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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) Ltd
No.1, Zhongzhu Road South,Science & Technology Innovation Coast, High Tech District, Zhuhai City, Guangdong Prov., China

For products:

LED Downlight

Models No.:

538292###(##=00-99,#=0-9)

(The product is a color tunable luminaire, tunable to 2700K to 5000K, # can be 0-9 and represent different client and sales districts.)

Test Date:	Jul. 2, 2020 to Jul. 3, 2020
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.1.4
Test Note:	

Complied by:		**Reviewed by:**	
Fish Tan	Fish Tan	**Lin Qiu**	Lin
Jul. 3, 2020		**Jul. 3, 2020**	

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1. General

1.1 Product Information

Brand Name	ETI, Commercial Electric
Product Type	LED Downlight
Model Number	538292###(##=00-99,#=0-9)
Rated Inputs	120-277VAC, 60Hz
Rated Power	25W
Rated Light output	1800lm
Declared CCT	2700K
Power Supply	ETI-AD02500500042SDA
LED Package, Array or Module	SPMWHX228FD5WAW0XX, Samsung Electronics Co., LTD.
Receipt Samples	1 unit
Sample Code of lab.	200630107001
Date of Receipt Samples	Jun. 30, 2020
Note	This is a color tunable product, 2700K was selected for the test.

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	2020-01-06	2021-01-05
AC Power supply	LC-I-989	APW-120N	2020-01-06	2021-01-05
Power analyzer	LC-I-928	WT210	2019-12-29	2020-12-28
Power analyzer	LC-I-954	WT210	2019-12-26	2020-12-25
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	2020-04-23	2021-04-22
Wireless temperature transmitter	LC-I-PL-009	DWLR-DLR	2020-01-03	2021-01-02
Wireless temperature transmitter	LC-I-PL-008	DWLR-DLR	2020-01-03	2021-01-02

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	119.98 V~60Hz	120.00 V~60Hz
Input Current(A)	0.201	0.199
Total Power(W)	23.81	23.50
Power Factor	0.985	0.984
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	1890.38
Luminaire Efficacy(lm/W)	-	80.44
Correlated Color Temperature (CCT)(K)	2706	-
Color Rendering Index (CRI)	92.9	-
R9	58	-
Chromaticity Coordinate (x,y)	x = 0.4587 y = 0.4093	-
Chromaticity Coordinate (u,v)	u = 0.2623 v = 0.3511	-
Chromaticity Coordinate (u',v')	u' = 0.2623 v' = 0.5267	-
Duv	-0.0004	-
Zone Lumens between 0-60 °	-	79.40%
Beam Angle(50%Imax)	-	C0/180= 110.6° C90/270= 110.8°

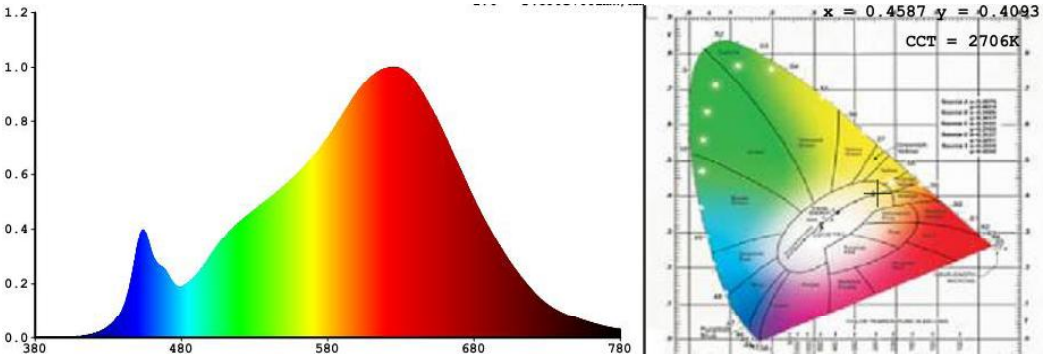
3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
93	97	99	93	93	97	91	80
R9	R10	R11	R12	R13	R14	R15	-
58	93	94	84	94	99	89	-

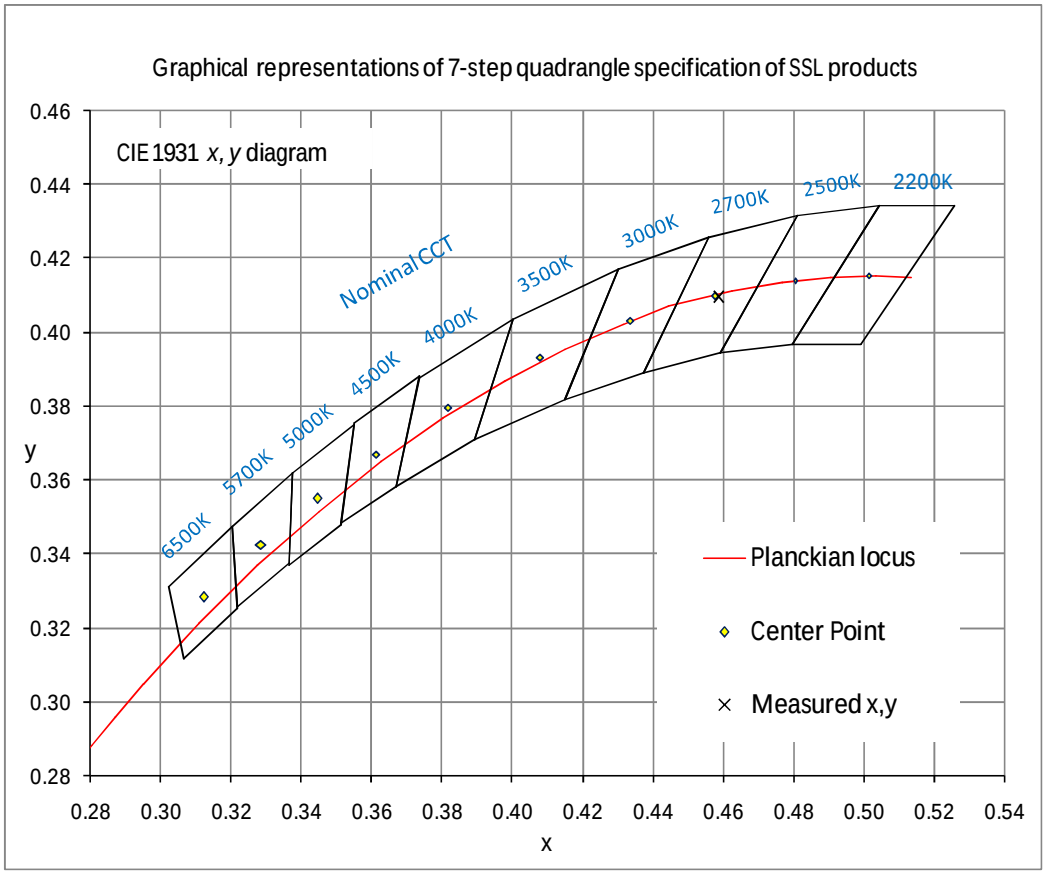
Note: N/A

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
Spacing Criteria (0-180)	1.26	Luminous Length	0.18 m (Diameter)
Spacing Criteria (90-270)	1.26	Luminous Width	0.18 m (Diameter)
Spacing Criteria (Diagonal)	1.38	Luminous Height	0.00 m
Test Distance	29.77 m		

4.4 Zonal Lumen Summary

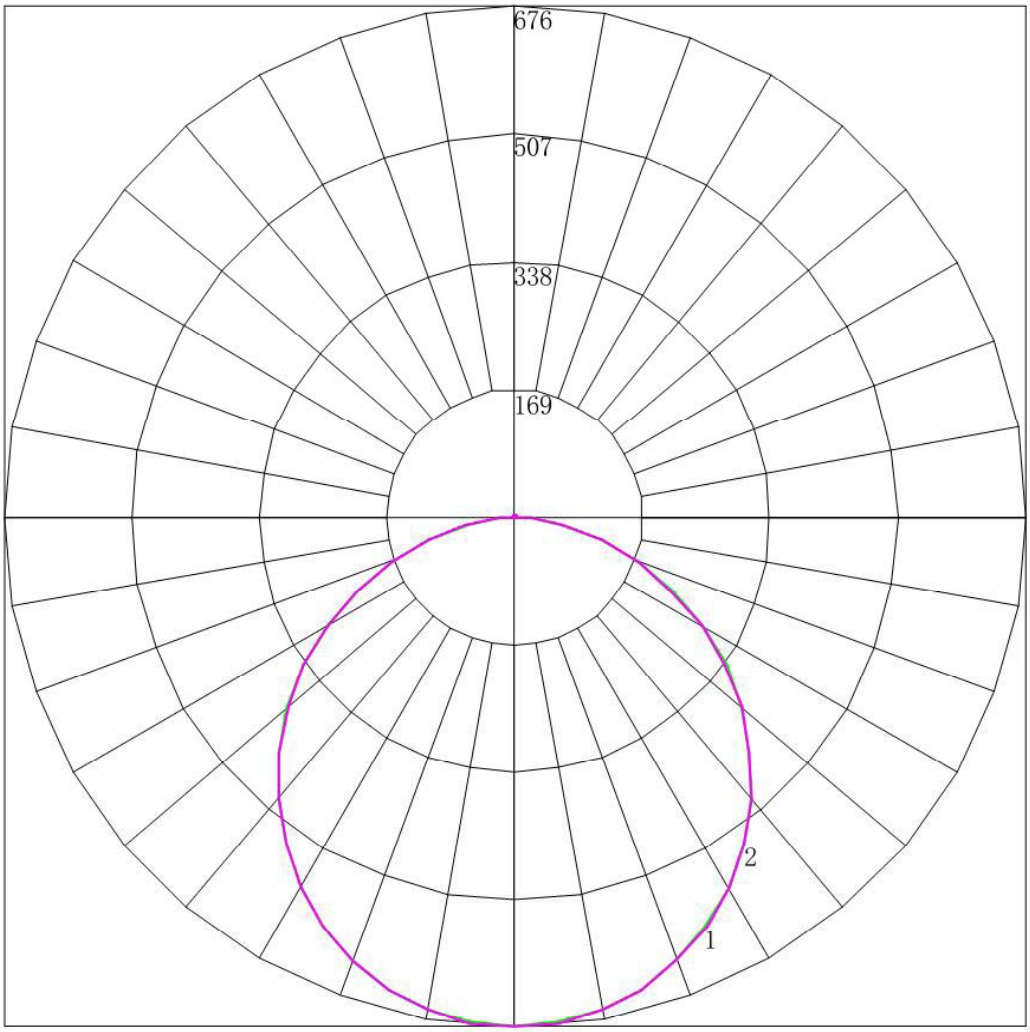
Zone	Lumens	%Lamp	%Fixt
0-20	246.89	13.10	13.10
0-30	523.34	27.70	27.70
0-40	854.62	45.20	45.20
0-60	1500.88	79.40	79.40
0-80	1856.1	98.20	98.20
0-90	1885.72	99.80	99.80
10-90	1821.76	96.40	96.40
20-40	607.73	32.10	32.10
20-50	948.78	50.20	50.20
40-70	874.95	46.30	46.30
60-80	355.22	18.80	18.80
70-80	126.53	6.70	6.70
80-90	29.62	1.60	1.60
90-110	0.98	0.10	0.10
90-120	1.42	0.10	0.10
90-130	1.98	0.10	0.10
90-150	3.21	0.20	0.20
90-180	4.66	0.20	0.20
110-180	3.68	0.20	0.20
0-180	1890.38	100.00	100.00

Total Luminaire Efficiency = 100.00%

ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	63.96
10-20	182.93
20-30	276.45
30-40	331.28
40-50	341.05
50-60	305.21
60-70	228.69
70-80	126.53
80-90	29.62
90-100	0.51
100-110	0.47
110-120	0.44
120-130	0.56
130-140	0.67
140-150	0.56
150-160	0.60
160-170	0.61
170-180	0.24

4.5 Polar Curves

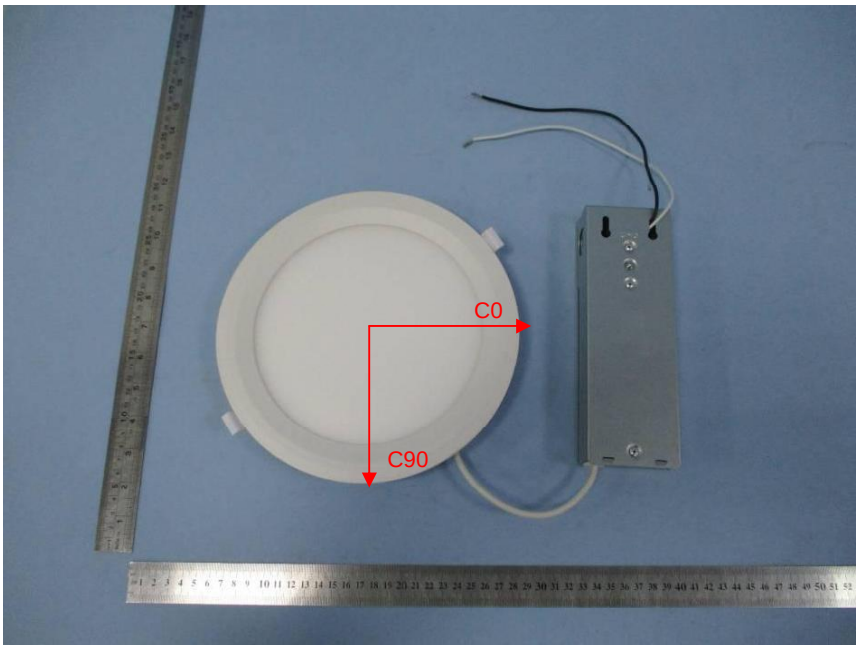


Maximum Candela = 676.211 Located At Horizontal Angle = 0, Vertical Angle = 0
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

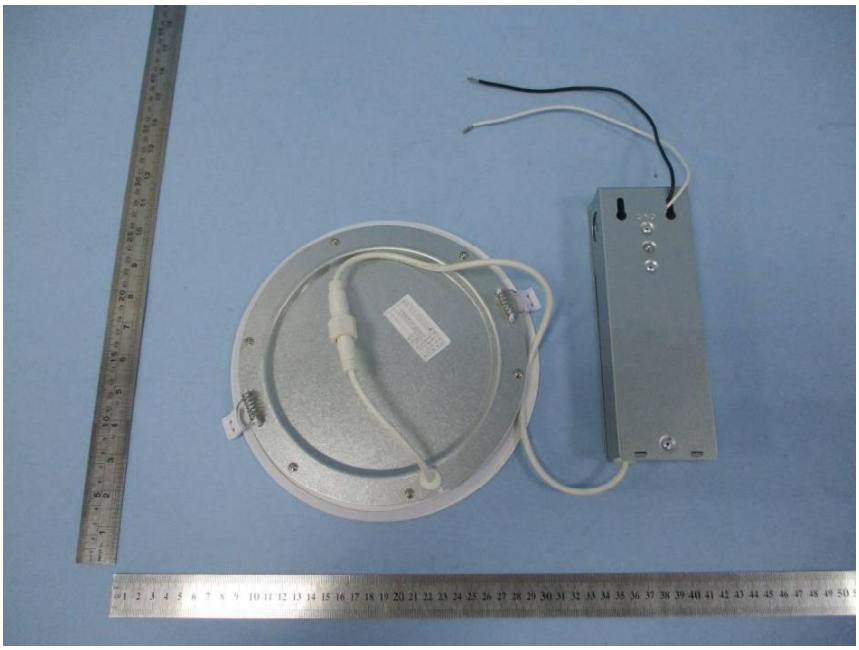
4.6 Candela Tabulation

	0	15	30	45	60	75	90
0	676.211	676.211	676.211	676.211	676.211	676.211	676.211
5	672.666	673.107	673.110	673.329	673.109	673.111	673.998
10	663.360	664.017	663.804	664.017	663.804	663.811	664.262
15	648.294	648.276	648.073	647.832	647.851	648.313	648.330
20	627.024	627.435	627.024	627.435	627.024	626.835	627.531
25	599.550	599.943	599.550	599.722	599.328	599.600	600.978
30	567.202	567.796	567.202	567.352	570.974	567.052	567.787
35	529.536	529.883	529.536	529.661	529.315	528.968	529.728
40	486.996	487.980	486.996	487.537	487.218	487.343	488.129
45	441.354	442.087	442.019	447.190	441.575	441.509	440.776
50	393.496	393.533	393.053	392.868	392.831	392.796	392.981
55	342.094	341.653	341.873	341.653	341.208	340.983	341.203
60	287.146	286.891	293.579	286.891	286.703	286.515	286.770
65	231.312	231.242	230.869	230.799	230.647	230.496	229.682
70	174.592	174.928	174.813	174.263	173.927	174.034	174.806
75	119.644	125.048	118.314	118.392	118.758	118.681	119.045
80	65.140	66.069	65.140	65.626	66.025	65.984	65.939
85	20.827	20.397	21.270	21.506	21.270	21.698	22.127
90	1.329	0.443	0.443	0.443	0.443	0.443	0.885
95	0.443	0.443	0.443	0.443	0.443	0.443	0.443
100	0.443	0.443	0.443	0.443	0.443	0.443	0.443
105	0.443	0.443	0.443	0.443	0.443	0.443	0.443
110	0.443	0.443	0.443	0.443	0.443	0.443	0.443
115	0.443	0.443	0.443	0.443	0.443	0.443	0.443
120	0.443	0.443	0.443	0.443	0.443	0.443	0.443
125	0.443	0.665	0.665	0.665	0.664	0.443	0.443
130	0.886	0.887	0.886	0.887	0.886	0.886	0.885
135	0.443	0.887	0.886	0.887	0.886	0.886	0.885
140	0.886	0.887	0.886	0.887	0.886	0.886	0.885
145	0.886	0.887	0.886	0.887	0.886	0.886	0.885
150	0.886	0.887	0.886	0.887	0.886	0.886	0.885
155	1.329	1.330	1.108	1.330	1.329	1.329	1.328
160	1.773	1.774	1.773	1.774	1.773	1.771	1.770
165	2.216	2.217	2.216	1.996	2.216	2.214	2.213
170	2.659	2.661	2.659	2.661	2.659	2.657	2.655
175	2.659	2.661	2.659	2.661	2.659	2.657	2.655
180	1.329	1.329	1.329	1.329	1.329	1.329	1.329

Appendix A Product Photo



Picture 1



Picture 2

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