



DesignLights Consortium Test Report

Reference Standards

UL1598-2008

ANSI C82.77-10-2014

IES LM-79-2008

Prepared For

Fulham Co., Inc.

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Test Laboratory:

UL-CCIC Company Limited

Test Laboratory Address:

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Catalog Number

VPR-22-MU-25-9TW-A

Project Number

4790617185

Report Number

4790617185_1

Test Date

2022-10-31~2022-11-07

Issue Date

2022-11-14

Revision Date

N/A

Prepared By

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Approved By

Maxine Zhou

Zhou, Maxine

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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%	2306.75
Minimum Luminaire Efficacy (lm/W)-Luminaires	IES LM-79-2008	≥125	-3%	125.36
Spacing Criteria (0-180°)	IES LM-79-2008	1.0-2.0	±0.1	1.28
Spacing Criteria (90-270°)	IES LM-79-2008	1.0-2.0	±0.1	1.28
Zonal Lumen Requirement 1(0°-60°)	IES LM-79-2008	≥75%	-3%	77.50%
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±245	N/A	3523
Allowable CCT (4000K)	IES LM-79-2008/ANSI C78.377-2015	3985±275	N/A	4116
Allowable CCT (5000K)	IES LM-79-2008/ANSI C78.377-2015	5029±283	N/A	4899
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±245	N/A	3521
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±245	N/A	3513
Minimum CRI	IES LM-79-2008/CIE 13.3-1995	≥80	-1	93
Minimum R9	IES LM-79-2008	≥0	-1	72.0
Minimum Rg	IES LM-79-2008	≥89	-1	101
Minimum Rf	IES LM-79-2008	≥70	-1	91
Rcs,h1	IES LM-79-2008	-12%-23%	-1%	-4%
Unified Glare Rating (UGR)	IES LM-79-2008	≤22	N/A	21.8
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	0.8904
Total Harmonic Distortion (A%)	ANSI C82.77-10-2014	≤20%	5%	16.80%
In-Situ Temperature Measurement Test for LED 1 (°C)	UL1598-2008	≤105	N/A	36.3
In-Situ Temperature Measurement Test for Driver 1 (°C)	UL1598-2008	≤90	N/A	43.5
Max Chromaticity Shift (1000-6000h)	N/A	≤0.004	0.0004	0.0017
Minimum Luminaire Warranty (Years)	N/A	≥5	N/A	≥5



Test List

Sample Received Date: 2022-10-27

Test Item	Test Date	Model Number	Tests Conducted By
Integrating Sphere Test	2022-11-01	VPR-22-MU-25-9TW-A	Yang, Gavin X
Integrating Sphere Test	2022-11-02	VPR-22-MU-25-9TW-A	Yang, Gavin X
Integrating Sphere Test	2022-11-02	VPR-22-MU-25-9TW-A	Yang, Gavin X
Integrating Sphere Test	2022-11-01	VPR-22-MU-25-9TW-A	Yang, Gavin X
Integrating Sphere Test	2022-11-01	VPR-22-MU-25-9TW-A	Yang, Gavin X
Goniophotometer Test	2022-10-31	VPR-22-MU-25-9TW-A	Yang, Gavin X
Goniophotometer Test	2022-10-31	VPR-22-MU-25-9TW-A	Yang, Gavin X
THD and PF Test	2022-10-31	VPR-22-MU-25-9TW-A	Yang, Gavin X
THD and PF Test	2022-10-31	VPR-22-MU-25-9TW-A	Yang, Gavin X
THD and PF Test	2022-10-31	VPR-22-MU-25-9TW-A	Yang, Gavin X
THD and PF Test	2022-10-31	VPR-22-MU-25-9TW-A	Yang, Gavin X
THD and PF Test	2022-10-31	VPR-22-MU-25-9TW-A	Yang, Gavin X
In-Situ Temperature Measurement Test	2022-11-07	VPR-22-MU-25-9TW-A	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: VPR-22-MU-25-9TW-A

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

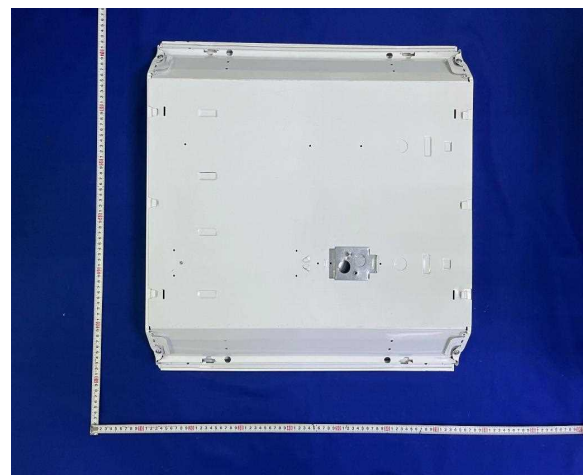
LED Package: BxFN-(A)G-13H-9RB

Dimming Information: Continuous dimming capability

Remark: Housing models: Lithonia 2GT8-2-17-A12-MVOLT-GEB10IS

Products Scaled Value

Model Number	CCT	Luminous Flux	Power	Luminous Efficacy
VPR-22-MU-25-9TW-A	3500K	3125	25	125
VPR-22-MU-25-9TW-A	4000K	3375	25	135
VPR-22-MU-25-9TW-A	5000K	3175	25	127
VPR-22-MU-25-9TW-A	3500K	2816	22	128
VPR-22-MU-25-9TW-A	4000K	3036	22	138
VPR-22-MU-25-9TW-A	5000K	2860	22	130
VPR-22-MU-25-9TW-A	3500K	2376	18	132
VPR-22-MU-25-9TW-A	4000K	2556	18	142
VPR-22-MU-25-9TW-A	5000K	2412	18	134





Integrating Sphere Test

Model No.	VPR-22-MU-25-9TW-A		Sample ID.	5475173
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.

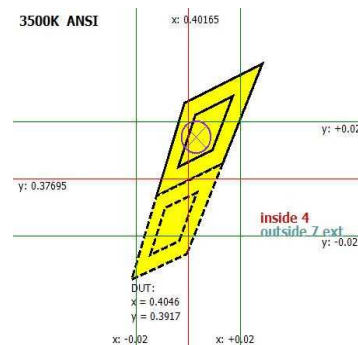
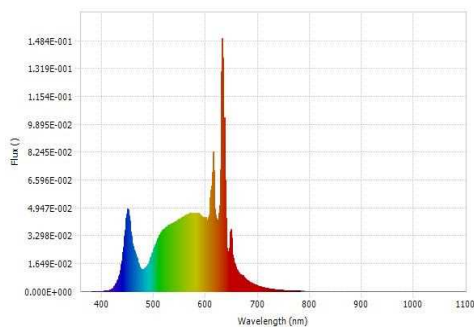
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using 4π geometry. The self-absorption 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 ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.6	119.95	60	0.2067	24.527	0.9895	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3523	93	72.0	0.0006	3107.06	126.68	N/A



Luminous Flux (lm)	3107.06	Chrom x	0.4046
Chrom y	0.3917	Chrom u	0.2349
Chrom v	0.3410	Duv	0.0006
Chrom u'	0.2349	Chrom v'	0.5116
CCT (K)	3523	Luminous Efficacy (lm/W)	126.68
Ra	94	R1	96.0
R2	94.0	R3	91.0
R4	95.0	R5	94.0
R6	93.0	R7	95.0
R8	90.0	R9	72.0
R10	84.0	R11	94.0
R12	75.0	R13	95.0
R14	94.0	R15	93.0
Rf	91	Rg	101
Rcs,h1	-4%		



Integrating Sphere Test (Cont'd)

TM-30 Report

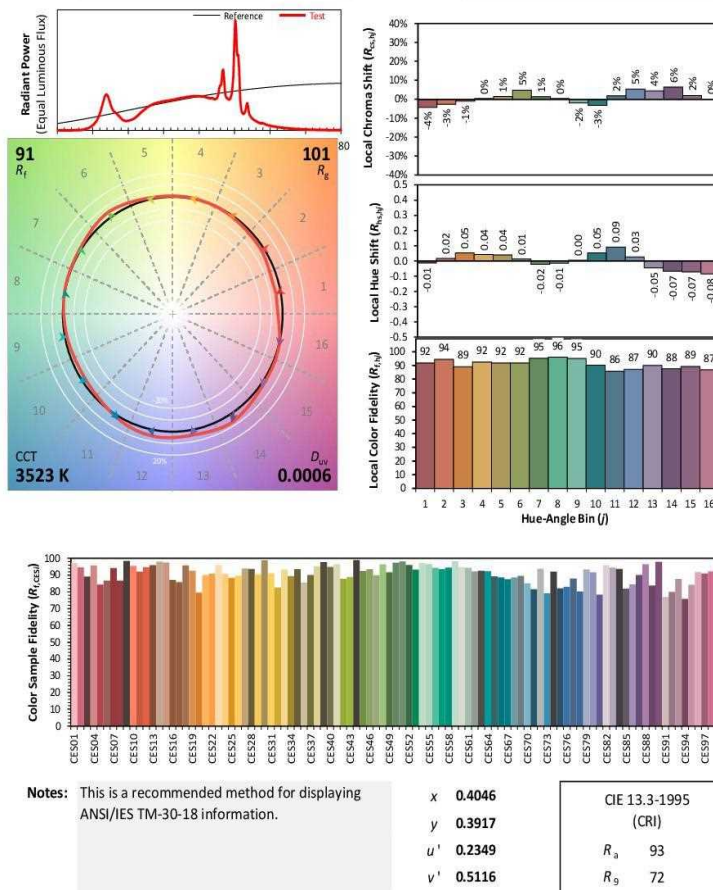
ANSI/IES TM-30-18 Color Rendition Report

Source: BXFN-(A)G-13H-9RB

Manufacturer: Fulham Co., Inc.

Date: 11/1/2022

Model: VPR-22-MU-25-9TW-A



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



Integrating Sphere Test

Model No.	VPR-22-MU-25-9TW-A	Sample ID.	5475173
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.

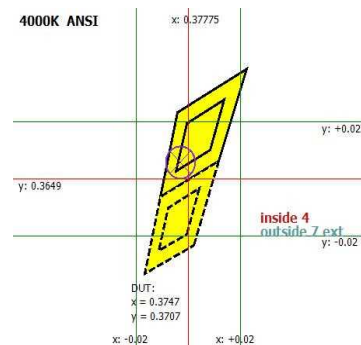
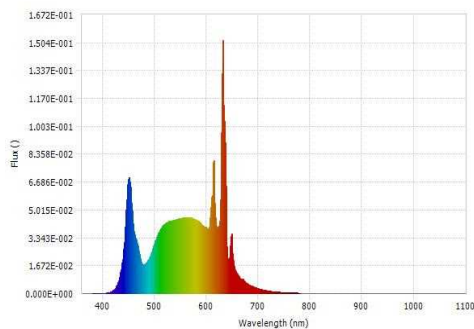
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using 4π geometry. The self-absorption 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 ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.6	120.08	60	0.1999	23.748	0.9892	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
4116	96	93.0	-0.0012	3226.56	135.87	N/A



Luminous Flux (lm)	3226.56	Chrom x	0.3747
Chrom y	0.3707	Chrom u	0.2238
Chrom v	0.3320	Duv	-0.0012
Chrom u'	0.2238	Chrom v'	0.4980
CCT (K)	4116	Luminous Efficacy (lm/W)	135.87
Ra	96	R1	99.0
R2	97.0	R3	91.0
R4	96.0	R5	98.0
R6	94.0	R7	97.0
R8	99.0	R9	93.0
R10	89.0	R11	93.0
R12	73.0	R13	99.0
R14	93.0	R15	99.0
Rf	92	Rg	102
Rcs,h1	-2%		



Integrating Sphere Test (Cont'd)

TM-30 Report

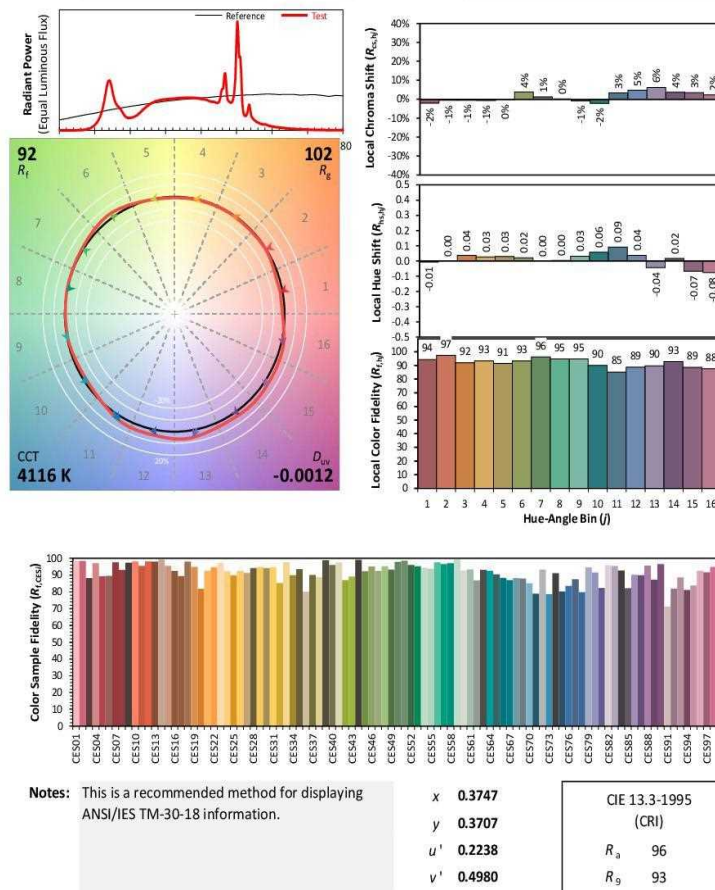
ANSI/IES TM-30-18 Color Rendition Report

Source: BXFN-(A)G-13H-9RB

Manufacturer: Fulham Co., Inc.

Date: 11/1/2022

Model: VPR-22-MU-25-9TW-A



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Integrating Sphere Test

Model No.	VPR-22-MU-25-9TW-A		Sample ID.	5475173
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.

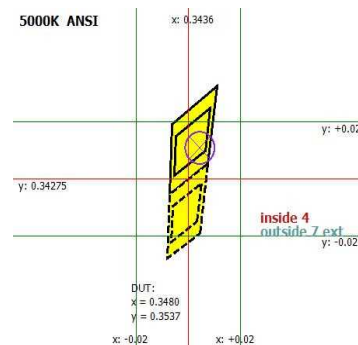
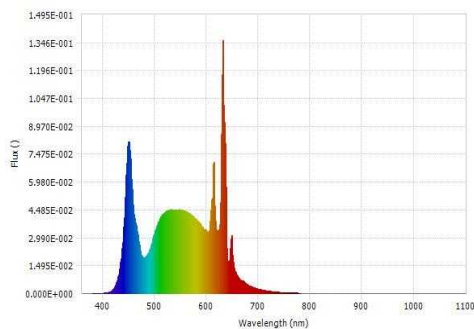
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using 4π geometry. The self-absorption 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 ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.6	120.07	60	0.2063	24.515	0.9897	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
4899	95	98.0	-0.0001	3118.28	127.20	N/A



Luminous Flux (lm)	3118.28	Chrom x	0.3480
Chrom y	0.3537	Chrom u	0.2125
Chrom v	0.3241	Duv	-0.0001
Chrom u'	0.2125	Chrom v'	0.4861
CCT (K)	4899	Luminous Efficacy (lm/W)	127.20
Ra	95	R1	99.0
R2	96.0	R3	88.0
R4	95.0	R5	98.0
R6	92.0	R7	96.0
R8	97.0	R9	98.0
R10	87.0	R11	92.0
R12	69.0	R13	98.0
R14	92.0	R15	97.0
Rf	91	Rg	104
Rcs,h1	-1%		



Integrating Sphere Test (Cont'd)

TM-30 Report

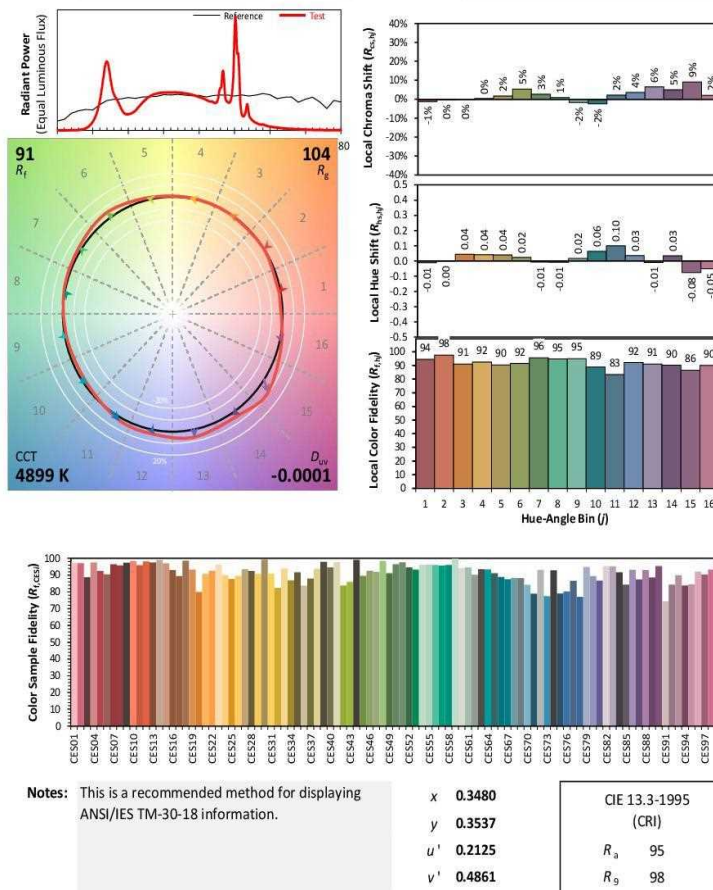
ANSI/IES TM-30-18 Color Rendition Report

Source: BXFN-(A)G-13H-9RB

Manufacturer: Fulham Co., Inc.

Date: 11/2/2022

Model: VPR-22-MU-25-9TW-A



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Integrating Sphere Test

Model No.	VPR-22-MU-25-9TW-A		Sample ID.	5475173
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.

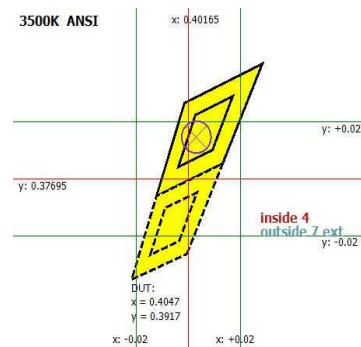
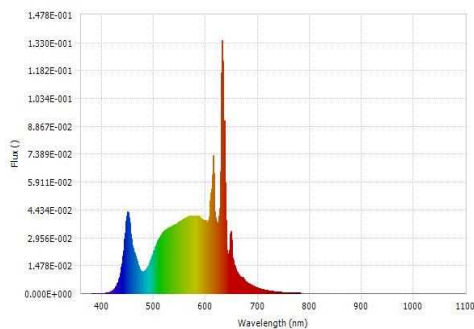
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using 4π geometry. The self-absorption 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 ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.6	119.97	60	0.1815	21.472	0.9863	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3521	94	73.0	0.0006	2765.84	128.81	N/A



Luminous Flux (lm)	2765.84	Chrom x	0.4047
Chrom y	0.3917	Chrom u	0.2349
Chrom v	0.3411	Duv	0.0006
Chrom u'	0.2349	Chrom v'	0.5116
CCT (K)	3521	Luminous Efficacy (lm/W)	128.81
Ra	94	R1	96.0
R2	94.0	R3	91.0
R4	95.0	R5	94.0
R6	93.0	R7	95.0
R8	90.0	R9	73.0
R10	85.0	R11	95.0
R12	75.0	R13	95.0
R14	94.0	R15	93.0
Rf	91	Rg	101
Rcs,h1	-4%		



Integrating Sphere Test (Cont'd)

TM-30 Report

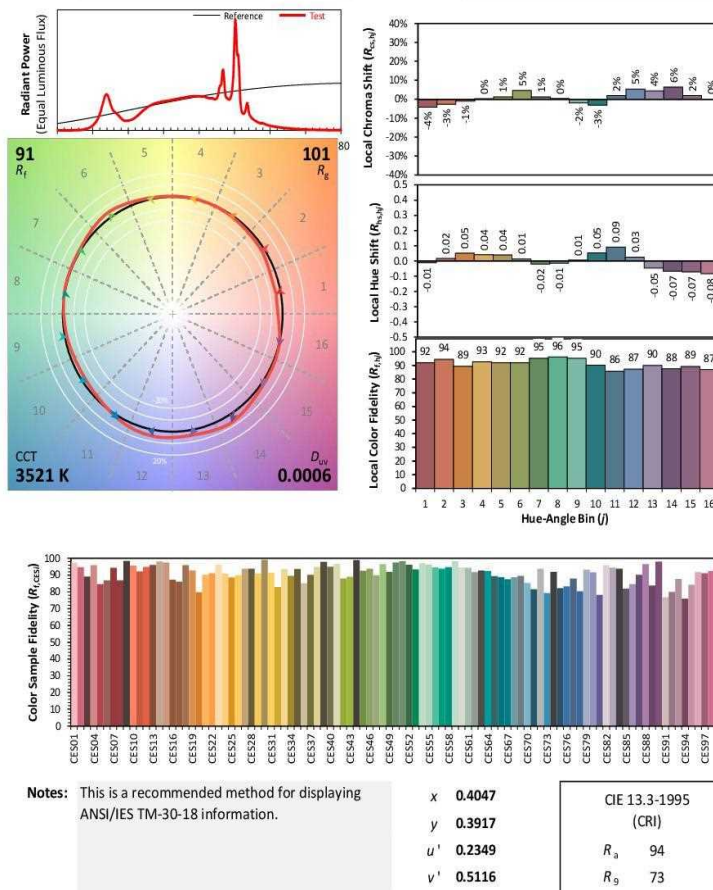
ANSI/IES TM-30-18 Color Rendition Report

Source: BXFN-(A)G-13H-9RB

Manufacturer: Fulham Co., Inc.

Date: 11/1/2022

Model: VPR-22-MU-25-9TW-A



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

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



Integrating Sphere Test

Model No.	VPR-22-MU-25-9TW-A	Sample ID.	5475173
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.

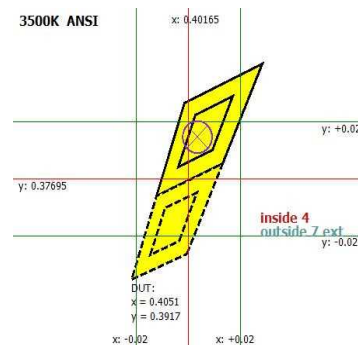
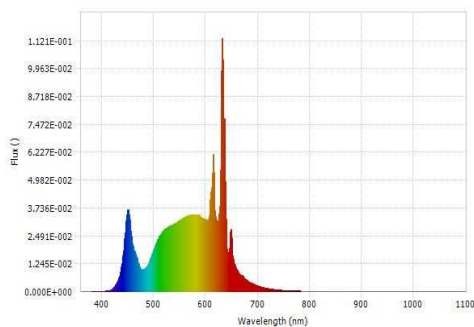
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using 4π geometry. The self-absorption 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 ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.6	120.02	60	0.1480	17.419	0.9803	Horizontal

Test Results

CCT (K)	CRI (Ra)	R9	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Efficacy(lm/ft)
3513	94	73.0	0.0005	2306.75	132.43	N/A



Luminous Flux (lm)	2306.75	Chrom x	0.4051
Chrom y	0.3917	Chrom u	0.2352
Chrom v	0.3411	Duv	0.0005
Chrom u'	0.2352	Chrom v'	0.5116
CCT (K)	3513	Luminous Efficacy (lm/W)	132.43
Ra	94	R1	96.0
R2	95.0	R3	92.0
R4	95.0	R5	95.0
R6	93.0	R7	95.0
R8	91.0	R9	73.0
R10	85.0	R11	95.0
R12	75.0	R13	95.0
R14	94.0	R15	94.0
Rf	91	Rg	101
Rcs,h1	-4%		



Integrating Sphere Test (Cont'd)

TM-30 Report

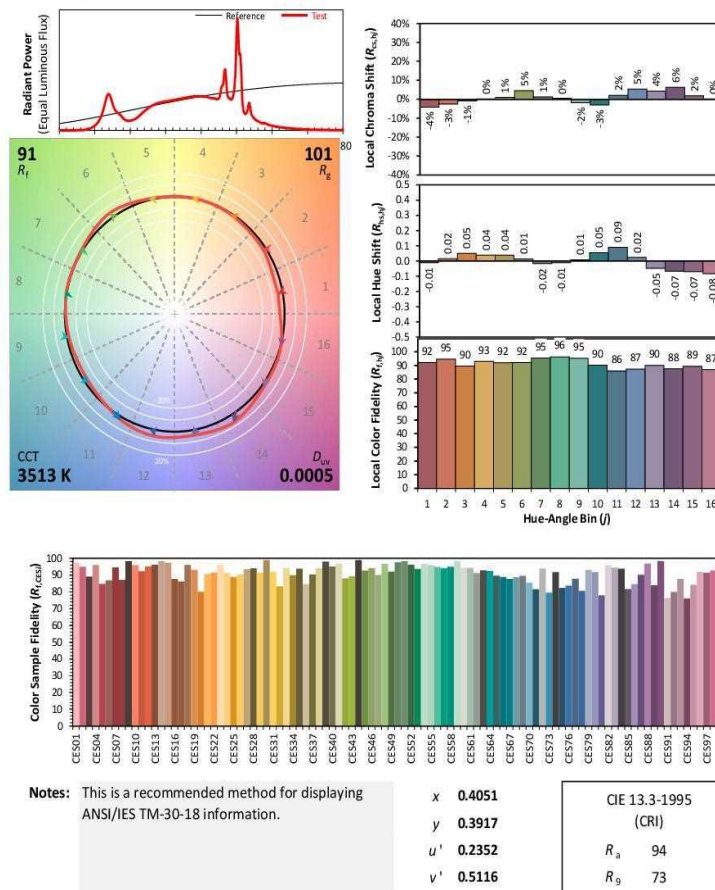
ANSI/IES TM-30-18 Color Rendition Report

Source: BXEN-(A)E-11M-3AA

Manufacturer: Jiangsu Ever-tie Lighting Inc

Date: 11/1/2022

Model: VPR-22-MU-25-9TW-A



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Goniophotometer Test

Model No.	VPR-22-MU-25-9TW-A	Sample ID.	5475173
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° 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 ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.9	120.06	60	0.2059	24.589	0.9947	5.38%	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	
3082.5	77.60%	N/A	114.5	113.7	125.36

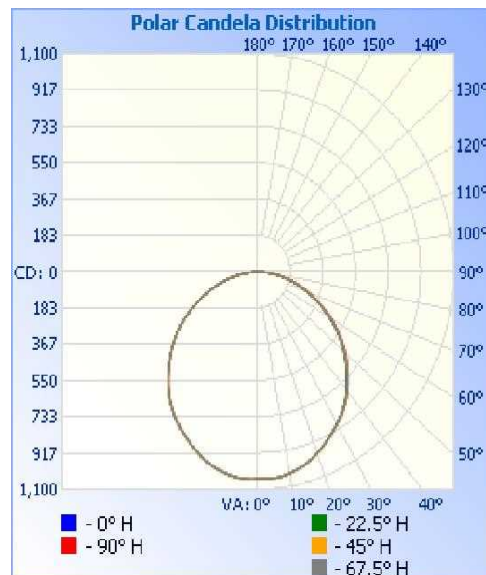
Backlight	Uplight	Glare
N/A	N/A	N/A

UGR		Spacing Criteria (0 - 180°)	Spacing Criteria (90° - 270°)
Crosswise	Endwise		
21.4	21.8	1.28	1.28

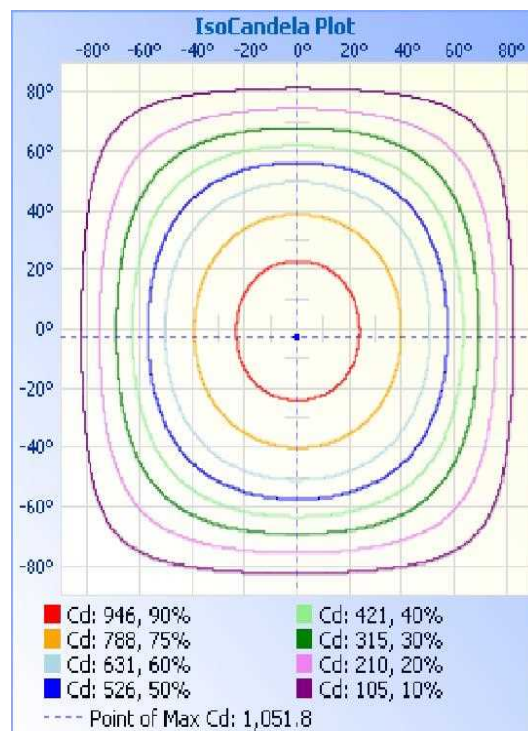


Goniophotometer Test (Cont'd)

Polar Candela Distribution



IsoCandela Plot





Goniophotometer Test (Cont'd)

Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	816.3	26.50%
0-40	1342.4	43.50%
0-60	2390.5	77.60%
60-90	682.6	22.10%
70-100	302.5	9.80%
90-120	3.2	0.10%
0-90	3073.2	99.70%
90-180	9.3	0.30%
0-180	3082.5	100.00%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	25.1	0.80%	90-95	0.8	0.00%
5-10	74.6	2.40%	95-100	0.6	0.00%
10-15	121.4	3.90%	100-105	0.6	0.00%
15-20	163.9	5.30%	105-110	0.4	0.00%
20-25	200.5	6.50%	110-115	0.4	0.00%
25-30	230.9	7.50%	115-120	0.4	0.00%
30-35	255.2	8.30%	120-125	0.5	0.00%
35-40	270.8	8.80%	125-130	0.6	0.00%
40-45	276.0	9.00%	130-135	0.6	0.00%
45-50	272.4	8.80%	135-140	0.6	0.00%
50-55	260.6	8.50%	140-145	0.6	0.00%
55-60	239.1	7.80%	145-150	0.6	0.00%
60-65	208.7	6.80%	150-155	0.6	0.00%
65-70	172.8	5.60%	155-160	0.6	0.00%
70-75	134.5	4.40%	160-165	0.5	0.00%
75-80	95.2	3.10%	165-170	0.5	0.00%
80-85	54.8	1.80%	170-175	0.3	0.00%
85-90	16.6	0.50%	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	1046	1046	1046	1046	1046	1046	1046	1046	1046	1046	1046	1046	1046	1046	1046	1046	1046	1046	1046
1	1048	1047	1046	1046	1046	1047	1048	1048	1051	1048	1048	1047	1048	1048	1049	1048	1048	1048	1048
2	1050	1049	1048	1048	1048	1049	1049	1049	1052	1051	1050	1050	1050	1050	1049	1048	1050	1050	1050
3	1051	1051	1050	1050	1049	1050	1051	1051	1051	1052	1051	1051	1050	1051	1050	1050	1051	1051	1051
4	1050	1051	1050	1049	1049	1050	1050	1050	1051	1052	1051	1051	1050	1051	1051	1049	1050	1050	1050
5	1048	1049	1049	1047	1047	1047	1049	1049	1050	1050	1050	1049	1049	1049	1048	1048	1048	1048	1048
6	1046	1048	1047	1047	1045	1048	1048	1048	1048	1049	1049	1047	1046	1047	1047	1046	1046	1046	1046
7	1044	1044	1045	1045	1045	1046	1045	1046	1045	1047	1046	1045	1044	1044	1044	1045	1043	1044	1044
8	1041	1042	1042	1042	1041	1042	1043	1043	1043	1044	1044	1042	1041	1041	1042	1041	1041	1041	1041
9	1038	1038	1038	1038	1039	1038	1039	1038	1040	1040	1040	1039	1038	1038	1038	1037	1038	1038	1038
10	1034	1035	1034	1035	1034	1035	1036	1035	1037	1036	1035	1035	1034	1034	1034	1033	1034	1034	1034
11	1029	1029	1032	1031	1031	1032	1032	1032	1033	1032	1032	1030	1030	1030	1029	1030	1029	1030	1029
12	1025	1026	1027	1026	1027	1028	1029	1028	1028	1028	1026	1026	1026	1025	1025	1025	1025	1025	1025
13	1020	1022	1022	1022	1022	1024	1024	1023	1023	1024	1022	1022	1022	1021	1021	1021	1021	1021	1020
14	1016	1017	1017	1017	1017	1019	1019	1019	1019	1019	1018	1016	1016	1016	1015	1015	1015	1015	1016
15	1011	1011	1011	1011	1012	1014	1014	1014	1013	1013	1013	1011	1010	1011	1011	1010	1011	1011	1011
16	1005	1005	1005	1004	1005	1007	1008	1008	1007	1007	1007	1005	1004	1005	1005	1003	1005	1005	1005
17	997	997	998	998	999	1001	1001	1000	1001	1001	1000	999	998	998	997	997	997	997	997
18	990	991	991	992	992	994	994	994	995	994	994	992	991	991	991	990	990	990	990
19	982	983	984	984	985	987	988	987	987	988	987	984	983	984	986	983	982	982	982
20	975	975	977	977	978	979	980	978	979	980	979	977	976	976	976	976	975	975	975
25	932	933	934	934	935	936	937	938	936	936	936	936	934	933	933	933	932	932	932
30	886	888	889	890	892	894	894	894	893	894	892	891	890	889	888	886	886	886	886
35	838	839	840	843	845	845	845	844	844	844	845	844	842	840	837	837	838	838	838
40	775	777	780	781	784	784	785	783	785	783	783	782	780	779	777	775	775	775	775
45	704	706	709	711	714	716	716	715	713	713	712	711	712	710	706	705	704	704	704
50	631	633	636	640	644	644	644	643	640	640	638	638	638	637	633	632	631	631	631
55	553	555	558	562	564	566	564	562	562	562	561	562	563	560	557	553	553	553	553
60	464	467	471	477	480	481	479	476	476	475	478	479	477	474	471	466	464	464	464
65	375	378	383	388	393	392	390	388	384	385	387	387	387	385	381	377	375	375	375
70	289	292	298	302	306	306	303	300	298	298	299	300	302	299	295	291	289	289	289
75	208	210	215	220	223	223	221	217	215	216	218	221	220	216	213	209	208	208	208
80	131	132	137	142	145	146	144	140	136	137	141	142	141	139	135	131	131	131	131
85	58	59	63	67	69	69	68	65	62	64	64	64	65	63	61	59	58	58	58
90	1	2	2	2	3	3	4	4	4	3	2	3	2	2	2	1	1	1	1
95	1	1	1	1	1	1	2	2	1	1	1	2	1	1	2	2	1	1	1
100	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
105	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1
110	1	1	1	1	1	1	1	1	0	1	0	1	0	1	1	0	1	1	1
115	1	0	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1
120	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1
125	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2
130	2	2	2	1	1	1	2	1	2	2	1	1	1	1	1	1	2	2	2
135	1	1	2	1	1	2	2	2	1	2	2	2	2	2	2	1	1	1	1
140	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
145	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
150	2	2	2	3	2	2	2	2	2	3	3	2	2	3	2	3	2	2	2
155	3	3	3	3	3	2	2	2	3	3	3	3	3	3	2	2	3	3	3
160	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3
165	4	3	4	4	3	4	4	4	4	3	3	3	4	3	4	4	4	4	4
170	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
175	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
180	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4



Goniophotometer Test

Model No.	VPR-22-MU-25-9TW-A	Sample ID.	5475173
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° 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 ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.9	120.07	60	0.2040	24.36	0.9945	5.43%	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	
3090.9	77.50%	N/A	114.3	113.4	126.88

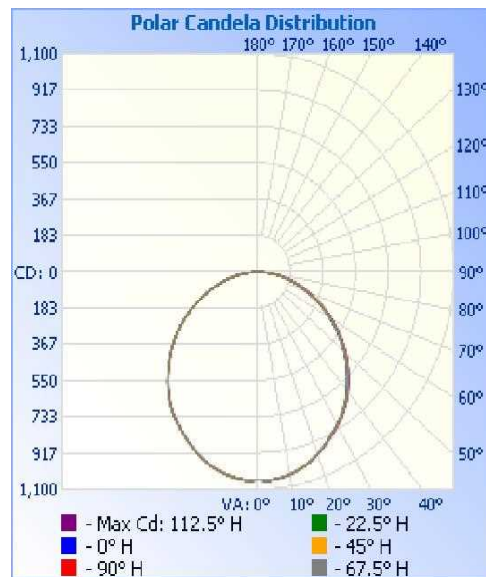
Backlight	Uplight	Glare
N/A	N/A	N/A

UGR		Spacing Criteria ($0\text{-}180^{\circ}$)	Spacing Criteria ($90^{\circ}\text{-}270^{\circ}$)
Crosswise	Endwise		
21.4	21.8	1.28	1.28

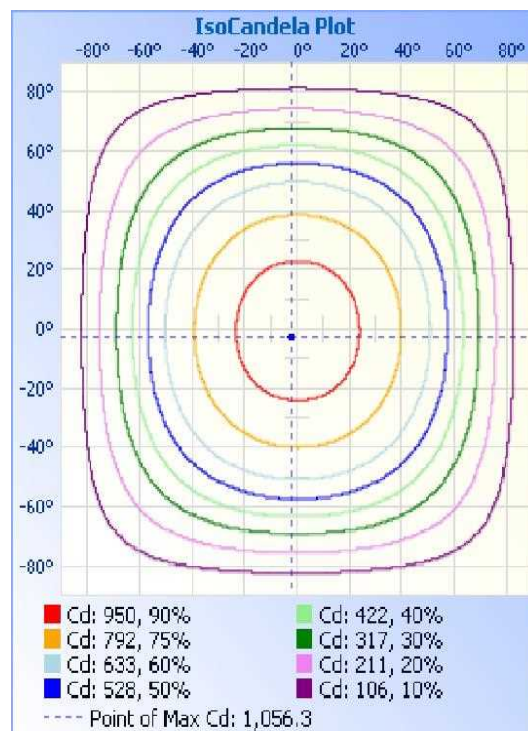


Goniophotometer Test (Cont'd)

Polar Candela Distribution



IsoCandela Plot





Goniophotometer Test (Cont'd)

Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	819.7	26.50%
0-40	1347.7	43.60%
0-60	2398.9	77.60%
60-90	682.8	22.10%
70-100	301.5	9.80%
90-120	3.2	0.10%
0-90	3081.7	99.70%
90-180	9.2	0.30%
0-180	3090.9	100.00%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	25.2	0.80%	90-95	0.7	0.00%
5-10	74.9	2.40%	95-100	0.6	0.00%
10-15	121.9	3.90%	100-105	0.6	0.00%
15-20	164.6	5.30%	105-110	0.4	0.00%
20-25	201.3	6.50%	110-115	0.4	0.00%
25-30	231.8	7.50%	115-120	0.5	0.00%
30-35	256.2	8.30%	120-125	0.5	0.00%
35-40	271.8	8.80%	125-130	0.5	0.00%
40-45	277.0	9.00%	130-135	0.5	0.00%
45-50	273.4	8.80%	135-140	0.6	0.00%
50-55	261.3	8.50%	140-145	0.6	0.00%
55-60	239.5	7.70%	145-150	0.6	0.00%
60-65	209.5	6.80%	150-155	0.6	0.00%
65-70	173.1	5.60%	155-160	0.6	0.00%
70-75	134.5	4.40%	160-165	0.5	0.00%
75-80	95.1	3.10%	165-170	0.5	0.00%
80-85	54.4	1.80%	170-175	0.3	0.00%
85-90	16.2	0.50%	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	1050	1050	1050	1050	1050	1050	1050	1050	1050	1050	1050	1050	1050	1050	1050	1050	1050
1	1052	1052	1052	1051	1051	1052	1052	1052	1053	1053	1053	1052	1052	1052	1053	1052	1052
2	1054	1054	1053	1052	1053	1054	1055	1053	1055	1056	1055	1053	1055	1055	1054	1054	1054
3	1055	1056	1054	1054	1054	1056	1055	1054	1056	1056	1055	1055	1054	1055	1055	1055	1055
4	1055	1055	1054	1054	1055	1055	1056	1055	1055	1056	1055	1055	1055	1056	1056	1056	1055
5	1054	1054	1054	1053	1053	1054	1054	1054	1053	1054	1053	1054	1052	1053	1053	1054	1054
6	1051	1052	1051	1051	1052	1053	1053	1052	1052	1052	1052	1052	1051	1052	1053	1052	1051
7	1049	1049	1049	1049	1049	1050	1052	1050	1049	1048	1049	1048	1049	1049	1050	1048	1049
8	1046	1046	1046	1046	1046	1047	1049	1048	1047	1046	1046	1046	1045	1046	1047	1046	1046
9	1042	1042	1044	1042	1043	1044	1045	1044	1045	1044	1044	1042	1040	1042	1044	1042	1042
10	1039	1038	1040	1039	1039	1041	1042	1042	1041	1040	1040	1040	1039	1039	1039	1038	1039
11	1034	1034	1035	1035	1035	1036	1037	1036	1037	1036	1036	1035	1034	1034	1034	1034	1034
12	1030	1030	1031	1030	1031	1032	1032	1032	1033	1030	1031	1030	1030	1030	1030	1029	1030
13	1025	1025	1026	1026	1028	1028	1027	1028	1026	1027	1027	1026	1026	1026	1025	1024	1025
14	1021	1021	1021	1021	1022	1022	1023	1023	1023	1023	1022	1022	1020	1021	1020	1019	1021
15	1015	1015	1015	1016	1017	1017	1018	1017	1017	1018	1017	1016	1015	1015	1015	1014	1015
16	1008	1010	1010	1010	1011	1011	1012	1011	1011	1012	1011	1010	1009	1008	1009	1008	1008
17	1001	1003	1003	1002	1003	1005	1006	1004	1004	1006	1004	1003	1002	1002	1002	1000	1001
18	994	996	996	996	997	998	999	997	998	997	998	996	995	995	995	994	994
19	986	987	989	989	988	991	991	990	990	990	990	988	988	989	988	985	986
20	979	979	982	982	982	984	983	982	982	982	982	982	979	980	981	979	979
25	935	937	939	938	940	941	941	940	940	940	941	938	938	937	936	936	935
30	890	891	892	895	896	898	898	896	895	896	895	895	894	893	891	891	890
35	840	842	843	846	847	848	848	847	846	847	846	847	846	844	842	840	840
40	777	779	781	784	786	787	787	787	785	786	786	785	783	782	781	778	777
45	707	709	711	715	718	718	718	717	714	714	713	714	714	712	709	708	707
50	634	636	639	642	646	646	645	643	640	641	640	641	643	639	637	635	634
55	552	555	558	562	565	567	565	563	563	563	564	565	563	561	557	553	552
60	466	468	473	478	482	483	480	478	476	477	478	479	478	475	471	467	466
65	376	379	385	390	394	394	392	388	385	386	387	389	389	387	382	379	376
70	288	290	296	302	306	306	303	300	298	299	302	304	303	299	295	290	288
75	209	211	217	221	224	224	221	220	215	217	219	220	219	218	214	210	209
80	133	132	137	142	146	145	142	138	135	137	139	141	142	140	134	131	133
85	56	58	61	66	68	68	66	64	62	63	64	64	65	62	58	57	56
90	1	2	2	2	2	3	3	3	3	2	2	2	2	1	2	2	1
95	1	1	1	1	1	1	2	1	1	2	2	1	1	1	1	1	1
100	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1
105	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1
110	1	0	1	1	0	1	1	1	1	1	0	1	1	0	1	1	1
115	2	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	2
120	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
125	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1
130	1	1	1	2	1	2	2	1	1	2	2	1	1	1	2	1	1
135	1	1	1	2	2	2	1	1	1	1	1	1	2	2	2	2	1
140	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	2
145	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
150	2	2	2	2	2	2	2	3	2	2	2	3	2	2	2	2	2
155	3	3	3	2	3	3	3	3	3	3	3	2	3	3	3	3	3
160	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
165	4	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4
170	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
175	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
180	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4



THD and PF Test

Model No.	VPR-22-MU-25-9TW-A	Sample ID.	5475173
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	120.06	60	0.2059	24.59	0.9947	5.38%	Horizontal
24.9	277.11	60	0.0965	24.84	0.9290	15.45%	Horizontal



THD and PF Test

Model No.	VPR-22-MU-25-9TW-A		Sample ID.	5475173
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	120.08	60	0.1979	23.63	0.9945	5.30%	Horizontal
24.9	277.09	60	0.0936	24.01	0.9257	15.61%	Horizontal



THD and PF Test

Model No.	VPR-22-MU-25-9TW-A	Sample ID.	5475173
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	0.2040	24.36	0.9945	5.43%	Horizontal
24.9	277.10	60	0.0960	24.71	0.9286	15.41%	Horizontal



THD and PF Test

Model No.	VPR-22-MU-25-9TW-A	Sample ID.	5475173
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	120.08	60	0.1790	21.35	0.9933	6.02%	Horizontal
24.9	277.11	60	0.0870	22.08	0.9157	15.92%	Horizontal



THD and PF Test

Model No.	VPR-22-MU-25-9TW-A		Sample ID.	5475173
Operate time (Min.)	90	Stabilization time (Min.)	45	

Test Method

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

Test Results

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.9	120.09	60	0.1458	17.34	0.9904	7.17%	Horizontal
24.9	277.12	60	0.0754	18.61	0.8904	16.80%	Horizontal



In-Situ Temperature Measurement Test

Model No.	VPR-22-MU-25-9TW-A	Sample ID.	5475173
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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 (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
22.6	120.06	60	0.2059	24.59	0.9947	5.38%	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	22.6	25.0				
TMP of Location 1	35	33.9	36.3	0.0017	BXFN-(A)G-13H-9RB	120	105

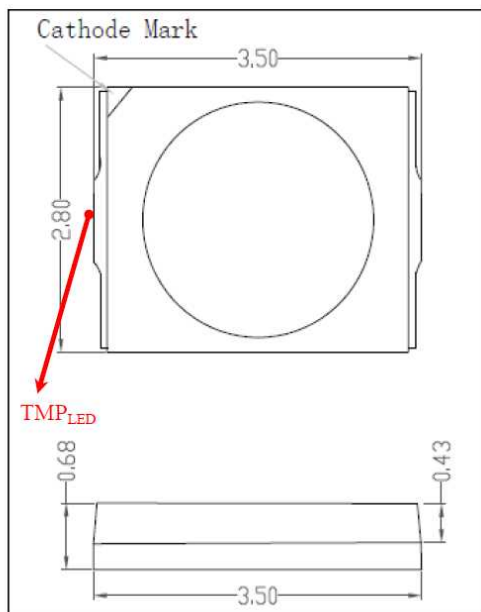
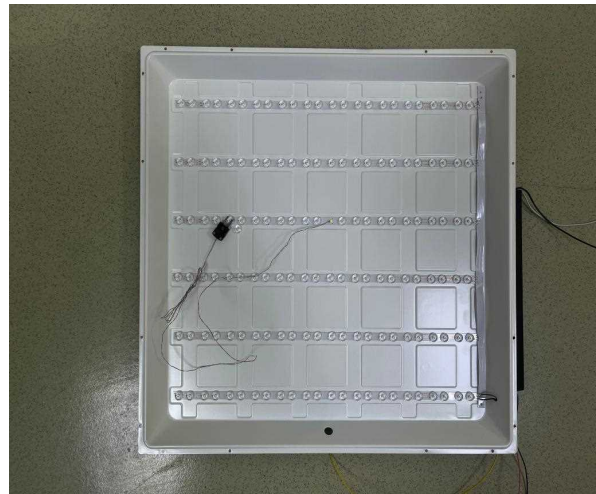
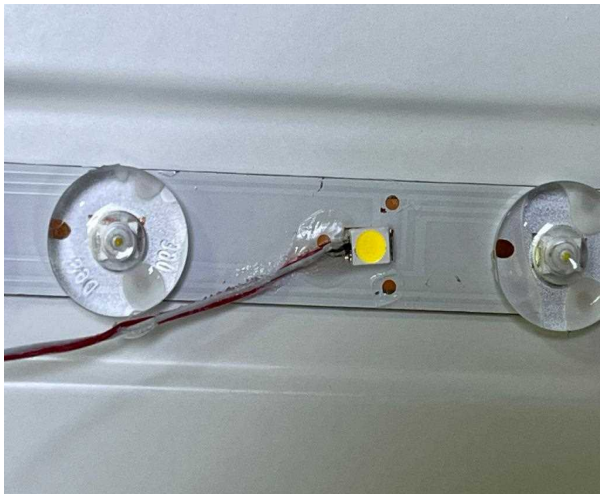
Test Results (Drivers)

Thermocouple Location	Temperature for Driver (°C)		Driver Model Number	Driver Limit Temp (°C)
	Test Result	Test Result (Correct to 25 °C)		
Ambient TEMP	22.6	25.0		
TMP of Location 1	41.1	43.5	T1M1UNV065S-30L-A	90



In-Situ Temperature Measurement Test (Cont'd)

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





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