



## LM-79-08 Test Report

for

### ABOVE ALL LIGHTING INC.

1501 Industrial Way N. Toms River, NJ 08755.

### WRAP

### Model: WRP06D28LED501S

### Laboratory: Leading Testing Laboratories

**NVLAP CODE: 200960-0**

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Report No.: HZ16100018i

The laboratory that conducted the testing detailed in this report has been accredited for SSL by NVLAP.

Reviewed by:

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Dec. 27, 2016

Approved by:

Manager: Jim Zhang  
Dec. 27, 2016

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

## Test Summary

Sample Tested: **WRP06D28LED501S**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
138.0	3511.5	25.44	0.9963
CCT (K)	CRI	Stabilization Time (Light & Power)	
5006	82.8	60	

Table 1: Executive Data Summary

### Test specifications:

<b>Date of Receipt</b>	: Dec. 14, 2016
<b>Date of Test</b>	: Dec. 22, 2016
<b>Test item</b>	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
<b>Reference Standard</b>	: IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

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## Sample Photo



Sample view

## Equipment Under Test (EUT)

<b>Name</b>	: WRAP
<b>Model</b>	: WRP06D28LED501S
<b>Electrical Ratings</b>	: 120~277Vac, 50/60Hz, 28W
<b>Product Description</b>	: 5000K, Aluminum frame, Frosted Lens, SPCC with powder paint Manufacturer of light source: LG Innotek Co., Ltd Model of light source: LGIT 5630HE Package
<b>Manufacturer</b>	: ABOVE ALL LIGHTING INC.
<b>Address</b>	: Room 1012, North Minch Fortune 108 Plaza,# 1839 Qixin road, Shanghai

## TEST RESULTS

Test ambient temperature was 24.7°C.

Base orientation was base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 60 minutes, and the total operating time including stabilization was 85 minutes.

The photometric distance of Goniophotometer is 30 m.

Luminous data was taken at 0.5° vertical intervals and 10.0° horizontal intervals.

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.213	0.099
Power Factor	0.9963	0.9283
Test Power (W)	25.44	25.49
THD A%	8.03	9.29
Luminous Efficacy (lm/W)	138.0	139.0
Total Luminous Flux (lm)	3511.5	3543.3
Color Rendering Index (CRI)	82.8	
R9	3	
Correlated Color Temperature (CCT) (K)	5006	
Chromaticity (Chroma x, Chroma y)	(0.3448, 0.3502)	
Chromaticity (Chroma u, Chroma v)	(0.2118, 0.3226)	
Chromaticity (Chroma u', Chroma v')	(0.2118, 0.4839)	
Duv	0.0006	
Average Beam Angle (°)	91.0	
Center Beam Candle Power (cd)	1378	
Spacing Criteria	1.20 (0°-180°)/ 1.17 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	73.77%	
Zonal Lumens in the 60°-90°Zone	17.65%	
Zonal Lumens in the 90°-120°Zone	6.08%	
Zonal Lumens in the 120°-180°Zone	2.51%	

Special Color Rendering Indices	
R1	81
R2	87
R3	93
R4	84
R5	83
R6	84
R7	86
R8	66
R9	3
R10	71
R11	84
R12	69
R13	82
R14	96

Table 2: Test data per Goniophotometer Method

Note: According to CIE 1976 (u',v') diagram,  $u' = u = 4x/(-2x+12y+3)$ ,  $v' = 3v/2 = 9y/(-2x+12y+3)$ .

## Spectral Power Distribution

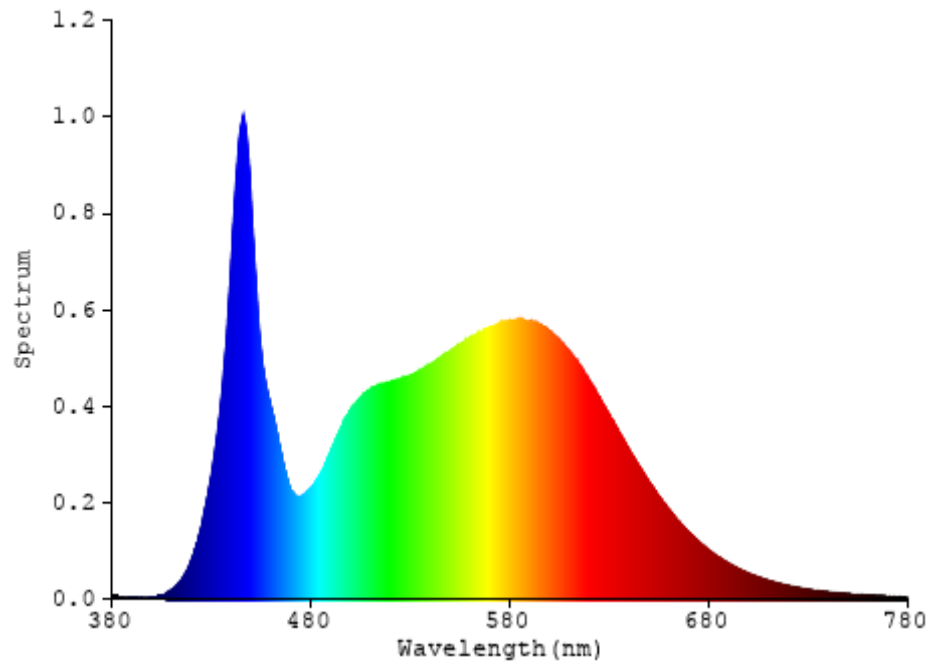


Chart 1: Spectral Power Distribution

### Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	129.358	3.68%
10- 20	370.22	10.54%
20- 30	545.402	15.53%
30- 40	601.135	17.12%
40- 50	542.199	15.44%
50- 60	401.975	11.45%
60- 70	270.521	7.70%
70- 80	213.643	6.08%
80- 90	135.739	3.87%
90-100	81.356	2.32%
100-110	73.428	2.09%
110-120	58.542	1.67%
120-130	40.27	1.15%
130-140	25.263	0.72%
140-150	13.362	0.38%
150-160	6.443	0.18%
160-170	2.358	0.07%
170-180	0.27	0.01%
Total	3511.5	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2590.289	73.77%
60- 90	619.903	17.65%
0-90	3210.192	91.42%
90- 180	301.292	8.58%
0- 180	3511.5	100%

Table 3: Zonal Lumen Data

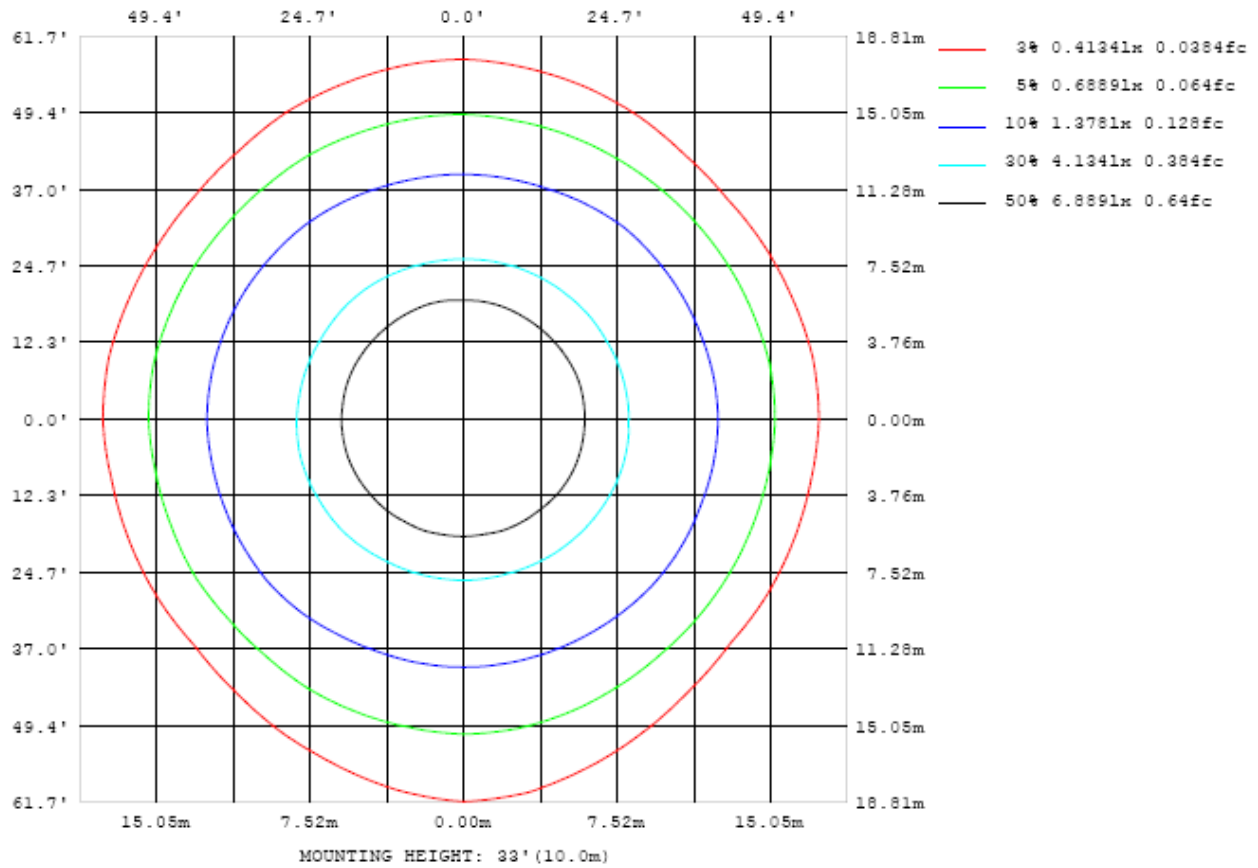


Chart 2: Illuminance Plot (Footcandles)



## Luminous Intensity Distribution Plots

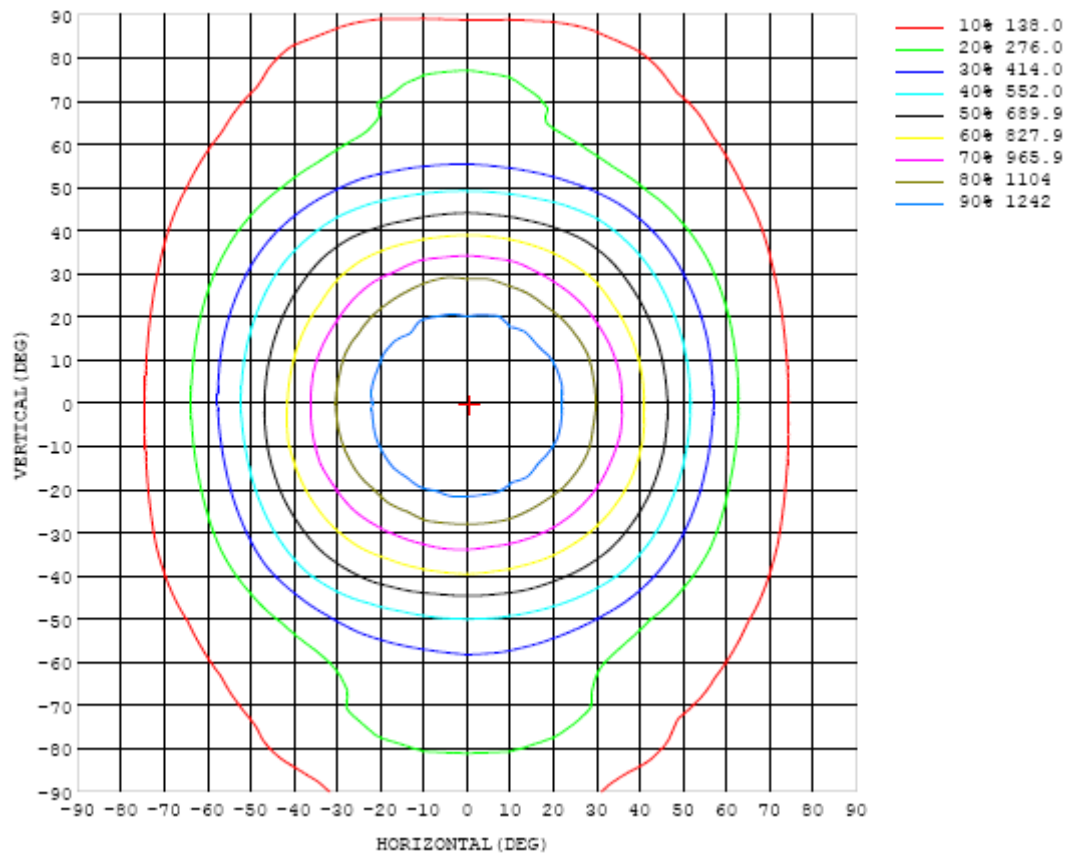


Chart 3: Isocandela Plot

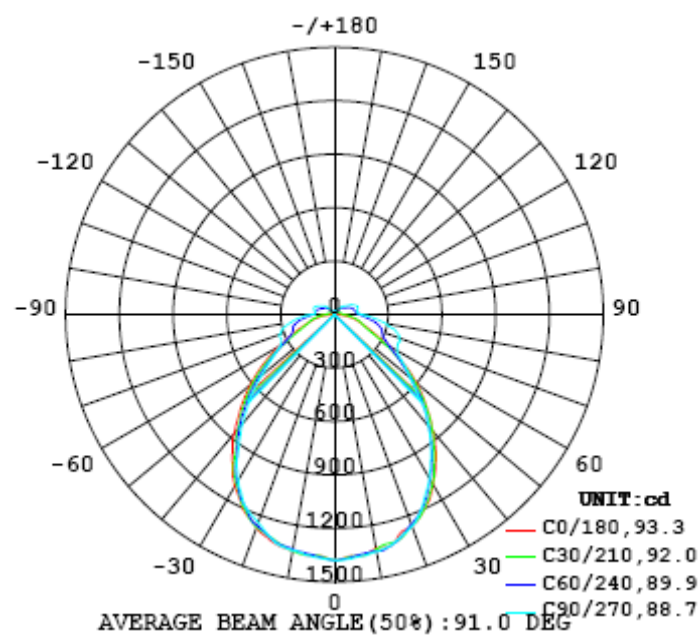


Chart 4: Polar Candela Distribution

## Luminous Intensity Data

Table--1

UNIT: cd

C (DEG) y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378
5	1359	1359	1359	1360	1358	1355	1359	1365	1369	1367	1366	1365	1358	1354	1356	1358	1361	1362	1359
10	1333	1335	1336	1338	1350	1353	1348	1342	1344	1350	1349	1348	1351	1353	1353	1351	1347	1348	1343
15	1316	1316	1323	1319	1312	1305	1322	1323	1309	1318	1318	1317	1320	1322	1325	1322	1318	1321	1323
20	1266	1265	1265	1260	1267	1266	1254	1278	1263	1264	1268	1264	1272	1274	1274	1273	1282	1279	1271
25	1196	1192	1191	1195	1183	1185	1179	1174	1175	1169	1180	1177	1185	1198	1197	1200	1193	1199	1206
30	1099	1095	1104	1096	1087	1070	1068	1069	1054	1061	1058	1071	1069	1082	1087	1098	1106	1111	1110
35	986	990	980	974	964	955	948	935	934	939	942	941	949	962	977	987	994	999	995
40	852	864	862	850	838	828	821	813	812	817	813	819	826	847	856	864	878	881	871
45	723	731	726	717	711	702	691	688	677	673	676	695	707	720	731	733	741	748	739
50	597	593	583	581	581	566	559	553	552	551	551	551	564	591	602	601	602	607	612
55	465	456	448	446	444	440	442	453	460	465	459	454	451	446	461	468	465	473	484
60	338	328	325	321	313	330	355	378	396	404	389	375	363	340	326	336	341	346	360
65	238	231	230	217	223	254	302	344	375	388	371	343	300	256	235	232	243	249	257
70	174	178	171	170	179	221	281	336	364	381	366	339	273	219	186	175	178	185	182
75	133	136	134	144	164	209	263	304	339	353	340	303	259	207	166	142	132	137	135
80	91.1	106	102	112	133	181	225	258	285	290	284	259	226	182	138	111	94.0	107	95.1
85	44.2	59.5	59.6	74.4	108	143	174	204	219	219	220	203	177	144	113	72.1	60.0	66.0	51.2
90	2.20	11.3	23.7	47.5	80.2	110	141	152	154	154	155	155	143	114	81.1	47.9	24.2	11.3	0.58
95	0.36	10.4	22.3	44.3	75.6	103	126	133	132	131	132	136	128	107	76.6	45.3	22.6	10.3	0.54
100	0.44	10.3	20.2	41.3	72.2	98.8	117	126	128	128	129	128	118	102	73.1	42.4	21.0	10.4	0.55
105	0.47	9.15	17.5	37.9	66.8	93.0	113	127	133	135	134	127	114	94.7	67.5	38.8	17.5	9.08	0.60
110	0.63	7.86	16.8	31.6	59.4	83.6	105	122	133	137	134	123	107	85.2	59.8	32.8	16.4	7.21	0.67
115	0.75	7.92	16.2	27.3	49.8	73.2	94.0	110	122	126	122	111	95.8	74.4	50.4	28.7	15.0	6.62	0.76
120	0.82	7.23	15.4	24.0	43.0	61.6	79.9	96.0	107	111	107	96.1	81.5	62.2	43.7	25.0	14.0	6.09	0.85
125	0.88	5.71	13.9	20.6	37.6	54.5	67.7	79.2	89.5	92.7	88.8	79.0	68.0	54.7	38.0	21.5	12.6	5.55	0.92
130	0.86	4.46	11.5	18.7	31.2	47.4	60.1	69.2	75.1	77.3	74.9	69.1	60.5	47.6	31.1	18.9	10.9	4.58	1.04
135	1.06	4.18	9.99	17.1	26.2	39.5	51.0	60.6	66.4	67.5	66.1	60.3	51.1	38.8	25.5	16.8	9.20	4.02	1.05
140	1.08	3.54	9.60	15.4	22.9	31.6	41.0	48.9	54.1	55.8	54.0	48.7	40.9	30.8	21.9	14.8	8.57	3.17	1.04
145	1.14	3.10	8.69	13.8	19.3	26.4	32.5	37.5	41.6	43.0	41.3	37.3	32.0	25.4	18.5	13.0	7.73	2.83	1.15
150	1.16	2.69	7.22	11.8	16.2	21.6	25.7	29.5	32.3	33.4	32.1	29.6	25.4	20.7	15.4	11.2	6.40	2.43	1.35
155	1.16	2.23	5.88	9.96	13.5	17.7	20.6	23.1	25.0	25.6	25.1	23.4	20.6	17.0	13.2	9.50	5.46	2.17	1.47
160	1.24	2.07	4.45	7.94	11.2	14.3	16.8	18.3	19.5	19.9	19.7	18.6	16.6	14.2	11.4	7.46	4.50	1.99	1.53
165	1.27	1.81	3.18	5.56	7.79	9.76	12.1	13.1	13.8	14.2	14.3	13.7	12.5	10.2	8.06	5.85	3.26	1.82	1.54
170	1.31	1.60	2.20	3.08	4.31	5.48	6.55	7.50	8.02	8.17	7.91	7.60	7.04	5.96	4.73	3.29	2.22	1.64	1.52
175	1.12	1.25	1.42	1.62	1.80	2.01	2.26	2.45	2.58	2.67	2.69	2.68	2.54	2.13	1.83	1.66	1.52	1.43	1.43
180	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13

Table 4: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) y (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378		
5	1357	1357	1356	1353	1352	1354	1358	1362	1364	1363	1362	1355	1349	1349	1353	1357	1358		
10	1338	1339	1347	1352	1346	1337	1334	1335	1343	1333	1328	1339	1348	1349	1343	1336	1333		
15	1320	1317	1306	1304	1307	1312	1307	1308	1314	1300	1306	1306	1301	1303	1317	1325	1322		
20	1276	1275	1269	1265	1254	1261	1260	1256	1243	1255	1263	1243	1263	1260	1256	1263	1265		
25	1205	1196	1196	1197	1192	1184	1173	1188	1184	1173	1174	1179	1186	1183	1192	1194	1196		
30	1110	1111	1098	1092	1086	1082	1093	1092	1076	1080	1075	1068	1069	1077	1089	1102	1097		
35	997	984	971	968	965	948	955	939	938	942	949	940	946	954	959	975	986		
40	859	854	836	840	836	821	805	798	799	801	802	815	819	829	826	840	849		
45	725	721	715	713	707	685	670	667	671	670	665	681	697	702	701	705	717		
50	605	598	592	579	573	559	541	533	532	530	533	552	565	569	571	576	587		
55	482	470	456	445	436	435	427	422	422	416	415	416	424	434	440	449	462		
60	357	340	326	316	319	336	341	346	350	341	333	320	300	294	306	319	335		
65	249	235	225	221	241	268	292	316	327	311	284	257	223	201	199	215	228		
70	176	171	170	176	206	246	283	311	323	306	274	242	194	163	157	160	167		
75	132	132	140	156	195	234	262	285	296	281	251	228	189	153	138	130	129		
80	103	96.8	111	131	173	202	225	247	246	245	219	197	165	126	108	103	101		
85	64.6	59.6	73.7	105	135	156	184	197	191	192	177	151	125	98.0	70.9	58.3	57.7		
90	13.6	22.1	43.4	70.3	96.7	119	127	125	123	123	124	115	91.1	66.6	40.0	19.2	9.13		
95	9.10	19.5	41.7	68.5	90.2	110	114	110	108	109	112	106	86.8	65.1	39.0	17.6	8.75		
100	9.36	17.5	39.0	66.7	87.8	106	114	112	111	112	111	103	84.4	62.7	35.7	16.1	8.50		
105	8.88	16.1	33.9	59.6	81.9	102	116	120	121	119	113	99.0	79.2	57.2	31.3	15.3	8.47		
110	7.79	14.9	28.5	51.3	72.9	92.6	110	119	121	117	107	90.6	71.2	50.4	27.2	14.8	7.67		
115	7.13	13.7	25.8	45.0	63.1	81.5	97.8	109	112	107	96.1	80.1	63.0	45.1	23.4	14.2	7.07		
120	6.89	12.4	21.8	40.8	58.5	71.9	84.1	93.9	97.4	93.3	83.0	71.7	58.9	39.1	19.7	12.9	6.34		
125	6.31	11.4	18.3	33.6	51.4	66.5	76.2	83.4	86.6	83.2	76.6	65.7	51.2	31.4	16.6	11.8	5.26		
130	5.41	10.7	15.8	27.0	42.3	56.5	67.3	74.8	77.4	74.3	66.8	55.9	41.8	24.9	14.9	10.6	4.27		
135	4.99	10.0	14.6	22.2	33.8	45.8	55.5	61.8	64.0	61.3	54.5	44.5	32.9	20.7	14.1	9.76	3.85		
140	4.38	9.53	13.6	18.5	26.0	34.9	42.8	47.6	49.0	46.6	41.3	34.3	25.9	18.0	13.4	9.43	3.25		
145	3.31	8.82	12.3	16.5	20.8	26.5	31.9	35.2	36.2	34.6	31.0	26.6	20.7	16.0	12.5	8.37	2.70		
150	3.12	7.00	10.9	14.4	17.7	21.1	24.8	27.1	27.6	26.7	24.4	21.3	17.4	13.9	10.9	6.74	2.41		
155	2.39	5.82	8.67	12.3	15.3	17.6	20.0	21.8	22.2	21.6	20.0	17.9	15.0	12.0	9.24	5.59	1.97		
160	1.45	4.29	7.24	9.07	12.2	14.3	16.0	17.2	17.8	17.7	16.6	15.3	12.7	10.6	8.13	4.83	1.64		
165	1.51	2.19	4.61	6.86	8.68	10.1	11.4	12.1	12.5	12.7	11.6	11.0	9.54	8.32	6.31	3.86	1.36		
170	1.54	1.50	1.93	3.30	4.73	5.82	6.67	7.13	7.35	7.44	7.46	6.82	5.96	4.87	3.47	2.08	1.41		
175	1.48	1.47	1.46	1.46	1.45	1.54	1.69	1.93	2.04	1.99	1.83	1.56	1.29	1.19	1.19	1.17	1.10		
180	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13		

Table 5: Luminous Intensity Data

## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jul. 27, 2016	Jul. 26, 2017
Digital Power Meter	PF2010A	HZTE028-01	Jul. 27, 2016	Jul. 26, 2017
AC Power Supply	PCR 500L	HZTE001-08	Jul. 27, 2016	Jul. 26, 2017
DC Power Supply	WY12010	HZTE004-03	Jul. 27, 2016	Jul. 26, 2017
Temperature Meter	TES1310	HZTE017-01	Jul. 27, 2016	Jul. 26, 2017
Standard Source	D908	HZTE012-01	Jul. 27, 2016	Jul. 26, 2017
Standard source	SCL-1400	HZTE012-02	Jul. 27, 2016	Jul. 26, 2017

Table 6: Test Equipment List

## TEST METHODS

### Seasoning of SSL Product

For the purpose of rating new SSL products, SSL products shall be tested with no seasoning. Therefore, no seasoning was performed.

### Goniophotometer Method

#### Photometric and Electrical Measurements

An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.

Ambient temperature was measured at the same height of the sample mounted on the Goniophotometer equipment. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation.

The stabilization time typically ranges from 30 min (small integrated LED lamps) to 2 or more hours for large SSL luminaires). It can be judged that stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 30 min, taken 15 minutes apart, is less than 0.5 %.

Electrical measurements including voltage, current, and power were measured using the Everfine Digital Power Meter.

Some graphics were created with Photometric Plus software.

The standard reference of the Goniophotometer system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Metrology P.R. China.

The uncertainty of goniophotometer system reported in this document is expanded uncertainty is 1.94% with a coverage factor k=2.

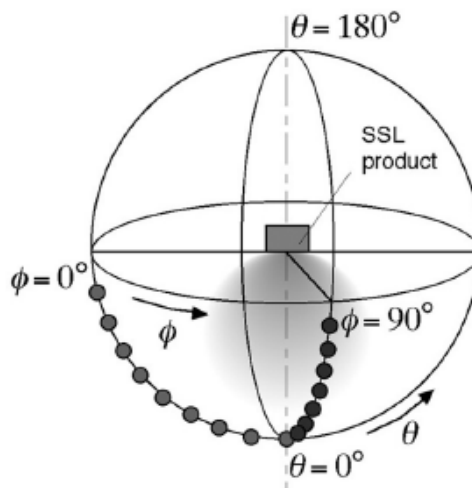
## Color Characteristics Measurements

The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as values that are spatially average, weighted to intensity, over the angular range where light is intentionally emitted from the SSL product. The color characteristics measurements are using gonio-spectroradiometer.

## Color Spatial Uniformity

The characteristics of SSL products may be spatially non-uniform, the chromaticity coordinate shall be measured at two vertical planes ( $C=0^\circ/180^\circ$  and  $C=90^\circ/270^\circ$ ) and at  $10^\circ$  or less intervals for vertical angle until the light output dropped to below 10% of the peak intensity. The averaged weighted chromaticity coordinate was calculated from these points. The data was then analyzed to check for delta color differences of the  $u'$ ,  $v'$  chromaticity coordinates. The spatial non-uniformity of chromaticity,  $\Delta u'v'$ , is determined as the maximum deviation (distance on the CIE ( $u'$ ,  $v'$ ) diagram) among all measured points from the spatially averaged chromaticity coordinate.

The geometry for the chromaticity measurement using gonio-spectroradiometer is shown as following.



\*\*\* End of Report \*\*\*

This report is considered invalidated without the Special Seal for Inspection of the LTL. This report shall not be altered, increased or deleted. The results shown in this test report refer only to the sample(s) tested. Without written approval of LTL, this test report shall not be copied except in full and published as advertisement.