



## DesignLights Consortium Test Report

### Reference Standards

UL1598-2008

ANSI C82.77-10-2014

IES LM-79-2008

### Prepared For

### IKIO LED LIGHTING

8470 Allison Pointe Blvd, Suite 128 Indianapolis, IN 46250

Test Laboratory:

UL-CCIC Company Limited

Test Laboratory Address:

No.2, Chengwan Road, Suzhou Industrial Park, Suzhou 21522, China

### Catalog Number

IK-AT24F-253035-CCT-D

### Project Number

4790110308

### Report Number

4790110308\_29R01

### Test Date

2021-12-13~2021-12-24

### Issue Date

2022-01-12

### Revision Date

2022-01-12

### Prepared By

Elaine Zhao

Roger Xu

Zhao, Elaine/Xu, Roger

### Approved By

Elvis Wu

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	≥1500	-10%	3272.32
Minimum Luminaire Efficacy (lm/W)-Luminaires	IES LM-79-2008	≥110	-3%	132.05
Spacing Criteria (0-180°)	IES LM-79-2008	1.0-2.0	±0.1	1.22
Spacing Criteria (90-270°)	IES LM-79-2008	1.0-2.0	±0.1	1.26
Zonal Lumen Requirement 1(0°-60°)	IES LM-79-2008	≥75%	-3%	76.50%
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±245	N/A	3396
Allowable CCT (4000K)	IES LM-79-2008/ANSI C78.377-2015	3985±275	N/A	4098
Minimum CRI	IES LM-79-2008/CIE 13.3-1995	≥80	-1	82
Minimum R9	IES LM-79-2008	≥0	-1	4.0
Minimum Rg	IES LM-79-2008	≥89	-1	94
Minimum Rf	IES LM-79-2008	≥70	-1	84
Rcs,h1	IES LM-79-2008	-12%-23%	-1%	-12%
Unified Glare Rating (UGR)	IES LM-79-2008	≤22	N/A	20.9
L70 Lumen maintenance (Hours)	N/A	≥50000	N/A	≥50000
L90 Lumen maintenance (Hours)	N/A	≥36000	N/A	≥36000
Power Factor	ANSI C82.77-10-2014	≥0.9	-0.03	0.9348
Total Harmonic Distortion (A%)	ANSI C82.77-10-2014	≤20%	5%	12.29%
In-Situ Temperature Measurement Test for LED 1 (°C)	UL1598-2008	≤105	N/A	40.8
In-Situ Temperature Measurement Test for Driver 1 (°C)	UL1598-2008	≤90	N/A	56.6
Max Chromaticity Shift (1000-6000h)	N/A	≤0.004	0.0004	0.0024
Minimum Luminaire Warranty (Years)	N/A	≥5	N/A	≥5



## Test List

Sample Received Date: 2021-12-22

Test Item	Test Date	Model Number	Tests Conducted By
Integrating Sphere Test	2021-12-22	IK-AT24F-253035-CCT-D 35W	Yang, Gavin X
Integrating Sphere Test	2021-12-22	IK-AT24F-253035-CCT-D 35W	Yang, Gavin X
Integrating Sphere Test	2021-12-22	IK-AT24F-253035-CCT-D 35W	Yang, Gavin X
Integrating Sphere Test	2021-12-22	IK-AT24F-253035-CCT-D 30W	Yang, Gavin X
Integrating Sphere Test	2021-12-22	IK-AT24F-253035-CCT-D 25W	Yang, Gavin X
Goniophotometer Test	2021-12-13	IK-AT24F-253035-CCT-D 35W	Yang, Gavin X
Goniophotometer Test	2021-12-13	IK-AT24F-253035-CCT-D 35W	Yang, Gavin X
THD and PF Test	2021-12-13	IK-AT24F-253035-CCT-D 35W	Yang, Gavin X
THD and PF Test	2021-12-13	IK-AT24F-253035-CCT-D 35W	Yang, Gavin X
THD and PF Test	2021-12-13	IK-AT24F-253035-CCT-D 35W	Yang, Gavin X
THD and PF Test	2021-12-13	IK-AT24F-253035-CCT-D 30W	Yang, Gavin X
THD and PF Test	2021-12-13	IK-AT24F-253035-CCT-D 25W	Yang, Gavin X
In-Situ Temperature Measurement Test	2021-12-24	IK-AT24F-253035-CCT-D 35W	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.
3. This report replace 4790110308\_29, the report 4790110308\_29 is terminated.



## Product Description

**Lamp/Luminaire Description:** 2X4 Luminaires for Ambient Lighting of Interior Commercial Spaces

**Model Number:** IK-AT24F-253035-CCT-D

**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
IK-AT24F-253035-CCT-D	3500k	4480	35	128
IK-AT24F-253035-CCT-D	4000k	4515	35	129
IK-AT24F-253035-CCT-D	5000k	4500	35	130
IK-AT24F-253035-CCT-D	3500k	3930	30	131
IK-AT24F-253035-CCT-D	4000k	3960	30	132
IK-AT24F-253035-CCT-D	5000k	3990	30	133
IK-AT24F-253035-CCT-D	3500k	3350	25	134
IK-AT24F-253035-CCT-D	4000k	3375	25	135
IK-AT24F-253035-CCT-D	5000k	3400	25	136

**Photos of Products Characteristics**





## Integrating Sphere Test

<b>Model No.</b>	IK-AT24F-253035-CCT-D 35W		<b>Sample ID.</b>	4517347
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45	

### Test Method

1. The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.

2. Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.

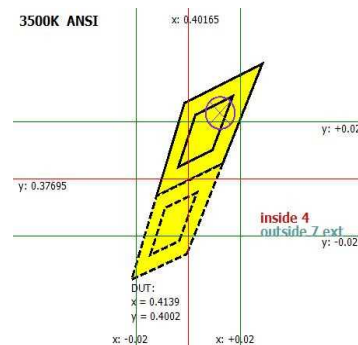
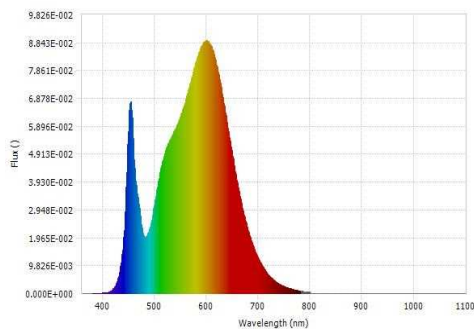
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using  $4\pi$  geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

### Integrating Sphere Test Conditions

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	120.01	60	0.2804	33.423	0.9933	Horizontal

### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3396	82	4.0	0.0023	4451.34	133.18	N/A



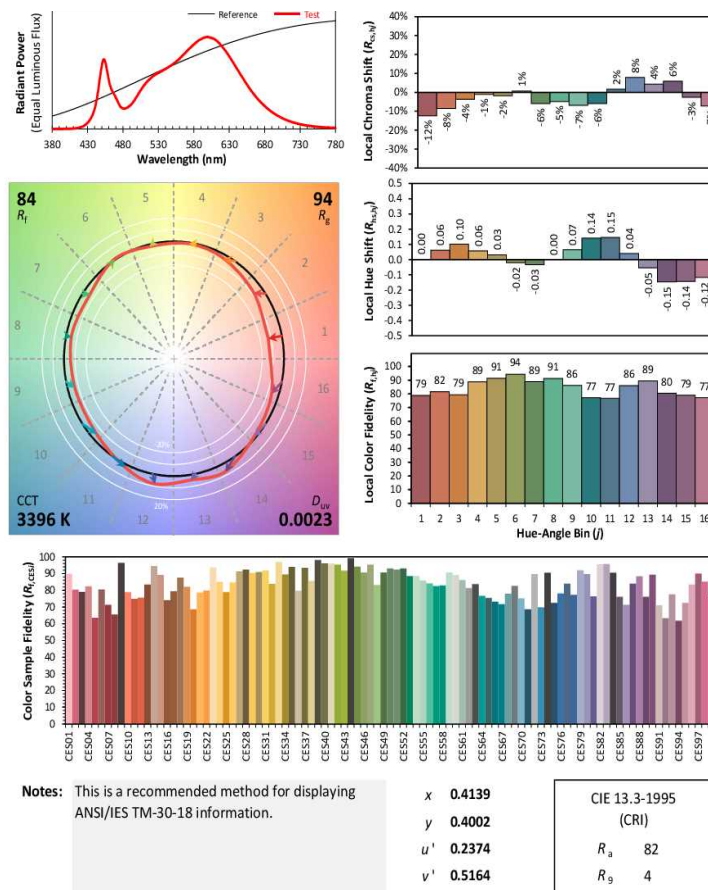
Luminous Flux (lm)	4451.34	Chrom x	0.4139
Chrom y	0.4002	Chrom u	0.2374
Chrom v	0.3443	Duv	0.0023
Chrom u'	0.2374	Chrom v'	0.5164
CCT (K)	3396	Luminous Efficacy (lm/W)	133.18
Ra	82	R1	80.0
R2	89.0	R3	96.0
R4	80.0	R5	80.0
R6	86.0	R7	85.0
R8	60.0	R9	4.0
R10	75.0	R11	79.0
R12	61.0	R13	82.0
R14	98.0	R15	73.0
Rf	84	Rg	94
Rcs,h1	-12%		



## Integrating Sphere Test (Cont'd)

### TM-30 Report

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



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## Integrating Sphere Test

<b>Model No.</b>	IK-AT24F-253035-CCT-D 35W		<b>Sample ID.</b>	4517347
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45	

### Test Method

1. The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.

2. Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.

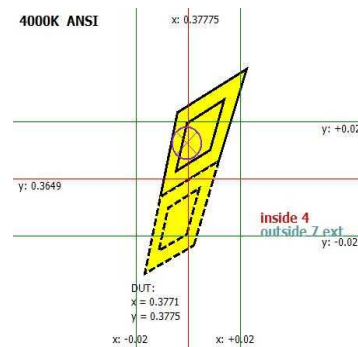
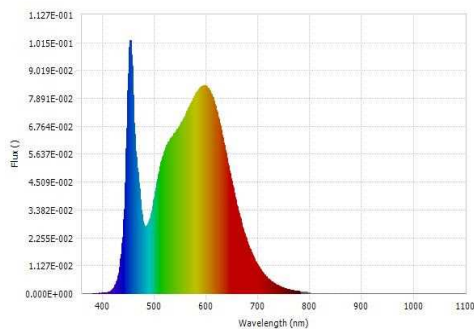
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using  $4\pi$  geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

### Integrating Sphere Test Conditions

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	119.99	60	0.2681	31.944	0.9929	Horizontal

### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
4098	84	12.0	0.0013	4641.11	145.29	N/A



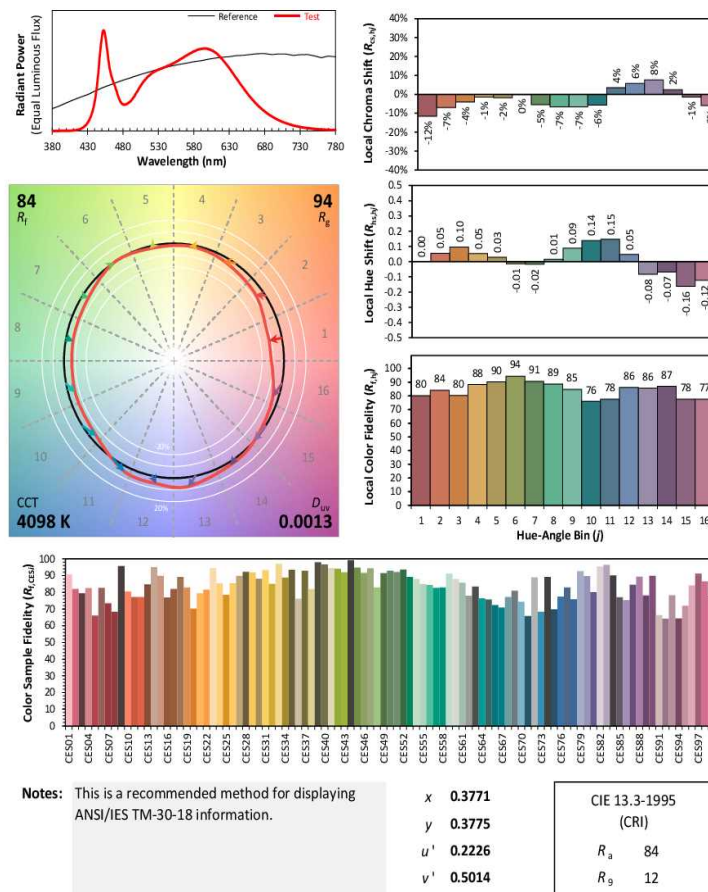
Luminous Flux (lm)	4641.11	Chrom x	0.3771
Chrom y	0.3775	Chrom u	0.2226
Chrom v	0.3343	Duv	0.0013
Chrom u'	0.2226	Chrom v'	0.5014
CCT (K)	4098	Luminous Efficacy (lm/W)	145.29
Ra	84	R1	82.0
R2	90.0	R3	95.0
R4	82.0	R5	82.0
R6	86.0	R7	87.0
R8	66.0	R9	12.0
R10	76.0	R11	81.0
R12	59.0	R13	85.0
R14	98.0	R15	76.0
Rf	84	Rg	94
Rcs,h1	-12%		



## Integrating Sphere Test (Cont'd)

### TM-30 Report

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



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## Integrating Sphere Test

Model No.	IK-AT24F-253035-CCT-D 35W		Sample ID.	4517347
Operate time (Min.)	90	Stabilization time (Min.)	45	

### Test Method

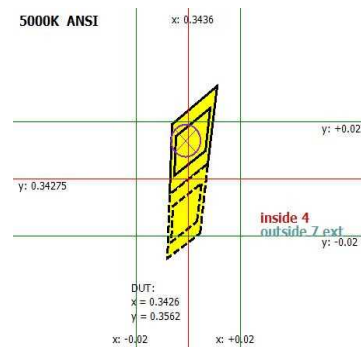
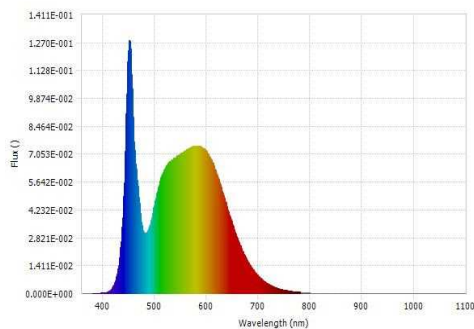
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.  
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °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 4 $\pi$  geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

### Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	119.99	60	0.2795	33.302	0.9932	Horizontal

### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
5109	83	8.0	0.0033	4507.51	135.35	N/A



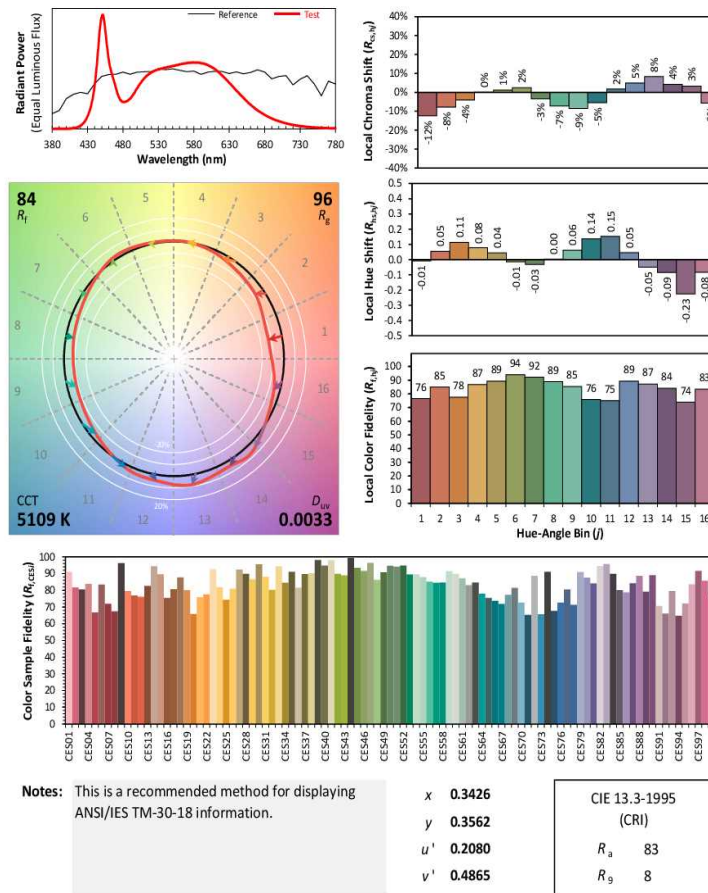
Luminous Flux (lm)	4507.51	Chrom x	0.3426
Chrom y	0.3562	Chrom u	0.2080
Chrom v	0.3243	Duv	0.0033
Chrom u'	0.2080	Chrom v'	0.4865
CCT (K)	5109	Luminous Efficacy (lm/W)	135.35
Ra	83	R1	81.0
R2	88.0	R3	93.0
R4	83.0	R5	82.0
R6	83.0	R7	87.0
R8	68.0	R9	8.0
R10	71.0	R11	82.0
R12	60.0	R13	83.0
R14	96.0	R15	76.0
Rf	84	Rg	96
Rcs,h1	-12%		



## Integrating Sphere Test (Cont'd)

### TM-30 Report

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



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## Integrating Sphere Test

<b>Model No.</b>	IK-AT24F-253035-CCT-D 30W		<b>Sample ID.</b>	4517347
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45	

### Test Method

1. The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.

2. Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.

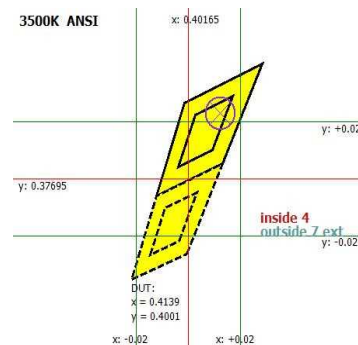
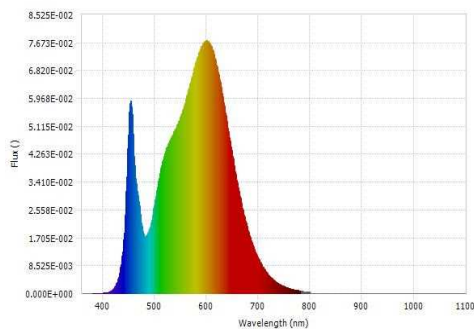
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using  $4\pi$  geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

### Integrating Sphere Test Conditions

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	120.04	60	0.2384	28.345	0.9905	Horizontal

### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3394	82	5.0	0.0022	3858.3	136.12	N/A



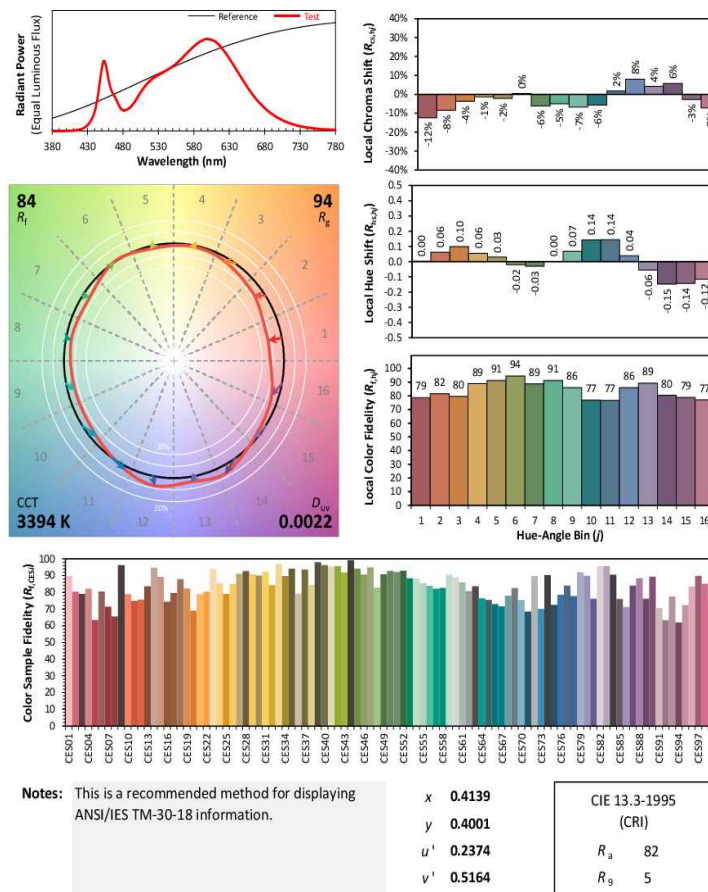
Luminous Flux (lm)	3858.3	Chrom x	0.4139
Chrom y	0.4001	Chrom u	0.2374
Chrom v	0.3442	Duv	0.0022
Chrom u'	0.2374	Chrom v'	0.5164
CCT (K)	3394	Luminous Efficacy (lm/W)	136.12
Ra	82	R1	80.0
R2	90.0	R3	97.0
R4	80.0	R5	80.0
R6	86.0	R7	85.0
R8	61.0	R9	5.0
R10	75.0	R11	79.0
R12	61.0	R13	83.0
R14	98.0	R15	73.0
Rf	84	Rg	94
Rcs,h1	-12%		



## Integrating Sphere Test (Cont'd)

### TM-30 Report

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



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## Integrating Sphere Test

<b>Model No.</b>	IK-AT24F-253035-CCT-D 25W		<b>Sample ID.</b>	4517347
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45	

### Test Method

1. The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.

2. Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.

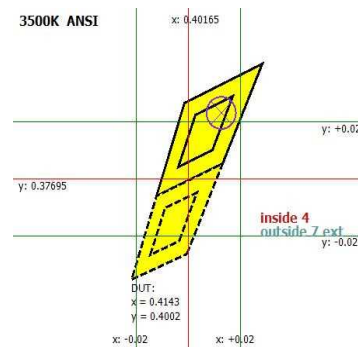
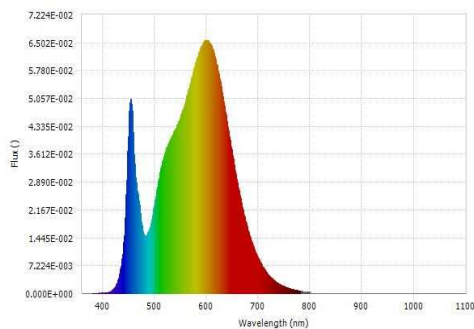
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using  $4\pi$  geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

### Integrating Sphere Test Conditions

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	120.05	60	0.1979	23.444	0.9866	Horizontal

### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3389	82	5.0	0.0022	3272.32	139.58	N/A



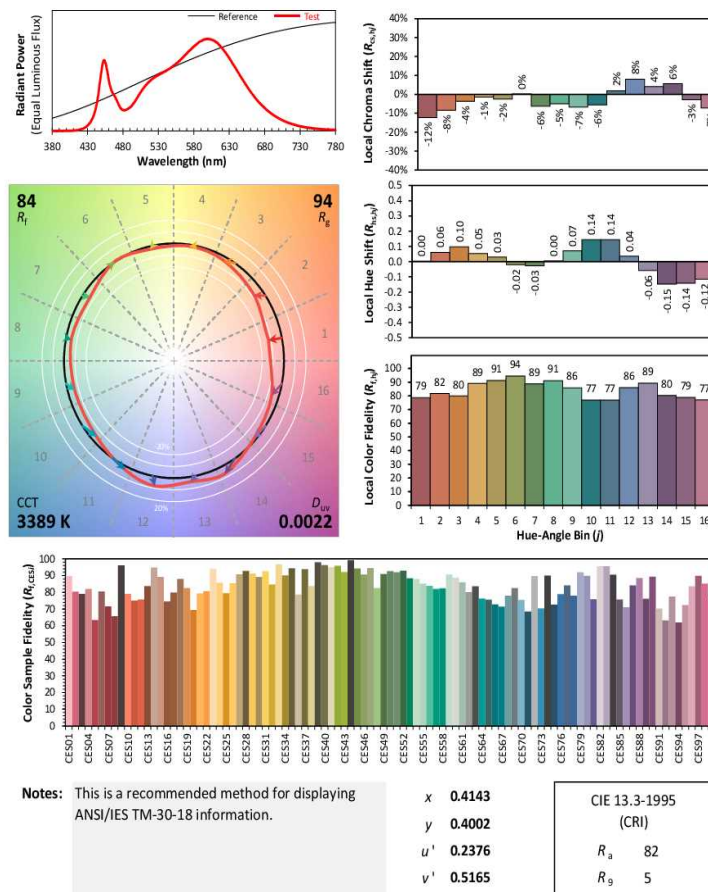
Luminous Flux (lm)	3272.32	Chrom x	0.4143
Chrom y	0.4002	Chrom u	0.2376
Chrom v	0.3443	Duv	0.0023
Chrom u'	0.2376	Chrom v'	0.5165
CCT (K)	3389	Luminous Efficacy (lm/W)	139.58
Ra	82	R1	80.0
R2	90.0	R3	97.0
R4	80.0	R5	80.0
R6	86.0	R7	85.0
R8	61.0	R9	5.0
R10	76.0	R11	79.0
R12	61.0	R13	83.0
R14	98.0	R15	73.0
Rf	84	Rg	94
Rcs,h1	-12%		



## Integrating Sphere Test (Cont'd)

### TM-30 Report

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



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## Goniophotometer Test

<b>Model No.</b>	IK-AT24F-253035-CCT-D 35W		<b>Sample ID.</b>	4517347
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45	

### Test Method

- 1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
- 2.Photometric parameters were measured using a type C goniophotometer and software.
- 3.The ambient temperature shall be maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , 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  $1^{\circ}$  vertical intervals and  $22.5^{\circ}$  horizontal intervals. Photometric distance was more than five times of the largest dimension of the test SSL product.

### Goniophotometer Test Conditions

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.3	120.05	60	0.2787	33.285	0.9946	7.04%	Horizontal

### Test Results

Luminous Flux (lm)	Zonal Lumen Requirement 1	Zonal Lumen Requirement 2	Beam Angle (50%)		Luminous Efficacy (lm/W)
	$0^{\circ}$ - $60^{\circ}$	N/A	Horizontal Spread	Vertical Spread	
4395.4	76.50%	N/A	113.9	104.5	132.05

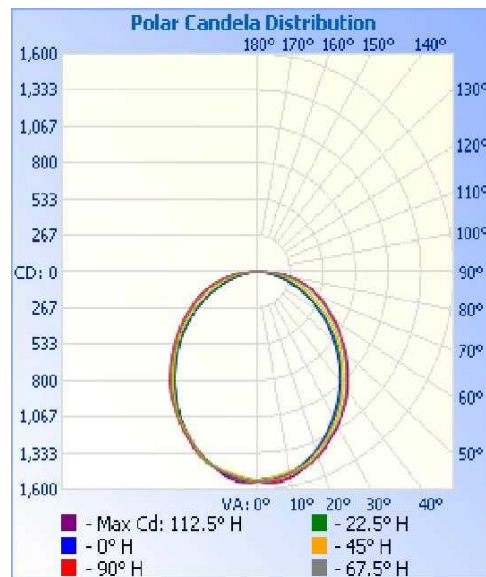
Backlight	Uplight	Glare
N/A	N/A	N/A

UGR		Spacing Criteria ( $0$ - $180^{\circ}$ )	Spacing Criteria ( $90^{\circ}$ - $270^{\circ}$ )
Crosswise	Endwise		
18.0	20.9	1.20	1.28

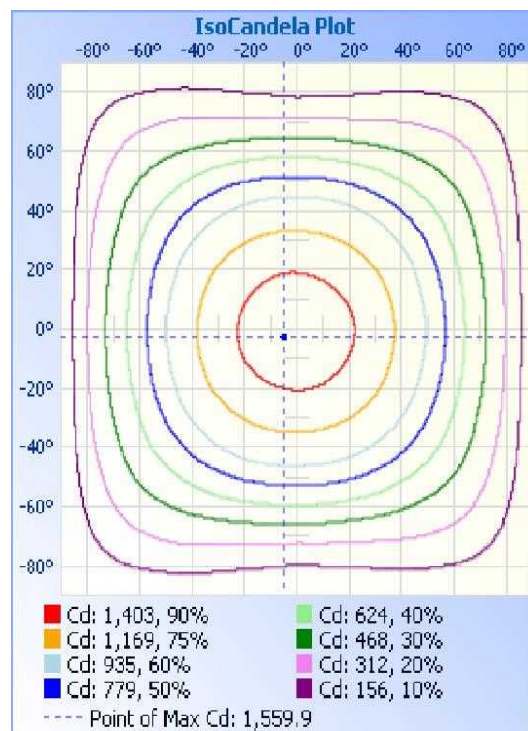


## Goniophotometer Test (Cont'd)

### Polar Candela Distribution



### IsoCandela Plot





## Goniophotometer Test (Cont'd)

### Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1180.3	26.90%
0-40	1919.7	43.70%
0-60	3364.0	76.50%
60-90	1019.3	23.20%
70-100	484.8	11.00%
90-120	4.9	0.10%
0-90	4383.2	99.70%
90-180	12.2	0.30%
0-180	4395.4	100.00%

### Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	36.8	0.80%	90-95	1.4	0.00%
5-10	109.0	2.50%	95-100	0.9	0.00%
10-15	177.0	4.00%	100-105	0.7	0.00%
15-20	237.9	5.40%	105-110	0.6	0.00%
20-25	289.0	6.60%	110-115	0.6	0.00%
25-30	330.5	7.50%	115-120	0.6	0.00%
30-35	360.8	8.20%	120-125	0.6	0.00%
35-40	378.7	8.60%	125-130	0.6	0.00%
40-45	383.3	8.70%	130-135	0.7	0.00%
45-50	375.8	8.60%	135-140	0.7	0.00%
50-55	357.2	8.10%	140-145	0.8	0.00%
55-60	327.9	7.50%	145-150	0.8	0.00%
60-65	289.8	6.60%	150-155	0.8	0.00%
65-70	246.9	5.60%	155-160	0.7	0.00%
70-75	201.1	4.60%	160-165	0.6	0.00%
75-80	150.9	3.40%	165-170	0.6	0.00%
80-85	95.9	2.20%	170-175	0.4	0.00%
85-90	34.6	0.80%	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	1535	1535	1535	1535	1535	1535	1535	1535	1535	1535	1535	1535	1535	1535	1535	1535	1535	1535	1535
1	1528	1527	1530	1543	1548	1540	1533	1531	1530	1530	1532	1548	1551	1540	1532	1530	1528	1528	1528
2	1526	1522	1527	1542	1553	1549	1543	1537	1532	1526	1529	1544	1553	1548	1540	1534	1528	1528	1528
3	1525	1520	1523	1540	1554	1553	1550	1539	1531	1523	1525	1542	1553	1553	1544	1534	1526	1526	1526
4	1525	1517	1520	1537	1551	1558	1552	1541	1530	1519	1519	1537	1549	1555	1548	1537	1526	1526	1526
5	1523	1514	1514	1533	1549	1560	1556	1542	1530	1515	1512	1532	1544	1556	1550	1535	1523	1523	1523
6	1520	1511	1507	1529	1544	1559	1556	1540	1527	1514	1506	1525	1538	1553	1548	1534	1520	1520	1520
7	1516	1509	1503	1523	1539	1555	1553	1537	1524	1511	1500	1519	1534	1549	1543	1532	1516	1516	1516
8	1512	1505	1500	1518	1538	1548	1550	1532	1520	1509	1496	1513	1528	1541	1540	1528	1513	1513	1513
9	1508	1503	1495	1514	1533	1544	1543	1528	1514	1504	1492	1507	1524	1534	1532	1521	1508	1508	1508
10	1503	1499	1492	1510	1528	1535	1538	1523	1509	1500	1489	1501	1517	1524	1526	1514	1501	1501	1501
11	1493	1491	1492	1506	1524	1529	1528	1518	1504	1496	1486	1496	1511	1514	1515	1505	1494	1494	1494
12	1486	1485	1486	1502	1517	1518	1519	1507	1494	1489	1485	1491	1501	1502	1502	1494	1485	1485	1485
13	1475	1478	1484	1496	1509	1508	1505	1495	1486	1481	1480	1486	1492	1491	1488	1482	1474	1474	1474
14	1464	1471	1478	1492	1501	1499	1492	1482	1477	1473	1474	1482	1482	1479	1476	1470	1466	1466	1466
15	1452	1461	1470	1489	1493	1490	1481	1472	1463	1463	1468	1476	1475	1470	1461	1458	1455	1455	1455
16	1441	1449	1463	1482	1484	1479	1468	1459	1454	1453	1458	1469	1467	1459	1448	1444	1443	1443	1443
17	1430	1439	1455	1475	1475	1467	1454	1448	1444	1441	1448	1460	1457	1448	1435	1433	1433	1433	1433
18	1420	1428	1443	1465	1467	1459	1445	1436	1432	1431	1436	1450	1447	1436	1422	1419	1421	1421	1421
19	1408	1416	1428	1451	1458	1449	1433	1422	1418	1420	1424	1438	1439	1426	1409	1404	1407	1407	1407
20	1394	1404	1414	1437	1448	1439	1422	1408	1405	1408	1411	1423	1428	1414	1396	1389	1392	1392	1392
25	1316	1329	1341	1360	1377	1376	1359	1339	1332	1332	1334	1344	1353	1348	1331	1317	1318	1318	1318
30	1234	1249	1270	1294	1308	1305	1287	1264	1250	1255	1264	1278	1282	1272	1256	1237	1235	1235	1235
35	1139	1158	1186	1218	1230	1221	1196	1171	1157	1162	1179	1199	1200	1189	1162	1143	1139	1139	1139
40	1040	1057	1087	1124	1143	1135	1104	1074	1059	1061	1079	1103	1114	1103	1070	1046	1041	1041	1041
45	934	952	983	1021	1044	1034	1005	972	951	956	975	1002	1012	998	969	941	931	931	931
50	821	844	883	923	941	928	891	859	837	846	873	902	910	891	855	829	820	820	820
55	704	730	774	818	837	821	780	740	719	731	762	795	807	788	744	713	706	706	706
60	582	609	659	709	733	716	669	622	597	611	647	686	702	680	634	594	583	583	583
65	462	488	545	605	633	613	558	503	475	486	530	580	599	575	523	477	462	462	462
70	345	376	442	509	538	517	453	388	357	371	423	482	504	481	421	365	346	346	346
75	235	270	346	412	438	420	356	282	244	264	326	383	403	382	324	258	235	235	235
80	134	174	247	301	323	306	255	183	141	167	228	275	292	272	224	162	134	134	134
85	48	88	135	170	184	174	140	93	52	81	121	153	164	150	118	78	49	49	49
90	2	3	5	8	8	9	7	4	3	4	7	7	6	6	4	2	2	2	2
95	2	2	2	3	2	2	2	2	1	2	2	2	3	2	2	2	2	2	2
100	1	1	2	2	2	2	2	1	1	1	1	2	2	1	1	1	2	2	2
105	1	2	1	1	1	1	1	1	1	1	1	2	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	1	1
115	1	1	1	2	1	1	1	1	1	1	2	2	1	1	2	2	1	1	1
120	1	1	2	1	1	2	1	2	1	1	2	2	2	1	1	2	1	1	1
125	2	1	2	1	2	1	1	1	1	1	1	2	2	2	1	1	1	1	1
130	2	2	2	2	2	1	1	2	2	2	2	1	2	1	1	1	1	1	1
135	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
140	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2
145	3	3	3	2	3	2	2	2	2	2	2	2	2	3	2	3	2	2	2
150	3	3	3	2	3	2	2	2	3	3	3	3	3	3	3	3	2	2	2
155	3	4	3	3	3	3	3	3	3	3	4	3	3	4	3	3	3	3	3
160	4	4	4	3	4	4	4	4	4	4	4	4	4	4	3	3	4	4	4
165	4	4	4	5	4	4	4	5	4	4	4	4	4	5	4	4	4	4	4
170	5	5	5	5	5	5	5	5	5	5	5	5	5	6	5	5	5	5	5
175	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
180	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5



## Goniophotometer Test

<b>Model No.</b>	IK-AT24F-253035-CCT-D 35W		<b>Sample ID.</b>	4517347
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45	

### Test Method

- 1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
- 2.Photometric parameters were measured using a type C goniophotometer and software.
- 3.The ambient temperature shall be maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , 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  $1^{\circ}$  vertical intervals and  $22.5^{\circ}$  horizontal intervals. Photometric distance was more than five times of the largest dimension of the test SSL product.

### Goniophotometer Test Conditions

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.2	120.14	60	0.2792	33.36	0.9946	7.10%	Horizontal

### Test Results

Luminous Flux (lm)	Zonal Lumen Requirement 1	Zonal Lumen Requirement 2	Beam Angle (50%)		Luminous Efficacy (lm/W)
	$0^{\circ}$ - $60^{\circ}$	N/A	Horizontal Spread	Vertical Spread	
4501.6	76.50%	N/A	114.4	104.7	134.94

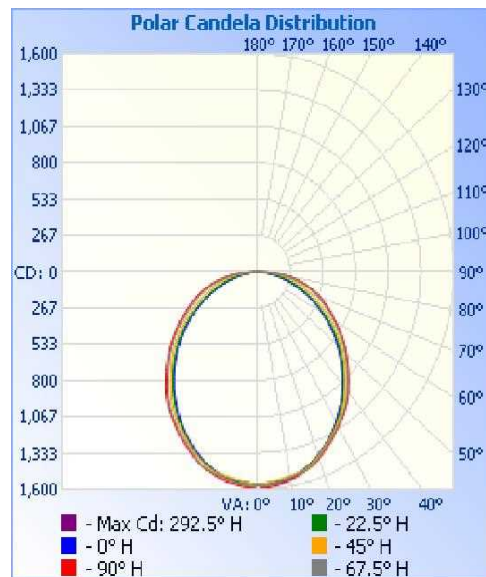
Backlight	Uplight	Glare
N/A	N/A	N/A

UGR		Spacing Criteria ( $0$ - $180^{\circ}$ )	Spacing Criteria ( $90^{\circ}$ - $270^{\circ}$ )
Crosswise	Endwise		
18.2	20.8	1.22	1.26

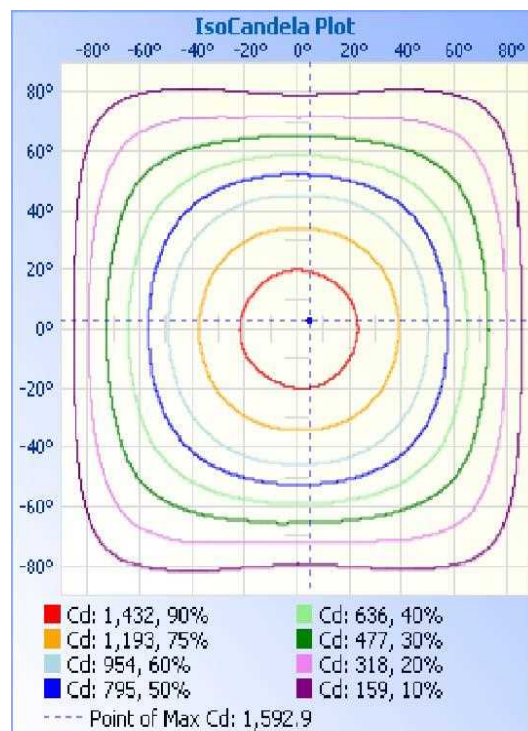


## Goniophotometer Test (Cont'd)

### Polar Candela Distribution



### IsoCandela Plot





## Goniophotometer Test (Cont'd)

### Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1206.4	26.80%
0-40	1963.8	43.60%
0-60	3444.3	76.50%
60-90	1044.6	23.20%
70-100	495.9	11.00%
90-120	5.1	0.10%
0-90	4488.9	99.70%
90-180	12.7	0.30%
0-180	4501.6	100.00%

### Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	37.5	0.80%	90-95	1.4	0.00%
5-10	111.4	2.50%	95-100	1.0	0.00%
10-15	180.9	4.00%	100-105	0.8	0.00%
15-20	243.1	5.40%	105-110	0.7	0.00%
20-25	295.5	6.60%	110-115	0.6	0.00%
25-30	338.0	7.50%	115-120	0.6	0.00%
30-35	369.2	8.20%	120-125	0.6	0.00%
35-40	388.1	8.60%	125-130	0.6	0.00%
40-45	392.5	8.70%	130-135	0.8	0.00%
45-50	384.9	8.60%	135-140	0.8	0.00%
50-55	366.7	8.10%	140-145	0.8	0.00%
55-60	336.5	7.50%	145-150	0.8	0.00%
60-65	297.3	6.60%	150-155	0.8	0.00%
65-70	253.7	5.60%	155-160	0.7	0.00%
70-75	206.4	4.60%	160-165	0.7	0.00%
75-80	154.7	3.40%	165-170	0.6	0.00%
80-85	98.1	2.20%	170-175	0.4	0.00%
85-90	34.3	0.80%	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	1567	1567	1567	1567	1567	1567	1567	1567	1567	1567	1567	1567	1567	1567	1567	1567	1567	1567	1567
1	1562	1562	1564	1579	1584	1575	1565	1562	1562	1560	1564	1577	1582	1574	1566	1562	1562	1562	1562
2	1564	1558	1561	1578	1587	1582	1572	1565	1563	1558	1561	1577	1585	1581	1573	1568	1564	1564	1564
3	1563	1555	1558	1573	1587	1586	1578	1569	1561	1553	1558	1575	1585	1586	1577	1571	1563	1563	1563
4	1562	1550	1550	1569	1582	1589	1583	1569	1559	1550	1553	1570	1584	1591	1584	1572	1562	1562	1562
5	1560	1549	1546	1563	1579	1590	1584	1570	1558	1547	1545	1566	1580	1593	1585	1574	1560	1560	1560
6	1558	1547	1540	1557	1574	1588	1582	1569	1554	1544	1540	1561	1575	1591	1585	1572	1558	1558	1558
7	1555	1545	1535	1552	1570	1582	1578	1566	1552	1543	1535	1556	1571	1588	1585	1570	1555	1555	1555
8	1550	1541	1531	1547	1564	1576	1574	1562	1548	1539	1530	1551	1568	1581	1579	1564	1550	1550	1550
9	1546	1538	1525	1542	1558	1568	1570	1555	1543	1533	1527	1546	1565	1574	1575	1562	1546	1546	1546
10	1541	1533	1524	1535	1552	1558	1558	1547	1535	1530	1524	1541	1558	1568	1567	1555	1541	1541	1541
11	1531	1527	1522	1530	1545	1547	1547	1538	1530	1524	1520	1536	1554	1558	1557	1544	1531	1531	1531
12	1524	1521	1518	1526	1538	1538	1536	1527	1519	1518	1518	1530	1544	1548	1544	1536	1524	1524	1524
13	1515	1513	1515	1522	1529	1527	1524	1517	1510	1510	1515	1527	1538	1538	1534	1525	1515	1515	1515
14	1506	1505	1510	1517	1522	1517	1512	1504	1500	1502	1510	1522	1529	1528	1523	1513	1506	1506	1506
15	1496	1496	1504	1513	1510	1507	1498	1493	1487	1491	1502	1517	1520	1519	1510	1504	1496	1496	1496
16	1484	1485	1494	1507	1503	1495	1483	1480	1478	1481	1494	1511	1514	1509	1498	1490	1484	1484	1484
17	1473	1475	1482	1496	1495	1484	1471	1464	1467	1472	1483	1505	1506	1498	1485	1477	1473	1473	1473
18	1461	1463	1469	1484	1486	1472	1457	1449	1454	1460	1471	1494	1496	1487	1471	1463	1461	1461	1461
19	1448	1450	1455	1470	1475	1460	1443	1434	1440	1448	1458	1478	1485	1476	1458	1450	1448	1448	1448
20	1434	1437	1441	1455	1462	1450	1429	1421	1425	1434	1444	1463	1473	1464	1446	1435	1434	1434	1434
25	1362	1366	1369	1381	1391	1386	1369	1352	1350	1360	1370	1388	1403	1402	1384	1366	1362	1362	1362
30	1275	1284	1293	1310	1316	1308	1289	1268	1265	1277	1296	1316	1332	1324	1309	1287	1275	1275	1275
35	1183	1194	1214	1234	1241	1227	1201	1177	1168	1184	1213	1243	1254	1244	1219	1193	1183	1183	1183
40	1081	1091	1108	1136	1152	1139	1105	1077	1069	1080	1109	1144	1164	1156	1123	1092	1081	1081	1081
45	968	982	1004	1032	1047	1032	1001	972	958	974	1003	1038	1057	1047	1017	985	968	968	968
50	854	872	903	936	945	927	889	857	845	863	900	937	952	938	902	871	854	854	854
55	738	758	793	831	843	823	778	739	725	744	784	830	847	831	788	751	738	738	738
60	609	631	674	718	736	714	664	618	600	620	666	714	736	718	671	626	609	609	609
65	484	506	558	614	636	612	554	500	476	495	548	604	630	609	555	504	484	484	484
70	365	389	452	518	543	516	450	385	354	375	436	504	533	510	448	388	365	365	365
75	248	279	352	415	437	413	352	275	241	268	338	402	428	408	346	276	248	248	248
80	142	179	250	302	321	299	248	177	137	169	237	290	312	294	243	175	142	142	142
85	53	89	136	169	180	166	131	86	49	81	125	161	174	163	129	86	53	53	53
90	3	3	5	6	6	4	3	3	2	3	5	6	8	8	6	4	3	3	3
95	2	1	2	3	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2
100	2	1	1	2	2	2	2	2	2	1	1	2	2	1	2	2	2	2	2
105	1	1	1	1	2	1	1	2	1	1	1	1	2	2	1	1	1	1	1
110	1	1	2	1	1	1	1	1	1	1	2	1	2	2	1	2	1	1	1
115	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	2	1	1	1
120	1	1	2	2	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1
125	1	1	1	1	1	2	1	2	1	1	1	1	2	1	1	2	1	1	1
130	2	2	2	1	2	2	2	2	1	2	2	1	2	2	2	2	2	2	2
135	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
140	2	2	3	2	2	3	2	2	3	3	3	2	2	2	2	2	2	2	2
145	2	3	2	3	3	2	2	2	3	3	2	3	2	3	2	2	2	2	2
150	2	2	3	3	3	3	3	2	3	3	3	3	3	3	3	3	2	2	2
155	3	4	3	3	3	3	3	4	3	3	4	4	4	4	3	3	3	3	3
160	3	4	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
165	4	5	4	5	5	4	5	4	4	4	5	4	4	5	4	4	4	4	4
170	5	5	5	5	5	5	5	5	6	5	5	6	5	6	5	5	5	5	5
175	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
180	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5



## THD and PF Test

<b>Model No.</b>	IK-AT24F-253035-CCT-D 35W		<b>Sample ID.</b>	4517347
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45	

### Test Method

1. The samples were tested according to the ANSI C82.77-10-2014.
2. The ambient temperature condition was maintained at  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ . The sample measurement was made using a digital power meter and power supply. The sample was operated at rated voltage and stabilized before measurement. The total harmonic distortion were calculated from the digital power meter.

### Test Results

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.3	120.05	60	0.2787	33.28	0.9946	7.04%	Horizontal
25.3	277.09	60	0.1235	32.91	0.9628	9.60%	Horizontal



## THD and PF Test

Model No.	IK-AT24F-253035-CCT-D 35W		Sample ID.	4517347
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  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . 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
25.3	120.13	60	0.2670	31.92	0.9946	6.72%	Horizontal
25.3	277.13	60	0.1190	31.66	0.9599	9.70%	Horizontal



## THD and PF Test

Model No.	IK-AT24F-253035-CCT-D 35W		Sample ID.	4517347
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
25.3	120.13	60	0.2792	33.36	0.9946	7.10%	Horizontal
25.3	277.12	60	0.1235	32.95	0.9629	9.63%	Horizontal



## THD and PF Test

<b>Model No.</b>	IK-AT24F-253035-CCT-D 30W		<b>Sample ID.</b>	4517347
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45	

### Test Method

1. The samples were tested according to the ANSI C82.77-10-2014.
2. The ambient temperature condition was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . 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
25.3	120.02	60	0.2376	28.29	0.9925	8.29%	Horizontal
25.3	277.10	60	0.1082	28.52	0.9515	10.65%	Horizontal



## THD and PF Test

<b>Model No.</b>	IK-AT24F-253035-CCT-D 25W		<b>Sample ID.</b>	4517347
<b>Operate time (Min.)</b>	90	<b>Stabilization time (Min.)</b>	45	

### Test Method

1. The samples were tested according to the ANSI C82.77-10-2014.
2. The ambient temperature condition was maintained at  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ . The sample measurement was made using a digital power meter and power supply. The sample was operated at rated voltage and stabilized before measurement. The total harmonic distortion were calculated from the digital power meter.

### Test Results

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.3	120.05	60	0.1970	23.38	0.9891	9.89%	Horizontal
25.3	277.12	60	0.0935	24.22	0.9348	12.29%	Horizontal



## In-Situ Temperature Measurement Test

<b>Model No.</b>	IK-AT24F-253035-CCT-D 35W	<b>Sample ID.</b>	4517347
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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
24.0	120.05	60	0.2787	33.28	0.9946	7.04%	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	24.0	25.0				
TMP of Location 1	125	39.8	40.8	0.0024	STW8A2PD-XX	200	105

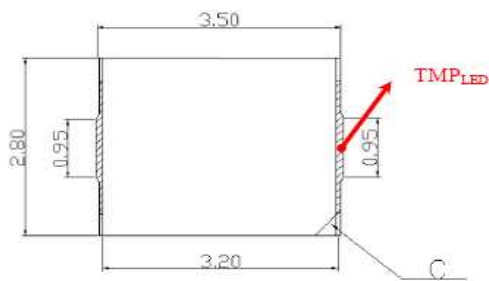
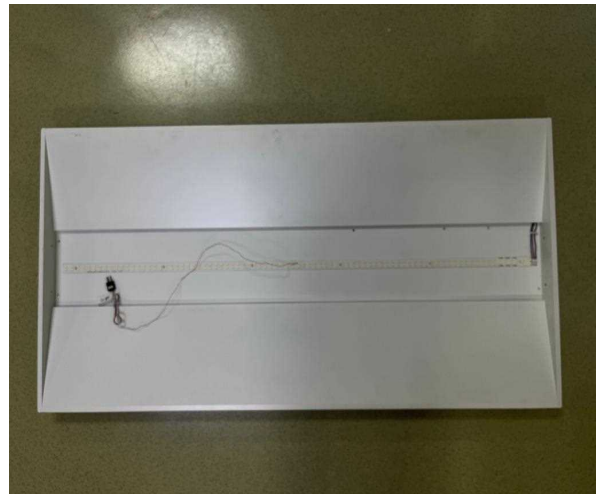
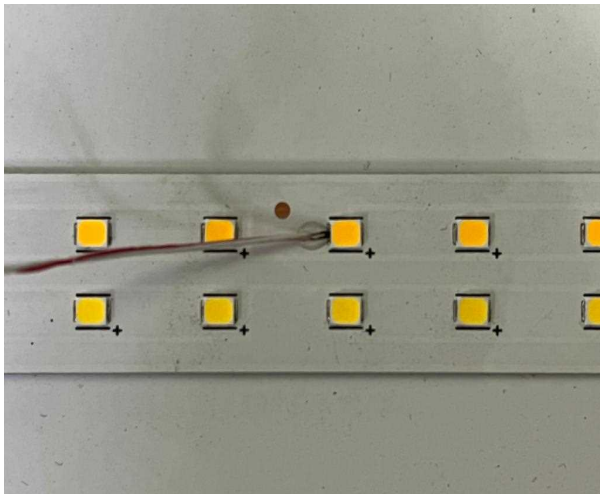
### Test Results (Drivers)

Thermocouple Location	Temperature for Driver (°C)		Driver Model Number	Driver Limit Temp (°C)
	Test Result	Test Result (Correct to 25 °C)		
Ambient TEMP	24.0	25.0		
TMP of Location 1	55.6	56.6	SIF 30-I0750 120-277 W D1-S1S2	90



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

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





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