

LM -79-08 Test Report
For
Espen Technology, Inc.
(Brand Name: ESPEN)

12257 FLORENCE AVE SANTA FE SPRINGS, CA 90670 USA

Model name(s): L48T8/ 840/14G-ID

Report Type: Testing and Report According to IES LM-79-2008
Type of Luminaire : Internal Driver/Line Voltage Lamp-Style Retrofit Kits (UL Type B)
Test Date: 2017-11-17
Ningbo TengLi Testing Co., Ltd
Prepared By: 2nd floor, Block B, Ningbo Testing and Certification Base,
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Test & Report By:

Johnson Sun

Engineer: Johnson Sun

Review By:

Tommy Liang

Manager: Tommy Liang

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 NVLAP, NIST, or any agency of the Federal Government.

1.1 Product Information:		
Model Number	L48T8/840/14G-ID	
Remark	N/A	
Representative (Tested) Model	L48T8/840/14G-ID	
Model Difference	N/A	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Internal Driver/Line Voltage Lamp-Style Retrofit Kits (UL Type B)	
LED Manufacturer	Toyoda Gosei Co., Ltd	
LED Model	PBD-R8Q0-0000-RNR1-1	
Dimming	Dimmable	
Sample Number	STD171121NB-D1,D2(4000K)	
Date of Receipt	Nov.16, 2017	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

1.2 Rated Values :	
Rated Voltage / Frequency	120 -277Vac, 50/60 Hz
Nominal Power	14W
Rated Initial Lamp Lumen	--
Declared CCT	4000K

1.3 Test Specifications:

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 C78.377-2015 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

1.4 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 Summary of Test Result

Criteria Item	Measured Value			Compliance	Requirement (DLC V4.2)
Power(W)	4000K	120V	14.42	N/A	N/A
	Bare Lamp	277V	14.31		
	4000K	120V	28.77		
	In Luminaire	277V	28.55		
Power Factor	4000K	120V	0.9305	Pass	$\geq 0.9(-3\%)$
	Bare Lamp	277V	0.9492		
	4000K	120V	0.9293		
	In Luminaire	277V	0.9489		
THD %	4000K	120V	16.79	Pass	$\leq 20(+5)$
	Bare Lamp	277V	18.04		
	4000K	120V	16.87		
	In Luminaire	277V	18.15		
CRI	4000K Bare Lamp		83.6	Pass	$\geq 80(-2)$
	4000K In Luminaire		83.7		
CCT (K)	4000K Bare Lamp		3997	Pass	$\leq 5000K$
	4000K In Luminaire		3995		
Luminous Intensity Distribution	Zonal lumens in the 0-60°:		84.5	Pass	$\geq 75(-2)$
	SC: 0-180° (if applicable):		1.32	Pass	1.0-2.0(± 0.1)
	SC: 90-270° (if applicable):		1.24	Pass	
Total Luminous	4000K	120V	2047	Pass	$\geq 1600(-10\%)$
	Bare Lamp	277V	2025		
	4000K	120V	3256.8		$\geq 3000(-10\%)$
	In Luminaire	277V	3221.5		
Luminous Efficacy	4000K	120V	141.96	Pass	Standard: $\geq 110(-3\%)$
	Bare Lamp	277V	141.51		
	4000K	120V	113.20		Standard: $\geq 100(-3\%)$
	In Luminaire	277V	112.84		

2.2 Electrical, Photometric and Chromaticity Measurements

Test date	2017-11-16	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	L48T8/840/14G-ID		

Electrical Measurement for Bare -lamp:

Sample No.	Voltage (V ac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
STD171121	120.0	60	0.1291	14.42	0.9305	16.79
NB-D1	277.0	60	0.0544	14.31	0.9492	18.04

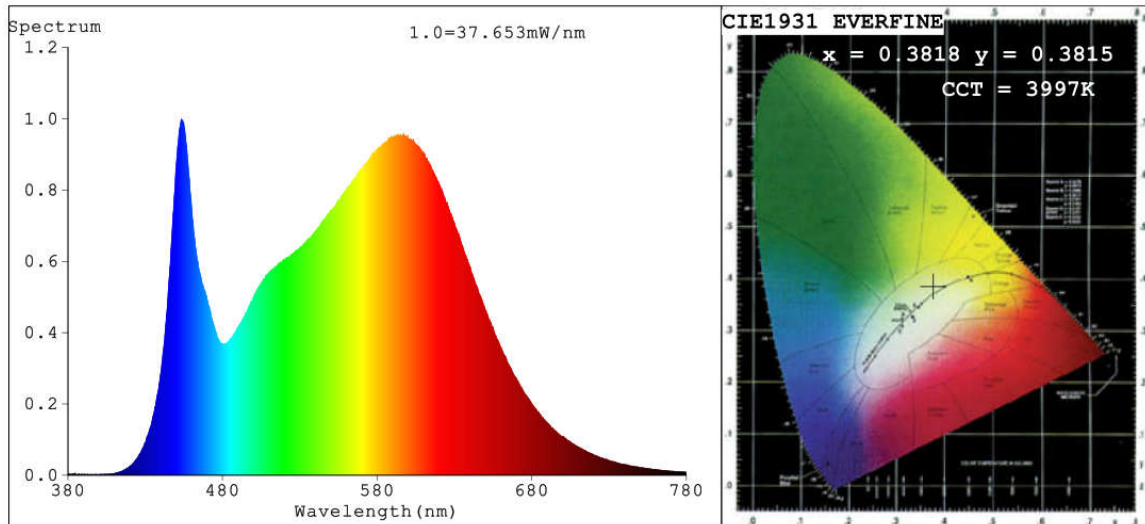
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	82	R9	7
Frequency (Hz)	60	R2	92	R10	82
CCT (K)	3997	R3	96	R11	80
Duv	0.0018	R4	80	R12	65
Chromaticity (x, y)	x=0.3818 y=0.3815	R5	82	R13	85
Chromaticity (u', v')	u'=0.2241 v'=0.5039	R6	89	R14	98
Color Rendering Index (CRI)	83.6	R7	84	R15	75
R9	7	R8	63	--	--

Photometric Measurement –Sphere-Spectroradiometer Method:

Parameter	Result	
Test Voltage (V)	120.0	277.0
Frequency (Hz)	60	60
Total Luminous (lm)	2047	2025
Luminous Efficacy (lm/W)	141.96	141.51
Worst Luminous/Highest Watts	140.43	

Spectral Power Distribution & Chromaticity Diagram



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

Test date	2017-11-16	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	L48T8/840/14G-ID		

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

Sample No.	Voltage (V ac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
STD171121	120.0	60	0.2580	28.77	0.9293	16.87
NB-D1,D2	277.0	60	0.1086	28.55	0.9489	18.15

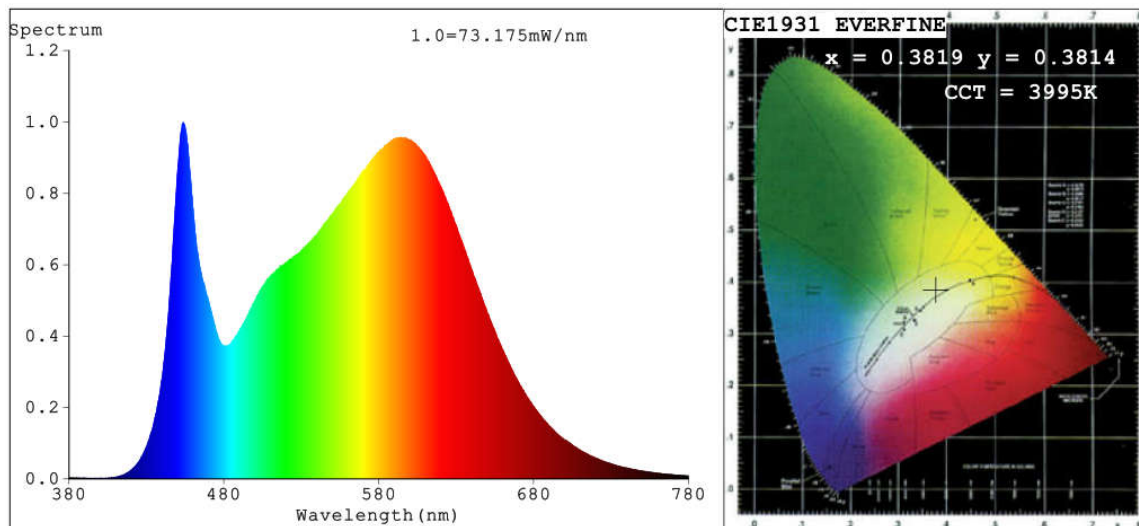
Chromaticity Measurement - Sphere-Spectroradiometer Method for 2-lamp in Lithonia 2GT8 lensed 2x4 :

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	82	R9	8
Frequency (Hz)	60	R2	92	R10	82
CCT (K)	3995	R3	96	R11	8
Duv	0.0017	R4	80	R12	065
Chromaticity (x, y)	x=0.3819 y=0.3814	R5	82	R13	85
Chromaticity (u', v')	u'=0.2242 v'=0.5038	R6	89	R14	98
Color Rendering Index (CRI)	83.7	R7	84	R15	75
R9	8	R8	63	--	--

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

Parameter	Result	
Test Voltage (V)	120.0	277.0
Frequency (Hz)	60	60
Total Luminous (lm)	3256.8	3221.5
Luminous Efficacy (lm/W)	113.20	112.84
Worst Luminous/Highest Watts	111.97	
Zonal lumens in the 0-60° zone (%)	84.5	--
SC: 0-180° (if applicable)	1.32	--
SC: 90-270° (if applicable)	1.24	--
Beam Angle (°)	102.1	--
Center Beam Candle Power (cd)	1278	--

Spectral Power Distribution & Chromaticity Diagram



Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,006.5	30.9%
0-40	1,648.4	50.6%
0-60	2,755.4	84.5%
60-90	502.8	15.4%
70-100	222.2	6.8%
90-120	0.5	0%
0-90	3,258.2	100%
90-180	1.6	0%
0-180	3,259.8	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	121.1	3.7%	90-100	0.1	0%
10-20	349.7	10.7%	100-110	0.2	0%
20-30	535.6	16.4%	110-120	0.3	0%
30-40	641.9	19.7%	120-130	0.2	0%
40-50	633.6	19.4%	130-140	0.2	0%
50-60	473.4	14.5%	140-150	0.2	0%
60-70	280.7	8.6%	150-160	0.2	0%
70-80	164.9	5.1%	160-170	0.2	0%
80-90	57.3	1.8%	170-180	0.1	0%

Photometric Data

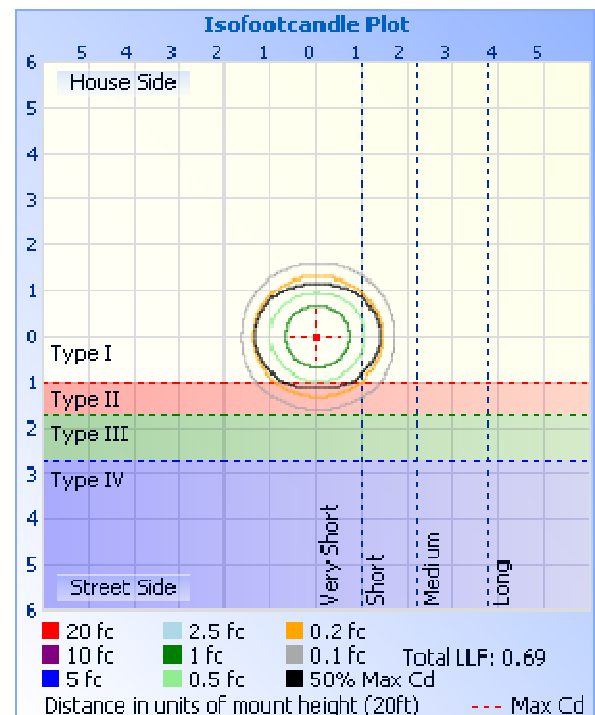
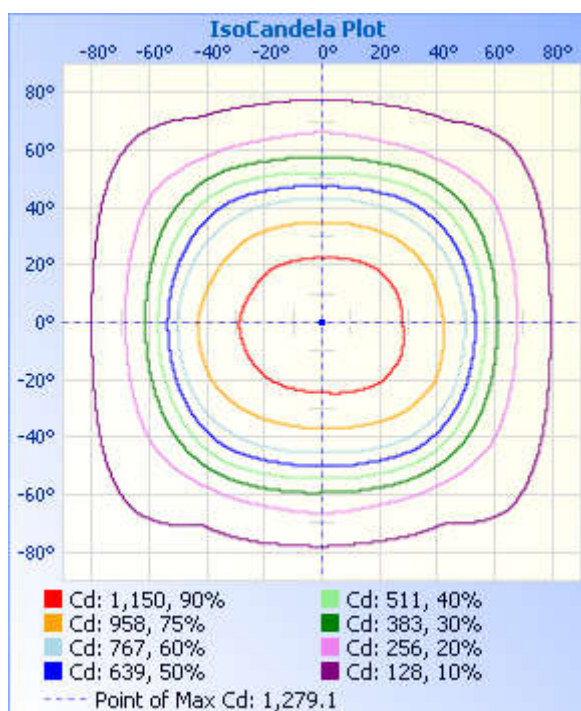
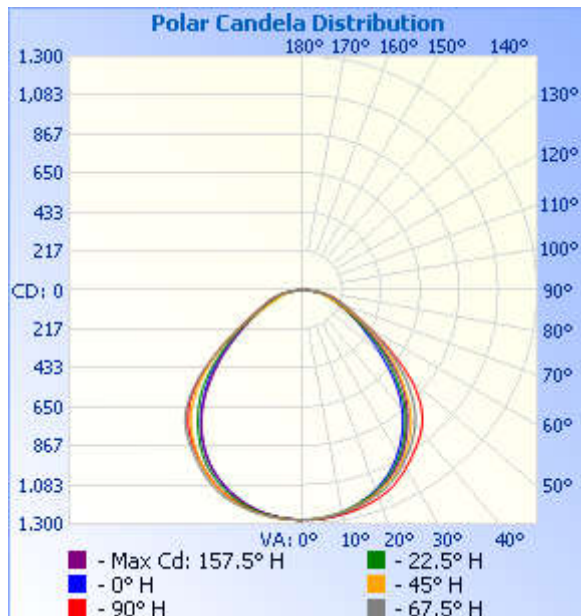


Table--1

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	1278	1278	1278	1278	1278	1278	1278	1278	1278	1278	1278	1278	1278	1278	1278	1278	
5	1272	1273	1273	1273	1271	1270	1270	1272	1276	1274	1273	1275	1274	1275	1277	1277	
10	1261	1263	1260	1257	1253	1252	1255	1258	1267	1265	1260	1259	1259	1262	1267	1269	
15	1243	1245	1237	1230	1224	1223	1231	1237	1252	1246	1239	1233	1230	1238	1250	1256	
20	1219	1219	1206	1189	1180	1185	1199	1209	1229	1222	1208	1196	1192	1203	1224	1234	
25	1179	1180	1164	1138	1124	1135	1158	1171	1196	1185	1166	1146	1139	1156	1183	1197	
30	1123	1122	1101	1070	1050	1069	1100	1114	1142	1128	1106	1083	1070	1093	1124	1140	
35	1062	1055	1021	980	961	983	1024	1047	1084	1064	1033	999	985	1008	1053	1080	
40	992	967	920	873	854	881	933	970	1021	1002	955	901	880	909	970	1013	
45	893	846	788	740	723	753	808	861	931	916	852	792	759	797	860	914	
50	743	702	652	602	572	617	680	727	790	768	713	651	623	652	715	756	
55	560	541	510	461	445	477	541	572	604	581	564	506	476	501	552	561	
60	399	401	378	343	347	352	402	425	433	415	402	370	358	359	386	396	
65	292	299	264	258	276	264	281	317	316	298	264	259	271	250	252	286	
70	222	229	182	197	214	201	193	243	241	227	175	191	205	183	167	221	
75	172	168	135	149	158	150	140	180	188	176	129	145	149	140	127	172	
80	118	112	100	100	110	104	106	124	135	128	103	105	109	99.6	101	122	
85	45.4	44.6	41.8	47.0	49.9	53.0	50.4	58.0	62.9	65.1	58.7	58.5	57.1	53.2	52.0	54.0	
90	0.00	0.00	0.00	0.11	0.03	0.12	0.04	0.04	0.00	0.00	0.03	0.56	0.31	0.14	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	0.11	0.24	0.19	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	0.11	0.43	0.45	0.46	0.17	0.00	
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.14	0.27	0.72	0.69	0.73	0.33	0.17	
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.28	0.46	0.78	0.75	0.73	0.61	0.37	
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.45	0.57	0.75	0.74	0.59	0.78	0.54	
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.45	0.57	0.24	0.48	0.30	0.78	0.60	
125	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.51	0.48	0.57	0.13	0.32	0.16	0.78	0.66	
130	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.65	0.56	0.60	0.16	0.37	0.16	0.70	0.71	
135	0.00	0.00	0.00	0.00	0.27	0.08	0.00	0.00	0.65	0.56	0.52	0.13	0.43	0.22	0.61	0.71	
140	0.00	0.00	0.00	0.19	0.32	0.05	0.00	0.00	0.65	0.56	0.52	0.13	0.48	0.22	0.56	0.71	
145	0.00	0.00	0.00	0.19	0.32	0.05	0.06	0.00	0.65	0.59	0.60	0.24	0.59	0.24	0.33	0.71	
150	0.06	0.03	0.22	0.21	0.50	0.11	0.31	0.00	0.71	0.64	0.63	0.29	0.64	0.30	0.33	0.68	
155	0.06	0.14	0.33	0.29	0.64	0.35	0.31	0.37	0.80	0.73	0.60	0.38	0.72	0.44	0.31	0.68	
160	0.34	0.31	0.30	0.32	0.74	0.57	0.31	0.34	0.77	0.73	0.57	0.43	0.75	0.62	0.39	0.57	
165	0.51	0.34	0.33	0.70	0.72	0.76	0.36	0.37	0.77	0.75	0.63	0.75	0.85	0.84	0.59	0.60	
170	0.51	0.36	0.38	0.75	0.85	0.87	0.72	0.80	0.88	0.87	0.87	0.75	0.85	0.89	0.92	0.74	
175	0.91	0.81	0.74	0.78	0.85	0.87	0.75	0.88	1.25	1.01	0.84	0.72	0.85	0.89	0.92	0.80	
180	1.11	0.78	0.74	0.83	0.88	0.87	0.78	0.88	1.22	1.01	0.79	0.72	0.85	0.89	0.92	0.80	

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-2000	Verified by D204 standard lamp	
D204	Standard Lamp	2017-02-09	2018-02-08
ST-R-704	Power Meter for Integrating Sphere	2017-01-08	2018-01-07
ST-R-714	Goniophotometer system	Verified by D908S standard lamp	
D908S	Standard Lamp	2017-02-14	2018-02-13
ST-R-711	Power Meter for Goniophotometer	2017-01-08	2018-01-07
Uncertainty: Photometric Measurement (Sphere):1.74% Chromaticity Measurement(Sphere):14.3K Photometric Measurement(Goniophotometer):1.62%			

4. Product Photo





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