

**TEST REPORT****COMMISSION REGULATION (EU) 2019/2020 of 1 October 2019****laying down ecodesign requirements for light sources and separate control gears pursuant to****Directive 2009/125/EC of the European Parliament and of the Council****Report reference No.**..... LCSB050523082S**Prepare by**..... Seth Cai (Project Engineer)*Seth Cai***Check by**..... Ian Luo (Director)*Ian Luo***Approved by**..... Jesse Liu (Manager)*Jesse Liu***Date of issue** ..... November 23, 2023**Contents**..... 14 pages**Testing laboratory****Name** ..... Shenzhen Southern LCS Compliance Testing Laboratory Ltd.**Address** ..... 101-201, No.39 Buliding, Xialang Industrial Zone, Heshuikou  
Community, Matian Street, Guangming District, Shenzhen, China**Testing location** ..... As above**Client****Name** ..... Shenzhen Penel Optoelectronics Technology Co., Ltd**Address**..... The 4th Floor ,Xihe Industrial Park, Tangtou Avenue, Shiyan Street,  
Bao'an District, Shenzhen, China**Manufacturer****Name** ..... Shenzhen Penel Optoelectronics Technology Co., Ltd**Address**..... The 4th Floor ,Xihe Industrial Park, Tangtou Avenue, Shiyan Street,  
Bao'an District, Shenzhen, China**Test specification****Standard**..... COMMISSION REGULATION (EU) 2019/2020  
COMMISSION DELEGATED REGULATION (EU) 2019/2015  
COMMISSION DELEGATED REGULATION (EU) 2021/340  
COMMISSION DELEGATED REGULATION (EU) 2021/341  
**Test procedure** ..... COMMISSION REGULATION (EU) 2019/2020  
COMMISSION DELEGATED REGULATION (EU) 2019/2015  
COMMISSION DELEGATED REGULATION (EU) 2021/340  
COMMISSION DELEGATED REGULATION (EU) 2021/341**Non-standard test metho**..... N/A**TRF No. (EU) 2019/2020**

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**Test item Description** .....: LED STREET LIGHT

Trademark .....: PENEL

Model and/or type reference.....: STL-100W-NS10

Rating(s)(V/Hz).....: AC100-240V, 50/60Hz, 100W

**Test case verdicts**

Test case does not apply to the test object.....: N(N/A)

Test item does meet the requirement .....: P(Pass)

Test item does not meet the requirement .....: F(Fail)

**Testing**

Date of receipt of test item .....: June 12, 2023

Date(s) of performance of test.....: June 13, 2023 – November 17, 2023

**Test item particulars:**

**Type of light source:**

- Lighting technology used ☐ HL ☐ LFLT5HE ☐ LFL T5HO ☐ CFLni ☐ other FL  
☐ HPS ☐ MH ☐ other HID ☒ LED ☐ OLED  
☐ mixed ☐ other
- Non-directional or directional ☐ NDLS ☒ DLS
- Mains or non-mains ☒ MLS ☐ NMLS
- Connected light source (CLS) ☐ Yes ☒ No
- Colour-tuneable light source ☐ Yes ☒ No
- Envelope ☒ no ☐ second ☐ non-clear
- High luminance light source ☐ Yes ☒ No
- Anti-glare shield ☐ Yes ☒ No
- Dimmable ☐ Yes ☐ only with specific dimmers ☒ No
- Use of light source: ☐ Indoor ☒ Outdoor ☐ Industry

**Lamp cap installed:** N/A

**General product parameters :**

Energy consumption in on-mode (kWh/1 000 h) 100

Energy efficiency class ☐ A ☐ B ☐ C ☒ D ☐ E ☐ F ☐ G

Rated useful luminous flux.....(lm): 12700

Rated CCT .....(K): 3000K

On-mode power (Pon), expressed in W.....: 100

Standby power (Psb).....(W): N/A

Networked standbypower(Pnet)for CLS.....(W): N/A

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Rated Ra.....: 70(use in out-door)  
Outer dimensions.....(mm): 610.4x235.7x78.9  
Spectral power distribution.....: See attachment 2  
Claim of equivalent power .....: ☐ Yes: ☒ N/A  
Chromaticity coordinates (x and y).....: x:0.4400, y:0.4030  
Peak luminous intensity .....(cd) : 5750  
Beam angle in degrees.....(°) : 150x80  
R9 colour rendering index value R9.....: -35  
Survival factor .....: 100%  
The lumen maintenance factor.....: 96%  
Displacement factor (cos  $\phi$  1).....: 0.9  
Colour consistency in McAdam ellipses.....: 6  
Claims that an LED light source replaces a  
fluorescent light source without integrated  
ballast of a particular wattage.....: ☐ Yes: ☒ N/A  
Flicker metric (Pst LM) .....: 0.05  
Stroboscopic effect metric (SVM).....: 0.05  
Rated life time .....(h): 50000h

**Attachments:**

The test report includes: ATTACHMENT 1(S) of Energy efficiency classes  
The test report includes: ATTACHMENT 2(S) of Spectral power distribution  
The test report includes: ATTACHMENT 3(S) of Photos

**Summary of testing:**

- 1、 These results are in compliance with the ecodesign requirements of the Commission Regulation (EU) 2019/2020.
- 2、 Measurement was conducted at voltage AC230V and a stable ambient temperature  $25 \pm 10^{\circ}\text{C}$ .
- 3、 The total harmonic content of the supply voltage shall not exceed 3 %.

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**Equipment List:**

Instrument	Equipment ID	Model	Calibration Date	Calibration Due Date
Full-field Speed Goniophotometer	SLCS-S-112	GO-R5000	2023/06/15	2024/06/14
Digital Power Meter	SLCS-S-103	PF2010	2023/06/15	2024/06/14
AC Testing Power Source	SLCS-S-115	DPS1060	2023/06/15	2024/06/14
Total Spectral Radiant Flux Standard Lamp	SLCS-S-143	D908S	2023/07/05	2024/07/04
2m Integrating Sphere System	SLCS-S-312	HAAS2000	2023/06/15	2024/06/14
Digital Power Meter	SLCS-S-309	PF9810	2023/06/15	2024/06/14
AC Testing Power Source	SLCS-S-310	DPS1005	2023/06/15	2024/06/14
Standard Lamp	SLCS-S-313	DC24/50W	2023/07/05	2024/07/04
Power Meter	SLCS-S-060	PF9800	2023/06/15	2024/06/14
Flicker Photometer	SLCS-S-119	FP-210	2023/06/15	2024/06/14

**General remarks**

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 Issuing testing laboratory.

"(see Enclosure #)" refers to additional information 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.

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Clause	Requirement - Test	Result - Remark	Verdict
<b>Annex I (Clause)</b>	<b>Definitions in Regulation (EU) 2019/2020</b>		<b>P</b>
	Number of sample used for test .....	10 pcs	P
(3)	Directional Light Source		<b>P</b>
	at least 80 % of total luminous flux within a solid angle of $\pi$ sr (corresponding to a cone with angle of $120^\circ$ )		P
(15)	Useful luminous flux $\Phi_{use}$		P
	for non-directional light sources it is the total flux emitted in a solid angle of $4\pi$ sr (corresponding to a $360^\circ$ sphere)		N
	for directional light sources with beam angle $\geq 90^\circ$ it is the flux emitted in a solid angle of $\pi$ sr (corresponding to a cone with angle of $120^\circ$ )		P
	for directional light sources with beam angle $< 90^\circ$ it is the flux emitted in a solid angle of $0,586\pi$ sr (corresponding to a cone with angle of $90^\circ$ )		N
<b>Annex II (Clause)</b>	<b>Energy Efficiency Requirements in Regulation (EU) 2019/2020</b>		<b>P</b>
1.(a)	<b>Energy Efficiency Requirements – Light Source</b>		<b>P</b>
	On-mode Power $P_{on}$ (W):	$P_{on}=102.76$ W	P
	Maximum Allowed Power $P_{onmax}$ (W): $P_{onmax} = C \times (L + \Phi_{use}/(F \times \eta)) \times R$	$P_{onmax}=145.31$ W	P
	$\Phi_{use}$ :	12700 lm	
	Threshold efficacy $\eta$ (lm/W): $\eta$ for LED:	120.0	P
	End loss factor L (W) depending on light source: L for LED: 1.5	1.5	P
	End loss factor L (W) for connected light sources: 2.0		N
	Efficacy Factor F: 1.00 for non-directional light sources (NDLS, using total flux)		N
	Efficacy Factor F: 0.85 for directional light sources (DLS, using flux in a cone)	0.85	P
	CRI Factor R: 0.65 for $CRI \leq 25$		N
	CRI Factor R: (CRI+80)/160 for $CRI > 25$ , rounded to two decimals	$R=(70+80)/160=0.94$	P

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Clause	Requirement - Test	Result - Remark	Verdict
	Correction Factor C Depending on Light Source Characteristics in Table 2		N
	Non-directional (NDLS) not operating on mains (NMLS), Basic Value: 1.00		N
	Non-directional (NDLS) operating on mains (MLS), Basic Value: 1.08		N
	Directional (DLS) not operating on mains (NMLS), Basic Value: 1.15		N
	Directional (DLS) operating on mains (MLS), Basic Value: 1.23	1.23	P
	Special Light Source Bonus on C		N
1.(a)	<b>Standby power – Light Source</b>		<b>N</b>
	The standby power $P_{sb}$ of a light source shall not exceed 0.5 W		N
	The networked standby power $P_{net}$ of a connected light source shall not exceed 0.5 W		N
	The allowable values for $P_{sb}$ and $P_{net}$ shall not be added together		N
1.(b)	<b>Energy Efficiency Requirements – Separate Control Gear (at full-load)</b>		<b>N</b>
	Control gear for LED or OLED light sources: $P_{eg}^{0.81} / (1.09 \times P_{eg}^{0.81} + 2.10)$		N
	The no-load power $P_{no}$ of a separate control gear shall not exceed 0.5 W		N
	The standby power $P_{sb}$ of a separate control gear shall not exceed 0.5 W		N
	The networked standby power $P_{net}$ of a connected separate control gear shall not exceed 0.5 W		N
	The allowable values for $P_{sb}$ and $P_{net}$ shall not be added together		N
2.	<b>Functional Requirements – Light Source (Table 4)</b>		<b>P</b>
	Colour Rendering Index CRI: $\geq 80$	71.5(use in out-door)	P
	Displacement Factor DF at Power Input $P_{on}$ for LED and OLED MLS:		P
	No limit at $P_{on} \leq 5$ W DF $\geq 0.5$ at $5$ W $< P_{on} \leq 10$ W, DF $\geq 0.7$ at $10$ W $< P_{on} \leq 25$ W DF $\geq 0.9$ at $25$ W $< P_{on}$	0.983	P
	Lumen Maintenance Factor (for LED and OLED): $X_{LMF,MIN}\% = 100 \times e^{\frac{(3000 \times \ln(0.7))}{L_{70}}}$	97.45%	P
	Survival Factor (for LED and OLED):	100%	P

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Clause	Requirement - Test	Result - Remark	Verdict
	At least 9 light sources of the test sample must be operational after completing the test in Annex V of this Regulation.		
	Colour consistency for LED and OLED light sources: Variation of chromaticity coordinates within a six-step MacAdam ellipse or less.	3.0	P
	Flicker for LED and OLED MLS: $P_{st} LM \leq 1.0$ at full-load	0.019	P
	Stroboscopic effect for LED and OLED MLS: $SVM \leq 0.4$ at full-load	0.002	P
3.(a)	<b>Information to be displayed on the light source itself</b>		P
	Useful luminous flux (lm)	12700lm	P
	Correlated colour temperature (K)	3000K	P
	Beam angle (°) For directional light sources	150x80	P
3.(b)	<b>Information to be visibly displayed on the packaging</b>		P
3.(b)(1)	<b>Light source placed on the market, not in a containing product</b>		P
	(a) Useful luminous flux (lm): - In a font at least twice as large as the display of the on-mode power (Pon) - Clearly indicating if it refers to the flux in a sphere (360°), in a wide cone (120°) or in a narrow cone (90°)		P
	(b) Correlated Colour Temperature, rounded to the nearest 100 K		P
	(c) Beam angle in degrees For directional light sources		P
	(d) electrical interface details, e.g. cap- or connector-type, type of power supply (e.g. 230 V AC 50 Hz, 12 V DC)		P
	(e) L70B50 lifetime for LED and OLED light sources, expressed in hours		P
	(f) on-mode power (Pon), expressed in W		P
	(g) standby power (Psb), expressed in W and rounded to the second decimal. If the value is zero, it may be omitted from the packaging		N
	(h) networked standby power (Pnet) for CLS, expressed in W and rounded to the second decimal. If the value is zero, it may be omitted from the packaging		N
	(i) Colour Rendering Index, rounded to the nearest integer		P
	(j) Clear indication to this effect, if CRI < 80, and the light source is intended for use in outdoor		N

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Clause	Requirement - Test	Result - Remark	Verdict
	applications, industrial applications or other applications where lighting standards allow a CRI < 80.		
	(k) Information on non-standard conditions (such as ambient temperature $T_a \neq 25^\circ \text{C}$ or specific thermal management is necessary)		P
	(l) a warning if the light source cannot be dimmed or can be dimmed only with specific dimmers or with specific wired or wireless dimming methods. In the latter cases a list of compatible dimmers and/or methods shall be provided on the manufacturer's website		N
	(m) if the light source contains mercury: a warning of this, including the mercury content in mg rounded to the first decimal place		N
	(n) if the light source is within the scope of Directive 2012/19/EU, without prejudice to marking obligations pursuant to Article 14(4) of Directive 2012/19/EU, or contains mercury: a warning that it shall not be disposed of as unsorted municipal waste		N
3.(b)(2)	<b>Separate control gears</b> For separate control gear placed on the market as a stand-alone product, not as a part of a containing product		N
	(a) the maximum output power of the control gear (for HL, LED and OLED) or the power of the light source for which the control gear is intended (for FL and HID)		N
	(b) the type of light source(s) for which it is intended		N
	(c) the efficiency in full-load, expressed in percentage		N
	(d) the no-load power ( $P_{no}$ ), expressed in W and rounded to the second decimal, or the indication that the gear is not intended to operate in no-load mode. If the value is zero, it may be omitted from the packaging but shall nonetheless be declared in the technical documentation and on websites		N
	(e) the standby power ( $P_{sb}$ ), expressed in W and rounded to the second decimal. If the value is zero, it may be omitted from the packaging but shall nonetheless be declared in		N
	(f) the networked standby power ( $P_{net}$ ),		N

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Clause	Requirement - Test	Result - Remark	Verdict
	expressed in W and rounded to the second decimal. If the value is zero, it may be omitted from the packaging but shall nonetheless be declared in the technical documentation and on websites		
	(g) a warning if the control gear is not suitable for dimming of light sources or can be used only with specific types of dimmable light sources or using specific wired or wireless dimming methods. In the latter cases, detailed information on the conditions in which the control gear can be used for dimming shall be provided on the manufacturer's or importer's website		N
	(h) a QR-code redirecting to a free-access website of the manufacturer, importer or authorised representative, or the internet address for such a website, where full information on the control gear can be found		N
3.(c)	<b>Information to be visibly displayed on a free-access website of the manufacturer, importer or authorised representative</b>		N
3.(c)(1)	Separate control gears For any separate control gear that is placed on the EU market, the following information shall be displayed on at least one free-access website:		N
	(a) the information specified in point 3(b)(2), except 3(b)(2)(h)		N
	(b) the outer dimensions in mm		N
	(c) the mass in grams of the control gear, without packaging, and without lighting control parts and non-lighting parts, if any and if they can be physically separated from the control gear		N
	(d) instructions on how to remove lighting control parts and non-lighting parts, if any, or how to switch them off or minimise their power consumption during control-gear testing for market surveillance purposes		N
	(e) if the control gear can be used with dimmable light sources, a list of minimum characteristics that the light sources should have to be fully compatible with the control gear during dimming, and possibly a list of compatible dimmable light sources		N
	(f) recommendations on how to dispose of it at		N

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## Appendix-Test Data Sheet

### 1、Initial Lumen Measurement :

Sample No.	Power Pon (W)	Disp. Factor	Luminous Flux $\Phi_{total}$ (lm)	Luminous Flux $\Phi_{use}$ (lm)	Efficacy (lm/W)	Beam angle (°)
1	103.15	0.984	15602.5	12736.0	151.26	123.8
2	102.95	0.981	15522.8	12751.8	150.78	122.4
3	103.05	0.988	15711.0	12718.6	152.46	123.1
4	102.71	0.982	15715.7	12755.3	153.01	122.8
5	102.88	0.983	15718.0	12784.1	152.78	122.5
6	103.06	0.985	15635.2	12706.8	151.71	123.0
7	103.41	0.986	15984.1	12774.8	154.57	122.7
8	102.55	0.982	15689.1	12735.0	152.99	122.6
9	101.78	0.980	15407.5	12721.5	151.38	123.3
10	102.09	0.982	15701.4	12729.3	153.80	123.0
Avg.	102.76	0.983	15668.7	12741.3	152.47	122.9

### 2、Color Performance:

Color Temp (CCT)	Color rendering (Ra)	R9	SDCM	x	y
3014	71.6	-34	3.1	0.4371	0.4062
3052	71.8	-33	2.8	0.4368	0.4050
3006	71.2	-35	2.8	0.4377	0.4062
3011	71.4	-30	3.1	0.4370	0.4060
3046	71.6	-32	3.1	0.4365	0.4055
3028	71.8	-35	3.2	0.4366	0.4058
3037	71.1	-33	2.9	0.4375	0.4063
3030	71.5	-36	3.3	0.4371	0.4066
3021	71.3	-31	2.6	0.4376	0.4057
3054	71.4	-33	3.3	0.4360	0.4051
3030	71.5	-33	3.0	0.4370	0.4058

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**3、Different Mode Power 、Flicker、Stroboscopic Effect and Lumen Maintenance Test:**

Sample No.	No-Load Power Pno	Standby Power Psb	Network Sb. Power Pnet	Flicker Pst LM	Stroboscopic Effect SVM	Total Luminous flux (lm) After 3600h	Lumen Maintenance at 3600h (%)	Survival factor at 3600h
1	N/A	N/A	N/A	0.020	0.000	15218.7	97.54%	P
2	N/A	N/A	N/A	0.015	0.005	15196.8	97.90%	P
3	N/A	N/A	N/A	0.022	0.000	15264.8	97.16%	P
4	N/A	N/A	N/A	0.015	0.000	15297.6	97.34%	P
5	N/A	N/A	N/A	0.019	0.006	15384.8	97.88%	P
6	N/A	N/A	N/A	0.023	0.002	15203.7	97.24%	P
7	N/A	N/A	N/A	0.017	0.004	15578.1	97.46%	P
8	N/A	N/A	N/A	0.024	0.000	15245.1	97.17%	P
9	N/A	N/A	N/A	0.020	0.005	14979.1	97.22%	P
10	N/A	N/A	N/A	0.019	0.007	15321.5	97.58%	P
Avg.	N/A	N/A	N/A	0.019	0.002	15269.0	97.45%	P

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ATTACHMENT 1(S)

Energy efficiency classes			
Standard	Clause	Model No.	Verdict
(EU) 2019/2015	Energy class	STL-100W-NS10	P
Conditions	-Test conditions: -ambition: 25°C/65%R.H. -Test voltage:AC230V		
$\Phi_{use}$	12700 lm (Declared)		
$P_{on}$	$P_{on} = 100W$ (Declared)		
$F_{TM}$	1.176		
$\eta_{TM}$	149.35 lm/w (Declared)		
Technical requirements		Test result	
$\eta_{TM} = (\Phi_{use}/P_{on}) \times F_{TM} \text{ (lm/W)}$	Energy efficiency class	Total mains efficacy $\eta_{TM}$ (lm/W)	--
	A	$210 \leq \eta_{TM}$	N
	B	$185 \leq \eta_{TM} < 210$	N
	C	$160 \leq \eta_{TM} < 185$	N
	D	$135 \leq \eta_{TM} < 160$	P
	E	$110 \leq \eta_{TM} < 135$	N
	F	$85 \leq \eta_{TM} < 110$	N
	G	$\eta_{TM} < 85$	N
Factors FTM by light source type			
Light source type		Factor $F_{TM}$	--
Non-directional (NDLS) operating on mains (MLS)		1.000	N
Non-directional (NDLS) not operating on mains (NMLS)		0.926	N
Directional (DLS) operating on mains (MLS)		1.176	P
Directional (DLS) not operating on mains (NMLS)		1.089	N

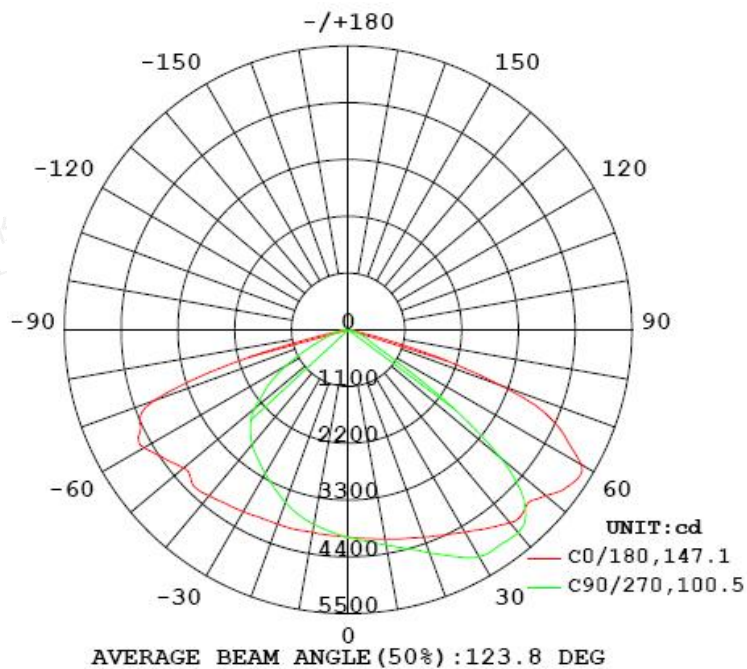
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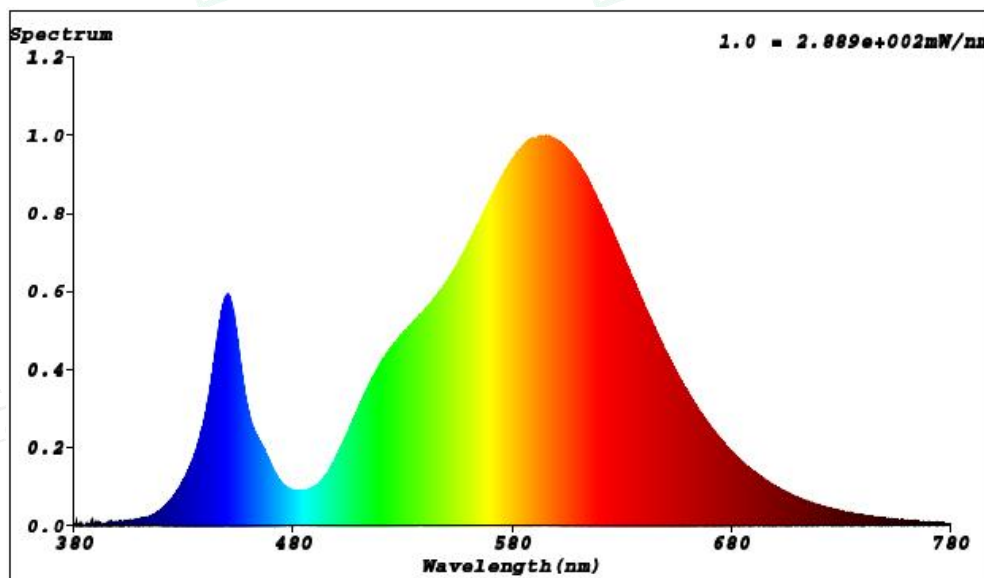
Shenzhen Southern LCS Compliance Testing Laboratory Ltd.  
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 Tel: +(86) 0755-29871520 | Fax: +(86) 0755-29871521 | E-mail: webmaster@lcs-cert.com | http:// www.lcs-cert.com  
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# ATTACHMENT 2(S)

Luminous Intensity Distribution Diagram



Spectral power distribution



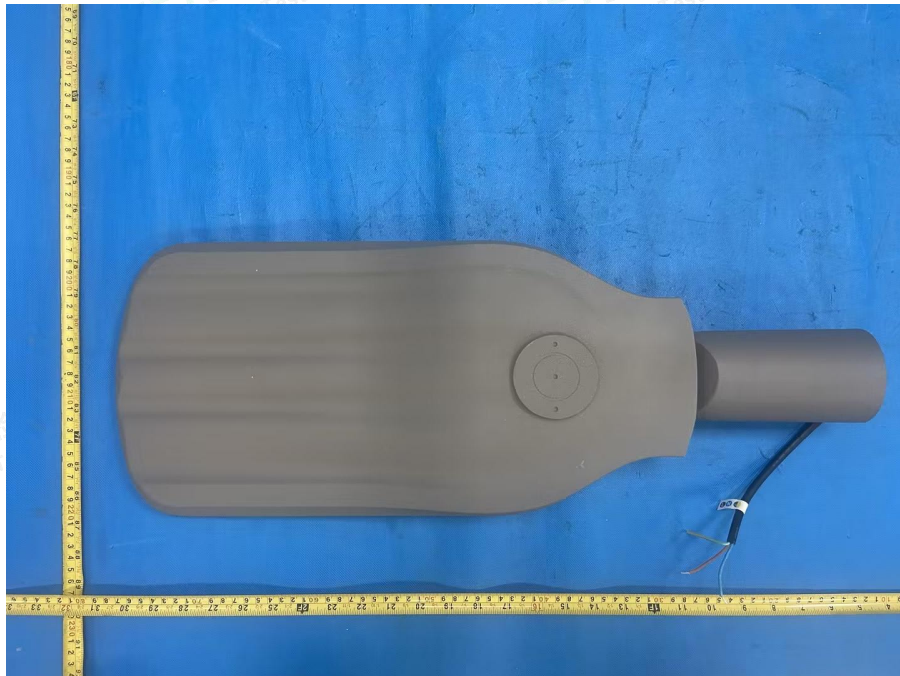
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**ATTACHMENT 3(S)**

Photos of STL-100W-NS10



----- End of test report-----

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