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Test report of

IES LM-79-08

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

Rendered to:

ETI Solid State Lighting (Zhuhai) Limited
Factory 2#-2 No.1 South Zhongzhu Rd., Science & Technology Innovation Coast, High Tech District, Zhuhai City, Guangdong Prov., China

For products:

LED Downlights

Models No.:

565781##(##=01-10)

(Where ## denotes CCT and could be 01-10 which refers 2700K .)

Test Date:	Dec. 26, 2019 to Dec. 30, 2019
Test Lab.:	**LCTECH Guangdong Testing Services 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
Test Sites:	1/F., Building I, Technology and Enterprise Development Center, Guangyuan Road, Xiaolan, Zhongshan, Guangdong, China
Template No.:	LC-RT-PL-001 Rev.1.3
Test Note:	

Complied by:		**Reviewed by:**	
Fish Tan	Fish Tan	**Lin Qiu**	Lin
Project Engineer		**Technical Manager**	
Dec. 31, 2019		**Dec. 31, 2019**	

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1. General

1.1 Product Information

Brand Name	ETI
Product Type	LED Downlights
Model Number	565781##(##=01-10)
Rated Inputs	120VAC, 60Hz
Rated Power	14W
Rated Light output	1000lm
Declared CCT	2700K
Power Supply	Integrated in luminaire
LED Package, Array or Module	SPMWH6229AQ5SGW*SM, SAMSUNG
Receipt Samples	1 unit
Sample Code of lab.	191223101006
Date of Receipt Samples	Dec. 23, 2019
Note	-

1.2 Standards or methods

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

No.	Name
ANSI/NEMA/ ANSLG C78.377-2011 or 2015 or 2017	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	2019-01-08	2020-01-07
AC Power supply	LC-I-989	APW-120N	2019-01-08	2020-01-07
Power analyzer	LC-I-928	WT210	2019-01-02	2020-01-01
Power analyzer	LC-I-954	WT210	2019-03-12	2020-03-11
Multimeter	LC-I-972	Fluke 17B	2019-07-29	2020-07-28
Photometric colorimetric electric system* (2 meter sphere)	LC-I-956	HAAS-2000	Before use	Before use
Standard lamp**	LC-PL-I-011	D204C	2019-08-01	2020-07-31
Luminous Flux Standard Lamp***	LC-PL-I-003	24V100W	2019-08-01	2020-07-31
Goniophotometer(with mirror)	LC-I-902	GMS2000	2019-05-06	2020-05-05
Wireless temperature transmitter	LC-I-978	DWRF-B	2019-01-07	2020-01-06
Wireless temperature transmitter	LC-I-979	DWRF-B	2019-01-07	2020-01-06

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 lamp/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 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.

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	120.02 V~60Hz	120.00 V~60Hz
Input Current(A)	0.125	0.124
Total Power(W)	13.92	13.80
Power Factor	0.928	0.931
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	1010.20
Luminaire Efficacy(lm/W)	-	73.20
Correlated Color Temperature (CCT)(K)	2740	-
Color Rendering Index (CRI)	84.1	-
R9	14	-
Chromaticity Coordinate (x,y)	x = 0.4540 y = 0.4050	-
Chromaticity Coordinate (u,v)	u = 0.2612 v = 0.3495	-
Chromaticity Coordinate (u',v')	u' = 0.2612 v' = 0.5243	-
Duv	-0.0016	-
Zone Lumens between 0-60 °	-	76.52%
Beam Angle(50%Imax)	-	C0/180=111.6° C90/270=111.0°

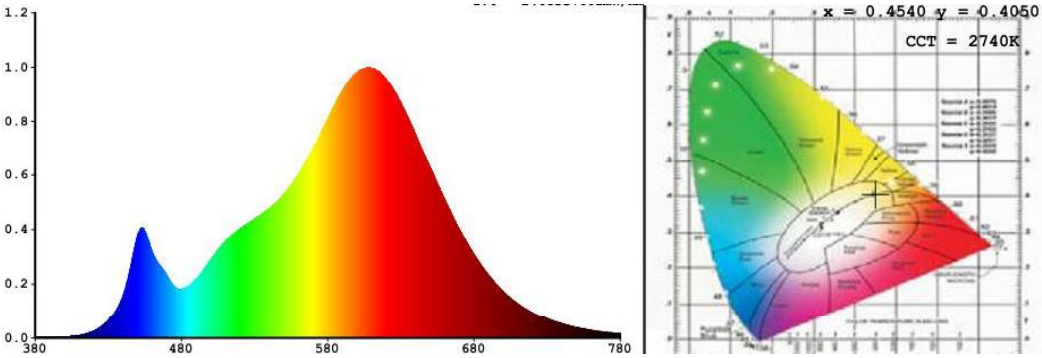
3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
84	94	94	82	84	94	82	60
R9	R10	R11	R12	R13	R14	R15	-
14	87	83	81	86	98	76	-

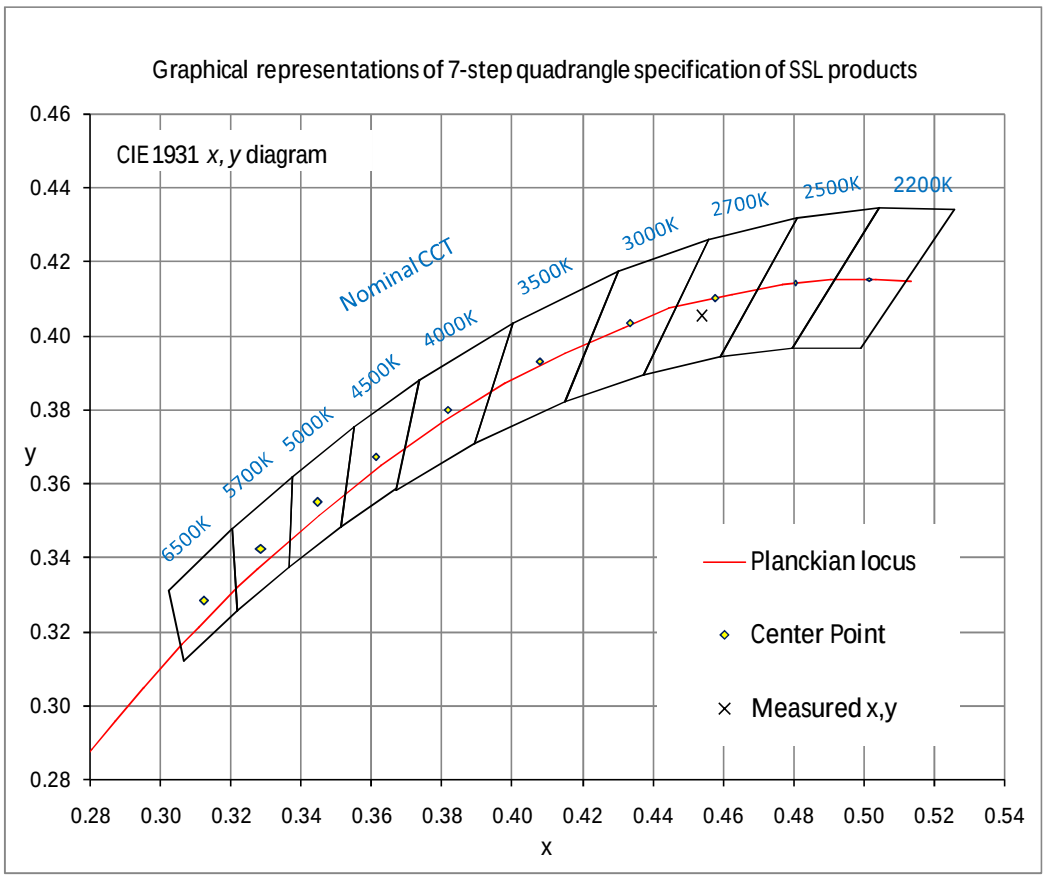
Note: N/A

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 w/ Sides
Spacing Criteria (0-180)	1.24	Luminous Length	0.10 m (Diameter)
Spacing Criteria (90-270)	1.26	Luminous Width	0.10 m (Diameter)
Spacing Criteria (Diagonal)	1.36	Luminous Height	0.01 m
Test Distance	30.00 m		

4.4 Zonal Lumen Summary

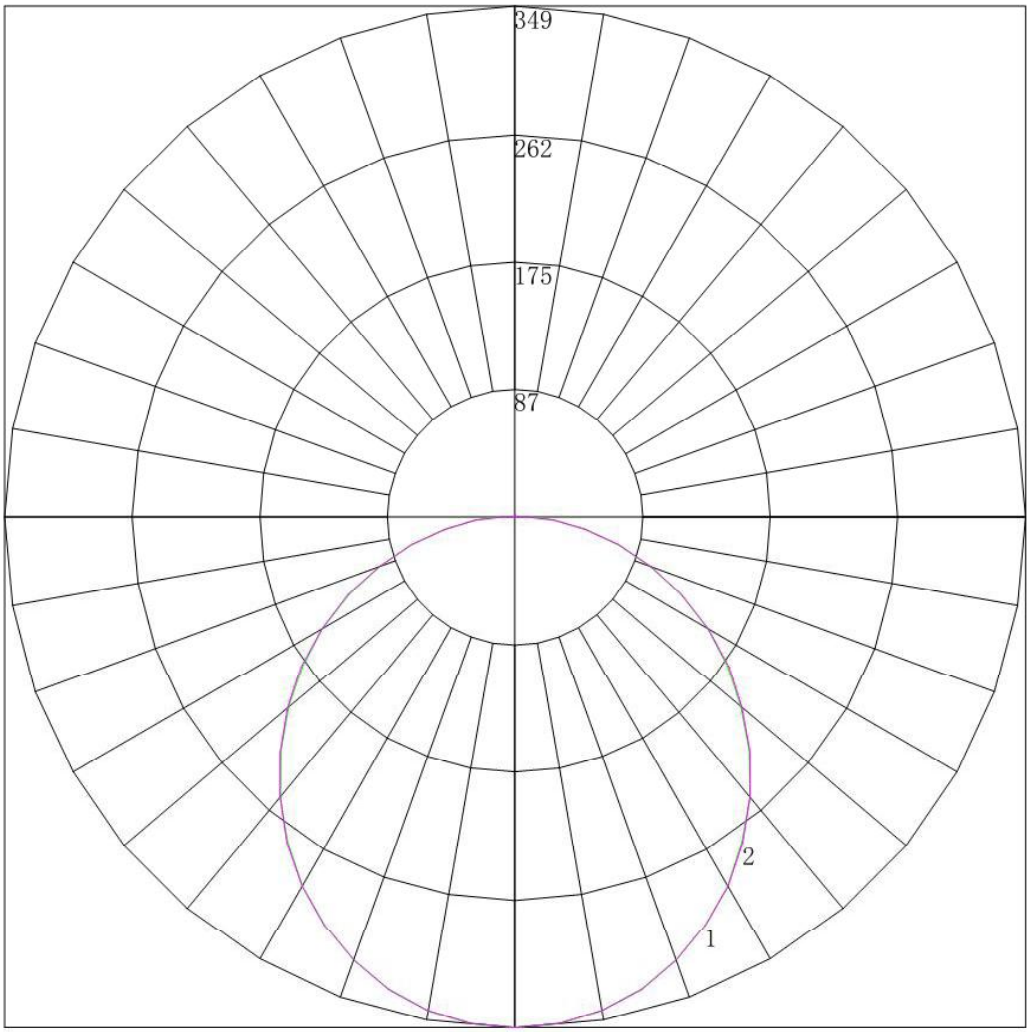
Zone	Lumens	%Lamp	%Fixt
0-20	127.28	12.60	12.60
0-30	269.23	26.70	26.70
0-40	439.00	43.50	43.50
0-60	772.96	76.50	76.50
0-80	975.07	96.50	96.50
0-90	1005.77	99.60	99.60
10-90	972.75	96.30	96.30
20-40	311.73	30.90	30.90
20-50	486.68	48.20	48.20
40-70	458.22	45.40	45.40
60-80	202.10	20.00	20.00
70-80	77.84	7.70	7.70
80-90	30.70	3.00	3.00
90-110	3.17	0.30	0.30
90-120	3.32	0.30	0.30
90-130	3.47	0.30	0.30
90-150	3.83	0.40	0.40
90-180	4.44	0.40	0.40
110-180	1.27	0.10	0.10
0-180	1010.2	100.00	100.00

Total Luminaire Efficiency = 100.00%

ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	33.01
10-20	94.26
20-30	141.95
30-40	169.78
40-50	174.95
50-60	159.01
60-70	124.26
70-80	77.84
80-90	30.70
90-100	2.98
100-110	0.19
110-120	0.15
120-130	0.16
130-140	0.17
140-150	0.19
150-160	0.25
160-170	0.25
170-180	0.10

4.5 Polar Curves

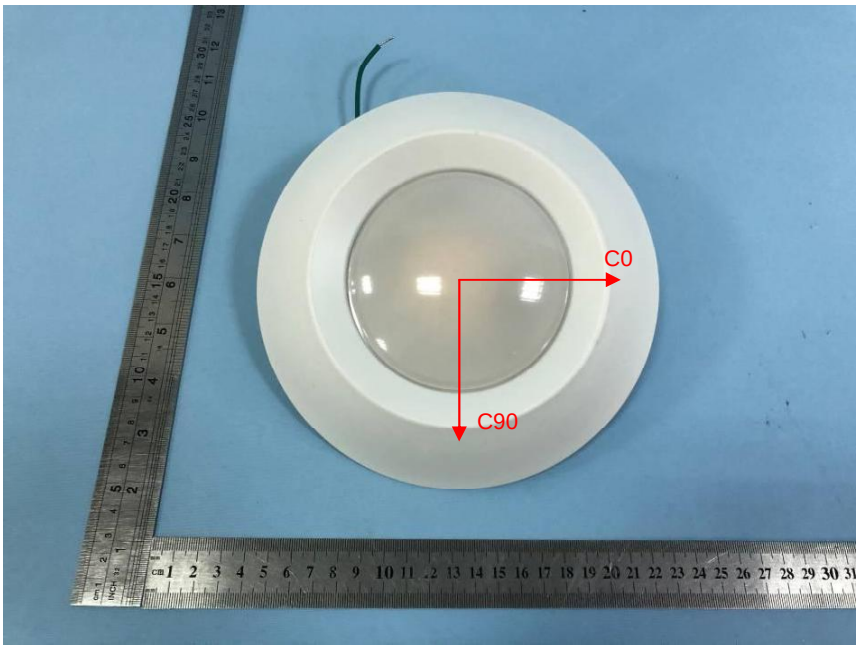


Maximum Candela = 349.112 Located At Horizontal Angle = 0, Vertical Angle = 0
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

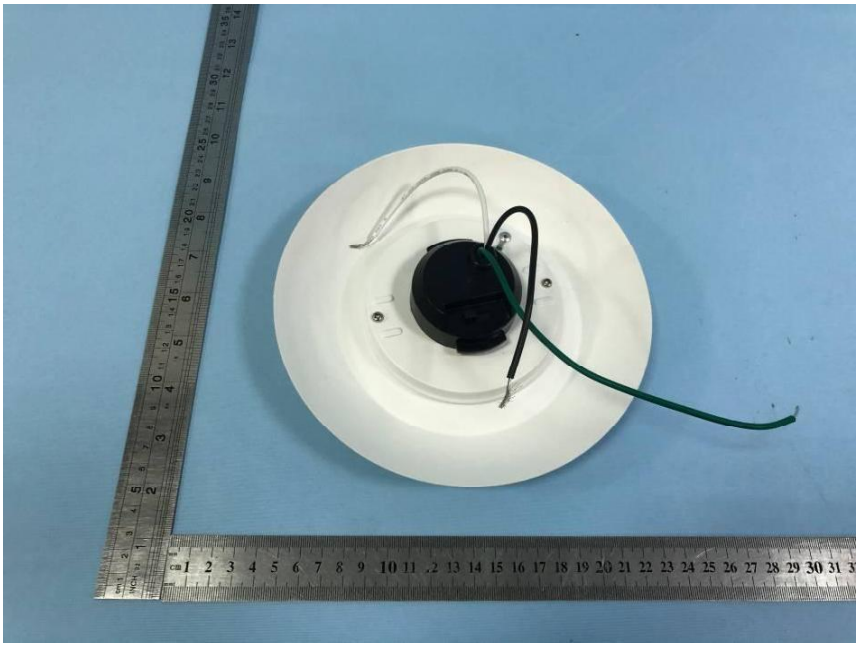
4.6 Candela Tabulation

	0	15	30	45	60	75	90
0	349.112	349.112	349.112	349.112	349.112	349.112	349.112
5	347.533	347.196	347.196	347.445	347.899	347.899	347.498
10	342.438	341.944	341.944	342.443	343.226	343.226	342.748
15	334.050	333.312	333.312	333.972	334.981	334.981	334.323
20	322.326	321.457	321.457	322.460	323.860	323.860	322.491
25	307.806	306.739	306.739	307.838	309.525	309.525	308.150
30	291.077	289.498	289.498	290.513	292.517	292.517	291.389
35	270.965	269.664	269.664	271.138	273.285	273.285	271.805
40	249.907	247.983	247.983	249.375	251.828	251.828	250.114
45	226.593	224.724	224.724	226.147	228.865	228.865	227.169
50	201.747	200.292	200.292	202.357	204.758	204.758	202.969
55	177.081	175.524	175.524	177.688	180.470	180.470	178.634
60	152.235	149.921	149.921	151.779	154.475	154.475	152.507
65	125.089	123.055	123.055	125.284	127.739	127.739	125.707
70	98.303	96.551	96.551	99.241	101.183	101.183	99.176
75	73.367	71.286	71.286	73.828	75.750	75.750	73.452
80	49.016	46.923	46.923	49.159	50.765	50.765	48.759
85	26.876	25.196	25.196	27.080	28.632	28.632	26.979
90	12.581	9.691	9.691	9.034	10.160	10.160	8.784
95	0.496	0.361	0.361	0.451	0.383	0.383	0.224
100	0.225	0.203	0.203	0.225	0.180	0.180	0.224
105	0.180	0.225	0.225	0.203	0.112	0.112	0.179
110	0.180	0.203	0.203	0.203	0.135	0.135	0.134
115	0.135	0.158	0.158	0.158	0.112	0.112	0.224
120	0.135	0.180	0.180	0.180	0.068	0.068	0.134
125	0.135	0.203	0.203	0.203	0.157	0.157	0.224
130	0.180	0.180	0.180	0.180	0.225	0.225	0.269
135	0.180	0.180	0.180	0.203	0.292	0.292	0.269
140	0.225	0.248	0.248	0.225	0.225	0.225	0.224
145	0.271	0.270	0.270	0.270	0.314	0.314	0.314
150	0.406	0.383	0.383	0.360	0.404	0.404	0.403
155	0.541	0.541	0.541	0.541	0.539	0.539	0.493
160	0.767	0.744	0.744	0.721	0.764	0.764	0.717
165	0.902	0.924	0.924	0.901	0.921	0.921	0.896
170	1.037	1.037	1.037	1.014	1.033	1.033	1.076
175	1.082	1.104	1.104	1.126	1.146	1.146	1.120
180	0.659	0.659	0.659	0.659	0.659	0.659	0.659

Appendix A Product Photo



Picture 1



Picture 2

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