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Test report of

IES LM-79-08

Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Rendered to:
Beyond LED Technology
,

For products:
SSL downlight retrofits

Models No.:
D228-20W-90-5000-WH

Test Date:	Oct. 26, 2018 to Oct. 30, 2018
Test Item:	Total luminous flux, Luminous Efficacy, Electrical values, Luminous Intensity Distribution, Chromaticity coordinates, CCT and CRI, Spectral Power Distribution.
Test Lab.:	**LCTECH (Zhongshan) Testing Service Co., Ltd** 2/F., Technology and Enterprise Development Center, Guangyuan Road, Xiaolan, Zhongshan, Guangdong, China Tel:+86-760-22833366 Fax:+86-760-22833399 E-mail:Service@lccert.com http://www.lccert.com
Template No.:	LC-RT-PL-001 Rev.1.1
Test Note:	

Complied by:	**Reviewed by:**
Kargel Yuan	**Lin Qiu**
Project Engineer	**Technical Manager**
Dec. 27, 2018	**Dec. 27, 2018**

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1. General

1.1 Product Information

Brand Name	Beyond LED Technology
Product Type	SSL downlight retrofits
Model Number	D228-20W-90-5000-WH
Rated Inputs	120VAC, 50/60Hz
Rated Power	15W
Rated Light output	1200lm
Declared CCT	2700K
Power Supply	Integrated in luminaire
LED Package, Array or Module	HL-AT-2835DW-S1-08-PCT-HR3, Guangzhou Hongli Opto-Electronic Co., Ltd.
Receipt Samples	1 unit
Sample Code of lab.	181019106002
Date of Receipt Samples	Oct. 19, 2018
Note	-

1.2 Standards or methods

The following standards are partly or totally used or referenced for test:

No.	Name
ANSI/NEMA/ ANSLG C78.377-2015	Specifications for the Chromaticity of Solid State Lighting Products
ANSI C82.77-2002	Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment
CIE Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
CIE Pub. No. 15:2004	Colorimetry
IES LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products

1.3 Equipment list

Instrument	ID	Model name	Cal. date	Next cal. Date
AC Power supply	LC-I-987	APW-120N	2018-01-10	2019-01-09
AC Power supply	LC-I-989	APW-120N	2018-01-10	2019-01-09
Power analyzer	LC-I-928	WT210	2018-01-05	2019-01-05
Power analyzer	LC-I-954	WT210	2018-01-10	2019-01-09
Multimeter	LC-I-972	Fluke 17B	2018-08-01	2019-07-31
Photometric colorimetric electric system[1] (2 meter sphere)	LC-I-956	HAAS-2000	Before use	Before use
Standard lamp[2]	LC-PL-I-011	D204C	2018-08-09	2019-08-08
Luminous Flux Standard Lamp	LC-PL-I-003	24V100W	2018-08-09	2019-08-08
Goniophotometer(with mirror)	LC-I-902	GMS2000	2018-05-06	2019-05-05
Wireless temperature transmitter	LC-I-978	DWRF-B	2018-02-11	2019-02-10
Wireless temperature transmitter	LC-I-979	DWRF-B	2018-02-11	2019-02-10

Note:

* Bandwidth of spectroradiometer is 1 nm.

** halogen lamp, 100W, omni-directional type, and its traceability to NIM.

*** halogen lamp, 100W, omni-directional type, and its traceability to NIM.

2. Test conducted and method

The luminaire was operated at least 2 hours to reach stabilization and temperature equilibrium before test.

2.1 Ambient Condition

The ambient temperature in which measurements are being taken was maintained at 25° C± 1° C; the air flow around the sample(s) being tested did not affect the performance.

2.2 Power Supply Characteristics

The AC power supply had a sinusoidal voltage wave shape at the prescribed frequency (60 Hz) such that the RMS summation of the harmonic components does not exceed 3 percent of the fundamental during operation of the test item.

The voltage of AC power supply (RMS voltage) applied to the device under test was regulated to within±0.2 percent under load.

2.3 Seasoning and Stabilization

No seasoning was performed in accordance with IESNA LM-79-08. And before the measurement, the sample was stabilized until the light output and power variations were less than 0.5% in 30 minutes intervals (3 readings, 15 minutes apart).

2.4 Electrical Instrumentation

The calibration uncertainties of the instruments for AC voltage and current were less than 0.2 percent, and the calibration uncertainty of the AC power meter was less than 0.5 percent(95 % confidence interval, k=2).

2.5 Color Measurement Method

Spectral radiant flux was measured by a sphere (2 meter)-spectroradiometer system, and the color characteristics (Color rendering index, correlated color temperature, chromaticity coordinate) were calculated from these by software automatically.

2.6 Total Luminous Flux Measurement Method

Total luminous flux was measured by both sphere-spectroradiometer system and type C goniophotometer system.

Light intensity distribution was measured by a type C goniophotometer (with mirror) which can keep the sample in burn position when the tests conduct, and the total luminous flux was calculated from the intensity data by software automatically.

Spectral radiant flux was measured by a sphere (2 meter)-spectroradiometer system, and the total luminous flux was calculated from these by software automatically.

2.7 Luminous Intensity Distribution Measurement Method

Luminous intensity distribution was measured by a mirror-type goniophotometer (Type C) which can keep the sample in burn position when the tests conduct, and the kinds of graph were generated by software automatically.

2.8 Spatial Non-uniformity of Chromaticity

The customer did not require this measurement.

3. Test Result Summary

3.1 Electrical data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	120.00 V~60Hz	120.00 V~60Hz
Input Current(A)	0.123	0.123
Total Power(W)	14.76	14.76
Power Factor	0.999	0.999
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	1212.17****	1216.54
Luminaire Efficacy(Lm/W)	82.13	82.42
Correlated Color Temperature (CCT)(K)	2718	-
Color Rendering Index (CRI)	91.9	-
R9	62	-
Chromaticity Coordinate (x,y)	x = 0.4635 y = 0.4195	-
Chromaticity Coordinate (u,v)	u = 0.2609 v = 0.3541	-
Chromaticity Coordinate (u',v')	u' = 0.2609 v' = 0.5312	-
Duv	0.0029	-
Zone Lumens between 0-60 °	-	76.10 %

3.3 Color Rendering Details

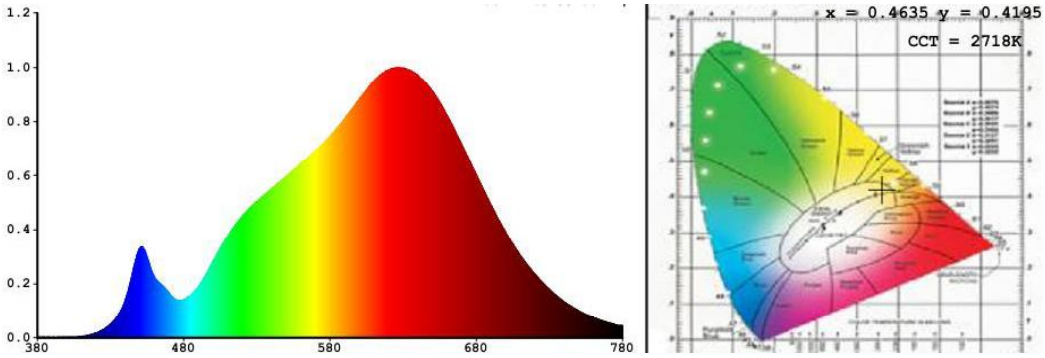
R1	R2	R3	R4	R5	R6	R7	R8
92	94	94	93	91	92	95	84
R9	R10	R11	R12	R13	R14	R15	-
62	84	94	77	92	96	88	-

Note:

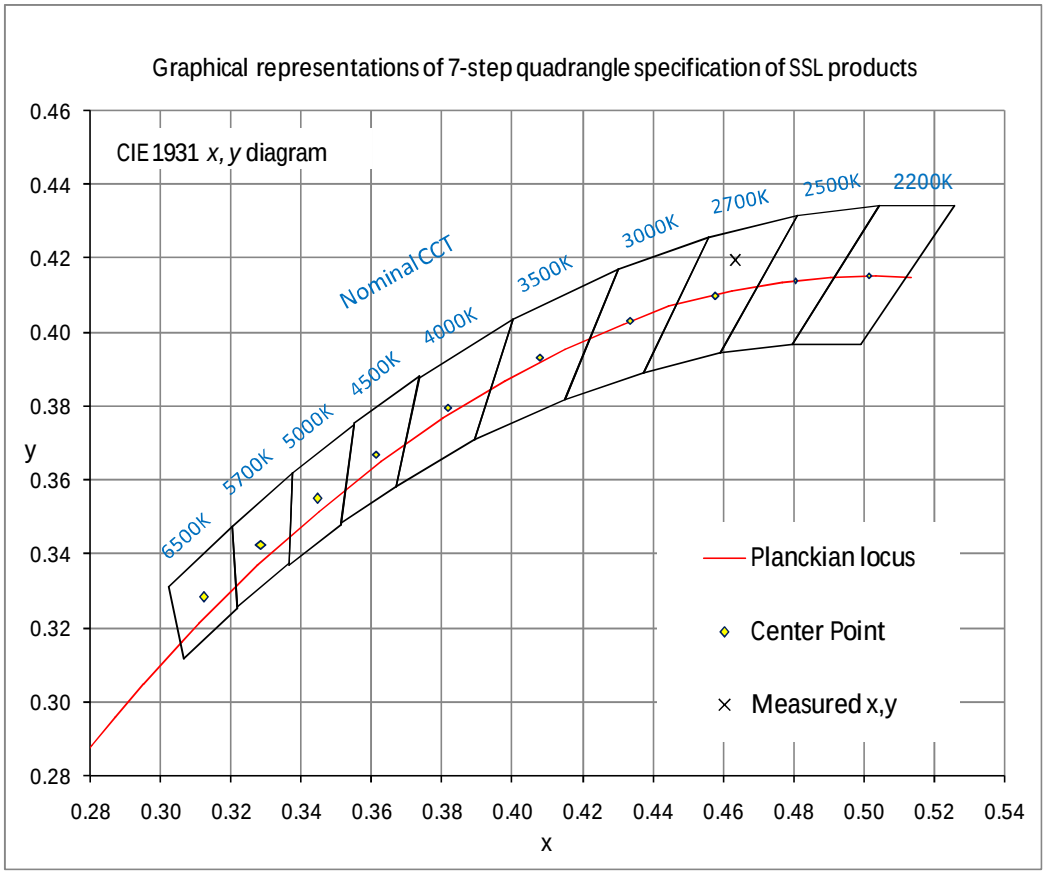
**** Self-absorption is 1.02.

4. Test Data

4.1 Spectral Distribution



4.2 ANSI Chromaticity Quadrangles Diagram



4.3 Goniometry Test Data

CIE Type	Direct	Basic Luminous Shape	Circular
Spacing Criteria (0-180)	1.22	Luminous Length	0.14 m (Diameter)
Spacing Criteria (90-270)	1.24	Luminous Width	0.14 m (Diameter)
Spacing Criteria (Diagonal)	1.34	Luminous Height	0.00 m
Test Distance	30.00 m		

4.4 Zonal Lumen Summary

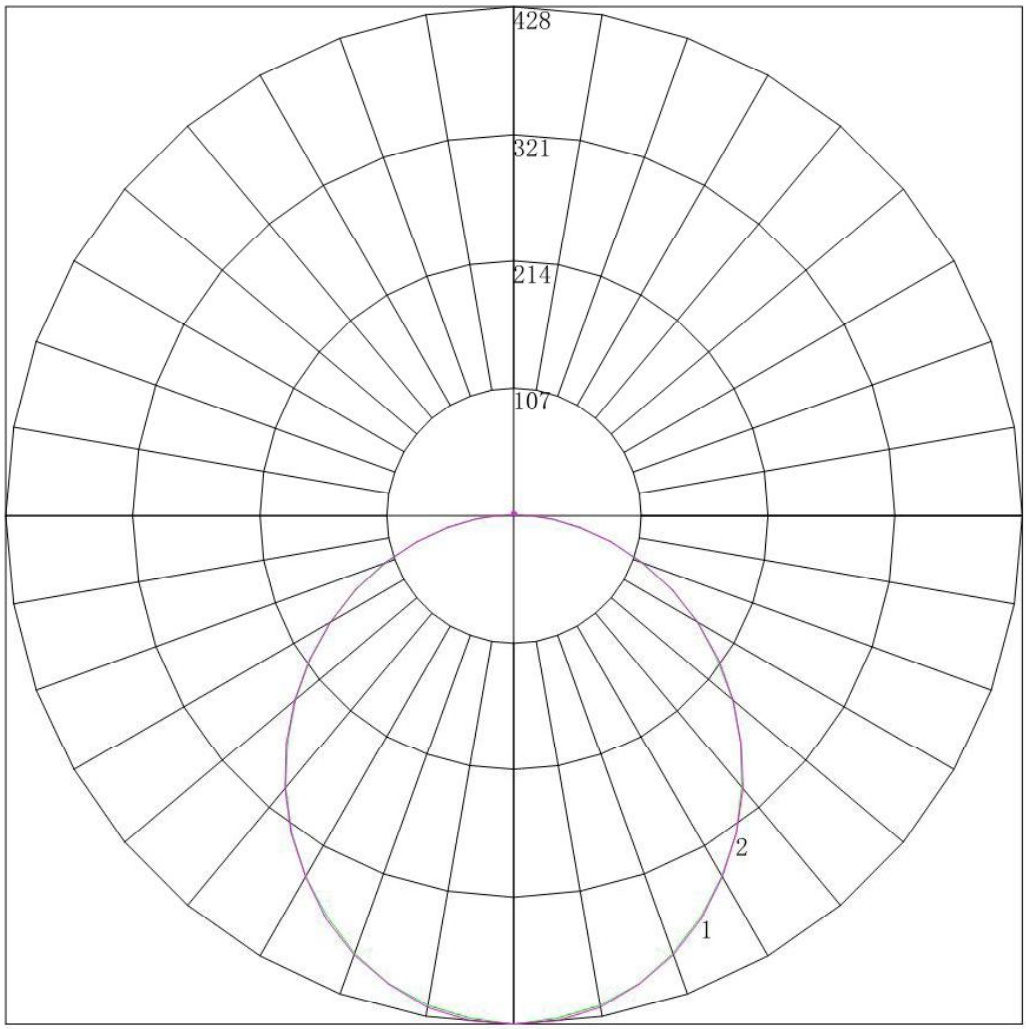
Zone	Lumens	%Lamp	%Fixt
0-20	155.09	12.70	12.70
0-30	326.74	26.90	26.90
0-40	530.54	43.60	43.60
0-60	926.29	76.10	76.10
0-80	1160.84	95.40	95.40
0-90	1197.46	98.40	98.40
10-90	1157.11	95.10	95.10
20-40	375.45	30.90	30.90
20-50	583.90	48.00	48.00
40-70	540.68	44.40	44.40
60-80	234.55	19.30	19.30
70-80	89.62	7.40	7.40
80-90	36.62	3.00	3.00
90-110	8.65	0.70	0.70
90-120	10.43	0.90	0.90
90-130	12.59	1.00	1.00
90-150	16.55	1.40	1.40
90-180	19.08	1.60	1.60
110-180	10.43	0.90	0.90
0-180	1216.54	100.00	100.00

Total Luminaire Efficiency = 100.00%

ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	40.36
10-20	114.73
20-30	171.64
30-40	203.80
40-50	208.45
50-60	187.30
60-70	144.93
70-80	89.62
80-90	36.62
90-100	7.29
100-110	1.36
110-120	1.78
120-130	2.16
130-140	2.08
140-150	1.88
150-160	1.46
160-170	0.85
170-180	0.23

4.5 Polar Curves

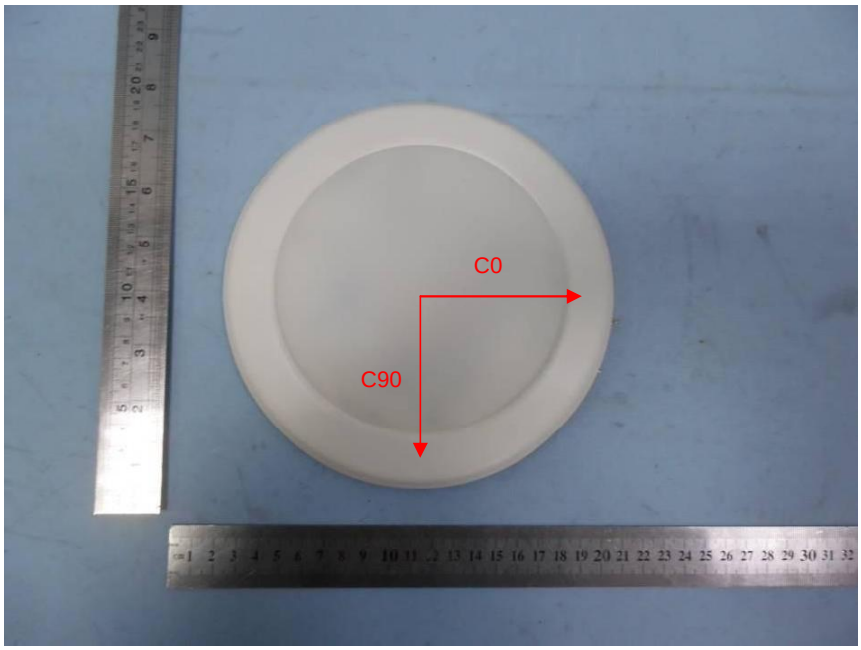


Maximum Candela = 427.501 Located At Horizontal Angle = 0, Vertical Angle = 0
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

4.6 Candela Tabulation

	0	15	30	45	60	75	90
0	427.501	427.501	427.501	427.501	427.501	427.501	427.501
5	423.900	424.736	425.228	424.868	425.270	424.732	426.246
10	418.184	417.514	417.868	418.500	418.305	418.519	419.520
15	407.112	406.200	406.367	406.439	407.149	407.107	407.768
20	391.493	391.151	391.287	391.024	391.554	392.026	392.831
25	371.959	371.736	372.696	372.910	372.734	372.532	373.724
30	349.994	350.344	350.280	350.520	350.985	350.428	350.715
35	325.734	325.710	325.611	325.678	326.012	326.028	326.355
40	298.368	298.199	298.738	298.787	298.968	298.836	299.626
45	269.607	270.079	269.974	270.277	270.660	270.294	270.604
50	240.171	239.688	239.814	239.606	240.346	240.154	240.776
55	208.619	209.163	209.384	209.498	209.919	209.631	210.051
60	178.013	177.445	177.402	178.197	178.478	178.050	178.566
65	146.236	146.109	146.454	146.356	146.317	145.862	147.123
70	114.009	114.682	114.741	114.718	114.470	115.294	115.185
75	84.573	84.493	84.537	84.429	84.156	84.073	84.193
80	55.722	56.081	55.705	55.964	56.570	56.093	56.741
85	31.867	31.808	31.915	31.908	31.936	32.166	32.072
90	14.448	14.150	14.359	14.312	14.447	14.676	14.490
95	5.131	5.264	5.132	5.288	5.319	5.335	5.159
100	1.710	1.732	1.733	1.755	1.803	1.868	1.795
105	0.945	0.877	0.968	1.035	1.082	1.013	0.987
110	1.305	1.305	1.440	1.553	1.442	1.238	1.256
115	1.800	1.800	1.868	2.025	1.847	1.666	1.570
120	2.205	2.273	2.250	2.340	2.231	1.936	1.929
125	2.476	2.543	2.520	2.633	2.456	2.251	2.153
130	2.521	2.521	2.633	2.723	2.614	2.453	2.287
135	2.566	2.656	2.745	2.858	2.682	2.589	2.377
140	2.566	2.858	2.926	2.970	2.817	2.836	2.781
145	2.881	2.880	3.038	3.083	2.997	3.129	3.095
150	2.926	2.947	3.173	3.196	3.088	3.264	3.230
155	2.926	2.969	3.151	3.150	3.245	3.309	3.364
160	2.926	2.947	2.971	3.105	3.313	3.331	3.364
165	3.016	3.104	2.926	3.083	3.020	3.129	3.183
170	2.791	2.722	2.633	2.498	2.547	2.611	2.691
175	2.340	2.295	2.341	2.250	2.254	2.228	2.287
180	2.051	2.051	2.051	2.051	2.051	2.051	2.051

Appendix A Product Photo



Picture 1

****End of test report****