



## DesignLights Consortium Test Report

### Reference Standards

UL1598-2008

ANSI C82.77-10-2014

IES LM-79-2008

### Prepared For IKIO LED LIGHTING

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Test Laboratory:

UL-CCIC Company Limited

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### Catalog Number

IK-AT22F-202530-CCT-D

### Project Number

4790110308

### Report Number

4790110308\_18

### Test Date

2021-12-12~2021-12-24

### Issue Date

2022-01-12

### Revision Date

N/A

### Prepared By

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### Approved By

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Wu, Elvis

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## Test Summary

### DLC Technical Requirements V5.1- issued 2020-02-14

Requirement Category	Test Method	Requirements	Tolerance	Test Result
Minimum Light Output (lm)-Luminaires	IES LM-79-2008	≥2000	-10%	2717.99
Minimum Luminaire Efficacy (lm/W)-Luminaires	IES LM-79-2008	≥110	-3%	129.62
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%	80.70%
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±245	N/A	3383
Allowable CCT (4000K)	IES LM-79-2008/ANSI C78.377-2015	3985±275	N/A	4059
Minimum CRI	IES LM-79-2008/CIE 13.3-1995	≥80	-1	82
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	21.9
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	0.9365
Total Harmonic Distortion (A%)	ANSI C82.77-10-2014	≤20%	5%	14.68%
In-Situ Temperature Measurement Test for LED 1 (°C)	UL1598-2008	≤105	N/A	47.2
In-Situ Temperature Measurement Test for Driver 1 (°C)	UL1598-2008	≤90	N/A	54.5
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: 2021-12-07

Test Item	Test Date	Model Number	Tests Conducted By
Integrating Sphere Test	2021-12-16	IK-AT22F-202530-CCT-D 30W	Yang, Gavin X
Integrating Sphere Test	2021-12-16	IK-AT22F-202530-CCT-D 30W	Yang, Gavin X
Integrating Sphere Test	2021-12-16	IK-AT22F-202530-CCT-D 30W	Yang, Gavin X
Integrating Sphere Test	2021-12-16	IK-AT22F-202530-CCT-D 25W	Yang, Gavin X
Integrating Sphere Test	2021-12-16	IK-AT22F-202530-CCT-D 20W	Yang, Gavin X
Goniophotometer Test	2021-12-12	IK-AT22F-202530-CCT-D 30W	Yang, Gavin X
Goniophotometer Test	2021-12-16	IK-AT22F-202530-CCT-D 30W	Yang, Gavin X
THD and PF Test	2021-12-12	IK-AT22F-202530-CCT-D 30W	Yang, Gavin X
THD and PF Test	2021-12-12	IK-AT22F-202530-CCT-D 30W	Yang, Gavin X
THD and PF Test	2021-12-12	IK-AT22F-202530-CCT-D 30W	Yang, Gavin X
THD and PF Test	2021-12-12	IK-AT22F-202530-CCT-D 25W	Yang, Gavin X
THD and PF Test	2021-12-12	IK-AT22F-202530-CCT-D 20W	Yang, Gavin X
In-Situ Temperature Measurement Test	2021-12-24	IK-AT22F-202530-CCT-D 30W	Yang, Gavin X

## Remark (if any)

1. UL test equipment information is recorded on Meter Use in UL's Aurora database.
2. The accuracy method decision rule is applied when the compliance or verdict is made to the results of this report.



## Product Description

**Lamp/Luminaire Description:** 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces

**Model Number:** IK-AT22F-202530-CCT-D 20W

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

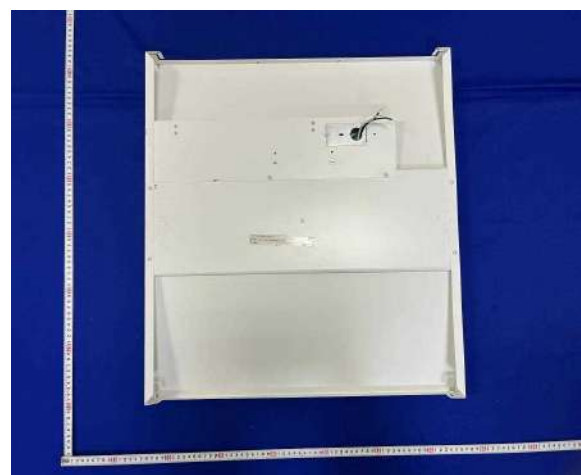
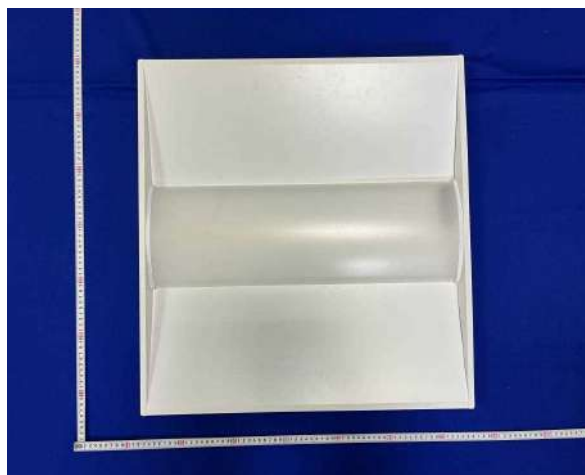
**LED Package:** STW8A2PD-XX

**Dimming Information:** Continuous dimming capability

**Products Scaled Value**

Model Number	CCT	Luminous Flux	Power	Luminous Efficacy
IK-AT22F-202530-CCT-D	3500k	3840	30	128
IK-AT22F-202530-CCT-D	4000k	3870	30	129
IK-AT22F-202530-CCT-D	5000k	3900	30	130
IK-AT22F-202530-CCT-D	3500k	3300	25	132
IK-AT22F-202530-CCT-D	4000k	3325	25	133
IK-AT22F-202530-CCT-D	5000k	3350	25	134
IK-AT22F-202530-CCT-D)	3500k	2700	20	135
IK-AT22F-202530-CCT-D	4000k	2720	20	136
IK-AT22F-202530-CCT-D	5000k	2740	20	137

**Photos of Products Characteristics**





## Integrating Sphere Test

<b>Model No.</b>	IK-AT22F-202530-CCT-D 30W		<b>Sample ID.</b>	4472594
<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.

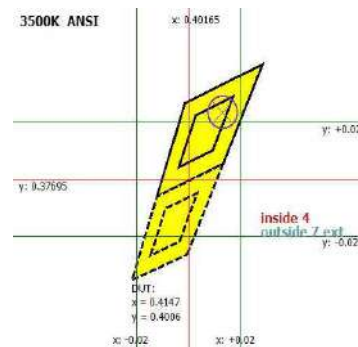
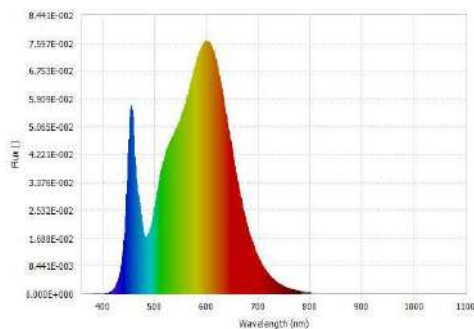
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using  $4\pi$  geometry. The self-absorption 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
24.8	120.04	60	0.2537	30.106	0.9886	Horizontal

### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3383	82	3.0	0.0023	3940.46	130.89	N/A



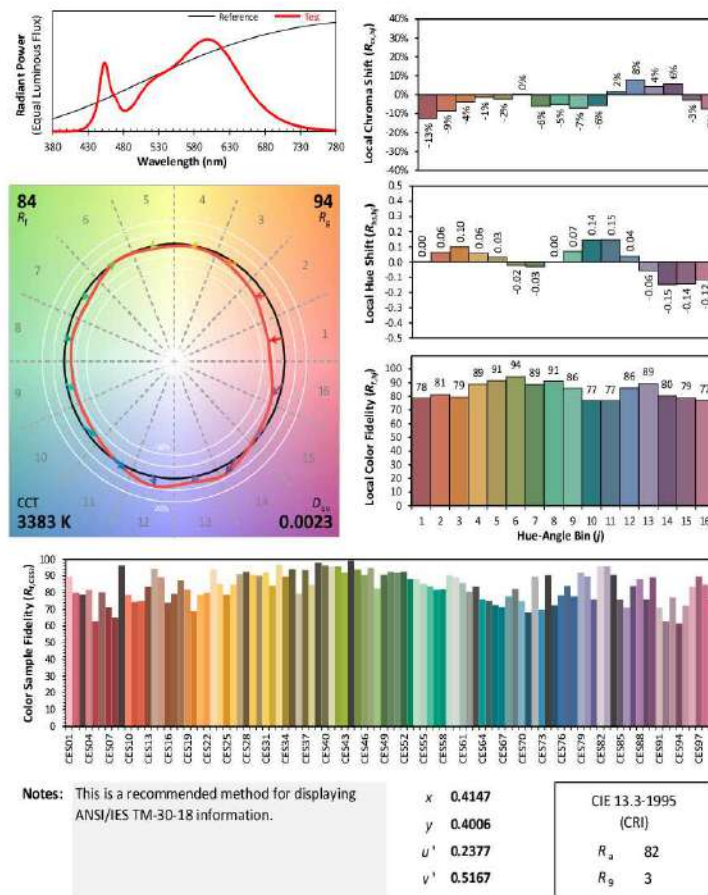
Luminous Flux (lm)	3940.46	Chrom x	0.4147
Chrom y	0.4006	Chrom u	0.2377
Chrom v	0.3445	Duv	0.0023
Chrom u'	0.2377	Chrom v'	0.5167
CCT (K)	3383	Luminous Efficacy (lm/W)	130.89
Ra	82	R1	80.0
R2	89.0	R3	97.0
R4	80.0	R5	80.0
R6	86.0	R7	84.0
R8	60.0	R9	3.0
R10	75.0	R11	78.0
R12	61.0	R13	82.0
R14	98.0	R15	72.0
Rf	84	Rg	94
Rcs,h1	-13%		



## 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-AT22F-202530-CCT-D 30W		Sample ID.	4472594
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  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.

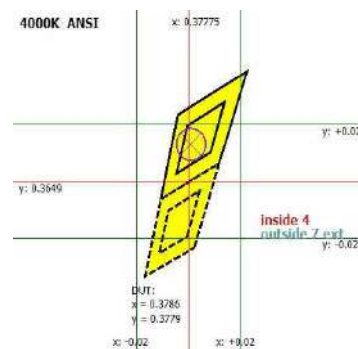
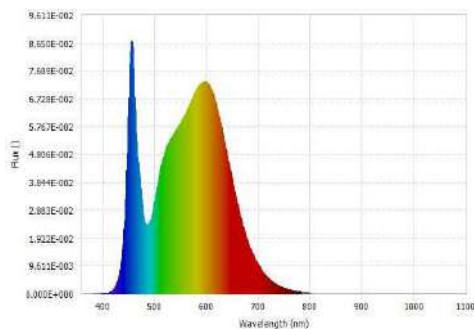
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using  $4\pi$  geometry. The self-absorption 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
24.8	120.01	60	0.2447	29.026	0.9883	Horizontal

### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
4059	84	12.0	0.0011	4133.17	142.40	N/A



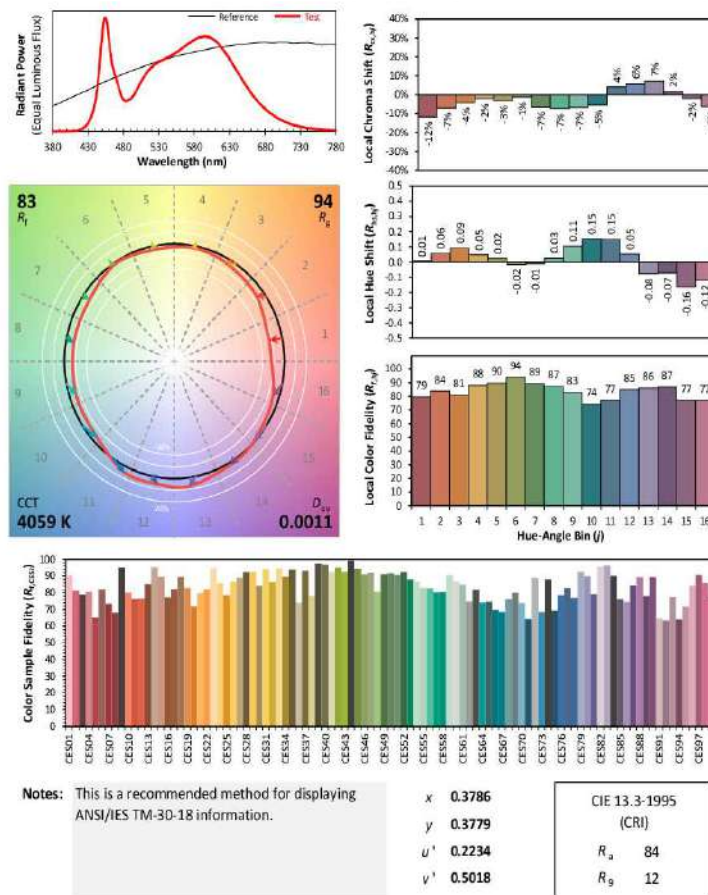
Luminous Flux (lm)	4133.17	Chrom x	0.3786
Chrom y	0.3779	Chrom u	0.2234
Chrom v	0.3346	Duv	0.0011
Chrom u'	0.2234	Chrom v'	0.5018
CCT (K)	4059	Luminous Efficacy (lm/W)	142.40
Ra	84	R1	82.0
R2	91.0	R3	96.0
R4	81.0	R5	82.0
R6	86.0	R7	86.0
R8	65.0	R9	12.0
R10	77.0	R11	80.0
R12	58.0	R13	85.0
R14	98.0	R15	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



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## Integrating Sphere Test

Model No.	IK-AT22F-202530-CCT-D 30W		Sample ID.	4472594
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  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.

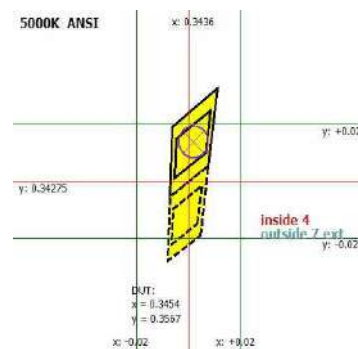
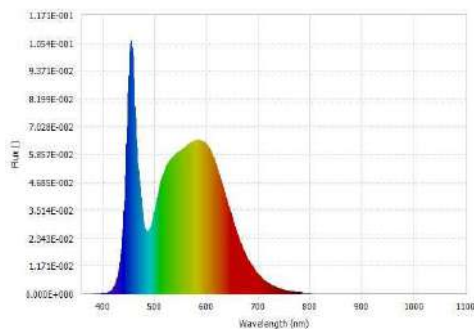
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using  $4\pi$  geometry. The self-absorption 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
24.8	120.02	60	0.2539	30.13	0.9887	Horizontal

### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
5008	83	8.0	0.0025	3975.7	131.95	N/A



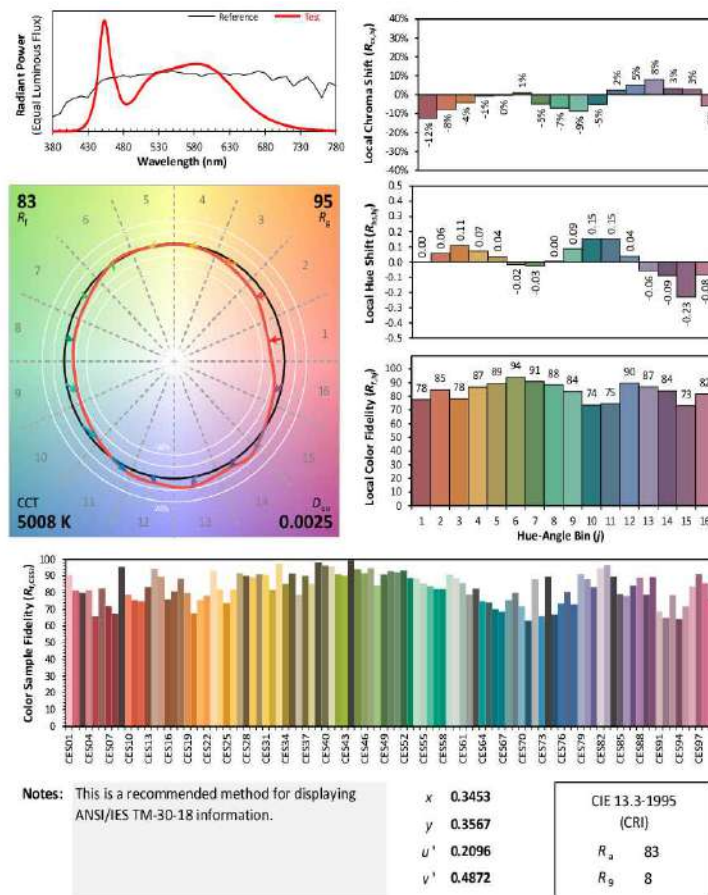
Luminous Flux (lm)	3975.7	Chrom x	0.3454
Chrom y	0.3567	Chrom u	0.2096
Chrom v	0.3248	Duv	0.0025
Chrom u'	0.2096	Chrom v'	0.4872
CCT (K)	5008	Luminous Efficacy (lm/W)	131.95
Ra	83	R1	82.0
R2	89.0	R3	93.0
R4	82.0	R5	82.0
R6	84.0	R7	87.0
R8	67.0	R9	8.0
R10	73.0	R11	80.0
R12	59.0	R13	84.0
R14	96.0	R15	76.0
Rf	83	Rg	95
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-AT22F-202530-CCT-D 25W		Sample ID.	4472594
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  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.

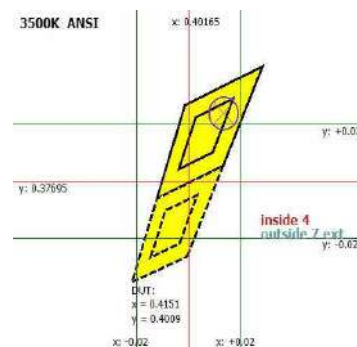
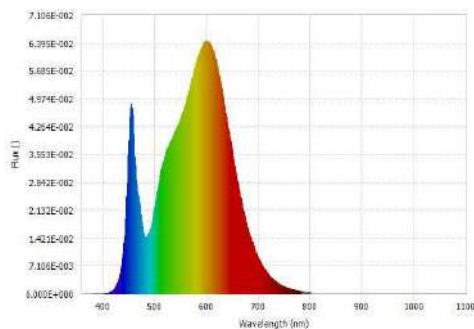
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using  $4\pi$  geometry. The self-absorption 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
24.8	120.06	60	0.2068	24.447	0.9847	Horizontal

### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3376	82	4.0	0.0023	3309.52	135.38	N/A



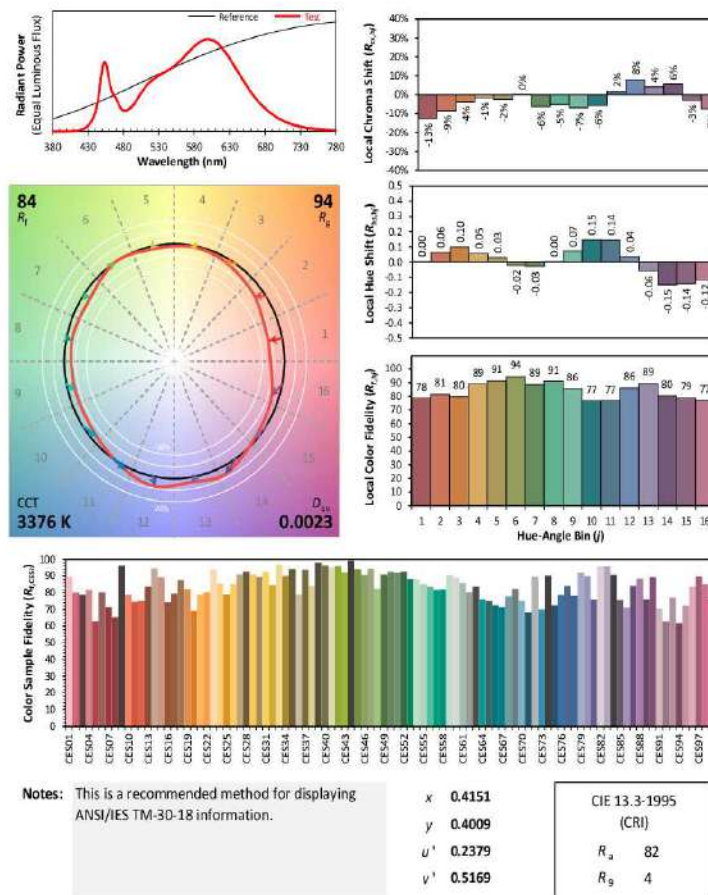
Luminous Flux (lm)	3309.52	Chrom x	0.4151
Chrom y	0.4009	Chrom u	0.2379
Chrom v	0.3446	Duv	0.0023
Chrom u'	0.2379	Chrom v'	0.5169
CCT (K)	3376	Luminous Efficacy (lm/W)	135.38
Ra	82	R1	80.0
R2	90.0	R3	97.0
R4	80.0	R5	80.0
R6	86.0	R7	84.0
R8	60.0	R9	4.0
R10	75.0	R11	78.0
R12	61.0	R13	82.0
R14	98.0	R15	73.0
Rf	84	Rg	94
Rcs,h1	-13%		



## 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-AT22F-202530-CCT-D 20W		Sample ID.	4472594
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  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.

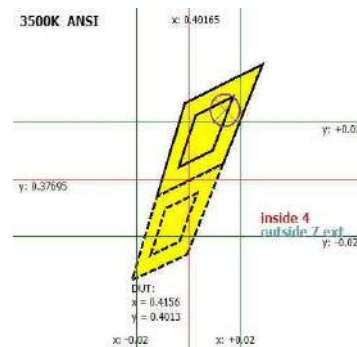
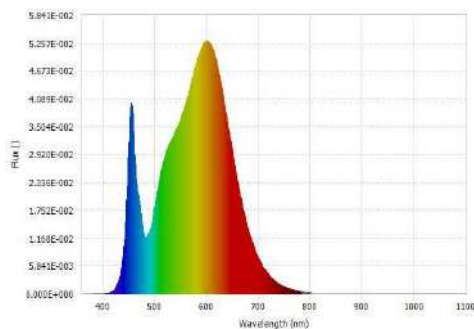
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using  $4\pi$  geometry. The self-absorption 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
24.8	120.06	60	0.1663	19.537	0.9785	Horizontal

### Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3369	82	4.0	0.0024	2717.99	139.12	N/A



Luminous Flux (lm)	2717.99	Chrom x	0.4156
Chrom y	0.4013	Chrom u	0.2380
Chrom v	0.3447	Duv	0.0024
Chrom u'	0.2380	Chrom v'	0.5171
CCT (K)	3369	Luminous Efficacy (lm/W)	139.12
Ra	82	R1	80.0
R2	90.0	R3	97.0
R4	80.0	R5	80.0
R6	86.0	R7	84.0
R8	60.0	R9	4.0
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%		

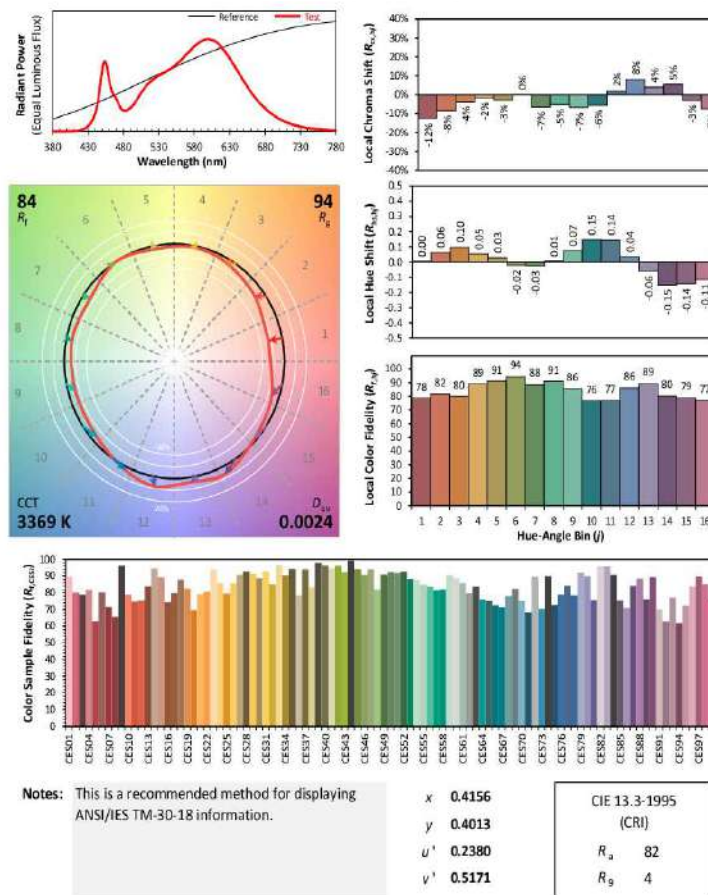




## Integrating Sphere Test (Cont'd)

### TM-30 Report

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



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## Goniophotometer Test

Model No.	IK-AT22F-202530-CCT-D 30W		Sample ID.	4472594
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  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , 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
24.9	120.06	60	0.2533	30.112	0.9901	11.78%	Horizontal

### Test Results

Luminous Flux (lm)	Zonal Lumen Requirement 1	Zonal Lumen Requirement 2	Beam Angle (50%)		Luminous Efficacy (lm/W)
	$0^{\circ}\text{-}60^{\circ}$	N/A	Horizontal Spread	Vertical Spread	
3903.2	80.70%	N/A	107.1	93.5	129.62

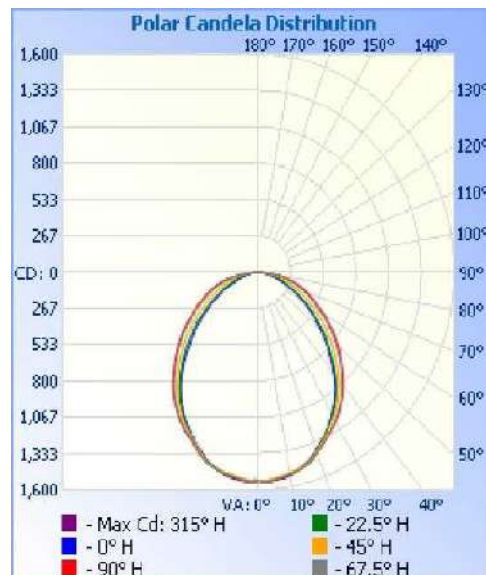
Backlight	Uplight	Glare
N/A	N/A	N/A

UGR		Spacing Criteria ( $0\text{-}180^{\circ}$ )	Spacing Criteria ( $90^{\circ}\text{-}270^{\circ}$ )
Crosswise	Endwise		
18.2	21.7	1.18	1.24

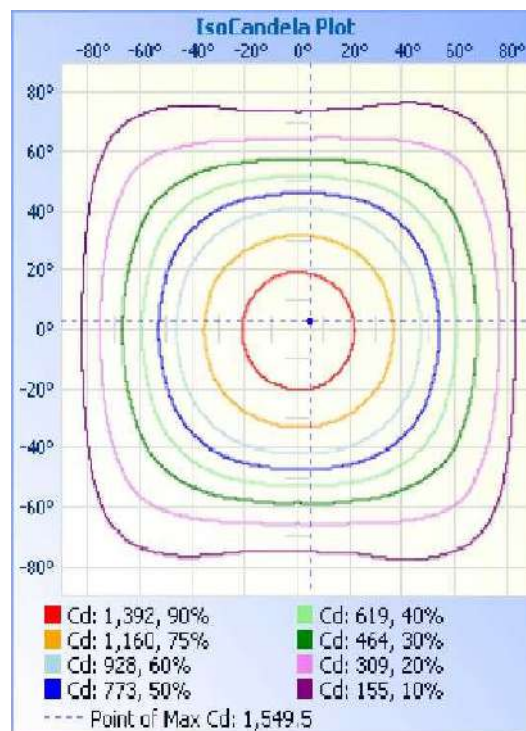


## Goniophotometer Test (Cont'd)

### Polar Candela Distribution



### IsoCandela Plot





## Goniophotometer Test (Cont'd)

### Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1168.4	29.90%
0-40	1880.5	48.20%
0-60	3151.1	80.70%
60-90	740.9	19.00%
70-100	332.0	8.50%
90-120	3.7	0.10%
0-90	3892.0	99.70%
90-180	11.2	0.30%
0-180	3903.2	100.00%

### Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	36.7	0.90%	90-95	0.9	0.00%
5-10	109.0	2.80%	95-100	0.7	0.00%
10-15	176.8	4.50%	100-105	0.6	0.00%
15-20	236.8	6.10%	105-110	0.6	0.00%
20-25	285.1	7.30%	110-115	0.5	0.00%
25-30	323.8	8.30%	115-120	0.5	0.00%
30-35	350.3	9.00%	120-125	0.5	0.00%
35-40	361.9	9.30%	125-130	0.6	0.00%
40-45	355.9	9.10%	130-135	0.7	0.00%
45-50	337.2	8.60%	135-140	0.8	0.00%
50-55	308.3	7.90%	140-145	0.8	0.00%
55-60	269.2	6.90%	145-150	0.8	0.00%
60-65	225.8	5.80%	150-155	0.8	0.00%
65-70	184.6	4.70%	155-160	0.8	0.00%
70-75	145.9	3.70%	160-165	0.7	0.00%
75-80	105.8	2.70%	165-170	0.6	0.00%
80-85	61.6	1.60%	170-175	0.4	0.00%
85-90	17.1	0.40%	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	1531	1531	1531	1531	1531	1531	1531	1531	1531	1531	1531	1531	1531	1531	1531	1531	1531
1	1531	1530	1530	1541	1537	1537	1531	1526	1526	1533	1532	1542	1540	1540	1534	1528	1528
2	1533	1531	1532	1543	1540	1540	1538	1532	1530	1535	1532	1543	1541	1545	1541	1533	1532
3	1532	1532	1529	1541	1541	1544	1543	1537	1532	1534	1530	1541	1543	1549	1545	1538	1533
4	1534	1530	1526	1537	1541	1546	1547	1539	1532	1531	1526	1537	1542	1548	1548	1540	1533
5	1530	1524	1520	1532	1536	1546	1547	1540	1532	1526	1520	1531	1538	1548	1550	1541	1532
6	1530	1519	1514	1527	1531	1546	1547	1538	1530	1522	1514	1525	1535	1546	1547	1539	1529
7	1526	1515	1510	1521	1529	1541	1543	1535	1527	1519	1509	1519	1530	1543	1544	1536	1526
8	1522	1511	1504	1516	1525	1537	1538	1531	1522	1514	1504	1516	1528	1538	1538	1530	1522
9	1516	1508	1499	1509	1520	1530	1533	1525	1517	1512	1501	1511	1522	1531	1533	1524	1517
10	1509	1502	1495	1506	1513	1525	1526	1518	1513	1509	1497	1507	1514	1522	1522	1517	1510
11	1501	1497	1491	1502	1505	1513	1513	1510	1503	1501	1493	1502	1507	1512	1512	1506	1502
12	1494	1491	1488	1497	1497	1504	1505	1498	1497	1498	1491	1497	1498	1500	1500	1495	1493
13	1484	1484	1482	1491	1490	1494	1492	1487	1485	1490	1485	1490	1491	1491	1490	1483	1484
14	1473	1477	1476	1486	1482	1484	1481	1475	1476	1481	1480	1485	1483	1481	1478	1472	1475
15	1461	1467	1469	1478	1474	1474	1470	1462	1465	1471	1473	1478	1475	1470	1466	1460	1462
16	1450	1455	1459	1469	1466	1463	1457	1452	1454	1460	1462	1469	1467	1461	1454	1447	1451
17	1437	1443	1447	1458	1456	1452	1444	1438	1441	1447	1449	1459	1457	1449	1442	1434	1436
18	1421	1428	1433	1444	1444	1439	1431	1422	1424	1432	1435	1446	1446	1436	1428	1419	1421
19	1404	1411	1416	1429	1430	1425	1416	1406	1407	1415	1418	1430	1431	1423	1414	1404	1406
20	1386	1394	1398	1411	1414	1410	1401	1390	1390	1398	1400	1412	1416	1409	1399	1388	1388
25	1301	1305	1314	1332	1336	1335	1325	1311	1306	1314	1318	1332	1340	1335	1325	1307	1302
30	1204	1212	1230	1256	1266	1260	1243	1220	1213	1223	1238	1259	1269	1260	1242	1216	1204
35	1093	1107	1138	1170	1181	1168	1142	1110	1101	1120	1146	1176	1184	1169	1144	1109	1094
40	959	978	1019	1065	1081	1065	1029	985	969	994	1032	1071	1087	1068	1031	983	961
45	814	837	891	947	968	949	904	848	824	855	906	954	972	952	907	849	814
50	674	701	767	831	853	830	777	710	681	719	783	841	860	836	782	713	674
55	540	568	642	713	737	712	647	575	545	583	657	726	747	719	655	577	539
60	410	440	515	589	618	590	520	445	417	453	530	605	631	601	529	447	411
65	303	330	399	477	509	479	406	335	310	342	418	499	527	495	417	338	304
70	216	239	309	387	418	388	313	242	219	250	326	408	437	404	324	247	216
75	140	163	230	300	327	300	232	166	143	173	247	320	346	315	243	170	139
80	76	100	155	203	220	204	158	102	80	109	172	218	232	213	166	106	76
85	29	45	71	90	98	93	74	47	31	52	78	94	95	90	75	49	30
90	2	2	2	2	3	2	2	2	2	2	2	3	2	3	2	1	1
95	1	1	1	2	2	1	2	1	1	1	1	2	2	2	1	1	1
100	1	1	1	2	2	1	1	1	1	0	2	1	1	1	1	1	0
105	1	1	1	1	2	1	1	0	1	1	1	1	1	1	1	1	1
110	1	0	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1
115	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1
120	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1	1	1
125	1	2	1	2	2	1	2	1	1	2	1	2	1	1	1	1	1
130	1	2	1	2	1	1	2	1	1	1	1	2	2	1	2	2	2
135	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	2	2	2	2	2
145	2	2	2	2	2	3	2	2	3	3	2	2	3	2	3	2	2
150	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3
155	4	4	3	3	4	3	3	3	4	3	3	4	4	3	4	3	4
160	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
165	5	4	4	4	5	5	4	4	5	5	4	4	5	4	5	5	4
170	6	6	5	6	5	6	5	6	5	5	5	6	5	6	6	6	6
175	6	5	6	6	5	6	6	5	5	5	6	5	5	5	5	6	6
180	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6



## Goniophotometer Test

Model No.	IK-AT22F-202530-CCT-D 30W		Sample ID.	4472594
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  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , 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
25.0	120.03	60	0.2538	30.158	0.9901	11.73%	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	
3955.1	80.70%	N/A	108.0	94.5	131.15

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

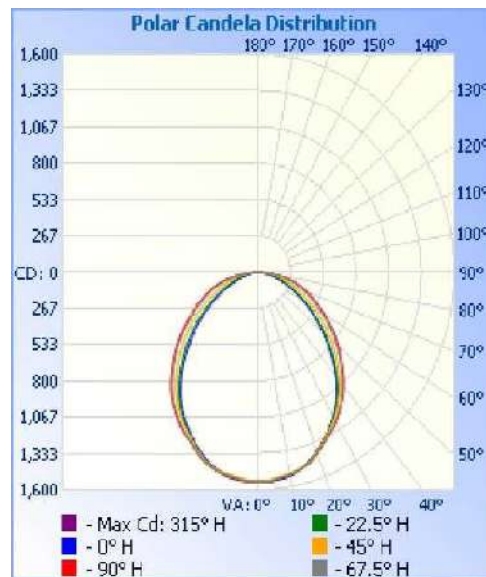
UGR		Spacing Criteria ( $0$ - $180^{\circ}$ )	Spacing Criteria ( $90^{\circ}$ - $270^{\circ}$ )
Crosswise	Endwise		
18.4	21.9	1.22	1.26



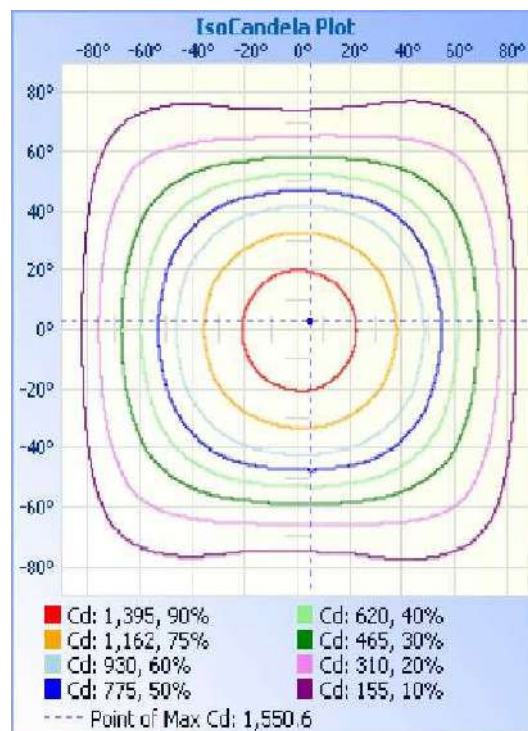


## Goniophotometer Test (Cont'd)

### Polar Candela Distribution



### IsoCandela Plot







## Goniophotometer Test (Cont'd)

### Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1174.8	29.70%
0-40	1895.1	47.90%
0-60	3187.6	80.60%
60-90	756.1	19.10%
70-100	338.6	8.60%
90-120	3.6	0.10%
0-90	3943.7	99.70%
90-180	11.4	0.30%
0-180	3955.1	100.00%

### Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	36.8	0.90%	90-95	0.9	0.00%
5-10	109.2	2.80%	95-100	0.7	0.00%
10-15	177.4	4.50%	100-105	0.6	0.00%
15-20	237.9	6.00%	105-110	0.5	0.00%
20-25	286.9	7.30%	110-115	0.5	0.00%
25-30	326.6	8.30%	115-120	0.5	0.00%
30-35	354.0	9.00%	120-125	0.5	0.00%
35-40	366.4	9.30%	125-130	0.6	0.00%
40-45	361.6	9.10%	130-135	0.7	0.00%
45-50	343.2	8.70%	135-140	0.8	0.00%
50-55	313.6	7.90%	140-145	0.8	0.00%
55-60	274.0	6.90%	145-150	0.8	0.00%
60-65	230.7	5.80%	150-155	0.8	0.00%
65-70	188.4	4.80%	155-160	0.8	0.00%
70-75	148.7	3.80%	160-165	0.7	0.00%
75-80	108.4	2.70%	165-170	0.6	0.00%
80-85	62.8	1.60%	170-175	0.4	0.00%
85-90	17.3	0.40%	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	1532	1532	1532	1532	1532	1532	1532	1532	1532	1532	1532	1532	1532	1532	1532	1532	1532	1532	1532
1	1530	1533	1533	1544	1541	1539	1533	1527	1532	1532	1531	1542	1539	1541	1534	1529	1530	1530	1530
2	1534	1535	1534	1544	1544	1546	1541	1535	1534	1535	1532	1542	1544	1546	1542	1536	1534	1534	1534
3	1537	1533	1532	1543	1543	1549	1543	1538	1535	1534	1531	1542	1543	1548	1547	1538	1537	1537	1537
4	1536	1531	1528	1541	1543	1550	1548	1542	1535	1533	1528	1538	1541	1549	1550	1544	1536	1536	1536
5	1534	1527	1521	1533	1539	1549	1549	1542	1534	1528	1522	1534	1540	1550	1551	1544	1534	1534	1534
6	1532	1523	1515	1527	1535	1546	1549	1540	1532	1524	1517	1528	1537	1549	1550	1542	1532	1532	1532
7	1529	1518	1510	1520	1530	1544	1544	1538	1529	1520	1512	1523	1534	1546	1546	1538	1529	1529	1529
8	1525	1514	1505	1517	1526	1539	1541	1533	1524	1517	1508	1520	1530	1542	1542	1535	1525	1525	1525
9	1521	1511	1501	1512	1521	1533	1533	1528	1520	1514	1505	1516	1526	1536	1537	1529	1521	1521	1521
10	1516	1507	1498	1508	1515	1526	1526	1520	1513	1510	1502	1513	1521	1528	1529	1522	1516	1516	1516
11	1508	1502	1495	1503	1507	1516	1516	1511	1505	1505	1499	1509	1514	1518	1518	1512	1508	1508	1508
12	1499	1497	1491	1497	1498	1505	1505	1501	1498	1500	1496	1504	1507	1507	1508	1502	1499	1499	1499
13	1490	1490	1487	1492	1489	1494	1493	1490	1489	1494	1491	1500	1499	1499	1497	1490	1490	1490	1490
14	1481	1481	1480	1487	1482	1484	1481	1478	1479	1484	1485	1494	1492	1490	1486	1479	1481	1481	1481
15	1469	1473	1473	1479	1475	1473	1470	1466	1469	1475	1479	1487	1484	1480	1476	1468	1469	1469	1469
16	1457	1461	1463	1471	1466	1462	1457	1452	1456	1466	1468	1479	1477	1470	1464	1456	1457	1457	1457
17	1444	1447	1452	1462	1458	1452	1446	1440	1443	1453	1457	1469	1467	1460	1454	1443	1444	1444	1444
18	1431	1435	1439	1448	1447	1440	1433	1425	1428	1440	1443	1457	1457	1449	1439	1430	1431	1431	1431
19	1416	1420	1423	1434	1433	1428	1418	1411	1412	1425	1429	1440	1443	1436	1426	1416	1416	1416	1416
20	1399	1404	1405	1415	1417	1412	1403	1394	1398	1408	1412	1425	1428	1421	1413	1401	1399	1399	1399
25	1315	1316	1321	1335	1341	1338	1326	1313	1312	1320	1328	1348	1356	1351	1339	1324	1315	1315	1315
30	1225	1228	1240	1262	1270	1263	1247	1224	1218	1234	1252	1278	1288	1280	1262	1238	1225	1225	1225
35	1113	1124	1147	1175	1184	1170	1145	1115	1109	1130	1161	1194	1206	1193	1166	1131	1113	1113	1113
40	982	997	1033	1071	1085	1070	1034	989	976	1005	1049	1094	1111	1094	1057	1009	982	982	982
45	838	857	905	953	971	952	909	854	829	865	924	979	998	980	935	873	838	838	838
50	693	719	781	839	858	835	781	716	688	727	800	862	882	861	807	735	693	693	693
55	554	581	652	720	743	716	651	578	549	590	669	730	764	739	677	595	554	554	554
60	426	452	526	600	627	598	525	448	420	460	541	617	643	616	547	464	426	426	426
65	316	340	411	490	520	489	412	338	312	346	425	507	537	506	431	352	316	316	316
70	223	245	315	395	426	394	315	243	221	251	330	413	445	414	335	256	223	223	223
75	146	169	236	308	330	306	234	166	143	175	251	324	350	325	252	177	146	146	146
80	81	104	162	210	226	206	159	102	79	110	172	220	238	222	174	112	81	81	81
85	31	47	73	90	94	87	69	44	29	50	77	95	101	97	81	52	31	31	31
90	2	2	3	2	2	2	2	2	1	2	2	2	2	2	3	2	2	2	2
95	1	2	1	1	2	2	1	1	1	2	2	2	2	2	1	2	1	1	1
100	0	1	1	1	2	2	1	1	0	1	2	1	2	1	1	1	0	0	0
105	1	1	1	2	1	1	1	1	0	0	1	1	1	1	1	0	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	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
120	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
125	1	1	1	1	2	2	1	2	1	2	1	1	1	2	1	1	1	1	1
130	2	1	1	2	1	2	1	2	2	2	2	2	2	2	1	1	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	3	2	3	2	3	2	3	2	3	2	3	2	2	2	2
145	2	2	3	2	3	3	3	2	3	3	2	3	3	3	3	3	2	2	2
150	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
155	3	3	3	4	4	3	3	4	3	3	3	3	3	3	3	4	3	3	3
160	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
165	5	4	5	5	5	5	5	4	5	5	5	5	4	5	5	4	5	5	5
170	5	5	6	5	6	6	6	6	6	6	5	5	6	6	6	6	5	5	5
175	6	5	5	5	5	5	5	5	5	6	6	6	5	6	5	5	6	6	6
180	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6



## THD and PF Test

Model No.	IK-AT22F-202530-CCT-D 30W		Sample ID.	4472594
Operate time (Min.)	90	Stabilization time (Min.)	45	

### Test Method

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

### Test Results

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.9	120.06	60	0.2533	30.11	0.9901	11.78%	Horizontal
24.9	277.11	60	0.1104	29.64	0.9688	8.54%	Horizontal



## THD and PF Test

Model No.	IK-AT22F-202530-CCT-D 30W		Sample ID.	4472594
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
24.9	120.01	60	0.2442	29.02	0.9902	11.45%	Horizontal
24.9	277.12	60	0.1066	28.55	0.9664	8.68%	Horizontal



## THD and PF Test

Model No.	IK-AT22F-202530-CCT-D 30W		Sample ID.	4472594
Operate time (Min.)	90	Stabilization time (Min.)	45	

### Test Method

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

### Test Results

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.9	120.02	60	0.2537	30.15	0.9901	11.73%	Horizontal
24.9	277.08	60	0.1100	29.52	0.9684	8.62%	Horizontal



## THD and PF Test

Model No.	IK-AT22F-202530-CCT-D) 25W		Sample ID.	4472594
Operate time (Min.)	90	Stabilization time (Min.)	45	

### Test Method

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

### Test Results

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.9	120.05	60	0.2050	24.28	0.9865	13.29%	Horizontal
24.9	277.10	60	0.0936	24.78	0.9555	9.97%	Horizontal





## THD and PF Test

Model No.	IK-AT22F-202530-CCT-D) 20W		Sample ID.	4472594
Operate time (Min.)	90	Stabilization time (Min.)	45	

### Test Method

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

### Test Results

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.9	120.07	60	0.1649	19.44	0.9819	14.68%	Horizontal
24.9	277.12	60	0.0796	20.64	0.9365	12.08%	Horizontal



## In-Situ Temperature Measurement Test

<b>Model No.</b>	IK-AT22F-202530-CCT-D 30W	<b>Sample ID.</b>	4472594
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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  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ . 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 ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.0	120.06	60	0.2533	30.11	0.9901	11.78%	Horizontal

### Test Results (LEDs)

Thermocouple Location	Declared Light Source Current (mA)	Temperature for Light Source ( $^{\circ}\text{C}$ )		Max Chromaticity Shift (1000-6000h)	LED Model Number	LM-80 Limit Current (mA)	LM-80 Limit Temp ( $^{\circ}\text{C}$ )
		Test Result	Test Result (Correct to $25^{\circ}\text{C}$ )				
Ambient TEMP	N/A	24.0	25.0				
TMP of Location 1	110	46.2	47.2	0.0024	STW8A2PD-XX	200	105

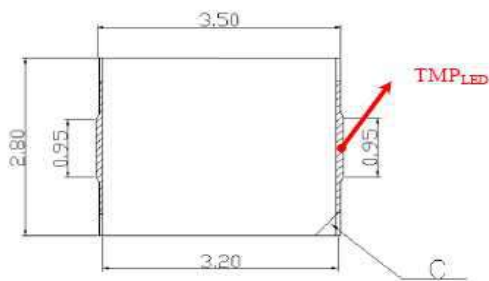
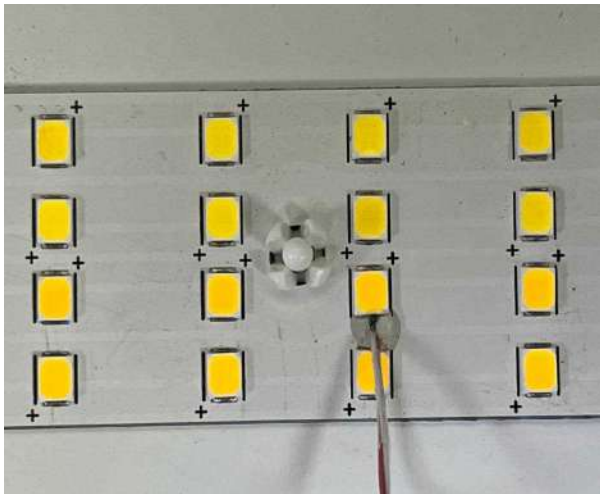
### Test Results (Drivers)

Thermocouple Location	Temperature for Driver ( $^{\circ}\text{C}$ )		Driver Model Number	Driver Limit Temp ( $^{\circ}\text{C}$ )
	Test Result	Test Result (Correct to $25^{\circ}\text{C}$ )		
Ambient TEMP	24.0	25.0		
TMP of Location 1	53.5	54.5	SIF 30-I0650 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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