



Report No.: GZE151161-F

NVLAP LAB CODE 201011-0

LM-79-08 Test Report

For

AOK LED LIGHT COMPANY LIMITED

(Brand Name: AOK)

Building 1, St George's Science and Technology Industrial Park, Shajin Street, Shenzhen,
Guangdong Province, China Zip 518104

Outdoor Pole/Arm-mounted Area and Roadway Luminaires

Model name(s): AOK-225WiT

Representative (Tested) Model: AOK-225WiT(3000K)
AOK-225WiT(5700K)

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

Test & Report By:

Jack Luo

Engineer: Jack Luo

Date: Jan.27,2016

Review By:

Tommy Liang

Manager: Tommy Liang

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Laboratory: Standard-Tech Co. Ltd Testing Center
NVLAP CODE: 201011-0

Report Format Number STD/QR4909-A/2

Address: Standard-Tech Building, No.6 Guanhong Road, Guangzhou Science City, Guangzhou 510663, China

Tel: 8620-3229 0320 Fax: 8620-32290422 <http://www.standard-tech.com>

Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
AOK-225WiT(3000K)	3000	27400	221.9	123.48
AOK-225WiT(3500K)	3500	27893 ^{*1}	224.3 ^{*2}	124.38 ^{*3}
AOK-225WiT(4000K)	4000	28386 ^{*1}	224.3 ^{*2}	126.58 ^{*3}
AOK-225WiT(4500K)	4500	28880 ^{*1}	224.3 ^{*2}	128.78 ^{*3}
AOK-225WiT(5000K)	5000	29373 ^{*1}	224.3 ^{*2}	130.98 ^{*3}
AOK-225WiT(5700K)	5700	29866	226.6	131.8

*1: This value is calculated and the calculation formula is as below:

$$27893 = (29866 - 27400) / 5 + 27400$$

$$28386 = (29866 - 27400) / 5 + 27893$$

$$28880 = (29866 - 27400) / 5 + 28386$$

$$28373 = (29866 - 27400) / 5 + 28880$$

*2: This value is calculated and the calculation formula is as below:

$$224.3 = (226.6 + 221.9) / 2$$

*3: This value is calculated and the calculation formula is as below:

$$124.39 = 27893 / 224.3$$

$$126.58 = 28386 / 224.3$$

$$128.78 = 28880 / 224.3$$

$$130.98 = 29373 / 224.3$$

U.S. Department of Energy

Lighting Facts™ Uniform LM-79 Reporting Template
Laboratory Information:

Name of Test Laboratory	Standard-Tech Co. Ltd
Date of Test Report	Jan.27,2015
Test Report No.	GZE151161-F
Laboratory Contact Name	Tommy Liang

Product Information:

Organization Name	AOK LED LIGHT COMPANY LIMITED		
Brand Name	AOK		
Model Number	AOK-225WiT(3000K)		
SKU (if available)	N/A		
Type of Luminaire (for integral lamps, list base type and lamp type)	Outdoor Pole/Arm-mounted Area and Roadway Luminaires		
Luminaire Aperture (for downlights)	--	in.	
Luminaire Length	--	mm	
Luminaires Width	--	mm	
Number of Units (modular products)	N/A	s	

Integrating Sphere
Goniophotometer
Electrical Measurements:

	Output	Output	
Input Wattage	--	221.9	W
Input Current	--	1.858	A
Input Voltage (ac)	--	120.0	V
Power Factor	--	0.9955	
Off-State Power	--	0	W

Photometric Characteristics

Total Initial Lumen Output	--	27400	lm
Initial Lumen Efficacy	--	123.48	lm/w
Correlated color temperature / CCT	3017	--	K
Color rendering index / CRI	72.3	--	
R9 Value	0	--	
Duv	-0.0015	--	
Luminous Intensity Distribution			
Center beam candlepower (if applicable)	-----	7886	cd
Beam angle (if applicable)		91.7	°
Zonal lumens in the 0°-60° zone		90.2	%
Zonal lumens in the 60°-90° zone		9.6	%
Zonal lumens in the 90°-120° zone		0	%
Zonal lumens in the 120°-180° zone		0.2	%

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Laboratory Information:

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Date of Test Report	Jan.27,2016
Test Report No.	GZE151161-F
Laboratory Contact Name	Tommy Liang

Product Information:

Organization Name	AOK LED LIGHT COMPANY LIMITED		
Brand Name	AOK		
Model Number	AOK-225WiT(5700K)		
SKU (if available)	N/A		
Type of Luminaire (for integral lamps, list base type and lamp type)	Outdoor Pole/Arm-mounted Area and Roadway Luminaires		
Luminaire Aperture (for downlights)	--	in.	
Luminaire Length	--	mm	
Luminaires Width	--	mm	
Number of Units (modular products)	N/A	s	

Integrating Sphere
Goniophotometer
Electrical Measurements:
Output
Output

Input Wattage	226.6	--	W
Input Current	1.895	--	A
Input Voltage (ac)	120.0	--	V
Power Factor	0.9965	--	
Off-State Power	0	--	W

Photometric Characteristics

Total Initial Lumen Output	29866	--	lm
Initial Lumen Efficacy	131.8	--	lm/w
Correlated color temperature / CCT	5802	--	K
Color rendering index / CRI	85.4	--	
R9 Value	0	--	
Duv	-0.0001	--	
Luminous Intensity Distribution			
Center beam candlepower (if applicable)			cd
Beam angle (if applicable)			°
Zonal lumens in the 0°-60° zone			%
Zonal lumens in the 60°-90° zone	-----	-----	%
Zonal lumens in the 90°-120° zone			%
Zonal lumens in the 120°-180° zone			%

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Test Specifications:	
Date of Receipt	: Dec.14,2015
Date of Test	: Jan.20,2016
Test item	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
Reference Standard	IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources CIE 15-2004 Technical Report Colorimetry IESNA LM-16-93 Practical Guide to Colorimetry of Light Source IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems
Reference Work Instruction	QD25

Test Methods

1. Photometric and Electrical measurements – Light Distribution 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 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. Photometric and Electrical Measurements – Integrating Sphere Method:

Photometric 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 Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at least 5 nm intervals over the range of 380 to 780 nm.

1. Product Information:

Brand Name	AOK
Model Number	AOK-225WiT
Luminaire Type	Outdoor Pole/Arm-mounted Area and Roadway Luminaires
Rated Voltage / Frequency	100~ 240/277Vac, 50/60Hz
Nominal Power	225W
Rated Initial Lamp Lumen	--
Declared CCT	3000K,3500K,4000K,4500K,5000K,5700K
LED Manufacturer	Philips Lumileds
LED Model	LUXEON 3030 2D
Sample Receipt Date	Dec.14,2015
Sample Number	GZE151161-F1(3000K),F2(5700K)

Photo



2.1 Electrical, Photometric and Chromaticity Measurements <i>(Refer to Work Instruction QD25)</i>	IES LM-79 2008
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Test date	2016-01-20	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	AOK-225WiT(3000K)		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE151161	120.0	60	1.858	221.9	0.9955	7.09
-F1	277.0	60	0.8521	219.8	0.9312	18.41

Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	69	R9	0
Frequency (Hz)	60	R2	83	R10	59
Color Rendering Index (CRI)	72.3	R3	93	R11	61
R9	0	R4	67	R12	48
CCT (K)	3017	R5	68	R13	71
Chromaticity (x, y)	x=0.4336 y=0.3991	R6	75	R14	96
Chromaticity (u', v')	u'=0.2505 v'=0.5189	R7	78	R15	63
Duv	-0.0015	R8	46	--	--

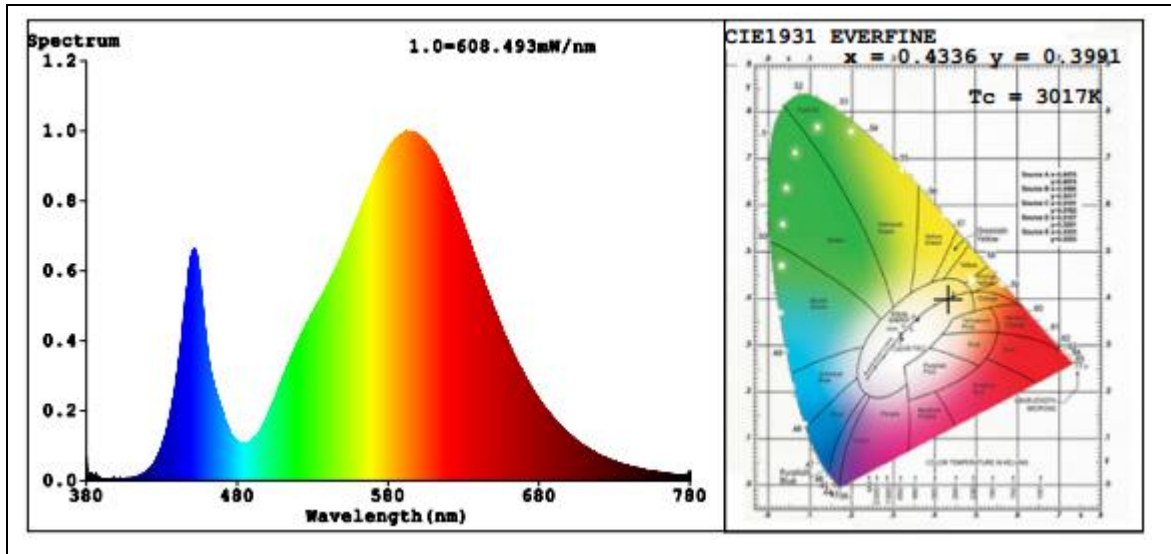
Goniophotometer Method:

Parameter	Result
Test Voltage (V)	120.1
Frequency (Hz)	60
Total Luminous (lm)	27400
Luminous Efficacy (lm/W)	123.48
Beam Angle°	91.7
Center Beam Candle Power (cd)	7886

Goniophotometer Method:

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	27198
Luminous Efficacy (lm/W)	123.74

Spectral Power Distribution & Chromaticity Diagram



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Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	7,014.6	25.6%
0-40	12,499.2	45.6%
0-60	24,705.5	90.2%
60-90	2,638.0	9.6%
70-100	1,012.6	3.7%
90-120	10.9	0%
0-90	27,343.5	99.8%
90-180	53.2	0.2%
0-180	27,396.7	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	745.3	2.7%	90-100	1.3	0%
10-20	2,270.6	8.3%	100-110	2.7	0%
20-30	3,998.7	14.6%	110-120	6.8	0%
30-40	5,484.6	20.0%	120-130	10.5	0%
40-50	7,085.2	25.9%	130-140	11.3	0%
50-60	5,121.0	18.7%	140-150	9.1	0%
60-70	1,626.8	5.9%	150-160	6.3	0%
70-80	845.3	3.1%	160-170	3.7	0%
80-90	165.9	0.6%	170-180	1.5	0%

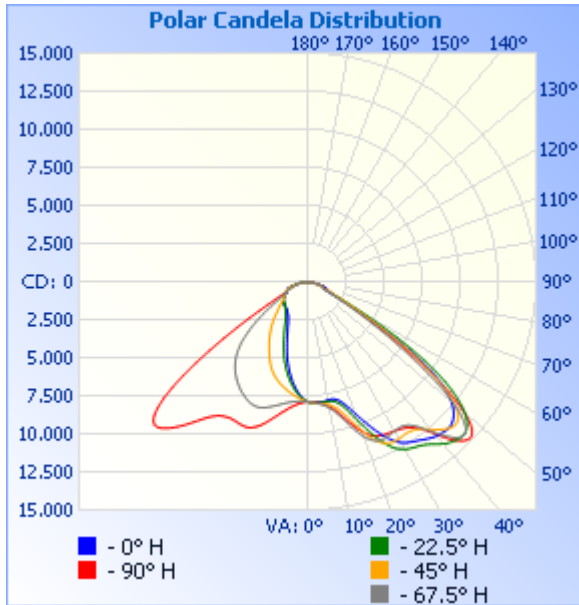
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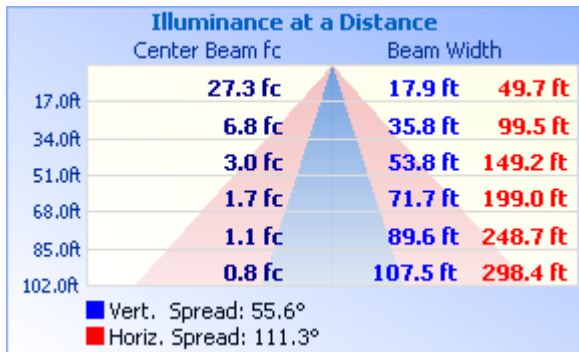
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Photometric Data



Illuminance Plots



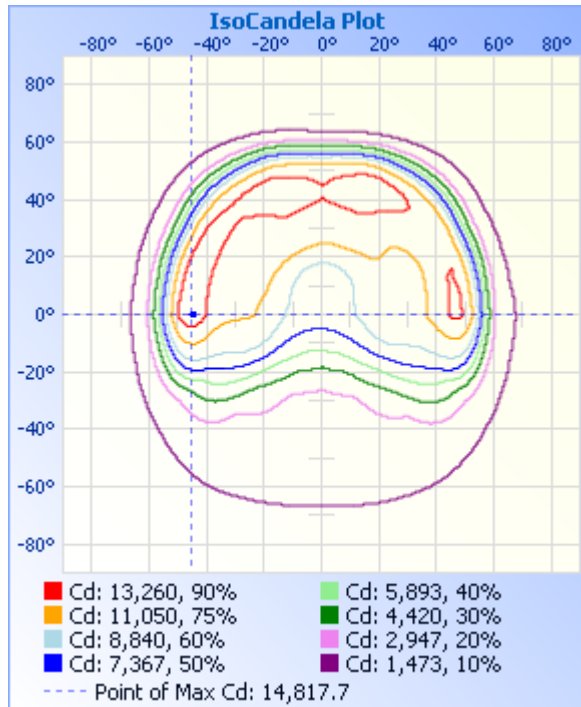
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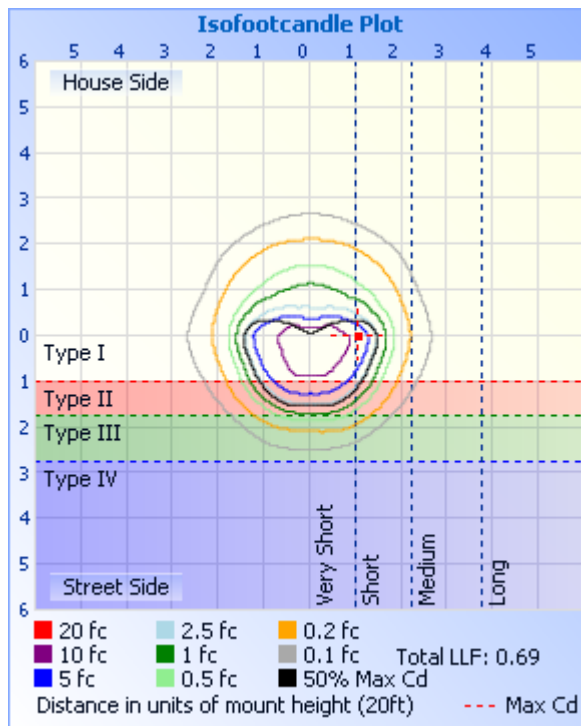
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ISOCANDELA DIAGRAM



ISOLUX DIAGRAM



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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	7886	7886	7886	7886	7886	7886	7886	7886	7886	7886	7886	7886	7886	7886	7886	7886	7886
1	7938	7933	7925	7903	7875	7851	7826	7809	7809	7821	7849	7874	7904	7927	7939	7944	7938
2	7972	7967	7951	7922	7876	7824	7762	7719	7707	7736	7800	7869	7932	7976	7988	7988	7972
3	7990	7989	7980	7947	7893	7805	7697	7614	7590	7641	7746	7868	7975	8029	8033	8021	7990
4	7997	8000	8005	7987	7906	7791	7624	7494	7450	7526	7688	7874	8028	8091	8077	8043	7997
5	7995	8003	8030	8031	7944	7781	7547	7357	7296	7397	7626	7889	8089	8159	8119	8055	7995
6	7983	8000	8062	8088	7994	7777	7464	7210	7130	7258	7565	7915	8166	8232	8160	8059	7983
7	7962	7994	8092	8154	8053	7786	7381	7054	6943	7108	7501	7943	8257	8315	8197	8054	7962
8	7935	7987	8131	8235	8131	7803	7293	6890	6747	6949	7434	7985	8358	8401	8234	8044	7935
9	7908	7980	8176	8331	8223	7832	7210	6720	6546	6786	7366	8033	8471	8502	8274	8036	7908
10	7884	7980	8233	8447	8340	7870	7130	6541	6337	6615	7296	8088	8594	8616	8331	8029	7884
11	7875	7994	8308	8585	8477	7918	7047	6356	6115	6432	7227	8152	8734	8744	8393	8035	7875
12	7886	8032	8411	8755	8636	7979	6965	6166	5889	6252	7157	8220	8884	8886	8476	8064	7886
13	7925	8096	8541	8953	8814	8054	6881	5972	5654	6061	7084	8291	9050	9040	8575	8120	7925
14	8001	8199	8713	9183	9026	8141	6798	5770	5417	5866	7011	8366	9212	9208	8699	8216	8001
15	8109	8344	8915	9441	9255	8236	6716	5566	5167	5666	6931	8445	9389	9387	8850	8346	8109
16	8264	8538	9165	9717	9504	8343	6634	5350	4913	5461	6847	8525	9564	9569	9030	8521	8264
17	8459	8782	9435	10007	9758	8459	6547	5130	4657	5252	6761	8606	9735	9743	9228	8733	8459
18	8690	9075	9746	10299	10010	8575	6455	4907	4404	5037	6671	8680	9895	9902	9448	8980	8690
19	8960	9397	10068	10579	10251	8695	6357	4684	4160	4819	6578	8742	10038	10040	9683	9261	8960
20	9258	9755	10400	10829	10480	8802	6255	4460	3929	4602	6475	8798	10159	10157	9926	9565	9258
21	9570	10128	10718	11044	10681	8897	6141	4239	3710	4382	6364	8839	10259	10242	10167	9887	9570
22	9898	10516	11017	11214	10854	8984	6026	4027	3512	4175	6244	8863	10327	10296	10393	10215	9898
23	10233	10893	11286	11350	10992	9053	5899	3824	3349	3975	6113	8866	10363	10313	10600	10542	10233
24	10569	11258	11512	11435	11093	9099	5768	3634	3186	3783	5974	8852	10369	10300	10770	10858	10569
25	10904	11605	11688	11471	11169	9116	5627	3460	3024	3605	5827	8822	10363	10260	10907	11158	10904
26	11223	11918	11816	11477	11218	9114	5481	3315	2901	3440	5676	8779	10340	10209	11006	11443	11223
27	11515	12189	11895	11455	11256	9092	5332	3169	2799	3304	5526	8723	10316	10149	11069	11689	11515
28	11781	12409	11937	11415	11278	9040	5180	3025	2711	3168	5372	8655	10304	10098	11099	11902	11781

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29	12010	12579	11949	11378	11310	8974	5028	2916	2633	3033	5221	8580	10302	10059	11111	12081	12010
30	12200	12705	11935	11348	11345	8897	4876	2817	2565	2927	5065	8506	10321	10032	11107	12231	12200
31	12335	12811	11916	11326	11378	8806	4726	2730	2506	2830	4915	8424	10362	10027	11113	12349	12335
32	12447	12887	11898	11322	11426	8707	4573	2653	2457	2745	4767	8333	10418	10056	11118	12440	12447
33	12545	12955	11889	11337	11492	8592	4421	2583	2413	2666	4620	8240	10508	10125	11136	12533	12545
34	12631	13019	11903	11404	11584	8472	4274	2519	2375	2596	4477	8141	10624	10239	11187	12641	12631
35	12729	13113	11937	11503	11701	8340	4128	2461	2339	2532	4334	8035	10782	10402	11263	12778	12729
36	12831	13222	12014	11678	11861	8197	3983	2409	2306	2474	4190	7927	10984	10607	11378	12967	12831
37	12939	13371	12128	11902	12067	8046	3836	2361	2277	2421	4044	7808	11243	10863	11524	13177	12939
38	13043	13544	12287	12200	12318	7881	3697	2317	2253	2372	3901	7688	11536	11156	11709	13394	13043
39	13135	13718	12467	12551	12649	7701	3553	2277	2232	2327	3754	7555	11855	11466	11911	13603	13135
40	13209	13900	12659	12932	13058	7517	3413	2240	2216	2286	3605	7413	12185	11799	12125	13806	13209
41	13257	14049	12859	13302	13488	7325	3275	2208	2200	2249	3462	7266	12510	12132	12348	14001	13257
42	13308	14157	13059	13663	13892	7116	3138	2179	2185	2215	3318	7099	12830	12457	12564	14195	13308
43	13347	14248	13243	13981	14251	6897	3000	2155	2170	2185	3175	6926	13130	12738	12773	14363	13347
44	13359	14335	13381	14227	14539	6667	2874	2133	2155	2157	3031	6732	13398	12973	12955	14490	13359
45	13319	14374	13471	14372	14734	6415	2749	2114	2141	2132	2893	6517	13606	13128	13103	14560	13319
46	13231	14349	13506	14376	14818	6151	2632	2096	2126	2109	2764	6275	13741	13171	13184	14572	13231
47	13098	14256	13467	14220	14761	5875	2522	2078	2110	2087	2633	6016	13766	13084	13190	14528	13098
48	12910	14092	13323	13876	14537	5584	2420	2062	2093	2067	2516	5724	13642	12832	13104	14411	12910
49	12666	13851	13062	13355	14124	5271	2323	2046	2073	2046	2404	5403	13338	12395	12904	14215	12666
50	12355	13518	12673	12650	13525	4946	2235	2029	2051	2026	2301	5069	12849	11772	12577	13914	12355
51	11955	13071	12154	11765	12739	4607	2161	2012	2026	2006	2209	4717	12149	10970	12090	13478	11955
52	11468	12530	11482	10750	11780	4257	2095	1992	1999	1985	2128	4341	11273	10003	11452	12923	11468
53	10865	11890	10701	9614	10708	3908	2039	1972	1969	1963	2058	3967	10231	8936	10657	12242	10865
54	10099	11142	9790	8456	9525	3574	1991	1951	1938	1940	1998	3608	9062	7789	9733	11423	10099
55	9159	10266	8816	7272	8322	3239	1949	1928	1905	1915	1945	3249	7857	6642	8684	10434	9159
56	8043	9258	7761	6173	7136	2906	1913	1902	1871	1889	1900	2892	6654	5542	7588	9273	8043
57	6851	8142	6720	5154	6029	2637	1880	1876	1836	1862	1860	2601	5534	4546	6468	8006	6851
58	5635	6949	5696	4273	5030	2393	1848	1846	1795	1833	1824	2340	4529	3695	5397	6672	5635
59	4514	5770	4749	3516	4172	2184	1817	1816	1749	1802	1790	2124	3676	2991	4412	5393	4514

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60	3577	4668	3913	2905	3580	2010	1784	1784	1694	1769	1756	1949	2999	2443	3560	4268	3577
61	2792	3713	3191	2417	2989	1866	1750	1746	1632	1732	1721	1807	2473	2032	2851	3327	2792
62	2169	2928	2606	2043	2405	1750	1713	1705	1567	1693	1683	1695	2096	1731	2304	2594	2169
63	1673	2315	2135	1762	2063	1651	1673	1661	1529	1651	1641	1607	1836	1588	1890	2018	1673
64	1436	1840	1779	1605	1817	1568	1629	1613	1510	1605	1595	1534	1664	1447	1666	1613	1436
65	1199	1622	1582	1453	1641	1491	1578	1563	1496	1557	1542	1463	1586	1306	1449	1417	1199
66	1127	1409	1389	1300	1516	1414	1527	1510	1482	1506	1485	1386	1511	1246	1232	1225	1127
67	1103	1195	1196	1221	1434	1332	1473	1455	1465	1454	1427	1300	1477	1203	1128	1162	1103
68	1089	1143	1096	1167	1376	1242	1416	1396	1439	1396	1366	1211	1450	1166	1052	1154	1089
69	1111	1121	1014	1132	1332	1153	1355	1336	1404	1339	1304	1116	1421	1119	990	1158	1111
70	1229	1097	939	1097	1289	1062	1291	1279	1360	1281	1240	1024	1381	1051	931	1149	1229
71	1275	1066	868	1037	1237	974	1225	1224	1309	1223	1178	932	1323	967	869	1130	1275
72	1177	1018	799	956	1175	890	1161	1168	1247	1166	1114	851	1245	878	809	1084	1177
73	998	949	737	872	1096	817	1094	1108	1173	1104	1049	779	1143	793	753	1010	998
74	836	866	678	787	1005	751	1028	1041	1090	1037	984	717	1024	714	695	915	836
75	712	777	620	704	897	693	962	966	1008	960	917	662	895	639	629	812	712
76	607	681	560	629	790	640	893	892	928	886	847	613	774	568	559	691	607
77	506	565	497	556	687	592	816	818	848	810	767	568	662	501	492	559	506
78	409	455	439	488	598	547	727	739	765	731	674	523	569	442	433	440	409
79	338	362	386	424	520	501	616	658	683	647	565	477	492	390	378	347	338
80	294	283	337	368	452	456	489	578	596	557	445	429	426	342	325	270	294
81	260	217	291	320	387	407	392	493	507	464	356	378	350	298	272	209	260
82	224	167	242	274	320	359	325	405	416	368	293	329	280	254	217	160	224
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84	132	90	149	187	222	250	197	225	231	192	181	224	198	169	126	82	132
85	86	61	111	143	184	195	145	150	140	121	129	172	161	130	89	54	86
86	43	36	76	103	146	143	96	81	57	61	82	120	121	92	57	30	43
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91	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1
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2.2 Electrical, Photometric and Chromaticity Measurements <i>(Refer to Work Instruction QD25)</i>	IES LM-79 2008
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Test date	2016-01-20	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	AOK-225WiT(5700K)		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE151161	120.0	60	1.895	226.6	0.9965	7.21
-F2	277.0	60	0.8685	223.9	0.9307	18.16

Sphere-Spectroradiometer Method:

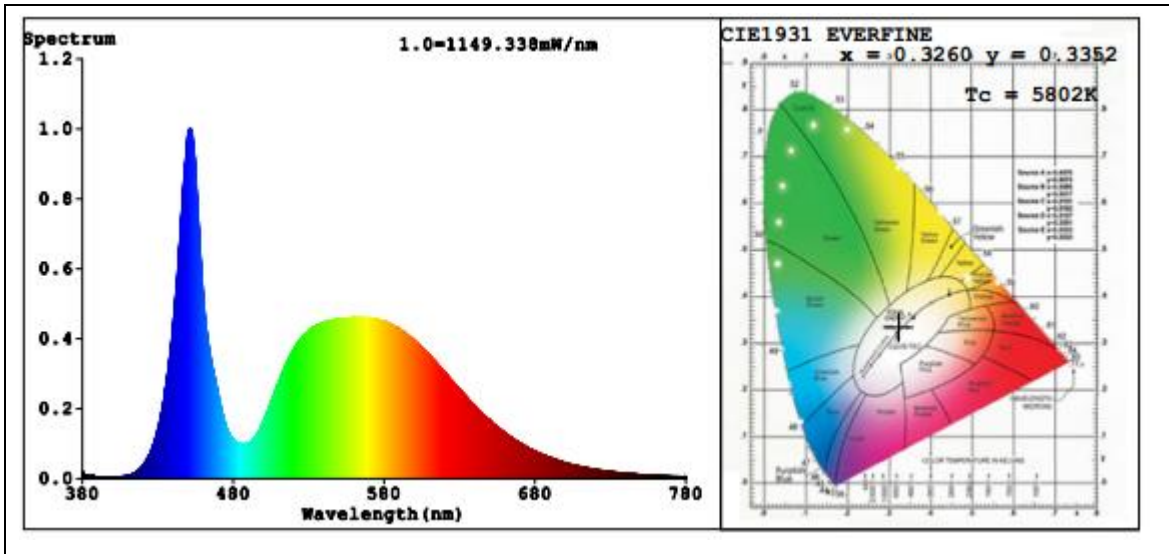
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Color Rendering Index (CRI)	85.4
R9	0
CCT (K)	5802
Chromaticity (x, y)	x=0.3260 y=0.3352
Chromaticity (u', v')	u'=0.2047 v'=0.4736
Duv	-0.0001
Total Luminous (lm)	29866
Luminous Efficacy (lm/W)	131.8

Special Color Rendering Indices			
R1	74	R9	0
R2	80	R10	49
R3	81	R11	73
R4	76	R12	43
R5	74	R13	75
R6	71	R14	89
R7	84	R15	71
R8	64	--	--

Sphere-Spectroradiometer Method :

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Initial Lumen Output(lm)	29823
Initial Lumen Efficacy(lm/w)	133.2

Spectral Power Distribution & Chromaticity Diagram



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3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-336	2 meter Integrating Sphere	2015-07-01	2016-06-30
ST-R-331	Spectral analysis system HAAS-2000	2015-07-01	2016-06-30
D204	Standard Lamp	2015-07-01	2016-06-30
PF2010	Power Meter for Integrating Sphere	2015-07-01	2016-06-30
EE-09	Goniophotometer system	2015-07-01	2016-06-30
D908S	Standard Lamp	2015-07-01	2016-06-30
PF210	Power Meter for Goniophotometer	2015-07-01	2016-06-30
ST-R-181A	Temperature Tester	2015-07-01	2016-06-30
Uncertainty Photometric Measurement (Sphere):1.74% Chromaticity Measurement(Sphere):14.3K Photometric Measurement(Goniophotometer):1.62%			

******* END OF DATASHEET PACKAGE *******

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