

LM-79-08 Test Report

For

Espen Technology Inc.

(Brand Name: Espen)

12257 Florence Ave., Santa Fe Springs, CA, 90670

Integrated Retrofit Kits for 2x2 Luminaires

Model name(s): VEKT-P2x2/830; VEKT-P2x2/835
VEKT-P2x2/840; VEKT-P2x2/850

Remark: This is a multiple listed report, the original report NO. is
GZE170236-A-R.

Representative (Tested) Model: VEKT-P2x2/830
VEKT-P2x2/850

Model Different: All construction and rating are the same, except CCT

Test & Report By:

Bennie Zhang

Engineer: Bennie Zhang

Date: Feb.22,2017

Review By:

Tommy Liang

Manager: Tommy Liang

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Laboratory: Standard-Tech Co. Ltd Testing Center
NVLAP CODE: 201011-0

Report Format Number STD/QR4909-A/2

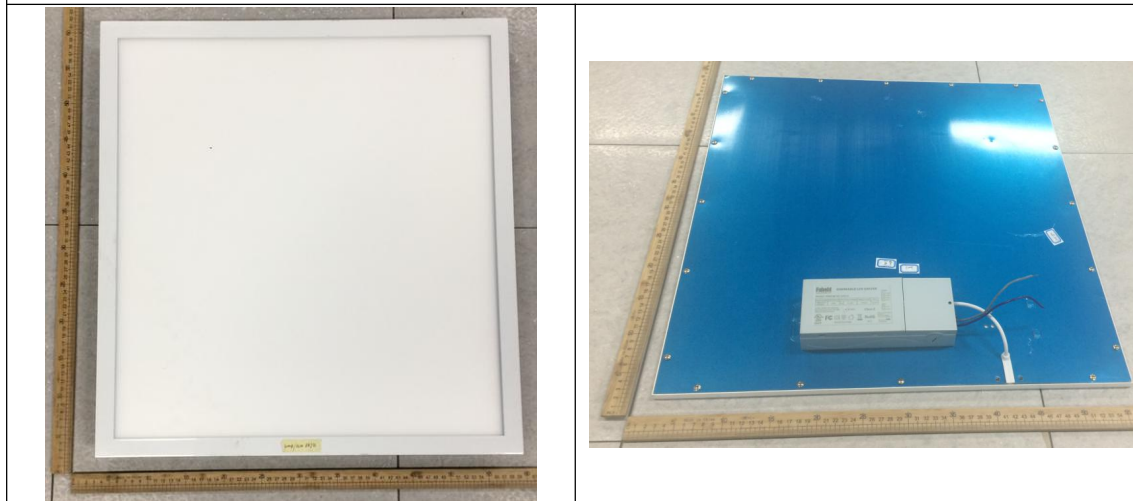
Address: Standard-Tech Building, No.6 Guanhong Road, Guangzhou Science City, Guangzhou 510663, China

Tel: 8620-3229 0320 Fax: 8620-32290422 <http://www.standard-tech.com>

Report No. Revision	Revised Item: Type of Luminaire	Revised Reason	Issue date
GZE170236-A	Integrated Retrofit Kits for 2x4 Luminaires	Typo when typed in the data	Feb.22,2017
GZE170236-A-R	Integrated Retrofit Kits for 2x2 Luminaires		Mar.06.2017

1.1 Product Information:

Organization Name	Eспен Technology Inc.	
Brand Name	Eспен	
Model Number	VEKT-P2x2/830;VEKT-P2x2/835 VEKT-P2x2/840;VEKT-P2x2/850	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Integrated Retrofit Kits for 2x2 Luminaires	
Rated Voltage / Frequency	120 -277Vac, 50/60 Hz	
Nominal Power	22W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,3500K,4000K ,5000K	
LED Manufacturer	EVERLIGHT ELECTRONICS CO., LTD	
LED Model	62-217D/KK5C-HXXXXXXXXX2532Z6/2T(HN)	
Sample Number	GZE170236-A1(3000K),A2(5000K)	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

Photo


1.2 Test Specifications:

Date of Receipt	Feb.20,2017
Date of Test	Feb.22,2017
Test item	1. Total Luminous Flux 2. Luminous Distribution Intensity 3. Luminous Efficacy 4. Correlated Color Temperature 5. Color Rendering Index 6. Chromaticity Coordinate 7. Electrical Parameters
Reference Standard	1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products 2. ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products 3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources 4. CIE 15-2004 Technical Report Colorimetry 5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source 6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems
Reference Work Instruction	QD25

1.3 Test Methods

1) Photometric and Light Distribution Measurement – Goniophotometer Method:

Photometric parameters were measured using the goniophotometer and software. 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 sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals.

2) Chromaticity Measurement – Sphere-Spectroradiometer Method:

Chromaticity 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 sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral power distribution taken at 5 nm intervals over the range of 380 to 780 nm.

3) Electrical Measurements:

Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Voltage, frequency, current, power, power factor and total harmonic distortion were measured by and read from the power meter.

2.1 Electrical, Photometric and Chromaticity Measurements
(Refer to Work Instruction QD25)

Test date	2017-02-22	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	VEKT-P2x2/830		

Electrical Measurement in Lithonia 2PM3 9 cell 2x2 parabolic:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170236-A1	120.0	60	0.1796	21.24	0.9857	7.58
	277.0	60	0.0900	21.76	0.8732	15.93
DLC Pass Criteria					$\geq 0.9(-3\%)$	$\leq 20(+5)$

**Chromaticity Measurement in Lithonia 2PM3 9 cell 2x2 parabolic -
Sphere-Spectroradiometer Method:**

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	4
Frequency (Hz)	60	R2	92	R10	82
CCT (K)	3001	R3	95	R11	79
Duv	0.0009	R4	79	R12	69
Chromaticity (x, y)	x=0.4382 y=0.4068	R5	81	R13	84
Chromaticity (u', v')	u'=0.2502 v'=0.5226	R6	91	R14	98
Color Rendering Index (CRI)	82.2	R7	81	R15	73
R9	4	R8	57	--	--

**Photometric Measurement in Lithonia 2PM3 9 cell 2x2 parabolic-
Goniophotometer Method:**

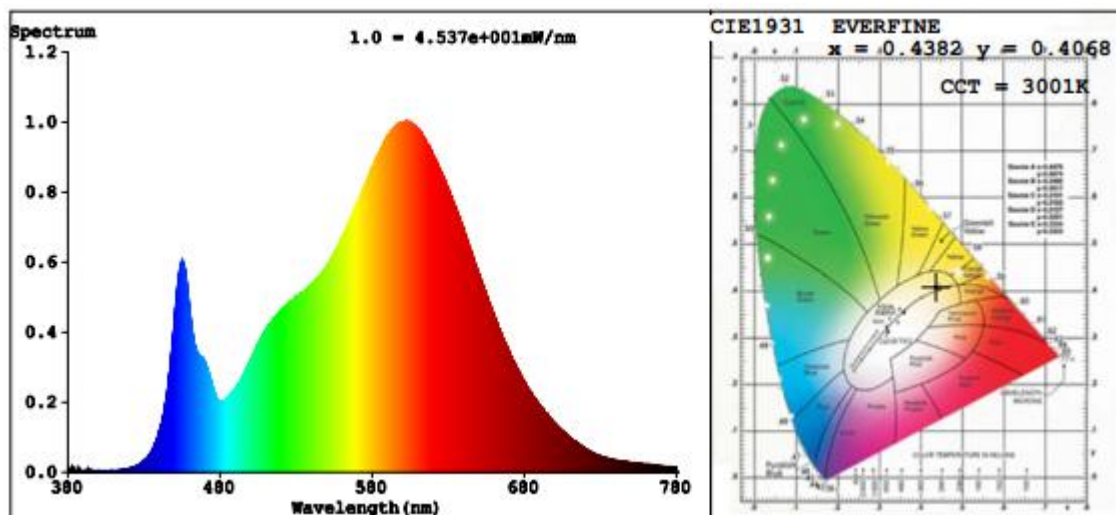
Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	2737.8	2728.9	$\geq 2000(-10\%)$	
Luminous Efficacy (lm/W)	128.88	125.43	Standard: $\geq 100(-3\%)$	Premium: $\geq 125(-3\%)$
Zonal lumens in the 0-60° zone (%)	79.2	--	$\geq 75(-3)$	
SC: 0-180° (if applicable)	1.35	--	1.0-2.0(± 0.1)	
SC: 90-270° (if applicable)	1.25	--	1.0-2.0(± 0.1)	
Beam Angle (°)	114.9	--	--	
Center Beam Candle Power (cd)	928	--	--	

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Spectral Power Distribution & Chromaticity Diagram

Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	736.4	26.9%
0-40	1,216.8	44.4%
0-60	2,168.4	79.2%
60-90	569.0	20.8%
70-100	230.0	8.4%
90-120	0.0	0%
0-90	2,737.4	100%
90-180	0.0	0%
0-180	2,737.5	100%

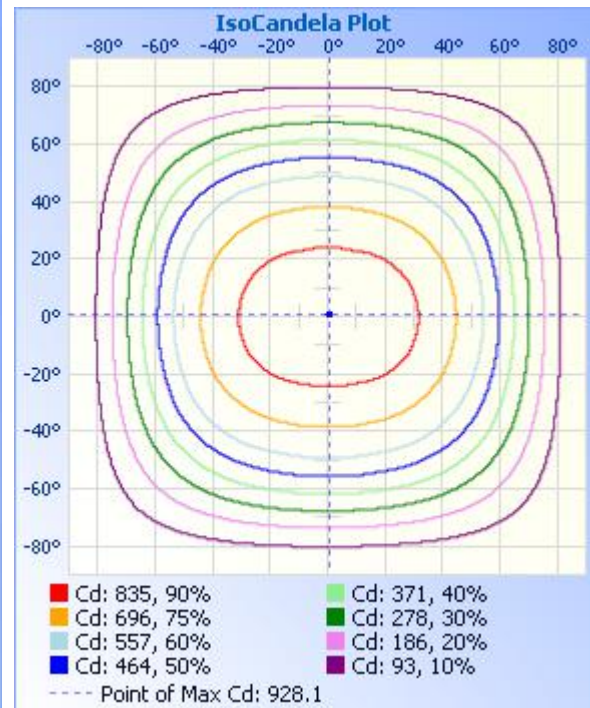
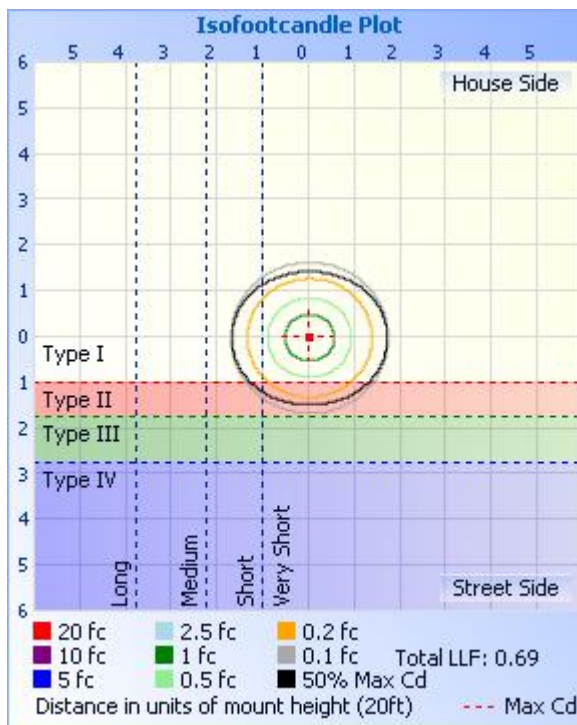
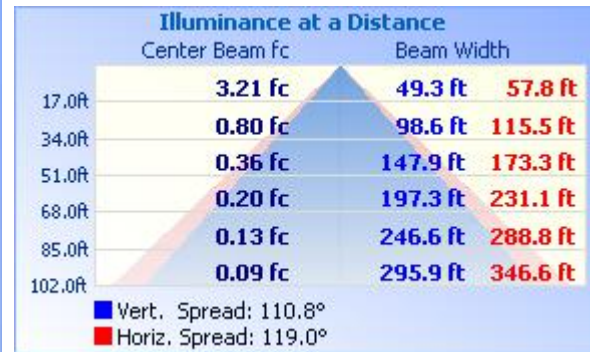
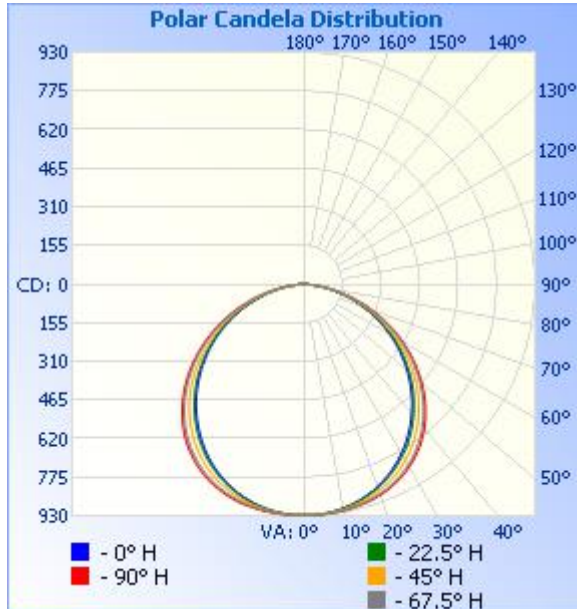
Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	88.1	3.2%	90-100	0.0	0%
10-20	255.2	9.3%	100-110	0	0%
20-30	393.1	14.4%	110-120	0	0%
30-40	480.4	17.5%	120-130	0.0	0%
40-50	500.9	18.3%	130-140	0.0	0%
50-60	450.7	16.5%	140-150	0.0	0%
60-70	339.0	12.4%	150-160	0.0	0%
70-80	187.6	6.9%	160-170	0.0	0%
80-90	42.4	1.5%	170-180	0.0	0%

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Photometric Data

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Table--1

UNIT: cd

C (DEG) γ (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338	
0	928	928	928	928	928	928	928	928	928	928	928	928	928	928	928	928	
5	927	927	926	925	925	925	926	926	927	926	926	924	924	924	925	927	
10	924	921	918	914	913	914	918	921	923	921	917	913	912	913	917	921	
15	915	911	904	896	893	896	904	911	914	910	903	894	891	894	902	911	
20	901	895	883	870	866	870	883	895	900	894	882	867	863	867	881	895	
25	879	871	854	835	830	836	855	872	878	870	853	833	826	833	852	871	
30	847	838	816	793	785	794	817	839	848	838	814	790	781	790	814	837	
35	805	794	769	743	734	745	771	796	807	795	767	740	730	739	766	794	
40	752	741	714	686	676	687	715	743	754	741	712	683	671	682	711	740	
45	689	678	651	623	613	624	652	680	692	680	649	619	607	618	648	677	
50	618	607	581	554	545	556	583	609	620	608	579	550	539	550	577	605	
55	539	530	506	482	473	484	508	532	542	530	504	477	466	476	501	528	
60	455	446	427	406	399	408	429	449	457	448	424	400	391	399	421	444	
65	366	360	345	328	323	330	347	363	370	361	341	322	314	320	339	358	
70	277	272	261	249	245	250	263	275	280	273	257	242	236	241	255	270	
75	189	186	179	172	169	172	181	189	192	186	175	164	160	163	172	184	
80	107	106	103	98.1	96.2	98.6	104	108	109	105	98.6	92.1	89.6	91.0	96.9	104	
85	36.0	36.8	35.5	34.1	34.0	34.8	36.3	37.2	36.9	34.9	32.3	29.9	28.7	29.3	31.8	34.4	
90	0.00	0.00	0.02	0.01	0.01	0.06	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.05	0.00	0.00	
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.10	0.10	0.00	0.00	
150	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.05	0.10	0.00	0.00	
155	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.10	0.00	0.00	
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.10	0.00	0.00	
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.20	0.00	0.00	0.00	0.10	0.00	0.00	
170	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.30	0.10	0.00	0.00	0.25	0.00	0.00	
175	0.30	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.35	0.25	0.00	0.00	0.00	0.15	0.00	0.00	
180	0.35	0.00	0.00	0.00	0.15	0.20	0.00	0.00	0.35	0.25	0.00	0.00	0.00	0.15	0.05	0.00	

2.2 Electrical, Photometric and Chromaticity Measurements
(Refer to Work Instruction QD25)

Test date	2017-02-22	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	VEKT-P2x2/850		

Electrical Measurement in Lithonia 2PM3 9 cell 2x2 parabolic:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170236-A2	120.0	60	0.1827	21.64	0.9871	8.34
	277.0	60	0.0893	21.93	0.8865	16.02
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

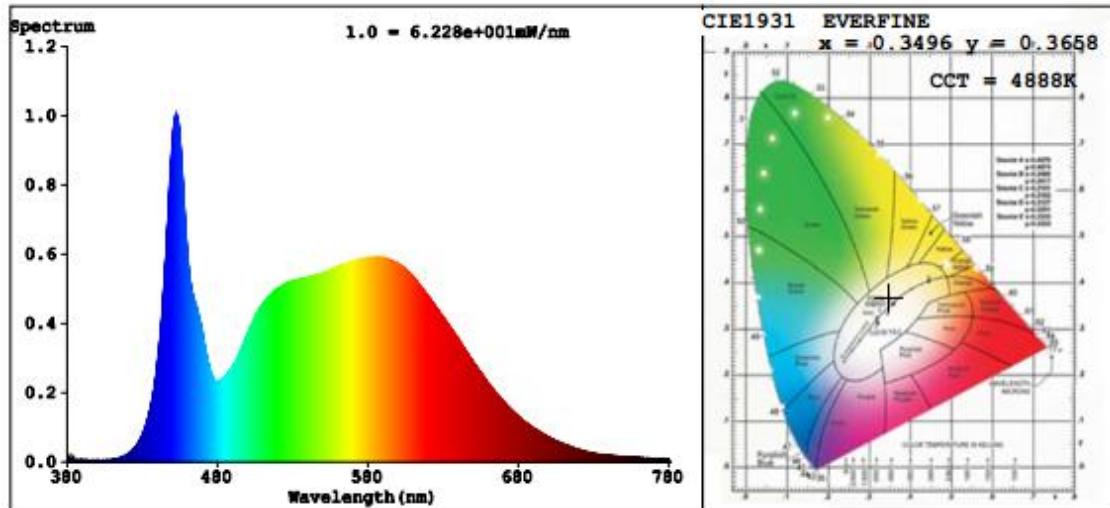
Chromaticity Measurement in Lithonia 2PM3 9 cell 2x2 parabolic -
Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	9
Frequency (Hz)	60	R2	89	R10	74
CCT (K)	4888	R3	95	R11	81
Duv	0.0052	R4	81	R12	54
Chromaticity (x, y)	x=0.3496 y=0.3658	R5	81	R13	83
Chromaticity (u', v')	u'=0.2090 v'=0.4921	R6	84	R14	97
Color Rendering Index (CRI)	83.4	R7	88	R15	75
R9	9	R8	67	--	--

Photometric Measurement in Lithonia 2PM3 9 cell 2x2 parabolic -
Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	2807.1	2771.2	>=2000(-10%)	
Luminous Efficacy (lm/W)	129.71	126.36	Standard: >= 100(-3%)	Premium: >= 125(-3%)

Spectral Power Distribution & Chromaticity Diagram



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2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
VEKT-P2x2/830	3000K	2737.8	21.24	128.88
VEKT-P2x2/835	3500K	2761 ^{*1}	21.44 ^{*2}	128.77 ^{*3}
VEKT-P2x2/840	4000K	2784 ^{*1}	21.44 ^{*2}	129.85 ^{*3}
VEKT-P2x2/850	5000K	2807.1	21.64	129.71

*1: This value is calculated and the calculation formula is as below:

$$2761=(2807.1-2737.8)/3+2737.8$$

$$2784=(2807.1-2737.8)/3+2761$$

*2: This value is calculated and the calculation formula is as below:

$$21.44=(21.24+21.64)/2$$

$$21.44=(21.24+21.64)/2$$

*3: This value is calculated and the calculation formula is as below:

$$128.77=2761/21.44$$

$$129.85=2784/21.44$$

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3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-336	2 meter Integrating Sphere	2016-07-01	2017-06-30
ST-R-331	Spectral analysis system HAAS-2000	2016-07-01	2017-06-30
D204	Standard Lamp	2016-07-01	2017-06-30
PF2010	Power Meter for Integrating Sphere	2016-07-01	2017-06-30
EE-09	Goniophotometer system	2016-07-01	2017-06-30
D908S	Standard Lamp	2016-07-01	2017-06-30
PF210	Power Meter for Goniophotometer	2016-07-01	2017-06-30
ST-R-181A	Temperature Tester	2016-07-01	2017-06-30
Uncertainty: Photometric Measurement (Sphere):1.74% Chromaticity Measurement(Sphere):14.3K Photometric Measurement(Goniophotometer):1.62%			

******* END OF REPORT *******