DesignLights Consortium Test Report

Refference Standards

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

Prepared For

IKIO LED Lighitng

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Test Laboratory:

UL-CCIC Company Limited

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Catalog Number

IK-RT22F-202530-CCT-D

Project Number

4790575900

Report Number

4790570432

Prepared By	**Approved By**
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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%	2514.16
Minimum Luminaire Efficacy (lm/W)-Luminaires	**IES LM-79-2008**	≥110	-3%	122.99
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%	81.60%
Allowable CCT (3500K)	**IES LM-79-2008/ANSI C78.377-2015**	3465±245	N/A	3399
Allowable CCT (4000K)	**IES LM-79-2008/ANSI C78.377-2015**	3985±275	N/A	4141
Allowable CCT (5000K)	**IES LM-79-2008/ANSI C78.377-2015**	5029±283	N/A	4994
Allowable CCT (3500K)	**IES LM-79-2008/ANSI C78.377-2015**	3465±245	N/A	3393
Allowable CCT (3500K)	**IES LM-79-2008/ANSI C78.377-2015**	3465±245	N/A	3388
Minimum CRI	**IES LM-79-2008/CIE 13.3-1995**	≥80	-1	82
Minimum R9	**IES LM-79-2008**	≥0	-1	5.0
Minimum Rg	**IES LM-79-2008**	≥89	-1	93
Minimum Rf	**IES LM-79-2008**	≥70	-1	82
Rcs,h1	**IES LM-79-2008**	-12%-23%	-1%	-12%
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	0.9312
Total Harmonic Distortion (A%)	**ANSI C82.77-10-2014**	≤20%	5%	15.41%
In-Situ Temperature Measurement Test for LED 1 (°C)	**UL1598-2008**	≤105	N/A	39.6
In-Situ Temperature Measurement Test for Driver 1 (°C)	**UL1598-2008**	≤90	N/A	50.3
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: 2022-12-08

Test Item	Test Date	Model Number	Tests Conducted By
Integrating Sphere Test	2022-12-13	IK-RT22F-202530-CCT-D (3500K 30 W)	Yang, Gavin X
Integrating Sphere Test	2022-12-13	IK-RT22F-202530-CCT-D (4000K 30 W)	Yang, Gavin X
Integrating Sphere Test	2022-12-13	IK-RT22F-22530-CCT-D (5000 K 30 W)	Yang, Gavin X
Integrating Sphere Test	2022-12-13	IK-RT22F-202530-CCT-D (3500K 25 W)	Yang, Gavin X
Integrating Sphere Test	2022-12-13	IK-RT22F-202530-CCT-D (3500K 20 W)	Yang, Gavin X
Goniophotometer Test	2022-12-09	IK-RT22F-202530-CCT-D (3500K 30 W)	Yang, Gavin X
Goniophotometer Test	2022-12-09	IK-RT22F-202530-CCT-D (5000K 30 W)	Yang, Gavin X
THD and PF Test	2022-12-09	IK-RT22F-202530-CCT-D (3500K 30 W)	Yang, Gavin X
THD and PF Test	2022-12-09	IK-RT22F-202530-CCT-D (4000K 30 W)	Yang, Gavin X
THD and PF Test	2022-12-09	IK-RT22F-202530-CCT-D (5000K 30 W)	Yang, Gavin X
THD and PF Test	2022-12-09	IK-RT22F-202530-CCT-D (3500K 25 W)	Yang, Gavin X
THD and PF Test	2022-12-09	IK-RT22F-202530-CCT-D (3500K 20 W)	Yang, Gavin X
In-Situ Temperature Measurement Test	2022-12-14	IK-RT22F-202530-CCT-D (3500K 30 W)	Yang, Gavin X

Remark (if any)

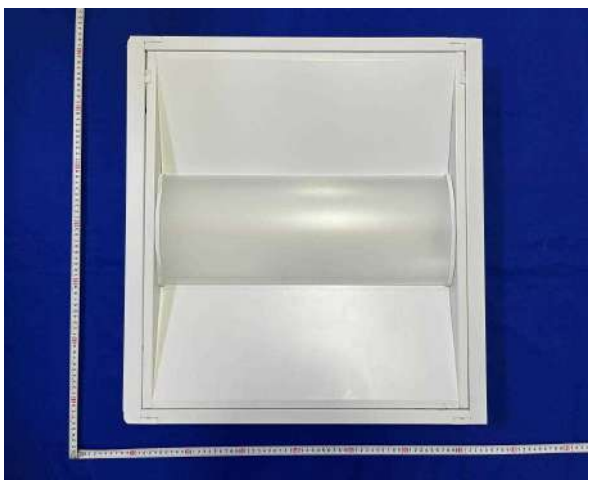
1. UL test equipment information is recorded on Meter Use in UL's Aurora database.
2. The accuracy method decision rule is applied when the compliance or verdict is made to the results of this report.

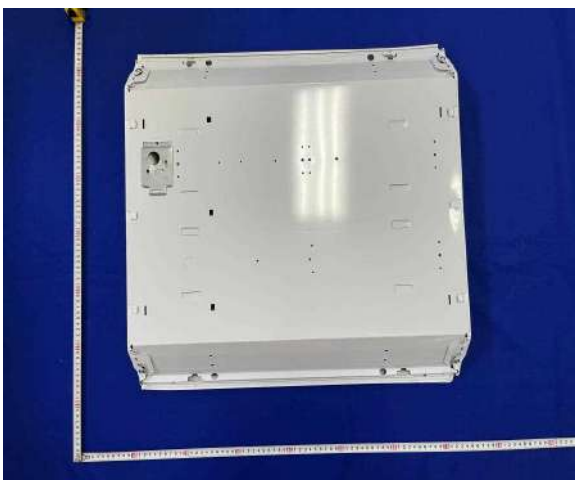
Product Description

Lamp/Luminaire Description: Integrated Retrofit Kits for 2x2 Luminaires.
Model Number: IK-RT22F-202530-CCT-D (3500K)
Electrical Parameter: 120-277V, 50/60Hz
LED Package: STW8A2PD-XX
Dimming Information: Continuous dimming capability
Remark: Housing models: Lithonia 2GT8 lensed 2X2

Products Scaled Value

Model Number	CCT	Luminous Flux	Power	Luminous Efficacy
IK-RT22F-202530-CCT-D (3500K)	3500K	3720	30	124
IK-RT22F-202530-CCT-D (4000K)	4000K	3750	30	125
IK-RT22F-202530-CCT-D (5000K)	5000K	3780	30	126
IK-RT22F-202530-CCT-D (3500K)	3500K	3175	25	127
IK-RT22F-202530-CCT-D (4000K)	4000K	3200	25	128
IK-RT22F-202530-CCT-D (5000K)	5000K	3225	25	129
IK-RT22F-202530-CCT-D (3500K)	3500K	2600	20	130
IK-RT22F-202530-CCT-D (4000K)	4000K	2620	20	131
IK-RT22F-202530-CCT-D (5000K)	5000K	2640	20	132





Integrating Sphere Test

Model No.	IK-RT22F-202530-CCT-D (3500K 30 W)	Sample ID.	5608736
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

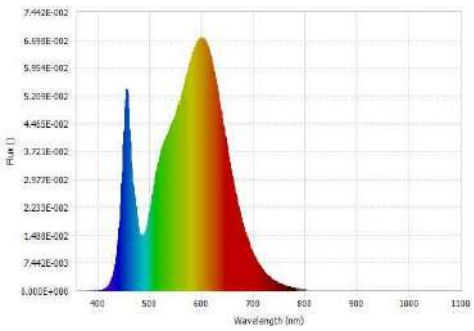
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C.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

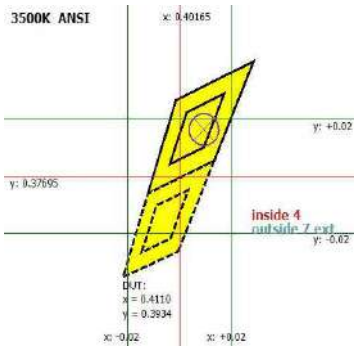
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.7	119.91	60	0.2436	28.852	0.9877	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3399	82	5.0	0.0001	3584.91	124.25	N/A





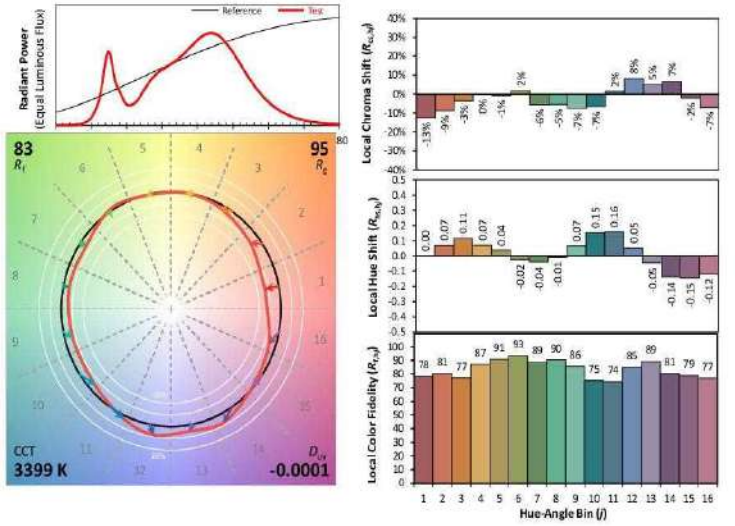
Luminous Flux (lm)	3584.91	Chrom x	0.4110
Chrom y	0.3934	Chrom u	0.2383
Chrom v	0.3421	Duv	0.0001
Chrom u’	0.2383	Chrom v’	0.5132
CCT (K)	3399	Luminous Efficacy (lm/W)	124.25
Ra	82	R1	80.0
R2	90.0	R3	96.0
R4	79.0	R5	80.0
R6	85.0	R7	84.0
R8	60.0	R9	5.0
R10	75.0	R11	77.0
R12	61.0	R13	82.0
R14	98.0	R15	73.0
Rf	83	Rg	95
Rcs,h1	-13%		

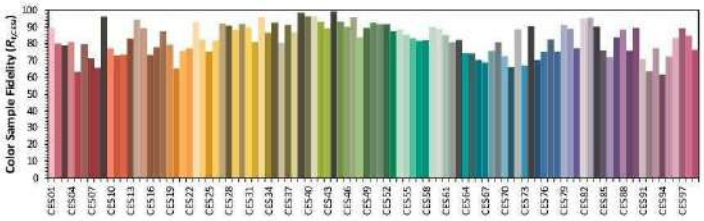
Integrating Sphere Test (Cont'd)

TM-30 Report

ANSI/IES TM-30-18 Color Rendition Report

Source:	STW8A2PD-XX	**Manufacturer:**	Ikio Led Lighting
Date:	12/13/2022	**Model:**	IK-RT22F-202530-CCT-D (3500K 30 W)





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

x	0.4110
y	0.3934
u'	0.2383
v'	0.5132

CIE 13.3-1995 (CRI)

R_a	82
R_9	5

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-RT22F-202530-CCT-D (4000K 30 W)	Sample ID.	5608736
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

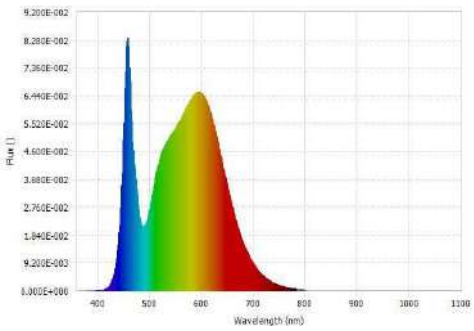
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C.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

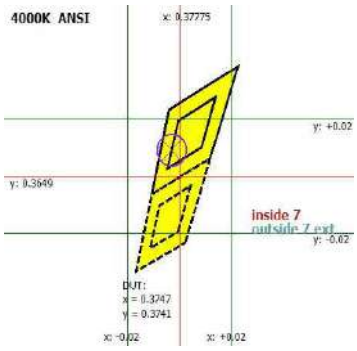
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.7	119.91	60	0.2338	27.686	0.9877	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
4141	83	12.0	0.0005	3845.77	138.91	N/A

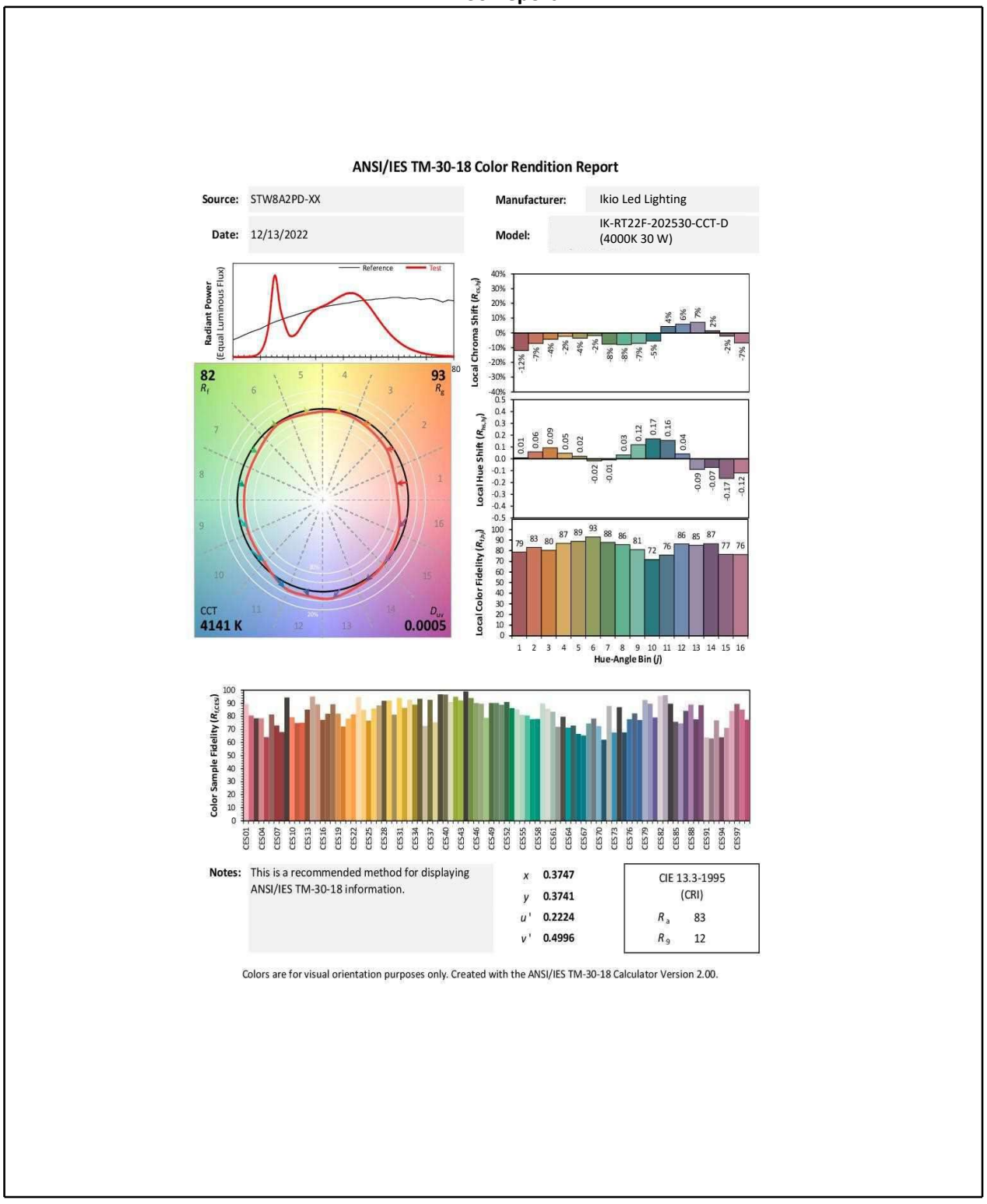




Luminous Flux (lm)	3845.77	Chrom x	0.3747
Chrom y	0.3741	Chrom u	0.2224
Chrom v	0.3330	Duv	0.0005
Chrom u’	0.2224	Chrom v’	0.4996
CCT (K)	4141	Luminous Efficacy (lm/W)	138.91
Ra	83	R1	82.0
R2	91.0	R3	95.0
R4	80.0	R5	81.0
R6	86.0	R7	86.0
R8	65.0	R9	12.0
R10	77.0	R11	78.0
R12	57.0	R13	85.0
R14	98.0	R15	77.0
Rf	82	Rg	93
Rcs,h1	-12%		

Integrating Sphere Test (Cont'd)

TM-30 Report



Integrating Sphere Test

Model No.	IK-RT22F-202530-CCT-D (5000K 30 W)	Sample ID.	5608736
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

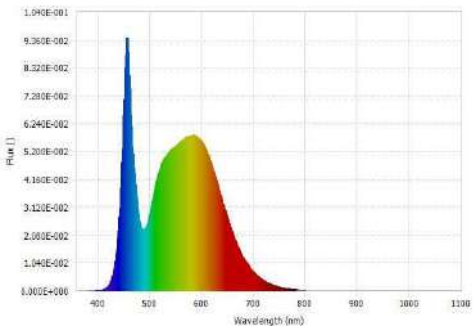
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C.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

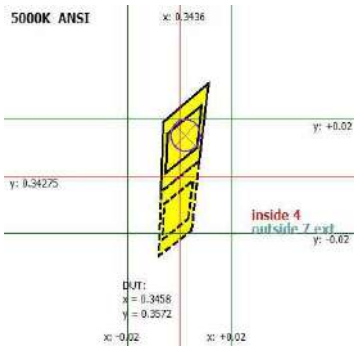
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.7	119.92	60	0.2413	28.591	0.9880	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
4994	82	8.0	0.0025	3658.11	127.95	N/A

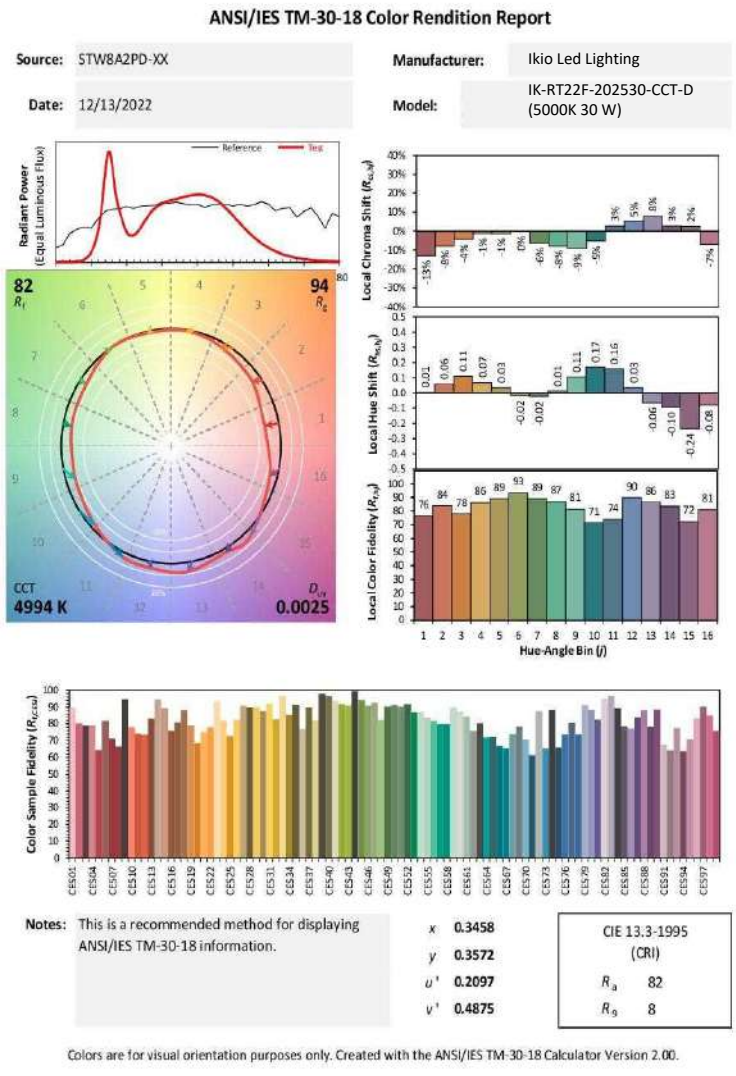




Luminous Flux (lm)	3658.11	Chrom x	0.3458
Chrom y	0.3572	Chrom u	0.2097
Chrom v	0.3250	Duv	0.0025
Chrom u’	0.2097	Chrom v’	0.4875
CCT (K)	4994	Luminous Efficacy (lm/W)	127.95
Ra	82	R1	81.0
R2	89.0	R3	94.0
R4	79.0	R5	79.0
R6	83.0	R7	87.0
R8	67.0	R9	8.0
R10	73.0	R11	77.0
R12	51.0	R13	83.0
R14	97.0	R15	75.0
Rf	82	Rg	94
Rcs,h1	-13%		

Integrating Sphere Test (Cont'd)

TM-30 Report



Integrating Sphere Test

Model No.	IK-RT22F-202530-CCT-D (3500K 25 W)	Sample ID.	5608736
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

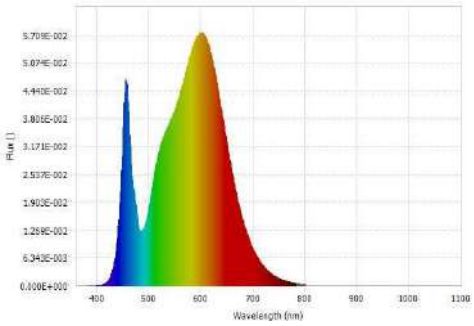
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C.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

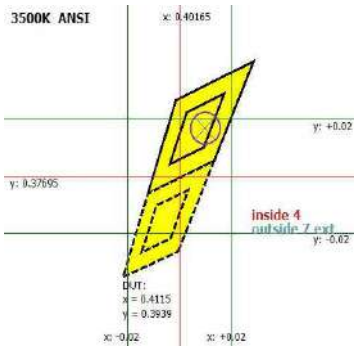
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.7	119.96	60	0.2000	23.588	0.9833	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3393	82	5.0	0.0001	3051.16	129.35	N/A





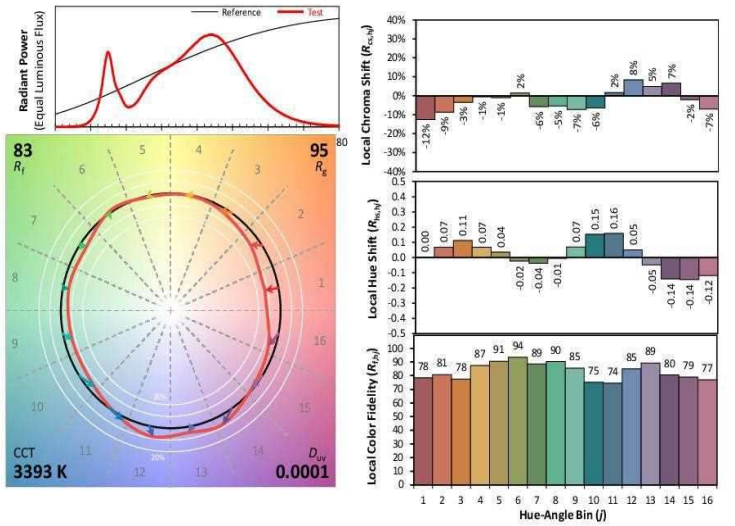
Luminous Flux (lm)	3051.16	Chrom x	0.4115
Chrom y	0.3939	Chrom u	0.2384
Chrom v	0.3423	Duv	0.0001
Chrom u’	0.2384	Chrom v’	0.5135
CCT (K)	3393	Luminous Efficacy (lm/W)	129.35
Ra	82	R1	80.0
R2	90.0	R3	96.0
R4	79.0	R5	80.0
R6	86.0	R7	84.0
R8	61.0	R9	5.0
R10	75.0	R11	77.0
R12	61.0	R13	83.0
R14	98.0	R15	74.0
Rf	83	Rg	95
Rcs,h1	-12%		

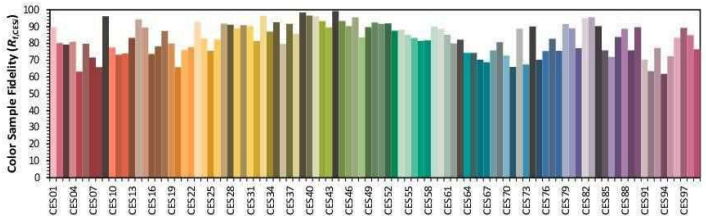
Integrating Sphere Test (Cont'd)

TM-30 Report

ANSI/IES TM-30-18 Color Rendition Report

Source:	STW8A2PD-XX	**Manufacturer:**	Ikio Led Lighting
Date:	12/13/2022	**Model:**	IK-RT22F-202530-CCT-D (3500K 25 W)





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

x	0.4115
y	0.3939
u'	0.2384
v'	0.5135

CIE 13.3-1995 (CRI)

R_a	82
R_9	5

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-RT22F-202530-CCT-D (3500K 20 W)	Sample ID.	5608736
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

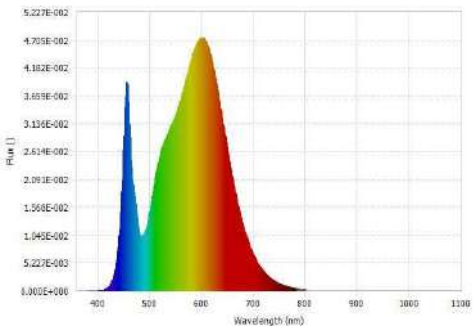
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 °C ± 1 °C.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

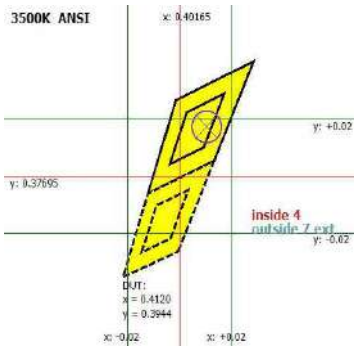
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.7	119.99	60	0.1602	18.776	0.9768	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3388	82	6.0	0.0002	2514.16	133.90	N/A





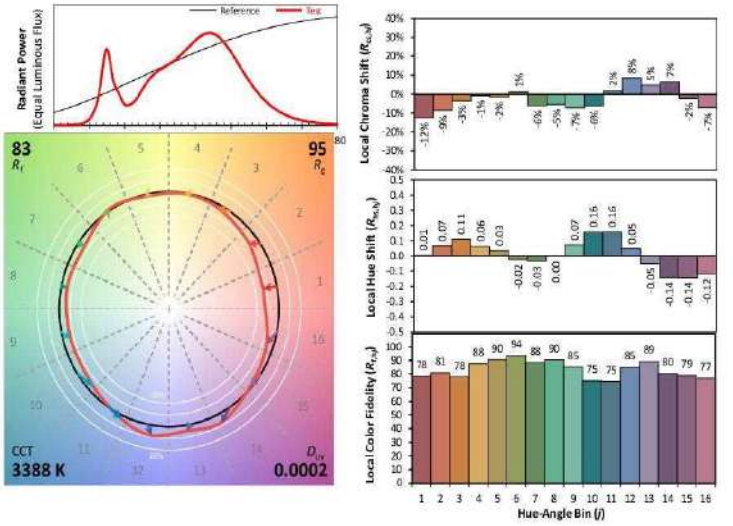
Luminous Flux (lm)	2514.16	Chrom x	0.4120
Chrom y	0.3944	Chrom u	0.2385
Chrom v	0.3425	Duv	0.0002
Chrom u’	0.2385	Chrom v’	0.5138
CCT (K)	3388	Luminous Efficacy (lm/W)	133.90
Ra	82	R1	80.0
R2	90.0	R3	96.0
R4	79.0	R5	80.0
R6	86.0	R7	84.0
R8	61.0	R9	6.0
R10	75.0	R11	77.0
R12	61.0	R13	83.0
R14	98.0	R15	74.0
Rf	83	Rg	95
Rcs,h1	-12%		

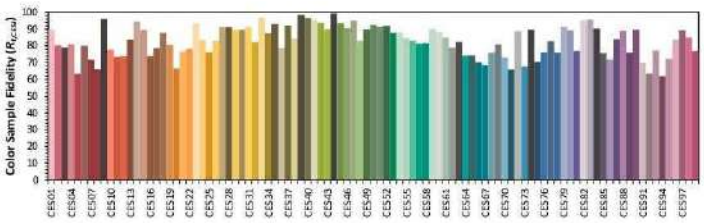
Integrating Sphere Test (Cont'd)

TM-30 Report

ANSI/IES TM-30-18 Color Rendition Report

Source:	STW8A2PD-XX	**Manufacturer:**	Ikio Led Lighting
Date:	12/13/2022	**Model:**	IK-RT22F-202530-CCT-D (3500K 20 W)





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

x	0.4120
y	0.3944
u'	0.2385
v'	0.5138

CIE 13.3-1995 (CRI)

R_a	82
R_9	6

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

Goniophotometer Test

Model No.	IK-RT22F-202530-CCT-D (3500K 30 W)	Sample ID.	5608736
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using a type C goniophotometer and software.
3.The ambient temperature shall be maintained at 25° C ± 1° C, measured at a point not more than 1 m from the sample and at the same height as the sample. The reference standard lamp is rated current 3.8581A, 3.8558A, 3.8466A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.
4.The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonallumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals. Photometric distance was more than five times of the largest dimension of the test SSL product.

Goniophotometer Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.1	120.05	60	0.2426	28.81	0.9892	12.20%	Horizontal

Test Results

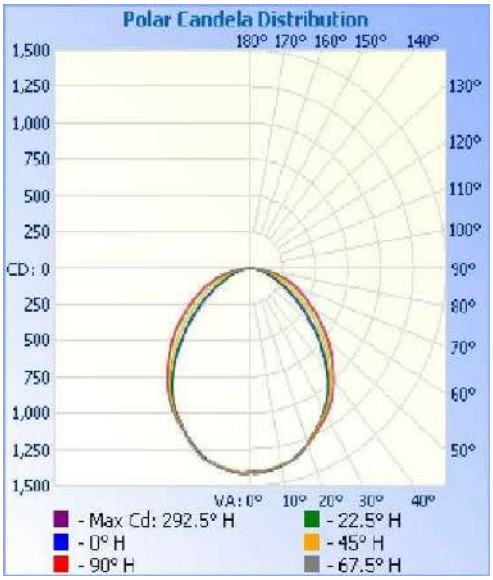
Luminous Flux (lm)	Zonal Lumen Requirement 1	Zonal Lumen Requirement 2	Beam Angle (50%)		Luminous Efficacy (lm/W)
	0°-60°	N/A	Horizontal Spread	Vertical Spread	
3543.2	82.00%	N/A	106.5	94.2	122.99

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

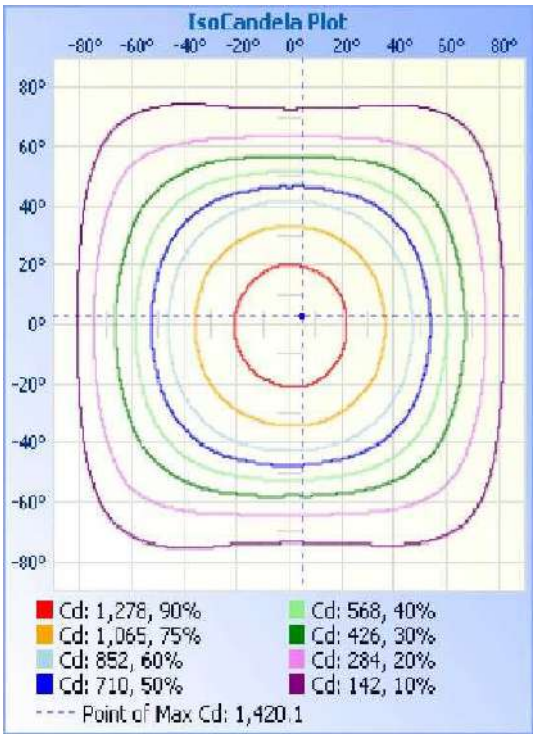
UGR		Spacing Criteria (0-180°)	Spacing Criteria (90°-270°)
Crosswise	Endwise		
18.3	21.9	1.22	1.24

Goniophotometer Test (Cont'd)

Polar Candela Distribution



IsoCandela Plot



Goniophotometer Test (Cont'd)

Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1077.4	30.40%
0-40	1739.8	49.10%
0-60	2904.3	82.00%
60-90	628.4	17.70%
70-100	270.6	7.60%
90-120	3.1	0.10%
0-90	3532.7	99.70%
90-180	10.5	0.30%
0-180	3543.2	100.00%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	33.7	1.00%	90-95	0.8	0.00%
5-10	100.0	2.80%	95-100	0.6	0.00%
10-15	162.5	4.60%	100-105	0.5	0.00%
15-20	218.0	6.20%	105-110	0.4	0.00%
20-25	263.3	7.40%	110-115	0.4	0.00%
25-30	299.8	8.50%	115-120	0.4	0.00%
30-35	325.9	9.20%	120-125	0.5	0.00%
35-40	336.6	9.50%	125-130	0.6	0.00%
40-45	330.2	9.30%	130-135	0.7	0.00%
45-50	311.2	8.80%	135-140	0.7	0.00%
50-55	281.0	7.90%	140-145	0.8	0.00%
55-60	242.1	6.80%	145-150	0.8	0.00%
60-65	199.5	5.60%	150-155	0.8	0.00%
65-70	159.6	4.50%	155-160	0.7	0.00%
70-75	123.7	3.50%	160-165	0.7	0.00%
75-80	86.6	2.40%	165-170	0.6	0.00%
80-85	46.7	1.30%	170-175	0.4	0.00%
85-90	12.3	0.30%	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	1405	1405	1405	1405	1405	1405	1405	1405	1405	1405	1405	1405	1405	1405	1405	1405	1405
1	1401	1407	1406	1414	1411	1414	1410	1402	1403	1406	1408	1415	1414	1413	1408	1399	1396
2	1404	1406	1406	1414	1411	1416	1413	1406	1408	1408	1411	1417	1416	1418	1411	1403	1401
3	1403	1406	1404	1413	1410	1417	1416	1407	1409	1410	1409	1416	1416	1420	1417	1407	1404
4	1402	1404	1400	1407	1408	1418	1419	1409	1408	1408	1406	1414	1412	1419	1419	1409	1404
5	1403	1399	1394	1402	1404	1416	1418	1410	1408	1403	1402	1410	1411	1420	1418	1409	1402
6	1399	1398	1391	1397	1400	1414	1416	1406	1405	1400	1398	1407	1406	1420	1418	1407	1400
7	1396	1393	1387	1393	1399	1410	1413	1402	1400	1397	1393	1402	1402	1416	1415	1405	1397
8	1391	1390	1383	1390	1393	1404	1407	1400	1396	1394	1389	1397	1398	1413	1411	1400	1393
9	1387	1386	1379	1385	1390	1398	1402	1395	1393	1389	1387	1392	1394	1407	1406	1394	1390
10	1384	1382	1376	1381	1384	1392	1393	1388	1388	1386	1381	1389	1390	1401	1399	1389	1384
11	1378	1377	1372	1375	1378	1384	1386	1379	1381	1381	1379	1383	1382	1392	1391	1382	1378
12	1371	1373	1369	1372	1370	1375	1375	1369	1375	1378	1375	1380	1376	1384	1382	1375	1372
13	1364	1368	1363	1366	1364	1366	1366	1361	1368	1374	1371	1375	1371	1375	1373	1367	1365
14	1353	1360	1359	1360	1358	1358	1358	1352	1358	1368	1367	1372	1363	1367	1365	1357	1356
15	1342	1352	1350	1354	1351	1350	1348	1342	1350	1359	1361	1364	1355	1358	1354	1346	1345
16	1333	1340	1340	1345	1342	1341	1337	1332	1340	1349	1351	1355	1346	1348	1344	1336	1334
17	1322	1329	1328	1333	1333	1331	1326	1318	1328	1338	1340	1346	1336	1338	1332	1322	1323
18	1309	1314	1315	1321	1321	1319	1315	1306	1315	1325	1327	1332	1324	1325	1320	1310	1310
19	1298	1300	1299	1308	1308	1306	1302	1294	1302	1309	1312	1318	1311	1314	1308	1297	1296
20	1284	1286	1284	1294	1296	1294	1290	1281	1288	1295	1297	1304	1298	1300	1295	1285	1282
25	1208	1211	1214	1223	1230	1228	1223	1212	1216	1221	1223	1230	1227	1230	1224	1213	1210
30	1131	1134	1144	1159	1168	1164	1151	1135	1136	1144	1149	1161	1163	1161	1151	1136	1132
35	1033	1043	1061	1084	1094	1084	1065	1043	1040	1049	1062	1082	1086	1077	1058	1040	1035
40	907	921	952	983	997	986	960	926	914	926	952	983	993	979	950	919	909
45	768	786	832	874	891	877	843	794	771	787	832	874	889	873	834	788	767
50	624	649	712	763	784	765	720	655	625	649	714	768	786	765	716	652	625
55	481	516	590	648	670	651	598	522	486	516	592	655	677	652	592	516	483
60	360	394	466	532	557	536	478	399	360	392	469	539	563	536	471	392	360
65	263	287	356	428	459	433	366	290	259	284	357	429	458	430	362	290	262
70	185	207	271	342	376	348	277	208	183	203	268	336	366	337	270	208	186
75	119	142	202	262	287	268	207	142	117	136	194	250	276	252	197	139	119
80	64	85	130	168	182	169	133	84	60	78	122	160	178	164	129	83	65
85	24	35	54	67	70	66	52	33	21	30	50	68	76	72	57	36	24
90	2	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	1
95	1	1	2	1	1	1	1	1	1	1	2	1	2	1	1	1	1
100	1	1	1	2	1	1	1	0	1	1	1	1	2	1	1	1	1
105	1	0	0	1	1	1	1	0	1	1	1	1	1	1	0	1	1
110	0	0	0	1	1	1	1	1	1	1	0	1	1	1	1	1	0
115	1	0	1	1	1	1	1	0	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	2	1	2	1	1	1	1	2	1	1	2	1	1	2	1
130	1	2	2	2	2	1	1	1	2	1	2	1	2	2	2	2	2
135	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2
140	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2
145	3	2	3	3	3	3	2	2	2	3	2	3	2	2	2	2	2
150	3	3	3	3	3	3	2	3	2	3	3	3	3	3	3	2	3
155	3	4	3	4	3	4	3	4	3	3	3	4	4	3	3	3	3
160	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
165	5	4	5	4	4	4	5	5	5	4	4	4	5	5	5	4	5
170	5	5	5	6	5	5	6	5	5	5	5	5	5	5	6	5	5
175	5	5	6	5	6	5	5	5	5	5	5	6	5	5	5	5	6
180	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

Goniophotometer Test

Model No.	IK-RT22F-202530-CCT-D (5000K 30 W)	Sample ID.	5608736
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using a type C goniophotometer and software.
3.The ambient temperature shall be maintained at 25° C ± 1° C, measured at a point not more than 1 m from the sample and at the same height as the sample. The reference standard lamp is rated current 3.8581A, 3.8558A, 3.8466A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology P.R.China.
4.The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonallumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals. Photometric distance was more than five times of the largest dimension of the test SSL product.

Goniophotometer Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.0	119.98	60	0.2406	28.57	0.9893	12.13%	Horizontal

Test Results

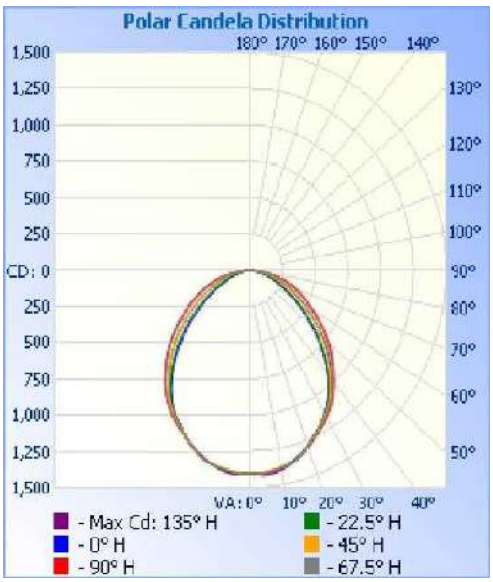
Luminous Flux (lm)	Zonal Lumen Requirement 1	Zonal Lumen Requirement 2	Beam Angle (50%)		Luminous Efficacy (lm/W)
	0°-60°	N/A	Horizontal Spread	Vertical Spread	
3596.4	81.60%	N/A	108.0	95.3	125.88

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

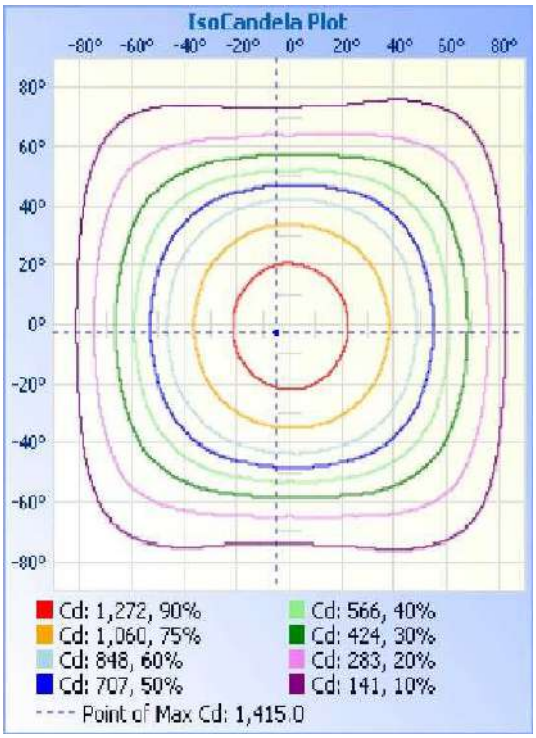
UGR		Spacing Criteria (0-180°)	Spacing Criteria (90°-270°)
Crosswise	Endwise		
18.5	21.9	1.22	1.26

Goniophotometer Test (Cont'd)

Polar Candela Distribution



IsoCandela Plot



Goniophotometer Test (Cont'd)

Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1078.7	30.00%
0-40	1747.6	48.60%
0-60	2935.6	81.60%
60-90	650.0	18.10%
70-100	282.1	7.80%
90-120	3.4	0.10%
0-90	3585.6	99.70%
90-180	10.9	0.30%
0-180	3596.4	100.00%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	33.6	0.90%	90-95	0.8	0.00%
5-10	99.7	2.80%	95-100	0.6	0.00%
10-15	162.2	4.50%	100-105	0.5	0.00%
15-20	218.0	6.10%	105-110	0.5	0.00%
20-25	263.9	7.30%	110-115	0.5	0.00%
25-30	301.4	8.40%	115-120	0.5	0.00%
30-35	328.6	9.10%	120-125	0.6	0.00%
35-40	340.3	9.50%	125-130	0.6	0.00%
40-45	335.5	9.30%	130-135	0.7	0.00%
45-50	317.9	8.80%	135-140	0.8	0.00%
50-55	287.3	8.00%	140-145	0.8	0.00%
55-60	247.3	6.90%	145-150	0.8	0.00%
60-65	205.1	5.70%	150-155	0.8	0.00%
65-70	164.2	4.60%	155-160	0.7	0.00%
70-75	127.1	3.50%	160-165	0.7	0.00%
75-80	90.1	2.50%	165-170	0.6	0.00%
80-85	49.8	1.40%	170-175	0.4	0.00%
85-90	13.7	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	1398	1398	1398	1398	1398	1398	1398	1398	1398	1398	1398	1398	1398	1398	1398	1398	1398
1	1397	1400	1401	1411	1404	1408	1404	1393	1396	1402	1401	1408	1404	1409	1403	1394	1396
2	1400	1402	1403	1410	1407	1412	1408	1400	1399	1403	1402	1410	1406	1411	1407	1398	1398
3	1400	1402	1402	1410	1407	1414	1411	1403	1400	1402	1402	1408	1406	1411	1411	1400	1400
4	1400	1400	1398	1405	1405	1414	1415	1406	1402	1401	1398	1404	1404	1412	1412	1402	1400
5	1398	1397	1393	1401	1402	1414	1414	1405	1401	1398	1394	1400	1401	1412	1413	1402	1400
6	1396	1394	1390	1398	1400	1414	1413	1404	1399	1396	1389	1395	1397	1408	1410	1400	1397
7	1394	1391	1386	1392	1397	1410	1412	1401	1397	1393	1385	1392	1394	1406	1406	1397	1393
8	1390	1387	1382	1389	1393	1406	1407	1398	1393	1389	1382	1388	1391	1401	1402	1393	1391
9	1386	1384	1378	1384	1389	1401	1402	1393	1389	1386	1378	1384	1387	1397	1396	1387	1386
10	1381	1381	1374	1382	1384	1394	1396	1388	1385	1383	1375	1380	1382	1389	1389	1382	1382
11	1374	1376	1373	1379	1377	1388	1388	1381	1380	1379	1374	1376	1376	1381	1382	1375	1376
12	1368	1373	1369	1373	1372	1379	1380	1374	1374	1375	1369	1371	1368	1373	1373	1368	1370
13	1360	1367	1365	1368	1364	1371	1371	1365	1366	1371	1366	1367	1363	1365	1364	1358	1363
14	1352	1360	1360	1364	1359	1363	1362	1356	1359	1363	1360	1362	1356	1359	1355	1349	1355
15	1343	1353	1352	1356	1353	1354	1352	1346	1349	1355	1354	1354	1350	1348	1345	1340	1346
16	1333	1341	1343	1347	1344	1345	1342	1336	1339	1345	1345	1347	1342	1339	1336	1327	1335
17	1324	1330	1330	1337	1334	1335	1332	1324	1329	1335	1334	1338	1333	1329	1325	1317	1324
18	1311	1318	1319	1325	1324	1324	1321	1312	1316	1321	1322	1327	1324	1320	1313	1304	1311
19	1299	1304	1304	1312	1313	1312	1309	1301	1305	1309	1308	1314	1313	1308	1302	1293	1298
20	1286	1290	1290	1299	1300	1300	1297	1289	1292	1295	1294	1301	1300	1296	1290	1280	1285
25	1213	1218	1220	1227	1233	1233	1230	1220	1221	1223	1225	1234	1236	1231	1224	1212	1215
30	1139	1144	1148	1163	1171	1168	1159	1148	1147	1152	1158	1172	1179	1169	1157	1140	1139
35	1043	1051	1064	1085	1096	1086	1072	1052	1052	1062	1078	1100	1107	1091	1072	1048	1044
40	922	929	954	985	1000	989	967	936	928	944	974	1006	1017	999	971	933	920
45	780	794	835	876	895	884	850	806	789	813	861	902	917	898	860	809	782
50	635	656	715	767	790	773	728	667	642	677	744	796	812	790	743	675	639
55	493	521	588	649	674	654	599	526	495	537	617	678	697	675	616	535	492
60	368	394	466	533	562	540	477	400	370	410	494	562	585	559	495	410	369
65	269	288	356	427	460	435	367	294	269	302	381	454	480	452	383	305	270
70	192	208	267	337	372	345	274	209	190	216	288	358	387	358	290	219	192
75	125	139	195	257	285	264	201	139	122	147	212	271	297	272	214	151	125
80	68	82	127	167	187	170	129	82	65	89	139	177	194	180	144	94	69
85	26	35	54	68	75	67	52	34	23	36	59	75	82	79	66	42	26
90	2	2	2	2	2	2	2	2	1	1	2	2	3	2	3	3	3
95	1	1	2	2	2	1	2	1	1	1	1	2	2	1	1	1	1
100	1	1	1	2	1	1	1	1	0	0	1	1	1	1	1	0	1
105	1	1	1	1	2	1	1	0	0	0	1	1	1	1	1	1	1
110	1	1	1	1	1	1	1	1	1	0	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	2	1	2	1	1	1	1	2	2	1	1	2	1	2	2
130	1	2	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1
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	3	2	2	3	2	2	3	2	2	2	2
145	3	3	2	3	2	3	3	3	3	2	3	2	3	2	3	2	2
150	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	2
155	3	4	4	4	3	3	4	3	3	4	3	3	3	4	4	3	3
160	4	4	4	4	4	3	3	3	4	3	4	4	4	4	4	4	4
165	4	4	4	4	5	4	5	4	5	4	4	4	4	5	5	5	4
170	5	5	6	5	6	5	5	5	5	5	5	5	5	5	6	5	5
175	5	5	6	6	5	5	5	5	5	5	5	5	5	5	6	5	6
180	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

THD and PF Test

Model No.	IK-RT22F-202530-CCT-D (3500K 30 W)	Sample ID.	5608736
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

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

Test Results

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.1	120.05	60	0.2426	28.81	0.9892	12.20%	Horizontal
25.1	277.07	60	0.1079	28.84	0.9652	8.86%	Horizontal

THD and PF Test

Model No.	IK-RT22F-202530-CCT-D (4000K 30 W)		Sample ID.	5608736
Operate time (Min.)	90	Stabilization time (Min.)		45

Test Method

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

Test Results

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.1	120.06	60	0.2322	27.61	0.9895	11.82%	Horizontal
25.1	277.08	60	0.1044	27.84	0.9629	9.02%	Horizontal

THD and PF Test

Model No.	IK-RT22F-202530-CCT-D (5000K 30 W)		Sample ID.	5608736
Operate time (Min.)	90	Stabilization time (Min.)		45

Test Method

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

Test Results

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.1	119.98	60	0.2406	28.57	0.9893	12.13%	Horizontal
25.1	277.11	60	0.1072	28.65	0.9649	8.86%	Horizontal

THD and PF Test

Model No.	IK-RT22F-202530-CCT-D (3500K 25 W)		Sample ID.	5608736
Operate time (Min.)	90	Stabilization time (Min.)		45

Test Method

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

Test Results

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.1	119.99	60	0.1989	23.51	0.9856	13.76%	Horizontal
25.1	277.10	60	0.0924	24.35	0.9510	10.62%	Horizontal

THD and PF Test

Model No.	IK-RT22F-202530-CCT-D (3500K 20 W)		Sample ID.	5608736
Operate time (Min.)	90	Stabilization time (Min.)		45

Test Method

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

Test Results

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.1	120.04	60	0.1591	18.73	0.9803	15.41%	Horizontal
25.1	277.10	60	0.0784	20.23	0.9312	12.35%	Horizontal

In-Situ Temperature Measurement Test

Model No.	IK-RT22F-202530-CCT-D (3500K 30 W)	Sample ID.	5608736

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
24.3	120.05	60	0.2426	28.81	0.9892	12.20%	Horizontal

Test Results (LEDs)

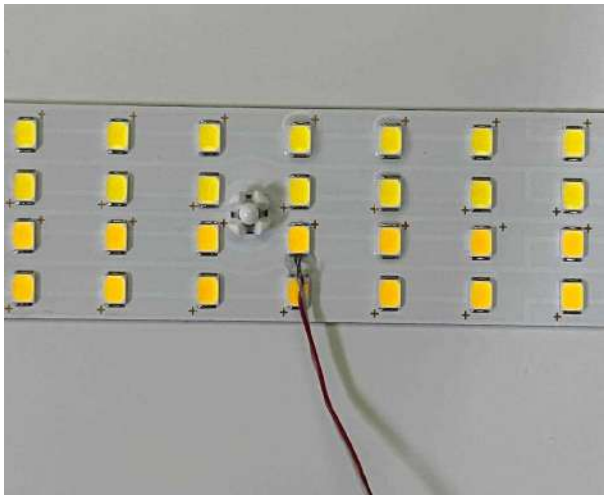
Thermocouple Location	Declared Light Source Current (mA)	Temperature for Light Source (°C)		Max Chromaticity Shift （1000-6000h)	LED Model Number	LM-80 Limit Current (mA)	LM-80 Limit Temp (°C)
		Test Result	Test Result (Correct to 25 °C)				
Ambient TEMP	N/A	24.3	25.0				
TMP of Location 1	110	38.9	39.6	0.0024	STW8A2PD-XX	200	105

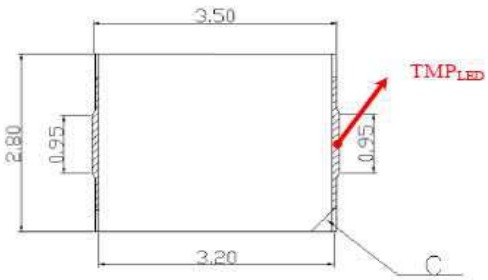
Test Results (Drivers)

Thermocouple Location	Temperature for Driver (°C)		Driver Model Number	Driver Limit Temp (°C)
	Test Result	Test Result (Correct to 25 °C)		
Ambient TEMP	24.3	25.0		
TMP of Location 1	49.6	50.3	SIF 30-I0650 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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