



# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai, China

**Test Model: 17T8U6/830/BYP/R**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
<b>Test Engineer:</b>	George Yang <i>George Yang</i>
<b>Report Number:</b>	PKS180910084-10
<b>Test Date:</b>	2018-09-10 to 2018-09-11
<b>Report Date:</b>	2018-09-18
<b>Reviewed By:</b>	Ray Gao/EE Engineer <i>Ray Gao</i>
<b>Prepared By:</b>	Bay Area Compliance Laboratories Corp. (Kunshan). No.248 Chenghu Road, Kunshan, Jiangsu province, China. Tel: +86-0512-86175000 Fax: +86-0512-88934268
<b>Test Facility:</b>	Test facility was located at No.248 Chenghu Road, Kunshan, Jiangsu province, China.
<b>Accreditation:</b>	The IAS Accreditation Number TL-749.

**Note:** The test data was only valid for the test sample(s). 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. (Kunshan). 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.

## 1. Product Description

### General Information:

one sample was received on 2018-09-10 and used for testing.

Model Tested: 17T8U6/830/BYP/R  
Manufacturer: GREEN CREATIVE LTD  
Brand Name: GREEN CREATIVE  
Product Designation: LED Tube  
Aging Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120-277VAC 50/60Hz  
Rated Power: 17W  
Nominal CCT: 3000K  
Nominal Lumen Output: 2100lm

## 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 Equipment
- IES TM-30-15: IES Method for Evaluating Light Source Color Rendition

## 3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Integrating Sphere	INVENTFINE	Dia 1.5m	JWWCV090112	2018-01-24	2019-01-24
Power Meter	INVENTFINE	WT500	GSJWQ20009	2018-04-08	2019-04-08
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2018-01-24	2019-01-24
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2018-04-08	2019-04-08
Standard Light Source	INVENTFINE	N/A	JWWCR020106	2018-01-24	2019-01-24
Thermal Meter	KEJIAN	TA298	N/A	2017-11-14	2018-11-14
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	2018-04-08	2019-04-08
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2018-04-08	2019-04-08
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2018-04-08	2019-04-08
Power Meter	INVENTFINE	WT500	GSDSQ200007	2018-04-08	2019-04-08
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	2018-01-24	2019-01-24
Wireless Weather Station	ZHONGXING	KG218	N/A	2017-11-14	2018-11-14
Standard Light Source	INVENTFINE	N/A	JWBYR040007	2018-01-24	2019-01-24

Statement of Traceability: Bay Area Compliance Laboratories Corp.(Kunshan) 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  $U=2.6\%$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is  $U=24\text{K}$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the CRI is  $U=2.5(K=2)$ , at the 95% confidence level.

The uncertainty of power meter AC current  $U=0.16\%$  of rdg, AC Voltage  $U=0.18\%$  of rdg, Power  $U=0.14\%$  ( $K=2$ ), 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 flux is  $U=2.6\%$  ( $K=2$ ), at the 95% confidence level.

### Fidelity Index and Gamut Index Calculation

The  $R_i$ ,  $R_g$  was calculated according to IES TM-30-15 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: **Downward**

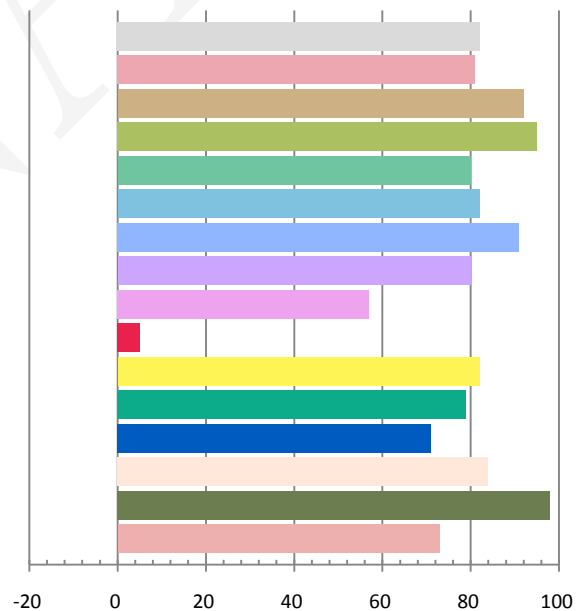
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.145	16.91	0.9718	2157.2	127.57

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
6.481	2939	-0.00004	0.4413	0.4054	0.2528	0.5226

### Color Rendering Index

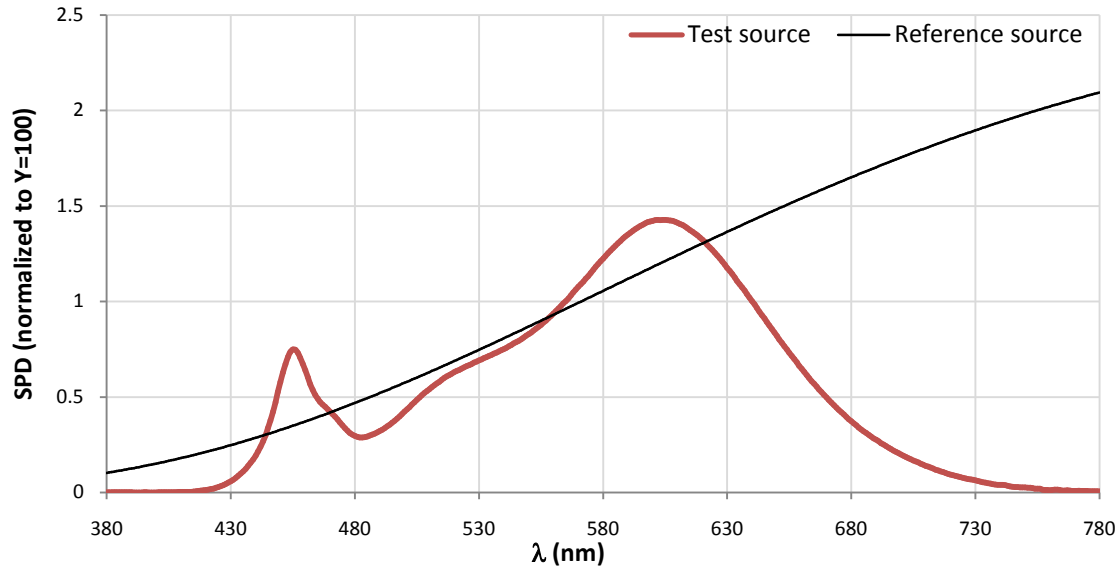
<b>Ra</b> <b>82.2</b>			
<b>R1</b> 81	<b>R2</b> 92	<b>R3</b> 95	<b>R4</b> 80
<b>R5</b> 82	<b>R6</b> 91	<b>R7</b> 80	<b>R8</b> 57
<b>R9</b> 5	<b>R10</b> 82	<b>R11</b> 79	<b>R12</b> 71
<b>R13</b> 84	<b>R14</b> 98	<b>R15</b> 73	



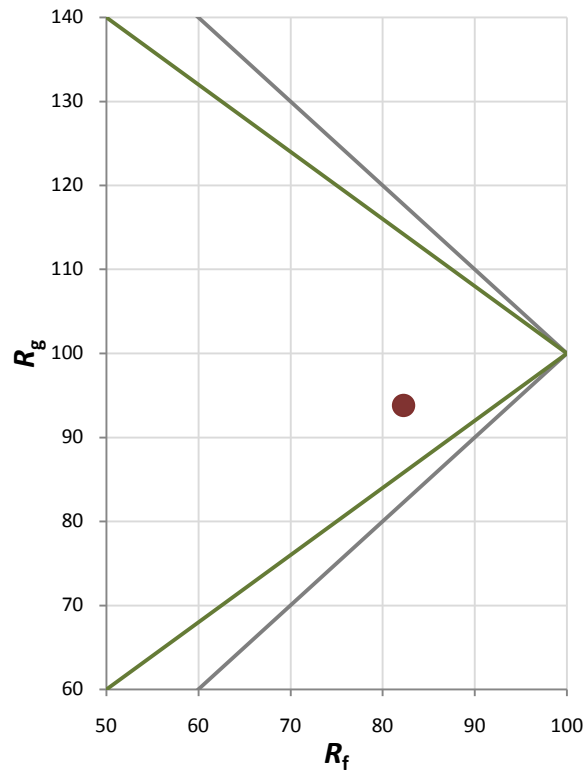
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	82
Gamut Index $R_g$	94

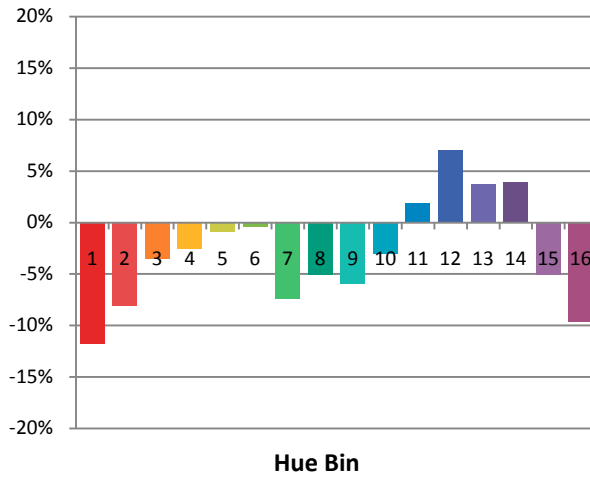
### Spectral Power Distribution Comparison



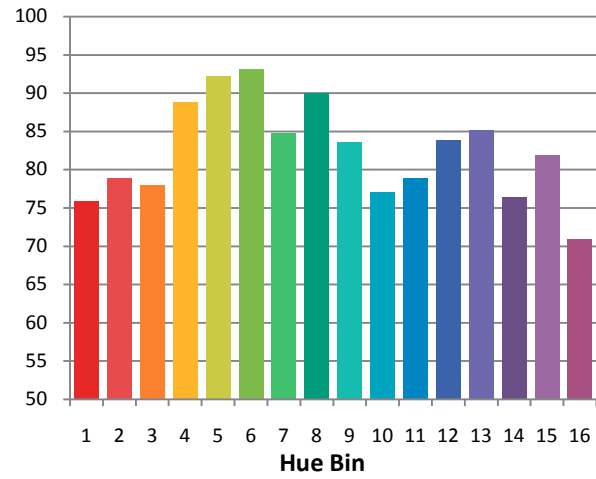
### Plot of $R_g$ versus $R_f$



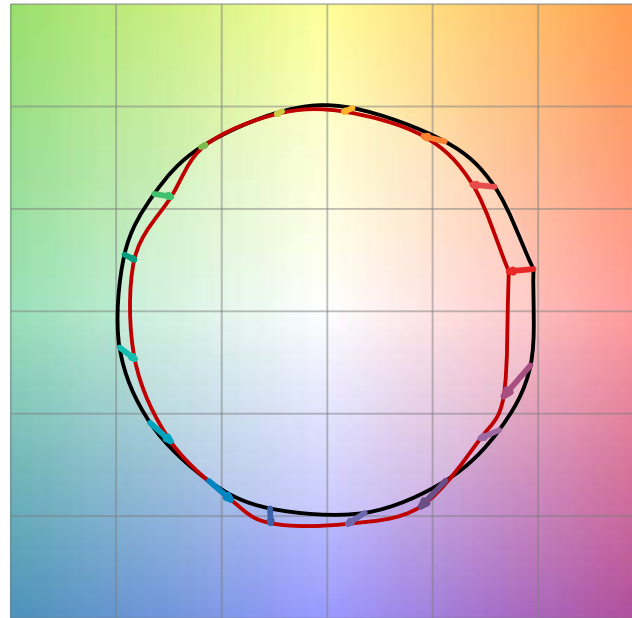
Chroma Shift by Hue



$R_t$  by Hue

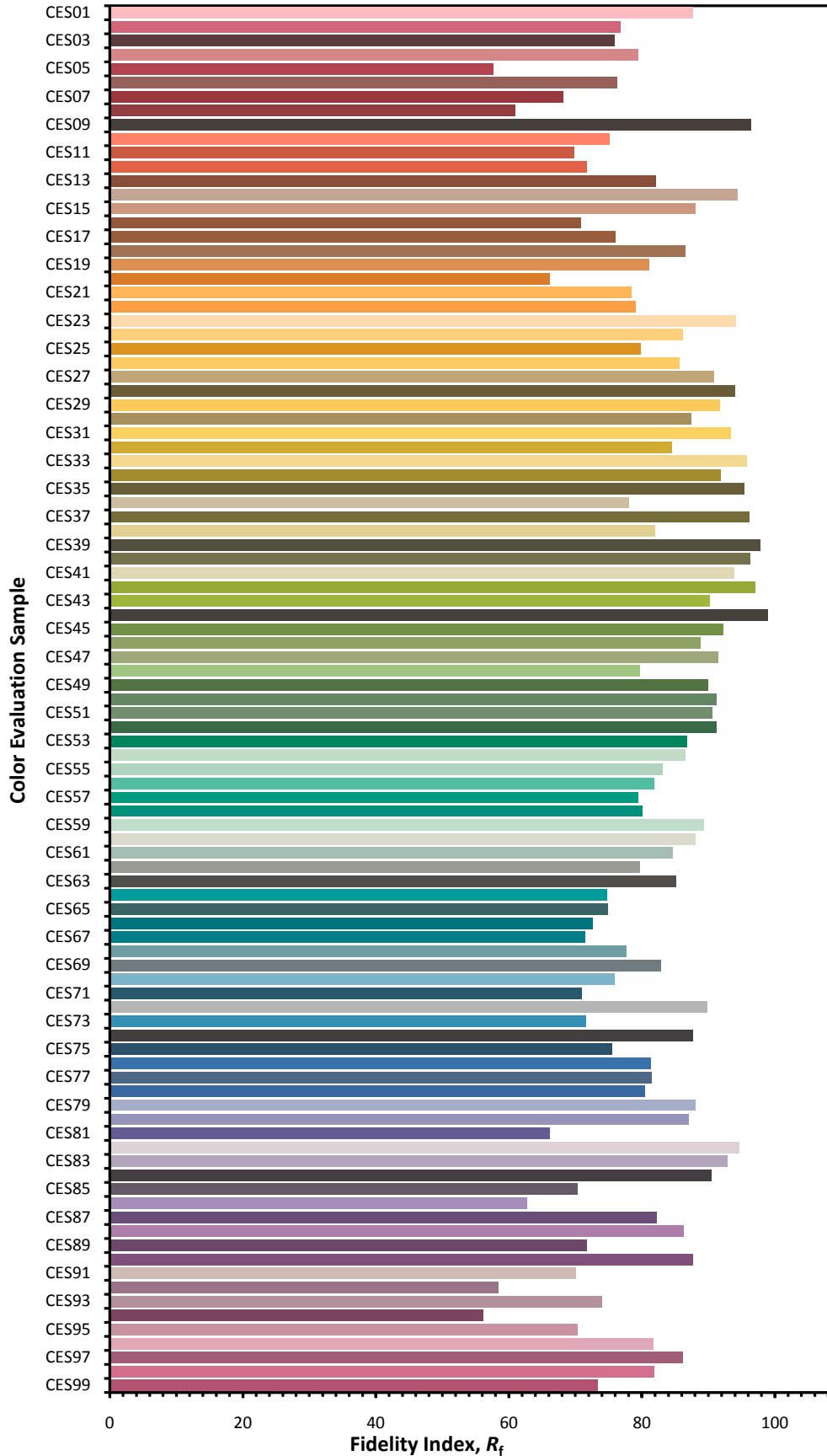


Color Vector Graphic

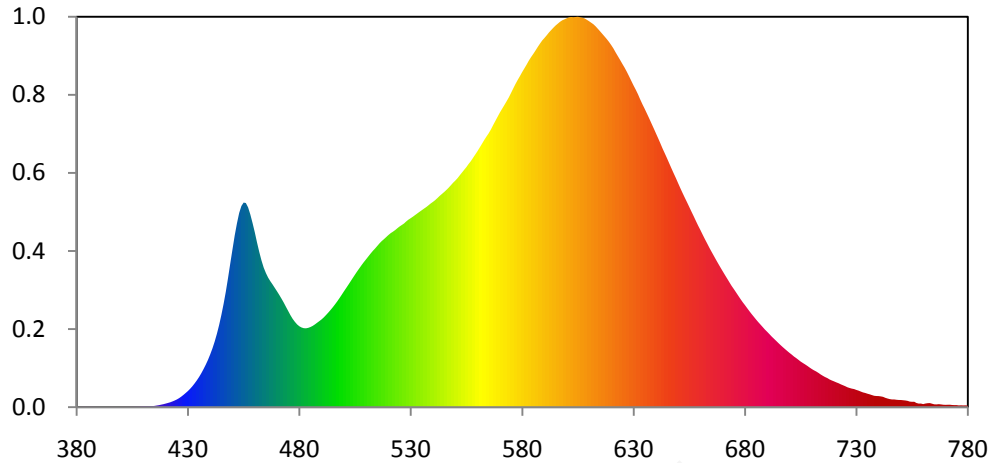


— Reference Illuminat    — Test Source

### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

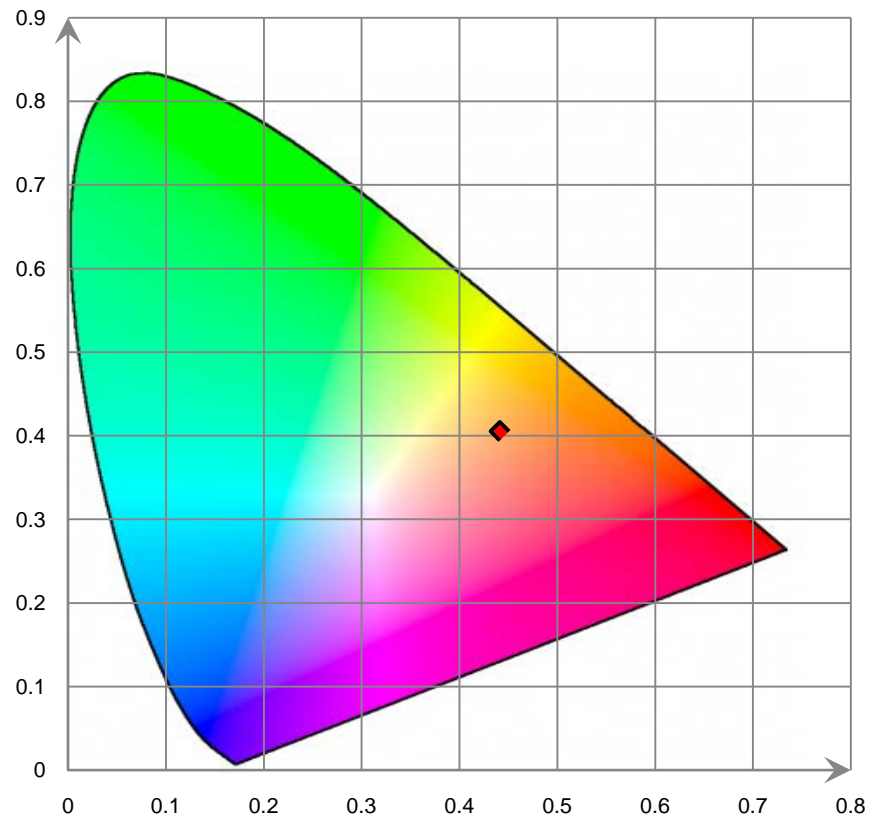


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.040E-02	421	4.855E-01	462	1.794E+01	503	1.453E+01	544	2.463E+01
381	2.320E-02	422	5.573E-01	463	1.696E+01	504	1.493E+01	545	2.485E+01
382	2.520E-02	423	6.578E-01	464	1.613E+01	505	1.532E+01	546	2.509E+01
383	3.990E-02	424	7.662E-01	465	1.549E+01	506	1.570E+01	547	2.535E+01
384	4.410E-02	425	8.905E-01	466	1.497E+01	507	1.606E+01	548	2.563E+01
385	3.200E-02	426	1.037E+00	467	1.454E+01	508	1.643E+01	549	2.592E+01
386	3.890E-02	427	1.218E+00	468	1.417E+01	509	1.677E+01	550	2.617E+01
387	4.130E-02	428	1.422E+00	469	1.377E+01	510	1.709E+01	551	2.645E+01
388	3.370E-02	429	1.639E+00	470	1.338E+01	511	1.742E+01	552	2.678E+01
389	3.270E-02	430	1.869E+00	471	1.297E+01	512	1.775E+01	553	2.710E+01
390	2.730E-02	431	2.129E+00	472	1.253E+01	513	1.805E+01	554	2.742E+01
391	1.360E-02	432	2.418E+00	473	1.208E+01	514	1.833E+01	555	2.774E+01
392	1.180E-02	433	2.746E+00	474	1.159E+01	515	1.863E+01	556	2.810E+01
393	1.690E-02	434	3.099E+00	475	1.111E+01	516	1.893E+01	557	2.842E+01
394	2.000E-02	435	3.486E+00	476	1.063E+01	517	1.919E+01	558	2.881E+01
395	2.500E-02	436	3.918E+00	477	1.020E+01	518	1.941E+01	559	2.920E+01
396	2.800E-02	437	4.397E+00	478	9.857E+00	519	1.965E+01	560	2.958E+01
397	1.990E-02	438	4.907E+00	479	9.562E+00	520	1.989E+01	561	3.001E+01
398	1.140E-02	439	5.466E+00	480	9.344E+00	521	2.010E+01	562	3.043E+01
399	7.100E-03	440	6.100E+00	481	9.206E+00	522	2.027E+01	563	3.087E+01
400	2.030E-02	441	6.786E+00	482	9.123E+00	523	2.045E+01	564	3.126E+01
401	2.950E-02	442	7.575E+00	483	9.109E+00	524	2.067E+01	565	3.164E+01
402	3.250E-02	443	8.474E+00	484	9.162E+00	525	2.087E+01	566	3.208E+01
403	2.940E-02	444	9.490E+00	485	9.257E+00	526	2.104E+01	567	3.259E+01
404	3.510E-02	445	1.064E+01	486	9.390E+00	527	2.122E+01	568	3.307E+01
405	4.030E-02	446	1.192E+01	487	9.561E+00	528	2.146E+01	569	3.355E+01
406	5.010E-02	447	1.333E+01	488	9.753E+00	529	2.166E+01	570	3.403E+01
407	6.080E-02	448	1.492E+01	489	9.946E+00	530	2.183E+01	571	3.446E+01
408	6.510E-02	449	1.660E+01	490	1.014E+01	531	2.201E+01	572	3.489E+01
409	9.200E-02	450	1.823E+01	491	1.038E+01	532	2.220E+01	573	3.532E+01
410	1.103E-01	451	1.984E+01	492	1.065E+01	533	2.239E+01	574	3.577E+01
411	1.039E-01	452	2.123E+01	493	1.093E+01	534	2.258E+01	575	3.628E+01
412	9.850E-02	453	2.244E+01	494	1.123E+01	535	2.276E+01	576	3.681E+01
413	1.094E-01	454	2.324E+01	495	1.154E+01	536	2.294E+01	577	3.732E+01
414	1.230E-01	455	2.363E+01	496	1.187E+01	537	2.312E+01	578	3.779E+01
415	1.506E-01	456	2.358E+01	497	1.222E+01	538	2.332E+01	579	3.823E+01
416	1.919E-01	457	2.308E+01	498	1.259E+01	539	2.354E+01	580	3.870E+01
417	2.367E-01	458	2.227E+01	499	1.297E+01	540	2.372E+01	581	3.913E+01
418	2.950E-01	459	2.128E+01	500	1.337E+01	541	2.392E+01	582	3.956E+01
419	3.457E-01	460	2.021E+01	501	1.375E+01	542	2.416E+01	583	4.002E+01
420	4.136E-01	461	1.904E+01	502	1.414E+01	543	2.441E+01	584	4.043E+01

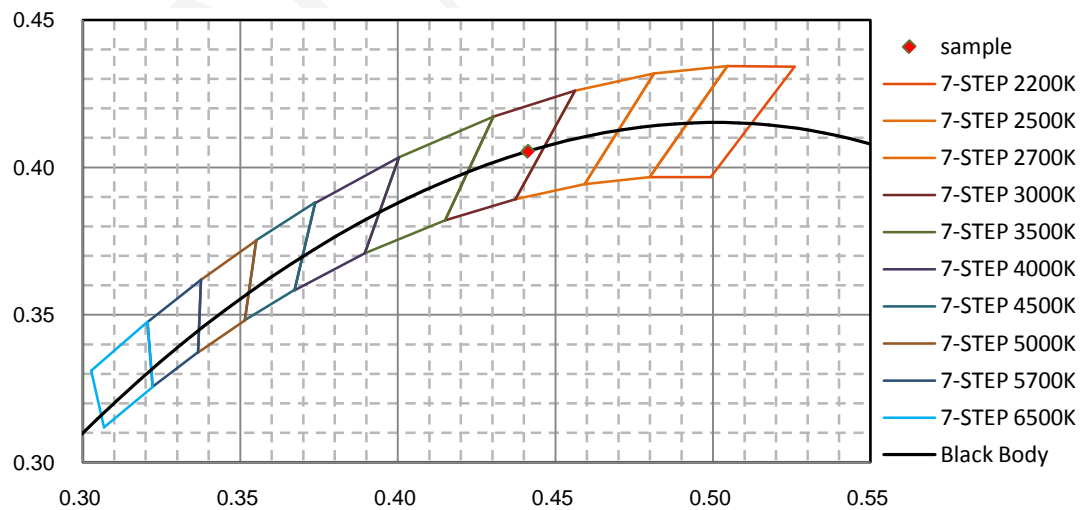


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	4.080E+01	626	3.922E+01	667	1.704E+01	708	4.770E+00	749	8.363E-01
586	4.120E+01	627	3.873E+01	668	1.659E+01	709	4.589E+00	750	8.284E-01
587	4.160E+01	628	3.822E+01	669	1.614E+01	710	4.409E+00	751	8.037E-01
588	4.199E+01	629	3.769E+01	670	1.571E+01	711	4.257E+00	752	7.744E-01
589	4.235E+01	630	3.716E+01	671	1.528E+01	712	4.122E+00	753	7.285E-01
590	4.264E+01	631	3.667E+01	672	1.486E+01	713	3.962E+00	754	6.457E-01
591	4.294E+01	632	3.614E+01	673	1.444E+01	714	3.778E+00	755	6.207E-01
592	4.327E+01	633	3.555E+01	674	1.402E+01	715	3.623E+00	756	6.280E-01
593	4.355E+01	634	3.499E+01	675	1.365E+01	716	3.478E+00	757	4.847E-01
594	4.382E+01	635	3.447E+01	676	1.327E+01	717	3.362E+00	758	4.140E-01
595	4.408E+01	636	3.392E+01	677	1.288E+01	718	3.203E+00	759	4.180E-01
596	4.430E+01	637	3.337E+01	678	1.250E+01	719	3.086E+00	760	3.585E-01
597	4.451E+01	638	3.281E+01	679	1.213E+01	720	2.980E+00	761	4.190E-01
598	4.468E+01	639	3.224E+01	680	1.179E+01	721	2.868E+00	762	4.589E-01
599	4.480E+01	640	3.166E+01	681	1.144E+01	722	2.771E+00	763	4.730E-01
600	4.492E+01	641	3.109E+01	682	1.109E+01	723	2.641E+00	764	3.993E-01
601	4.503E+01	642	3.050E+01	683	1.076E+01	724	2.533E+00	765	3.309E-01
602	4.507E+01	643	2.990E+01	684	1.044E+01	725	2.428E+00	766	3.221E-01
603	4.504E+01	644	2.934E+01	685	1.013E+01	726	2.301E+00	767	3.467E-01
604	4.507E+01	645	2.877E+01	686	9.824E+00	727	2.214E+00	768	3.221E-01
605	4.510E+01	646	2.818E+01	687	9.540E+00	728	2.140E+00	769	2.832E-01
606	4.504E+01	647	2.760E+01	688	9.248E+00	729	2.095E+00	770	2.725E-01
607	4.498E+01	648	2.703E+01	689	8.963E+00	730	1.994E+00	771	2.795E-01
608	4.491E+01	649	2.647E+01	690	8.703E+00	731	1.911E+00	772	2.842E-01
609	4.475E+01	650	2.588E+01	691	8.439E+00	732	1.806E+00	773	2.525E-01
610	4.459E+01	651	2.530E+01	692	8.163E+00	733	1.703E+00	774	2.406E-01
611	4.441E+01	652	2.475E+01	693	7.914E+00	734	1.641E+00	775	2.401E-01
612	4.423E+01	653	2.420E+01	694	7.669E+00	735	1.556E+00	776	2.031E-01
613	4.398E+01	654	2.367E+01	695	7.414E+00	736	1.485E+00	777	2.167E-01
614	4.370E+01	655	2.313E+01	696	7.172E+00	737	1.396E+00	778	2.045E-01
615	4.341E+01	656	2.259E+01	697	6.935E+00	738	1.316E+00	779	2.107E-01
616	4.311E+01	657	2.206E+01	698	6.713E+00	739	1.288E+00	780	1.898E-01
617	4.282E+01	658	2.151E+01	699	6.488E+00	740	1.280E+00		
618	4.252E+01	659	2.097E+01	700	6.272E+00	741	1.243E+00		
619	4.219E+01	660	2.047E+01	701	6.073E+00	742	1.194E+00		
620	4.182E+01	661	1.994E+01	702	5.854E+00	743	1.085E+00		
621	4.142E+01	662	1.943E+01	703	5.672E+00	744	1.000E+00		
622	4.096E+01	663	1.894E+01	704	5.473E+00	745	9.320E-01		
623	4.053E+01	664	1.844E+01	705	5.272E+00	746	8.931E-01		
624	4.010E+01	665	1.796E+01	706	5.105E+00	747	8.909E-01		
625	3.965E+01	666	1.750E+01	707	4.945E+00	748	8.566E-01		

### CIE 1931 x y Chromaticity Diagram



### 7-Step Chromaticity Quadrangles



## [Goniophotometer System]

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

Test orientation: **Downward**

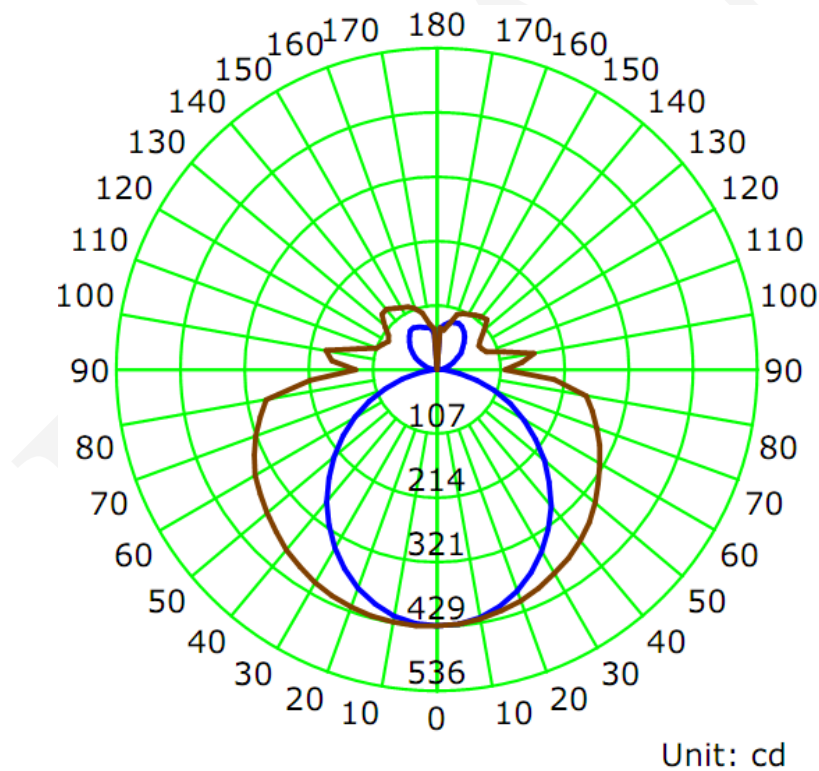
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1450	16.9	0.9740

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
2160.7	127.90	429.3	1.21	1.41

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	105.0	144.8	168.5	147.4	141.4
Field Angle (10% $I_{max}$ ):	353.6	353.0	353.9	353.7	353.6

### Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	428	428	428	428	428	428	428	428
5.0°	427	425	425	425	426	426	427	424
10.0°	420	419	420	423	423	421	420	417
15.0°	409	408	412	415	417	415	412	406
20.0°	393	393	400	408	411	406	399	391
25.0°	374	376	386	398	403	397	385	372
30.0°	351	354	370	387	393	386	369	352
35.0°	325	331	353	375	384	373	352	328
40.0°	297	306	332	361	373	360	333	302
45.0°	266	279	313	347	361	346	312	276
50.0°	236	251	292	332	345	332	293	249
55.0°	203	224	273	317	331	316	273	221
60.0°	170	196	252	301	315	302	253	194
65.0°	135	169	232	286	300	286	233	167
70.0°	102	143	213	269	285	269	215	142
75.0°	69	119	195	253	270	252	198	119
80.0°	39	97	176	237	255	238	180	99
85.0°	13	76	150	189	198	186	150	82
90.0°	0	35	77	108	115	105	81	41
95.0°	0	38	96	131	143	133	103	40
100.0°	7	28	84	146	165	143	85	30
105.0°	14	33	61	98	117	98	62	32
110.0°	23	47	58	81	88	81	59	45
115.0°	32	51	62	77	83	77	62	50
120.0°	40	54	75	78	82	78	74	53
125.0°	49	58	89	89	89	88	91	57
130.0°	57	63	88	105	104	105	92	63
135.0°	64	68	89	111	118	113	91	68
140.0°	72	72	91	108	116	109	90	72
145.0°	78	78	93	107	112	106	89	75
150.0°	84	82	94	105	107	100	89	77
155.0°	86	81	95	104	104	97	81	79
160.0°	84	80	95	100	99	83	78	76
165.0°	82	80	88	95	80	75	70	65
170.0°	77	78	81	79	68	69	60	58
175.0°	71	74	63	64	71	61	66	68
180.0°	0	0	0	0	0	0	0	0

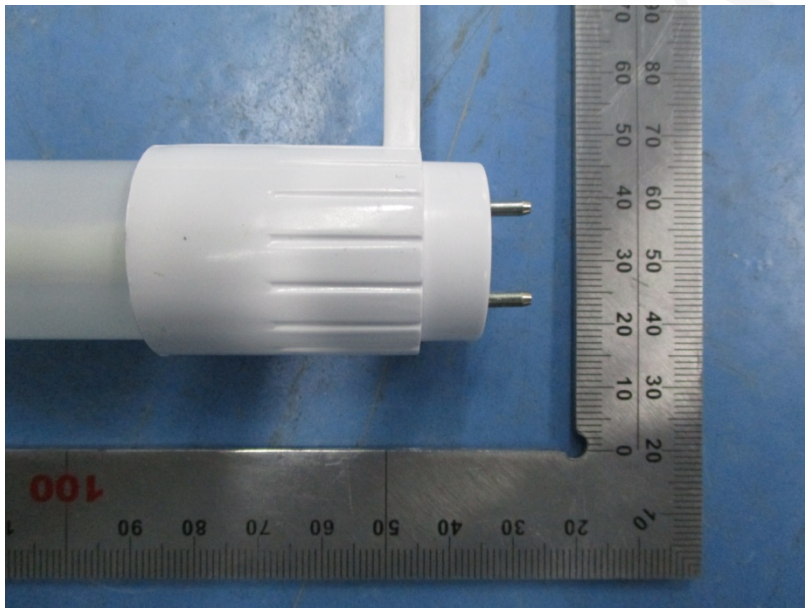
Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ Y \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	428	428	428	428	428	428	428	428
5.0°	425	424	426	429	429	428	428	426
10.0°	418	419	422	427	428	427	425	421
15.0°	405	407	414	424	426	424	418	410
20.0°	388	394	405	418	421	419	409	397
25.0°	367	375	392	410	417	412	397	380
30.0°	344	355	378	402	410	405	383	360
35.0°	317	331	361	391	402	395	368	338
40.0°	289	306	343	380	393	384	350	313
45.0°	257	279	325	368	383	372	333	287
50.0°	226	251	305	355	372	359	314	260
55.0°	192	224	286	343	362	346	295	232
60.0°	160	196	266	329	352	333	276	205
65.0°	126	169	248	315	339	319	257	179
70.0°	93	144	230	301	324	305	240	154
75.0°	60	121	214	284	307	289	222	131
80.0°	31	101	196	266	291	273	203	110
85.0°	8	83	156	199	214	207	166	88
90.0°	0	44	91	125	137	125	90	41
95.0°	2	40	121	164	178	164	121	50
100.0°	9	33	94	163	190	172	105	36
105.0°	17	38	73	115	140	121	76	38
110.0°	26	53	70	99	108	99	72	52
115.0°	34	56	72	93	102	94	72	64
120.0°	42	60	86	91	95	91	83	66
125.0°	51	66	103	101	100	100	100	69
130.0°	59	68	104	117	114	115	108	72
135.0°	67	71	100	130	132	131	107	75
140.0°	74	74	102	124	133	126	106	77
145.0°	80	77	102	118	125	120	105	81
150.0°	82	78	99	116	121	117	103	85
155.0°	79	79	93	111	116	113	99	84
160.0°	76	78	82	104	110	107	93	84
165.0°	73	68	77	79	99	96	89	84
170.0°	71	63	72	76	78	86	85	78
175.0°	63	58	59	69	70	73	71	73
180.0°	0	0	0	0	0	0	0	0

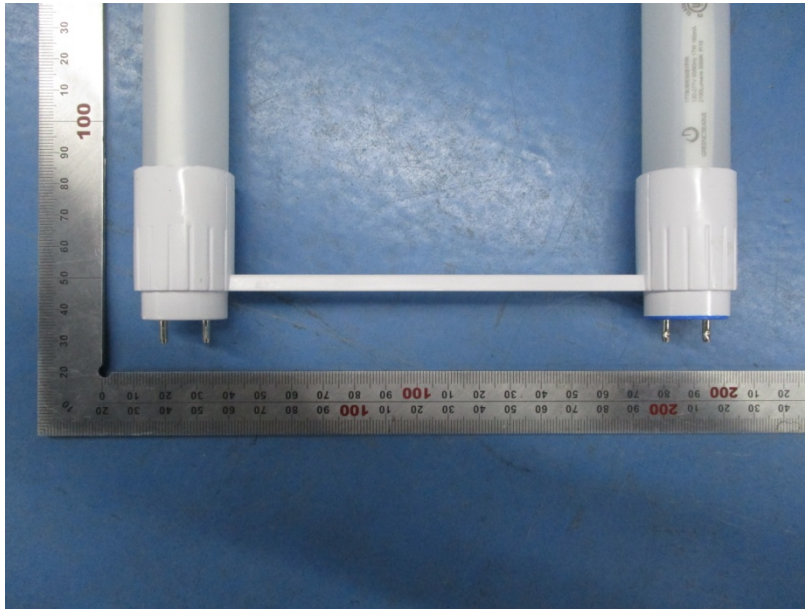
### Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	10.2	0.47	0-5	10.2	0.47
5-10	30.3	1.40	0-10	40.5	1.88
10-15	49.6	2.29	0-15	90.1	4.17
15-20	67.3	3.12	0-20	157.4	7.29
20-25	83.2	3.85	0-25	240.6	11.14
25-30	96.8	4.48	0-30	337.4	15.62
30-35	107.8	4.99	0-35	445.3	20.61
35-40	116.2	5.38	0-40	561.5	25.99
40-45	121.8	5.64	0-45	683.3	31.62
45-50	124.7	5.77	0-50	808.0	37.39
50-55	125.1	5.79	0-55	933.1	43.19
55-60	123.3	5.70	0-60	1056.4	48.89
60-65	119.4	5.52	0-65	1175.7	54.41
65-70	113.8	5.26	0-70	1289.5	59.68
70-75	106.7	4.94	0-75	1396.2	64.62
75-80	98.6	4.56	0-80	1494.8	69.18
80-85	84.2	3.90	0-85	1579.0	73.08
85-90	57.8	2.68	0-90	1636.8	75.75
90-95	46.9	2.17	0-95	1683.7	77.92
95-100	51.2	2.37	0-100	1734.8	80.29
100-105	43.8	2.03	0-105	1778.7	82.32
105-110	35.8	1.66	0-110	1814.5	83.98
110-115	33.9	1.57	0-115	1848.4	85.54
115-120	33.8	1.57	0-120	1882.2	87.11
120-125	35.3	1.64	0-125	1917.5	88.74
125-130	37.1	1.72	0-130	1954.7	90.46
130-135	37.5	1.73	0-135	1992.2	92.20
135-140	35.6	1.65	0-140	2027.8	93.85
140-145	32.3	1.49	0-145	2060.0	95.34
145-150	28.4	1.31	0-150	2088.4	96.65
150-155	24.0	1.11	0-155	2112.4	97.76
155-160	19.2	0.89	0-160	2131.6	98.65
160-165	14.1	0.65	0-165	2145.7	99.30
165-170	9.2	0.43	0-170	2154.9	99.73
170-175	5.0	0.23	0-175	2159.9	99.96
175-180	0.8	0.04	0-180	2160.7	100.00

## 6. Product Photo







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