

# ANSI/IES LM-79-19

## MEASUREMENT AND TEST REPORT

For

**LEDVANCE LLC**  
200 Ballardvale Street Wilmington, MA 01887

**Test Model: LEDMD8R3B1600ST9SC3WH**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Power Factor, Chromaticity, Luminous Intensity Distribution, THD
<b>Reviewed By:</b>	
<b>Report Number:</b>	DG3230310-11396E-EE
<b>Test Date:</b>	2023-03-24
<b>Report Date:</b>	
<b>Approved by:</b>	
<b>Prepared By:</b>	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
<b>Test Facility:</b>	Test facility was located at No.12, Pulong East 1 <sup>st</sup> 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<sup>#</sup>

### General Information:

One test sample was in good condition and received on 2023-03-10, and used for testing. All tests and evaluations were performed at the 2700K light setting.

Model Tested: LEDMD8R3B1600ST9SC3WH  
Manufacturer: LEDVANCE LLC  
Brand Name: SYLVANIA; LEDVANCE  
Product Designation: LED Recessed luminaires  
Burning Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120 V AC 60Hz  
Rated Power: 19 W  
Nominal CCT: 2700K/3000K/3500K/4000K/5000K  
Nominal Lumen Output: 1600 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
2.0m integrating sphere	EVERFINE	R98	11010018	2022-09-27	2023-09-26
spectroradiometer	EVERFINE	HAAS-2000	G112048TS81331121	2022-09-27	2023-09-26
Digital Power Meter	EVERFINE	PF2010A	1011004	2022-11-18	2023-11-17
Digital CC&CV DC Power Supply	EVERFINE	WY305-V1	1101047	2022-11-18	2023-11-17
Standard Light Source	EVERFINE	D204	N/A	2021-10-15	2023-10-14
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	2022-11-18	2023-11-17
AC POWER SUPPLY	EVERFINE	VPS1030 PWM	1012017	2022-11-18	2023-11-17
Digital CC&CV DC Power Supply	EVERFINE	WY12010	1009009	2022-11-18	2023-11-17
Digital power meter	YOKOGAWA	WT-210	91j926132	2022-11-18	2023-11-17
full-field speed goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	2022-10-26	2023-10-25
wireless remote thermohygrometer	N/A	433MHz	N/A	2022-11-18	2023-11-17

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Standard Light Source	EVERFINE	D908	1012003	2021-10-15	2023-10-14

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.

$4\pi$  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  $U=22\text{K}$  ( $K=2$ ), 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  $U=0.39\%$  of rdg, AC Voltage  $U=0.25\%$  of rdg, Power  $U=0.42\%$  ( $K=2$ ), 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 ( $\gamma$ ) 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 ( $\gamma$ ) 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.

### Additional Test

The Additional Test item may not be covered by IESNA LM-79-2019. Additional test including power factor, off-state power and THD, was measured by Digital Power Meter after stabilized at  $25^{\circ}\text{C} \pm 1.2^{\circ}\text{C}$ . 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 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  $U=22\text{K}$  ( $K=2$ ), 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  $U=0.39\%$  of rdg, AC Voltage  $U=0.25\%$  of rdg, Power  $U=0.42\%$  ( $K=2$ ), 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**

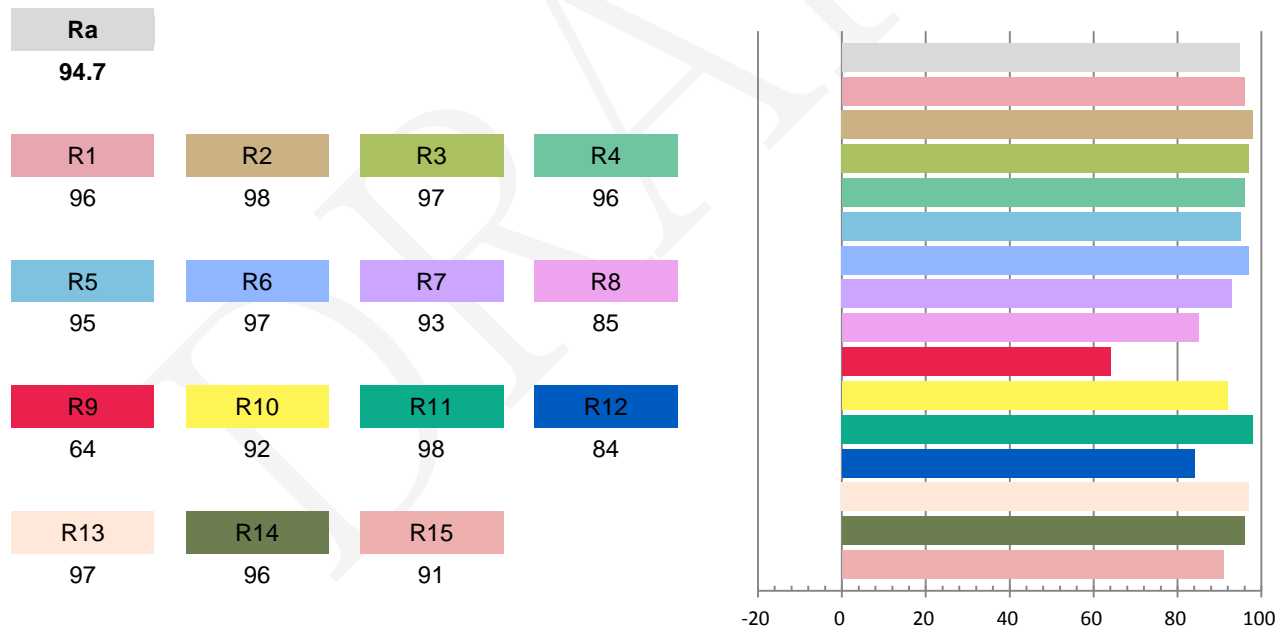
Test orientation: **Downward**

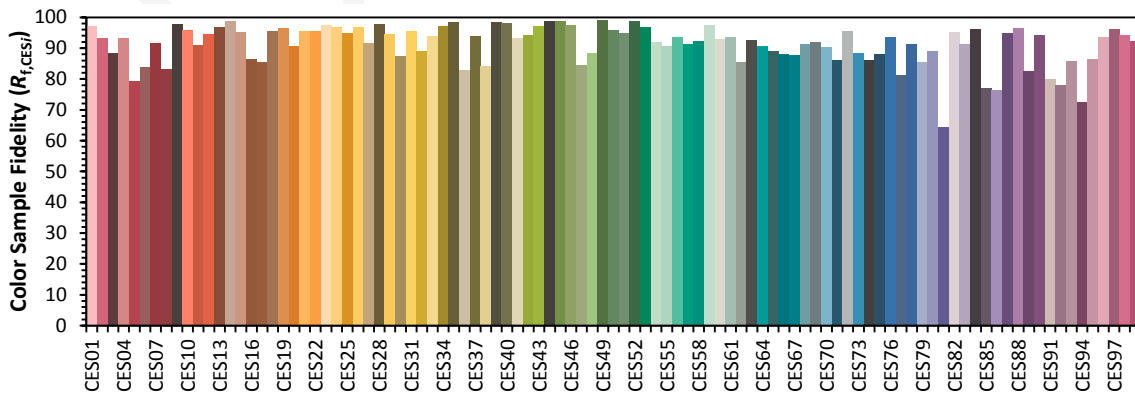
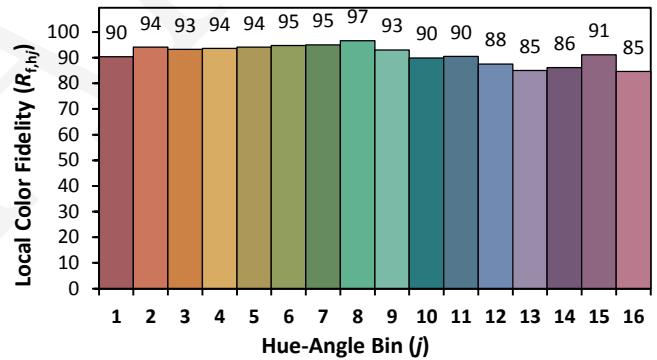
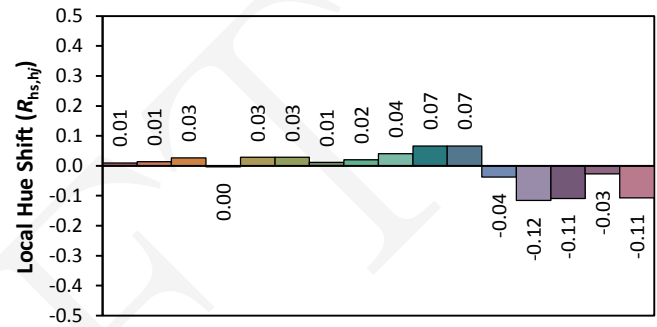
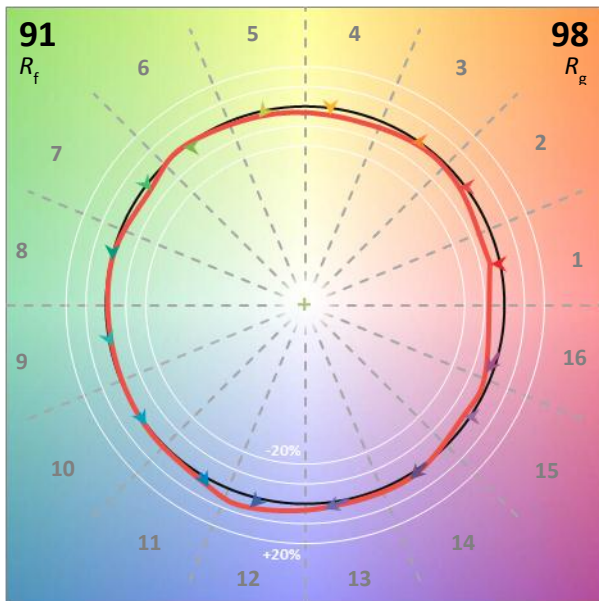
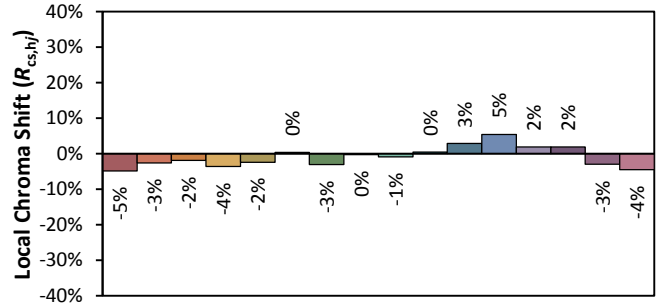
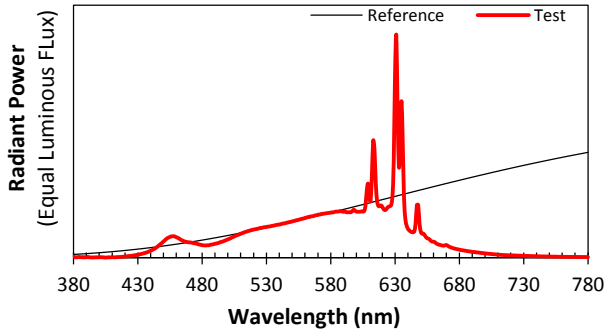
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.1	60	0.1521	17.75	0.9723	1610.3	90.71

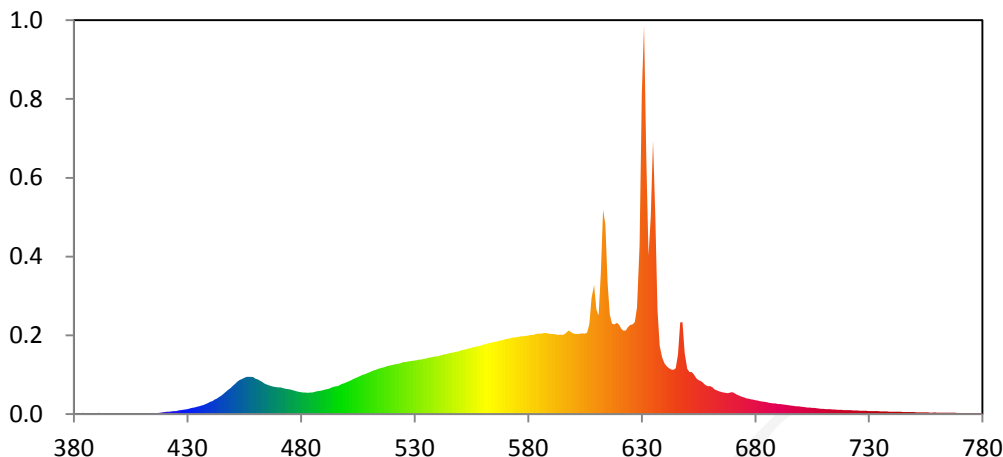
Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
4.7553	2731	0.00125	0.4595	0.4139	0.2608	0.5286

### Color Rendering Index





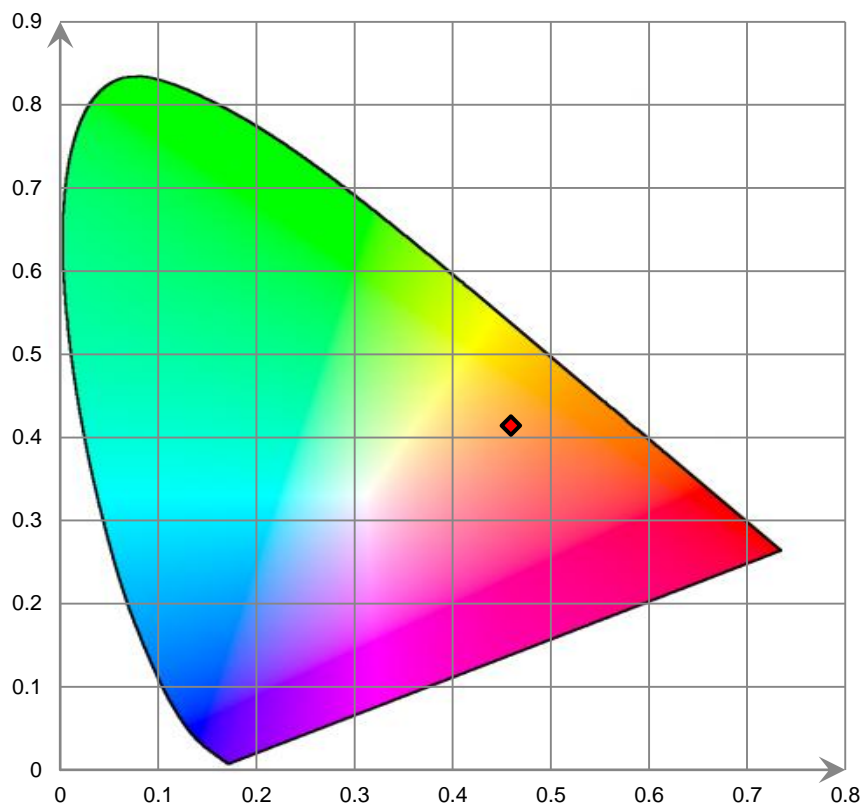
# Relative Spectral Power Distribution



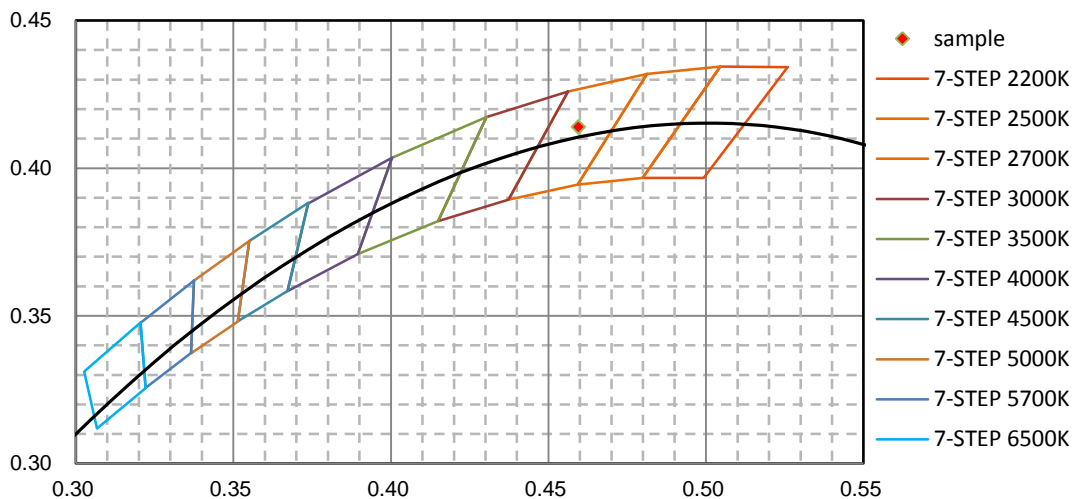
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.731E-01	421	6.588E-01	462	1.067E+01	503	1.120E+01	544	1.914E+01
381	2.064E-01	422	7.232E-01	463	1.022E+01	504	1.153E+01	545	1.935E+01
382	1.810E-01	423	7.818E-01	464	9.737E+00	505	1.181E+01	546	1.954E+01
383	1.151E-01	424	8.936E-01	465	9.475E+00	506	1.215E+01	547	1.970E+01
384	3.525E-01	425	9.436E-01	466	9.115E+00	507	1.248E+01	548	1.991E+01
385	2.008E-01	426	1.072E+00	467	8.921E+00	508	1.276E+01	549	1.998E+01
386	2.138E-01	427	1.211E+00	468	8.734E+00	509	1.300E+01	550	2.026E+01
387	2.406E-01	428	1.288E+00	469	8.586E+00	510	1.334E+01	551	2.041E+01
388	5.687E-02	429	1.465E+00	470	8.488E+00	511	1.360E+01	552	2.059E+01
389	2.817E-01	430	1.584E+00	471	8.465E+00	512	1.391E+01	553	2.083E+01
390	9.259E-02	431	1.731E+00	472	8.303E+00	513	1.418E+01	554	2.099E+01
391	3.896E-01	432	1.899E+00	473	8.145E+00	514	1.442E+01	555	2.112E+01
392	1.478E-01	433	2.066E+00	474	8.032E+00	515	1.464E+01	556	2.140E+01
393	9.247E-02	434	2.263E+00	475	7.852E+00	516	1.489E+01	557	2.157E+01
394	1.139E-01	435	2.441E+00	476	7.719E+00	517	1.508E+01	558	2.177E+01
395	0.000E+00	436	2.666E+00	477	7.450E+00	518	1.532E+01	559	2.188E+01
396	1.070E-01	437	2.909E+00	478	7.286E+00	519	1.550E+01	560	2.220E+01
397	1.085E-01	438	3.175E+00	479	7.106E+00	520	1.567E+01	561	2.239E+01
398	1.390E-01	439	3.486E+00	480	6.954E+00	521	1.581E+01	562	2.258E+01
399	1.049E-01	440	3.833E+00	481	6.826E+00	522	1.595E+01	563	2.278E+01
400	1.792E-01	441	4.135E+00	482	6.814E+00	523	1.614E+01	564	2.292E+01
401	2.109E-01	442	4.561E+00	483	6.756E+00	524	1.628E+01	565	2.310E+01
402	1.483E-01	443	4.961E+00	484	6.887E+00	525	1.656E+01	566	2.314E+01
403	1.416E-01	444	5.424E+00	485	6.859E+00	526	1.658E+01	567	2.340E+01
404	3.368E-02	445	5.967E+00	486	7.052E+00	527	1.677E+01	568	2.360E+01
405	0.000E+00	446	6.544E+00	487	7.233E+00	528	1.695E+01	569	2.372E+01
406	3.271E-02	447	7.162E+00	488	7.342E+00	529	1.702E+01	570	2.397E+01
407	1.349E-01	448	7.744E+00	489	7.480E+00	530	1.717E+01	571	2.409E+01
408	1.085E-01	449	8.344E+00	490	7.708E+00	531	1.727E+01	572	2.417E+01
409	1.047E-01	450	9.045E+00	491	7.869E+00	532	1.739E+01	573	2.448E+01
410	2.242E-01	451	9.656E+00	492	8.009E+00	533	1.748E+01	574	2.448E+01
411	1.758E-01	452	1.032E+01	493	8.282E+00	534	1.768E+01	575	2.466E+01
412	1.134E-01	453	1.087E+01	494	8.560E+00	535	1.778E+01	576	2.474E+01
413	1.877E-01	454	1.120E+01	495	8.779E+00	536	1.797E+01	577	2.488E+01
414	2.339E-01	455	1.154E+01	496	8.965E+00	537	1.814E+01	578	2.493E+01
415	2.696E-01	456	1.187E+01	497	9.262E+00	538	1.827E+01	579	2.507E+01
416	3.344E-01	457	1.193E+01	498	9.580E+00	539	1.847E+01	580	2.512E+01
417	3.244E-01	458	1.192E+01	499	9.852E+00	540	1.845E+01	581	2.532E+01
418	4.240E-01	459	1.174E+01	500	1.016E+01	541	1.871E+01	582	2.531E+01
419	4.656E-01	460	1.133E+01	501	1.048E+01	542	1.887E+01	583	2.555E+01
420	5.805E-01	461	1.109E+01	502	1.074E+01	543	1.909E+01	584	2.574E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.575E+01	626	2.874E+01	667	6.712E+00	708	1.779E+00	749	5.600E-01
586	2.576E+01	627	2.944E+01	668	6.654E+00	709	1.679E+00	750	5.540E-01
587	2.597E+01	628	3.414E+01	669	6.837E+00	710	1.645E+00	751	5.403E-01
588	2.597E+01	629	5.398E+01	670	7.011E+00	711	1.557E+00	752	5.204E-01
589	2.576E+01	630	1.027E+02	671	6.588E+00	712	1.528E+00	753	5.126E-01
590	2.564E+01	631	1.245E+02	672	6.109E+00	713	1.476E+00	754	5.093E-01
591	2.569E+01	632	8.221E+01	673	5.820E+00	714	1.410E+00	755	4.915E-01
592	2.552E+01	633	5.083E+01	674	5.539E+00	715	1.389E+00	756	4.757E-01
593	2.531E+01	634	6.339E+01	675	5.301E+00	716	1.325E+00	757	4.440E-01
594	2.541E+01	635	8.761E+01	676	5.067E+00	717	1.324E+00	758	4.190E-01
595	2.537E+01	636	6.408E+01	677	4.913E+00	718	1.281E+00	759	4.506E-01
596	2.550E+01	637	3.338E+01	678	4.737E+00	719	1.253E+00	760	4.466E-01
597	2.620E+01	638	2.179E+01	679	4.557E+00	720	1.241E+00	761	4.188E-01
598	2.681E+01	639	1.797E+01	680	4.419E+00	721	1.213E+00	762	3.941E-01
599	2.615E+01	640	1.621E+01	681	4.256E+00	722	1.171E+00	763	3.805E-01
600	2.574E+01	641	1.525E+01	682	4.108E+00	723	1.162E+00	764	3.850E-01
601	2.567E+01	642	1.463E+01	683	4.036E+00	724	1.141E+00	765	3.667E-01
602	2.565E+01	643	1.427E+01	684	3.890E+00	725	1.105E+00	766	3.674E-01
603	2.570E+01	644	1.414E+01	685	3.782E+00	726	1.061E+00	767	3.625E-01
604	2.585E+01	645	1.467E+01	686	3.627E+00	727	1.042E+00	768	3.646E-01
605	2.575E+01	646	1.910E+01	687	3.522E+00	728	1.027E+00	769	3.347E-01
606	2.602E+01	647	2.939E+01	688	3.419E+00	729	9.888E-01	770	3.385E-01
607	2.882E+01	648	2.943E+01	689	3.335E+00	730	9.486E-01	771	3.309E-01
608	3.728E+01	649	1.949E+01	690	3.202E+00	731	9.327E-01	772	3.320E-01
609	4.137E+01	650	1.444E+01	691	3.123E+00	732	9.080E-01	773	3.083E-01
610	3.342E+01	651	1.338E+01	692	3.062E+00	733	9.067E-01	774	3.150E-01
611	3.161E+01	652	1.341E+01	693	2.925E+00	734	8.847E-01	775	3.109E-01
612	4.535E+01	653	1.261E+01	694	2.860E+00	735	8.146E-01	776	2.832E-01
613	6.542E+01	654	1.149E+01	695	2.781E+00	736	8.224E-01	777	2.963E-01
614	6.087E+01	655	1.086E+01	696	2.678E+00	737	8.120E-01	778	2.917E-01
615	4.220E+01	656	1.059E+01	697	2.575E+00	738	7.801E-01	779	2.872E-01
616	3.181E+01	657	1.004E+01	698	2.499E+00	739	7.491E-01	780	2.877E-01
617	2.897E+01	658	9.294E+00	699	2.417E+00	740	7.246E-01		
618	2.873E+01	659	8.947E+00	700	2.332E+00	741	7.017E-01		
619	2.923E+01	660	8.898E+00	701	2.261E+00	742	6.864E-01		
620	2.857E+01	661	8.568E+00	702	2.172E+00	743	6.723E-01		
621	2.727E+01	662	7.909E+00	703	2.086E+00	744	6.522E-01		
622	2.662E+01	663	7.565E+00	704	2.053E+00	745	6.281E-01		
623	2.683E+01	664	7.254E+00	705	1.963E+00	746	6.257E-01		
624	2.790E+01	665	7.047E+00	706	1.895E+00	747	6.146E-01		
625	2.850E+01	666	6.870E+00	707	1.838E+00	748	5.783E-01		

### 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**

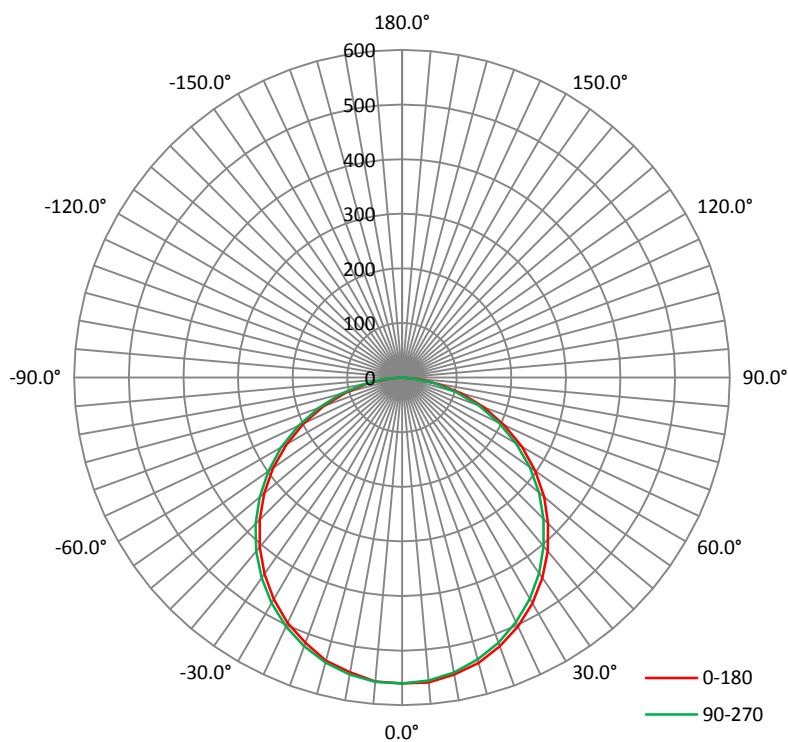
**Electrical Measurement**

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1522	17.76	0.9727

**Photometric Measurement**

Luminous Flux (lm)	Efficacy (lm/W)	I <sub>max</sub> (cd)	S/MH (C0/180)	S/MH (C90/270)
1611.7	90.75	561.2	1.27	1.24

**Luminous Intensity Distribution**



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	112.8	112.8	112.8	112.8	112.8
Field Angle (10% I <sub>max</sub> ):	162.6	162.6	162.6	162.6	162.6

**Luminous Intensity (cd) Distribution Data**

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0°	560	560	560	560	560	560	560	560
1°	560	559	560	560	560	561	561	561
2°	559	559	560	559	560	560	561	561
3°	560	559	560	559	560	560	561	560
4°	558	557	559	558	559	559	559	560
5°	558	557	559	558	559	559	559	560
6°	556	555	557	557	557	558	558	559
7°	555	553	556	556	556	557	557	558
8°	553	552	554	554	554	556	556	557
9°	551	551	552	552	554	554	555	555
10°	548	549	550	551	552	553	553	553
11°	547	547	548	549	550	551	551	551
12°	543	543	546	546	547	548	549	549
13°	542	541	543	544	545	546	547	547
14°	538	538	540	541	542	544	544	545
15°	537	536	539	538	540	541	541	543
16°	532	532	534	535	537	538	539	539
17°	529	528	531	531	533	535	536	536
18°	525	525	527	529	530	532	532	533
19°	522	521	524	525	527	528	529	529
20°	517	518	520	522	523	526	526	526
21°	514	514	516	518	520	521	521	522
22°	508	509	512	514	515	517	518	518
23°	505	505	508	509	511	513	514	514
24°	500	500	503	505	507	509	510	510
25°	495	495	499	500	503	504	505	505
26°	490	490	494	495	497	499	500	501
27°	485	484	489	490	493	495	495	496
28°	480	480	483	485	488	490	490	491
29°	474	475	478	480	482	484	485	486
30°	469	469	472	475	477	480	480	481
31°	463	463	466	469	471	473	474	475
32°	457	458	460	463	465	468	469	469
33°	451	452	455	457	460	462	463	464
34°	445	446	449	451	454	456	457	457
35°	439	439	442	445	448	450	452	451
36°	432	433	436	439	441	444	445	445
37°	425	426	430	432	435	437	438	438
38°	419	420	423	426	429	431	432	432
39°	412	413	416	419	422	424	425	426
40°	405	406	409	412	415	418	419	419
41°	398	399	403	405	408	410	412	412
42°	391	392	395	398	401	403	404	404
43°	384	385	388	391	394	396	397	397
44°	376	377	381	384	387	389	390	390
45°	368	370	374	376	379	381	383	383
46°	361	362	366	369	371	374	375	375
47°	353	354	358	361	364	366	367	367

**Luminous Intensity (cd) Distribution Data**

$\begin{matrix} C \\ \backslash \\ \gamma \end{matrix}$	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
48°	345	347	350	354	356	359	359	360
49°	337	339	343	345	348	350	351	352
50°	329	331	335	337	340	343	344	344
51°	321	323	326	329	332	334	335	335
52°	313	315	318	321	324	326	327	327
53°	305	306	310	313	316	318	319	319
54°	296	298	302	305	307	309	310	311
55°	288	289	293	296	299	301	302	302
56°	279	281	284	288	290	292	293	293
57°	270	272	276	279	281	283	284	284
58°	261	264	267	270	273	275	276	276
59°	253	255	258	261	264	266	267	267
60°	244	246	250	253	255	257	258	258
61°	235	237	241	243	246	248	249	248
62°	226	228	231	234	237	239	240	239
63°	217	219	222	225	228	229	230	230
64°	208	210	213	217	219	221	221	221
65°	199	201	204	207	210	211	212	211
66°	190	192	195	198	200	202	203	202
67°	180	182	186	188	191	192	193	193
68°	171	173	177	180	182	183	184	183
69°	162	164	167	170	172	174	174	174
70°	153	155	158	161	163	165	165	164
71°	143	146	149	151	154	155	156	155
72°	134	136	140	142	145	146	146	145
73°	125	127	131	133	136	137	137	136
74°	116	118	121	124	126	128	128	127
75°	107	109	112	115	117	118	118	118
76°	98	101	103	106	108	109	109	109
77°	90	92	94	97	99	100	100	99
78°	81	83	86	88	90	92	91	91
79°	73	75	77	80	82	83	83	82
80°	64	66	69	71	73	74	74	73
81°	56	58	61	63	65	66	66	65
82°	49	51	53	55	57	58	58	56
83°	41	43	45	47	49	50	50	49
84°	33	35	37	39	41	42	42	41
85°	26	28	30	32	33	34	34	33
86°	19	21	23	25	26	27	26	26
87°	13	15	16	18	19	20	20	19
88°	7	8	10	12	13	13	13	12
89°	5	6	5	6	7	7	7	6
90°	2	3	2	3	4	5	4	3
91°	0	0	0	0	0	2	0	0
92°	0	0	0	0	0	0	0	0
93°	0	0	0	0	0	0	0	0
94°	0	0	0	0	0	0	0	0
95°	0	0	0	0	0	0	0	0
96°	0	0	0	0	0	0	0	0

**Luminous Intensity (cd) Distribution Data**

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
97°	0	0	0	0	0	0	0	0
98°	0	0	0	0	0	0	0	0
99°	0	0	0	0	0	0	0	0
100°	0	0	0	0	0	0	0	0
101°	0	0	0	0	0	0	0	0
102°	0	0	0	0	0	0	0	0
103°	0	0	0	0	0	0	0	0
104°	0	0	0	0	0	0	0	0
105°	0	0	0	0	0	0	0	0
106°	0	0	0	0	0	0	0	0
107°	0	0	0	0	0	0	0	0
108°	0	0	0	0	0	0	0	0
109°	0	0	0	0	0	0	0	0
110°	0	0	0	0	0	0	0	0
111°	0	0	0	0	0	0	0	0
112°	0	0	0	0	0	0	0	0
113°	0	0	0	0	0	0	0	0
114°	0	0	0	0	0	0	0	0
115°	0	0	0	0	0	0	0	0
116°	0	0	0	0	0	0	0	0
117°	0	0	0	0	0	0	0	0
118°	0	0	0	0	0	0	0	0
119°	0	0	0	0	0	0	0	0
120°	0	0	0	0	0	0	0	0
121°	0	0	0	0	0	0	0	0
122°	0	0	0	0	0	0	0	0
123°	0	0	0	0	0	0	0	0
124°	0	0	0	0	0	0	0	0
125°	0	0	0	0	0	0	0	0
126°	0	0	0	0	0	0	0	0
127°	0	0	0	0	0	0	0	0
128°	0	0	0	0	0	0	0	0
129°	0	0	0	0	0	0	0	0
130°	0	0	0	0	0	0	0	0
131°	0	0	0	0	0	0	0	0
132°	0	0	0	0	0	0	0	0
133°	0	0	0	0	0	0	0	0
134°	0	0	0	0	0	0	0	0
135°	0	0	0	0	0	0	0	0
136°	0	0	0	0	0	0	0	0
137°	0	0	0	0	0	0	0	0
138°	0	0	0	0	0	0	0	0
139°	0	0	0	0	0	0	0	0
140°	0	0	0	0	0	1	0	0
141°	0	1	1	1	1	1	1	0
142°	1	1	1	1	1	1	1	1
143°	1	1	1	1	1	1	1	1
144°	1	1	1	1	1	1	1	1
145°	1	1	1	1	1	1	1	1

**Luminous Intensity (cd) Distribution Data**

$\begin{matrix} C \\ \backslash \\ \gamma \end{matrix}$	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
146°	1	1	1	1	1	1	1	1
147°	1	1	1	1	1	1	1	1
148°	1	1	1	1	1	1	1	1
149°	1	1	1	1	1	1	1	1
150°	1	1	1	1	1	1	1	1
151°	1	1	1	1	1	1	1	1
152°	1	1	1	1	1	1	1	1
153°	1	1	1	1	1	1	1	1
154°	1	1	1	1	1	1	1	1
155°	1	1	1	1	1	1	1	1
156°	1	1	1	1	1	1	1	1
157°	1	1	1	1	1	1	1	1
158°	1	1	1	1	1	1	1	1
159°	1	1	1	1	1	1	1	1
160°	1	1	1	1	1	1	1	1
161°	1	1	1	1	1	1	1	1
162°	1	1	1	1	1	1	1	1
163°	1	1	1	1	1	1	1	1
164°	1	1	1	1	1	1	1	1
165°	1	1	1	1	1	1	1	1
166°	1	1	1	1	1	1	1	1
167°	1	1	1	1	1	1	1	1
168°	1	1	1	1	1	1	1	1
169°	1	1	1	1	1	1	1	1
170°	1	1	1	1	1	1	1	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

**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°
0°	560	560	560	560	560	560	560	560
1°	561	560	560	560	560	561	560	561
2°	561	559	559	560	559	559	559	560
3°	560	560	560	559	559	559	559	560
4°	560	558	559	557	558	558	557	558
5°	560	558	559	557	557	557	556	557
6°	558	556	556	555	555	555	555	556
7°	557	555	555	554	554	554	554	554
8°	555	554	554	552	552	552	552	552
9°	554	552	552	550	551	550	550	551
10°	552	551	550	548	548	547	547	548
11°	550	548	549	546	546	546	545	546
12°	548	546	546	544	543	543	542	543
13°	545	544	543	542	541	540	540	541
14°	543	541	540	539	537	537	536	537
15°	541	538	538	536	534	534	533	535
16°	537	535	535	532	531	531	530	531
17°	534	531	531	529	528	528	527	527
18°	531	528	528	526	524	524	523	524
19°	528	525	524	522	521	520	519	520
20°	524	521	520	517	517	515	515	516
21°	520	517	516	513	513	512	511	512
22°	516	513	512	510	508	507	507	507
23°	512	509	508	506	503	503	502	503
24°	507	505	503	501	499	498	498	498
25°	503	500	498	496	494	493	493	493
26°	498	495	494	491	489	488	488	487
27°	493	490	489	486	484	483	482	483
28°	488	485	484	480	479	478	477	478
29°	483	479	478	475	473	472	471	472
30°	477	474	473	469	468	466	466	466
31°	472	469	467	464	462	461	460	461
32°	466	463	461	458	456	455	454	455
33°	460	458	456	452	450	449	448	449
34°	454	451	449	446	444	442	442	442
35°	448	445	443	440	437	436	435	436
36°	442	438	436	433	431	429	429	430
37°	436	432	430	427	425	423	422	423
38°	429	425	424	420	418	416	415	416
39°	422	419	416	413	410	410	408	409
40°	415	411	410	406	404	402	401	402
41°	408	405	403	399	397	396	394	396
42°	401	398	395	392	390	388	387	388
43°	394	391	388	385	382	381	380	381
44°	387	383	381	377	375	373	372	373
45°	379	376	373	370	367	366	365	366
46°	372	368	366	362	360	358	357	358
47°	364	360	358	354	352	350	349	350
48°	356	353	350	346	344	342	341	342

**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°	348	344	341	338	335	334	333	334
50°	340	337	334	330	328	326	325	326
51°	332	328	325	322	319	318	317	318
52°	324	320	317	314	311	310	309	309
53°	315	311	309	305	303	301	300	301
54°	307	303	301	297	294	292	292	292
55°	298	295	292	288	286	284	283	284
56°	290	286	284	279	277	275	275	275
57°	280	277	274	271	268	266	266	267
58°	272	268	266	262	259	258	257	258
59°	262	259	256	253	250	249	248	249
60°	254	251	248	244	241	240	239	240
61°	244	241	238	235	232	231	230	231
62°	235	232	229	226	223	222	221	222
63°	226	223	220	216	214	212	212	213
64°	217	213	211	207	205	203	203	204
65°	207	204	201	198	195	194	194	195
66°	198	195	192	189	187	185	185	186
67°	188	185	183	179	177	176	175	176
68°	179	176	173	170	168	166	166	168
69°	169	167	164	161	158	157	157	158
70°	160	157	155	151	149	148	148	149
71°	151	148	145	142	140	139	139	139
72°	142	139	136	133	130	129	129	130
73°	132	129	126	123	121	120	120	121
74°	122	120	117	114	112	111	111	112
75°	113	110	107	105	103	102	102	103
76°	104	101	99	96	94	93	93	94
77°	95	92	90	87	85	84	84	85
78°	86	83	81	79	77	76	76	77
79°	78	75	73	70	69	68	68	69
80°	69	66	64	62	60	60	60	60
81°	61	58	56	54	52	51	52	53
82°	53	50	48	46	44	44	44	45
83°	45	42	40	38	37	36	36	37
84°	37	35	33	31	30	29	29	30
85°	30	28	25	24	23	22	22	23
86°	23	21	19	17	16	16	16	17
87°	16	15	13	11	10	10	10	11
88°	10	9	6	5	4	4	4	5
89°	4	3	2	1	1	1	1	1
90°	1	0	0	0	0	0	0	0
91°	0	0	0	0	0	0	0	0
92°	0	0	0	0	0	0	0	0
93°	0	0	0	0	0	0	0	0
94°	0	0	0	0	0	0	0	0
95°	0	0	0	0	0	0	0	0
96°	0	0	0	0	0	0	0	0
97°	0	0	0	0	0	0	0	0

**Luminous Intensity (cd) Distribution Data (cont.)**

C γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
98°	0	0	0	0	0	0	0	0
99°	0	0	0	0	0	0	0	0
100°	0	0	0	0	0	0	0	0
101°	0	0	0	0	0	0	0	0
102°	0	0	0	0	0	0	0	0
103°	0	0	0	0	0	0	0	0
104°	0	0	0	0	0	0	0	0
105°	0	0	0	0	0	0	0	0
106°	0	0	0	0	0	0	0	0
107°	0	0	0	0	0	0	0	0
108°	0	0	0	0	0	0	0	0
109°	0	0	0	0	0	0	0	0
110°	0	0	0	0	0	0	0	0
111°	0	0	0	0	0	0	0	0
112°	0	0	0	0	0	0	0	0
113°	0	0	0	0	0	0	0	0
114°	0	0	0	0	0	0	0	0
115°	0	0	0	0	0	0	0	0
116°	0	0	0	0	0	0	0	0
117°	0	0	0	0	0	0	0	0
118°	0	0	0	0	0	0	0	0
119°	0	0	0	0	0	0	0	0
120°	0	0	0	0	0	0	0	0
121°	0	0	0	0	0	0	0	0
122°	0	0	0	0	0	0	0	0
123°	0	0	0	0	0	0	0	0
124°	0	0	0	0	0	0	0	0
125°	0	0	0	0	0	0	0	0
126°	0	0	0	0	0	0	0	0
127°	0	0	0	0	0	0	0	0
128°	0	0	0	0	0	0	0	0
129°	0	0	0	0	0	0	0	0
130°	0	0	0	0	0	0	0	0
131°	0	0	0	0	0	0	0	0
132°	0	0	0	0	0	0	0	0
133°	0	0	0	0	0	0	0	0
134°	0	0	0	0	0	0	0	0
135°	0	0	0	0	0	0	0	0
136°	0	0	0	0	0	0	0	0
137°	0	0	0	0	0	0	0	0
138°	0	0	0	0	0	0	0	0
139°	0	0	0	0	0	0	0	0
140°	0	0	0	0	0	0	0	0
141°	0	0	0	0	0	0	0	0
142°	0	0	0	0	0	0	0	0
143°	0	0	0	0	0	0	0	0
144°	0	0	0	0	0	0	0	0
145°	0	0	0	0	0	0	0	0
146°	0	0	0	0	0	0	0	0

**Luminous Intensity (cd) Distribution Data (cont.)**

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
147°	0	0	0	0	0	0	0	0
148°	0	0	0	0	0	0	0	0
149°	0	0	0	0	0	0	0	0
150°	0	0	0	0	0	0	0	0
151°	0	0	0	0	0	0	0	0
152°	0	0	0	0	0	0	0	0
153°	0	0	0	0	0	0	0	0
154°	0	0	0	0	0	0	0	0
155°	0	0	0	0	0	0	0	0
156°	0	0	0	0	0	0	0	0
157°	0	0	0	0	0	0	0	0
158°	0	0	0	0	0	0	0	0
159°	0	0	0	0	0	0	0	0
160°	0	0	0	0	0	0	0	0
161°	0	0	0	0	0	0	0	0
162°	0	0	0	0	0	0	0	0
163°	0	0	0	0	0	0	0	0
164°	0	0	0	0	0	0	0	0
165°	0	0	0	0	0	0	0	0
166°	0	0	0	0	0	0	0	0
167°	0	0	0	0	0	0	0	0
168°	1	0	0	0	0	0	0	0
169°	1	1	0	0	0	0	0	1
170°	1	1	0	0	0	0	0	1
171°	1	1	0	0	0	0	0	1
172°	1	1	1	0	0	0	0	1
173°	1	1	1	1	1	0	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)	%
0-5	13.4	0.83
5-10	39.6	2.46
10-15	64.5	4.00
15-20	87.2	5.41
20-25	106.8	6.63
25-30	122.9	7.62
30-35	134.8	8.36
35-40	142.2	8.83
40-45	145.0	8.99
45-50	143.0	8.87
50-55	136.2	8.46
55-60	125.0	7.75
60-65	109.6	6.81
65-70	90.8	5.63
70-75	69.5	4.32
75-80	47.1	2.92
80-85	25.5	1.58
85-90	6.9	0.42
90-95	0.2	0.01
95-100	0.1	0.01
100-105	0.1	0.00
105-110	0.1	0.00
110-115	0.1	0.01
115-120	0.1	0.00
120-125	0.1	0.01
125-130	0.1	0.01
130-135	0.1	0.00
135-140	0.1	0.01
140-145	0.1	0.01
145-150	0.1	0.01
150-155	0.1	0.01
155-160	0.1	0.00
160-165	0.1	0.01
165-170	0.1	0.01
170-175	0.0	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	13.4	0.83
0-10	53.0	3.29
0-15	117.5	7.29
0-20	204.7	12.70
0-25	311.5	19.33
0-30	434.4	26.95
0-35	569.2	35.31
0-40	711.4	44.14
0-45	856.4	53.13
0-50	999.3	62.00
0-55	1135.6	70.46
0-60	1260.6	78.21
0-65	1370.2	85.02
0-70	1461.0	90.65
0-75	1530.6	94.97
0-80	1577.6	97.89
0-85	1603.1	99.47
0-90	1610.0	99.89
0-95	1610.1	99.90
0-100	1610.2	99.91
0-105	1610.2	99.91
0-110	1610.3	99.91
0-115	1610.4	99.92
0-120	1610.5	99.92
0-125	1610.6	99.93
0-130	1610.7	99.94
0-135	1610.8	99.94
0-140	1610.9	99.95
0-145	1611.0	99.96
0-150	1611.2	99.97
0-155	1611.3	99.98
0-160	1611.4	99.98
0-165	1611.6	99.99
0-170	1611.6	100.00
0-175	1611.7	100.00
0-180	1611.7	100.00

Test Item	Test Voltage (V)	Frequency (Hz)	Test Result
Total Harmonic Distortion:	120	60	15.05%

## 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.
5. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor  $K=2$  with the 95% confidence interval.
6. This report cannot be reproduced except in full, without prior written approval of the Company.
7. 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.

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