



Ref. No.: LCZF17060100

Version: 1.0

Date of Issue: Jun. 29, 2017

Total pages: 12

Test report of

IES LM-79-08

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

Rendered to:

ELEC-TECH INTERNATIONAL CO LTD

No.1 Jinfeng Road, Tangjiawan Town, Xiangzhou District,
Zhuhai City, Guangdong Province, P.R. China 519085

For products:

SSL Recessed Downlights

Models No.:

531922##(##=11-30)

(The product is a color tunable luminaire, tunable to 3000K, 4000K, 5000K and ## can be 11-30 and represent different client and sales districts.)

Test Date: Jun. 23, 2017 to Jun. 24, 2017

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/LM79-08/01

Test Note: *This product is a color tunable luminaire, all the tests were tested at 3000K setting.*

Complied by:

Fish Tan

Project Engineer

Jun. 29, 2017

Fish Tan

Reviewed by:

Richard Li

Technical Manager

Jun. 29, 2017

Richard Li

The duplication of this report or parts of it and its use for advertising purposes is only allowed with permission of the testing laboratory. This report contains the result of the examination of the product sample submitted by the applicant. A general statement concerning the quality of the products from the series manufacture cannot be derived therefore. This report must not be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Table of Contents

1. General	3
1.1 Product Information	3
1.2 Standards or methods	4
1.3 Equipment list	4
2. Test conducted and method	5
2.1 Ambient Condition	5
2.2 Power Supply Characteristics	5
2.3 Seasoning and Stabilization	5
2.4 Electrical Instrumentation	5
2.5 Color Measurement Method	5
2.6 Total Luminous Flux Measurement Method	5
2.7 Luminous Intensity Distribution Measurement Method	5
2.8 Spatial Non-uniformity of Chromaticity	5
3. Test Result Summary	6
3.1 Electrical data	6
3.2 Photometric data	6
3.3 Color Rendering Details	6
4. Test Data	7
4.1 Spectral Distribution	7
4.2 ANSI Chromaticity Quadrangles Diagram	7
4.3 Goniometry Test Data	8
4.4 Zonal Lumen Summary	8
4.5 Polar Curves	9
4.6 Candela Tabulation	10
Appendix 1 Product Photo	11
Appendix 2 U.S. Department of Energy Lighting Facts CM Uniform LM-79 Reporting Template	12

1. General

1.1 Product Information

Brand Name	ETI
Product Type	SSL Recessed Downlights
Model Number	531922##(##=11-30)
Rated Inputs	120-277VAC, 50/60Hz
Rated Power	14W
Rated Light output	800lm
Declared CCT	3000K
Power Supply	LED Driver
LED Package, Array or Module	Model: SPMWHx229xxxxxxx, Samsung Electronics Co., LTD
Receipt Samples	1 unit
Sample Code of lab.	1706221122
Date of Receipt Samples	Jun. 22, 2017
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	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-923	CHP-500	2017-02-04	2018-02-03
AC Power supply	LC-I-987	APW-110N	2017-02-04	2018-02-03
Power analyzer	LC-I-928	WT210	2017-01-19	2018-01-19
Power analyzer	LC-I-954	WT210	2017-02-04	2018-02-03
Multimeter	LC-I-972	Fluke 17B	2016-08-10	2017-08-09
Photometric colorimetric electric system (2 meter sphere)	LC-I-900	SPR3000	Before use	Before use
Standard lamp	LC-PL-I-002	24V100W	2016-10-08	2017-10-07
Luminous Flux Standard Lamp	LC-PL-I-001	110V/200W	2016-09-24	2017-09-23
Goniophotometer(with mirror)	LC-I-902	GMS2000	2017-05-07	2018-05-07
Wireless temperature transmitter	LC-I-978	DWRF-B	2017-02-10	2018-02-10
Wireless temperature transmitter	LC-I-979	DWRF-B	2017-02-10	2018-02-10

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 $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$; 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 type C goniophotometer system and a sphere (2 meter)-spectroradiometer 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.

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.

2.7 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	120.03 V~60Hz
Input Current(A)	0.110	0.110
Total Power(W)	12.88	12.88
Power Factor	0.976	0.976
I-THD	-	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	880.26	880.25
Luminaire Efficacy(Lm/W)	68.34	68.34
Correlated Color Temperature (CCT)(K)	3059	-
Color Rendering Index (CRI)	92.5	-
R9	56	-
Chromaticity Coordinate (x,y)	x = 0.4327 y = 0.4025	-
Chromaticity Coordinate (u,v)	u = 0.2485 v = 0.3467	-
Chromaticity Coordinate (u',v')	u' = 0.2485 v' = 0.5201	-
Duv	-0.00004	-
Zone Lumens between 0-60 °	-	87.03%

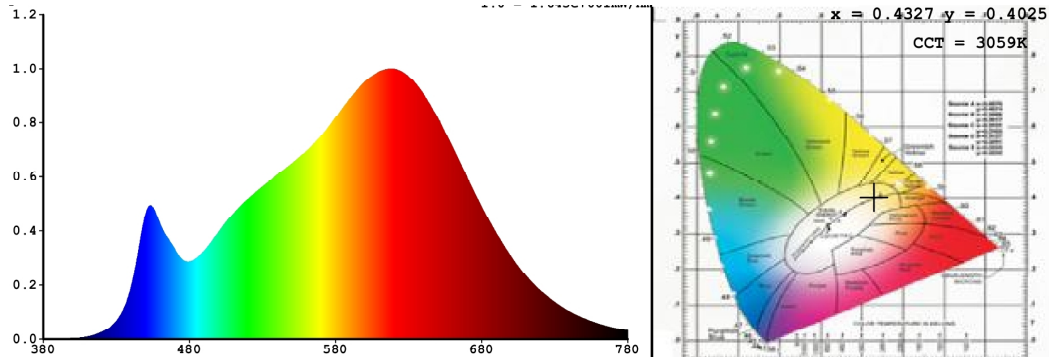
3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
93	97	99	92	93	96	91	80
R9	R10	R11	R12	R13	R14	R15	-
56	93	93	82	94	100	88	-

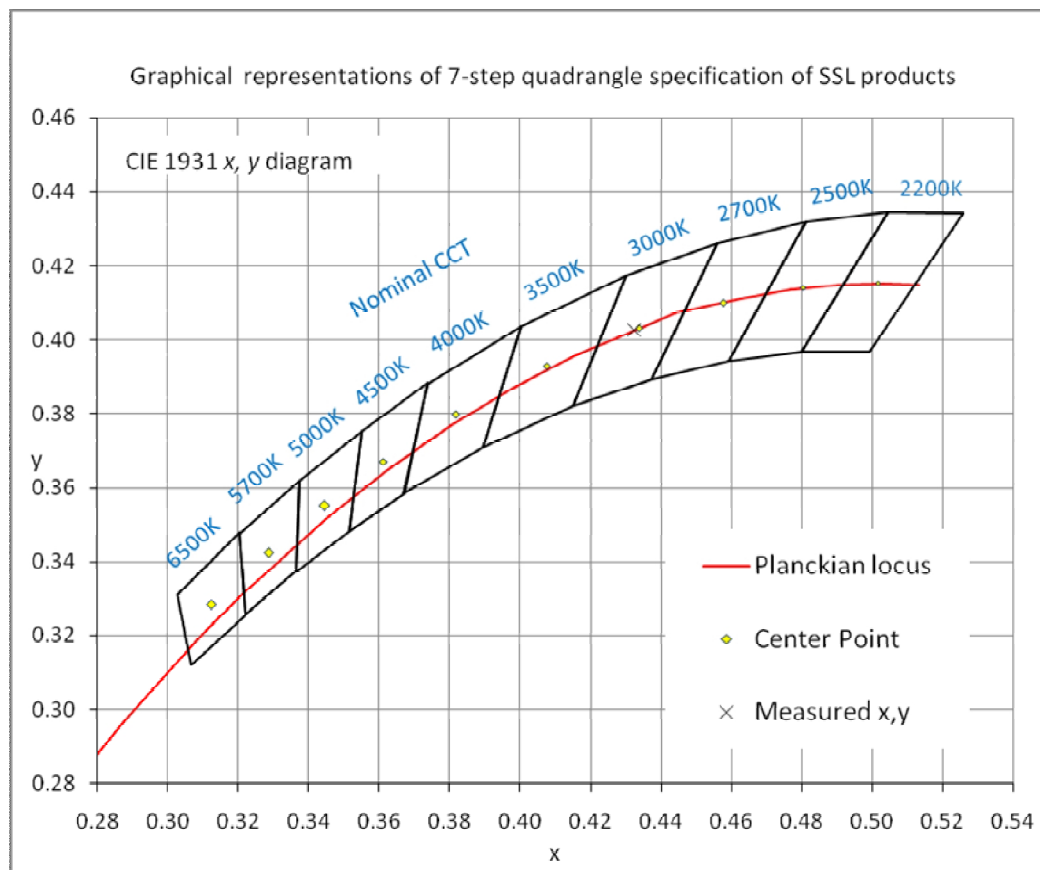
Note: N.A.

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)	1.16	Luminous Length	0.12 m (Diameter)
Spacing Criteria (90-270)	1.18	Luminous Width	0.12 m (Diameter)
Spacing Criteria (Diagonal)	1.24	Luminous Height	0.00 m
Test Distance	29.65 m		

4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	147.58	16.80	16.80
0-30	305.80	34.70	34.70
0-40	482.38	54.80	54.80
0-60	766.07	87.00	87.00
0-80	873.81	99.30	99.30
0-90	879.77	99.90	99.90
10-90	841.09	95.60	95.60
20-40	334.80	38.00	38.00
20-50	495.94	56.30	56.30
40-70	359.26	40.80	40.80
60-80	107.74	12.20	12.20
70-80	32.17	3.70	3.70
80-90	5.97	0.70	0.70
90-110	0.07	0.00	0.00
90-120	0.07	0.00	0.00
90-130	0.07	0.00	0.00
90-150	0.07	0.00	0.00
90-180	0.48	0.10	0.10
110-180	0.41	0.00	0.00
0-180	880.25	100.00	100.00

Total Luminaire Efficiency = 100.00%

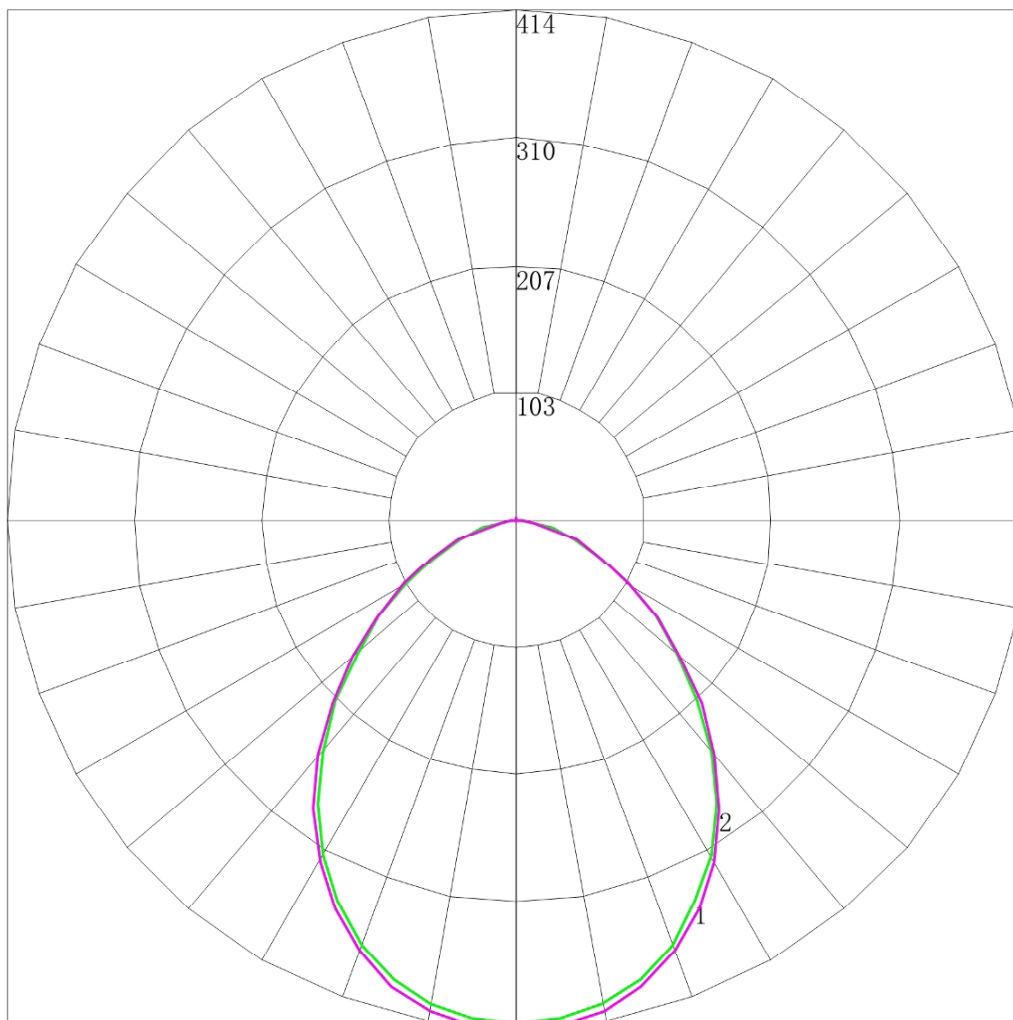
ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	38.69
10-20	108.89
20-30	158.22
30-40	176.58
40-50	161.13
50-60	122.55
60-70	75.57
70-80	32.17
80-90	5.97
90-100	0.07
100-110	0.00
110-120	0.00
120-130	0.00
130-140	0.00
140-150	0.00
150-160	0.09
160-170	0.23
170-180	0.08



LCTECH

4.5 Polar Curves



Maximum Candela = 413.637 Located At Horizontal Angle = 90, Vertical Angle = 5

1 - Vertical Plane Through Horizontal Angles (0 - 180)

2 - Vertical Plane Through Horizontal Angles (90 - 270)



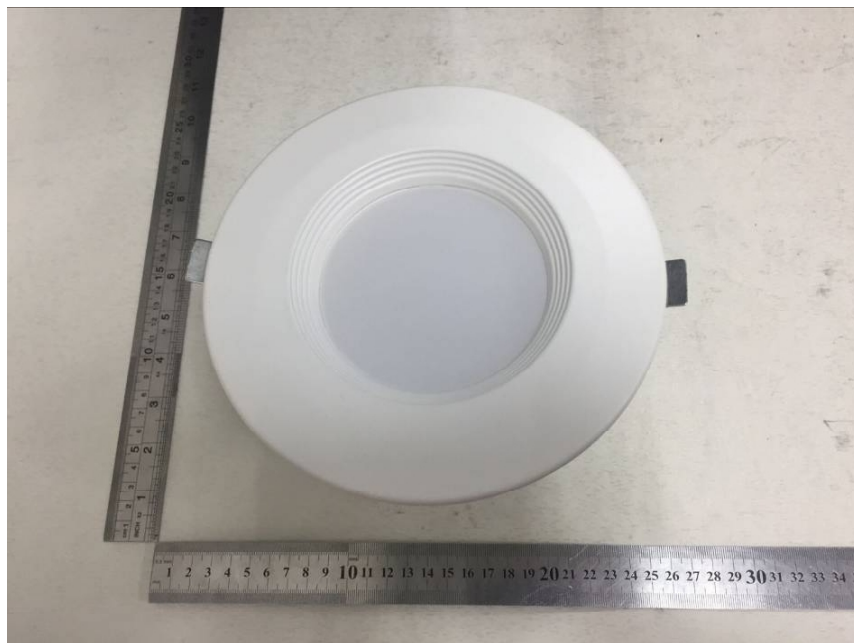
LCTECH



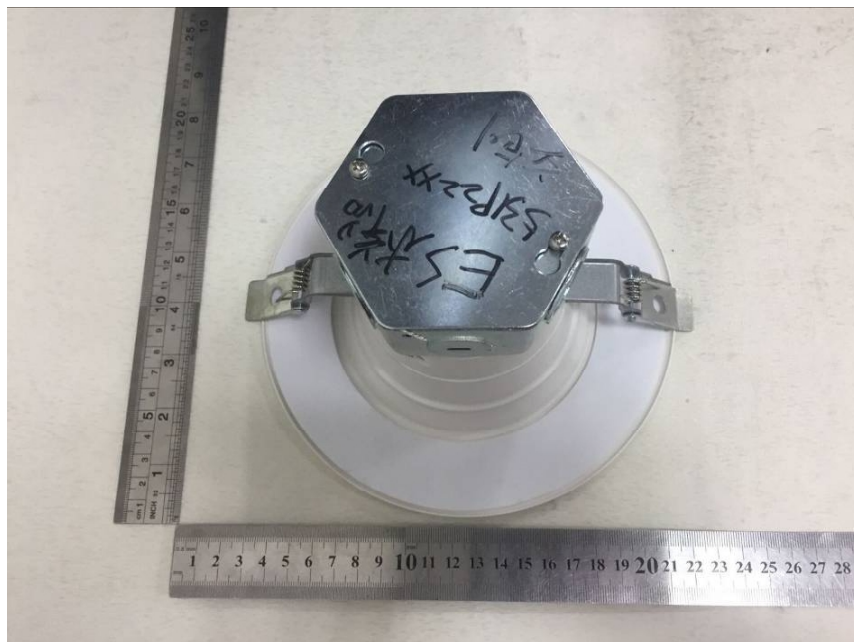
4.6 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
0	410.082	410.082	410.082	410.082	410.082	410.082	410.082
5	407.873	406.996	408.098	407.005	407.669	407.887	413.637
10	399.477	399.501	399.720	399.313	398.666	400.221	405.811
15	386.220	385.832	386.492	385.909	386.372	387.076	392.306
20	367.660	367.090	368.192	367.447	367.713	368.027	372.753
25	343.355	343.941	343.941	343.490	343.124	344.361	349.286
30	315.516	315.057	315.939	314.704	315.026	315.663	320.625
35	282.815	282.207	282.868	282.618	282.534	283.243	287.182
40	246.580	245.830	246.710	246.355	246.312	246.658	250.707
45	208.134	208.568	208.127	208.556	208.990	208.763	211.642
50	170.573	171.087	170.647	170.976	170.793	171.302	173.885
55	136.989	136.032	136.253	136.474	135.891	136.253	139.174
60	104.288	104.505	103.843	104.170	104.056	104.050	105.773
65	75.565	75.403	75.182	75.380	75.295	75.568	76.711
70	49.935	50.266	50.488	50.104	50.488	50.380	51.136
75	29.165	29.322	29.543	29.447	28.976	29.353	29.433
80	13.257	13.009	13.008	12.964	12.951	13.145	12.967
85	4.419	4.410	4.190	4.395	4.391	4.160	4.313
90	0.000	0.220	0.220	0.219	0.436	0.217	0.427
95	0.000	0.000	0.000	0.000	0.000	0.000	0.000
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000
105	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	0.000	0.000	0.000	0.000	0.000	0.000	0.000
115	0.000	0.000	0.000	0.000	0.000	0.000	0.000
120	0.000	0.000	0.000	0.000	0.000	0.000	0.000
125	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	0.000	0.000	0.000	0.000	0.000	0.000	0.000
135	0.000	0.000	0.000	0.000	0.000	0.000	0.000
140	0.000	0.000	0.000	0.000	0.000	0.000	0.000
145	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150	0.000	0.000	0.000	0.000	0.000	0.000	0.000
155	0.000	0.000	0.220	0.000	0.221	0.000	0.000
160	0.884	0.662	0.441	0.879	0.439	0.876	0.868
165	0.884	0.882	0.882	0.879	0.878	0.876	0.868
170	0.884	0.882	0.882	0.879	0.878	0.876	0.868
175	0.884	0.882	0.882	0.879	0.878	0.876	0.868
180	0.878	0.878	0.878	0.878	0.878	0.878	0.878

Appendix 1 Product Photo



Picture 1



Picture 2

Appendix 2 U.S. Department of Energy Lighting Facts CM Uniform LM-79 Reporting Template

Laboratory Information

Name of test lab	LCTECH (Zhongshan) Testing Service Co., Ltd
Date of test report	Jun. 29, 2017
Test report number	LCZP17060100
Laboratory contact name	Richard Li

Product Information

Applicant	ELEC-TECH INTERNATIONAL CO LTD		
Brand name	ETI		
Model number	531922##(##=11-30)		
SKU(if available)	N/A		
Type of luminaire (for integral lamps, list base type and lamp type)	SSL Recessed Downlights		
Luminaire aperture	-	in.	
Luminaire height	0		
Luminaire length	4.7		
Luminaire width	4.7		
Number of units(modular products)	N/A		

Electrical Measurements	Integrating sphere output	Goniophotometer Output	
Input wattage	12.88	12.88	W
Input current	0.110	0.110	A
Input voltage(AC)	120.00	120.03	V
Power factor	0.976	0.976	
Off-state power	0.0	0.0	W

Photometric Characteristics

Total initial lumen output	880.26	880.25	lm
Initial luminaire efficacy	68.34	68.34	lm/W
Correlated color temperature / CCT	3059	K	
Color rendering index/CRI	92.5		
Rgvalue	56		
Duv	-0.00004		

Luminous Intensity Distribution		Goniophotometer Output	
Center beam candle power(if applicable)	--	410.082	cd
Beam angle(if applicable)		90.8	°
Zonallumensinthe0°-60°zone		87.03	%
Zonal lumens in the60°-90° zone		19.24	%
Zonallumensinthe90°-120°zone		0.15	%
Zonallumensinthe120°-180°zone		0.05	%

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