



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 21522, China

Catalog Number

55101

Project Number

4790110305

Report Number

4790110305_8

Test Date

2022-01-07~2022-01-13

Issue Date

2022-01-20

Revision Date

N/A

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Roger Xu

Zhao, Elaine/Xu, Roger

Approved By

Elvis Wu

Wu, Elvis

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%	4402.87
Minimum Luminaire Efficacy (lm/W)-Luminaires	IES LM-79-2008	≥125	-3%	127.48
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	1.26
Zonal Lumen Requirement 1(0°-60°)	IES LM-79-2008	≥75%	-3%	76.80%
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±245	N/A	3471
Allowable CCT (4000K)	IES LM-79-2008/ANSI C78.377-2015	3985±275	N/A	4127
Minimum CRI	IES LM-79-2008/CIE 13.3-1995	≥80	-1	82
Minimum R9	IES LM-79-2008	≥0	-1	6.0
Minimum Rg	IES LM-79-2008	≥89	-1	94
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	-10%	21.9
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	0.9353
Total Harmonic Distortion (A%)	ANSI C82.77-10-2014	≤20%	5%	15.82%
In-Situ Temperature Measurement Test for LED 1 (°C)	UL1598-2008	≤105	N/A	49.0
In-Situ Temperature Measurement Test for Driver 1 (°C)	UL1598-2008	≤90	N/A	57.3
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: 2021-12-21

Test Item	Test Date	Model Number	Tests Conducted By
Integrating Sphere Test	2022-01-10	55101-45W-35K	Yang, Gavin X
Integrating Sphere Test	2022-01-10	55101-45W-40K	Yang, Gavin X
Integrating Sphere Test	2022-01-10	55101-45W-50K	Yang, Gavin X
Integrating Sphere Test	2022-01-10	55101-38W-35K	Yang, Gavin X
Integrating Sphere Test	2022-01-10	55101-34W-35K	Yang, Gavin X
Goniophotometer Test	2022-01-07	55101-45W-35K	Yang, Gavin X
Goniophotometer Test	2022-01-07	55101-45W-50K	Yang, Gavin X
THD and PF Test	2022-01-07	55101-45W-35K	Yang, Gavin X
THD and PF Test	2022-01-07	55101-45W-40K	Yang, Gavin X
THD and PF Test	2022-01-07	55101-45W-50K	Yang, Gavin X
THD and PF Test	2022-01-07	55101-38W-35K	Yang, Gavin X
THD and PF Test	2022-01-07	55101-34W-35K	Yang, Gavin X
In-Situ Temperature Measurement Test	2022-01-13	55101-45W-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: Integrated Retrofit Kits for 2x4 Luminaires

Model Number: 55101

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

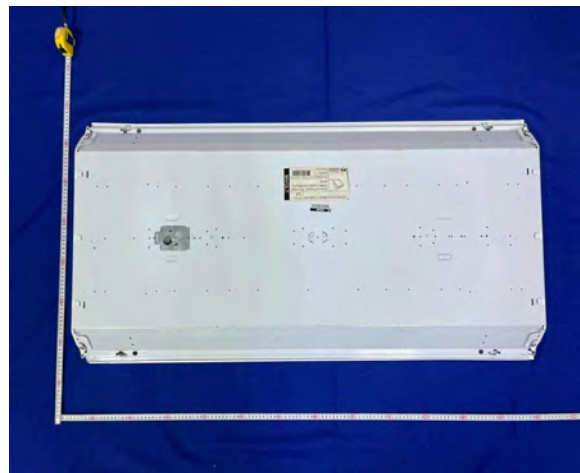
LED Package: STW8A2PD-XX

Dimming Information: Continuous dimming capability

Products Scaled Value

Model Number	CCT	Luminous Flux	Power	Luminous Efficacy
55101-45W-35K	3500k	5625	45	125
55101-45W-40K	4000k	5670	45	126
55101-45W-50K	5000k	5715	45	127
55101-38W-35K	3500k	4864	38	128
55101-38W-40K	4000k	4902	38	129
55101-38W-50K	5000k	4940	38	130
55101-34W-35K	3500k	4454	34	131
55101-34W-40K	4000k	4488	34	132
55101-34W-50K	5000k	4522	34	133

Photos of Products Characteristics





Integrating Sphere Test

Model No.	55101-45W-35K		Sample ID.	4535697
Operate time (Min.)	90	Stabilization time (Min.)	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.

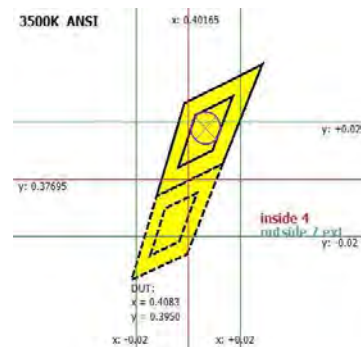
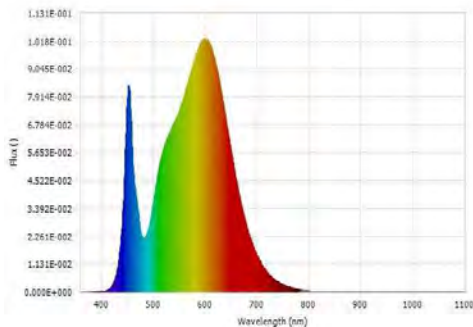
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using 4π geometry. The self-absorption 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 ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.8	120.02	60	0.3598	42.769	0.9903	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3471	82	6.0	0.0012	5482.36	128.19	N/A



Luminous Flux (lm)	5482.36	Chrom x	0.4083
Chrom y	0.3950	Chrom u	0.2359
Chrom v	0.3423	Duv	0.0012
Chrom u'	0.2359	Chrom v'	0.5135
CCT (K)	3471	Luminous Efficacy (lm/W)	128.19
Ra	82	R1	80.0
R2	89.0	R3	95.0
R4	81.0	R5	80.0
R6	85.0	R7	85.0
R8	62.0	R9	6.0
R10	73.0	R11	80.0
R12	62.0	R13	82.0
R14	98.0	R15	73.0
Rf	84	Rg	95
Rcs,h1	-12%		



Integrating Sphere Test (Cont'd)

TM-30 Report

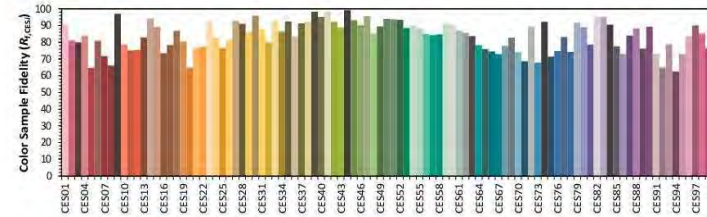
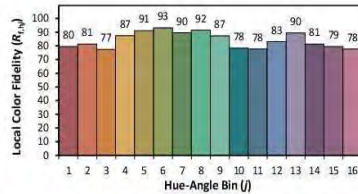
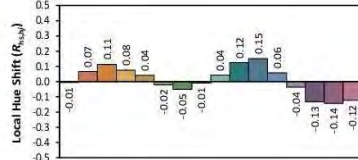
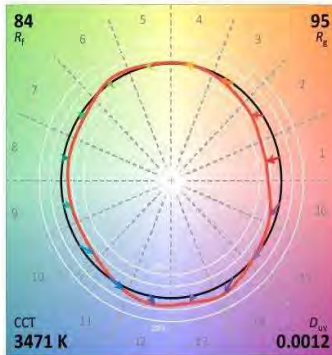
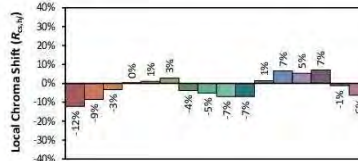
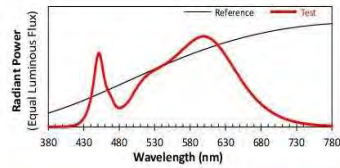
ANSI/IES TM-30-18 Color Rendition Report

Source: STW8A2PD-XX

Manufacturer: P.Q.L., Inc.

Date: 1/10/2022

Model: 55101-45W-35K



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

x 0.4083
 y 0.3950
 u' 0.2359
 v' 0.5135

CIE 13.3-1995
 (CRI)
 R_a 82
 R_s 6

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



Integrating Sphere Test

Model No.	55101-45W-40K		Sample ID.	4535697
Operate time (Min.)	90	Stabilization time (Min.)	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.

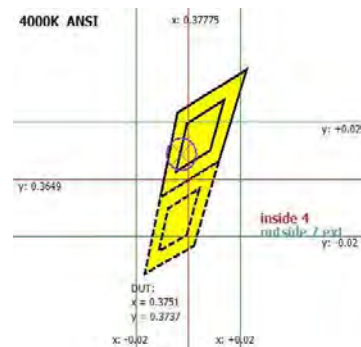
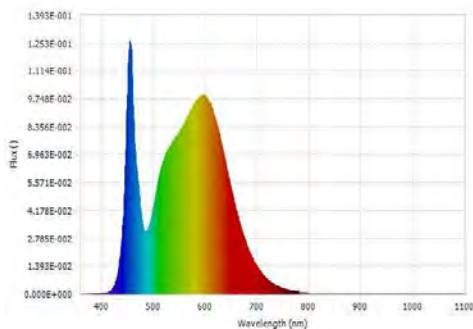
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using 4π geometry. The self-absorption 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 ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.8	120.05	60	0.3428	40.748	0.9902	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
4127	84	14.0	0.0001	5749.22	141.09	N/A



Luminous Flux (lm)	5749.22	Chrom x	0.3751
Chrom y	0.3737	Chrom u	0.2228
Chrom v	0.3330	Duv	0.0001
Chrom u'	0.2228	Chrom v'	0.4994
CCT (K)	4127	Luminous Efficacy (lm/W)	141.09
Ra	84	R1	83.0
R2	91.0	R3	95.0
R4	82.0	R5	82.0
R6	86.0	R7	86.0
R8	66.0	R9	14.0
R10	77.0	R11	80.0
R12	58.0	R13	85.0
R14	98.0	R15	77.0
Rf	83	Rg	94
Rcs,h1	-12%		



Integrating Sphere Test (Cont'd)

TM-30 Report

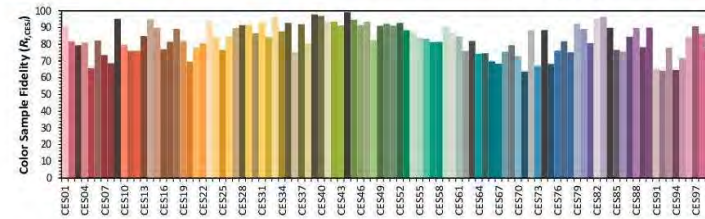
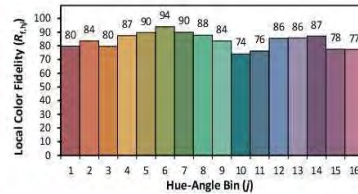
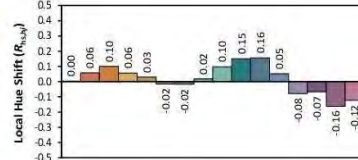
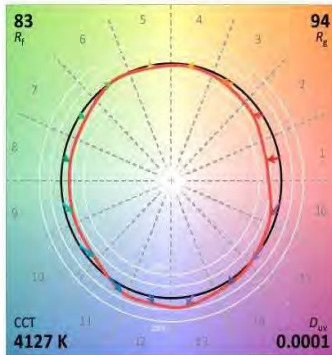
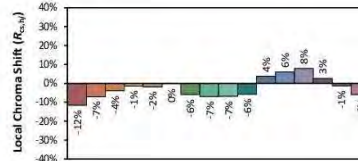
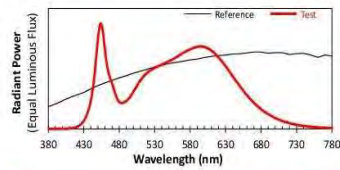
ANSI/IES TM-30-18 Color Rendition Report

Source: STW8A2PD-XX

Manufacturer: P.Q.L., Inc.

Date: 1/10/2022

Model: 55101-45W-40K



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

x 0.3751
y 0.3737
u' 0.2228
v' 0.4994

CIE 13.3-1995
(CRI)
R_a 84
R_s 14

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



Integrating Sphere Test

Model No.	55101-45W-50K		Sample ID.	4535697
Operate time (Min.)	90	Stabilization time (Min.)	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.

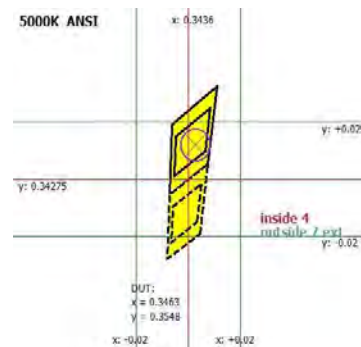
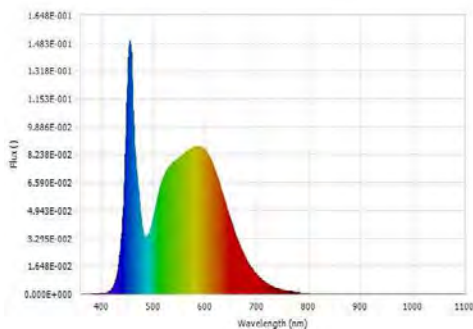
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using 4π geometry. The self-absorption 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 ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.8	120.03	60	0.3601	42.804	0.9902	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
4964	83	12.0	0.0011	5530.44	129.20	N/A



Luminous Flux (lm)	5530.44	Chrom x	0.3463
Chrom y	0.3548	Chrom u	0.2110
Chrom v	0.3243	Duv	0.0011
Chrom u'	0.2110	Chrom v'	0.4864
CCT (K)	4964	Luminous Efficacy (lm/W)	129.20
Ra	83	R1	82.0
R2	90.0	R3	93.0
R4	81.0	R5	81.0
R6	83.0	R7	88.0
R8	68.0	R9	12.0
R10	73.0	R11	79.0
R12	53.0	R13	84.0
R14	96.0	R15	77.0
Rf	83	Rg	95
Rcs,h1	-12%		



Integrating Sphere Test (Cont'd)

TM-30 Report

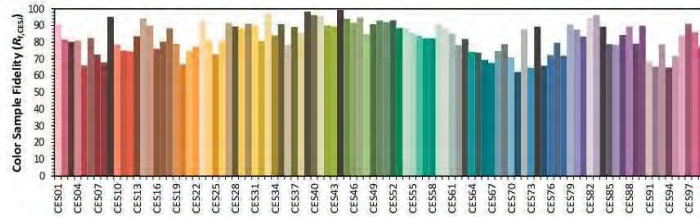
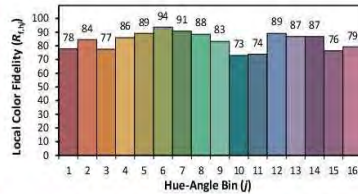
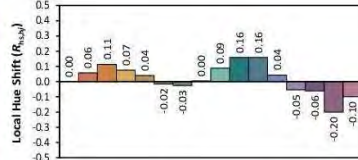
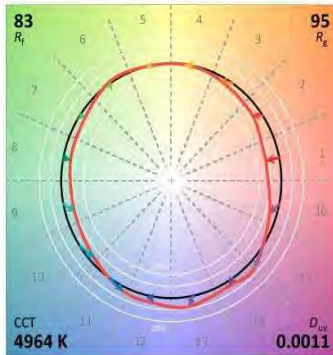
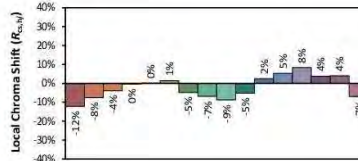
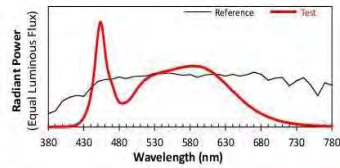
ANSI/IES TM-30-18 Color Rendition Report

Source: STW8A2PD-XX

Manufacturer: P.Q.L., Inc.

Date: 1/10/2022

Model: 55101-45W-50K



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

x 0.3463
 y 0.3548
 u' 0.2110
 v' 0.4864

CIE 13.3-1995
 (CRI)
 R_a 83
 R_s 12

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



Integrating Sphere Test

Model No.	55101-38W-35K		Sample ID.	4535697
Operate time (Min.)	90	Stabilization time (Min.)	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.

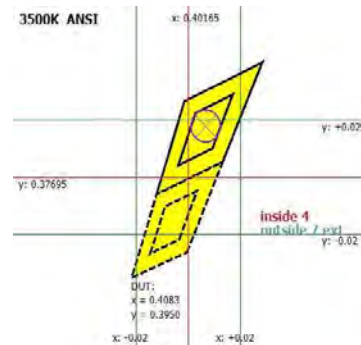
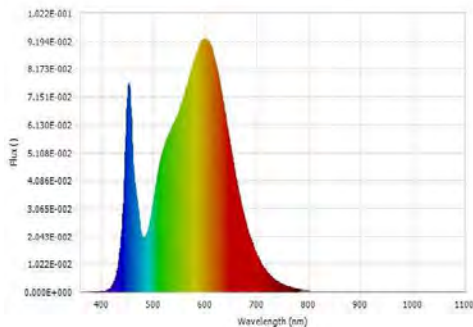
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using 4π geometry. The self-absorption 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 ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.8	120.05	60	0.3180	37.682	0.9870	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3471	82	6.0	0.0012	4952.23	131.42	N/A



Luminous Flux (lm)	4952.23	Chrom x	0.4083
Chrom y	0.3950	Chrom u	0.2359
Chrom v	0.3423	Duv	0.0012
Chrom u'	0.2359	Chrom v'	0.5135
CCT (K)	3471	Luminous Efficacy (lm/W)	131.42
Ra	82	R1	80.0
R2	89.0	R3	96.0
R4	81.0	R5	80.0
R6	85.0	R7	85.0
R8	62.0	R9	6.0
R10	74.0	R11	80.0
R12	62.0	R13	82.0
R14	98.0	R15	73.0
Rf	84	Rg	95
Rcs,h1	-12%		



Integrating Sphere Test (Cont'd)

TM-30 Report

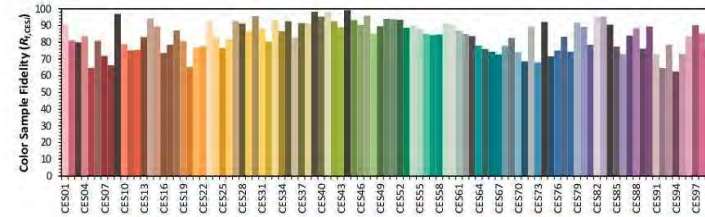
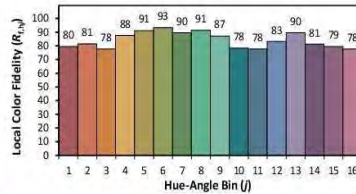
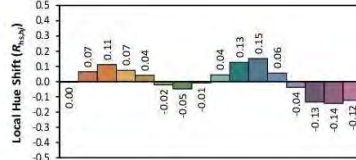
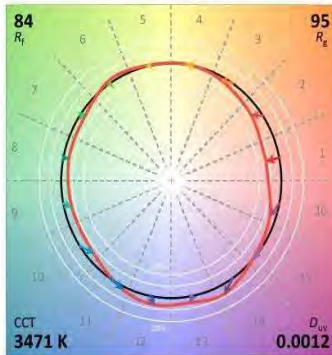
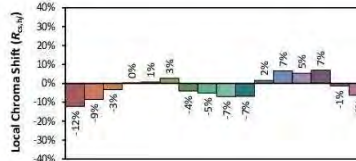
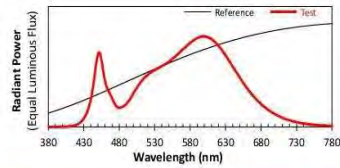
ANSI/IES TM-30-18 Color Rendition Report

Source: STW8A2PD-XX

Manufacturer: P.Q.L., Inc.

Date: 1/10/2022

Model: 55101-38W-35K



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

x 0.4083
 y 0.3950
 u' 0.2359
 v' 0.5135

CIE 13.3-1995
 (CRI)
 R_a 82
 R_s 6

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



Integrating Sphere Test

Model No.	55101-34W-35K		Sample ID.	4535697
Operate time (Min.)	90	Stabilization time (Min.)	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.

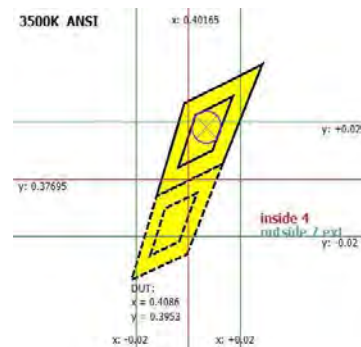
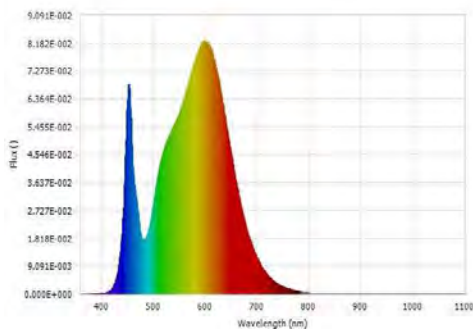
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using 4π geometry. The self-absorption 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 ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.8	120.08	60	0.2764	32.619	0.9829	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3466	82	6.0	0.0013	4402.87	134.98	N/A



Luminous Flux (lm)	4402.87	Chrom x	0.4086
Chrom y	0.3953	Chrom u	0.2360
Chrom v	0.3424	Duv	0.0013
Chrom u'	0.2360	Chrom v'	0.5136
CCT (K)	3466	Luminous Efficacy (lm/W)	134.98
Ra	82	R1	80.0
R2	89.0	R3	96.0
R4	81.0	R5	80.0
R6	85.0	R7	85.0
R8	62.0	R9	6.0
R10	74.0	R11	80.0
R12	62.0	R13	82.0
R14	98.0	R15	73.0
Rf	84	Rg	95
Rcs,h1	-12%		



Integrating Sphere Test (Cont'd)

TM-30 Report

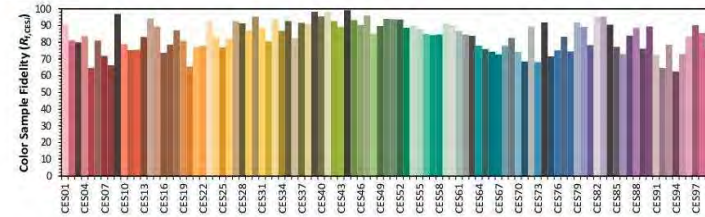
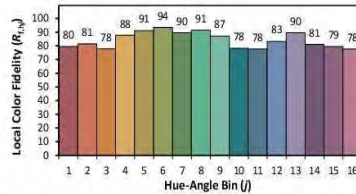
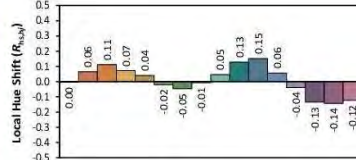
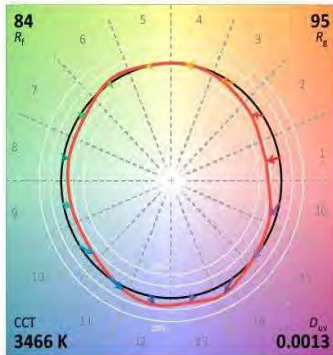
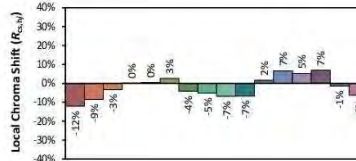
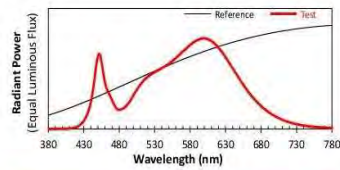
ANSI/IES TM-30-18 Color Rendition Report

Source: STW8A2PD-XX

Manufacturer: P.Q.L., Inc.

Date: 1/10/2022

Model: 55101-34W-35K



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

x 0.4086
 y 0.3953
 u' 0.2360
 v' 0.5136

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.



Goniophotometer Test

Model No.	55101-45W-35K	Sample ID.	4535697
Operate time (Min.)	90	Stabilization time (Min.)	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
24.8	120.05	60	0.3594	42.76	0.9908	9.71%	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	
5451.0	77.10%	N/A	113.1	104.2	127.48

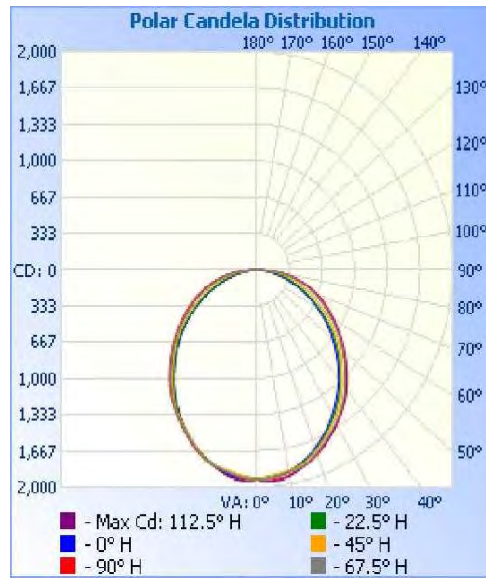
Backlight	Uplight	Glare
N/A	N/A	N/A

UGR		Spacing Criteria (0-180°)	Spacing Criteria (90°-270°)
Crosswise	Endwise		
19.3	21.9	1.20	1.28

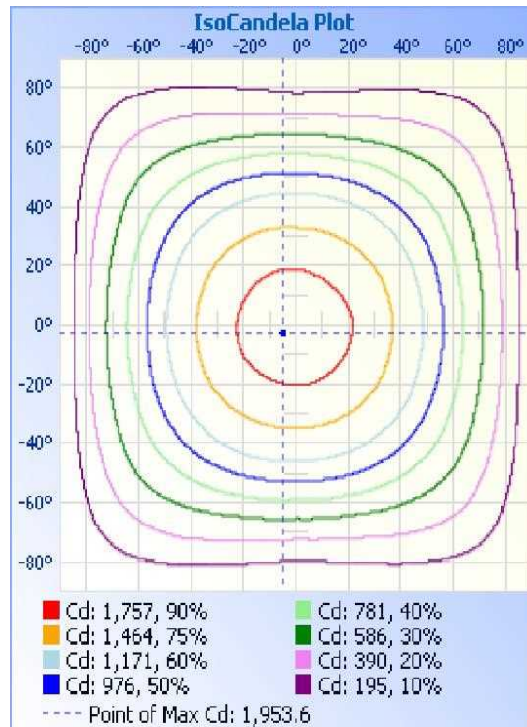


Goniophotometer Test (Cont'd)

Polar Candela Distribution



IsoCandela Plot





Goniophotometer Test (Cont'd)
Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1475.0	27.10%
0-40	2398.1	44.00%
0-60	4194.0	76.90%
60-90	1241.8	22.80%
70-100	580.5	10.70%
90-120	6.0	0.10%
0-90	5435.8	99.70%
90-180	15.3	0.30%
0-180	5451.0	100.00%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	46.0	0.80%	90-95	1.7	0.00%
5-10	136.5	2.50%	95-100	1.2	0.00%
10-15	221.4	4.10%	100-105	0.9	0.00%
15-20	297.3	5.50%	105-110	0.8	0.00%
20-25	361.2	6.60%	110-115	0.7	0.00%
25-30	412.6	7.60%	115-120	0.8	0.00%
30-35	450.4	8.30%	120-125	0.8	0.00%
35-40	472.7	8.70%	125-130	0.8	0.00%
40-45	477.4	8.80%	130-135	0.9	0.00%
45-50	467.5	8.60%	135-140	1.0	0.00%
50-55	444.1	8.10%	140-145	1.0	0.00%
55-60	406.9	7.50%	145-150	1.0	0.00%
60-65	358.9	6.60%	150-155	0.9	0.00%
65-70	305.1	5.60%	155-160	0.9	0.00%
70-75	246.8	4.50%	160-165	0.8	0.00%
75-80	181.8	3.30%	165-170	0.7	0.00%
80-85	111.6	2.00%	170-175	0.4	0.00%
85-90	37.6	0.70%	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	1921	1921	1921	1921	1921	1921	1921	1921	1921	1921	1921	1921	1921	1921	1921	1921	1921
1	1916	1915	1918	1934	1941	1933	1923	1920	1915	1916	1920	1936	1942	1928	1916	1912	1910
2	1914	1912	1916	1934	1945	1942	1933	1925	1918	1910	1917	1932	1944	1935	1925	1917	1908
3	1912	1907	1910	1931	1944	1946	1940	1928	1916	1906	1912	1929	1942	1941	1931	1919	1908
4	1911	1901	1904	1925	1943	1952	1946	1933	1916	1902	1904	1920	1937	1945	1936	1923	1908
5	1908	1898	1895	1918	1939	1954	1948	1932	1916	1897	1893	1912	1932	1946	1938	1922	1905
6	1905	1894	1890	1914	1935	1953	1948	1930	1912	1894	1886	1906	1925	1941	1935	1920	1902
7	1900	1891	1885	1907	1932	1949	1944	1926	1910	1892	1879	1897	1918	1935	1932	1914	1898
8	1897	1887	1878	1900	1927	1942	1940	1922	1906	1889	1871	1892	1912	1927	1924	1910	1893
9	1890	1883	1873	1895	1920	1934	1932	1915	1899	1885	1868	1881	1903	1916	1915	1901	1886
10	1882	1877	1871	1889	1915	1923	1921	1906	1890	1878	1863	1875	1896	1902	1904	1891	1878
11	1872	1871	1867	1884	1906	1912	1907	1895	1882	1871	1859	1868	1886	1889	1889	1880	1868
12	1860	1864	1865	1880	1899	1901	1895	1882	1869	1863	1856	1862	1876	1876	1875	1866	1857
13	1848	1854	1860	1875	1888	1887	1881	1869	1857	1855	1852	1858	1864	1863	1858	1853	1846
14	1836	1843	1854	1871	1879	1875	1867	1857	1846	1843	1846	1852	1854	1849	1842	1837	1833
15	1821	1831	1845	1863	1869	1864	1853	1841	1834	1832	1838	1845	1842	1835	1825	1820	1818
16	1807	1818	1834	1855	1858	1851	1837	1826	1821	1821	1826	1837	1831	1820	1806	1802	1804
17	1793	1804	1821	1845	1848	1837	1821	1810	1806	1806	1811	1824	1818	1805	1788	1785	1789
18	1777	1790	1806	1830	1837	1824	1805	1793	1790	1790	1795	1810	1806	1790	1770	1767	1771
19	1760	1774	1790	1813	1824	1810	1790	1776	1773	1774	1777	1792	1794	1776	1754	1749	1755
20	1743	1758	1773	1795	1810	1796	1774	1760	1756	1758	1759	1773	1779	1761	1739	1732	1738
25	1647	1664	1679	1702	1723	1722	1702	1679	1669	1666	1666	1678	1686	1679	1658	1641	1645
30	1540	1561	1588	1618	1636	1629	1607	1578	1562	1565	1574	1588	1594	1583	1562	1540	1537
35	1424	1450	1487	1523	1540	1529	1498	1466	1450	1454	1474	1493	1497	1478	1447	1424	1422
40	1300	1323	1359	1400	1428	1419	1381	1343	1322	1324	1342	1372	1385	1368	1330	1300	1296
45	1161	1189	1229	1274	1298	1285	1248	1210	1184	1190	1212	1244	1256	1237	1204	1172	1161
50	1020	1054	1102	1149	1171	1150	1107	1067	1043	1055	1086	1122	1131	1105	1061	1031	1023
55	877	910	962	1014	1040	1021	970	921	899	914	949	988	1000	974	921	883	875
60	725	757	816	878	909	886	827	770	741	757	802	850	869	841	784	738	723
65	572	606	675	750	784	754	684	620	587	604	658	720	743	712	646	592	574
70	430	465	545	627	660	634	557	480	443	463	527	595	619	589	516	450	428
75	293	332	425	493	522	502	435	345	304	329	402	465	487	460	396	320	292
80	166	216	292	348	370	348	294	220	173	208	274	328	345	322	267	202	168
85	62	103	147	182	195	183	149	107	66	98	141	177	190	172	135	93	62
90	2	4	3	3	4	4	5	4	4	5	9	9	9	8	7	4	3
95	2	2	2	2	3	3	2	2	2	2	3	2	3	3	3	2	2
100	2	1	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2
105	2	1	2	1	2	2	1	2	1	2	1	2	1	2	1	2	1
110	1	2	1	1	1	2	1	2	1	2	1	2	1	2	1	1	1
115	1	2	1	1	2	2	2	1	1	2	2	1	2	1	2	1	2
120	1	2	1	1	2	2	2	1	2	2	2	2	1	1	2	2	2
125	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2
130	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
135	3	2	2	3	2	2	2	3	2	2	3	2	2	2	3	2	3
140	3	3	3	3	3	3	3	3	2	3	3	3	3	2	3	3	3
145	3	3	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3
150	4	4	4	4	4	3	4	3	4	3	3	3	4	3	3	4	3
155	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
160	5	4	4	5	5	4	5	4	5	4	4	4	4	5	4	4	5
165	6	5	5	5	5	5	5	5	5	5	5	5	6	6	5	6	6
170	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	7	6
175	6	6	6	7	6	6	6	6	6	6	6	6	6	7	6	6	7
180	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6



Goniophotometer Test

Model No.	55101-45W-50K	Sample ID.	4535697
Operate time (Min.)	90	Stabilization time (Min.)	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
24.8	120.08	60	0.3596	42.78	0.9909	9.64%	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	
5489.4	76.80%	N/A	113.7	104.6	128.32

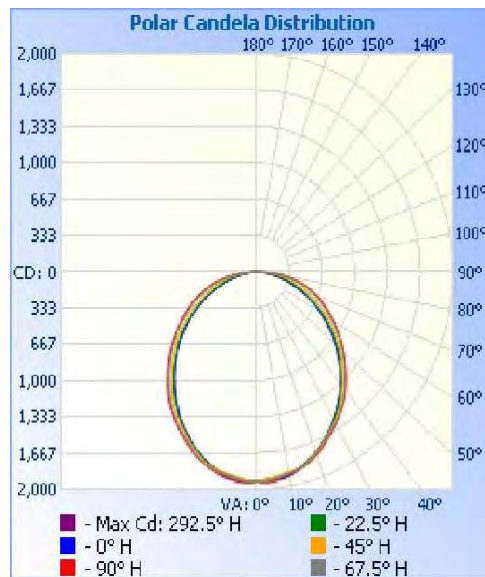
Backlight	Uplight	Glare
N/A	N/A	N/A

UGR		Spacing Criteria (0-180°)	Spacing Criteria (90°-270°)
Crosswise	Endwise		
19.5	21.9	1.22	1.26

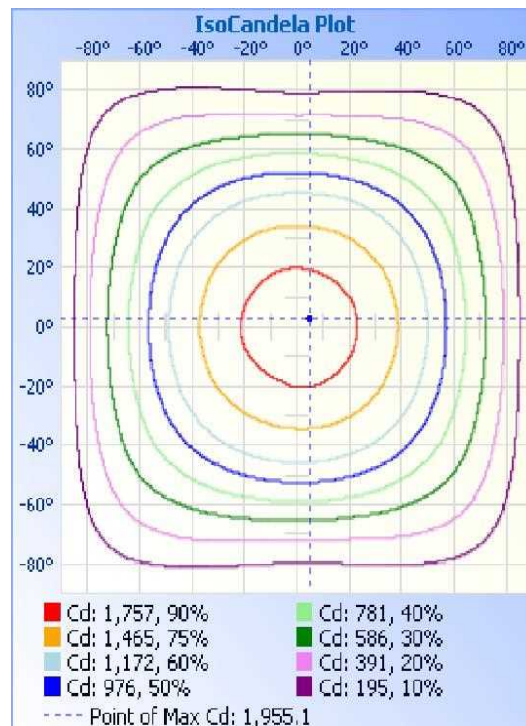


Goniophotometer Test (Cont'd)

Polar Candela Distribution



IsoCandela Plot





Goniophotometer Test (Cont'd)
Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1479.7	27.00%
0-40	2407.9	43.90%
0-60	4218.2	76.80%
60-90	1255.3	22.90%
70-100	587.2	10.70%
90-120	6.3	0.10%
0-90	5473.5	99.70%
90-180	15.9	0.30%
0-180	5489.4	100.00%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	46.1	0.80%	90-95	1.7	0.00%
5-10	136.7	2.50%	95-100	1.2	0.00%
10-15	222.0	4.00%	100-105	1.0	0.00%
15-20	298.2	5.40%	105-110	0.8	0.00%
20-25	362.5	6.60%	110-115	0.8	0.00%
25-30	414.3	7.50%	115-120	0.8	0.00%
30-35	452.7	8.20%	120-125	0.8	0.00%
35-40	475.4	8.70%	125-130	0.9	0.00%
40-45	480.6	8.80%	130-135	1.0	0.00%
45-50	471.4	8.60%	135-140	1.0	0.00%
50-55	447.9	8.20%	140-145	1.0	0.00%
55-60	410.5	7.50%	145-150	1.0	0.00%
60-65	362.8	6.60%	150-155	0.9	0.00%
65-70	308.2	5.60%	155-160	0.9	0.00%
70-75	249.1	4.50%	160-165	0.8	0.00%
75-80	184.0	3.40%	165-170	0.7	0.00%
80-85	113.0	2.10%	170-175	0.4	0.00%
85-90	38.1	0.70%	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	1924	1924	1924	1924	1924	1924	1924	1924	1924	1924	1924	1924	1924	1924	1924	1924	1924
1	1916	1916	1920	1938	1942	1928	1917	1912	1927	1923	1927	1940	1944	1933	1922	1921	1916
2	1918	1911	1917	1934	1944	1938	1927	1918	1928	1921	1923	1939	1947	1941	1931	1925	1918
3	1916	1907	1911	1930	1944	1944	1932	1921	1926	1917	1918	1936	1947	1948	1939	1926	1916
4	1919	1904	1904	1923	1941	1947	1938	1924	1925	1911	1912	1929	1945	1952	1946	1932	1919
5	1915	1899	1895	1915	1934	1949	1940	1923	1922	1906	1902	1921	1940	1955	1947	1932	1915
6	1913	1897	1888	1908	1929	1945	1940	1921	1920	1901	1896	1916	1937	1953	1947	1931	1913
7	1908	1895	1882	1902	1923	1940	1935	1918	1915	1899	1890	1911	1931	1949	1944	1927	1908
8	1904	1890	1876	1895	1917	1932	1930	1913	1910	1894	1883	1904	1927	1942	1940	1920	1904
9	1899	1887	1870	1888	1911	1920	1920	1904	1904	1889	1879	1897	1920	1931	1930	1914	1899
10	1892	1883	1868	1880	1902	1908	1909	1894	1896	1886	1874	1892	1913	1921	1919	1906	1892
11	1881	1876	1866	1874	1894	1895	1894	1884	1888	1878	1870	1886	1905	1911	1908	1895	1881
12	1871	1868	1862	1868	1884	1882	1881	1871	1877	1871	1867	1879	1897	1899	1896	1884	1871
13	1860	1859	1858	1863	1873	1870	1864	1857	1863	1861	1863	1874	1887	1887	1881	1870	1860
14	1848	1849	1854	1859	1863	1857	1849	1842	1850	1850	1857	1869	1877	1874	1865	1857	1848
15	1836	1836	1845	1853	1852	1843	1832	1825	1837	1838	1849	1863	1866	1862	1850	1841	1836
16	1822	1824	1833	1843	1840	1829	1816	1809	1822	1826	1840	1855	1856	1848	1833	1826	1822
17	1808	1810	1820	1833	1830	1814	1797	1791	1806	1813	1825	1844	1845	1834	1818	1809	1808
18	1794	1797	1806	1820	1818	1800	1780	1772	1791	1797	1810	1830	1834	1821	1803	1793	1794
19	1777	1782	1787	1804	1807	1786	1765	1755	1776	1782	1794	1814	1821	1807	1788	1777	1777
20	1761	1766	1770	1784	1792	1773	1748	1737	1758	1765	1774	1795	1807	1794	1772	1759	1761
25	1671	1674	1678	1692	1701	1695	1673	1651	1662	1673	1682	1702	1718	1717	1697	1678	1671
30	1567	1577	1589	1607	1614	1601	1577	1552	1557	1567	1588	1615	1631	1623	1603	1578	1567
35	1453	1466	1489	1513	1519	1500	1466	1439	1439	1456	1487	1519	1534	1522	1492	1464	1453
40	1328	1340	1362	1394	1408	1392	1349	1315	1314	1326	1357	1396	1420	1412	1374	1340	1328
45	1192	1207	1235	1269	1283	1262	1225	1186	1179	1189	1224	1266	1290	1279	1244	1210	1192
50	1052	1073	1110	1148	1159	1133	1085	1048	1037	1053	1096	1142	1160	1142	1101	1067	1052
55	902	928	972	1018	1031	1004	948	900	889	913	956	1004	1025	1007	956	914	902
60	748	776	830	884	903	872	811	752	736	756	806	864	891	869	813	764	748
65	595	623	686	755	779	746	675	611	583	599	661	730	762	736	670	615	595
70	446	479	554	632	658	626	545	467	436	458	527	603	634	609	536	468	446
75	305	345	434	502	525	497	425	336	296	324	404	470	498	475	411	333	305
80	176	223	300	358	377	352	293	216	169	205	274	326	347	328	276	211	176
85	66	108	158	197	210	193	151	102	63	95	134	167	181	169	136	97	66
90	3	6	8	9	8	8	7	4	3	3	4	4	4	4	4	4	3
95	2	2	2	3	3	3	3	2	1	2	3	3	3	3	2	2	2
100	1	2	2	2	3	2	2	2	2	2	2	3	2	2	2	2	1
105	1	1	2	2	2	2	2	1	2	2	2	2	2	2	1	2	1
110	1	2	2	2	2	2	1	1	1	2	2	2	1	2	1	2	1
115	2	1	2	2	1	2	2	1	1	2	2	2	1	2	1	2	2
120	1	2	2	1	2	2	2	2	2	2	2	2	2	2	1	1	1
125	1	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	1
130	2	2	2	2	2	3	2	2	2	2	2	3	2	3	2	2	2
135	3	2	3	3	2	3	2	2	2	3	3	3	2	3	3	2	3
140	3	2	3	3	2	3	3	3	2	3	3	3	3	3	3	3	3
145	3	3	3	3	3	3	3	3	3	4	3	3	4	4	3	3	3
150	3	3	4	4	4	4	4	4	3	3	3	4	4	4	4	4	3
155	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
160	5	4	5	4	4	5	4	4	5	5	4	5	5	5	5	5	5
165	6	5	6	6	5	6	5	5	5	5	5	6	6	6	6	5	6
170	6	6	6	6	6	7	6	6	6	6	6	6	6	7	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

Model No.	55101-45W-35K	Sample ID.	4535697
Operate time (Min.)	90	Stabilization time (Min.)	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
24.8	120.05	60	0.3594	42.76	0.9908	9.71%	Horizontal
24.8	277.11	60	0.1639	43.49	0.9572	12.60%	Horizontal



THD and PF Test

Model No.	55101-45W-40K	Sample ID.	4535697
Operate time (Min.)	90	Stabilization time (Min.)	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
24.8	120.06	60	0.3421	40.72	0.9910	9.33%	Horizontal
24.8	277.03	60	0.1578	41.74	0.9549	12.60%	Horizontal



THD and PF Test

Model No.	55101-45W-50K	Sample ID.	4535697
Operate time (Min.)	90	Stabilization time (Min.)	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
24.8	120.08	60	0.3596	42.78	0.9909	9.64%	Horizontal
24.8	277.18	60	0.1636	43.40	0.9572	12.60%	Horizontal



THD and PF Test

Model No.	55101-38W-35K	Sample ID.	4535697
Operate time (Min.)	90	Stabilization time (Min.)	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
24.8	120.06	60	0.3168	37.61	0.9881	11.08%	Horizontal
24.8	277.10	60	0.1492	39.19	0.9479	14.08%	Horizontal



THD and PF Test

Model No.	55101-34W-35K	Sample ID.	4535697
Operate time (Min.)	90	Stabilization time (Min.)	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
24.8	120.07	60	0.2752	32.54	0.9842	12.80%	Horizontal
24.8	277.05	60	0.1339	34.69	0.9353	15.82%	Horizontal



In-Situ Temperature Measurement Test

Model No.	55101-45W-35K	Sample ID.	4535697
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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
24.3	120.05	60	0.3594	42.76	0.9908	9.71%	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	24.3	25.0				
TMP of Location 1	120	48.3	49.0	0.0024	STW8A2PD-XX	200	105

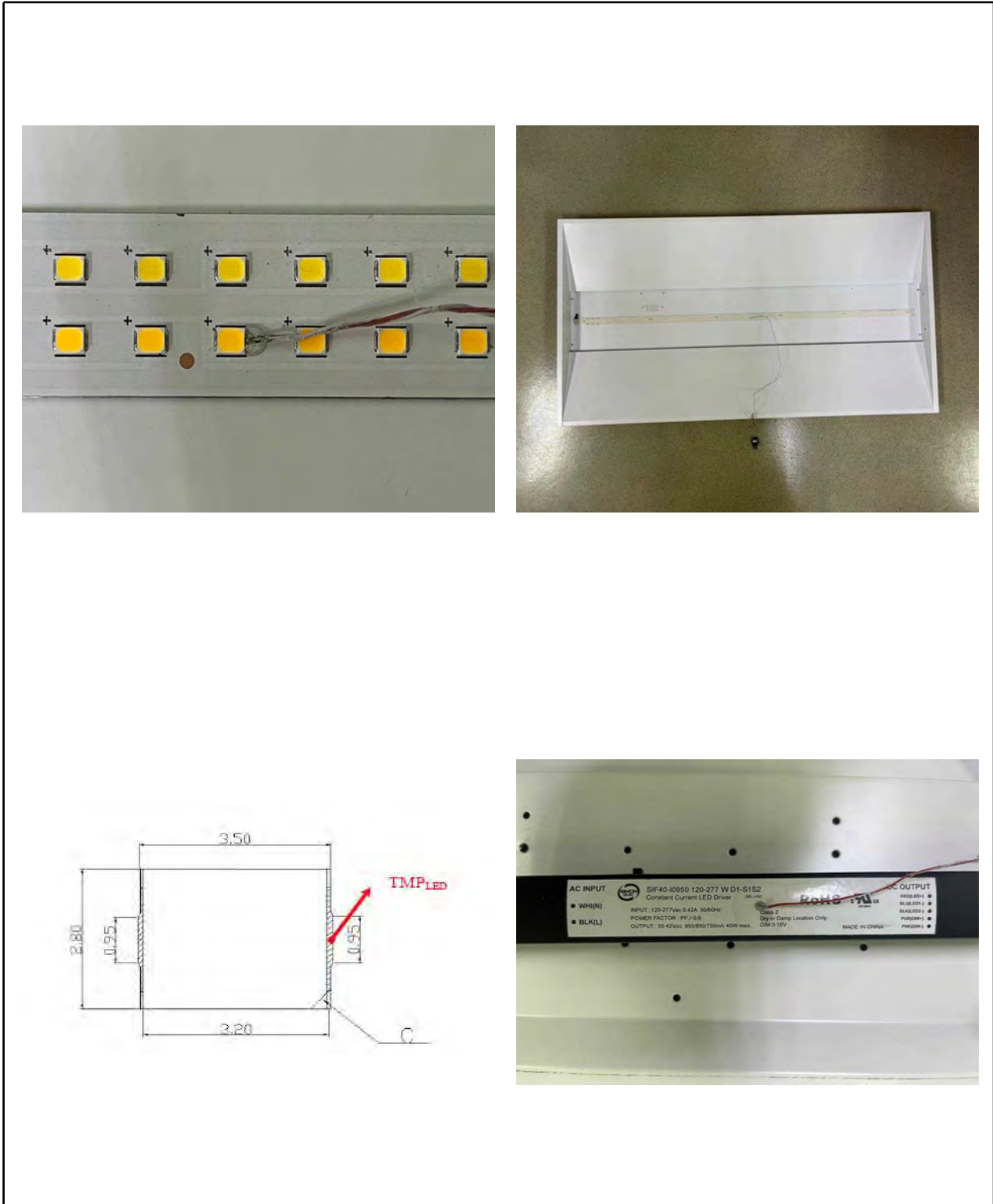
Test Results (Drivers)

Thermocouple Location	Temperature for Driver (°C)		Driver Model Number	Driver Limit Temp (°C)
	Test Result	Test Result (Correct to 25 °C)		
Ambient TEMP	24.3	25.0		
TMP of Location 1	56.6	57.3	SIF 40-I0950 120-277 W D1-S1S2	85



In-Situ Temperature Measurement Test (Cont'd)

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





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