



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

ATG Electronics Corp.

9020 Rancho Park Court Rancho Cucamonga, CA 91730

Test Model: RTUS22-S-30W-35-PE

Report Type:	Electrical and Photometric tests including: Luminous Flux, Power Factor, Chromaticity, Luminous Intensity Distribution, THD
Test Engineer:	Carl Du <i>Carl Du</i>
Report Number:	RSZ160908507-10
Test Date:	2016-09-09 to 2016-09-12
Report Date:	2016-09-22
Approved By:	Blake Zhang / EE Engineer <i>Blake Zhang</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China. Tel: +86-0769-86858888 Fax: +86-0769-86858588
Accreditation:	The IAS Accreditation Number TL-460.

Note: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan). This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

1. Product Description

General Information:

One sample was received on 2016-09-08 and used for testing.

Model Tested: RTUS22-S-30W-35-PE
 Manufacturer: ATG Electronics Co.,Ltd
 Brand Name: ATG
 Product Designation: 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces
 Burning Time Before Test: 0hour(For New Products)
 Driver Model: WP-UL-T40-48-0.73A

Rated Values:

Rated Voltage/Frequency: 120-277V AC 50/60Hz
 Rated Power: 30 W
 Nominal CCT: 3500K
 Nominal Lumen Output: 3900 lm

2. Standards Used

- IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits – Related Power Quality Requirements for Lighting
- IES TM-30-15: IES Method for Evaluating Light Source Color Rendition (This method is not in IAS accreditation scope)

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
2.0m integrating sphere	EVERFINE	R98	11010018	R98	2015-11-09	2016-11-08
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2016-03-10	2017-03-09
Digital Power Meter	EVERFINE	PF2010A	1011004	600V/20A	2016-07-11	2017-07-10
Digital CC&CV DC Power Supply	EVERFINE	WY305-V1	1101047	30V/5A	2016-07-07	2017-07-06
Temperature/humidity/clock	Victor	VC230	EE023	0~40°C0~90%	2016-03-21	2017-03-20
Standard Light Source	SENSING	N/A	LSD090808	N/A	2015-09-25	2016-09-24
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	0-150V, 0-300V	2016-03-04	2017-03-03
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V, 0-300V	2016-03-04	2017-03-03
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2016-03-04	2017-03-03
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2016-03-04	2017-03-03

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2016-03-10	2017-03-09
Wireless Remote Sensor	N/A	433MHz	N/A	0°C~50°C;-20°C~60°C	2016-03-21	2017-03-20
Standard Light Source	EVERFINE	D908	1012003	N/A	2016-09-08	2017-09-07

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

4. Test Method

Product was tested with no seasoning. All stabilization and measurements were made in compliance with IES LM-79-08. The product was operated at rated voltage or at voltage required by manufacturer. The ambient temperature of the sample was maintained at 25°C±1°C during measurement. And relative humidity is less than 65%.

Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, Spectroradiometer, and integrating sphere. The integrating sphere system is calibrated by standard spectrum light source before measurement.

4π geometry was used during measurement. The product was operated in its intended orientation in application and was recorded in this report.

The uncertainty of the light output (luminous flux) measurements is U=1.8% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=20K (K=2), at the 95% confidence level.

The uncertainty of power meter AC current U=0.19 % of rdg, AC Voltage U=0.15% of rdg, Power U=0.20%) (K=2), at the 95% confidence level.

Goniophotometer System

The goniophotometer system is calibrated by standard light source before measurement.

Type C goniophotometer was used for measuring total luminous flux, luminous intensity distribution, and color spatial uniformity. The product was operated in its intended orientation in application and was recorded in this report. The vertical angle (γ) test intervals were set no more than 1 degree while data for 5 degree intervals is reported. The horizontal angle (C plane) test intervals were set no more than 22.5 degree.

The uncertainty of the luminous intensity is U=1.6% (K=2) , at the 95% confidence level.

Additional Test

The Additional Test item may not be covered by IESNA LM-79-2008. Additional test including power factor, off-state power and THD, was measured by Digital Power Meter after stabilized at 25°C±1°C. Test voltage for THD and power factor test would be equal to rated voltage or, in case of a voltage range, maximum value of that range.

The uncertainty of power meter AC current U=0.19 % of rdg, AC Voltage U=0.15% of rdg, Power U=0.20%) (K=2), at the 95% confidence level.

Fidelity Index and Gamut Index Calculation

The R_i , R_g was calculated according to IES TM-30-15 by using calculation tools. The calculation was based on the measured SPD from 380nm to 780nm with 1nm intervals. All the colors in this report is for reference only.

5. Test Result

[Integrating Sphere System]

Total operating time for integrating sphere test: **1.0 hour**

Test orientation: **Downward**

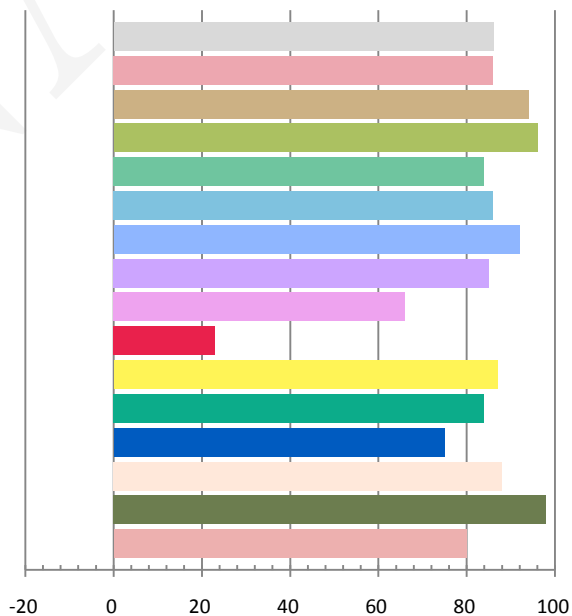
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.1	60	0.2535	30.29	0.9953	3962.8	130.83

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
12.403	3344	-0.00207	0.4120	0.3892	0.2407	0.5116

Color Rendering Index

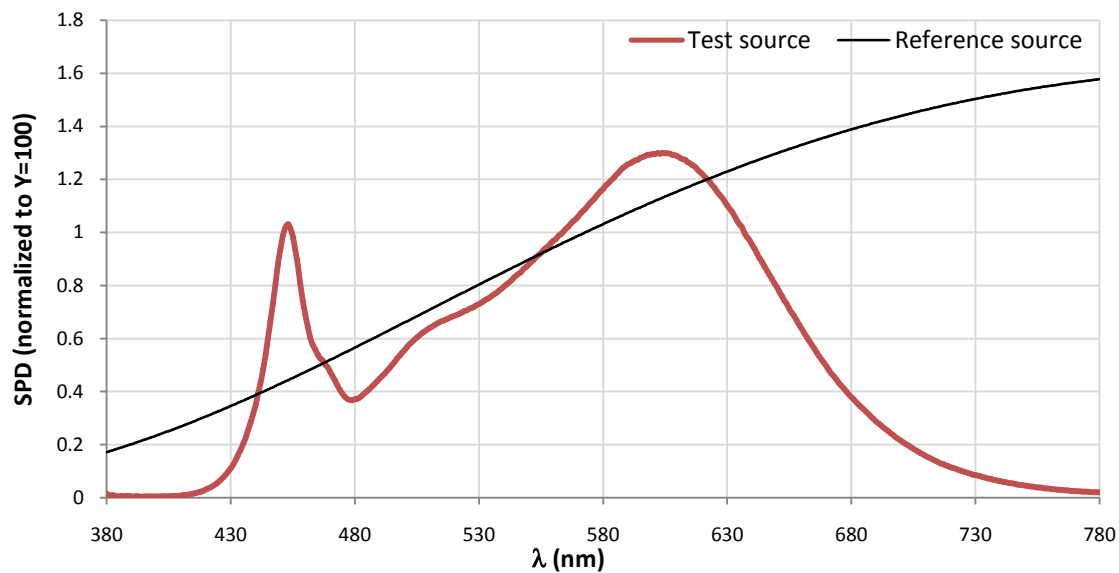
Ra			
86.1			
R1	R2	R3	R4
86	94	96	84
R5	R6	R7	R8
86	92	85	66
R9	R10	R11	R12
23	87	84	75
R13	R14	R15	
88	98	80	



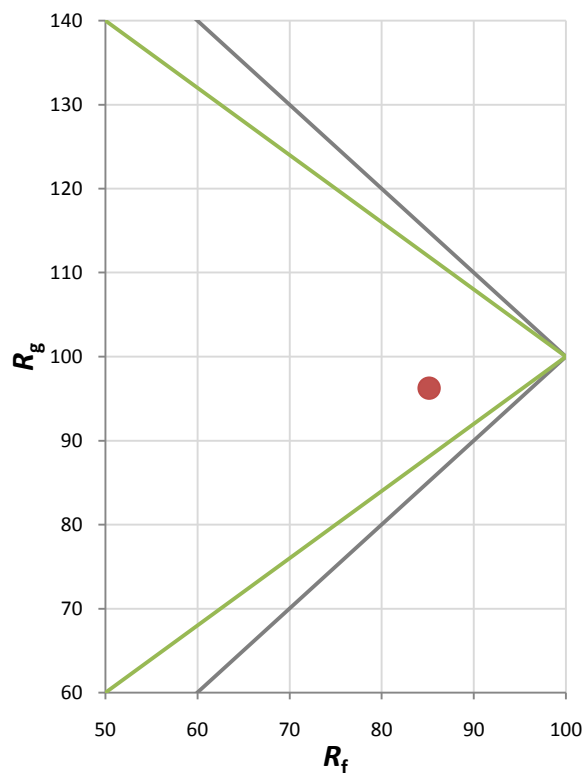
Fidelity Index and Gamut Index

Fidelity Index R_f	85
Gamut Index R_g	96

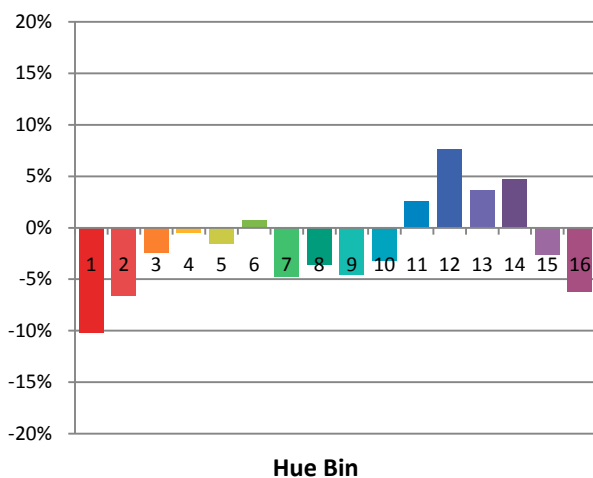
Spectral Power Distribution Comparison



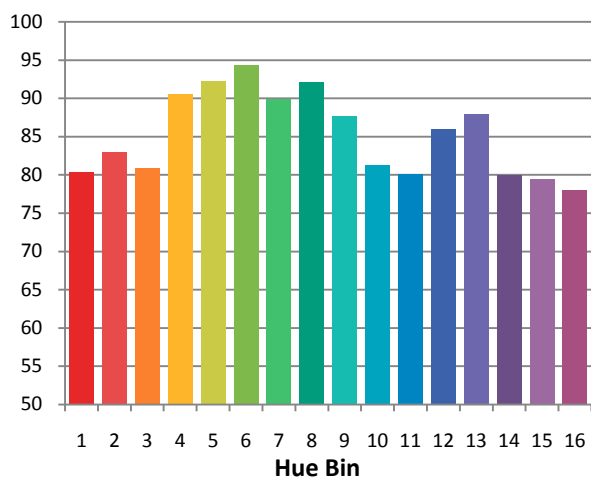
Plot of R_g versus R_f



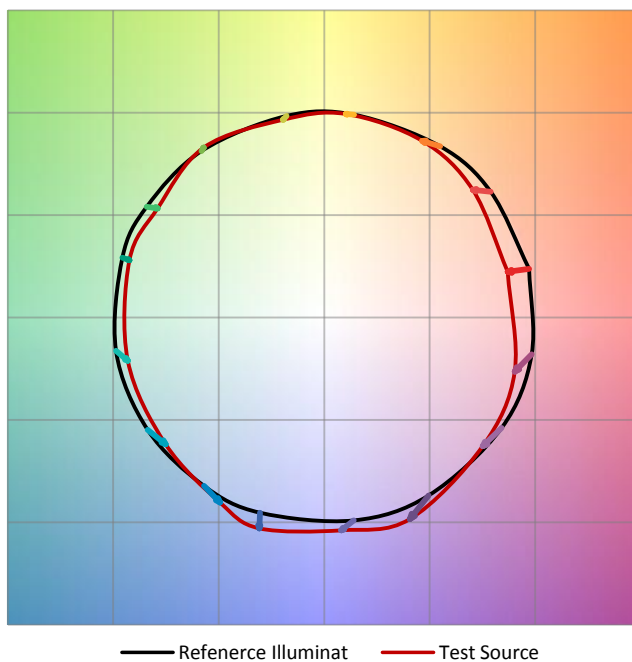
Chroma Shift by Hue



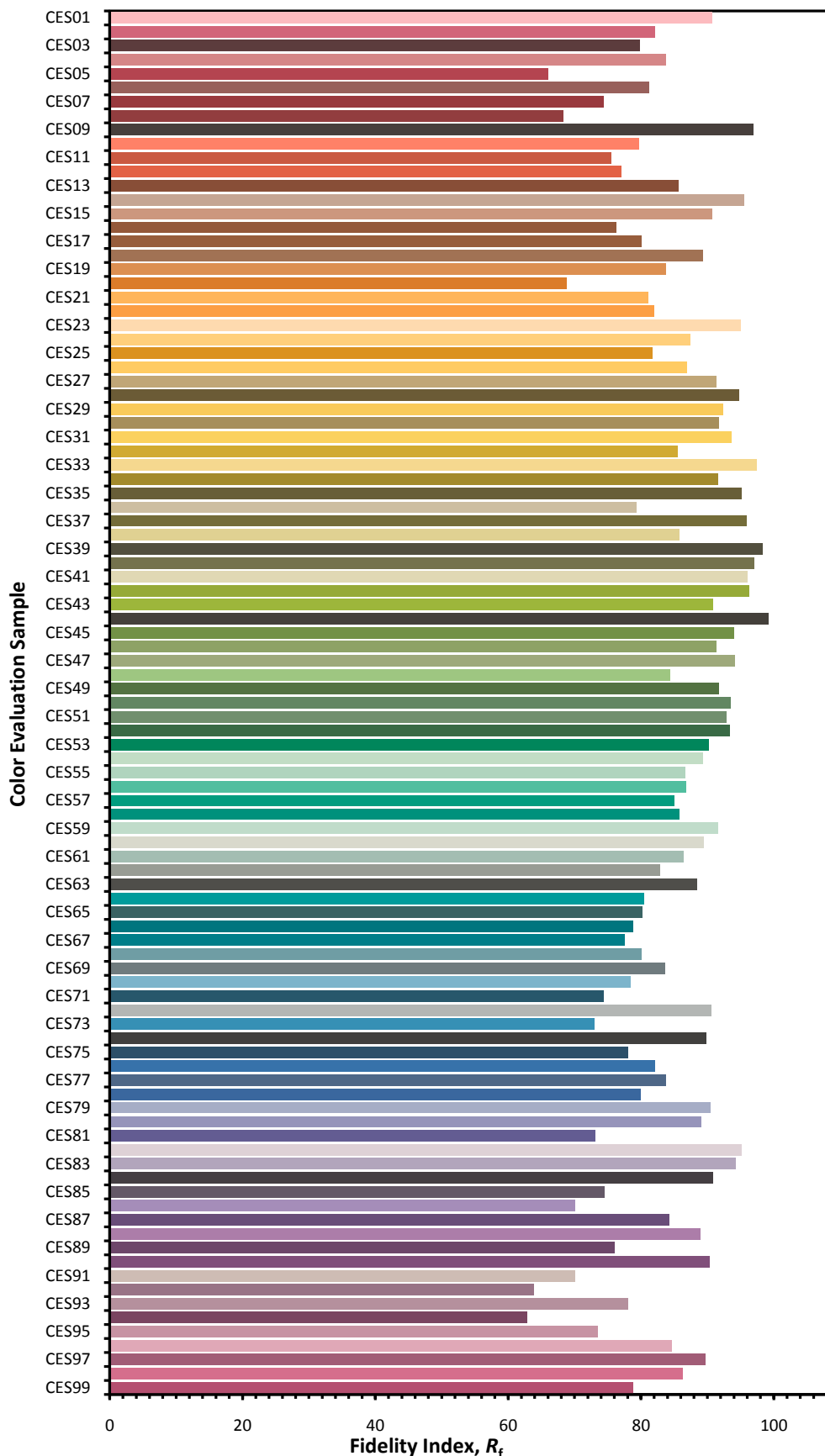
R_f by Hue



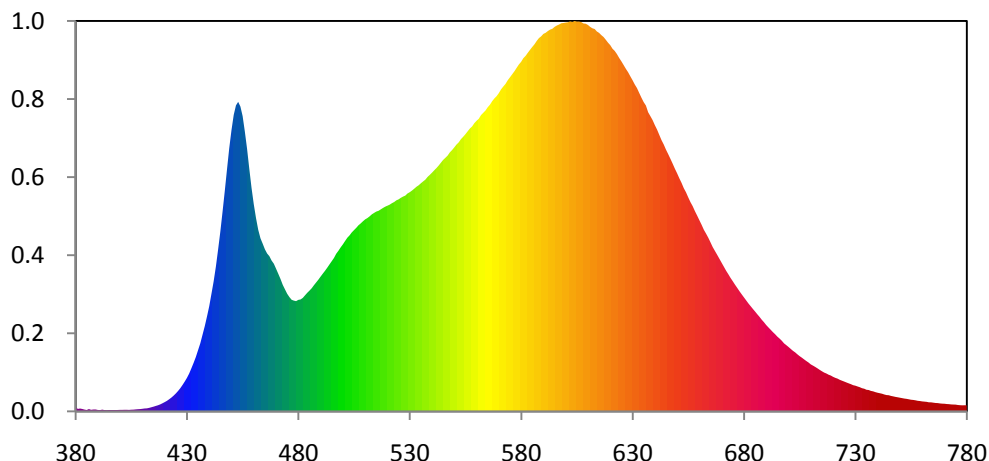
Color Vector Graphic



Color Fidelity by CES Sample



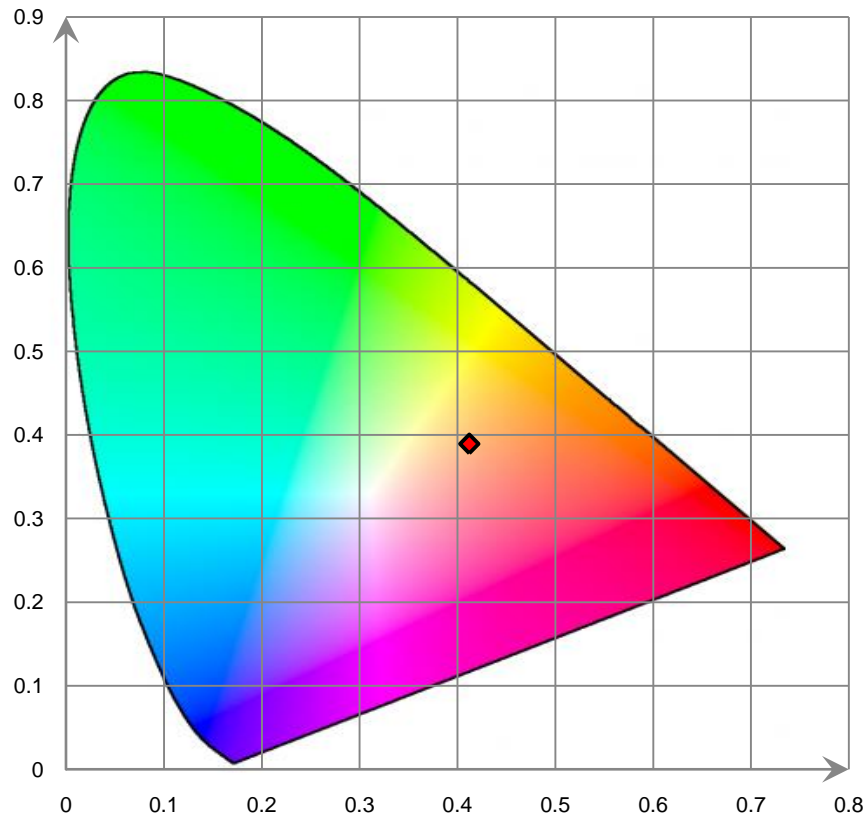
Relative Spectral Power Distribution



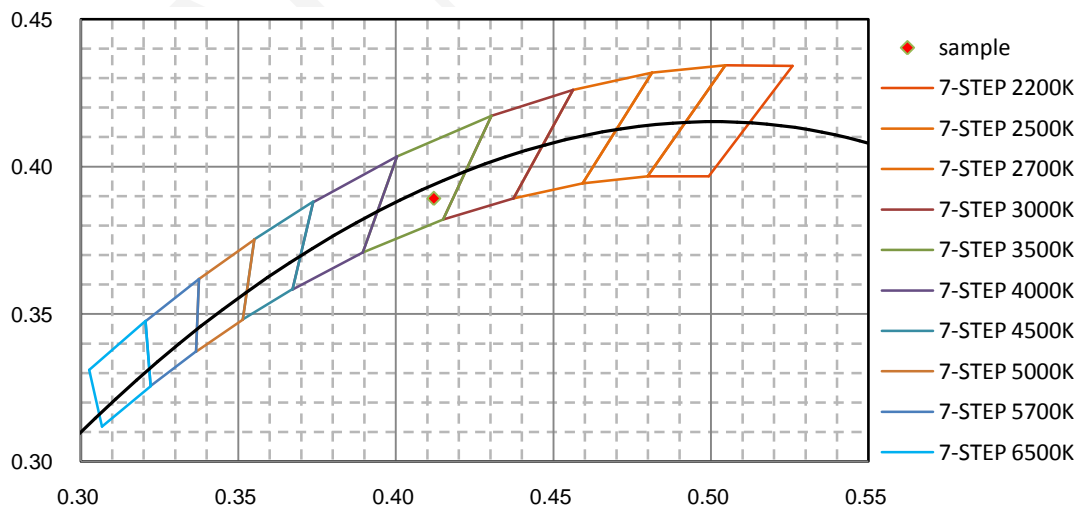
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	9.171E-01	421	2.031E+00	462	3.509E+01	503	3.402E+01	544	4.806E+01
381	4.687E-01	422	2.335E+00	463	3.345E+01	504	3.459E+01	545	4.859E+01
382	5.512E-01	423	2.658E+00	464	3.242E+01	505	3.503E+01	546	4.900E+01
383	4.702E-01	424	3.034E+00	465	3.131E+01	506	3.547E+01	547	4.943E+01
384	3.479E-01	425	3.456E+00	466	3.051E+01	507	3.596E+01	548	5.005E+01
385	2.675E-01	426	3.934E+00	467	2.999E+01	508	3.633E+01	549	5.049E+01
386	4.433E-01	427	4.466E+00	468	2.914E+01	509	3.674E+01	550	5.101E+01
387	2.995E-01	428	5.088E+00	469	2.853E+01	510	3.710E+01	551	5.157E+01
388	3.600E-01	429	5.758E+00	470	2.758E+01	511	3.736E+01	552	5.199E+01
389	3.673E-01	430	6.467E+00	471	2.659E+01	512	3.769E+01	553	5.262E+01
390	2.760E-01	431	7.305E+00	472	2.558E+01	513	3.808E+01	554	5.307E+01
391	2.496E-01	432	8.329E+00	473	2.446E+01	514	3.835E+01	555	5.356E+01
392	3.372E-01	433	9.378E+00	474	2.358E+01	515	3.861E+01	556	5.413E+01
393	2.488E-01	434	1.051E+01	475	2.273E+01	516	3.876E+01	557	5.466E+01
394	1.958E-01	435	1.183E+01	476	2.207E+01	517	3.903E+01	558	5.507E+01
395	2.691E-01	436	1.316E+01	477	2.157E+01	518	3.931E+01	559	5.569E+01
396	2.522E-01	437	1.479E+01	478	2.140E+01	519	3.955E+01	560	5.616E+01
397	2.531E-01	438	1.646E+01	479	2.130E+01	520	3.975E+01	561	5.654E+01
398	2.572E-01	439	1.832E+01	480	2.155E+01	521	3.994E+01	562	5.725E+01
399	2.684E-01	440	2.031E+01	481	2.163E+01	522	4.023E+01	563	5.769E+01
400	2.956E-01	441	2.268E+01	482	2.193E+01	523	4.045E+01	564	5.814E+01
401	2.965E-01	442	2.514E+01	483	2.242E+01	524	4.078E+01	565	5.877E+01
402	3.079E-01	443	2.801E+01	484	2.290E+01	525	4.097E+01	566	5.926E+01
403	3.127E-01	444	3.129E+01	485	2.334E+01	526	4.126E+01	567	5.994E+01
404	2.884E-01	445	3.478E+01	486	2.379E+01	527	4.151E+01	568	6.047E+01
405	3.222E-01	446	3.861E+01	487	2.438E+01	528	4.169E+01	569	6.091E+01
406	3.378E-01	447	4.263E+01	488	2.492E+01	529	4.211E+01	570	6.151E+01
407	3.826E-01	448	4.680E+01	489	2.546E+01	530	4.235E+01	571	6.223E+01
408	4.196E-01	449	5.091E+01	490	2.605E+01	531	4.267E+01	572	6.277E+01
409	4.463E-01	450	5.432E+01	491	2.662E+01	532	4.302E+01	573	6.329E+01
410	4.944E-01	451	5.729E+01	492	2.718E+01	533	4.340E+01	574	6.399E+01
411	5.570E-01	452	5.913E+01	493	2.778E+01	534	4.370E+01	575	6.457E+01
412	5.910E-01	453	5.981E+01	494	2.841E+01	535	4.407E+01	576	6.515E+01
413	6.751E-01	454	5.891E+01	495	2.902E+01	536	4.443E+01	577	6.572E+01
414	7.887E-01	455	5.707E+01	496	2.965E+01	537	4.477E+01	578	6.640E+01
415	9.137E-01	456	5.404E+01	497	3.046E+01	538	4.530E+01	579	6.704E+01
416	1.047E+00	457	5.072E+01	498	3.104E+01	539	4.570E+01	580	6.755E+01
417	1.180E+00	458	4.684E+01	499	3.169E+01	540	4.613E+01	581	6.824E+01
418	1.353E+00	459	4.320E+01	500	3.228E+01	541	4.658E+01	582	6.870E+01
419	1.565E+00	460	4.003E+01	501	3.293E+01	542	4.703E+01	583	6.930E+01
420	1.787E+00	461	3.739E+01	502	3.356E+01	543	4.751E+01	584	6.987E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	7.042E+01	626	6.693E+01	667	3.099E+01	708	9.731E+00	749	2.724E+00
586	7.094E+01	627	6.620E+01	668	3.025E+01	709	9.443E+00	750	2.638E+00
587	7.159E+01	628	6.554E+01	669	2.948E+01	710	9.083E+00	751	2.556E+00
588	7.214E+01	629	6.476E+01	670	2.872E+01	711	8.843E+00	752	2.479E+00
589	7.248E+01	630	6.399E+01	671	2.795E+01	712	8.583E+00	753	2.422E+00
590	7.295E+01	631	6.318E+01	672	2.718E+01	713	8.318E+00	754	2.335E+00
591	7.316E+01	632	6.248E+01	673	2.650E+01	714	8.029E+00	755	2.249E+00
592	7.350E+01	633	6.153E+01	674	2.579E+01	715	7.758E+00	756	2.208E+00
593	7.377E+01	634	6.061E+01	675	2.515E+01	716	7.500E+00	757	2.132E+00
594	7.393E+01	635	5.977E+01	676	2.448E+01	717	7.323E+00	758	2.043E+00
595	7.430E+01	636	5.910E+01	677	2.386E+01	718	7.089E+00	759	1.998E+00
596	7.456E+01	637	5.781E+01	678	2.321E+01	719	6.925E+00	760	1.926E+00
597	7.475E+01	638	5.705E+01	679	2.262E+01	720	6.678E+00	761	1.884E+00
598	7.500E+01	639	5.630E+01	680	2.203E+01	721	6.480E+00	762	1.842E+00
599	7.505E+01	640	5.533E+01	681	2.146E+01	722	6.330E+00	763	1.752E+00
600	7.514E+01	641	5.447E+01	682	2.087E+01	723	6.101E+00	764	1.744E+00
601	7.518E+01	642	5.343E+01	683	2.034E+01	724	5.934E+00	765	1.683E+00
602	7.536E+01	643	5.242E+01	684	1.981E+01	725	5.766E+00	766	1.620E+00
603	7.525E+01	644	5.158E+01	685	1.930E+01	726	5.588E+00	767	1.597E+00
604	7.544E+01	645	5.060E+01	686	1.877E+01	727	5.415E+00	768	1.529E+00
605	7.532E+01	646	4.971E+01	687	1.826E+01	728	5.258E+00	769	1.498E+00
606	7.533E+01	647	4.881E+01	688	1.771E+01	729	5.063E+00	770	1.480E+00
607	7.522E+01	648	4.788E+01	689	1.722E+01	730	4.965E+00	771	1.417E+00
608	7.495E+01	649	4.690E+01	690	1.668E+01	731	4.817E+00	772	1.393E+00
609	7.491E+01	650	4.602E+01	691	1.622E+01	732	4.668E+00	773	1.347E+00
610	7.467E+01	651	4.504E+01	692	1.578E+01	733	4.473E+00	774	1.321E+00
611	7.430E+01	652	4.416E+01	693	1.532E+01	734	4.373E+00	775	1.303E+00
612	7.402E+01	653	4.314E+01	694	1.491E+01	735	4.178E+00	776	1.236E+00
613	7.389E+01	654	4.234E+01	695	1.445E+01	736	4.126E+00	777	1.195E+00
614	7.341E+01	655	4.135E+01	696	1.407E+01	737	3.950E+00	778	1.171E+00
615	7.313E+01	656	4.044E+01	697	1.365E+01	738	3.872E+00	779	1.178E+00
616	7.271E+01	657	3.966E+01	698	1.314E+01	739	3.720E+00	780	1.180E+00
617	7.235E+01	658	3.869E+01	699	1.281E+01	740	3.600E+00		
618	7.181E+01	659	3.784E+01	700	1.245E+01	741	3.509E+00		
619	7.125E+01	660	3.694E+01	701	1.208E+01	742	3.407E+00		
620	7.078E+01	661	3.607E+01	702	1.170E+01	743	3.270E+00		
621	7.009E+01	662	3.510E+01	703	1.140E+01	744	3.151E+00		
622	6.966E+01	663	3.436E+01	704	1.103E+01	745	3.124E+00		
623	6.904E+01	664	3.355E+01	705	1.068E+01	746	2.988E+00		
624	6.830E+01	665	3.266E+01	706	1.037E+01	747	2.897E+00		
625	6.765E+01	666	3.174E+01	707	1.005E+01	748	2.800E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

Total operating time for luminous intensity distribution: **1.0 hour**

Test orientation: **Downward**

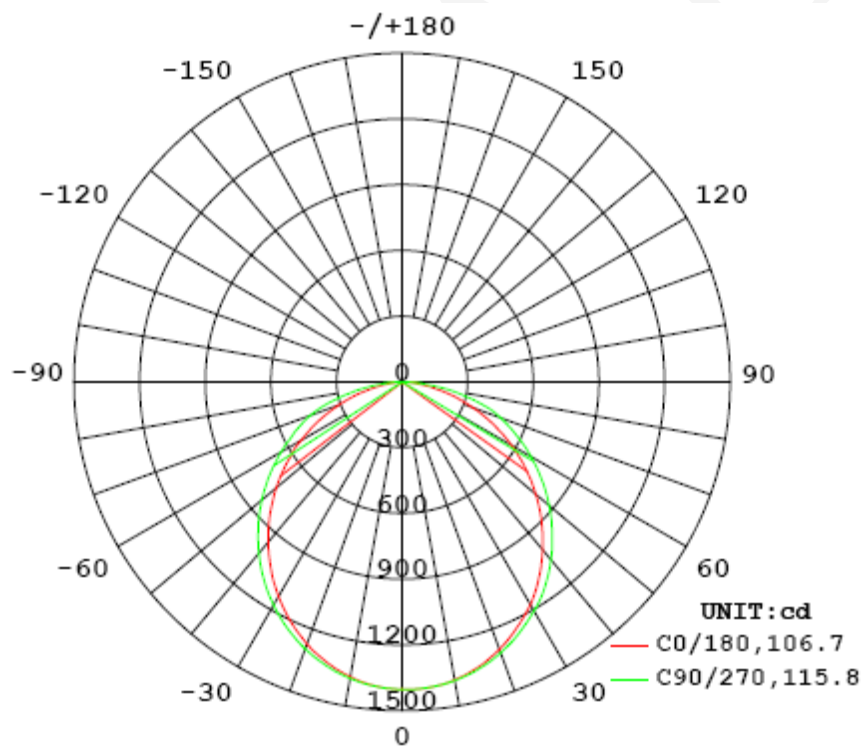
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
119.9	60	0.2542	30.36	0.9958

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
3976.25	130.97	1404.0	1.24	1.28

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	106.7	110.6	115.8	110.7	111.0
Field Angle (10% I _{max}):	157.3	163.3	165.1	163.3	162.3

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1403	1403	1403	1403	1403	1403	1403	1403
5.0°	1393	1392	1392	1393	1394	1396	1396	1398
10.0°	1366	1365	1368	1371	1373	1376	1376	1377
15.0°	1326	1326	1330	1335	1340	1343	1342	1342
20.0°	1273	1273	1280	1289	1296	1299	1296	1294
25.0°	1207	1209	1219	1232	1241	1243	1238	1234
30.0°	1131	1134	1148	1165	1176	1177	1169	1162
35.0°	1046	1051	1067	1088	1102	1102	1091	1080
40.0°	954	958	979	1004	1020	1018	1004	990
45.0°	855	860	884	913	931	928	910	893
50.0°	751	758	785	818	838	833	810	790
55.0°	644	651	681	719	740	734	706	683
60.0°	535	543	576	617	641	632	599	573
65.0°	422	432	470	518	543	532	495	462
70.0°	308	321	366	419	446	431	388	349
75.0°	199	216	267	307	323	320	287	240
80.0°	102	121	158	180	192	190	177	140
85.0°	30	41	54	57	61	66	67	56
90.0°	0	0	0	1	0	0	0	4
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	1	1	1	1	1	1	1	0
130.0°	1	1	1	1	1	1	1	1
135.0°	1	1	1	1	1	1	1	1
140.0°	1	1	1	1	1	1	1	1
145.0°	1	1	1	1	1	1	1	1
150.0°	1	1	1	1	1	1	1	1
155.0°	1	2	2	2	2	2	1	1
160.0°	2	2	2	2	2	2	2	2
165.0°	2	2	2	2	2	2	2	1
170.0°	1	1	1	1	1	1	1	1
175.0°	1	1	1	1	1	1	1	1
180.0°	1	1	1	1	1	1	1	1

Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1403	1403	1403	1403	1403	1403	1403	1403
5.0°	1400	1400	1401	1400	1399	1398	1396	1394
10.0°	1380	1382	1384	1385	1383	1380	1375	1371
15.0°	1347	1350	1354	1356	1355	1350	1341	1333
20.0°	1299	1304	1311	1316	1316	1308	1295	1283
25.0°	1239	1245	1256	1265	1265	1254	1237	1220
30.0°	1173	1181	1194	1205	1206	1196	1176	1155
35.0°	1090	1102	1120	1137	1139	1124	1097	1072
40.0°	1000	1012	1034	1055	1059	1041	1010	981
45.0°	902	915	940	966	972	951	915	882
50.0°	798	812	841	870	878	856	815	779
55.0°	689	704	736	770	780	756	711	672
60.0°	577	593	628	667	679	653	604	561
65.0°	462	479	519	562	578	549	495	449
70.0°	346	365	410	459	478	447	389	337
75.0°	233	254	306	354	361	340	288	230
80.0°	129	153	200	219	225	208	180	133
85.0°	47	65	84	85	82	75	68	50
90.0°	1	1	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	0	0	0	0	0	1	1	0
130.0°	1	1	1	1	1	1	1	1
135.0°	1	1	1	1	1	1	1	1
140.0°	1	1	1	1	1	1	1	1
145.0°	1	1	1	1	1	1	1	1
150.0°	1	1	1	1	1	1	1	1
155.0°	1	1	1	1	1	1	1	1
160.0°	1	1	1	1	1	1	1	1
165.0°	1	1	1	1	1	1	1	1
170.0°	1	1	1	1	1	1	1	1
175.0°	1	1	1	1	1	1	1	1
180.0°	1	1	1	1	1	1	1	1

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	33.5	0.84
5-10	99.2	2.50
10-15	161.2	4.05
15-20	217.4	5.47
20-25	265.7	6.68
25-30	304.8	7.66
30-35	333.7	8.40
35-40	350.5	8.81
40-45	355.6	8.95
45-50	349.1	8.77
50-55	331.6	8.34
55-60	304.0	7.65
60-65	267.8	6.73
65-70	224.8	5.66
70-75	176.5	4.44
75-80	120.7	3.03
80-85	62.5	1.58
85-90	13.9	0.35
90-95	0.1	0.00
95-100	0.1	0.00
100-105	0.2	0.01
105-110	0.2	0.00
110-115	0.2	0.01
115-120	0.2	0.00
120-125	0.2	0.01
125-130	0.2	0.01
130-135	0.3	0.00
135-140	0.3	0.01
140-145	0.3	0.01
145-150	0.3	0.00
150-155	0.3	0.01
155-160	0.3	0.01
160-165	0.2	0.00
165-170	0.2	0.01
170-175	0.1	0.00
175-180	0.0	0.00

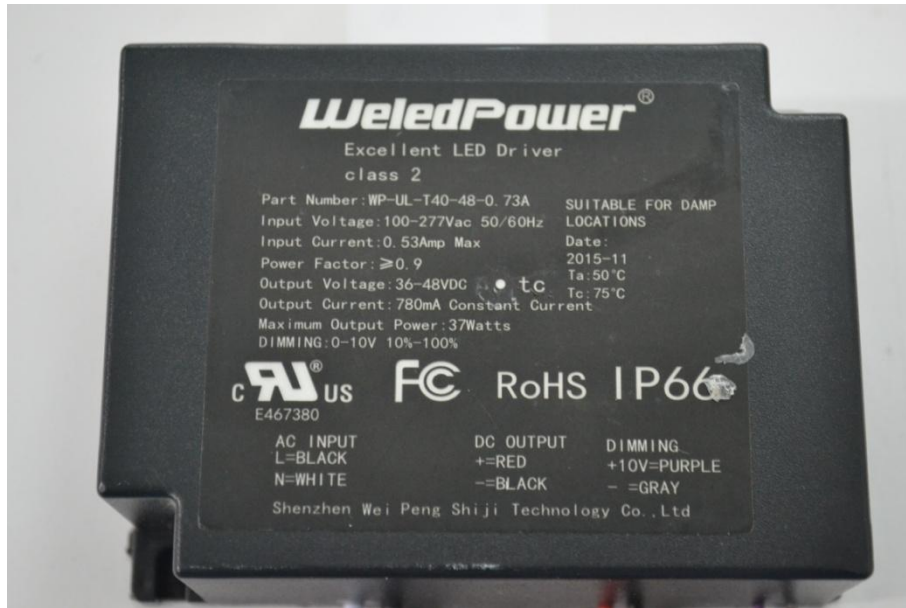
Deg	Flux (lm)	%
0-5	33.5	0.84
0-10	132.6	3.34
0-15	293.8	7.39
0-20	511.2	12.86
0-25	776.9	19.54
0-30	1081.7	27.20
0-35	1415.4	35.60
0-40	1766.0	44.41
0-45	2121.5	53.36
0-50	2470.6	62.13
0-55	2802.2	70.47
0-60	3106.2	78.12
0-65	3374.0	84.85
0-70	3598.9	90.51
0-75	3775.3	94.95
0-80	3896.1	97.98
0-85	3958.6	99.56
0-90	3972.6	99.91
0-95	3972.7	99.91
0-100	3972.9	99.91
0-105	3973.0	99.92
0-110	3973.2	99.92
0-115	3973.4	99.93
0-120	3973.6	99.93
0-125	3973.8	99.94
0-130	3974.1	99.95
0-135	3974.3	99.95
0-140	3974.6	99.96
0-145	3974.9	99.97
0-150	3975.2	99.97
0-155	3975.5	99.98
0-160	3975.8	99.99
0-165	3976.0	99.99
0-170	3976.1	100.00
0-175	3976.2	100.00
0-180	3976.2	100.00

[Additional Test]

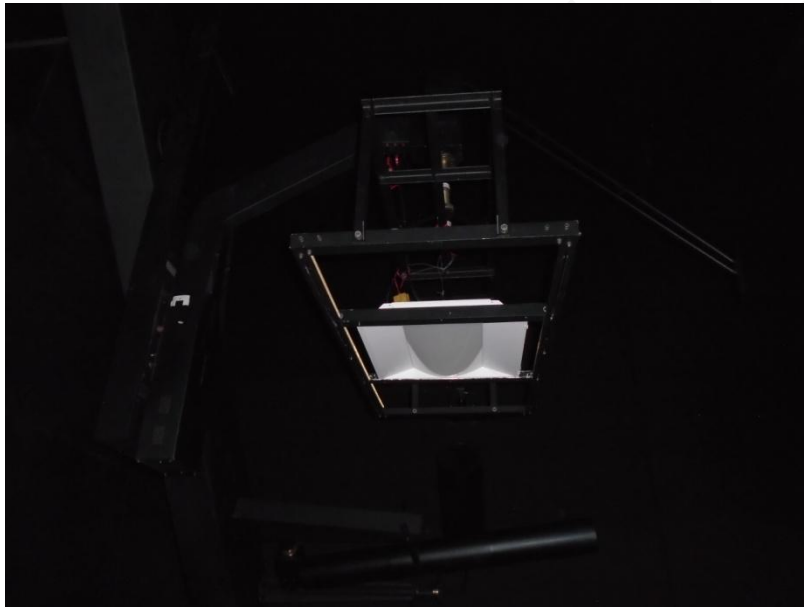
Test Item	Test Voltage (V)	Frequency (Hz)	Test Result
Power Factor:	277.0	60	0.9458
Total Harmonic Distortion:	277.0	60	9.28%
Total Harmonic Distortion:	120.0	60	5.84%

6. Product Photo





7. Product Test orientation in the Goniophotometer



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