



LM-79-08 Test Report

For

P.Q.L., Inc.

2285 Ward Avenue / Simi Valley, CA 93065

Model name(s):
93780

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,
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Test & Report By:

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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	93780	
Representative (Tested) Model	93780 (0%,3500K) 93780 (50%,4000K) 93780 (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		
LED Model	01.JT.CC2835W80P03	
Dimming	Continuous	
Integral Controls	NO	
Sample Number	STD221156NB-A1	
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	25W/20W/15W (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)	
				Standard: >=	Premium: >=
Minimum Total Luminous	3896.2		Pass	>=375 lm/ft (-10%)	
Minimum Luminous Efficacy	146.06		Pass	Standard: >= 115(-3%)	Premium: >= 130(-3%)
Minimum Power Factor	0.9748		Pass	>= 0.9(-3%)	
Maximum THD %	14.55		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	3464	Pass	<=6500K	
	4000K	4170			
	5000K	5055			
Zonal Lumen Requirement	0-60°:	80.9	Pass	>= 40(-3)	
Corrected UGR(Crosswise)	20.0		Pass	Premium: <22.0	
Corrected UGR(Endwise)	18.5		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	93780 (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	119.9	60.01	0.2254	26.87	0.9954	7.33
NB-A1	277.1	60.01	0.0995	26.92	0.9761	14.22

**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)	3924.4	3896.2
Luminous Efficacy (lm/W)	146.06	144.75
Zonal lumens in the 0-60° zone (%)	80.9	--
Corrected UGR(Crosswise)	20.0	--
Corrected UGR(Endwise)	18.5	--
Beam Angle (°)	117.5	--
Center Beam Candle Power (cd)	1354	--



Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,065.7	27.2%
0-40	1,760.7	44.9%
0-60	3,174.1	80.9%
60-90	746.7	19%
70-100	226.6	5.8%
90-120	0.8	0%
0-90	3,920.8	99.9%
90-180	3.3	0.1%
0-180	3,924.0	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	128.3	3.3%	90-100	0.2	0%
10-20	370.0	9.4%	100-110	0.2	0%
20-30	567.3	14.5%	110-120	0.4	0%
30-40	695.0	17.7%	120-130	0.5	0%
40-50	735.4	18.7%	130-140	0.5	0%
50-60	678.0	17.3%	140-150	0.5	0%
60-70	520.2	13.3%	150-160	0.4	0%
70-80	204.7	5.2%	160-170	0.3	0%
80-90	21.7	0.6%	170-180	0.1	0%

Photometric Data

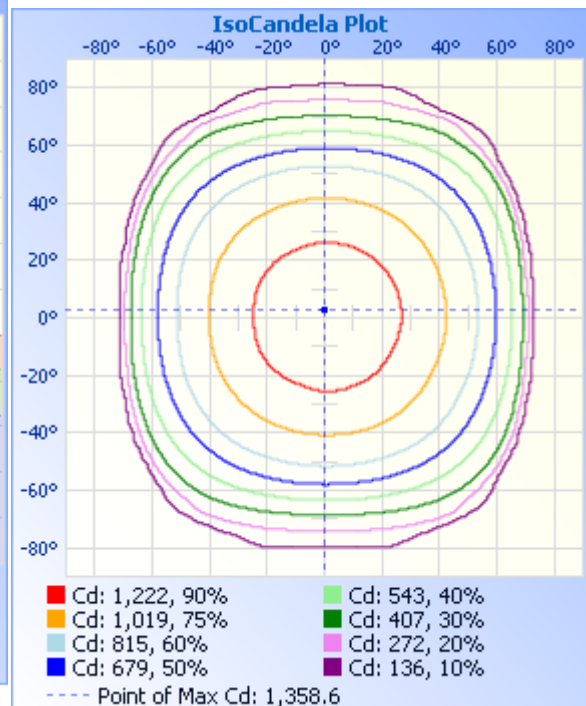
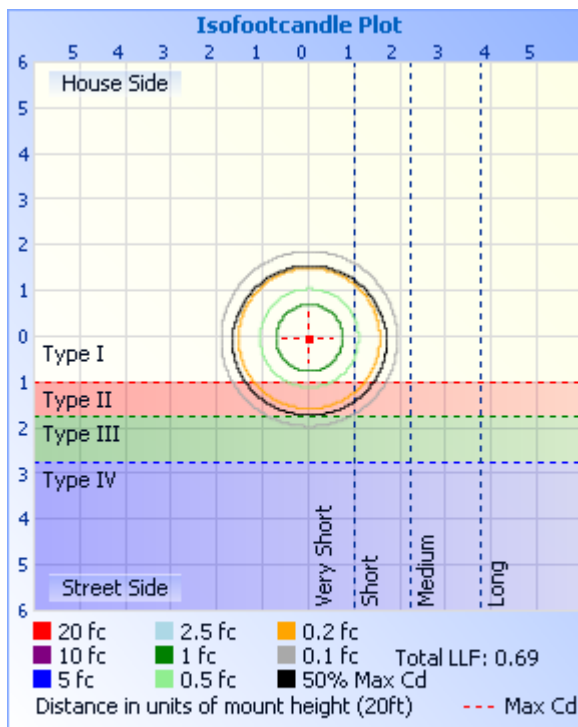
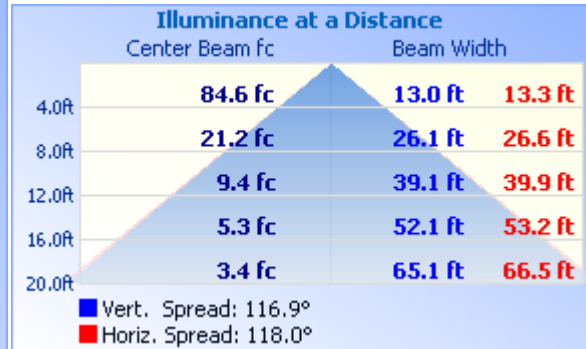
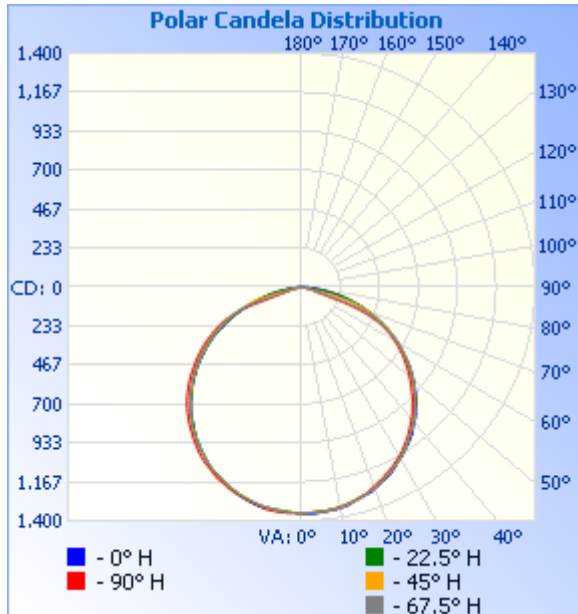




Table--1 UNIT: cd

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	1354	1354	1354	1354	1354	1354	1354	1354	1354	1354	1354	1354	1354	1354	1354	1354		
5	1353	1351	1349	1349	1355	1348	1352	1352	1350	1348	1346	1347	1347	1343	1347	1347		
10	1342	1340	1336	1337	1344	1339	1340	1336	1334	1331	1331	1327	1337	1331	1333	1332		
15	1314	1315	1313	1317	1315	1312	1315	1311	1308	1305	1306	1300	1311	1307	1304	1305		
20	1281	1283	1280	1285	1286	1280	1278	1277	1269	1270	1271	1269	1270	1271	1269	1268		
25	1239	1240	1240	1240	1243	1236	1235	1232	1222	1226	1220	1217	1225	1225	1226	1226		
30	1187	1185	1186	1184	1186	1179	1182	1178	1171	1170	1165	1161	1168	1166	1172	1171		
35	1123	1123	1121	1121	1127	1122	1116	1114	1103	1101	1097	1096	1102	1099	1103	1105		
40	1051	1050	1051	1049	1052	1047	1046	1042	1026	1027	1022	1021	1022	1026	1030	1031		
45	972	970	970	969	973	969	964	961	941	942	935	935	937	938	943	948		
50	879	876	880	878	879	874	873	869	847	850	845	839	841	843	849	855		
55	776	778	780	777	777	773	772	770	751	747	739	734	735	737	745	755		
60	667	670	672	669	666	665	664	660	648	635	629	620	621	623	635	646		
65	545	555	556	553	552	551	549	540	521	516	510	496	489	500	517	527		
70	355	410	433	430	429	427	426	353	285	341	386	369	363	374	392	388		
75	76.5	82.3	285	306	302	304	217	78.2	71.3	71.2	221	247	239	251	247	78.5		
80	6.69	6.42	29.6	185	179	176	16.3	7.28	6.51	7.08	31.9	133	124	137	27.1	6.25		
85	5.25	4.94	4.14	6.28	74.4	5.01	4.94	5.99	6.26	5.80	4.68	8.63	34.4	3.38	4.06	4.88		
90	0.01	0.02	0.01	1.48	2.44	1.40	0.00	0.02	0.00	0.10	0.44	1.49	0.13	0.91	0.00	0.00		
95	0.00	0.00	0.00	0.28	0.07	0.28	0.00	0.00	0.00	0.00	0.07	0.30	0.15	0.20	0.00	0.00		
100	0.00	0.00	0.00	0.07	0.07	0.10	0.00	0.00	0.00	0.05	0.22	0.30	0.35	0.27	0.15	0.00		
105	0.00	0.00	0.00	0.07	0.10	0.10	0.00	0.00	0.20	0.27	0.35	0.55	0.60	0.47	0.35	0.25		
110	0.00	0.00	0.20	0.27	0.30	0.15	0.05	0.00	0.37	0.37	0.52	0.72	0.85	0.70	0.55	0.40		
115	0.07	0.17	0.32	0.32	0.32	0.35	0.35	0.07	0.52	0.52	0.67	0.70	0.87	0.82	0.74	0.57		
120	0.27	0.27	0.32	0.35	0.32	0.37	0.32	0.27	0.55	0.59	0.74	0.67	0.70	0.82	0.82	0.67		
125	0.27	0.30	0.32	0.35	0.32	0.35	0.32	0.30	0.55	0.67	0.77	0.65	0.70	0.82	0.82	0.77		
130	0.35	0.32	0.45	0.47	0.32	0.67	0.35	0.32	0.80	0.92	0.84	0.82	0.55	0.89	0.92	0.79		
135	0.40	0.44	0.47	0.60	0.32	0.67	0.40	0.45	0.80	0.89	0.84	0.90	0.55	0.97	0.94	0.87		
140	0.50	0.52	0.52	0.77	0.32	0.72	0.55	0.47	0.87	0.89	0.94	0.95	0.55	1.17	0.99	0.94		
145	0.70	0.59	0.64	0.77	0.32	0.77	0.74	0.60	0.87	0.92	1.07	1.09	0.60	1.17	1.12	1.04		
150	0.70	0.69	0.72	0.85	0.47	0.84	0.82	0.77	0.90	1.02	1.19	1.22	0.72	1.12	1.14	1.24		
155	0.75	0.84	0.72	0.87	0.72	0.97	0.97	0.84	1.02	1.11	1.31	1.29	0.80	0.97	1.19	1.27		
160	0.77	0.87	0.84	0.99	0.77	1.07	1.17	0.89	1.09	1.16	1.41	1.29	0.95	0.99	1.24	1.32		
165	1.09	1.16	1.09	1.14	0.90	1.07	1.21	1.17	1.22	1.19	1.49	1.32	1.15	1.09	1.24	1.44		
170	1.32	1.59	1.34	1.14	1.12	1.09	1.49	1.44	1.54	1.54	1.64	1.47	1.22	1.17	1.24	1.59		
175	1.52	1.59	1.46	1.14	1.17	1.09	1.61	1.54	1.67	1.59	1.64	1.47	1.17	1.17	1.12	1.59		
180	1.52	1.59	1.46	1.17	1.17	1.09	1.59	1.59	1.69	1.51	1.59	1.47	1.20	1.17	1.09	1.59		



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	93780 (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	0.2258	26.98	0.9956	7.28
NB-A1	277.0	60	0.1000	27.03	0.9763	14.16

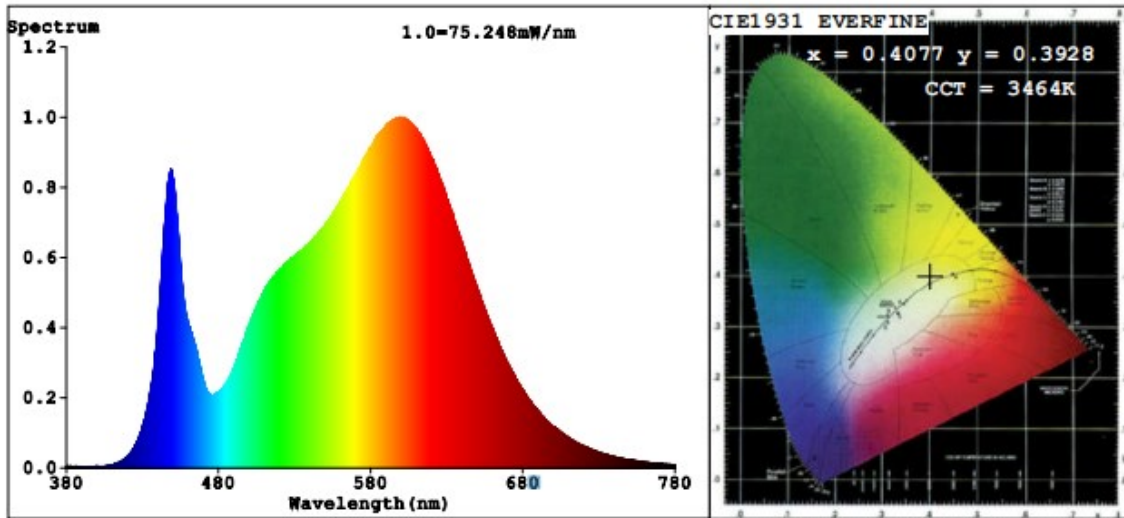
**Chromaticity Measurement in LITHONIA SERIES L2 32 MOVLT GEB10IS -
 Sphere-Spectroradiometer Method(Self-absorption:1.0549)(4π geometry):**

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3464
Duv	0.0004
Chromaticity (x, y)	x=0.4077 y=0.3928
Chromaticity (u', v')	u'=0.2364 v'=0.5125
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	277
Frequency (Hz)	60	60
Total Luminous (lm)	3971	3942
Luminous Efficacy (lm/W)	147.18	145.84

Spectral Power Distribution & Chromaticity Diagram



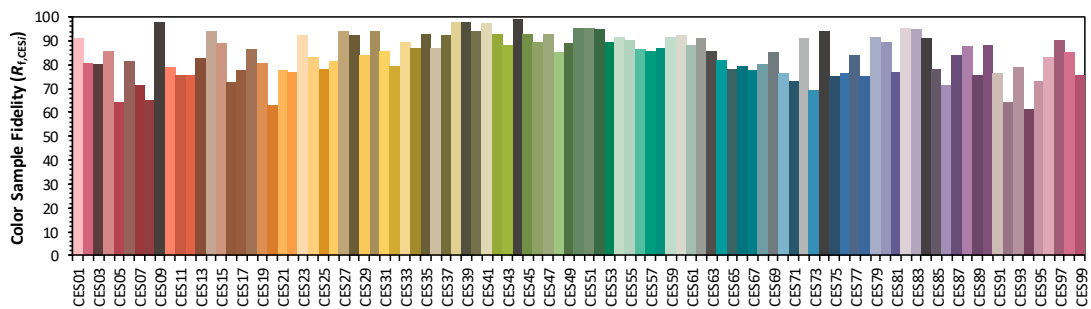
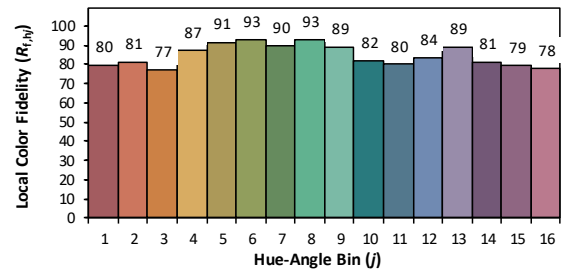
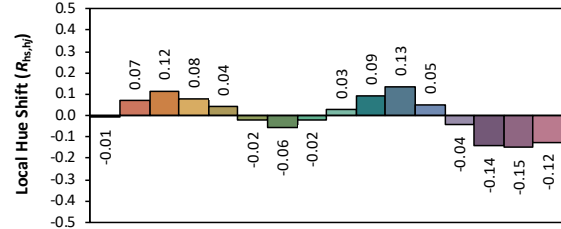
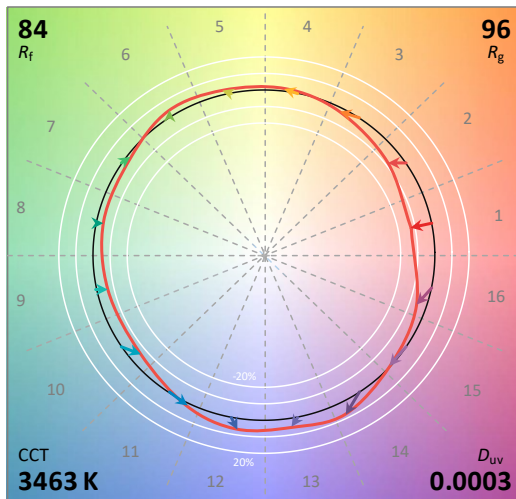
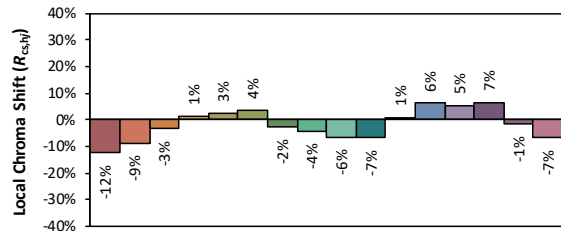
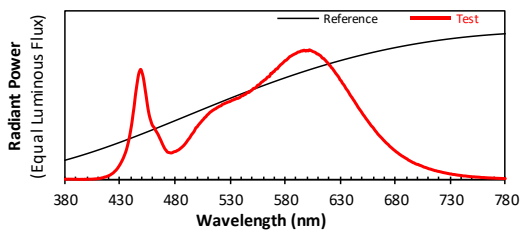
R1 =81	R2 =89	R3 =96	R4 =82	R5 =81	R6 =86	R7 =84		
R8 =60	R9 =3	R10=76	R11=81	R12=67	R13=83	R14=98	R15=73	



TM30

ANSI/IES TM-30-18 Color Rendition Report

Source: 01.JT.CC2835W80P03 Manufacturer: P.Q.L., Inc.
 Date: 2022-12-05 Model: 93780 (0%, 3500K)



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

x	0.4077	CIE 13.3-1995 (CRI)
y	0.3927	
u'	0.2365	
v'	0.5124	
		R_a 83
		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	93780 (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	0.2153	25.69	0.9943	7.48
NB-A1	277.0	60	0.0953	25.74	0.9748	14.55

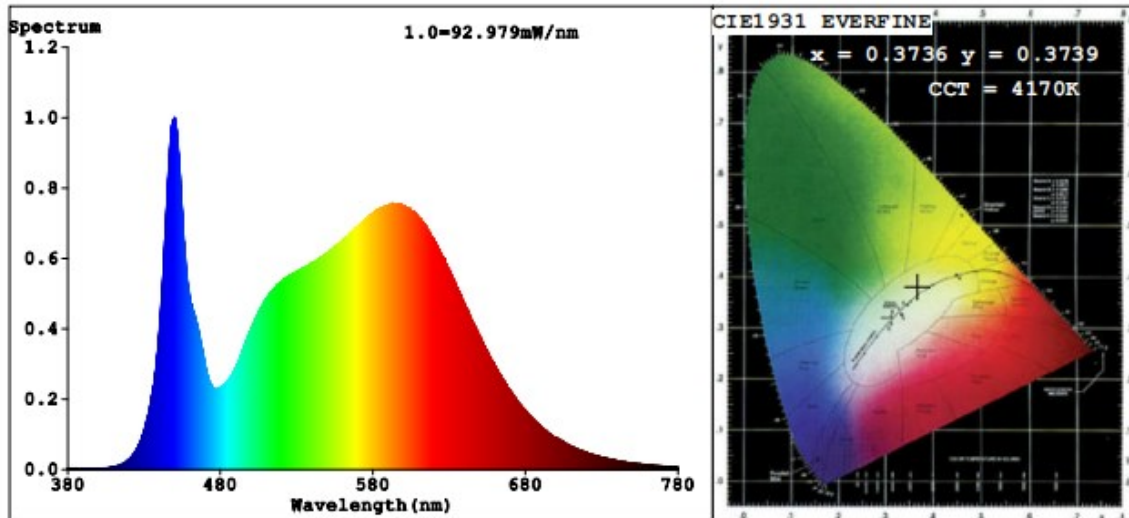
**Chromaticity Measurement in LITHONIA SERIES L2 32 MOVLT GEB10IS -
 Sphere-Spectroradiometer Method(Self-absorption:1.0551)(4π geometry):**

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	4170
Duv	0.0007
Chromaticity (x, y)	x=0.3736 y=0.3739
Chromaticity (u', v')	u'=0.2218 v'=0.4993
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
Frequency (Hz)	60	60
Total Luminous (lm)	4122	4092
Luminous Efficacy (lm/W)	160.45	158.97

Spectral Power Distribution & Chromaticity Diagram



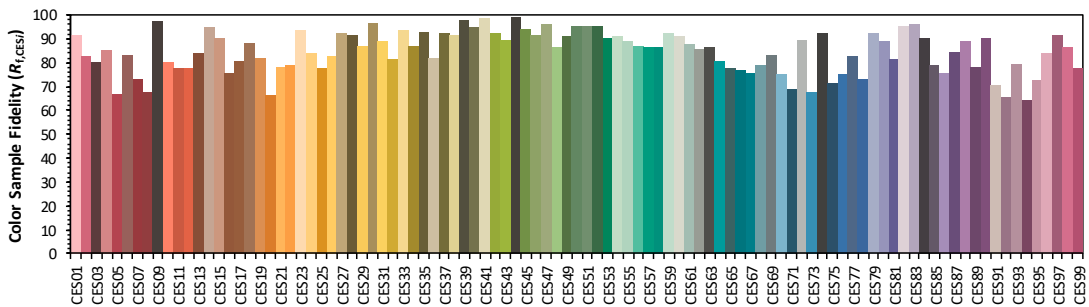
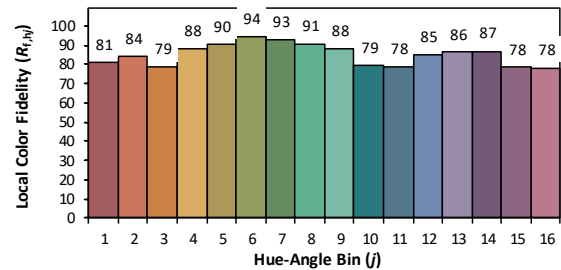
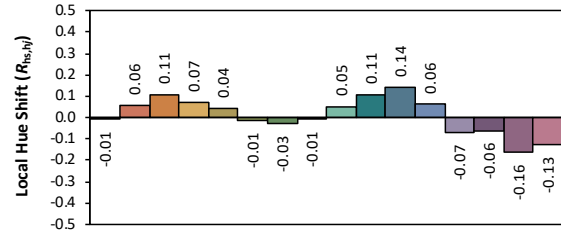
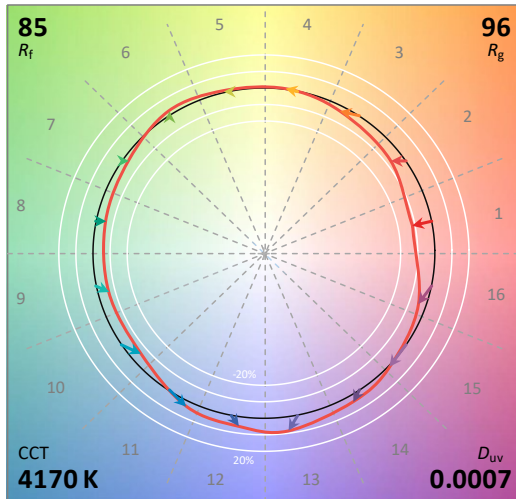
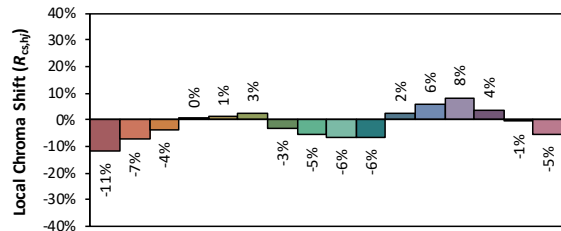
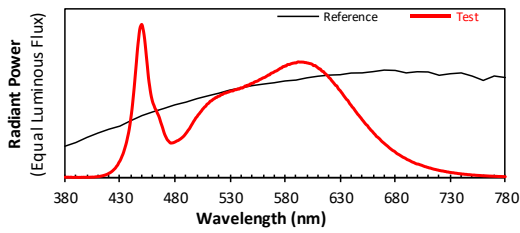
R1 =83	R2 =90	R3 =95	R4 =84	R5 =83	R6 =86	R7 =87		
R8 =66	R9 =11	R10=76	R11=83	R12=63	R13=84	R14=97	R15=76	



TM30

ANSI/IES TM-30-18 Color Rendition Report

Source: 01.JT.CC2835W80P03 Manufacturer: P.Q.L., Inc.
 Date: 2022-12-05 Model: 93780 (50%, 4000K)



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

x **0.3736**
 y **0.3738**
 u' **0.2218**
 v' **0.4992**

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	93780 (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	0.2231	26.68	0.9965	7.15
NB-A1	277.0	60	0.0988	26.74	0.9772	14.06

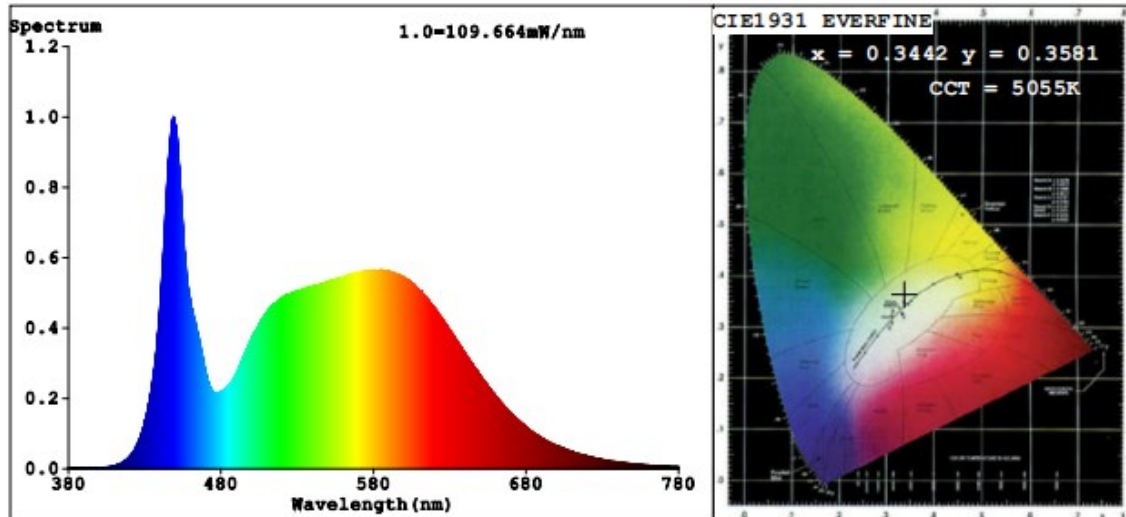
Chromaticity Measurement in LITHONIA SERIES L2 32 MOVLT GEB10IS - Sphere-Spectroradiometer Method(Self-absorption:1.0553)(4π geometry):

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	5055
Duv	0.0036
Chromaticity (x, y)	x=0.3442 y=0.3581
Chromaticity (u', v')	u'=0.2083 v'=0.4877
Color Rendering Index (CRI)	83.0
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)	3985	3956
Luminous Efficacy (lm/W)	149.36	147.94

Spectral Power Distribution & Chromaticity Diagram



R1 =81	R2 =87	R3 =92	R4 =84	R5 =82	R6 =83	R7 =87		
R8 =68	R9 =7	R10=70	R11=84	R12=63	R13=82	R14=96	R15=75	

TM30

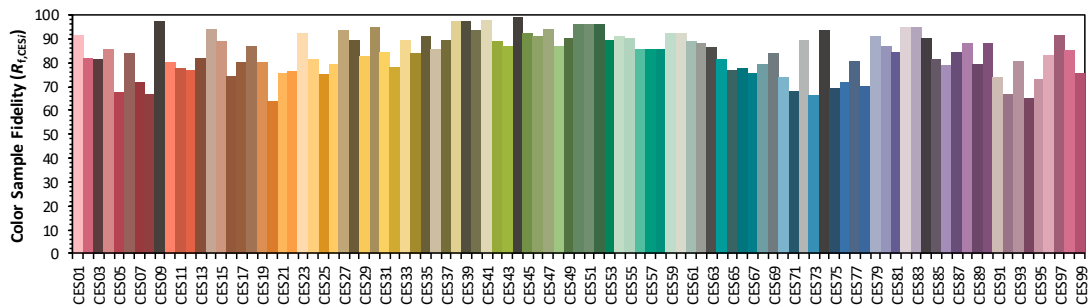
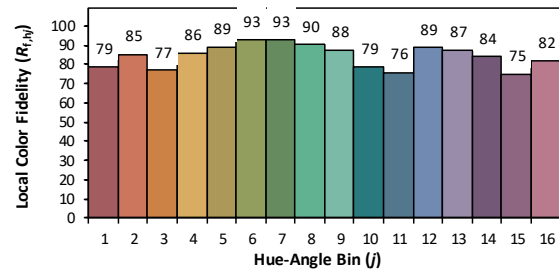
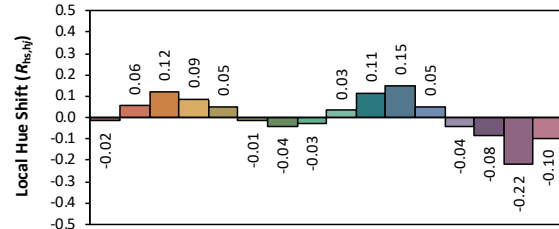
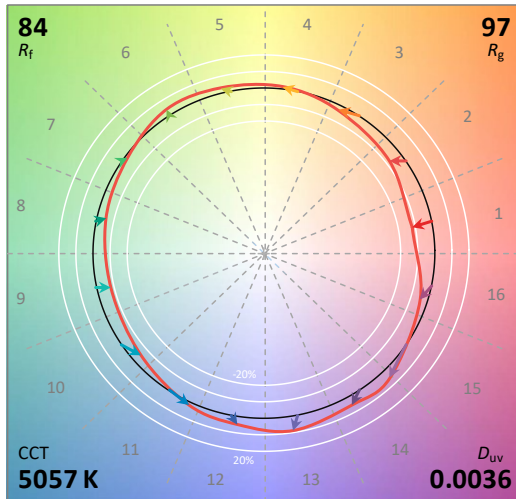
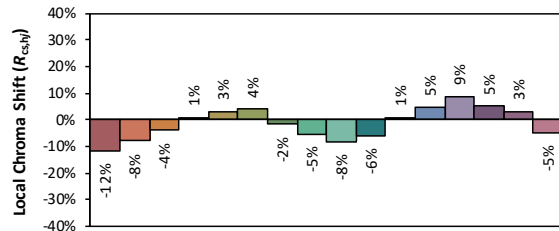
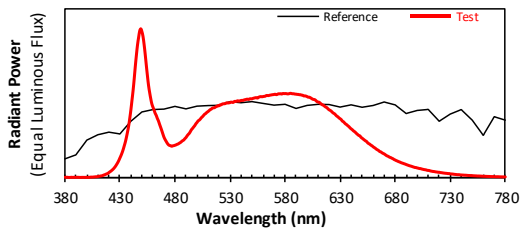
ANSI/IES TM-30-18 Color Rendition Report

Source: 01.JT.CC2835W80P03

Manufacturer: P.Q.L., Inc.

Date: 2022-12-05

Model: 93780 (100%, 5000K)



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

x 0.3441
 y 0.3580
 u' 0.2083
 v' 0.4876

CIE 13.3-1995
(CRI)
 R_a 83
 R_g 7

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	93780	Total Operating Time(min)	61

Sample No.	Wattage and CCT setting	Test Voltage (V)	Flux(lm)	P(W)	Luminous Efficacy lm/W
STD221156NB-A1	15W,3500K setting	120.0	2525	16.39	154.06
STD221156NB-A1	20W,3500K setting	120.0	3104	20.44	151.86
STD221156NB-A1	25W,3500K setting	120.0	3924.4	26.87	146.06



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 *****