

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

SHENZHEN TUBU TECH CO.,LTD

Building C,Hankun Hi-tech Industrial Zone,Longteng Road,Gaoqiao District,Pingdi,Longgang,Shenzhen,Guangdong,China.

Test Model: TBHBR09-150W(4000K)

Report Type:	Electrical and Photometric tests including: Luminous Flux, Power Factor, Chromaticity, Luminous Intensity Distribution, THD
Test Engineer:	Carl Du <i>Carl Du</i>
Report Number:	RSZ170412514-10
Test Date:	2017-04-20 to 2017-04-21
Report Date:	2017-05-04
Reviewed By:	Blake Zhang / EE Engineer <i>Blake Zhang</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
Accreditation:	The IAS Accreditation Number TL-460.

1. Product Description

General Information:

One sample was received on 2017-04-12 and used for testing.

Model Tested: TBHBR09-150W(4000K)
 Manufacturer: SHENZHEN TUBU TECH CO.,LTD
 Brand Name: TUBU
 Product Designation: High-bay Luminaires for Commercial and Industrial Buildings
 Burning Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 100-277 V AC 50/60Hz
 Rated Power: 150 W
 Nominal CCT: 4000K
 Nominal Lumen Output: 19500 lm

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 (This method is not in IAS accreditation scope)

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integrating Sphere	SENSING	SPR-600	S09008	25~50°C	2017-03-09	2018-03-08
High Accuracy Array spectroradiometer	EVERFINE	HAAS-2000	M112048CA1361125	380-780nm	2016-07-08	2017-07-07
Power meter	YOKOGAWA	WT310	C20E17024V	2kV/20A	2016-07-08	2017-07-07
DC Power Supply	ITECH	IT6154	0061 0417 64710010 19	0~32V	2017-03-03	2018-03-02
Thermal Meter	SENSING	N/A	N/A	25、50°C	2017-03-09	2018-03-08
Standard Light Source	SENSING	N/A	LSD090808	N/A	2016-12-05	2017-12-04
AC Power Supply	ALL Power	APW-105N	970613	220V±10% 50Hz	2017-03-03	2018-03-02
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V, 0-300V	2017-03-03	2018-03-02
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2017-03-03	2018-03-02
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2017-03-03	2018-03-02
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000 W/10A	2017-03-09	2018-03-08
Wireless Remote Sensor	N/A	433MHz	N/A	0°C~50°C;-20°C~60°C	2017-03-20	2018-03-19

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Standard Light Source	EVERFINE	D908	1012003	N/A	2016-12-17	2017-12-17

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.

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 $U=1.8\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=20\text{K}$ ($K=2$), at the 95% confidence level. The uncertainty of the CRI is $U=1.8(K=2)$, at the 95% confidence level.

The uncertainty of power meter AC current $U=0.19\%$ of rdg, AC Voltage $U=0.15\%$ of rdg, Power $U=0.20\%$ ($K=2$), 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 intensity is $U=1.6\%$ ($K=2$), at the 95% confidence level.

Additional Test

The Additional Test item may not be covered by IESNA LM-79-2008. Additional test including power factor, off-state power and THD, was measured by Digital Power Meter after stabilized at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. Test voltage for THD and power factor test would be equal to rated voltage or, in case of a voltage range, maximum value of that range.

The uncertainty of power meter AC current $U=0.19\%$ of rdg, AC Voltage $U=0.15\%$ of rdg, Power $U=0.20\%$ ($K=2$), 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**

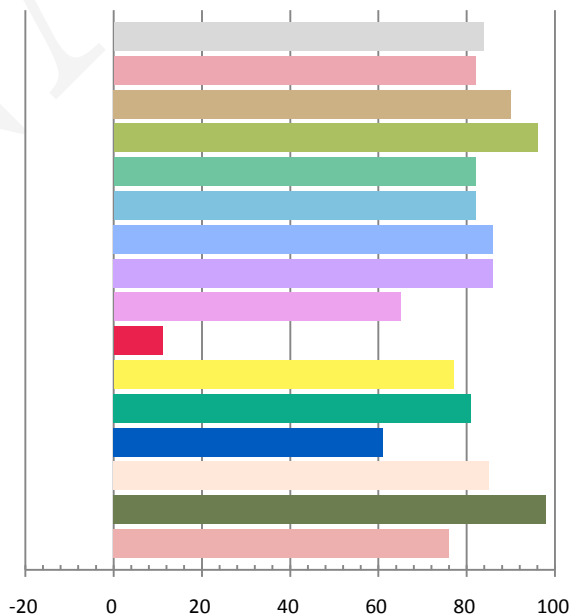
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	1.262	150.7	0.9951	20551	136.38

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
62.596	4146	0.000447	0.3745	0.3739	0.2223	0.4994

Color Rendering Index

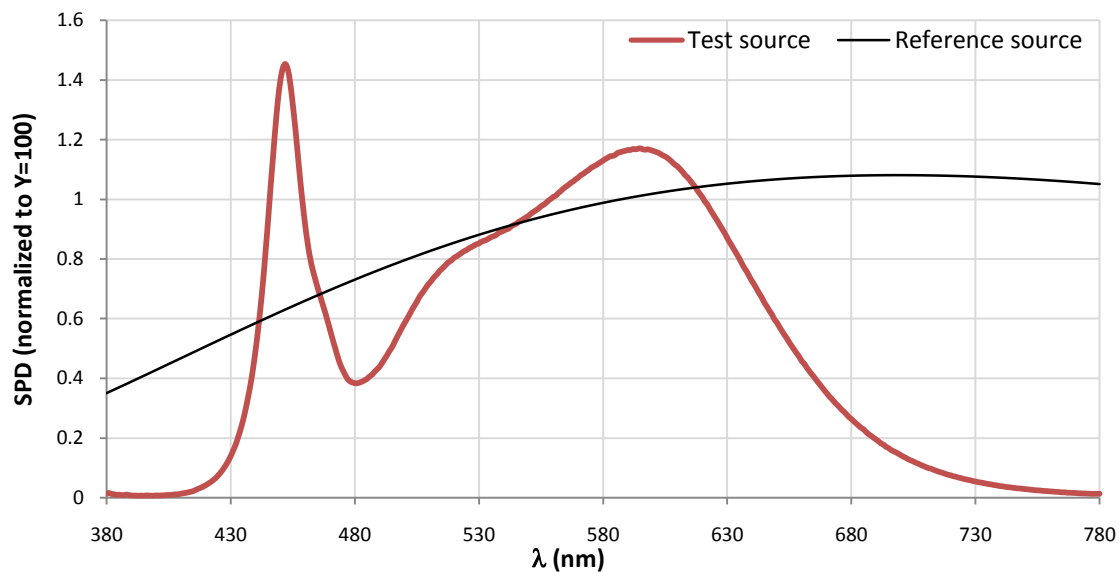
Ra			
83.8			
R1	R2	R3	R4
82	90	96	82
R5	R6	R7	R8
82	86	86	65
R9	R10	R11	R12
11	77	81	61
R13	R14	R15	
85	98	76	



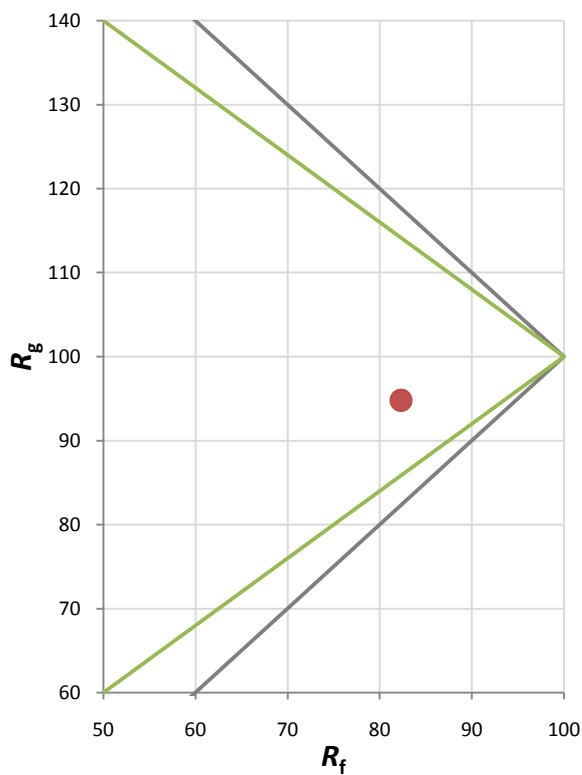
Fidelity Index and Gamut Index

Fidelity Index R_f	82
Gamut Index R_g	95

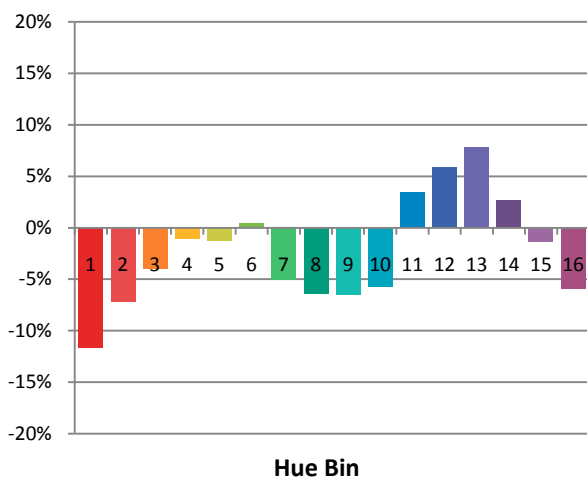
Spectral Power Distribution Comparison



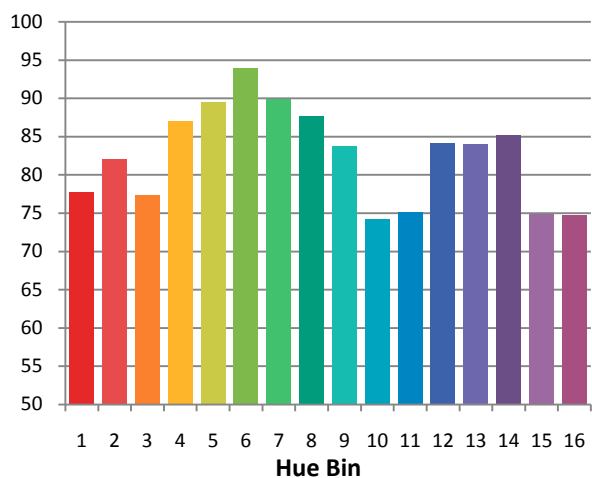
Plot of R_g versus R_f



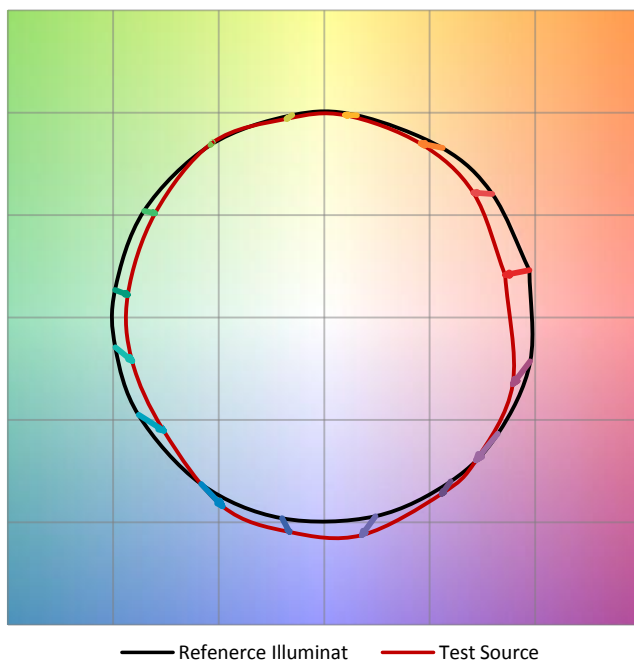
Chroma Shift by Hue



R_f by Hue

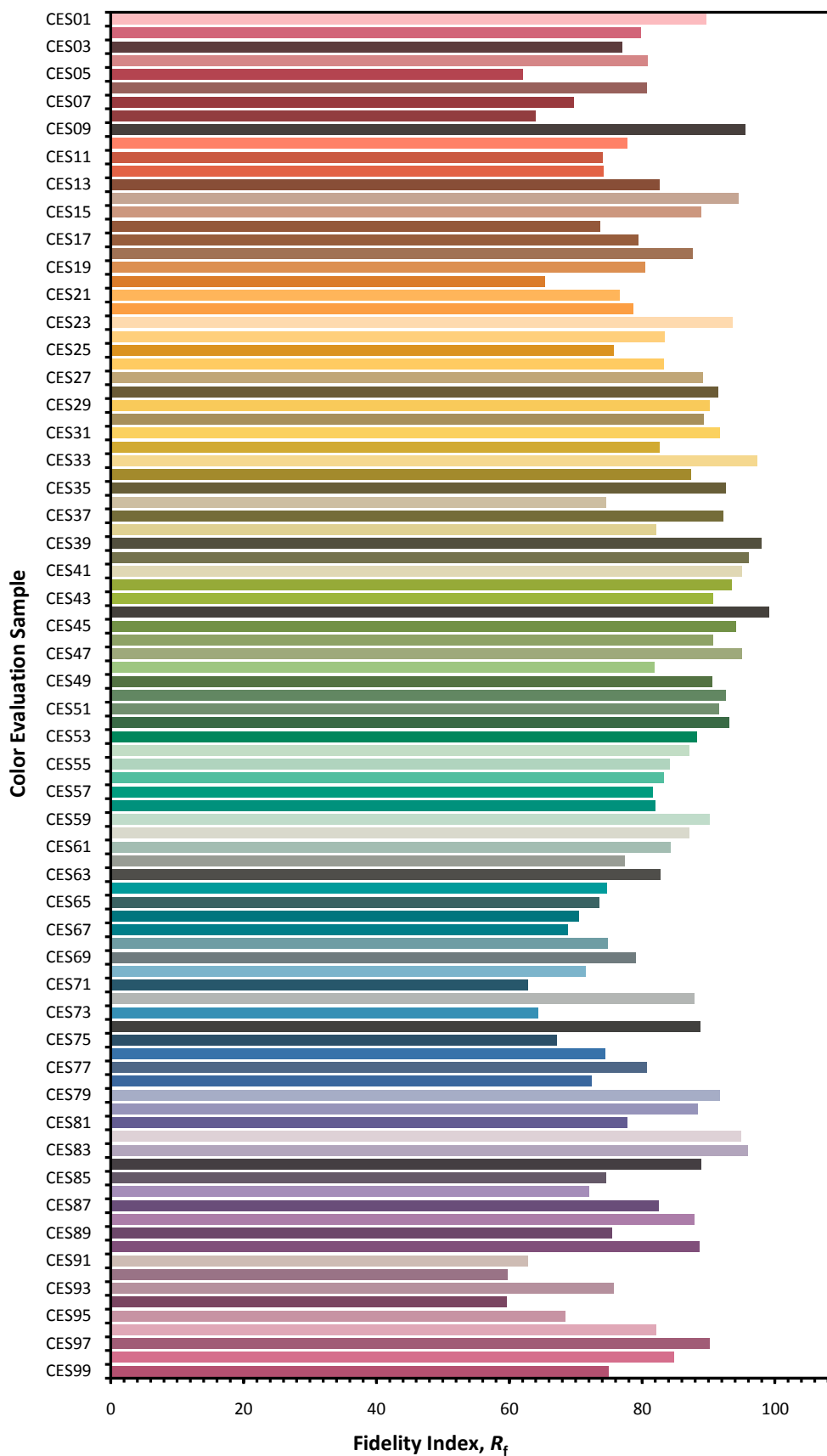


Color Vector Graphic

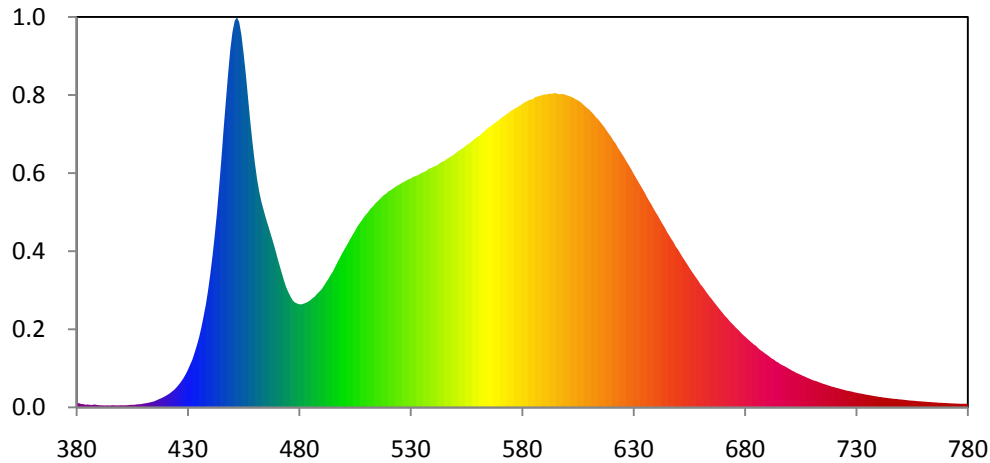


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



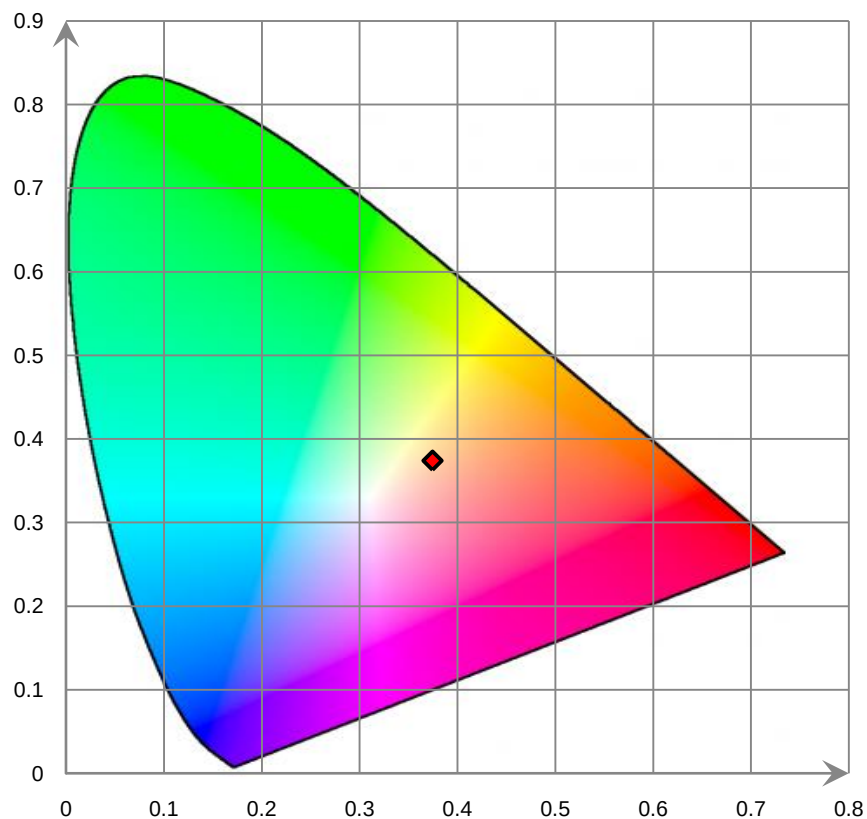
Relative Spectral Power Distribution



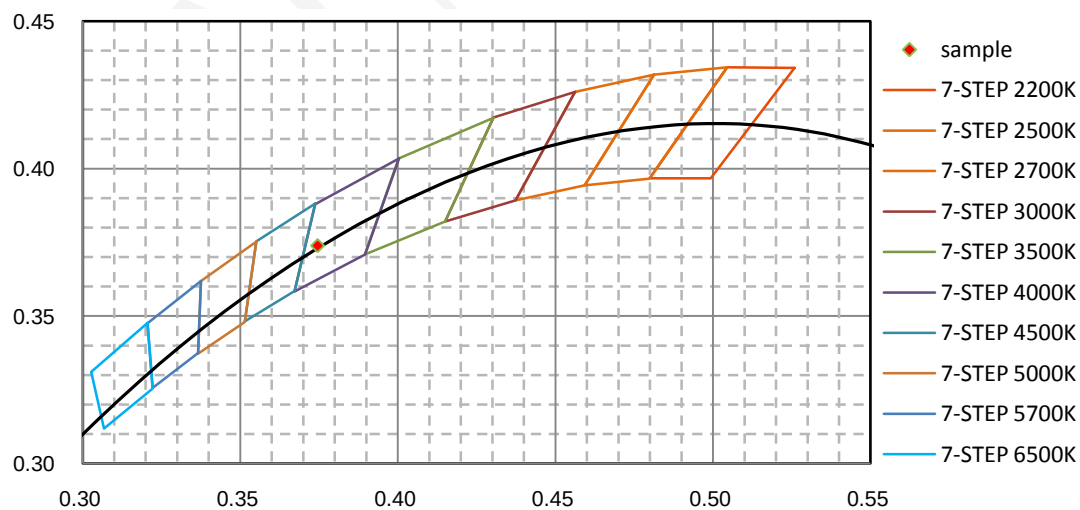
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.053E+00	421	1.442E+01	462	2.417E+02	503	1.894E+02	544	2.751E+02
381	4.868E+00	422	1.599E+01	463	2.302E+02	504	1.936E+02	545	2.762E+02
382	3.815E+00	423	1.800E+01	464	2.209E+02	505	1.978E+02	546	2.782E+02
383	3.665E+00	424	2.008E+01	465	2.118E+02	506	2.024E+02	547	2.795E+02
384	3.012E+00	425	2.274E+01	466	2.038E+02	507	2.060E+02	548	2.812E+02
385	3.175E+00	426	2.568E+01	467	1.954E+02	508	2.094E+02	549	2.827E+02
386	2.826E+00	427	2.907E+01	468	1.873E+02	509	2.132E+02	550	2.844E+02
387	2.712E+00	428	3.283E+01	469	1.785E+02	510	2.163E+02	551	2.865E+02
388	3.279E+00	429	3.714E+01	470	1.694E+02	511	2.193E+02	552	2.883E+02
389	2.778E+00	430	4.209E+01	471	1.603E+02	512	2.227E+02	553	2.899E+02
390	2.448E+00	431	4.784E+01	472	1.516E+02	513	2.250E+02	554	2.916E+02
391	2.298E+00	432	5.364E+01	473	1.431E+02	514	2.283E+02	555	2.939E+02
392	2.223E+00	433	6.122E+01	474	1.353E+02	515	2.306E+02	556	2.953E+02
393	2.138E+00	434	6.939E+01	475	1.295E+02	516	2.331E+02	557	2.973E+02
394	2.288E+00	435	7.839E+01	476	1.245E+02	517	2.357E+02	558	2.996E+02
395	2.079E+00	436	8.921E+01	477	1.201E+02	518	2.380E+02	559	3.014E+02
396	2.449E+00	437	1.015E+02	478	1.175E+02	519	2.395E+02	560	3.034E+02
397	2.304E+00	438	1.146E+02	479	1.163E+02	520	2.420E+02	561	3.047E+02
398	2.190E+00	439	1.303E+02	480	1.156E+02	521	2.434E+02	562	3.073E+02
399	2.223E+00	440	1.485E+02	481	1.155E+02	522	2.451E+02	563	3.093E+02
400	2.405E+00	441	1.689E+02	482	1.163E+02	523	2.469E+02	564	3.117E+02
401	2.269E+00	442	1.920E+02	483	1.172E+02	524	2.486E+02	565	3.136E+02
402	2.422E+00	443	2.176E+02	484	1.186E+02	525	2.498E+02	566	3.153E+02
403	2.467E+00	444	2.469E+02	485	1.201E+02	526	2.515E+02	567	3.174E+02
404	2.788E+00	445	2.782E+02	486	1.225E+02	527	2.528E+02	568	3.190E+02
405	2.900E+00	446	3.113E+02	487	1.243E+02	528	2.542E+02	569	3.211E+02
406	2.895E+00	447	3.424E+02	488	1.273E+02	529	2.556E+02	570	3.228E+02
407	3.342E+00	448	3.730E+02	489	1.297E+02	530	2.565E+02	571	3.252E+02
408	3.517E+00	449	4.005E+02	490	1.323E+02	531	2.581E+02	572	3.266E+02
409	3.669E+00	450	4.206E+02	491	1.361E+02	532	2.591E+02	573	3.285E+02
410	4.251E+00	451	4.332E+02	492	1.400E+02	533	2.600E+02	574	3.301E+02
411	4.602E+00	452	4.373E+02	493	1.438E+02	534	2.614E+02	575	3.323E+02
412	5.083E+00	453	4.318E+02	494	1.482E+02	535	2.629E+02	576	3.338E+02
413	5.618E+00	454	4.175E+02	495	1.519E+02	536	2.638E+02	577	3.351E+02
414	6.193E+00	455	3.965E+02	496	1.570E+02	537	2.650E+02	578	3.367E+02
415	6.929E+00	456	3.731E+02	497	1.620E+02	538	2.672E+02	579	3.383E+02
416	8.073E+00	457	3.466E+02	498	1.667E+02	539	2.681E+02	580	3.400E+02
417	9.184E+00	458	3.202E+02	499	1.715E+02	540	2.693E+02	581	3.416E+02
418	1.024E+01	459	2.964E+02	500	1.760E+02	541	2.705E+02	582	3.430E+02
419	1.144E+01	460	2.749E+02	501	1.803E+02	542	2.714E+02	583	3.444E+02
420	1.281E+01	461	2.566E+02	502	1.847E+02	543	2.736E+02	584	3.447E+02

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.459E+02	626	2.793E+02	667	1.152E+02	708	3.313E+01	749	9.037E+00
586	3.479E+02	627	2.750E+02	668	1.120E+02	709	3.211E+01	750	8.827E+00
587	3.484E+02	628	2.709E+02	669	1.088E+02	710	3.104E+01	751	8.612E+00
588	3.493E+02	629	2.668E+02	670	1.058E+02	711	3.000E+01	752	8.250E+00
589	3.498E+02	630	2.620E+02	671	1.026E+02	712	2.947E+01	753	8.009E+00
590	3.506E+02	631	2.576E+02	672	1.001E+02	713	2.841E+01	754	7.689E+00
591	3.506E+02	632	2.535E+02	673	9.706E+01	714	2.748E+01	755	7.531E+00
592	3.516E+02	633	2.492E+02	674	9.442E+01	715	2.653E+01	756	7.374E+00
593	3.513E+02	634	2.450E+02	675	9.195E+01	716	2.577E+01	757	7.091E+00
594	3.518E+02	635	2.407E+02	676	8.911E+01	717	2.494E+01	758	6.856E+00
595	3.523E+02	636	2.357E+02	677	8.686E+01	718	2.407E+01	759	6.746E+00
596	3.513E+02	637	2.314E+02	678	8.425E+01	719	2.325E+01	760	6.507E+00
597	3.509E+02	638	2.275E+02	679	8.156E+01	720	2.270E+01	761	6.377E+00
598	3.513E+02	639	2.228E+02	680	7.945E+01	721	2.184E+01	762	6.099E+00
599	3.506E+02	640	2.184E+02	681	7.710E+01	722	2.136E+01	763	6.041E+00
600	3.498E+02	641	2.145E+02	682	7.484E+01	723	2.052E+01	764	5.740E+00
601	3.490E+02	642	2.100E+02	683	7.266E+01	724	2.002E+01	765	5.550E+00
602	3.480E+02	643	2.056E+02	684	7.050E+01	725	1.923E+01	766	5.533E+00
603	3.468E+02	644	2.016E+02	685	6.887E+01	726	1.865E+01	767	5.174E+00
604	3.452E+02	645	1.967E+02	686	6.621E+01	727	1.815E+01	768	5.174E+00
605	3.441E+02	646	1.928E+02	687	6.410E+01	728	1.768E+01	769	4.969E+00
606	3.424E+02	647	1.886E+02	688	6.241E+01	729	1.692E+01	770	4.926E+00
607	3.404E+02	648	1.849E+02	689	6.052E+01	730	1.648E+01	771	4.723E+00
608	3.380E+02	649	1.800E+02	690	5.878E+01	731	1.588E+01	772	4.565E+00
609	3.357E+02	650	1.767E+02	691	5.686E+01	732	1.547E+01	773	4.410E+00
610	3.340E+02	651	1.725E+02	692	5.487E+01	733	1.504E+01	774	4.355E+00
611	3.313E+02	652	1.684E+02	693	5.350E+01	734	1.449E+01	775	4.253E+00
612	3.287E+02	653	1.645E+02	694	5.144E+01	735	1.398E+01	776	4.145E+00
613	3.254E+02	654	1.608E+02	695	5.019E+01	736	1.365E+01	777	3.987E+00
614	3.231E+02	655	1.567E+02	696	4.826E+01	737	1.316E+01	778	4.075E+00
615	3.200E+02	656	1.529E+02	697	4.703E+01	738	1.275E+01	779	4.083E+00
616	3.169E+02	657	1.493E+02	698	4.584E+01	739	1.232E+01	780	4.091E+00
617	3.137E+02	658	1.456E+02	699	4.438E+01	740	1.177E+01		
618	3.099E+02	659	1.422E+02	700	4.290E+01	741	1.165E+01		
619	3.063E+02	660	1.380E+02	701	4.147E+01	742	1.106E+01		
620	3.030E+02	661	1.352E+02	702	4.023E+01	743	1.083E+01		
621	2.987E+02	662	1.315E+02	703	3.877E+01	744	1.055E+01		
622	2.956E+02	663	1.280E+02	704	3.770E+01	745	1.015E+01		
623	2.912E+02	664	1.247E+02	705	3.663E+01	746	9.870E+00		
624	2.872E+02	665	1.217E+02	706	3.537E+01	747	9.542E+00		
625	2.832E+02	666	1.183E+02	707	3.441E+01	748	9.435E+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: **Downward**

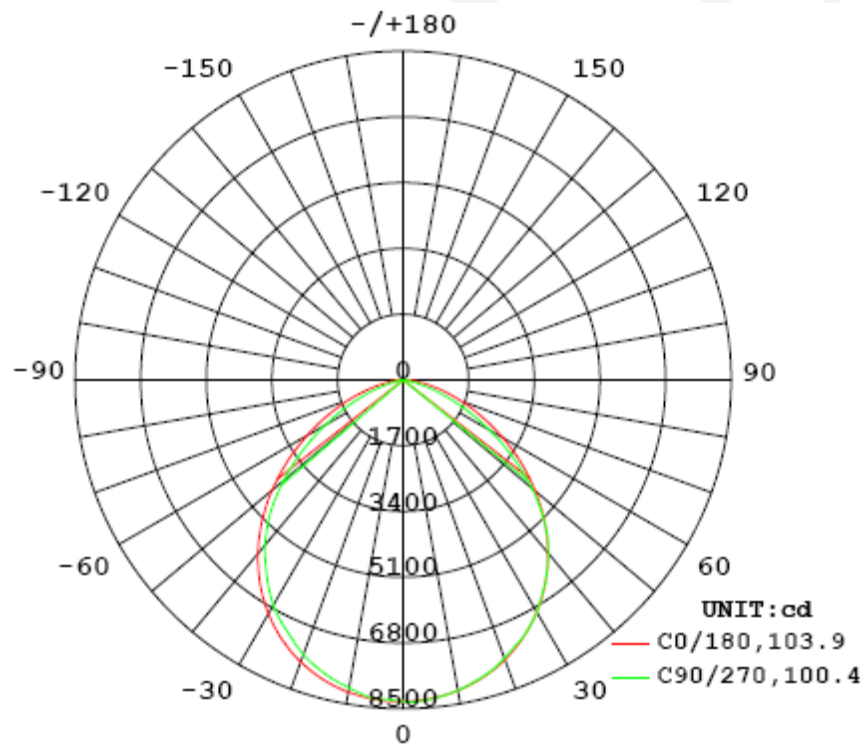
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	1.2590	150.4	0.9949

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
20560.4	136.71	8333.0	1.24	1.24

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	103.9	104.9	100.4	104.7	103.5
Field Angle (10% I _{max}):	152.8	148.9	142.5	148.6	148.2

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	8314	8313	8311	8307	8308	8312	8310	8313
5.0°	8290	8263	8261	8271	8268	8264	8243	8241
10.0°	8194	8179	8159	8100	8077	8086	8126	8135
15.0°	8021	8013	7927	7885	7861	7863	7879	7950
20.0°	7758	7709	7658	7595	7559	7564	7601	7642
25.0°	7415	7350	7290	7189	7148	7156	7229	7265
30.0°	6984	6919	6829	6777	6727	6743	6761	6836
35.0°	6462	6403	6327	6244	6167	6208	6261	6329
40.0°	5859	5800	5753	5637	5572	5607	5692	5739
45.0°	5178	5132	5085	4964	4871	4942	5037	5083
50.0°	4436	4415	4407	4191	4050	4170	4375	4395
55.0°	3658	3686	3672	3339	3180	3325	3653	3693
60.0°	2882	2957	2871	2486	2333	2484	2868	2987
65.0°	2148	2244	2058	1695	1561	1702	2076	2291
70.0°	1487	1555	1317	1011	901	1023	1344	1612
75.0°	916	926	681	464	374	478	715	985
80.0°	450	394	198	105	91	110	226	451
85.0°	104	51	39	34	32	38	45	74
90.0°	1	3	1	1	1	4	5	3
95.0°	1	1	1	1	1	1	1	1
100.0°	2	2	2	1	1	1	2	2
105.0°	2	2	2	2	2	2	2	2
110.0°	2	2	2	2	2	2	2	2
115.0°	2	2	2	2	2	2	2	2
120.0°	2	2	2	2	2	2	2	2
125.0°	3	3	3	3	3	3	3	3
130.0°	3	3	3	3	3	3	3	3
135.0°	4	4	4	4	4	4	4	4
140.0°	5	5	5	5	6	5	5	5
145.0°	6	6	7	7	7	7	7	6
150.0°	7	8	8	9	9	9	8	7
155.0°	8	9	9	10	10	10	9	8
160.0°	9	10	10	11	10	10	10	9
165.0°	9	10	10	10	10	10	10	9
170.0°	9	9	9	9	9	9	9	9
175.0°	9	9	9	9	8	9	9	9
180.0°	8	7	7	7	8	7	7	8

Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	8314	8313	8311	8307	8308	8312	8310	8313
5.0°	8268	8293	8288	8277	8277	8289	8301	8314
10.0°	8152	8171	8146	8141	8148	8163	8177	8208
15.0°	7966	7967	7961	7934	7944	7962	8003	8020
20.0°	7697	7700	7682	7664	7656	7695	7735	7770
25.0°	7352	7370	7342	7318	7340	7360	7395	7453
30.0°	6925	6941	6909	6934	6930	6973	6983	7016
35.0°	6418	6439	6461	6418	6407	6453	6526	6512
40.0°	5833	5868	5906	5868	5855	5906	5961	5925
45.0°	5182	5228	5276	5243	5177	5268	5322	5281
50.0°	4470	4571	4617	4479	4349	4483	4648	4605
55.0°	3725	3876	3884	3613	3454	3603	3893	3885
60.0°	2972	3145	3095	2729	2578	2716	3077	3130
65.0°	2253	2429	2294	1917	1762	1892	2240	2396
70.0°	1596	1738	1515	1204	1064	1174	1454	1684
75.0°	1032	1100	853	600	487	570	791	1034
80.0°	544	530	315	182	137	165	266	464
85.0°	178	128	57	51	44	48	50	75
90.0°	1	3	4	3	2	1	1	1
95.0°	1	1	1	1	1	1	1	1
100.0°	1	1	1	1	1	1	1	1
105.0°	1	1	1	1	1	1	1	1
110.0°	1	1	1	1	1	1	1	1
115.0°	2	2	2	2	1	1	1	2
120.0°	2	2	2	2	2	2	2	2
125.0°	2	2	2	2	2	2	2	2
130.0°	3	3	3	3	3	3	3	3
135.0°	3	3	3	3	3	3	3	3
140.0°	4	4	4	4	4	4	4	4
145.0°	4	4	5	5	5	5	4	4
150.0°	5	5	5	5	5	5	5	5
155.0°	5	5	6	6	6	6	6	6
160.0°	6	6	6	6	6	6	6	6
165.0°	6	6	6	6	6	6	6	6
170.0°	7	7	6	6	6	6	6	7
175.0°	7	7	7	7	6	6	6	7
180.0°	8	8	8	8	7	7	7	8

Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	198.3	0.96	0-5	198.3	0.96
5-10	587.7	2.86	0-10	785.9	3.82
10-15	954.7	4.65	0-15	1740.7	8.47
15-20	1287.1	6.26	0-20	3027.7	14.73
20-25	1570.7	7.64	0-25	4598.4	22.37
25-30	1796.9	8.74	0-30	6395.3	31.11
30-35	1953.5	9.50	0-35	8348.8	40.61
35-40	2031.5	9.88	0-40	10380.3	50.49
40-45	2026.0	9.85	0-45	12406.3	60.34
45-50	1931.7	9.40	0-50	14338.1	69.74
50-55	1749.9	8.51	0-55	16088.0	78.25
55-60	1492.8	7.26	0-60	17580.8	85.51
60-65	1186.0	5.77	0-65	18766.8	91.28
65-70	859.9	4.18	0-70	19626.7	95.46
70-75	545.4	2.65	0-75	20172.1	98.11
75-80	268.3	1.31	0-80	20440.4	99.42
80-85	86.7	0.42	0-85	20527.1	99.84
85-90	14.0	0.07	0-90	20541.1	99.91
90-95	0.5	0.00	0-95	20541.6	99.91
95-100	0.6	0.00	0-100	20542.1	99.91
100-105	0.7	0.00	0-105	20542.8	99.91
105-110	0.8	0.01	0-110	20543.6	99.92
110-115	0.9	0.00	0-115	20544.5	99.92
115-120	1.0	0.01	0-120	20545.4	99.93
120-125	1.0	0.00	0-125	20546.5	99.93
125-130	1.2	0.01	0-130	20547.7	99.94
130-135	1.4	0.00	0-135	20549.0	99.94
135-140	1.5	0.01	0-140	20550.5	99.95
140-145	1.7	0.01	0-145	20552.2	99.96
145-150	1.8	0.01	0-150	20554.0	99.97
150-155	1.8	0.01	0-155	20555.8	99.98
155-160	1.6	0.01	0-160	20557.4	99.99
160-165	1.3	0.00	0-165	20558.8	99.99
165-170	0.9	0.01	0-170	20559.7	100.00
170-175	0.5	0.00	0-175	20560.2	100.00
175-180	0.2	0.00	0-180	20560.4	100.00

[Additional Test]

Test Item	Test Voltage (V)	Frequency (Hz)	Test Result
Power Factor:	277.0	60	0.9334
Total Harmonic Distortion:	277.0	60	12.26%
Total Harmonic Distortion:	120.0	60	7.07%
Total Harmonic Distortion:	100.0	60	7.37%
Power Factor:	100.0	60	0.9967

6. Product Photo



7. Product Test orientation in the Goniophotometer



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