



Report No.: ELC1905042E-B

## LM-79-08 Test Report

For

# Beyond LED Technology

Model name(s): AST-PG05B-40WAT2A1-abcd

Remark: "a" can be any two letters to represent lamp colors, Where "b" can be "S" or blank to represent Surge protector or None Surge protector. Where "c" can be "MS" or "PS" or blank represent Motion-sensor or PIR-sensor or None motion-sensor. "d" can be any two digits to represent CCT

Representative (Tested) Model:

AST-PG05B-40WAT2A1-abc30(tested at 0% CCT setting)

AST-PG05B-40WAT2A1-abc40(tested at 50% CCT setting)

AST-PG05B-40WAT2A1-abc50(tested at 100% CCT setting)

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

Test & Report By:

*Sherry Yang*

Engineer: Sherry Yang

Date: Jun.10, 2019

Review By:

*Jason Luo*

Manager: Jason Luo



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### 1.1 Product Information:

Organization Name	ASmart LIGHT CO., LTD	
Brand Name	ASmart	
Model Number	AST-PG05B-40WAT2A1-abcd	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Parking Garage Luminaires	
Rated Voltage / Frequency	100-277 VAC, 50/60 Hz	
Nominal Power	40W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,4000K,5000K	
LED Manufacturer	Lumileds Holding B.V.	
LED Model	L128-3080RA35000H1 L128-5080RA35000H1	
Sample Number	ELC1905042E-B1	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

#### Photo





## 1.2 Test Specifications:

Date of Receipt	Jun. 06, 2019
Date of Test	Jun. 07, 2019
Test item	<ol style="list-style-type: none"><li>1. Total Luminous Flux</li><li>2. Luminous Distribution Intensity</li><li>3. Luminous Efficacy</li><li>4. Correlated Color Temperature</li><li>5. Color Rendering Index</li><li>6. Chromaticity Coordinate</li><li>7. Electrical Parameters</li></ol>
Reference Standard	<ol style="list-style-type: none"><li>1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products</li><li>2. ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products</li><li>3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources</li><li>4. CIE 15-2004 Technical Report Colorimetry</li><li>5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source</li><li>6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems</li></ol>
Reference Work Instruction	BL-QP-033

## 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  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ , 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  $1\text{ }^{\circ}$  vertical intervals and  $22.5\text{ }^{\circ}$  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  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ . 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  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ . 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 Electrical, Photometric and Chromaticity Measurements***(Refer to Work Instruction BL-QP-033)*

<b>Test date</b>	2019-06-07	<b>Test Ambient:</b>	25.2 °C
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	90
<b>Model Number</b>	AST-PG05B-40WAT2A1-abc30 (tested at 0% CCT setting)		

**Electrical Measurement:**

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
ELC1905042	120.0	60	0.3236	38.41	0.989	12.89
E-B1	277.0	60	0.1556	38.62	0.896	13.74
<b>DLC Pass Criteria</b>					<b>&gt;= 0.9(-3%)</b>	<b>&lt;= 20(+5)</b>

**Chromaticity Measurement - Sphere-Spectroradiometer Method:**

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	80	R9	4
Frequency (Hz)	60	R2	91	R10	79
CCT (K)	2955	R3	96	R11	78
Duv	-0.00066	R4	79	R12	70
Chromaticity (x, y)	x=0.4392 y=0.4032	R5	81	R13	82
Chromaticity (u', v')	u(u')=0.2524 v'=0.5214	R6	89	R14	99
Color Rendering Index (CRI)	81.7	R7	81	R15	73
R9	4	R8	57	--	--

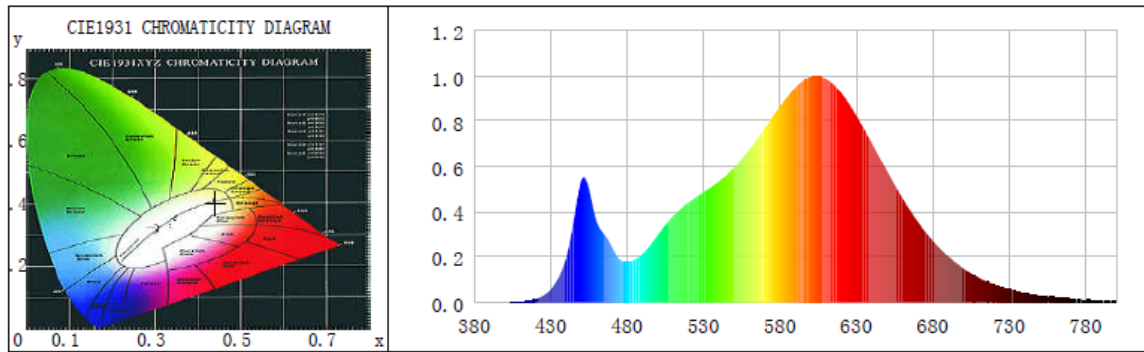
**Photometric Measurement – Goniophotometer Method:**

Parameter	Result		DLC V4.4 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	4425.2	4454.0	250-5000(-10%)
Luminous Efficacy (lm/W)	115.21	115.33	Premium: >= 110(-3%)
Most worst Luminous/Highest Watts	114.58		



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## Spectral Power Distribution & Chromaticity Diagram



**2.2 Electrical, Photometric and Chromaticity Measurements***(Refer to Work Instruction BL-QP-033)*

<b>Test date</b>	2019-06-07	<b>Test Ambient:</b>	25.2 °C
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	90
<b>Model Number</b>	AST-PG05B-40WAT2A1-abc40 (tested at 50% CCT setting)		

**Electrical Measurement:**

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
ELC1905042	120.0	60	0.3247	38.5	0.988	12.84
E-B2	277.0	60	0.1565	38.57	0.89	13.67
<b>DLC Pass Criteria</b>					<b>&gt;= 0.9(-3%)</b>	<b>&lt;= 20(+5)</b>

**Chromaticity Measurement - Sphere-Spectroradiometer Method:**

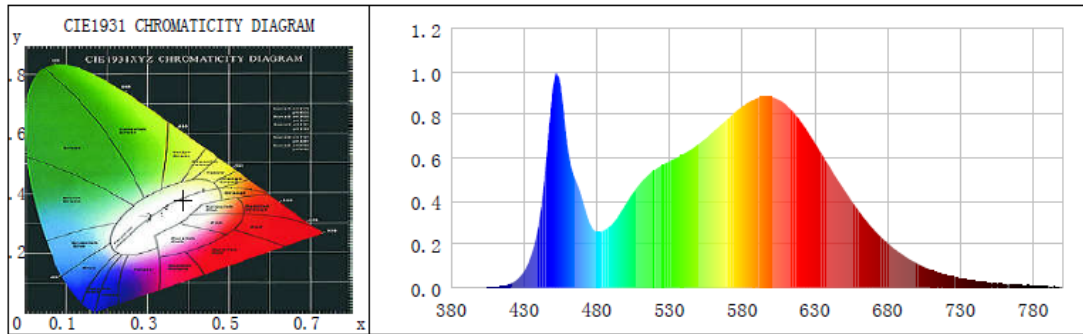
Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	82	R9	9
Frequency (Hz)	60	R2	91	R10	79
CCT (K)	3843	R3	96	R11	80
Duv	-0.00127	R4	81	R12	63
Chromaticity (x, y)	x=0.3866 y=0.3778	R5	82	R13	85
Chromaticity (u', v')	u(u')=0.2288 v'(v')=0.5029	R6	87	R14	98
Color Rendering Index (CRI)	83.4	R7	84	R15	76
R9	9	R8	63	--	--

**Photometric Measurement – Goniophotometer Method:**

Parameter	Result		DLC V4.4 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	5287.8	5293.2	5000-10000(-10%)
Luminous Efficacy (lm/W)	137.35	137.24	Premium: >= 115(-3%)
Most worst Luminous/Highest Watts	137.10		
Zonal lumens in the 60-80 °zone (%)	30.7	--	>=30(-3)
Zonal lumens in the 70-80 °zone (%)	12.2	--	≤25(+3)
Beam Angle (°)	141.9	--	--
Center Beam Candle Power (cd)	973	--	--



**Spectral Power Distribution & Chromaticity Diagram**



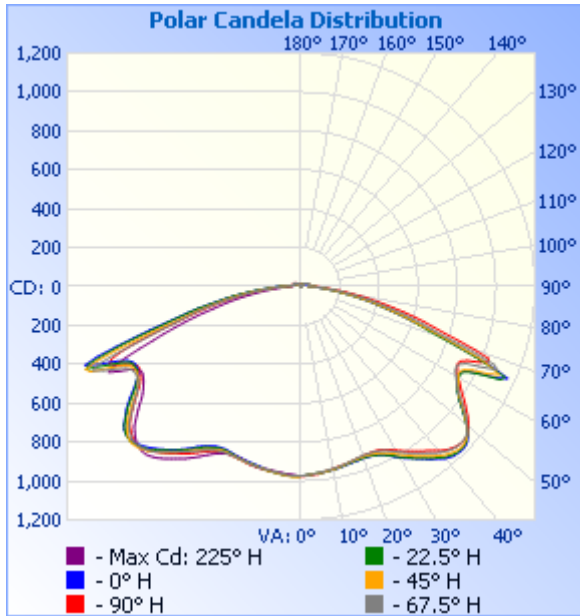
**Zonal Lumen Tabulation**

Zonal Lumen Summary			
Zone	Lumens	% Lamp	% Luminaire
0-30	796.1	15.1%	15.1%
0-40	1,455.0	27.5%	27.5%
0-60	3,273.6	61.9%	61.9%
60-90	1,833.5	34.7%	34.7%
70-100	913.8	17.3%	17.3%
90-120	135.1	2.6%	2.6%
0-90	5,107.1	96.6%	96.6%
90-180	180.6	3.4%	3.4%
0-180	5,287.7	100%	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	91.8	1.7%	90-100	57.3	1.1%
10-20	267.2	5.1%	100-110	41.6	0.8%
20-30	437.0	8.3%	110-120	36.2	0.7%
30-40	659.0	12.5%	120-130	23.1	0.4%
40-50	891.1	16.9%	130-140	12.5	0.2%
50-60	927.4	17.5%	140-150	5.9	0.1%
60-70	977.0	18.5%	150-160	2.5	0%
70-80	645.8	12.2%	160-170	1.1	0%
80-90	210.8	4.0%	170-180	0.4	0%



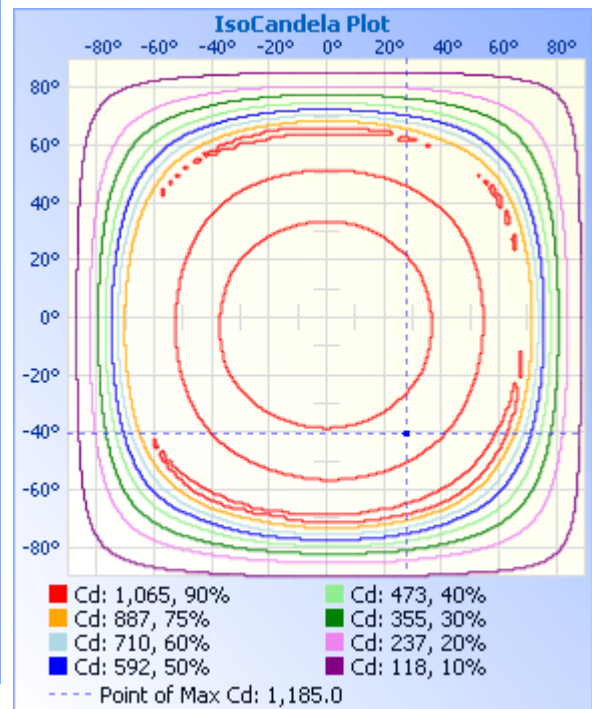
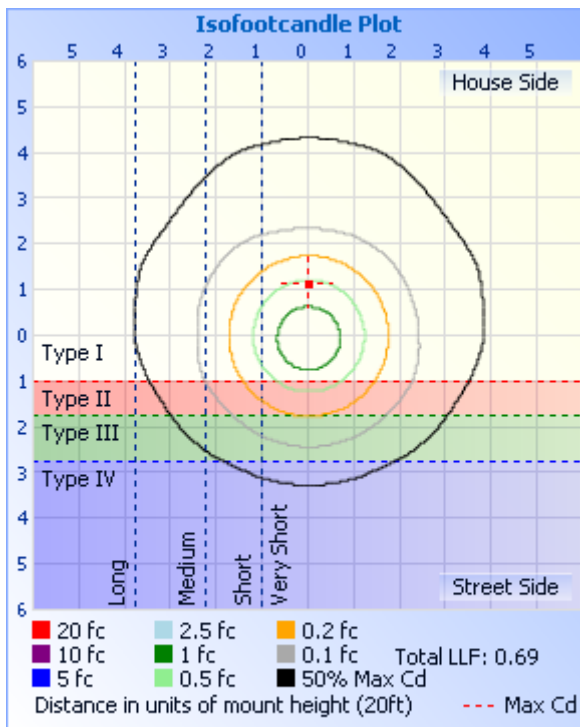
**Photometric Data**



**Illuminance at a Distance**

	Center Beam fc	Beam Width	
17.0ft	3.37 fc	110.7 ft	98.5 ft
34.0ft	0.84 fc	221.4 ft	197.0 ft
51.0ft	0.37 fc	332.2 ft	295.5 ft
68.0ft	0.21 fc	442.9 ft	393.9 ft
85.0ft	0.13 fc	553.6 ft	492.4 ft
102.0ft	0.09 fc	664.3 ft	590.9 ft

■ Vert. Spread: 145.9°  
■ Horiz. Spread: 141.9°







**Candela Table - Type C**

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
0	973	973	973	973	973	973	973	973	973	973	973	973	973	973	973	973	973
1	971	971	972	972	974	972	972	975	973	974	977	973	975	971	971	972	971
2	968	968	969	970	973	973	973	974	974	975	977	973	973	971	969	970	968
3	967	966	968	967	971	971	971	972	974	975	977	972	973	968	967	966	967
4	965	963	965	965	968	968	969	971	972	974	975	970	971	966	965	963	965
5	963	963	963	961	968	964	966	968	971	972	972	968	969	962	964	962	963
6	962	962	962	959	963	962	961	964	968	970	970	966	968	961	961	960	962
7	960	960	960	956	960	957	957	962	966	967	968	963	966	959	960	959	960
8	959	958	957	954	956	953	954	960	963	965	965	961	964	958	958	957	959
9	956	956	955	952	954	950	952	956	960	963	963	959	961	956	956	955	956
10	954	954	953	949	951	948	950	954	958	961	961	957	962	955	955	956	954
11	954	952	951	948	947	945	948	951	956	958	959	955	958	956	955	955	954
12	951	949	948	945	944	944	945	949	951	955	955	955	958	955	957	954	951
13	948	947	945	942	942	941	942	945	948	953	954	954	957	955	956	953	948
14	946	943	942	939	940	938	941	942	945	949	952	952	956	953	955	951	946
15	944	942	937	936	938	936	938	940	942	948	950	951	953	951	951	948	944
16	942	940	936	933	934	934	936	938	941	946	948	949	952	949	949	946	942
17	939	938	933	931	933	930	932	936	939	944	947	946	949	944	945	942	939
18	940	938	932	927	930	927	929	935	937	942	944	943	946	940	939	941	940
19	939	938	931	925	928	924	927	930	934	940	942	941	943	937	938	939	939
20	937	936	930	924	925	922	925	928	932	937	940	940	942	936	935	938	937
21	940	937	931	924	924	920	923	925	929	935	938	939	939	934	934	937	940
22	941	939	932	925	925	919	922	924	927	932	937	937	939	933	934	935	941
23	944	942	936	926	926	919	920	922	925	929	935	937	938	932	936	938	944
24	948	948	940	929	926	920	920	921	923	928	933	937	939	935	940	941	948
25	954	953	945	933	929	920	920	922	921	927	933	939	942	937	947	947	954
26	961	961	951	938	933	924	924	924	923	929	935	943	943	943	953	956	961
27	972	972	960	946	940	928	927	927	926	933	941	947	951	951	963	969	972
28	986	983	971	956	947	935	933	932	930	940	947	953	958	963	975	980	986
29	1000	997	982	967	957	945	942	940	936	946	956	962	968	976	989	995	1000



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Certificate#4810.01

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32	1041	1035	1023	1007	996	979	977	973	968	976	988	995	1006	1019	1036	1037	1041
33	1052	1052	1036	1020	1009	992	992	988	981	992	1002	1008	1021	1033	1051	1052	1052
34	1066	1064	1052	1032	1019	1006	1006	1003	1000	1007	1018	1022	1036	1047	1066	1066	1066
35	1081	1076	1064	1046	1032	1018	1021	1019	1017	1022	1033	1035	1049	1061	1079	1082	1081
36	1095	1091	1076	1057	1045	1030	1033	1036	1033	1039	1048	1049	1062	1073	1093	1097	1095
37	1110	1104	1092	1071	1057	1041	1046	1052	1048	1054	1064	1064	1073	1088	1108	1112	1110
38	1123	1118	1105	1084	1071	1056	1062	1065	1063	1069	1080	1079	1089	1102	1122	1131	1123
39	1137	1132	1119	1100	1084	1070	1076	1078	1077	1083	1095	1097	1102	1119	1136	1147	1137
40	1152	1144	1132	1112	1101	1083	1090	1094	1092	1099	1111	1111	1114	1130	1150	1160	1152
41	1161	1154	1142	1122	1114	1095	1103	1107	1107	1114	1125	1125	1128	1145	1160	1171	1161
42	1172	1162	1151	1133	1126	1108	1117	1120	1119	1128	1139	1139	1141	1156	1169	1179	1172
43	1174	1169	1158	1141	1134	1117	1129	1131	1132	1144	1154	1150	1151	1164	1175	1183	1174
44	1178	1170	1164	1146	1144	1128	1138	1141	1145	1155	1165	1158	1161	1172	1176	1184	1178
45	1178	1172	1166	1147	1149	1137	1149	1150	1155	1165	1175	1165	1168	1174	1174	1180	1178
46	1174	1168	1164	1149	1150	1142	1156	1159	1164	1172	1180	1170	1169	1174	1170	1175	1174
47	1166	1160	1156	1146	1150	1145	1160	1165	1172	1178	1185	1171	1169	1170	1159	1166	1166
48	1151	1146	1146	1140	1146	1146	1161	1168	1177	1183	1182	1168	1162	1163	1147	1150	1151
49	1132	1128	1130	1128	1133	1139	1157	1167	1180	1182	1177	1161	1154	1151	1133	1132	1132
50	1110	1108	1112	1112	1122	1132	1147	1162	1176	1175	1166	1151	1144	1140	1118	1114	1110
51	1086	1083	1086	1092	1104	1118	1134	1150	1168	1166	1150	1136	1131	1121	1093	1088	1086
52	1058	1058	1065	1070	1086	1101	1116	1135	1155	1152	1132	1117	1114	1101	1071	1060	1058
53	1033	1033	1040	1047	1064	1082	1098	1115	1133	1129	1110	1093	1092	1078	1047	1038	1033
54	1009	1007	1017	1023	1043	1063	1078	1095	1113	1107	1085	1071	1070	1055	1023	1015	1009
55	986	987	993	998	1023	1041	1056	1073	1095	1087	1062	1050	1047	1032	998	993	986
56	970	969	974	978	1000	1019	1029	1048	1071	1061	1039	1028	1025	1007	982	975	970
57	958	957	960	957	980	995	1006	1026	1047	1035	1011	1003	1004	985	967	967	958
58	947	949	952	943	963	972	985	1004	1021	1011	991	990	982	969	954	956	947
59	936	939	941	929	947	956	967	981	998	990	977	973	965	953	942	948	936
60	929	933	930	917	929	939	953	965	977	974	964	964	953	939	936	942	929
61	926	931	924	905	916	924	940	953	960	961	956	960	942	928	929	937	926

Laboratory: Belling Test Laboratory Co., LTD A2LA Certificate# 4810.01  
Unit 401, No. 309 Xinxin Seven Road, Zengcheng District,  
Guangzhou, People' s Republic of China. Website: <http://www.blst.com>

Report Format Number BL-FM-SA-012



Certificate#4810.01

62	933	937	925	898	907	915	932	942	947	952	952	960	937	924	927	940	933
63	959	965	941	897	899	908	927	937	942	946	951	962	930	920	937	960	959
64	1019	1030	980	906	896	904	926	935	939	945	956	971	932	928	969	1012	1019
65	1111	1132	1062	937	905	906	928	939	940	948	968	993	948	948	1030	1077	1111
66	1160	1142	1110	1016	935	924	947	954	949	960	999	1040	984	1005	1082	1109	1160
67	1080	1060	1060	1094	994	978	990	989	972	998	1069	1104	1034	1086	1046	1071	1080
68	984	963	994	1067	1037	1072	1086	1064	1023	1082	1167	1151	1063	1119	969	966	984
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70	789	766	804	861	949	1037	1078	1087	1180	1159	1113	1014	992	927	809	765	789
71	720	692	723	766	860	947	979	1002	1110	1066	1006	905	917	831	748	696	720
72	646	638	647	701	772	856	875	901	997	968	896	816	829	744	682	635	646
73	587	591	597	646	711	770	786	832	895	871	805	739	746	668	625	576	587
74	530	538	541	594	658	694	696	773	809	780	718	671	673	602	569	533	530
75	476	484	488	536	605	638	626	706	724	706	647	614	611	552	517	486	476
76	428	435	440	486	546	588	582	634	655	642	590	569	561	506	461	439	428
77	388	396	399	434	490	527	530	578	597	592	542	525	513	460	420	404	388
78	351	358	362	398	441	471	468	519	543	538	493	477	463	420	384	367	351
79	307	314	318	357	398	424	425	465	486	476	443	433	423	379	342	322	307
80	270	275	280	312	351	387	390	420	434	432	400	386	378	334	303	283	270
81	235	239	243	273	307	342	354	380	393	391	361	344	334	292	268	247	235
82	206	204	209	235	265	300	307	339	352	351	324	307	295	256	233	211	206
83	176	177	182	204	231	262	270	297	312	311	286	271	258	224	202	183	176
84	151	151	156	178	198	222	235	260	268	270	247	236	226	192	172	158	151
85	130	131	136	152	165	191	203	225	234	235	215	204	193	165	149	136	130
86	113	114	118	131	143	163	174	195	204	201	187	177	165	144	130	117	113
87	94	97	100	111	125	138	151	170	176	171	161	154	144	125	112	99	94
88	79	82	86	94	108	120	132	150	153	149	140	132	124	107	95	83	79
89	69	72	74	78	90	104	115	130	135	131	121	115	106	93	81	72	69
90	63	65	66	68	76	86	99	110	117	114	105	99	89	79	72	64	63
91	56	57	59	61	68	75	85	93	101	98	89	85	78	71	65	58	56
92	50	51	52	53	60	65	73	80	85	83	78	75	69	63	58	51	50
93	45	45	46	47	52	58	65	70	76	74	70	67	62	56	51	46	45

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Certificate#4810.01

94	41	41	41	42	45	51	58	63	67	66	63	60	56	50	47	42	41
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101	38	39	38	38	38	39	39	38	39	39	40	41	41	41	40	39	38
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121	29	33	34	34	35	31	24	27	20	28	26	31	36	34	35	34	29
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123	26	31	31	32	32	30	23	20	17	23	23	30	33	31	33	31	26
124	25	29	30	30	31	29	22	18	15	20	23	29	32	30	32	30	25
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129	19	24	24	24	25	25	19	13	12	12	20	25	24	24	27	24	19
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132	17	21	22	21	19	22	17	11	11	10	17	22	20	20	23	20	17
133	17	20	21	20	18	21	17	10	12	9	17	21	18	19	22	19	17
134	16	20	20	20	17	20	16	10	11	9	15	20	17	18	20	18	16
135	16	19	19	19	16	19	16	10	12	9	15	19	16	17	19	16	16
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156	4	5	4	5	5	5	5	6	6	5	6	5	5	3	5	5	4
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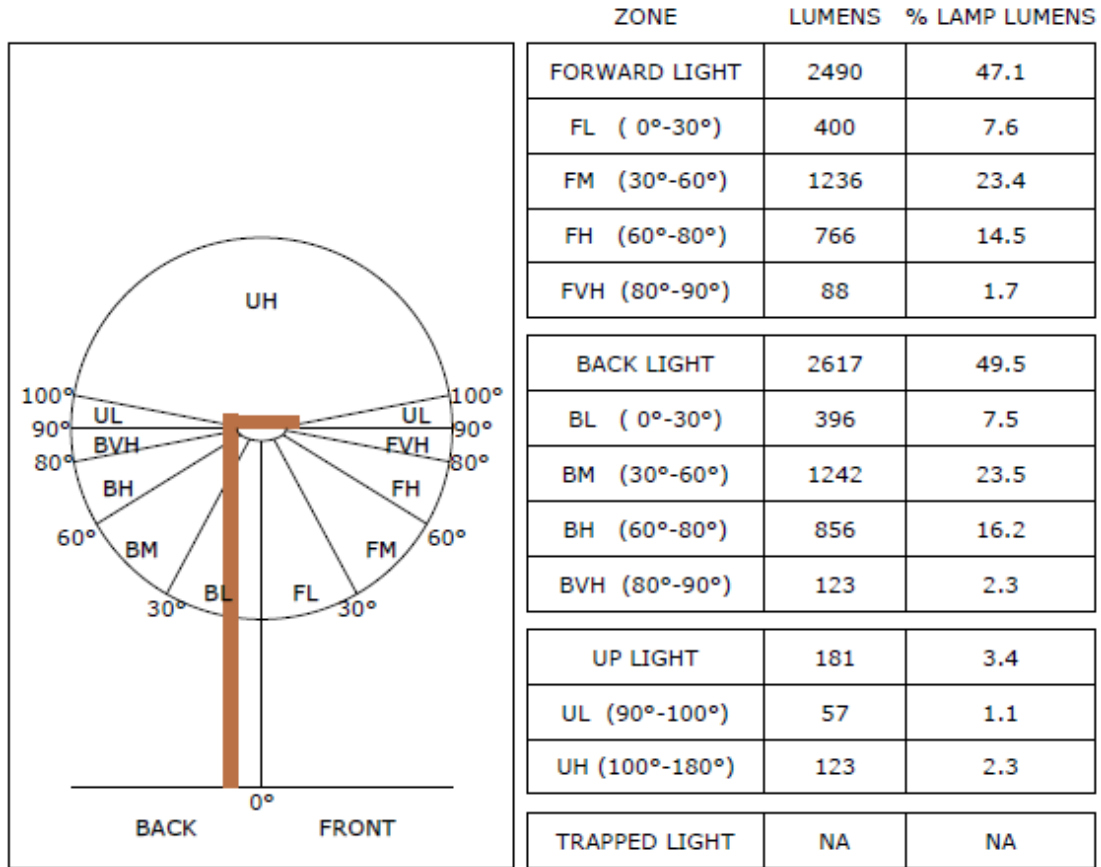
Laboratory: Belling Test Laboratory Co., LTD A2LA Certificate# 4810.01  
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165	4	4	4	4	4	4	5	4	4	4	5	4	4	3	4	3	4
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179	4	4	4	3	4	3	3	3	4	4	3	3	4	3	3	4	4
180	3	4	4	3	4	3	3	3	4	3	3	3	4	2	4	4	3



**2.3 Electrical, Photometric and Chromaticity Measurements***(Refer to Work Instruction BL-QP-033)*

<b>Test date</b>	2019-06-07	<b>Test Ambient:</b>	25.2 °C
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	90
<b>Model Number</b>	AST-PG05B-40WAT2A1-abc50 (tested at 100% CCT setting)		

**Electrical Measurement:**

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
ELC1905042	120.0	60	0.3236	38.44	0.99	12.95
E-B3	277.0	60	0.1554	38.69	0.899	13.97
<b>DLC Pass Criteria</b>					>= 0.9(-3%)	<= 20(+5)

**Chromaticity Measurement - Sphere-Spectroradiometer Method:**

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	79	R9	0
Frequency (Hz)	60	R2	88	R10	71
CCT (K)	4902	R3	94	R11	78
Duv	0.00273	R4	79	R12	54
Chromaticity (x, y)	x=0.3486 y=0.3599	R5	79	R13	81
Chromaticity (u', v')	u(u')=0.2106 v'=0.4892	R6	83	R14	97
Color Rendering Index (CRI)	81.2	R7	85	R15	73
R9	0	R8	63	--	--

**Photometric Measurement – Goniophotometer Method:**

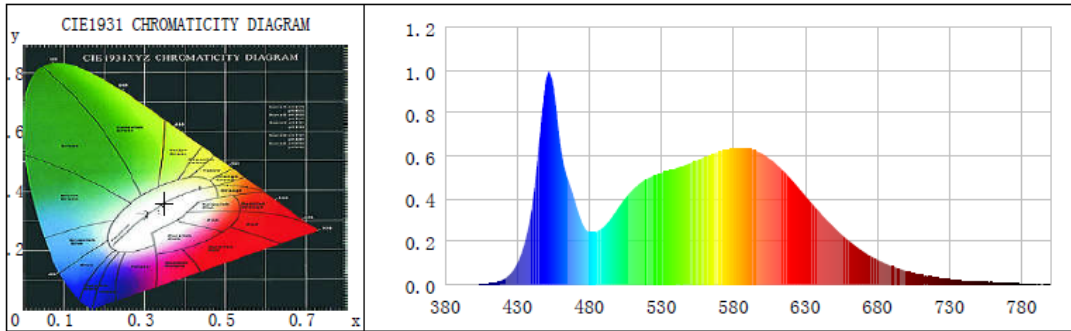
Parameter	Result		DLC V4.4 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	4992.2	5009.6	5000-10000(-10%)
Luminous Efficacy (lm/W)	129.87	129.48	Premium: >= 115(-3%)
Most worst Luminous/Highest Watts	129.03		





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## Spectral Power Distribution & Chromaticity Diagram





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### 3. Test Equipment

Equipment Name	Model No.	Serial No.	Next Calibration Date
Goniophotometric System	GPM-3000	DYHXF120001	2020-01-14
AC Power Source	CHP-500C	N/A	2020-01-13
Total Luminous Flux Standard Lamp	24V/150W	DYJYR040040	2020-01-21
Digital Power Meter	WT500	DYDWQ200006	2020-01-13
Integral Sphere (2M)	2M	DYJCE120067	2020-01-14
Digital Power Meter	WT500	DYDWQ200006	2020-01-13
Optical Color and Electrical Measurement System	CMS-3000S	DYJCE120067	2020-01-14

Expand Uncertainty:  
Photometric Measurement (Sphere): 2.08%, k=2  
Chromaticity Measurement(Sphere):25.6K, k=2  
Photometric Measurement(Goniophotometer):2.645%, k=2

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