

**CEC Title 24 (CEC-400-2018-021-CMF 2019**  
**REFERENCE APPENDICES JA8 and JA10) Test Report**  
For  
**LEDVANCE LLC**  
**(Brand Name: LEDVANCE, SYLVANIA)**

200 BALLARDVALE STREET WILMINGTON, MA 01887

**Model name(s):**  
**LEDLD2A900ST9SC3WH**

**Type of  
Luminaire:** Downlights

**Report Date:** 2022-02-16  
Ningbo TengLi Testing Co., Ltd

**Prepared By:** 2nd floor, Block B, Ningbo Testing and Certification Base,  
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Test & Report By:

*Nick Song*

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Review By:

*Garman Mo*

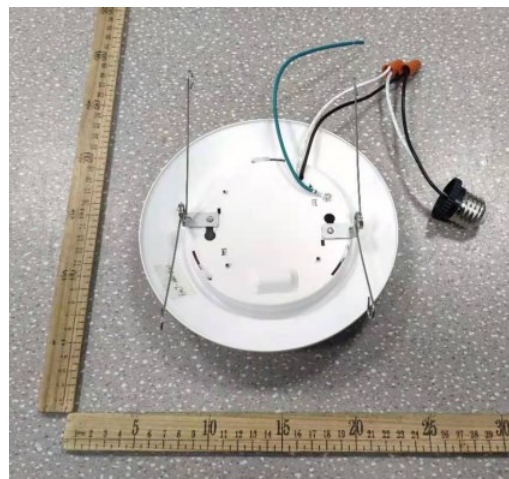
Manager: Garman Mo

Note: 1. The results contained in this report pertain only to the tested samples.  
2. This report does not imply product certification, approval, or endorsement by any agency of the  
Federal Government.

1.1 Product Information:	
Model Number	LEDLD2A900ST9SC3WH
Remark	N/A
Representative (Tested) Model	LEDLD2A900ST9SC3WH
Model Difference	N/A
SKU (if available)	N/A
Type of Lamp	Downlights
LED Manufacturer	Bridgelux, Inc
LED Model	BXFN-27G-13H-98
Dimming	Dimmable
Sample Number	STD211233NB-B1-B3

1.2 Rated Values:		
Rated Voltage / Frequency	120Vac, 60Hz	
Nominal Power	15W	
Rated Initial Lamp Lumen	--	
Dimming range	10%-100%	
Target Replacement Wattage	--	
Declared CCT	2700K/3000K/3500K/4000K/5000K	
Luminaire Aperture (for Downlight)	8	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

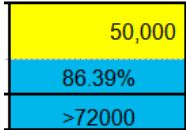
Product Photo



### 1.3 Test Specifications:

Date of Receipt	Feb.09,2022
Date of Test	Feb.10,2022
1.Test Method according to 10 CFR 430 Appendix BB to Subpart B, Uniform Test Method for Measuring the Input Power, Lumen Output, Lamp Efficacy, Correlated Color Temperature (CCT), Color Rendering Index (CRI), Power Factor, Time to Failure, and Standby Mode Power of Integrated Light-Emitting Diode (LED) Lamps	
2.Standards used: IES LM-84-14 Approved Method for Measuring Luminous Flux and Color Maintenance of LED Downlight Retrofits, Light Engines, and Luminaires	
3.The ambient temperature during maintenance test of the DUT between photometric measurements shall be maintained at 25°C ± 5°C. Humidity: < 65 RH. Airflow shall be minimized.	
4. Supply rated input voltage (e.g. 120V) and frequency (60Hz) to the samples. Branch circuit input voltage shall be regulated to within ≤ 2% of the rated rms value. The input voltage to each DUT or driver shall be verified periodically.	
5. Conduct minimum 6000 hours life test, conduct LM-79 test measurement in 1000-hour interval.	
6. At each measurement interval, the DUT shall be taken off the test racks and measured per IES LM-79-08 for electrical, photometric, and colorimetric characteristics. After measurement, the DUT shall be placed back on the test rack for the next cycle if required.	
7. Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25° C ± 1° C. The 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.	
8. Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at 25° C ± 1° 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.	
9. Off state power measurement – accordance to IEC 62301	

## 2.1 Summary of Test Result

Criteria Item	Requirement	Measured Value	Status
Light Source Type	LED, OLED, Fluorescent, HID, Incandescent, Other	LED	Pass
Product type	Omnidirectional lamp, Directional lamp, Decorative lamp, LED light engine, inseparable SSL luminaire, T20 lamp, other	Downlights	Pass
Luminous Efficacy	$\geq 45$ lumens/Watt	63.08lm/W	Pass
Power Factor	$\geq 0.90$	0.9074	Pass
Start time	$\leq 0.5$ sec	136ms	Pass
Correlated Color Temperature (CCT)	For inseparable SSL luminaires, LED light engines and GU24 LED lamps, $\leq 4000$ Kelvin. For all other sources, $\leq 3000$ Kelvin.	2747K	Pass
Duv	--	0.0018	Pass
Color Rendering Index (CRI)	$\geq 90$	92.9	Pass
Color Rendering R9 (red)	$\geq 50$	73	Pass
LM-80 and TM-21 Projected Time to L70	$\geq 25,000$ hours, or N/A for light sources providing 6,000 hour lumen maintenance testing		Pass
Rated life	$\geq 15,000$ hours	50000	Pass
Standby Power Consumption	Luminaires shall not draw power in the off state.	See the data sheet	Pass
Minimum dimming level	$\leq 10\%$	See Below Test Data	Pass
Audible Noise	$\leq 24$ dBA	See Below Test Data	Pass

### 2.2.1 Initial Electrical and Light Output Measurement

(Refer to Work Instruction QD25)

[ ✓ ] IES LM-79 (2008)

[ ✓ ] ANSI C82.2:2002

Test date	2022-02-10	Test Ambient:	25.0 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	LEDLD2A900ST9SC3WH /2700K setting		

### Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
STD211233NB-B1	120.0	60	0.1376	14.98	0.9074

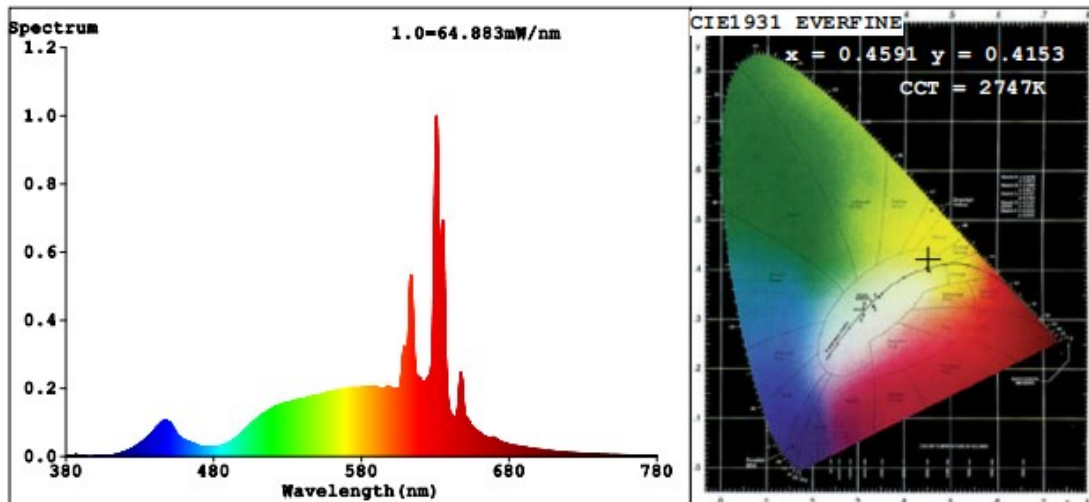
### Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	2747
Duv	0.0018
Chromaticity (x, y)	x=0.4591 y=0.4153
Chromaticity (u', v')	u'=0.2599 v'=0.5290
Color Rendering Index (CRI)	92.9
R9	73

### Photometric Measurement – Goniophotometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	944.91
Luminous Efficacy (lm/W)	63.08
Beam Angle (°)	108.4
Center Beam Candle Power (cd)	330

## Spectral Power Distribution & Chromaticity Diagram



R1 =97   R2 =94   R3 =87   R4 =93   R5 =94   R6 =93   R7 =94  
R8 =91   R9 =73   R10=81   R11=93   R12=78   R13=95   R14=91   R15=93

## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	%Luminaire
0-30	253.0	26.8%
0-40	411.0	43.5%
0-60	716.2	75.8%
60-90	217.4	23%
70-100	111.7	11.8%
90-120	7.4	0.8%
0-90	933.5	98.8%
90-180	11.3	1.2%
0-180	944.8	100%

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-10	31.2	3.3%	90-100	6.0	0.6%
10-20	88.8	9.4%	100-110	0.7	0.1%
20-30	133.1	14.1%	110-120	0.7	0.1%
30-40	158.0	16.7%	120-130	0.8	0.1%
40-50	161.1	17.1%	130-140	1.2	0.1%
50-60	144.1	15.2%	140-150	0.8	0.1%
60-70	111.7	11.8%	150-160	0.6	0.1%
70-80	71.5	7.6%	160-170	0.4	0%
80-90	34.1	3.6%	170-180	0.1	0%

## Photometric Data

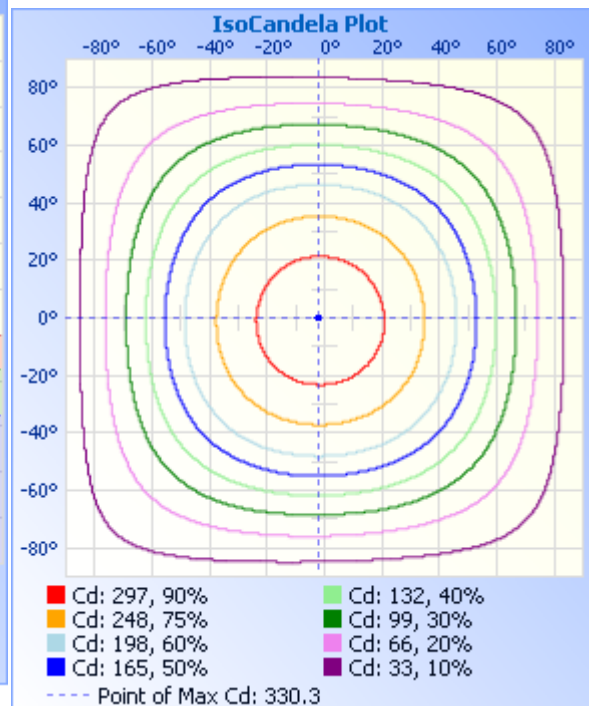
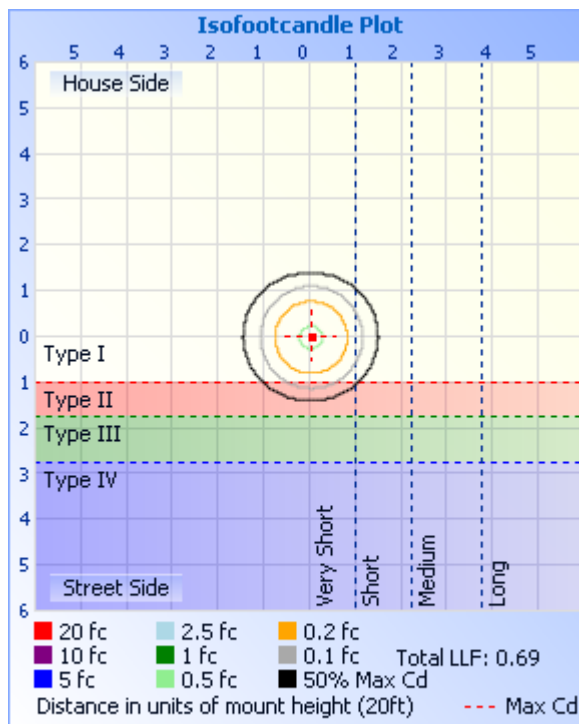
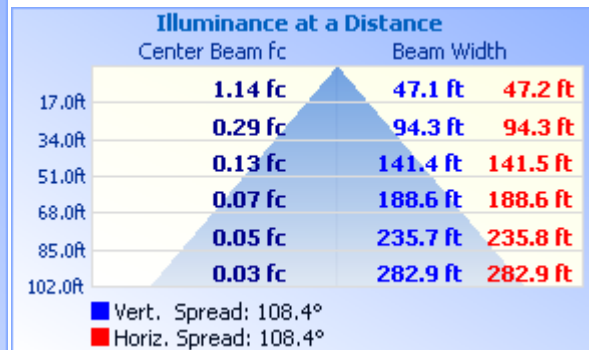
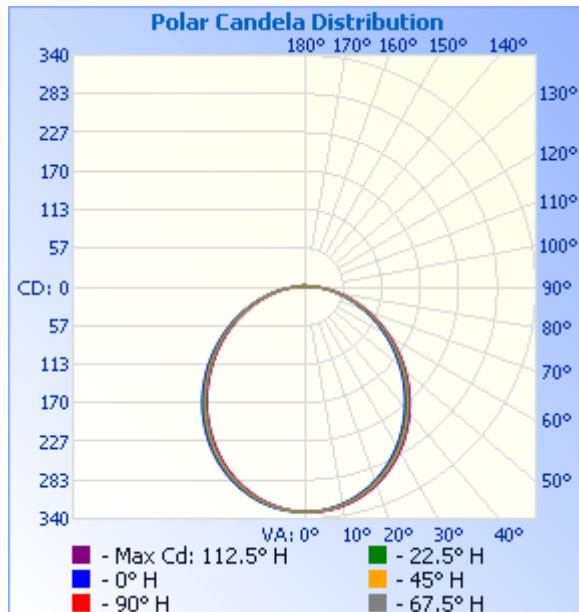




Table--1

UNIT: °C

γ (DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5			
0	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330			
5	327	327	327	327	328	328	329	329	330	330	329	329	329	329	328	328	327		
10	321	320	321	322	322	323	324	325	326	326	326	325	324	323	322	321			
15	311	311	311	312	314	315	316	317	319	319	318	317	316	314	313	312			
20	298	298	299	300	302	304	305	307	308	309	308	307	305	303	301	300			
25	283	283	283	285	287	289	292	293	295	295	294	293	291	288	286	284			
30	265	265	266	267	270	272	275	277	279	279	278	276	274	271	269	267			
35	245	245	246	248	250	253	256	258	260	261	259	257	255	252	249	247			
40	223	223	224	226	229	232	235	237	240	240	239	236	234	231	228	226			
45	201	201	202	204	207	210	213	215	218	218	216	214	211	208	205	203			
50	177	177	178	180	183	186	189	191	194	194	193	190	187	184	181	179			
55	153	153	154	156	159	162	165	167	170	170	168	166	163	160	157	155			
60	129	129	130	132	135	138	141	143	145	145	144	141	138	136	133	131			
65	105	105	106	108	111	114	117	118	121	120	119	117	114	111	109	107			
70	82.3	82.4	83.5	85.3	87.8	90.6	93.1	94.8	96.8	96.5	95.2	93.1	90.6	88.2	86.0	84.3			
75	61.1	61.3	62.3	63.9	66.1	68.6	70.8	72.3	73.9	73.6	72.3	70.4	68.2	66.1	64.2	62.8			
80	42.4	42.5	43.3	44.7	46.6	48.7	50.5	51.8	53.1	52.8	51.7	50.0	48.1	46.4	44.9	43.8			
85	26.6	26.7	27.4	28.4	30.0	31.7	33.2	34.1	35.0	34.8	33.9	32.4	30.9	29.6	28.6	27.7			
90	14.7	14.7	15.2	15.9	16.9	18.1	19.0	19.6	20.6	20.4	19.7	18.5	17.5	16.6	16.0	15.5			
95	1.17	2.57	0.06	7.80	1.85	8.16	0.03	2.19	1.84	0.18	0.00	0.83	0.31	2.88	0.00	0.00			
100	0.31	0.39	0.03	2.45	2.97	2.78	0.03	0.11	0.17	0.08	1.97	3.49	3.36	3.05	0.80	0.14			
105	0.94	0.81	0.18	0.06	0.03	0.04	0.22	1.44	1.69	0.99	0.13	0.05	0.39	0.04	0.15	0.87			
110	0.72	0.54	0.38	0.19	0.27	0.28	0.58	1.16	1.05	0.91	0.25	0.19	0.25	0.23	0.26	0.86			
115	0.78	0.59	0.53	0.40	0.15	0.54	1.03	1.21	1.14	0.85	0.67	0.28	0.02	0.35	0.79	1.01			
120	0.96	0.73	0.68	0.30	0.62	0.60	1.34	1.37	1.22	1.01	0.65	0.44	0.37	0.87	1.20	1.20			
125	1.16	0.88	0.84	0.23	0.77	0.57	1.54	1.41	1.14	0.94	0.74	0.14	0.62	0.32	1.60	1.47			
130	1.37	1.04	0.99	1.10	1.06	0.54	1.94	1.67	1.39	1.04	0.78	0.65	0.98	0.61	1.85	1.68			
135	1.78	1.18	0.56	1.38	1.35	3.79	2.13	1.87	1.59	1.33	0.53	1.05	1.45	3.80	1.62	1.93			
140	1.65	1.04	0.59	1.49	2.13	2.18	1.71	2.00	1.94	1.44	0.65	1.13	1.39	2.58	2.00	3.03			
145	1.13	0.83	0.78	1.61	1.44	2.19	0.28	1.86	1.42	1.09	0.31	1.35	0.41	1.84	0.47	1.52			
150	0.77	0.32	0.73	1.97	1.54	2.16	0.53	1.78	3.28	1.06	0.82	0.55	0.49	0.33	1.20	0.55			
155	0.82	0.80	0.88	0.92	3.18	3.55	1.77	0.45	0.62	0.66	1.37	1.77	0.61	0.38	2.08	1.58			
160	1.70	1.52	0.38	0.99	1.10	1.80	0.58	0.84	1.69	1.64	1.76	1.73	0.89	1.32	1.73	1.66			
165	1.18	1.58	0.42	0.70	0.59	0.44	0.60	0.83	1.76	1.87	2.34	1.60	1.10	2.07	3.53	2.73			
170	0.95	1.44	0.85	0.13	0.67	1.23	2.13	0.86	1.49	1.52	1.55	1.37	0.95	1.35	1.27	1.19			
175	0.87	0.75	0.40	0.63	0.77	0.98	0.73	0.43	0.62	0.64	0.81	0.84	0.55	0.89	0.92	0.83			
180	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			



<b>2.2.2 Initial Electrical and Light Output Measurement</b> (Refer to Work Instruction QD25)	[ ✓ ] IES LM-79 (2008) [ ✓ ] ANSI C82.2:2002
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<b>Test date</b>	2022-02-10	<b>Test Ambient:</b>	25.0 ° C
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	90
<b>Model Number</b>	LEDLD2A900ST9SC3WH /3000K setting		

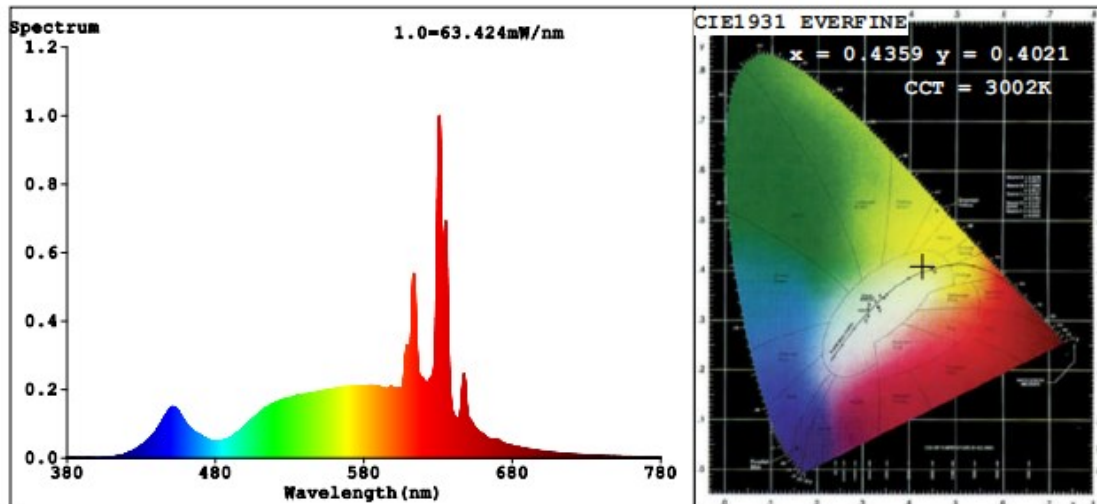
**Electrical Measurement:**

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
STD211233NB-B1	120.0	60	0.1357	14.83	0.9106

**Chromaticity Measurement - Sphere-Spectroradiometer Method:**

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3002
Duv	-0.0006
Chromaticity (x, y)	x=0.4359 y=0.4021
Chromaticity (u', v')	u'=0.2507 v'=0.5204
Color Rendering Index (CRI)	95.6
R9	84
Total Luminous (lm)	983.0
Luminous Efficacy (lm/W)	66.28

Spectral Power Distribution & Chromaticity Diagram



R1 =100	R2 =96	R3 =90	R4 =94	R5 =98	R6 =96	R7 =96	
R8 =95	R9 =84	R10=88	R11=93	R12=82	R13=99	R14=92	R15=98

### 2.2.3 Initial Electrical and Light Output Measurement

(Refer to Work Instruction QD25)

[ ✓ ] IES LM-79 (2008)

[ ✓ ] ANSI C82.2:2002

Test date	2022-02-10	Test Ambient:	25.0 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	LEDLD2A900ST9SC3WH /3500K setting		

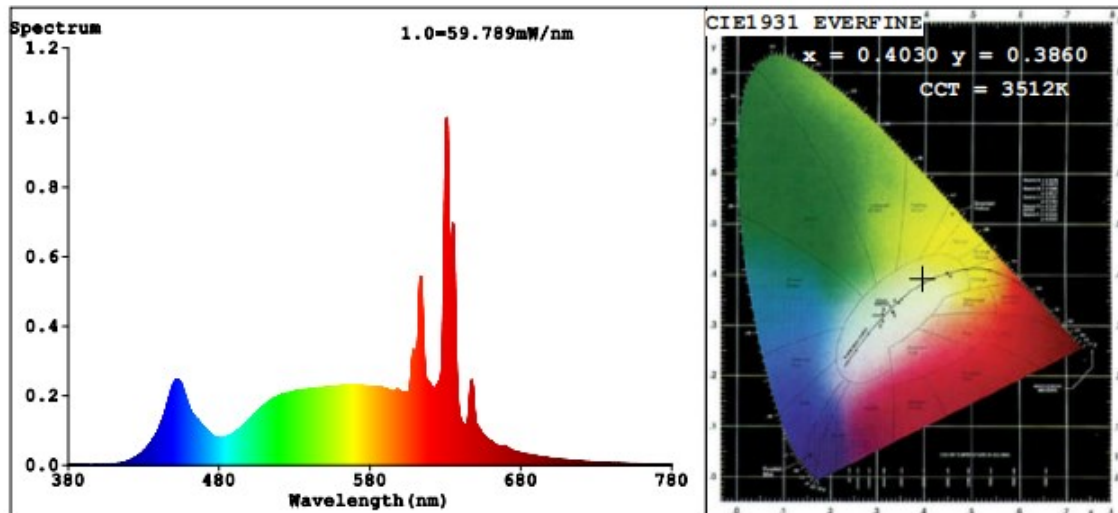
### Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
STD211233NB-B1	120.0	60	0.1338	14.70	0.9155

### Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3512
Duv	-0.0016
Chromaticity (x, y)	x=0.4030 y=0.3860
Chromaticity (u', v')	u'=0.2362 v'=0.5089
Color Rendering Index (CRI)	96.6
R9	94
Total Luminous (lm)	1038.0
Luminous Efficacy (lm/W)	70.60

Spectral Power Distribution & Chromaticity Diagram



R1 =98	R2 =98	R3 =91	R4 =95	R5 =100	R6 =96	R7 =97	
R8 =99	R9 =94	R10=91	R11=92	R12=80	R13=99	R14=93	R15=99

<b>2.2.4 Initial Electrical and Light Output Measurement</b> (Refer to Work Instruction QD25)	[ ✓ ] IES LM-79 (2008) [ ✓ ] ANSI C82.2:2002
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<b>Test date</b>	2022-02-10	<b>Test Ambient:</b>	25.0 ° C
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	90
<b>Model Number</b>	LEDLD2A900ST9SC3WH /4000K setting		

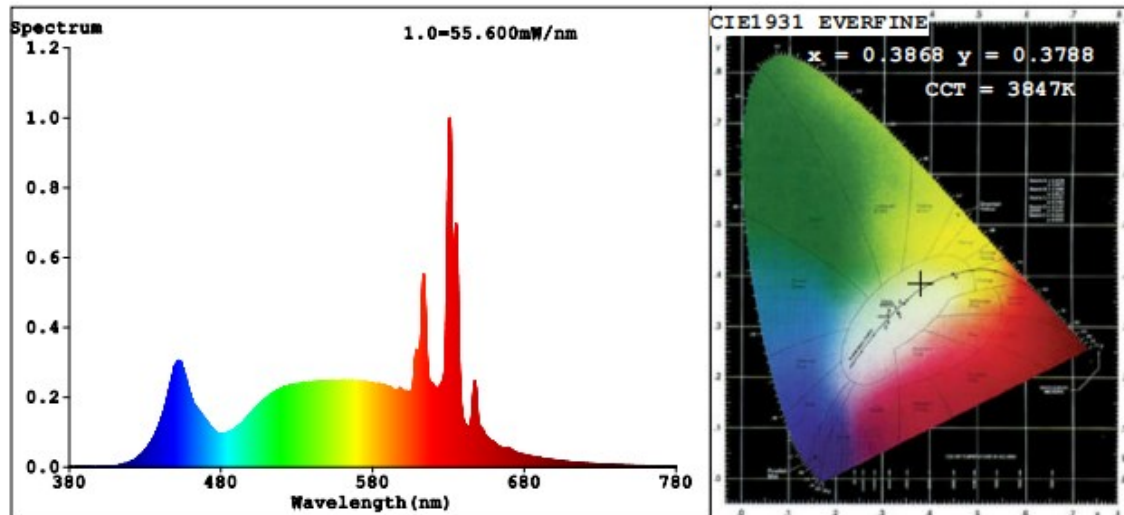
**Electrical Measurement:**

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
STD211233NB-B1	120.0	60	0.1333	14.68	0.9176

**Chromaticity Measurement - Sphere-Spectroradiometer Method:**

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3847
Duv	-0.0008
Chromaticity (x, y)	x=0.3868 y=0.3788
Chromaticity (u', v')	u'=0.2284 v'=0.5034
Color Rendering Index (CRI)	96.7
R9	96
Total Luminous (lm)	1041.0
Luminous Efficacy (lm/W)	70.91

Spectral Power Distribution & Chromaticity Diagram



R1 =98	R2 =98	R3 =91	R4 =96	R5 =99	R6 =95	R7 =98	
R8 =99	R9 =96	R10=91	R11=93	R12=77	R13=99	R14=93	R15=98

### 2.2.5 Initial Electrical and Light Output Measurement

(Refer to Work Instruction QD25)

[ ✓ ] IES LM-79 (2008)

[ ✓ ] ANSI C82.2:2002

Test date	2022-02-10	Test Ambient:	25.0 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	LEDLD2A900ST9SC3WH /5000K setting		

### Electrical Measurement:

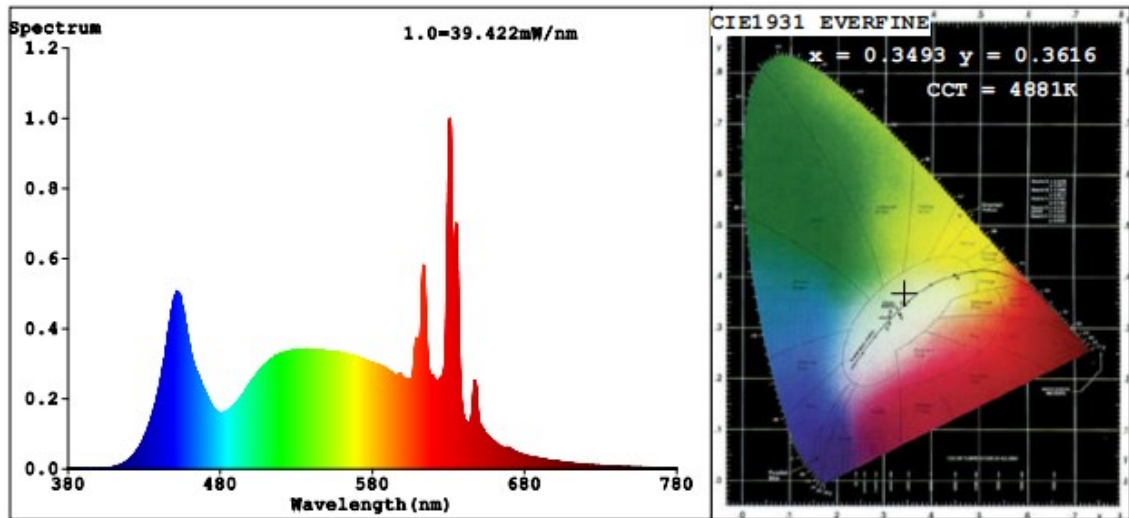
Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
STD211233NB-B1	120.0	60	0.1360	14.85	0.9099

### Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	4881
Duv	0.0033
Chromaticity (x, y)	x=0.3493 y=0.3616
Chromaticity (u', v')	u'=0.2104 v'=0.4901
Color Rendering Index (CRI)	95.0
R9	85
Total Luminous (lm)	964.0
Luminous Efficacy (lm/W)	64.91



Spectral Power Distribution & Chromaticity Diagram



R1 =97	R2 =95	R3 =91	R4 =96	R5 =94	R6 =92	R7 =98	
R8 =96	R9 =85	R10=85	R11=94	R12=69	R13=96	R14=94	R15=95

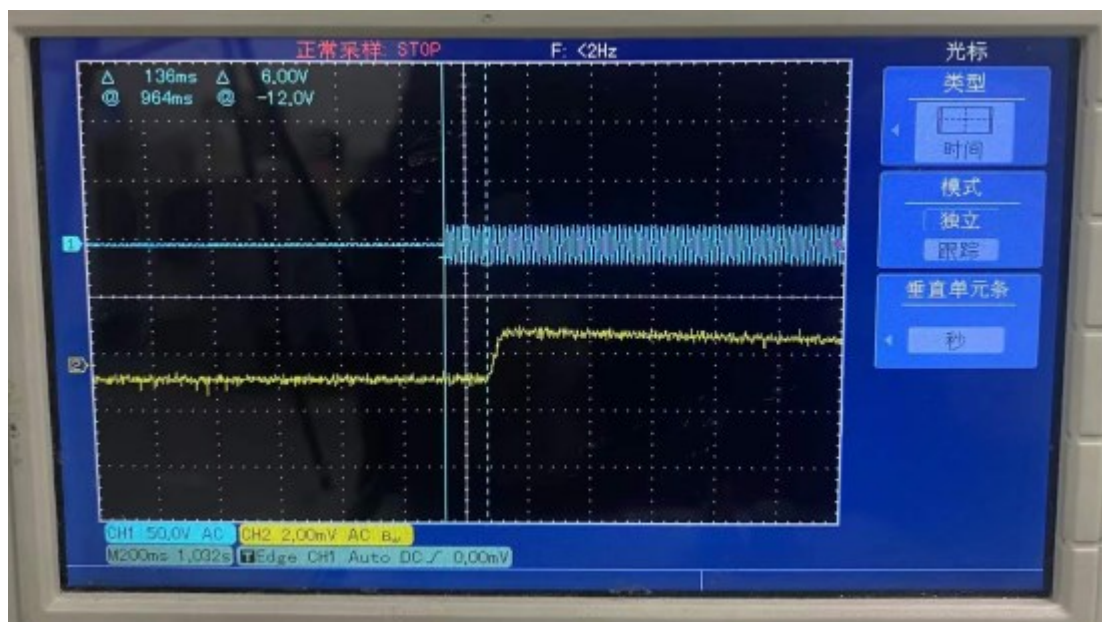
### 2.3 Start Time Test

Test date	2022-02-10	Test Ambient:	25±1 °C
Test Orientation	As intended	Stabilization Time (min)	45
Model Number	LEDLD2A900ST9SC3WH		

#### Electrical Measurement:

Sample No.	Start Time (ms)
STD211233NB-B1	136
STD220128NB-B2	134
STD220128NB-B3	132
Average	134

#### Graph (Start Time):



## 2.4 In-Situ Temperature Measurement Test (ISTMT)

Test date	2022-02-10	Test Ambient:	25.1 °C
Test Orientation	As intended	Stabilization Time (min)	45
Model Number	LEDLD2A900ST9SC3WH		

### Electrical Measurement:

Input Vol./Frequency	120 V / 60 Hz		Output Current of Single LED(mA)	88.00mA	
Sample No.	LED Package Model	Maximum Measured LED Ts Point Temperature (°C)	Maximum LED Ts Point Temperature Limited (°C)	Maximum Measured LED Driver Td Point Temperature (°C)	Maximum LED Driver Td Point Temperature Limited (°C)
STD211233NB-B1	BXFN-27G-13H-98	68.5	105	91.6	105
STD220128NB-B2		68.1		91.2	
STD220128NB-B3		67.8		91.0	

## Results

Time (t) at which to estimate lumen maintenance (hours):	50,000
Lumen maintenance at time (t) (%):	86.39%
Reported L70 (hours):	>72000

## 2.5 Dimming, Reduced Flicker Operation and Audible Noise

Test date	2022-02-10	Test Ambient:	25±1 ° C
Test Orientation	As intended	Stabilization Time (min)	45
Model Number	LEDLD2A900ST9SC3WH		

### Electrical Measurement:

Dimmer Model	LUTRON MACL-153M		
Sample No.	Input	Dimming (100%)	Dimming (<10%)
		Luminous flux (lm)	Luminous flux (lm)
STD211233NB-B1	120.0 V / 60 Hz	916.9	17.33
STD220128NB-B2	120.0 V / 60 Hz	918.4	18.85
STD220128NB-B3	120.0 V / 60 Hz	919.8	19.05
		Dimming (100%)	Dimming (20%)
Sample No.	Input	Peak Noise Reading (dBA)	Peak Noise Reading (dBA)
STD211233NB-B1	120.0 V / 60 Hz	19.9	20.3
STD220128NB-B2	120.0 V / 60 Hz	19.5	20.0
STD220128NB-B3	120.0 V / 60 Hz	19.6	20.1

### Flicker Result:

Dimming Level	100% Dimming Level	20% Dimming Level	Nominal Dimming Level
Percent Flicker (Unfiltered)	8.056%	4.583%	85.823%
Percent Flicker (1000Hz cut-off)	7.735%	2.277%	36.953%
Percent Flicker (400Hz cut-off)	5.725%	1.582%	35.742%
Percent Flicker (200Hz cut-off)	3.771%	1.302%	26.485%
Percent Flicker (90Hz cut-off)	0.251%	1.101%	15.062%
Percent Flicker (40Hz cut-off)	0.243%	1.078%	8.294%

### 3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-702	2 meter Integrating Sphere	Verified by D204 standard lamp	
ST-R-701	Spectral analysis system HAAS-1200	Verified by D204 standard lamp	
ST-R-703	Standard Lamp D204	2022-01-14	2023-01-13
ST-R-704	Power Meter for Integrating Sphere	2022-01-03	2023-01-02
ST-R-714	Goniophotometer system	Verified by D908S standard lamp	
ST-R-710	Standard Lamp D908S	2022-01-14	2023-01-13
ST-R-711	Power Meter for Goniophotometer	2022-01-03	2023-01-02
ST-R-725	LFA-3000	2022-01-03	2023-01-02
Uncertainty(K=2): Photometric Measurement (Sphere):3.94% Chromaticity Measurement(Sphere):48.2K Photometric Measurement(Goniophotometer):3.96%			

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