



## DesignLights Consortium Test Report

### Reference Standards

UL1598-2008

ANSI C82.77-10-2014

IES LM-79-2008

### Prepared For

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

v2285 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

55685

### Project Number

4790575900

### Report Number

4790575900\_2

### Test Date

2022-09-27~2022-09-28

### Issue Date

2022-09-29

### 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/ft)-Luminaires	IES LM-79-2008	≥375	-10%	1341.11
Zonal Lumen Requirement 1(0°-60°)	IES LM-79-2008	≥40%	-3%	74.00%
Minimum Luminaire Efficacy (lm/W)-Luminaires	IES LM-79-2008	≥115	-3%	133.67
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±245	N/A	3403
Allowable CCT (4000K)	IES LM-79-2008/ANSI C78.377-2015	3985±275	N/A	4120
Allowable CCT (5000K)	IES LM-79-2008/ANSI C78.377-2015	5029±283	N/A	5027
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±245	N/A	3396
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±245	N/A	3392
Minimum CRI	IES LM-79-2008/CIE 13.3-1995	≥80	-1	81
Minimum R9	IES LM-79-2008	≥0	-1	6.0
Minimum Rf	IES LM-79-2008	≥70	-1	82
Minimum Rg	IES LM-79-2008	≥89	-1	96
Rcs,h1	IES LM-79-2008	-12%-23%	-1%	-12%
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	0.9516
Total Harmonic Distortion (A%)	ANSI C82.77-10-2014	≤20%	5%	6.52%
In-Situ Temperature Measurement Test for LED 1 (°C)	UL1598-2008	≤105	N/A	64.9
In-Situ Temperature Measurement Test for Driver 1 (°C)	UL1598-2008	≤90	N/A	71.0
Max Chromaticity Shift (1000-6000h)	N/A	≤0.004	0.0004	0.0023
Minimum Luminaire Warranty (Years)	N/A	≥5	N/A	≥5



## Test List

Sample Received Date: 2022-09-23

Test Item	Test Date	Model Number	Tests Conducted By
Integrating Sphere Test	2022-09-27	55685-54W-35K	Yang, Gavin X
Integrating Sphere Test	2022-09-27	55685-54W-40K	Yang, Gavin X
Integrating Sphere Test	2022-09-27	55685-54W-50K	Yang, Gavin X
Integrating Sphere Test	2022-09-27	55685-46W-35K	Yang, Gavin X
Integrating Sphere Test	2022-09-27	55685-38W-35K	Yang, Gavin X
Goniophotometer Test	2022-09-28	55685-54W-35K	Yang, Gavin X
Goniophotometer Test	2022-09-28	55685-54W-50K	Yang, Gavin X
THD and PF Test	2022-09-28	55685-54W-35K	Yang, Gavin X
THD and PF Test	2022-09-28	55685-54W-40K	Yang, Gavin X
THD and PF Test	2022-09-28	55685-54W-50K	Yang, Gavin X
THD and PF Test	2022-09-28	55685-46W-35K	Yang, Gavin X
THD and PF Test	2022-09-28	55685-38W-35K	Yang, Gavin X
In-Situ Temperature Measurement Test	2022-09-28	55685-54W-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:** Direct Linear Ambient Luminaires

**Model Number:** 55685

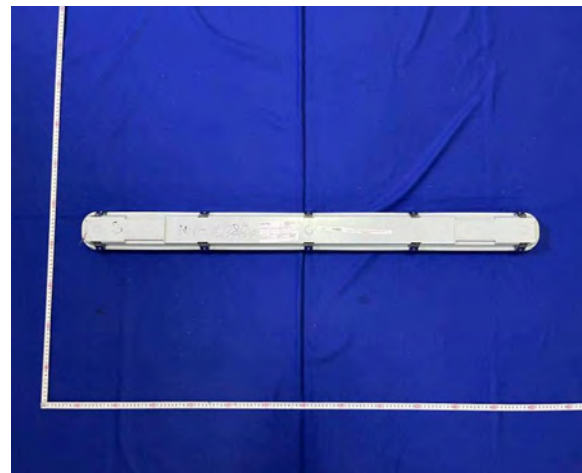
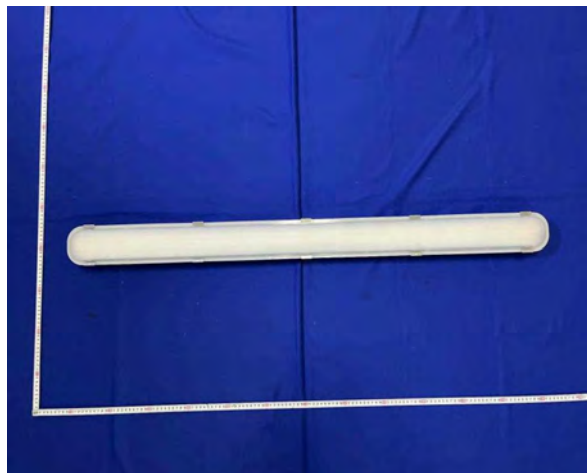
**Electrical Parameter:** 120-277V, 50/60Hz

**LED Package:** BXEN-(A)E-11M-3AA

**Dimming Information:** Continuous dimming capability

Products Scaled Value

Model Number	CCT	Luminous Flux	Power	Luminous Efficacy
55685-54W-35K	3500K	7182	54	133
55685-54W-40K	4000K	7722	54	143
55685-54W-50K	5000K	7290	54	135
55685-46W-35K	3500K	6256	46	136
55685-46W-40K	4000K	6716	46	146
55685-46W-50K	5000K	6348	46	138
55685-38W-35K	3500K	5282	38	139
55685-38W-40K	4000K	5662	38	149
55685-38W-50K	5000K	5358	38	141





## Integrating Sphere Test

<b>Model No.</b>	55685-54W-35K	<b>Sample ID.</b>	5359936
<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 assumed 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  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ . The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.

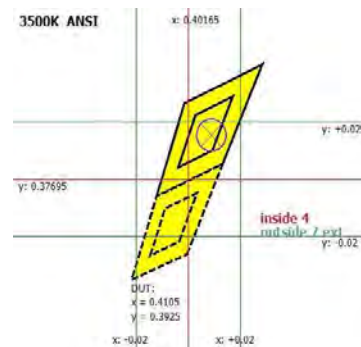
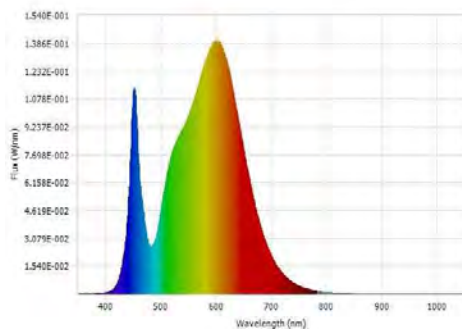
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using  $4\pi$  geometry. The self-absorption 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 ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	119.92	60	0.4690	55.878	0.9935	Horizontal

### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3403	82	6.0	-0.0003	7522.82	134.63	1880.71



Luminous Flux (lm)	7522.82	Chrom x	0.4105
Chrom y	0.3925	Chrom u	0.2383
Chrom v	0.3419	Duv	-0.0003
Chrom u'	0.2383	Chrom v'	0.5128
CCT (K)	3403	Luminous Efficacy (lm/W)	134.63
Ra	82	R1	80.0
R2	88.0	R3	95.0
R4	81.0	R5	80.0
R6	84.0	R7	85.0
R8	62.0	R9	6.0
R10	72.0	R11	79.0
R12	62.0	R13	82.0
R14	97.0	R15	74.0
Rf	83	Rg	97
Rcs,h1	-12%		



## Integrating Sphere Test (Cont'd)

### TM-30 Report

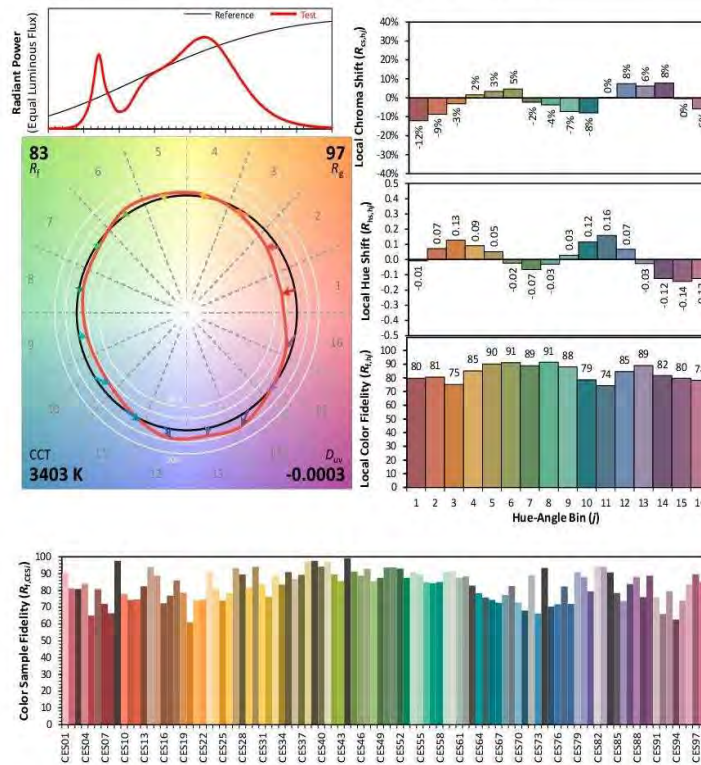
#### ANSI/IES TM-30-18 Color Rendition Report

Source: BXEN-(A)E-11M-3AA

Manufacturer: P.Q.L., Inc.

Date: 9/27/2022

Model: 55685-54W-35K



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

x 0.4105  
y 0.3925  
 $u'$  0.2383  
 $v'$  0.5128

CIE 13.3-1995  
(CRI)  
 $R_a$  82  
 $R_9$  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>	55685-54W-40K	<b>Sample ID.</b>	5359936
<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 assumed 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  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ . The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.

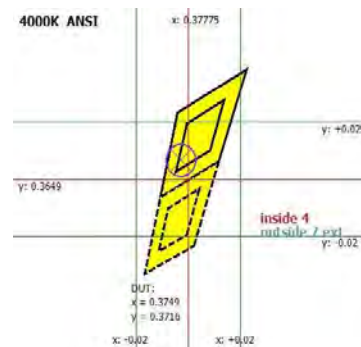
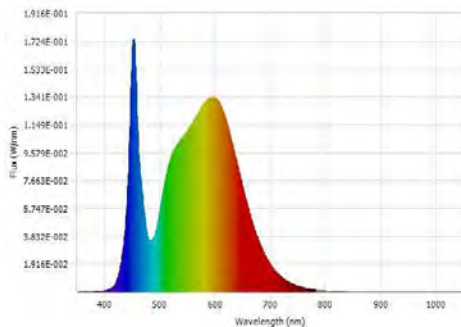
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using  $4\pi$  geometry. The self-absorption 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 ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.8	119.91	60	0.4470	53.2	0.9925	Horizontal

### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
4120	83	12.0	-0.0007	7964.1	149.70	1991.02



Luminous Flux (lm)	7964.1	Chrom x	0.3749
Chrom y	0.3716	Chrom u	0.2235
Chrom v	0.3323	Duv	-0.0007
Chrom u'	0.2235	Chrom v'	0.4985
CCT (K)	4120	Luminous Efficacy (lm/W)	149.70
Ra	83	R1	82.0
R2	88.0	R3	93.0
R4	82.0	R5	81.0
R6	83.0	R7	87.0
R8	67.0	R9	12.0
R10	71.0	R11	81.0
R12	58.0	R13	83.0
R14	96.0	R15	76.0
Rf	83	Rg	96
Rcs,h1	-12%		



## Integrating Sphere Test (Cont'd)

### TM-30 Report

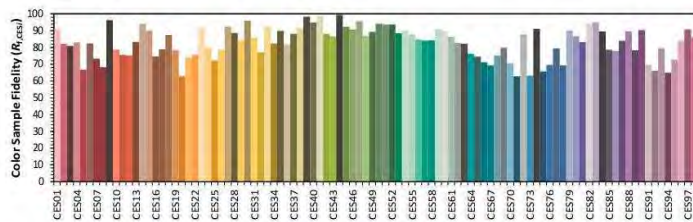
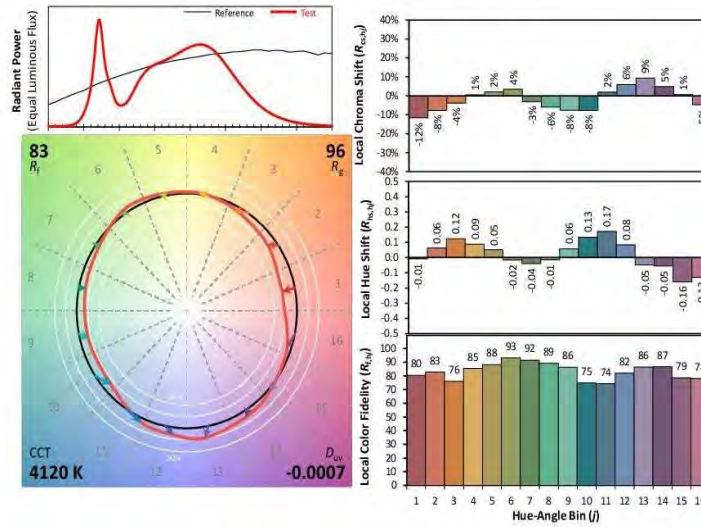
#### ANSI/IES TM-30-18 Color Rendition Report

Source: BXEN-(A)E-11M-3AA

Manufacturer: P.Q.L., Inc.

Date: 9/27/2022

Model: 55685-54W-40K



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

x 0.3749  
 y 0.3716  
 u' 0.2235  
 v' 0.4985

CIE 13.3-1995  
 (CRI)  
 $R_a$  83  
 $R_9$  12

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>	55685-54W-50K	<b>Sample ID.</b>	5359936
<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 assumed 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  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ . The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.

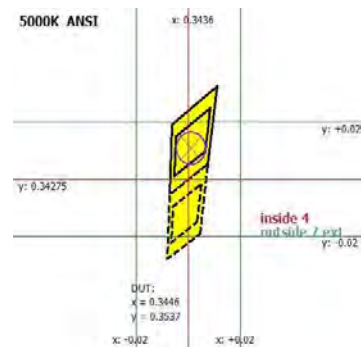
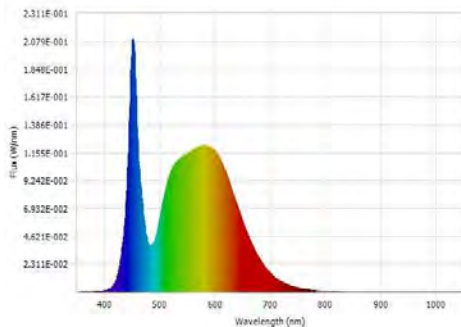
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using  $4\pi$  geometry. The self-absorption 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 ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	119.92	60	0.4659	55.52	0.9934	Horizontal

### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
5027	81	6.0	0.0012	7776.09	140.06	1994.02



Luminous Flux (lm)	7776.09	Chrom x	0.3446
Chrom y	0.3537	Chrom u	0.2103
Chrom v	0.3237	Duv	0.0012
Chrom u'	0.2103	Chrom v'	0.4856
CCT (K)	502	Luminous Efficacy (lm/W)	140.06
Ra	81	R1	80.0
R2	86.0	R3	89.0
R4	82.0	R5	80.0
R6	80.0	R7	86.0
R8	67.0	R9	6.0
R10	65.0	R11	81.0
R12	57.0	R13	81.0
R14	94.0	R15	75.0
Rf	82	Rg	97
Rcs,h1	-12%		



## Integrating Sphere Test (Cont'd)

### TM-30 Report

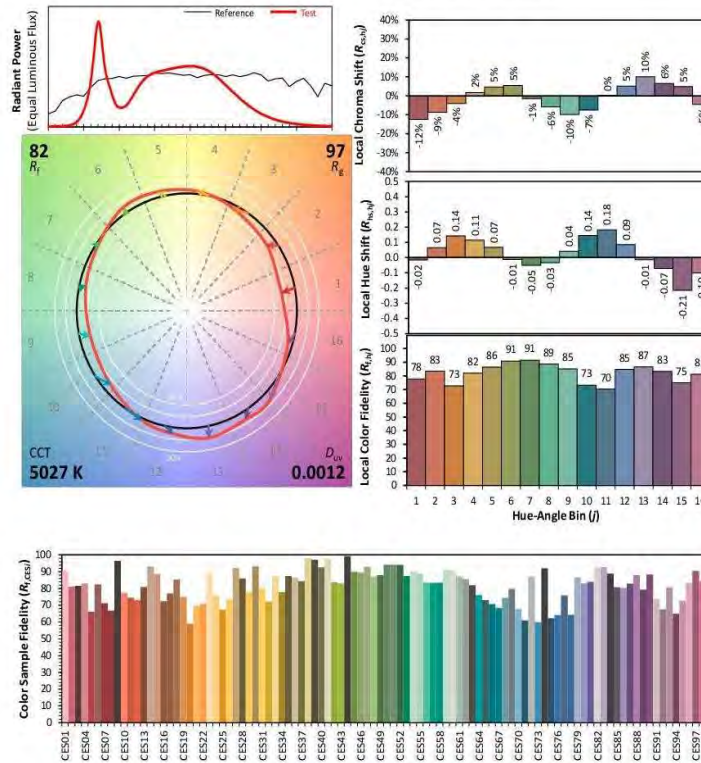
#### ANSI/IES TM-30-18 Color Rendition Report

Source: BXEN-(A)E-11M-3AA

Manufacturer: P.Q.L., Inc.

Date: 9/27/2022

Model: 55685-54W-50K



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

x 0.3446  
 y 0.3537  
 u' 0.2103  
 v' 0.4856

CIE 13.3-1995  
 (CRI)  
 $R_a$  81  
 $R_9$  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>	55685-46W-35K	<b>Sample ID.</b>	5359936
<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 assumed 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  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ . The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.

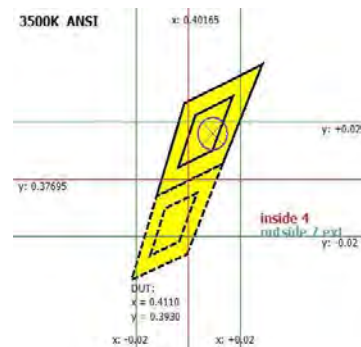
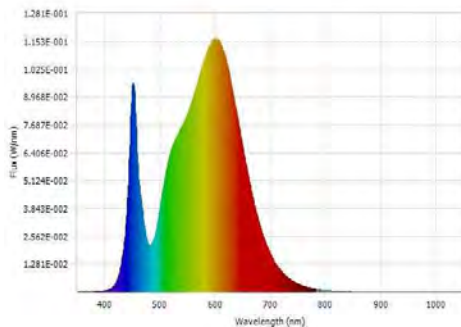
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using  $4\pi$  geometry. The self-absorption 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 ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	120.06	60	0.3735	44.497	0.9923	Horizontal

### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3396	82	7.0	-0.0002	6255.66	140.59	1563.92



Luminous Flux (lm)	6255.66	Chrom x	0.4110
Chrom y	0.3930	Chrom u	0.2385
Chrom v	0.3420	Duv	-0.0002
Chrom u'	0.2385	Chrom v'	0.5130
CCT (K)	3396	Luminous Efficacy (lm/W)	140.59
Ra	82	R1	80.0
R2	88.0	R3	95.0
R4	81.0	R5	80.0
R6	84.0	R7	85.0
R8	62.0	R9	7.0
R10	73.0	R11	80.0
R12	62.0	R13	82.0
R14	97.0	R15	74.0
Rf	83	Rg	97
Rcs,h1	-12%		



## Integrating Sphere Test (Cont'd)

### TM-30 Report

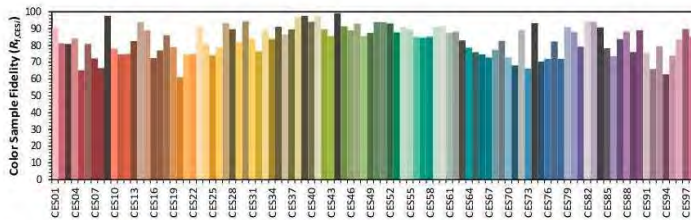
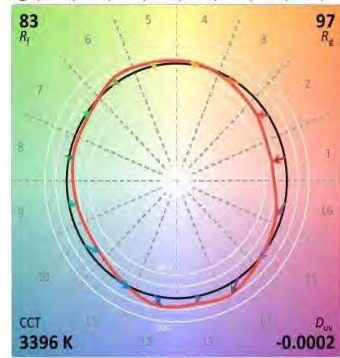
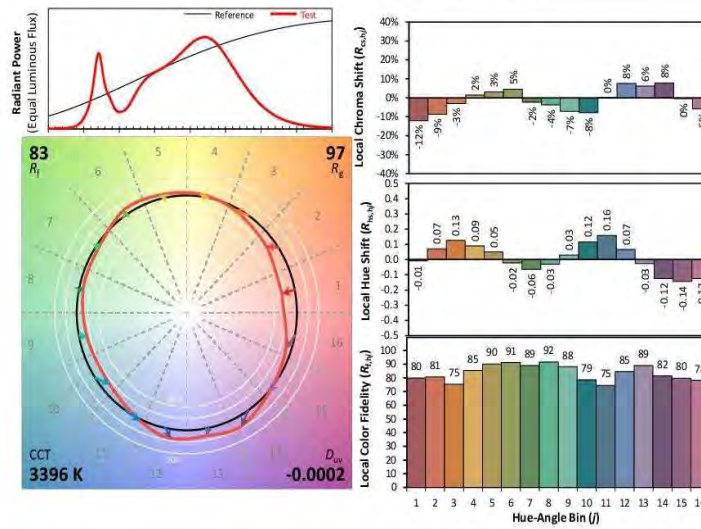
#### ANSI/IES TM-30-18 Color Rendition Report

Source: BXEN-(A)E-11M-3AA

Manufacturer: P.Q.L., Inc.

Date: 9/27/2022

Model: 55685-46W-35K



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

x 0.4110  
 y 0.3929  
 u' 0.2385  
 v' 0.5130

CIE 13.3-1995  
 (CRI)  
 $R_a$  82  
 $R_9$  7

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>	55685-38W-35K	<b>Sample ID.</b>	5359936
<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 assumed 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  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ . The reference standard lamp is rated current 2.679A omnidirectional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.

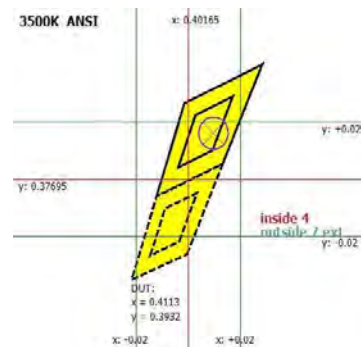
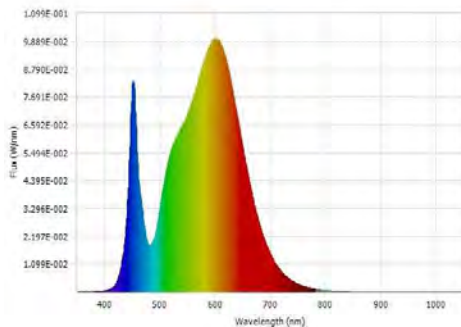
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using  $4\pi$  geometry. The self-absorption 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 ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	120	60	0.3130	37.212	0.9909	Horizontal

### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3392	82	7.0	-0.0002	5364.44	144.16	1341.11



Luminous Flux (lm)	5364.44	Chrom x	0.4113
Chrom y	0.3932	Chrom u	0.2386
Chrom v	0.3421	Duv	-0.0002
Chrom u'	0.2386	Chrom v'	0.5132
CCT (K)	3392	Luminous Efficacy (lm/W)	144.16
Ra	82	R1	81.0
R2	89.0	R3	95.0
R4	81.0	R5	80.0
R6	85.0	R7	85.0
R8	62.0	R9	7.0
R10	73.0	R11	80.0
R12	62.0	R13	82.0
R14	97.0	R15	74.0
Rf	83	Rg	97
Rcs,h1	-12%		



## Integrating Sphere Test (Cont'd)

### TM-30 Report

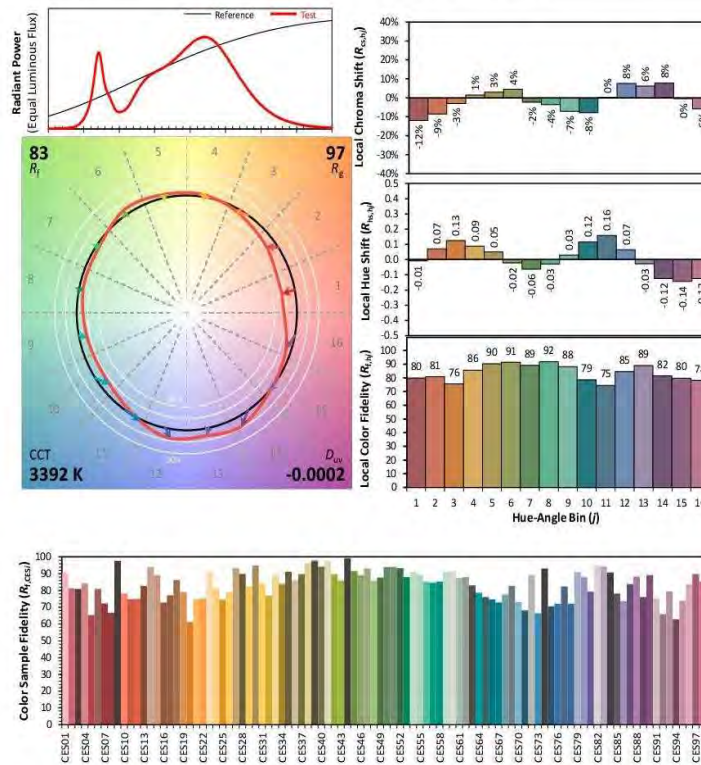
#### ANSI/IES TM-30-18 Color Rendition Report

Source: BXEN-(A)E-11M-3AA

Manufacturer: P.Q.L., Inc.

Date: 9/27/2022

Model: 55685-38W-35K



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

x 0.4113  
 y 0.3932  
 u' 0.2386  
 v' 0.5132

CIE 13.3-1995
(CRI)
$R_a$ 82
$R_9$ 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>	55685-54W-35K	<b>Sample ID.</b>	5359936
<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	120.07	60	0.4662	55.80	0.9969	5.02%	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	
7458.9	74.00%	N/A	107.3	98.6	133.67

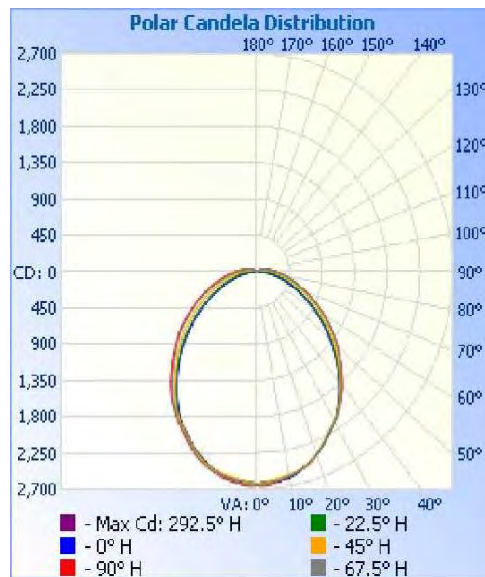
Backlight	Uplight	Glare
N/A	N/A	N/A

UGR		Spacing Criteria (0-180°)	Spacing Criteria (90°-270°)
Crosswise	Endwise		
N/A	N/A	N/A	N/A

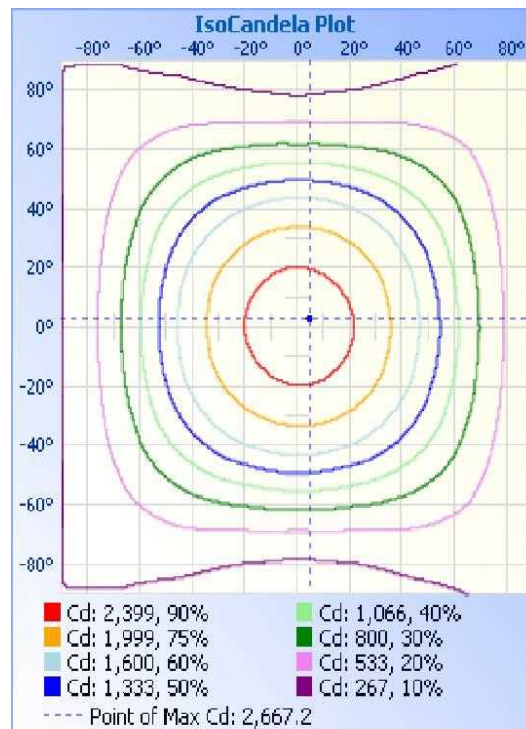


## Goniophotometer Test (Cont'd)

### Polar Candela Distribution



### IsoCandela Plot







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

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	2005.0	26.90%
0-40	3238.9	43.40%
0-60	5524.2	74.10%
60-90	1620.2	21.70%
70-100	976.4	13.10%
90-120	275.7	3.70%
0-90	7144.4	95.80%
90-180	314.5	4.20%
0-180	7458.9	100.00%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	63.0	0.80%	90-95	88.7	1.20%
5-10	186.6	2.50%	95-100	66.4	0.90%
10-15	302.5	4.10%	100-105	48.5	0.70%
15-20	405.2	5.40%	105-110	34.3	0.50%
20-25	490.4	6.60%	110-115	23.1	0.30%
25-30	557.3	7.50%	115-120	14.6	0.20%
30-35	606.1	8.10%	120-125	8.8	0.10%
35-40	627.8	8.40%	125-130	5.3	0.10%
40-45	623.9	8.40%	130-135	4.0	0.10%
45-50	600.2	8.00%	135-140	3.7	0.00%
50-55	559.3	7.50%	140-145	3.4	0.00%
55-60	501.9	6.70%	145-150	3.1	0.00%
60-65	434.8	5.80%	150-155	2.8	0.00%
65-70	364.1	4.90%	155-160	2.5	0.00%
70-75	294.3	3.90%	160-165	2.1	0.00%
75-80	230.4	3.10%	165-170	1.7	0.00%
80-85	173.3	2.30%	170-175	1.1	0.00%
85-90	123.4	1.70%	175-180	0.4	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	2638	2638	2638	2638	2638	2638	2638	2638	2638	2638	2638	2638	2638	2638	2638	2638	2638
1	2624	2621	2626	2657	2658	2643	2634	2626	2622	2622	2626	2654	2659	2642	2628	2624	2623
2	2624	2615	2623	2652	2659	2654	2641	2626	2622	2616	2620	2653	2661	2656	2643	2629	2624
3	2622	2611	2616	2645	2655	2658	2648	2633	2618	2610	2616	2648	2658	2663	2650	2634	2620
4	2622	2603	2604	2634	2647	2660	2654	2632	2618	2600	2607	2639	2653	2667	2660	2638	2619
5	2619	2596	2594	2624	2636	2659	2654	2634	2612	2592	2595	2628	2643	2667	2663	2642	2617
6	2616	2596	2582	2615	2628	2656	2649	2628	2609	2589	2582	2619	2637	2667	2661	2638	2613
7	2610	2591	2576	2603	2620	2646	2644	2623	2605	2585	2575	2611	2629	2658	2657	2638	2610
8	2605	2588	2564	2593	2607	2631	2636	2614	2596	2580	2566	2602	2619	2648	2654	2630	2605
9	2599	2581	2558	2582	2600	2618	2620	2603	2587	2575	2556	2591	2612	2637	2640	2621	2599
10	2590	2576	2550	2570	2589	2600	2605	2590	2576	2564	2550	2579	2599	2619	2625	2612	2587
11	2579	2566	2546	2561	2576	2580	2586	2574	2561	2555	2545	2568	2589	2601	2611	2598	2578
12	2565	2556	2540	2552	2560	2563	2567	2561	2547	2544	2539	2556	2574	2586	2593	2583	2562
13	2551	2541	2534	2542	2543	2544	2544	2539	2532	2530	2532	2550	2556	2569	2572	2566	2551
14	2533	2528	2524	2530	2525	2524	2520	2516	2516	2514	2523	2537	2541	2551	2552	2549	2536
15	2511	2511	2511	2521	2508	2502	2495	2495	2497	2499	2509	2527	2527	2532	2530	2525	2516
16	2496	2494	2493	2508	2487	2480	2473	2472	2474	2479	2492	2518	2508	2509	2505	2506	2498
17	2477	2475	2474	2490	2469	2457	2448	2444	2452	2459	2472	2500	2487	2488	2480	2483	2478
18	2458	2455	2453	2470	2453	2437	2423	2422	2430	2439	2447	2478	2473	2466	2456	2459	2456
19	2436	2434	2427	2446	2433	2417	2400	2397	2406	2417	2421	2453	2453	2445	2432	2433	2434
20	2414	2412	2401	2417	2408	2395	2375	2372	2382	2393	2398	2425	2429	2425	2411	2409	2411
25	2281	2283	2266	2271	2272	2268	2251	2240	2246	2258	2260	2280	2295	2306	2294	2288	2286
30	2147	2149	2142	2153	2146	2137	2120	2103	2101	2119	2128	2156	2165	2163	2167	2153	2144
35	1965	1973	1984	2007	1996	1980	1943	1919	1919	1941	1972	2006	2014	2014	1997	1980	1968
40	1767	1772	1791	1828	1830	1813	1761	1720	1712	1733	1768	1821	1844	1845	1810	1780	1765
45	1554	1560	1594	1637	1643	1620	1566	1514	1496	1516	1564	1630	1657	1653	1615	1572	1548
50	1328	1351	1405	1455	1456	1428	1361	1297	1275	1308	1376	1452	1479	1464	1409	1358	1330
55	1105	1136	1205	1266	1268	1240	1161	1080	1054	1095	1182	1271	1302	1281	1208	1135	1107
60	890	927	1011	1071	1071	1050	970	878	842	887	987	1082	1115	1096	1014	924	888
65	689	734	827	885	885	868	793	695	649	696	807	906	939	922	836	736	692
70	513	562	659	716	717	701	635	530	478	527	646	744	776	758	674	565	514
75	363	418	517	569	570	559	499	391	331	387	505	595	625	611	531	417	361
80	232	297	398	448	449	439	381	276	209	270	387	472	498	485	409	295	233
85	125	196	296	344	348	336	283	181	105	175	288	365	388	374	304	194	125
90	39	119	214	260	266	255	205	110	29	104	206	274	295	281	217	116	39
95	26	76	158	202	210	199	152	70	23	67	153	213	231	218	162	76	26
100	21	47	117	157	166	154	113	43	19	42	115	167	183	170	120	49	21
105	18	26	84	120	129	118	81	23	15	24	83	127	142	131	87	28	17
110	14	14	54	90	99	89	52	13	13	14	53	96	109	98	57	15	14
115	12	12	29	60	70	60	29	11	11	12	28	64	78	66	34	12	12
120	11	11	14	38	46	37	14	10	10	11	14	40	52	42	17	11	10
125	10	10	10	19	27	20	11	10	9	9	11	21	30	23	11	10	10
130	10	10	10	10	12	11	11	10	9	10	10	10	14	10	10	9	9
135	11	11	10	9	10	10	10	11	10	10	10	10	10	10	10	10	10
140	11	11	10	9	9	10	10	11	10	10	10	8	9	10	10	10	11
145	12	11	11	9	9	10	11	11	12	11	10	8	9	10	10	11	11
150	13	12	12	10	9	10	11	12	12	12	11	9	9	10	11	12	12
155	14	13	12	10	9	11	12	12	13	13	12	10	9	10	11	12	13
160	15	14	13	11	10	12	13	14	14	13	13	11	10	11	13	14	15
165	16	16	14	12	11	12	14	16	15	15	14	12	10	12	14	16	16
170	17	16	16	13	12	13	16	16	17	16	15	13	12	13	15	17	17
175	17	16	16	14	12	13	16	16	17	16	16	13	12	13	16	17	17
180	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15



### Goniophotometer Test

<b>Model No.</b>	55685-54W-50K	<b>Sample ID.</b>	5359936
<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	120.10	60	0.4639	55.54	0.9968	5.02%	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	
7753.9	74.10%	N/A	107.3	98.0	139.61

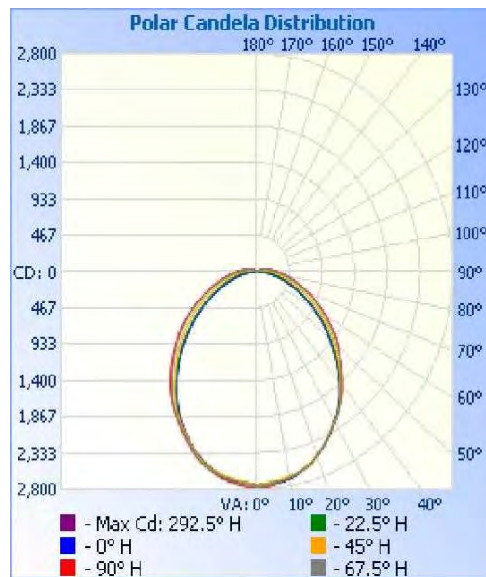
Backlight	Uplight	Glare
N/A	N/A	N/A

UGR		Spacing Criteria (0-180°)	Spacing Criteria (90°-270°)
Crosswise	Endwise		
N/A	N/A	N/A	N/A

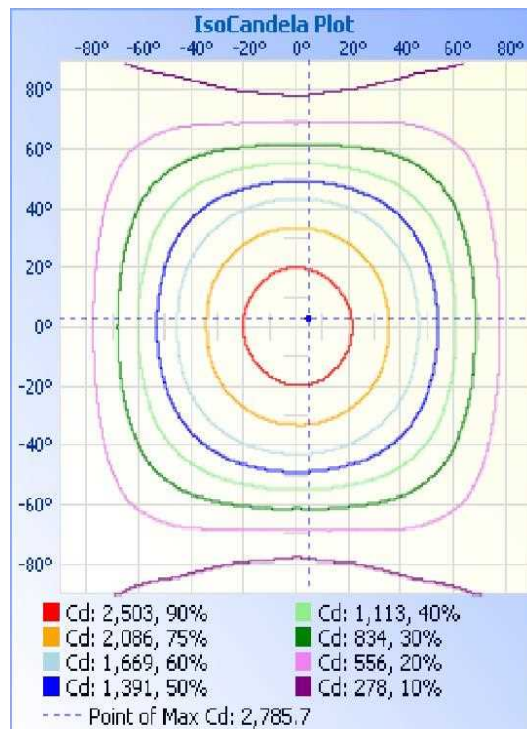


## Goniophotometer Test (Cont'd)

### Polar Candela Distribution



### IsoCandela Plot





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

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	2090.9	27.00%
0-40	3371.7	43.50%
0-60	5745.7	74.10%
60-90	1683.5	21.70%
70-100	1014.2	13.10%
90-120	285.7	3.70%
0-90	7429.2	95.80%
90-180	324.7	4.20%
0-180	7753.9	100.00%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	65.7	0.80%	90-95	92.1	1.20%
5-10	194.8	2.50%	95-100	69.0	0.90%
10-15	315.7	4.10%	100-105	50.3	0.60%
15-20	422.8	5.50%	105-110	35.4	0.50%
20-25	511.6	6.60%	110-115	23.9	0.30%
25-30	580.3	7.50%	115-120	15.0	0.20%
30-35	628.7	8.10%	120-125	8.9	0.10%
35-40	652.0	8.40%	125-130	5.3	0.10%
40-45	647.9	8.40%	130-135	3.9	0.10%
45-50	623.5	8.00%	135-140	3.6	0.00%
50-55	581.0	7.50%	140-145	3.4	0.00%
55-60	521.7	6.70%	145-150	3.1	0.00%
60-65	452.3	5.80%	150-155	2.8	0.00%
65-70	378.1	4.90%	155-160	2.6	0.00%
70-75	306.0	3.90%	160-165	2.2	0.00%
75-80	239.4	3.10%	165-170	1.7	0.00%
80-85	179.7	2.30%	170-175	1.1	0.00%
85-90	128.0	1.70%	175-180	0.4	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	2754	2754	2754	2754	2754	2754	2754	2754	2754	2754	2754	2754	2754	2754	2754	2754	2754
1	2740	2740	2741	2774	2776	2761	2748	2739	2735	2733	2740	2767	2770	2758	2746	2741	2736
2	2737	2732	2738	2769	2774	2769	2758	2745	2736	2723	2736	2769	2772	2771	2758	2745	2736
3	2738	2726	2733	2764	2774	2779	2766	2750	2731	2720	2727	2759	2770	2780	2768	2749	2735
4	2735	2720	2720	2753	2766	2780	2772	2751	2729	2709	2717	2749	2762	2782	2774	2755	2736
5	2732	2714	2707	2743	2753	2778	2773	2748	2726	2709	2704	2741	2753	2786	2778	2752	2732
6	2730	2710	2697	2732	2744	2771	2766	2749	2721	2703	2695	2730	2745	2781	2776	2754	2732
7	2727	2707	2688	2721	2732	2766	2762	2736	2717	2697	2683	2721	2739	2769	2768	2748	2726
8	2722	2702	2682	2713	2726	2753	2754	2732	2708	2692	2675	2710	2730	2762	2763	2739	2720
9	2708	2696	2669	2697	2714	2737	2741	2721	2696	2682	2664	2697	2720	2745	2751	2734	2709
10	2701	2690	2664	2686	2705	2717	2722	2711	2689	2676	2659	2690	2706	2732	2734	2717	2700
11	2688	2680	2659	2677	2687	2698	2702	2690	2673	2665	2655	2677	2697	2711	2716	2706	2687
12	2675	2667	2656	2666	2669	2675	2682	2674	2658	2655	2649	2668	2681	2695	2700	2690	2678
13	2658	2652	2646	2652	2653	2656	2659	2655	2641	2640	2640	2656	2664	2673	2680	2668	2660
14	2644	2640	2636	2646	2636	2638	2636	2634	2624	2622	2628	2648	2649	2659	2657	2651	2643
15	2624	2623	2624	2635	2619	2616	2610	2609	2603	2605	2614	2638	2629	2639	2634	2630	2625
16	2605	2606	2605	2620	2600	2596	2586	2583	2583	2586	2598	2621	2612	2616	2608	2608	2606
17	2585	2583	2582	2605	2580	2566	2560	2561	2560	2565	2577	2605	2595	2594	2587	2583	2582
18	2564	2558	2560	2582	2563	2548	2532	2532	2535	2541	2554	2582	2574	2570	2560	2562	2562
19	2537	2539	2537	2556	2542	2524	2508	2505	2512	2519	2530	2557	2554	2551	2535	2536	2540
20	2511	2515	2506	2523	2518	2504	2481	2482	2488	2499	2501	2528	2532	2527	2513	2511	2514
25	2381	2384	2372	2376	2373	2374	2355	2342	2344	2354	2354	2372	2388	2402	2387	2377	2382
30	2214	2220	2219	2231	2223	2214	2202	2182	2174	2192	2200	2232	2241	2245	2238	2224	2221
35	2041	2053	2064	2089	2077	2058	2028	2000	1992	2012	2040	2085	2095	2092	2065	2049	2038
40	1828	1838	1856	1897	1900	1883	1830	1786	1777	1793	1835	1898	1924	1922	1877	1841	1829
45	1600	1613	1649	1699	1708	1681	1628	1572	1550	1573	1628	1701	1734	1726	1678	1625	1605
50	1369	1395	1454	1511	1522	1489	1417	1350	1321	1352	1430	1515	1539	1525	1461	1400	1374
55	1146	1180	1254	1324	1338	1301	1206	1121	1090	1130	1223	1316	1348	1330	1253	1171	1142
60	916	957	1049	1128	1143	1109	1009	909	869	920	1026	1121	1146	1134	1053	958	919
65	707	754	860	942	958	924	824	718	670	722	840	929	954	942	868	763	712
70	528	578	688	770	786	756	660	542	491	549	667	750	777	767	696	586	530
75	372	423	536	614	631	606	520	399	342	408	525	602	624	616	552	440	375
80	238	297	412	485	501	476	396	277	214	286	401	471	492	485	424	313	240
85	125	194	306	374	387	366	290	176	107	188	300	367	382	374	317	208	125
90	37	112	216	280	295	276	209	103	30	114	217	276	291	284	229	126	36
95	25	74	161	219	231	216	157	69	22	73	162	215	229	222	171	80	26
100	23	46	119	170	183	168	114	42	18	45	120	166	181	171	128	53	21
105	17	26	88	129	141	125	82	22	16	25	87	128	141	132	90	27	17
110	14	15	54	96	108	94	52	14	13	14	55	96	109	100	60	15	12
115	11	13	29	66	78	63	28	12	11	12	28	64	80	69	37	14	12
120	10	13	12	39	49	37	14	12	11	10	14	41	53	43	17	10	11
125	10	9	10	20	28	20	11	10	12	11	9	21	31	22	12	8	12
130	9	9	10	12	11	10	9	9	11	10	9	8	12	11	10	10	9
135	9	10	12	9	10	11	12	10	12	10	10	9	11	9	9	8	10
140	10	11	9	8	9	9	10	9	11	13	8	10	11	10	10	12	10
145	10	12	10	9	10	10	10	13	10	11	11	7	8	11	10	10	10
150	13	12	12	9	8	11	11	11	14	12	10	8	9	10	12	11	11
155	15	14	13	10	6	10	13	13	15	14	10	10	8	11	13	12	13
160	14	15	14	12	9	11	13	15	14	13	14	11	9	12	12	14	13
165	16	16	16	13	10	14	15	16	16	16	14	12	12	12	14	17	15
170	19	16	17	13	10	12	16	17	18	15	16	12	13	13	12	15	16
175	18	16	17	13	12	12	15	20	18	18	15	14	11	13	15	17	16
180	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16



## THD and PF Test

<b>Model No.</b>	55685-54W-35K	<b>Sample ID.</b>	5359936
<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	120.07	60	0.4662	55.80	0.9969	5.02%	Horizontal
25.1	277.13	60	0.2025	54.67	0.9750	4.77%	Horizontal



## THD and PF Test

<b>Model No.</b>	55685-54W-40K	<b>Sample ID.</b>	5359936
<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	120.07	60	0.4442	53.12	0.9960	5.45%	Horizontal
25.1	277.13	60	0.1934	52.11	0.9730	4.31%	Horizontal





## THD and PF Test

<b>Model No.</b>	55685-54W-50K	<b>Sample ID.</b>	5359936
<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  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ . 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 ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.1	120.09	60	0.4639	55.54	0.9968	5.02%	Horizontal
25.1	277.11	60	0.2014	54.47	0.9752	4.65%	Horizontal



## THD and PF Test

<b>Model No.</b>	55685-46W-35K	<b>Sample ID.</b>	5359936
<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	0.3782	45.25	0.9955	6.52%	Horizontal
25.1	277.11	60	0.1668	44.55	0.9637	5.09%	Horizontal



## THD and PF Test

<b>Model No.</b>	55685-38W-35K	<b>Sample ID.</b>	5359936
<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	0.3110	37.22	0.9962	3.78%	Horizontal
25.1	277.07	60	0.1397	36.81	0.9516	5.92%	Horizontal



## In-Situ Temperature Measurement Test

<b>Model No.</b>	55685-54W-35K	<b>Sample ID.</b>	5359936
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### Test Method

1. In-Situ Temperature Measurement Test is conducted according to the UL 1598-2008, Section 14.  
 2. 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.  
 3. 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
23.2	120.07	60	0.4662	55.80	0.9969	5.02%	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	23.2	25.0				
TMP of Location 1	85	63.1	64.9	0.0023	BXEN-(A)E-11M-3AA	120	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	23.2	25.0		
TMP of Location 1	69.2	71.0	SIL 50-I1200 120-277 W D1S+D3 R	90



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

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





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