

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### Shenzhen Jiawei Photovoltaic Lighting Co., Ltd.

No. 1,2,3,4, Xinfu Industry Zone, Central Community, Pingdi Road, Longgang District, Shenzhen City, Guangdong Province, P.R.China

**Test Model: 22PL-840-SQ15-WFL-D**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Color, Luminous Intensity Distribution
<b>Test Engineer:</b>	Daniel Duan <i>Daniel Duan</i>
<b>Report Number:</b>	RSZ140925505-10A1
<b>Test Date:</b>	2014-10-11 to 2014-10-28
<b>Report Date:</b>	2014-11-03
<b>Reviewed By:</b>	Jeanne Han/Safety Manager <i>Jeanne Han</i>
<b>Prepared By:</b>	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008
<b>Test Facility:</b>	Test facility was located at Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China.
<b>Accreditation:</b>	The NVLAP Lab Code is 200707-0.

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## 1. Product Description

### General Information:

One sample was received on 2014-09-25 and used for testing.

Model Tested: 22PL-840-SQ15-WFL-D  
 Manufacturer: Shenzhen Jiawei Photovoltaic Lighting Co., Ltd. Gaoqiao Subsidiary  
 Brand Name: Maximus; duracell  
 Product Designation: LED Ceiling Light  
 Burning Time Before Test: 0 hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: AC 120 V 60Hz  
 Rated Power: 22W  
 Nominal CCT: 4000K

## 2. Standards Used

- IESNA LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits – Related Power Quality Requirements for Lighting

## 3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integrating Sphere	SENSING	SPR-600	S09008	1.5 meter	2014-03-16	2015-03-16
Spectral photometer	SENSING	SPR3000	90902027	350nm~800nm	2014-03-16	2015-03-16
Power Meter	YOKOGAWA	WT-210	91j926132	15/30/60/150/300/600 V	2014-03-12	2015-03-12
AC Power Supply	ALL Power	APW-105N	970613	0V-300V 50-400Hz	2014-03-12	2015-03-12
Standard Light Source	EVERFINE	D204	01331191	N/A	2013-12-04	2014-12-04
Thermal Meter	SENSING	N/A	N/A	25°C,45°C,55°C	2014-03-16	2015-03-16
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~60V	2014-03-12	2015-03-12
AC Power Supply	EVERFINE	VPS1060 PWM	1101006	0-150V, 0-300V	2014-03-12	2015-03-12
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2014-03-12	2015-03-12
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2014-03-12	2015-03-12
Goniophotometer	EVERFINE	GO- R5000	YG108492N10120001	1600mm,3000W/10A	2014-03-04	2015-03-04
Thermal Meter	Victor	VC230	EE091	0~40°C0~90%	2013-04-01	2016-03-31
Standard Light Source	EVERFINE	D908	1012001	N/A	2014-05-06	2015-05-06

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

## 4. Test Method

Product was tested with no seasoning. All stabilization and measurements were made in compliance with IES LM-79-08. The product was operated at rated voltage or at voltage required by manufacturer. The ambient temperature of the sample was maintained at  $25^{\circ}\text{C}\pm 1^{\circ}\text{C}$  during measurement. And relative humidity is less than 65%.

### **Integrating Sphere System**

The system includes AC power source, digital power meter, DC power supply, spectrophotometer, and integrating sphere. The integrating sphere system is calibrated by standard light source before measurement.

$4\pi$  geometry was used during measurement. The product was operated in its intended orientation in application and was recorded in this report.

The uncertainty of the light output (luminous flux) measurements is  $U=1.64\%$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is  $U=21\text{K}$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the CRI is  $U=1.6(K=2)$ , at the 95% confidence level.

### **Goniophotometer System**

The goniophotometer system is calibrated by standard light source before measurement.

Type C goniophotometer was used for measuring total luminous flux, luminous intensity distribution, and color spatial uniformity. The product was operated in its intended orientation in application and was recorded in this report.

The uncertainty of the luminous intensity is  $U=2.82\%$  ( $K=2$ ), at the 95% confidence level.

## 5. Test Result

### [Integrating Sphere System]

Total operating time for integrating sphere test: **1.0 hours**

Test orientation: **Downward**

#### Electrical Measurement

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
119.98	60.0	0.1867	22.274	0.995

#### Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
1635.002	5.254	73.404	4247	-1.46E-03

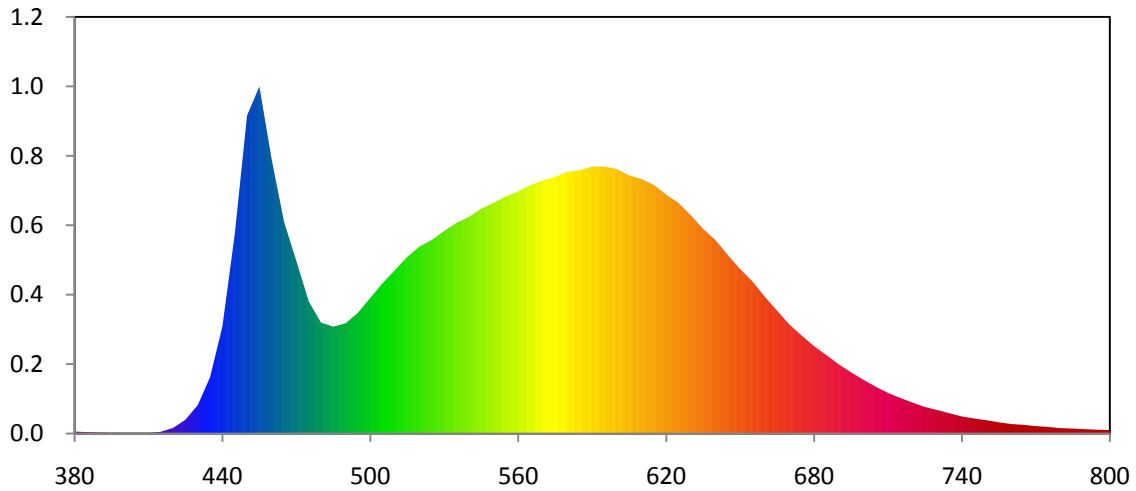
#### Chromaticity Coordinate

x	y	u	v	u'	v'
0.3694	0.3666	0.2219	0.3303	0.2219	0.4954

#### Color Rendering Index

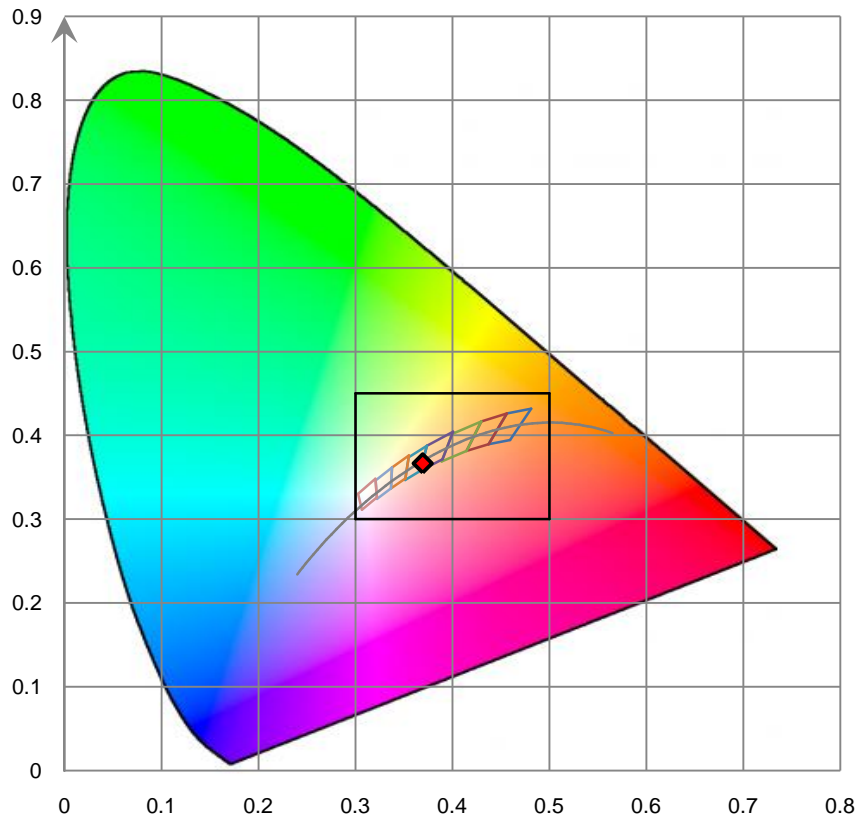
<b>Ra</b>			
86.6			
R1 86	R2 93	R3 96	R4 84
R5 85	R6 88	R7 89	R8 73
R9 33	R10 81	R11 82	R12 61
R13 89	R14 97	R15 83	

Relative Spectral Power Distribution

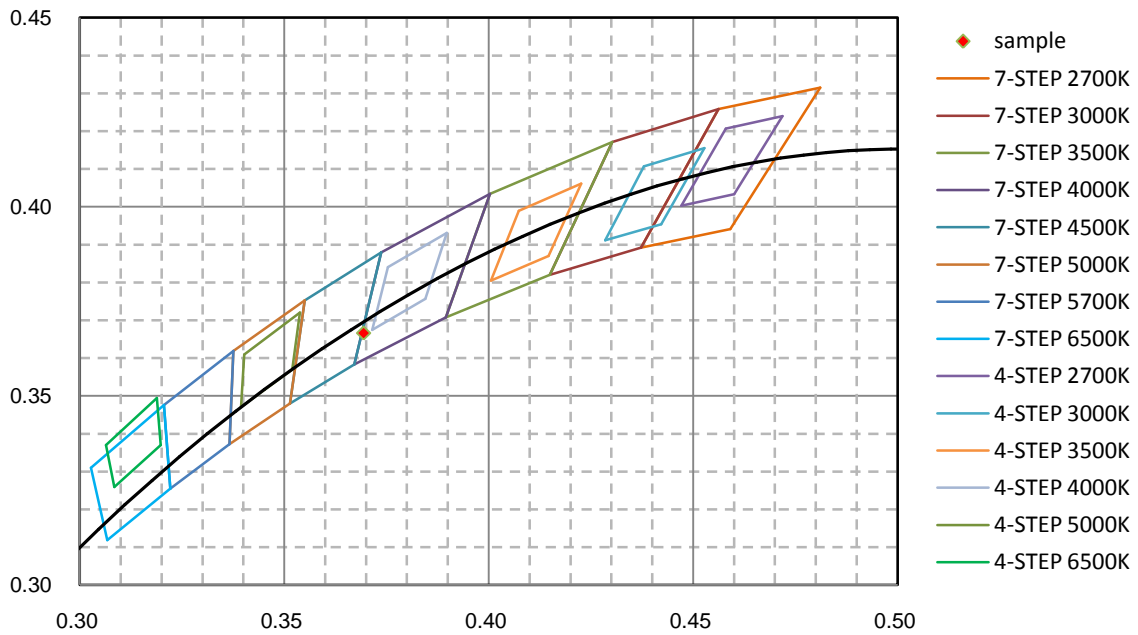


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.016E-03	465	1.060E-01	550	1.155E-01	635	1.025E-01	720	1.551E-02
385	7.131E-04	470	8.635E-02	555	1.187E-01	640	9.690E-02	725	1.329E-02
390	4.783E-04	475	6.625E-02	560	1.211E-01	645	8.945E-02	730	1.179E-02
395	3.599E-04	480	5.553E-02	565	1.243E-01	650	8.241E-02	735	1.017E-02
400	3.183E-04	485	5.350E-02	570	1.266E-01	655	7.619E-02	740	8.577E-03
405	3.413E-04	490	5.520E-02	575	1.285E-01	660	6.856E-02	745	7.555E-03
410	2.542E-04	495	6.047E-02	580	1.310E-01	665	6.158E-02	750	6.672E-03
415	8.926E-04	500	6.786E-02	585	1.318E-01	670	5.463E-02	755	5.646E-03
420	2.837E-03	505	7.520E-02	590	1.336E-01	675	4.912E-02	760	4.769E-03
425	6.950E-03	510	8.177E-02	595	1.336E-01	680	4.380E-02	765	4.372E-03
430	1.423E-02	515	8.840E-02	600	1.324E-01	685	3.934E-02	770	3.743E-03
435	2.826E-02	520	9.364E-02	605	1.292E-01	690	3.472E-02	775	3.327E-03
440	5.364E-02	525	9.689E-02	610	1.274E-01	695	3.071E-02	780	2.728E-03
445	9.972E-02	530	1.014E-01	615	1.245E-01	700	2.697E-02	785	2.509E-03
450	1.592E-01	535	1.054E-01	620	1.196E-01	705	2.350E-02	790	2.195E-03
455	1.737E-01	540	1.084E-01	625	1.155E-01	710	2.039E-02	795	1.935E-03
460	1.372E-01	545	1.125E-01	630	1.093E-01	715	1.782E-02	800	1.753E-03

CIE 1931 x y Chromaticity Diagram



7-Step & 4-Step Chromaticity Quadrangles



**[Goniophotometer System]**

Total operating time for luminous intensity distribution: **1.0 hours**

Test orientation: **Downward**

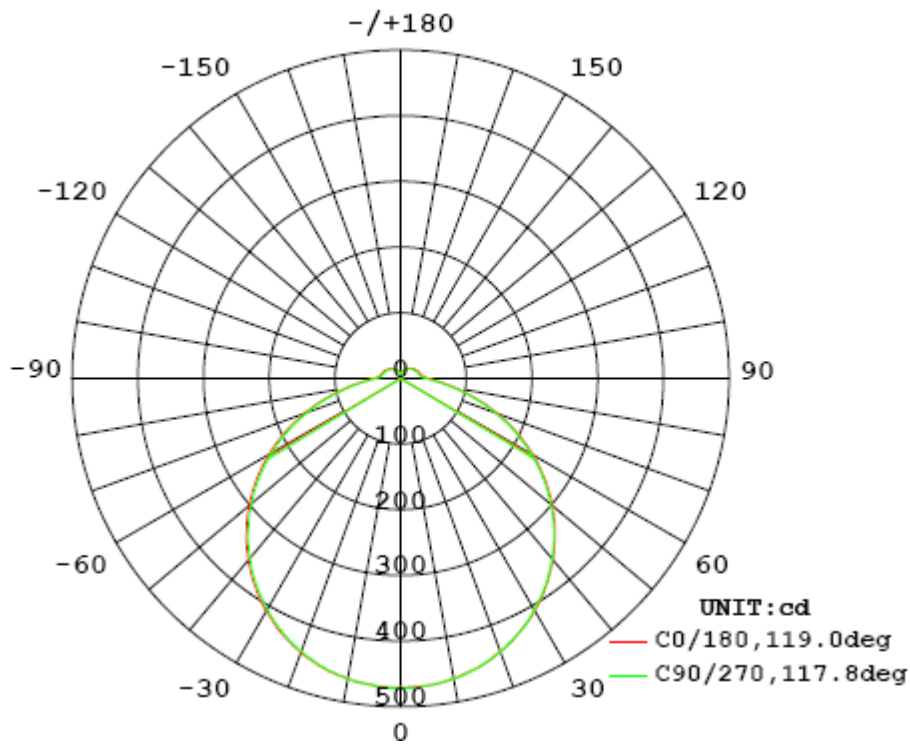
**Electrical Measurement**

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.1	60.0	0.1877	22.36	0.9917

**Photometric Measurement**

Luminous Flux (lm)	Efficacy (lm/W)	CBCP (cd)	S/MH (C0/180)	S/MH (C90/270)
1654.23	73.99	471	1.29	1.28

**Luminous Intensity Distribution**



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	119.0	119.4	117.8	119.5	118.93
Field Angle (10% I <sub>max</sub> ):	175.7	179.0	173.6	178.8	176.78

Luminous Intensity (cd) Distribution Data

C \ γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	471	471	471	471	471	471	471	471
5.0°	469	469	469	470	470	470	469	469
10.0°	464	463	464	463	464	463	464	464
15.0°	456	456	456	455	456	455	456	456
20.0°	444	443	443	443	442	443	443	444
25.0°	428	429	427	427	427	427	428	428
30.0°	410	409	408	407	406	408	409	410
35.0°	387	387	386	384	383	385	387	388
40.0°	361	362	361	358	357	359	362	362
45.0°	333	333	332	330	328	331	334	334
50.0°	302	302	301	298	297	300	303	304
55.0°	267	269	268	264	263	267	270	271
60.0°	232	233	232	229	227	231	234	235
65.0°	194	196	195	192	190	194	197	198
70.0°	156	158	157	154	152	156	160	160
75.0°	118	121	121	117	115	119	123	123
80.0°	85	88	88	84	81	86	90	89
85.0°	57	62	62	58	55	60	64	62
90.0°	41	44	45	41	38	43	46	45
95.0°	34	36	37	34	32	35	37	37
100.0°	31	34	34	31	29	32	35	33
105.0°	30	32	33	29	28	31	33	32
110.0°	29	30	31	28	27	30	32	30
115.0°	28	29	29	27	26	28	30	29
120.0°	26	27	27	25	24	26	28	27
125.0°	25	25	25	23	23	24	26	25
130.0°	23	23	23	22	21	23	24	24
135.0°	21	21	21	20	20	21	22	22
140.0°	20	19	19	18	18	19	20	20
145.0°	18	18	17	17	17	17	18	18
150.0°	16	16	16	15	15	15	16	16
155.0°	14	14	14	13	14	14	14	14
160.0°	13	12	12	12	12	12	12	12
165.0°	12	11	8	11	11	10	10	10
170.0°	8	9	9	9	9	8	9	9
175.0°	6	6	6	6	7	6	6	7
180.0°	9	7	6	4	5	7	6	5

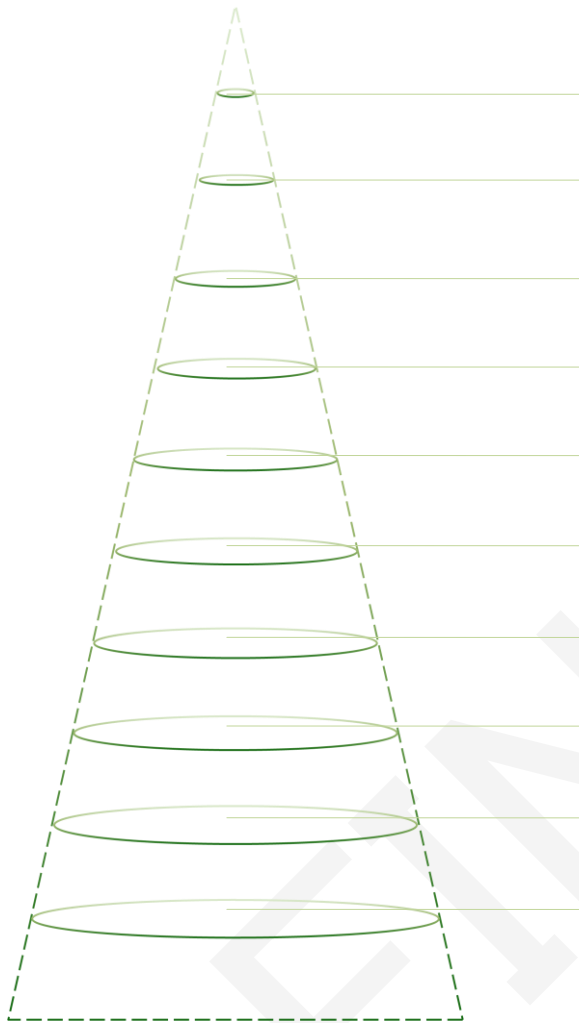


Luminous Intensity (cd) Distribution Data (cont.)

C \ γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	471	471	471	471	471	471	471	471
5.0°	469	469	469	469	469	470	469	469
10.0°	464	464	464	464	464	464	464	464
15.0°	456	455	455	455	456	456	455	455
20.0°	443	443	443	443	443	443	444	443
25.0°	427	428	428	427	426	427	428	427
30.0°	408	409	409	408	407	408	409	408
35.0°	386	386	387	385	385	386	387	386
40.0°	360	361	361	359	358	360	361	360
45.0°	332	333	333	331	330	331	333	332
50.0°	301	303	303	300	298	300	302	301
55.0°	268	270	270	266	264	267	268	267
60.0°	232	235	235	231	229	231	233	231
65.0°	195	198	198	194	191	194	196	194
70.0°	157	160	160	157	154	156	158	156
75.0°	119	123	123	119	116	119	121	118
80.0°	86	90	90	86	82	86	88	85
85.0°	59	63	64	59	55	59	62	59
90.0°	42	46	47	42	39	43	45	42
95.0°	35	37	38	34	32	35	37	35
100.0°	32	34	35	31	29	32	34	32
105.0°	30	33	33	30	28	31	33	31
110.0°	29	31	32	29	27	29	31	30
115.0°	28	30	30	27	26	28	30	28
120.0°	27	28	28	26	25	26	28	27
125.0°	25	26	27	24	23	25	26	25
130.0°	24	24	25	23	22	23	24	23
135.0°	22	22	23	21	21	21	22	21
140.0°	20	20	21	19	19	19	20	19
145.0°	18	19	19	18	18	17	18	18
150.0°	17	16	17	16	16	16	16	16
155.0°	15	15	15	14	14	14	14	14
160.0°	13	13	13	13	13	12	12	12
165.0°	10	11	11	11	11	10	10	10
170.0°	8	9	9	9	9	9	8	8
175.0°	7	7	8	8	7	7	7	7
180.0°	7	7	7	7	7	8	7	7

Average Area Illumination Figure

Angle: 118.93°. Flux out: 1107.0 lm.



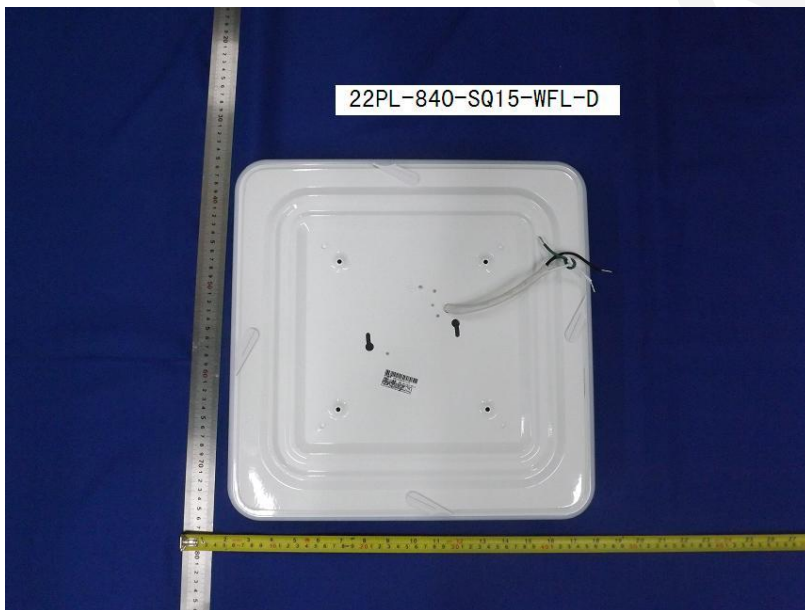
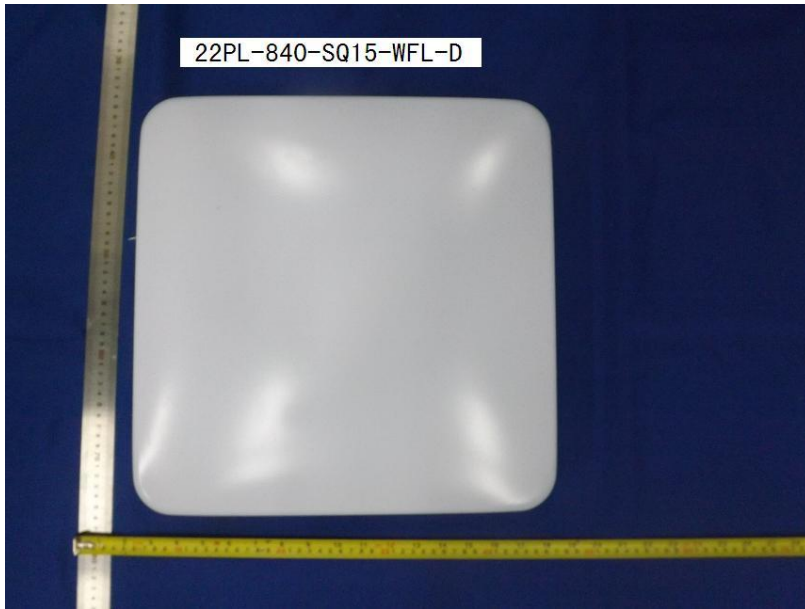
Height (m)	Diameter (cm)	E <sub>avg</sub> (lx)	E <sub>max</sub> (lx)
0.5	169.5	469.7	1898.0
1.0	339.1	117.4	474.5
1.5	508.6	52.2	210.9
2.0	678.1	29.4	118.6
2.5	847.6	18.8	75.9
3.0	1017.2	13.1	52.7
3.5	1186.7	9.6	38.7
4.0	1356.2	7.3	29.7
4.5	1525.8	5.8	23.4
5.0	1695.3	4.7	19.0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	11.2	0.68
5-10	33.4	2.02
10-15	54.5	3.30
15-20	74.1	4.47
20-25	91.3	5.52
25-30	105.8	6.40
30-35	117.0	7.07
35-40	124.5	7.52
40-45	128.2	7.75
45-50	127.9	7.73
50-55	123.6	7.47
55-60	115.4	6.98
60-65	103.7	6.26
65-70	89.0	5.38
70-75	72.2	4.37
75-80	54.9	3.32
80-85	39.4	2.38
85-90	27.7	1.67
90-95	21.2	1.28
95-100	18.3	1.11
100-105	17.0	1.02
105-110	15.9	0.96
110-115	14.7	0.89
115-120	13.3	0.80
120-125	11.9	0.72
125-130	10.4	0.63
130-135	9.0	0.55
135-140	7.6	0.45
140-145	6.2	0.38
145-150	5.0	0.30
150-155	3.8	0.23
155-160	2.8	0.16
160-165	1.9	0.12
165-170	1.1	0.07
170-175	0.6	0.03
175-180	0.1	0.01

Deg	Flux (lm)	%
0-5	11.2	0.68
0-10	44.6	2.70
0-15	99.2	6.00
0-20	173.2	10.47
0-25	264.6	15.99
0-30	370.3	22.39
0-35	487.3	29.46
0-40	611.7	36.98
0-45	739.9	44.73
0-50	867.8	52.46
0-55	991.4	59.93
0-60	1106.8	66.91
0-65	1210.5	73.17
0-70	1299.5	78.55
0-75	1371.7	82.92
0-80	1426.5	86.24
0-85	1465.9	88.62
0-90	1493.6	90.29
0-95	1514.8	91.57
0-100	1533.1	92.68
0-105	1550.1	93.70
0-110	1565.9	94.66
0-115	1580.6	95.55
0-120	1593.9	96.35
0-125	1605.8	97.07
0-130	1616.2	97.70
0-135	1625.2	98.25
0-140	1632.8	98.70
0-145	1639.0	99.08
0-150	1643.9	99.38
0-155	1647.7	99.61
0-160	1650.5	99.77
0-165	1652.4	99.89
0-170	1653.5	99.96
0-175	1654.1	99.99
0-180	1654.2	100.00

6. Product Photo



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