

# ANSI/IES LM-79-19

## MEASUREMENT AND TEST REPORT

For

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

**Test Model: LEDMD3R3B500ST9SC3WH**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Power Factor, Chromaticity, Luminous Intensity Distribution
<b>Reviewed By:</b>	
<b>Report Number:</b>	DG3230310-11393E-EE
<b>Test Date:</b>	2023-03-18 to 2023-03-20
<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.

Model Tested: LEDMD3R3B500ST9SC3WH  
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: 6.5 W  
Nominal CCT: 2700K/3000K/3500K/4000K/5000K  
Nominal Lumen Output: 500 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 temperature integrating sphere	SENSING	SPR-600	S09008	2022-09-27	2023-09-26
High-precision rapid spectral analysis system	EVERFINE	HAAS-2000	M112048CA1361125	2022-09-27	2023-09-26
Digital power meter	YOKOGAWA	WT310	13398	2022-11-18	2023-11-17
Programmable Precision DC Power Supply	EVERFINE	WY5015	11060010	2022-11-18	2023-11-17
thermometer	SENSING	NA	NA	2022-11-18	2023-11-17
Standard Light Source	EVERFINE	D204	N/A	2021-10-15	2023-10-14
Precision frequency power supply	ALL Power	APW-105N	970613	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

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
wireless remote thermohygrometer	N/A	433MHz	N/A	2022-11-18	2023-11-17
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.

### 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**

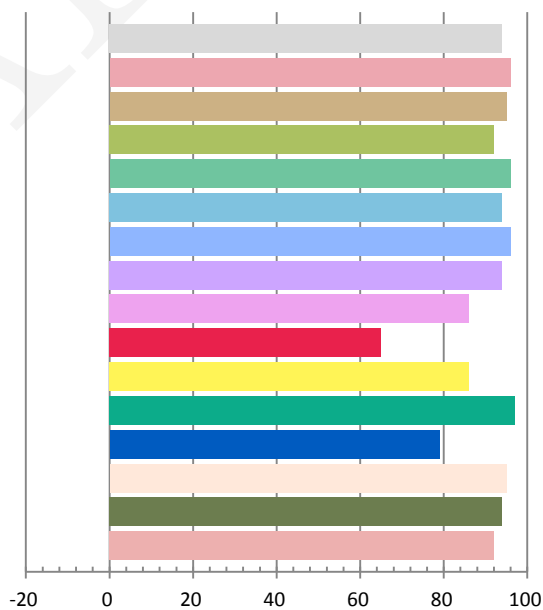
### Photometric and Electrical Measurement Result

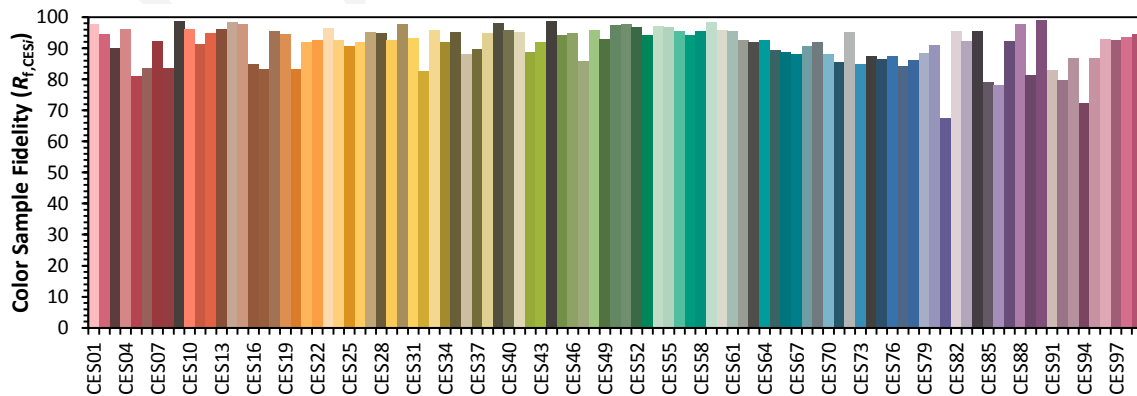
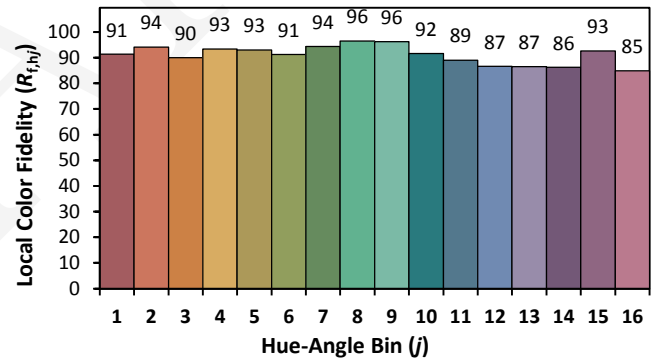
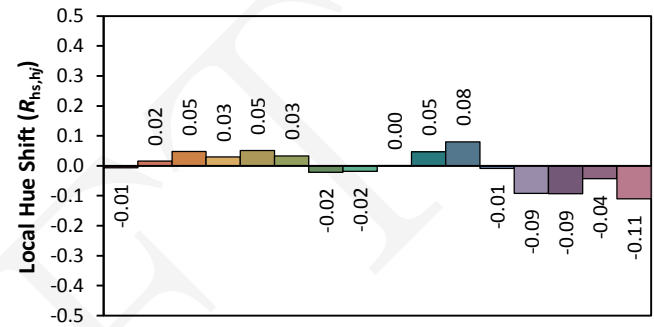
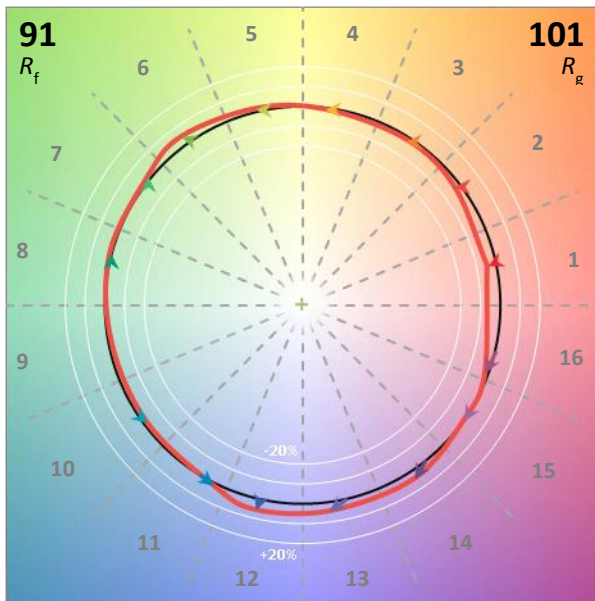
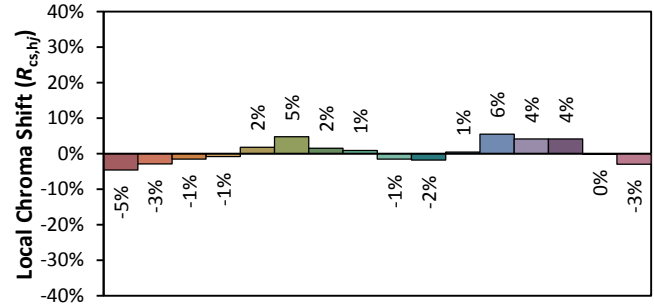
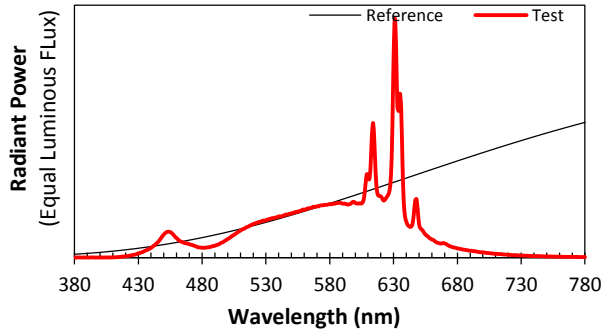
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0549	6.3	0.9564	505.23	80.2

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.4811	2657	0.00153	0.4662	0.4162	0.2640	0.5304

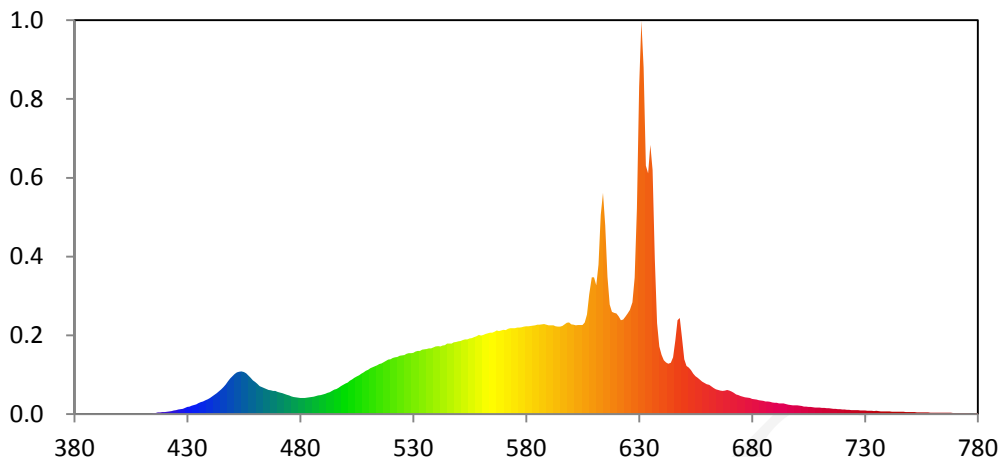
### Color Rendering Index

<b>Ra</b>			
<b>93.9</b>			
<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R4</b>
96	95	92	96
<b>R5</b>	<b>R6</b>	<b>R7</b>	<b>R8</b>
94	96	94	86
<b>R9</b>	<b>R10</b>	<b>R11</b>	<b>R12</b>
65	86	97	79
<b>R13</b>	<b>R14</b>	<b>R15</b>	
95	94	92	





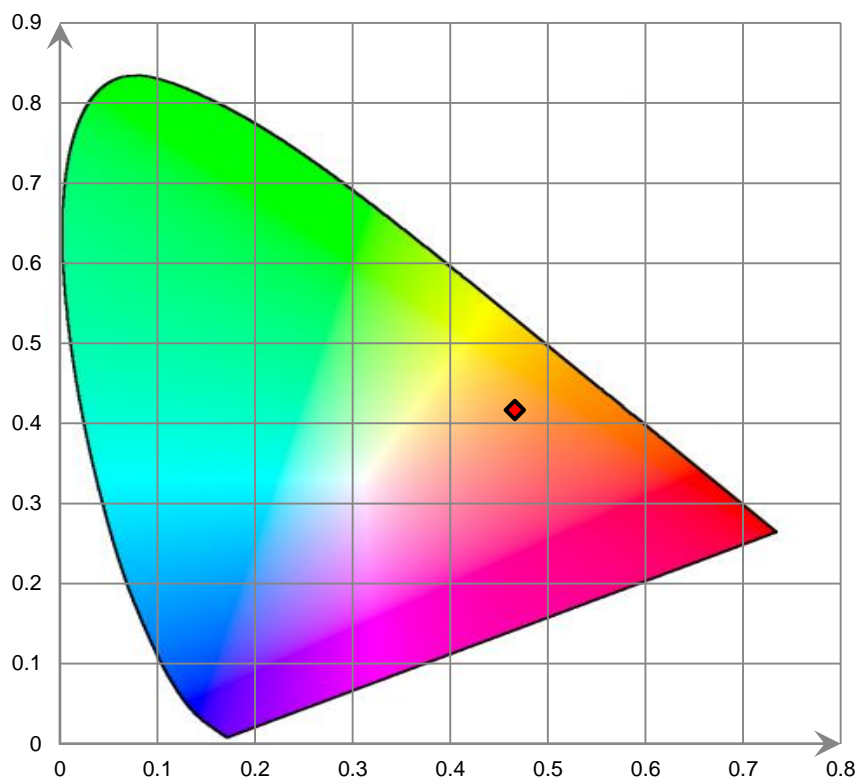
# Relative Spectral Power Distribution



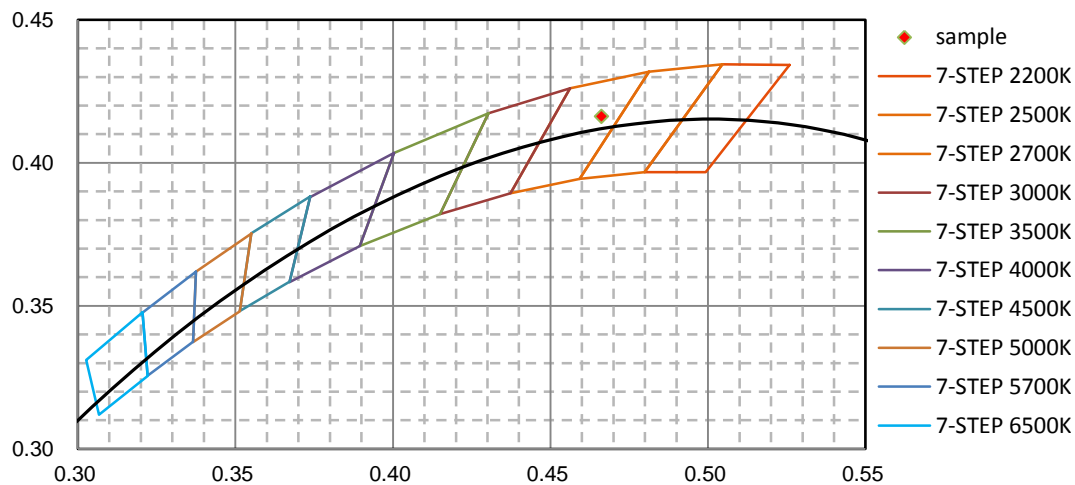
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.290E-02	421	2.113E-01	462	2.477E+00	503	3.086E+00	544	6.140E+00
381	0.000E+00	422	2.288E-01	463	2.383E+00	504	3.216E+00	545	6.274E+00
382	1.312E-02	423	2.680E-01	464	2.301E+00	505	3.330E+00	546	6.288E+00
383	2.702E-03	424	3.026E-01	465	2.222E+00	506	3.456E+00	547	6.278E+00
384	2.543E-02	425	3.423E-01	466	2.143E+00	507	3.589E+00	548	6.385E+00
385	0.000E+00	426	3.833E-01	467	2.107E+00	508	3.702E+00	549	6.408E+00
386	0.000E+00	427	4.120E-01	468	2.063E+00	509	3.855E+00	550	6.488E+00
387	0.000E+00	428	4.608E-01	469	2.040E+00	510	3.931E+00	551	6.498E+00
388	2.200E-02	429	5.401E-01	470	1.957E+00	511	4.066E+00	552	6.590E+00
389	0.000E+00	430	6.155E-01	471	1.902E+00	512	4.160E+00	553	6.655E+00
390	1.185E-02	431	6.476E-01	472	1.846E+00	513	4.237E+00	554	6.657E+00
391	0.000E+00	432	7.333E-01	473	1.785E+00	514	4.349E+00	555	6.745E+00
392	0.000E+00	433	7.839E-01	474	1.722E+00	515	4.454E+00	556	6.771E+00
393	2.307E-02	434	8.560E-01	475	1.640E+00	516	4.519E+00	557	6.844E+00
394	1.661E-02	435	9.723E-01	476	1.567E+00	517	4.632E+00	558	6.921E+00
395	1.100E-02	436	1.049E+00	477	1.495E+00	518	4.722E+00	559	7.040E+00
396	0.000E+00	437	1.123E+00	478	1.492E+00	519	4.840E+00	560	6.997E+00
397	0.000E+00	438	1.222E+00	479	1.449E+00	520	4.886E+00	561	7.040E+00
398	5.104E-03	439	1.304E+00	480	1.434E+00	521	4.980E+00	562	7.146E+00
399	2.846E-03	440	1.414E+00	481	1.429E+00	522	5.041E+00	563	7.189E+00
400	0.000E+00	441	1.562E+00	482	1.438E+00	523	5.082E+00	564	7.236E+00
401	2.751E-02	442	1.708E+00	483	1.453E+00	524	5.182E+00	565	7.255E+00
402	2.222E-03	443	1.852E+00	484	1.490E+00	525	5.226E+00	566	7.324E+00
403	0.000E+00	444	2.018E+00	485	1.504E+00	526	5.261E+00	567	7.435E+00
404	1.844E-02	445	2.200E+00	486	1.532E+00	527	5.367E+00	568	7.402E+00
405	0.000E+00	446	2.385E+00	487	1.590E+00	528	5.412E+00	569	7.451E+00
406	2.040E-02	447	2.626E+00	488	1.656E+00	529	5.406E+00	570	7.507E+00
407	0.000E+00	448	2.899E+00	489	1.678E+00	530	5.451E+00	571	7.490E+00
408	1.904E-02	449	3.153E+00	490	1.741E+00	531	5.554E+00	572	7.583E+00
409	1.945E-02	450	3.377E+00	491	1.803E+00	532	5.617E+00	573	7.646E+00
410	2.985E-02	451	3.564E+00	492	1.877E+00	533	5.606E+00	574	7.653E+00
411	3.143E-02	452	3.711E+00	493	1.924E+00	534	5.738E+00	575	7.654E+00
412	3.510E-02	453	3.770E+00	494	2.047E+00	535	5.757E+00	576	7.716E+00
413	5.294E-02	454	3.779E+00	495	2.162E+00	536	5.792E+00	577	7.712E+00
414	6.236E-02	455	3.726E+00	496	2.227E+00	537	5.838E+00	578	7.737E+00
415	9.182E-02	456	3.612E+00	497	2.337E+00	538	5.864E+00	579	7.791E+00
416	8.607E-02	457	3.434E+00	498	2.471E+00	539	5.941E+00	580	7.820E+00
417	1.362E-01	458	3.228E+00	499	2.582E+00	540	6.016E+00	581	7.806E+00
418	1.278E-01	459	3.002E+00	500	2.709E+00	541	6.035E+00	582	7.845E+00
419	1.737E-01	460	2.850E+00	501	2.798E+00	542	6.021E+00	583	7.876E+00
420	1.734E-01	461	2.676E+00	502	2.953E+00	543	6.105E+00	584	7.889E+00

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	7.973E+00	626	9.267E+00	667	2.058E+00	708	5.677E-01	749	1.694E-01
586	7.966E+00	627	9.948E+00	668	2.080E+00	709	5.639E-01	750	1.617E-01
587	7.999E+00	628	1.216E+01	669	2.129E+00	710	5.551E-01	751	1.598E-01
588	8.031E+00	629	1.831E+01	670	2.075E+00	711	5.308E-01	752	1.641E-01
589	7.969E+00	630	2.918E+01	671	1.999E+00	712	5.289E-01	753	1.521E-01
590	7.896E+00	631	3.505E+01	672	1.886E+00	713	4.982E-01	754	1.434E-01
591	7.898E+00	632	3.088E+01	673	1.750E+00	714	5.023E-01	755	1.442E-01
592	7.894E+00	633	2.214E+01	674	1.684E+00	715	4.786E-01	756	1.503E-01
593	7.813E+00	634	2.147E+01	675	1.598E+00	716	4.444E-01	757	1.358E-01
594	7.777E+00	635	2.402E+01	676	1.541E+00	717	4.463E-01	758	1.329E-01
595	7.797E+00	636	2.175E+01	677	1.486E+00	718	4.348E-01	759	1.231E-01
596	7.840E+00	637	1.379E+01	678	1.445E+00	719	4.255E-01	760	1.219E-01
597	7.978E+00	638	8.094E+00	679	1.415E+00	720	3.961E-01	761	1.233E-01
598	8.138E+00	639	6.025E+00	680	1.334E+00	721	3.979E-01	762	1.173E-01
599	8.156E+00	640	5.266E+00	681	1.307E+00	722	3.749E-01	763	1.028E-01
600	7.980E+00	641	4.802E+00	682	1.284E+00	723	3.602E-01	764	1.069E-01
601	7.949E+00	642	4.603E+00	683	1.234E+00	724	3.528E-01	765	1.058E-01
602	7.894E+00	643	4.488E+00	684	1.190E+00	725	3.492E-01	766	9.951E-02
603	7.937E+00	644	4.560E+00	685	1.155E+00	726	3.525E-01	767	9.959E-02
604	7.936E+00	645	5.062E+00	686	1.123E+00	727	3.264E-01	768	1.067E-01
605	7.924E+00	646	6.525E+00	687	1.097E+00	728	3.183E-01	769	8.605E-02
606	8.159E+00	647	8.363E+00	688	1.067E+00	729	3.004E-01	770	9.539E-02
607	8.888E+00	648	8.555E+00	689	1.027E+00	730	2.975E-01	771	9.133E-02
608	1.067E+01	649	6.775E+00	690	1.010E+00	731	2.876E-01	772	9.220E-02
609	1.218E+01	650	4.864E+00	691	9.978E-01	732	2.809E-01	773	8.590E-02
610	1.218E+01	651	4.286E+00	692	9.488E-01	733	2.737E-01	774	9.588E-02
611	1.146E+01	652	4.133E+00	693	9.288E-01	734	2.552E-01	775	8.755E-02
612	1.333E+01	653	3.899E+00	694	9.267E-01	735	2.690E-01	776	7.112E-02
613	1.775E+01	654	3.609E+00	695	8.787E-01	736	2.477E-01	777	6.829E-02
614	1.971E+01	655	3.357E+00	696	8.301E-01	737	2.394E-01	778	6.735E-02
615	1.681E+01	656	3.227E+00	697	8.073E-01	738	2.175E-01	779	8.462E-02
616	1.223E+01	657	3.064E+00	698	7.685E-01	739	2.279E-01	780	7.183E-02
617	9.767E+00	658	2.879E+00	699	7.799E-01	740	2.165E-01		
618	9.090E+00	659	2.767E+00	700	7.570E-01	741	2.130E-01		
619	9.025E+00	660	2.648E+00	701	7.393E-01	742	2.079E-01		
620	8.955E+00	661	2.600E+00	702	7.176E-01	743	2.112E-01		
621	8.707E+00	662	2.445E+00	703	6.689E-01	744	1.976E-01		
622	8.367E+00	663	2.302E+00	704	6.642E-01	745	1.980E-01		
623	8.418E+00	664	2.195E+00	705	6.367E-01	746	1.858E-01		
624	8.673E+00	665	2.142E+00	706	6.223E-01	747	1.843E-01		
625	8.956E+00	666	2.084E+00	707	6.041E-01	748	1.551E-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**

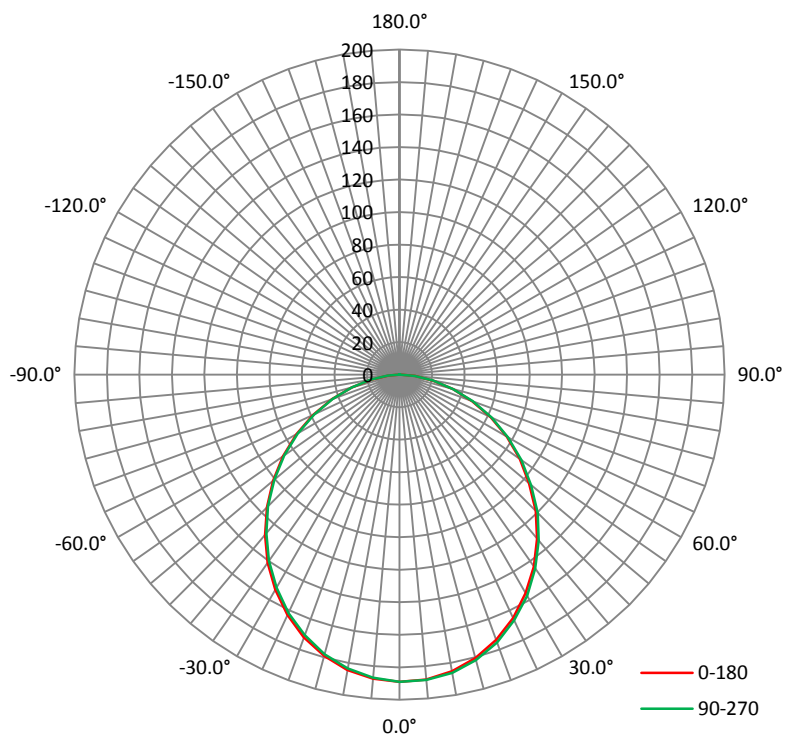
**Electrical Measurement**

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0550	6.310	0.9566

**Photometric Measurement**

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
506.8	80.32	189.2	1.23	1.24

**Luminous Intensity Distribution**



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	105.9	106.0	106.0	106.1	106.0
Field Angle (10% $I_{max}$ ):	160.4	160.4	160.4	160.4	160.4

**Luminous Intensity (cd) Distribution Data**

$\gamma \backslash C$	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0°	189	189	189	189	189	189	189	189
1°	189	189	189	189	189	189	189	189
2°	189	189	189	188	189	188	188	189
3°	188	188	188	188	188	188	189	189
4°	188	188	188	188	188	188	188	188
5°	188	187	187	187	187	187	188	188
6°	188	187	187	187	187	187	187	188
7°	187	186	186	186	186	186	187	187
8°	186	186	185	185	185	185	186	186
9°	185	185	185	184	184	185	185	186
10°	184	184	184	183	184	184	184	185
11°	184	183	183	183	183	183	184	184
12°	183	182	182	181	182	182	182	183
13°	181	181	181	180	181	181	182	182
14°	180	180	179	179	179	179	180	181
15°	179	178	178	178	178	178	179	180
16°	178	177	177	176	177	177	178	179
17°	177	176	175	175	175	176	177	177
18°	175	174	174	173	174	174	175	176
19°	174	173	172	172	172	173	174	175
20°	172	171	171	170	171	171	172	173
21°	170	170	169	169	169	170	171	172
22°	169	168	167	167	167	168	169	170
23°	167	166	165	165	166	166	167	168
24°	165	164	164	163	164	164	165	166
25°	163	162	162	161	162	162	164	165
26°	161	160	160	159	160	160	162	163
27°	159	158	158	157	158	158	160	161
28°	157	156	156	155	156	156	158	159
29°	155	154	153	153	154	154	155	157
30°	153	152	151	151	151	152	153	155
31°	150	150	149	149	149	150	151	153
32°	148	147	147	146	147	148	149	150
33°	146	145	144	144	145	145	147	148
34°	144	142	142	142	142	143	144	146
35°	141	140	140	139	140	141	142	143
36°	139	138	137	137	138	138	140	141
37°	136	135	135	134	135	136	137	139
38°	134	133	132	132	133	133	135	136
39°	131	130	130	129	130	131	132	134
40°	129	128	127	127	127	128	130	131
41°	126	125	124	124	125	126	127	129
42°	123	122	122	122	122	123	124	126
43°	121	120	119	119	120	120	122	123
44°	118	117	117	116	117	118	119	121
45°	115	114	114	114	114	115	117	118
46°	113	112	111	111	112	112	114	115
47°	110	109	108	108	109	110	111	113
48°	107	106	106	105	106	107	108	110

**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°	104	103	103	103	103	104	106	107
50°	102	101	100	100	101	102	103	104
51°	99	98	97	97	98	99	100	101
52°	96	95	94	94	95	96	97	98
53°	93	92	92	92	92	93	94	96
54°	90	89	89	89	89	90	92	93
55°	87	86	86	86	87	87	89	90
56°	84	84	83	83	84	85	86	87
57°	81	81	80	80	81	82	83	84
58°	79	78	77	77	78	79	80	81
59°	76	75	75	75	75	76	77	79
60°	73	72	72	72	72	73	74	76
61°	70	69	69	69	70	70	72	73
62°	67	66	66	66	67	67	69	70
63°	64	63	63	63	64	65	66	67
64°	61	60	60	60	61	62	63	64
65°	59	58	57	57	58	59	60	61
66°	56	55	55	55	55	56	57	58
67°	53	52	52	52	52	53	54	56
68°	50	49	49	49	49	50	51	53
69°	47	46	46	46	47	48	49	50
70°	44	43	43	43	44	45	46	47
71°	41	41	40	41	41	42	43	44
72°	39	38	38	38	38	39	40	41
73°	36	35	35	35	36	36	38	39
74°	33	32	32	32	33	34	35	36
75°	30	30	30	30	30	31	32	33
76°	28	27	27	27	28	29	30	31
77°	25	25	25	25	25	26	27	28
78°	23	22	22	22	23	24	25	25
79°	20	20	20	20	20	21	22	23
80°	18	17	17	18	18	19	20	21
81°	16	15	15	15	16	17	17	18
82°	13	13	13	13	14	14	15	16
83°	11	11	11	11	11	12	13	14
84°	9	9	9	9	9	10	11	11
85°	7	7	7	7	7	8	9	9
86°	5	5	5	5	5	6	7	7
87°	3	3	3	3	4	4	5	5
88°	2	1	2	2	2	3	3	4
89°	0	0	1	1	1	1	1	2
90°	0	0	0	0	0	0	1	1
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**

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
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**

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
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°	0	0	0	0	0	0	0	0
169°	0	0	0	0	0	0	0	0
170°	0	0	0	0	0	0	0	0
171°	0	0	0	0	0	0	0	0
172°	0	0	0	0	0	0	0	0
173°	0	0	0	0	0	0	0	0
174°	0	0	0	0	0	0	0	0
175°	0	0	0	0	0	0	0	0
176°	0	0	0	0	0	0	0	0
177°	0	0	0	0	0	0	0	0
178°	0	0	0	0	0	0	0	0
179°	0	0	0	0	0	0	0	0
180°	0	0	0	0	0	0	0	0

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

$\begin{matrix} \text{C} \\ \backslash \\ \gamma \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0°	189	189	189	189	189	189	189	189
1°	189	189	189	189	189	189	189	189
2°	189	189	189	189	189	189	189	189
3°	189	189	189	189	189	189	189	189
4°	189	189	189	189	189	189	189	188
5°	188	188	189	188	189	188	188	188
6°	188	188	188	188	188	188	188	188
7°	187	188	188	188	188	187	188	187
8°	187	187	187	188	187	187	187	186
9°	186	187	187	187	187	186	186	185
10°	185	186	186	186	186	186	186	185
11°	185	185	185	185	185	185	185	184
12°	184	184	184	185	185	184	184	183
13°	182	183	184	183	184	183	183	182
14°	182	182	183	183	183	182	182	181
15°	180	181	182	182	182	181	181	180
16°	179	180	180	181	181	180	180	179
17°	178	179	179	179	179	179	178	178
18°	177	177	178	178	178	177	177	176
19°	175	176	176	176	177	176	175	174
20°	174	175	175	175	175	175	174	173
21°	172	173	174	174	174	173	172	171
22°	171	172	172	172	172	171	171	170
23°	169	170	170	170	170	169	169	168
24°	167	168	168	169	169	168	167	166
25°	165	166	167	167	167	166	165	164
26°	163	164	165	165	165	164	164	163
27°	162	162	163	163	163	162	162	160
28°	159	160	161	161	161	160	159	158
29°	157	158	159	159	159	158	157	156
30°	155	156	157	157	157	156	155	154
31°	153	154	155	155	155	154	153	152
32°	151	152	153	153	153	152	151	150
33°	149	150	150	150	150	149	149	147
34°	146	147	148	148	148	147	146	145
35°	144	145	146	146	146	145	144	143
36°	142	143	143	143	143	142	142	140
37°	139	140	141	141	141	140	139	138
38°	137	138	138	138	138	137	136	135
39°	134	135	136	136	136	135	134	133
40°	132	133	133	134	133	132	131	130
41°	129	130	131	131	131	130	129	127
42°	127	128	128	128	128	127	126	125
43°	124	125	126	125	125	125	124	122
44°	121	123	123	123	123	122	121	119
45°	118	120	120	120	120	119	118	116
46°	115	117	117	117	117	116	115	113
47°	113	114	114	114	114	113	112	111
48°	110	111	111	111	111	110	109	108

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

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
49°	107	108	109	109	108	107	106	105
50°	104	105	106	106	106	105	104	102
51°	102	103	103	103	103	102	101	99
52°	99	100	100	100	100	99	98	97
53°	96	97	98	97	97	96	95	94
54°	93	94	95	95	94	93	92	91
55°	90	91	92	92	92	90	90	88
56°	87	89	89	89	89	88	87	85
57°	85	86	86	86	86	85	84	82
58°	82	83	83	83	83	82	81	79
59°	79	80	80	80	80	79	78	76
60°	76	77	77	78	77	76	75	74
61°	73	74	75	75	74	73	72	71
62°	70	71	72	72	71	70	69	68
63°	67	68	69	69	68	67	66	65
64°	65	65	66	66	65	64	63	62
65°	62	63	63	63	63	62	61	59
66°	59	60	60	60	60	59	58	56
67°	56	57	57	57	57	56	55	53
68°	53	54	54	54	54	53	52	51
69°	50	51	52	51	51	50	49	48
70°	48	48	49	49	48	47	46	45
71°	45	46	46	46	45	44	43	42
72°	42	43	43	43	42	41	40	39
73°	39	40	40	40	40	39	38	37
74°	37	37	37	37	37	36	35	34
75°	34	34	35	34	34	33	32	31
76°	31	32	32	32	31	30	29	28
77°	29	29	29	29	29	28	27	26
78°	26	27	27	26	26	25	24	23
79°	23	24	24	24	23	22	22	21
80°	21	21	22	21	21	20	19	18
81°	19	19	19	19	18	18	17	16
82°	16	17	17	16	16	15	14	14
83°	14	14	14	14	14	13	12	12
84°	12	12	12	12	11	11	10	9
85°	10	10	10	10	9	8	8	7
86°	8	8	8	7	7	6	6	5
87°	6	6	6	5	5	4	4	3
88°	4	4	4	4	3	3	2	2
89°	2	2	2	2	1	1	1	1
90°	1	1	1	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.)**

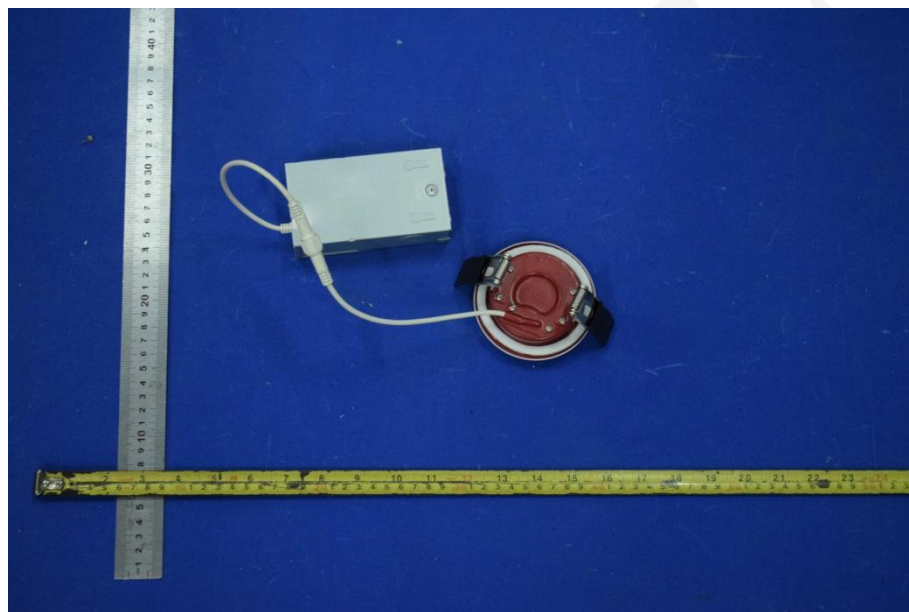
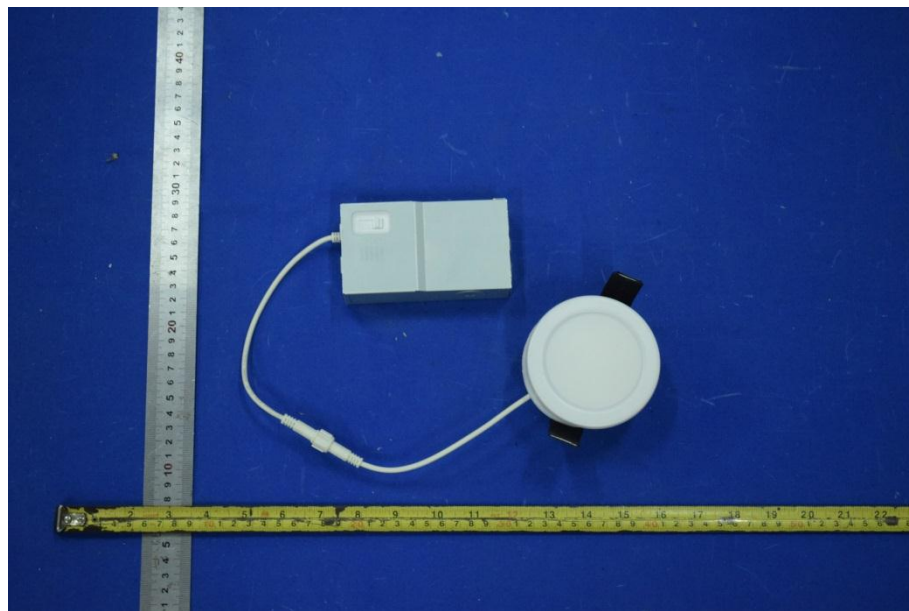
C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
147°	0	0	0	0	0	0	0	0
148°	0	0	0	0	0	0	0	0
149°	0	0	0	0	0	0	0	0
150°	0	0	0	0	0	0	0	0
151°	0	0	0	0	0	0	0	0
152°	0	0	0	0	0	0	0	0
153°	0	0	0	0	0	0	0	0
154°	0	0	0	0	0	0	0	0
155°	0	0	0	0	0	0	0	0
156°	0	0	0	0	0	0	0	0
157°	0	0	0	0	0	0	0	0
158°	0	0	0	0	0	0	0	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°	0	0	0	0	0	0	0	0
169°	0	0	0	0	0	0	0	0
170°	0	0	0	0	0	0	0	0
171°	0	0	0	0	0	0	0	0
172°	0	0	0	0	0	0	0	0
173°	0	0	0	0	0	0	0	0
174°	0	0	0	0	0	0	0	0
175°	0	0	0	0	0	0	0	0
176°	0	0	0	0	0	0	0	0
177°	0	0	0	0	0	0	0	0
178°	0	0	0	0	0	0	0	0
179°	0	0	0	0	0	0	0	0
180°	0	0	0	0	0	0	0	0

### Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	4.5	0.89
5-10	13.3	2.63
10-15	21.6	4.27
15-20	29.1	5.74
20-25	35.4	6.97
25-30	40.3	7.95
30-35	43.7	8.62
35-40	45.5	8.99
40-45	45.8	9.04
45-50	44.4	8.76
50-55	41.7	8.23
55-60	37.8	7.45
60-65	32.7	6.47
65-70	26.8	5.29
70-75	20.3	4.02
75-80	13.7	2.71
80-85	7.5	1.47
85-90	2.1	0.41
90-95	0.0	0.00
95-100	0.0	0.00
100-105	0.0	0.01
105-110	0.0	0.00
110-115	0.0	0.00
115-120	0.0	0.01
120-125	0.0	0.00
125-130	0.0	0.01
130-135	0.0	0.00
135-140	0.0	0.01
140-145	0.0	0.01
145-150	0.0	0.01
150-155	0.0	0.01
155-160	0.0	0.00
160-165	0.0	0.01
165-170	0.0	0.01
170-175	0.0	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	4.5	0.89
0-10	17.8	3.52
0-15	39.5	7.79
0-20	68.5	13.53
0-25	103.9	20.50
0-30	144.2	28.45
0-35	187.9	37.07
0-40	233.4	46.06
0-45	279.2	55.10
0-50	323.6	63.86
0-55	365.4	72.09
0-60	403.1	79.54
0-65	435.9	86.01
0-70	462.7	91.30
0-75	483.1	95.32
0-80	496.8	98.03
0-85	504.3	99.50
0-90	506.3	99.91
0-95	506.3	99.91
0-100	506.4	99.91
0-105	506.4	99.92
0-110	506.4	99.92
0-115	506.4	99.92
0-120	506.4	99.93
0-125	506.4	99.93
0-130	506.5	99.94
0-135	506.5	99.94
0-140	506.5	99.95
0-145	506.6	99.96
0-150	506.6	99.97
0-155	506.7	99.98
0-160	506.7	99.98
0-165	506.8	99.99
0-170	506.8	100.00
0-175	506.8	100.00
0-180	506.8	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.
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.
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\*\*\*\*\*END OF REPORT\*\*\*\*\*