

LM-79-08 Test Report

For

Beyond LED TECHNOLOGY

2/F BUILDING 1, CHANGFANG LIGHT INDUSTRIAL PARK, NO. 1 XINGYUN EAST ROAD, DONGXING BLOCK, DONGJIANG HI-TECH INDUSTRIAL ZONE, ZHONGKAI DISTRICT, HUIZHOU CITY

2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces

Model name(s): ZS-BL2*4-F49-CC

Remark: the "CC" in the model names represents the different CCT, it could be 30=3000K,35=3500K,40=4000K,45=4500K,50=5000K.

Representative (Tested) Model: ZS-BL2*4-F49-30

ZS-BL2*4-F49-50

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

Test & Report By:

Leo Wang

Engineer: Leo Wang

Date: Jul.04,2019

Review By:

Garman Mo

Manager: Garman Mo

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 A2LA, or any agency of the Federal Government.

Laboratory: Standard-Tech Co., Ltd. Testing Center

Report Format Number STD-QP019-409-B/0

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	SHENZHEN ZENITH TECHNOLOGY CO.,LTD.	
Brand Name	N/A	
Model Number	ZS-BL2*4-F49-CC	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces	
Rated Voltage / Frequency	100-277Vac, 50/60Hz	
Nominal Power	50W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,3500K,4000K,4500K,5000K	
LED Manufacturer	Shenzhen Runlite Technology Co.,Ltd	
LED Model	3000K:P28351-W29SJ0K1FE8F2-XXXX 5000K:P28351-W50SJ0K2FE8F2-XXXX	
Sample Number	JBE190415-B1(3000K),B2(5000K)	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

Photo



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1.2 Test Specifications:

Date of Receipt	Jun.18,2019
Date of Test	Jun.20,2019
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

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 $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$, 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.</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 $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. 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.</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 $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. 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.</p>

2.1 Electrical, Photometric and Chromaticity Measurements

Test date	2019-06-20	Test Ambient:	25.1 °C
Test Orientation	As intended	Stabilization Time (min)	60
Model Number	ZS-BL2*4-F49-30	Total Operating Time (min)	90

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE190415-	120.0	60	0.4212	49.68	0.9828	4.38
B1	277.0	60	0.1925	49.88	0.9352	12.10
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

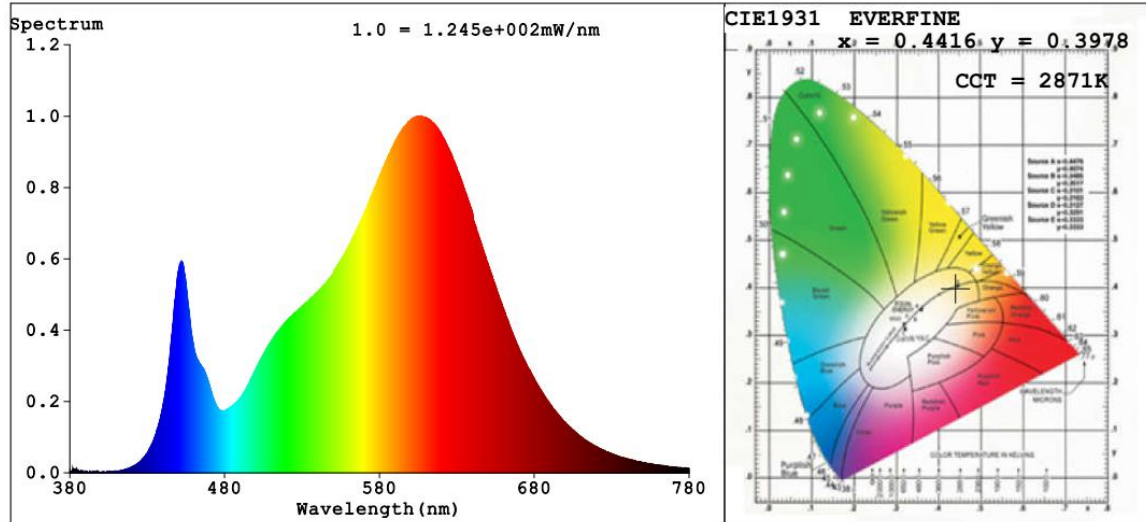
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	83	R9	11
Frequency (Hz)	60	R2	93	R10	84
CCT (K)	2871	R3	95	R11	81
Duv	-0.0031	R4	81	R12	76
Chromaticity (x, y)	x=0.4416 y=0.3978	R5	83	R13	86
Chromaticity (u', v')	u'=0.2564 v'=0.5196	R6	92	R14	98
Color Rendering Index (CRI)	83.4	R7	81	R15	76
R9	11	R8	59	--	--

Photometric Measurement – Goniophotometer Method(Test Distance: 26.000m):

Parameter	Result		DLC V4.4 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	6366.7	6523.0	>=3000 (-10%)	
Luminous Efficacy (lm/W)	128.15	130.77	Standard: >= 100(-3%)	Premium: >= 125(-3%)
Zonal lumens in the 0-60° zone (%)	77.8	--	>= 75(-3)	
SC: 0-180° (if applicable)	1.27	--	1.0-2.0(±0.1)	
SC: 90-270° (if applicable)	1.27	--	1.0-2.0(±0.1)	
Beam Angle (°)	114.3	--	--	
Center Beam Candle Power (cd)	2168	--	--	

Spectral Power Distribution & Chromaticity Diagram

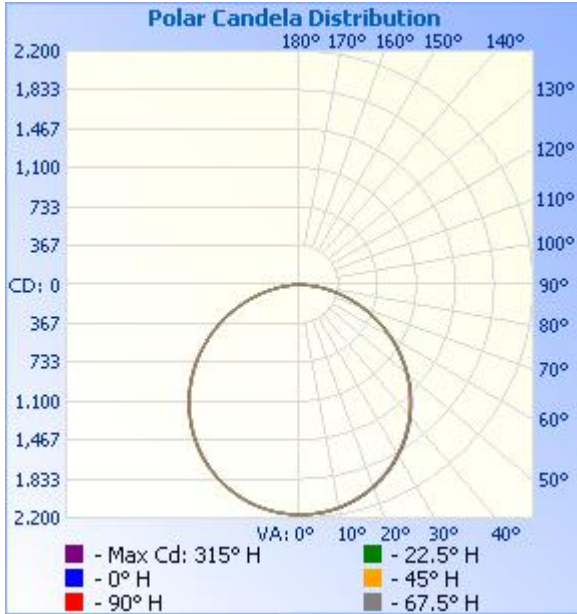


Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,692.2	26.6%
0-40	2,781.0	43.7%
0-60	4,953.0	77.8%
60-90	1,403.1	22%
70-100	607.3	9.5%
90-120	5.8	0.1%
0-90	6,356.1	99.8%
90-180	10.1	0.2%
0-180	6,366.2	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	205.2	3.2%	90-100	2.4	0%
10-20	589.4	9.3%	100-110	1.9	0%
20-30	897.6	14.1%	110-120	1.6	0%
30-40	1,088.8	17.1%	120-130	1.2	0%
40-50	1,137.1	17.9%	130-140	1.0	0%
50-60	1,034.9	16.3%	140-150	0.8	0%
60-70	798.2	12.5%	150-160	0.6	0%
70-80	471.7	7.4%	160-170	0.4	0%
80-90	133.2	2.1%	170-180	0.2	0%

Photometric Data



Illuminance at a Distance

Height	Center Beam fc	Beam Width	Illuminance
4.0ft	135.5 fc	12.4 ft	12.4 ft
8.0ft	33.9 fc	24.8 ft	24.8 ft
12.0ft	15.1 fc	37.3 ft	37.2 ft
16.0ft	8.5 fc	49.7 ft	49.6 ft
20.0ft	5.4 fc	62.1 ft	61.9 ft

■ Vert. Spread: 114.4°
■ Horiz. Spread: 114.3°

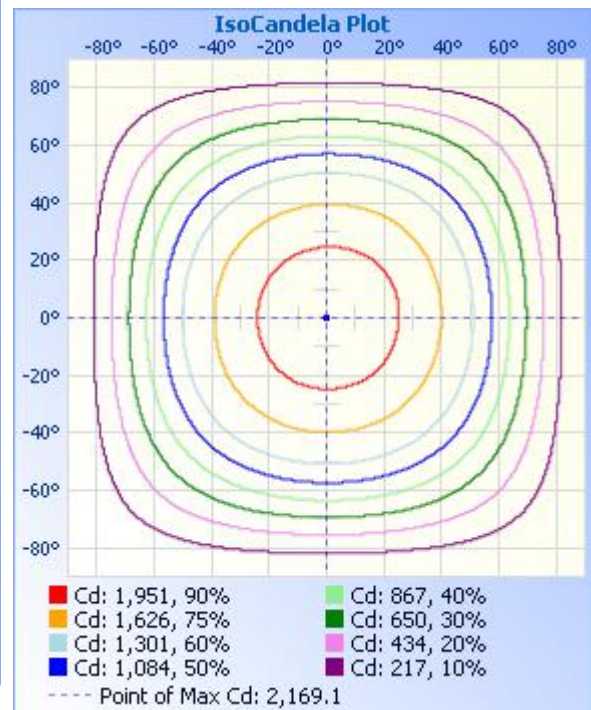
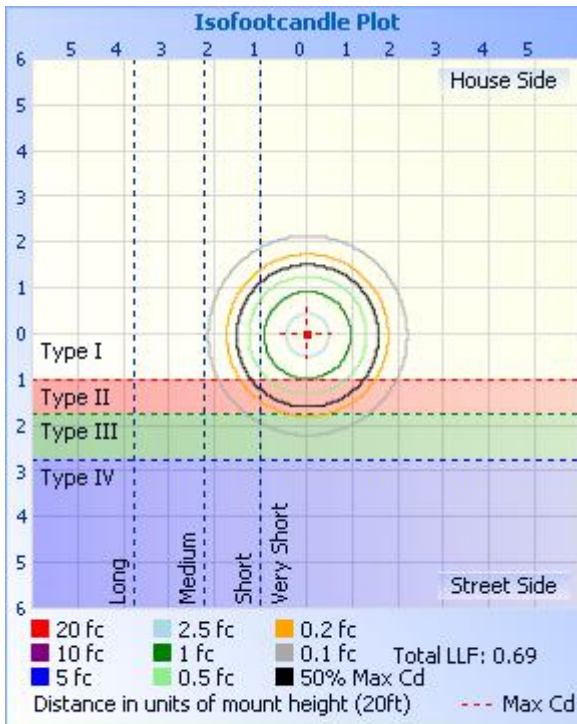


Table--1 UNIT: cd

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	2168	2168	2168	2168	2168	2168	2168	2168	2168	2168	2168	2168	2168	2168	2168	2168	
5	2159	2162	2163	2161	2162	2160	2159	2158	2158	2156	2155	2155	2157	2159	2159	2159	
10	2133	2139	2141	2137	2138	2134	2132	2131	2129	2128	2125	2126	2129	2130	2130	2131	
15	2088	2097	2100	2096	2095	2089	2087	2085	2084	2081	2081	2081	2084	2085	2085	2085	
20	2027	2037	2041	2037	2034	2028	2025	2023	2021	2018	2018	2019	2021	2022	2023	2023	
25	1949	1959	1963	1960	1955	1949	1946	1944	1942	1940	1941	1941	1942	1942	1943	1943	
30	1854	1864	1868	1865	1861	1855	1850	1849	1847	1847	1846	1846	1846	1845	1846	1847	
35	1742	1752	1757	1753	1749	1743	1738	1738	1734	1737	1735	1736	1735	1732	1733	1737	
40	1615	1625	1632	1629	1624	1617	1614	1613	1609	1610	1611	1609	1607	1607	1606	1609	
45	1476	1486	1490	1488	1484	1478	1473	1474	1470	1471	1470	1469	1467	1467	1465	1470	
50	1324	1332	1337	1336	1331	1327	1322	1323	1318	1318	1317	1316	1314	1313	1313	1317	
55	1160	1167	1172	1172	1169	1165	1161	1161	1155	1154	1153	1152	1150	1150	1149	1154	
60	985	993	998	999	997	993	989	988	984	981	980	978	978	978	978	981	
65	806	812	819	819	818	815	811	810	805	802	801	799	799	799	799	801	
70	624	630	636	637	636	634	630	627	623	621	620	618	617	618	617	619	
75	443	448	456	458	457	455	451	446	443	442	441	438	437	437	439	441	
80	268	275	284	287	287	284	280	274	271	271	270	268	266	267	268	270	
85	110	115	123	129	128	127	124	116	112	111	111	112	111	112	110	111	
90	3.22	3.39	3.92	4.64	5.21	5.32	4.97	4.60	3.80	3.40	2.93	3.18	3.28	3.32	2.91	2.92	
95	1.73	1.74	1.95	2.30	2.50	2.39	1.98	1.63	1.36	1.53	1.75	2.40	2.53	2.44	1.77	1.42	
100	1.48	1.53	1.79	2.10	2.44	2.30	1.82	1.40	1.38	1.50	1.64	2.35	2.55	2.28	1.79	1.42	
105	1.54	1.57	1.79	2.05	2.41	2.19	1.82	1.43	1.48	1.52	1.65	1.69	1.93	1.77	1.66	1.47	
110	1.61	1.74	1.79	2.00	2.19	2.13	1.82	1.47	1.56	1.63	1.66	1.62	1.61	1.66	1.64	1.57	
115	1.73	1.73	1.79	1.57	1.93	1.62	1.84	1.69	1.73	1.60	1.68	0.79	1.25	1.03	1.62	1.54	
120	1.94	1.80	1.79	1.01	1.30	1.18	1.84	1.75	1.60	1.63	1.72	0.67	1.05	0.97	1.58	1.52	
125	1.92	1.88	1.79	0.91	1.27	1.12	1.80	1.76	1.57	1.64	1.47	0.68	1.00	0.91	1.15	1.33	
130	1.90	1.89	1.58	0.94	1.23	1.07	1.67	1.73	1.56	1.62	1.11	0.84	1.04	0.97	1.00	1.25	
135	1.88	1.85	1.33	0.97	1.20	1.04	1.36	1.69	1.60	1.61	1.10	0.99	1.20	1.02	0.99	1.19	
140	1.87	1.69	1.02	1.00	1.20	1.04	1.04	1.55	1.62	1.60	1.10	1.19	1.36	1.09	0.99	1.19	
145	1.85	1.53	0.85	1.02	1.20	1.04	0.98	1.44	1.60	1.59	1.14	1.34	1.46	1.46	1.09	1.22	
150	1.74	1.44	0.84	1.00	1.20	1.11	0.96	1.38	1.58	1.60	1.26	1.44	1.67	1.67	1.41	1.24	
155	1.58	1.29	0.89	1.15	1.30	1.30	0.94	1.10	1.56	1.62	1.26	1.50	1.74	1.77	1.67	1.29	
160	1.52	1.22	0.97	1.51	1.68	1.45	0.97	1.03	1.64	1.65	1.33	1.57	1.77	1.87	1.68	1.35	
165	1.52	1.18	1.08	1.67	1.73	1.66	1.07	1.04	1.67	1.69	1.39	1.65	1.75	1.90	1.69	1.52	
170	1.58	1.17	1.21	1.70	1.76	1.72	1.46	1.13	1.68	1.71	1.40	1.66	1.86	1.93	1.70	1.68	
175	1.94	1.16	1.42	1.72	1.77	1.72	1.62	1.28	1.68	1.80	1.37	1.52	1.67	1.79	1.71	1.53	
180	1.74	1.32	1.42	1.73	1.77	1.72	1.25	1.31	1.63	1.79	1.21	1.41	1.72	1.77	1.72	1.42	

2.2 Electrical, Photometric and Chromaticity Measurements

Test date	2019-06-20	Test Ambient:	25.1 ° C
Test Orientation	As intended	Stabilization Time (min)	60
Model Number	ZS-BL2*4-F49-50	Total Operating Time (min)	90

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE190415-	120.0	60	0.4211	49.59	0.9814	4.73
B2	277.0	60	0.1928	49.79	0.9322	12.64
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

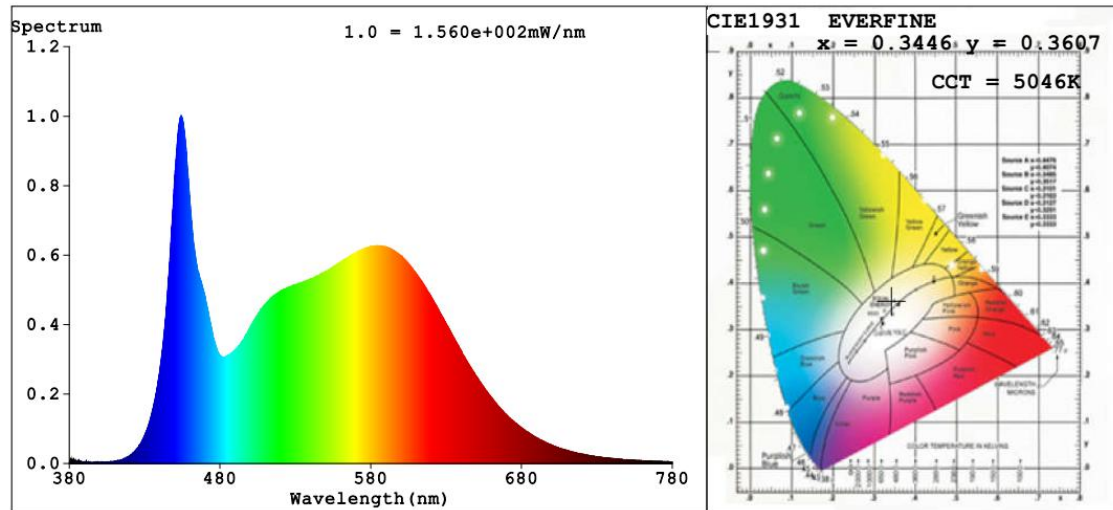
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	80	R9	0
Frequency (Hz)	60	R2	91	R10	78
CCT (K)	5046	R3	95	R11	79
Duv	0.0047	R4	79	R12	62
Chromaticity (x, y)	x=0.3446 y=0.3607	R5	81	R13	83
Chromaticity (u', v')	u'=0.2077 v'=0.4889	R6	87	R14	98
Color Rendering Index (CRI)	82.4	R7	84	R15	73
R9	0	R8	61	--	--

Photometric Measurement – Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.4 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	6582	6743	>=3000 (-10%)	
Luminous Efficacy (lm/W)	132.73	135.43	Standard: >= 100(-3%)	Premium: >= 125(-3%)

Spectral Power Distribution & Chromaticity Diagram



2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
ZS-BL2*4-F49-30	3000K	6366.7	49.68	128.15
ZS-BL2*4-F49-35	3500K	6421 ^{*1}	49.64 ^{*2}	129.35 ^{*3}
ZS-BL2*4-F49-40	4000K	6474 ^{*1}	49.64 ^{*2}	130.42 ^{*3}
ZS-BL2*4-F49-45	4500K	6528 ^{*1}	49.64 ^{*2}	131.51 ^{*3}
ZS-BL2*4-F49-50	5000K	6582	49.59	132.73

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

$$6421 = (6582 - 6366.7) / 4 * 1 + 6366.7$$

$$6474 = (6582 - 6366.7) / 4 * 2 + 6366.7$$

$$6528 = (6582 - 6366.7) / 4 * 3 + 6366.7$$

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

$$49.64 = (49.68 + 49.59) / 2$$

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

$$129.35 = (6421 / 49.64)$$

$$130.42 = (6474 / 49.64)$$

$$131.51 = (6528 / 49.64)$$

3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-423	2 meter Integrating Sphere	Verified by D204 standard lamp	
ST-R-327	Spectral analysis system HAAS-2000	Verified by D204 standard lamp	
ST-R-332	Standard Lamp	2019-07-03	2020-07-02
ST-R-333	Power Meter for Integrating Sphere	2019-06-27	2020-06-26
ST-R-355	Goniophotometer system	Verified by D908S standard lamp	
ST-R-359	Standard Lamp	2019-07-03	2020-07-02
ST-R-358	Power Meter for Goniophotometer	2019-06-27	2020-06-26
Expand Uncertainty: Photometric Measurement (Sphere):2.66%, k=2 Chromaticity Measurement(Sphere):28.6K, k=2 Photometric Measurement(Goniophotometer):2.76%, k=2			

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