



LM-79-08 Test Report

For

P.Q.L., Inc.

2285 Ward Avenue / Simi Valley, CA 93065

Model name(s):
93781

Report Type: Testing and Report According to IES LM-79-2008
Type of Luminaire: Retrofit Kits for Direct Linear Ambient Luminaires
Report Date: 2022-12-12
Ningbo TengLi Testing Co., Ltd
Prepared By: 2nd floor, Block B, Ningbo Testing and Certification Base,
No. 66 Qingyi Road, Ningbo National Hi-Tech Zone,
Ningbo, Zhejiang

Test & Report By:

Wat Wang

Engineer: Wat Wang

Review By:

Nick Song

Manager: Nick Song

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:		
Model Number	93781	
Representative (Tested) Model	93781 (0%,3500K) 93781 (50%,4000K) 93781 (100%,5000K)	
Model Difference	N/A	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Retrofit Kits for Direct Linear Ambient Luminaires	
LED Manufacturer	ShenZhen JuFei Optoelectronics Co., Ltd.	
LED Model	01.JT.CC2835W80P03	
Dimming	Continuous	
Integral Controls	NO	
Sample Number	STD221156NB-C1	
Date of Receipt	Dec.02,2022	
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, 50/60Hz
Nominal Power	35W/28W/20W (Power Adjustable)
Rated Initial Lamp Lumen	--
Declared CCT	3500K,4000K,5000K (Color Tunable)



1.3 Test Specifications:

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 C78.377-2015 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

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 V5.1)	
Minimum Total Luminous	5419.5		Pass	≥375 lm/ft (-10%)	
Minimum Luminous Efficacy	148.74		Pass	Standard: ≥115(-3%)	Premium: ≥130(-3%)
Minimum Power Factor	0.9705		Pass	≥0.9(-3%)	
Maximum THD %	13.92		Pass	≤20(+5)	
Minimum CRI	82.5		Pass	≥80(-1)	
Minimum R9	3		Pass	≥0(-1)	
Minimum Rg	96		Pass	≥89(-1)	
Minimum Rf	84		Pass	≥70(-1)	
Res, h1	-12		Pass	-12%-23%(-1%)	
CCT (K)	3500K	3471	Pass	≤6500K	
	4000K	4176			
	5000K	5070			
Zonal Lumen Requirement	0-60°:	80.8	Pass	≥40(-3)	
Corrected UGR(Crosswise)	20.7		Pass	Premium: <22.0	
Corrected UGR(Endwise)	20.0		Pass	Premium: <22.0	



2.2 Electrical, Photometric and Chromaticity Measurements

Test date	2022-12-05	Test Ambient:	25 ± 1 ° C
Test Orientation	As intended	Stabilization Time (min)	60
Model Number	93781 (0%,3500K)	Total Operating Time(min)	75

Electrical Measurement in LITHONIA SERIES L2 32 MOVLT GEB10IS:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
STD221156	120.1	60.01	0.3049	36.44	0.9944	6.46
NB-C1	277.0	60.01	0.1362	36.62	0.9705	13.92

**Photometric Measurement in LITHONIA SERIES L2 32 MOVLT GEB10IS –
 Goniophotometer Method(Test Distance: 26.00m):**

Parameter	Result	
Test Voltage (V)	120	277
Frequency (Hz)	60	60
Total Luminous (lm)	5419.5	5448.0
Luminous Efficacy (lm/W)	148.74	148.76
Zonal lumens in the 0-60° zone (%)	80.8	--
Corrected UGR(Crosswise)	20.7	--
Corrected UGR(Endwise)	20.0	--
Beam Angle (°)	117.8	--
Center Beam Candle Power (cd)	1847	--

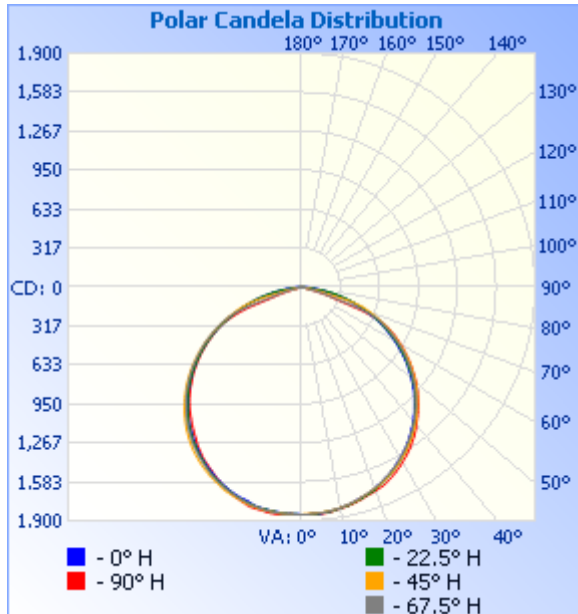


Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,462.4	27%
0-40	2,421.0	44.7%
0-60	4,376.5	80.8%
60-90	1,035.2	19.1%
70-100	315.8	5.8%
90-120	3.2	0.1%
0-90	5,411.7	99.9%
90-180	7.2	0.1%
0-180	5,418.9	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	175.5	3.2%	90-100	1.1	0%
10-20	507.0	9.4%	100-110	1.0	0%
20-30	779.9	14.4%	110-120	1.1	0%
30-40	958.6	17.7%	120-130	0.9	0%
40-50	1,016.8	18.8%	130-140	0.9	0%
50-60	938.8	17.3%	140-150	0.8	0%
60-70	720.5	13.3%	150-160	0.7	0%
70-80	280.9	5.2%	160-170	0.5	0%
80-90	33.9	0.6%	170-180	0.2	0%

Photometric Data



Illuminance at a Distance

	Center Beam fc	Beam Width	
4.0ft	115.5 fc	13.0 ft	13.4 ft
8.0ft	28.9 fc	26.0 ft	26.8 ft
12.0ft	12.8 fc	39.0 ft	40.2 ft
16.0ft	7.2 fc	51.9 ft	53.6 ft
20.0ft	4.6 fc	64.9 ft	67.0 ft

■ Vert. Spread: 116.7°
■ Horiz. Spread: 118.3°

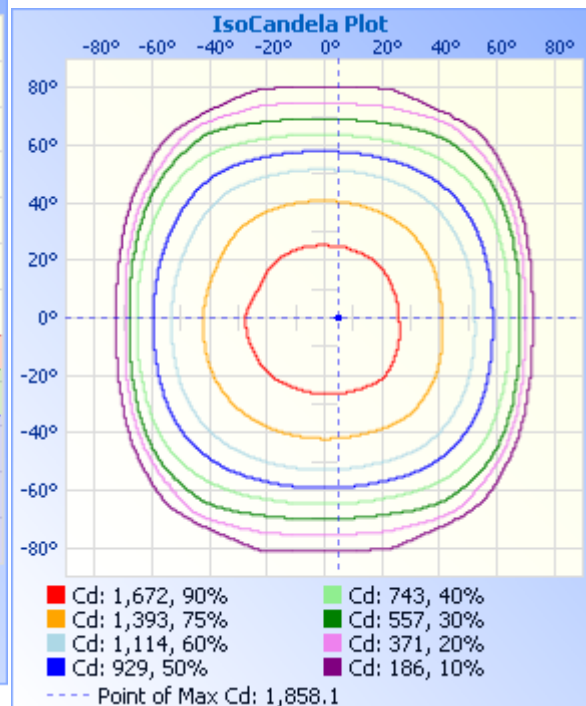
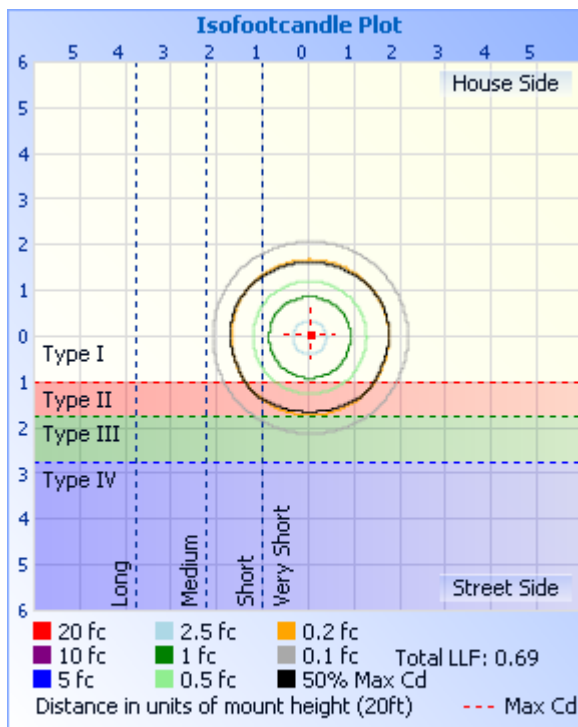




Table--1

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	1847	1847	1847	1847	1847	1847	1847	1847	1847	1847	1847	1847	1847	1847	1847	1847	
5	1857	1842	1841	1840	1845	1842	1840	1843	1849	1844	1843	1844	1841	1843	1846	1849	
10	1844	1822	1825	1824	1822	1824	1820	1823	1825	1832	1826	1822	1826	1829	1835	1832	
15	1815	1787	1796	1789	1782	1792	1787	1784	1797	1799	1799	1793	1787	1799	1812	1800	
20	1754	1741	1749	1741	1743	1750	1742	1737	1761	1757	1757	1749	1747	1754	1771	1756	
25	1680	1679	1689	1682	1681	1688	1683	1678	1715	1702	1700	1689	1688	1694	1716	1701	
30	1603	1605	1613	1608	1606	1617	1614	1602	1643	1633	1627	1612	1613	1617	1650	1627	
35	1501	1517	1525	1521	1518	1528	1536	1520	1557	1553	1543	1528	1526	1534	1567	1545	
40	1400	1414	1423	1415	1415	1427	1443	1421	1454	1459	1446	1429	1428	1433	1466	1446	
45	1293	1302	1307	1298	1298	1313	1333	1312	1342	1349	1332	1316	1311	1315	1347	1332	
50	1165	1175	1176	1167	1170	1185	1210	1192	1217	1226	1207	1188	1184	1184	1218	1204	
55	1026	1036	1035	1026	1029	1042	1075	1058	1079	1088	1068	1050	1044	1040	1072	1063	
60	874	884	880	870	877	889	924	911	932	937	918	891	889	887	911	910	
65	715	725	720	711	716	732	766	754	774	775	754	727	718	713	744	745	
70	294	473	550	543	546	563	595	481	350	522	584	557	544	542	567	486	
75	39.9	89.2	298	372	373	391	276	107	64.6	137	353	386	373	372	286	90.5	
80	13.8	13.7	23.7	213	212	228	27.4	10.8	12.1	11.1	40.5	226	209	213	19.4	14.3	
85	11.8	11.6	10.1	20.8	78.3	16.0	8.37	9.00	10.2	9.15	8.21	29.4	75.3	12.9	10.5	12.2	
90	0.01	0.76	2.40	3.49	4.24	3.49	1.47	0.01	0.00	0.28	1.97	3.20	1.88	3.59	2.01	0.26	
95	0.00	0.39	1.64	1.55	2.72	1.43	0.82	0.00	0.00	0.00	0.79	1.15	1.46	1.65	1.19	0.08	
100	0.00	0.05	0.62	1.06	3.24	0.89	0.20	0.00	0.03	0.10	0.50	1.08	2.43	1.31	0.71	0.21	
105	0.03	0.43	0.47	1.08	3.43	0.86	0.25	0.00	0.40	0.36	0.62	1.28	3.21	1.51	0.84	0.72	
110	0.29	0.49	0.49	1.13	2.87	0.94	0.31	0.08	0.58	0.54	0.82	1.62	3.43	1.90	1.10	0.87	
115	0.29	0.49	0.72	1.13	2.27	1.11	0.41	0.21	0.74	0.69	1.01	1.62	3.21	1.88	1.33	0.98	
120	0.34	0.49	0.72	1.01	1.76	1.09	0.48	0.32	0.74	0.80	1.11	1.52	2.84	1.88	1.38	1.03	
125	0.34	0.49	0.72	1.05	0.96	0.89	0.71	0.34	0.76	0.92	1.14	1.48	1.93	1.55	1.38	1.11	
130	0.71	0.64	0.72	1.15	1.16	1.26	0.74	0.77	1.05	1.16	1.19	1.68	1.46	1.63	1.40	1.25	
135	0.82	0.72	0.72	1.23	0.69	1.46	0.74	0.80	1.06	1.21	1.21	1.80	1.23	1.75	1.43	1.30	
140	0.82	0.72	0.72	1.35	0.67	1.53	0.89	0.80	1.19	1.23	1.34	1.80	0.89	1.88	1.53	1.35	
145	0.82	0.74	0.94	1.35	0.69	1.53	1.20	0.82	1.24	1.26	1.46	1.85	0.96	1.88	1.68	1.43	
150	0.82	1.00	1.06	1.35	0.89	1.53	1.37	1.01	1.27	1.36	1.63	1.87	1.09	1.87	1.76	1.70	
155	0.97	1.13	1.11	1.38	1.11	1.53	1.53	1.19	1.45	1.46	1.76	1.87	1.24	1.51	1.76	1.86	
160	1.27	1.13	1.26	1.48	1.38	1.55	1.55	1.43	1.58	1.57	1.88	1.87	1.43	1.43	2.14	2.02	
165	1.61	1.59	1.48	1.74	1.46	1.87	1.73	1.70	1.77	1.70	2.00	1.89	1.68	1.51	2.24	2.10	
170	1.97	1.93	1.93	1.84	1.51	1.92	2.11	2.04	2.16	2.08	2.23	1.99	1.68	1.51	2.17	2.28	
175	2.16	2.08	2.05	1.84	1.51	1.90	2.40	2.12	2.24	2.13	2.20	1.99	1.68	1.51	2.04	2.25	
180	2.16	2.16	2.10	1.65	1.51	1.90	2.22	2.17	2.24	2.13	2.08	2.02	1.71	1.51	1.96	2.28	



2.2 Electrical, Photometric and Chromaticity Measurements

Test date	2022-12-05	Test Ambient:	25 ± 1 ° C
Test Orientation	As intended	Stabilization Time (min)	60
Model Number	93781 (0%,3500K)	Total Operating Time(min)	61

Electrical Measurement in LITHONIA SERIES L2 32 MOVLT GEB10IS:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
STD221156	120.0	60	0.3063	36.62	0.9964	6.26
NB-C1	277.0	60	0.1366	36.80	0.9725	13.72

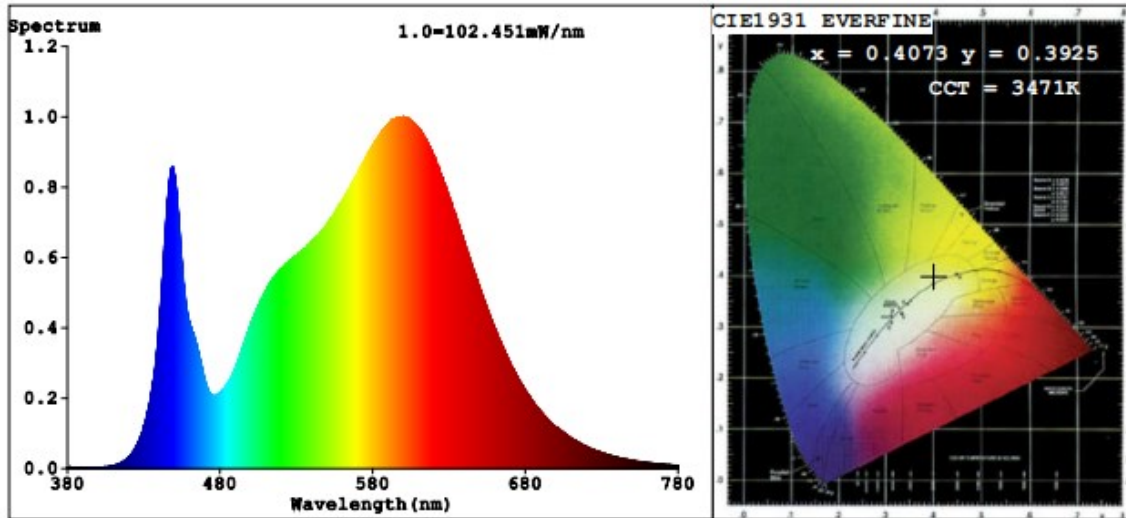
**Chromaticity Measurement in LITHONIA SERIES L2 32 MOVLT GEB10IS -
 Sphere-Spectroradiometer Method(Self-absorption:1.0826)(4π geometry):**

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3471
Duv	0.0003
Chromaticity (x, y)	x=0.4073 y=0.3925
Chromaticity (u', v')	u'=0.2363 v'=0.5123
Color Rendering Index (CRI)	82.5
R9	3
Rg	96
Rf	84
Rcs,h1(%)	-12

Photometric Measurement –Sphere-Spectroradiometer Method:

Parameter	Result	
	Test Voltage (V)	120
Frequency (Hz)	60	60
Total Luminous (lm)	5479	5508
Luminous Efficacy (lm/W)	149.62	149.67

Spectral Power Distribution & Chromaticity Diagram



R1 =81	R2 =89	R3 =96	R4 =82	R5 =81	R6 =86	R7 =84		
R8 =61	R9 =3	R10=76	R11=81	R12=67	R13=83	R14=98	R15=73	

TM30

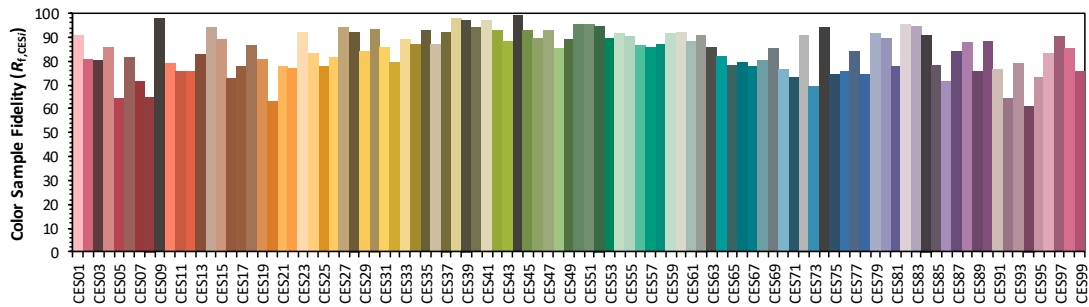
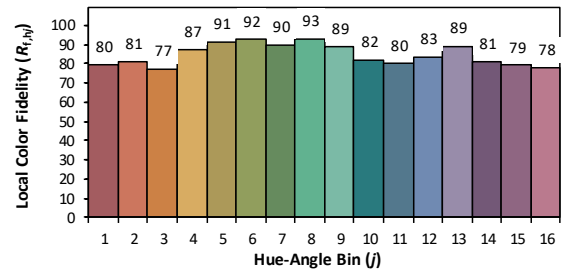
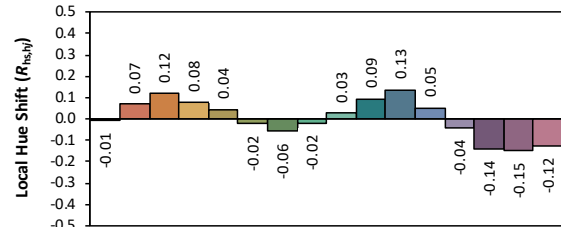
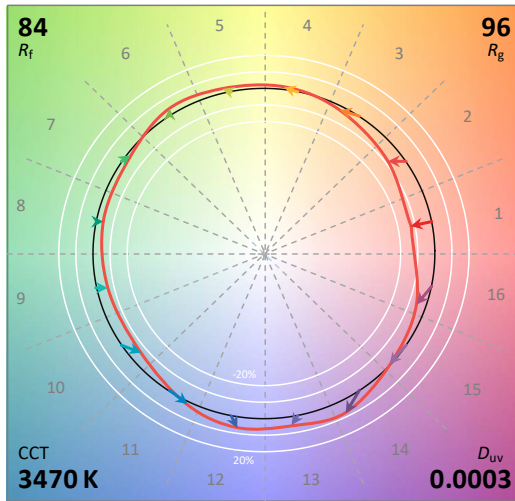
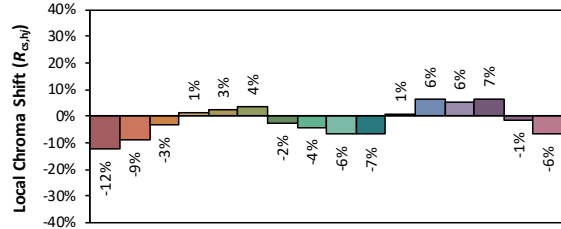
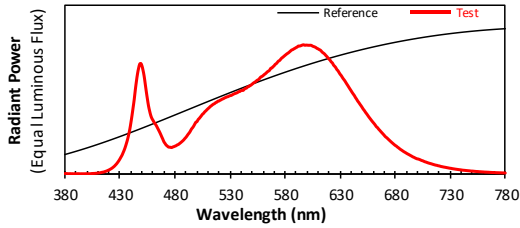
ANSI/IES TM-30-18 Color Rendition Report

Source: 01.JT.CC2835W80P03

Manufacturer: P.Q.L., Inc.

Date: 2022-12-05

Model: 93781 (0%, 3500K)



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.4073
 y 0.3924
 u' 0.2363
 v' 0.5122

CIE 13.3-1995
(CRI)
 R_a 82
 R_g 3

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.0



2.3 Electrical, Photometric and Chromaticity Measurements

Test date	2022-12-05	Test Ambient:	25 ± 1 ° C
Test Orientation	As intended	Stabilization Time (min)	60
Model Number	93781 (50%,4000K)	Total Operating Time(min)	61

Electrical Measurement in LITHONIA SERIES L2 32 MOVLT GEB10IS:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
STD221156	120.0	60	0.2913	34.82	0.9961	6.31
NB-C1	277.0	60	0.1299	34.99	0.9722	13.78

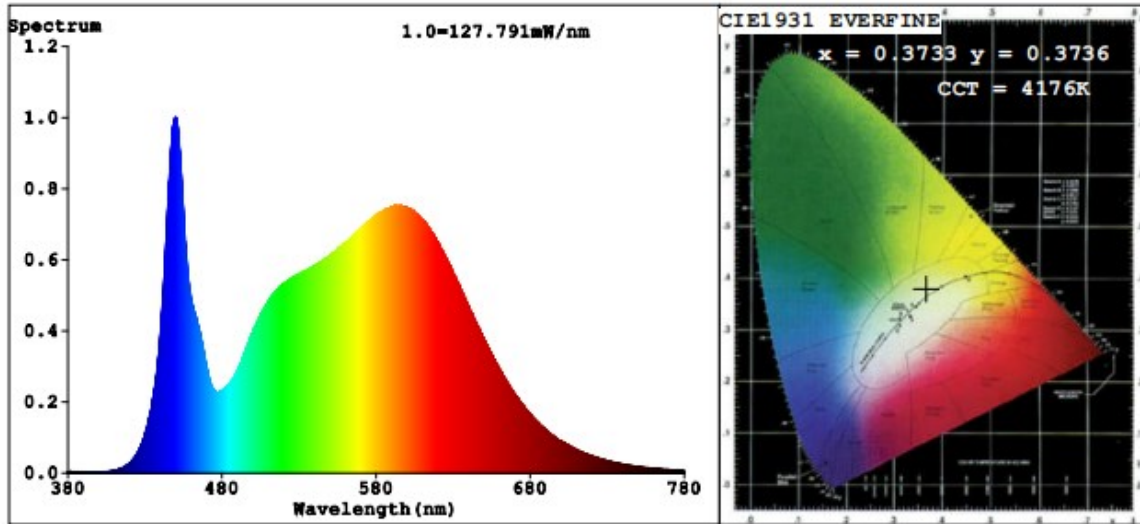
**Chromaticity Measurement in LITHONIA SERIES L2 32 MOVLT GEB10IS -
 Sphere-Spectroradiometer Method(Self-absorption:1.0830)(4π geometry):**

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	4176
Duv	0.0007
Chromaticity (x, y)	x=0.3733 y=0.3736
Chromaticity (u', v')	u'=0.2217 v'=0.4991
Color Rendering Index (CRI)	84.1
R9	11
Rg	96
Rf	85
Rcs,h1(%)	-12

Photometric Measurement –Sphere-Spectroradiometer Method:

Parameter	Result	
Test Voltage (V)	120	277
Frequency (Hz)	60	60
Total Luminous (lm)	5696	5726
Luminous Efficacy (lm/W)	163.58	163.65

Spectral Power Distribution & Chromaticity Diagram



R1 =83	R2 =90	R3 =95	R4 =84	R5 =83	R6 =86	R7 =87		
R8 =66	R9 =11	R10=76	R11=83	R12=63	R13=84	R14=97	R15=76	

TM30

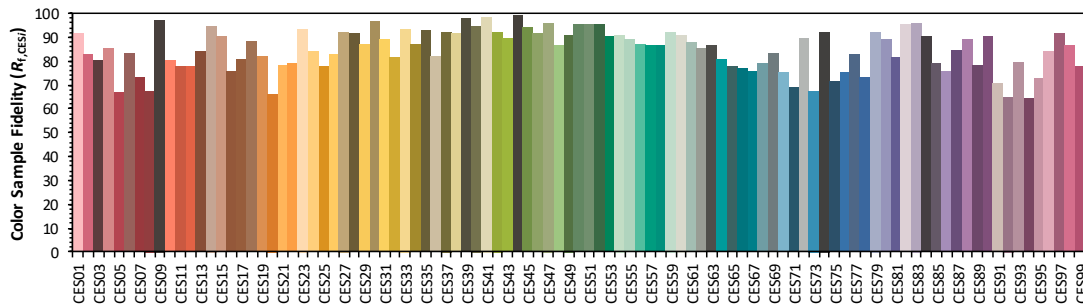
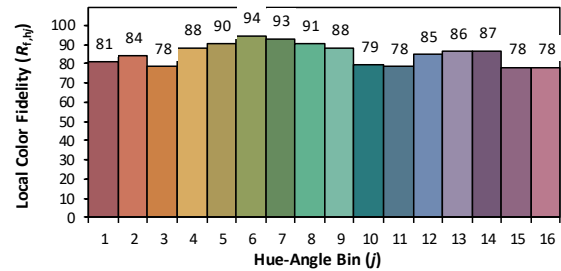
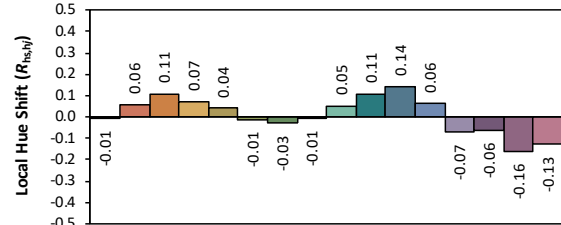
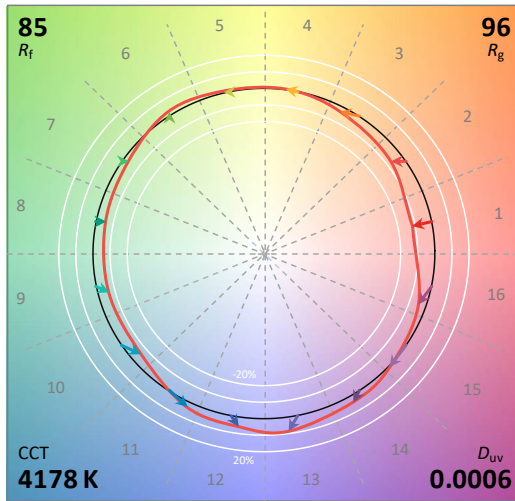
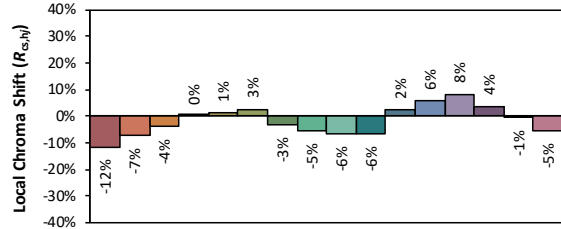
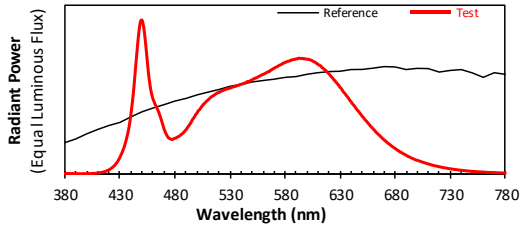
ANSI/IES TM-30-18 Color Rendition Report

Source: 01.JT.CC2835W80P03

Manufacturer: P.Q.L., Inc.

Date: 2022-12-05

Model: 93781 (50%, 4000K)



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3733
 y 0.3734
 u' 0.2217
 v' 0.4991

CIE 13.3-1995
(CRI)
 R_a 84
 R_g 11

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.0



2.4 Electrical, Photometric and Chromaticity Measurements

Test date	2022-12-05	Test Ambient:	25 ± 1 ° C
Test Orientation	As intended	Stabilization Time (min)	60
Model Number	93781 (100%,5000K)	Total Operating Time(min)	61

Electrical Measurement in LITHONIA SERIES L2 32 MOVLT GEB10IS:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
STD221156	120.0	60	0.3030	36.22	0.9963	6.28
NB-C1	277.0	60	0.1351	36.40	0.9725	13.75

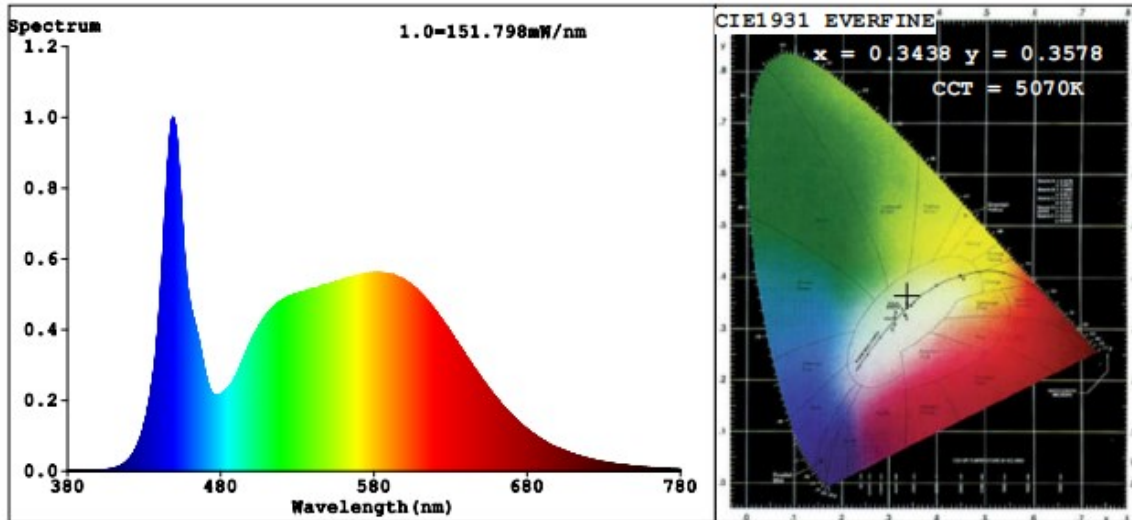
**Chromaticity Measurement in LITHONIA SERIES L2 32 MOVLT GEB10IS -
 Sphere-Spectroradiometer Method(Self-absorption:1.0832)(4π geometry):**

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	5070
Duv	0.0036
Chromaticity (x, y)	x=0.3438 y=0.3578
Chromaticity (u', v')	u'=0.2082 v'=0.4875
Color Rendering Index (CRI)	83.1
R9	7
Rg	96
Rf	84
Rcs,h1(%)	-12

Photometric Measurement –Sphere-Spectroradiometer Method:

Parameter	Result	
Test Voltage (V)	120	277
Frequency (Hz)	60	60
Total Luminous (lm)	5510	5539
Luminous Efficacy (lm/W)	152.13	152.17

Spectral Power Distribution & Chromaticity Diagram



R1 =81	R2 =87	R3 =92	R4 =84	R5 =83	R6 =83	R7 =87		
R8 =68	R9 =7	R10=70	R11=84	R12=63	R13=83	R14=96	R15=75	

TM30

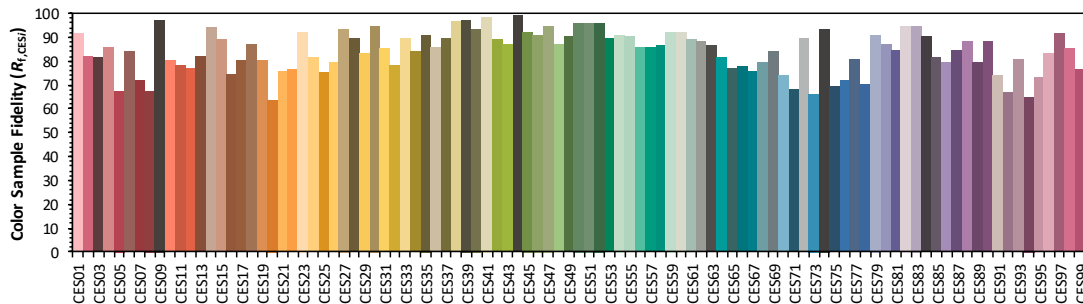
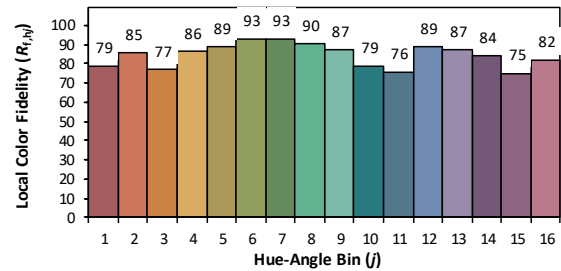
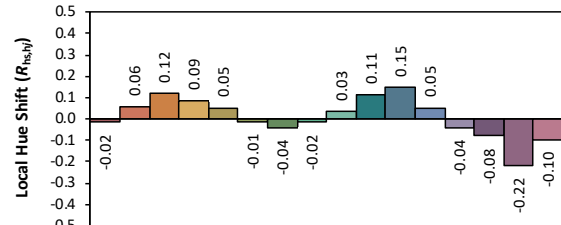
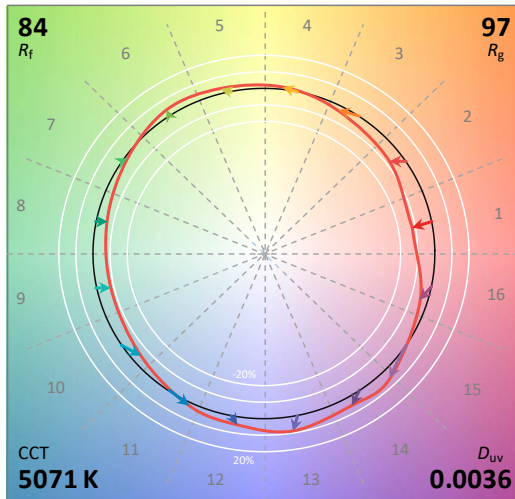
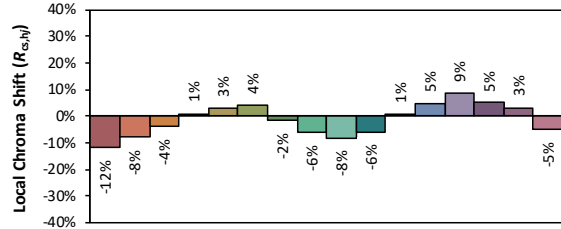
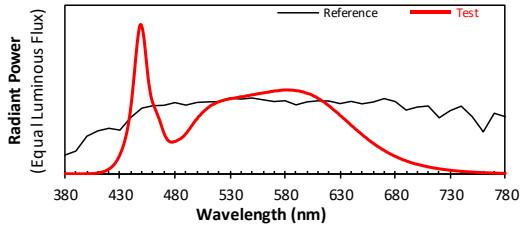
ANSI/IES TM-30-18 Color Rendition Report

Source: 01.JT.CC2835W80P03

Manufacturer: P.Q.L., Inc.

Date: 2022-12-05

Model: 93781 (100%, 5000K)



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3437
 y 0.3576
 u' 0.2082
 v' 0.4874

CIE 13.3-1995
(CRI)
 R_a 83
 R_g 8

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.0



2.5 Data comparison for different power

Test date	2022-12-05	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	60
Model Number	93781	Total Operating Time(min)	61

Sample No.	Wattage and CCT setting	Test Voltage (V)	Flux(lm)	P(W)	Luminous Efficacy lm/W
STD221156NB-C1	20W,3500K setting	120.0	3235	20.28	159.52
STD221156NB-C1	28W,3500K setting	120.0	4508	29.28	153.96
STD221156NB-C1	35W,3500K setting	120.0	5419.5	36.44	148.74



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-707	Temperature Probe 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-709	Hygrothermograph for Goniophotometer	2022-01-03	2023-01-02
Uncertainty(K=2): Photometric Measurement (Sphere):3.40% Chromaticity Measurement(Sphere):44.8K Photometric Measurement(Goniophotometer):3.64%			

4. Product Photo



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