DesignLights Consortium Test Report

Refference 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
55764

Project Number
4790562779
Report Number
4790562779_6

Test Date
2022-09-26~2022-09-28
Issue Date
2022-10-09
Revision Date
N/A

Prepared By	**Approved By**
Zhao, Elaine	Wu, Elvis

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%	695.47
Minimum Luminaire Efficacy (lm/W)-Luminaires	**IES LM-79-2008**	≥115	-3%	132.43
Allowable CCT (3500K)	**IES LM-79-2008/ANSI C78.377-2015**	3465±245	N/A	3424
Allowable CCT (4000K)	**IES LM-79-2008/ANSI C78.377-2015**	3985±275	N/A	4118
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	3422
Allowable CCT (3500K)	**IES LM-79-2008/ANSI C78.377-2015**	3465±245	N/A	3418
Minimum CRI	**IES LM-79-2008/CIE 13.3-1995**	≥80	-1	81
Minimum R9	**IES LM-79-2008**	≥0	-1	2.0
Minimum Rf	**IES LM-79-2008**	≥70	-1	82
Minimum Rg	**IES LM-79-2008**	≥89	-1	97
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	0.9555
Total Harmonic Distortion (A%)	**ANSI C82.77-10-2014**	≤20%	5%	11.01%
In-Situ Temperature Measurement Test for LED 1 (°C)	**UL1598-2008**	≤105	N/A	47.6
In-Situ Temperature Measurement Test for Driver 1 (°C)	**UL1598-2008**	≤90	N/A	70.0
Max Chromaticity Shift (1000-6000h)	**N/A**	≤0.004	0.0004	0.0022
Minimum Luminaire Warranty (Years)	**N/A**	≥5	N/A	≥5

Test List

Sample Received Date: 2022-09-19

Test Item	Test Date	Model Number	Tests Conducted By
Integrating Sphere Test	2022-09-26	55764-54W-35K	Yang, Gavin X
Integrating Sphere Test	2022-09-27	55764-54W-40K	Yang, Gavin X
Integrating Sphere Test	2022-09-27	55764-54W-50K	Yang, Gavin X
Integrating Sphere Test	2022-09-27	55764-46W-35K	Yang, Gavin X
Integrating Sphere Test	2022-09-27	55764-38W-35K	Yang, Gavin X
THD and PF Test	2022-09-27	55764-54W-35K	Yang, Gavin X
THD and PF Test	2022-09-27	55764-54W-40K	Yang, Gavin X
THD and PF Test	2022-09-27	55764-54W-50K	Yang, Gavin X
THD and PF Test	2022-09-27	55764-46W-35K	Yang, Gavin X
THD and PF Test	2022-09-27	55764-38W-35K	Yang, Gavin X
In-Situ Temperature Measurement Test	2022-09-28	55764-54W-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: 55764
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
55764-54W-35K	3500K	7128	54	132
55764-54W-40K	4000K	7668	54	142
55764-54W-50K	5000K	7236	54	134
55764-46W-35K	3500K	6348	46	138
55764-46W-40K	4000K	6808	46	148
55764-46W-50K	5000K	6440	46	140
55764-38W-35K	3500K	5472	38	144
55764-38W-40K	4000K	5852	38	154
55764-38W-50K	5000K	5548	38	146

Integrating Sphere Test

Model No.	55764-54W-35K	Sample ID.	5350103
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

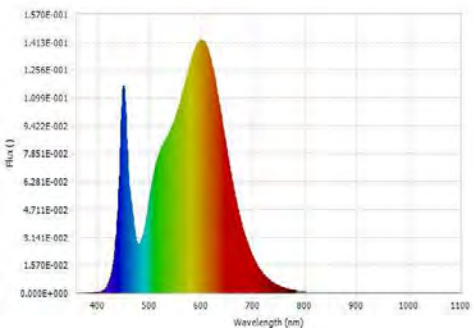
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C.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

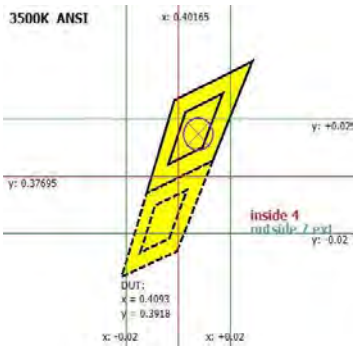
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
25.1	120.07	60	0.4737	56.578	0.9947	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3424	82	6.0	-0.0004	7492.65	132.43	936.58

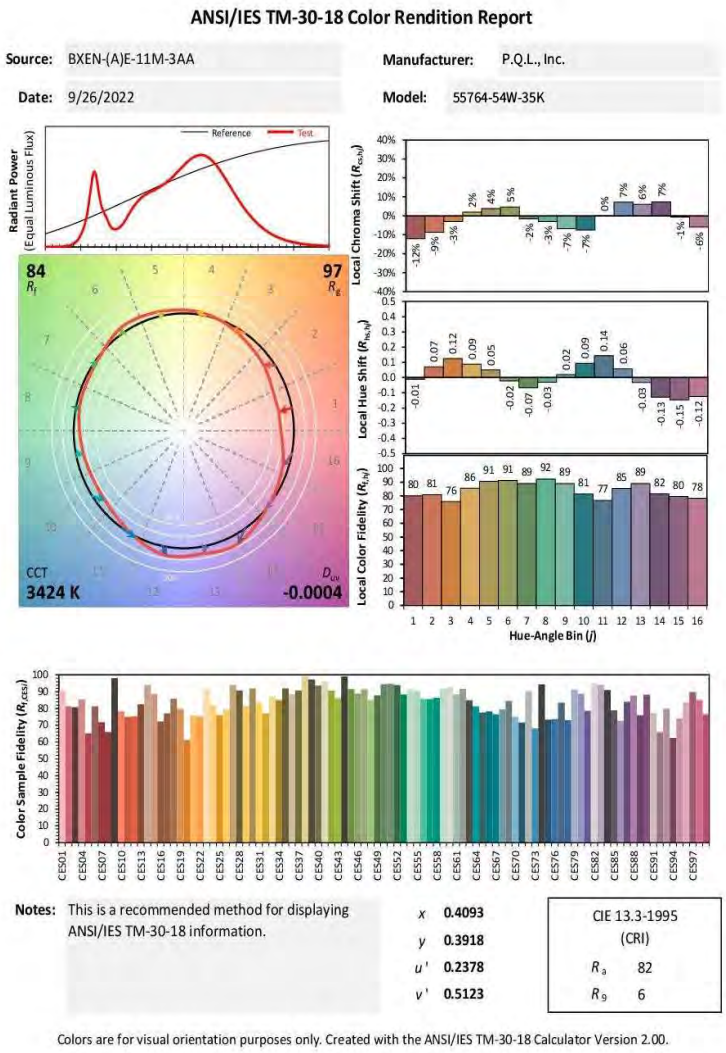




Luminous Flux (lm)	7492.65	Chrom x	0.4093
Chrom y	0.3918	Chrom u	0.2378
Chrom v	0.3415	Duv	-0.0004
Chrom u’	0.2378	Chrom v’	0.5123
CCT (K)	3424	Luminous Efficacy (lm/W)	132.43
Ra	82	R1	81.0
R2	89.0	R3	96.0
R4	82.0	R5	81.0
R6	86.0	R7	84.0
R8	61.0	R9	6.0
R10	74.0	R11	81.0
R12	66.0	R13	82.0
R14	98.0	R15	74.0
Rf	84	Rg	97
Rcs,h1	-12%		

Integrating Sphere Test (Cont'd)

TM-30 Report



Integrating Sphere Test

Model No.	55764-54W-40K	Sample ID.	5350103
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

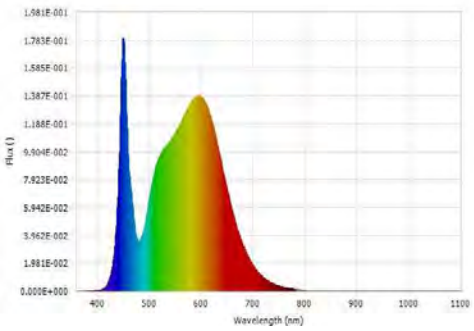
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C.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

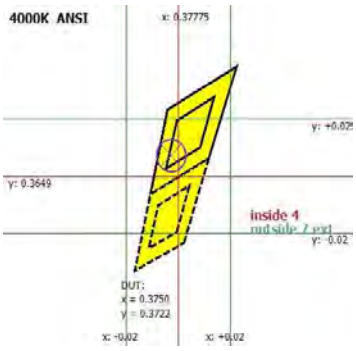
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	120.08	60	0.4523	54.041	0.9950	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
4118	83	10.0	-0.0005	8027.88	148.55	1003.48





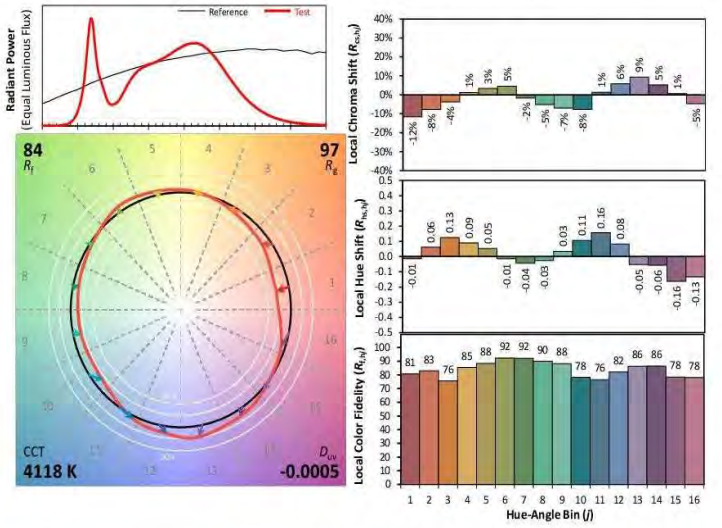
Luminous Flux (lm)	8027.88	Chrom x	0.3750
Chrom y	0.3722	Chrom u	0.2234
Chrom v	0.3325	Duv	-0.0005
Chrom u’	0.2234	Chrom v’	0.4988
CCT (K)	4118	Luminous Efficacy (lm/W)	148.55
Ra	83	R1	82.0
R2	88.0	R3	93.0
R4	83.0	R5	82.0
R6	84.0	R7	86.0
R8	66.0	R9	10.0
R10	72.0	R11	83.0
R12	62.0	R13	83.0
R14	96.0	R15	76.0
Rf	84	Rg	97
Rcs,h1	-12%		

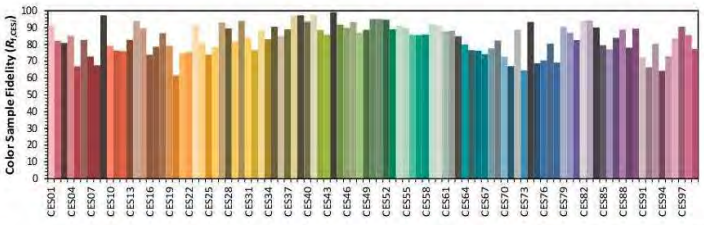
Integrating Sphere Test (Cont'd)

TM-30 Report

ANSI/IES TM-30-18 Color Rendition Report

Source:	BXEN-(A)E-11M-3AA	**Manufacturer:**	P.Q.L., Inc.
Date:	9/26/2022	**Model:**	55764-54W-40K





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

x	0.3750
y	0.3722
u'	0.2234
v'	0.4987

CIE 13.3-1995 (CRI)

R_a	83
R_9	10

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

Integrating Sphere Test

Model No.	55764-54W-50K	Sample ID.	5350103
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

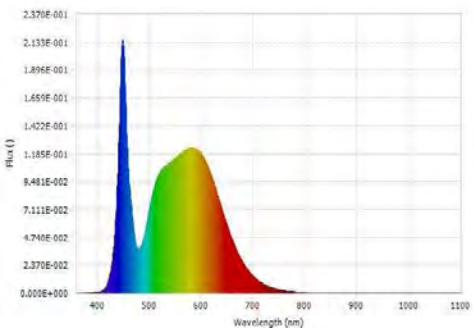
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C.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

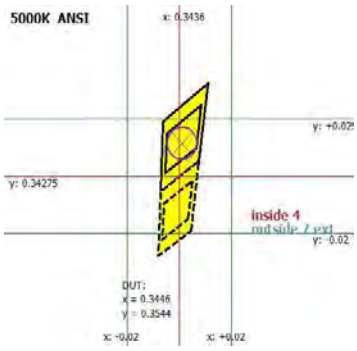
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	120.08	60	0.4719	56.368	0.9947	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
5027	81	2.0	0.0016	7704.13	136.68	963.02

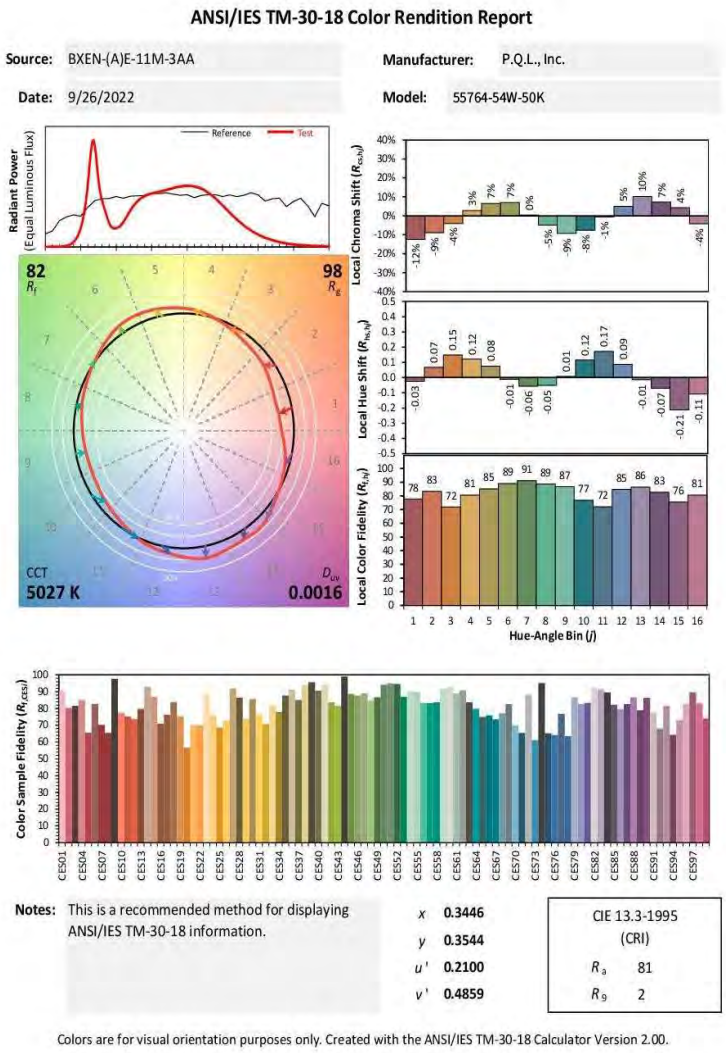




Luminous Flux (lm)	7704.13	Chrom x	0.3446
Chrom y	0.3544	Chrom u	0.2100
Chrom v	0.3240	Duv	0.0016
Chrom u’	0.2100	Chrom v’	0.4859
CCT (K)	5027	Luminous Efficacy (lm/W)	136.68
Ra	81	R1	80.0
R2	85.0	R3	89.0
R4	82.0	R5	81.0
R6	80.0	R7	85.0
R8	66.0	R9	2.0
R10	65.0	R11	82.0
R12	61.0	R13	80.0
R14	94.0	R15	74.0
Rf	82	Rg	98
Rcs,h1	-12%		

Integrating Sphere Test (Cont'd)

TM-30 Report



Integrating Sphere Test

Model No.	55764-46W-35K	Sample ID.	5350103
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

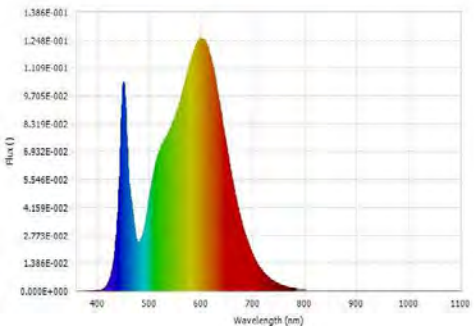
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C.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

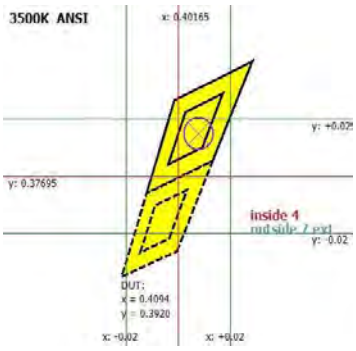
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	120.02	60	0.4032	48.111	0.9942	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3422	82	6.0	-0.0003	6609.42	137.38	826.18





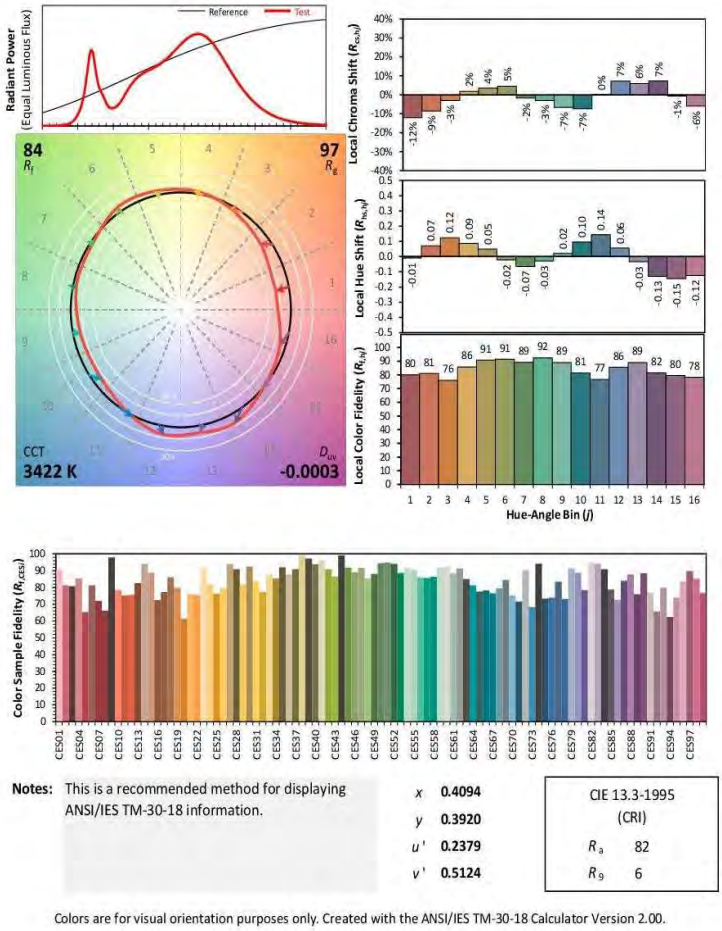
Luminous Flux (lm)	6609.42	Chrom x	0.4094
Chrom y	0.3920	Chrom u	0.2379
Chrom v	0.3416	Duv	-0.0003
Chrom u’	0.2379	Chrom v’	0.5124
CCT (K)	3422	Luminous Efficacy (lm/W)	137.38
Ra	82	R1	81.0
R2	89.0	R3	96.0
R4	82.0	R5	81.0
R6	86.0	R7	84.0
R8	61.0	R9	6.0
R10	75.0	R11	81.0
R12	66.0	R13	83.0
R14	98.0	R15	74.0
Rf	84	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:**	55764-46W-35K



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

x	0.4094
y	0.3920
u'	0.2379
v'	0.5124

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

Model No.	55764-38W-35K	Sample ID.	5350103
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

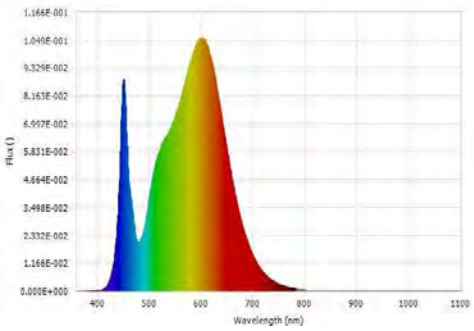
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C.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

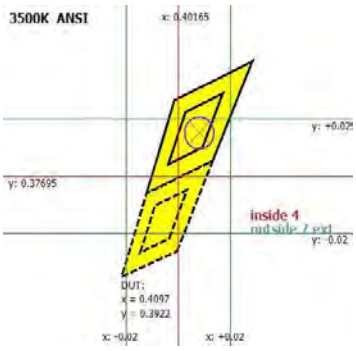
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	120.07	60	0.3271	38.955	0.9919	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3418	83	7.0	-0.0003	5563.79	142.83	695.47





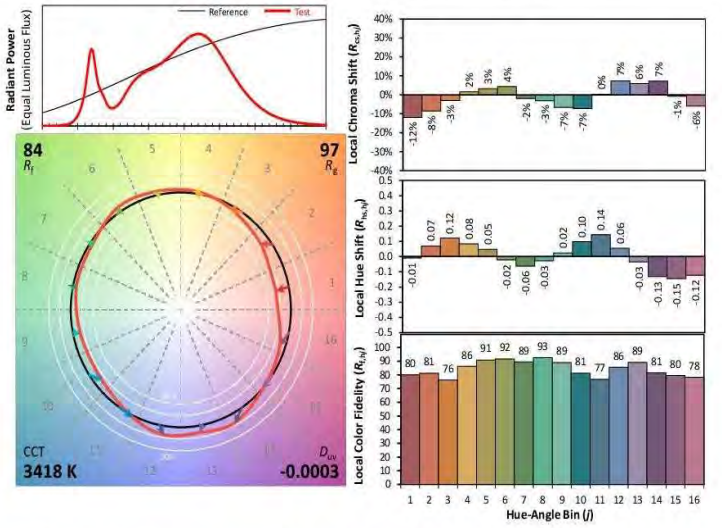
Luminous Flux (lm)	5563.79	Chrom x	0.4097
Chrom y	0.3922	Chrom u	0.2379
Chrom v	0.3417	Duv	-0.0003
Chrom u'	0.2379	Chrom v'	0.5125
CCT (K)	3418	Luminous Efficacy (lm/W)	142.83
Ra	83	R1	81.0
R2	89.0	R3	96.0
R4	82.0	R5	81.0
R6	86.0	R7	84.0
R8	62.0	R9	7.0
R10	75.0	R11	81.0
R12	66.0	R13	83.0
R14	98.0	R15	74.0
Rf	84	Rg	97
Rcs,h1	-12%		

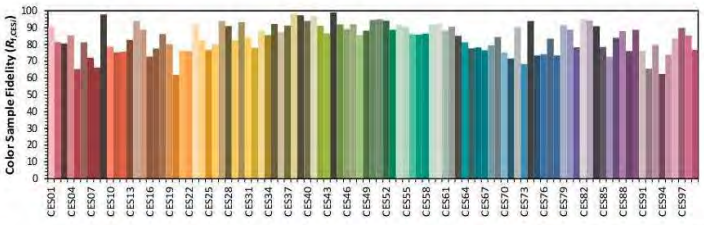
Integrating Sphere Test (Cont'd)

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:**	55764-38W-35K





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

x	0.4097
y	0.3922
u'	0.2379
v'	0.5125

CIE 13.3-1995 (CRI)

R_a	83
R_9	7

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

THD and PF Test

Model No.	55764-54W-35K		Sample ID.	5350103
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	120.00	60	0.4748	56.73	0.9954	6.83%	Horizontal
24.8	277.07	60	0.2019	54.48	0.9737	10.44%	Horizontal

THD and PF Test

Model No.	55764-54W-40K		Sample ID.	5350103
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	120.00	60	0.4537	54.21	0.9957	6.42%	Horizontal
24.8	277.08	60	0.1936	52.12	0.9713	10.86%	Horizontal

THD and PF Test

Model No.	55764-54W-50K		Sample ID.	5350103
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	119.98	60	0.4736	56.57	0.9955	6.78%	Horizontal
24.8	277.06	60	0.2013	54.31	0.9736	10.50%	Horizontal

THD and PF Test

Model No.	55764-46W-35K		Sample ID.	5350103
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	120.04	60	0.4030	48.14	0.9949	7.54%	Horizontal
24.8	277.09	60	0.1774	47.54	0.9672	10.38%	Horizontal

THD and PF Test

Model No.	55764-38W-35K		Sample ID.	5350103
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	120.09	60	0.3262	38.89	0.9926	8.75%	Horizontal
24.8	277.10	60	0.1506	39.90	0.9555	11.01%	Horizontal

In-Situ Temperature Measurement Test

Model No.	55764-54W-35K	Sample ID.	5350103

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
23.5	119.98	60	0.4736	56.57	0.9955	6.78%	Horizontal

Test Results (LEDs)

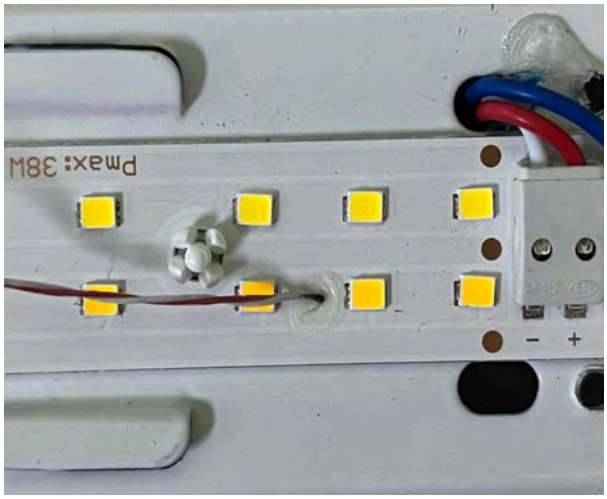
Thermocouple Location	Declared Light Source Current (mA)	Temperature for Light Source (°C)		Max Chromaticity Shift (1000-6000h)	LED Model Number	LM-80 Limit Current (mA)	LM-80 Limit Temp (°C)
		Test Result	Test Result (Correct to 25 °C)				
Ambient TEMP	N/A	23.5	25.0				
TMP of Location 1	100	46.1	47.6	0.0022	BXEN-(A)E-11M-3AA	150	105

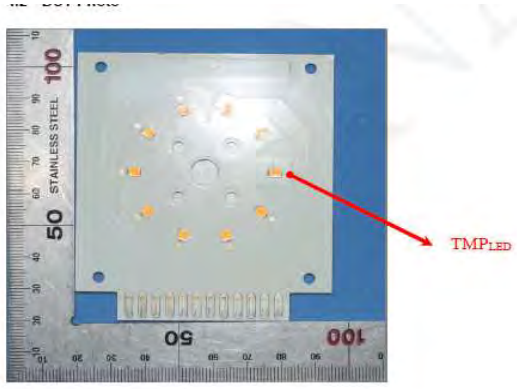
Test Results (Drivers)

Thermocouple Location	Temperature for Driver (°C)		Driver Model Number	Driver Limit Temp (°C)
	Test Result	Test Result (Correct to 25 °C)		
Ambient TEMP	23.5	25.0		
TMP of Location 1	68.5	70.0	SIF 50-I1200 120-277 W D1 F-S1S2	90

In-Situ Temperature Measurement Test (Cont'd)

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





******** END OF REPORT. THIS PAGE INTENTIONALLY LEFT BLANK ********