13	85
Chromaticity (u', v')	u'=0.2527 v'=0.5205	R6	91	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)	6895.4	6714.7	In luminaire (2 lamps): 6000(-10%)
Luminous Efficacy (lm/W)	114.58	112.89	In luminaire: >= 100(-3%)
Most Worst Luminous/Highest Watts	111.58		
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)	2949	--	--

Spectral Power Distribution & Chromaticity Diagram

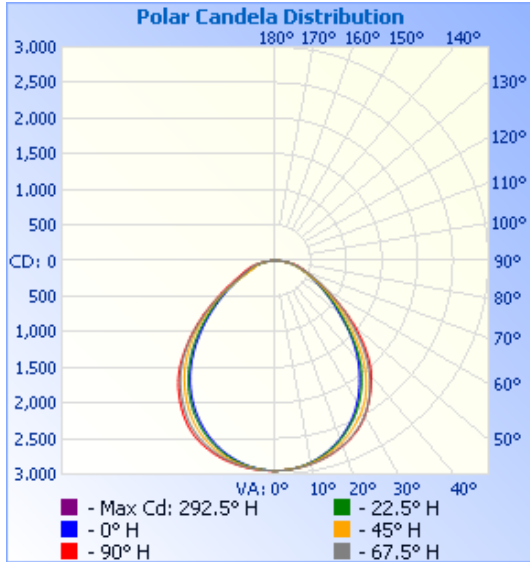


Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	2,268.3	32.9%
0-40	3,648.2	52.9%
0-60	5,868.3	85.1%
60-90	1,014.0	14.7%
70-100	449.1	6.5%
90-120	5.6	0.1%
0-90	6,882.4	99.8%
90-180	12.1	0.2%
0-180	6,894.5	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	%Total
0-10	278.8	4.0%	90-100	1.8	0%
10-20	796.1	11.5%	100-110	1.8	0%
20-30	1,193.4	17.3%	110-120	1.9	0%
30-40	1,379.9	20.0%	120-130	1.8	0%
40-50	1,279.9	18.6%	130-140	1.6	0%
50-60	940.3	13.6%	140-150	1.3	0%
60-70	566.8	8.2%	150-160	1.0	0%
70-80	333.7	4.8%	160-170	0.7	0%
80-90	113.6	1.6%	170-180	0.2	0%

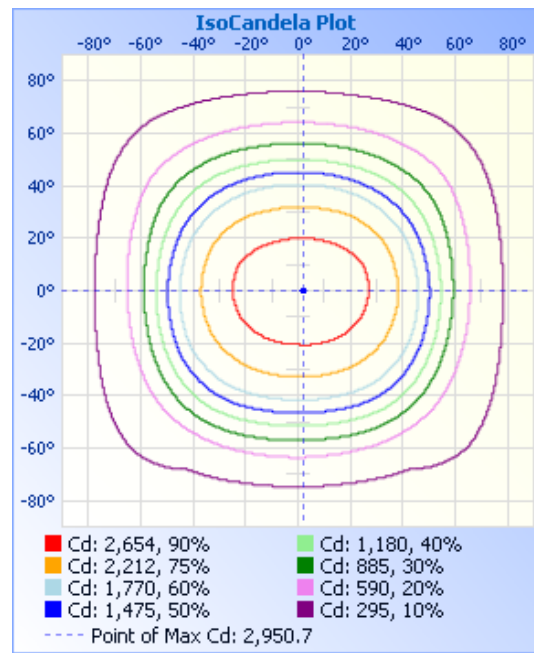
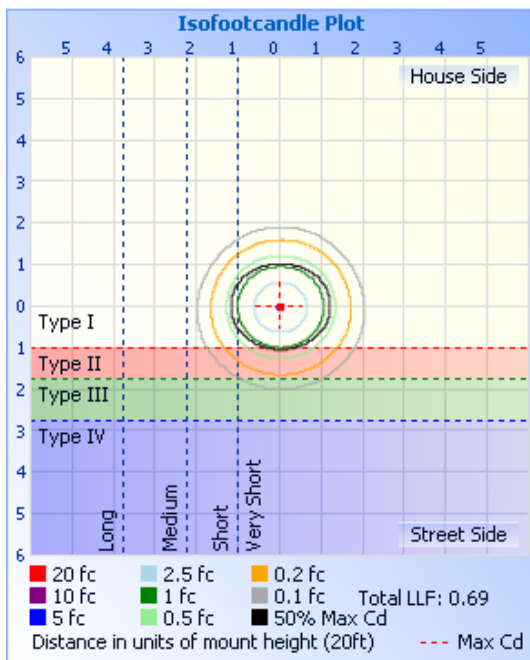
Photometric Data



Illuminance at a Distance

	Center Beam fc	Beam Width	
17.0ft	10.20 fc	35.0 ft	40.6 ft
34.0ft	2.55 fc	70.0 ft	81.2 ft
51.0ft	1.13 fc	105.0 ft	121.8 ft
68.0ft	0.64 fc	140.0 ft	162.4 ft
85.0ft	0.41 fc	175.0 ft	203.0 ft
102.0ft	0.28 fc	210.0 ft	243.6 ft

■ Vert. Spread: 91.7°
 ■ Horiz. Spread: 100.1°



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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	2949	2949	2949	2949	2949	2949	2949	2949	2949	2949	2949	2949	2949	2949	2949	2949
5	2944	2947	2939	2936	2932	2932	2933	2936	2933	2930	2929	2928	2930	2932	2937	2941
10	2920	2921	2901	2888	2878	2880	2889	2898	2899	2891	2882	2875	2873	2881	2897	2911
15	2876	2871	2833	2804	2786	2793	2818	2844	2845	2830	2807	2788	2781	2798	2830	2857
20	2805	2796	2735	2687	2660	2674	2718	2764	2770	2746	2708	2671	2656	2681	2730	2778
25	2704	2692	2608	2537	2500	2523	2591	2658	2667	2634	2577	2522	2499	2533	2599	2665
30	2550	2543	2447	2353	2303	2340	2433	2513	2516	2475	2407	2340	2309	2350	2425	2503
35	2351	2326	2228	2126	2068	2117	2226	2306	2319	2277	2200	2124	2086	2131	2216	2302
40	2116	2059	1945	1853	1807	1854	1956	2056	2098	2059	1969	1868	1823	1873	1980	2071
45	1809	1741	1617	1531	1515	1541	1637	1756	1814	1794	1699	1588	1531	1587	1699	1784
50	1470	1405	1303	1230	1201	1238	1331	1430	1486	1471	1391	1286	1233	1281	1379	1444
55	1125	1102	1022	968	950	975	1046	1129	1148	1135	1083	1002	953	990	1057	1100
60	824	843	780	750	741	753	796	864	842	808	774	740	716	723	744	774
65	602	628	578	573	575	577	589	645	611	553	502	506	519	495	485	538
70	461	453	420	426	438	429	430	471	468	417	348	363	383	359	342	413
75	358	324	311	315	330	320	317	337	360	334	283	281	287	278	281	332
80	246	222	210	212	227	219	218	232	250	242	215	200	201	195	212	240
85	100.0	108	99.6	110	115	117	104	116	106	111	100	99.3	101	96.6	97.0	106
90	2.21	2.01	2.66	3.25	3.36	3.82	3.05	2.33	1.53	1.29	1.71	2.13	2.00	1.89	1.58	1.35
95	1.23	1.11	1.61	2.16	2.19	2.13	1.47	1.35	1.02	0.97	1.36	1.98	1.98	1.78	1.22	1.17
100	1.04	1.02	1.71	2.04	2.22	2.06	1.31	1.08	1.29	1.23	1.47	2.02	1.96	1.73	1.58	1.32
105	1.23	1.29	2.07	1.97	2.23	1.97	1.64	1.16	1.60	1.57	2.02	2.06	1.87	1.67	1.95	1.72
110	1.78	1.96	2.12	1.84	2.16	1.88	2.07	1.84	2.03	1.97	2.08	1.95	1.70	1.69	1.94	1.96
115	2.21	2.26	2.35	1.70	2.10	1.78	2.26	2.12	2.27	2.34	2.15	1.22	1.38	1.26	1.92	1.95
120	2.33	2.40	2.40	1.63	1.70	1.61	2.33	2.36	2.39	2.28	2.22	1.09	1.35	1.18	1.90	1.93
125	2.71	2.59	2.33	1.60	1.78	1.60	2.34	2.47	2.51	2.28	2.08	1.18	1.38	1.10	1.86	1.91
130	2.72	2.70	2.25	1.65	1.80	1.59	2.32	2.64	2.56	2.28	1.90	1.40	1.51	1.40	1.77	1.90
135	2.74	2.68	2.14	1.74	1.82	1.70	2.01	2.63	2.59	2.28	1.77	1.77	1.76	1.58	1.48	1.89
140	2.76	2.66	1.65	1.79	1.78	1.72	1.69	2.52	2.62	2.28	1.76	2.00	2.07	1.83	1.55	1.87
145	2.61	2.47	1.56	1.83	1.80	1.83	1.55	2.40	2.54	2.28	1.72	2.32	2.25	2.13	1.71	1.86
150	2.43	2.22	1.73	1.83	1.82	2.04	1.57	2.15	2.52	2.28	1.90	2.36	2.57	2.37	2.14	1.84
155	2.33	2.03	1.86	1.99	2.12	2.12	1.84	1.97	2.52	2.28	1.93	2.49	2.73	2.68	2.38	1.90
160	2.28	1.88	1.88	2.14	2.31	2.22	1.91	1.90	2.54	2.28	1.99	2.60	2.85	2.71	2.57	2.13
165	2.29	1.77	1.90	2.32	2.61	2.35	2.00	1.87	2.58	2.29	2.09	2.67	2.91	2.79	2.81	2.17
170	2.32	1.85	2.08	2.72	2.91	2.62	2.20	1.91	2.76	2.31	2.13	2.68	2.97	2.86	2.99	2.21
175	2.33	1.90	2.18	2.82	2.93	2.76	2.28	1.95	2.52	2.33	2.00	2.19	2.79	2.80	2.75	2.25
180	2.33	1.91	2.21	2.86	2.91	2.74	2.26	1.97	2.46	2.34	1.90	2.19	2.86	2.86	2.69	2.27

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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	205423-215		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE180607-	120.0	60	0.1272	15.13	0.9912	6.74
J5	277.0	60	0.0565	14.95	0.9548	7.52
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

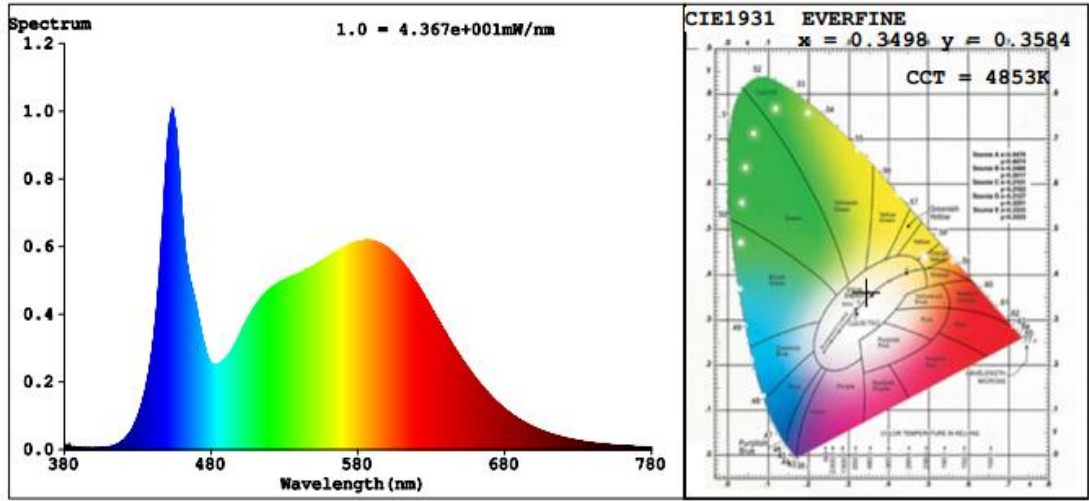
Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	5
Frequency (Hz)	60	R2	90	R10	75
CCT (K)	4853	R3	95	R11	79
Duv	0.0015	R4	80	R12	56
Chromaticity (x, y)	x=0.3498 y=0.3584	R5	81	R13	84
Chromaticity (u', v')	u'=0.2120 v'=0.4886	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)	2200	2142	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	145.41	143.28	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	141.57		

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)
205423-211	3000K	2077	15.15	137.1
205423-212	3500K	2108 ^{*1}	15.14 ^{*2}	139.23 ^{*3}
205423-213	4000K	2139 ^{*1}	15.14 ^{*2}	141.28 ^{*3}
205423-215	5000K	2200	15.13	145.41

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

$$2108 = (2200 - 2077) / 4 * 1 + 2077$$

$$2139 = (2200 - 2077) / 4 * 2 + 2077$$

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

$$15.14 = (15.15 + 15.13) / 2$$

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

$$139.23 = 2108 / 15.14$$

$$141.28 = 2139 / 15.14$$

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 *******