

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE109027DIM120VMD/ADR4BL

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190329021-10-2
Test Date:	2019-04-03 to 2019-04-04
Report Date:	2019-05-16
Reviewed By:	Ray Gao/EE Engineer <i>Ry Gao</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan). No.248 Chenghu Road, Kunshan, Jiangsu province, China. Tel: +86-0512-86175000 Fax: +86-0512-88934268
Test Facility:	Test facility was located at No.248 Chenghu Road, Kunshan, Jiangsu province, China.
Accreditation:	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 2019-03-29 and used for testing.

Model Tested: LE109027DIM120VMD/ADR4BL
 Manufacturer: GREEN CREATIVE LTD
 Brand Name: GREEN CREATIVE
 Product Designation: LED Recessed Downlight
 Aging Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120-277 VAC 60Hz
 Rated Power: 12W
 Nominal CCT: 2700K
 Nominal Lumen Output: 900lm

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	2019-01-23	2020-01-23
Power Meter	INVENTFINE	WT500	GSJWQ20009	2018-04-23	2019-04-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2019-01-23	2020-01-23
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2018-04-23	2019-04-22
Standard Light Source	INVENTFINE	N/A	JWWCR020106	2018-12-24	2019-12-24
Thermal Meter	KEJIAN	TA298	N/A	2018-12-01	2019-12-01
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	2018-04-23	2019-04-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2018-04-23	2019-04-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2018-04-23	2019-04-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	2018-04-23	2019-04-22
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	2019-01-24	2020-01-24
Wireless Weather Station	ZHONGXING	KG218	N/A	2018-12-01	2019-12-01
Standard Light Source	INVENTFINE	N/A	JWBYR040008	2019-03-08	2020-03-08

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.

4π 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 $U_{rel}=2.61\%$ ($k=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=34\text{K}$ ($k=2$), 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 $U_{rel}=0.48\%$ of rdg, AC Voltage $U_{rel}=0.25\%$ of rdg, Power $U_{rel}=0.44\%$, ($k=2$), 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 (γ) 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 $U_{rel}=2.6\%$ ($k=2$), at the 95% confidence level.

Fidelity Index and Gamut Index Calculation

The R_f , 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**

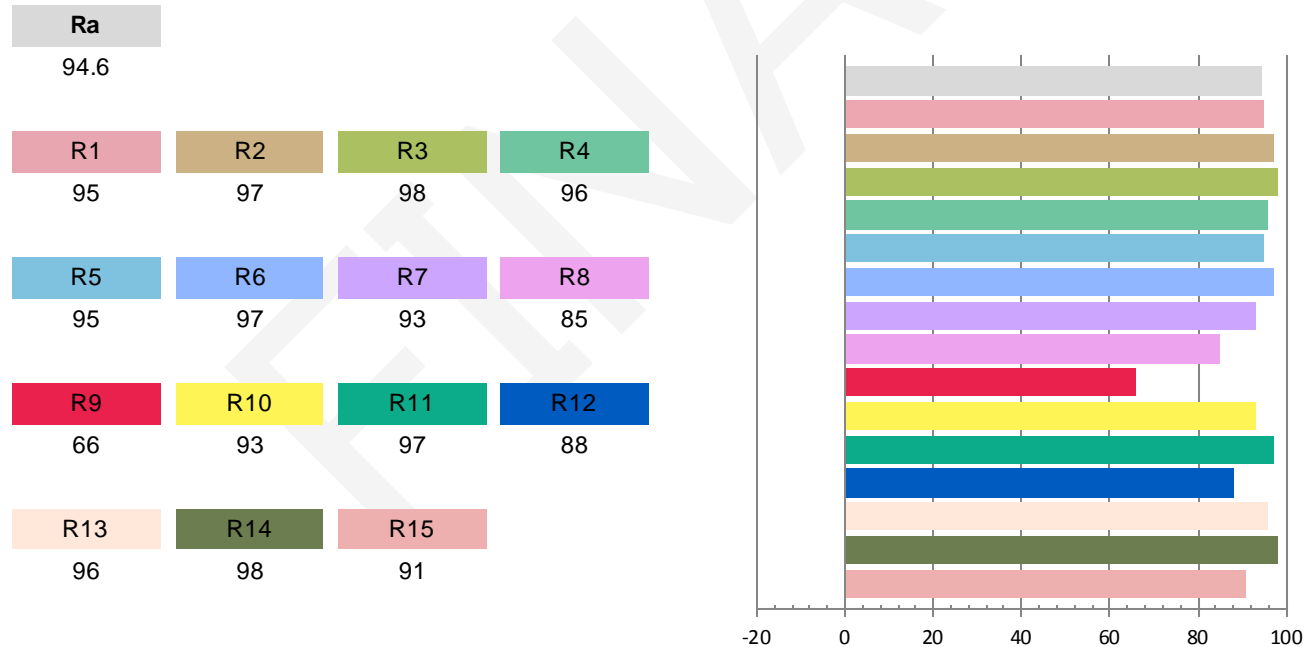
Test orientation: **Downward**

Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.1029	12.2	0.988	949.75	77.85

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.357	2730	-0.00019	0.4571	0.4095	0.2613	0.5265

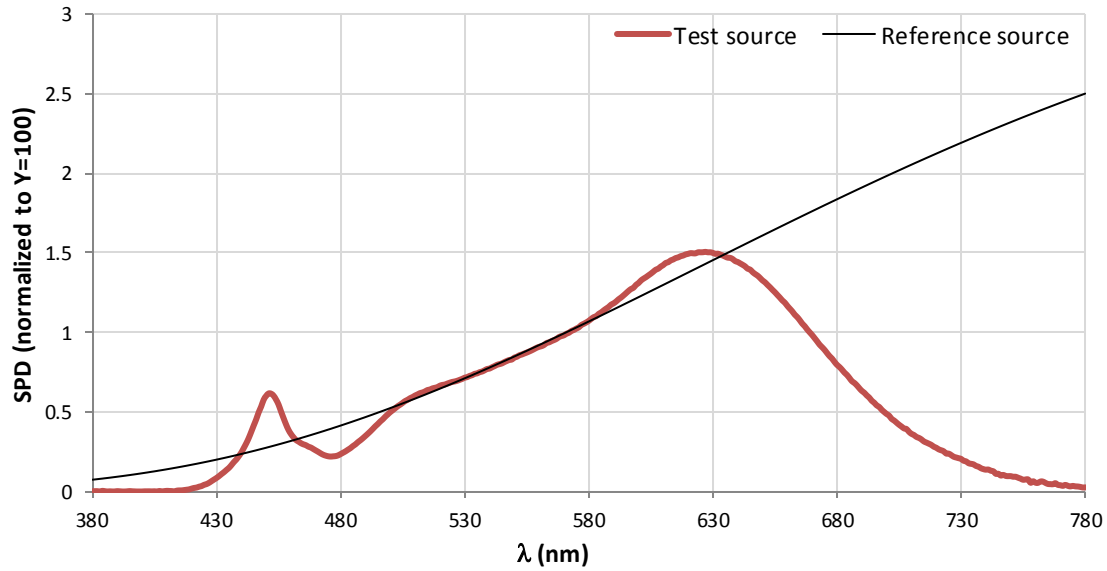
Color Rendering Index



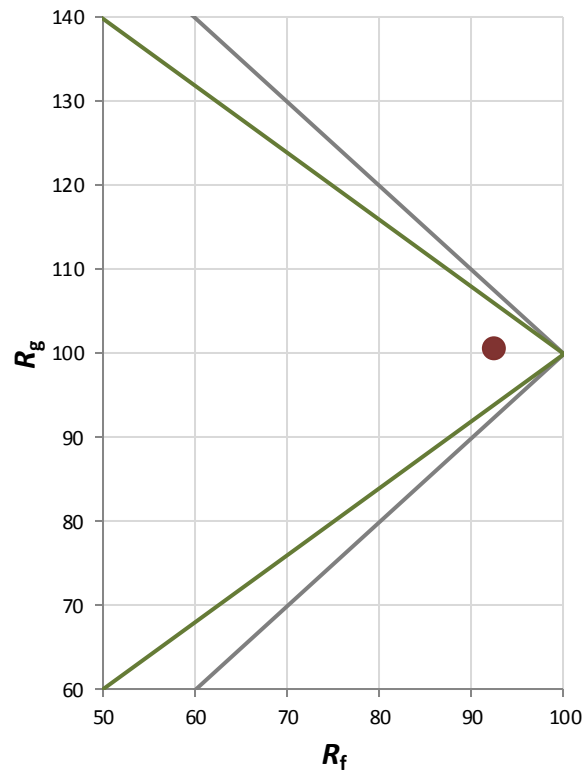
Fidelity Index and Gamut Index

Fidelity Index R_f	92
Gamut Index R_g	101

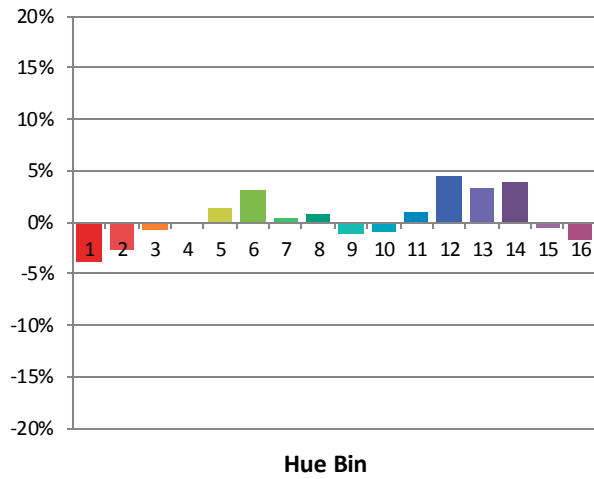
Spectral Power Distribution Comparison



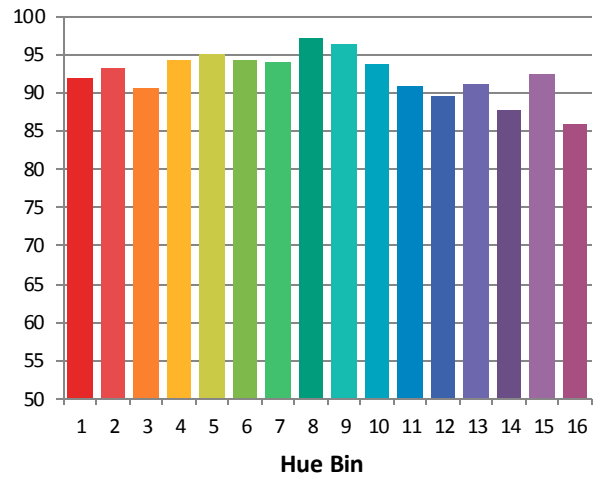
Plot of R_g versus R_f



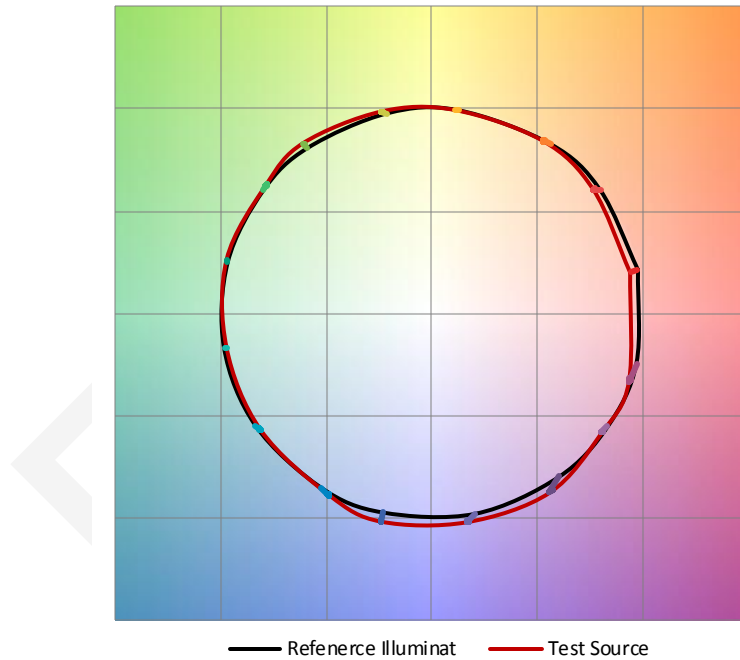
Chroma Shift by Hue



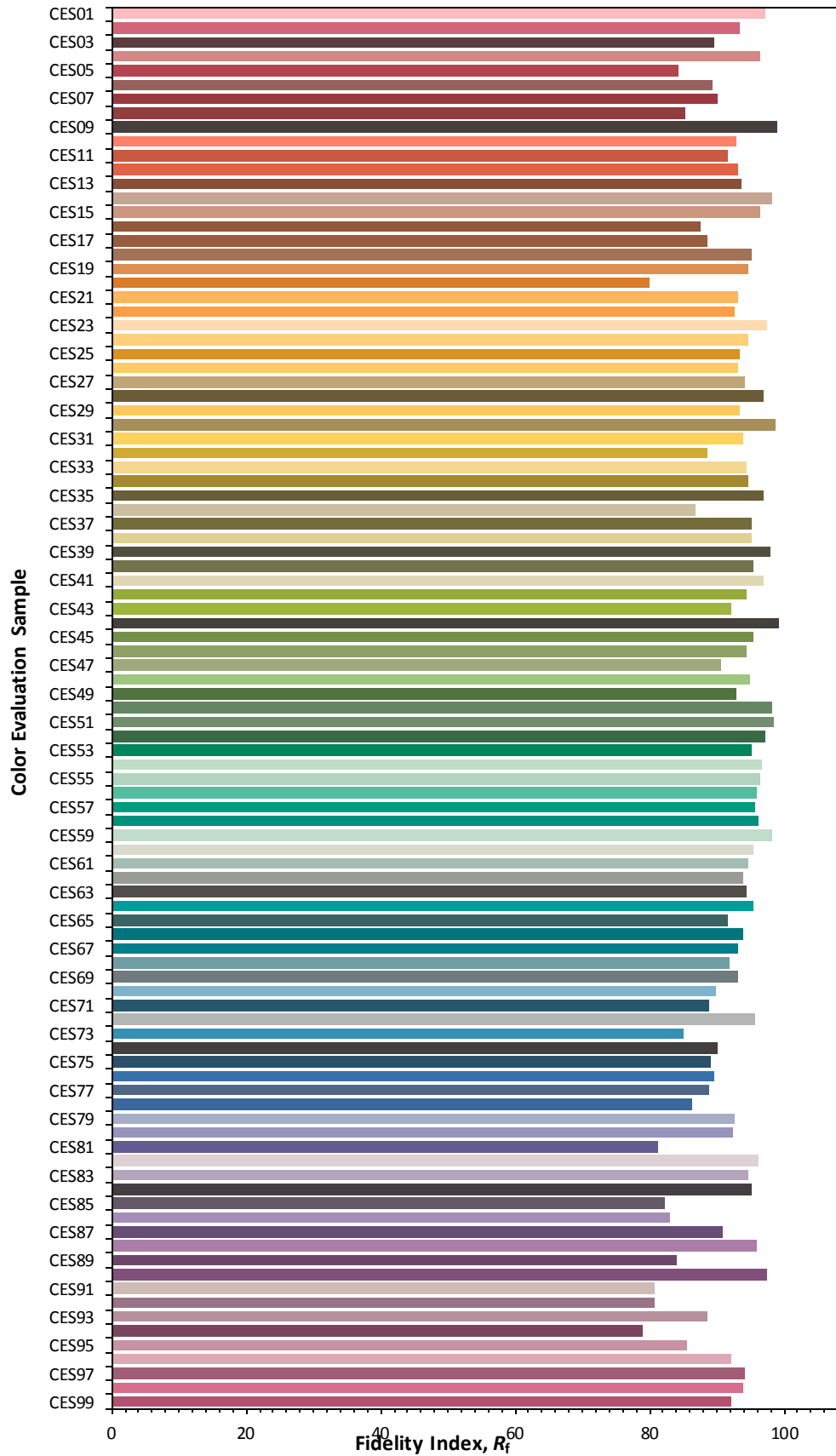
R_f by Hue



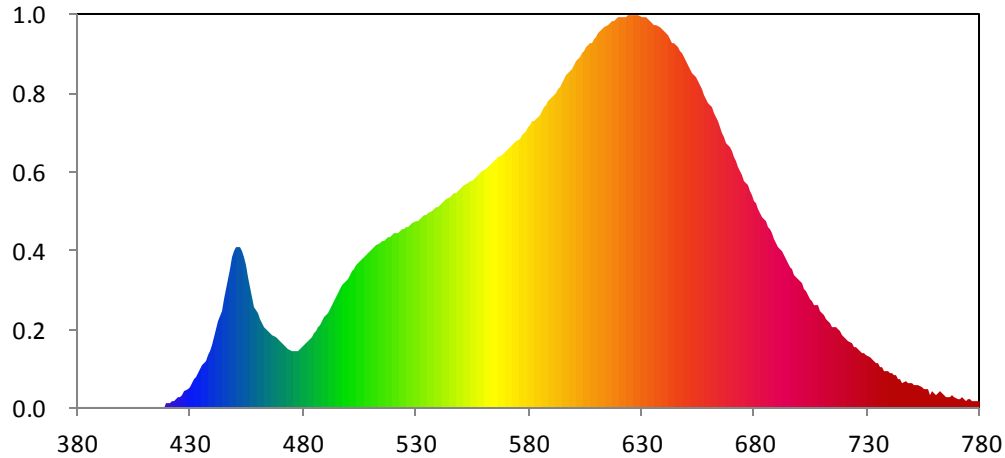
Color Vector Graphic



Color Fidelity by CES Sample



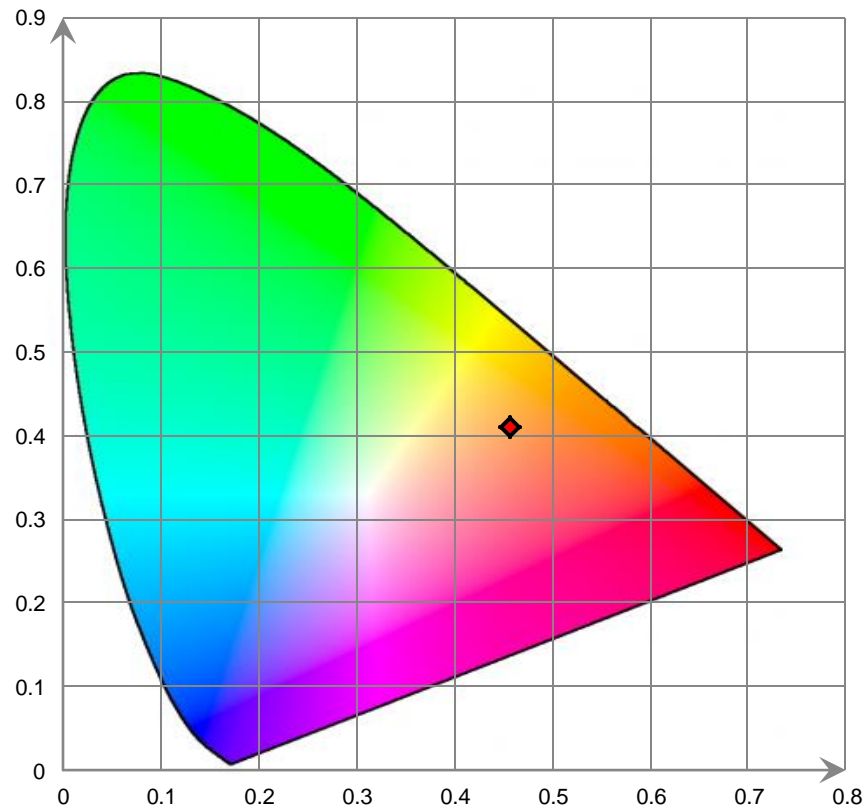
Relative Spectral Power Distribution



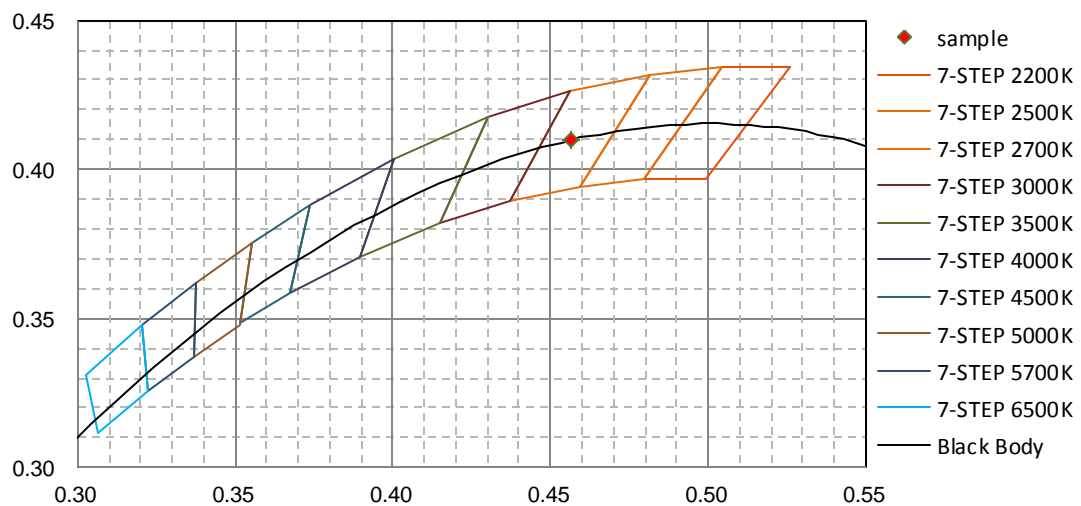
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.040E-02	421	3.109E-01	462	4.502E+00	503	7.448E+00	544	1.113E+01
381	2.870E-02	422	3.476E-01	463	4.367E+00	504	7.589E+00	545	1.119E+01
382	2.840E-02	423	4.217E-01	464	4.224E+00	505	7.744E+00	546	1.131E+01
383	4.200E-03	424	4.781E-01	465	4.121E+00	506	7.902E+00	547	1.141E+01
384	5.500E-02	425	5.828E-01	466	4.047E+00	507	8.014E+00	548	1.149E+01
385	2.800E-02	426	6.503E-01	467	3.921E+00	508	8.151E+00	549	1.153E+01
386	2.300E-03	427	7.621E-01	468	3.842E+00	509	8.252E+00	550	1.170E+01
387	1.420E-02	428	9.047E-01	469	3.714E+00	510	8.381E+00	551	1.177E+01
388	2.300E-03	429	1.044E+00	470	3.586E+00	511	8.482E+00	552	1.190E+01
389	3.300E-03	430	1.184E+00	471	3.462E+00	512	8.595E+00	553	1.197E+01
390	3.050E-02	431	1.341E+00	472	3.327E+00	513	8.653E+00	554	1.206E+01
391	1.580E-02	432	1.521E+00	473	3.213E+00	514	8.744E+00	555	1.214E+01
392	7.000E-04	433	1.686E+00	474	3.133E+00	515	8.861E+00	556	1.223E+01
393	0.000E+00	434	1.877E+00	475	3.078E+00	516	8.910E+00	557	1.233E+01
394	1.340E-02	435	2.062E+00	476	3.054E+00	517	9.006E+00	558	1.245E+01
395	3.470E-02	436	2.307E+00	477	3.072E+00	518	9.061E+00	559	1.256E+01
396	1.830E-02	437	2.573E+00	478	3.094E+00	519	9.122E+00	560	1.264E+01
397	8.000E-03	438	2.800E+00	479	3.158E+00	520	9.241E+00	561	1.270E+01
398	8.000E-04	439	3.090E+00	480	3.269E+00	521	9.309E+00	562	1.281E+01
399	1.000E-04	440	3.406E+00	481	3.390E+00	522	9.347E+00	563	1.297E+01
400	0.000E+00	441	3.805E+00	482	3.511E+00	523	9.427E+00	564	1.303E+01
401	1.270E-02	442	4.215E+00	483	3.655E+00	524	9.504E+00	565	1.314E+01
402	1.370E-02	443	4.678E+00	484	3.796E+00	525	9.574E+00	566	1.323E+01
403	1.670E-02	444	5.214E+00	485	3.973E+00	526	9.614E+00	567	1.334E+01
404	7.900E-03	445	5.767E+00	486	4.121E+00	527	9.675E+00	568	1.349E+01
405	1.850E-02	446	6.304E+00	487	4.316E+00	528	9.757E+00	569	1.358E+01
406	3.400E-03	447	6.918E+00	488	4.478E+00	529	9.841E+00	570	1.365E+01
407	4.400E-02	448	7.420E+00	489	4.662E+00	530	9.944E+00	571	1.378E+01
408	1.120E-02	449	8.017E+00	490	4.854E+00	531	9.996E+00	572	1.387E+01
409	3.230E-02	450	8.351E+00	491	5.051E+00	532	1.010E+01	573	1.403E+01
410	5.490E-02	451	8.566E+00	492	5.257E+00	533	1.016E+01	574	1.412E+01
411	4.410E-02	452	8.547E+00	493	5.476E+00	534	1.028E+01	575	1.424E+01
412	3.400E-02	453	8.368E+00	494	5.701E+00	535	1.032E+01	576	1.435E+01
413	1.600E-02	454	8.029E+00	495	5.900E+00	536	1.042E+01	577	1.455E+01
414	7.240E-02	455	7.594E+00	496	6.121E+00	537	1.048E+01	578	1.465E+01
415	9.410E-02	456	6.991E+00	497	6.310E+00	538	1.059E+01	579	1.478E+01
416	9.660E-02	457	6.422E+00	498	6.536E+00	539	1.070E+01	580	1.491E+01
417	1.259E-01	458	5.870E+00	499	6.734E+00	540	1.074E+01	581	1.508E+01
418	1.555E-01	459	5.385E+00	500	6.931E+00	541	1.085E+01	582	1.523E+01
419	1.886E-01	460	5.024E+00	501	7.100E+00	542	1.095E+01	583	1.532E+01
420	2.536E-01	461	4.740E+00	502	7.273E+00	543	1.107E+01	584	1.552E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.565E+01	626	2.091E+01	667	1.444E+01	708	5.457E+00	749	1.343E+00
586	1.582E+01	627	2.094E+01	668	1.416E+01	709	5.217E+00	750	1.341E+00
587	1.598E+01	628	2.090E+01	669	1.391E+01	710	5.040E+00	751	1.288E+00
588	1.613E+01	629	2.090E+01	670	1.366E+01	711	4.934E+00	752	1.287E+00
589	1.632E+01	630	2.084E+01	671	1.339E+01	712	4.771E+00	753	1.199E+00
590	1.644E+01	631	2.076E+01	672	1.312E+01	713	4.682E+00	754	1.122E+00
591	1.660E+01	632	2.078E+01	673	1.283E+01	714	4.553E+00	755	1.023E+00
592	1.679E+01	633	2.069E+01	674	1.261E+01	715	4.376E+00	756	1.053E+00
593	1.695E+01	634	2.062E+01	675	1.237E+01	716	4.278E+00	757	1.052E+00
594	1.713E+01	635	2.052E+01	676	1.209E+01	717	4.178E+00	758	7.621E-01
595	1.732E+01	636	2.043E+01	677	1.183E+01	718	4.071E+00	759	8.939E-01
596	1.752E+01	637	2.041E+01	678	1.161E+01	719	3.917E+00	760	7.686E-01
597	1.769E+01	638	2.030E+01	679	1.132E+01	720	3.820E+00	761	7.559E-01
598	1.780E+01	639	2.013E+01	680	1.107E+01	721	3.680E+00	762	8.745E-01
599	1.805E+01	640	2.005E+01	681	1.088E+01	722	3.600E+00	763	8.625E-01
600	1.821E+01	641	1.993E+01	682	1.065E+01	723	3.510E+00	764	7.504E-01
601	1.843E+01	642	1.980E+01	683	1.039E+01	724	3.315E+00	765	6.579E-01
602	1.859E+01	643	1.966E+01	684	1.019E+01	725	3.309E+00	766	6.453E-01
603	1.872E+01	644	1.946E+01	685	9.921E+00	726	3.182E+00	767	6.341E-01
604	1.888E+01	645	1.939E+01	686	9.642E+00	727	3.040E+00	768	7.252E-01
605	1.903E+01	646	1.917E+01	687	9.485E+00	728	2.972E+00	769	5.781E-01
606	1.920E+01	647	1.900E+01	688	9.275E+00	729	2.910E+00	770	5.492E-01
607	1.938E+01	648	1.886E+01	689	9.024E+00	730	2.846E+00	771	4.945E-01
608	1.947E+01	649	1.866E+01	690	8.790E+00	731	2.686E+00	772	5.758E-01
609	1.965E+01	650	1.844E+01	691	8.623E+00	732	2.633E+00	773	4.965E-01
610	1.978E+01	651	1.827E+01	692	8.392E+00	733	2.473E+00	774	4.448E-01
611	1.997E+01	652	1.805E+01	693	8.201E+00	734	2.417E+00	775	4.889E-01
612	2.003E+01	653	1.784E+01	694	7.933E+00	735	2.371E+00	776	4.487E-01
613	2.019E+01	654	1.762E+01	695	7.756E+00	736	2.233E+00	777	4.370E-01
614	2.027E+01	655	1.740E+01	696	7.524E+00	737	2.165E+00	778	4.025E-01
615	2.039E+01	656	1.717E+01	697	7.388E+00	738	2.034E+00	779	3.524E-01
616	2.045E+01	657	1.693E+01	698	7.145E+00	739	1.953E+00	780	3.597E-01
617	2.056E+01	658	1.669E+01	699	6.951E+00	740	1.906E+00		
618	2.061E+01	659	1.649E+01	700	6.772E+00	741	1.920E+00		
619	2.071E+01	660	1.622E+01	701	6.625E+00	742	1.810E+00		
620	2.076E+01	661	1.597E+01	702	6.348E+00	743	1.765E+00		
621	2.082E+01	662	1.573E+01	703	6.203E+00	744	1.544E+00		
622	2.081E+01	663	1.545E+01	704	6.014E+00	745	1.549E+00		
623	2.081E+01	664	1.523E+01	705	5.833E+00	746	1.394E+00		
624	2.090E+01	665	1.496E+01	706	5.676E+00	747	1.448E+00		
625	2.090E+01	666	1.467E+01	707	5.513E+00	748	1.357E+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**

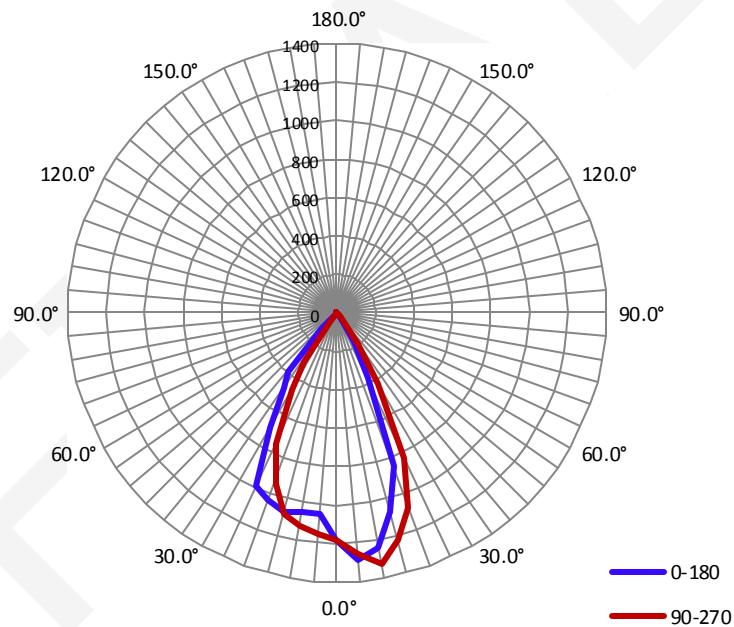
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1060	12.22	0.9610

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
953.7	78.09	1321.2	0.87	0.93

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	53.3	51.7	53.7	53.8	53.1
Field Angle (10% I _{max}):	76.9	77.3	75.3	77.2	76.7

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1184	1184	1184	1184	1184	1184	1184	1184
5.0°	1293	1303	1298	1289	1254	1183	1138	1081
10.0°	1240	1255	1283	1308	1321	1261	1167	1092
15.0°	1073	1098	1139	1188	1228	1271	1211	1123
20.0°	852	862	918	1002	1075	1138	1178	1125
25.0°	377	377	470	647	834	947	1009	1032
30.0°	176	177	218	296	423	548	633	706
35.0°	68	71	89	137	193	320	458	482
40.0°	8	7	8	10	22	92	237	374
45.0°	2	2	2	2	4	7	34	88
50.0°	1	0	0	1	1	1	2	1
55.0°	0	0	0	0	0	0	0	0
60.0°	0	0	0	0	0	0	0	0
65.0°	0	0	0	0	0	0	0	0
70.0°	0	0	0	0	0	0	0	0
75.0°	0	0	0	0	0	0	0	0
80.0°	0	0	0	0	0	0	0	0
85.0°	0	0	0	0	0	0	0	0
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

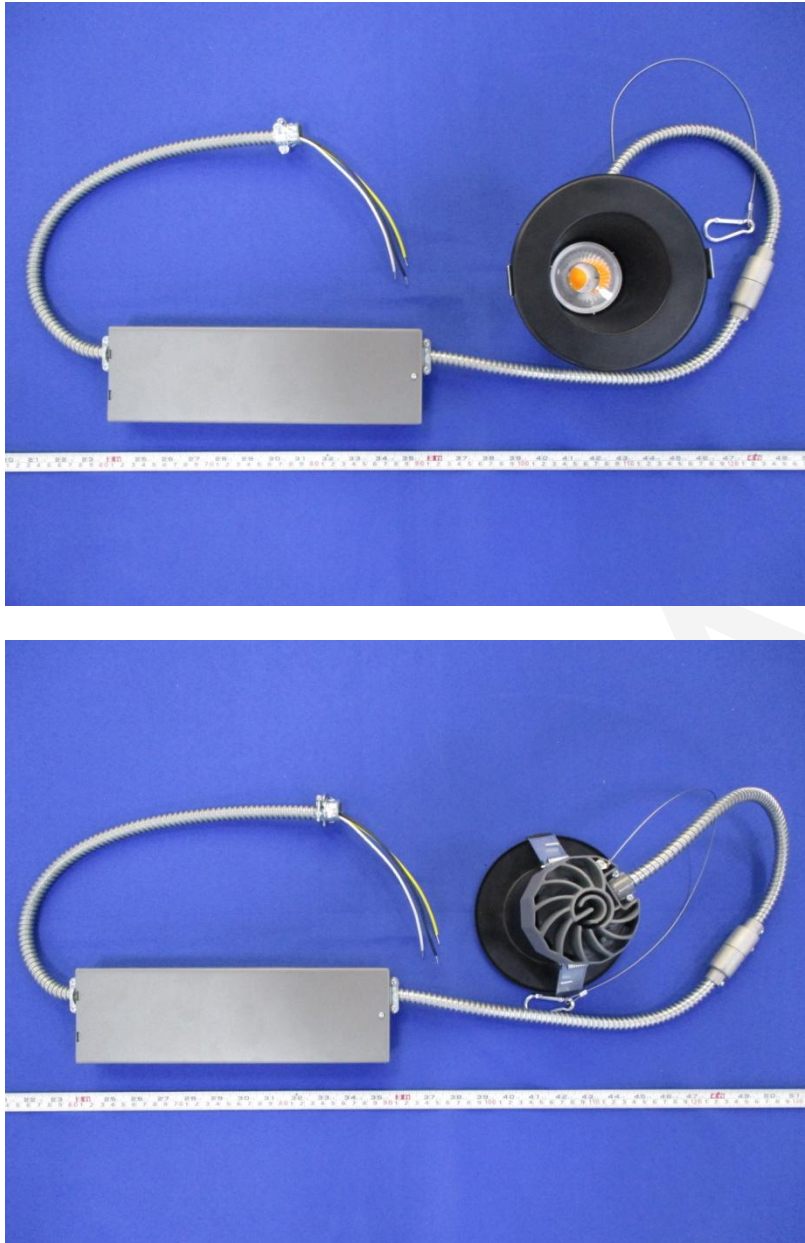
Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1184	1184	1184	1184	1184	1184	1184	1184
5.0°	1045	1037	1066	1124	1157	1200	1237	1270
10.0°	1049	1029	1047	1080	1127	1187	1202	1202
15.0°	1075	1005	994	1028	1083	1081	1056	1050
20.0°	1040	978	947	971	942	899	862	834
25.0°	995	934	879	830	757	634	506	406
30.0°	695	642	565	517	462	347	267	199
35.0°	479	480	474	433	307	182	104	70
40.0°	402	396	343	203	56	19	10	7
45.0°	114	113	71	15	4	3	3	2
50.0°	2	2	1	1	1	1	1	1
55.0°	0	0	0	0	0	0	0	0
60.0°	0	0	0	0	0	0	0	0
65.0°	0	0	0	0	0	0	0	0
70.0°	0	0	0	0	0	0	0	0
75.0°	0	0	0	0	0	0	0	0
80.0°	0	0	0	0	0	0	0	0
85.0°	0	0	0	0	0	0	0	0
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	28.3	2.97	0-5	28.3	2.97
5-10	84.6	8.87	0-10	112.9	11.84
10-15	135.5	14.21	0-15	248.4	26.05
15-20	171.6	18.00	0-20	420.1	44.05
20-25	178.7	18.73	0-25	598.7	62.78
25-30	146.4	15.35	0-30	745.1	78.13
30-35	103.2	10.83	0-35	848.3	88.95
35-40	68.2	7.15	0-40	916.5	96.11
40-45	30.8	3.23	0-45	947.3	99.33
45-50	6.1	0.64	0-50	953.4	99.97
50-55	0.3	0.03	0-55	953.7	100.00
55-60	0.0	0.00	0-60	953.7	100.00
60-65	0.0	0.00	0-65	953.7	100.00
65-70	0.0	0.00	0-70	953.7	100.00
70-75	0.0	0.00	0-75	953.7	100.00
75-80	0.0	0.00	0-80	953.7	100.00
80-85	0.0	0.00	0-85	953.7	100.00
85-90	0.0	0.00	0-90	953.7	100.00
90-95	0.0	0.00	0-95	953.7	100.00
95-100	0.0	0.00	0-100	953.7	100.00
100-105	0.0	0.00	0-105	953.7	100.00
105-110	0.0	0.00	0-110	953.7	100.00
110-115	0.0	0.00	0-115	953.7	100.00
115-120	0.0	0.00	0-120	953.7	100.00
120-125	0.0	0.00	0-125	953.7	100.00
125-130	0.0	0.00	0-130	953.7	100.00
130-135	0.0	0.00	0-135	953.7	100.00
135-140	0.0	0.00	0-140	953.7	100.00
140-145	0.0	0.00	0-145	953.7	100.00
145-150	0.0	0.00	0-150	953.7	100.00
150-155	0.0	0.00	0-155	953.7	100.00
155-160	0.0	0.00	0-160	953.7	100.00
160-165	0.0	0.00	0-165	953.7	100.00
165-170	0.0	0.00	0-170	953.7	100.00
170-175	0.0	0.00	0-175	953.7	100.00
175-180	0.0	0.00	0-180	953.7	100.00

6. Product Photo



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