

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

Shenzhen Brilloop Lighting Co., Ltd

6F, B6 Building, Junfeng Industrial Park, Yonghe Road, Fuyong, Bao'an District, Shenzhen City, Guangdong Province, P.R.China

Test Model: BLP-FL100W06

Report Type:	Electrical and Photometric tests including: Luminous Flux, Power Factor, Chromaticity, Luminous Intensity Distribution, THD
Test Engineer:	Hexy He <i>Hexy He</i>
Report Number:	R2DG170628054-10
Test Date:	2017-07-02 to 2017-07-03
Report Date:	2017-07-06
Reviewed By:	Blake Zhang / EE Engineer <i>Blake Zhang</i>
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Test Facility:	Test facility was located at No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

STATEMENT: This test may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Shenzhen). The test data was only valid for the test sample(s). This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Federal Government.

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1. Product Description

General Information:

One sample was received on 2017-06-28 and used for testing.

Model Tested: BLP-FL100W06
 Manufacturer: Shenzhen Brillloop Lighting Co., Ltd
 Brand Name: Brillloop
 Product Designation: LED Flood Light
 Burning Time Before Test: 0hour(For New Products)
 Driver Brand: Meanwell
 Driver Model: ELG-100-48A

Rated Values:

Rated Voltage/Frequency: 100-240V AC 50/60Hz
 Rated Power: 100 W
 Nominal CCT: 4000K
 Nominal Lumen Output: 14800 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 NVLAP accreditation scope)

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integrating Sphere	SENSING	SPR-600	S09008	25~50°C	2017-03-09	2018-03-08
High Accuracy Array spectroradiometer	EVERFINE	HAAS-2000	M112048CA13 61125	380-780nm	2016-07-08	2017-07-07
Power meter	YOKOGAWA	WT310	C20E17024V	2kV/20A	2016-07-08	2017-07-07
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	2017-03-03	2018-03-02
Thermal Meter	SENSING	N/A	N/A	25、50°C	2017-03-09	2018-03-08
Standard Light Source	SENSING	N/A	LSD090808	N/A	2016-12-05	2017-12-04
AC Power Supply	ALL Power	APW-105N	970613	220V±10% 50Hz	2017-03-03	2018-03-02
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V, 0- 300V	2017-03-03	2018-03-02
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2017-03-03	2018-03-02
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/3 00/600 V	2017-03-03	2018-03-02
Goniophotometer	EVERFINE	GO-R5000	YG108492N10 120001	1600mm,3000 W/10A	2017-03-09	2018-03-08
Wireless Remote Sensor	N/A	433MHz	N/A	0°C~50°C;- 20°C~60°C	2017-03-20	2018-03-19

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Standard Light Source	EVERFINE	D908	1012003	N/A	2016-12-17	2017-12-17

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) 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 $25^{\circ}\text{C}\pm 1^{\circ}\text{C}$ 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 $U=2.1\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=32\text{K}$ ($K=2$), at the 95% confidence level. The uncertainty of the CRI is $U=2.1$ ($K=2$), 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 $25^{\circ}\text{C}\pm 1^{\circ}\text{C}$. 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**

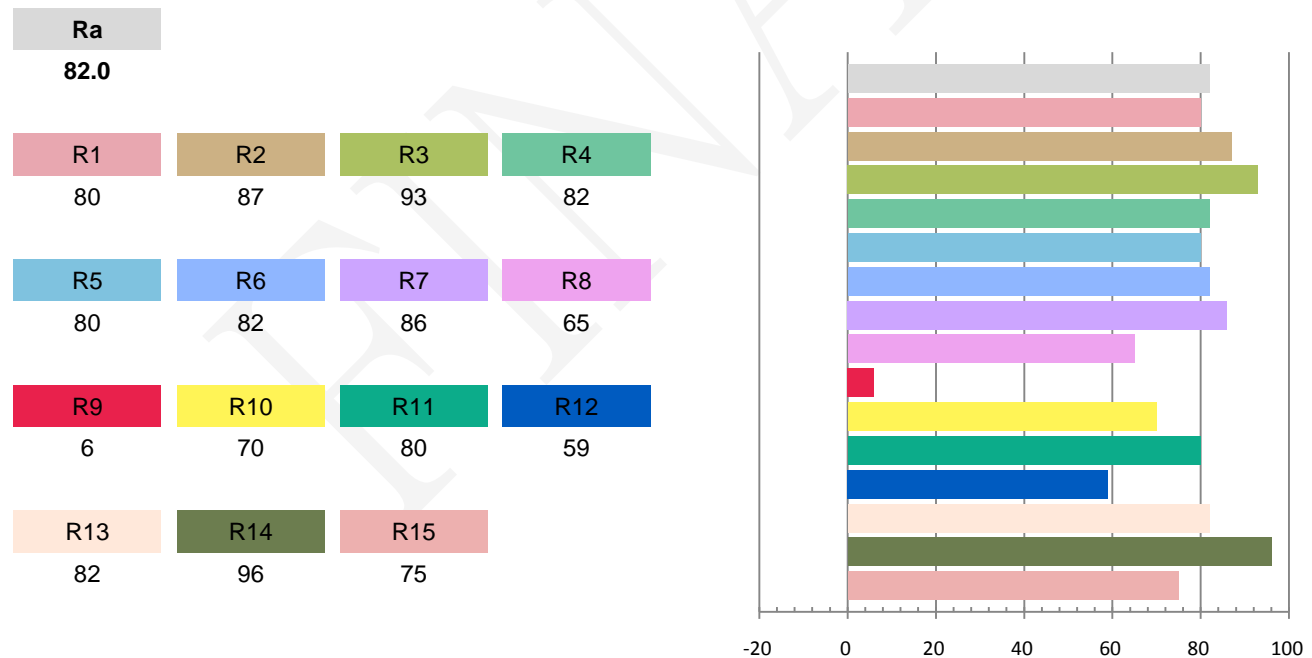
Test orientation: **Downward**

Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
230.0	50	0.4314	97.37	0.9812	14800	152

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
44.768	4114	0.000192	0.3756	0.3741	0.2230	0.4997

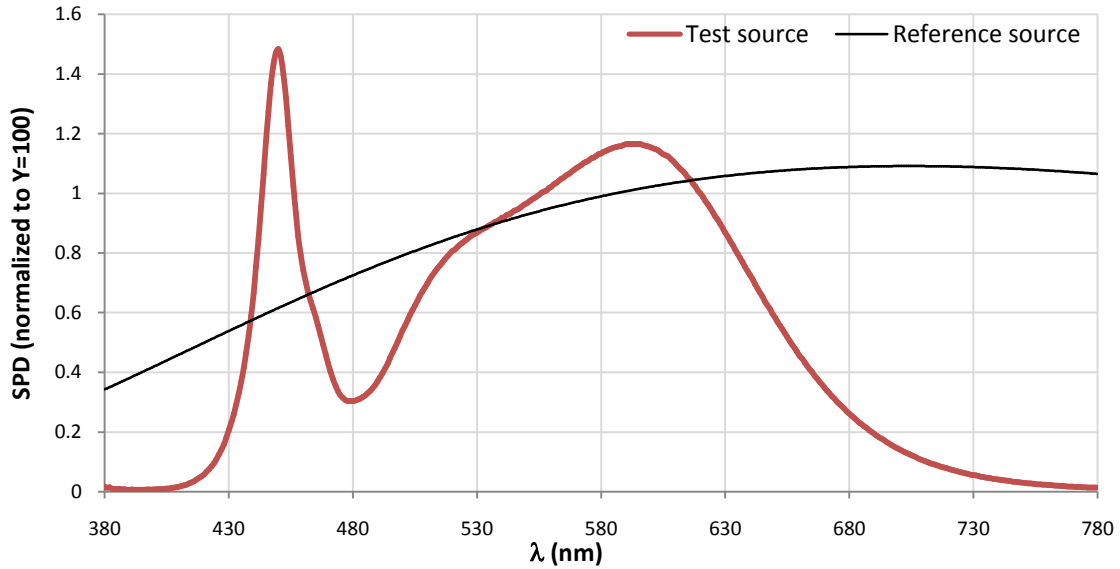
Color Rendering Index



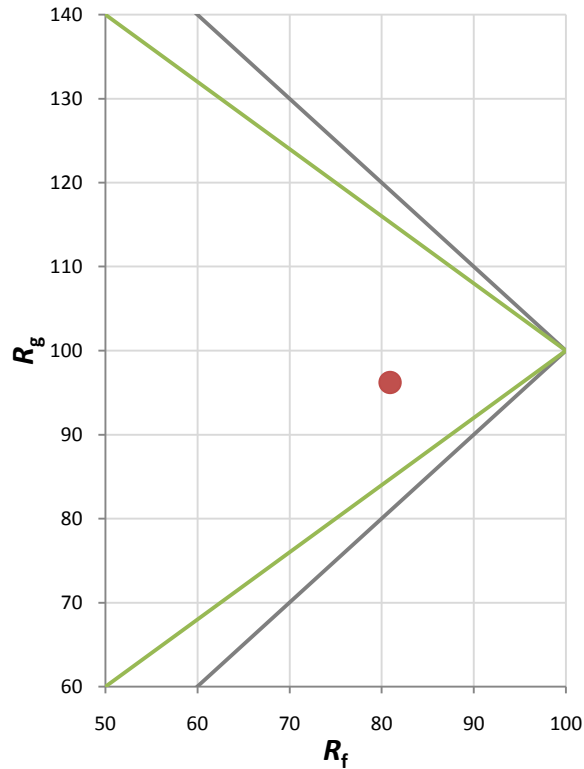
Fidelity Index and Gamut Index

Fidelity Index R_f	81
Gamut Index R_g	96

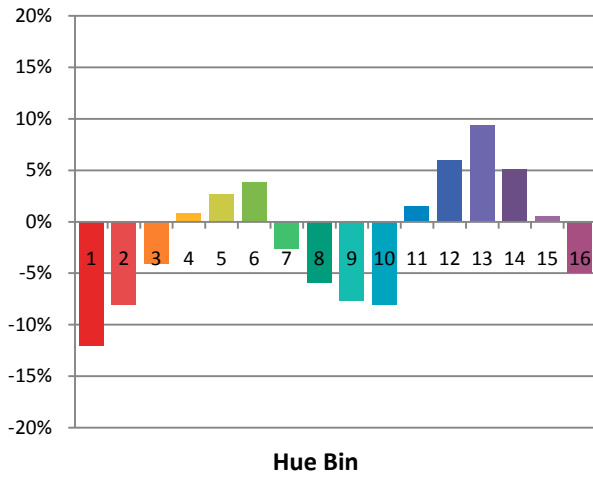
Spectral Power Distribution Comparison



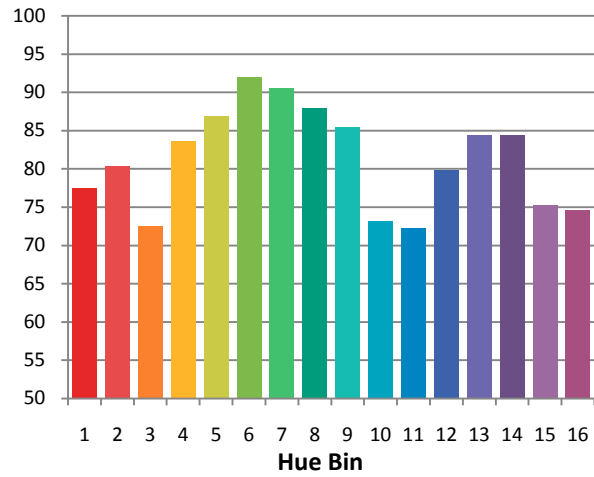
Plot of R_g versus R_f



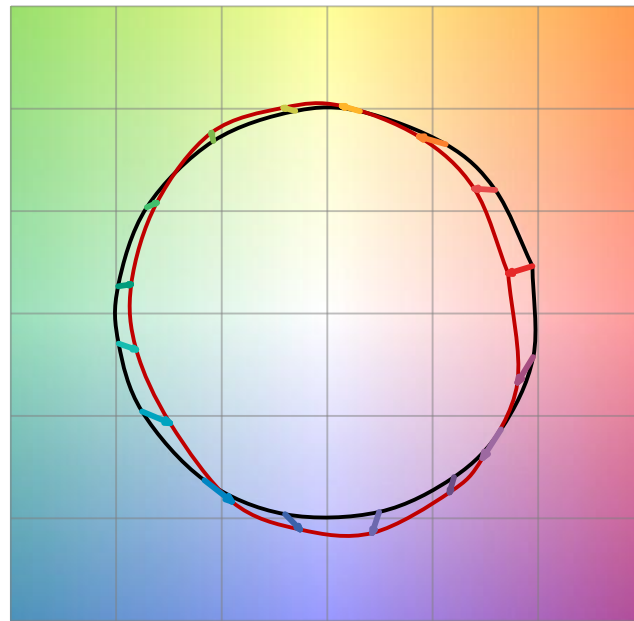
Chroma Shift by Hue



R_f by Hue

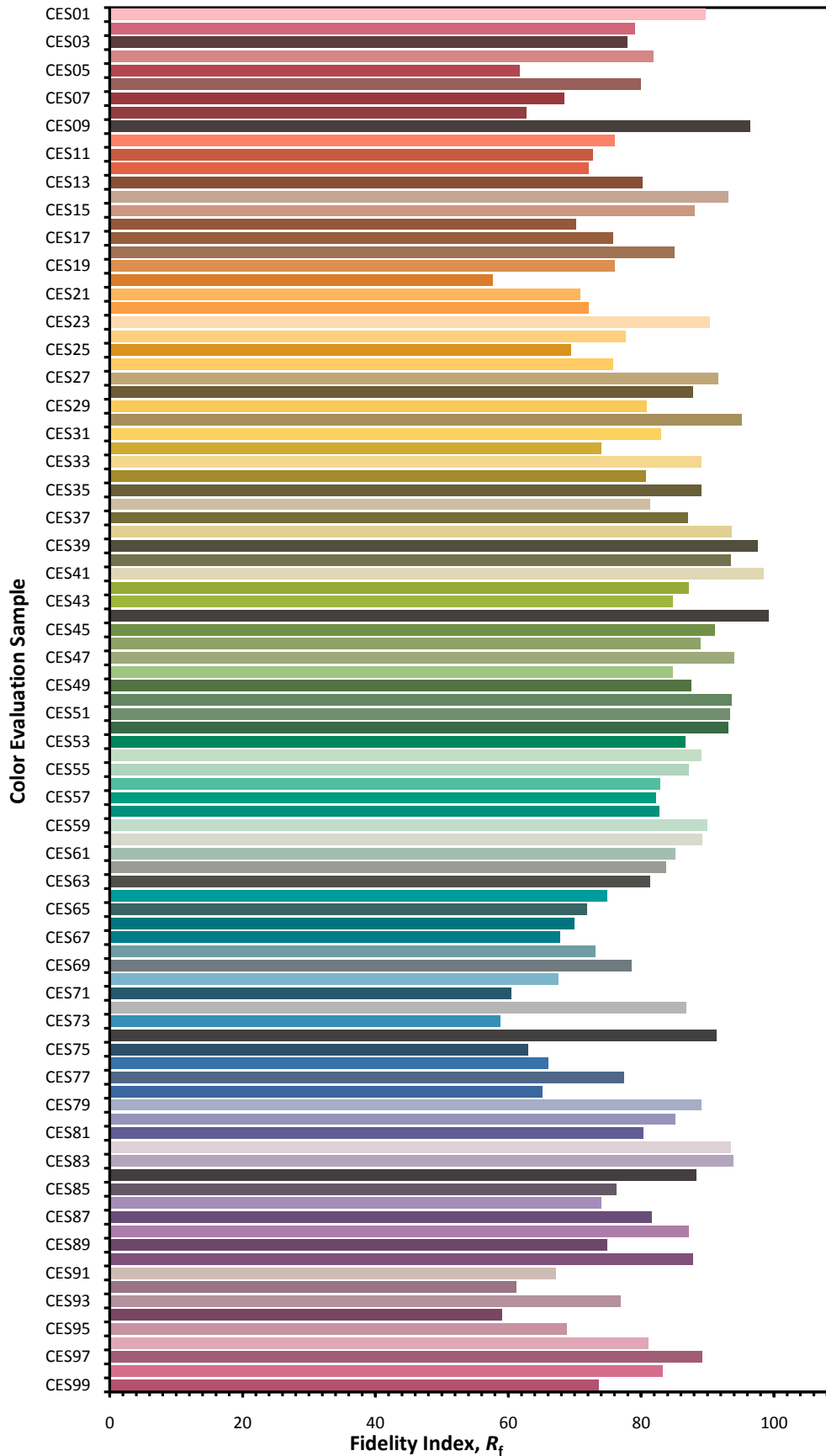


Color Vector Graphic

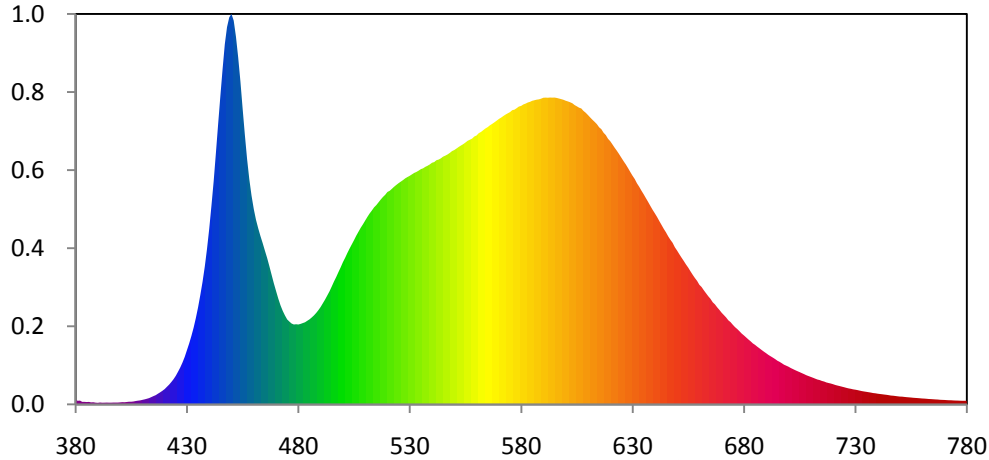


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



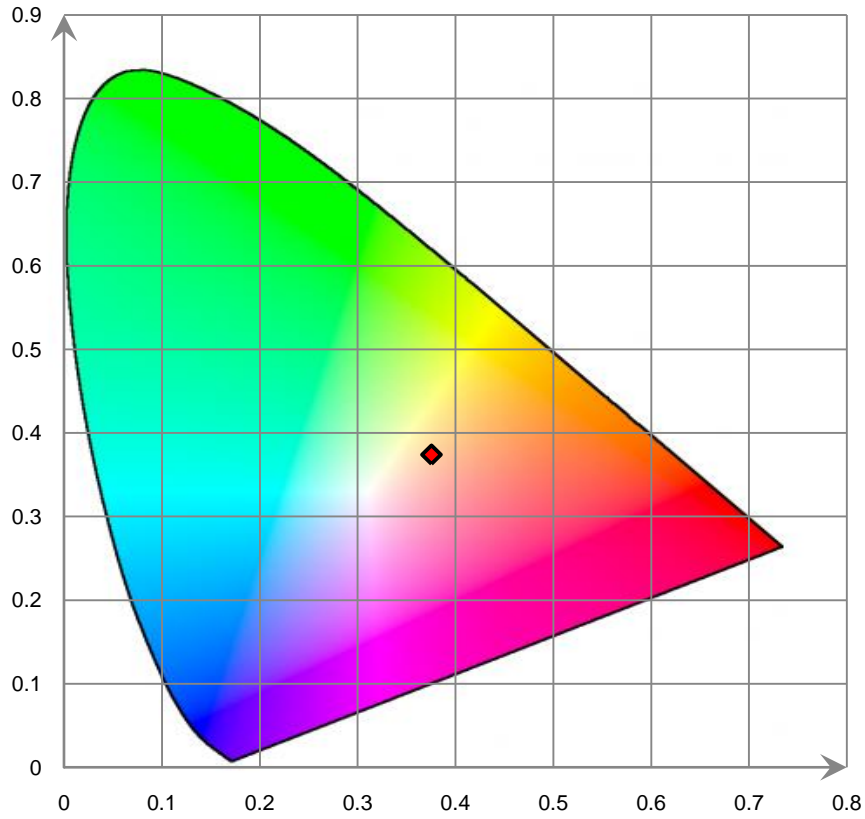
Relative Spectral Power Distribution



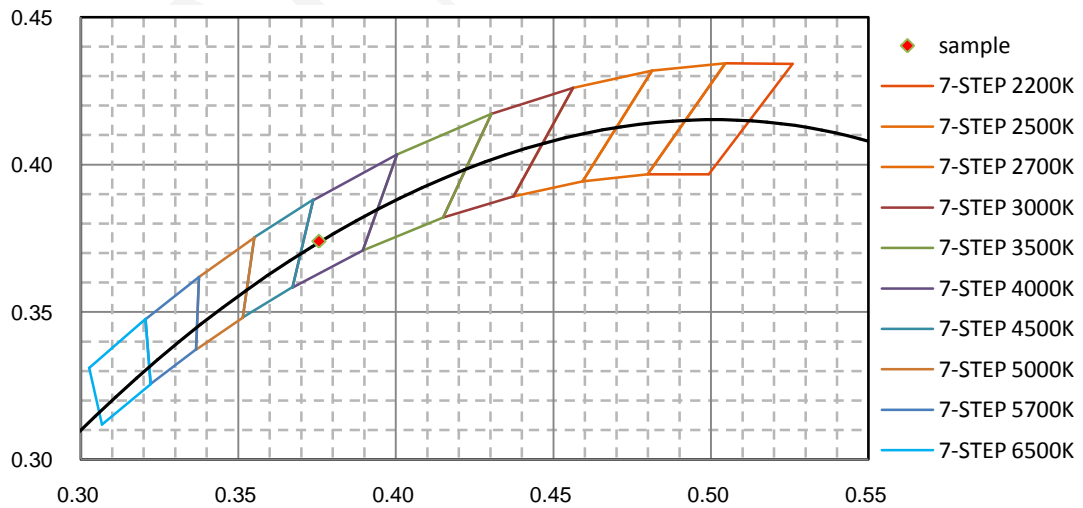
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.723E+00	421	1.441E+01	462	1.448E+02	503	1.282E+02	544	2.025E+02
381	2.946E+00	422	1.624E+01	463	1.384E+02	504	1.317E+02	545	2.039E+02
382	3.130E+00	423	1.840E+01	464	1.327E+02	505	1.352E+02	546	2.047E+02
383	2.082E+00	424	2.072E+01	465	1.265E+02	506	1.388E+02	547	2.057E+02
384	2.082E+00	425	2.353E+01	466	1.205E+02	507	1.421E+02	548	2.069E+02
385	1.941E+00	426	2.683E+01	467	1.137E+02	508	1.453E+02	549	2.084E+02
386	2.020E+00	427	3.036E+01	468	1.067E+02	509	1.482E+02	550	2.093E+02
387	1.663E+00	428	3.440E+01	469	9.967E+01	510	1.512E+02	551	2.106E+02
388	1.764E+00	429	3.905E+01	470	9.335E+01	511	1.543E+02	552	2.119E+02
389	1.415E+00	430	4.452E+01	471	8.705E+01	512	1.571E+02	553	2.130E+02
390	1.272E+00	431	5.010E+01	472	8.147E+01	513	1.595E+02	554	2.141E+02
391	1.533E+00	432	5.633E+01	473	7.696E+01	514	1.621E+02	555	2.155E+02
392	1.391E+00	433	6.311E+01	474	7.312E+01	515	1.639E+02	556	2.169E+02
393	1.411E+00	434	7.105E+01	475	6.989E+01	516	1.663E+02	557	2.178E+02
394	1.465E+00	435	7.983E+01	476	6.809E+01	517	1.686E+02	558	2.187E+02
395	1.399E+00	436	8.996E+01	477	6.652E+01	518	1.707E+02	559	2.205E+02
396	1.398E+00	437	1.007E+02	478	6.573E+01	519	1.725E+02	560	2.213E+02
397	1.502E+00	438	1.132E+02	479	6.591E+01	520	1.748E+02	561	2.232E+02
398	1.518E+00	439	1.277E+02	480	6.575E+01	521	1.757E+02	562	2.242E+02
399	1.498E+00	440	1.443E+02	481	6.622E+01	522	1.774E+02	563	2.257E+02
400	1.661E+00	441	1.633E+02	482	6.689E+01	523	1.791E+02	564	2.271E+02
401	1.835E+00	442	1.835E+02	483	6.757E+01	524	1.806E+02	565	2.282E+02
402	1.763E+00	443	2.069E+02	484	6.874E+01	525	1.820E+02	566	2.297E+02
403	1.959E+00	444	2.304E+02	485	6.994E+01	526	1.833E+02	567	2.308E+02
404	2.183E+00	445	2.536E+02	486	7.149E+01	527	1.846E+02	568	2.321E+02
405	2.199E+00	446	2.758E+02	487	7.318E+01	528	1.860E+02	569	2.334E+02
406	2.392E+00	447	2.964E+02	488	7.519E+01	529	1.871E+02	570	2.349E+02
407	2.763E+00	448	3.105E+02	489	7.753E+01	530	1.881E+02	571	2.360E+02
408	3.045E+00	449	3.185E+02	490	8.011E+01	531	1.893E+02	572	2.372E+02
409	3.287E+00	450	3.213E+02	491	8.319E+01	532	1.904E+02	573	2.385E+02
410	3.683E+00	451	3.158E+02	492	8.623E+01	533	1.913E+02	574	2.395E+02
411	4.119E+00	452	3.026E+02	493	8.963E+01	534	1.924E+02	575	2.405E+02
412	4.621E+00	453	2.857E+02	494	9.306E+01	535	1.935E+02	576	2.421E+02
413	5.131E+00	454	2.658E+02	495	9.701E+01	536	1.942E+02	577	2.425E+02
414	5.990E+00	455	2.434E+02	496	1.011E+02	537	1.955E+02	578	2.437E+02
415	6.804E+00	456	2.218E+02	497	1.048E+02	538	1.963E+02	579	2.451E+02
416	7.622E+00	457	2.020E+02	498	1.089E+02	539	1.974E+02	580	2.456E+02
417	8.800E+00	458	1.852E+02	499	1.127E+02	540	1.988E+02	581	2.468E+02
418	9.913E+00	459	1.718E+02	500	1.170E+02	541	1.994E+02	582	2.475E+02
419	1.118E+01	460	1.608E+02	501	1.206E+02	542	2.009E+02	583	2.484E+02
420	1.257E+01	461	1.519E+02	502	1.245E+02	543	2.015E+02	584	2.490E+02

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.498E+02	626	2.001E+02	667	8.224E+01	708	2.399E+01	749	6.662E+00
586	2.503E+02	627	1.974E+02	668	7.985E+01	709	2.330E+01	750	6.439E+00
587	2.507E+02	628	1.944E+02	669	7.772E+01	710	2.262E+01	751	6.356E+00
588	2.510E+02	629	1.912E+02	670	7.540E+01	711	2.191E+01	752	6.133E+00
589	2.516E+02	630	1.881E+02	671	7.347E+01	712	2.118E+01	753	5.941E+00
590	2.523E+02	631	1.854E+02	672	7.155E+01	713	2.043E+01	754	5.785E+00
591	2.524E+02	632	1.819E+02	673	6.918E+01	714	2.002E+01	755	5.618E+00
592	2.523E+02	633	1.790E+02	674	6.770E+01	715	1.926E+01	756	5.440E+00
593	2.525E+02	634	1.759E+02	675	6.556E+01	716	1.881E+01	757	5.289E+00
594	2.524E+02	635	1.729E+02	676	6.358E+01	717	1.807E+01	758	5.172E+00
595	2.525E+02	636	1.697E+02	677	6.200E+01	718	1.756E+01	759	5.018E+00
596	2.522E+02	637	1.666E+02	678	6.018E+01	719	1.715E+01	760	4.847E+00
597	2.517E+02	638	1.633E+02	679	5.829E+01	720	1.662E+01	761	4.748E+00
598	2.512E+02	639	1.602E+02	680	5.674E+01	721	1.597E+01	762	4.579E+00
599	2.506E+02	640	1.573E+02	681	5.511E+01	722	1.549E+01	763	4.421E+00
600	2.499E+02	641	1.543E+02	682	5.343E+01	723	1.505E+01	764	4.351E+00
601	2.493E+02	642	1.509E+02	683	5.192E+01	724	1.455E+01	765	4.219E+00
602	2.486E+02	643	1.477E+02	684	5.020E+01	725	1.410E+01	766	4.080E+00
603	2.478E+02	644	1.445E+02	685	4.896E+01	726	1.358E+01	767	3.998E+00
604	2.463E+02	645	1.416E+02	686	4.744E+01	727	1.315E+01	768	3.803E+00
605	2.452E+02	646	1.383E+02	687	4.611E+01	728	1.281E+01	769	3.692E+00
606	2.441E+02	647	1.354E+02	688	4.470E+01	729	1.237E+01	770	3.625E+00
607	2.435E+02	648	1.329E+02	689	4.335E+01	730	1.208E+01	771	3.511E+00
608	2.415E+02	649	1.292E+02	690	4.205E+01	731	1.173E+01	772	3.417E+00
609	2.400E+02	650	1.266E+02	691	4.072E+01	732	1.131E+01	773	3.370E+00
610	2.381E+02	651	1.236E+02	692	3.957E+01	733	1.090E+01	774	3.250E+00
611	2.361E+02	652	1.207E+02	693	3.847E+01	734	1.059E+01	775	3.143E+00
612	2.342E+02	653	1.180E+02	694	3.732E+01	735	1.032E+01	776	3.108E+00
613	2.325E+02	654	1.151E+02	695	3.595E+01	736	9.990E+00	777	3.018E+00
614	2.306E+02	655	1.125E+02	696	3.503E+01	737	9.707E+00	778	2.940E+00
615	2.280E+02	656	1.095E+02	697	3.388E+01	738	9.313E+00	779	2.962E+00
616	2.264E+02	657	1.067E+02	698	3.265E+01	739	9.118E+00	780	2.968E+00
617	2.235E+02	658	1.040E+02	699	3.184E+01	740	8.813E+00		
618	2.216E+02	659	1.016E+02	700	3.099E+01	741	8.560E+00		
619	2.185E+02	660	9.843E+01	701	2.996E+01	742	8.319E+00		
620	2.165E+02	661	9.658E+01	702	2.903E+01	743	8.113E+00		
621	2.139E+02	662	9.389E+01	703	2.817E+01	744	7.861E+00		
622	2.111E+02	663	9.143E+01	704	2.735E+01	745	7.570E+00		
623	2.086E+02	664	8.896E+01	705	2.655E+01	746	7.254E+00		
624	2.059E+02	665	8.686E+01	706	2.571E+01	747	7.140E+00		
625	2.029E+02	666	8.401E+01	707	2.491E+01	748	6.878E+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**

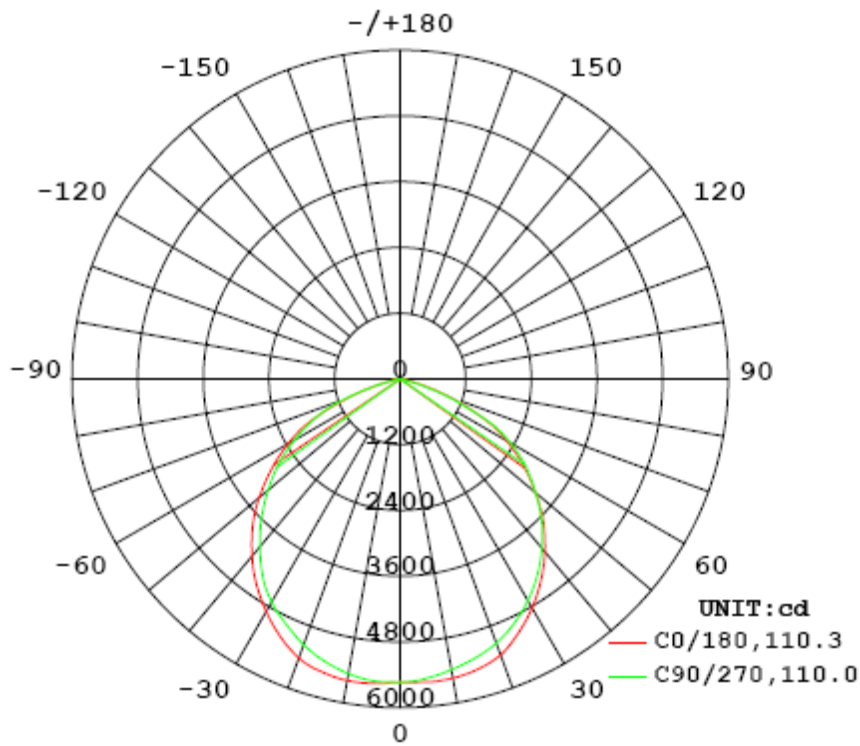
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
230.1	50	0.4313	97.32	0.9807

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
14813.1	152.21	5591	1.29	1.25

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	110.3	110.7	110.0	110.9	110.5
Field Angle (10% I _{max}):	146.7	149.6	145.4	149.6	147.8

Luminous Intensity (cd) Distribution Data

C \ γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	5534	5534	5534	5534	5534	5534	5534	5534
5.0°	5578	5573	5562	5542	5533	5537	5546	5550
10.0°	5587	5585	5553	5501	5463	5485	5527	5544
15.0°	5536	5536	5479	5397	5336	5382	5443	5481
20.0°	5420	5421	5349	5247	5165	5227	5300	5357
25.0°	5191	5195	5156	5039	4939	5014	5100	5117
30.0°	4906	4904	4882	4812	4703	4777	4813	4815
35.0°	4586	4569	4564	4525	4392	4492	4475	4469
40.0°	4222	4200	4215	4138	4002	4107	4118	4090
45.0°	3824	3786	3789	3718	3593	3675	3702	3672
50.0°	3372	3351	3309	3263	3160	3217	3211	3210
55.0°	2879	2860	2828	2799	2721	2745	2723	2721
60.0°	2373	2369	2334	2302	2236	2247	2217	2225
65.0°	1786	1856	1828	1773	1738	1722	1717	1661
70.0°	1042	1144	1298	1210	1096	1176	1186	971
75.0°	411	493	646	445	354	433	530	353
80.0°	29	75	75	48	20	40	66	40
85.0°	9	8	9	9	8	7	7	9
90.0°	1	1	1	0	0	1	1	1
95.0°	1	1	1	1	1	1	1	1
100.0°	1	1	1	1	1	1	1	1
105.0°	1	1	1	1	1	1	1	1
110.0°	1	1	2	2	2	2	2	2
115.0°	2	2	2	2	2	2	2	2
120.0°	2	2	2	2	2	2	2	2
125.0°	2	2	2	2	2	2	2	2
130.0°	2	2	2	2	2	2	2	2
135.0°	3	3	3	3	3	3	3	3
140.0°	4	4	4	4	4	4	4	4
145.0°	5	5	5	5	5	5	5	5
150.0°	5	6	6	6	6	6	6	6
155.0°	6	7	7	7	7	7	7	7
160.0°	7	7	7	7	7	7	7	7
165.0°	7	7	7	7	7	7	7	7
170.0°	7	7	7	7	7	7	7	7
175.0°	7	7	6	6	6	6	7	7
180.0°	6	6	6	5	6	6	6	6

Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	5534	5534	5534	5534	5534	5534	5534	5534
5.0°	5552	5542	5518	5495	5485	5499	5539	5565
10.0°	5545	5512	5459	5409	5389	5435	5500	5559
15.0°	5481	5421	5359	5310	5276	5346	5417	5488
20.0°	5365	5279	5223	5180	5133	5227	5292	5363
25.0°	5115	5049	5055	4990	4926	5048	5131	5141
30.0°	4824	4753	4813	4738	4670	4805	4890	4855
35.0°	4489	4428	4486	4438	4371	4509	4572	4531
40.0°	4115	4071	4123	4090	4032	4165	4212	4179
45.0°	3706	3673	3719	3707	3661	3773	3816	3787
50.0°	3231	3235	3274	3269	3231	3335	3373	3375
55.0°	2746	2764	2808	2812	2811	2864	2919	2897
60.0°	2246	2287	2298	2326	2325	2376	2397	2419
65.0°	1635	1782	1799	1742	1649	1821	1895	1918
70.0°	953	1072	1194	930	853	1025	1331	1175
75.0°	326	415	418	245	174	326	529	491
80.0°	18	17	31	11	13	18	59	38
85.0°	9	8	5	5	6	8	9	10
90.0°	0	0	0	0	0	0	0	1
95.0°	0	0	0	0	0	0	0	0
100.0°	1	1	1	1	1	1	1	1
105.0°	1	1	1	1	1	1	1	1
110.0°	1	1	1	1	1	1	1	1
115.0°	1	1	1	1	1	1	1	1
120.0°	1	1	1	1	1	1	1	1
125.0°	2	2	2	2	2	2	2	2
130.0°	2	2	2	2	2	2	2	2
135.0°	3	3	3	3	3	2	2	3
140.0°	3	3	3	3	3	3	3	3
145.0°	3	3	3	3	3	3	3	3
150.0°	3	3	4	4	4	4	4	4
155.0°	4	4	4	4	4	4	4	4
160.0°	4	4	4	4	4	4	4	4
165.0°	4	4	4	4	4	4	4	5
170.0°	5	5	4	4	4	5	5	5
175.0°	5	5	5	5	5	5	5	5
180.0°	6	6	6	6	5	6	6	6

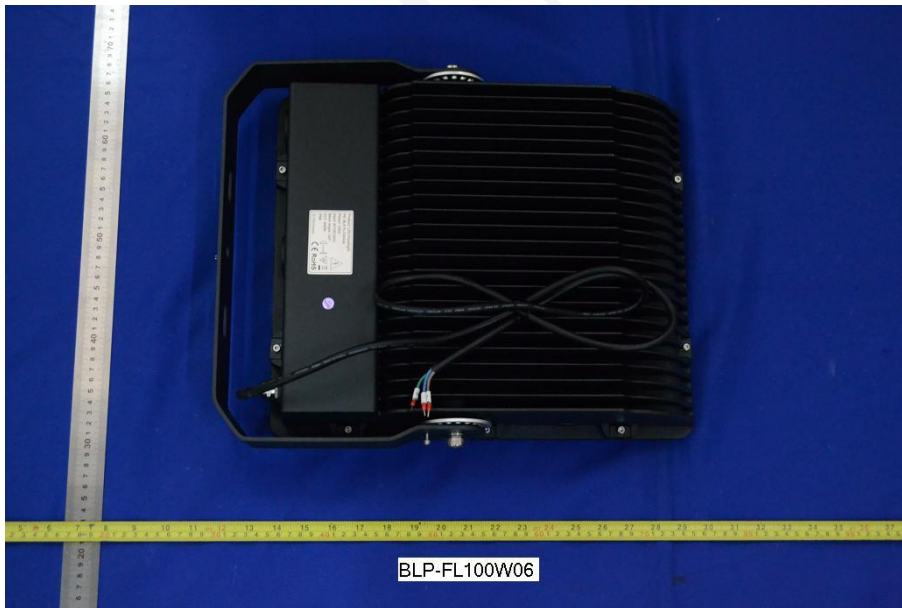
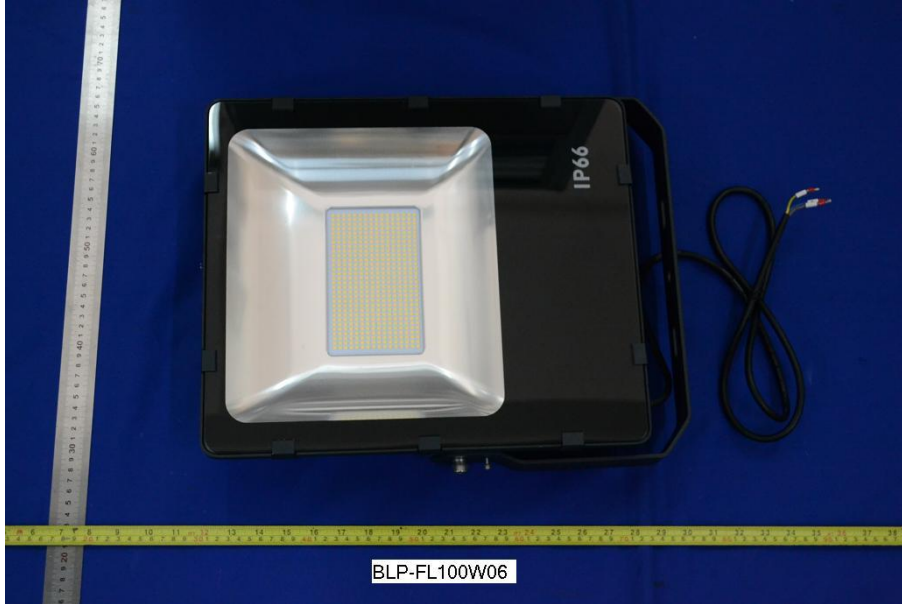
Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	132.4	0.89	0-5	132.4	0.89
5-10	395.2	2.67	0-10	527.6	3.56
10-15	648.0	4.38	0-15	1175.6	7.94
15-20	882.3	5.95	0-20	2057.9	13.89
20-25	1087.2	7.34	0-25	3145.1	21.23
25-30	1251.2	8.45	0-30	4396.2	29.68
30-35	1370.0	9.25	0-35	5766.2	38.93
35-40	1438.9	9.71	0-40	7205.1	48.64
40-45	1454.3	9.82	0-45	8659.4	58.46
45-50	1415.1	9.55	0-50	10074.5	68.01
50-55	1321.4	8.92	0-55	11395.9	76.93
55-60	1183.4	7.99	0-60	12579.3	84.92
60-65	995.5	6.72	0-65	13574.8	91.64
65-70	727.9	4.91	0-70	14302.7	96.55
70-75	390.4	2.64	0-75	14693.1	99.19
75-80	95.1	0.64	0-80	14788.2	99.83
80-85	8.8	0.06	0-85	14797.0	99.89
85-90	1.9	0.01	0-90	14798.9	99.90
90-95	0.3	0.01	0-95	14799.2	99.91
95-100	0.4	0.00	0-100	14799.6	99.91
100-105	0.5	0.00	0-105	14800.2	99.91
105-110	0.6	0.01	0-110	14800.8	99.92
110-115	0.7	0.00	0-115	14801.4	99.92
115-120	0.7	0.01	0-120	14802.1	99.93
120-125	0.8	0.00	0-125	14802.9	99.93
125-130	0.9	0.01	0-130	14803.8	99.94
130-135	1.0	0.00	0-135	14804.8	99.94
135-140	1.1	0.01	0-140	14805.9	99.95
140-145	1.2	0.01	0-145	14807.2	99.96
145-150	1.3	0.01	0-150	14808.5	99.97
150-155	1.3	0.01	0-155	14809.7	99.98
155-160	1.2	0.01	0-160	14810.9	99.99
160-165	1.0	0.00	0-165	14811.9	99.99
165-170	0.7	0.01	0-170	14812.5	100.00
170-175	0.4	0.00	0-175	14812.9	100.00
175-180	0.1	0.00	0-180	14813.1	100.00

[Additional Test]

Test Item	Test Voltage (V)	Frequency (Hz)	Test Result
Total Harmonic Distortion:	230.0	50	8.47%

6. Product Photo



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