

ANSI/IES LM-79-19

MEASUREMENT AND TEST REPORT

For

#ULA1L PTY LTD
#2/63 Industrial Dr, Braeside VIC 3195

#Test Model: ECO-BT16W-1200-D



Report Type:	Electrical and Photometric tests including: Luminous Flux, Power Factor, Chromaticity, Luminous Intensity Distribution
Reviewed By:	Hexy He <i>Hexy He</i>
Report Number:	DG5220916-42072E-EE
Test Date:	2022-09-20 to 2022-09-22
Report Date:	2022-10-10
Approved by:	Bill Xiong / EE Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China. Tel: +86-755-33320018 Fax: +86-755-33320008
Test Facility:	Test facility was located at No.12, Pulong East 1 st Road, Tangxia Town, Dongguan, Guangdong, China.

Note: 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.(Shenzhen). This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, or any agency of the U.S. Government.

1. Product Description[#]

General Information:

One test sample was in good condition and received on 2022-09-16, and used for testing. All tests and evaluations were performed at the lowest CCT.

Model Tested: ECO-BT16W-1200-D
Manufacturer: ULA1L PTY LTD
Brand Name: 
Product Designation: LED Batten Light
Burning Time Before Test: 0hour(For New Products)
Driver Brand: 
Driver Model: MC16W MS CCT

Rated Values:

Rated Voltage/Frequency: 220-240V 50/60Hz
Rated Power: 16W
Nominal CCT: 3000/4000/5700K
Nominal Lumen Output: 2240 lm

2. Standards Used

- ANSI/IES LM-79-19: Approved method :Optical and Electrical Measurements of Solid-State Lighting Products
- ANSI C82.77-10-2014: Harmonic Emission Limits – Related Power Quality Requirements for Lighting
- *IES TM-30-18: 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	Calibration date	Calibration due date
1.5m integrating sphere	SENSING	1.5m	NA	2022-06-07	2023-06-06
Digital power meter	EVERFINE	PF9811	G135717CN1361159	2022-01-05	2023-01-04
High-precision rapid spectral radiometer	EVERFINE	HAAS-2000	N/A	2022-06-07	2023-06-06
Precision frequency power supply	ALL Power	APW-105N	970663	2022-01-06	2023-01-05
Standard Light Source	EVERFINE	D204	N/A	2021-10-15	2022-10-14
thermometer	SENSING	NA	NA	2022-01-11	2023-01-10
Programmable Precision DC Power Supply	EVERFINE	WY5015	11060010	2022-01-05	2023-01-04
AC POWER SUPPLY	EVERFINE	VPS1030 PWM	1012017	2022-01-06	2023-01-05
Digital CC&CV DC Power Supply	EVERFINE	WY12010	1009009	2022-01-06	2023-01-05
Digital power meter	YOKOGAWA	WT-210	91j926132	2022-01-06	2023-01-05

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
full-field speed goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	2021-10-26	2022-10-25
wireless remote thermohygrometer	N/A	433MHz	N/A	2022-01-10	2023-01-09
Standard Light Source	EVERFINE	D908	1012003	2021-10-15	2022-10-14

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 ANSI/IES LM-79-19. The product was operated at rated voltage or at voltage required by manufacturer. The ambient temperature of the sample was maintained at $25^{\circ}\text{C} \pm 1.2^{\circ}\text{C}$ during measurement. And relative humidity is maintained between 10% and 65%. The air flow around the SSL product is less than 0.2m/s.

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 $U=21\text{K}$ ($K=2$), 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 $U=0.17\%$ of rdg, Power $U=0.48\%$ ($K=2$), 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. For luminous intensity distribution, The vertical angle (γ) test intervals were set no more than 2.5 degree, The horizontal angle (C plane) test intervals were set no more than 22.5 degree. For color spatial uniformity, The vertical angle (γ) test intervals were set no more than 90 degree, The horizontal angle (C plane) test intervals were set no more than 10 degree

The uncertainty of the luminous intensity is $U=2.00\%$ ($K=2$), at the 95% confidence level.

Fidelity Index and Gamut Index Calculation

The R_i , R_g was calculated according to IES TM-30-18 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]

The Stabilization time: **30 minutes**

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

Test orientation: **Downward**

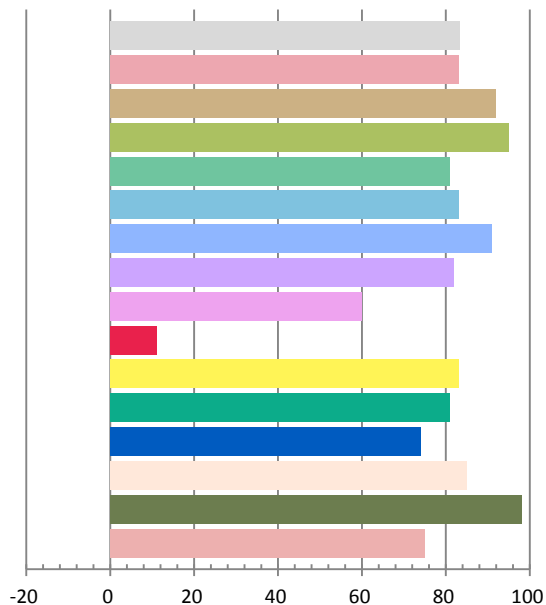
Photometric and Electrical Measurement Result

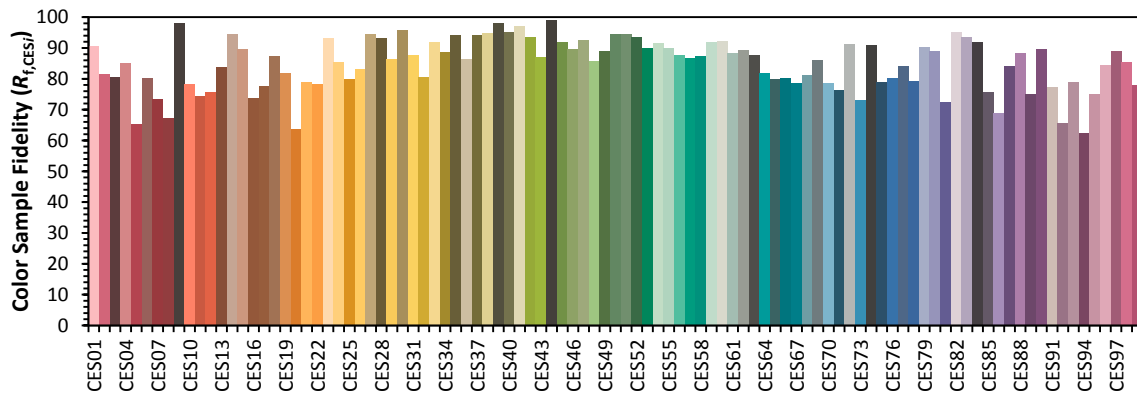
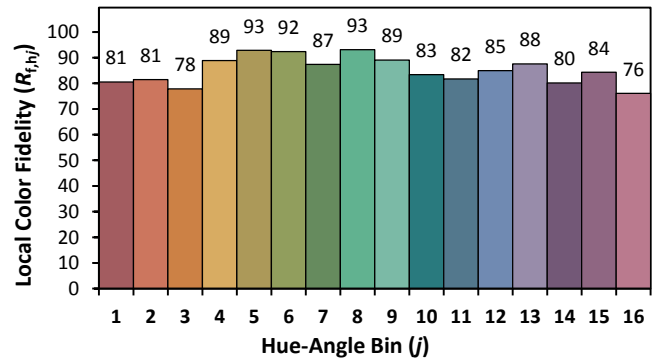
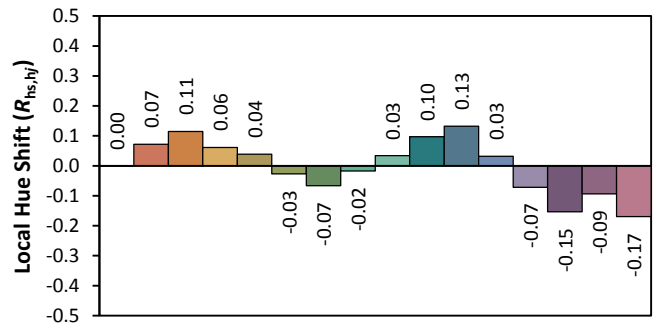
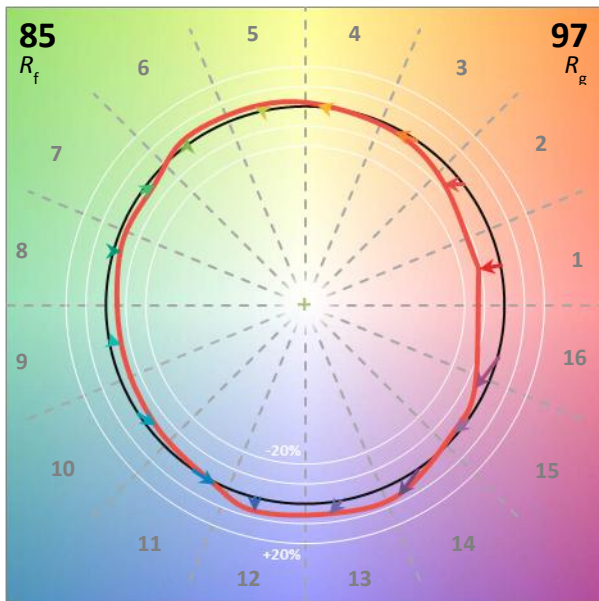
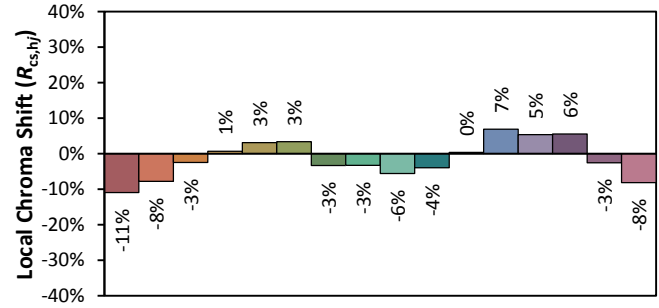
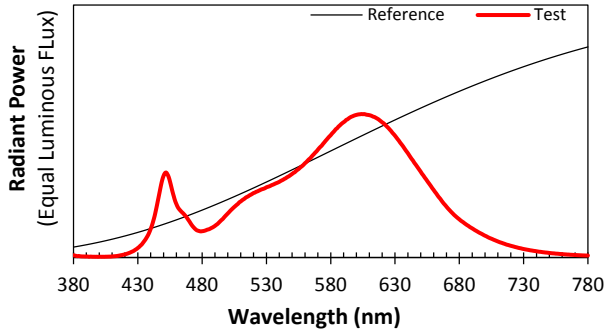
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
230.1	50	0.07264	15.85	0.948	2251.1	142.03

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
6.925	2945	-0.00217	0.4377	0.3989	0.2533	0.5194

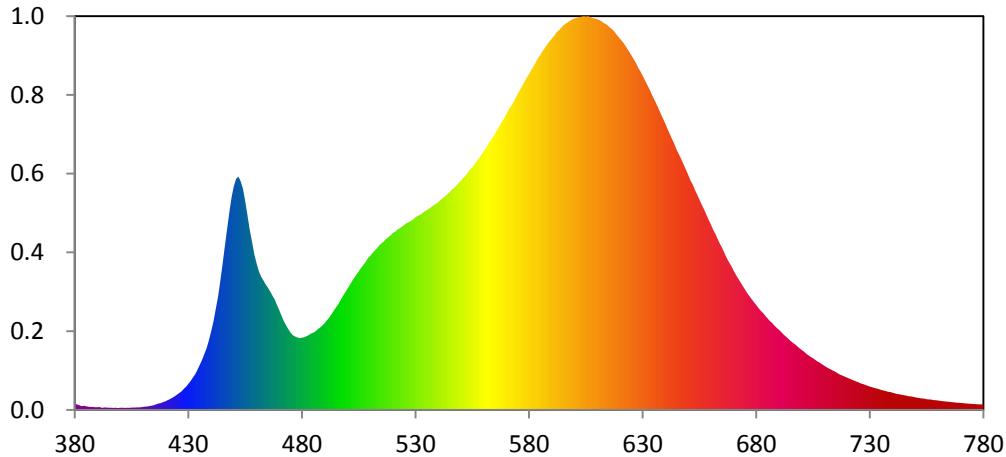
Color Rendering Index

Ra			
83.4			
R1	R2	R3	R4
83	92	95	81
R5	R6	R7	R8
83	91	82	60
R9	R10	R11	R12
11	83	81	74
R13	R14	R15	
85	98	75	





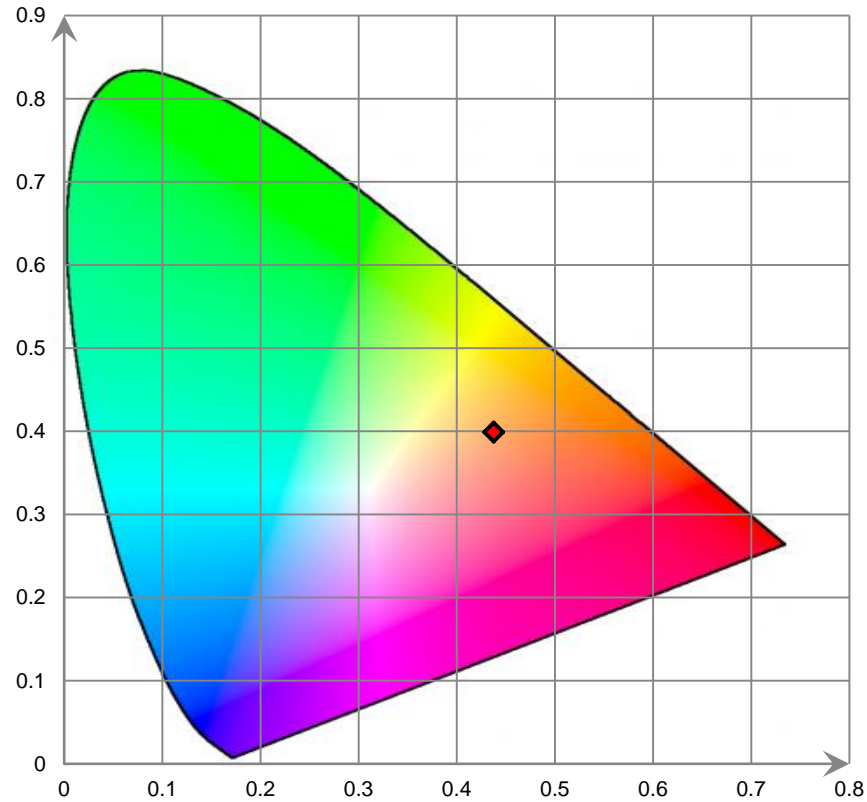
Relative Spectral Power Distribution



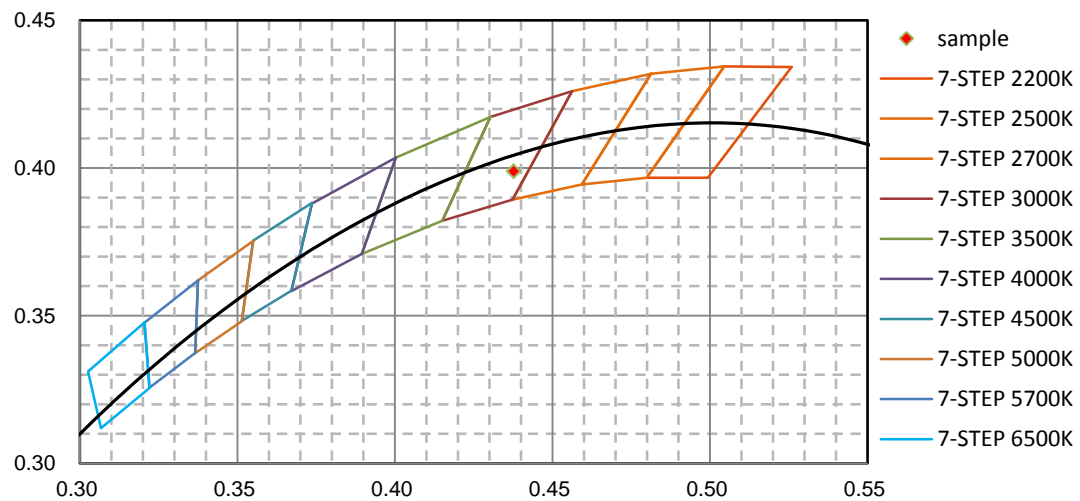
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	7.549E-01	421	1.169E+00	462	1.587E+01	503	1.571E+01	544	2.567E+01
381	6.471E-01	422	1.304E+00	463	1.539E+01	504	1.612E+01	545	2.587E+01
382	5.493E-01	423	1.460E+00	464	1.492E+01	505	1.650E+01	546	2.619E+01
383	4.544E-01	424	1.631E+00	465	1.453E+01	506	1.687E+01	547	2.641E+01
384	5.056E-01	425	1.828E+00	466	1.409E+01	507	1.723E+01	548	2.668E+01
385	4.328E-01	426	2.008E+00	467	1.361E+01	508	1.758E+01	549	2.699E+01
386	3.805E-01	427	2.223E+00	468	1.310E+01	509	1.805E+01	550	2.728E+01
387	3.546E-01	428	2.527E+00	469	1.246E+01	510	1.830E+01	551	2.762E+01
388	3.589E-01	429	2.782E+00	470	1.187E+01	511	1.865E+01	552	2.784E+01
389	3.232E-01	430	3.112E+00	471	1.120E+01	512	1.895E+01	553	2.824E+01
390	3.324E-01	431	3.445E+00	472	1.057E+01	513	1.922E+01	554	2.859E+01
391	3.401E-01	432	3.869E+00	473	1.004E+01	514	1.958E+01	555	2.886E+01
392	2.405E-01	433	4.251E+00	474	9.591E+00	515	1.980E+01	556	2.927E+01
393	3.019E-01	434	4.792E+00	475	9.179E+00	516	2.003E+01	557	2.961E+01
394	2.870E-01	435	5.352E+00	476	8.882E+00	517	2.033E+01	558	2.994E+01
395	2.570E-01	436	5.923E+00	477	8.740E+00	518	2.053E+01	559	3.034E+01
396	2.636E-01	437	6.628E+00	478	8.613E+00	519	2.078E+01	560	3.079E+01
397	2.446E-01	438	7.358E+00	479	8.535E+00	520	2.105E+01	561	3.115E+01
398	2.606E-01	439	8.267E+00	480	8.600E+00	521	2.119E+01	562	3.160E+01
399	2.255E-01	440	9.336E+00	481	8.653E+00	522	2.145E+01	563	3.204E+01
400	2.529E-01	441	1.046E+01	482	8.768E+00	523	2.159E+01	564	3.238E+01
401	2.712E-01	442	1.192E+01	483	8.905E+00	524	2.180E+01	565	3.287E+01
402	2.434E-01	443	1.343E+01	484	9.098E+00	525	2.199E+01	566	3.335E+01
403	2.603E-01	444	1.529E+01	485	9.188E+00	526	2.221E+01	567	3.378E+01
404	2.406E-01	445	1.727E+01	486	9.368E+00	527	2.234E+01	568	3.426E+01
405	2.773E-01	446	1.937E+01	487	9.602E+00	528	2.248E+01	569	3.467E+01
406	2.747E-01	447	2.145E+01	488	9.799E+00	529	2.266E+01	570	3.519E+01
407	2.928E-01	448	2.353E+01	489	1.005E+01	530	2.292E+01	571	3.570E+01
408	3.012E-01	449	2.532E+01	490	1.034E+01	531	2.307E+01	572	3.613E+01
409	3.133E-01	450	2.662E+01	491	1.067E+01	532	2.320E+01	573	3.653E+01
410	3.606E-01	451	2.748E+01	492	1.097E+01	533	2.338E+01	574	3.708E+01
411	4.043E-01	452	2.775E+01	493	1.138E+01	534	2.361E+01	575	3.757E+01
412	4.236E-01	453	2.718E+01	494	1.181E+01	535	2.377E+01	576	3.809E+01
413	4.678E-01	454	2.630E+01	495	1.222E+01	536	2.395E+01	577	3.856E+01
414	5.158E-01	455	2.483E+01	496	1.257E+01	537	2.416E+01	578	3.907E+01
415	5.925E-01	456	2.316E+01	497	1.306E+01	538	2.433E+01	579	3.953E+01
416	6.790E-01	457	2.145E+01	498	1.353E+01	539	2.451E+01	580	3.994E+01
417	7.693E-01	458	1.996E+01	499	1.397E+01	540	2.471E+01	581	4.047E+01
418	8.398E-01	459	1.849E+01	500	1.440E+01	541	2.497E+01	582	4.091E+01
419	9.500E-01	460	1.745E+01	501	1.484E+01	542	2.519E+01	583	4.138E+01
420	1.042E+00	461	1.652E+01	502	1.530E+01	543	2.540E+01	584	4.190E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	4.221E+01	626	4.172E+01	667	1.810E+01	708	5.599E+00	749	1.557E+00
586	4.272E+01	627	4.126E+01	668	1.757E+01	709	5.414E+00	750	1.500E+00
587	4.309E+01	628	4.070E+01	669	1.712E+01	710	5.247E+00	751	1.447E+00
588	4.350E+01	629	4.026E+01	670	1.660E+01	711	5.074E+00	752	1.402E+00
589	4.385E+01	630	3.975E+01	671	1.610E+01	712	4.918E+00	753	1.369E+00
590	4.416E+01	631	3.921E+01	672	1.565E+01	713	4.798E+00	754	1.342E+00
591	4.446E+01	632	3.865E+01	673	1.520E+01	714	4.630E+00	755	1.275E+00
592	4.490E+01	633	3.813E+01	674	1.475E+01	715	4.504E+00	756	1.261E+00
593	4.510E+01	634	3.751E+01	675	1.433E+01	716	4.335E+00	757	1.226E+00
594	4.542E+01	635	3.697E+01	676	1.390E+01	717	4.187E+00	758	1.174E+00
595	4.571E+01	636	3.643E+01	677	1.353E+01	718	4.092E+00	759	1.147E+00
596	4.594E+01	637	3.581E+01	678	1.316E+01	719	3.958E+00	760	1.119E+00
597	4.610E+01	638	3.519E+01	679	1.280E+01	720	3.839E+00	761	1.079E+00
598	4.629E+01	639	3.460E+01	680	1.247E+01	721	3.729E+00	762	1.041E+00
599	4.644E+01	640	3.404E+01	681	1.211E+01	722	3.622E+00	763	1.021E+00
600	4.656E+01	641	3.339E+01	682	1.180E+01	723	3.494E+00	764	9.787E-01
601	4.666E+01	642	3.276E+01	683	1.152E+01	724	3.387E+00	765	9.733E-01
602	4.673E+01	643	3.215E+01	684	1.118E+01	725	3.279E+00	766	9.213E-01
603	4.677E+01	644	3.160E+01	685	1.089E+01	726	3.159E+00	767	9.021E-01
604	4.683E+01	645	3.092E+01	686	1.059E+01	727	3.074E+00	768	8.808E-01
605	4.678E+01	646	3.038E+01	687	1.034E+01	728	2.991E+00	769	8.537E-01
606	4.682E+01	647	2.979E+01	688	1.002E+01	729	2.874E+00	770	8.336E-01
607	4.672E+01	648	2.918E+01	689	9.762E+00	730	2.783E+00	771	8.097E-01
608	4.660E+01	649	2.859E+01	690	9.521E+00	731	2.700E+00	772	7.864E-01
609	4.655E+01	650	2.799E+01	691	9.256E+00	732	2.624E+00	773	7.640E-01
610	4.647E+01	651	2.733E+01	692	8.969E+00	733	2.539E+00	774	7.383E-01
611	4.636E+01	652	2.680E+01	693	8.737E+00	734	2.468E+00	775	7.225E-01
612	4.619E+01	653	2.616E+01	694	8.490E+00	735	2.377E+00	776	7.011E-01
613	4.598E+01	654	2.561E+01	695	8.243E+00	736	2.316E+00	777	6.839E-01
614	4.586E+01	655	2.501E+01	696	8.006E+00	737	2.244E+00	778	6.678E-01
615	4.563E+01	656	2.442E+01	697	7.806E+00	738	2.174E+00	779	6.638E-01
616	4.539E+01	657	2.384E+01	698	7.577E+00	739	2.120E+00	780	6.650E-01
617	4.514E+01	658	2.325E+01	699	7.337E+00	740	2.043E+00		
618	4.481E+01	659	2.262E+01	700	7.122E+00	741	1.977E+00		
619	4.448E+01	660	2.208E+01	701	6.934E+00	742	1.902E+00		
620	4.413E+01	661	2.146E+01	702	6.695E+00	743	1.869E+00		
621	4.386E+01	662	2.094E+01	703	6.484E+00	744	1.808E+00		
622	4.346E+01	663	2.032E+01	704	6.298E+00	745	1.744E+00		
623	4.304E+01	664	1.975E+01	705	6.140E+00	746	1.701E+00		
624	4.262E+01	665	1.927E+01	706	5.949E+00	747	1.640E+00		
625	4.221E+01	666	1.867E+01	707	5.764E+00	748	1.609E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

The Stabilization time: **30 minutes**

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

Test orientation: **Downward**

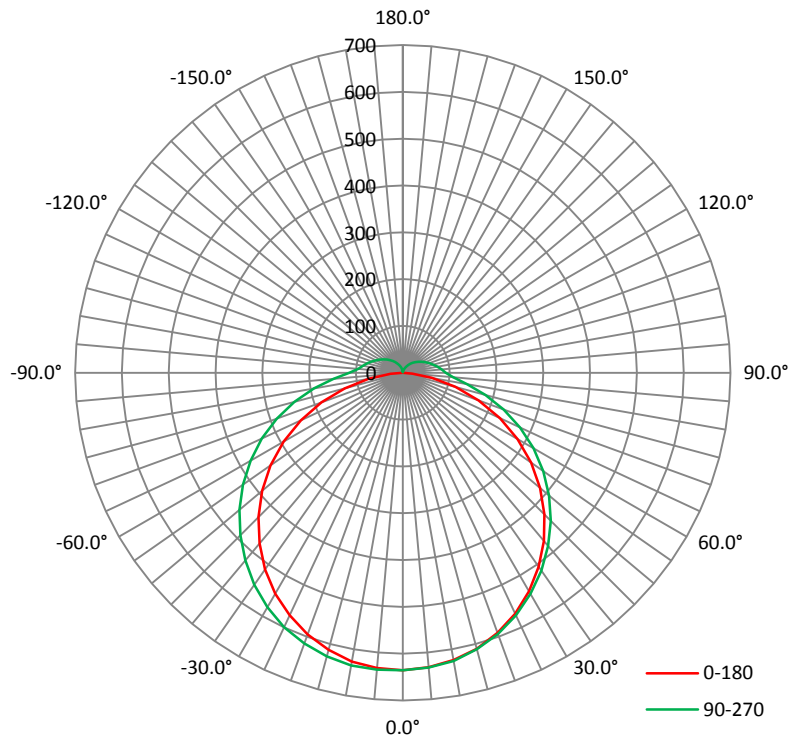
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
230.1	50	0.0728	15.88	0.9481

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2255.91	142.06	636.7	1.26	1.28

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	114.3	122.4	126.9	122.4	121.5
Field Angle (10% I _{max}):	160.9	183.6	222.1	184.9	187.9

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0°	635	635	635	635	635	635	635	635
1°	635	635	635	636	636	636	635	636
2°	635	635	635	636	636	636	635	636
3°	634	635	635	635	637	636	635	635
4°	633	634	635	634	637	636	634	635
5°	633	634	633	634	637	634	634	635
6°	632	634	633	634	636	635	633	634
7°	631	632	632	634	636	635	633	632
8°	629	631	632	634	636	634	632	631
9°	628	629	631	634	635	634	631	630
10°	626	627	630	633	635	633	629	628
11°	624	626	629	632	633	632	629	626
12°	621	624	627	631	631	630	627	624
13°	619	622	625	630	631	629	625	622
14°	616	620	624	628	630	627	623	620
15°	613	617	621	626	627	626	621	616
16°	610	615	619	623	625	623	620	613
17°	606	611	616	622	623	621	617	610
18°	602	609	614	620	620	619	613	607
19°	599	604	611	616	618	616	610	605
20°	595	601	608	614	615	613	607	600
21°	591	598	605	611	613	610	605	597
22°	586	594	601	607	610	607	601	592
23°	583	589	598	605	607	603	597	588
24°	577	585	594	601	604	600	593	584
25°	572	581	590	598	600	596	589	580
26°	566	575	586	593	595	592	585	574
27°	562	571	582	589	591	588	580	570
28°	556	566	576	585	588	584	576	565
29°	551	560	571	580	583	580	572	559
30°	545	555	566	576	578	575	566	555
31°	538	549	562	571	573	570	561	549
32°	532	544	557	565	569	565	556	543
33°	526	538	551	561	564	559	550	537
34°	520	532	545	555	558	554	545	531
35°	513	526	540	550	553	549	539	524
36°	506	519	533	544	548	543	533	518
37°	499	513	527	538	541	537	527	511
38°	492	505	521	532	536	531	520	504
39°	484	498	515	526	530	525	514	497
40°	476	491	509	520	523	519	507	491
41°	468	484	502	514	518	513	501	483
42°	461	477	495	507	511	506	494	476
43°	453	470	488	501	504	499	487	468
44°	444	461	481	494	498	492	479	460
45°	436	454	473	486	491	485	472	453
46°	428	446	466	479	484	478	465	445
47°	419	438	459	472	477	471	457	437
48°	410	430	451	465	470	464	450	429

Luminous Intensity (cd) Distribution Data

$\begin{matrix} \text{C} \\ \backslash \\ \gamma \end{matrix}$	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
49°	401	421	443	458	462	457	442	419
50°	392	413	435	450	455	449	433	411
51°	382	403	427	443	448	442	426	402
52°	373	394	419	435	440	433	417	393
53°	364	386	411	427	432	426	409	384
54°	354	377	402	419	424	418	401	375
55°	345	368	394	411	417	409	392	366
56°	335	359	386	403	409	401	383	357
57°	325	349	377	395	400	393	375	348
58°	315	340	368	387	391	385	366	338
59°	304	330	359	378	384	377	357	328
60°	294	320	350	369	375	368	348	319
61°	283	310	341	360	367	359	339	309
62°	273	301	332	352	358	350	330	299
63°	262	291	322	343	350	342	320	289
64°	251	281	313	334	341	333	311	279
65°	240	270	304	325	332	324	302	268
66°	229	260	294	316	323	315	292	258
67°	218	249	284	307	314	306	282	247
68°	207	239	275	297	305	296	273	237
69°	196	229	265	288	296	287	263	227
70°	185	218	255	279	287	277	253	216
71°	173	208	245	270	277	268	243	205
72°	162	197	235	260	268	259	233	195
73°	151	186	225	250	259	249	224	184
74°	140	176	215	241	249	240	214	174
75°	128	165	205	231	239	230	204	163
76°	117	154	195	222	230	221	194	153
77°	106	144	185	212	221	211	184	142
78°	95	134	176	202	211	202	174	132
79°	84	123	166	193	202	192	164	122
80°	74	113	156	183	193	183	155	111
81°	63	103	146	174	183	174	145	102
82°	53	93	137	165	175	164	136	92
83°	44	84	128	156	166	156	127	83
84°	35	75	119	148	157	147	118	75
85°	26	67	110	139	149	139	110	66
86°	19	58	102	131	141	131	102	58
87°	13	51	95	124	134	124	95	51
88°	7	44	88	117	127	117	88	45
89°	4	39	82	110	120	110	82	39
90°	1	34	77	105	114	105	78	36
91°	0	31	73	100	109	100	74	33
92°	0	29	68	95	105	96	69	31
93°	0	28	65	92	101	93	67	30
94°	0	27	64	89	98	90	65	29
95°	0	27	62	87	96	87	64	28
96°	0	26	61	85	93	86	62	28
97°	0	25	60	83	92	84	61	27

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
98°	0	25	58	82	90	82	60	26
99°	0	24	57	80	88	81	59	25
100°	0	23	56	78	87	79	57	25
101°	0	23	55	77	85	78	56	24
102°	0	22	54	75	83	76	55	23
103°	0	22	53	74	82	74	54	23
104°	0	21	51	72	80	73	53	22
105°	0	21	50	71	78	71	51	22
106°	0	20	49	69	77	70	50	21
107°	0	20	48	68	75	69	49	21
108°	0	19	47	67	73	67	48	20
109°	0	19	46	65	72	66	47	20
110°	0	18	45	64	70	64	46	19
111°	0	18	44	62	69	63	45	19
112°	0	17	43	61	67	62	44	19
113°	0	17	42	60	66	60	43	18
114°	0	17	41	58	65	59	42	18
115°	0	16	40	57	63	58	41	17
116°	0	16	39	56	62	56	40	17
117°	0	16	38	55	60	55	39	17
118°	0	15	37	53	59	54	38	16
119°	0	15	36	52	58	52	37	16
120°	0	15	36	51	56	51	36	16
121°	0	14	35	50	55	50	36	15
122°	0	14	34	48	54	49	35	15
123°	0	14	33	47	53	48	34	15
124°	0	13	32	46	51	47	33	14
125°	0	13	31	45	50	45	32	14
126°	0	13	31	44	49	44	31	14
127°	0	12	30	43	47	43	31	13
128°	0	12	29	42	46	42	30	13
129°	0	12	28	40	45	41	29	13
130°	0	11	28	39	44	40	28	12
131°	0	11	27	38	43	39	28	12
132°	1	11	26	37	41	38	27	12
133°	1	11	25	36	40	37	26	11
134°	1	10	25	35	39	36	25	11
135°	1	10	24	34	38	35	25	11
136°	1	10	23	33	37	34	24	10
137°	1	10	23	32	36	33	23	10
138°	1	9	22	31	35	32	22	10
139°	1	9	21	30	34	31	22	10
140°	1	9	21	29	33	30	21	9
141°	1	8	20	29	32	29	21	9
142°	1	8	19	28	31	28	20	9
143°	1	8	19	27	30	27	19	8
144°	1	8	18	26	29	26	19	8
145°	1	7	17	25	28	25	18	8
146°	1	7	17	24	27	24	17	8

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
147°	1	7	16	23	26	23	17	7
148°	1	7	16	22	25	23	16	7
149°	1	7	15	21	24	22	15	7
150°	1	6	14	21	23	21	15	7
151°	1	6	14	20	22	20	14	6
152°	1	6	13	19	21	19	14	6
153°	1	6	13	18	20	18	13	6
154°	1	5	12	17	19	18	13	6
155°	1	5	12	17	18	17	12	5
156°	1	5	11	16	17	16	11	5
157°	1	5	10	15	17	15	11	5
158°	1	5	10	14	16	14	10	5
159°	1	4	9	13	15	14	10	4
160°	1	4	9	13	14	13	9	4
161°	1	4	8	12	13	12	8	4
162°	1	4	8	11	12	11	8	4
163°	1	4	7	10	11	10	7	3
164°	1	3	7	10	11	10	6	3
165°	1	3	6	9	10	9	5	3
166°	1	3	6	8	9	8	5	3
167°	1	3	5	7	8	8	5	3
168°	1	3	5	7	8	7	4	2
169°	1	2	4	6	7	6	4	2
170°	1	2	4	5	6	5	3	2
171°	1	2	4	5	5	5	3	2
172°	1	2	3	4	5	4	3	2
173°	1	2	3	4	4	3	3	2
174°	1	2	3	3	3	3	2	2
175°	1	2	2	3	3	2	2	2
176°	1	1	2	2	2	2	2	1
177°	1	1	2	2	2	2	2	1
178°	1	1	1	2	2	1	1	1
179°	1	1	1	1	1	1	1	1
180°	1	1	1	1	1	1	1	1

Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} \diagup C \\ \diagdown \gamma \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0°	635	635	635	635	635	635	635	635
1°	635	635	635	635	635	635	635	635
2°	635	635	634	635	635	634	634	635
3°	634	634	633	634	635	633	634	635
4°	633	633	633	633	634	632	632	633
5°	631	631	631	632	632	631	631	633
6°	630	631	630	631	631	631	630	631
7°	629	629	628	628	629	629	628	630
8°	628	627	627	628	628	628	626	628
9°	625	626	625	626	627	626	625	626
10°	623	624	623	624	625	624	623	624
11°	621	622	621	622	622	622	621	622
12°	619	619	618	619	620	620	620	619
13°	617	616	615	616	617	617	617	617
14°	614	613	612	613	614	614	614	613
15°	611	609	609	611	611	610	611	611
16°	607	606	607	607	608	607	609	607
17°	603	602	603	604	604	604	605	604
18°	599	600	599	600	601	601	601	600
19°	596	595	596	598	598	597	597	597
20°	591	592	592	593	594	593	593	592
21°	587	586	587	589	589	589	588	588
22°	582	583	583	585	585	585	584	583
23°	578	578	579	580	581	580	580	579
24°	573	573	574	576	577	575	575	574
25°	568	568	569	571	572	570	570	570
26°	562	562	564	566	567	566	565	563
27°	556	557	559	561	562	561	560	558
28°	551	552	553	555	557	555	554	553
29°	545	546	548	550	552	551	548	548
30°	539	540	543	544	545	545	542	541
31°	532	534	537	539	540	539	537	535
32°	526	528	530	533	534	533	532	529
33°	519	521	524	527	527	528	525	523
34°	513	515	517	521	522	521	519	516
35°	506	508	511	514	516	515	512	509
36°	499	501	504	508	510	509	506	502
37°	492	494	498	501	503	502	499	495
38°	484	487	491	494	497	496	492	489
39°	477	479	484	487	490	488	485	481
40°	469	472	477	481	483	481	478	474
41°	461	465	470	474	476	475	471	466
42°	453	456	462	467	469	467	463	458
43°	444	448	454	459	462	460	456	450
44°	436	440	446	452	454	452	448	442
45°	428	432	439	445	447	445	441	434
46°	419	423	431	437	439	437	432	426
47°	409	415	423	429	431	430	424	417
48°	401	406	414	421	424	422	416	408

Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ \gamma \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
49°	391	397	407	413	416	413	408	400
50°	383	389	397	405	408	406	399	391
51°	373	380	389	397	400	398	391	382
52°	364	371	381	389	392	389	383	373
53°	354	361	372	380	383	381	373	364
54°	344	352	362	371	375	372	365	354
55°	334	342	355	363	366	364	356	345
56°	324	333	345	354	358	355	347	335
57°	314	323	336	346	349	346	338	326
58°	304	313	326	336	341	337	328	316
59°	293	303	317	328	331	328	319	306
60°	283	293	308	319	322	319	309	296
61°	272	283	298	309	314	310	300	286
62°	261	273	288	300	304	301	290	276
63°	251	262	279	290	295	292	281	265
64°	240	252	269	281	286	282	271	255
65°	229	241	259	272	277	273	261	245
66°	218	231	249	262	267	263	251	234
67°	206	220	239	253	258	254	241	223
68°	196	210	229	243	248	244	231	213
69°	184	199	220	233	239	234	222	202
70°	172	188	209	224	229	225	211	192
71°	160	177	199	214	220	215	201	181
72°	149	166	189	205	210	205	191	170
73°	138	155	179	195	201	196	181	159
74°	127	145	168	186	192	186	171	148
75°	116	134	159	176	182	177	161	138
76°	105	124	149	166	173	167	151	127
77°	94	114	140	157	164	158	142	117
78°	84	104	131	148	155	149	132	107
79°	73	94	122	140	147	141	123	97
80°	63	85	113	132	139	133	115	88
81°	53	76	105	125	132	125	106	78
82°	44	67	97	118	125	118	99	70
83°	35	59	90	111	118	112	92	62
84°	27	52	84	105	113	106	85	54
85°	20	45	78	100	108	101	79	47
86°	14	40	74	96	104	96	75	41
87°	8	35	70	92	100	93	71	37
88°	4	32	67	89	97	90	68	33
89°	2	30	65	87	94	87	65	31
90°	1	29	63	85	92	85	63	29
91°	1	28	61	83	90	83	62	28
92°	1	27	60	81	88	81	60	27
93°	1	26	59	80	86	80	59	26
94°	0	25	57	78	85	78	58	26
95°	0	24	56	76	83	76	56	25
96°	0	23	54	75	82	75	55	24
97°	0	22	53	73	80	73	54	23

Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} \text{C} \\ \backslash \\ \text{Y} \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
98°	0	22	52	72	78	72	52	22
99°	0	21	51	70	77	70	51	22
100°	0	20	50	69	75	69	50	21
101°	0	20	48	67	73	67	49	20
102°	0	19	47	66	72	66	48	20
103°	0	18	46	64	70	64	46	19
104°	0	18	45	63	69	63	45	18
105°	0	17	44	61	67	62	44	18
106°	0	17	43	60	66	60	43	17
107°	0	16	42	59	64	59	42	17
108°	0	16	41	57	63	57	41	16
109°	0	15	40	56	62	56	40	16
110°	0	15	39	55	60	55	39	15
111°	0	14	38	53	59	53	38	15
112°	0	14	37	52	57	52	37	14
113°	0	14	36	51	56	51	36	14
114°	0	13	35	50	55	50	35	14
115°	0	13	34	48	53	48	34	13
116°	0	12	33	47	52	47	33	13
117°	0	12	32	46	51	46	32	12
118°	0	12	31	45	50	45	31	12
119°	0	11	30	44	48	44	30	12
120°	0	11	29	42	47	43	30	11
121°	0	10	29	41	46	41	29	11
122°	0	10	28	40	45	40	28	10
123°	0	10	27	39	43	39	27	10
124°	0	9	26	38	42	38	26	10
125°	0	9	25	37	41	37	25	9
126°	0	9	25	36	40	36	25	9
127°	0	8	24	35	39	35	24	9
128°	0	8	23	34	38	34	23	8
129°	0	8	22	33	37	33	22	8
130°	0	7	21	32	35	32	22	8
131°	0	7	21	31	34	31	21	7
132°	0	7	20	30	33	30	20	7
133°	0	7	19	29	32	29	20	7
134°	0	6	19	28	31	28	19	7
135°	0	6	18	27	30	27	18	6
136°	0	6	17	26	29	26	18	6
137°	0	5	16	25	28	25	17	6
138°	0	5	16	24	27	24	16	6
139°	0	5	15	23	26	23	16	5
140°	0	4	14	22	25	23	15	5
141°	0	4	14	21	24	22	15	5
142°	0	4	13	20	23	21	14	5
143°	0	3	12	19	22	20	14	5
144°	0	3	11	18	21	19	13	4
145°	0	3	11	18	20	19	13	4
146°	1	2	10	17	19	18	12	4

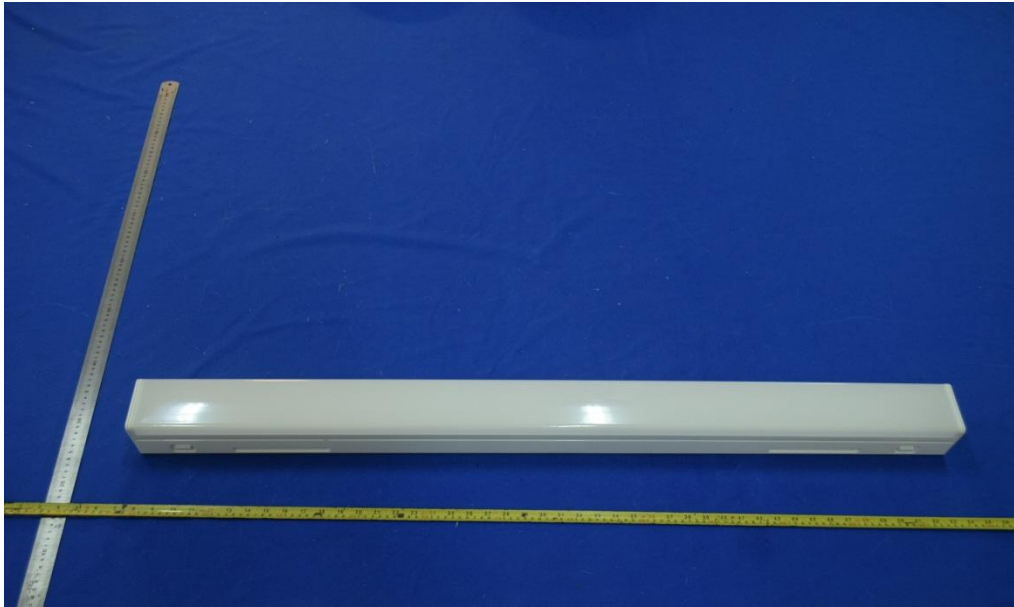
Luminous Intensity (cd) Distribution Data (cont.)

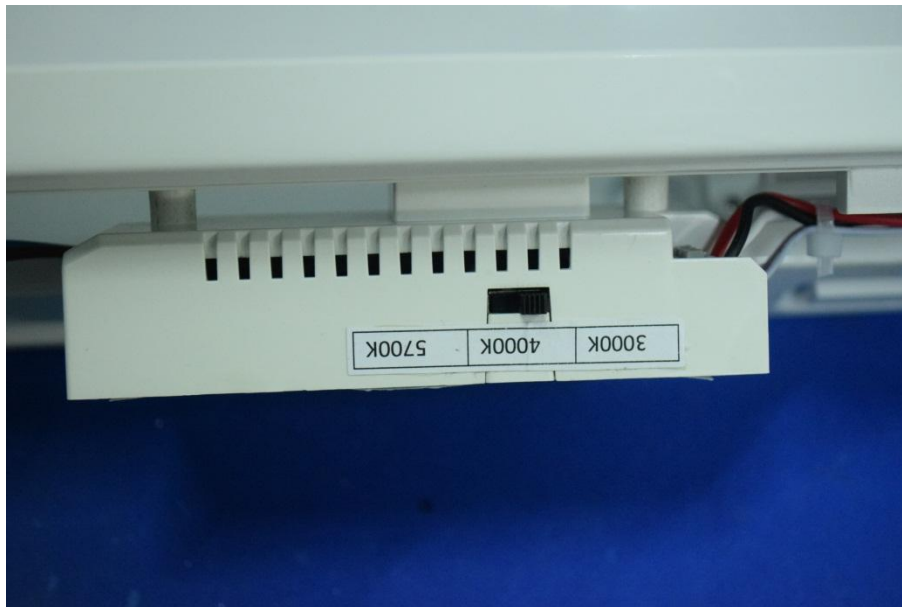
C γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
147°	1	2	9	16	19	17	12	4
148°	1	2	9	15	18	16	11	4
149°	1	2	8	14	17	15	11	4
150°	1	1	7	13	16	15	10	4
151°	1	1	7	12	15	14	10	4
152°	1	1	6	11	14	13	9	4
153°	1	1	5	10	13	13	9	4
154°	1	1	5	10	12	12	8	3
155°	1	1	4	9	11	11	8	3
156°	1	1	3	8	11	10	8	3
157°	1	1	3	7	10	10	7	3
158°	1	1	2	6	9	9	7	3
159°	1	1	2	6	8	8	6	3
160°	1	1	2	5	7	8	6	3
161°	1	1	1	4	7	7	5	3
162°	1	1	1	4	6	6	5	2
163°	1	1	1	3	5	6	4	2
164°	1	1	1	3	5	5	4	2
165°	1	1	1	2	4	4	3	2
166°	1	1	1	2	3	4	3	2
167°	1	1	1	2	3	3	3	1
168°	1	1	1	1	2	3	2	1
169°	1	1	1	1	2	2	2	1
170°	1	1	1	1	2	2	2	1
171°	1	1	1	1	1	1	1	1
172°	1	1	1	1	1	1	1	1
173°	1	1	1	1	1	1	1	1
174°	1	1	1	1	1	1	1	1
175°	1	1	1	1	1	1	1	1
176°	1	1	1	1	1	1	1	1
177°	1	1	1	1	1	1	1	1
178°	1	1	1	1	1	1	1	1
179°	1	1	1	1	1	1	1	1
180°	1	1	1	1	1	1	1	1

Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	15.2	0.67	0-5	15.2	0.67
5-10	45.1	2.00	0-10	60.2	2.67
10-15	73.7	3.27	0-15	134.0	5.94
15-20	100.2	4.44	0-20	234.1	10.38
20-25	123.6	5.48	0-25	357.7	15.86
25-30	143.3	6.35	0-30	501.0	22.21
30-35	158.7	7.03	0-35	659.7	29.24
35-40	169.3	7.51	0-40	829.0	36.75
40-45	174.8	7.75	0-45	1003.8	44.50
45-50	175.3	7.77	0-50	1179.1	52.27
50-55	170.4	7.55	0-55	1349.5	59.82
55-60	160.6	7.12	0-60	1510.1	66.94
60-65	146.1	6.48	0-65	1656.2	73.42
65-70	127.2	5.64	0-70	1783.5	79.06
70-75	105.0	4.65	0-75	1888.4	83.71
75-80	80.8	3.58	0-80	1969.2	87.29
80-85	57.5	2.55	0-85	2026.7	89.84
85-90	39.9	1.77	0-90	2066.6	91.61
90-95	31.2	1.38	0-95	2097.8	92.99
95-100	27.3	1.21	0-100	2125.0	94.20
100-105	24.0	1.06	0-105	2149.0	95.26
105-110	21.0	0.93	0-110	2170.0	96.19
110-115	18.1	0.80	0-115	2188.1	96.99
115-120	15.4	0.68	0-120	2203.4	97.67
120-125	12.9	0.57	0-125	2216.3	98.24
125-130	10.6	0.47	0-130	2226.8	98.71
130-135	8.5	0.38	0-135	2235.3	99.09
135-140	6.6	0.29	0-140	2241.9	99.38
140-145	5.0	0.22	0-145	2246.9	99.60
145-150	3.6	0.16	0-150	2250.5	99.76
150-155	2.4	0.11	0-155	2253.0	99.87
155-160	1.5	0.07	0-160	2254.5	99.94
160-165	0.8	0.04	0-165	2255.3	99.98
165-170	0.4	0.01	0-170	2255.7	99.99
170-175	0.1	0.01	0-175	2255.9	100.00
175-180	0.0	0.00	0-180	2255.9	100.00

6. Product Photo







Directions

1. The information marked "superscript #" is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. This report includes some test methods are not in NVLAP accreditation scope marked *.
3. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
4. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
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*****END OF REPORT*****