

LM-79-08 Test Report

For

ATG ELECTRONICS CORP**(Brand Name: N/A)**

10700 7th Street Rancho Cucamonga, CA 91730

**2x2 Luminaires for Ambient Lighting of Interior
Commercial Spaces**

Model name(s): FPEL22-30W-ZZ

Remark: The suffix of the model name "ZZ" stands for different color
temperature as below: 30=3000K, 35=3500K, 40=4000K,
45=4500K, 50=5000K.

Representative (Tested) Model: FPEL22-30W-30
FPEL22-30W-50

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

Test & Report By:

Garman Mo

Engineer: Garman Mo

Date: Mar.29,2017

Review By:

Tommy Liang

Manager: Tommy Liang

Remark: This is a multiple listed report, the Project Number of the original report is GZE170352-H-C1.

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

1.1 Product Information:

Organization Name	ATG ELECTRONICS CORP	
Brand Name	N/A	
Model Number	FPEL22-30W-ZZ	
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, 50/60 Hz	
Nominal Power	30W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,3500K,4000K,4500K,5000K	
LED Manufacturer	EVERLIGHT ELECTRONICS CO., LTD	
LED Model	67-21S Series (3000K)	
Sample Number	GZE170352-H-C1(3000K),C2(5000K)	
Luminaire Aperture (for downlights)	--	in. mm mm s
Luminaire Length	--	
Luminaires Width	--	
Number of Units (modular products)	N/A	
Photo		
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1.2 Test Specifications:

Date of Receipt	Mar.26,2017
Date of Test	Mar.27,2017
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**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.

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

Test date	2017-03-27	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	FPEL22-30W-30		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170352-H-C1	120.0	60	0.2559	30.35	0.9882	6.46
	277.0	60	0.1209	30.03	0.8968	8.90
DLC Pass Criteria					$\geq 0.9(-3\%)$	$\leq 20(+5)$

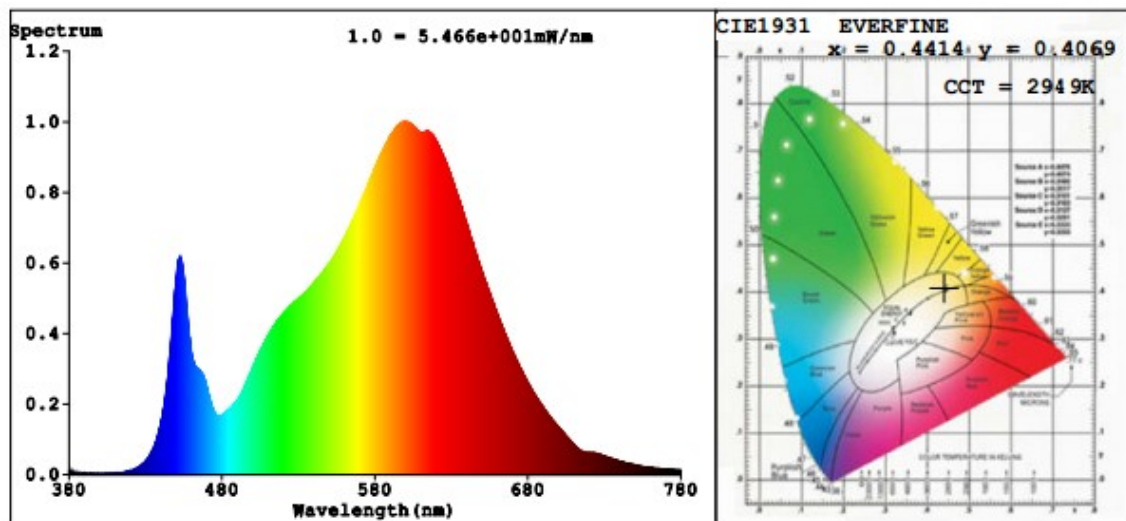
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	6
Frequency (Hz)	60	R2	91	R10	79
CCT (K)	2949	R3	96	R11	79
Duv	0.0005	R4	80	R12	68
Chromaticity (x, y)	x=0.4414 y=0.4069	R5	81	R13	83
Chromaticity (u', v')	u'=0.2522 v'=0.5232	R6	89	R14	99
Color Rendering Index (CRI)	82.2	R7	82	R15	73
R9	6	R8	58	--	--

Photometric Measurement – Goniophotometer Method:

Parameter	Result		DLC V4.1 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	3818.0	3808.7	$\geq 2000 (-10\%)$	
Luminous Efficacy (lm/W)	125.80	126.83	Standard: $\geq 100(-3\%)$	Premium: $\geq 125(-3\%)$
Zonal lumens in the 0-60° zone (%)	77.8	--	$\geq 75(-3)$	
SC: 0-180° (if applicable)	1.26	--	1.0-2.0(± 0.1)	
SC: 90-270° (if applicable)	1.24	--	1.0-2.0(± 0.1)	
Beam Angle (°)	113.0	--	--	
Center Beam Candle Power (cd)	1320	--	--	

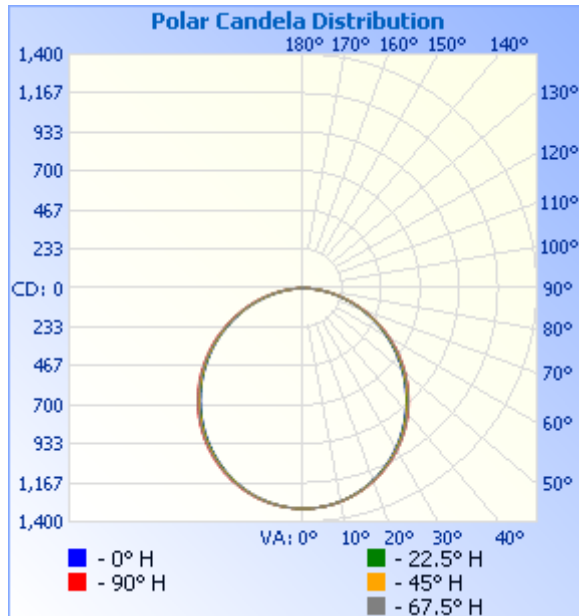
Spectral Power Distribution & Chromaticity Diagram



Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,023.5	26.8%
0-40	1,676.0	43.9%
0-60	2,969.8	77.8%
60-90	847.3	22.2%
70-100	369.7	9.7%
90-120	0.0	0%
0-90	3,817.1	100%
90-180	0.5	0%
0-180	3,817.6	100%

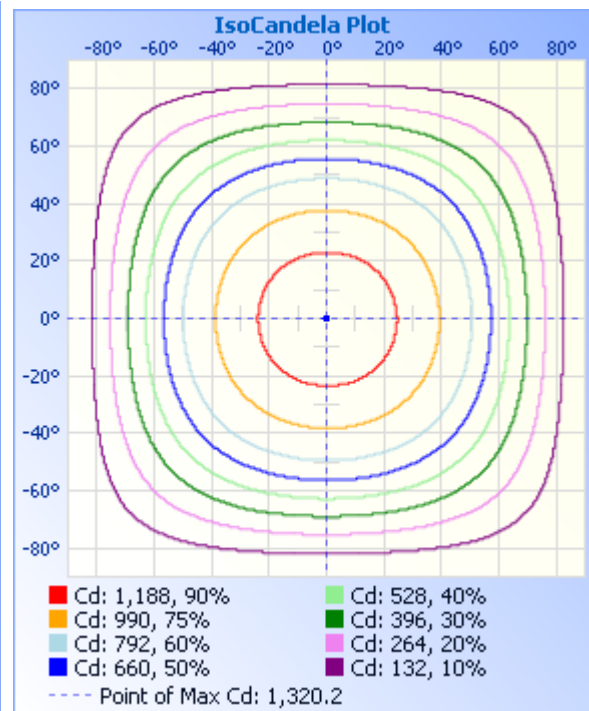
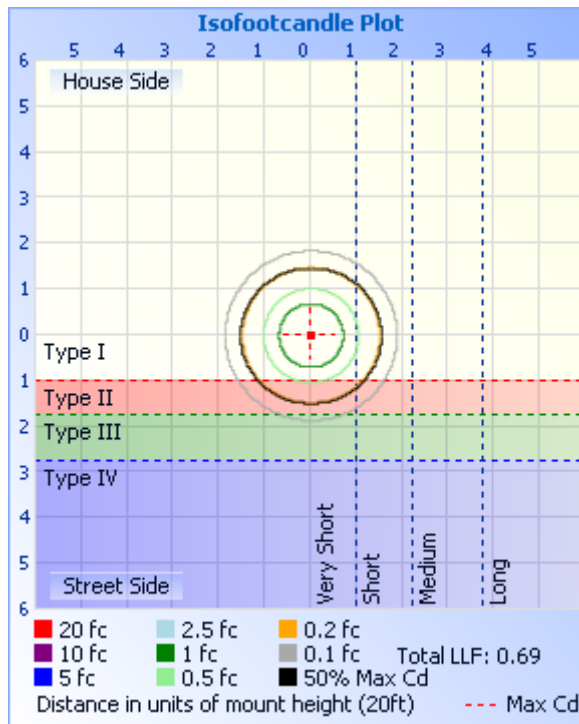
Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	124.9	3.3%	90-100	0.0	0%
10-20	357.4	9.4%	100-110	0.0	0%
20-30	541.3	14.2%	110-120	0.0	0%
30-40	652.5	17.1%	120-130	0.1	0%
40-50	677.9	17.8%	130-140	0.1	0%
50-60	615.9	16.1%	140-150	0.1	0%
60-70	477.6	12.5%	150-160	0.1	0%
70-80	287.7	7.5%	160-170	0.0	0%
80-90	82.0	2.1%	170-180	0.0	0%

Photometric Data


Illuminance at a Distance

	Center Beam fc	Beam Width	
17.0ft	4.57 fc	50.3 ft	52.3 ft
34.0ft	1.14 fc	100.7 ft	104.7 ft
51.0ft	0.51 fc	151.0 ft	157.0 ft
68.0ft	0.29 fc	201.3 ft	209.4 ft
85.0ft	0.18 fc	251.6 ft	261.7 ft
102.0ft	0.13 fc	302.0 ft	314.1 ft

■ Vert. Spread: 111.9°
 ■ Horiz. Spread: 114.0°



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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	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	
5	1315	1314	1314	1314	1314	1314	1314	1314	1315	1314	1314	1313	1313	1313	1314	1314	
10	1298	1297	1296	1296	1296	1296	1297	1297	1298	1296	1295	1294	1294	1294	1296	1297	
15	1269	1268	1267	1265	1265	1266	1268	1269	1269	1268	1266	1263	1263	1263	1265	1268	
20	1231	1228	1227	1224	1223	1225	1227	1230	1231	1228	1225	1221	1221	1221	1225	1228	
25	1181	1178	1175	1171	1171	1173	1176	1180	1181	1178	1173	1168	1167	1169	1173	1178	
30	1121	1118	1114	1109	1108	1110	1115	1120	1122	1117	1112	1107	1105	1106	1112	1117	
35	1052	1049	1044	1038	1037	1039	1045	1051	1053	1048	1042	1036	1033	1035	1041	1048	
40	975	971	965	959	957	961	967	974	976	971	964	956	954	956	963	971	
45	889	886	879	873	870	874	881	888	891	886	878	871	868	871	877	885	
50	797	793	787	780	778	782	789	796	799	794	786	778	776	778	785	793	
55	700	696	689	682	681	684	692	698	702	696	689	681	678	681	687	695	
60	597	593	587	581	579	583	590	596	600	594	587	580	577	579	585	593	
65	492	488	483	477	475	478	485	491	495	490	482	475	472	474	481	488	
70	385	383	377	372	371	373	379	385	387	383	376	370	366	368	374	382	
75	280	278	273	269	268	270	275	277	279	275	271	265	262	263	270	277	
80	176	176	174	170	168	170	172	173	174	171	168	165	162	164	169	174	
85	75.1	75.4	75.0	75.1	74.5	74.4	74.0	74.7	74.7	72.1	69.7	68.3	67.2	68.8	70.5	73.2	
90	0.02	0.04	0.07	0.05	0.07	0.06	0.05	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.11	0.00	0.05	0.00	0.00	0.21	
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.11	0.00	0.05	0.00	0.00	0.11	
120	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.24	0.00	0.00	0.16	0.16	0.11	0.00	0.11	
125	0.29	0.11	0.00	0.00	0.33	0.00	0.00	0.26	0.30	0.00	0.00	0.26	0.48	0.40	0.00	0.11	
130	0.26	0.12	0.00	0.00	0.42	0.16	0.00	0.35	0.36	0.05	0.00	0.30	0.49	0.52	0.00	0.21	
135	0.22	0.13	0.00	0.25	0.45	0.11	0.00	0.32	0.41	0.05	0.00	0.27	0.41	0.39	0.00	0.17	
140	0.19	0.14	0.00	0.21	0.38	0.11	0.00	0.26	0.28	0.11	0.00	0.27	0.32	0.37	0.00	0.14	
145	0.16	0.15	0.00	0.18	0.32	0.11	0.00	0.11	0.25	0.11	0.00	0.26	0.48	0.42	0.00	0.05	
150	0.13	0.05	0.00	0.13	0.32	0.11	0.00	0.05	0.22	0.11	0.00	0.16	0.54	0.42	0.00	0.00	
155	0.11	0.00	0.00	0.05	0.37	0.05	0.00	0.05	0.11	0.11	0.00	0.00	0.44	0.42	0.07	0.00	
160	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.20	0.11	0.05	0.00	0.35	0.35	0.17	0.00	
165	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.32	0.11	0.05	0.00	0.36	0.44	0.23	0.00	
170	0.00	0.00	0.00	0.00	0.32	0.16	0.00	0.00	0.42	0.11	0.11	0.00	0.36	0.49	0.27	0.00	
175	0.00	0.05	0.00	0.37	0.42	0.38	0.00	0.00	0.32	0.05	0.05	0.00	0.37	0.52	0.30	0.00	
180	0.00	0.11	0.00	0.37	0.63	0.37	0.00	0.00	0.21	0.00	0.16	0.00	0.37	0.53	0.42	0.00	

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2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2017-03-27	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	FPEL22-30W-50		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170352-H-C2	120.0	60	0.2602	30.71	0.9835	7.03
	277.0	60	0.1232	30.38	0.8901	9.59
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

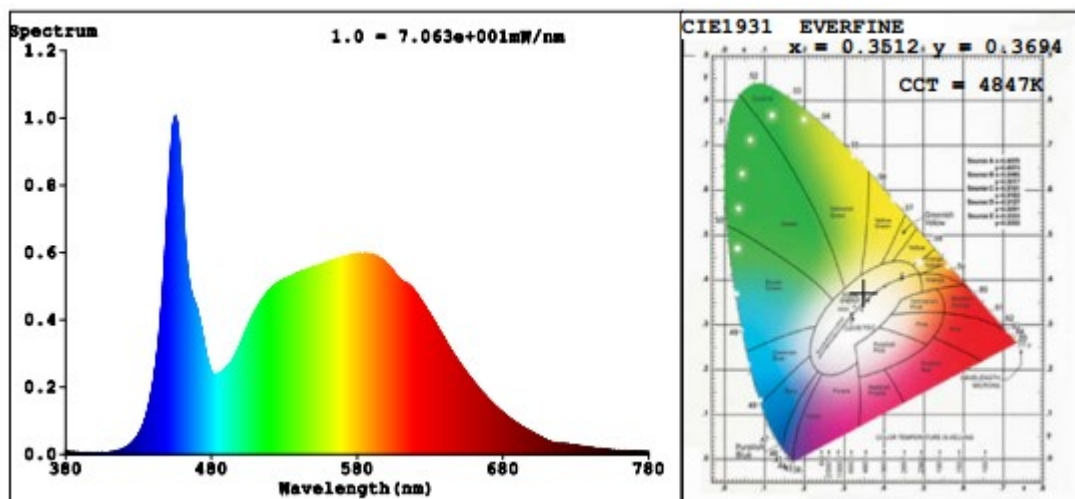
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	79	R9	3
Frequency (Hz)	60	R2	89	R10	72
CCT (K)	4847	R3	95	R11	76
Duv	0.0064	R4	78	R12	50
Chromaticity (x, y)	x=0.3512 y=0.3694	R5	78	R13	82
Chromaticity (u', v')	u'=0.2087 v'=0.4940	R6	83	R14	97
Color Rendering Index (CRI)	81.7	R7	87	R15	73
R9	3	R8	65	--	--

Photometric Measurement – Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.1 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	3960	3950	>=1500(-10%)	
Luminous Efficacy (lm/W)	128.96	130.02	Standard: >= 100(-3%)	Premium: >= 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)
FPEL22-30W-30	3000K	3818.0	30.35	125.80
FPEL22-30W-35	3500K	3854 ^{*1}	30.53 ^{*2}	126.24 ^{*3}
FPEL22-30W-40	4000K	3889 ^{*1}	30.53 ^{*2}	127.38 ^{*3}
FPEL22-30W-45	4500K	3925 ^{*1}	30.53 ^{*2}	128.56 ^{*3}
FPEL22-30W-50	5000K	3960	30.71	128.96

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

$$3854 = (3960 - 3818.0) / 4 + 3818.0$$

$$3889 = (3960 - 3818.0) / 4 + 3854$$

$$3925 = (3960 - 3818.0) / 4 + 3889$$

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

$$30.53 = (30.35 + 30.71) / 2$$

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

$$126.24 = 3854 / 30.53$$

$$127.38 = 3889 / 30.53$$

$$128.56 = 3925 / 30.53$$

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3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-331	2 meter Integrating Sphere	2016-07-01	2017-06-30
ST-R-327	Spectral analysis system HAAS-2000	2016-07-01	2017-06-30
D204	Standard Lamp	2016-07-12	2017-07-11
PF2010	Power Meter for Integrating Sphere	2016-07-01	2017-06-30
GO-R5000	Goniophotometer system	2016-07-01	2017-06-30
D908S	Standard Lamp	2016-07-12	2017-07-11
PF210	Power Meter for Goniophotometer	2016-07-07	2017-07-06
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 *******