



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

55094

Project Number

4790320956

Report Number

4790320956_10

Test Date

2022-03-21~2022-03-23

Issue Date

2022-04-17

Revision Date

N/A

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Wu, Elvis

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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	≥2000	-10%	4012.05
Minimum Luminaire Efficacy (lm/W)-Luminaires	IES LM-79-2008	≥110	-3%	126.60
Spacing Criteria (0-180°)	IES LM-79-2008	1.0-2.0	±0.1	1.20
Spacing Criteria (90-270°)	IES LM-79-2008	1.0-2.0	±0.1	1.24
Zonal Lumen Requirement 1(0°-60°)	IES LM-79-2008	≥75%	-3%	80.20%
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±245	N/A	3426
Allowable CCT (4000K)	IES LM-79-2008/ANSI C78.377-2015	3985±275	N/A	4059
Allowable CCT (5000K)	IES LM-79-2008/ANSI C78.377-2015	5029±283	N/A	4902
Minimum CRI	IES LM-79-2008/CIE 13.3-1995	≥80	-1	83
Minimum R9	IES LM-79-2008	≥0	-1	7.0
Minimum Rg	IES LM-79-2008	≥89	-1	93
Minimum Rf	IES LM-79-2008	≥70	-1	82
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	0.9207
Total Harmonic Distortion (A%)	ANSI C82.77-10-2014	≤20%	5%	17.91%
In-Situ Temperature Measurement Test for LED 1 (°C)	UL1598-2008	≤105	N/A	57.9
In-Situ Temperature Measurement Test for Driver 1 (°C)	UL1598-2008	≤90	N/A	52.2
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: 2022-03-18

Test Item	Test Date	Model Number	Tests Conducted By
Integrating Sphere Test	2022-03-22	55094-40W-35K	Yang, Gavin X
Integrating Sphere Test	2022-03-22	55094-40W-40K	Yang, Gavin X
Integrating Sphere Test	2022-03-22	55094-40W-50K	Yang, Gavin X
Integrating Sphere Test	2022-03-22	55094-35W-35K	Yang, Gavin X
Integrating Sphere Test	2022-03-22	55094-30W-35K	Yang, Gavin X
Goniophotometer Test	2022-03-21	55094-40W-35K	Yang, Gavin X
Goniophotometer Test	2022-03-21	55094-40W-50K	Yang, Gavin X
THD and PF Test	2022-03-21	55094-40W-35K	Yang, Gavin X
THD and PF Test	2022-03-21	55094-40W-40K	Yang, Gavin X
THD and PF Test	2022-03-21	55094-40W-50K	Yang, Gavin X
THD and PF Test	2022-03-21	55094-35W-35K	Yang, Gavin X
THD and PF Test	2022-03-21	55094-30W-35K	Yang, Gavin X
In-Situ Temperature Measurement Test	2022-03-23	55094-40W-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: 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces

Model Number: 55094

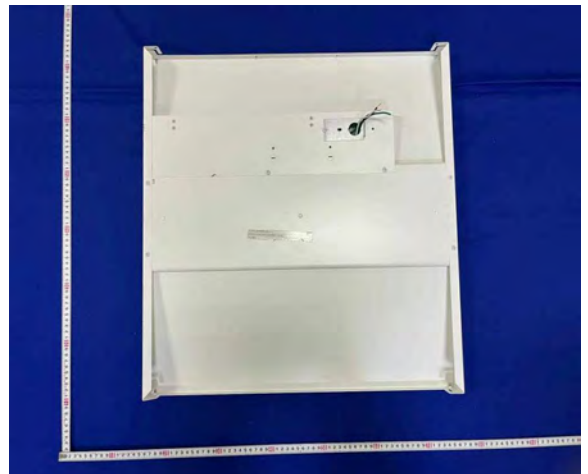
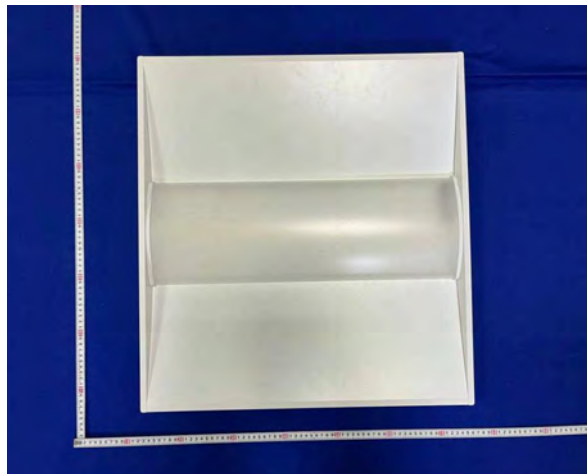
Electrical Parameter: 120-277V, 50/60Hz

LED Package: STW8A2PD-XX

Dimming Information: Continuous dimming capability

Products Scaled Value

Model Number	CCT	Luminous Flux	Power	Luminous Efficacy
55094	3500k	5040	40	126
55094	4000k	5080	40	127
55094	5000k	5120	40	128
55094	3500k	4515	35	129
55094	4000k	4550	35	130
55094	5000k	4585	35	131
55094	3500k	3960	30	132
55094	4000k	3990	30	133
55094	5000k	4020	30	134





Integrating Sphere Test

Model No.	55094-40W-35K	Sample ID.	4776406
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.

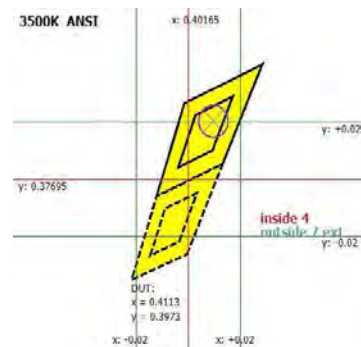
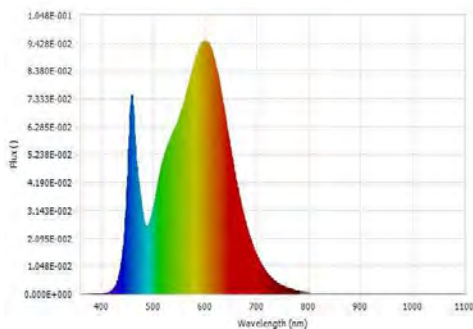
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using 4π geometry. The self-absorption 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
24.9	119.96	60	0.3326	39.422	0.9880	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3426	83	7.0	0.0016	5045.99	128.00	N/A



Luminous Flux (lm)	5045.99	Chrom x	0.4113
Chrom y	0.3973	Chrom u	0.2369
Chrom v	0.3432	Duv	0.0016
Chrom u'	0.2369	Chrom v'	0.5148
CCT (K)	3426	Luminous Efficacy (lm/W)	128.00
Ra	83	R1	81.0
R2	91.0	R3	96.0
R4	79.0	R5	80.0
R6	88.0	R7	84.0
R8	61.0	R9	7.0
R10	79.0	R11	77.0
R12	62.0	R13	84.0
R14	99.0	R15	74.0
Rf	83	Rg	93
Rcs,h1	-12%		



Integrating Sphere Test (Cont'd)

TM-30 Report

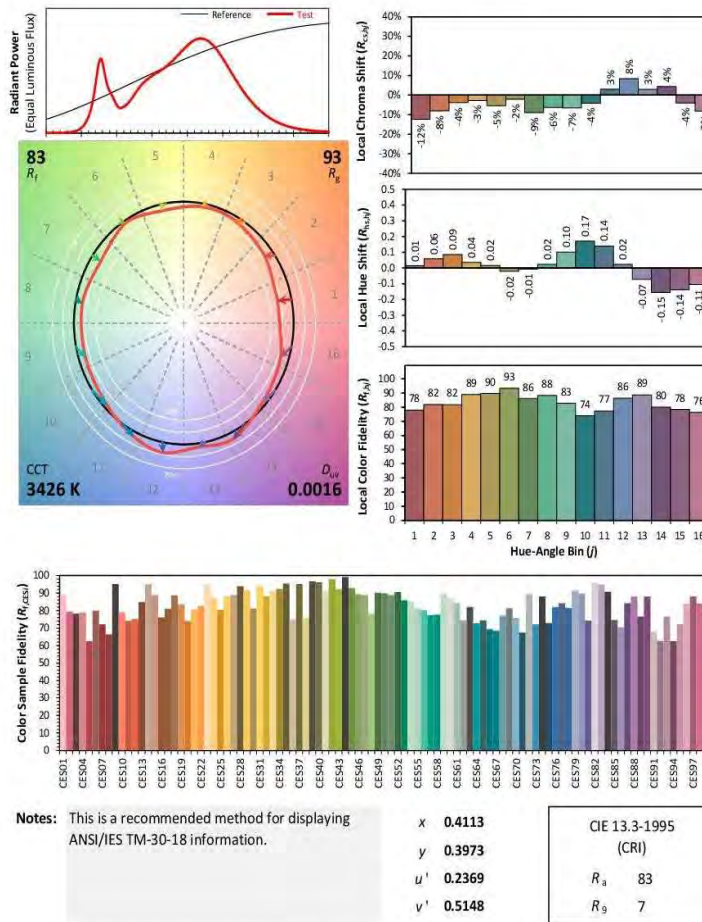
ANSI/IES TM-30-18 Color Rendition Report

Source: STW8A2PD-XX

Manufacturer: P.O.L., Inc.

Date: 3/22/2022

Model: 55094-40W-35K



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



Integrating Sphere Test

Model No.	55094-40W-40K	Sample ID.	4776406
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.

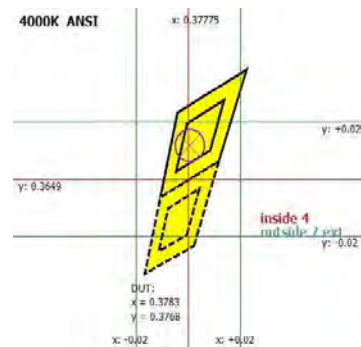
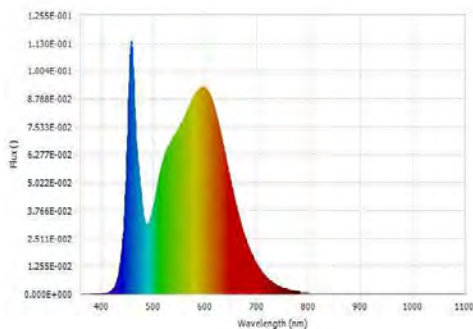
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using 4π geometry. The self-absorption 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
24.9	119.96	60	0.3182	37.717	0.9881	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
4059	84	13.0	0.0007	5414.2	143.55	N/A



Luminous Flux (lm)	TM	Chrom x	0.3783
Chrom y	0.3768	Chrom u	0.2237
Chrom v	0.3342	Duv	0.0007
Chrom u'	0.2237	Chrom v'	0.5013
CCT (K)	4059	Luminous Efficacy (lm/W)	143.55
Ra	84	R1	83.0
R2	92.0	R3	96.0
R4	80.0	R5	82.0
R6	87.0	R7	85.0
R8	65.0	R9	13.0
R10	79.0	R11	78.0
R12	58.0	R13	85.0
R14	98.0	R15	77.0
Rf	83	Rg	93
Rcs,h1	-12%		



Integrating Sphere Test (Cont'd)

TM-30 Report

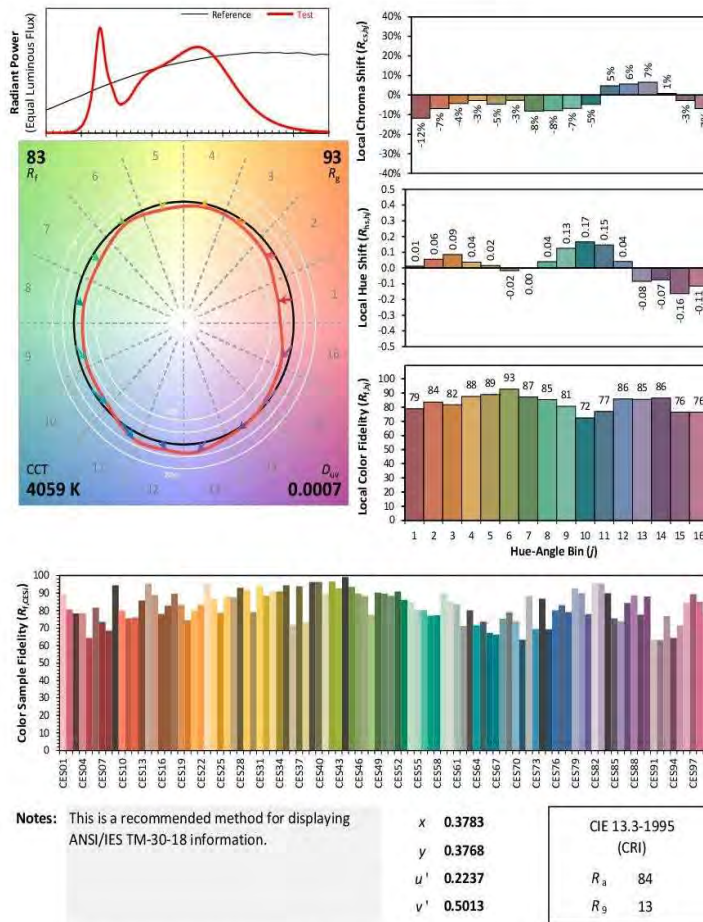
ANSI/IES TM-30-18 Color Rendition Report

Source: STW8A2PD-XX

Manufacturer: P.Q.L., Inc.

Date: 3/22/2022

Model: 55094-40W-40K



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Integrating Sphere Test

Model No.	55094-40W-50K		Sample ID.	4776406
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.

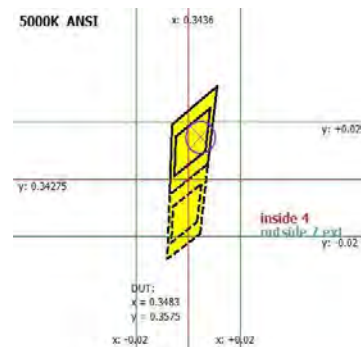
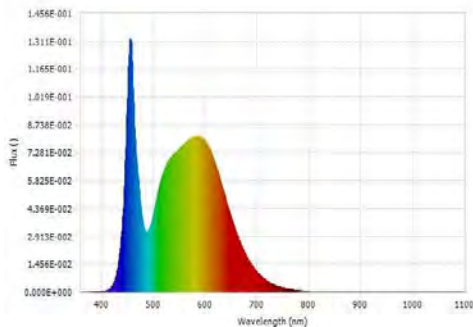
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using 4π geometry. The self-absorption 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
24.9	119.98	60	0.3307	39.201	0.9881	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
4902	83	9.0	0.0017	5086.92	129.77	N/A



Luminous Flux (lm)	5086.92	Chrom x	0.3483
Chrom y	0.3575	Chrom u	0.2113
Chrom v	0.3253	Duv	0.0017
Chrom u'	0.2113	Chrom v'	0.4880
CCT (K)	4902	Luminous Efficacy (lm/W)	129.77
Ra	83	R1	81.0
R2	89.0	R3	94.0
R4	79.0	R5	80.0
R6	83.0	R7	87.0
R8	67.0	R9	9.0
R10	73.0	R11	77.0
R12	53.0	R13	84.0
R14	97.0	R15	76.0
Rf	82	Rg	94
Rcs,h1	-13%		



Integrating Sphere Test (Cont'd)

TM-30 Report

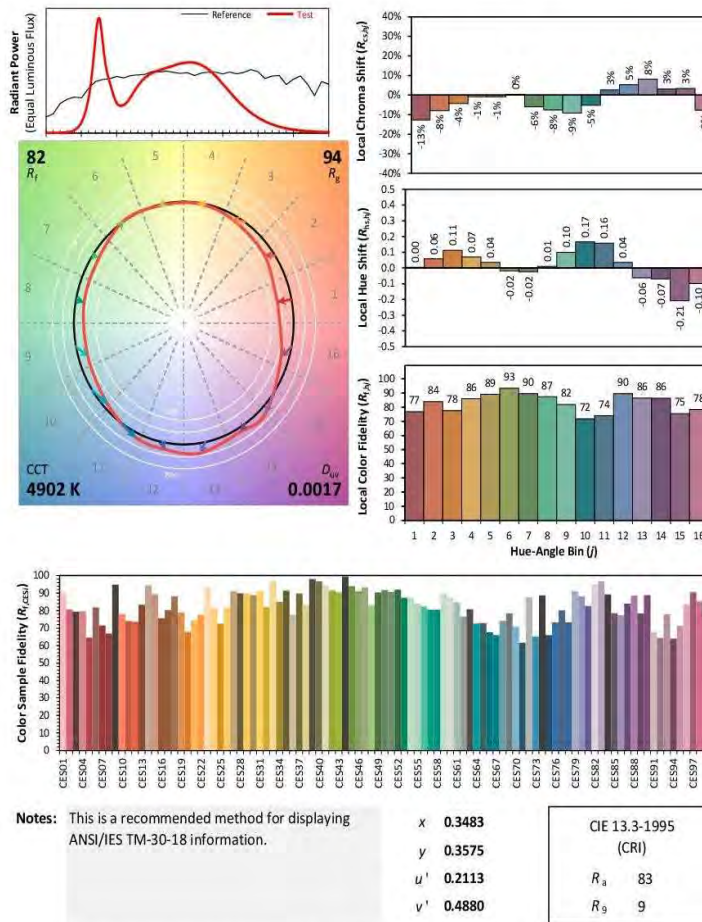
ANSI/IES TM-30-18 Color Rendition Report

Source: STW8A2PD-XX

Manufacturer: P.Q.L., Inc.

Date: 3/22/2022

Model: 55094-40W-50K



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Integrating Sphere Test

Model No.	55094-35W-35K	Sample ID.	4776406
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.

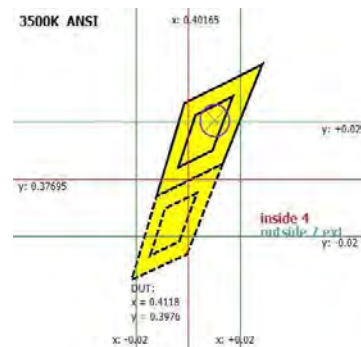
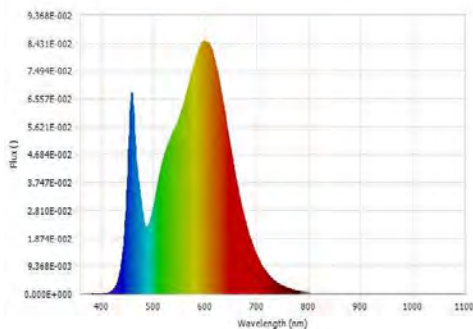
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using 4π geometry. The self-absorption 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
24.9	119.99	60	0.2890	34.115	0.9839	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3419	83	8.0	0.0016	4508.24	132.15	N/A



Luminous Flux (lm)	4508.24	Chrom x	0.4118
Chrom y	0.3976	Chrom u	0.2370
Chrom v	0.3434	Duv	0.0016
Chrom u'	0.2370	Chrom v'	0.5151
CCT (K)	3419	Luminous Efficacy (lm/W)	132.15
Ra	83	R1	81.0
R2	91.0	R3	96.0
R4	79.0	R5	81.0
R6	88.0	R7	84.0
R8	61.0	R9	8.0
R10	79.0	R11	77.0
R12	62.0	R13	84.0
R14	99.0	R15	74.0
Rf	83	Rg	93
Rcs,h1	-12%		



Integrating Sphere Test (Cont'd)

TM-30 Report

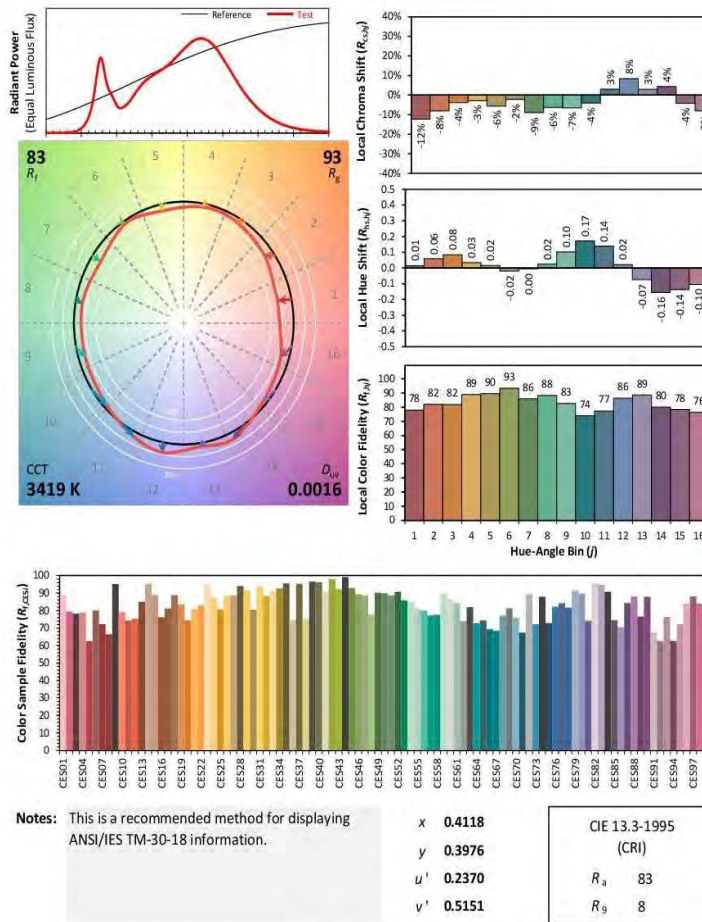
ANSI/IES TM-30-18 Color Rendition Report

Source: STW8A2PD-XX

Manufacturer: P.Q.L., Inc.

Date: 3/22/2022

Model: 55094-35W-35K



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Integrating Sphere Test

Model No.	55094-30W-35K		Sample ID.	4776406
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.

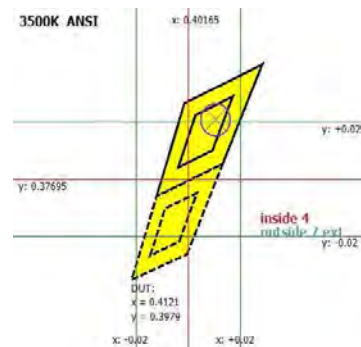
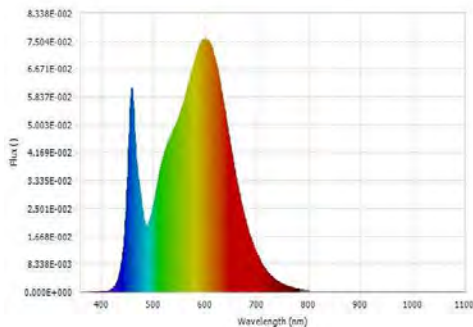
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using 4π geometry. The self-absorption 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
24.9	120.03	60	0.2518	29.591	0.9793	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3413	83	8.0	0.0017	4012.05	135.58	N/A



Luminous Flux (lm)	4012.05	Chrom x	0.4121
Chrom y	0.3979	Chrom u	0.2372
Chrom v	0.3435	Duv	0.0017
Chrom u'	0.2372	Chrom v'	0.5152
CCT (K)	3413	Luminous Efficacy (lm/W)	135.58
Ra	83	R1	81.0
R2	92.0	R3	96.0
R4	79.0	R5	81.0
R6	88.0	R7	84.0
R8	61.0	R9	8.0
R10	79.0	R11	77.0
R12	62.0	R13	84.0
R14	99.0	R15	74.0
Rf	83	Rg	93
Rcs,h1	-12%		



Integrating Sphere Test (Cont'd)

TM-30 Report

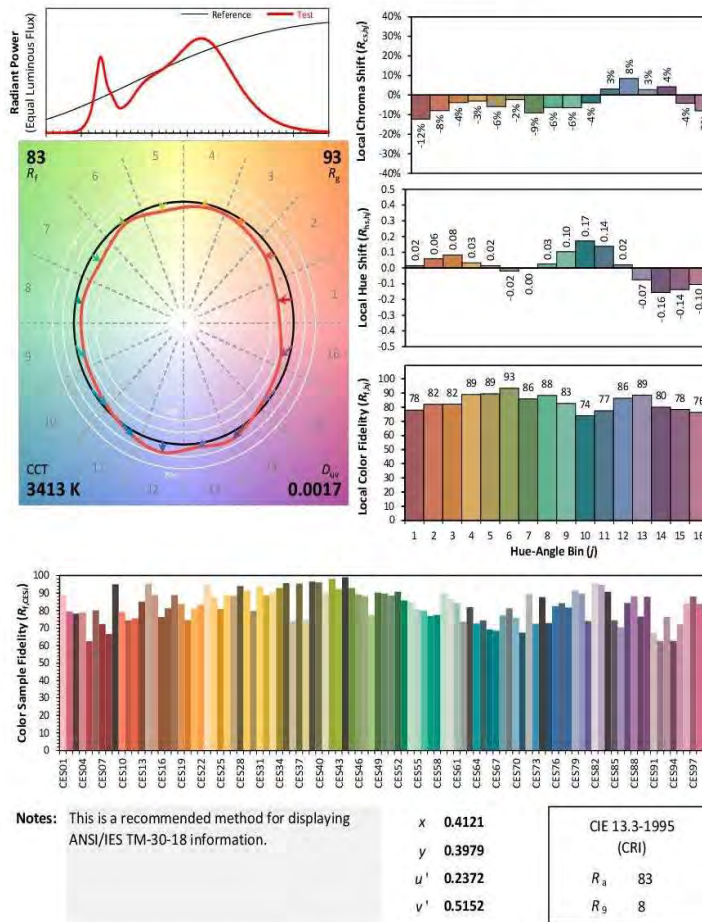
ANSI/IES TM-30-18 Color Rendition Report

Source: STW8A2PD-XX

Manufacturer: P.Q.L., Inc.

Date: 3/22/2022

Model: 55094-30W-35K



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Goniophotometer Test

Model No.	55094-40W-35K	Sample ID.	4776406
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
25.6	120.08	60	0.3322	39.45	0.9890	10.94%	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	
4994.2	80.40%	N/A	107.4	93.0	126.60

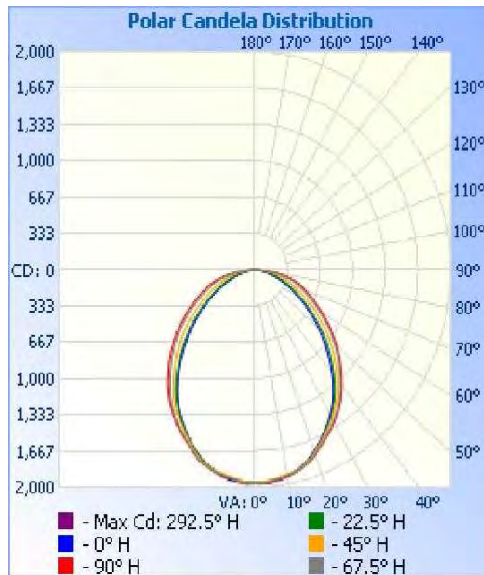
Backlight	Uplight	Glare
N/A	N/A	N/A

UGR		Spacing Criteria (0-180°)	Spacing Criteria (90°-270°)
Crosswise	Endwise		
N/A	N/A	1.18	1.24

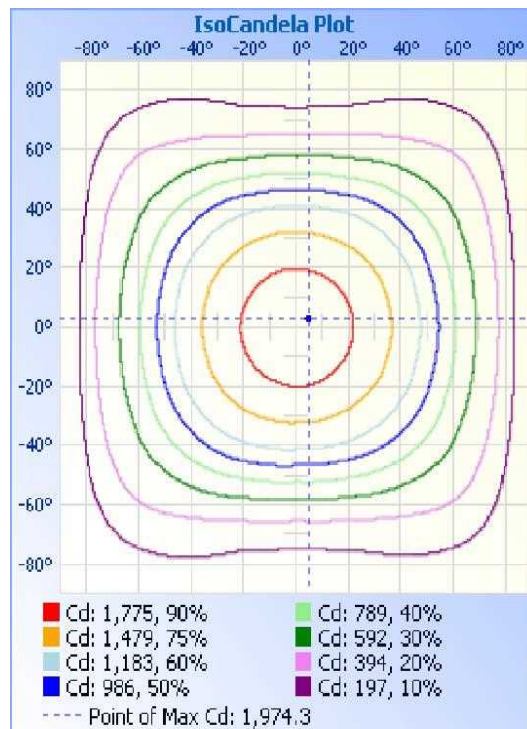


Goniophotometer Test (Cont'd)

Polar Candela Distribution



IsoCandela Plot





Goniophotometer Test (Cont'd)
Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1487.8	29.80%
0-40	2393.3	47.90%
0-60	4013.6	80.40%
60-90	967.0	19.40%
70-100	439.7	8.80%
90-120	4.4	0.10%
0-90	4980.6	99.70%
90-180	13.6	0.30%
0-180	4994.2	100.00%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	46.9	0.90%	90-95	1.1	0.00%
5-10	138.8	2.80%	95-100	0.9	0.00%
10-15	225.0	4.50%	100-105	0.7	0.00%
15-20	301.5	6.00%	105-110	0.7	0.00%
20-25	363.4	7.30%	110-115	0.6	0.00%
25-30	412.1	8.30%	115-120	0.5	0.00%
30-35	446.0	8.90%	120-125	0.7	0.00%
35-40	459.6	9.20%	125-130	0.7	0.00%
40-45	452.8	9.10%	130-135	0.8	0.00%
45-50	430.5	8.60%	135-140	0.9	0.00%
50-55	392.8	7.90%	140-145	1.0	0.00%
55-60	344.1	6.90%	145-150	1.0	0.00%
60-65	291.1	5.80%	150-155	1.0	0.00%
65-70	238.2	4.80%	155-160	0.9	0.00%
70-75	190.0	3.80%	160-165	0.9	0.00%
75-80	140.6	2.80%	165-170	0.7	0.00%
80-85	82.3	1.60%	170-175	0.5	0.00%
85-90	24.8	0.50%	175-180	0.2	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	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960
1	1957	1956	1953	1967	1965	1966	1954	1953	1952	1955	1954	1968	1966	1967	1959	1952	1950
2	1952	1957	1951	1967	1963	1967	1966	1958	1957	1954	1955	1969	1966	1971	1963	1958	1953
3	1954	1951	1950	1962	1966	1971	1971	1962	1956	1950	1954	1967	1969	1972	1969	1961	1956
4	1956	1951	1940	1955	1967	1972	1972	1963	1953	1948	1944	1956	1962	1974	1972	1967	1955
5	1951	1944	1936	1946	1961	1973	1970	1960	1953	1941	1932	1952	1959	1972	1974	1965	1953
6	1948	1941	1932	1942	1953	1969	1968	1959	1950	1937	1928	1945	1953	1971	1973	1959	1952
7	1944	1936	1924	1937	1948	1961	1966	1951	1944	1930	1919	1934	1951	1960	1973	1954	1946
8	1935	1931	1917	1934	1946	1952	1958	1945	1939	1929	1913	1930	1944	1956	1960	1950	1942
9	1930	1924	1909	1928	1935	1948	1948	1938	1928	1917	1910	1923	1936	1952	1955	1942	1931
10	1922	1921	1907	1916	1926	1934	1933	1925	1920	1910	1901	1915	1927	1942	1938	1936	1922
11	1913	1912	1903	1915	1919	1921	1925	1912	1908	1903	1899	1911	1918	1928	1926	1921	1912
12	1900	1902	1901	1909	1910	1911	1911	1899	1899	1900	1893	1904	1909	1916	1911	1907	1905
13	1892	1894	1893	1901	1903	1898	1896	1882	1883	1888	1886	1896	1896	1903	1897	1891	1889
14	1876	1886	1884	1894	1893	1884	1879	1867	1872	1877	1878	1893	1888	1891	1886	1878	1879
15	1864	1869	1873	1885	1880	1870	1860	1855	1859	1860	1865	1878	1876	1875	1870	1860	1864
16	1851	1854	1857	1870	1867	1858	1846	1844	1844	1845	1854	1868	1863	1860	1852	1845	1851
17	1835	1843	1841	1855	1859	1846	1836	1822	1825	1834	1843	1853	1850	1845	1842	1832	1833
18	1814	1825	1831	1843	1845	1832	1818	1805	1805	1816	1825	1842	1843	1836	1824	1813	1813
19	1793	1805	1809	1824	1826	1813	1801	1788	1787	1793	1802	1822	1827	1818	1808	1796	1796
20	1770	1783	1787	1801	1808	1797	1781	1769	1767	1772	1779	1800	1802	1801	1785	1776	1776
25	1660	1670	1677	1702	1709	1701	1684	1664	1652	1658	1670	1696	1707	1701	1691	1667	1662
30	1538	1556	1577	1607	1620	1607	1581	1546	1529	1539	1565	1601	1616	1606	1585	1552	1541
35	1396	1420	1458	1497	1512	1487	1454	1404	1383	1402	1446	1490	1510	1490	1457	1412	1395
40	1221	1254	1310	1361	1382	1356	1310	1249	1212	1235	1296	1354	1385	1362	1313	1251	1222
45	1039	1081	1152	1214	1237	1214	1156	1079	1031	1060	1138	1213	1248	1220	1165	1084	1048
50	862	912	993	1069	1094	1064	996	903	853	888	979	1070	1105	1074	1000	908	866
55	694	733	830	911	941	910	830	731	678	717	816	916	958	923	837	736	690
60	534	576	671	763	795	760	673	574	526	562	665	771	812	775	682	580	536
65	398	436	529	623	662	623	528	435	392	426	522	629	675	637	538	440	401
70	286	316	409	510	551	511	410	316	278	310	402	511	557	518	415	322	285
75	187	222	313	409	444	409	312	222	182	213	304	403	444	410	319	223	189
80	103	138	220	283	303	280	220	140	103	132	208	274	303	282	218	138	106
85	39	65	101	122	129	126	102	67	40	59	95	125	135	132	104	66	42
90	4	3	5	3	4	2	2	2	1	4	2	6	5	4	7	2	3
95	2	4	3	1	1	2	2	1	0	1	3	2	3	3	2	1	2
100	2	4	2	2	2	2	1	1	2	2	2	1	1	1	1	1	2
105	1	1	2	3	2	1	1	2	0	0	0	3	1	0	0	1	0
110	0	1	1	2	2	0	1	1	0	1	0	2	0	2	4	1	1
115	1	1	3	1	0	0	2	1	0	2	0	1	0	0	0	0	1
120	1	2	1	0	1	0	2	3	1	2	2	1	1	0	2	1	0
125	0	2	2	0	1	1	3	0	1	1	0	3	3	0	3	0	0
130	3	3	2	2	2	2	1	1	2	2	3	1	1	2	1	2	2
135	3	2	2	2	4	4	2	3	2	2	2	4	3	2	2	3	1
140	1	4	3	2	3	5	2	2	1	2	4	4	2	2	4	2	2
145	3	4	2	2	2	3	4	3	3	3	3	2	3	2	4	4	4
150	4	3	4	4	4	5	2	2	4	4	4	2	4	4	3	5	3
155	2	4	5	4	4	5	4	5	3	3	5	3	3	5	3	4	5
160	6	6	6	5	5	4	4	5	5	3	6	6	3	5	3	4	4
165	6	5	5	6	5	7	5	7	4	5	6	7	5	5	6	5	6
170	8	8	7	6	6	5	5	6	6	7	8	8	6	9	7	6	5
175	7	6	8	6	7	8	6	6	6	7	6	6	7	8	6	8	6
180	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7



Goniophotometer Test

Model No.	55094-40W-50K	Sample ID.	4776406
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
25.5	120.07	60	0.3301	39.19	0.9890	10.85%	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	
5037.9	80.20%	N/A	108.6	94.0	128.55

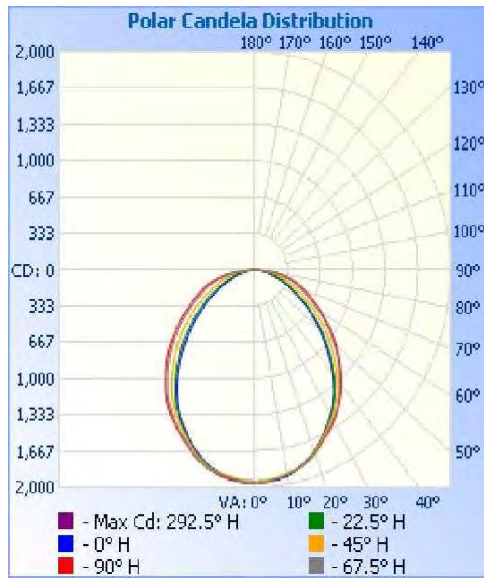
Backlight	Uplight	Glare
N/A	N/A	N/A

UGR		Spacing Criteria (0-180°)	Spacing Criteria (90°-270°)
Crosswise	Endwise		
N/A	N/A	1.20	1.24

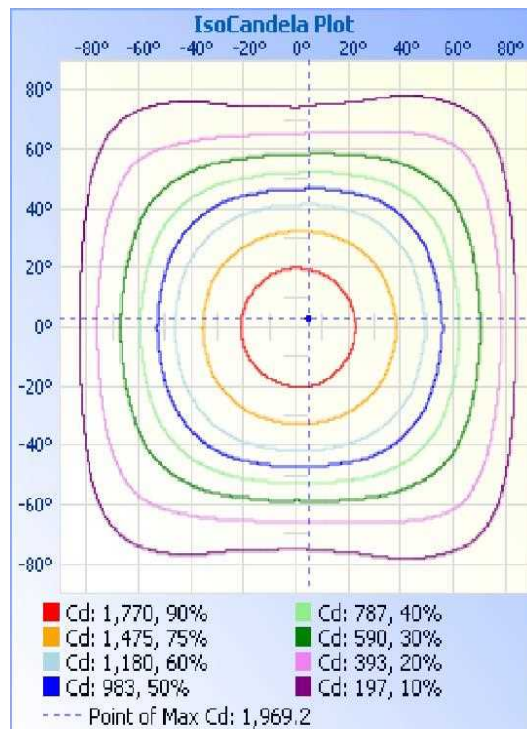


Goniophotometer Test (Cont'd)

Polar Candela Distribution



IsoCandela Plot





Goniophotometer Test (Cont'd)
Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1487.2	29.50%
0-40	2398.8	47.60%
0-60	4040.9	80.20%
60-90	984.0	19.50%
70-100	447.8	8.90%
90-120	4.2	0.10%
0-90	5024.9	99.70%
90-180	13.0	0.30%
0-180	5037.9	100.00%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	46.7	0.90%	90-95	1.1	0.00%
5-10	138.3	2.70%	95-100	1.0	0.00%
10-15	224.4	4.50%	100-105	0.5	0.00%
15-20	301.0	6.00%	105-110	0.5	0.00%
20-25	363.7	7.20%	110-115	0.5	0.00%
25-30	413.1	8.20%	115-120	0.6	0.00%
30-35	448.3	8.90%	120-125	0.6	0.00%
35-40	463.3	9.20%	125-130	0.7	0.00%
40-45	457.8	9.10%	130-135	0.8	0.00%
45-50	436.0	8.70%	135-140	0.9	0.00%
50-55	398.6	7.90%	140-145	1.0	0.00%
55-60	349.8	6.90%	145-150	0.9	0.00%
60-65	296.0	5.90%	150-155	1.0	0.00%
65-70	242.2	4.80%	155-160	0.8	0.00%
70-75	193.3	3.80%	160-165	0.9	0.00%
75-80	142.9	2.80%	165-170	0.7	0.00%
80-85	84.0	1.70%	170-175	0.5	0.00%
85-90	25.6	0.50%	175-180	0.2	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	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
1	1946	1942	1944	1958	1949	1952	1946	1937	1941	1946	1944	1960	1957	1958	1951	1943	1945
2	1947	1943	1945	1958	1956	1959	1950	1945	1944	1948	1947	1960	1960	1961	1957	1951	1944
3	1948	1947	1940	1958	1955	1961	1959	1949	1943	1949	1942	1959	1962	1969	1962	1953	1951
4	1946	1943	1936	1946	1954	1960	1961	1952	1945	1940	1937	1951	1960	1969	1969	1957	1950
5	1944	1934	1928	1942	1948	1959	1962	1950	1941	1937	1926	1947	1953	1967	1968	1957	1944
6	1941	1931	1924	1936	1946	1959	1960	1950	1939	1929	1924	1939	1950	1966	1967	1954	1942
7	1941	1925	1915	1932	1938	1952	1955	1945	1934	1925	1914	1931	1944	1960	1961	1951	1939
8	1930	1919	1908	1924	1932	1944	1953	1937	1927	1919	1912	1925	1942	1954	1957	1943	1930
9	1926	1914	1901	1914	1920	1936	1936	1930	1923	1916	1908	1923	1934	1947	1947	1937	1926
10	1916	1906	1897	1909	1914	1926	1928	1919	1912	1913	1901	1912	1926	1936	1936	1926	1921
11	1908	1902	1891	1902	1907	1916	1915	1909	1903	1904	1897	1910	1919	1925	1922	1917	1913
12	1897	1893	1885	1897	1897	1905	1900	1894	1892	1897	1895	1903	1912	1910	1910	1905	1901
13	1886	1884	1882	1891	1886	1889	1887	1879	1881	1887	1888	1898	1899	1901	1902	1891	1886
14	1872	1874	1875	1879	1874	1876	1872	1864	1868	1877	1879	1892	1891	1890	1885	1876	1877
15	1856	1865	1861	1871	1867	1863	1856	1848	1851	1866	1868	1881	1885	1876	1868	1859	1860
16	1841	1850	1851	1859	1856	1848	1838	1831	1836	1848	1856	1871	1872	1862	1852	1845	1844
17	1826	1830	1835	1845	1840	1834	1827	1818	1822	1832	1839	1858	1856	1846	1838	1822	1827
18	1814	1819	1821	1830	1826	1823	1812	1802	1805	1818	1827	1841	1845	1836	1824	1815	1814
19	1795	1798	1802	1816	1814	1807	1792	1782	1784	1799	1809	1829	1827	1825	1810	1796	1796
20	1773	1779	1778	1796	1795	1787	1776	1760	1766	1780	1789	1808	1817	1809	1793	1777	1775
25	1665	1667	1672	1692	1698	1691	1677	1658	1654	1668	1681	1708	1722	1714	1702	1677	1666
30	1543	1551	1570	1596	1607	1599	1574	1544	1537	1553	1579	1622	1637	1629	1602	1567	1547
35	1406	1419	1452	1491	1500	1484	1444	1404	1390	1424	1468	1518	1542	1521	1482	1432	1407
40	1233	1252	1302	1351	1372	1350	1304	1243	1220	1260	1327	1392	1423	1399	1349	1276	1235
45	1052	1078	1142	1207	1228	1204	1148	1073	1042	1085	1173	1252	1288	1264	1200	1110	1055
50	872	905	986	1059	1085	1054	985	900	862	914	1019	1112	1147	1119	1041	936	879
55	701	730	818	903	933	900	819	727	689	742	856	956	998	964	874	761	702
60	541	570	661	753	786	751	664	570	534	585	699	804	848	815	718	602	545
65	405	429	515	610	647	611	519	432	400	441	551	664	709	676	570	459	408
70	291	311	396	492	532	494	398	312	284	325	431	547	594	555	445	338	289
75	190	214	298	392	426	390	300	213	185	226	331	435	479	444	346	240	194
80	107	133	203	268	291	267	206	130	105	144	228	298	327	305	242	153	109
85	44	61	94	121	129	122	96	61	41	66	107	136	145	141	116	75	41
90	2	4	3	3	4	5	3	2	3	2	3	5	5	3	7	5	4
95	1	2	1	3	4	2	3	0	1	0	2	1	2	0	2	2	0
100	0	2	2	0	2	1	0	0	0	4	1	0	2	1	2	0	2
105	2	1	0	1	1	3	1	0	1	2	2	2	2	1	2	1	0
110	0	1	0	0	1	1	1	2	2	1	2	3	2	0	0	1	0
115	0	1	0	1	1	0	0	2	2	0	2	1	1	0	2	0	1
120	0	2	2	1	2	0	0	0	2	0	3	0	3	0	0	2	1
125	1	1	1	3	2	0	1	0	1	0	1	1	1	3	2	0	4
130	2	0	3	3	1	1	2	3	3	2	2	2	2	2	2	1	2
135	1	2	3	3	2	2	3	2	3	1	0	2	2	3	2	1	1
140	4	2	2	4	3	3	3	3	4	2	3	3	1	2	5	3	3
145	2	4	4	2	1	1	5	1	5	4	3	3	2	3	3	4	4
150	3	4	5	3	3	5	4	3	4	3	4	4	3	4	3	6	4
155	5	2	5	4	4	4	5	5	3	3	4	7	3	4	6	3	3
160	4	7	4	5	4	4	3	4	4	4	5	6	6	6	4	7	4
165	7	5	6	5	7	7	5	5	7	7	5	5	4	5	5	6	4
170	8	8	8	6	7	8	8	8	9	8	5	7	6	5	6	8	6
175	5	6	8	7	6	6	6	7	5	7	8	6	6	7	9	7	7
180	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8



THD and PF Test

Model No.	55094-40W-35K	Sample ID.	4776406
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
25.6	120.08	60	0.3322	39.45	0.9890	10.94%	Horizontal
25.6	277.08	60	0.1470	38.61	0.9477	14.08%	Horizontal



THD and PF Test

Model No.	55094-40W-40K	Sample ID.	4776406
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
25.6	120.07	60	0.3164	37.59	0.9892	10.39%	Horizontal
25.6	277.08	60	0.1415	37.01	0.9440	14.21%	Horizontal



THD and PF Test

Model No.	55094-40W-50K	Sample ID.	4776406
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
25.6	120.07	60	0.3300	39.18	0.9890	10.84%	Horizontal
25.6	277.02	60	0.1463	38.39	0.9472	14.13%	Horizontal



THD and PF Test

Model No.	55094-35W-35K	Sample ID.	4776406
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
25.6	120.08	60	0.2869	33.94	0.9851	12.73%	Horizontal
25.6	277.08	60	0.1322	34.20	0.9344	15.98%	Horizontal



THD and PF Test

Model No.	55094-30W-35K	Sample ID.	4776406
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
25.6	120.08	60	0.2496	29.42	0.9806	14.40%	Horizontal
25.6	277.11	60	0.1192	30.41	0.9207	17.91%	Horizontal



In-Situ Temperature Measurement Test

Model No.	55094-40W	Sample ID.	4776406
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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
24.4	120.08	60	0.3322	39.45	0.9890	10.94%	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	24.4	25.0				
TMP of Location 1	105	57.3	57.9	0.0024	STW8A2PD-XX	200	105

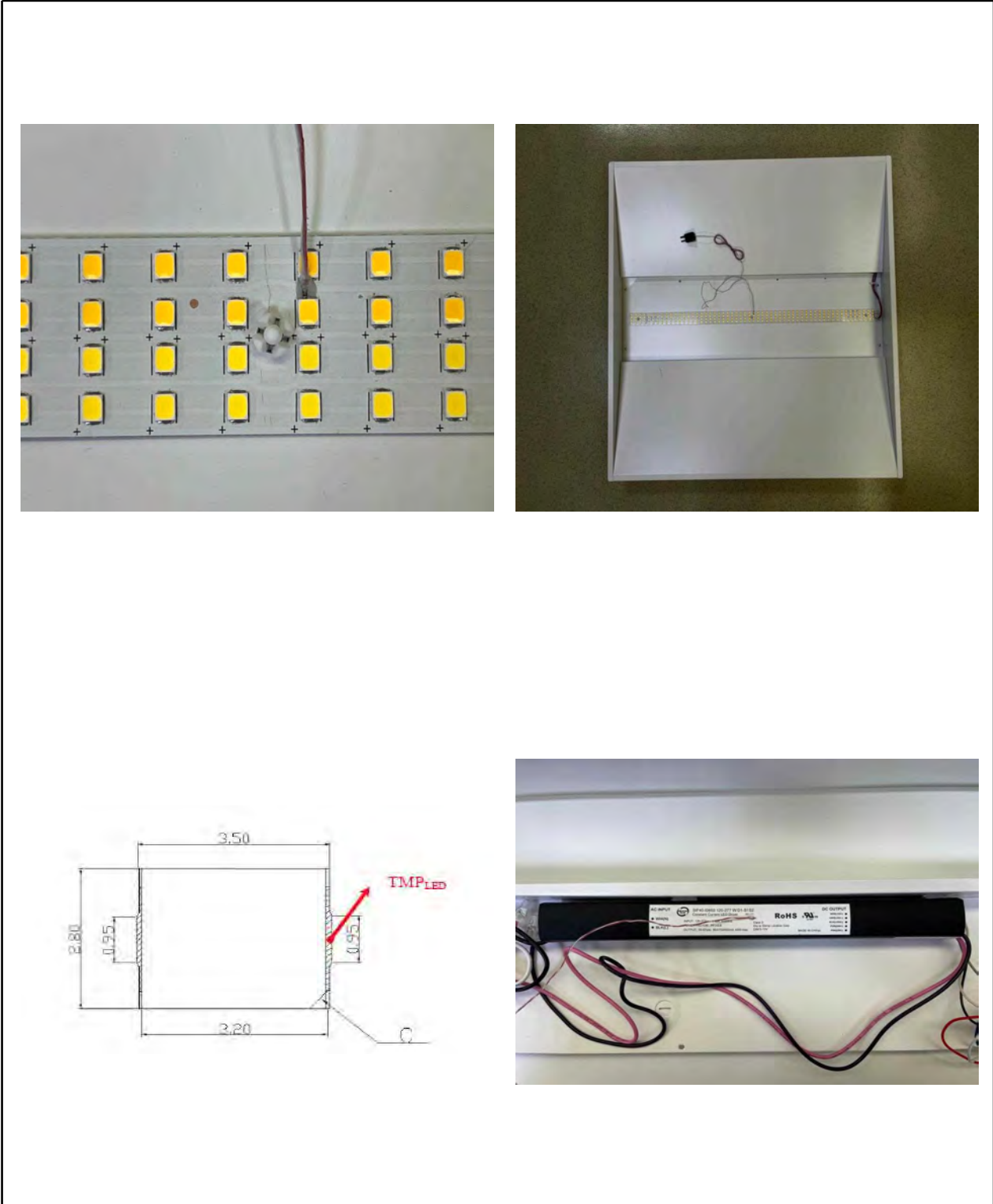
Test Results (Drivers)

Thermocouple Location	Temperature for Driver (°C)		Driver Model Number	Driver Limit Temp (°C)
	Test Result	Test Result (Correct to 25 °C)		
Ambient TEMP	24.4	25.0		
TMP of Location 1	51.6	52.2	SIF 40-I0850 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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