

1.2 Test Specifications:

Date of Receipt	Aug.18,2016
Date of Test	Aug.24,2016
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

1) Photometric and Light Distribution Measurement – Goniophotometer Method:

Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$, 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.

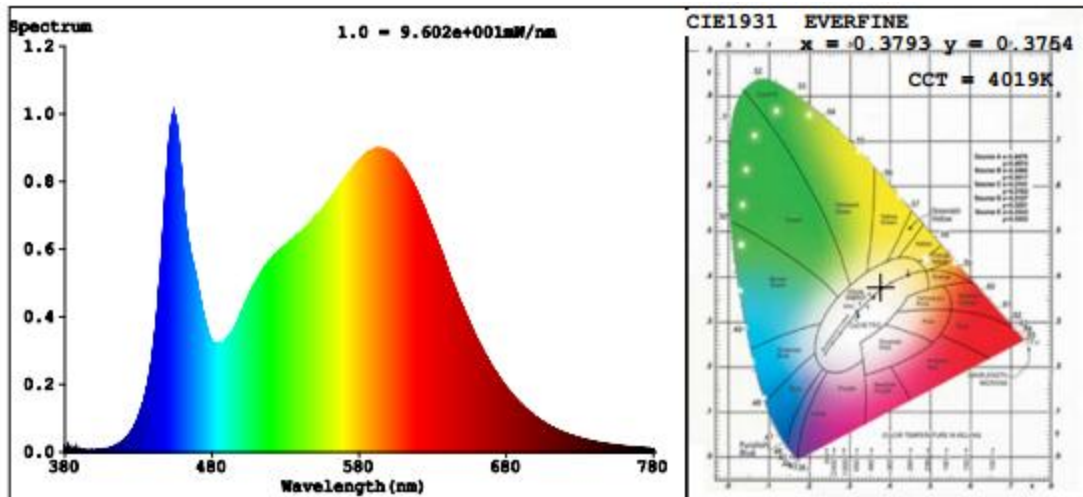
2) Chromaticity Measurement – Sphere-Spectroradiometer Method:

Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. 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 $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. 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.

Spectral Power Distribution & Chromaticity Diagram

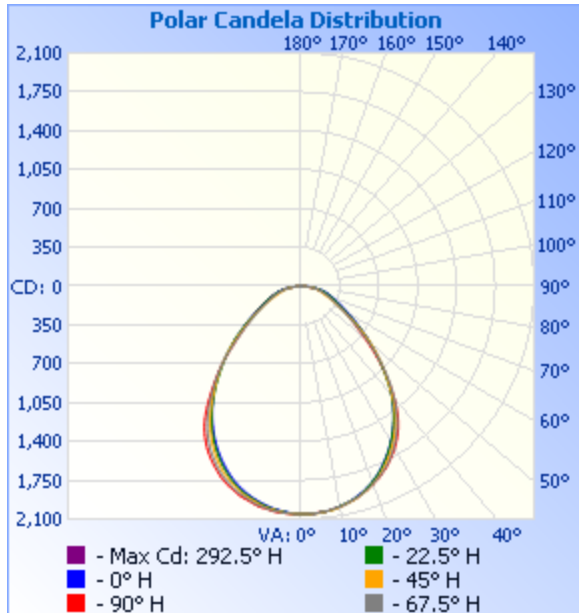


Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,559.6	35%
0-40	2,468.0	55.5%
0-60	3,806.2	85.5%
60-90	636.2	14.3%
70-100	289.9	6.5%
90-120	2.0	0%
0-90	4,442.3	99.8%
90-180	7.8	0.2%
0-180	4,450.1	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	194.1	4.4%	90-100	0.1	0%
10-20	551.9	12.4%	100-110	0.6	0%
20-30	813.6	18.3%	110-120	1.3	0%
30-40	908.4	20.4%	120-130	1.6	0%
40-50	791.5	17.8%	130-140	1.5	0%
50-60	546.7	12.3%	140-150	1.2	0%
60-70	346.4	7.8%	150-160	0.8	0%
70-80	217.2	4.9%	160-170	0.5	0%
80-90	72.6	1.6%	170-180	0.2	0%

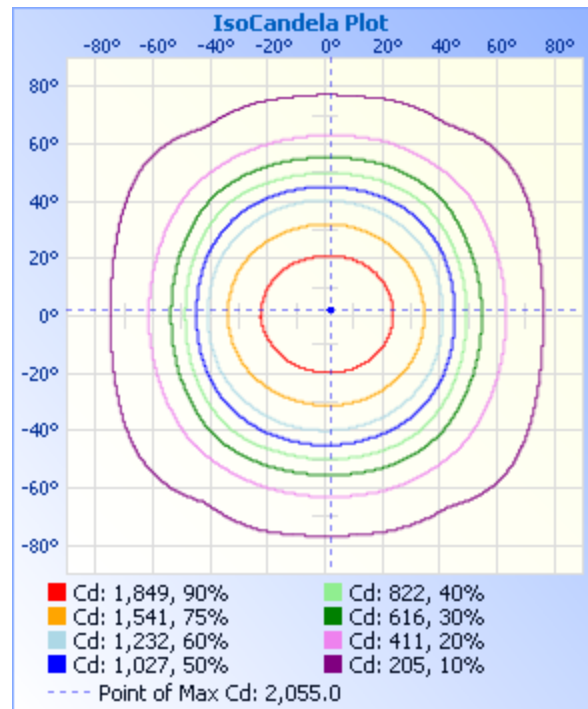
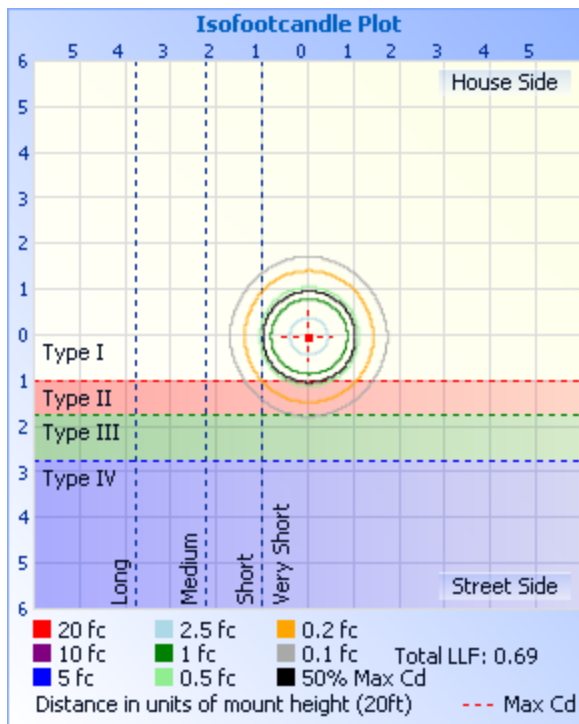
Photometric Data



Illuminance at a Distance

	Center Beam fc	Beam Width	
17.0ft	7.10 fc	34.0 ft	34.0 ft
34.0ft	1.78 fc	68.0 ft	68.1 ft
51.0ft	0.79 fc	101.9 ft	102.1 ft
68.0ft	0.44 fc	135.9 ft	136.1 ft
85.0ft	0.28 fc	169.9 ft	170.2 ft
102.0ft	0.20 fc	203.9 ft	204.2 ft

■ Vert. Spread: 90.0°
■ Horiz. Spread: 90.1°



Laboratory: Standard-Tech Co. Ltd Testing Center
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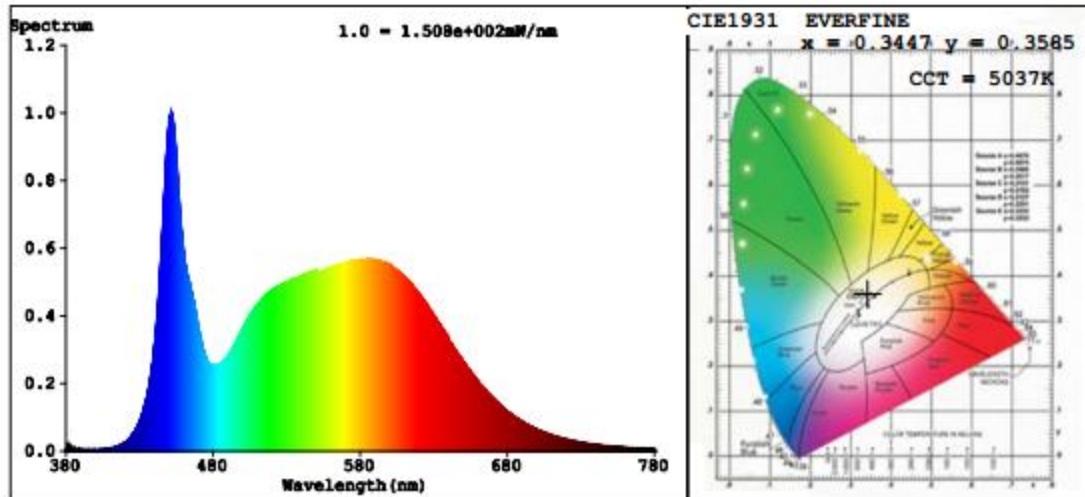
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Table--1 UNIT: cd

C (DEG) \ T (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338	
0	2053	2053	2053	2053	2053	2053	2053	2053	2053	2053	2053	2053	2053	2053	2053	2053	
5	2048	2051	2053	2051	2047	2046	2049	2044	2043	2038	2037	2035	2033	2037	2042	2045	
10	2025	2027	2030	2023	2015	2015	2020	2017	2018	2004	2000	1993	1991	1998	2010	2017	
15	1979	1981	1979	1970	1958	1964	1972	1970	1969	1952	1940	1930	1924	1938	1954	1964	
20	1912	1911	1902	1890	1875	1877	1893	1897	1897	1874	1853	1835	1831	1848	1869	1893	
25	1815	1815	1797	1774	1758	1762	1785	1801	1808	1774	1737	1713	1709	1728	1759	1792	
30	1690	1680	1649	1628	1617	1619	1646	1674	1685	1640	1594	1567	1564	1581	1609	1655	
35	1520	1501	1470	1456	1455	1454	1479	1510	1525	1473	1427	1402	1399	1405	1428	1474	
40	1271	1277	1253	1250	1267	1264	1269	1299	1298	1262	1222	1214	1215	1204	1216	1249	
45	1020	1042	1049	1041	1050	1041	1052	1060	1038	1026	1006	999	1011	1003	1012	1017	
50	772	786	835	842	832	829	838	804	780	776	801	792	804	812	801	770	
55	596	583	621	644	644	631	617	584	583	564	590	604	622	623	599	576	
60	471	442	456	486	493	468	439	431	452	415	419	448	475	468	443	438	
65	372	339	335	377	383	360	316	327	358	313	301	347	367	362	326	336	
70	289	265	246	301	304	288	233	257	279	245	222	277	288	287	240	264	
75	216	201	187	233	242	224	181	198	210	188	172	215	226	217	180	200	
80	147	136	139	163	171	160	135	135	142	126	128	150	158	148	132	132	
85	61.7	60.1	62.3	85.1	83.8	85.0	64.2	61.8	61.4	55.3	58.0	77.6	74.6	74.2	57.0	56.9	
90	0.01	0.13	0.21	0.42	0.27	0.39	0.25	0.10	0.00	0.00	0.00	0.11	0.05	0.11	0.05	0.00	
95	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.16	0.21	0.27	0.16	0.16	0.00	
100	0.00	0.00	0.00	0.10	0.05	0.21	0.21	0.00	0.16	0.27	0.64	0.42	0.27	0.42	0.48	0.32	
105	0.37	0.32	0.42	0.48	0.21	0.47	0.74	0.43	1.01	0.90	0.95	0.74	0.42	0.48	0.90	0.58	
110	0.85	0.90	1.00	0.74	0.48	0.89	0.95	1.16	1.38	1.27	1.38	0.95	0.74	0.74	1.27	1.22	
115	1.38	1.43	1.32	1.17	0.69	1.32	1.27	1.27	1.86	1.85	1.85	0.90	0.90	0.74	1.59	1.75	
120	1.69	1.58	1.38	1.11	0.74	1.37	1.38	1.85	2.18	2.06	2.17	1.38	1.06	1.32	1.54	1.91	
125	2.01	2.06	1.54	1.32	1.48	1.95	1.64	2.17	2.33	2.27	2.12	1.48	1.86	1.91	1.54	2.02	
130	2.23	2.17	1.54	1.64	1.69	2.01	1.64	2.17	2.54	2.22	2.12	1.59	2.07	2.12	1.54	1.96	
135	2.23	2.17	1.54	1.64	1.96	2.06	1.64	2.18	2.54	2.22	1.96	1.75	2.01	2.06	1.33	2.07	
140	2.60	2.28	1.27	1.64	2.01	2.12	1.49	2.23	2.54	2.27	1.38	1.75	2.01	1.85	1.27	2.07	
145	2.49	2.12	1.01	1.59	1.86	1.85	1.06	2.12	2.44	2.12	1.38	1.96	2.02	1.96	1.54	1.86	
150	2.49	1.91	1.01	1.59	2.01	1.53	0.95	1.91	2.38	2.12	1.43	2.07	2.17	2.12	1.64	1.49	
155	2.01	1.80	1.01	1.59	2.12	1.53	1.17	1.86	2.07	2.12	1.54	2.01	2.12	2.12	1.70	1.27	
160	1.91	1.54	1.01	1.59	2.12	1.48	0.95	1.80	2.07	2.06	1.64	1.80	2.07	2.12	1.80	1.27	
165	1.91	1.38	1.01	1.64	1.96	1.53	1.11	1.54	2.07	2.01	1.70	1.54	1.91	2.12	1.81	1.49	
170	2.01	1.48	1.22	2.17	2.01	1.90	1.33	1.54	2.17	2.01	1.91	1.54	2.39	2.75	2.12	1.49	
175	2.07	1.54	1.27	2.23	2.49	2.01	1.38	1.59	2.07	1.90	1.64	1.48	2.23	2.91	2.07	1.43	
180	1.85	1.59	1.32	2.23	2.44	2.01	1.43	1.49	1.91	1.90	1.59	1.32	2.23	2.43	2.02	1.43	

Spectral Power Distribution & Chromaticity Diagram



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3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-336	2 meter Integrating Sphere	2016-07-01	2017-06-30
ST-R-331	Spectral analysis system HAAS-2000	2016-07-01	2017-06-30
D204	Standard Lamp	2016-07-01	2017-06-30
PF2010	Power Meter for Integrating Sphere	2016-07-01	2017-06-30
EE-09	Goniophotometer system	2016-07-01	2017-06-30
D908S	Standard Lamp	2016-07-01	2017-06-30
PF210	Power Meter for Goniophotometer	2016-07-01	2017-06-30
ST-R-181A	Temperature Tester	2016-07-01	2017-06-30
Uncertainty: Photometric Measurement (Sphere):1.74% Chromaticity Measurement(Sphere):14.3K Photometric Measurement(Goniophotometer):1.62%			

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