



Photometric Test Report

Relevant Standards

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

Prepared For Eспен Technology Inc.

12257 Florence Ave., Santa Fe Springs, CA, 90650, United States
Eric Yu, Song, 562.529.2938, eric@espentech.com

Test Laboratory:

UL-CCIC Company Limited

Test Laboratory Address:

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

Catalog Number

VEKT-DP2X4

Project Number

4790023987

Report Number

4790023987-4

Test Date

2021-03-16~2021-05-08

Issue Date

2021-08-11

Revision Date

Prepared By

Duff Yang

Yang, Duff

Approved By

Susie Shao

Shao, Susie

The results contained in this report pertain only to the tested sample. This report shall not be reproduced, except in full, without written approval of Underwriters Laboratories. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government. The laboratory is not responsible for the information which provided by customer, its authenticity can affect the validity of the result in the test report.



Test Summary

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

Requirement Category	Test Method	Requirements	Tolerance	Test Result
Minimum Light Output (lm)-Luminaires	IES LM-79-2008	≥3000	-10%	2392.90
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%	78.4%
Minimum Luminaire Efficacy (lm/W)-Luminaires	IES LM-79-2008	≥125	-3%	126.42
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±124	N/A	3384
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±124	N/A	3388
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±124	N/A	3392
Allowable CCT (4000K)	IES LM-79-2008/ANSI C78.377-2015	3985±154	N/A	4121
Allowable CCT (5000K)	IES LM-79-2008/ANSI C78.377-2015	5029±220	N/A	4938
Minimum CRI	IES LM-79-2008/CIE 13.3-1995	≥80	-1	82.0
Minimum R9	IES LM-79-2008	≥0	-1	25.0
Minimum Rg	IES LM-79-2008	≥89	-1	98.0
Minimum Rf	IES LM-79-2008	≥70	-1	82.0
Rcs,h1	IES LM-79-2008	-12%~23%	-1	-10%
Unified Glare Rating (UGR)	IES LM-79-2008	≤22	N/A	21.7
L90 Lumen maintenance (Hours)	N/A	≥36000	N/A	≥36000
Power Factor	ANSI C82.77-10-2014	≥0.9	-0.03	0.9041
Total Harmonic Distortion (A%)	ANSI C82.77-10-2014	≤20%	5%	16.72%
In-Situ Temperature Measurement Test for LED 1 (°C)	UL1598-2008	≤105	N/A	43.3
In-Situ Temperature Measurement Test for Driver 1 (°C)	UL1598-2008	≤75	N/A	45.1
Max Chromaticity Shift (1000-6000h)	N/A	≤0.007	0.0004	0.0023
Minimum Luminaire Warranty (Years)	N/A	≥5	N/A	≥5



Test List

Sample Received Date: 2021-03-11

Test Item	Test Date	Model Number	Tests Conducted By
Integrating Sphere Test	2021-03-17	VEKT-DP2X4	Yang, Gavin X
Integrating Sphere Test	2021-03-17	VEKT-DP2X4	Yang, Gavin X
Integrating Sphere Test	2021-03-17	VEKT-DP2X4	Yang, Gavin X
Integrating Sphere Test	2021-03-17	VEKT-DP2X4	Yang, Gavin X
Integrating Sphere Test	2021-03-16	VEKT-DP2X4	Yang, Gavin X
Goniophotometer Test	2021-03-16	VEKT-DP2X4	Yang, Gavin X
Goniophotometer Test	2021-03-16	VEKT-DP2X4	Yang, Gavin X
THD and PF Test	2021-03-16	VEKT-DP2X4	Yang, Gavin X
THD and PF Test	2021-03-16	VEKT-DP2X4	Yang, Gavin X
THD and PF Test	2021-03-16	VEKT-DP2X4	Yang, Gavin X
THD and PF Test	2021-05-08	VEKT-DP2X4	Yang, Gavin X
THD and PF Test	2021-05-08	VEKT-DP2X4	Yang, Gavin X
In-Situ Temperature Measurement Test	2021-03-18	VEKT-DP2X4	Yang, Gavin X

Remark (if any)

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



Product Description

Lamp/Luminaire Description: Integrated Retrofit Kits for 2x4 Luminaires

Model Number: VEKT-DP2X4

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

LED Package: P2835Y-WXXXXXXXXXXXX-XXXX

Family Model and Variation: N/A

Dimming Information: continuous dimming capability

Remark: Housing Model: Lithonia 2GT8 4 32 A12 MVOLT GEB10IS

Products Scaled Value

Model Number	CCT	Luminous Flux	Power	Luminous Efficacy
VEKT-DP2X4	3500	4572	36	127
VEKT-DP2X4	4000	4608	36	128
VEKT-DP2X4	5000	4644	36	129
VEKT-DP2X4	3500	3900	30	130
VEKT-DP2X4	4000	3930	30	131
VEKT-DP2X4	5000	3960	30	132
VEKT-DP2X4	3500	3105	23	135
VEKT-DP2X4	4000	3128	23	136
VEKT-DP2X4	5000	3151	23	137

Photos of Products Characteristics





Integrating Sphere Test

Model No.	VEKT-DP2X4		Sample ID.	3693525
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.

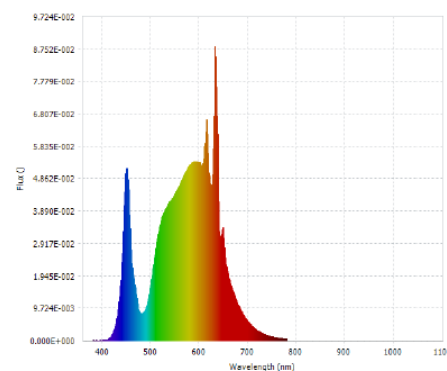
Integrating Sphere Test Conditions

Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.8	120.15	60	0.2039	23.31	0.9514	N/A	Horizontal

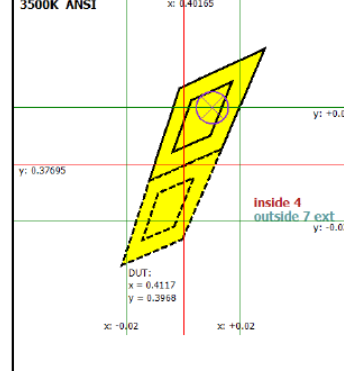
Test Results

CCT (K)	CRI (Ra)	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
3413	83.0	0.0013	3146.32	134.99	N/A

Spectral Flux Graph



Chromaticity Diagram
3500K ANSI



Luminous Flux (lm)	3146.32	Chrom x	0.4117
Chrom y	0.3968	Chrom u	0.2374
Chrom v	0.3431	Duv	0.0013
Chrom u'	0.2374	Chrom v'	0.5147
CCT (K)	3413	Luminous Efficacy (lm/W)	134.99
Ra	83.0	R1	82.7
R2	86.7	R3	89.2
R4	83.8	R5	81.2
R6	81.7	R7	88.1
R8	70.6	R9	25.0
R10	67.4	R11	82.9
R12	57.1	R13	82.2
R14	93.2	R15	78.1
Rf	83.0	Rg	99.0
Rcs,h1	-10%		



Integrating Sphere Test

ANSI/IES TM-30-18 Color Rendition Report

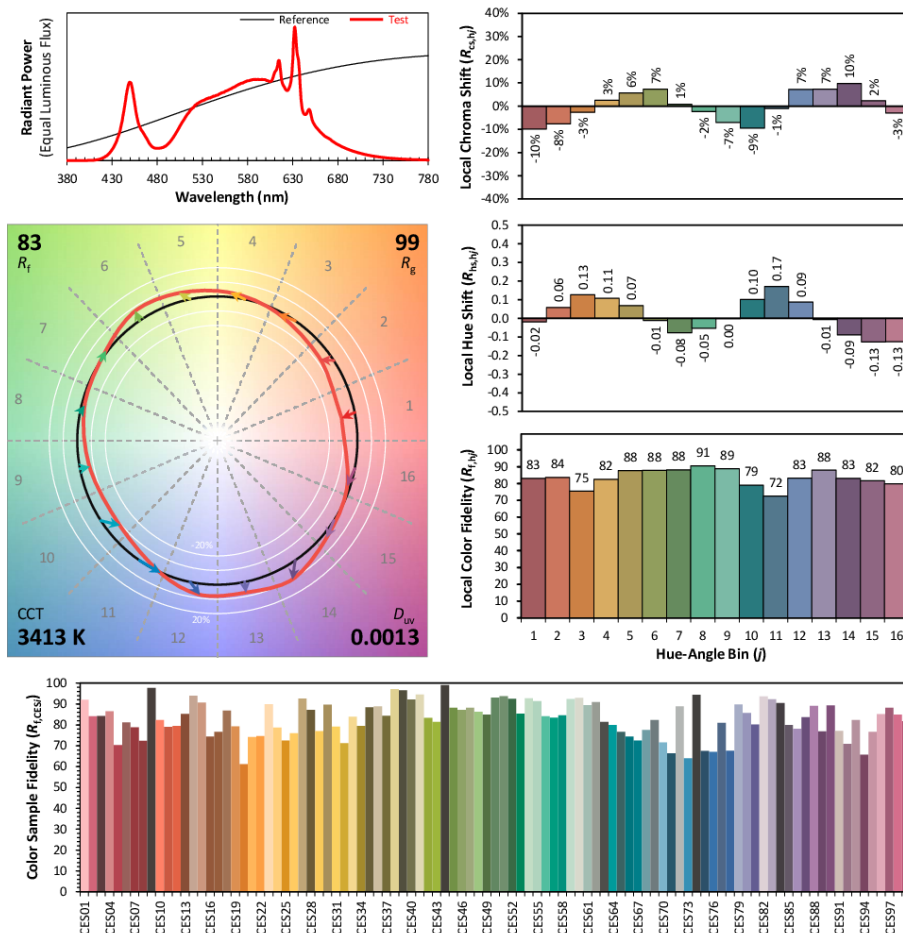
Source: P2Y-WXXXXXXXXXXXX-XXXX

Manufacturer: Espen Technology Inc.

Date: 3/17/2021

Model:

VEKT-DP2X4



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

x 0.4117
 y 0.3968
 u' 0.2374
 v' 0.5147

CIE 13.3-1995
(CRI)
 R_a 83
 R_g 25

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



Integrating Sphere Test

Model No.	VEKT-DP2X4		Sample ID.	3693525
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.

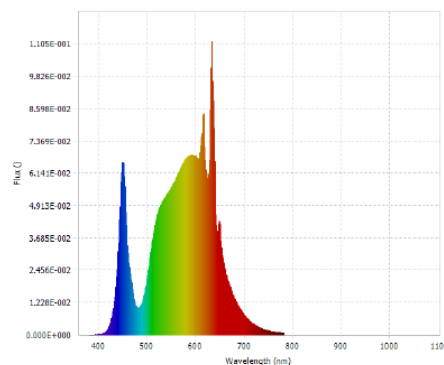
Integrating Sphere Test Conditions

Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.8	120.11	60	0.2623	30.52	0.9688	N/A	Horizontal

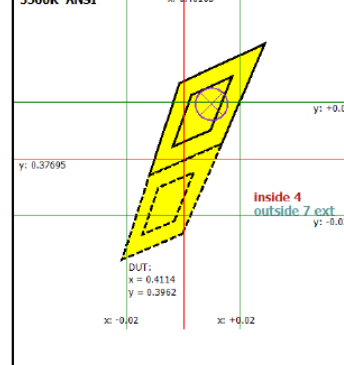
Test Results

CCT (K)	CRI (Ra)	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
3415	83.0	0.0011	3995.62	130.90	N/A

Spectral Flux Graph



Chromaticity Diagram
3500K ANSI



Luminous Flux (lm)	3995.62	Chrom x	0.4114
Chrom y	0.3962	Chrom u	0.2374
Chrom v	0.3430	Duv	0.0011
Chrom u'	0.2374	Chrom v'	0.5144
CCT (K)	3415	Luminous Efficacy (lm/W)	130.90
Ra	83.0	R1	82.5
R2	86.5	R3	89.0
R4	83.7	R5	81.1
R6	81.4	R7	87.9
R8	70.5	R9	24.0
R10	67.0	R11	82.3
R12	57.2	R13	82.8
R14	93.1	R15	77.9
Rf	83.0	Rg	100.0
Rcs,h1	-10%		



Integrating Sphere Test

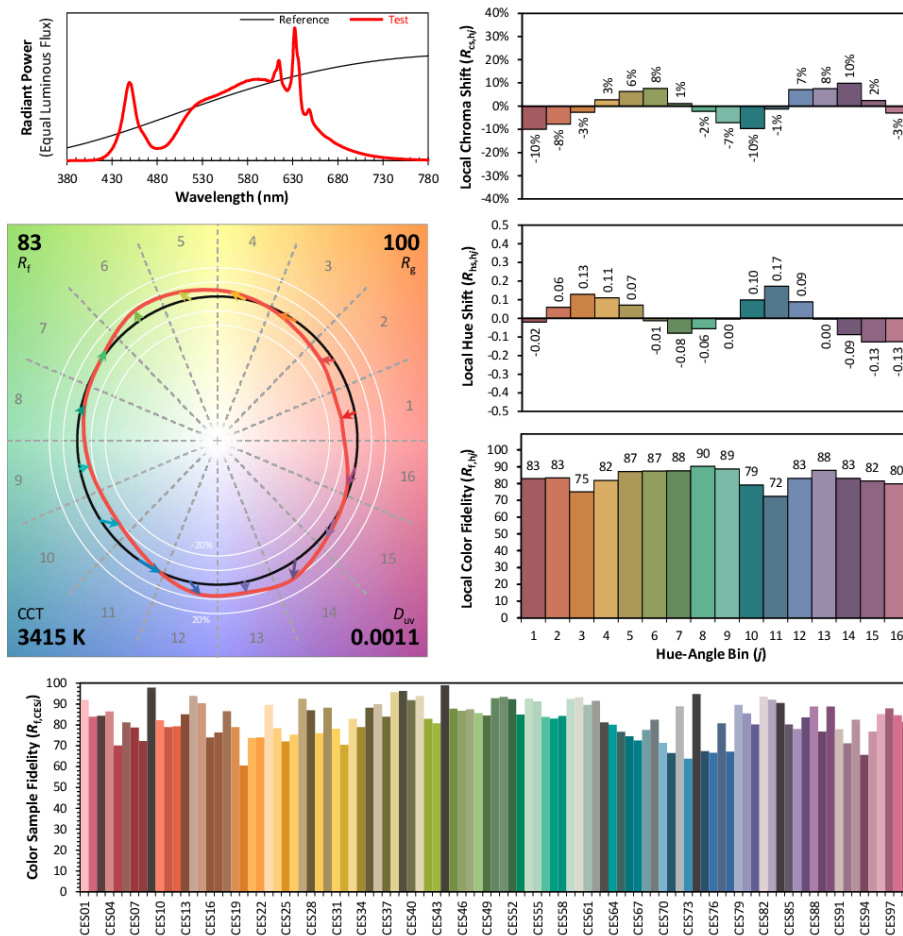
ANSI/IES TM-30-18 Color Rendition Report

Source: P2Y-WXXXXXXXXXX-XXXX

Manufacturer: Espen Technology Inc.

Date: 3/17/2021

Model: VEKT-DP2X4



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

x 0.4114
 y 0.3962
 u' 0.2374
 v' 0.5144

CIE 13.3-1995
(CRI)
 R_a 83
 R_g 24

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



Integrating Sphere Test

Model No.	VEKT-DP2X4		Sample ID.	3693525
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.

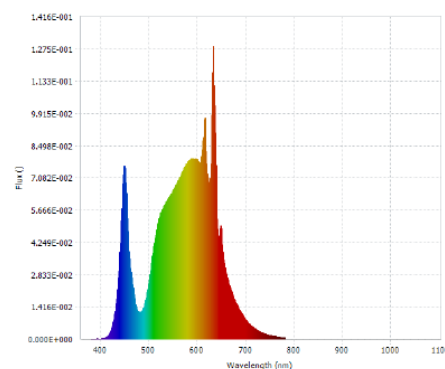
Integrating Sphere Test Conditions

Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.8	120.06	60	0.3103	36.36	0.9760	N/A	Horizontal

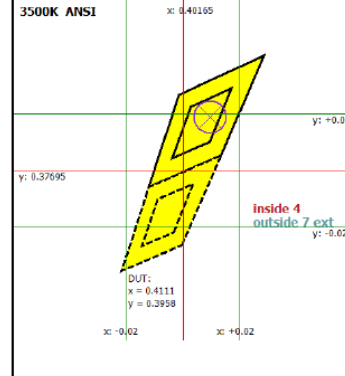
Test Results

CCT (K)	CRI (Ra)	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
3418	83.0	0.0010	4635.62	127.50	N/A

Spectral Flux Graph



Chromaticity Diagram



Luminous Flux (lm)	4635.62	Chrom x	0.4111
Chrom y	0.3958	Chrom u	0.2374
Chrom v	0.3428	Duv	0.0010
Chrom u'	0.2374	Chrom v'	0.5142
CCT (K)	3418	Luminous Efficacy (lm/W)	127.50
Ra	83.0	R1	82.4
R2	86.4	R3	88.8
R4	83.5	R5	81.0
R6	81.3	R7	87.7
R8	70.4	R9	24.0
R10	66.7	R11	82.1
R12	57.3	R13	82.7
R14	93.0	R15	77.9
Rf	83.0	Rg	100.0
Rcs,h1	-10%		



Integrating Sphere Test

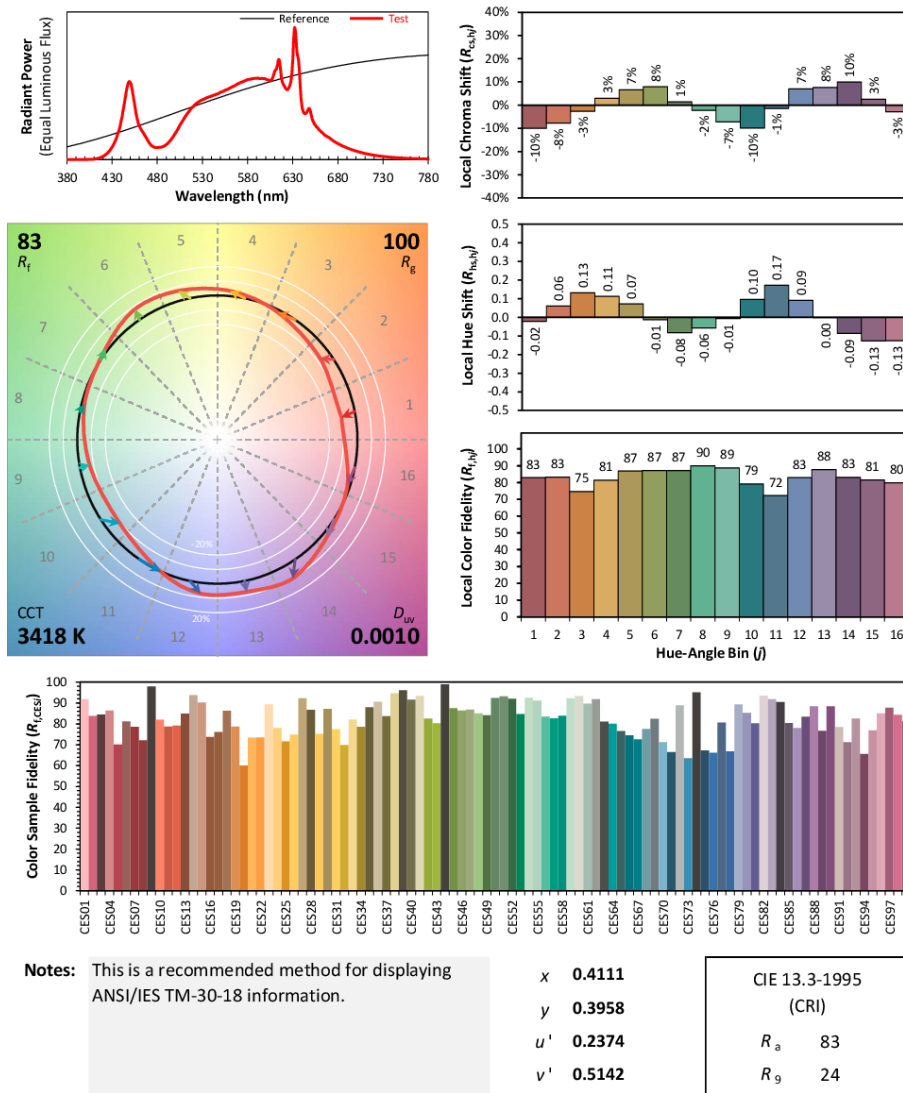
ANSI/IES TM-30-18 Color Rendition Report

Source: P2Y-WXXXXXXXXXXXX-XXXX

Manufacturer: Espen Technology Inc.

Date: 3/17/2021

Model: VEKT-DP2X4



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



Integrating Sphere Test

Model No.	VEKT-DP2X4		Sample ID.	3693525
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.

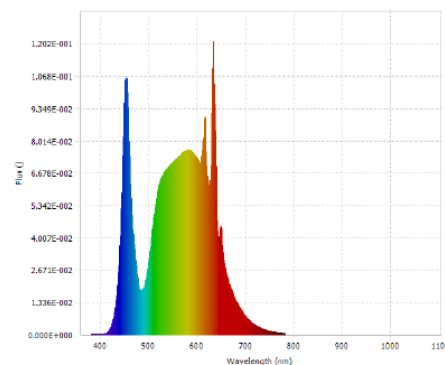
Integrating Sphere Test Conditions

Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.8	120.08	60	0.3014	35.27	0.9744	N/A	Horizontal

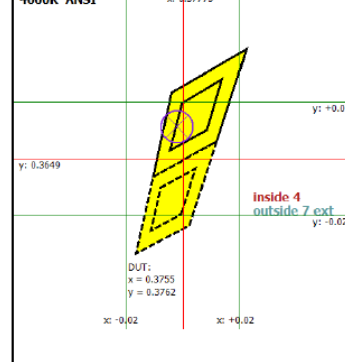
Test Results

CCT (K)	CRI (Ra)	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
4134		0.0013	4812.06	136.45	N/A

Spectral Flux Graph



Chromaticity Diagram
1000K ANSI



Luminous Flux (lm)	4812.06	Chrom x	0.3755
Chrom y	0.3762	Chrom u	0.2221
Chrom v	0.3338	Duv	0.0013
Chrom u'	0.2221	Chrom v'	0.5006
CCT (K)	4134	Luminous Efficacy (lm/W)	136.45
Ra	85.0	R1	84.4
R2	87.8	R3	88.6
R4	85.0	R5	82.8
R6	82.0	R7	90.5
R8	75.7	R9	33.0
R10	68.8	R11	82.9
R12	53.3	R13	84.9
R14	93.0	R15	81.2
Rf	84.0	Rg	98.0
Rcs,h1	-9%		



Integrating Sphere Test

ANSI/IES TM-30-18 Color Rendition Report

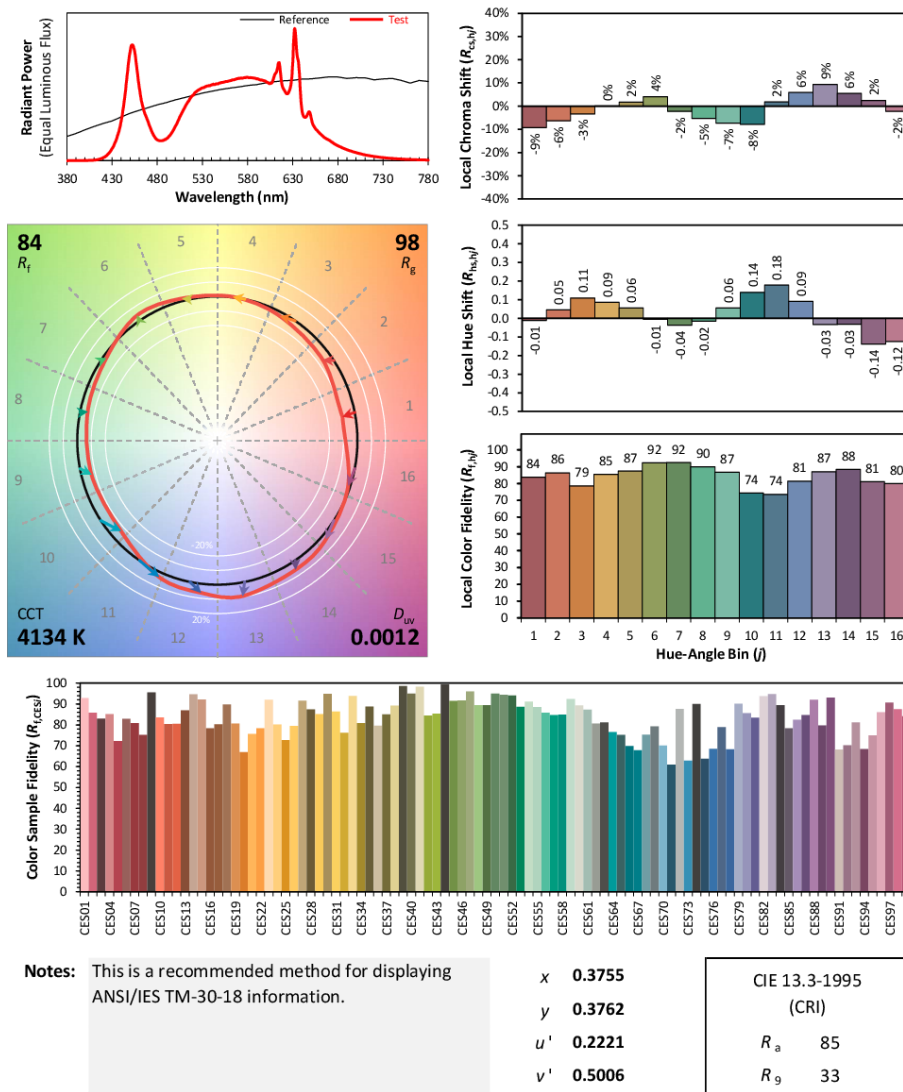
Source: P2Y-WXXXXXXXXXXXX-XXXX

Manufacturer: Espen Technology Inc.

Date: 3/17/2021

Model:

VEKT-DP2X4



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



Integrating Sphere Test

Model No.	VEKT-DP2X4		Sample ID.	3693525
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.

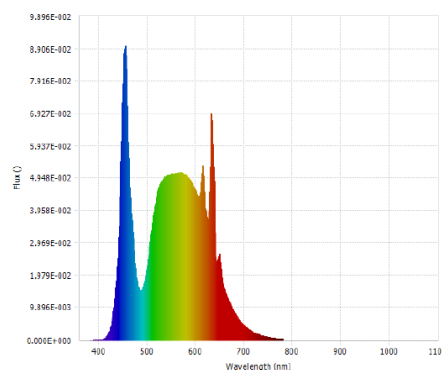
Integrating Sphere Test Conditions

Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.8	120.08	60	0.3078	36.04	0.9755	N/A	Horizontal

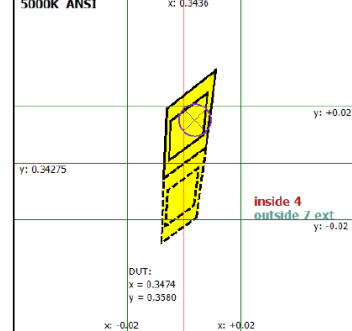
Test Results

CCT (K)	CRI (Ra)	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
4910	84.0	0.0027	4656.90	129.22	N/A

Spectral Flux Graph



Chromaticity Diagram
5000K ANSI



Luminous Flux (lm)	4656.90	Chrom x	0.3483
Chrom y	0.3596	Chrom u	0.2105
Chrom v	0.3260	Duv	0.0027
Chrom u'	0.2105	Chrom v'	0.4890
CCT (K)	4910	Luminous Efficacy (lm/W)	129.22
Ra	84.0	R1	83.1
R2	86.4	R3	86.7
R4	83.9	R5	81.5
R6	79.7	R7	91.0
R8	76.8	R9	31.0
R10	65.3	R11	81.3
R12	48.8	R13	83.6
R14	92.2	R15	80.4
Rf	83.0	Rg	98.0
Rcs,h1	-10%		



Integrating Sphere Test

ANSI/IES TM-30-18 Color Rendition Report

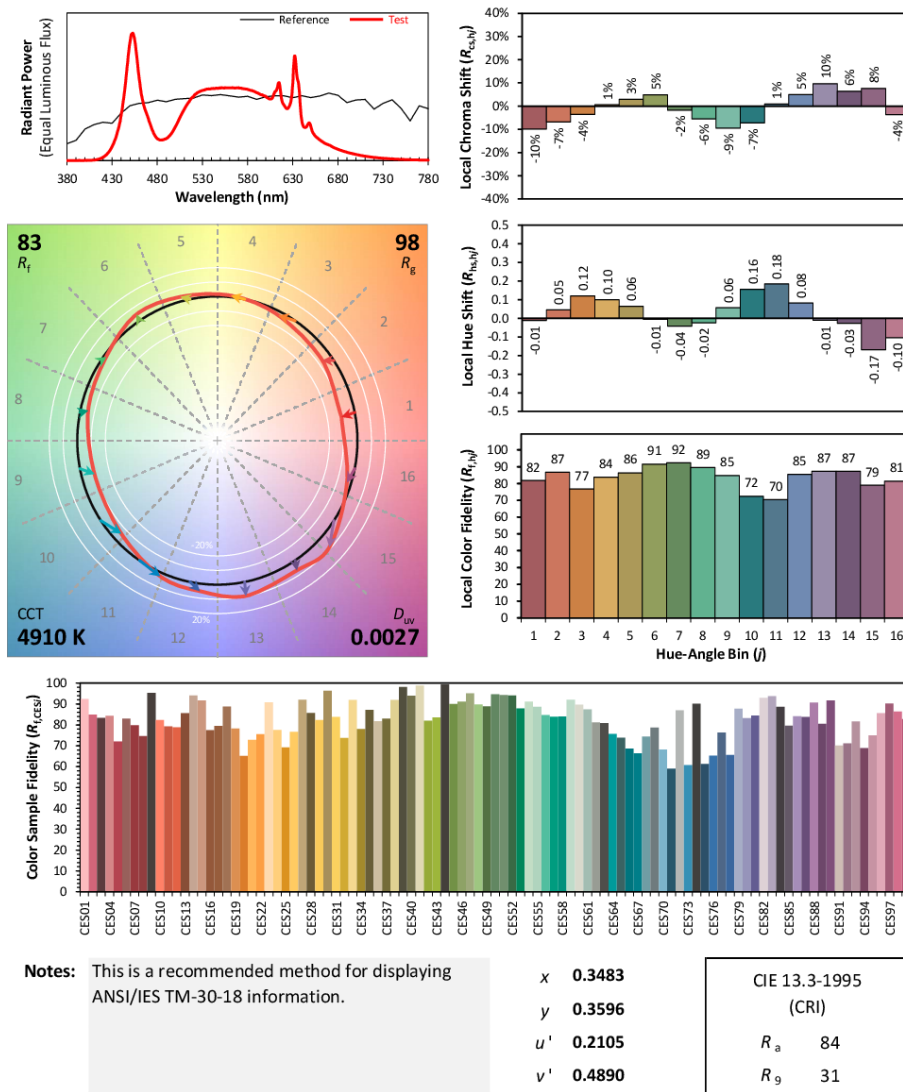
Source: P2Y-WXXXXXXXXXXXX-XXXX

Manufacturer: Espen Technology Inc.

Date: 3/17/2021

Model:

VEKT-DP2X4



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



Integrating Sphere Test

Model No.	VEKT-DP2X4		Sample ID.	3693525
Operate time (Min.)	90	Stabilization time (Min.)	45	

Test Method

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

Goniophotometer Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.2	120.09	60	0.3046	36.38	0.9943	9.87%	Horizontal

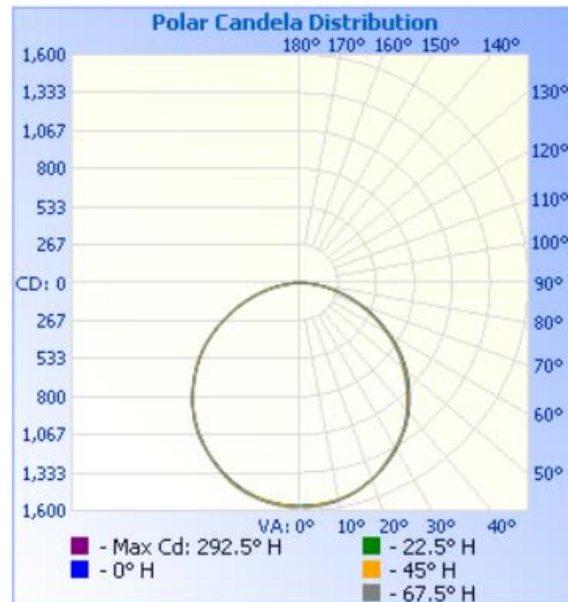
Test Results

Luminous Flux (lm)	Zonal Lumen Requirement 1	Zonal Lumen Requirement 2	Beam Angle (50%)		Luminous Efficacy (lm/W)	Spacing Criteria (0-180°)	Spacing Criteria (90°-270°)
	0°-60°	N/A	Horizontal Spread	Vertical Spread			
4582.6	78.1%	N/A	113.0	113.8	125.96	1.28	1.28
UGR							
						Crosswise	Endwise
						20.3	19.9

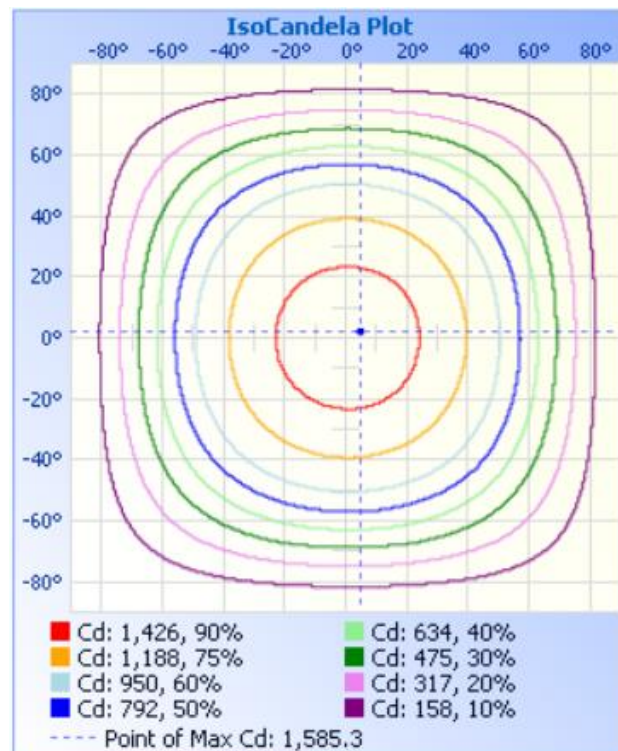


Goniophotometer Test (Cont'd)

Polar Candela Distribution



IsoCandela Plot





Goniophotometer Test (Cont'd)

Zonal Lumen Summary

Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	1,225.3	26.7%
0-40	2,012.8	43.9%
0-60	3,580.5	78.1%
60-90	989.4	21.6%
70-100	425.4	9.3%
90-120	4.5	0.1%
0-90	4,569.9	99.7%
90-180	12.7	0.3%
0-180	4,582.6	100%

Lumens Per Zone

Lumens Per Zone

Zone	Lumens	% Total	Zone	Lumens	% Total
0-5	37.6	0.8%	90-95	1.1	0%
5-10	111.8	2.4%	95-100	0.9	0%
10-15	181.9	4.0%	100-105	0.7	0%
15-20	245.8	5.4%	105-110	0.6	0%
20-25	301.2	6.6%	110-115	0.6	0%
25-30	347.0	7.6%	115-120	0.6	0%
30-35	382.2	8.3%	120-125	0.7	0%
35-40	405.3	8.8%	125-130	0.8	0%
40-45	413.5	9.0%	130-135	0.8	0%
45-50	407.8	8.9%	135-140	0.9	0%
50-55	389.7	8.5%	140-145	0.9	0%
55-60	356.7	7.8%	145-150	0.8	0%
60-65	310.1	6.8%	150-155	0.8	0%
65-70	255.8	5.6%	155-160	0.8	0%
70-75	195.7	4.3%	160-165	0.7	0%
75-80	133.0	2.9%	165-170	0.6	0%
80-85	73.8	1.6%	170-175	0.4	0%
85-90	21.0	0.5%	175-180	0.1	0%



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	1569	1569	1569	1569	1569	1569	1569	1569	1569	1569	1569	1569	1569	1569	1569	1569	1569
1	1564	1565	1570	1576	1579	1575	1570	1565	1566	1565	1569	1577	1580	1577	1570	1565	1564
2	1566	1565	1570	1577	1582	1581	1575	1569	1566	1563	1569	1577	1583	1582	1576	1569	1566
3	1566	1565	1568	1575	1582	1583	1577	1569	1564	1563	1566	1577	1582	1584	1578	1571	1566
4	1564	1562	1565	1572	1582	1583	1580	1571	1563	1561	1564	1574	1582	1584	1581	1573	1564
5	1565	1559	1562	1571	1579	1582	1578	1570	1563	1559	1561	1571	1580	1585	1582	1575	1565
6	1563	1557	1558	1566	1576	1580	1579	1570	1558	1555	1558	1567	1577	1584	1581	1572	1563
7	1561	1555	1556	1562	1571	1576	1574	1566	1558	1552	1555	1563	1574	1580	1579	1570	1561
8	1558	1550	1552	1559	1568	1572	1570	1563	1554	1548	1553	1559	1570	1575	1574	1567	1558
9	1556	1547	1549	1553	1561	1567	1565	1558	1550	1545	1548	1555	1562	1570	1570	1562	1556
10	1548	1544	1544	1549	1555	1561	1559	1553	1545	1541	1544	1550	1558	1565	1562	1557	1548
11	1544	1538	1539	1543	1548	1551	1550	1546	1540	1535	1539	1545	1550	1556	1555	1550	1544
12	1537	1533	1532	1539	1542	1543	1541	1537	1534	1529	1533	1538	1542	1549	1547	1543	1537
13	1530	1526	1528	1531	1534	1535	1531	1527	1525	1523	1527	1532	1537	1541	1542	1535	1530
14	1524	1522	1522	1524	1526	1525	1522	1519	1517	1515	1520	1527	1531	1533	1530	1528	1524
15	1516	1513	1515	1516	1519	1514	1512	1509	1510	1510	1514	1520	1522	1523	1521	1518	1516
16	1505	1506	1508	1509	1509	1505	1503	1500	1500	1501	1506	1511	1514	1513	1512	1508	1505
17	1497	1496	1498	1501	1500	1495	1493	1491	1491	1494	1499	1502	1505	1502	1499	1500	1497
18	1487	1488	1491	1491	1490	1486	1482	1481	1481	1483	1489	1495	1496	1492	1490	1488	1487
19	1477	1477	1481	1479	1478	1474	1470	1470	1470	1473	1478	1484	1484	1482	1480	1478	1477
20	1468	1468	1469	1469	1467	1463	1459	1458	1460	1463	1467	1471	1473	1471	1468	1467	1468
25	1413	1409	1406	1403	1402	1402	1399	1401	1401	1401	1404	1408	1409	1413	1413	1414	1413
30	1345	1340	1338	1334	1329	1330	1329	1331	1332	1335	1336	1337	1337	1342	1343	1346	1345
35	1267	1266	1263	1258	1252	1249	1249	1251	1255	1257	1259	1262	1261	1265	1268	1268	1267
40	1180	1176	1170	1164	1160	1160	1161	1164	1166	1166	1167	1169	1172	1175	1179	1180	1180
45	1080	1074	1065	1058	1052	1052	1055	1061	1063	1066	1064	1063	1065	1069	1076	1079	1080
50	972	968	959	948	940	938	941	947	953	955	955	954	953	957	964	969	972
55	854	850	843	831	824	821	822	828	836	837	839	837	838	840	844	851	854
60	722	718	708	699	691	689	693	697	704	708	705	705	706	710	716	720	722
65	589	584	573	564	557	557	560	565	566	570	569	569	571	576	583	588	589
70	455	449	442	433	428	427	428	432	435	437	437	439	442	447	452	456	455
75	324	318	310	303	300	297	299	303	305	307	307	310	314	317	322	325	324
80	202	198	190	183	180	180	180	183	185	187	187	188	191	196	200	202	202
85	92	88	84	79	77	75	74	76	80	80	82	84	87	90	91	93	92
90	5	4	3	2	2	2	2	2	2	2	2	3	5	5	6	6	5
95	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2
100	1	2	2	2	1	1	2	2	2	2	1	1	1	1	2	2	1
105	1	1	2	1	2	1	1	1	1	2	1	2	1	1	1	1	1
110	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1
115	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1	1	1
120	2	1	1	2	1	1	2	1	1	1	1	1	2	1	1	1	2
125	2	2	1	2	2	1	2	2	2	1	2	1	2	2	2	2	2
130	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
135	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
140	2	3	3	2	3	3	3	3	2	2	3	3	2	2	3	2	2
145	2	3	3	3	2	3	3	3	3	3	3	3	3	3	3	2	2
150	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
155	3	4	4	3	4	3	4	3	3	4	4	3	3	3	3	4	3
160	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
165	5	4	5	5	5	4	5	5	5	5	4	5	4	5	5	4	5
170	5	5	5	5	5	5	5	6	5	5	6	5	6	6	5	6	5
175	5	5	5	5	6	5	6	5	6	5	5	5	5	5	5	5	5
180	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5



Goniophotometer Test

Model No.	VEKT-DP2X4		Sample ID.	3693525
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
24.2	120.12	60	0.3018	36.04	0.9942	9.97%	Horizontal

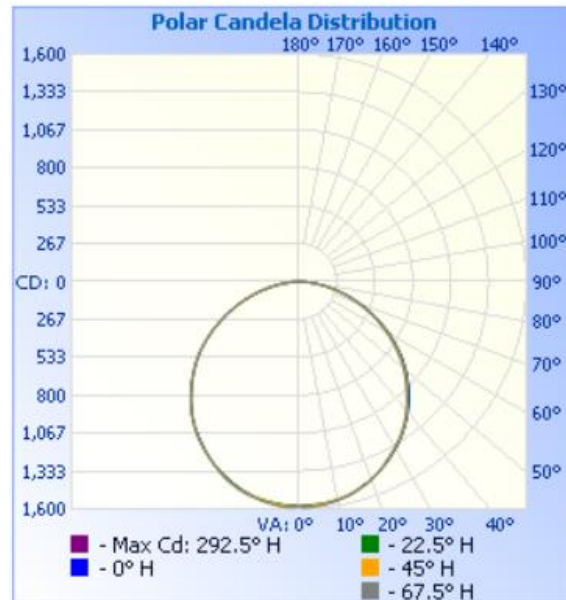
Test Results

Luminous Flux (lm)	Zonal Lumen Requirement 1	Zonal Lumen Requirement 2	Beam Angle (50%)		Luminous Efficacy (lm/W)	Spacing Criteria (0-180 $^{\circ}$)	Spacing Criteria (90 $^{\circ}$ -270 $^{\circ}$)
	0 $^{\circ}$ -60 $^{\circ}$	N/A	Horizontal Spread	Vertical Spread			
4631.6	78.0%	N/A	112.9	113.9	128.51	1.28	1.28
						UGR	
						Crosswise	Endwise
						20.3	19.9

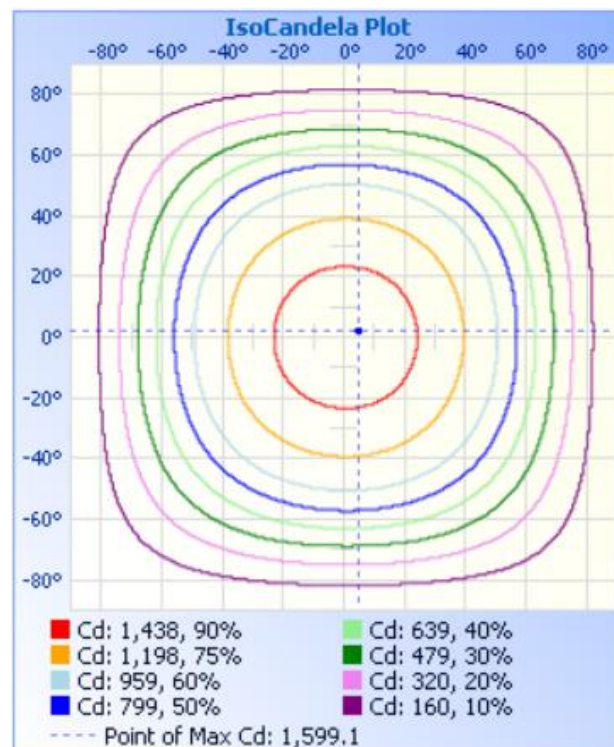


Goniophotometer Test (Cont'd)

Polar Candela Distribution



IsoCandela Plot





Goniophotometer Test (Cont'd)

Zonal Lumen Summary

Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	1,236.2	26.7%
0-40	2,030.8	43.8%
0-60	3,614.2	78%
60-90	1,004.6	21.7%
70-100	433.0	9.3%
90-120	4.6	0.1%
0-90	4,618.8	99.7%
90-180	12.9	0.3%
0-180	4,631.6	100%

Lumens Per Zone

Lumens Per Zone

Zone	Lumens	% Total	Zone	Lumens	% Total
0-5	37.9	0.8%	90-95	1.2	0%
5-10	112.7	2.4%	95-100	0.9	0%
10-15	183.5	4.0%	100-105	0.7	0%
15-20	247.9	5.4%	105-110	0.6	0%
20-25	304.0	6.6%	110-115	0.6	0%
25-30	350.1	7.6%	115-120	0.6	0%
30-35	385.7	8.3%	120-125	0.7	0%
35-40	408.9	8.8%	125-130	0.8	0%
40-45	417.4	9.0%	130-135	0.8	0%
45-50	412.2	8.9%	135-140	0.9	0%
50-55	393.7	8.5%	140-145	0.9	0%
55-60	360.1	7.8%	145-150	0.8	0%
60-65	314.3	6.8%	150-155	0.8	0%
65-70	259.3	5.6%	155-160	0.8	0%
70-75	198.0	4.3%	160-165	0.7	0%
75-80	135.7	2.9%	165-170	0.6	0%
80-85	75.5	1.6%	170-175	0.4	0%
85-90	21.8	0.5%	175-180	0.1	0%



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	1582	1582	1582	1582	1582	1582	1582	1582	1582	1582	1582	1582	1582	1582	1582	1582	1582
1	1577	1578	1583	1591	1590	1588	1583	1578	1578	1577	1583	1590	1592	1589	1584	1579	1577
2	1576	1576	1581	1590	1594	1593	1587	1582	1578	1576	1581	1590	1595	1592	1589	1582	1576
3	1577	1573	1582	1589	1595	1596	1590	1583	1576	1575	1580	1591	1596	1599	1592	1584	1577
4	1576	1572	1577	1586	1597	1597	1594	1583	1577	1573	1576	1588	1596	1599	1594	1586	1576
5	1576	1571	1574	1584	1594	1597	1594	1583	1574	1570	1573	1585	1595	1599	1596	1587	1576
6	1576	1568	1572	1580	1592	1595	1591	1582	1574	1568	1571	1581	1592	1598	1593	1584	1576
7	1574	1566	1569	1575	1587	1591	1589	1580	1570	1563	1568	1577	1588	1594	1592	1583	1574
8	1570	1562	1564	1570	1582	1586	1586	1578	1567	1561	1564	1572	1583	1590	1590	1581	1570
9	1566	1559	1561	1567	1575	1581	1580	1572	1563	1557	1560	1567	1576	1583	1584	1574	1566
10	1561	1555	1557	1561	1569	1573	1572	1567	1558	1552	1556	1562	1571	1576	1577	1570	1561
11	1556	1550	1552	1556	1561	1565	1565	1559	1552	1547	1549	1556	1564	1569	1568	1563	1556
12	1552	1545	1546	1551	1555	1558	1556	1552	1546	1542	1545	1551	1556	1562	1561	1556	1552
13	1543	1539	1540	1546	1546	1548	1548	1544	1538	1536	1540	1546	1550	1554	1553	1550	1543
14	1536	1532	1533	1538	1539	1539	1537	1535	1531	1529	1533	1539	1542	1545	1544	1540	1536
15	1527	1525	1528	1530	1532	1531	1528	1524	1523	1520	1526	1532	1537	1535	1534	1532	1527
16	1519	1516	1520	1523	1522	1518	1517	1515	1513	1513	1519	1525	1526	1526	1524	1522	1519
17	1509	1507	1512	1515	1514	1508	1505	1503	1504	1504	1512	1517	1518	1515	1513	1511	1509
18	1500	1499	1503	1505	1503	1498	1494	1492	1494	1495	1501	1505	1509	1506	1502	1501	1500
19	1491	1490	1494	1495	1493	1488	1484	1482	1483	1485	1492	1496	1499	1496	1491	1490	1491
20	1480	1480	1482	1485	1481	1477	1474	1472	1473	1474	1482	1486	1487	1484	1483	1481	1480
25	1423	1422	1419	1417	1415	1416	1415	1412	1416	1417	1418	1420	1423	1425	1425	1423	1423
30	1356	1354	1351	1347	1343	1342	1341	1344	1345	1347	1349	1350	1350	1353	1354	1356	1356
35	1278	1275	1274	1268	1264	1263	1261	1266	1267	1269	1272	1272	1274	1276	1278	1279	1278
40	1190	1185	1179	1174	1170	1170	1171	1174	1177	1179	1178	1180	1182	1185	1188	1190	1190
45	1089	1084	1075	1068	1063	1064	1068	1071	1074	1076	1073	1074	1076	1080	1086	1090	1089
50	981	978	969	960	952	949	954	959	962	968	966	964	965	966	972	978	981
55	860	856	848	837	830	828	830	838	847	848	848	845	844	846	851	857	860
60	730	726	717	706	700	698	701	706	713	714	714	713	714	717	723	727	730
65	595	590	582	573	567	566	569	574	574	580	579	580	581	585	591	595	595
70	458	453	444	437	433	431	434	439	441	442	443	444	447	451	456	459	458
75	327	323	314	308	303	303	304	308	312	312	312	314	317	321	326	329	327
80	205	201	194	188	185	184	185	188	189	192	193	194	198	201	204	206	205
85	94	90	84	81	78	76	77	80	83	83	84	86	89	91	93	94	94
90	6	5	3	2	2	2	2	2	2	2	3	4	5	6	7	6	6
95	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
100	2	1	2	1	1	1	2	2	1	1	2	1	2	1	1	1	2
105	1	1	2	1	1	2	1	1	1	1	1	1	1	1	2	1	1
110	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1
115	1	1	2	1	2	1	1	1	1	1	1	2	1	1	1	1	1
120	1	1	2	1	1	1	1	1	2	2	1	1	1	1	1	2	1
125	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
130	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
135	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
140	2	2	3	3	2	3	3	2	3	3	2	3	3	2	3	2	2
145	2	3	3	3	3	3	3	3	3	2	3	3	3	3	3	2	2
150	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
155	3	4	3	4	4	3	4	4	3	3	3	4	4	4	3	3	3
160	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
165	4	4	4	5	5	4	5	4	5	4	5	4	5	5	5	5	4
170	6	6	6	5	6	6	5	6	5	6	6	6	6	5	5	6	6
175	5	5	5	5	5	5	5	5	5	5	5	5	5	6	5	5	5
180	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6



THD and PF Test

Model No.	VEKT-DP2X4		Sample ID.	3693525
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
24.8	120.02	60	0.1947	23.23	0.9946	8.84%	Horizontal
24.8	277.06	60	0.0940	23.54	0.9041	14.40%	Horizontal



THD and PF Test

Model No.	VEKT-DP2X4		Sample ID.	3693525
Operate time (Min.)	90	Stabilization time (Min.)	45	

Test Method

3. The samples were tested according to the ANSI C82.77-10-2014.
4. 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
24.8	120.08	60	0.2552	30.51	0.9956	8.27%	Horizontal
24.8	277.02	60	0.1179	30.80	0.9425	14.26%	Horizontal



THD and PF Test

Model No.	VEKT-DP2X4		Sample ID.	3693525
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
24.2	120.09	60	0.3046	36.38	0.9943	9.87%	Horizontal
24.2	277.04	60	0.1370	36.51	0.9622	13.35%	Horizontal



THD and PF Test

Model No.	VEKT-DP2X4		Sample ID.	3693525
Operate time (Min.)	90	Stabilization time (Min.)	45	

Test Method

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

Test Results

Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.0	120.05	60	0.3035	35.41	0.9717	10.35%	Horizontal
25.0	277.06	60	0.1350	35.68	0.9542	14.02%	Horizontal



THD and PF Test

Model No.	VEKT-DP2X4		Sample ID.	3693525
Operate time (Min.)	90	Stabilization time (Min.)	45	

Test Method

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

Test Results

Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.0	120.12	60	0.3018	36.04	0.9942	9.97%	Horizontal
25.0	277.06	60	0.1360	36.25	0.9621	13.36%	Horizontal



In-Situ Temperature Measurement Test

Model No.	VEKT-DP2X4	Sample ID.	3693525
-----------	------------	------------	---------

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 $35^{\circ}\text{C} \pm 5^{\circ}\text{C}$. 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
24.2	120.09	60	0.3046	36.38	0.9943	9.87%	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°C)				
Ambient TEMP	N/A	24.2	25.0				
TMP of Location 1	30	39.1	39.9	0.0023	P2835Y-WXXXXXXXXX XXXXX-XXXX	100	105

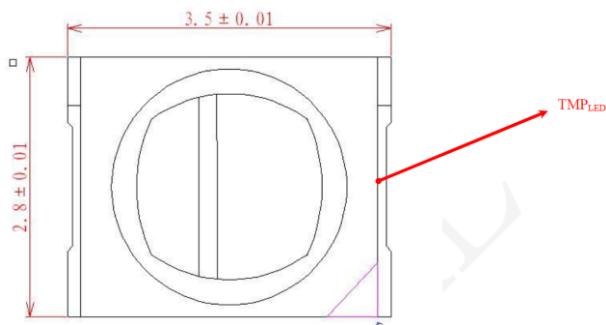
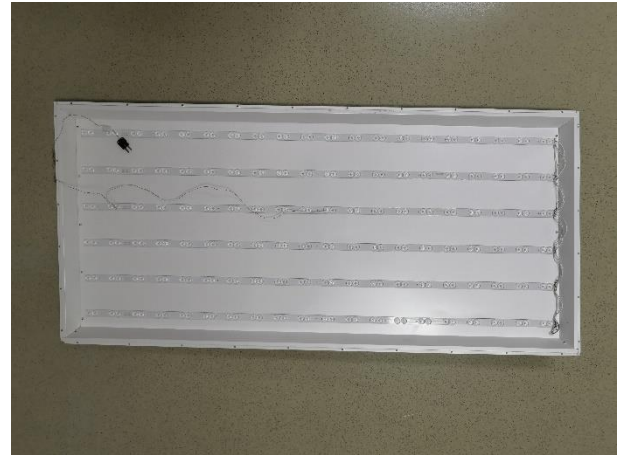
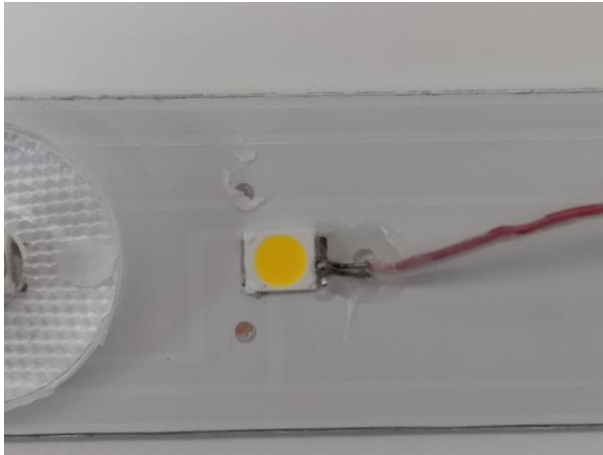
Test Results (Drivers)

Thermocouple Location	Temperature for Driver ($^{\circ}\text{C}$)		Driver Model Number	Driver Limit Temp ($^{\circ}\text{C}$)
	Test Result	Test Result (Correct to 25°C)		
Ambient TEMP	24.2	25.0		
TMP of Location 1	47.9	48.7	SIE 46-I0950-42 120-277 W D1 B-S1S2	75



In-Situ Temperature Measurement Test (Cont'd)

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





***** END OF REPORT. THIS PAGE INTENTIONALLY LEFT BLANK *****