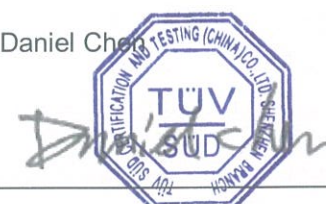


Test-Report IES LM-79-08 for  
SL Lamp 3 W

<b>TEST REPORT</b> <b>IES LM-79-08</b> <b>TÜV SÜD Test Report for</b> <b>Electrical and Photometric Measurements of Solid-State Lighting Products</b>	
Report reference No.....	68.184.17.473.01
Date of issue.....	2017-06-27
Project handler.....	Sky Feng
Testing laboratory.....	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Address .....	Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District 518052 Shenzhen, CHINA
Testing location.....	Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District 518052 Shenzhen, CHINA
Client.....	PHOCOS China Ltd.
Client number.....	83887
Address .....	3F 1st Bldg. 4A Chang Yi Road, 266021, Qingdao, PEOPLE'S REPUBLIC OF CHINA
Contact person.....	Ms. Wang Minhua
Standard.....	This TÜV SÜD test program is based on the following requirements: IES LM-79-08
TRF originated by.....	TÜV SÜD Product Service GmbH, Mr. Kenneth Lau
Copyright blank test report.....	This test report is based on the content of the standard (see above). The test report considered selected clauses of the a.m. standard(s) and experience gained with product testing. It was prepared by TÜV SÜD Product Service GmbH.  TUV SUD Group takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.
Test procedure .....	<input type="checkbox"/> TÜV Mark <input checked="" type="checkbox"/> without certification
Non-standard test method .....	N/A
National deviations.....	N/A
Number of pages (Report).....	13 (Including Attachment)
Number of pages (Attachments).....	2
Compiled by..... : Sky Feng (+ signature)	Approved by..... : Daniel Chen (+ signature)



Test sample .....	LED lamp	
Type of test object .....	LED lamp	
Trade mark .....	PHOCOS	
Model and/or type reference .....	SL-3W	
Rating(s) .....	12VDC / 24VDC; 3W	
Manufacturer.....	Same as client.	
Manufacturer number .....	Same as client.	
Address .....	Same as client.	
Contact person.....	Same as client.	
Sub-contractors/ tests (clause).....	N/A	
Name.....	N/A	
Order description.....	<input checked="" type="checkbox"/>	Complete test according to TRF
	<input type="checkbox"/>	Partial test according to manufacturer's specifications
	<input type="checkbox"/>	Preliminary test
	<input type="checkbox"/>	Spot check
	<input type="checkbox"/>	Other:
Date of order.....	2017-06-14	
Date of receipt of test item .....	2017-06-14	
Date(s) of performance of test.....	2017-06-14 to 2017-06-27	
Test item particulars (declared):		
Lamp type :	<input type="checkbox"/>	Bare lamp
	<input type="checkbox"/>	Covered lamp, no reflector
	<input type="checkbox"/>	Lamp with reflector
	<input checked="" type="checkbox"/>	other: LED lamp
Lamp cap installed :	E27	
Rated Voltage:	12VDC / 24VDC	
Rated Power:	3W	
Rated Power Factor :	--	
Rated Luminous Flux :	--	
Rated CCT :	5700K	
Rated CRI :	--	
Attachments:		
	1. Test Equipment List;	
	2. Lighting Facts Uniform Reporting Template	

**General remarks:**

"(See remark #)" refers to a remark appended to the report.

"(See appended table)" refers to a table appended to the report.

Throughout this report a point is used as the decimal separator.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced except in full without the written approval of the testing laboratory.

Measurement uncertainty budgets have been determined for applicable test methods and are available upon request.

TUV SUD Cert & Testing (China) Co., Ltd. Shenzhen Branch is an accredited Test Laboratory (NVLAP Lab Code: 500067-0) to IESNA LM-79-08 by NVLAP (National Voluntary Laboratory Accreditation Program).



NVLAP LAB CODE 500067-0

The report must not be used by the client to claim product certification, approval or endorsement by NVLAP, NIST or any agency of the federal government.

**Summary of testing:**

Model:	SL-3W
Luminous Efficacy (Lumens/Watt)	124.5
Luminous Flux (Lumens)	298.7
Input Voltage (Volts DC)	24.0
Input Power (Watts)	2.40
CCT (K)	5752
CRI	72.9
Stabilisation Time (Light Power) (minutes)	More than 120

**LED specification:**

Model:	Manufactory	Vf (V)	If (mA)	Viewing angle (°)	CCT(K)
LED2835-0.2W	SHENZHEN JIANGNA PHOTOELECTRIC CO., LTD	3.0-3.6	60	120	6000-6500

Picture of the product



Overview of SL-3W



LED view

Copy of marking plate:

--

Characteristic data

--

Purpose of the product

LED lamp for generally lighting purpose.

Possible test case verdicts:

- test case does not apply to the test object: .....: N/A
- test object does meet the requirement.....: P(ass)
- test object does not meet the requirement: .....: F(ail)

Possible suffixes to the verdicts:

- suffix for detailed information for the client.....: C(comment)
- suffix for important information for factory inspection...: - M(manufacturing)

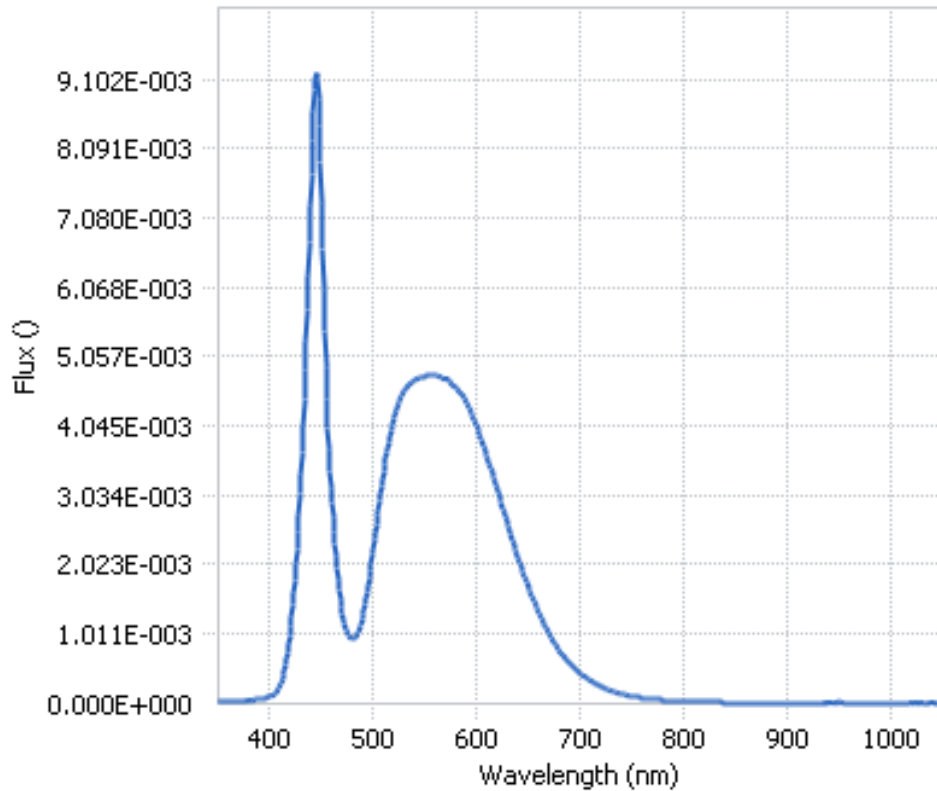
IES LM-79-08			
Clause	Requirement – Test	Measuring result – Remark	Verdict
1.0	Introduction		--
2.0	Ambient Conditions		P
2.1	General		P
2.2	Air Temperature		P
2.3	Thermal Condition for Mounting SSL Products		P
2.4	Air Movement		P
3.0	Power Supply Characteristics		P
3.1	Wave shape of AC power supply		P
3.2	Voltage regulation		P
4.0	Seasoning of SSL Product	No seasoning of SSL product	N/A
5.0	Stabilization of SSL Product		P
	SSL product has sufficiently stabilized before measurement		P
6.0	Operation Orientation		P
	SSL product shall be stabilized and measured in intended operating orientation	As normal working	P
7.0	Electrical Settings		P
	SSL product shall be operated at rated voltage		P
	SSL product with dimming capability are tested at maximum input power condition		N/A
	SSL product with different modes are measured in all relevant modes		N/A
8.0	Electrical Instrumentations		P
8.1	Circuits		P
8.2	Uncertainties		P
9.0	Test methods for Luminous Flux measurement		P
9.1	Integrating sphere with a spectroradiometer (Sphere-spectroradiometer system)		P
9.2	Integrating sphere with a photometer head (Sphere-photometer system)		N/A
9.3	Goniophotometer		P
10.0	Luminous Intensity Distribution		P
	Reporting acc, to IEC LM-63		P
11.0	Luminous Efficacy		P
	Calculation		P
12.0	Test Methods for Colour Characteristics of SSL Products		P
	Measurements		P
13.0	Uncertainty statement		N/A
14.0	Test report		--

Table 1		Test data	
Model:	SL-3W		
Rated Voltage (V):	12VDC or 24 VDC	Rated Power (W):	3W
Rated luminous flux (lm):	--	Ambient temperature 25 ±1 (°C):	25.1
Test item	Measured Value		
	Integrating Sphere		Goniophotometer
<b>Key Photometric Results</b>			
Luminous Efficacy (Lumens/Watt)	--	124.5	
Total Luminous Flux (Lumens)	--	298.7	
Correlated Color Temperature (CCT:K)	5752	--	
Color Rendering Index (CRI)	72.9	--	
Chromaticity (Chroma x / Chroma y)	0.3267 / 0.3428	--	
Chromaticity (Chroma u / Chroma v)	0.2023 / 0.3184	--	
Chromaticity (Chroma u' / Chroma v')	0.2023 / 0.4776	--	
Duv Value	0.0023	--	
Colour Angular Uniformity (Max,du'v')	--	--	
Stabilization Time (Light and Power)	90 Minutes	100Minutes	
Total Run Time – (Minutes)	120Minutes	140Minutes	
Zonal flux (0-60°)	--	46.73%	
Zonal flux (60-90°)	--	30.03%	
Spacing Criteria (C/γ)	--	C:15° / γ:1.0°	
<b>Electrical Input Results</b>			
Input Power (Watts)	--	2.40	
Input Voltage (Volts DC)	--	24.0	
Input Current (Amps)	--	0.0998	
Input Frequency (Hertz)	--	--	
Power Factor	--	--	
A-THD (Current – Total Harmonic Distortion)	--	--	
<b>Additional Information</b>			
Ambient Temperature (°C):	25.1	25.1	
ISTMT (In-Situ Temperature Measurement) (°C):	--		
Photometric measurement condition	--	--	
Supplementary Information:			
<ul style="list-style-type: none"> <li>- Absorbion Correction used: Yes</li> <li>- Stabilization was considered reached by: the variation (maximum-minimum) of at least 3 readings of the light output and electrical power over a period of 30 minutes is less than 0.5%.</li> </ul>			



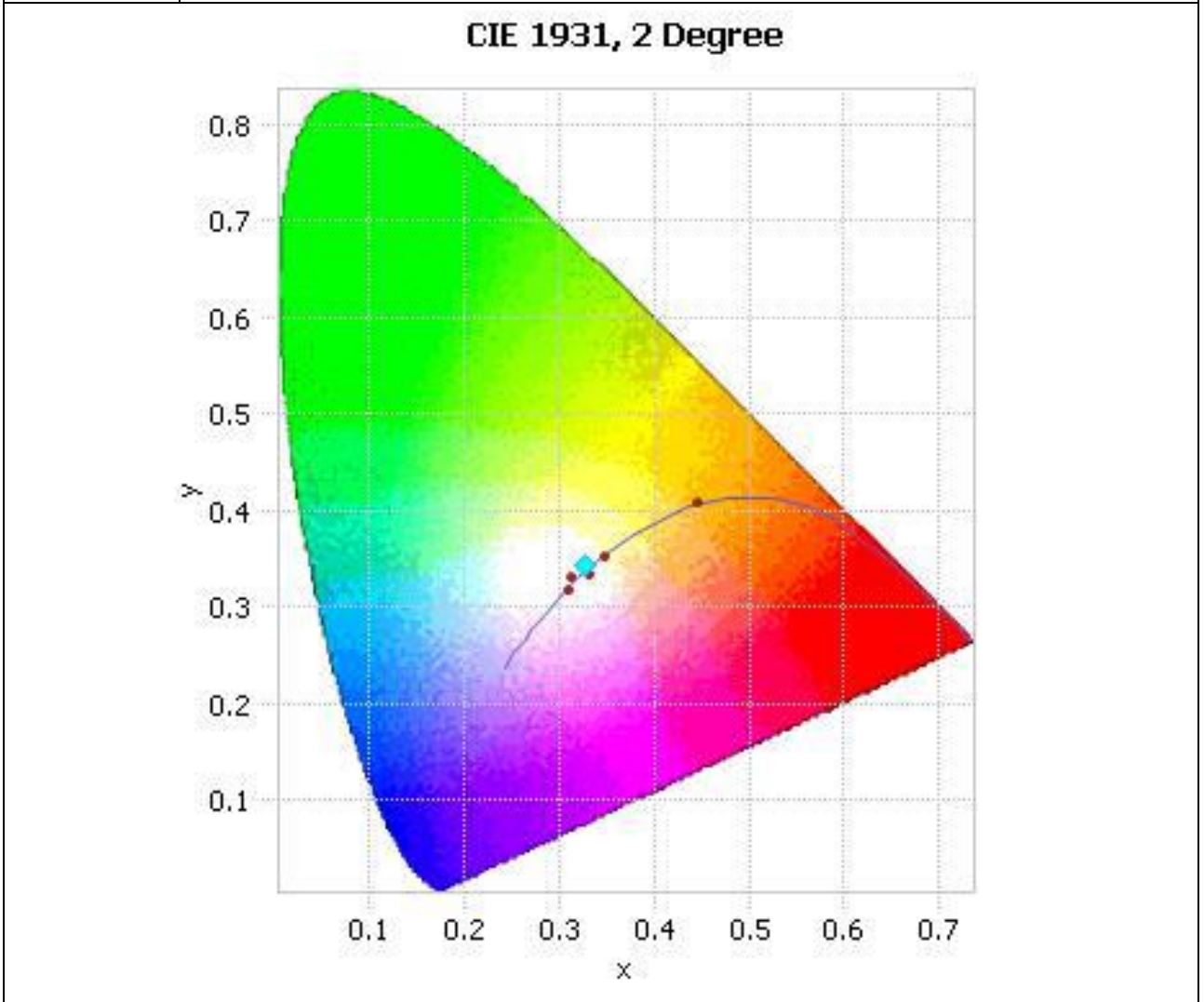
<b>Table 2</b>	<b>Spectral Flux Graph</b>
<b>Model:</b>	SL-3W

The following graph shows the spectral response curve of the radiant flux for the sample:



**Spectral response of the Radiant Flux**  
(350nm to 1100nm – calibrated range of the Spectroradiometer)

<b>Table 3</b>	<b>Chromaticity Diagram</b>
<b>Model:</b>	SL-3W



**Chromaticity Coordinate values: x / y = 0.3267 / 0.3428 Location is indicated by: The green point.**

<b>Table 4</b>	<b>Luminous Intensity distribution diagram</b>
<b>Model:</b>	SL-3W

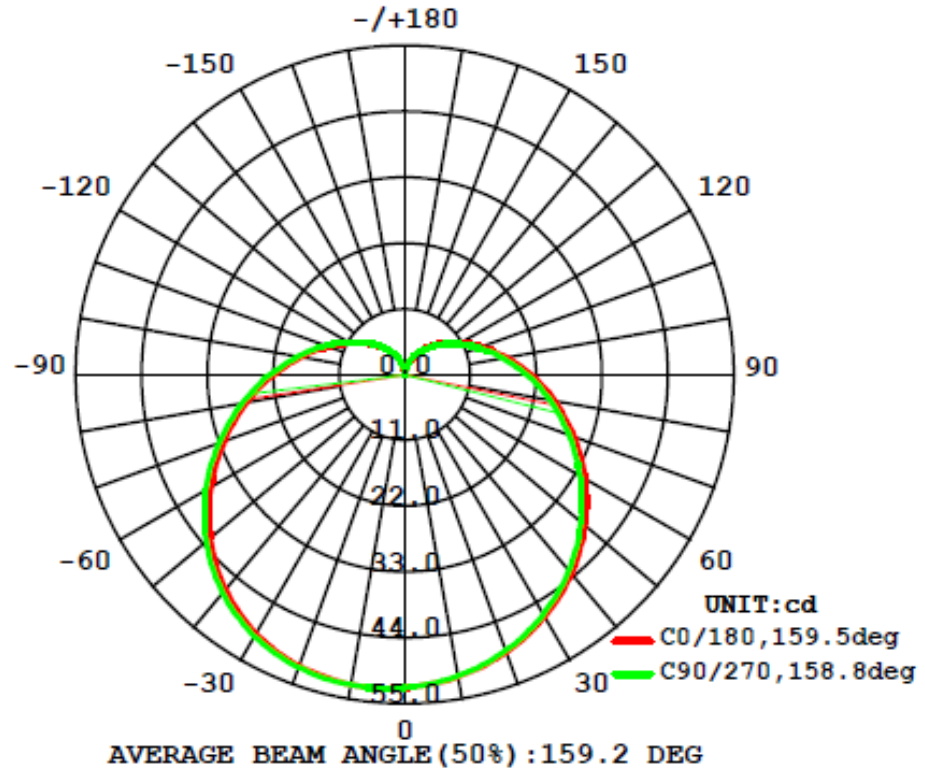


Table 5		Zonal flux diagram										
Model:		SL-3W										
$\gamma$	C0	C45	C90	C135	C180	C225	C270	C315	$\gamma$	$\Phi$ zone	$\Phi$ total	$\Phi$ lum
10	51.22	50.85	51.06	51.75	52.50	52.85	52.63	51.94	0- 10	4.970	4.970	1.66
20	49.37	48.69	49.05	50.30	51.77	52.49	52.07	50.74	10- 20	14.52	19.49	6.52
30	46.76	45.84	46.21	47.86	49.91	50.97	50.45	48.61	20- 30	22.89	42.38	14.2
40	43.37	42.31	42.59	44.39	46.74	48.08	47.55	45.47	30- 40	29.35	71.73	24
50	39.31	38.21	38.36	40.10	42.50	43.96	43.48	41.38	40- 50	33.30	105.0	35.2
60	34.79	33.72	33.77	35.27	37.48	38.92	38.53	36.66	50- 60	34.56	139.6	46.7
70	30.10	29.18	29.10	30.32	32.10	33.45	33.12	31.64	60- 70	33.36	172.9	57.9
80	25.50	24.75	24.57	25.54	26.86	27.96	27.75	26.70	70- 80	30.28	203.2	68
90	21.21	20.60	20.37	21.08	21.98	22.83	22.73	22.06	80- 90	26.04	229.3	76.8
100	17.32	16.85	16.63	17.09	17.67	18.28	18.27	17.89	90-100	21.29	250.6	83.9
110	13.83	13.55	13.29	13.62	13.97	14.33	14.43	14.17	100-110	16.58	267.1	89.4
120	10.87	10.66	10.45	10.65	10.85	11.10	11.20	11.07	110-120	12.27	279.4	93.5
130	8.351	8.203	8.018	8.152	8.263	8.415	8.516	8.459	120-130	8.583	288.0	96.4
140	6.231	6.120	5.969	6.008	6.116	6.212	6.300	6.284	130-140	5.595	293.6	98.3
150	4.453	4.396	4.280	2.853	4.182	4.401	4.482	4.443	140-150	3.271	296.8	99.4
160	2.404	2.763	2.666	0.4745	2.084	2.640	2.715	2.273	150-160	1.518	298.4	99.9
170	0.0062	0.0084	0.0093	0.0060	0	0.0000	0	0.0000	160-170	0.3113	298.7	100
180	0	0	0	0	0	0	0	0	170-180	0.0003	298.7	100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

**Attachment 1: Equipment List**

<b>Equipment</b>	<b>ID No.</b>	<b>Model</b>	<b>Brand/Manufacturer</b>	<b>Calibration due date</b>
Digital Power Meter	13217	WT210	YOKOGAWA	2017-08-20
Anemometer	13117	471-1	Dwyer	2018-01-24
Temperature and Humidity meter	13397	SK-L200TH	SATO	2018-02-24
Goniophotometer system	13345	GO-R5000-SML	Everfine	2018-03-10
Integrating sphere test system	13342	CSLMS-7621	Labsphere	2018-03-10

Attachment 2

U,S, Department of Energy

Lighting Facts<sup>SM</sup> Uniform LM-79 Reporting Template



**Laboratory Information**

Name of test lab	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Date of test report	2017-06-27
Test report number	68.184.17.473.01
Laboratory contact name	Daniel Chen
Laboratory contact signature*	<i>Daniel Chen</i>

\* By signing this form, the signatory is attesting that the information on the form is correct and the same as on the original, complete test report(s),  
The signatory also attests that all of the results on this form were measured entirely in accordance with IES LM-79-08,

**Product Information**

Manufacturer	PHOCOS China Ltd.		
Brand name	PHOCOS		
Model number	SL-3W		
SKU (if available)	--		
Type of luminaire (for integral lamps, list base type and lamp type)	LED lamp		
Luminaire aperture (downlights)	--	<input type="checkbox"/> in,	<input type="checkbox"/> cm
Luminaire length	--	<input type="checkbox"/> in,	<input type="checkbox"/> cm
Luminaire width	--	<input type="checkbox"/> in,	<input type="checkbox"/> cm
Number of units (modular products)	--		

Electrical Measurements	Integrating sphere output	Goniophotometer output	
Input wattage	--	2.40	W
Input current	--	0.0998	A
Input voltage (DC)	--	24.0	V
Power factor	--	--	
Off-state power	--	--	W

**Photometric Characteristics**

Total initial lumen output	--	298.7	lm
Initial luminaire efficacy	--	124.7	lm/W
Correlated color temperature / CCT	5752	--	K
Color rendering index / CRI	72.9	--	
R <sub>9</sub> value	-21.4	--	
Duv	0.0027	--	

**Luminous Intensity Distribution**

		Goniophotometer output	
Centre beam candlepower (if applicable)	--	52.87	cd
Beam angle (if applicable)	--	159.2	°
Zonal lumens in the 0°-60° zone	--	46.73	%
Zonal lumens in the 60°-90° zone	--	30.03	%
Zonal lumens in the 90°-120° zone	--	16.79	%
Zonal lumens in the 120°-180° zone	--	6.45	%

END OF TEST REPORT