



Photometric Test Report

Relevant Standards

IES LM-79-2008

Prepared For

P.Q.L., Inc.

2285 Ward Avenue

Simi Valley, CA 93065

Test Laboratory & Address:

UL-CCIC Company Limited location

2, Chengwan Road, Suzhou Industrial Park, Suzhou 21522 China

Catalog Number

55328

Project Number

4788011618

Report Number

4788011618_17

Test Date

7/12/2017

Issue Date

7/25/2017

Prepared By

Jonathan Xu

Jonathan Xu

Approved By

Duff Yang

Duff Yang

The results contained in this report pertain only to the tested sample.

This report shall not be reproduced, except in full, without written approval of Underwriters Laboratories.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



1.0 Test List

Test Item	Test	Test Date	Model Number	Tests Conducted By
1	Integrating Sphere Test for the Lower CCT	7/12/2017	55328	Gavin Yang
2	Goniophotometer Test	7/12/2017	55328	Gavin Yang

Remark (if any)

1. UL test equipment information is recorded on Meter Use in UL's Aurora database.



2.0 Production Description

Luminaire Description: 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces

Model Number: 55328

Rated Voltage: 120-277V

Frequency: 50/60Hz

LED Package: SPMWH1228xxxxxxxxx

Photos of Luminaire Characteristics





3.0 LM-79 Measurement and Test Results

3.1 Integrating Sphere Test for the lower CCT

Model No.	55328		Sample ID.	1047708	
Driver No.	N/A	Operate time (Min.)	80	Stabilization time (Min.)	70

Test Method

1.The sample was tested according to the IES LM-79-2008.
 2.Photometric paramters 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 reference standard lamp is rated current 2.6A omni-directional Incandescent lamp and was calibrated by china seprei laboratory.
 3.The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%.Photometric measurement conditions was using 4π geometry.The self-absorption factor is applied in the final test result.The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

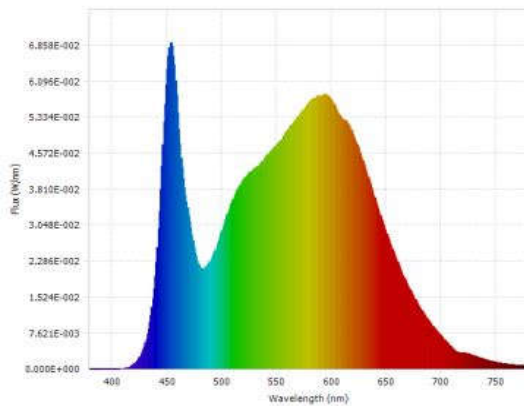
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD
25.2	120.03	60	0.2229	26.48	0.9900	9.10%

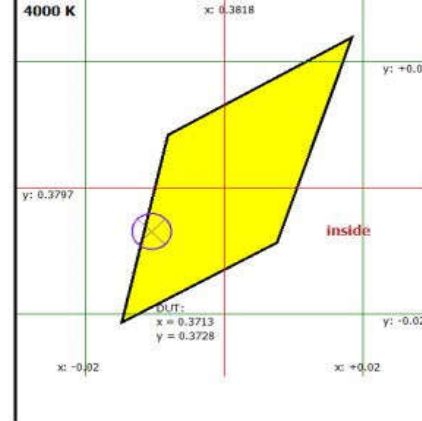
Test Results

Orientation	CCT (K)	CRI (Ra)	Duv	Luminous Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
Horizontal	4229	84.0	0.0009	3412.0	128.83	N/A

Spectral Flux Graph



Chromaticity Diagram



Spectral Result

Luminous Flux Φ(v)	3412.01 (lm)	Chrom x	0.3713
Chrom y	0.3728	Chrom u	0.2206
Chrom v	0.3323	Duv	0.0009
Chrom u'	0.2206	Chrom v'	0.4985
CCT	4229.0 (K)	Luminous Efficacy η	128.83 (lm/W)
Ra	83.96	R1	82.4
R2	91.3	R3	95.8
R4	81.2	R5	82.1
R6	87.0	R7	86.0
R8	65.8	R9	12.5
R10	78.7	R11	80.2
R12	60.3	R13	85.1
R14	98.2	R15	76.6
Rf	81.9	Rg	93.7



3.0 LM-79 Measurement and Test Results

3.2 Goniophotometer Test

Model No.	55328		Sample ID.	1047708	
Driver No.	N/A	Operate time (Min.)	80	Stabilization time (Min.)	70

Test Method

- 1.The sample was tested according to the IES LM-79-2008.
- 2.Photometric paramters were measured using a type C goniophotometer and software.
- 3.The ambient temperature shall be maintained at 25° C ± 1° C, measured at a point not more than 1 m from the sample and at the same height as the sample.The reference standard lamp is rated current 3.865A omni-directional Incandescent lamp and was calibrated by china seprei laboratory.
- 4.The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 0.5° vertical intervals and 22.5° horizontal intervals..Photometric distance was more than five times of the largest dimension of the test SSL product.

Goniophotometer Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
25.2	120.02	60	0.22235	26.43	0.9904

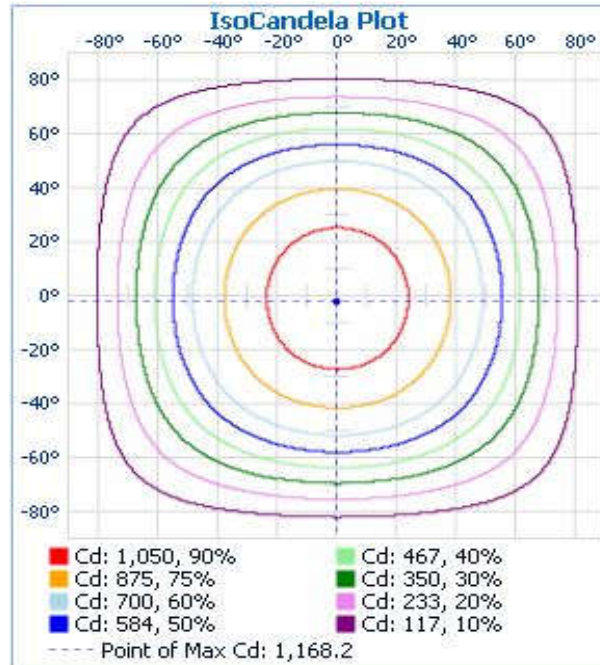
Test Result

Orientation	Flux (lm)	Field Angle (10%)		Beam Angle (50%)		Luminous Efficacy (lm/W)
		Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	
Horizontal	3348.10	161.5	162.3	110.3	114.1	126.7

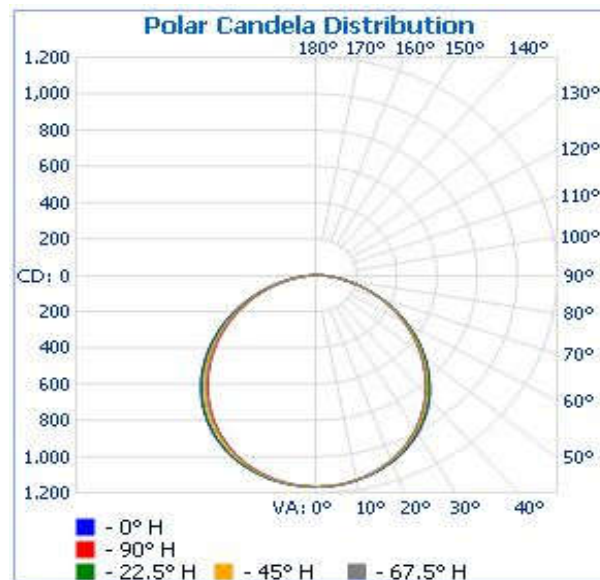


3.2 Goniophotometer Test (Cont'd)

IsoCandela Plot



Polar Candela Distribution





3.2 Goniophotometer Test (Cont'd)

Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	911.9	27.2%
0-40	1,496.5	44.7%
0-60	2,639.5	78.8%
60-90	702.1	21%
70-100	297.3	8.9%
90-120	2.3	0.1%
0-90	3,341.6	99.8%
90-180	6.2	0.2%
0-180	3,347.8	100%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-5	27.8	0.8%	90-95	0.6	0%
5-10	82.6	2.5%	95-100	0.5	0%
10-15	134.8	4.0%	100-105	0.4	0%
15-20	182.7	5.5%	105-110	0.3	0%
20-25	224.7	6.7%	110-115	0.3	0%
25-30	259.2	7.7%	115-120	0.3	0%
30-35	284.6	8.5%	120-125	0.3	0%
35-40	300.0	9.0%	125-130	0.3	0%
40-45	304.8	9.1%	130-135	0.4	0%
45-50	298.8	8.9%	135-140	0.4	0%
50-55	282.5	8.4%	140-145	0.4	0%
55-60	256.8	7.7%	145-150	0.4	0%
60-65	223.0	6.7%	150-155	0.4	0%
65-70	183.0	5.5%	155-160	0.4	0%
70-75	138.8	4.1%	160-165	0.3	0%
75-80	93.6	2.8%	165-170	0.3	0%
80-85	50.3	1.5%	170-175	0.2	0%
85-90	13.5	0.4%	175-180	0.1	0%



3.2 Goniophotometer Test (Cont'd)

Intensity Data(cd)

	0	22.5	45	67.5	90	113	135	158	180	203	225	247.5	270	293	315	338	360
0	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167
1	1166	1167	1165	1166	1167	1167	1166	1166	1167	1166	1166	1167	1167	1166	1165	1167	1166
2	1166	1166	1166	1166	1166	1166	1165	1166	1166	1166	1165	1166	1166	1166	1166	1166	1166
3	1166	1165	1164	1164	1166	1164	1164	1164	1168	1164	1164	1164	1166	1164	1164	1165	1166
4	1163	1162	1162	1163	1164	1163	1164	1165	1164	1165	1164	1163	1164	1163	1162	1162	1163
5	1162	1160	1161	1161	1162	1161	1162	1163	1163	1163	1162	1161	1162	1161	1161	1160	1162
6	1161	1160	1158	1159	1159	1160	1161	1161	1162	1161	1161	1160	1159	1159	1158	1160	1161
7	1158	1156	1156	1156	1157	1158	1157	1161	1160	1161	1157	1158	1157	1156	1156	1156	1158
8	1156	1153	1152	1153	1154	1154	1156	1157	1158	1157	1156	1154	1154	1153	1152	1153	1156
9	1152	1150	1150	1148	1150	1151	1152	1154	1156	1154	1152	1151	1150	1148	1150	1150	1152
10	1148	1147	1146	1145	1147	1147	1149	1152	1152	1152	1149	1147	1147	1145	1146	1147	1148
11	1144	1143	1142	1141	1143	1143	1146	1149	1150	1149	1146	1143	1143	1141	1142	1143	1144
12	1141	1140	1137	1136	1137	1138	1141	1146	1147	1146	1141	1138	1137	1136	1137	1140	1141
13	1137	1135	1132	1131	1132	1134	1137	1141	1143	1141	1137	1134	1132	1131	1132	1135	1137
14	1132	1130	1127	1125	1127	1128	1132	1137	1138	1137	1132	1128	1127	1125	1127	1130	1132
15	1126	1125	1121	1119	1120	1122	1127	1132	1134	1132	1127	1122	1120	1119	1121	1125	1126
16	1122	1119	1116	1113	1114	1117	1122	1126	1129	1126	1122	1117	1114	1113	1116	1119	1122
17	1117	1113	1108	1106	1107	1110	1115	1122	1124	1122	1115	1110	1107	1106	1108	1113	1117
18	1110	1107	1103	1099	1100	1104	1109	1116	1118	1116	1109	1104	1100	1099	1103	1107	1110
19	1102	1101	1095	1092	1093	1096	1102	1110	1113	1110	1102	1096	1093	1092	1095	1101	1102
20	1097	1094	1089	1085	1085	1087	1096	1103	1106	1103	1096	1087	1085	1085	1089	1094	1097
25	1058	1052	1045	1040	1039	1043	1053	1065	1070	1065	1053	1043	1039	1040	1045	1052	1058
30	1007	1002	992	984	984	989	1002	1016	1021	1016	1002	989	984	984	992	1002	1007
35	947	941	928	919	917	925	940	957	961	957	940	925	917	919	928	941	947
40	875	870	856	846	844	852	868	887	894	887	868	852	844	846	856	870	875
45	794	789	775	764	764	772	789	807	816	807	789	772	764	764	775	789	794
50	705	702	688	679	676	685	702	719	729	719	702	685	676	679	688	702	705
55	612	608	597	586	586	594	610	627	635	627	610	594	586	586	597	608	612
60	512	511	501	492	492	500	513	530	538	530	513	500	492	492	501	511	512
65	412	411	403	397	398	404	416	430	436	430	416	404	398	397	403	411	412
70	312	312	306	302	304	309	318	329	335	329	318	309	304	302	306	312	312
75	216	217	212	211	213	218	224	232	237	232	224	218	213	211	212	217	216
80	127	128	126	126	129	133	136	141	146	141	136	133	129	126	126	128	127
85	49	51	51	52	55	57	58	61	65	61	58	57	55	52	51	51	49
90	1	2	2	2	2	3	3	3	3	3	3	3	2	2	2	2	1
95	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
100	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
105	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
110	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1	0	0
115	0	0	0	0	1	0	0	1	1	1	0	0	1	0	0	0	0
120	0	0	1	0	1	1	1	1	1	1	1	1	1	0	1	0	0
125	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
130	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
135	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
140	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
145	1	1	1	1	1	2	1	1	1	1	1	2	1	1	1	1	1
150	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2
155	2	2	2	2	2	1	2	2	2	2	2	1	2	2	2	2	2
160	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
165	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
170	2	3	3	3	2	3	3	3	2	3	3	3	2	3	3	3	2
175	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2
180	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3



***** END OF REPORT. THIS PAGE INTENTIONALLY LEFT BLANK *****