Ningbo TengLi Testing Co., Ltd

2nd floor, Block B, Ningbo Testing and Certification Base, No. 66
Qingyi Road, Ningbo National Hi-Tech Zone, Ningbo, Zhejiang
Tel: 86574-8783 6802
Fax: 86574-8783 5902

CEC Title 24 (CEC-400-2018-021-CMF 2019

REFERENCE APPENDICES JA8 and JA10) Test Report

For

LEDVANCE LLC

(Brand Name: SYLVANIA)

200 BALLARDVALE STREET WILMINGTON, MA 01887

Model name(s): LEDRT4G650SC3

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Type of Luminaire:	Directional downlights
Report Date:	2021-11-15
Prepared By:	Ningbo TengLi Testing Co., Ltd 2nd floor, Block B, Ningbo Testing and Certification Base, No. 66 Qingyi Road, Ningbo National Hi-Tech Zone, Ningbo, Zhejiang

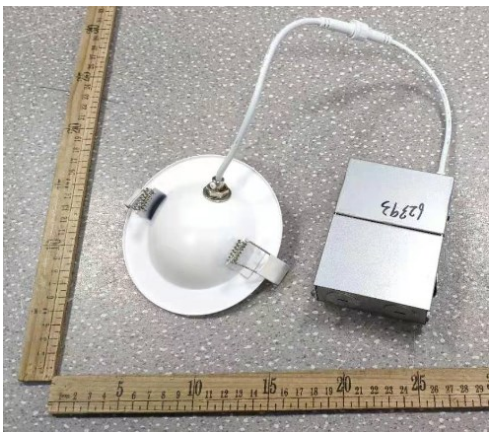
Test & Report By:	Review By:
Engineer: Nick Song	Manager: Garman Mo

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	LEDRT4G650SC3
Remark	N/A
Representative (Tested) Model	LEDRT4G650SC3
SKU (if available)	N/A
Type of Lamp	Directional downlights
LED Manufacturer	Bridgelux,Inc.
LED Model	BXFN-XXG-13H-98
Dimming	Dimmable
Sample Number	STD210933NB-B1-B3

1.2 Rated Values:		
Rated Voltage / Frequency	120Vac,60 Hz	
Nominal Power	9W	
Rated Initial Lamp Lumen	--	
Dimming range	10%-100%	
Target Replacement Wattage	--	
Declared CCT	2700K/3000K/3500K/4000K	
Luminaire Aperture (for Downlight Retrofits)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

Product Photo



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1.3 Test Specifications:

Date of Receipt	Nov.03,2021
Date of Test	Nov.04,2021
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	

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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	Directional downlights	Pass
Luminous Efficacy	≥ 45 lumens/Watt	81.69lm/W	Pass
Power Factor	≥ 0.90	0.9688	Pass
Start time	≤ 0.5 sec	333ms	Pass
Correlated Color Temperature (CCT)	≤4000 Kelvin	2722	Pass
Color Rendering Index (CRI)	≥ 90 for all products other than T20 lamps, ≥ 82 for T20 lamps	95.0	Pass
Color Rendering R9 (red)	≥ 50 for all products other than T20 lamps	77	Pass
Rated life	≥ 15,000 hours	50000	Pass
Minimum dimming level	≤ 10%	2.41%	Pass
Flicker	<30% for frequencies of 200 Hz or below, at 100% and 20% light output	See Below Test Data	Pass
Audible Noise	≤ 24 dBA	16.1	Pass

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2.2 Initial Electrical and Light Output Measurement *(Refer to Work Instruction QD25)*	**[√] IES LM-79 (2008)** **[√] ANSI C82.2:2002**

Test date	2021-11-04	**Test Ambient:**	25±1 ° C
Test Orientation	As intended	**Stabilization Time (min)**	45
Model Number	LEDRT4G650SC3		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
STD210933 NB-B1	119.9	60.01	0.0744	8.642	0.9688

Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	2722
Duv	0.0013
Chromaticity (x, y)	x=0.4603 y=0.4142
Chromaticity (u', v')	u'=0.2612 v'=0.5288
Color Rendering Index (CRI)	95.0
R9	77

Goniophotometer Method:

Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	705.97
Luminous Efficacy (lm/W)	81.69

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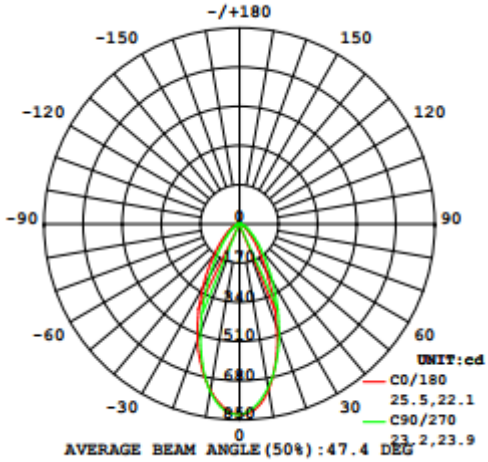
Zonal Lumen Tabulation



Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	420.7	59.6%
0-40	544.3	77.1%
0-60	664.1	94.1%
60-90	41.6	5.9%
70-100	16.3	2.3%
90-120	0	0%
0-90	705.8	100%
90-180	0.0	0%
0-180	705.8	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	74.1	10.5%	90-100	0	0%
10-20	172.6	24.5%	100-110	0	0%
20-30	174.0	24.7%	110-120	0	0%
30-40	123.6	17.5%	120-130	0	0%
40-50	75.7	10.7%	130-140	0.0	0%
50-60	44.2	6.3%	140-150	0	0%
60-70	25.3	3.6%	150-160	0	0%
70-80	12.9	1.8%	160-170	0	0%
80-90	3.4	0.5%	170-180	0	0%

CTC-LT

Table--1 UNIT: cd

γ (DEG) \ C (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	826	826	826	826	826	826	826	826	826	826	826	826	826	826	826	826		
5	805	802	797	793	792	793	794	795	798	799	801	803	807	809	809	809		
10	729	727	720	716	720	724	725	727	732	732	730	731	737	740	738	734		
15	612	614	608	613	620	629	631	633	641	639	632	625	626	628	621	615		
20	473	480	483	494	505	521	525	526	536	531	516	503	498	491	478	473		
25	338	348	361	374	389	411	414	416	424	419	397	382	369	358	341	338		
30	230	241	259	270	288	312	315	316	323	318	293	276	261	247	232	231		
35	155	164	180	189	207	234	231	230	238	238	211	195	182	168	156	156		
40	105	113	123	131	148	173	164	162	170	178	149	135	125	114	106	106		
45	72.2	78.5	84.9	91.2	105	125	117	115	121	130	106	92.8	85.9	78.6	71.6	70.3		
50	50.1	55.6	60.1	64.2	74.2	88.4	83.8	83.3	86.8	92.4	74.1	65.0	60.5	55.2	49.2	47.6		
55	35.1	39.6	43.3	45.8	52.5	63.3	60.5	60.1	62.7	65.9	52.6	46.3	43.6	39.4	34.5	33.1		
60	25.3	28.8	31.6	32.6	37.1	45.7	43.4	43.0	45.1	47.4	37.6	33.3	31.9	28.5	25.0	23.9		
65	18.6	21.0	23.2	23.4	26.3	32.3	30.7	30.1	32.2	33.9	26.9	24.2	23.4	20.8	18.6	17.8		
70	13.5	15.1	16.7	16.7	18.5	22.4	21.4	20.9	22.5	23.7	19.0	17.4	16.9	15.0	13.6	13.1		
75	9.04	10.1	11.2	11.3	12.4	14.8	14.3	14.1	15.1	15.7	12.9	11.9	11.5	10.2	9.12	8.74		
80	5.30	5.90	6.57	6.69	7.29	8.52	8.42	8.47	9.09	9.34	7.91	7.32	6.99	6.04	5.36	5.14		
85	2.11	2.31	2.49	2.66	2.89	3.17	3.57	3.69	3.75	3.85	3.43	3.16	2.93	2.56	2.24	2.12		
90	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		
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	0.00	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	0.00	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	0.00	0.00	0.00		
140	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		
145	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		
150	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		
155	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		
160	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		
165	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		
170	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		
175	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		
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		

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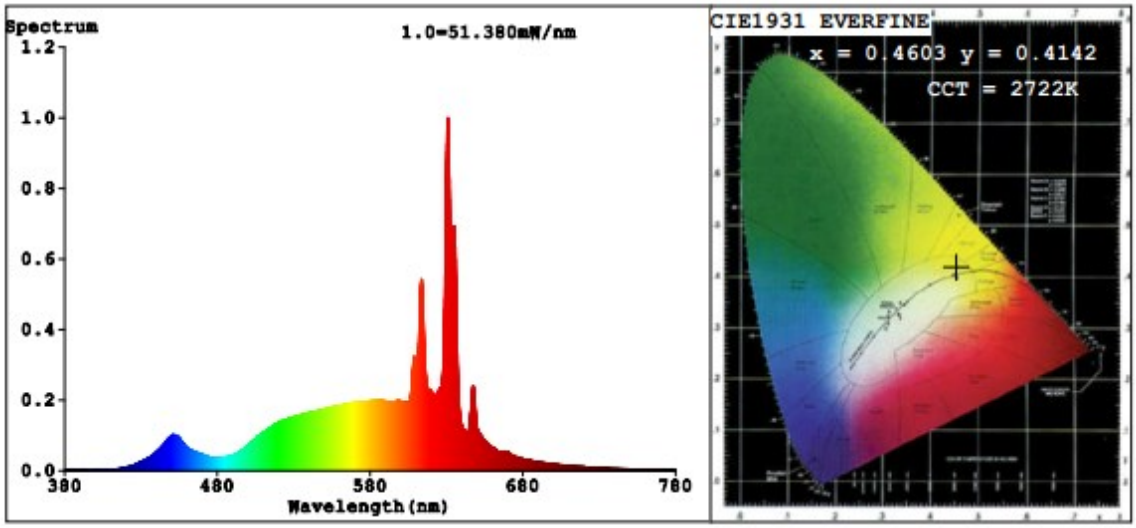
Spectral Power Distribution & Chromaticity Diagram



R1 =99	R2 =96	R3 =89	R4 =95	R5 =97	R6 =96	R7 =96	
R8 =92	R9 =77	R10=86	R11=94	R12=81	R13=98	R14=92	R15=95

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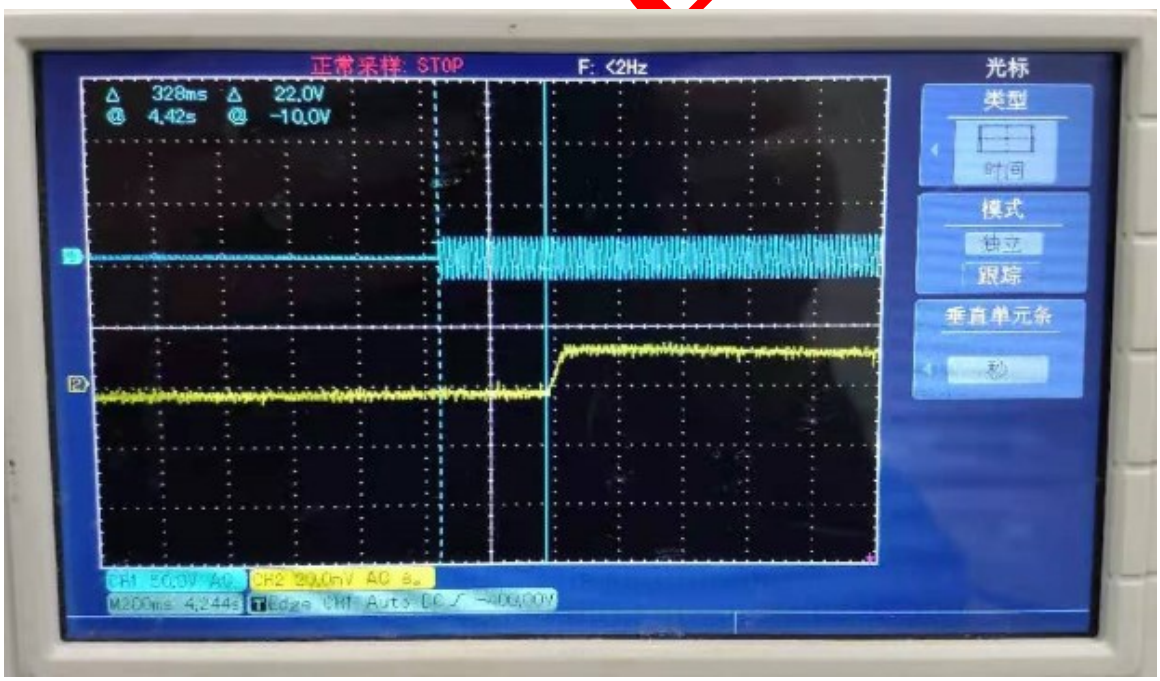
2.3 Start Time Test

Test date	2021-11-04	**Test Ambient:**	25±1 ° C
Test Orientation	As intended	**Stabilization Time (min)**	45
Model Number	LEDRT4G650SC3		

Electrical Measurement:

Sample No.	Start Time (ms)
STD210933NB-B1	328
STD210933NB-B2	340
STD210933NB-B3	332
Average	333

Graph (Start Time):



2.4 In-Situ Temperature Measurement Test (ISTMT)

Test date	2021-11-04	**Test Ambient:**	25.1 ° C
Test Orientation	As intended	**Stabilization Time (min)**	45
Model Number	LEDRT4G650SC3		

Electrical Measurement:

Input Vol./Frequency	**120 V / 60 Hz**		**Output Current of Single LED(mA)**	**80mA**	
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)**
STD210933NB-B1	BXFN-XXG-13H-98	86.1	105	66.6	105
STD210933NB-B2		85.4		66.3	
STD210933NB-B3		84.7		65.4	

Time (t) at which to estimate lumen maintenance (hours):	50,000
Lumen maintenance at time (t) (%):	86.24%
Reported L70 (hours):	>72000

2.5 Dimming, Reduced Flicker Operation and Audible Noise

Test date	2021-11-04	**Test Ambient:**	25±1 ° C
Test Orientation	As intended	**Stabilization Time (min)**	45
Model Number	LEDRT4G650SC3		

Electrical Measurement:

Dimmer Model	**LEVITON MFG CO INC (E31373), Cat. No. 6681**		
Sample No.	**Input**	**Dimming (100%)**	**Dimming (<10%)**
		Luminous flux (lm)	**Luminous flux (lm)**
STD210933NB-B1	120.0 V / 60 Hz	700.2	16.86
STD210933NB-B2	120.0 V / 60 Hz	688.3	36.64
STD210933NB-B3	120.0 V / 60 Hz	680.0	33.72
		Dimming (100%)	**Dimming (20%)**
Sample No.	**Input**	**Peak Noise Reading (dBA)**	**Peak Noise Reading (dBA)**
STD210933NB-B1	120.0 V / 60 Hz	14.5	16.1
STD210933NB-B2	120.0 V / 60 Hz	14.7	16.0
STD210933NB-B3	120.0 V / 60 Hz	14.3	15.7

Flicker Result:

Dimming Level	100% Dimming Level	20% Dimming Level	Nominal Dimming Level
Percent Flicker (Unfiltered)	13.673%	18.756%	20.262%
Percent Flicker (1000Hz cut-off)	13.186%	18.351%	17.347%
Percent Flicker (400Hz cut-off)	12.777%	18.342%	17.473%
Percent Flicker (200Hz cut-off)	12.024%	14.616%	13.692%
Percent Flicker (90Hz cut-off)	0.341%	1.781%	4.065%
Percent Flicker (40Hz cut-off)	0.241%	1.699%	3.942%

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2.6 Data comparison for different CCT setting

Test date	2021-11-04	**Test Ambient:**	25±1 ° C
Test Orientation	As intended	**Stabilization Time (min)**	45
Model Number	LEDRT4G650SC3		

Sample No.	CCT setting	Flux(lm)	P(W)	lm/W
STD210933NB-B1	2700K setting	705.97	8.642	81.69
	3000K setting	712.5	8.657	82.30
	3500K setting	722.5	8.649	83.54
	4000K setting	724.7	8.665	83.64

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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	2021-02-21	2022-02-20
ST-R-704	Power Meter for Integrating Sphere	2021-01-04	2022-01-03
ST-R-714	Goniophotometer system	Verified by D908S standard lamp	
ST-R-710	Standard Lamp D908S	2021-02-21	2022-02-20
ST-R-711	Power Meter for Goniophotometer	2021-01-04	2022-01-03
ST-R-725	LFA-3000	2021-01-04	2022-01-03
ST-R-622	Oscillograph	2021-01-04	2022-01-03

Uncertainty(K=2):
Photometric Measurement (Sphere):3.94%
Chromaticity Measurement(Sphere):48.2K
Photometric Measurement(Goniophotometer):3.96%

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