

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: 20SMPS9DIM/930/277V**

<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>	PKS171229082-10-1
<b>Test Date:</b>	2018-01-02
<b>Report Date:</b>	2018-01-04
<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.

## 1. Product Description

### General Information:

One sample was received on 2018-01-02 and used for testing.

Model Tested: 20SMPS9DIM/930/277V  
Manufacturer: GREEN CREATIVE LTD  
Brand Name: GREEN CREATIVE  
Product Designation: LED Downlight  
Aging Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120-277 VAC 60Hz  
Rated Power: 20W  
Nominal CCT: 3000K  
Nominal Lumen Output: 1250lm

## 2. Standards Used

- IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits – Related Power Quality Requirements for Lighting
- IES TM-30-15: IES Method for Evaluating Light Source Color Rendition

## 3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integrating Sphere	INVENTFINE	Dia 1.5m	JWWCV090112	Dia 1.5m	2017-01-25	2018-01-25
Power Meter	INVENTFINE	WT500	GSJWQ20009	20/40/80/150/300/600V	2017-03-23	2018-03-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	380nm~780nm	2017-01-25	2018-01-25
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	0~150V 4.2A/0~300V 2.1A	2017-03-23	2018-03-22
Standard Light Source	INVENTFINE	N/A	JWWCR020106	24V/50W	2017-01-26	2018-01-26
Thermal Meter	KEJIAN	TA298	N/A	0~60℃	2017-10-17	2018-10-17
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	30V/5A	2017-03-23	2018-03-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	0-150V, 0-300V, 5KVA	2017-03-23	2018-03-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	30V/10A	2017-03-23	2018-03-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	20/40/80/150/300/600V	2017-03-23	2018-03-22
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	0.001lx-99999lx	2017-01-25	2018-01-25
Wireless Weather Station	ZHONGXING	KG218	N/A	-40~65℃, 20%~99%RH	2017-10-17	2018-10-17
Standard Light Source	INVENTFINE	N/A	JWBYR040007	24V/150W	2017-01-25	2018-01-25

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**

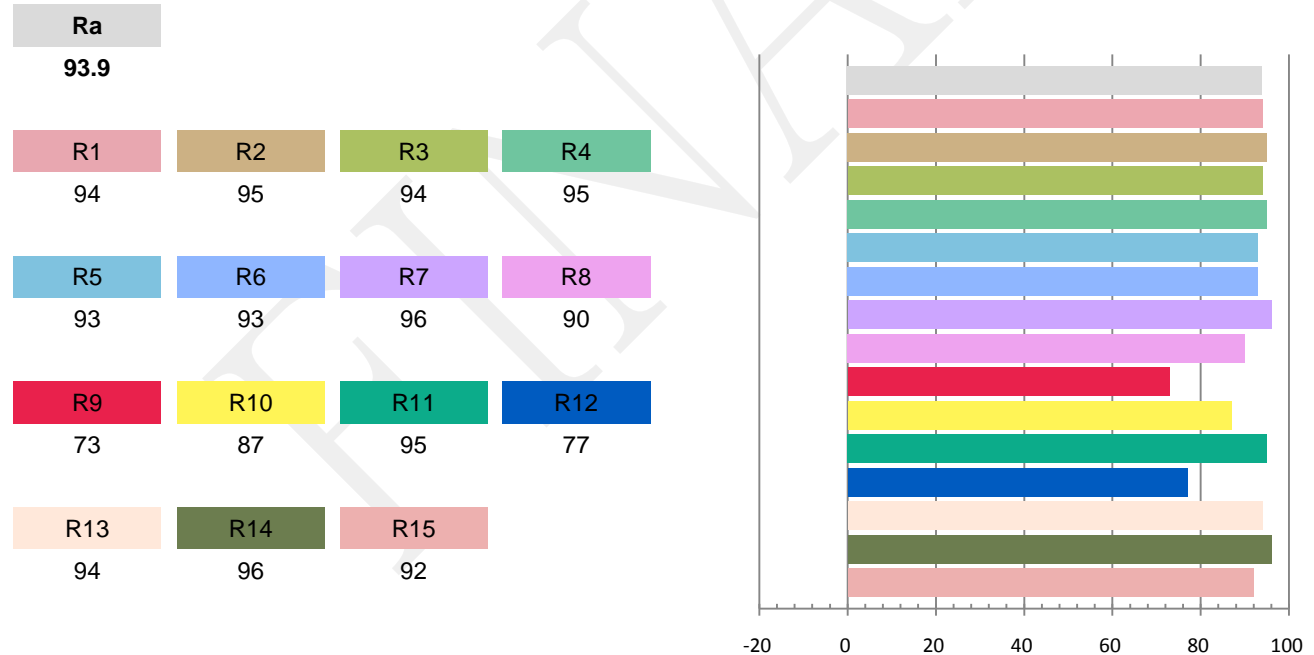
Test orientation: **Downward**

### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1606	19.13	0.9927	1470.2	76.84

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
5.164	3066	0.00271	0.4362	0.4106	0.2473	0.5238

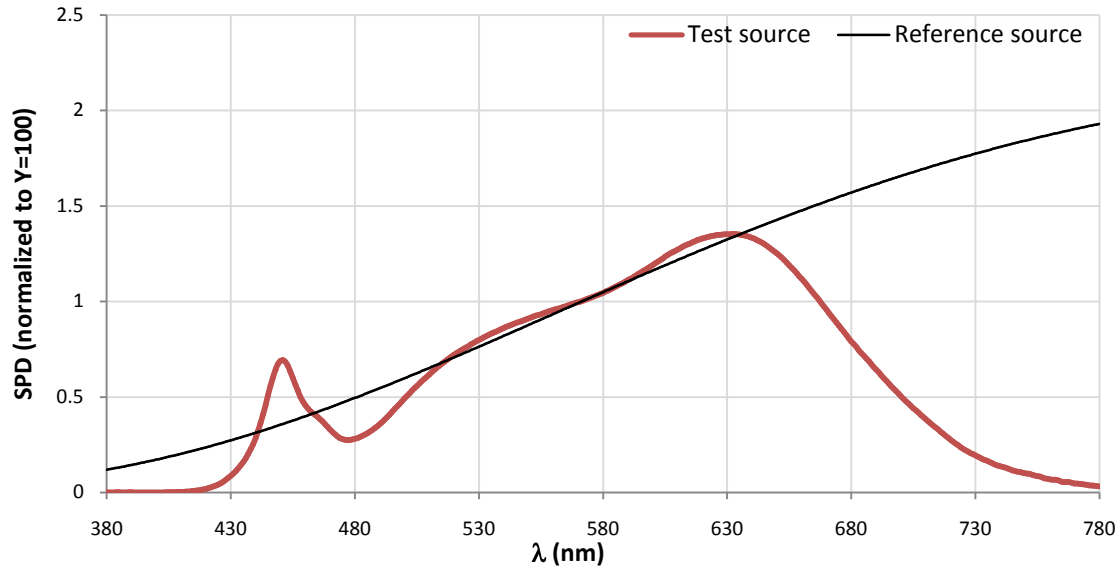
### Color Rendering Index



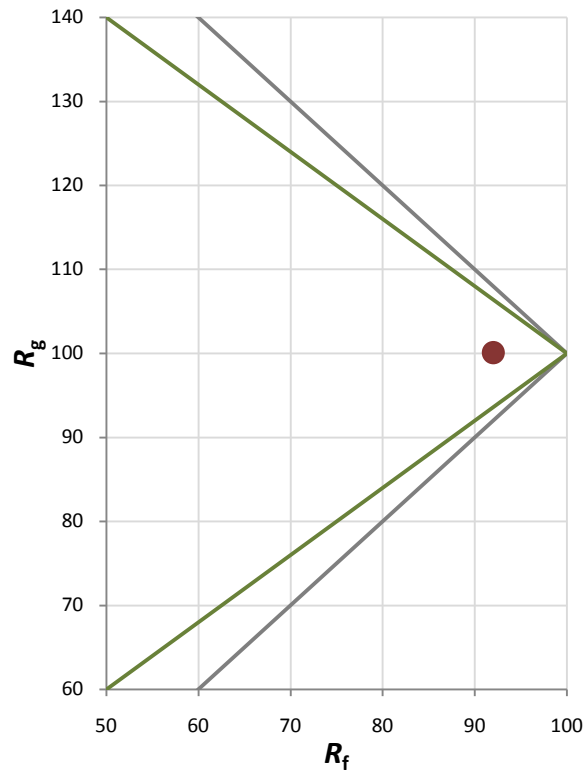
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	92
Gamut Index $R_g$	100

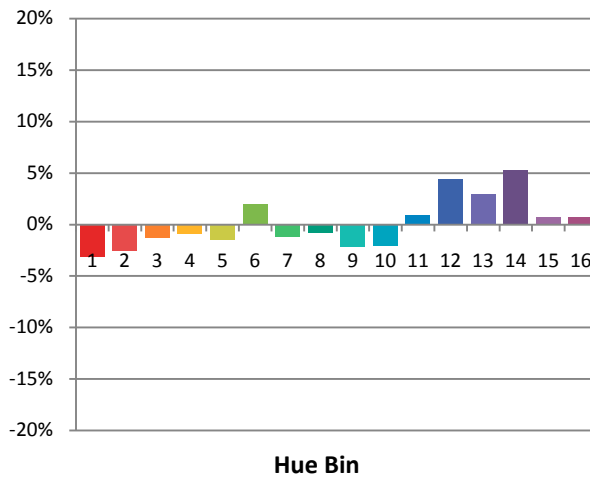
### Spectral Power Distribution Comparison



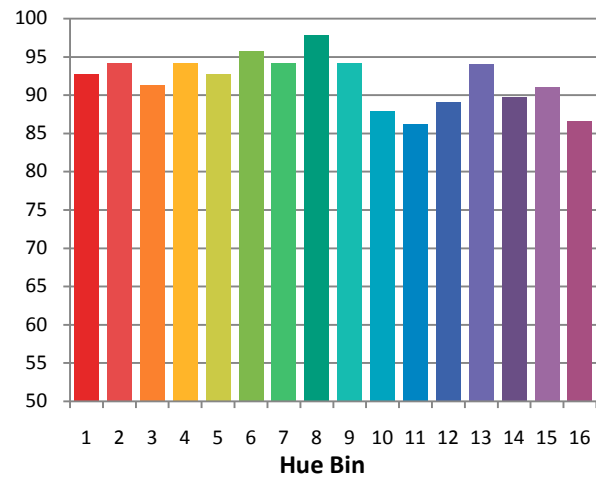
### Plot of $R_g$ versus $R_f$



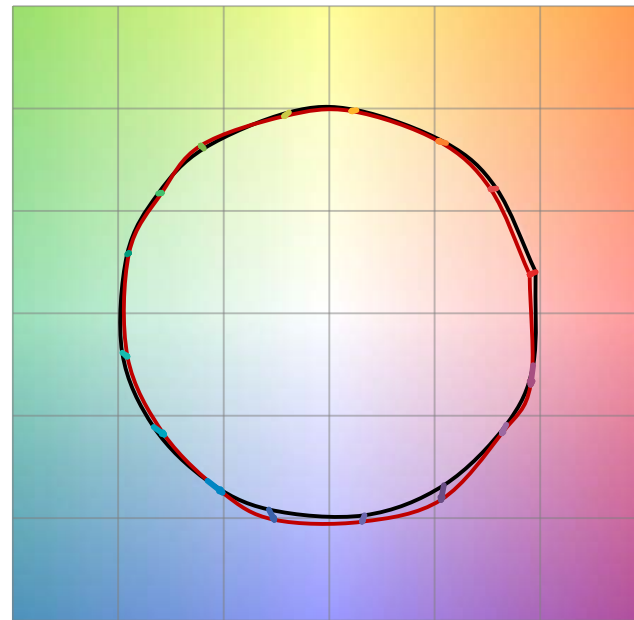
Chroma Shift by Hue



$R_t$  by Hue

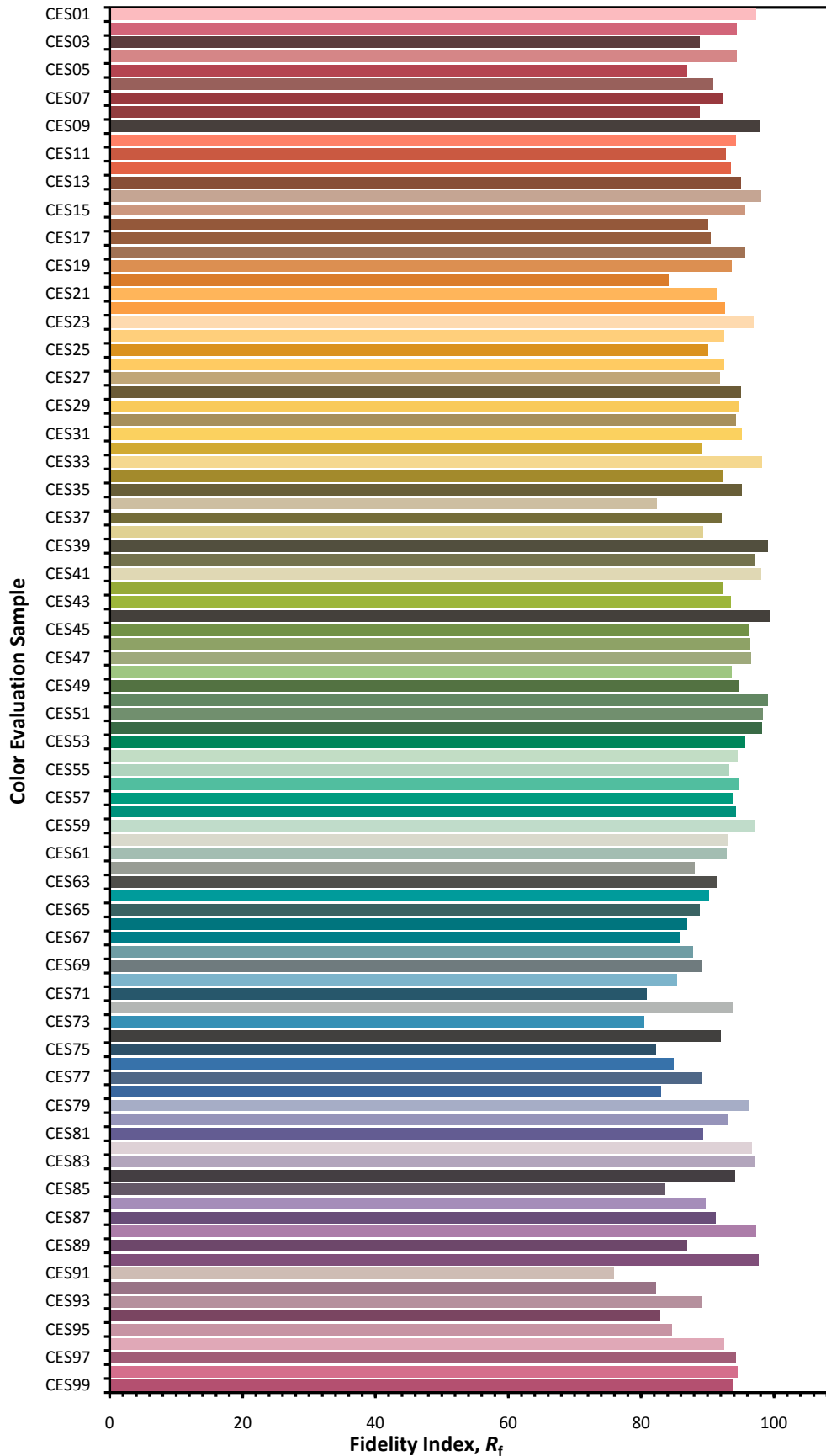


Color Vector Graphic

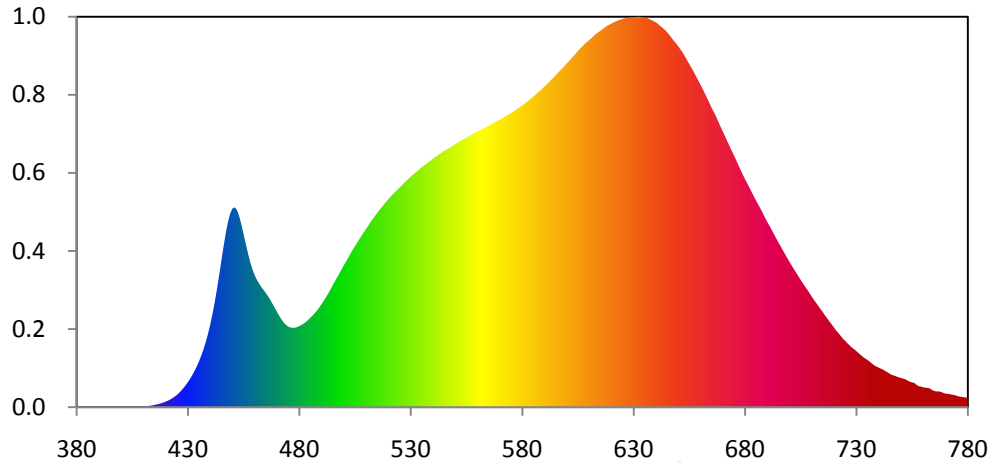


— Reference Illuminant — Test Source

### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

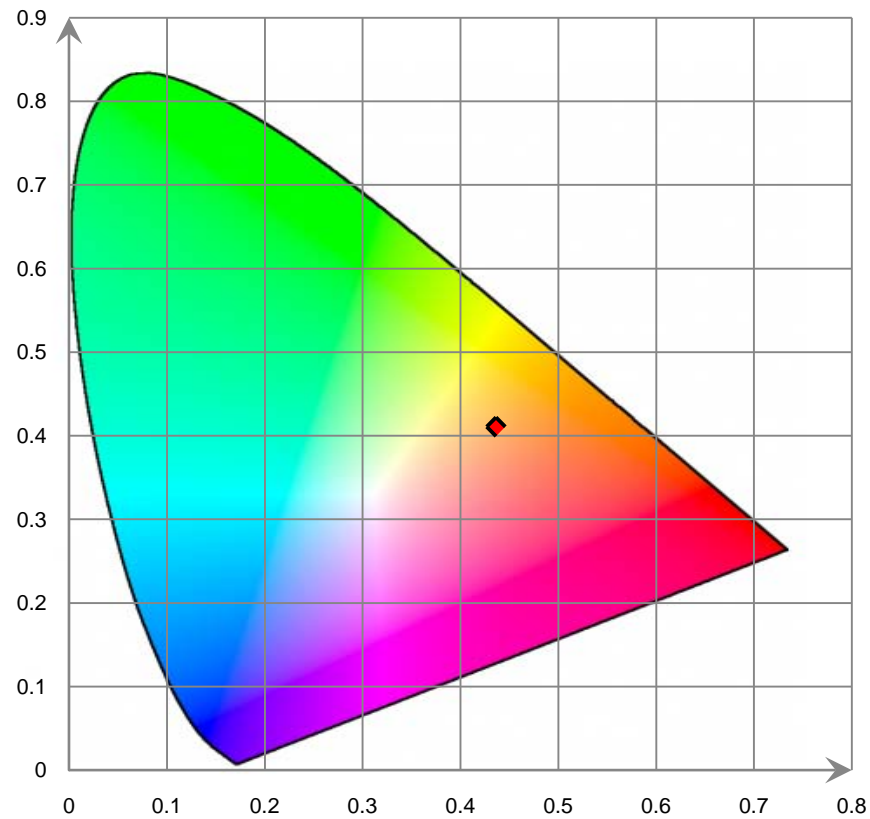


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.670E-02	421	4.866E-01	462	9.206E+00	503	1.147E+01	544	1.901E+01
381	1.440E-02	422	5.666E-01	463	8.955E+00	504	1.176E+01	545	1.911E+01
382	8.300E-03	423	6.693E-01	464	8.736E+00	505	1.202E+01	546	1.921E+01
383	1.450E-02	424	7.828E-01	465	8.511E+00	506	1.228E+01	547	1.931E+01
384	2.160E-02	425	9.062E-01	466	8.266E+00	507	1.255E+01	548	1.941E+01
385	1.780E-02	426	1.057E+00	467	7.991E+00	508	1.281E+01	549	1.952E+01
386	1.330E-02	427	1.240E+00	468	7.696E+00	509	1.306E+01	550	1.963E+01
387	1.190E-02	428	1.431E+00	469	7.407E+00	510	1.332E+01	551	1.973E+01
388	1.220E-02	429	1.640E+00	470	7.107E+00	511	1.356E+01	552	1.983E+01
389	2.230E-02	430	1.873E+00	471	6.810E+00	512	1.381E+01	553	1.994E+01
390	2.360E-02	431	2.125E+00	472	6.546E+00	513	1.405E+01	554	2.002E+01
391	1.250E-02	432	2.406E+00	473	6.317E+00	514	1.428E+01	555	2.010E+01
392	9.500E-03	433	2.718E+00	474	6.144E+00	515	1.451E+01	556	2.021E+01
393	7.500E-03	434	3.055E+00	475	6.023E+00	516	1.473E+01	557	2.031E+01
394	9.500E-03	435	3.433E+00	476	5.947E+00	517	1.492E+01	558	2.040E+01
395	1.040E-02	436	3.854E+00	477	5.922E+00	518	1.513E+01	559	2.049E+01
396	7.400E-03	437	4.328E+00	478	5.930E+00	519	1.534E+01	560	2.057E+01
397	5.500E-03	438	4.863E+00	479	5.979E+00	520	1.553E+01	561	2.066E+01
398	2.600E-03	439	5.459E+00	480	6.045E+00	521	1.572E+01	562	2.074E+01
399	1.600E-03	440	6.147E+00	481	6.139E+00	522	1.590E+01	563	2.082E+01
400	5.700E-03	441	6.931E+00	482	6.243E+00	523	1.606E+01	564	2.092E+01
401	7.300E-03	442	7.812E+00	483	6.369E+00	524	1.622E+01	565	2.100E+01
402	5.900E-03	443	8.788E+00	484	6.522E+00	525	1.639E+01	566	2.109E+01
403	9.200E-03	444	9.829E+00	485	6.682E+00	526	1.655E+01	567	2.119E+01
404	1.600E-02	445	1.092E+01	486	6.847E+00	527	1.672E+01	568	2.129E+01
405	1.840E-02	446	1.200E+01	487	7.029E+00	528	1.688E+01	569	2.138E+01
406	2.440E-02	447	1.299E+01	488	7.230E+00	529	1.705E+01	570	2.146E+01
407	2.790E-02	448	1.384E+01	489	7.452E+00	530	1.720E+01	571	2.154E+01
408	3.010E-02	449	1.446E+01	490	7.693E+00	531	1.735E+01	572	2.164E+01
409	5.690E-02	450	1.483E+01	491	7.949E+00	532	1.749E+01	573	2.175E+01
410	7.710E-02	451	1.492E+01	492	8.213E+00	533	1.762E+01	574	2.186E+01
411	8.150E-02	452	1.471E+01	493	8.494E+00	534	1.777E+01	575	2.196E+01
412	8.910E-02	453	1.426E+01	494	8.792E+00	535	1.792E+01	576	2.205E+01
413	1.077E-01	454	1.362E+01	495	9.099E+00	536	1.804E+01	577	2.216E+01
414	1.352E-01	455	1.291E+01	496	9.398E+00	537	1.815E+01	578	2.228E+01
415	1.666E-01	456	1.216E+01	497	9.703E+00	538	1.828E+01	579	2.239E+01
416	2.048E-01	457	1.145E+01	498	9.999E+00	539	1.841E+01	580	2.251E+01
417	2.425E-01	458	1.080E+01	499	1.029E+01	540	1.854E+01	581	2.263E+01
418	2.924E-01	459	1.027E+01	500	1.059E+01	541	1.866E+01	582	2.276E+01
419	3.471E-01	460	9.834E+00	501	1.088E+01	542	1.878E+01	583	2.290E+01
420	4.112E-01	461	9.488E+00	502	1.118E+01	543	1.890E+01	584	2.304E+01

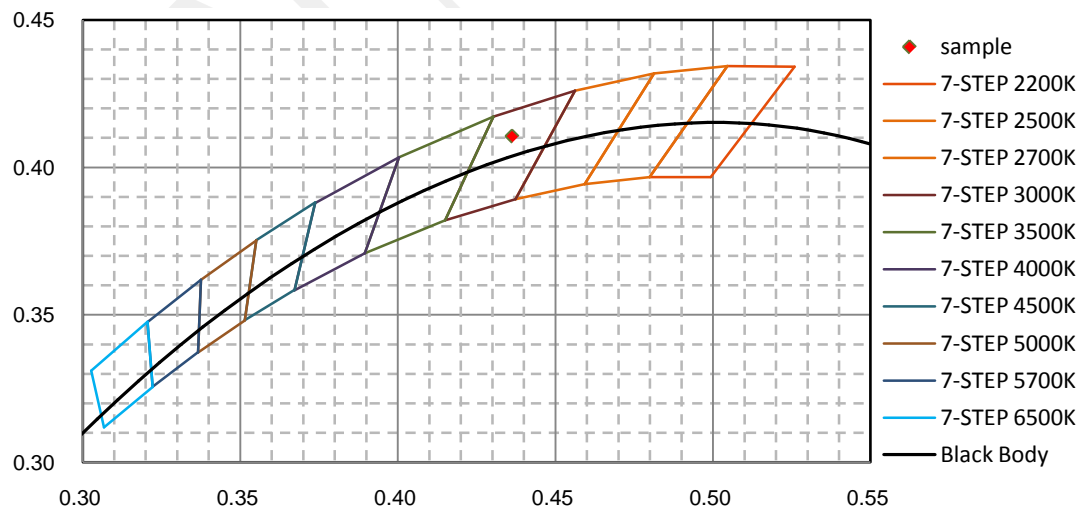


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.318E+01	626	2.901E+01	667	2.171E+01	708	8.768E+00	749	2.229E+00
586	2.332E+01	627	2.904E+01	668	2.132E+01	709	8.514E+00	750	2.176E+00
587	2.346E+01	628	2.907E+01	669	2.094E+01	710	8.246E+00	751	2.137E+00
588	2.360E+01	629	2.909E+01	670	2.060E+01	711	8.002E+00	752	2.081E+00
589	2.375E+01	630	2.910E+01	671	2.024E+01	712	7.774E+00	753	1.992E+00
590	2.393E+01	631	2.911E+01	672	1.987E+01	713	7.541E+00	754	1.902E+00
591	2.409E+01	632	2.913E+01	673	1.952E+01	714	7.308E+00	755	1.847E+00
592	2.425E+01	633	2.913E+01	674	1.916E+01	715	7.087E+00	756	1.814E+00
593	2.442E+01	634	2.910E+01	675	1.882E+01	716	6.832E+00	757	1.675E+00
594	2.459E+01	635	2.908E+01	676	1.846E+01	717	6.616E+00	758	1.569E+00
595	2.476E+01	636	2.903E+01	677	1.809E+01	718	6.384E+00	759	1.538E+00
596	2.494E+01	637	2.897E+01	678	1.773E+01	719	6.167E+00	760	1.483E+00
597	2.511E+01	638	2.890E+01	679	1.737E+01	720	5.943E+00	761	1.457E+00
598	2.527E+01	639	2.880E+01	680	1.703E+01	721	5.715E+00	762	1.439E+00
599	2.545E+01	640	2.872E+01	681	1.671E+01	722	5.526E+00	763	1.397E+00
600	2.564E+01	641	2.860E+01	682	1.640E+01	723	5.319E+00	764	1.281E+00
601	2.582E+01	642	2.844E+01	683	1.606E+01	724	5.117E+00	765	1.203E+00
602	2.601E+01	643	2.831E+01	684	1.573E+01	725	4.947E+00	766	1.173E+00
603	2.619E+01	644	2.816E+01	685	1.542E+01	726	4.769E+00	767	1.176E+00
604	2.637E+01	645	2.800E+01	686	1.511E+01	727	4.609E+00	768	1.141E+00
605	2.657E+01	646	2.780E+01	687	1.481E+01	728	4.449E+00	769	1.068E+00
606	2.675E+01	647	2.758E+01	688	1.448E+01	729	4.330E+00	770	1.015E+00
607	2.692E+01	648	2.736E+01	689	1.414E+01	730	4.185E+00	771	9.977E-01
608	2.709E+01	649	2.716E+01	690	1.383E+01	731	4.039E+00	772	9.678E-01
609	2.724E+01	650	2.695E+01	691	1.355E+01	732	3.888E+00	773	9.375E-01
610	2.738E+01	651	2.671E+01	692	1.324E+01	733	3.754E+00	774	9.024E-01
611	2.752E+01	652	2.647E+01	693	1.292E+01	734	3.637E+00	775	8.603E-01
612	2.769E+01	653	2.619E+01	694	1.261E+01	735	3.524E+00	776	7.946E-01
613	2.784E+01	654	2.590E+01	695	1.230E+01	736	3.399E+00	777	7.777E-01
614	2.795E+01	655	2.561E+01	696	1.201E+01	737	3.261E+00	778	7.472E-01
615	2.807E+01	656	2.532E+01	697	1.172E+01	738	3.132E+00	779	7.268E-01
616	2.819E+01	657	2.503E+01	698	1.142E+01	739	3.031E+00	780	6.747E-01
617	2.832E+01	658	2.471E+01	699	1.113E+01	740	2.956E+00		
618	2.844E+01	659	2.439E+01	700	1.084E+01	741	2.877E+00		
619	2.853E+01	660	2.408E+01	701	1.057E+01	742	2.805E+00		
620	2.862E+01	661	2.376E+01	702	1.029E+01	743	2.701E+00		
621	2.871E+01	662	2.341E+01	703	1.003E+01	744	2.603E+00		
622	2.878E+01	663	2.307E+01	704	9.765E+00	745	2.498E+00		
623	2.885E+01	664	2.272E+01	705	9.500E+00	746	2.402E+00		
624	2.891E+01	665	2.235E+01	706	9.250E+00	747	2.357E+00		
625	2.897E+01	666	2.204E+01	707	9.008E+00	748	2.292E+00		

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**

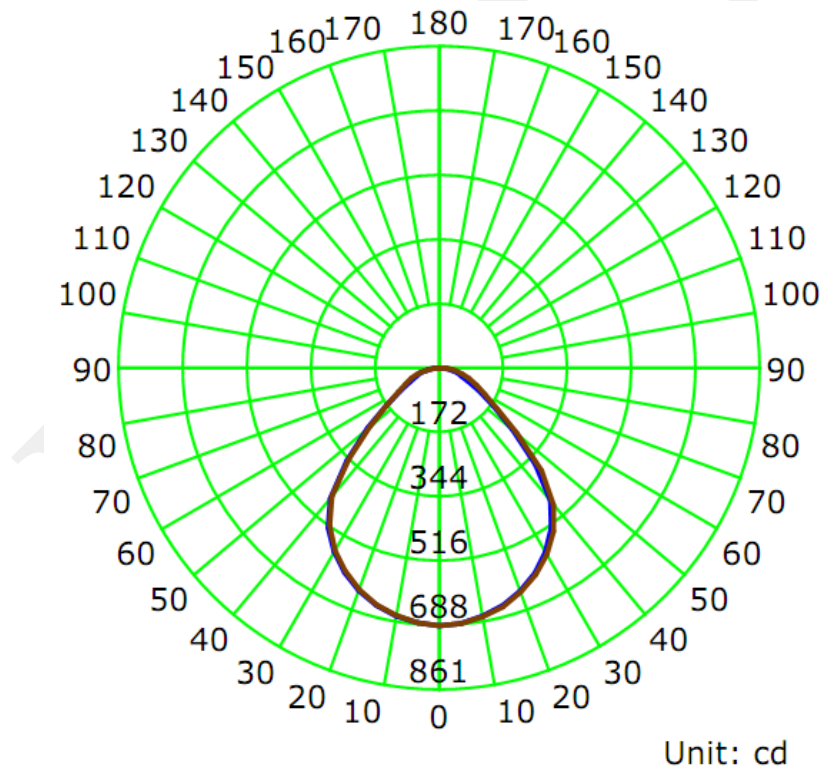
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1600	19.13	0.9950

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I <sub>max</sub> (cd)	S/MH (C0/180)	S/MH (C90/270)
1474.8	77.15	688.9	1.23	1.23

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	91.4	91.8	91.9	91.8	91.7
Field Angle (10% I <sub>max</sub> ):	138.7	143.5	146.6	143.0	143.0

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	689	689	689	689	689	689	689	689
5.0°	686	685	686	686	687	686	686	686
10.0°	675	676	676	676	677	677	677	676
15.0°	659	659	660	661	661	661	661	659
20.0°	636	637	638	639	639	639	639	638
25.0°	607	607	609	611	612	612	611	608
30.0°	571	572	574	576	577	576	575	574
35.0°	525	527	530	533	534	533	532	529
40.0°	464	468	473	478	479	477	475	469
45.0°	366	372	380	387	388	385	382	374
50.0°	258	262	268	273	274	272	269	265
55.0°	179	183	188	191	192	192	189	186
60.0°	123	134	134	134	143	135	135	135
65.0°	87	102	100	95	111	97	100	104
70.0°	66	79	78	72	87	74	78	82
75.0°	51	59	59	56	65	58	60	62
80.0°	35	38	39	39	43	40	41	40
85.0°	16	17	18	19	22	20	19	18
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	0	0	0	0	0	0	0	0
130.0°	0	0	0	0	0	0	0	0
135.0°	0	0	0	0	0	0	0	0
140.0°	0	0	0	0	0	0	0	0
145.0°	0	0	0	0	0	0	0	0
150.0°	0	0	0	0	0	0	0	0
155.0°	0	0	0	0	0	0	0	0
160.0°	0	0	0	0	0	0	0	0
165.0°	0	0	0	0	0	0	0	0
170.0°	0	0	0	0	0	0	0	0
175.0°	0	0	0	0	0	0	0	0
180.0°	0	0	0	0	0	0	0	0

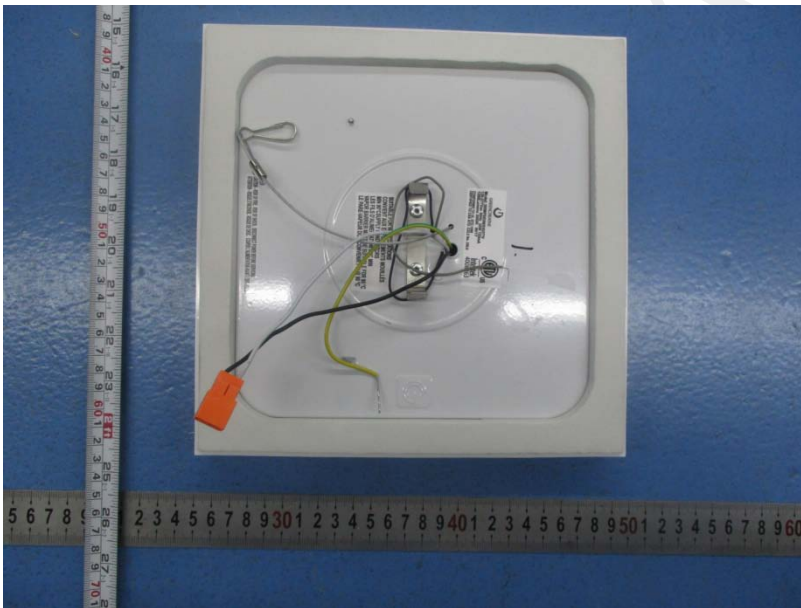
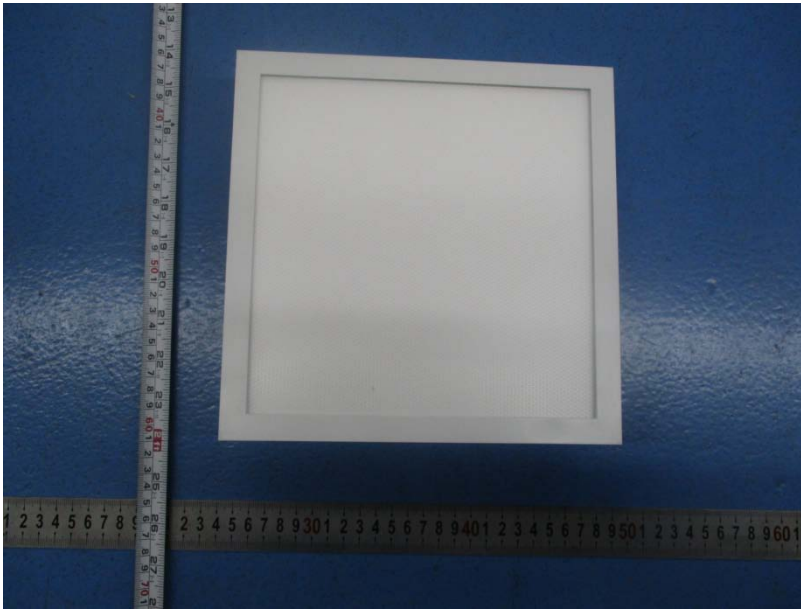
Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ Y \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	689	689	689	689	689	689	689	689
5.0°	685	685	684	685	685	684	684	684
10.0°	675	674	673	673	672	672	674	673
15.0°	657	657	655	655	656	655	655	655
20.0°	634	633	632	632	632	631	631	632
25.0°	604	603	602	601	601	600	601	601
30.0°	569	566	564	563	563	563	563	565
35.0°	521	520	517	516	516	515	516	517
40.0°	455	453	452	451	449	450	453	454
45.0°	354	351	349	345	345	345	347	348
50.0°	251	247	246	245	243	242	243	244
55.0°	176	175	173	172	172	169	169	171
60.0°	121	127	123	119	129	118	120	126
65.0°	88	98	93	87	100	86	89	97
70.0°	66	77	73	67	79	67	71	76
75.0°	52	57	55	51	58	52	53	55
80.0°	36	36	34	34	36	33	34	35
85.0°	15	14	13	13	14	12	12	12
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	0	0	0	0	0	0	0	0
130.0°	0	0	0	0	0	0	0	0
135.0°	0	0	0	0	0	0	0	0
140.0°	0	0	0	0	0	0	0	0
145.0°	0	0	0	0	0	0	0	0
150.0°	0	0	0	0	0	0	0	0
155.0°	0	0	0	0	0	0	0	0
160.0°	0	0	0	0	0	0	0	0
165.0°	0	0	0	0	0	0	0	0
170.0°	0	0	0	0	0	0	0	0
175.0°	0	0	0	0	0	0	0	0
180.0°	0	0	0	0	0	0	0	0

### Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	16.4	1.11	0-5	16.4	1.11
5-10	48.6	3.30	0-10	65.1	4.41
10-15	79.1	5.36	0-15	144.1	9.77
15-20	106.6	7.22	0-20	250.7	17.00
20-25	130.1	8.82	0-25	380.8	25.82
25-30	148.7	10.08	0-30	529.5	35.90
30-35	161.0	10.91	0-35	690.4	46.82
35-40	164.5	11.16	0-40	855.0	57.97
40-45	152.9	10.37	0-45	1007.9	68.34
45-50	125.3	8.49	0-50	1133.2	76.83
50-55	94.8	6.43	0-55	1228.0	83.26
55-60	71.3	4.83	0-60	1299.3	88.10
60-65	54.5	3.70	0-65	1353.9	91.80
65-70	43.1	2.92	0-70	1397.0	94.72
70-75	34.2	2.32	0-75	1431.2	97.04
75-80	25.0	1.70	0-80	1456.2	98.74
80-85	14.3	0.97	0-85	1470.6	99.71
85-90	4.3	0.29	0-90	1474.8	100.00
90-95	0.0	0.00	0-95	1474.8	100.00
95-100	0.0	0.00	0-100	1474.8	100.00
100-105	0.0	0.00	0-105	1474.8	100.00
105-110	0.0	0.00	0-110	1474.8	100.00
110-115	0.0	0.00	0-115	1474.8	100.00
115-120	0.0	0.00	0-120	1474.8	100.00
120-125	0.0	0.00	0-125	1474.8	100.00
125-130	0.0	0.00	0-130	1474.8	100.00
130-135	0.0	0.00	0-135	1474.8	100.00
135-140	0.0	0.00	0-140	1474.8	100.00
140-145	0.0	0.00	0-145	1474.8	100.00
145-150	0.0	0.00	0-150	1474.8	100.00
150-155	0.0	0.00	0-155	1474.8	100.00
155-160	0.0	0.00	0-160	1474.8	100.00
160-165	0.0	0.00	0-165	1474.8	100.00
165-170	0.0	0.00	0-170	1474.8	100.00
170-175	0.0	0.00	0-175	1474.8	100.00
175-180	0.0	0.00	0-180	1474.8	100.00

## 6. Product Photo



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