

LM-79-08 Test Report

For

Espen Technology Inc.

(Brand Name: ESPEN)

12257 Florence Ave, Santa Fe Springs CA 90670

Replacement Lamps ("Plug and Play") (UL Type A)

Model name(s): L48T8/8XX/10G-EB

Remark: Where "XX" stand for CCT, 30=3000K, 35=3500K, 40=4000K, 50=5000K
This is multiple listed report, the Project Number of the original report is
JBE190314-D-R

Representative (Tested) Model: L48T8/830/10G-EB
L48T8/850/10G-EB

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

Test & Report By:

Garman Mo

Engineer: Garman Mo

Date: Mar.24,2020

Review By:

Johnson Sun

Manager: Johnson Sun

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 A2LA, or any agency of the Federal Government.

1.1 Product Information:

Organization Name	Eспен Technology Inc.	
Brand Name	ESPEN	
Model Number	L48T8/8XX/10G-EB	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Replacement Lamps ("Plug and Play") (UL Type A)	
Rated Voltage / Frequency	120-277 Vac, 50/60 Hz	
Nominal Lamp Power	10W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,3500K,4000K, 5000K	
LED Manufacturer	EVERLIGHT ELECTRONICS CO., LTD	
LED Model	67-21S Series	
Test Ballast	OSRAM SYLVANIA QTP 2x32T8/UNV ISN-SC	
Sample Number	JBE190314-D1,D2(4000K),D3(5000K)	
Lamp Length	1200	mm
Lamp Width	--	mm
Number of Units (modular products)	N/A	s

Photo




1.2 Test Specifications:

Date of Receipt	Apr.30, 2019
Date of Test	May.08, 2019
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 Color 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

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.

2.1.1 Electrical, Photometric and Chromaticity Measurements

Test date	2019-05-08	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	L48T8/830/10G-EB with ballast OSRAM SYLVANIA QTP 2x32T8/UNV ISN-SC		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE190314-D1	120.0	60	0.1085	12.79	0.9823	6.53
	277.0	60	0.0489	12.93	0.9540	10.71
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

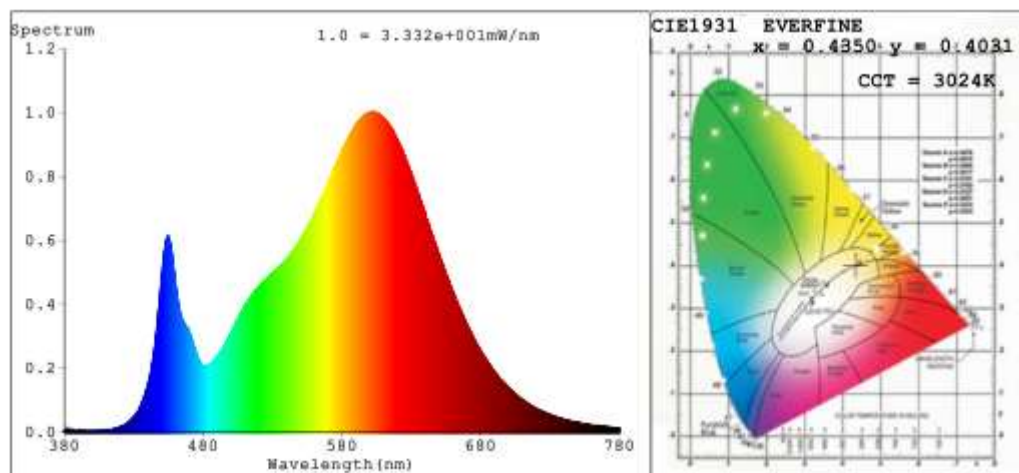
Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	80	R9	3
Frequency (Hz)	60	R2	92	R10	81
CCT (K)	3024	R3	95	R11	77
Duv	-0.0001	R4	78	R12	69
Chromaticity (x, y)	x=0.4350 y=0.4031	R5	80	R13	83
Chromaticity (u', v')	u'=0.2498 v'=0.5207	R6	90	R14	98
Color Rendering Index (CRI)	81.7	R7	81	R15	72
R9	3	R8	57	--	--

Photometric Measurement for Bare-lamp –Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.4 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	1676	1673	Bare Lamp: >= 1600(-10%)
System Efficacy (lm/W)	131.04	129.39	Bare lamp: >= 110(-3%)
Bare Lamp Efficacy (lm/W)	167.60	167.30	--

Spectral Power Distribution & Chromaticity Diagram



Laboratory: Standard-Tech Co., Ltd Testing Center

Report Format Number STD-QP019-409-B/0

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2.2 Electrical, Photometric and Chromaticity Measurements

Test date	2019-05-08	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	L48T8/830/10G-EB, with ballast OSRAM SYLVANIA QTP 2x32T8/UNV ISN-SC		

Electrical Measurement for 2-lamp in Lithonia 2GT8 lensed 2x4:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE190314-D	120.0	60	0.2183	25.68	0.9802	6.60
1,D2	277.0	60	0.0984	25.96	0.9520	10.80
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

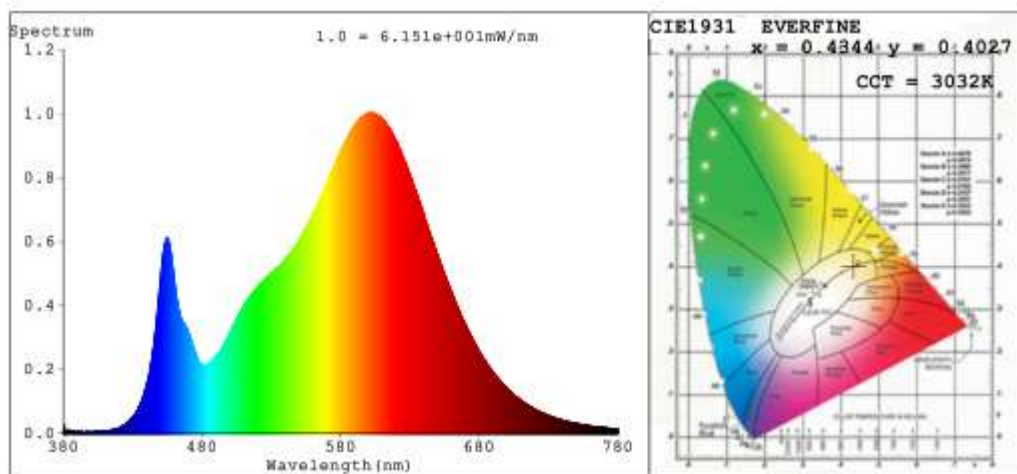
Chromaticity Measurement for 2-lamp in Lithonia 2GT8 lensed 2x4 - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	80	R9	3
Frequency (Hz)	60	R2	92	R10	81
CCT (K)	3032	R3	95	R11	77
Duv	-0.0002	R4	78	R12	69
Chromaticity (x, y)	x=0.4344 y=0.4027	R5	81	R13	83
Chromaticity (u', v')	u'=0.2495 v'=0.5205	R6	90	R14	98
Color Rendering Index (CRI)	81.7	R7	81	R15	73
R9	3	R8	57	--	--

Photometric Measurement 2-lamp in Lithonia 2GT8 lensed 2x4 - Goniophotometer Method:

Parameter	Result		DLC V4.4 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	2782.2	2776.4	In luminaire (2 lamps): >= 3000(-10%)
Luminous Efficacy (lm/W)	108.34	106.95	In luminaire: >= 100(-3%)
Zonal lumens in the 0-60 °zone (%)	84.7	--	>= 75(-3)
SC: 0-180 °(if applicable)	1.39	--	1.0-2.0(±0.1)
SC: 90-270 °(if applicable)	1.22	--	1.0-2.0(±0.1)
Beam Angle (°)	101.4	--	--
Center Beam Candle Power (cd)	1097	--	--

Spectral Power Distribution & Chromaticity Diagram

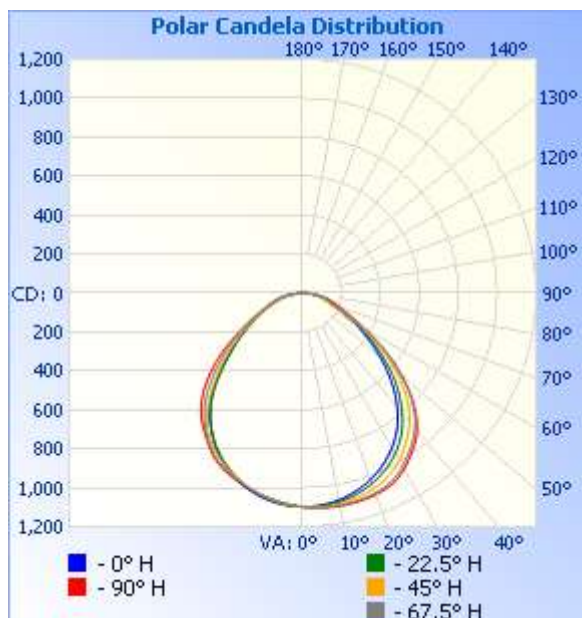


Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	865.5	31.1%
0-40	1,418.9	51%
0-60	2,356.8	84.7%
60-90	420.8	15.1%
70-100	182.3	6.6%
90-120	1.8	0.1%
0-90	2,777.6	99.8%
90-180	4.4	0.2%
0-180	2,781.9	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	104.0	3.7%	90-100	0.7	0%
10-20	300.2	10.8%	100-110	0.5	0%
20-30	461.4	16.6%	110-120	0.6	0%
30-40	553.3	19.9%	120-130	0.6	0%
40-50	534.3	19.2%	130-140	0.6	0%
50-60	403.7	14.5%	140-150	0.5	0%
60-70	239.1	8.6%	150-160	0.4	0%
70-80	135.7	4.9%	160-170	0.3	0%
80-90	45.9	1.7%	170-180	0.1	0%

Photometric Data



Illuminance at a Distance

	Center Beam fc	Beam Width	
3.3ft	101 fc	7.4 ft	8.7 ft
6.7ft	24.4 fc	15.0 ft	17.7 ft
10.0ft	11.0 fc	22.4 ft	26.5 ft
13.3ft	6.20 fc	29.8 ft	35.2 ft
16.7ft	3.93 fc	37.4 ft	44.2 ft
20.0ft	2.74 fc	44.8 ft	52.9 ft

■ Vert. Spread: 96.5°
■ Horiz. Spread: 105.8°

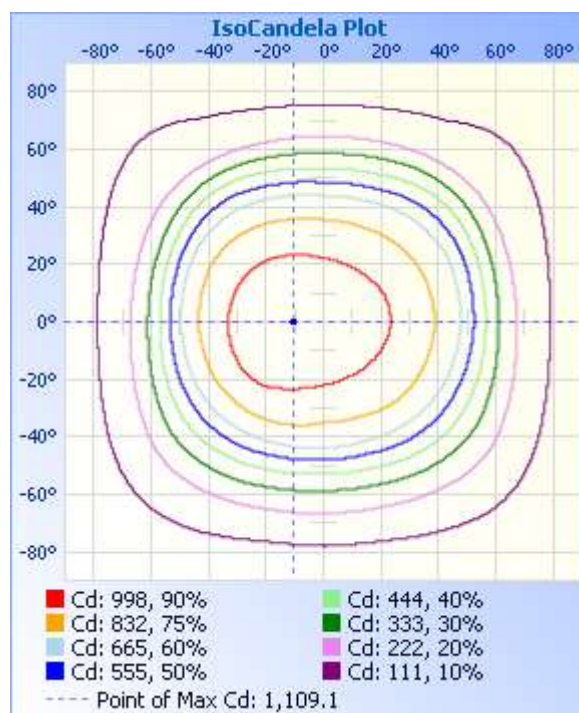
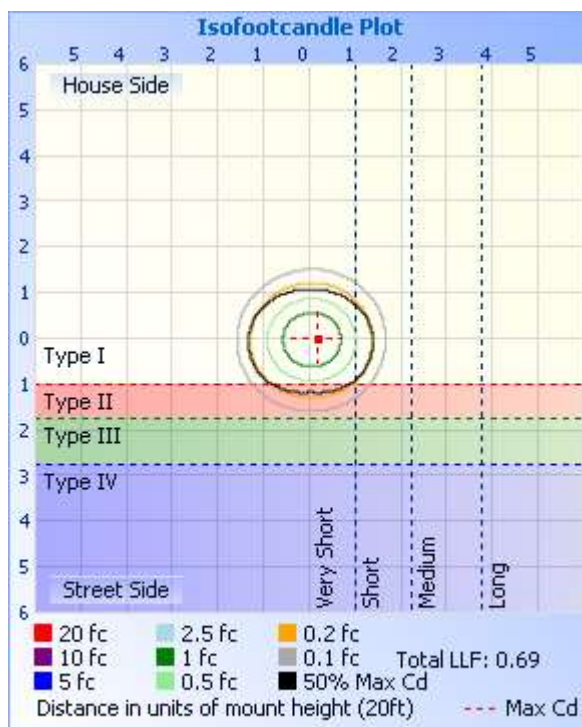


Table--1

UNIT: cd

C (DEG) 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	1097	1097	1097	1097	1097	1097	1097	1097	1097	1097	1097	1097	1097	1097	1097	1097			
5	1083	1084	1086	1089	1093	1097	1101	1104	1106	1103	1099	1096	1091	1087	1084	1083			
10	1064	1066	1068	1072	1078	1088	1098	1106	1109	1103	1094	1085	1074	1068	1065	1064			
15	1042	1044	1043	1045	1053	1069	1087	1102	1107	1098	1081	1064	1048	1040	1037	1039			
20	1016	1017	1011	1010	1019	1041	1068	1092	1100	1087	1061	1034	1010	1001	1004	1010			
25	986	983	972	965	974	1002	1038	1071	1083	1069	1034	994	962	954	964	977			
30	939	932	920	909	917	951	992	1027	1042	1033	996	942	901	897	917	932			
35	876	868	853	841	847	884	929	967	984	970	931	873	824	825	851	866			
40	812	803	780	753	755	795	854	899	915	882	829	776	734	732	757	785			
45	721	718	688	653	646	690	755	801	807	759	695	645	623	612	638	680			
50	607	605	575	538	530	566	627	667	671	623	566	522	494	496	525	562			
55	476	478	460	426	414	445	493	517	516	494	449	411	392	390	415	448			
60	349	343	334	318	311	326	347	361	373	378	343	317	306	300	317	346			
65	250	227	212	214	222	216	216	236	262	276	252	240	236	230	234	259			
70	187	166	140	149	159	150	142	174	195	194	178	175	178	169	168	185			
75	143	134	114	115	118	115	117	140	149	135	130	127	131	125	123	131			
80	98.6	97.6	89.5	83.4	84.9	82.9	91.6	101	103	92.4	86.8	84.2	89.2	83.7	84.3	89.7			
85	40.1	44.5	43.3	43.2	44.5	43.3	43.5	44.0	39.9	42.5	38.6	41.3	42.6	42.7	38.1	42.5			
90	0.96	0.97	0.98	1.22	1.23	1.36	1.08	1.13	0.56	0.79	0.84	0.95	0.73	0.83	1.08	0.78			
95	0.45	0.46	0.51	0.67	0.78	0.73	0.48	0.51	0.30	0.40	0.70	0.50	0.65	0.49	0.86	0.39			
100	0.36	0.33	0.53	0.63	0.78	0.55	0.44	0.35	0.34	0.40	0.59	0.42	0.56	0.47	0.64	0.45			
105	0.38	0.34	0.55	0.59	0.70	0.52	0.44	0.37	0.42	0.45	0.62	0.44	0.40	0.46	0.62	0.51			
110	0.39	0.62	0.60	0.55	0.62	0.49	0.45	0.34	0.50	0.62	0.71	0.45	0.41	0.44	0.70	0.75			
115	0.68	0.82	0.73	0.49	0.55	0.46	0.45	0.79	0.53	0.72	0.75	0.34	0.43	0.42	0.74	0.83			
120	0.85	0.90	0.91	0.42	0.45	0.40	0.67	0.95	0.57	0.78	0.78	0.38	0.47	0.40	0.77	0.91			
125	0.93	0.96	0.95	0.43	0.46	0.41	0.90	0.95	0.71	0.85	0.82	0.45	0.53	0.43	0.68	0.96			
130	0.90	0.96	0.98	0.43	0.48	0.42	0.81	0.95	0.85	0.91	0.85	0.62	0.62	0.48	0.62	1.01			
135	1.13	1.10	0.97	0.44	0.50	0.43	0.75	0.95	0.87	0.96	0.87	0.66	0.75	0.53	0.59	0.95			
140	1.11	1.10	0.90	0.44	0.67	0.44	0.73	0.96	0.95	1.01	0.89	0.78	0.95	0.67	0.60	0.90			
145	1.10	1.01	0.75	0.50	0.81	0.39	0.75	0.97	0.96	1.02	0.91	0.96	1.08	0.77	0.61	0.87			
150	1.09	0.91	0.63	0.61	0.87	0.67	0.76	0.98	1.00	1.04	0.94	0.99	1.12	0.86	0.73	0.84			
155	1.08	0.81	0.66	0.73	0.88	0.61	0.78	0.99	1.05	1.06	0.96	0.96	1.22	0.96	0.91	0.81			
160	0.90	0.79	0.73	0.77	0.89	0.61	0.77	1.00	1.02	1.00	0.96	0.86	1.21	1.01	1.09	1.07			
165	0.87	0.81	0.84	0.88	1.02	0.62	0.74	0.96	0.90	0.96	0.96	0.88	1.20	1.06	1.12	1.11			
170	0.96	0.85	0.96	1.01	1.15	1.00	0.77	0.91	0.62	0.94	0.92	0.95	1.19	1.11	1.12	1.16			
175	0.84	0.89	1.01	1.20	1.19	1.14	1.01	0.95	1.02	0.91	0.91	0.99	1.17	1.15	1.12	1.18			
180	0.96	0.90	1.01	1.18	1.17	1.12	1.07	0.95	1.02	0.90	0.90	1.01	1.17	1.17	1.12	1.07			

2.3 Electrical, Photometric and Chromaticity Measurements

Test date	2019-05-08	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	L48T8/850/10G-EB, with ballast OSRAM SYLVANIA QTP 2x32T8/UNV ISN-SC		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE190314-D3	120.0	60	0.1092	12.83	0.9788	6.81
	277.0	60	0.0493	12.97	0.9506	11.03
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

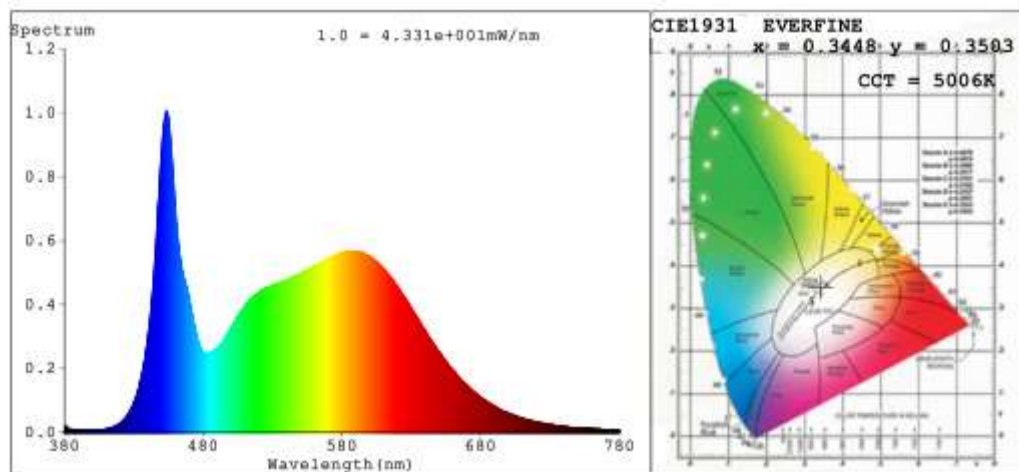
Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	83	R9	10
Frequency (Hz)	60	R2	91	R10	79
CCT (K)	5006	R3	94	R11	82
Duv	-0.0005	R4	83	R12	63
Chromaticity (x, y)	x=0.3448 y=0.3503	R5	84	R13	86
Chromaticity (u', v')	u'=0.2117 v'=0.4840	R6	87	R14	98
Color Rendering Index (CRI)	84.3	R7	85	R15	78
R9	10	R8	66	--	--

Photometric Measurement for Bare-lamp –Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.4 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	1710	1706	Bare Lamp: >= 1600(-10%)
System Efficacy (lm/W)	133.28	131.53	Bare lamp: >= 110(-3%)
Bare Lamp Efficacy (lm/W)	171.00	170.60	--

Spectral Power Distribution & Chromaticity Diagram



Laboratory: Standard-Tech Co., Ltd Testing Center

Report Format Number STD-QP019-409-B/0

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2.4 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
L48T8/830/10G-EB	3000K	1676	12.79	131.04
L48T8/835/10G-EB	3500K	1685 ^{*1}	12.81 ^{*2}	131.54 ^{*3}
L48T8/840/10G-EB	4000K	1693 ^{*1}	12.81 ^{*2}	132.16 ^{*3}
L48T8/850/10G-EB	5000K	1710	12.83	133.28

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

$$1685 = (1710 - 1676) / 4 * 1 + 1676$$

$$1693 = (1710 - 1676) / 4 * 2 + 1676$$

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

$$12.81 = (12.83 + 12.79) / 2$$

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

$$131.54 = 1685 / 12.81$$

$$132.28 = 1693 / 12.81$$

3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-331	2 meter Integrating Sphere	Verified by D204 standard lamp	
ST-R-327	Spectral analysis system HAAS-2000	Verified by D204 standard lamp	
ST-R-332	Standard Lamp	2018-07-04	2019-07-03
ST-R-333	Power Meter for Integrating Sphere	2018-06-28	2019-06-27
ST-R-355	Goniophotometer system	Verified by D908S standard lamp	
ST-R-359	Standard Lamp	2018-07-04	2019-07-03
ST-R-358	Power Meter for Goniophotometer	2018-06-28	2019-06-27
Expand Uncertainty: Photometric Measurement (Sphere):2.66%, k=2 Chromaticity Measurement(Sphere):28.6K, k=2 Photometric Measurement(Goniophotometer):2.76%, k=2			

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