

LM-79-08 Test Report

For

GL LED LLC

5F, Bld 5, Ji 'AnTai Hi-tech Park, Fuqiao 1st Zone, Qiaotou of Fuyong, Bao'an District, Shenzhen 518103, China

2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces

Model name(s): GL-PL-22-40W

Representative (Tested) Model: GL-PL-22-40W(3500K)
GL-PL-22-40W(5000K)

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

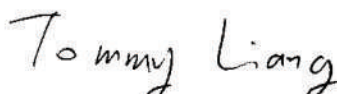
Test & Report By:



Engineer: Garman Mo

Date: Sept 13, 2016

Review By:



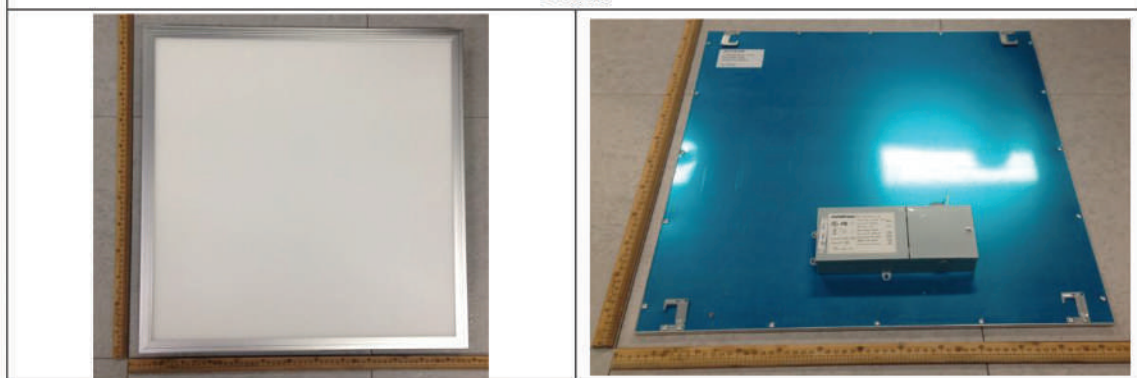
Manager: Tommy Liang

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

1.1 Product Information:

Brand Name	GL LED LLC	
Model Number	GL-PL-22-40W	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces	
Rated Voltage / Frequency	100 -277Vac, 50 Hz	
Nominal Power	40W	
Rated Initial Lamp Lumen	--	
Declared CCT	3500K,4000K,4500K,5000K	
LED Manufacturer	EVERLIGHT ELECTRONICS CO., LTD	
LED Model	67-21S Series (3000K)	
Sample Number	GZE160848-B1(3500K);B2(5000K)	
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	Sept.04,2016
Date of Test	Sept.05,2016
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, 50Hz. 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, 50Hz. 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, 50Hz. 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.

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

2.1 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2016-09-05	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	GL-PL-22-40W(3500K)		

Electrical Measurement :

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE160848-B1	120.0	50	0.3406	40.63	0.9940	4.03
	277.0	50	0.1564	40.23	0.9286	8.75
DLC Pass Criteria					$\geq 0.9(-3\%)$	$\leq 20(+5)$

Chromaticity Measurement - Sphere-Spectroradiometer Method :

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	7
Frequency (Hz)	50	R2	91	R10	78
CCT (K)	3514	R3	96	R11	80
Duv	0.0008	R4	81	R12	65
Chromaticity (x, y)	x=0.4053 y=0.3924	R5	81	R13	84
Chromaticity (u', v')	u'=0.2350 v'=0.5120	R6	87	R14	99
Color Rendering Index (CRI)	83.0	R7	84	R15	74
R9	7	R8	61	--	--

Photometric Measurement – Goniophotometer Method :

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	50	50		
Total Luminous (lm)	5529.7	5511.5	$\geq 2000 (-10\%)$	
Luminous Efficacy (lm/W)	136.10	137.00	Standard: $\geq 100(-3\%)$	Premium: $\geq 125(-3\%)$
Zonal lumens in the 0-60° zone (%)	78.8	--	$\geq 75(-3)$	
SC: 0-180° (if applicable)	1.24	--	1.0-2.0(± 0.1)	
SC: 90-270° (if applicable)	1.24	--	1.0-2.0(± 0.1)	
Beam Angle (°)	110.5	--	--	
Center Beam Candle Power (cd)	1970	--	--	

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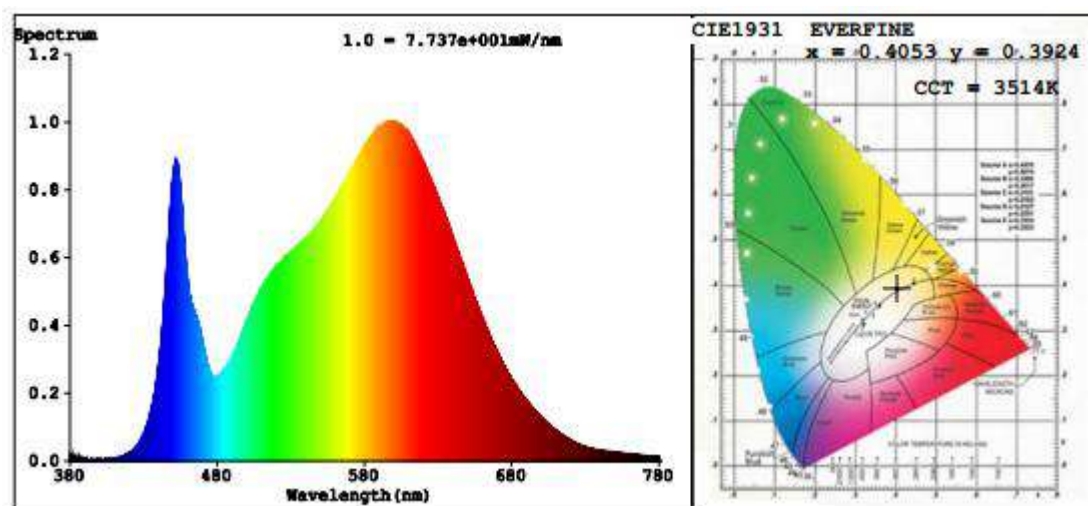
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Spectral Power Distribution & Chromaticity Diagram

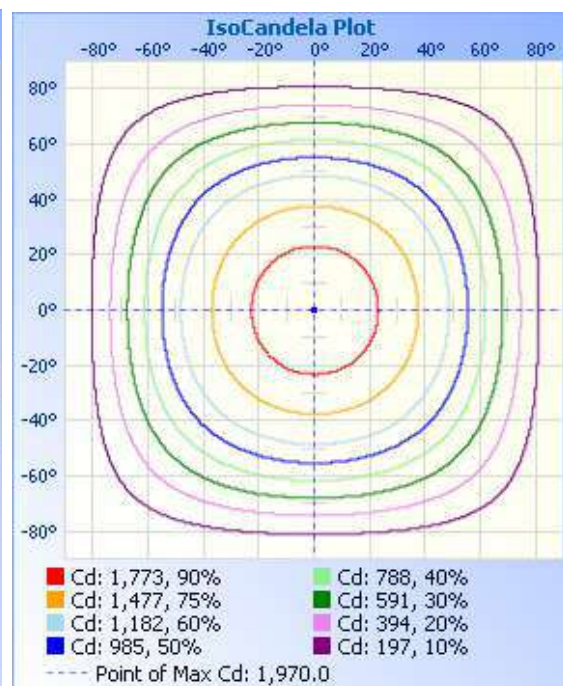
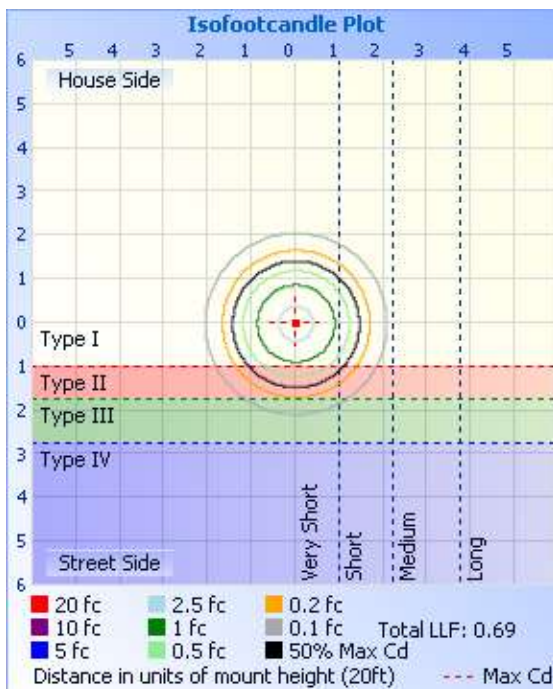
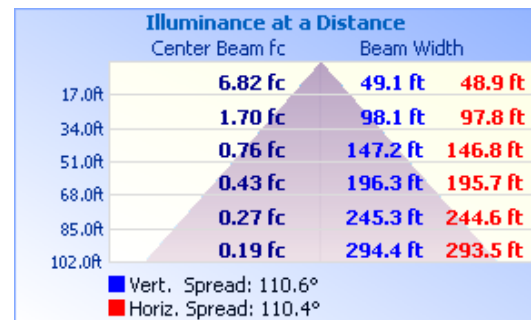
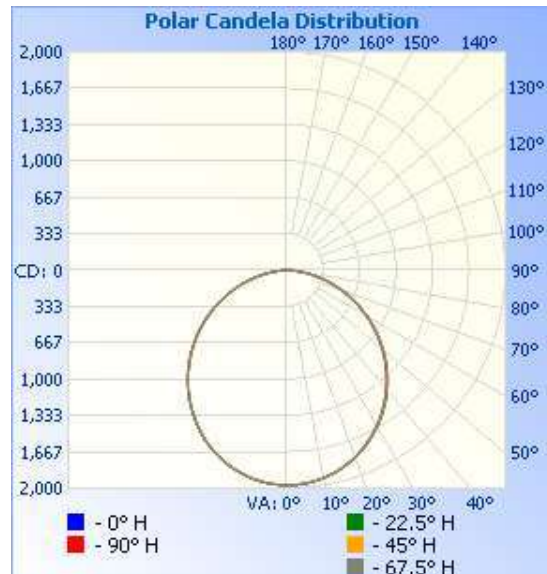


Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,519.4	27.5%
0-40	2,479.0	44.8%
0-60	4,354.3	78.8%
60-90	1,168.6	21.1%
70-100	494.6	8.9%
90-120	2.1	0%
0-90	5,522.9	99.9%
90-180	6.2	0.1%
0-180	5,529.1	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	186.2	3.4%	90-100	0.4	0%
10-20	531.7	9.6%	100-110	0.7	0%
20-30	801.5	14.5%	110-120	1.1	0%
30-40	959.6	17.4%	120-130	1.2	0%
40-50	988.3	17.9%	130-140	1.0	0%
50-60	887.0	16.0%	140-150	0.8	0%
60-70	674.4	12.2%	150-160	0.6	0%
70-80	390.5	7.1%	160-170	0.4	0%
80-90	103.8	1.9%	170-180	0.1	0%

Photometric Data



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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	1970	1970	1970	1970	1970	1970	1970	1970	1970	1970	1970	1970	1970	1970	1970	1970		
5	1960	1961	1960	1961	1962	1962	1961	1961	1961	1960	1960	1960	1960	1959	1959	1959		
10	1931	1932	1933	1934	1935	1934	1934	1933	1933	1931	1931	1930	1930	1929	1930	1930		
15	1883	1885	1886	1888	1890	1889	1888	1886	1885	1884	1883	1883	1883	1881	1882	1882		
20	1818	1819	1822	1824	1827	1825	1825	1822	1821	1819	1818	1818	1819	1816	1816	1817		
25	1736	1738	1742	1745	1748	1746	1745	1742	1739	1737	1737	1736	1737	1735	1735	1734		
30	1640	1642	1647	1651	1654	1652	1650	1647	1643	1641	1641	1640	1639	1638	1638	1638		
35	1530	1533	1539	1543	1547	1545	1542	1538	1534	1531	1531	1528	1528	1526	1528	1527		
40	1408	1412	1418	1423	1426	1425	1423	1417	1414	1411	1409	1407	1406	1405	1405	1406		
45	1277	1281	1287	1293	1296	1295	1293	1287	1282	1279	1276	1274	1273	1271	1272	1274		
50	1136	1141	1148	1152	1155	1156	1153	1147	1142	1139	1135	1132	1131	1130	1131	1133		
55	988	993	1000	1002	1005	1006	1006	1000	995	992	987	983	982	981	982	984		
60	834	840	846	848	850	851	852	847	842	838	833	829	828	827	828	830		
65	678	684	688	690	692	694	694	691	684	680	676	672	671	670	671	674		
70	521	527	529	532	534	535	534	530	523	519	519	516	515	513	514	517		
75	369	372	374	377	379	380	375	371	366	362	362	363	361	360	362	365		
80	221	224	229	231	232	232	227	223	220	216	216	219	217	217	218	218		
85	88.4	89.6	92.4	97.3	98.3	96.7	93.3	91.6	90.0	86.3	84.6	85.1	85.9	86.0	84.3	85.6		
90	0.59	0.62	0.70	0.81	0.80	0.91	1.05	0.83	0.31	0.21	0.32	0.37	0.16	0.16	0.37	0.48		
95	0.27	0.32	0.32	0.26	0.16	0.27	0.42	0.21	0.21	0.21	0.37	0.32	0.16	0.27	0.37	0.37		
100	0.37	0.37	0.53	0.21	0.11	0.32	0.42	0.21	0.53	0.43	0.69	0.53	0.48	0.37	0.64	0.59		
105	0.53	0.53	0.58	0.47	0.37	0.37	0.48	0.47	0.74	0.69	1.11	0.69	0.64	0.64	1.06	1.06		
110	0.80	1.00	0.79	0.58	0.63	0.69	0.85	0.74	1.11	1.06	1.22	0.85	0.95	0.64	1.27	1.38		
115	1.27	1.32	1.01	0.64	0.85	0.80	1.01	1.27	1.33	1.27	1.27	0.85	1.11	0.64	1.22	1.38		
120	1.38	1.27	1.27	0.79	1.11	0.85	1.22	1.33	1.43	1.38	1.22	1.27	1.27	1.17	1.17	1.38		
125	1.54	1.43	1.32	1.32	1.54	1.38	1.22	1.43	1.48	1.38	1.16	1.38	1.59	1.43	1.06	1.38		
130	1.64	1.48	1.32	1.38	1.54	1.38	1.22	1.54	1.48	1.43	0.85	1.32	1.59	1.43	0.85	1.38		
135	1.64	1.48	1.17	1.38	1.59	1.43	1.27	1.54	1.48	1.43	0.85	1.32	1.59	1.43	0.74	1.33		
140	1.64	1.48	0.90	1.38	1.59	1.48	0.96	1.54	1.48	1.43	0.53	1.32	1.32	1.38	0.74	1.33		
145	1.64	1.48	0.42	1.38	1.54	1.48	0.53	1.38	1.48	1.43	0.58	1.32	1.38	1.59	0.80	1.33		
150	1.64	1.32	0.42	1.43	1.54	1.43	0.48	1.27	1.48	1.43	0.85	1.32	1.59	1.64	0.90	1.11		
155	1.43	1.17	0.48	1.32	1.54	1.38	0.48	1.27	1.43	1.43	0.95	1.16	1.43	1.64	1.11	1.11		
160	1.27	1.11	0.53	1.11	1.54	1.22	0.48	1.11	1.59	1.43	1.01	1.11	1.43	1.64	1.28	1.27		
165	1.33	1.11	0.63	1.11	1.48	1.22	0.69	1.11	1.64	1.59	1.33	1.22	1.43	1.70	1.28	1.33		
170	1.43	1.22	0.80	1.32	1.48	1.22	0.96	1.33	1.64	1.59	1.38	1.16	1.43	1.91	1.43	1.33		
175	1.59	1.22	0.95	1.38	1.54	1.27	1.17	1.54	1.48	1.59	1.32	1.06	1.33	1.70	1.43	1.33		
180	1.59	1.27	1.01	1.38	1.54	1.38	1.22	1.38	1.43	1.59	1.27	1.01	1.22	1.54	1.33	1.17		

2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2016-09-05	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	GL-PL-22-40W(5000K)		

Electrical Measurement :

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE160848-B2	120.0	50	0.3446	41.06	0.9929	4.76
	277.0	50	0.1589	40.66	0.9238	9.67
DLC Pass Criteria					$\geq 0.9(-3\%)$	$\leq 20(+5)$

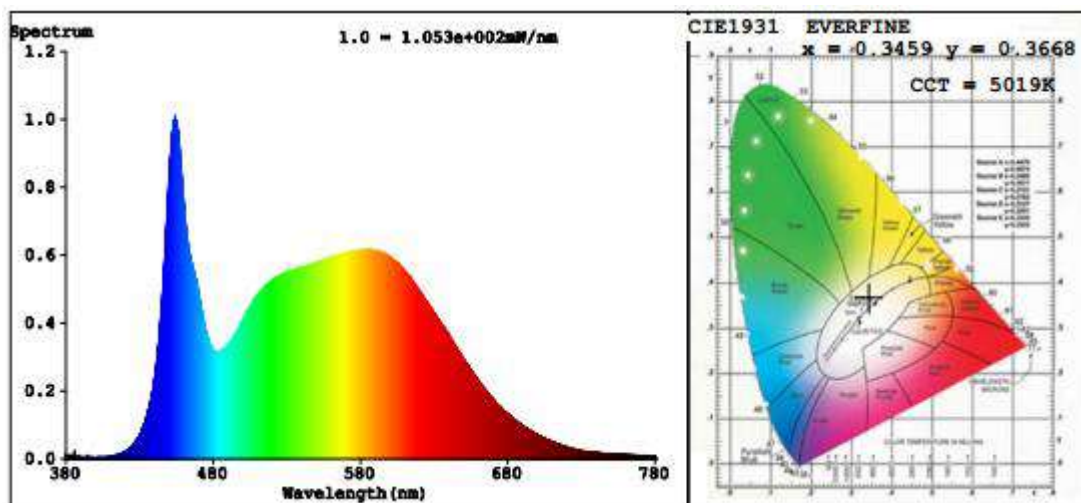
Chromaticity Measurement - Sphere-Spectroradiometer Method :

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	7
Frequency (Hz)	50	R2	91	R10	78
CCT (K)	5019	R3	96	R11	80
Duv	0.0071	R4	81	R12	61
Chromaticity (x, y)	x=0.3459 y=0.3668	R5	82	R13	84
Chromaticity (u', v')	u'=0.2062 v'=0.4920	R6	87	R14	98
Color Rendering Index (CRI)	83.7	R7	86	R15	75
R9	7	R8	65	--	--

Photometric Measurement – Sphere-Spectroradiometer Method :

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	50	50		
Total Luminous (lm)	5732	5702	$\geq 2000 (\pm 10\%)$	
Luminous Efficacy (lm/W)	139.59	140.24	Standard: $\geq 100(-3\%)$	Premium: $\geq 125(-3\%)$

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)
GL-PL-22-40W(3500K)	3500K	5529.7	40.63	136.10
GL-PL-22-40W(4000K)	4000K	5597.1 ^{*1}	40.85 ^{*2}	137.03 ^{*3}
GL-PL-22-40W(4500K)	4500K	5664.6 ^{*1}	40.85 ^{*2}	138.68 ^{*3}
GL-PL-22-40W(5000K)	5000K	5732	41.06	139.59

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

$$5597.1 = (5732 - 5529.7) / 3 + 5529.7$$

$$5664.6 = (5732 - 5529.7) / 3 + 5597.1$$

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

$$40.85 = (40.63 + 41.06) / 2$$

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

$$137.03 = 5597.1 / 40.85$$

$$138.68 = 5664.6 / 40.85$$

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 *******