

**TEST REPORT**

**IES LM 79-08**

**PHOTOMETRIC & ELECTRICAL MEASUREMENT**

Sample Tested:

**Indoor LED Downlight Retrofit Kit**

Model:

**91455, 91456**

Applicant:

**P.Q.L., Inc.**

Technical Report Number:

**265072-70098585-16-02**

Report Date:

**2017-9-25**

Prepared by:



Alex Song  
Senior Project Engineer

Approved by:



Wallace Zhang  
Technical Lab Manager

## Table of Contents

1. IES LM 79-08 Testing Report	Page 3
2. Product Description	Page 4
3. Photometric Test Result	Page 5
4. Spectral Flux	Page 6
5. Intensity Distribution Diagram	Page 7
6. Flux Distribution – Zonal Lumen Summary	Page 8
7. Isocandela Diagram	Page 9
8. Planar illuminance curve	Page 10
9. Luminous distribution intensity data	Page 11-14
10. Photometric Testing Information	Page 15
11. Equipment List	Page 16

**IES LM 79-08 Testing Report:**
**Laboratory Information**

Name of test lab	CSA Group (Shanghai)
Date of test report	2017-9-25
Test report number	265072-70098585-16-02
Laboratory contact name	Alex Song
Laboratory contact signature*	<i>Alex Song</i>

\* By signing this form, the signatory is attesting that the information on the form is correct and the same as on the original, complete test report(s).  
The signatory also attests that all of the results on this form were measured entirely in accordance with IES LM-79-08.

**Product Information**

Applicant	P.Q.L., Inc.	
Manufacturer	P.Q.L., Inc.	
Brand name	Superior Life®	
SKU (if available)	N/A	
Model number	91455, 91456	
Type of luminaire (for integral lamps, list base type and lamp type)	Indoor LED Downlight Retrofit Kit	
Luminaire aperture (downlights)	10	in.
Luminaire length	N/A	in.
Luminaire width	N/A	in.
Number of units (modular products)	N/A	

**Electrical Measurements**
**120V**

Input wattage	41.041	W
Input current	0.3441	A
Input voltage (AC)	120.09	V
Power factor	0.9934	
Off-state power	0	W
THD A%	7.15	%

**Photometric Characteristics**

Total initial lumen output	4072.3	lm
Initial luminaire efficacy	99.23	lm/W
Correlated color temperature / CCT	3815	K
Color rendering index / CRI	82.1	
R <sub>9</sub> value	9	
Duv	0.00075	

**Luminous Intensity Distribution**

Center beam candlepower (if applicable)	9097	cd
Beam angle (if applicable)	34.5	°
Zonal lumens in the 0°-60° zone	99.80	%
Zonal lumens in the 60°-90° zone	0.20	%
Zonal lumens in the 90°-120° zone	0.00	%
Zonal lumens in the 120°-180° zone	0.00	%

### Product Description

The following Products were submitted for evaluation:

Indoor LED Downlight Retrofit Kit

Applicant: P.Q.L., Inc.

Manufacturer: P.Q.L., Inc.

Model No: 91455, 91456

Input Rating: 100-277V, 50/60Hz, 0.34A, 40W

LED Driver Manufacturer: P.Q.L., Inc.

LED Driver Model: 914516

LED Chip Manufacturer: Seoul Semiconductor Co., Ltd.

LED Chip Model: 3030B (SAWxC22B-NZ)

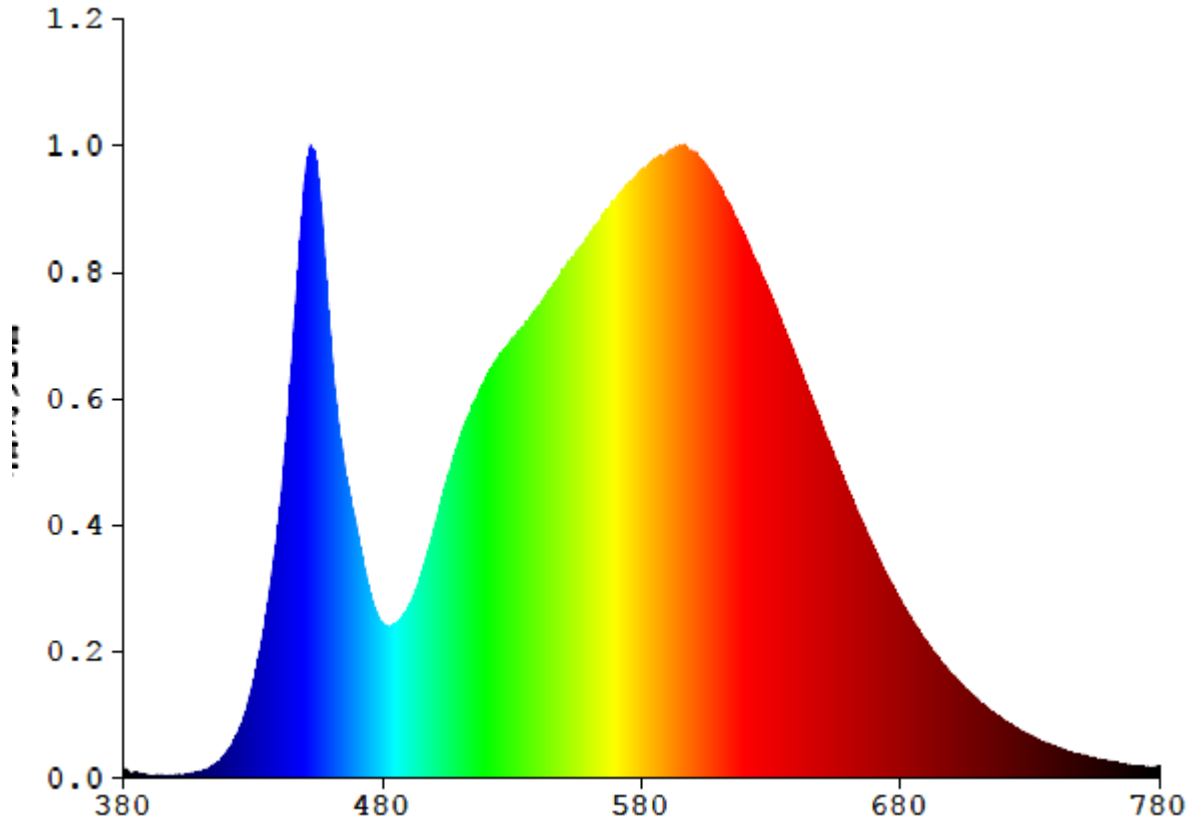
Note: Testing can, "Lithonia Lighting", Part No.: CJ00212 was used for test.



<b>Photometric Test Result:</b>	
The following results were measured after stabilization of the sample in the <b>Goniophotometer</b> (unless otherwise stated). Stability is reached when the variation of 3 readings of light output and electrical power, taken 15 minutes apart, is less than 0.50% (in accordance with IES LM 79-08).	
<b>Key Photometric Results</b>	<b>P.Q.L., Inc.</b>
	<b>91455, 91456</b>
Luminous Efficacy (Lumens/Watt)	<b>99.23</b>
Total Luminous Flux (Lumens)	<b>4072.3</b>
Total Radiant Flux (Watts)	<b>/</b>
Correlated Color Temperature (CCT)	<b>3815</b>
Color Rendering Index (CRI)-Ra	<b>82.1</b>
R9 Value	<b>9</b>
Chromaticity (Chroma x / Chroma y)	<b>0.3895 / 0.3838</b>
Chromaticity (Chroma u / Chroma v)	<b>0.2282 / 0.3373</b>
Chromaticity (Chroma u' / Chroma v')	<b>0.2282 / 0.5060</b>
D <sub>uv</sub> Value	<b>0.00075</b>
Stabilization Time (Light and Power)	<b>Approx. 60 minutes</b>
Total Run Time – Goniophotometer	<b>100 minutes</b>
Spacing Criteria	<b>0.55 (0° – 180°) / 0.58 (90° – 270°)</b>
<b>Electrical Input Results:</b>	
Input Power (Watts)	<b>41.041</b>
Input Voltage (Volts AC)	<b>120.09</b>
Input Current (Amps)	<b>0.3441</b>
Input Frequency (Hertz)	<b>60.0</b>
Power Factor	<b>0.9934</b>
Total Harmonic Distortion (THDi)	<b>7.15%</b>
<b>Additional Information</b>	
Ambient Temperature	<b>25.0°C</b>
Integrating Sphere Detector	<b>Everfine HAAS-2000 Spectroradiometer</b>
Absorption Correction used?	<b>No</b>

**Test Results – Spectral Flux**

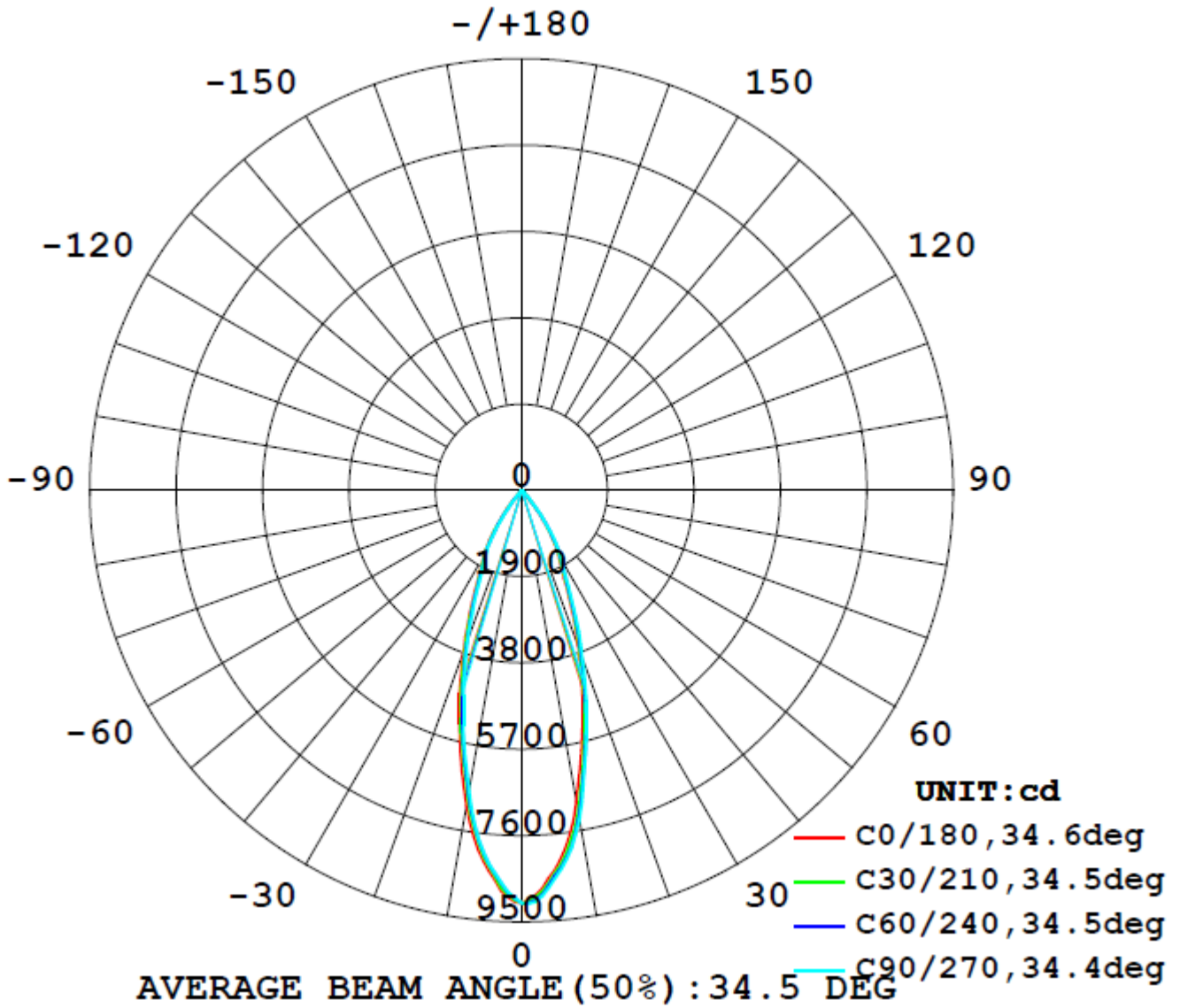
The following graph shows the spectral response curve of the radiant flux.



**Spectral response of the Radiant Flux**  
(380nm to 780nm – calibrated range of the Spectroradiometer).

**Test Results – Intensity Distribution Diagram**

The following images depict the luminous intensity distribution characteristics



Intensity Distribution Diagram

**Test Results – Flux Distribution – Zonal Lumen Summary**

The following table depicts the zonal lumen distribution.

<b>Zone</b>	<b>Lumens</b>	<b>% Total</b>
<b>0 - 10</b>	<b>759.5</b>	<b>18.65%</b>
<b>10 - 20</b>	<b>1450</b>	<b>35.61%</b>
<b>20 - 30</b>	<b>1130</b>	<b>27.75%</b>
<b>30 - 40</b>	<b>614.7</b>	<b>15.09%</b>
<b>40 - 50</b>	<b>98.26</b>	<b>2.41%</b>
<b>50 - 60</b>	<b>11.63</b>	<b>0.29%</b>
<b>60 - 70</b>	<b>4.877</b>	<b>0.12%</b>
<b>70 - 80</b>	<b>2.724</b>	<b>0.07%</b>
<b>80 - 90</b>	<b>0.8925</b>	<b>0.02%</b>
<b>Total</b>	<b>4072.3 Lumens</b>	<b>100.00 %</b>

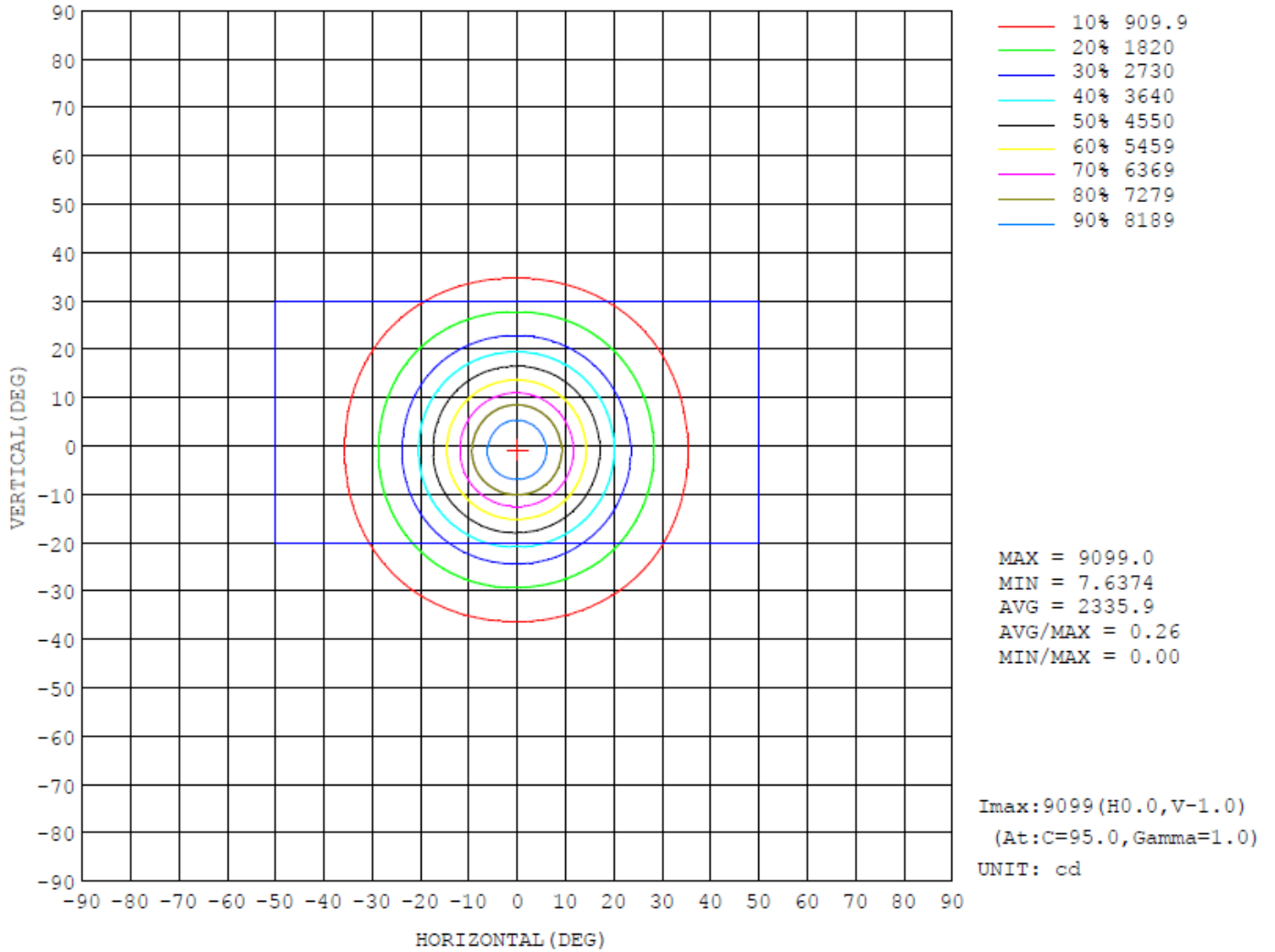
**Zonal Lumen Summary**

<b>Zone</b>	<b>Lumens</b>	<b>% Lamp / Luminaire</b>
<b>0 - 60</b>	<b>4064.09</b>	<b>99.80%</b>
<b>60 - 90</b>	<b>8.4935</b>	<b>0.20%</b>
<b>0 - 90</b>	<b>4072.3</b>	<b>100.00%</b>
<b>90 - 180</b>	<b>0.0605</b>	<b>0.00%</b>
<b>0 - 180</b>	<b>4072.3</b>	<b>100.00%</b>



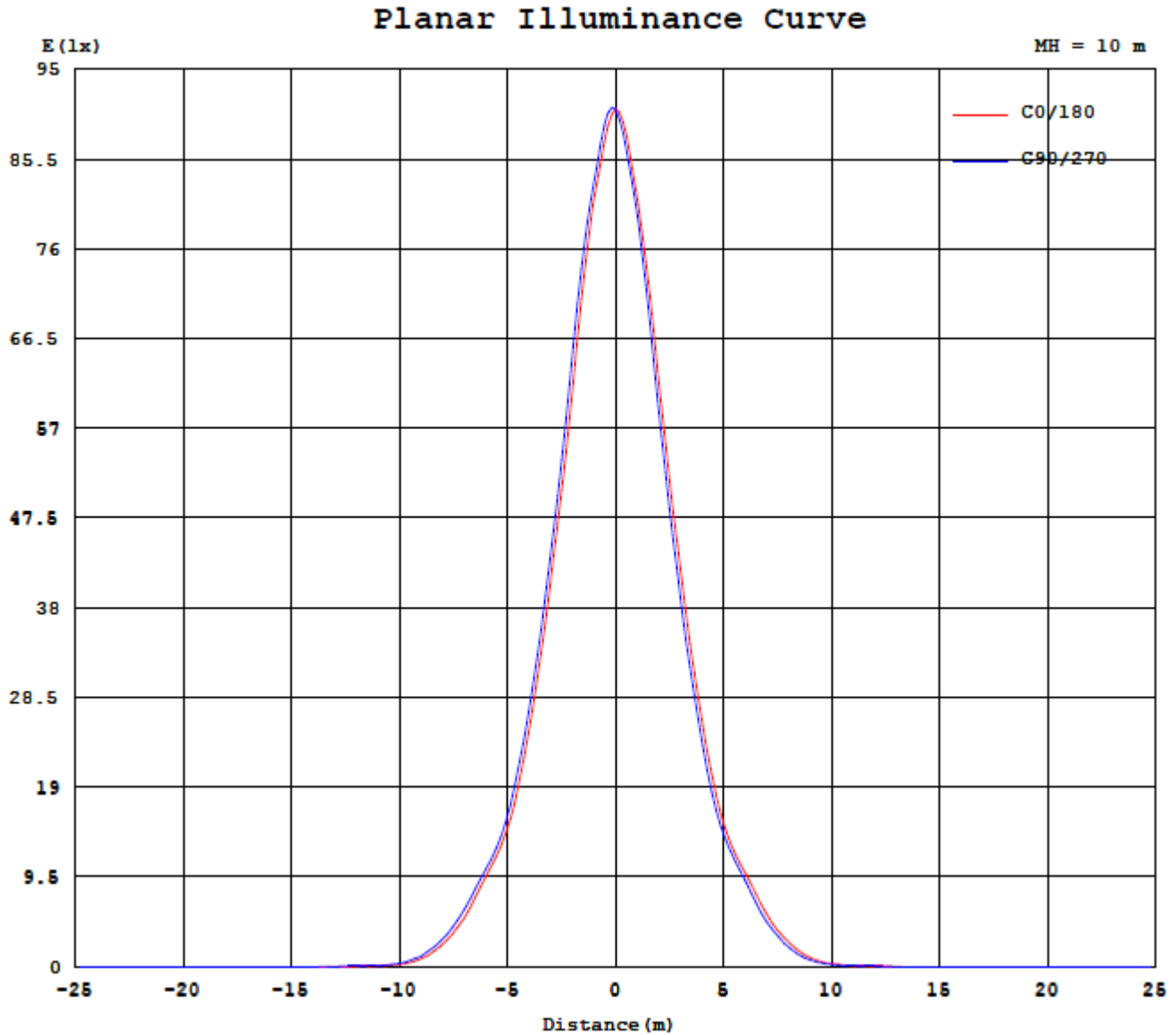
**Test Results – Isocandela Diagram**

The following images depict the isocandela diagram characteristics



**Test Results – Planar illuminance curve**

The following images depict the planar illuminance curve characteristics



**Test Results – Luminous distribution intensity data-1**

 C range: 0-360 DEG C, Interval: 5.0 DEG,  $\gamma$  range: 0-180 DEG,  $\gamma$  Interval: 5.0 DEG

C (DEG) $\gamma$ (DEG)	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
0	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077
5	8387	8397	8409	8423	8430	8437	8451	8458	8464	8479	8490	8500	8511	8527	8531	8535	8542	8551	8558
10	6961	6997	7030	7062	7091	7124	7158	7184	7212	7238	7257	7270	7289	7309	7325	7333	7339	7342	7346
15	5209	5233	5253	5274	5286	5305	5335	5363	5395	5420	5442	5461	5475	5492	5502	5508	5517	5524	5535
20	3647	3666	3688	3702	3717	3734	3752	3769	3789	3807	3820	3832	3842	3859	3871	3881	3894	3904	3917
25	2345	2366	2384	2398	2413	2442	2462	2478	2490	2500	2510	2531	2534	2545	2556	2566	2577	2587	2596
30	1635	1643	1652	1659	1668	1676	1682	1689	1696	1705	1712	1715	1719	1721	1726	1731	1736	1741	1747
35	951	962	975	984	995	1007	1019	1029	1040	1052	1061	1070	1079	1087	1092	1097	1104	1108	1113
40	379	387	392	398	404	410	415	421	428	435	440	445	451	456	460	464	466	471	472
45	74.1	76.1	77.9	80.3	82.7	84.9	87.1	89.7	91.8	94.1	95.9	97.9	99.9	101	103	104	105	106	107
50	31.9	32.4	33.0	33.5	34.1	34.7	35.2	35.7	36.2	36.6	36.8	36.9	37.0	37.0	36.8	36.7	36.4	36.1	35.8
55	8.95	9.16	9.39	9.67	9.98	10.3	10.6	10.8	11.0	11.1	11.2	11.1	11.1	10.9	10.8	10.7	10.5	10.4	10.3
60	6.41	6.55	6.71	6.91	7.16	7.36	7.59	7.79	7.96	8.05	8.06	8.05	7.98	7.90	7.84	7.76	7.68	7.61	7.54
65	4.60	4.71	4.83	4.96	5.12	5.28	5.46	5.62	5.74	5.82	5.85	5.84	5.82	5.78	5.73	5.69	5.63	5.59	5.54
70	3.34	3.42	3.51	3.62	3.73	3.85	3.97	4.08	4.18	4.24	4.27	4.27	4.27	4.25	4.23	4.20	4.17	4.15	4.12
75	2.37	2.43	2.50	2.58	2.66	2.74	2.81	2.89	2.96	3.01	3.03	3.04	3.03	3.03	3.03	3.02	3.01	3.00	2.99
80	1.53	1.56	1.60	1.65	1.70	1.75	1.79	1.84	1.89	1.92	1.93	1.94	1.95	1.96	1.97	1.97	1.97	1.98	1.98
85	0.64	0.66	0.71	0.75	0.78	0.83	0.87	0.91	0.95	0.97	1.00	1.01	1.01	1.03	1.04	1.04	1.03	1.03	1.03
90	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.04	0.06
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
135	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
140	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
145	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
150	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
155	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
160	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
165	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
170	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
175	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
180	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Luminous Intensity Data -1

**Test Results – Luminous distribution intensity data-2**

C range: 0-360 DEG C, Interval: 5.0 DEG,  $\gamma$  range: 0-180 DEG,  $\gamma$  Interval: 5.0 DEG

C (DEG) \ $\gamma$ (DEG)	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
0	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077
5	8556	8562	8567	8558	8559	8560	8556	8545	8541	8538	8520	8506	8495	8478	8464	8448	8434	8401	8385
10	7346	7343	7341	7332	7329	7323	7314	7305	7295	7283	7265	7246	7220	7193	7162	7130	7103	7043	7010
15	5541	5542	5541	5544	5537	5528	5515	5500	5489	5477	5463	5447	5433	5417	5395	5378	5355	5320	5301
20	3927	3933	3933	3935	3933	3930	3920	3912	3905	3894	3886	3874	3860	3845	3830	3814	3787	3754	3739
25	2602	2608	2611	2613	2610	2605	2601	2592	2585	2576	2568	2558	2546	2532	2517	2501	2488	2436	2423
30	1752	1756	1757	1757	1756	1753	1751	1746	1741	1736	1732	1727	1722	1717	1711	1706	1698	1680	1670
35	1113	1116	1118	1115	1112	1110	1107	1103	1097	1090	1082	1073	1067	1056	1049	1041	1032	1016	1005
40	473	475	475	473	472	468	466	463	459	455	451	446	441	436	430	425	418	410	403
45	107	108	107	108	107	107	106	105	104	103	102	99.6	98.5	96.3	94.8	92.8	91.2	101	99.2
50	35.7	35.5	35.3	35.2	35.1	35.0	34.9	34.8	34.7	34.6	34.4	34.3	34.2	34.1	34.0	34.0	34.0	34.2	34.2
55	10.2	10.1	9.95	9.85	9.76	9.67	9.59	9.50	9.51	9.32	9.22	9.13	9.04	8.98	8.94	8.93	8.96	8.99	9.05
60	7.47	7.38	7.31	7.24	7.18	7.10	7.02	6.94	6.86	6.77	6.68	6.61	6.52	6.46	6.41	6.40	6.40	6.43	6.46
65	5.49	5.45	5.39	5.35	5.30	5.25	5.19	5.12	5.06	4.99	4.91	4.84	4.79	4.73	4.69	4.66	4.64	4.60	4.62
70	4.09	4.07	4.04	4.01	3.97	3.93	3.88	3.82	3.77	3.71	3.66	3.60	3.55	3.51	3.47	3.43	3.42	3.38	3.39
75	2.97	2.96	2.94	2.92	2.90	2.87	2.82	2.79	2.76	2.72	2.68	2.64	2.59	2.56	2.52	2.49	2.47	2.46	2.46
80	1.99	2.00	2.00	1.99	1.98	1.96	1.95	1.93	1.91	1.88	1.86	1.83	1.80	1.78	1.77	1.75	1.73	1.71	1.71
85	1.06	1.08	1.08	1.09	1.07	1.05	1.04	1.03	1.03	1.04	1.03	1.01	1.00	1.00	0.98	0.97	0.96	0.94	0.94
90	0.06	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
135	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02
140	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
145	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
150	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
155	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
160	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
165	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02
170	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02
175	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02
180	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.02	0.02	0.00	0.00

Luminous Intensity Data -2

**Test Results – Luminous distribution intensity data-3**

 C range: 0-360 DEG C, Interval: 5.0 DEG,  $\gamma$  range: 0-180 DEG,  $\gamma$  Interval: 5.0 DEG

C (DEG) \ $\gamma$ (DEG)	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280
0	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077
5	8372	8356	8333	8322	8313	8296	8289	8287	8281	8272	8270	8269	8263	8260	8256	8259	8256	8251	8254
10	6980	6949	6919	6893	6871	6847	6828	6810	6795	6776	6762	6754	6745	6731	6724	6718	6710	6705	6692
15	5271	5250	5227	5205	5187	5166	5149	5129	5112	5088	5073	5055	5043	5027	5017	5005	4998	4998	5000
20	3720	3699	3680	3664	3648	3628	3613	3594	3575	3560	3543	3525	3513	3498	3489	3478	3470	3466	3462
25	2406	2393	2378	2365	2352	2340	2327	2316	2302	2290	2275	2262	2251	2243	2235	2226	2221	2216	2213
30	1663	1657	1651	1645	1639	1634	1629	1621	1616	1609	1603	1595	1588	1583	1578	1572	1568	1564	1563
35	995	984	976	966	956	947	938	926	918	908	900	892	884	878	872	867	865	861	860
40	397	389	384	377	370	366	359	354	349	344	339	335	332	328	324	321	320	319	319
45	97.4	95.6	93.9	92.3	90.7	89.2	87.3	85.8	84.4	77.4	76.1	79.4	78.2	77.1	75.9	75.0	74.2	73.7	73.2
50	34.2	34.2	34.2	34.1	34.0	33.8	33.5	33.2	32.9	32.7	32.4	32.0	31.6	31.1	30.8	30.5	30.3	30.1	30.0
55	9.12	9.23	9.35	9.45	9.55	9.61	9.63	9.60	9.53	9.41	9.25	9.10	8.94	8.79	8.66	8.54	8.41	8.31	8.22
60	6.52	6.60	6.70	6.77	6.83	6.86	6.87	6.84	6.77	6.67	6.58	6.47	6.35	6.25	6.12	6.02	5.94	5.86	5.80
65	4.66	4.70	4.76	4.81	4.86	4.88	4.89	4.86	4.81	4.74	4.66	4.58	4.49	4.41	4.33	4.27	4.21	4.15	4.12
70	3.41	3.43	3.47	3.50	3.53	3.55	3.54	3.52	3.49	3.43	3.37	3.31	3.26	3.20	3.14	3.10	3.07	3.04	3.02
75	2.47	2.48	2.50	2.52	2.53	2.54	2.53	2.51	2.48	2.44	2.39	2.35	2.31	2.28	2.25	2.23	2.21	2.19	2.19
80	1.70	1.70	1.69	1.69	1.68	1.69	1.68	1.66	1.63	1.60	1.56	1.53	1.49	1.47	1.45	1.43	1.42	1.41	1.41
85	0.93	0.92	0.90	0.88	0.88	0.88	0.86	0.85	0.82	0.79	0.74	0.72	0.69	0.68	0.66	0.64	0.62	0.60	0.59
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
130	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
135	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
140	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
145	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
150	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
155	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
160	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
165	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
170	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
175	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
180	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01

Luminous Intensity Data -3

**Test Results – Luminous distribution intensity data-4**

C range: 0-360 DEG C, Interval: 5.0 DEG,  $\gamma$  range: 0-180 DEG,  $\gamma$  Interval: 5.0 DEG

C (DEG) \ $\gamma$ (DEG)	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355					
0	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077	9077					
5	8252	8247	8254	8257	8263	8272	8279	8288	8298	8311	8321	8329	8343	8354	8371					
10	6693	6688	6690	6698	6711	6717	6732	6746	6761	6780	6799	6826	6856	6877	6906					
15	5004	5007	5010	5013	5018	5025	5032	5041	5056	5078	5099	5122	5142	5162	5182					
20	3458	3459	3466	3472	3480	3487	3501	3509	3517	3533	3550	3565	3581	3601	3622					
25	2212	2214	2217	2221	2222	2224	2231	2240	2245	2252	2263	2277	2290	2303	2317					
30	1562	1562	1564	1566	1567	1568	1570	1574	1579	1585	1591	1598	1607	1614	1621					
35	859	858	861	863	866	871	876	881	887	894	899	907	916	925	934					
40	318	319	319	320	320	323	326	330	334	337	341	348	354	362	370					
45	72.7	72.8	72.8	72.8	73.1	73.6	74.2	74.9	75.7	76.7	77.8	79.1	80.6	77.0	78.7					
50	29.9	29.8	29.7	29.7	29.7	29.6	29.7	29.8	29.9	30.0	30.2	30.5	30.7	31.0	31.6					
55	8.13	8.07	8.02	7.98	7.96	7.94	7.95	8.00	8.07	8.15	8.25	8.34	8.46	8.59	8.76					
60	5.68	5.64	5.60	5.57	5.56	5.57	5.59	5.62	5.66	5.72	5.85	5.94	6.04	6.14	6.28					
65	4.08	4.05	4.03	4.02	4.03	4.04	4.05	4.08	4.11	4.15	4.19	4.24	4.30	4.38	4.46					
70	3.00	2.99	2.97	2.97	2.98	3.00	3.01	3.02	3.03	3.05	3.07	3.11	3.15	3.20	3.26					
75	2.18	2.18	2.17	2.18	2.18	2.19	2.20	2.21	2.22	2.23	2.24	2.25	2.27	2.30	2.33					
80	1.41	1.42	1.42	1.42	1.44	1.45	1.46	1.46	1.46	1.47	1.48	1.49	1.50	1.51	1.52					
85	0.57	0.57	0.56	0.55	0.54	0.55	0.55	0.55	0.55	0.56	0.57	0.58	0.60	0.61	0.63	0.64				
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
125	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01					
130	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01					
135	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02					
140	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02					
145	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02					
150	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02					
155	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02					
160	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02					
165	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02					
170	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02					
175	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02					
180	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01					

Luminous Intensity Data -4

### Photometric Testing Information

The sample was evaluated for photometric and electrical characteristics using a goniophotometer, each located in purpose-built, temperature and humidity-controlled, draft free environments.

#### Lamp / Luminaire Stabilization.

The sample was placed inside the integrating sphere or set up to goniophotometer system and powered by a regulated and conditioned, alternating current supply. The correlated color temperature, color rendering index, chromaticity coordinates and electrical power measurements contained in this report are the numeric readings upon which stabilization is verified. The stabilization times shown on the results pages of this report denote the time of the 1<sup>st</sup> measurement (of the 3 consecutive readings) since this is the minimum time that the sample is assumed to have taken to reach stabilization.

The goniophotometer is calibrated using a tungsten lamp with the following specifications:

Manufacturer: Everfine

Part Number: D908

Bulb Number: 11090005

Voltage: 82.98 Volts

Calibration Current: 6.9258 Amperes

Luminous Flux = 8779 Lumens (ilac-MRA traceable)

A *Power Analyzer* was used to measure all electrical characteristics of the sample.

CSA is an accredited Test Laboratory (TL-555)  
to IESNA LM-79-08 by IAS  
(International Accreditation Service)



<b>Equipment List:</b>				
<b>Description</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Range</b>	<b>Calibration Due Date</b>
Goniophotometer	EVERFINE	GO-R5000	/	N/A
Photometer Head	EVERFINE	ID-1000	0.0001~200000lx	Nov.2017
Photometer Head	EVERFINE	ID-1000	0.0001~200000lx	Nov.2017
Spectroradiometer	EVERFINE	HAAS-2000	380nm~780nm	Nov.2017
Standard Lamp	EVERFINE	D908	2788K, 8779lm	Oct.2017
Power Analyzer	Yokogawa	WT210	15/30/60/150/300/600V 5/10/20/50/100/200mA DC10Hz~20kHz	Nov.2017
Digital DC Power Supply	Keithley	2420	Volts Ranges: 0.2, 2, 20, 60 V Basic V Source Accuracy: 0.02%	Nov.2017
AC Power Supply	Agilent	6812B	300 V 6.5 A	Nov.2017

**End of Report**