

LM-79-08 Test Report

For

Revolution Lighting Technologies, Inc.

(Brand Name: Revolution Lighting Technologies)

2280 Ward Ave. Simi Valley, CA. 93065

Outdoor Full-Cutoff Wall-Mounted Area Luminaires

Model name(s): 281202-S4X

Remark: S = Sensor Option (Can be any number);

X = CCT (3 = 4000K, 4 = 4500K, 5 = 5000K, 6 = 5700K).

This is multiple listed report, the Project Number of the original report is
GZE1712011-C

Representative (Tested) Model: 281202-S43
281202-S46

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

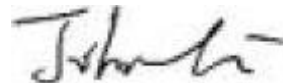
Test & Report By:



Engineer: Garman Mo

Date: Dec.12,2018

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.

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

Fax: 8620-32290422

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

1.1 Product Information:

Organization Name	Revolution Lighting Technologies, Inc.	
Brand Name	Revolution Lighting Technologies	
Model Number	281202-S4X	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Outdoor Full-Cutoff Wall-Mounted Area Luminaires	
Rated Voltage / Frequency	100-277Vac, 50/60Hz	
Nominal Power	60W	
Rated Initial Lamp Lumen	--	
Declared CCT	4000K,4500K,5000K,5700K	
LED Manufacturer	Seoul Semiconductor Co., LTD	
LED Model	SAWxC22B-xx	
Sample Number	GZE1712011-C1(4000K), C2(5700K)	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

Photo



1.2 Test Specifications:

Date of Receipt	Dec.05,2017
Date of Test	Dec.12,2017
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	2017-12-12	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	281202-S43		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171201	120.0	60	0.5160	61.42	0.9920	8.64
1-C1	277.0	60	0.2333	60.59	0.9374	10.47
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

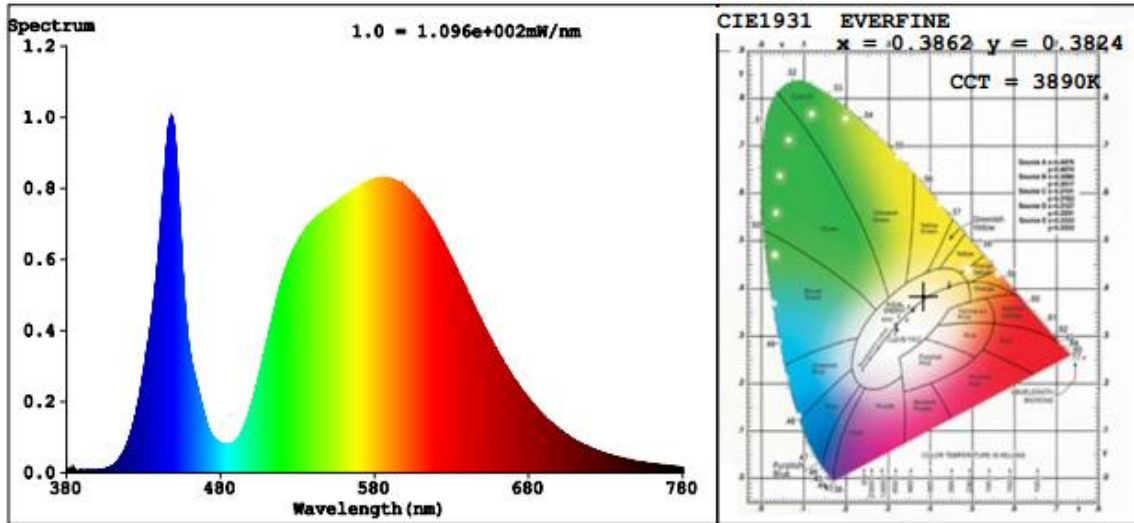
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	72	R9	0
Frequency (Hz)	60	R2	78	R10	46
CCT (K)	3890	R3	81	R11	70
Duv	0.0010	R4	74	R12	40
Chromaticity (x, y)	x=0.3862 y=0.3824	R5	70	R13	72
Chromaticity (u', v')	u'=0.2266 v'=0.5049	R6	68	R14	89
Color Rendering Index (CRI)	73.0	R7	82	R15	67
R9	0	R8	59	--	--

Photometric Measurement – Goniophotometer Method:

Parameter	Result		DLC V4.2 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	7346.7	7271.5	5000-10000(-10%)	
Luminous Efficacy (lm/W)	119.61	120.01	Standard: >= 95(-3%)	Premium: >= 115(-3%)
Most Worst Luminous/Highest Watts	118.39			
Zonal lumens in the 0-90 °zone (%)	99.6	--	>= 100(-3)	
Zonal lumens in the 80-90 °zone (%)	3.6	--	<=10(+3)	
Beam Angle (°)	121.5	--	--	
Center Beam Candle Power (cd)	2149	--	--	

Spectral Power Distribution & Chromaticity Diagram



Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,688.0	23%
0-40	2,799.4	38.1%
0-60	5,233.4	71.2%
60-90	2,086.5	28.4%
70-100	1,028.8	14%
90-120	10.3	0.1%
0-90	7,319.8	99.6%
90-180	25.7	0.4%
0-180	7,345.6	100%

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-10	203.5	2.8%	90-100	3.7	0.1%
10-20	585.9	8.0%	100-110	3.2	0%
20-30	898.6	12.2%	110-120	3.5	0%
30-40	1,111.4	15.1%	120-130	3.5	0%
40-50	1,222.3	16.6%	130-140	3.5	0%
50-60	1,211.6	16.5%	140-150	3.2	0%
60-70	1,061.4	14.4%	150-160	2.7	0%
70-80	761.1	10.4%	160-170	1.7	0%
80-90	264.0	3.6%	170-180	0.7	0%

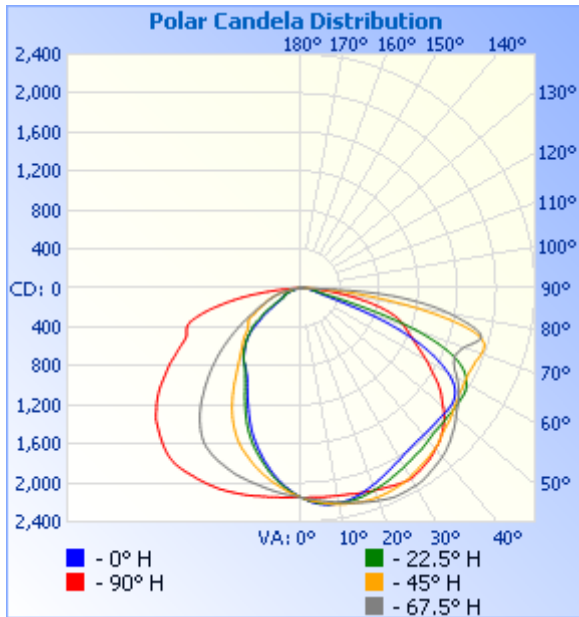
Laboratory: Standard-Tech Co. Ltd Testing Center
NVLAP CODE: 201011-0

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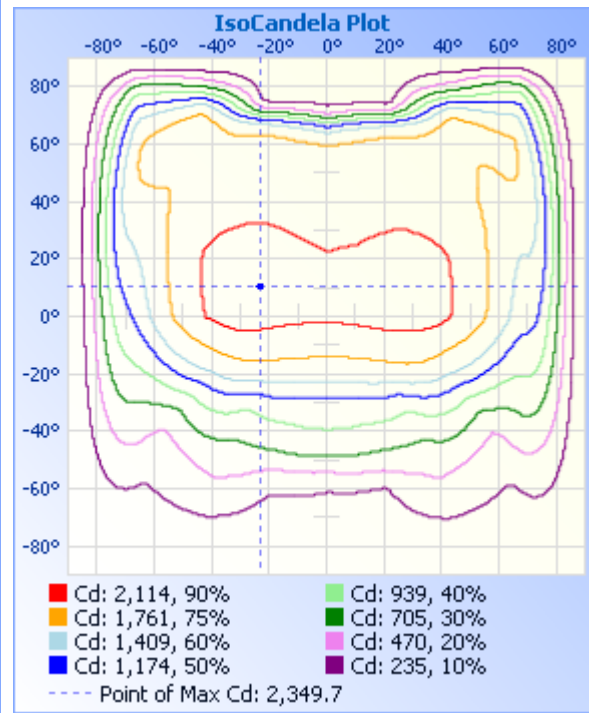
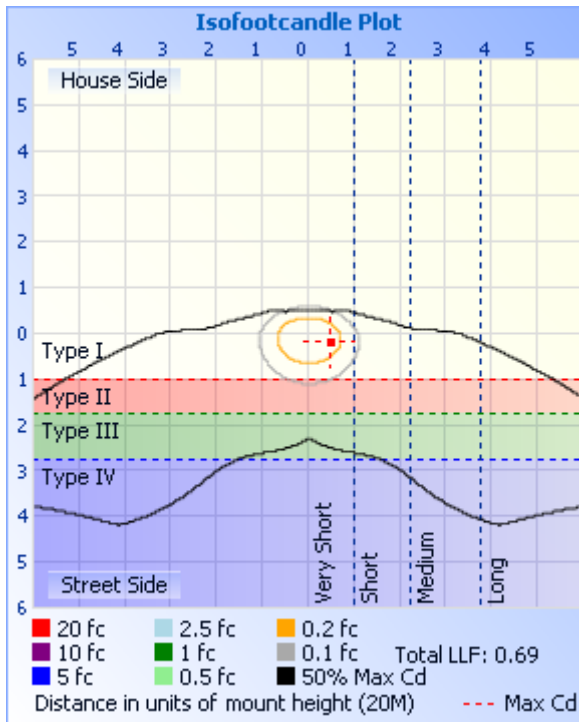
Photometric Data



Illuminance at a Distance

	Center Beam fc	Beam Width
3.33M	18.0 fc	7.39 M 22.21 M
6.67M	4.49 fc	14.78 M 44.40 M
10.00M	2.00 fc	22.17 M 66.61 M
13.33M	1.12 fc	29.56 M 88.80 M
16.67M	0.72 fc	36.95 M 111.01 M
20.00M	0.50 fc	44.35 M 133.22 M

■ Vert. Spread: 95.9°
■ Horiz. Spread: 146.6°



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Table--1 UNIT: cd

C (DEG) \ γ (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338
0	2149	2149	2149	2149	2149	2149	2149	2149	2149	2149	2149	2149	2149	2149	2149	2149
5	2156	2185	2215	2216	2225	2217	2207	2185	2155	2113	2074	2041	2031	2044	2070	2119
10	2172	2220	2261	2241	2239	2242	2252	2230	2163	2072	1986	1906	1879	1907	1980	2085
15	2198	2256	2286	2230	2211	2237	2276	2279	2183	2031	1877	1753	1704	1749	1876	2052
20	2218	2291	2283	2183	2152	2204	2287	2321	2208	1990	1754	1577	1510	1571	1760	2021
25	2229	2306	2250	2137	2087	2163	2271	2350	2238	1946	1606	1359	1293	1358	1611	1972
30	2225	2305	2205	2089	2027	2118	2239	2344	2255	1871	1404	1155	1105	1149	1419	1911
35	2224	2258	2166	2040	1982	2075	2191	2306	2214	1730	1173	1009	993	1007	1195	1795
40	2169	2205	2115	2002	1963	2036	2144	2256	2147	1535	977	922	917	923	996	1607
45	2067	2132	2056	1989	1953	2009	2072	2177	2056	1301	849	807	805	809	856	1377
50	1940	2048	2003	1990	1956	1999	2018	2074	1904	1077	740	671	649	673	752	1143
55	1766	1938	1943	1996	1927	1997	1966	1973	1717	845	657	470	422	483	661	900
60	1557	1804	1940	1945	1744	1959	1935	1848	1488	625	589	319	244	289	603	670
65	1343	1672	1960	1730	1335	1778	1935	1732	1276	448	442	215	193	193	443	482
70	1253	1679	1971	1154	625	1248	1970	1780	1123	338	343	170	148	155	357	349
75	1086	1903	1806	271	192	325	1888	1915	920	256	234	130	107	115	248	256
80	701	1650	1075	133	116	138	1244	1573	563	142	134	71.1	51.9	63.7	132	145
85	268	1046	412	86.0	66.2	91.1	490	968	216	59.5	49.4	26.5	18.8	23.5	53.4	61.9
90	6.35	23.0	17.9	13.4	11.7	14.2	14.7	17.7	4.89	3.78	2.65	3.35	0.57	1.02	3.24	14.1
95	3.39	3.78	3.16	1.59	1.44	1.46	2.74	3.75	3.49	4.08	3.32	1.28	0.82	1.63	3.80	4.35
100	3.34	2.27	1.99	1.18	1.16	1.17	1.72	2.33	3.44	4.58	3.99	2.16	1.30	2.61	4.46	4.66
105	3.79	1.98	1.73	1.03	1.05	1.16	1.58	2.11	3.89	4.85	4.64	3.23	2.32	3.62	5.63	4.93
110	4.75	2.07	1.75	1.05	1.06	1.14	1.62	2.08	4.14	4.89	5.41	4.04	3.25	4.34	6.13	4.98
115	5.15	2.36	1.77	1.06	1.09	1.13	1.69	2.48	4.40	4.88	5.61	4.56	4.12	4.95	5.67	5.06
120	5.66	3.11	1.79	1.33	1.13	1.38	1.85	3.14	4.69	4.98	5.25	4.89	4.63	5.17	5.27	5.16
125	6.21	3.57	2.09	1.59	1.57	1.63	2.17	3.79	4.90	5.11	5.28	4.99	4.69	5.22	5.29	5.25
130	6.47	4.17	2.45	1.94	1.80	1.88	2.48	4.00	5.26	5.29	5.31	5.04	4.93	5.28	5.32	5.52
135	6.72	4.63	2.85	2.40	2.06	2.45	2.73	4.40	5.81	5.74	5.54	5.12	5.04	5.38	5.62	5.84
140	7.12	5.03	3.37	2.66	2.42	2.60	3.34	4.75	6.27	6.09	5.87	5.37	5.17	5.46	5.79	5.97
145	7.38	5.33	4.03	3.12	2.57	3.11	3.85	4.97	6.57	6.39	6.38	5.63	5.46	5.66	5.98	6.18
150	7.42	5.64	4.59	3.88	3.29	3.77	4.40	5.42	6.60	6.50	6.43	6.25	5.97	5.94	6.49	6.49
155	7.36	6.04	5.15	4.40	4.01	4.44	4.81	5.77	6.57	6.39	6.38	6.17	6.02	6.10	6.43	6.43
160	7.28	6.34	5.56	5.06	4.32	4.85	5.07	5.77	6.18	6.21	6.28	6.15	6.07	6.12	6.42	6.31
165	7.22	6.49	5.96	5.68	4.99	5.40	5.62	6.14	6.04	6.02	6.19	6.09	6.11	6.12	6.50	6.38
170	7.88	7.44	7.13	6.40	5.61	6.12	6.64	7.14	7.73	7.70	7.91	7.73	7.10	6.89	7.35	7.75
175	8.08	8.05	7.65	6.96	6.48	6.78	7.34	7.59	7.86	7.90	8.40	8.23	7.53	7.29	7.30	7.98
180	7.98	8.05	8.06	7.37	6.69	7.14	7.50	7.75	7.73	7.85	8.16	8.14	7.41	6.68	7.14	7.49

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BUG Rating: B2-U2-G2

IESNA Luminaire Flux Distribution Table:

Zone	Lumens	Luminaire %
FL - Front-Low(0-30)	937.4	12.8
FM - Front-Medium(30-60)	2338.8	31.8
FH - Front-High(60-80)	1443.7	19.7
FVH - Front-Very High(80-90)	226.42	3.1
Total Forward Light	4956.7	67.5

BL - Back-Low(0-30)	750.7	10.2
BM - Back-Medium(30-60)	1207.5	16.4
BH - Back-High(60-80)	378.81	5.2
BVH - Back-Very High(80-90)	37.601	0.5
Total Back Light	2390	32.5

UL - Uplight-Low(90-100)	3.7064	0.1
UH - Uplight-High(100-180)	22.018	0.3
Total Up Light	25.725	0.4

BUG(Back,Up,Glare) Rating	B2-U2-G2
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Zone	Downward Lumens	Upward Lumens	Total Lumens
House Side	2374.6	15.395	2390
Street Side	4946.4	10.329	4956.7

2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2017-12-12	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	281202-S46		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171201	120.0	60	0.5222	62.26	0.9936	8.18
1-C2	277.0	60	0.2361	61.41	0.9388	10.52
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

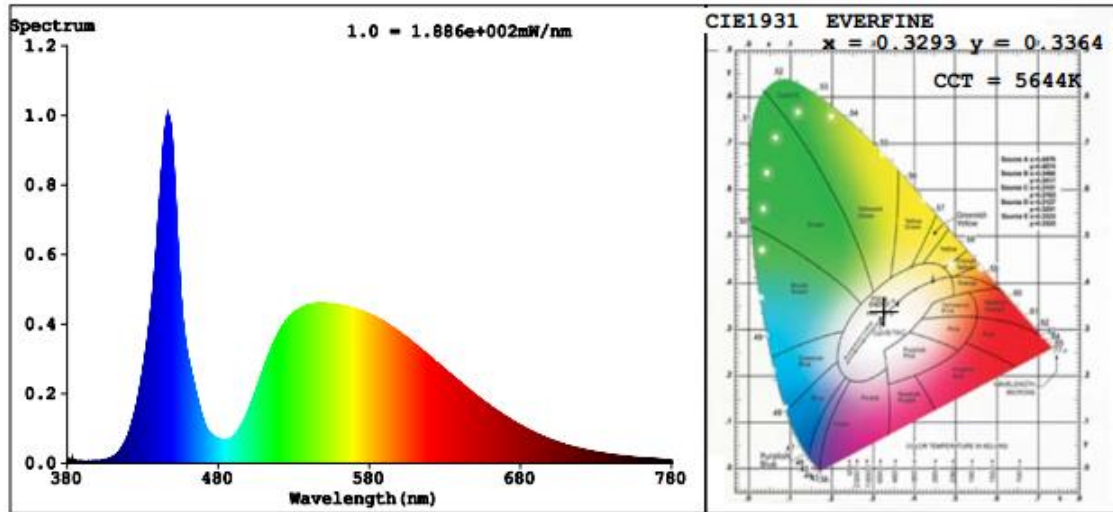
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	74	R9	0
Frequency (Hz)	60	R2	75	R10	39
CCT (K)	5644	R3	73	R11	75
Duv	-0.0010	R4	76	R12	43
Chromaticity (x, y)	x=0.3293 y=0.3364	R5	75	R13	73
Chromaticity (u', v')	u'=0.2065 v'=0.4747	R6	66	R14	84
Color Rendering Index (CRI)	73.2	R7	79	R15	72
R9	0	R8	68	--	--

Photometric Measurement – Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.2 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	7550	7516	5000-10000(-10%)	
Luminous Efficacy (lm/W)	121.27	122.39	Standard: >=	Premium: >=
Most Worst Luminous/Highest Watts	120.72		95(-3%)	115(-3%)

Spectral Power Distribution & Chromaticity Diagram



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2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
281202-S43	4000K	7346.7	61.42	119.61
281202-S44	4500K	7414 ^{*1}	61.84 ^{*2}	119.89 ^{*3}
281202-S45	5000K	7482 ^{*1}	61.84 ^{*2}	120.99 ^{*3}
281202-S46	5700K	7550	62.26	121.27

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

$$7414 = (7550 - 7346.7) / 3 + 7346.7$$

$$7482 = (7550 - 7346.7) / 3 + 7414$$

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

$$61.84 = (61.42 + 62.26) / 2$$

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

$$119.89 = 7414 / 61.84$$

$$120.99 = 7482 / 61.84$$

3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-331	2 meter Integrating Sphere	2017-07-01	2018-06-30
ST-R-327	Spectral analysis system HAAS-2000	2017-07-01	2018-06-30
D204	Standard Lamp	2017-07-12	2018-07-11
PF2010	Power Meter for Integrating Sphere	2017-07-01	2018-06-30
GO-R5000	Goniophotometer system	2017-07-01	2018-06-30
D908S	Standard Lamp	2017-07-12	2018-07-11
PF210	Power Meter for Goniophotometer	2017-07-07	2018-07-06

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 *******

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