



Report No.: GZE160979-A

NVLAP LAB CODE 201011-0

LM-79-08 Test Report

For

Beyond LED Technology (Brand Name: Beyond LED Technology)

Direct Linear Ambient Luminaires

Model name(s): ZY-18W1200 BINS

Representative (Tested) Model: ZY-18W1200 BINS (3000K)

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

Test & Report By:

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Engineer: Jack Luo

Date: Spet.26, 2016

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.

1.1 Product Information:

Organization Name	Beyond LED Technology	
Brand Name	Beyond LED Technology	
Model Number	ZY-18W1200 BINS	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Direct Linear Ambient Luminaires	
Rated Voltage / Frequency	100 -277Vac, 50/60 Hz	
Nominal Power	18W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,3500K,4000K,5000K	
LED Manufacturer	Beyond LED Technology	
LED Model	67-21S Series (3000K)	
Sample Number	GZE160949-A1(3000K), A2(3500K), A3(4000K), A4(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	Spet.20, 2016
Date of Test	Spet.20, 2016
Test item	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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 $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$, 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 $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$. 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 $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$. 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	2016-09-20	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	ZY-18W1200 BINS		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE160949-	120.0	60	0.1516	18.03	0.9909	10.99
A1	277.0	60	0.0680	18.12	0.9622	13.67
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

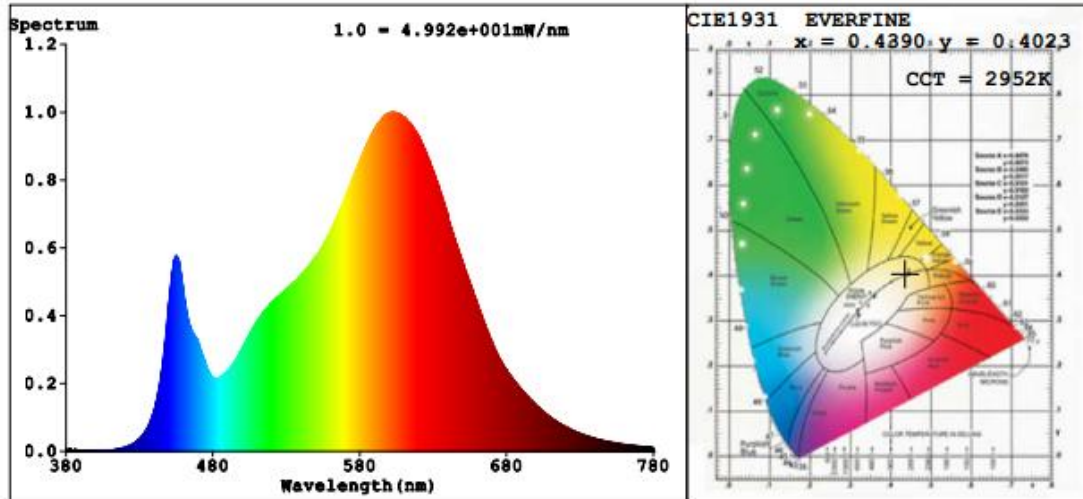
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	82	R9	6
Frequency (Hz)	60	R2	93	R10	85
CCT (K)	2952	R3	94	R11	79
Duv	-0.0010	R4	79	R12	73
Chromaticity (x, y)	x=0.4390 y=0.4023	R5	82	R13	85
Chromaticity (u', v')	u'=0.2527 v'=0.5210	R6	92	R14	97
Color Rendering Index (CRI)	82.5	R7	80	R15	74
R9	6	R8	57	--	--

Photometric Measurement – Goniophotometer Method:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	2518.4	2502.1	--	
Luminous Efficacy (lm/W)	139.68	138.08	Standard: >= 105(-3%)	Premium: >= 130(-3%)
Total Luminous (lm)/Length(ft)	629.6	625.5	≥ 375 lm/ft	
Zonal lumens in the 0-60 ° zone (%)	61.4	--	≥ 40(-3)	
Beam Angle (°)	145.4	--	--	
Center Beam Candle Power (cd)	658	--	--	

Spectral Power Distribution & Chromaticity Diagram

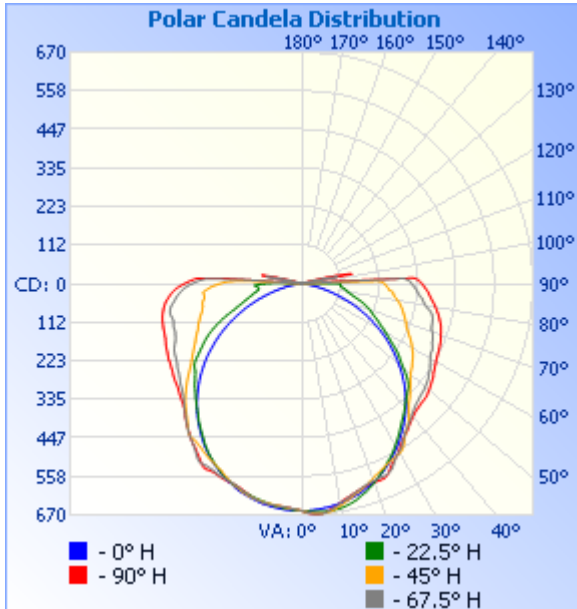


Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	511.0	20.3%
0-40	841.1	33.4%
0-60	1,544.9	61.4%
60-90	868.0	34.5%
70-100	618.7	24.6%
90-120	101.7	4%
0-90	2,412.9	95.8%
90-180	105.2	4.2%
0-180	2,518.1	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	62.4	2.5%	90-100	76.0	3%
10-20	177.4	7.0%	100-110	21.5	0.9%
20-30	271.1	10.8%	110-120	4.1	0.2%
30-40	330.2	13.1%	120-130	1.8	0.1%
40-50	352.7	14.0%	130-140	0.8	0%
50-60	351.0	13.9%	140-150	0.5	0%
60-70	325.3	12.9%	150-160	0.3	0%
70-80	289.6	11.5%	160-170	0.2	0%
80-90	253.1	10.0%	170-180	0.1	0%

Photometric Data



Illuminance at a Distance

	Center Beam fc	Beam Width
17.0ft	2.28 fc	46.2 ft
34.0ft	0.57 fc	92.3 ft
51.0ft	0.25 fc	138.5 ft
68.0ft	0.14 fc	184.6 ft
85.0ft	0.09 fc	230.8 ft
102.0ft	0.06 fc	276.9 ft

■ Beam Spread: 107.2°

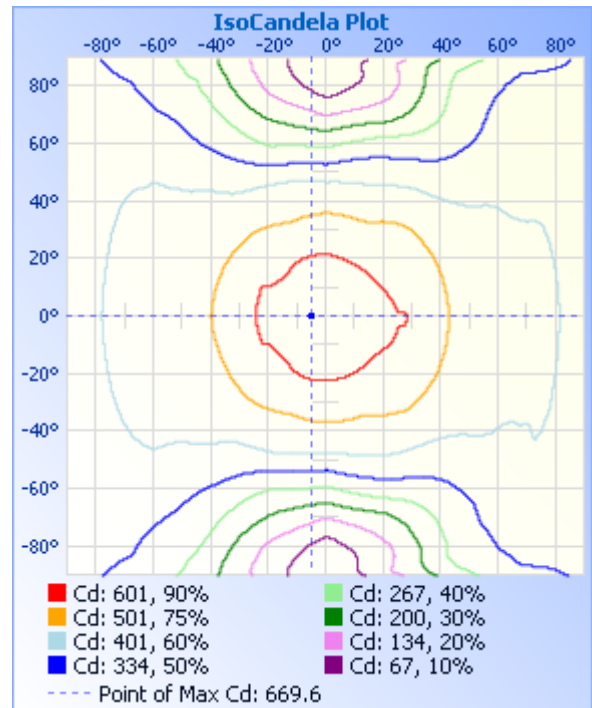
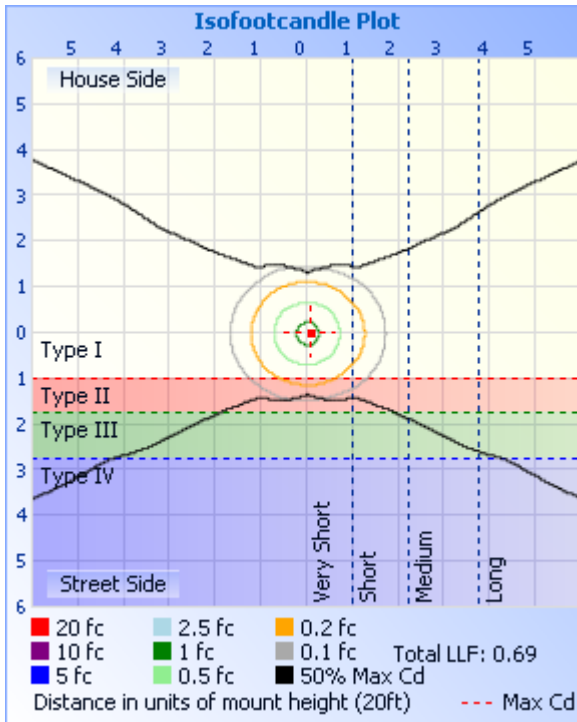


Table--1 UNIT: cd

C (DEG) \ γ (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338	
0	658	658	658	658	658	658	658	658	658	658	658	658	658	658	658	658	
5	648	647	647	649	654	663	668	669	668	669	668	662	655	651	648	648	
10	645	643	641	638	646	660	652	645	644	647	654	659	647	640	642	643	
15	625	625	629	622	632	642	626	622	622	622	629	644	632	627	630	628	
20	612	606	605	603	611	614	602	608	612	605	604	617	612	609	607	609	
25	603	595	578	578	584	579	579	602	600	601	581	584	586	584	582	599	
30	589	588	560	544	550	542	568	563	562	561	564	548	553	550	565	594	
35	555	551	539	504	511	502	525	525	527	523	530	508	514	510	548	555	
40	521	516	511	460	469	465	483	497	502	494	487	467	472	471	515	519	
45	487	478	470	422	422	435	445	477	490	473	445	432	423	436	477	482	
50	468	452	427	387	370	387	412	466	481	465	414	399	371	402	432	457	
55	455	432	384	361	314	334	392	450	465	449	393	340	314	369	389	437	
60	443	414	352	312	256	280	370	430	449	429	373	285	255	320	358	422	
65	433	400	326	261	196	238	342	417	440	413	346	240	193	263	334	404	
70	422	388	305	193	136	205	321	402	429	401	321	207	133	199	316	391	
75	417	381	286	146	79.1	167	303	393	414	386	303	172	78.6	160	298	387	
80	406	374	282	119	33.7	136	282	364	393	364	284	137	35.9	134	290	384	
85	383	354	273	114	6.07	117	263	340	371	341	262	118	10.1	127	286	358	
90	340	311	228	90.2	0.00	112	240	319	348	321	243	113	1.38	109	238	318	
95	9.61	3.27	1.84	3.83	0.00	4.45	2.11	3.11	4.56	2.90	7.61	6.18	0.37	8.19	8.71	5.03	
100	3.67	65.7	29.5	2.26	0.00	2.71	28.1	95.2	8.12	102	24.5	1.26	0.21	2.28	34.0	16.0	
105	52.6	25.9	6.43	2.00	0.00	2.28	7.51	26.3	54.2	29.4	5.44	1.58	0.21	2.33	8.68	33.8	
110	11.1	9.26	4.92	1.53	0.00	1.80	5.17	9.81	11.3	11.3	3.38	1.78	0.48	2.17	6.97	10.1	
115	7.78	6.56	3.44	1.10	0.26	1.48	4.00	6.73	8.08	7.40	2.75	1.21	0.48	1.53	4.89	7.13	
120	5.86	4.87	2.23	0.79	0.42	1.16	2.56	4.96	5.37	5.07	1.53	0.74	0.48	0.95	3.02	5.00	
125	4.31	3.14	1.80	0.89	0.42	1.22	1.92	3.41	3.83	3.11	1.27	0.47	0.63	0.95	1.70	3.14	
130	2.24	1.96	1.22	0.95	0.42	1.22	1.44	1.86	1.70	1.53	0.74	0.42	0.63	0.90	1.27	1.70	
135	1.76	1.38	0.90	0.58	0.48	0.85	1.07	1.39	1.38	1.27	0.69	0.37	0.79	0.79	0.85	1.28	
140	1.33	1.01	0.74	0.58	0.58	0.58	1.01	0.96	0.75	0.79	0.63	0.47	0.95	0.79	0.59	0.74	
145	0.91	0.79	0.69	0.58	0.53	0.58	1.01	0.91	0.75	0.74	0.48	0.47	1.00	0.85	0.53	0.69	
150	0.85	0.74	0.58	0.58	0.68	0.64	0.75	0.80	0.74	0.69	0.42	0.37	0.95	0.85	0.53	0.64	
155	0.85	0.58	0.37	0.58	0.63	0.64	0.38	0.75	0.48	0.53	0.42	0.47	0.58	0.85	0.69	0.48	
160	0.27	0.26	0.58	0.58	0.63	0.64	0.48	0.32	0.32	0.42	0.47	0.47	0.58	0.90	0.69	0.59	
165	0.32	0.26	0.53	0.52	0.63	0.64	0.48	0.37	0.48	0.53	0.42	0.53	0.48	1.00	0.69	0.64	
170	0.42	0.32	0.53	0.53	0.63	0.58	0.53	0.43	0.48	0.42	0.48	0.53	0.53	1.22	0.69	0.64	
175	0.48	0.32	0.53	0.58	1.11	0.58	0.58	0.43	0.48	0.42	0.37	0.53	0.53	1.32	0.69	0.59	
180	0.48	0.48	0.53	0.53	1.16	0.64	0.59	0.43	0.48	0.48	0.37	0.53	0.53	1.22	0.64	0.59	

2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2016-09-20	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	ZY-18W1200 BINS		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE160949-	120.0	60	0.1518	18.06	0.9916	10.56
A2	277.0	60	0.0678	18.11	0.9643	13.51
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

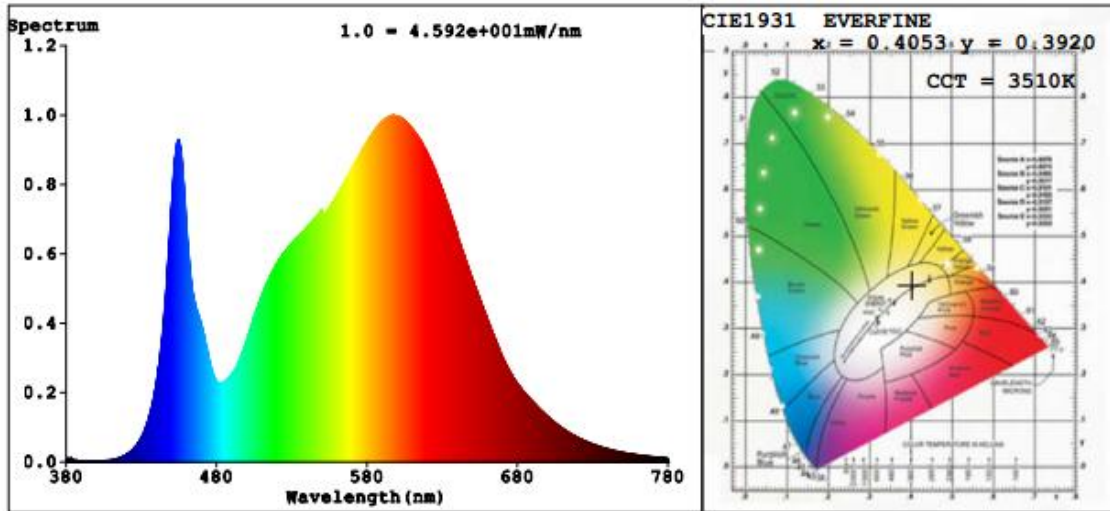
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	7
Frequency (Hz)	60	R2	90	R10	76
CCT (K)	3510	R3	96	R11	79
Duv	0.0006	R4	80	R12	60
Chromaticity (x, y)	x=0.4053 y=0.3920	R5	81	R13	84
Chromaticity (u', v')	u'=0.2352 v'=0.5118	R6	86	R14	98
Color Rendering Index (CRI)	82.6	R7	85	R15	74
R9	7	R8	62	--	--

Photometric Measurement – Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	2553	2560		
Luminous Efficacy (lm/W)	141.60	141.28	Standard: >= 105(-3%)	Premium: >= 130(-3%)

Spectral Power Distribution & Chromaticity Diagram



2.3 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2016-09-20	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	ZY-18W1200 BINS		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE160949-	120.0	60	0.1482	18.12	0.9909	10.07
A3	277.0	60	0.0665	18.30	0.9611	13.83
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

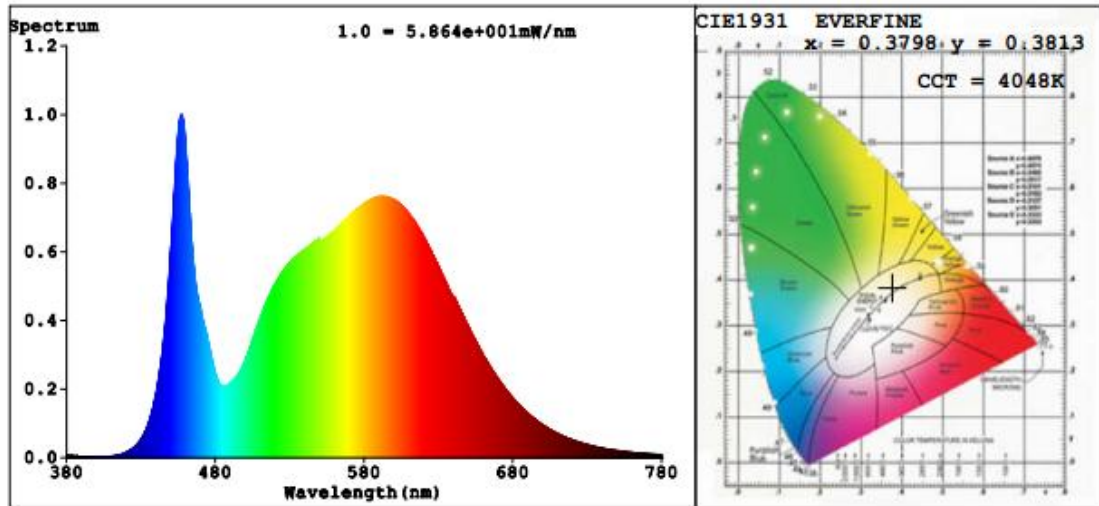
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	80	R9	4
Frequency (Hz)	60	R2	89	R10	72
CCT (K)	4048	R3	94	R11	75
Duv	0.0023	R4	78	R12	52
Chromaticity (x, y)	x=0.3798 y=0.3813	R5	78	R13	82
Chromaticity (u', v')	u'=0.2229 v'=0.5035	R6	84	R14	97
Color Rendering Index (CRI)	81.3	R7	85	R15	74
R9	4	R8	63	--	--

Photometric Measurement – Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	2581	2588		
Luminous Efficacy (lm/W)	143.15	142.83	Standard: >= 105(-3%)	Premium: >= 130(-3%)

Spectral Power Distribution & Chromaticity Diagram



2.4 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2016-09-20	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	ZY-18W1200 BINS		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE160949-	120.0	60	0.1619	17.49	0.9001	10.79
A4	277.0	60	0.0657	17.55	0.9643	13.63
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

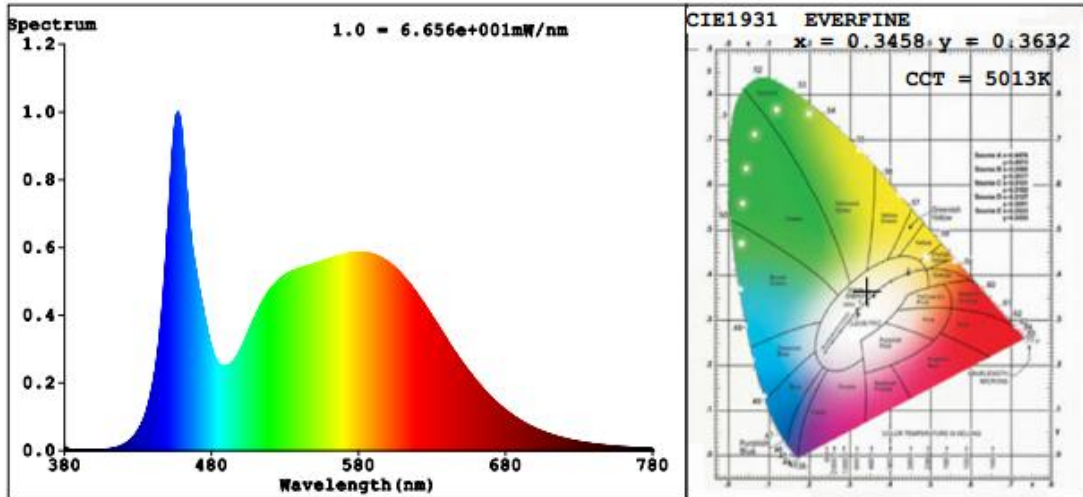
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	80	R9	2
Frequency (Hz)	60	R2	90	R10	74
CCT (K)	5013	R3	94	R11	76
Duv	0.0054	R4	78	R12	55
Chromaticity (x, y)	x=0.3458 y=0.3632	R5	79	R13	83
Chromaticity (u', v')	u'=0.2075 v'=0.4903	R6	85	R14	97
Color Rendering Index (CRI)	81.9	R7	85	R15	74
R9	2	R8	64	--	--

Photometric Measurement – Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	2611	2613		
Luminous Efficacy (lm/W)	144.81	144.21	Standard: >= 105(-3%)	Premium: >= 130(-3%)

Spectral Power Distribution & Chromaticity Diagram



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 *******