



# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### Beyond LED Technology

**#Test Model: BLT-L11-A19DF-11W-2700K**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
<b>Test Engineer:</b>	Mick Huang <i>Mick Huang</i>
<b>Report Number:</b>	RSZ190802507-10-1
<b>Test Date:</b>	2019-08-03
<b>Report Date:</b>	2019-12-10
<b>Reviewed By:</b>	Blake Zhang / EE Engineer <i>Blake Zhang</i>
<b>Accreditation:</b>	The IAS Accreditation Number TL-460.

## 1. Product Description

### General Information:

Two test samples were in good condition and received on 2019-08-02. One was tested in integrating sphere and the other was tested in goniophotometer

#Model Tested: BLT-L11-A19DF-11W-2700K  
 #Manufacturer: Beyond LED Technology  
 #Product Designation: Omnidirectional LED Lamp  
 Burning Time Before Test: 0hour(For New Products)

### #Rated Values:

Rated Voltage/Frequency: 120 V AC 60Hz  
 Rated Power: 11W  
 Nominal CCT: 2700K

## 2. Standards Used

- IES LM-79-08: Approved Method: Electrical & Photometric Measurement 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 IAS 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	2019-05-09	2020-05-08
Digital power meter	EVERFINE	PF9811	G135717CN1361159	2018-12-13	2019-12-13
High-precision rapid spectral radiometer	EVERFINE	HAAS-2000	N/A	2019-05-09	2020-05-08
Precision frequency power supply	ALL Power	APW-105N	970663	2019-03-08	2020-03-07
Standard Light Source	EVERFINE	D204	N/A	2019-07-19	2020-07-18
thermometer	SENSING	NA	NA	2019-03-08	2020-03-07
Programmable Precision DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	2019-03-08	2020-03-07
AC POWER SUPPLY	EVERFINE	VPS1030 PWM	1012017	2019-03-08	2020-03-07
Digital CC&CV DC Power Supply	EVERFINE	WY12010	1009009	2019-04-10	2020-04-09
Digital power meter	YOKOGAWA	WT-210	91j926132	2019-03-08	2020-03-07
full-field speed goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	2019-03-08	2020-03-07
Wireless Remote Sensor	N/A	433MHz	N/A	2019-03-08	2020-03-07

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Standard Light Source	EVERFINE	D908	1012001	2018-12-24	2019-12-24

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

#### 4. Test Method

Product was tested with no seasoning. All stabilization and measurements were made in compliance with IES LM-79-08. The product was operated at rated voltage or at voltage required by manufacturer. The ambient temperature of the sample was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$  during measurement. And relative humidity is less than 65%.

##### **Integrating Sphere System**

The system includes AC power source, digital power meter, DC power supply, Spectroradiometer, and integrating sphere. The integrating sphere system is calibrated by standard spectrum light source before measurement.

$4\pi$  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  $U=21\text{K}$  ( $K=2$ ), 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. The vertical angle ( $\gamma$ ) test intervals were set no more than 1 degree while data for 5 degree intervals is reported. The horizontal angle (C plane) test intervals were set no more than 22.5 degree.

The uncertainty of the luminous intensity is  $U=2.00\%$  ( $K=2$ ), 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]

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

Test orientation: **Base up**

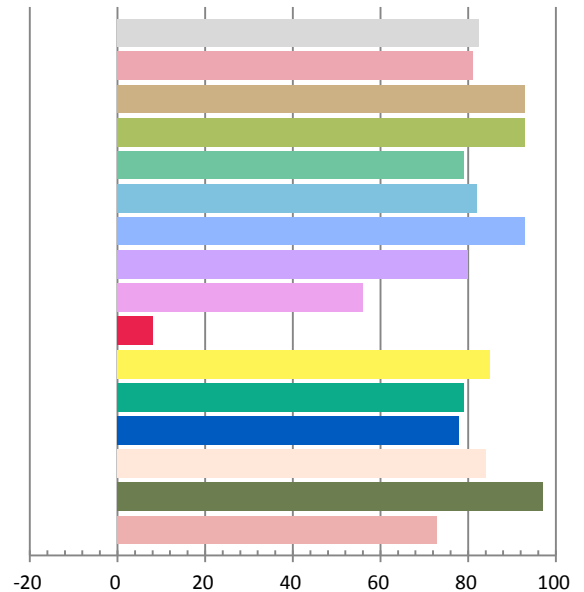
### Photometric and Electrical Measurement Result

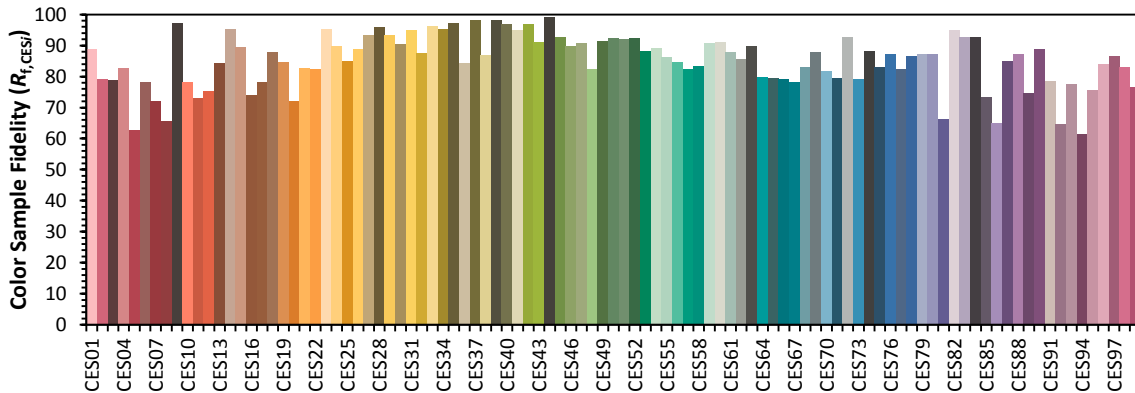
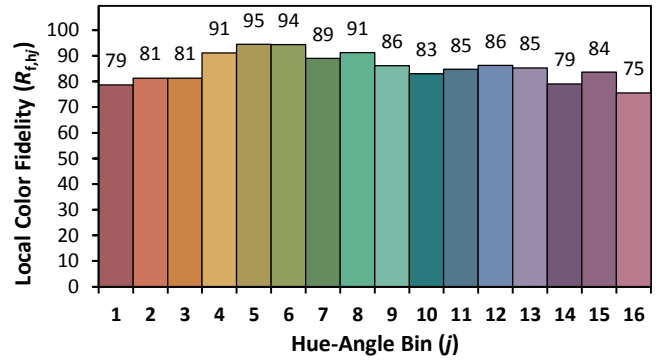
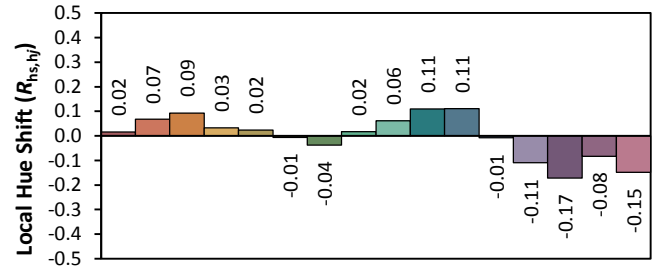
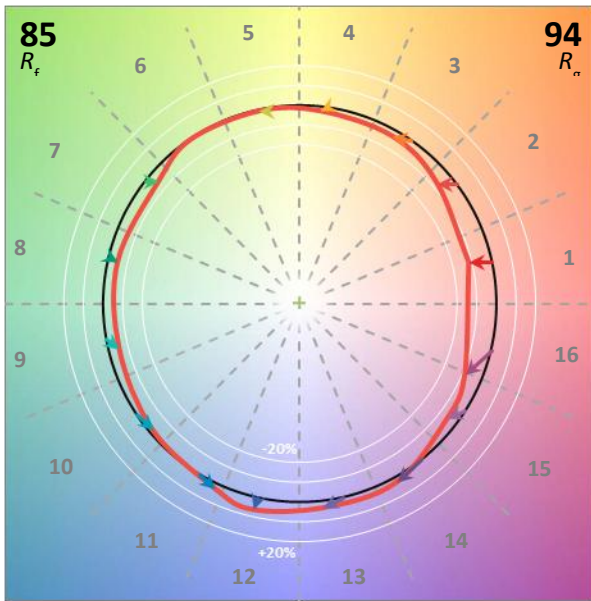
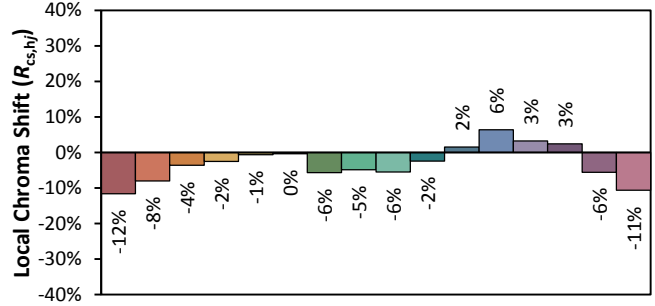
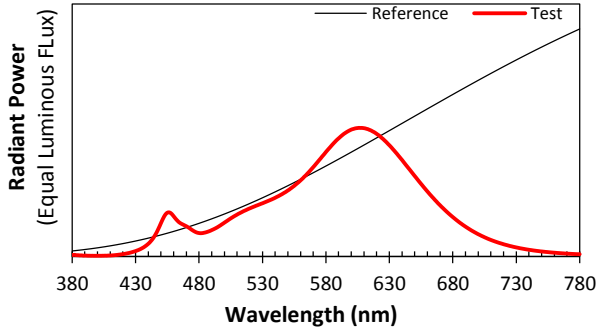
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1079	10.71	0.8266	1188.7	111.02

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.707	2648	0.0002040	0.4646	0.4122	0.2648	0.5287

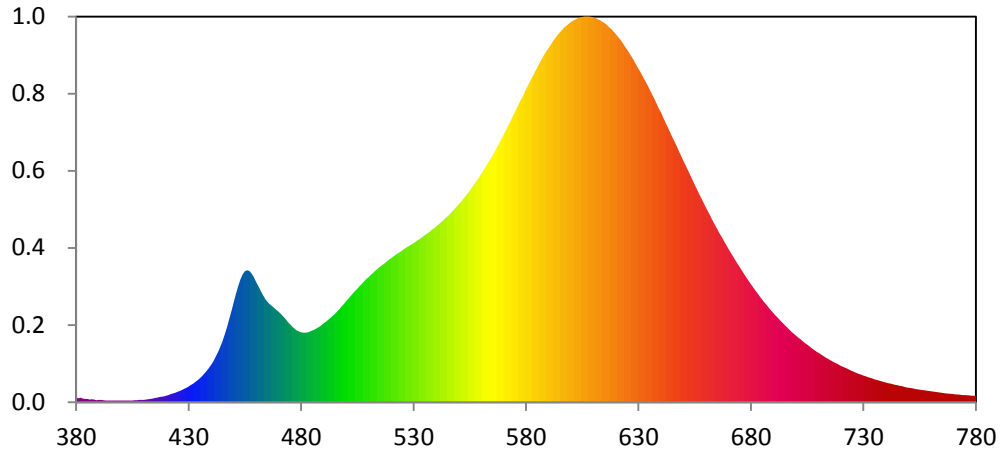
### Color Rendering Index

<b>Ra</b>			
82.4			
<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R4</b>
81	93	93	79
<b>R5</b>	<b>R6</b>	<b>R7</b>	<b>R8</b>
82	93	80	56
<b>R9</b>	<b>R10</b>	<b>R11</b>	<b>R12</b>
8	85	79	78
<b>R13</b>	<b>R14</b>	<b>R15</b>	
84	97	73	





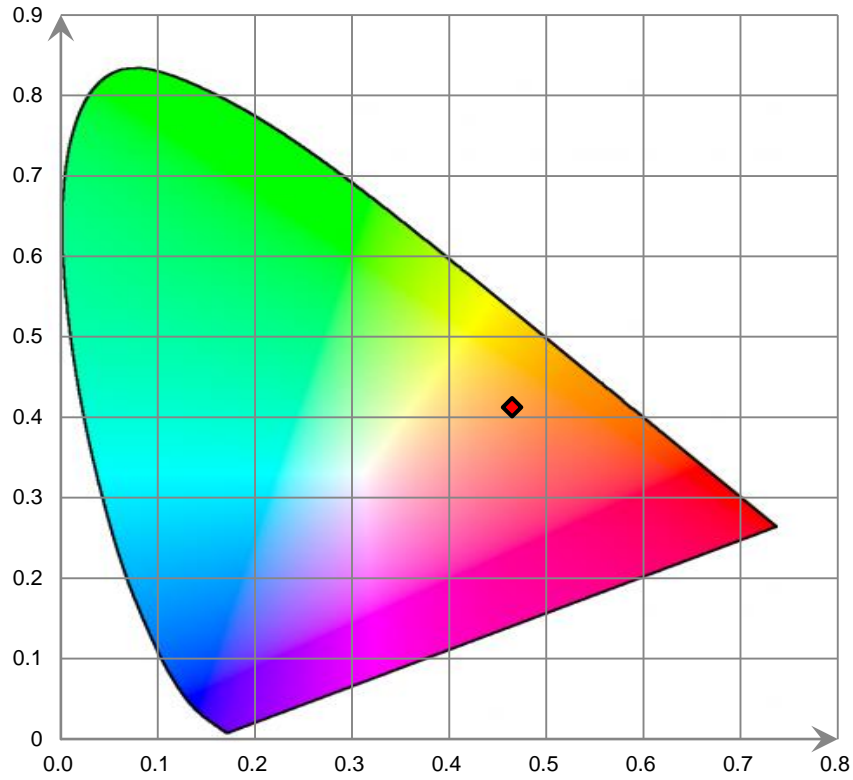
### Relative Spectral Power Distribution



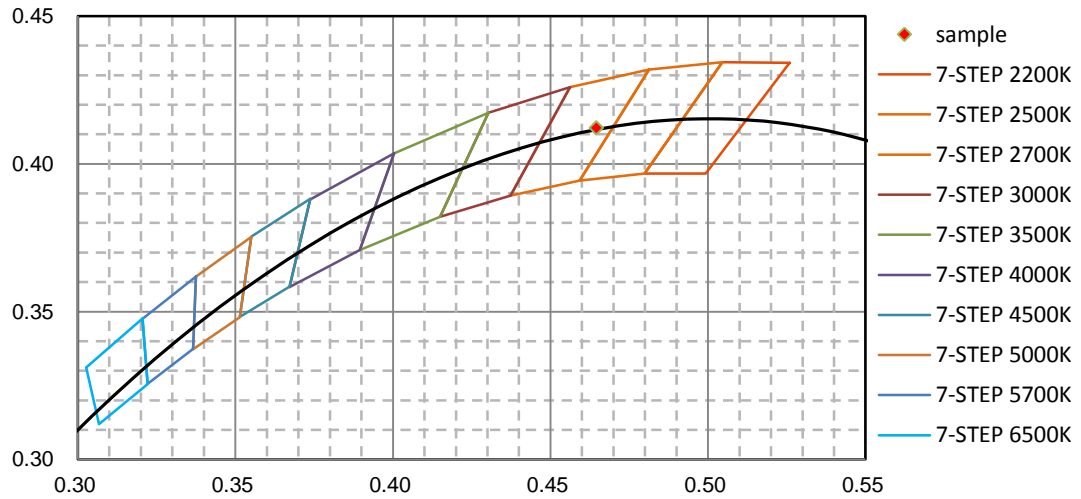
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.129E-01	421	4.992E-01	462	7.649E+00	503	7.495E+00	544	1.266E+01
381	2.789E-01	422	5.501E-01	463	7.367E+00	504	7.677E+00	545	1.280E+01
382	3.109E-01	423	5.988E-01	464	7.111E+00	505	7.843E+00	546	1.295E+01
383	2.543E-01	424	6.567E-01	465	6.917E+00	506	8.010E+00	547	1.312E+01
384	2.340E-01	425	7.051E-01	466	6.758E+00	507	8.171E+00	548	1.326E+01
385	2.282E-01	426	7.773E-01	467	6.623E+00	508	8.334E+00	549	1.344E+01
386	1.915E-01	427	8.487E-01	468	6.493E+00	509	8.484E+00	550	1.362E+01
387	2.005E-01	428	9.249E-01	469	6.359E+00	510	8.632E+00	551	1.378E+01
388	1.815E-01	429	1.008E+00	470	6.228E+00	511	8.792E+00	552	1.399E+01
389	1.421E-01	430	1.088E+00	471	6.072E+00	512	8.916E+00	553	1.417E+01
390	1.599E-01	431	1.190E+00	472	5.909E+00	513	9.056E+00	554	1.438E+01
391	1.552E-01	432	1.285E+00	473	5.734E+00	514	9.188E+00	555	1.457E+01
392	1.341E-01	433	1.402E+00	474	5.536E+00	515	9.328E+00	556	1.480E+01
393	1.275E-01	434	1.523E+00	475	5.373E+00	516	9.445E+00	557	1.502E+01
394	1.284E-01	435	1.668E+00	476	5.211E+00	517	9.559E+00	558	1.523E+01
395	1.152E-01	436	1.808E+00	477	5.068E+00	518	9.687E+00	559	1.546E+01
396	1.291E-01	437	1.981E+00	478	4.950E+00	519	9.809E+00	560	1.570E+01
397	1.119E-01	438	2.165E+00	479	4.870E+00	520	9.919E+00	561	1.594E+01
398	1.152E-01	439	2.371E+00	480	4.818E+00	521	1.003E+01	562	1.619E+01
399	1.110E-01	440	2.591E+00	481	4.786E+00	522	1.014E+01	563	1.647E+01
400	1.170E-01	441	2.840E+00	482	4.794E+00	523	1.025E+01	564	1.671E+01
401	1.184E-01	442	3.133E+00	483	4.821E+00	524	1.035E+01	565	1.699E+01
402	1.199E-01	443	3.444E+00	484	4.878E+00	525	1.047E+01	566	1.727E+01
403	1.138E-01	444	3.801E+00	485	4.937E+00	526	1.056E+01	567	1.755E+01
404	1.312E-01	445	4.207E+00	486	5.012E+00	527	1.067E+01	568	1.785E+01
405	1.278E-01	446	4.665E+00	487	5.101E+00	528	1.077E+01	569	1.815E+01
406	1.453E-01	447	5.151E+00	488	5.194E+00	529	1.088E+01	570	1.844E+01
407	1.349E-01	448	5.707E+00	489	5.299E+00	530	1.097E+01	571	1.874E+01
408	1.567E-01	449	6.275E+00	490	5.425E+00	531	1.108E+01	572	1.905E+01
409	1.689E-01	450	6.868E+00	491	5.542E+00	532	1.119E+01	573	1.936E+01
410	1.688E-01	451	7.450E+00	492	5.670E+00	533	1.130E+01	574	1.968E+01
411	1.918E-01	452	7.981E+00	493	5.802E+00	534	1.141E+01	575	1.999E+01
412	2.084E-01	453	8.454E+00	494	5.947E+00	535	1.152E+01	576	2.030E+01
413	2.311E-01	454	8.796E+00	495	6.098E+00	536	1.163E+01	577	2.063E+01
414	2.578E-01	455	9.017E+00	496	6.267E+00	537	1.174E+01	578	2.093E+01
415	2.876E-01	456	9.092E+00	497	6.432E+00	538	1.186E+01	579	2.124E+01
416	3.125E-01	457	9.052E+00	498	6.613E+00	539	1.198E+01	580	2.157E+01
417	3.534E-01	458	8.878E+00	499	6.783E+00	540	1.211E+01	581	2.188E+01
418	3.815E-01	459	8.619E+00	500	6.965E+00	541	1.225E+01	582	2.218E+01
419	4.182E-01	460	8.294E+00	501	7.144E+00	542	1.238E+01	583	2.247E+01
420	4.587E-01	461	7.965E+00	502	7.317E+00	543	1.251E+01	584	2.277E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.307E+01	626	2.402E+01	667	1.137E+01	708	3.600E+00	749	1.033E+00
586	2.336E+01	627	2.378E+01	668	1.108E+01	709	3.499E+00	750	1.012E+00
587	2.363E+01	628	2.352E+01	669	1.081E+01	710	3.394E+00	751	9.803E-01
588	2.391E+01	629	2.323E+01	670	1.055E+01	711	3.295E+00	752	9.518E-01
589	2.416E+01	630	2.298E+01	671	1.028E+01	712	3.196E+00	753	9.207E-01
590	2.439E+01	631	2.270E+01	672	1.003E+01	713	3.099E+00	754	9.007E-01
591	2.463E+01	632	2.241E+01	673	9.778E+00	714	3.009E+00	755	8.736E-01
592	2.486E+01	633	2.210E+01	674	9.524E+00	715	2.917E+00	756	8.463E-01
593	2.508E+01	634	2.181E+01	675	9.276E+00	716	2.831E+00	757	8.215E-01
594	2.529E+01	635	2.150E+01	676	9.036E+00	717	2.749E+00	758	7.985E-01
595	2.547E+01	636	2.120E+01	677	8.795E+00	718	2.667E+00	759	7.761E-01
596	2.564E+01	637	2.087E+01	678	8.569E+00	719	2.592E+00	760	7.546E-01
597	2.580E+01	638	2.056E+01	679	8.342E+00	720	2.504E+00	761	7.347E-01
598	2.595E+01	639	2.023E+01	680	8.122E+00	721	2.431E+00	762	7.097E-01
599	2.608E+01	640	1.993E+01	681	7.907E+00	722	2.362E+00	763	6.891E-01
600	2.621E+01	641	1.958E+01	682	7.685E+00	723	2.292E+00	764	6.707E-01
601	2.630E+01	642	1.925E+01	683	7.478E+00	724	2.219E+00	765	6.526E-01
602	2.637E+01	643	1.891E+01	684	7.271E+00	725	2.147E+00	766	6.311E-01
603	2.645E+01	644	1.859E+01	685	7.068E+00	726	2.089E+00	767	6.152E-01
604	2.650E+01	645	1.826E+01	686	6.873E+00	727	2.024E+00	768	5.968E-01
605	2.653E+01	646	1.794E+01	687	6.690E+00	728	1.957E+00	769	5.809E-01
606	2.657E+01	647	1.761E+01	688	6.497E+00	729	1.904E+00	770	5.670E-01
607	2.655E+01	648	1.727E+01	689	6.321E+00	730	1.844E+00	771	5.468E-01
608	2.656E+01	649	1.694E+01	690	6.141E+00	731	1.792E+00	772	5.341E-01
609	2.654E+01	650	1.661E+01	691	5.969E+00	732	1.737E+00	773	5.191E-01
610	2.650E+01	651	1.629E+01	692	5.801E+00	733	1.678E+00	774	5.015E-01
611	2.646E+01	652	1.596E+01	693	5.635E+00	734	1.630E+00	775	4.936E-01
612	2.637E+01	653	1.562E+01	694	5.469E+00	735	1.584E+00	776	4.773E-01
613	2.631E+01	654	1.530E+01	695	5.312E+00	736	1.540E+00	777	4.623E-01
614	2.619E+01	655	1.498E+01	696	5.163E+00	737	1.489E+00	778	4.551E-01
615	2.609E+01	656	1.467E+01	697	5.014E+00	738	1.444E+00	779	4.471E-01
616	2.596E+01	657	1.434E+01	698	4.868E+00	739	1.400E+00	780	4.479E-01
617	2.581E+01	658	1.403E+01	699	4.723E+00	740	1.359E+00		
618	2.568E+01	659	1.372E+01	700	4.584E+00	741	1.319E+00		
619	2.551E+01	660	1.341E+01	701	4.456E+00	742	1.284E+00		
620	2.533E+01	661	1.311E+01	702	4.322E+00	743	1.243E+00		
621	2.514E+01	662	1.280E+01	703	4.193E+00	744	1.203E+00		
622	2.496E+01	663	1.251E+01	704	4.075E+00	745	1.170E+00		
623	2.473E+01	664	1.222E+01	705	3.950E+00	746	1.133E+00		
624	2.449E+01	665	1.194E+01	706	3.835E+00	747	1.102E+00		
625	2.428E+01	666	1.164E+01	707	3.717E+00	748	1.072E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles





### [Goniophotometer System]

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

Test orientation: **Base up**

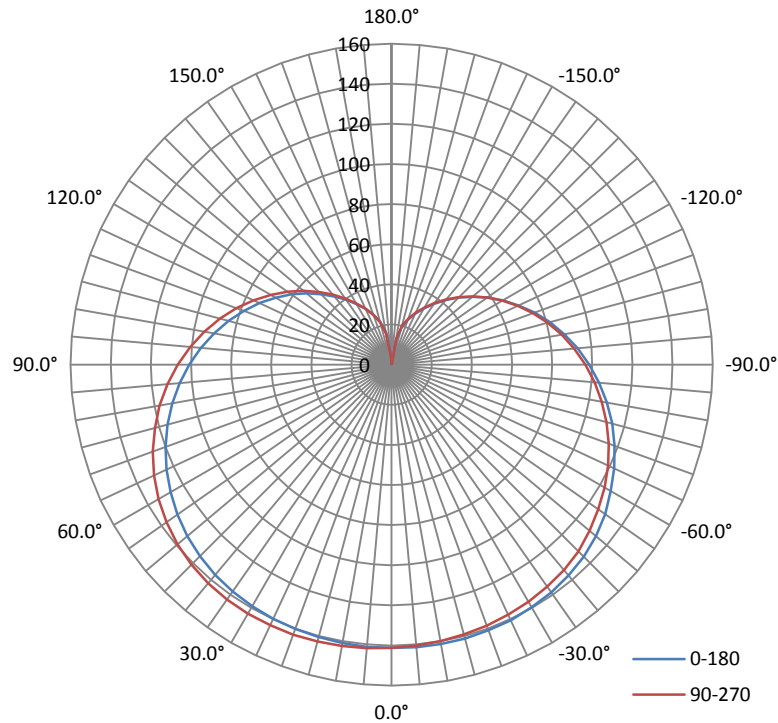
#### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.1	60	0.1083	10.69	0.8216

#### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
1189.44	111.31	143.4	1.51	1.47

#### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	230.8	230.9	231.2	231.2	231.0
Field Angle (10% $I_{max}$ ):	340.3	340.4	340.4	339.8	340.2

Luminous Intensity (cd) Distribution Data

C \ Y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	141	141	141	141	141	141	141	141
5.0°	141	141	142	142	142	142	142	142
10.0°	141	141	142	142	142	142	142	142
15.0°	141	141	142	142	143	143	142	142
20.0°	140	141	142	143	143	143	142	142
25.0°	140	141	142	143	143	143	142	142
30.0°	139	140	142	143	143	143	142	141
35.0°	138	140	141	142	143	143	142	140
40.0°	137	138	140	142	142	142	141	139
45.0°	135	137	139	140	141	141	139	138
50.0°	133	135	137	139	139	139	137	135
55.0°	130	132	135	136	137	137	135	133
60.0°	127	129	132	133	134	134	132	129
65.0°	124	126	128	130	131	130	128	126
70.0°	120	122	124	126	127	126	124	122
75.0°	116	118	120	122	122	122	120	117
80.0°	111	113	115	117	117	117	115	112
85.0°	106	108	110	112	112	111	109	107
90.0°	101	103	105	106	107	106	104	102
95.0°	95	97	99	100	101	100	98	96
100.0°	90	92	93	94	95	94	92	90
105.0°	84	86	87	88	89	88	86	84
110.0°	78	80	81	82	82	81	80	78
115.0°	73	74	75	76	76	75	74	72
120.0°	67	68	69	70	70	69	67	66
125.0°	61	62	63	63	63	63	61	60
130.0°	55	56	57	58	57	57	55	54
135.0°	50	50	51	51	51	51	49	48
140.0°	44	45	45	46	46	45	44	43
145.0°	39	40	40	41	40	40	39	38
150.0°	35	35	36	36	35	35	34	33
155.0°	31	31	31	31	31	30	30	29
160.0°	26	27	27	27	26	26	25	25
165.0°	22	23	22	22	22	21	20	20
170.0°	16	17	16	15	16	15	13	13
175.0°	6	5	5	5	4	3	3	0
180.0°	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°
0.0°	141	141	141	141	141	141	141	141
5.0°	141	141	141	141	141	141	141	141
10.0°	141	141	140	140	140	140	140	140
15.0°	141	140	140	139	139	139	140	140
20.0°	141	140	139	139	138	139	139	140
25.0°	141	139	138	138	137	138	138	139
30.0°	140	138	137	137	136	137	137	138
35.0°	139	137	136	135	135	135	136	137
40.0°	137	135	134	134	134	134	134	136
45.0°	135	134	132	132	132	132	133	134
50.0°	133	131	130	129	129	129	130	131
55.0°	130	128	126	126	126	126	127	128
60.0°	126	124	123	123	123	123	124	125
65.0°	122	120	119	119	119	119	120	121
70.0°	118	116	115	115	115	116	116	117
75.0°	114	112	111	111	111	111	112	113
80.0°	109	107	106	106	106	107	108	109
85.0°	104	102	101	102	102	102	103	104
90.0°	99	97	96	97	97	97	98	99
95.0°	93	91	91	91	91	92	93	94
100.0°	87	86	85	86	86	87	87	88
105.0°	82	80	80	80	81	81	82	83
110.0°	76	74	74	75	75	76	76	77
115.0°	70	69	68	69	69	70	71	71
120.0°	64	63	63	63	64	64	65	66
125.0°	58	57	57	58	58	59	59	60
130.0°	53	52	52	52	53	53	54	54
135.0°	47	47	47	47	47	48	48	49
140.0°	42	42	42	42	42	43	43	44
145.0°	37	37	37	37	38	38	38	39
150.0°	32	32	32	33	33	33	34	34
155.0°	28	28	28	28	29	29	30	30
160.0°	24	24	24	24	24	25	25	26
165.0°	19	19	19	20	20	21	21	22
170.0°	12	12	12	12	13	14	15	16
175.0°	0	0	0	0	0	0	1	3
180.0°	0	0	0	0	0	0	0	0

### Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	3.4	0.28
5-10	10.1	0.85
10-15	16.7	1.41
15-20	23.2	1.95
20-25	29.5	2.48
25-30	35.4	2.98
30-35	41.0	3.44
35-40	46.1	3.88
40-45	50.6	4.26
45-50	54.5	4.57
50-55	57.5	4.84
55-60	59.7	5.01
60-65	61.2	5.15
65-70	61.8	5.19
70-75	61.6	5.18
75-80	60.7	5.10
80-85	59.0	4.96
85-90	56.6	4.76
90-95	53.6	4.51
95-100	50.2	4.22
100-105	46.4	3.90
105-110	42.2	3.55
110-115	37.9	3.19
115-120	33.6	2.82
120-125	29.2	2.45
125-130	25.0	2.10
130-135	20.9	1.76
135-140	17.1	1.44
140-145	13.7	1.15
145-150	10.7	0.90
150-155	8.0	0.68
155-160	5.8	0.48
160-165	3.8	0.32
165-170	2.1	0.18
170-175	0.7	0.06
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	3.4	0.28
0-10	13.5	1.13
0-15	30.2	2.54
0-20	53.4	4.49
0-25	82.9	6.97
0-30	118.3	9.95
0-35	159.3	13.39
0-40	205.4	17.27
0-45	256.0	21.53
0-50	310.5	26.10
0-55	368.0	30.94
0-60	427.6	35.95
0-65	488.8	41.10
0-70	550.6	46.29
0-75	612.2	51.47
0-80	672.9	56.57
0-85	731.9	61.53
0-90	788.5	66.29
0-95	842.1	70.80
0-100	892.3	75.02
0-105	938.7	78.92
0-110	980.9	82.47
0-115	1018.9	85.66
0-120	1052.4	88.48
0-125	1081.6	90.93
0-130	1106.6	93.03
0-135	1127.4	94.79
0-140	1144.6	96.23
0-145	1158.3	97.38
0-150	1169.0	98.28
0-155	1177.0	98.96
0-160	1182.8	99.44
0-165	1186.6	99.76
0-170	1188.7	99.94
0-175	1189.4	100.00
0-180	1189.4	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. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
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\*\*\*\*\*END OF REPORT\*\*\*\*\*