DesignLights Consortium Test Report

Refference Standards

UL1598-2008
ANSI C82.77-10-2014
IES LM-79-2008

Prepared For

IKIO LED Lighitng

8470 Allison Pointe Blvd, Suite 128 Indianapolis, IN 46250

Test Laboratory:

UL-CCIC Company Limited

Test Laboratory Address:

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Catalog Number

IK-RT24F-253035-CCT-D

Project Number

4790285215

Report Number

4790283487

Prepared By	**Approved By**
Zhao, Elaine/Xu, Roger	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)-Luminaires	**IES LM-79-2008**	≥3000	-10%	3312.84
Minimum Luminaire Efficacy (lm/W)-Luminaires	**IES LM-79-2008**	≥110	-3%	129.76
Spacing Criteria (0-180°)	**IES LM-79-2008**	1.0-2.0	±0.1	1.24
Spacing Criteria (90-270°)	**IES LM-79-2008**	1.0-2.0	±0.1	1.30
Zonal Lumen Requirement 1(0°-60°)	**IES LM-79-2008**	≥75%	-3%	75.40%
Allowable CCT (3500K)	**IES LM-79-2008/ANSI C78.377-2015**	3465±245	N/A	3382
Allowable CCT (4000K)	**IES LM-79-2008/ANSI C78.377-2015**	3985±275	N/A	4117
Minimum CRI	**IES LM-79-2008/CIE 13.3-1995**	≥80	-1	81
Minimum R9	**IES LM-79-2008**	≥0	-1	3.0
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	N/A	21.7
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	0.9538
Total Harmonic Distortion (A%)	**ANSI C82.77-10-2014**	≤20%	5%	11.73%
In-Situ Temperature Measurement Test for LED 1 (°C)	**UL1598-2008**	≤105	N/A	44.1
In-Situ Temperature Measurement Test for Driver 1 (°C)	**UL1598-2008**	≤90	N/A	61.2
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: 2022-02-15

Test Item	Test Date	Model Number	Tests Conducted By
Integrating Sphere Test	2022-02-24	IK-RT24F-253035-CCT-D (3500K 35 W)	Yang, Gavin X
Integrating Sphere Test	2022-02-24	IK-RT24F-253035-CCT-D (4000K 35 W)	Yang, Gavin X
Integrating Sphere Test	2022-02-24	IK-RT24F-253035-CCT-D (5000K 35 W)	Yang, Gavin X
Integrating Sphere Test	2022-02-24	IK-RT24F-253035-CCT-D (3500K 30 W)	Yang, Gavin X
Integrating Sphere Test	2022-02-24	IK-RT24F-253035-CCT-D (3500K 25 W)	Yang, Gavin X
Goniophotometer Test	2022-02-23	IK-RT24F-253035-CCT-D (3500K 35 W)	Yang, Gavin X
Goniophotometer Test	2022-02-23	IK-RT24F-253035-CCT-D (5000K 35 W)	Yang, Gavin X
THD and PF Test	2022-02-23	IK-RT24F-253035-CCT-D (3500K 35 W)	Yang, Gavin X
THD and PF Test	2022-02-23	IK-RT24F-253035-CCT-D (4000K 35 W)	Yang, Gavin X
THD and PF Test	2022-02-23	IK-RT24F-253035-CCT-D (5000K 35 W)	Yang, Gavin X
THD and PF Test	2022-02-23	IK-RT24F-253035-CCT-D (3500K 30 W)	Yang, Gavin X
THD and PF Test	2022-02-23	IK-RT24F-253035-CCT-D (3500K 25 W)	Yang, Gavin X
In-Situ Temperature Measurement Test	2022-02-28	IK-RT24F-253035-CCT-D (3500K 35 W)	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: IK-RT24F-253035-CCT-D (3500K)
Electrical Parameter: 120-277V, 50/60Hz
LED Package: STW8A2PD-XX
Dimming Information: Continuous dimming capability
Remark: Housing Model Number: 2GT8-4-32-A12-MVOLT-1/4

Products Scaled Value

Model Number	CCT	Luminous Flux	Power	Luminous Efficacy
IK-RT24F-253035-CCT-D (3500K)	3500K	4480	35	128
IK-RT24F-253035-CCT-D (4000K)	4000K	4515	35	129
IK-RT24F-253035-CCT-D (5000K)	5000K	4550	35	130
IK-RT24F-253035-CCT-D (5000K)	3500K	3990	30	133
IK-RT24F-253035-CCT-D (4000K)	4000K	4020	30	134
IK-RT24F-253035-CCT-D (5000K)	5000K	4050	30	135
IK-RT24F-253035-CCT-D (5000K)	3500K	3400	25	136
IK-RT24F-253035-CCT-D (4000K)	4000K	3425	25	137
IK-RT24F-253035-CCT-D (5000K)	5000K	3450	25	138

Integrating Sphere Test

Model No.	IK-RT24F-253035-CCT-D (3500K 35 W)		Sample ID.	4671877
Operate time (Min.)	90	Stabilization time (Min.)		45

Test Method

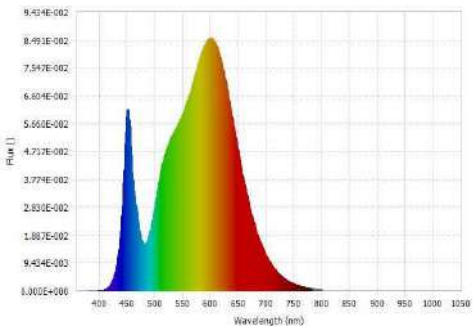
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C. 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.

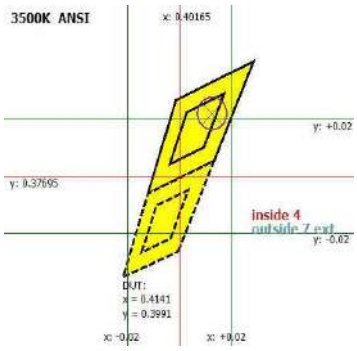
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	119.98	60	0.2826	33.658	0.9929	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3382	81	3.0	0.0018	4459.83	132.50	N/A





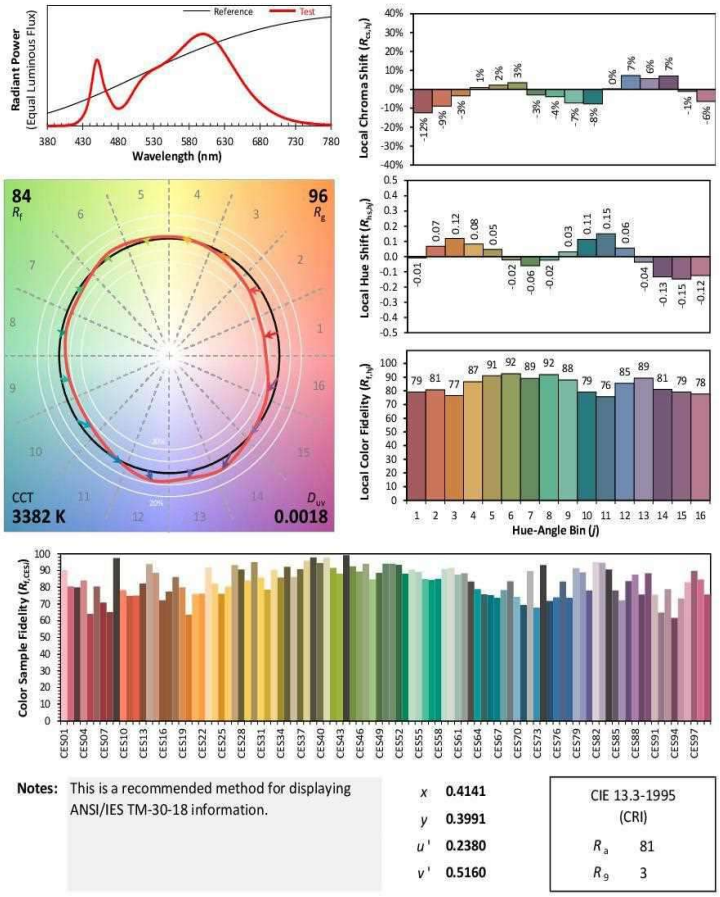
Luminous Flux (lm)	4459.83	Chrom x	0.4141
Chrom y	0.3991	Chrom u	0.2380
Chrom v	0.3440	Duv	0.0018
Chrom u’	0.2380	Chrom v’	0.5160
CCT (K)	3382	Luminous Efficacy (lm/W)	132.50
Ra	81	R1	79.0
R2	88.0	R3	95.0
R4	81.0	R5	79.0
R6	84.0	R7	85.0
R8	60.0	R9	3.0
R10	72.0	R11	79.0
R12	62.0	R13	81.0
R14	97.0	R15	72.0
Rf	84	Rg	96
Rcs,h1	-12%		

Integrating Sphere Test (Cont'd)

TM-30 Report

ANSI/IES TM-30-18 Color Rendition Report

Source:	STW8A2PD-XX	**Manufacturer:**	Ikio Led Lighting
Date:	2/24/2022	**Model:**	IK-RT24F-253035-CCT-D (3500K 35W)



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

x	0.4141
y	0.3991
u'	0.2380
v'	0.5160

CIE 13.3-1995 (CRI)

R_a	81
R_9	3

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

Integrating Sphere Test

Model No.	IK-RT24F-253035-CCT-D (4000K 35 W)		Sample ID.	4671877
Operate time (Min.)	90	Stabilization time (Min.)		45

Test Method

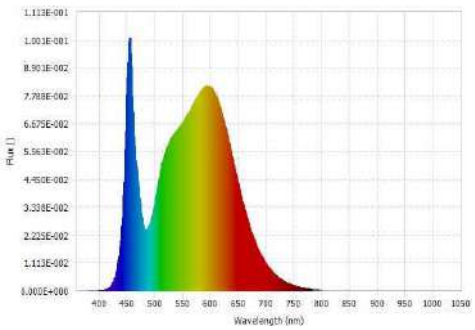
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C. 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.

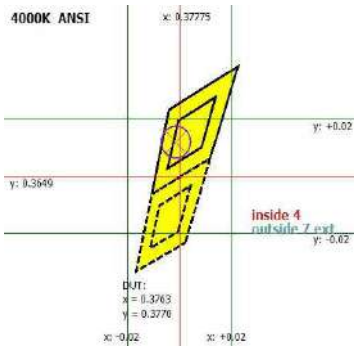
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	120	60	0.2711	32.307	0.9931	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
4117	83	10.0	0.0014	4717.85	146.03	N/A





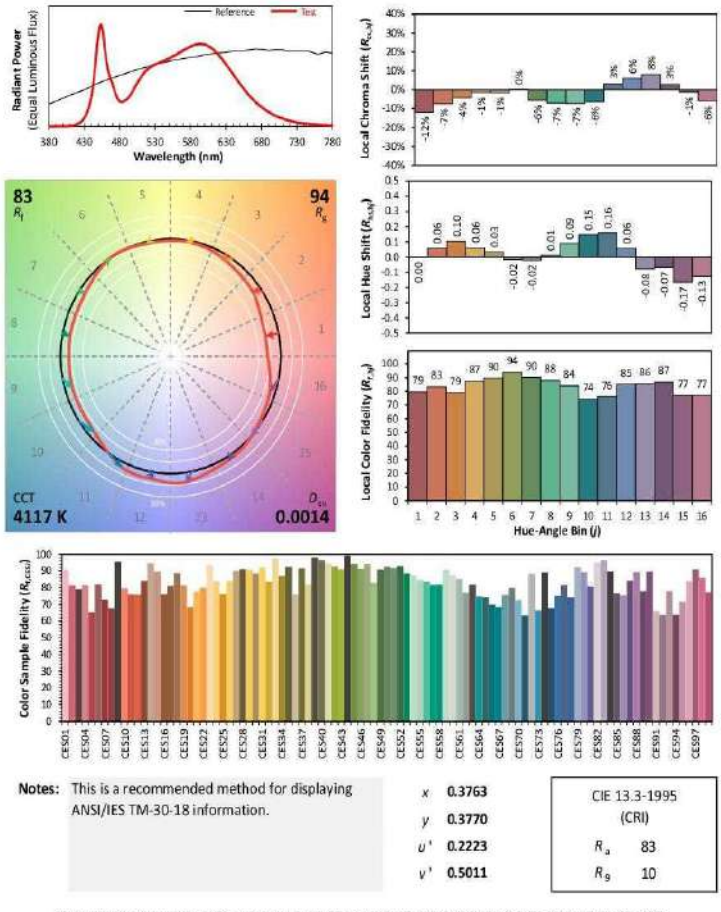
Luminous Flux (lm)	4717.85	Chrom x	0.3763
Chrom y	0.3770	Chrom u	0.2223
Chrom v	0.3341	Duv	0.0014
Chrom u’	0.2223	Chrom v’	0.5011
CCT (K)	4117	Luminous Efficacy (lm/W)	146.03
Ra	83	R1	82.0
R2	90.0	R3	95.0
R4	81.0	R5	81.0
R6	85.0	R7	87.0
R8	65.0	R9	10.0
R10	74.0	R11	80.0
R12	57.0	R13	84.0
R14	97.0	R15	76.0
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:**	Ikio Led Lighting
Date:	2/24/2022	**Model:**	IK-RT24F-253035-CCT-D (4000K 35W)



Notes:	This is a recommended method for displaying ANSI/IES TM-30-18 information.	x 0.3763 y 0.3770 u' 0.2223 v' 0.5011	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.	IK-RT24F-253035-CCT-D (5000K 35 W)	Sample ID.	4671877
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

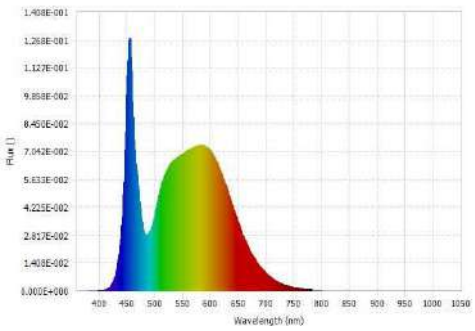
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C. 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.

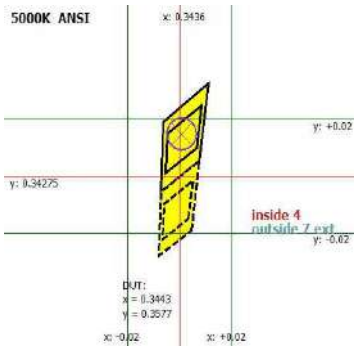
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	119.99	60	0.2820	33.598	0.9930	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
5049	82	5.0	0.0034	4581.22	136.35	N/A

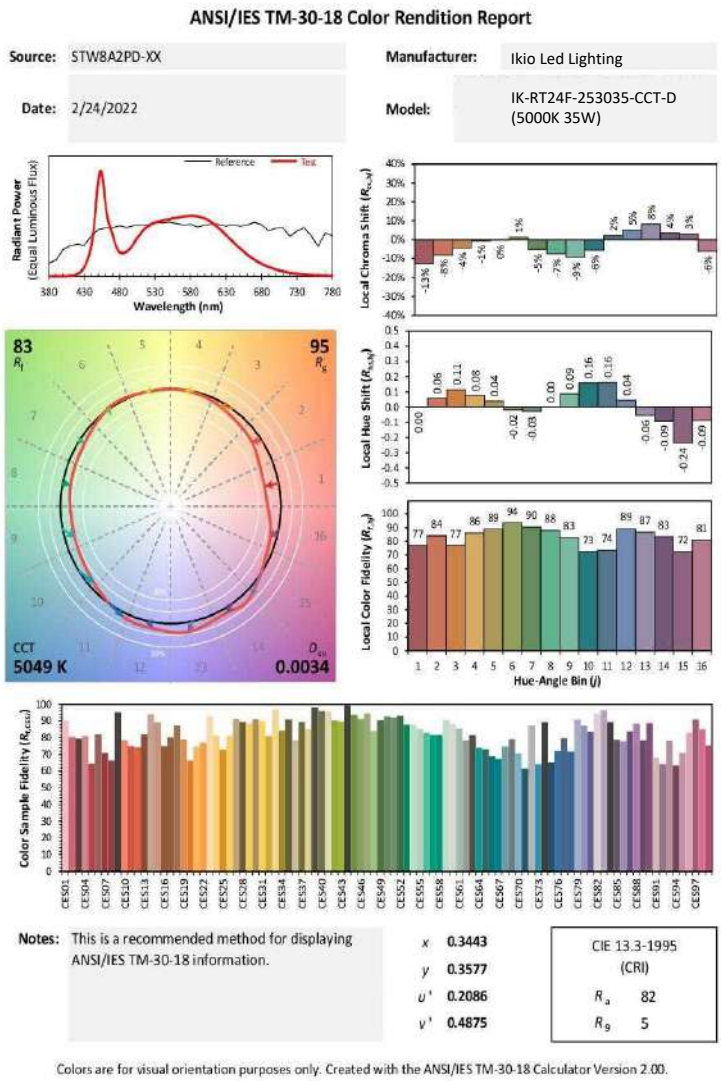




Luminous Flux (lm)	4581.22	Chrom x	0.3443
Chrom y	0.3577	Chrom u	0.2086
Chrom v	0.3250	Duv	0.0034
Chrom u’	0.2086	Chrom v’	0.4875
CCT (K)	5049	Luminous Efficacy (lm/W)	136.35
Ra	82	R1	80.0
R2	88.0	R3	92.0
R4	81.0	R5	80.0
R6	82.0	R7	87.0
R8	66.0	R9	5.0
R10	71.0	R11	79.0
R12	56.0	R13	83.0
R14	96.0	R15	75.0
Rf	83	Rg	95
Rcs,h1	-13%		

Integrating Sphere Test (Cont'd)

TM-30 Report



Integrating Sphere Test

Model No.	IK-RT24F-253035-CCT-D (3500K 30 W)	Sample ID.	4671877
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

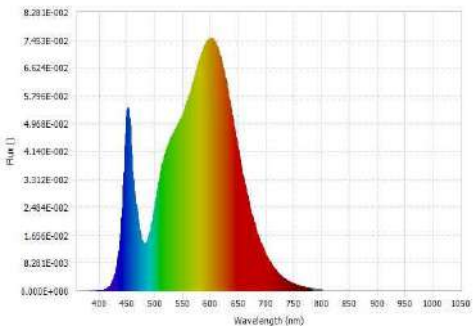
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C. 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.

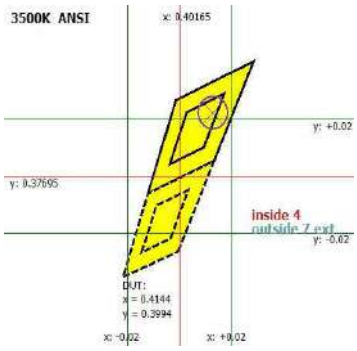
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	120.04	60	0.2413	28.702	0.9909	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3378	82	3.0	0.0018	3912.05	136.30	N/A





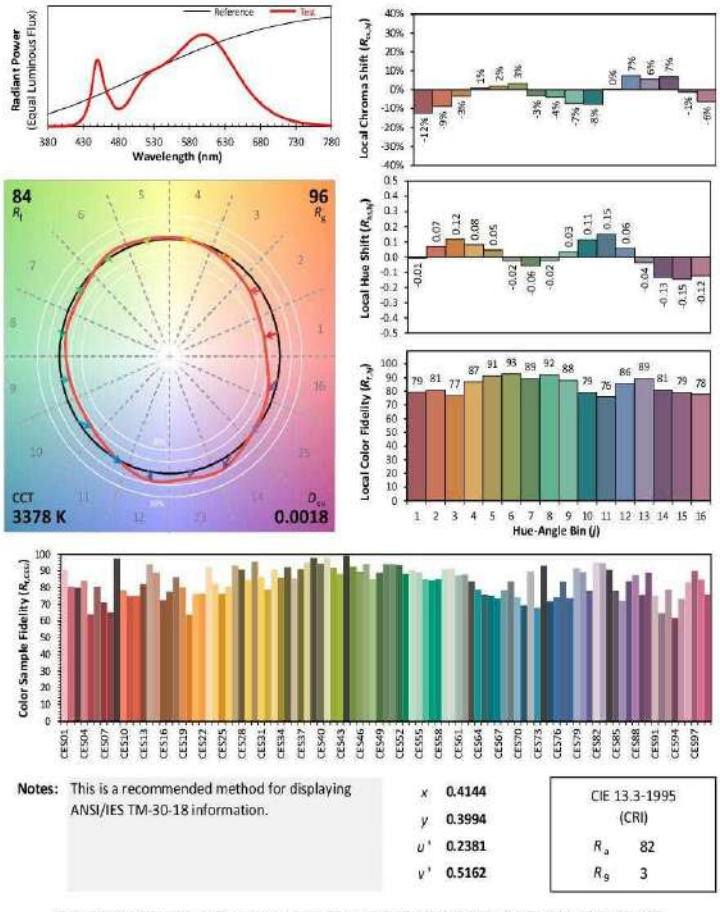
Luminous Flux (lm)	3912.05	Chrom x	0.4144
Chrom y	0.3994	Chrom u	0.2381
Chrom v	0.3441	Duv	0.0018
Chrom u’	0.2381	Chrom v’	0.5162
CCT (K)	3378	Luminous Efficacy (lm/W)	136.30
Ra	82	R1	80.0
R2	88.0	R3	95.0
R4	81.0	R5	79.0
R6	84.0	R7	85.0
R8	61.0	R9	3.0
R10	72.0	R11	79.0
R12	62.0	R13	81.0
R14	97.0	R15	72.0
Rf	84	Rg	96
Rcs,h1	-12%		

Integrating Sphere Test (Cont'd)

TM-30 Report

ANSI/IES TM-30-18 Color Rendition Report

Source:	STW8A2PD-XX	**Manufacturer:**	Ikio Led Lighting
Date:	2/24/2022	**Model:**	IK-RT24F-253035-CCT-D (3500K 35W)



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

x	0.4144
y	0.3994
u'	0.2381
v'	0.5162

CIE 13.3-1995 (CRI)

R_a	82
R_9	3

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

Integrating Sphere Test

Model No.	IK-RT24F-253035-CCT-D (3500K 25 W)	Sample ID.	4671877
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

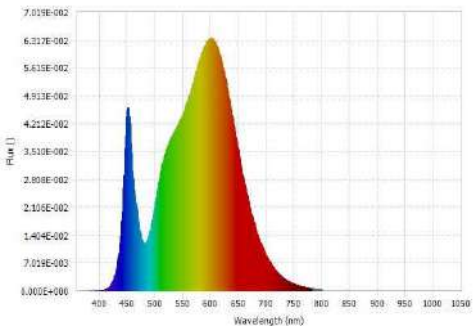
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C. 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.

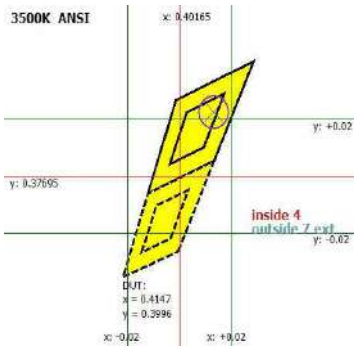
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	120.05	60	0.1996	23.637	0.9864	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3374	82	4.0	0.0019	3312.84	140.15	N/A

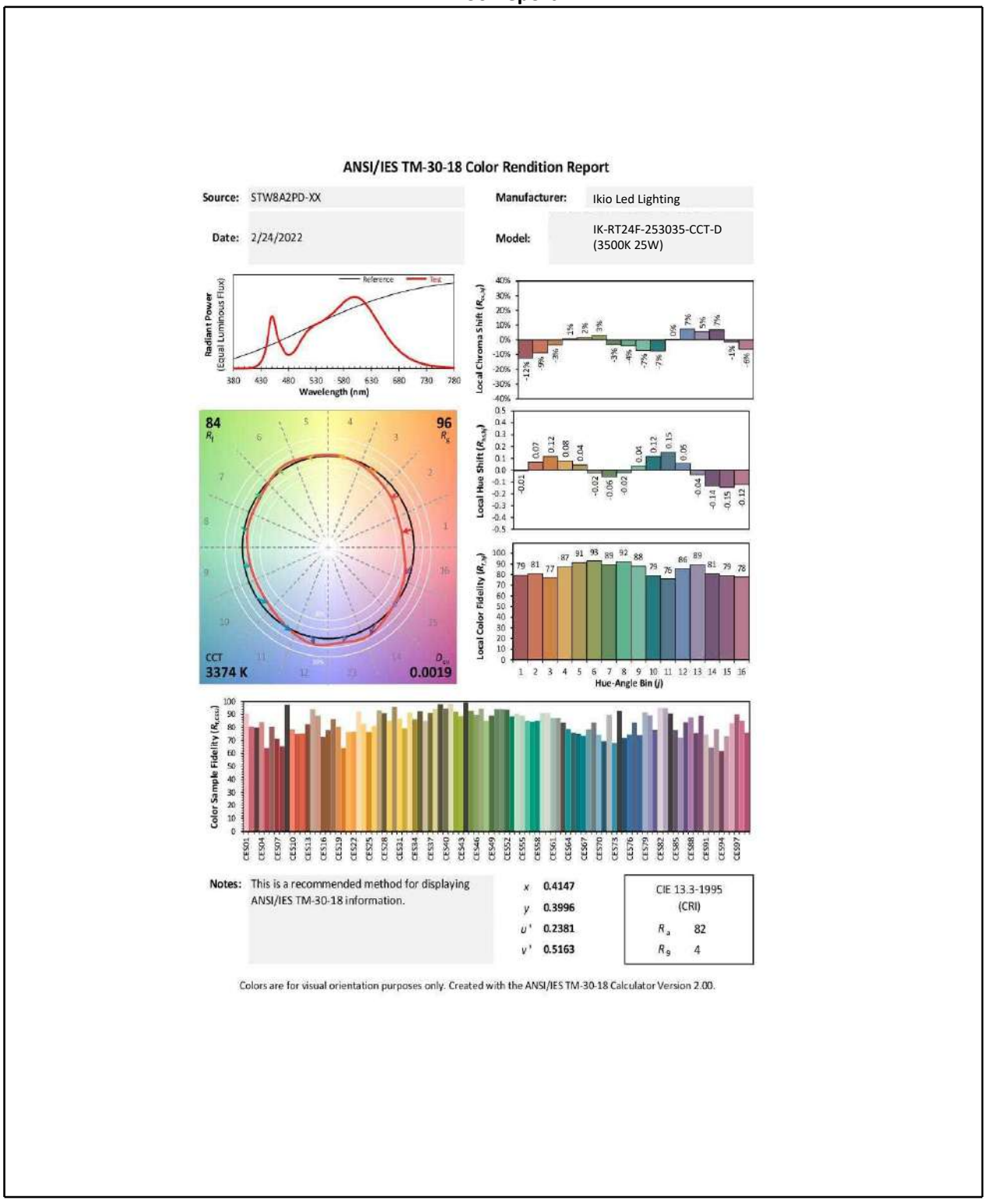




Luminous Flux (lm)	3312.84	Chrom x	0.4147
Chrom y	0.3996	Chrom u	0.2381
Chrom v	0.3442	Duv	0.0019
Chrom u’	0.2381	Chrom v’	0.5163
CCT (K)	3374	Luminous Efficacy (lm/W)	140.15
Ra	82	R1	80.0
R2	88.0	R3	95.0
R4	81.0	R5	79.0
R6	84.0	R7	85.0
R8	61.0	R9	4.0
R10	72.0	R11	80.0
R12	62.0	R13	82.0
R14	97.0	R15	72.0
Rf	84	Rg	96
Rcs,h1	-12%		

Integrating Sphere Test (Cont'd)

TM-30 Report



Goniophotometer Test

Model No.	IK-RT24F-253035-CCT-D (3500K 35 W)	Sample ID.	4671877
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
24.1	120.02	60	0.2822	33.67	0.9938	8.72%	Horizontal

Test Results

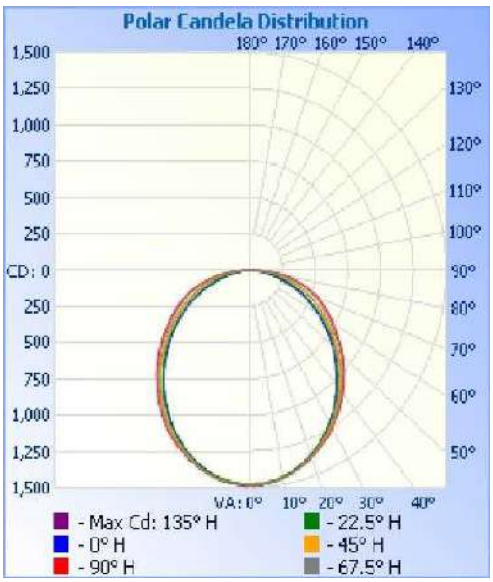
Luminous Flux (lm)	Zonal Lumen Requirement 1	Zonal Lumen Requirement 2	Beam Angle (50%)		Luminous Efficacy (lm/W)
	0°-60°	N/A	Horizontal Spread	Vertical Spread	
4368.9	75.60%	N/A	118.2	107.5	129.76

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

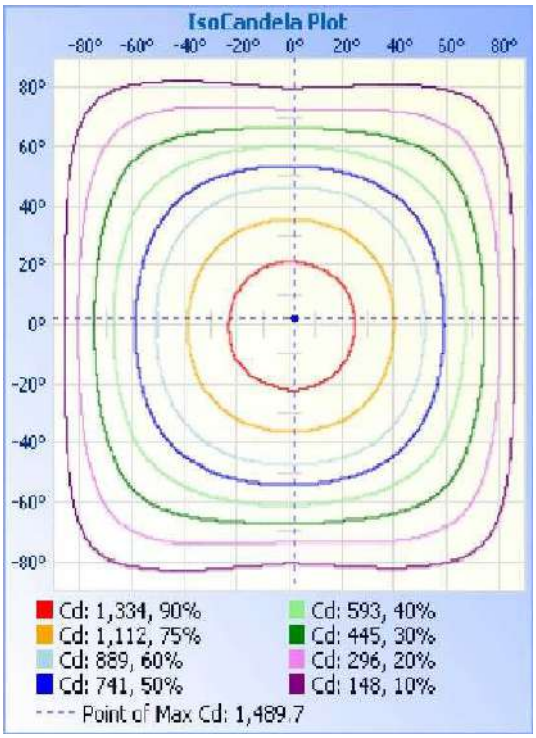
UGR		Spacing Criteria (0-180°)	Spacing Criteria (90°-270°)
Crosswise	Endwise		
18.9	21.6	1.24	1.28

Goniophotometer Test (Cont'd)

Polar Candela Distribution



IsoCandela Plot



Goniophotometer Test (Cont'd)

Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1141.2	26.10%
0-40	1864.9	42.70%
0-60	3301.4	75.60%
60-90	1057.6	24.20%
70-100	508.4	11.60%
90-120	4.6	0.10%
0-90	4359.0	99.80%
90-180	9.9	0.20%
0-180	4368.9	100.00%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	35.3	0.80%	90-95	1.8	0.00%
5-10	104.6	2.40%	95-100	0.9	0.00%
10-15	169.9	3.90%	100-105	0.6	0.00%
15-20	229.1	5.20%	105-110	0.5	0.00%
20-25	280.3	6.40%	110-115	0.4	0.00%
25-30	321.9	7.40%	115-120	0.4	0.00%
30-35	352.4	8.10%	120-125	0.4	0.00%
35-40	371.3	8.50%	125-130	0.5	0.00%
40-45	377.6	8.60%	130-135	0.5	0.00%
45-50	372.9	8.50%	135-140	0.6	0.00%
50-55	356.1	8.20%	140-145	0.6	0.00%
55-60	329.9	7.60%	145-150	0.6	0.00%
60-65	296.1	6.80%	150-155	0.5	0.00%
65-70	255.7	5.90%	155-160	0.4	0.00%
70-75	209.7	4.80%	160-165	0.4	0.00%
75-80	157.3	3.60%	165-170	0.3	0.00%
80-85	100.1	2.30%	170-175	0.2	0.00%
85-90	38.6	0.90%	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	1480	1480	1480	1480	1480	1480	1480	1480	1480	1480	1480	1480	1480	1480	1480	1480	1480
1	1479	1474	1479	1482	1484	1485	1490	1481	1481	1470	1480	1481	1478	1477	1489	1478	1479
2	1482	1470	1480	1479	1474	1484	1486	1472	1481	1472	1473	1477	1476	1486	1486	1473	1482
3	1479	1471	1476	1474	1473	1483	1484	1472	1478	1473	1480	1480	1476	1484	1484	1474	1479
4	1477	1472	1474	1474	1475	1482	1479	1469	1473	1470	1474	1477	1477	1481	1481	1473	1477
5	1471	1465	1474	1474	1476	1476	1475	1466	1472	1466	1472	1475	1477	1481	1476	1469	1471
6	1467	1461	1470	1469	1472	1473	1470	1463	1470	1462	1474	1473	1476	1477	1476	1463	1467
7	1465	1460	1467	1469	1467	1470	1468	1455	1464	1457	1471	1472	1471	1474	1469	1460	1465
8	1459	1457	1464	1465	1463	1464	1463	1450	1458	1456	1463	1468	1469	1468	1467	1455	1459
9	1455	1448	1456	1459	1458	1460	1456	1448	1454	1450	1459	1464	1466	1463	1463	1450	1455
10	1449	1442	1450	1451	1451	1453	1449	1439	1448	1443	1457	1459	1456	1459	1453	1444	1449
11	1442	1434	1448	1443	1448	1448	1439	1434	1441	1439	1447	1456	1454	1453	1448	1436	1442
12	1436	1427	1440	1442	1436	1438	1436	1429	1436	1432	1445	1444	1442	1448	1443	1428	1436
13	1427	1425	1433	1434	1432	1437	1430	1413	1424	1426	1437	1442	1438	1441	1437	1421	1427
14	1418	1414	1428	1424	1424	1426	1420	1408	1414	1417	1428	1432	1430	1434	1426	1414	1418
15	1409	1405	1419	1416	1415	1418	1415	1398	1407	1406	1420	1424	1423	1428	1421	1402	1409
16	1399	1396	1407	1412	1409	1413	1406	1390	1398	1402	1414	1418	1416	1417	1411	1396	1399
17	1392	1386	1394	1400	1400	1400	1392	1379	1388	1390	1404	1409	1412	1411	1401	1381	1392
18	1376	1374	1385	1389	1394	1390	1384	1368	1375	1378	1391	1398	1400	1398	1389	1378	1376
19	1368	1366	1375	1380	1386	1384	1376	1357	1365	1369	1379	1390	1392	1393	1382	1364	1368
20	1356	1353	1366	1372	1374	1376	1366	1347	1354	1355	1371	1380	1384	1385	1374	1352	1356
25	1292	1284	1302	1315	1319	1321	1304	1282	1289	1293	1313	1324	1333	1328	1312	1292	1292
30	1214	1217	1234	1249	1258	1253	1233	1213	1210	1220	1241	1262	1269	1262	1241	1218	1214
35	1126	1134	1157	1174	1185	1177	1158	1134	1123	1134	1164	1181	1191	1184	1164	1137	1126
40	1033	1038	1068	1088	1101	1092	1067	1042	1030	1041	1070	1093	1105	1104	1069	1045	1033
45	932	942	970	1000	1013	1007	976	941	930	939	974	999	1019	1008	976	944	932
50	827	839	873	908	925	910	872	841	822	837	871	905	922	909	869	840	827
55	712	733	771	808	825	811	767	730	712	725	763	798	818	802	765	726	712
60	602	622	661	711	731	718	668	623	600	611	655	698	718	701	659	618	602
65	480	505	560	617	642	617	564	507	482	499	545	600	628	606	550	500	480
70	366	398	463	525	555	528	464	396	365	388	446	507	531	507	444	386	366
75	252	290	364	423	446	424	362	288	254	281	347	402	422	399	342	277	252
80	148	190	257	307	327	308	257	191	150	182	241	285	301	282	236	178	148
85	57	97	142	177	191	178	143	98	60	90	127	156	168	153	123	85	57
90	2	4	15	27	33	28	17	5	3	4	12	16	16	12	7	3	2
95	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
100	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1	1	2
105	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
110	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
115	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
120	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
125	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
130	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
135	2	2	2	2	2	2	1	1	1	1	2	2	1	2	2	2	2
140	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
145	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
150	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
155	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
160	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
165	3	3	3	3	3	2	2	2	3	3	3	3	3	2	2	2	3
170	3	3	3	4	3	3	3	3	3	3	4	4	3	3	3	3	3
175	3	3	4	4	4	4	3	3	3	3	4	4	4	4	3	3	3
180	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Goniophotometer Test

Model No.	IK-RT24F-253035-CCT-D (5000K 35 W)	Sample ID.	4671877
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
24.4	119.99	60	0.2817	33.59	0.9939	8.57%	Horizontal

Test Results

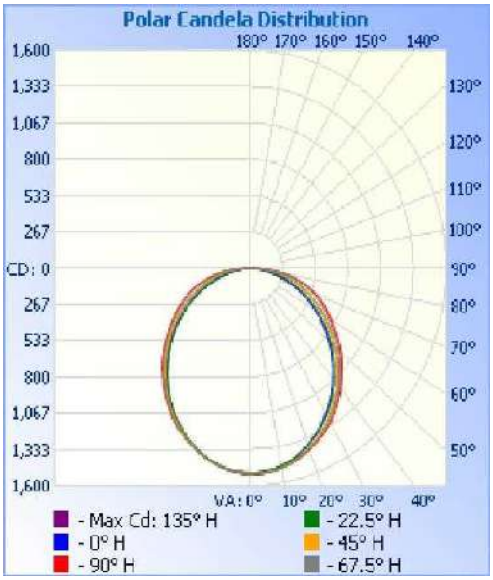
Luminous Flux (lm)	Zonal Lumen Requirement 1	Zonal Lumen Requirement 2	Beam Angle (50%)		Luminous Efficacy (lm/W)
			Horizontal Spread	Vertical Spread	
	0°-60°	N/A			
4471.5	75.40%	N/A	118.6	107.7	133.12

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

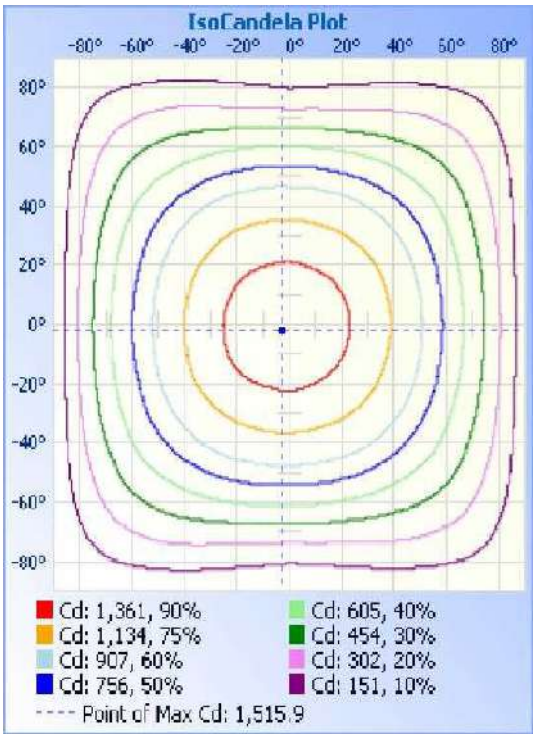
UGR		Spacing Criteria (0-180°)	Spacing Criteria (90°-270°)
Crosswise	Endwise		
19.0	21.7	1.24	1.30

Goniophotometer Test (Cont'd)

Polar Candela Distribution



IsoCandela Plot



Goniophotometer Test (Cont'd)

Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1163.8	26.00%
0-40	1902.8	42.60%
0-60	3371.8	75.40%
60-90	1089.4	24.40%
70-100	525.6	11.80%
90-120	4.9	0.10%
0-90	4461.3	99.80%
90-180	10.3	0.20%
0-180	4471.5	100.00%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	36.0	0.80%	90-95	2.0	0.00%
5-10	106.6	2.40%	95-100	0.9	0.00%
10-15	173.2	3.90%	100-105	0.7	0.00%
15-20	233.6	5.20%	105-110	0.5	0.00%
20-25	285.8	6.40%	110-115	0.5	0.00%
25-30	328.6	7.30%	115-120	0.4	0.00%
30-35	359.8	8.00%	120-125	0.4	0.00%
35-40	379.2	8.50%	125-130	0.5	0.00%
40-45	385.6	8.60%	130-135	0.6	0.00%
45-50	381.2	8.50%	135-140	0.6	0.00%
50-55	364.5	8.20%	140-145	0.6	0.00%
55-60	337.7	7.60%	145-150	0.6	0.00%
60-65	303.7	6.80%	150-155	0.5	0.00%
65-70	262.9	5.90%	155-160	0.5	0.00%
70-75	215.8	4.80%	160-165	0.4	0.00%
75-80	162.6	3.60%	165-170	0.3	0.00%
80-85	104.0	2.30%	170-175	0.2	0.00%
85-90	40.4	0.90%	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	1508	1508	1508	1508	1508	1508	1508	1508	1508	1508	1508	1508	1508	1508	1508	1508	1508
1	1509	1503	1508	1508	1508	1514	1516	1505	1508	1499	1507	1508	1504	1509	1515	1506	1512
2	1504	1501	1504	1508	1506	1514	1516	1506	1510	1498	1506	1506	1504	1510	1510	1503	1506
3	1500	1497	1504	1508	1506	1512	1512	1505	1506	1493	1503	1504	1503	1509	1508	1502	1507
4	1502	1494	1508	1508	1507	1513	1512	1502	1506	1499	1502	1501	1503	1508	1507	1499	1501
5	1500	1493	1506	1506	1506	1508	1507	1498	1500	1493	1499	1495	1497	1504	1504	1494	1502
6	1495	1492	1500	1511	1506	1508	1508	1496	1498	1494	1497	1495	1494	1496	1497	1490	1498
7	1490	1487	1496	1502	1501	1503	1502	1488	1492	1485	1492	1490	1490	1492	1492	1483	1490
8	1485	1486	1498	1499	1498	1503	1498	1483	1489	1485	1489	1488	1487	1490	1488	1481	1488
9	1480	1482	1492	1495	1490	1494	1493	1478	1482	1477	1484	1484	1478	1482	1482	1474	1486
10	1475	1473	1490	1493	1487	1489	1483	1476	1478	1469	1476	1476	1477	1476	1476	1466	1474
11	1468	1468	1479	1486	1485	1486	1480	1463	1469	1464	1472	1469	1465	1467	1463	1459	1469
12	1461	1463	1475	1481	1479	1480	1474	1459	1461	1457	1463	1461	1461	1463	1458	1449	1464
13	1452	1456	1468	1476	1472	1476	1469	1451	1453	1449	1459	1458	1454	1455	1452	1442	1450
14	1444	1446	1462	1467	1469	1467	1462	1443	1448	1441	1448	1448	1442	1448	1446	1434	1443
15	1436	1438	1454	1459	1460	1460	1454	1434	1437	1434	1438	1436	1437	1440	1432	1425	1436
16	1425	1431	1447	1451	1455	1455	1442	1429	1427	1424	1428	1427	1426	1431	1423	1413	1427
17	1415	1420	1434	1441	1444	1446	1435	1416	1416	1409	1420	1422	1420	1419	1416	1402	1413
18	1399	1408	1425	1434	1436	1438	1425	1406	1406	1400	1411	1414	1411	1410	1404	1393	1402
19	1394	1395	1416	1424	1431	1428	1421	1397	1394	1387	1397	1398	1398	1404	1396	1384	1391
20	1383	1385	1407	1415	1421	1419	1405	1386	1382	1375	1385	1390	1391	1391	1386	1369	1381
25	1312	1322	1345	1360	1369	1368	1351	1324	1318	1312	1322	1331	1333	1335	1321	1302	1312
30	1234	1248	1274	1299	1312	1301	1279	1250	1238	1238	1252	1263	1271	1266	1248	1234	1234
35	1149	1163	1199	1218	1234	1225	1201	1168	1155	1154	1171	1181	1189	1186	1169	1147	1149
40	1051	1069	1106	1134	1148	1143	1110	1073	1056	1058	1073	1096	1108	1100	1080	1058	1052
45	947	967	1009	1038	1056	1045	1010	973	953	957	981	1004	1016	1005	980	953	948
50	841	865	909	943	965	950	913	869	844	854	880	907	920	911	875	850	841
55	726	752	799	839	864	847	801	755	728	742	769	801	817	806	766	736	726
60	613	640	690	743	766	748	693	647	617	627	661	700	719	708	662	626	612
65	494	526	582	648	678	649	586	526	495	510	552	605	625	607	555	510	497
70	377	411	481	551	578	552	482	410	376	398	452	508	535	510	450	395	376
75	263	302	381	442	466	440	378	298	261	286	351	406	430	406	350	285	262
80	156	200	270	320	338	318	266	197	154	186	245	293	311	292	246	186	156
85	63	104	148	180	191	176	142	98	60	92	133	166	180	168	134	94	63
90	3	6	14	19	20	15	9	3	2	5	16	29	36	31	19	6	3
95	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
100	1	1	2	2	1	2	1	2	1	1	2	2	1	1	1	1	1
105	1	1	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1
110	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
115	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1
120	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
125	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
130	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	2
135	2	2	1	2	1	2	2	2	2	2	1	2	1	2	1	2	1
140	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
145	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
150	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2
155	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
160	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2
165	3	3	3	2	3	2	2	2	3	3	3	3	3	2	2	3	2
170	3	3	4	4	4	3	3	3	3	3	4	4	3	3	3	3	3
175	3	3	4	4	4	4	4	3	3	3	3	4	4	4	4	3	3
180	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

THD and PF Test

Model No.	IK-RT24F-253035-CCT-D (3500K 35 W)		Sample ID.	4671877
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
24.1	120.02	60	0.2822	33.67	0.9938	8.72%	Horizontal
24.1	276.93	60	0.1279	34.48	0.9741	9.25%	Horizontal

THD and PF Test

Model No.	IK-RT24F-253035-CCT-D (4000K 35 W)		Sample ID.	4671877
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
24.1	120.00	60	0.2708	32.30	0.9940	8.27%	Horizontal
24.1	276.92	60	0.1233	33.19	0.9724	9.26%	Horizontal

THD and PF Test

Model No.	IK-RT24F-253035-CCT-D (5000K 35 W)		Sample ID.	4671877
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
24.1	119.99	60	0.2817	33.59	0.9939	8.57%	Horizontal
24.1	276.92	60	0.1277	34.46	0.9740	9.35%	Horizontal

THD and PF Test

Model No.	IK-RT24F-253035-CCT-D (3500K 30 W)		Sample ID.	4671877
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
24.1	119.89	60	0.2404	28.58	0.9916	10.04%	Horizontal
24.1	276.91	60	0.1123	30.06	0.9663	10.00%	Horizontal

THD and PF Test

Model No.	IK-RT24F-253035-CCT-D (3500K 25 W)		Sample ID.	4671877
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
24.1	119.98	60	0.1190	23.58	0.9882	11.73%	Horizontal
24.1	276.93	60	0.0964	25.47	0.9538	11.26%	Horizontal

In-Situ Temperature Measurement Test

Model No.	IK-RT24F-253035-CCT-D (3500K 35 W)	Sample ID.	4671877

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
24.1	120.02	60	0.2822	33.67	0.9938	8.72%	Horizontal

Test Results (LEDs)

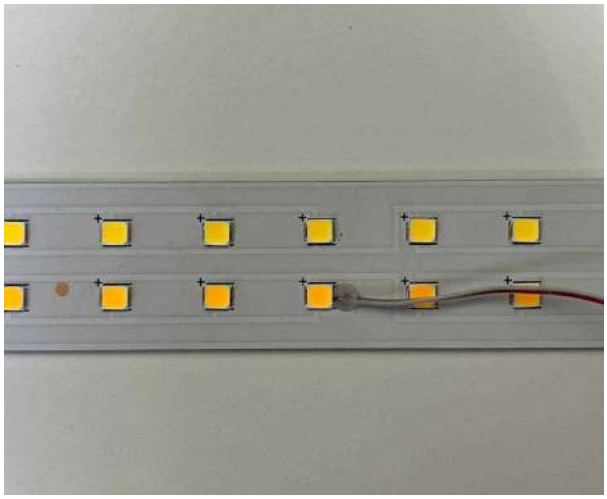
Thermocouple Location	Declared Light Source Current (mA)	Temperature for Light Source (°C)		Max Chromaticity Shift （1000-6000h)	LED Model Number	LM-80 Limit Current (mA)	LM-80 Limit Temp (°C)
		Test Result	Test Result (Correct to 25 °C)				
Ambient TEMP	N/A	24.1	25.0				
TMP of Location 1	125	43.2	44.1	0.0024	STW8A2PD-XX	200	105

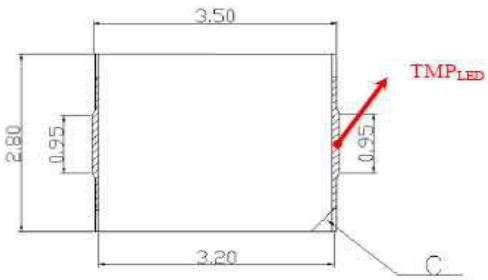
Test Results (Drivers)

Thermocouple Location	Temperature for Driver (°C)		Driver Model Number	Driver Limit Temp (°C)
	Test Result	Test Result (Correct to 25 °C)		
Ambient TEMP	24.1	25.0		
TMP of Location 1	60.3	61.2	SIF 30-I0750 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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