



## DesignLights Consortium Test Report

### Reference Standards

UL1598-2008

ANSI C82.77-10-2014

IES LM-79-2008

### Prepared For

**P.Q.L., Inc.**

2285 Ward Avenue

Simi Valley, CA 93065

Test Laboratory:

**UL-CCIC Company Limited**

Test Laboratory Address:

**No.2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, China**

### Catalog Number

**55099**

### Project Number

**4790736618**

### Report Number

**4790736618\_2**

### Test Date

**2023-02-22~2023-02-23**

### Issue Date

**2023-02-27**

### Revision Date

**N/A**

### Prepared By

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**Zhao, Elaine**

### Approved By

*Maxine Zhou*

**Zhou, Maxine**

The results contained in this report pertain only to the tested sample.

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## Test Summary

### DLC Technical Requirements V5.1- issued 2020-02-14

Requirement Category	Test Method	Requirements	Tolerance	Test Result
Minimum Light Output (lm)-Luminaires	IES LM-79-2008	≥1500	-10%	2536.55
Minimum Luminaire Efficacy (lm/W)-Luminaires	IES LM-79-2008	≥110	-3%	121.98
Spacing Criteria (0-180°)	IES LM-79-2008	1.0-2.0	±0.1	1.22
Spacing Criteria (90-270°)	IES LM-79-2008	1.0-2.0	±0.1	1.30
Zonal Lumen Requirement 1(0°-60°)	IES LM-79-2008	≥75%	-3%	81.50%
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±245	N/A	3441
Allowable CCT (4000K)	IES LM-79-2008/ANSI C78.377-2015	3985±275	N/A	4026
Allowable CCT (5000K)	IES LM-79-2008/ANSI C78.377-2015	5029±283	N/A	4858
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±245	N/A	3433
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±245	N/A	3427
Minimum CRI	IES LM-79-2008/CIE 13.3-1995	≥80	-1	82
Minimum R9	IES LM-79-2008	≥0	-1	5.0
Minimum Rg	IES LM-79-2008	≥89	-1	95
Minimum Rf	IES LM-79-2008	≥70	-1	83
Rcs,h1	IES LM-79-2008	-12%-23%	-1%	-12%
Unified Glare Rating (UGR)	IES LM-79-2008	≤22	N/A	21.5
L70 Lumen maintenance (Hours)	N/A	≥50000	N/A	≥50000
L90 Lumen maintenance (Hours)	N/A	≥36000	N/A	≥36000
Power Factor	ANSI C82.77-10-2014	≥0.9	-0.03	0.9067
Total Harmonic Distortion (A%)	ANSI C82.77-10-2014	≤20%	5%	15.65%
In-Situ Temperature Measurement Test for LED 1 (°C)	UL1598-2008	≤105	N/A	44.3
In-Situ Temperature Measurement Test for Driver 1 (°C)	UL1598-2008	≤90	N/A	46.1
Max Chromaticity Shift (1000-6000h)	N/A	≤0.004	0.0004	0.0024
Minimum Luminaire Warranty (Years)	N/A	≥5	N/A	≥5

## Test List

Sample Received Date: 2023-02-15

Test Item	Test Date	Model Number	Tests Conducted By
Integrating Sphere Test	2023-02-22	55099-35W-35K	Yang, Gavin X
Integrating Sphere Test	2023-02-22	55099-35W-40K	Yang, Gavin X
Integrating Sphere Test	2023-02-22	55099-35W-50K	Yang, Gavin X
Integrating Sphere Test	2023-02-23	55099-25W-35K	Yang, Gavin X
Integrating Sphere Test	2023-02-23	55099-18W-35K	Yang, Gavin X
Goniophotometer Test	2023-02-22	55099-35W-35K	Yang, Gavin X
Goniophotometer Test	2023-02-22	55099-35W-50K	Yang, Gavin X
THD and PF Test	2023-02-22	55099-35W-35K	Yang, Gavin X
THD and PF Test	2023-02-22	55099-35W-40K	Yang, Gavin X
THD and PF Test	2023-02-22	55099-35W-50K	Yang, Gavin X
THD and PF Test	2023-02-22	55099-25W-35K	Yang, Gavin X
THD and PF Test	2023-02-22	55099-18W-35K	Yang, Gavin X
In-Situ Temperature Measurement Test	2023-02-23	55099-35W-35K	Yang, Gavin X

### Remark (if any)

1. UL test equipment information is recorded on Meter Use in UL's Aurora database.
2. The accuracy method decision rule is applied when the compliance or verdict is made to the results of this report.

**Product Description**

**Lamp/Luminaire Description:** 1x4 Luminaires for Ambient Lighting of Interior Commercial Spaces

**Model Number:** 55099

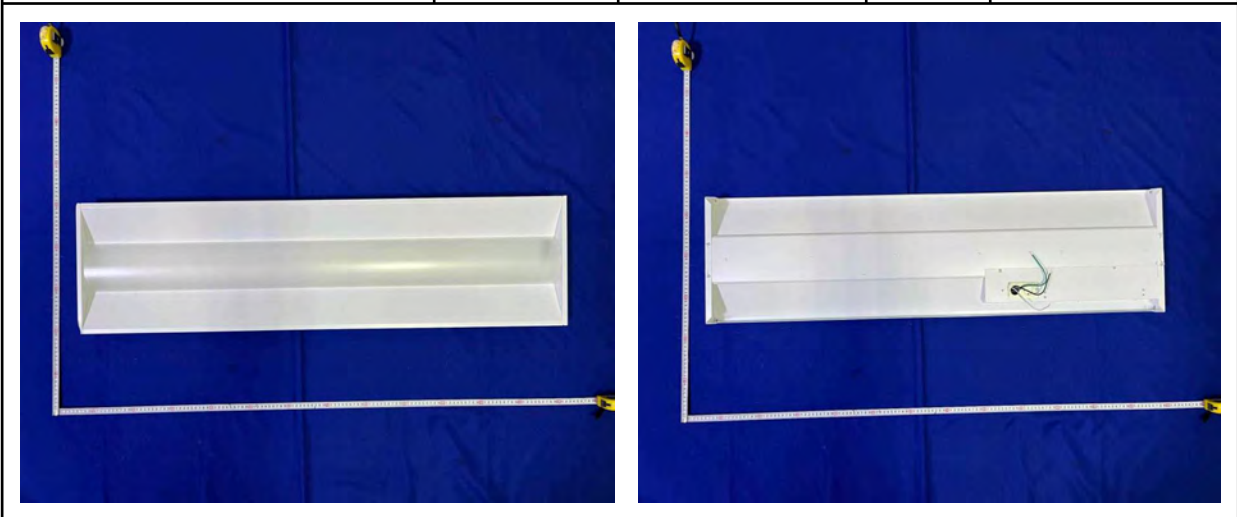
**Electrical Parameter:** 120-277V, 50/60Hz

**LED Package:** STW8A2PD-XX

**Dimming Information:** continuing Capability

**Products Scaled Value**

Model Number	CCT	Luminous Flux	Power	Luminous Efficacy
55099-35W-35K	3500K	4375	35	125
55099-35W-40K	4000K	4725	35	135
55099-35W-50K	5000K	4445	35	127
55099-25W-35K	3500K	3375	25	135
55099-25W-40K	4000K	3625	25	145
55099-25W-50K	5000K	3425	25	137
55099-18W-35K	3500K	2556	18	142
55099-18W-40K	4000K	2736	18	152
55099-18W-50K	5000K	2592	18	144



### Integrating Sphere Test

<b>Model No.</b>	55099-35W-35K		<b>Sample ID.</b>	5786149
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45	

#### Test Method

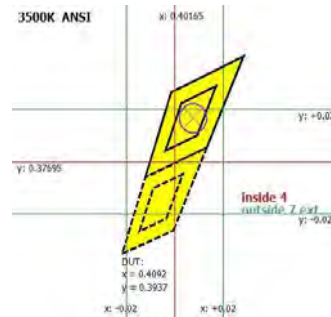
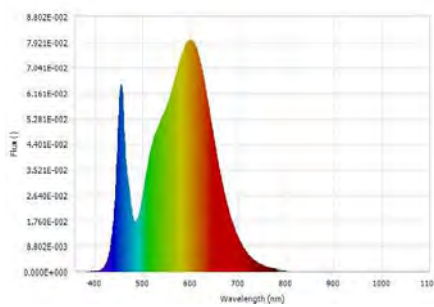
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.  
 2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C. The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.  
 3.The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using 4π geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

#### Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.4	120.11	60	0.3134	35.109	0.9334	Horizontal

#### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3441	82	5.0	0.0005	4368.96	124.44	N/A



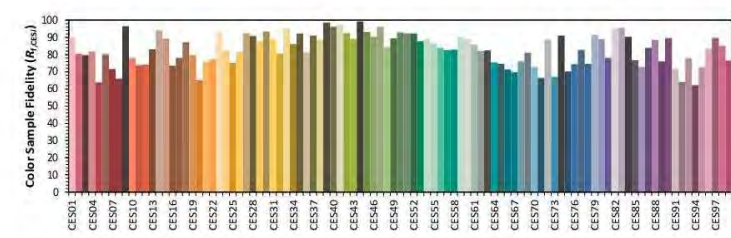
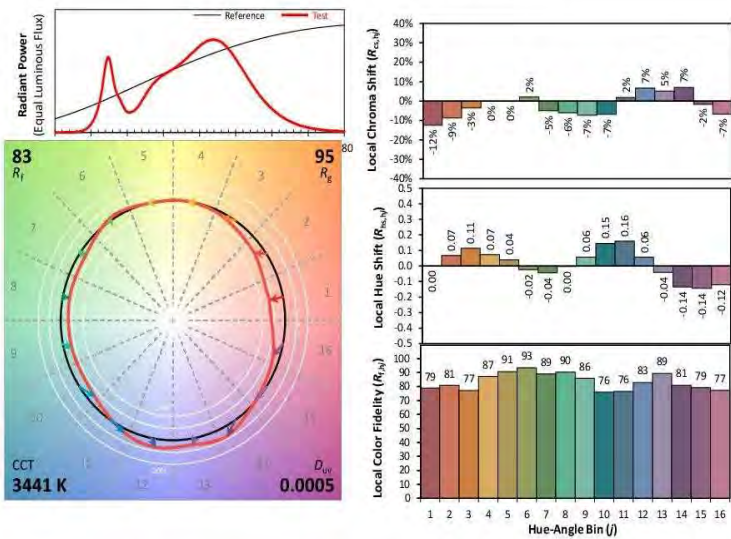
Luminous Flux (lm)	4368.96	Chrom x	0.4092
Chrom y	0.3937	Chrom u	0.2370
Chrom v	0.3420	Duv	0.0005
Chrom u'	0.2370	Chrom v'	0.5131
CCT (K)	3441	Luminous Efficacy (lm/W)	124.44
Ra	82	R1	80.0
R2	89.0	R3	96.0
R4	80.0	R5	80.0
R6	85.0	R7	85.0
R8	61.0	R9	5.0
R10	74.0	R11	78.0
R12	61.0	R13	82.0
R14	98.0	R15	73.0
Rf	83	Rg	95
Rcs,h1	-12%		

# Integrating Sphere Test (Cont'd)

## TM-30 Report

### ANSI/IES TM-30-18 Color Rendition Report

Source: STW8A2PD-XX      Manufacturer: P.Q.L., Inc.  
 Date: 2/22/2023      Model: 55099-35W-35K



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.4092      y 0.3937      u' 0.2370      v' 0.5131

CIE 13.3-1995 (CRI)  
 $R_a$  82  
 $R_g$  5

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

### Integrating Sphere Test

<b>Model No.</b>	55099-35W-40K	<b>Sample ID.</b>	5786149
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45

#### Test Method

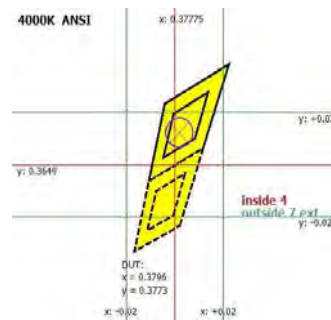
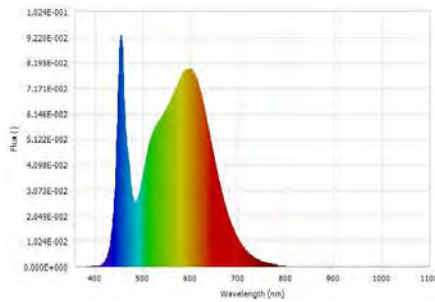
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.  
 2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C. The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.  
 3.The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using 4π geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

#### Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.4	120.11	60	0.3059	34.106	0.9282	Horizontal

#### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
4026	84	15.0	0.0005	4720.8	138.42	N/A



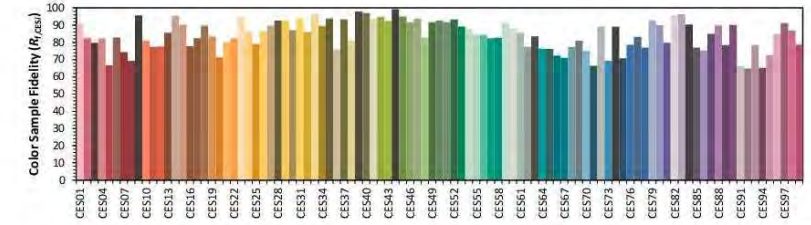
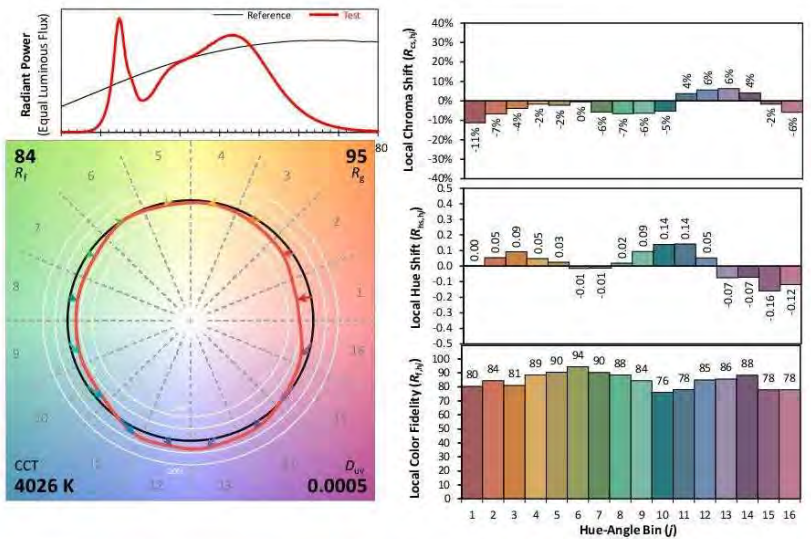
Luminous Flux (lm)	4720.8	Chrom x	0.3796
Chrom y	0.3773	Chrom u	0.2244
Chrom v	0.3345	Duv	0.0005
Chrom u'	0.2244	Chrom v'	0.5017
CCT (K)	4026	Luminous Efficacy (lm/W)	138.42
Ra	84	R1	83.0
R2	91.0	R3	96.0
R4	82.0	R5	83.0
R6	87.0	R7	86.0
R8	66.0	R9	15.0
R10	78.0	R11	81.0
R12	61.0	R13	85.0
R14	98.0	R15	77.0
Rf	84	Rg	95
Rcs,h1	-11%		

# Integrating Sphere Test (Cont'd)

## TM-30 Report

### ANSI/IES TM-30-18 Color Rendition Report

Source: STW8A2PD-XX      Manufacturer: P.Q.L., Inc.  
 Date: 2/22/2023      Model: 55099-35W-40K



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.3796	CIE 13.3-1995 (CRI)
y	0.3773	
u'	0.2244	
v'	0.5017	

$R_a$	84
$R_g$	15

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### Integrating Sphere Test

<b>Model No.</b>	55099-35W-50K		<b>Sample ID.</b>	5786149
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45	

#### Test Method

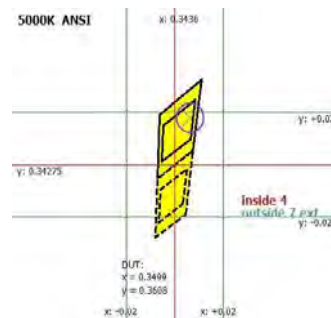
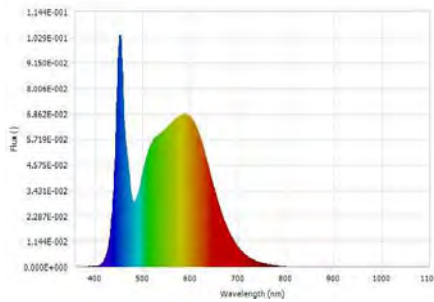
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.  
 2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C. The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.  
 3.The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using 4π geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

#### Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.4	120.13	60	0.3147	35.289	0.9336	Horizontal

#### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
4858	85	15.0	0.0027	4425.85	125.42	N/A



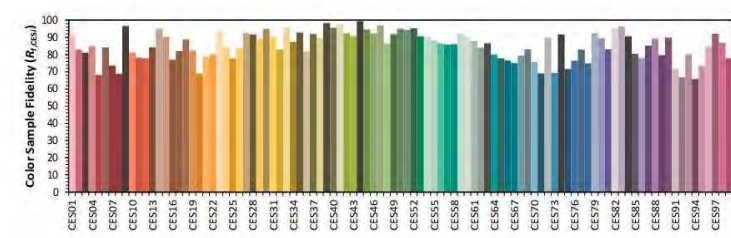
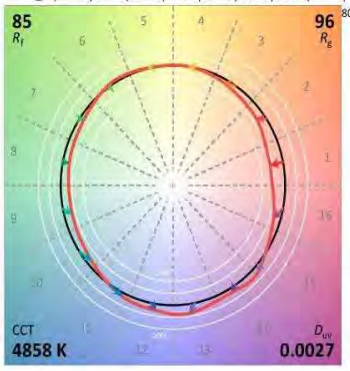
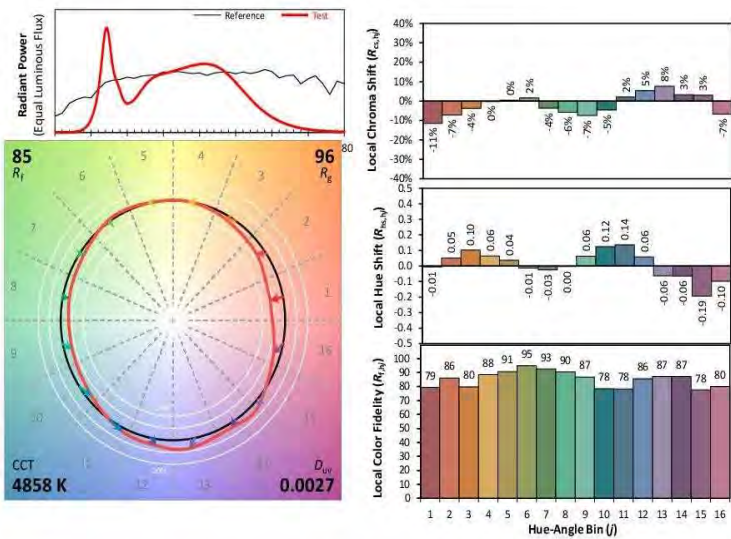
Luminous Flux (lm)	4425.85	Chrom x	0.3499
Chrom y	0.3608	Chrom u	0.2111
Chrom v	0.3265	Duv	0.0027
Chrom u'	0.2111	Chrom v'	0.4898
CCT (K)	4858	Luminous Efficacy (lm/W)	125.42
Ra	85	R1	83.0
R2	90.0	R3	95.0
R4	83.0	R5	83.0
R6	85.0	R7	88.0
R8	69.0	R9	15.0
R10	76.0	R11	83.0
R12	60.0	R13	85.0
R14	97.0	R15	77.0
Rf	85	Rg	96
Rcs,h1	-11%		

# Integrating Sphere Test (Cont'd)

## TM-30 Report

### ANSI/IES TM-30-18 Color Rendition Report

Source: STW8A2PD-XX      Manufacturer: P.Q.L., Inc.  
 Date: 2/22/2023      Model: 55099-35W-50K



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.3499	CIE 13.3-1995 (CRI)
y	0.3608	
u'	0.2111	
v'	0.4898	

$R_a$  85  
 $R_g$  15

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

### Integrating Sphere Test

<b>Model No.</b>	55099-25W-35K	<b>Sample ID.</b>	5786149
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45

#### Test Method

1. The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.

2. Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C. The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.

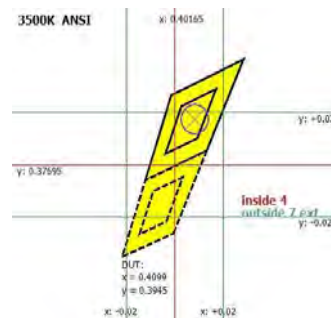
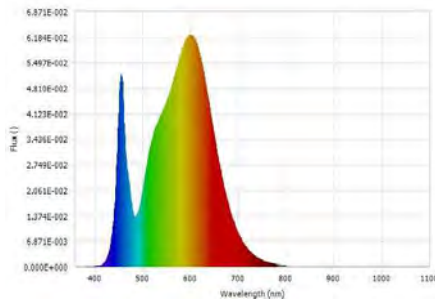
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using 4π geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

#### Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.5	120.05	60	0.2120	25.151	0.9884	Horizontal

#### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3433	82	6.0	0.0007	3412.14	135.67	N/A



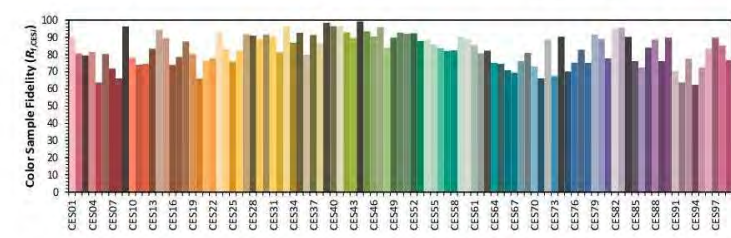
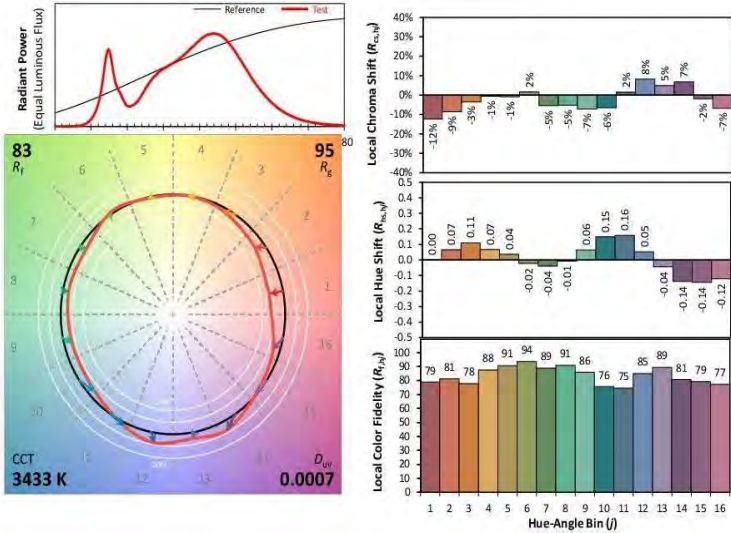
Luminous Flux (lm)	3412.14	Chrom x	0.4099
Chrom y	0.3945	Chrom u	0.2371
Chrom v	0.3423	Duv	0.0007
Chrom u'	0.2371	Chrom v'	0.5135
CCT (K)	3433	Luminous Efficacy (lm/W)	135.67
Ra	82	R1	80.0
R2	89.0	R3	96.0
R4	80.0	R5	80.0
R6	85.0	R7	85.0
R8	61.0	R9	6.0
R10	74.0	R11	78.0
R12	60.0	R13	83.0
R14	98.0	R15	74.0
Rf	83	Rg	95
Rcs,h1	-12%		

# Integrating Sphere Test (Cont'd)

## TM-30 Report

### ANSI/IES TM-30-18 Color Rendition Report

Source: STW8A2PD-XX      Manufacturer: P.Q.L., Inc.  
 Date: 2/25/2023      Model: 55099-25W-35K



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.4099
y	0.3945
u'	0.2371
v'	0.5135

CIE 13.3-1995 (CRI)	
$R_a$	82
$R_g$	6

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

### Integrating Sphere Test

<b>Model No.</b>	55099-18W-35K	<b>Sample ID.</b>	5786149
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45

#### Test Method

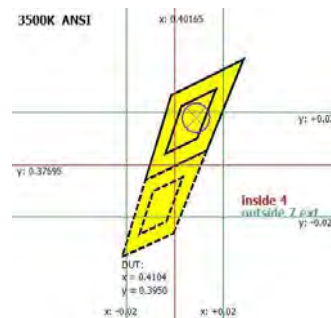
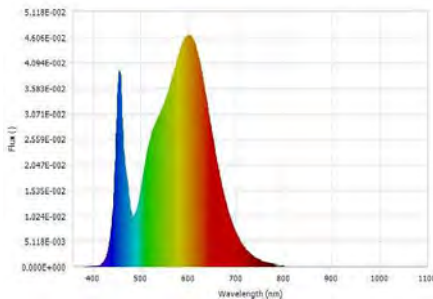
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.  
 2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C. The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.  
 3.The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using 4π geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

#### Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.5	120.03	60	0.1500	17.637	0.9798	Horizontal

#### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3427	82	7.0	0.0008	2536.55	143.82	N/A



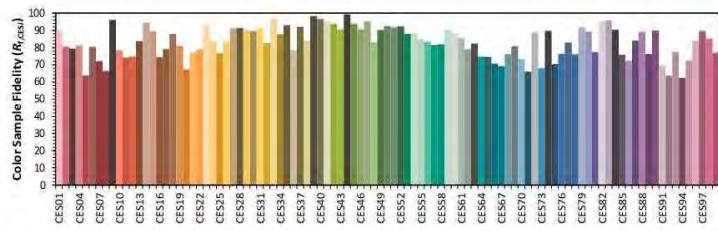
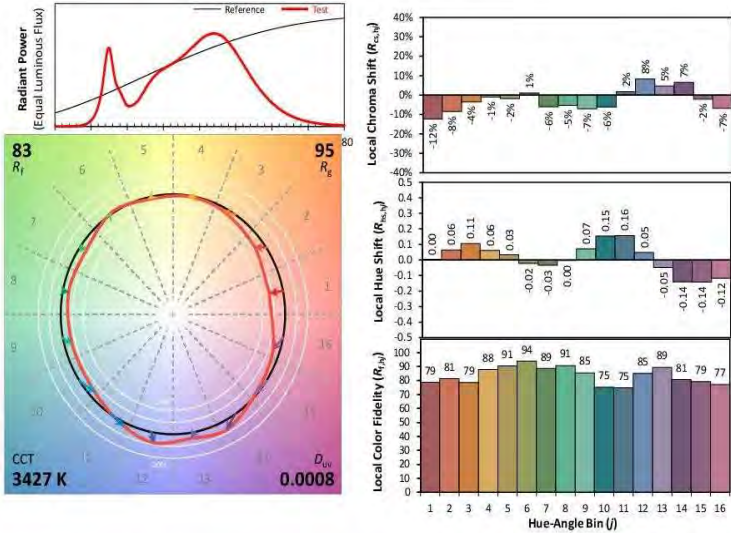
Luminous Flux (lm)	2536.55	Chrom x	0.4104
Chrom y	0.3950	Chrom u	0.2372
Chrom v	0.3425	Duv	0.0008
Chrom u'	0.2372	Chrom v'	0.5138
CCT (K)	3427	Luminous Efficacy (lm/W)	143.82
Ra	82	R1	81.0
R2	90.0	R3	96.0
R4	80.0	R5	80.0
R6	86.0	R7	85.0
R8	61.0	R9	7.0
R10	75.0	R11	78.0
R12	60.0	R13	83.0
R14	98.0	R15	74.0
Rf	83	Rg	95
Rcs,h1	-12%		

# Integrating Sphere Test (Cont'd)

## TM-30 Report

### ANSI/IES TM-30-18 Color Rendition Report

Source: STW8A2PD-XX      Manufacturer: P.Q.L., Inc.  
 Date: 2/23/2023      Model: 55099-18W-35K



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.4104	CIE 13.3-1995 (CRI)
y	0.3950	
u'	0.2372	
v'	0.5138	

$R_a$  82  
 $R_g$  7

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

## Goniophotometer Test

<b>Model No.</b>	55099-35W-35K	<b>Sample ID.</b>	5786149
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45

### Test Method

- 1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
- 2.Photometric parameters were measured using a type C goniophotometer and software.
- 3.The ambient temperature shall be maintained at 25° C ± 1° C, measured at a point not more than 1 m from the sample and at the same height as the sample. The reference standard lamp is rated current 3.8581A, 3.8558A, 3.8466A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.
- 4.The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonallumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals. Photometric distance was more than five times of the largest dimension of the test SSL product.

### Goniophotometer Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.1	120.08	60	0.3075	35.26	0.9551	6.57%	Horizontal

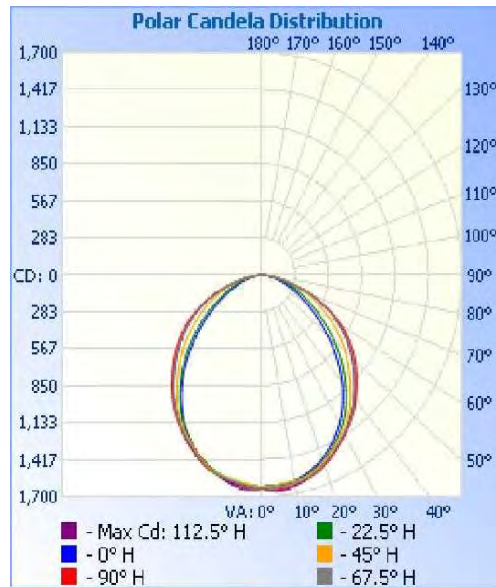
### Test Results

Luminous Flux (lm)	Zonal Lumen Requirement 1	Zonal Lumen Requirement 2	Beam Angle (50%)		Luminous Efficacy (lm/W)
	0°-60°	N/A	Horizontal Spread	Vertical Spread	
4300.9	81.50%	N/A	114.3	95.2	121.98

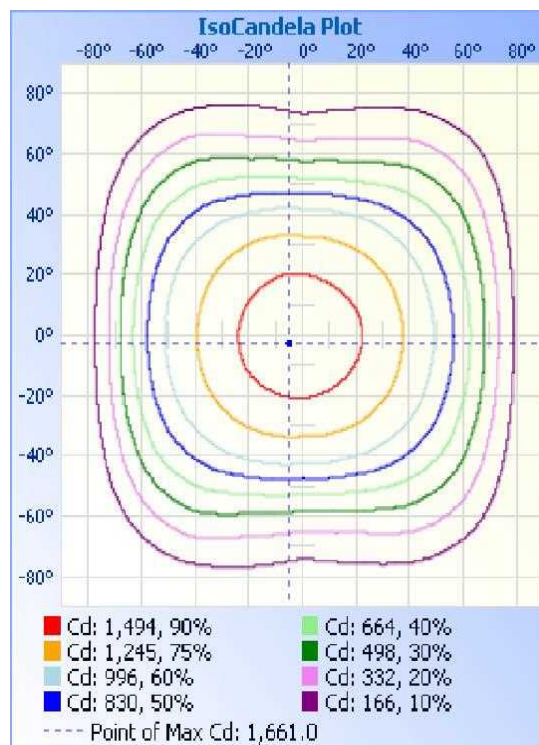
Backlight	Uplight	Glare
N/A	N/A	N/A

UGR		Spacing Criteria (0-180°)	Spacing Criteria (90°-270°)
Crosswise	Endwise		
19.0	21.4	1.22	1.30

**Goniophotometer Test (Cont'd)**  
Polar Candela Distribution



IsoCandela Plot





**Goniophotometer Test (Cont'd)**  
Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1264.0	29.40%
0-40	2052.0	47.70%
0-60	3506.7	81.50%
60-90	781.8	18.20%
70-100	303.6	7.10%
90-120	3.8	0.10%
0-90	4288.5	99.70%
90-180	12.4	0.30%
0-180	4300.9	100.00%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	39.1	0.90%	90-95	0.8	0.00%
5-10	116.1	2.70%	95-100	0.7	0.00%
10-15	189.0	4.40%	100-105	0.6	0.00%
15-20	254.6	5.90%	105-110	0.6	0.00%
20-25	310.3	7.20%	110-115	0.5	0.00%
25-30	354.9	8.30%	115-120	0.5	0.00%
30-35	386.4	9.00%	120-125	0.6	0.00%
35-40	401.6	9.30%	125-130	0.7	0.00%
40-45	399.8	9.30%	130-135	0.8	0.00%
45-50	384.1	8.90%	135-140	0.9	0.00%
50-55	355.4	8.30%	140-145	0.9	0.00%
55-60	315.4	7.30%	145-150	1.0	0.00%
60-65	267.4	6.20%	150-155	0.9	0.00%
65-70	212.3	4.90%	155-160	0.8	0.00%
70-75	153.0	3.60%	160-165	0.8	0.00%
75-80	93.8	2.20%	165-170	0.7	0.00%
80-85	45.3	1.10%	170-175	0.4	0.00%
85-90	10.0	0.20%	175-180	0.1	0.00%

**Goniophotometer Test (Cont'd)**  
**Intensity Data(cd)**

Candela Table - Type C

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
0	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630
1	1622	1621	1625	1647	1647	1640	1631	1625	1624	1623	1626	1645	1648	1641	1631	1625	1622
2	1622	1618	1625	1646	1650	1649	1638	1631	1624	1619	1624	1644	1648	1645	1637	1629	1622
3	1622	1618	1622	1644	1651	1655	1645	1634	1626	1615	1619	1639	1645	1648	1640	1631	1623
4	1622	1614	1618	1641	1651	1661	1652	1638	1624	1611	1612	1632	1640	1651	1645	1633	1622
5	1621	1615	1613	1636	1648	1661	1655	1638	1622	1609	1604	1625	1635	1651	1646	1634	1621
6	1618	1613	1609	1632	1646	1661	1654	1638	1621	1608	1599	1619	1630	1649	1645	1633	1620
7	1615	1612	1606	1629	1645	1659	1654	1636	1618	1606	1594	1613	1626	1644	1644	1631	1616
8	1611	1611	1604	1626	1642	1652	1651	1633	1615	1602	1590	1608	1621	1637	1637	1626	1612
9	1607	1608	1604	1622	1640	1646	1644	1628	1609	1599	1586	1602	1616	1627	1630	1620	1608
10	1601	1605	1602	1620	1633	1637	1637	1622	1604	1595	1584	1597	1608	1617	1621	1613	1602
11	1597	1600	1602	1615	1628	1629	1628	1614	1597	1589	1582	1591	1601	1608	1611	1604	1596
12	1587	1594	1601	1612	1622	1620	1618	1605	1589	1582	1580	1587	1595	1598	1600	1594	1588
13	1578	1588	1598	1610	1617	1612	1608	1596	1580	1574	1576	1584	1588	1588	1588	1584	1579
14	1569	1579	1593	1607	1610	1601	1596	1585	1571	1564	1570	1580	1579	1578	1576	1573	1571
15	1558	1571	1585	1602	1602	1592	1583	1573	1560	1555	1562	1574	1571	1567	1563	1560	1561
16	1547	1561	1577	1596	1595	1581	1571	1560	1550	1544	1551	1567	1563	1556	1548	1547	1549
17	1536	1550	1565	1587	1588	1572	1558	1547	1537	1532	1539	1558	1555	1544	1534	1532	1537
18	1525	1540	1553	1574	1578	1561	1546	1533	1524	1520	1527	1545	1546	1533	1521	1519	1524
19	1513	1528	1539	1561	1569	1551	1534	1521	1511	1507	1512	1530	1536	1523	1509	1505	1513
20	1500	1516	1527	1545	1556	1541	1523	1508	1498	1495	1498	1515	1524	1511	1495	1491	1499
25	1418	1444	1456	1475	1487	1479	1463	1436	1420	1420	1425	1439	1449	1446	1432	1415	1420
30	1321	1353	1382	1405	1414	1402	1383	1347	1319	1328	1348	1365	1374	1362	1349	1323	1320
35	1198	1244	1292	1326	1337	1318	1285	1235	1198	1215	1251	1279	1288	1274	1247	1211	1200
40	1059	1110	1173	1222	1243	1225	1175	1105	1056	1077	1126	1168	1187	1174	1133	1080	1059
45	903	966	1051	1115	1139	1114	1052	962	896	933	1000	1057	1079	1058	1008	936	901
50	738	816	930	1013	1037	1004	918	806	733	782	875	950	972	942	870	783	740
55	580	662	801	897	922	887	787	649	574	628	739	829	857	826	738	626	580
60	441	518	665	762	787	757	657	510	436	486	608	704	732	702	612	489	441
65	325	394	530	611	620	608	526	390	320	364	480	566	585	567	487	370	326
70	229	291	401	446	445	443	400	288	224	264	361	418	431	422	368	271	229
75	149	207	273	258	236	258	272	205	146	184	249	264	256	268	256	190	150
80	83	129	149	128	117	126	146	125	79	112	140	136	131	139	145	117	83
85	32	54	51	42	38	40	48	50	30	45	50	46	45	49	55	49	32
90	3	2	2	2	2	2	2	1	2	2	2	2	2	2	2	3	3
95	1	1	2	2	1	2	1	1	1	1	1	2	1	2	2	1	1
100	1	1	2	1	1	2	1	2	1	1	1	2	1	1	1	1	1
105	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1
110	1	0	1	1	1	2	1	1	1	1	1	1	1	2	1	1	1
115	0	0	1	1	1	2	1	1	1	1	1	1	1	2	1	1	1
120	1	1	2	1	1	2	2	1	2	1	1	2	1	1	1	1	1
125	1	1	2	2	1	2	2	1	2	1	1	1	1	2	2	2	1
130	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
135	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
140	3	2	2	2	2	3	2	3	2	2	2	3	3	3	3	2	2
145	3	3	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3
150	3	3	3	4	3	3	4	4	3	3	4	4	4	4	3	3	3
155	3	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4	3
160	4	5	4	5	4	4	4	4	4	5	4	4	4	4	5	5	4
165	5	5	6	6	5	5	5	5	5	5	6	5	5	6	5	5	5
170	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
175	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
180	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

## Goniophotometer Test

<b>Model No.</b>	55099-35W-50K	<b>Sample ID.</b>	5786149
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45

### Test Method

- 1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
- 2.Photometric parameters were measured using a type C goniophotometer and software.
- 3.The ambient temperature shall be maintained at 25° C ± 1° C, measured at a point not more than 1 m from the sample and at the same height as the sample. The reference standard lamp is rated current 3.8581A, 3.8558A, 3.8466A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.
- 4.The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonallumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals. Photometric distance was more than five times of the largest dimension of the test SSL product.

### Goniophotometer Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.5	120.10	60	0.3083	35.40	0.9559	6.45%	Horizontal

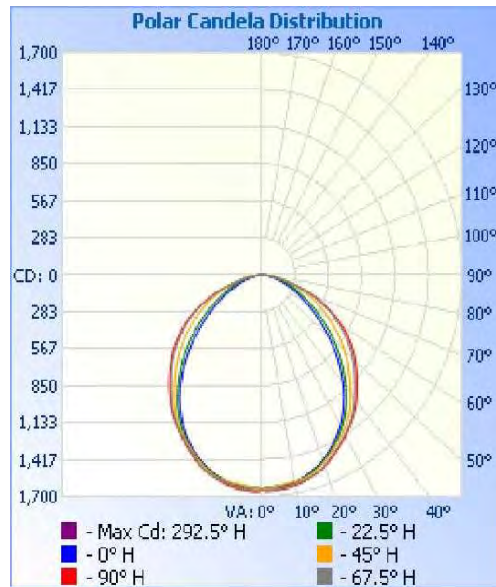
### Test Results

Luminous Flux (lm)	Zonal Lumen Requirement 1	Zonal Lumen Requirement 2	Beam Angle (50%)		Luminous Efficacy (lm/W)
	0°-60°	N/A	Horizontal Spread	Vertical Spread	
4367.9	81.50%	N/A	115.3	95.4	123.39

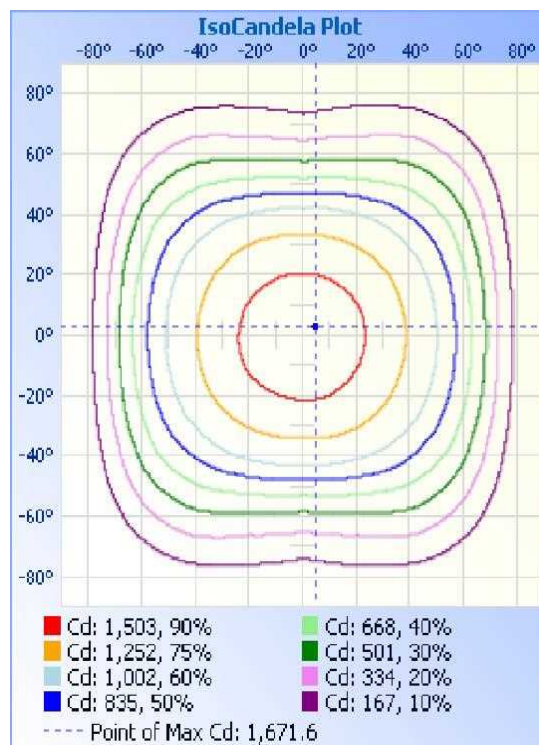
Backlight	Uplight	Glare
N/A	N/A	N/A

UGR		Spacing Criteria (0-180°)	Spacing Criteria (90°-270°)
Crosswise	Endwise		
19.0	21.5	1.22	1.30

**Goniophotometer Test (Cont'd)**  
**Polar Candela Distribution**



**IsoCandela Plot**



**Goniophotometer Test (Cont'd)**  
**Zonal Lumen Summary**

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1278.1	29.30%
0-40	2077.5	47.60%
0-60	3557.7	81.40%
60-90	797.6	18.30%
70-100	309.6	7.10%
90-120	3.8	0.10%
0-90	4355.3	99.70%
90-180	12.7	0.30%
0-180	4367.9	100.00%

**Lumens Per Zone**

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	39.4	0.90%	90-95	0.8	0.00%
5-10	117.1	2.70%	95-100	0.7	0.00%
10-15	190.9	4.40%	100-105	0.6	0.00%
15-20	257.3	5.90%	105-110	0.6	0.00%
20-25	314.0	7.20%	110-115	0.6	0.00%
25-30	359.4	8.20%	115-120	0.6	0.00%
30-35	391.7	9.00%	120-125	0.7	0.00%
35-40	407.7	9.30%	125-130	0.7	0.00%
40-45	406.1	9.30%	130-135	0.9	0.00%
45-50	390.5	8.90%	135-140	0.9	0.00%
50-55	362.2	8.30%	140-145	0.9	0.00%
55-60	321.5	7.40%	145-150	0.9	0.00%
60-65	272.6	6.20%	150-155	0.9	0.00%
65-70	217.0	5.00%	155-160	0.9	0.00%
70-75	156.3	3.60%	160-165	0.8	0.00%
75-80	95.7	2.20%	165-170	0.7	0.00%
80-85	46.2	1.10%	170-175	0.4	0.00%
85-90	9.8	0.20%	175-180	0.1	0.00%

## Goniophotometer Test (Cont'd)

### Intensity Data(cd)

Candela Table - Type C

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
0	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642
1	1634	1633	1637	1658	1660	1652	1641	1638	1636	1635	1641	1661	1662	1654	1644	1638	1636
2	1634	1630	1635	1656	1660	1657	1649	1640	1636	1632	1638	1658	1664	1662	1651	1642	1636
3	1634	1627	1633	1654	1659	1662	1654	1646	1636	1630	1635	1657	1663	1667	1657	1645	1635
4	1634	1624	1627	1651	1658	1668	1660	1647	1636	1626	1630	1652	1660	1671	1661	1648	1635
5	1633	1622	1621	1645	1654	1670	1663	1649	1635	1626	1624	1646	1658	1672	1665	1649	1634
6	1631	1620	1617	1641	1651	1669	1662	1648	1633	1624	1619	1641	1654	1670	1664	1648	1633
7	1628	1619	1612	1636	1647	1666	1661	1646	1631	1622	1614	1636	1651	1667	1663	1646	1630
8	1624	1616	1610	1632	1646	1660	1658	1643	1627	1622	1612	1631	1648	1661	1659	1644	1627
9	1620	1614	1607	1627	1641	1654	1652	1637	1623	1619	1610	1626	1643	1652	1654	1639	1623
10	1614	1611	1606	1624	1636	1645	1646	1631	1617	1616	1609	1622	1636	1643	1646	1632	1617
11	1608	1606	1604	1620	1630	1636	1637	1625	1611	1610	1607	1617	1631	1634	1636	1624	1610
12	1601	1601	1604	1616	1625	1628	1627	1617	1604	1605	1606	1613	1623	1625	1624	1615	1602
13	1591	1592	1601	1615	1618	1620	1616	1607	1595	1597	1604	1610	1615	1614	1613	1605	1594
14	1581	1585	1596	1612	1611	1611	1604	1596	1586	1589	1598	1607	1608	1605	1602	1595	1585
15	1570	1575	1591	1607	1604	1600	1592	1584	1576	1580	1590	1603	1599	1593	1588	1581	1575
16	1559	1567	1580	1601	1597	1590	1579	1572	1565	1569	1580	1595	1591	1582	1574	1570	1563
17	1549	1555	1571	1593	1589	1580	1568	1560	1553	1559	1569	1585	1582	1571	1560	1556	1552
18	1538	1544	1558	1582	1581	1570	1555	1546	1540	1548	1556	1573	1574	1560	1548	1542	1540
19	1526	1532	1544	1569	1574	1560	1543	1533	1529	1536	1543	1560	1563	1548	1536	1529	1527
20	1513	1520	1533	1554	1564	1550	1532	1519	1516	1524	1529	1543	1551	1538	1523	1515	1513
25	1431	1447	1461	1482	1494	1491	1471	1447	1437	1451	1455	1466	1475	1471	1460	1441	1434
30	1334	1356	1387	1414	1424	1414	1392	1357	1338	1362	1380	1394	1398	1387	1376	1350	1334
35	1213	1246	1295	1334	1345	1328	1294	1245	1217	1248	1284	1309	1316	1301	1275	1238	1216
40	1071	1110	1174	1226	1250	1233	1181	1113	1075	1112	1162	1200	1217	1204	1163	1106	1072
45	912	962	1047	1116	1142	1118	1053	966	913	964	1037	1092	1111	1089	1037	962	912
50	748	810	924	1011	1038	1004	917	809	749	812	913	987	1005	977	904	809	751
55	588	660	790	892	925	887	781	650	589	656	781	867	890	860	773	652	589
60	447	510	652	760	792	757	648	506	445	510	646	735	756	731	644	510	446
65	330	384	519	613	634	611	518	385	327	385	514	591	600	589	516	392	331
70	231	283	392	454	466	453	392	282	228	282	386	432	436	433	391	289	232
75	151	198	267	276	262	275	267	196	148	199	264	259	242	264	270	206	152
80	85	122	151	139	131	138	148	119	80	122	146	131	123	134	151	128	85
85	34	51	53	45	42	44	44	50	48	30	49	49	43	41	45	53	33
90	3	2	2	2	2	2	1	1	1	2	2	2	2	2	2	2	3
95	1	2	2	2	1	2	1	1	1	1	1	2	2	1	1	1	1
100	1	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1	1
105	0	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
110	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1	1	1
115	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1
120	1	1	1	2	1	1	1	2	2	1	2	2	1	2	1	2	1
125	1	1	2	2	1	1	1	2	1	2	2	2	1	2	2	2	1
130	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2
135	2	2	2	3	3	3	2	2	2	2	2	2	3	2	2	2	2
140	2	3	2	3	2	2	2	3	3	2	3	3	2	3	2	3	3
145	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3
150	3	3	4	4	3	3	3	4	3	4	3	3	3	3	3	4	3
155	3	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4
160	4	5	4	5	4	5	4	5	5	4	4	4	4	4	5	5	4
165	5	5	5	6	6	5	5	6	6	5	5	5	5	6	5	5	6
170	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
175	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
180	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

### THD and PF Test

<b>Model No.</b>	55099-35W-35K	<b>Sample ID.</b>	5786149
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45

#### Test Method

1. The samples were tested according to the ANSI C82.77-10-2014.
2. The ambient temperature condition was maintained at 25 °C ± 1 °C. The sample measurement was made using a digital power meter and power supply. The sample was operated at rated voltage and stabilized before measurement. The total harmonic distortion were calculated from the digital power meter.

#### Test Results

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.1	120.08	60	0.3075	35.26	0.9551	6.57%	Horizontal
25.1	277.10	60	0.1295	34.40	0.9618	13.93%	Horizontal

### THD and PF Test

<b>Model No.</b>	55099-35W-40K	<b>Sample ID.</b>	5786149
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45

#### Test Method

1. The samples were tested according to the ANSI C82.77-10-2014.
2. The ambient temperature condition was maintained at 25 °C ± 1 °C. The sample measurement was made using a digital power meter and power supply. The sample was operated at rated voltage and stabilized before measurement. The total harmonic distortion were calculated from the digital power meter.

#### Test Results

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.1	120.11	60	0.2955	34.11	0.9600	5.86%	Horizontal
25.1	277.09	60	0.1251	33.28	0.9600	14.21%	Horizontal



### THD and PF Test

<b>Model No.</b>	55099-35W-50K	<b>Sample ID.</b>	5786149
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45

#### Test Method

1. The samples were tested according to the ANSI C82.77-10-2014.
2. The ambient temperature condition was maintained at 25 °C ± 1 °C. The sample measurement was made using a digital power meter and power supply. The sample was operated at rated voltage and stabilized before measurement. The total harmonic distortion were calculated from the digital power meter.

#### Test Results

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.1	120.09	60	0.3083	35.40	0.9559	6.44%	Horizontal
25.1	277.08	60	0.1299	34.62	0.9621	13.91%	Horizontal

### THD and PF Test

<b>Model No.</b>	55099-25W-35K	<b>Sample ID.</b>	5786149
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45

#### Test Method

1. The samples were tested according to the ANSI C82.77-10-2014.
2. The ambient temperature condition was maintained at 25 °C ± 1 °C. The sample measurement was made using a digital power meter and power supply. The sample was operated at rated voltage and stabilized before measurement. The total harmonic distortion were calculated from the digital power meter.

#### Test Results

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.1	120.02	60	0.2103	25.07	0.9939	6.67%	Horizontal
25.1	277.11	60	0.0974	25.38	0.9405	14.63%	Horizontal

### THD and PF Test

<b>Model No.</b>	55099-18W-35K	<b>Sample ID.</b>	5786149
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45

#### Test Method

1. The samples were tested according to the ANSI C82.77-10-2014.
2. The ambient temperature condition was maintained at 25 °C ± 1 °C. The sample measurement was made using a digital power meter and power supply. The sample was operated at rated voltage and stabilized before measurement. The total harmonic distortion were calculated from the digital power meter.

#### Test Results

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.1	120.04	60	0.1476	17.55	0.9904	8.48%	Horizontal
25.1	277.14	60	0.0754	18.95	0.9067	15.65%	Horizontal

## In-Situ Temperature Measurement Test

<b>Model No.</b>	55099-35W-35K	<b>Sample ID.</b>	5786149
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### Test Method

- In-Situ Temperature Measurement Test is conducted according to the UL 1598-2008, Section 14.
- The testing was conducted in a room with ambient temperature of 25 °C ± 5 °C. The apparatus construction followed those described in UL1598-2008 for normal temperature testing. Thermocouples were placed on the LED package in the locations indicated by LM-80 report. Thermocouples were placed on the LED driver case in the locations specified by the manufacture if necessary. The temperature was recorded after the lamp was operated by 7.5 hours.
- The data and photos in LM-80 test report is provided by the customer/ The data and photos in driver specification is provided by the customer.

### In-Situ Temperature Measurement Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.2	120.08	60	0.3075	35.26	0.9551	6.57%	Horizontal

### Test Results (LEDs)

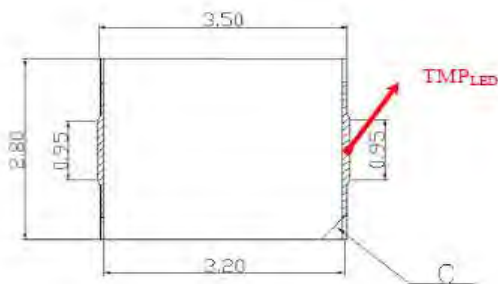
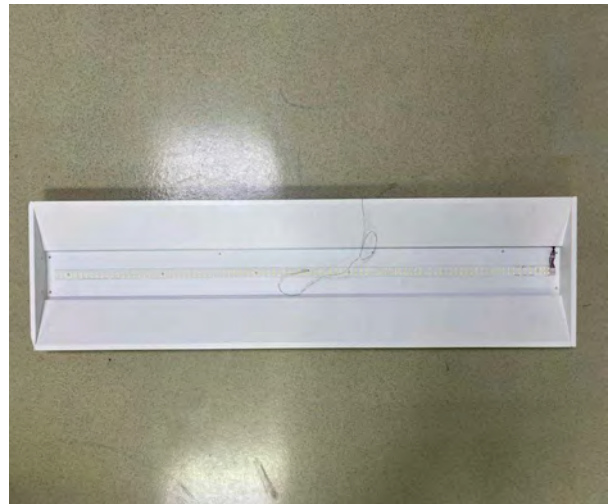
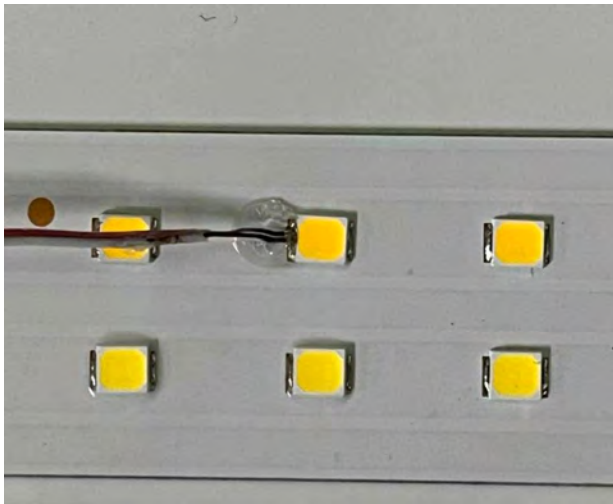
Thermocouple Location	Declared Light Source Current (mA)	Temperature for Light Source (°C)		Max Chromaticity Shift (1000-6000h)	LED Model Number	LM-80 Limit Current (mA)	LM-80 Limit Temp (°C)
		Test Result	Test Result (Correct to 25 °C)				
Ambient TEMP	N/A	24.2	25.0				
TMP of Location 1	110	43.5	44.3	0.0024	STW8A2PD-XX	200	105

### Test Results (Drivers)

Thermocouple Location	Temperature for Driver (°C)		Driver Model Number	Driver Limit Temp (°C)
	Test Result	Test Result (Correct to 25 °C)		
Ambient TEMP	24.2	25.0		
TMP of Location 1	45.3	46.1	SIF30-I0750 120-277 W D1 S1S2	90

### In-Situ Temperature Measurement Test (Cont'd)

Test Photos for Ts Point of Light Sources & Tc Point of Drivers





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