

## Photometric Test Report

### Relevant Standards

- ☒ IES LM-79-2008
- ☒ ANSI C82.77-2017

Prepared For

**RAB Lighting Inc.**

Prepared By

**Dongguan New Testing Centre Co., Ltd.**

Prepare by:

*Alan Wang*

Engineer: Alan Wang

Date: 2023-11-16

Review by:

*Vincent Yuan*

Technical Lead: Vincent Yuan

Issue Date: 2023-11-16

Revised Date: N/A

## 1.0 Test Summary

DLC Technical Requirements V5.1

Outdoor Non-Cutoff and Semi-Cutoff Wall-Mounted Area Luminaires				
Requirement Category	Test Method	Requirements		Test Value
Luminaire Output (lm) (Goniophotometer – Section 4.2) (0°-180° zones)	IES LM-79-2008	N/A		8463
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-180° zones)	IES LM-79-2008	N/A		151.1
Luminaire Output (lm) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	300		8257
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	Standard	Premium	147.7
		105	120	
Power (Input Wattage) (W) (Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		56.0
Total Harmonic Distortion (A%) (THD & PF – Section 4.3)	ANSI C82.77:2014	20.00%	120V	2.03
			277V	12.03
Power Factor (THD & PF – Section 4.3)	ANSI C82.77:2014	0.9	120V	0.996
			277V	0.910
Allowable CCTs* (K) (Integrating Sphere – Section 4.1)	IES LM-79-2008	7 steps	3985±275	3932
		4 steps	3985±154	
Minimum CRI (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	≥70		84.3
Minimum R9 (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	N/A		17
Minimum Rf (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	≥70		84
Minimum Rg (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	≥89		96
IES Rcs,h1 (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	-18%≤IES Rcs,h1≤+23%		-11%
Zonal Lumen Requirement (80°-90°) (Goniophotometer – Section 4.2)	IES LM-79-2008	≤10%		2.8%
Input Voltage (V)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Cast		120.0
(Goniophotometer – Section 4.2)		Non-Worst Case		277.0
Input Current (A)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		0.469
(Goniophotometer – Section 4.2)		Non-Worst Case		0.219
Power (Input Wattage – W)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		56.0
(Goniophotometer – Section 4.2)		Non-Worst Case		55.1

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2023-11-02	WPX2 @ 60W / 4000K	231101003-S1
2	Goniophotometer Test	2023-11-02	WPX2 @ 60W / 4000K	231101003-S1
3	THD and PF Test	2023-11-02	WPX2 @ 60W / 4000K	231101003-S1

### Remark (If any)

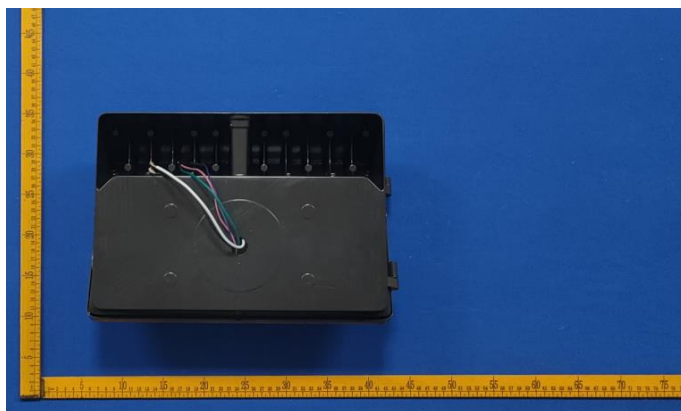
1. The results contained in this report pertain only to the tested samples.
2. This report shall not be reproduced, no limited part or full, without approval of Dongguan New Testing Centre Co., Ltd.
3. This report does not imply product certification, approval, or endorsement by NVLAP, or any agency of the Federal Government.

## 3.0 Product Description

Luminaire Description: Model No. WPX2 @ 60W / 4000K, color tunable from 3000K, 4000K and 5000K.

Electrical Specification: 120-277Vac, 50/60Hz

Photos of Luminaire Characteristics



## 4.0 LM-79 Measurement and Test Results

### 4.1 Integrating Sphere Test

<b>Model No.</b>	WPX2 @ 60W / 4000K	<b>Sample ID</b>	231101003-S1
<b>Operate time (Min.)</b>	10	<b>Stabilization time (Min.)</b>	60
<b>Temperature (°C)</b>	25.4	<b>Humidity (%RH)</b>	41.0

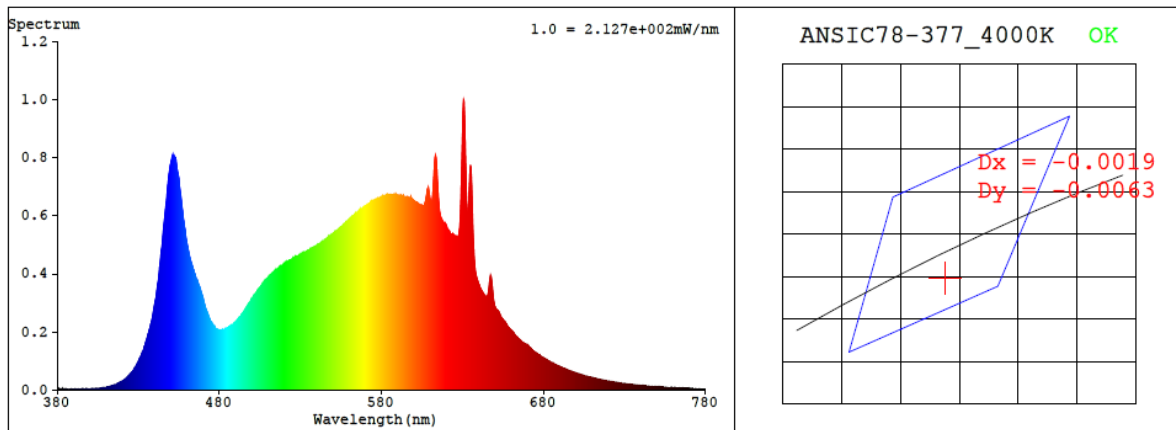
<b>Test Method</b>
<p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25±1°C.</p> <p>The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere.</p> <p>The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.</p> <p>The sample was measured using 4<math>\pi</math> geometry and operated at rated voltage and was stabilized before measurement.</p> <p>Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780nm.</p>

#### Test Result

Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.0	60	0.469	56.0	0.996
277.0	60	0.219	55.1	0.910

CCT (K)	CRI	R9	Duv	Rf	Rg	IES Rcs,h1
3932	84.3	17	-0.0024	84	96	-11%

## 4.1 Integrating Sphere Test



### Colorimetric Parameters

Chromaticity Coordinate:  $x = 0.3816$   $y = 0.3724$  /  $u' = 0.2277$   $v' = 0.4998$  ( $duv = -2.41e-03$ )

CCT= 3932K Prcp WL:  $L_d = 580.7nm$  Purity=26.3%

Peak WL:  $L_p = 631nm$  FWHM:  $= 97.4nm$  Ratio: R=18.9% G=77.3% B=3.7%

Render Index:  $R_a = 84.3$  AvgR = 78.4 TM30:  $R_f = 84$   $R_g = 96$

EEL: 0.09072 A++ Highest

R1 =83	R2 =91	R3 =95	R4 =82	R5 =83	R6 =87	R7 =86
R8 =67	R9 =17	R10=78	R11=81	R12=64	R13=85	R14=98 R15=78

## 4.1 Integrating Sphere Test

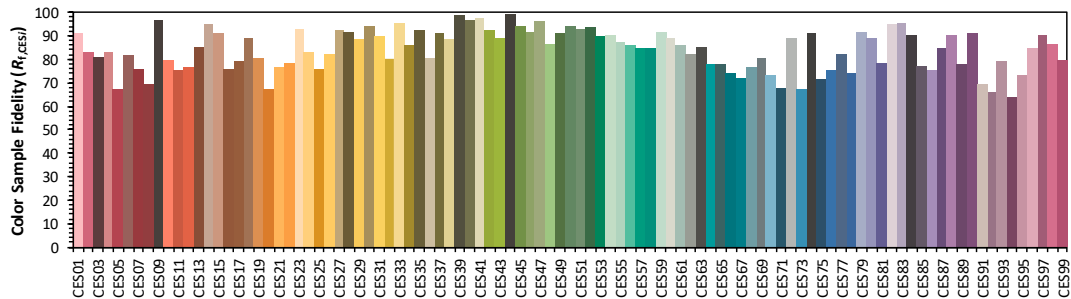
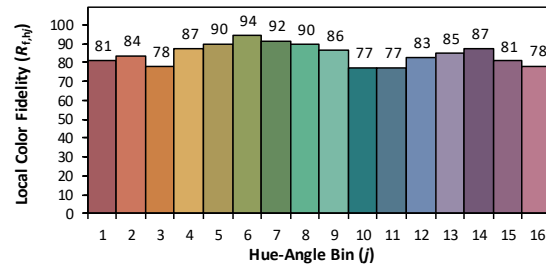
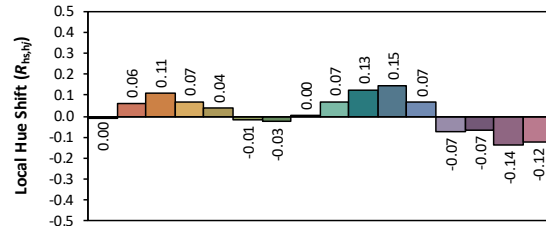
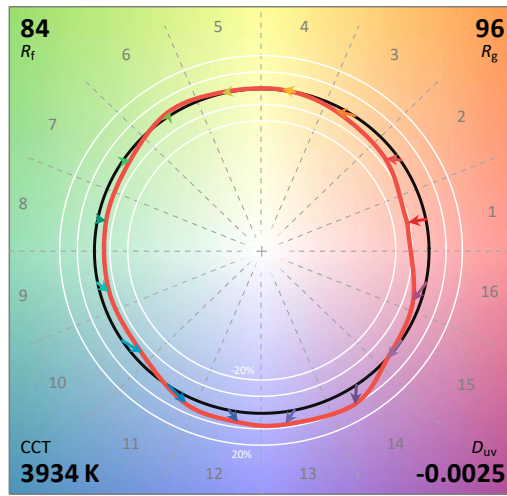
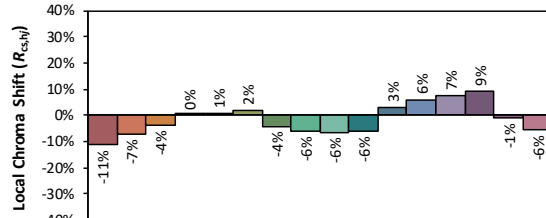
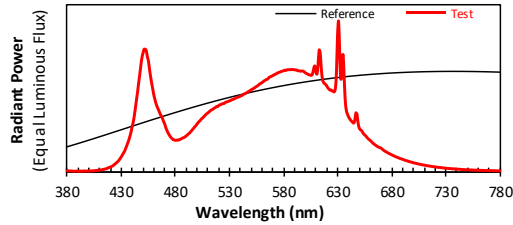
### ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: RAB Lighting Inc.

Date: 2023/11/16

Model: WPX2 @ 60W / 4000K



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

$x$  0.3816  
 $y$  0.3722  
 $u'$  0.2277  
 $v'$  0.4997

CIE 13.3-1995  
(CRI)

$R_a$  84  
 $R_g$  17

## 4.1 Integrating Sphere Test

Spectral Distribution over Visible Wavelength											
WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)
380	4.10E-06	447	6.38E-04	514	4.09E-04	581	6.68E-04	648	3.77E-04	715	3.63E-05
381	4.90E-06	448	6.98E-04	515	4.13E-04	582	6.66E-04	649	3.21E-04	716	3.54E-05
382	3.20E-06	449	7.49E-04	516	4.18E-04	583	6.71E-04	650	2.89E-04	717	3.40E-05
383	4.80E-06	450	7.79E-04	517	4.22E-04	584	6.71E-04	651	2.77E-04	718	3.30E-05
384	2.70E-06	451	8.06E-04	518	4.28E-04	585	6.72E-04	652	2.71E-04	719	3.19E-05
385	3.50E-06	452	8.06E-04	519	4.29E-04	586	6.72E-04	653	2.62E-04	720	3.12E-05
386	2.20E-06	453	7.99E-04	520	4.35E-04	587	6.72E-04	654	2.49E-04	721	2.98E-05
387	1.70E-06	454	7.59E-04	521	4.40E-04	588	6.73E-04	655	2.42E-04	722	2.90E-05
388	2.90E-06	455	7.31E-04	522	4.41E-04	589	6.72E-04	656	2.36E-04	723	2.80E-05
389	2.80E-06	456	6.78E-04	523	4.45E-04	590	6.71E-04	657	2.27E-04	724	2.73E-05
390	1.30E-06	457	6.28E-04	524	4.48E-04	591	6.69E-04	658	2.19E-04	725	2.66E-05
391	2.90E-06	458	5.85E-04	525	4.49E-04	592	6.70E-04	659	2.12E-04	726	2.54E-05
392	3.10E-06	459	5.46E-04	526	4.55E-04	593	6.65E-04	660	2.07E-04	727	2.45E-05
393	2.70E-06	460	5.06E-04	527	4.58E-04	594	6.65E-04	661	2.00E-04	728	2.42E-05
394	2.40E-06	461	4.78E-04	528	4.60E-04	595	6.63E-04	662	1.93E-04	729	2.32E-05
395	4.00E-06	462	4.49E-04	529	4.63E-04	596	6.61E-04	663	1.85E-04	730	2.23E-05
396	3.70E-06	463	4.30E-04	530	4.66E-04	597	6.63E-04	664	1.80E-04	731	2.14E-05
397	3.00E-06	464	4.12E-04	531	4.69E-04	598	6.62E-04	665	1.75E-04	732	2.11E-05
398	3.80E-06	465	3.96E-04	532	4.73E-04	599	6.58E-04	666	1.70E-04	733	2.04E-05
399	3.80E-06	466	3.78E-04	533	4.75E-04	600	6.52E-04	667	1.65E-04	734	1.97E-05
400	2.60E-06	467	3.65E-04	534	4.78E-04	601	6.47E-04	668	1.61E-04	735	1.93E-05
401	3.70E-06	468	3.51E-04	535	4.81E-04	602	6.44E-04	669	1.58E-04	736	1.83E-05
402	4.20E-06	469	3.31E-04	536	4.85E-04	603	6.40E-04	670	1.56E-04	737	1.78E-05
403	4.30E-06	470	3.16E-04	537	4.88E-04	604	6.37E-04	671	1.50E-04	738	1.73E-05
404	4.50E-06	471	2.93E-04	538	4.91E-04	605	6.35E-04	672	1.44E-04	739	1.68E-05
405	5.80E-06	472	2.74E-04	539	4.93E-04	606	6.35E-04	673	1.38E-04	740	1.60E-05
406	6.40E-06	473	2.58E-04	540	4.97E-04	607	6.47E-04	674	1.34E-04	741	1.59E-05
407	6.90E-06	474	2.45E-04	541	5.01E-04	608	6.80E-04	675	1.30E-04	742	1.54E-05
408	7.70E-06	475	2.33E-04	542	5.03E-04	609	6.96E-04	676	1.26E-04	743	1.50E-05
409	8.40E-06	476	2.24E-04	543	5.09E-04	610	6.59E-04	677	1.21E-04	744	1.43E-05
410	9.10E-06	477	2.17E-04	544	5.13E-04	611	6.44E-04	678	1.18E-04	745	1.37E-05
411	1.06E-05	478	2.10E-04	545	5.15E-04	612	7.06E-04	679	1.14E-04	746	1.33E-05
412	1.21E-05	479	2.09E-04	546	5.20E-04	613	8.01E-04	680	1.11E-04	747	1.29E-05
413	1.35E-05	480	2.06E-04	547	5.25E-04	614	7.79E-04	681	1.07E-04	748	1.25E-05
414	1.51E-05	481	2.06E-04	548	5.28E-04	615	6.78E-04	682	1.04E-04	749	1.22E-05
415	1.72E-05	482	2.09E-04	549	5.33E-04	616	6.11E-04	683	1.00E-04	750	1.17E-05
416	1.84E-05	483	2.07E-04	550	5.38E-04	617	5.88E-04	684	9.76E-05	751	1.14E-05
417	2.19E-05	484	2.11E-04	551	5.43E-04	618	5.80E-04	685	9.43E-05	752	1.09E-05
418	2.51E-05	485	2.14E-04	552	5.46E-04	619	5.74E-04	686	9.20E-05	753	1.05E-05
419	2.80E-05	486	2.19E-04	553	5.51E-04	620	5.65E-04	687	8.88E-05	754	1.06E-05
420	3.02E-05	487	2.22E-04	554	5.56E-04	621	5.52E-04	688	8.59E-05	755	1.01E-05
421	3.39E-05	488	2.25E-04	555	5.61E-04	622	5.45E-04	689	8.37E-05	756	9.60E-06
422	3.77E-05	489	2.30E-04	556	5.65E-04	623	5.37E-04	690	8.09E-05	757	9.30E-06
423	4.30E-05	490	2.35E-04	557	5.71E-04	624	5.38E-04	691	7.86E-05	758	9.10E-06
424	4.92E-05	491	2.41E-04	558	5.77E-04	625	5.32E-04	692	7.56E-05	759	9.10E-06
425	5.53E-05	492	2.48E-04	559	5.82E-04	626	5.29E-04	693	7.35E-05	760	8.20E-06
426	6.10E-05	493	2.53E-04	560	5.86E-04	627	5.26E-04	694	7.13E-05	761	8.60E-06
427	6.80E-05	494	2.62E-04	561	5.91E-04	628	5.47E-04	695	6.89E-05	762	7.80E-06
428	7.67E-05	495	2.69E-04	562	5.97E-04	629	6.53E-04	696	6.66E-05	763	7.90E-06
429	8.76E-05	496	2.79E-04	563	6.01E-04	630	8.96E-04	697	6.47E-05	764	7.50E-06
430	9.78E-05	497	2.87E-04	564	6.07E-04	631	9.91E-04	698	6.28E-05	765	7.20E-06
431	1.10E-04	498	2.96E-04	565	6.08E-04	632	7.80E-04	699	6.06E-05	766	7.10E-06
432	1.23E-04	499	3.03E-04	566	6.15E-04	633	6.12E-04	700	5.87E-05	767	6.90E-06
433	1.35E-04	500	3.13E-04	567	6.23E-04	634	6.70E-04	701	5.67E-05	768	6.60E-06
434	1.53E-04	501	3.23E-04	568	6.25E-04	635	7.72E-04	702	5.53E-05	769	6.50E-06
435	1.70E-04	502	3.30E-04	569	6.29E-04	636	6.47E-04	703	5.36E-05	770	6.50E-06
436	1.90E-04	503	3.38E-04	570	6.32E-04	637	4.83E-04	704	5.18E-05	771	6.20E-06
437	2.11E-04	504	3.46E-04	571	6.37E-04	638	4.09E-04	705	4.98E-05	772	6.10E-06
438	2.35E-04	505	3.52E-04	572	6.40E-04	639	3.82E-04	706	4.83E-05	773	5.80E-06
439	2.62E-04	506	3.60E-04	573	6.43E-04	640	3.64E-04	707	4.68E-05	774	5.60E-06
440	2.96E-04	507	3.67E-04	574	6.48E-04	641	3.51E-04	708	4.54E-05	775	5.40E-06
441	3.26E-04	508	3.75E-04	575	6.51E-04	642	3.40E-04	709	4.39E-05	776	5.10E-06
442	3.69E-04	509	3.81E-04	576	6.55E-04	643	3.32E-04	710	4.26E-05	777	5.00E-06
443	4.19E-04	510	3.87E-04	577	6.56E-04	644	3.25E-04	711	4.11E-05	778	4.80E-06
444	4.74E-04	511	3.93E-04	578	6.60E-04	645	3.20E-04	712	4.01E-05	779	4.80E-06
445	5.24E-04	512	3.99E-04	579	6.62E-04	646	3.38E-04	713	3.86E-05	780	4.80E-06
446	5.84E-04	513	4.05E-04	580	6.64E-04	647	3.86E-04	714	3.75E-05	N/A	N/A



## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

<b>Model No.</b>	WPX2 @ 60W / 4000K	<b>Sample ID</b>	231101003-S1
<b>Operate time (Min.)</b>	30	<b>Stabilization time (Min.)</b>	60
<b>Temperature (°C)</b>	24.8	<b>Humidity (%RH)</b>	42.9

<b>Test Method</b>
<p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using a type C goniophotometer and software.</p> <p>The ambient temperature shall be maintained at <math>25 \pm 1^\circ\text{C}</math>, measured at a point not more than 1 m from the sample and at the same height as the sample.</p> <p>The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within <math>\pm 0.2</math> percent under load.</p> <p>The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at <math>1.0^\circ</math> vertical intervals and <math>15^\circ</math> horizontal intervals.</p>

#### Test Conditions

Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
<b>WORST CASE</b>	120.0	60	0.469	56.0	0.996
<b>NON-WORST CASE</b>	277.0	60	0.219	55.1	0.910

#### Test Result

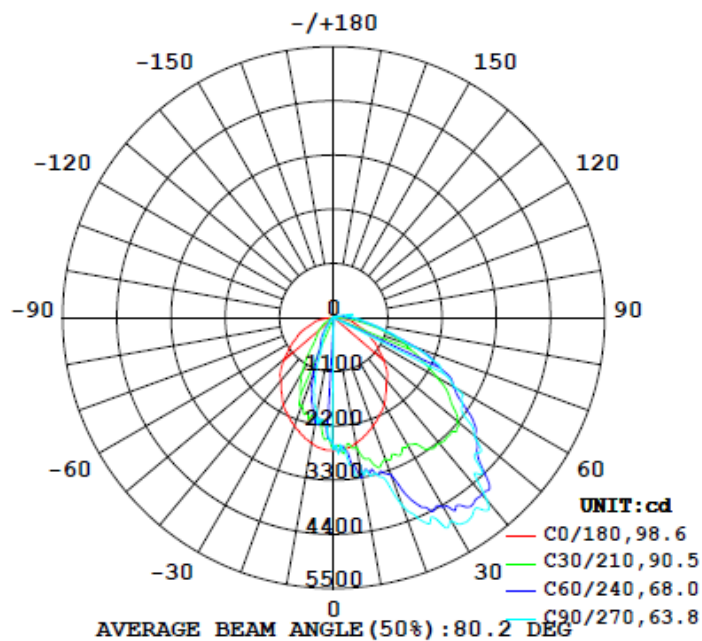
Result Type	Flux (lm)	Field Angle (10%)		Beam Angle (50%)		Luminous Efficacy (lm/W)	Zonal Lumen Requirement (80°-90°)	BUG
		C0-180	C90-270	C0-180	C90-270			
<b>0°-180° zones</b>	8463	113.7	147.8	65.3	98.4	151.1	2.7%	B2-U3-G2
<b>0°-90° zones</b>	8257	113.7	147.8	65.3	98.4	147.7	2.8%	B2-U3-G2



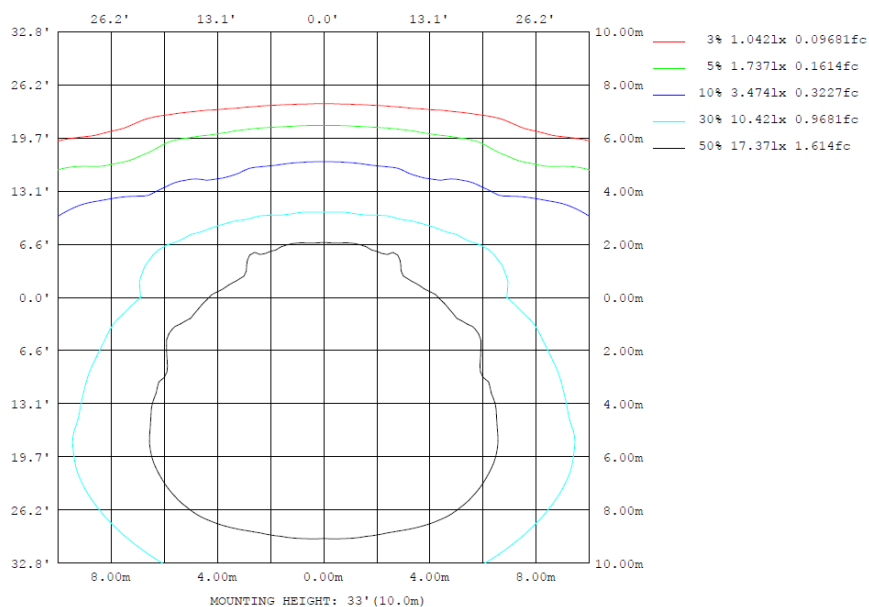
## 4.2 Goniophotometer Test

### Lighting Distribution Curve

#### LUMINOUS INTENSITY DISTRIBUTION DIAGRAM



### Isolux Plot



## 4.2 Goniophotometer Test

### Zonal Lumen Summary

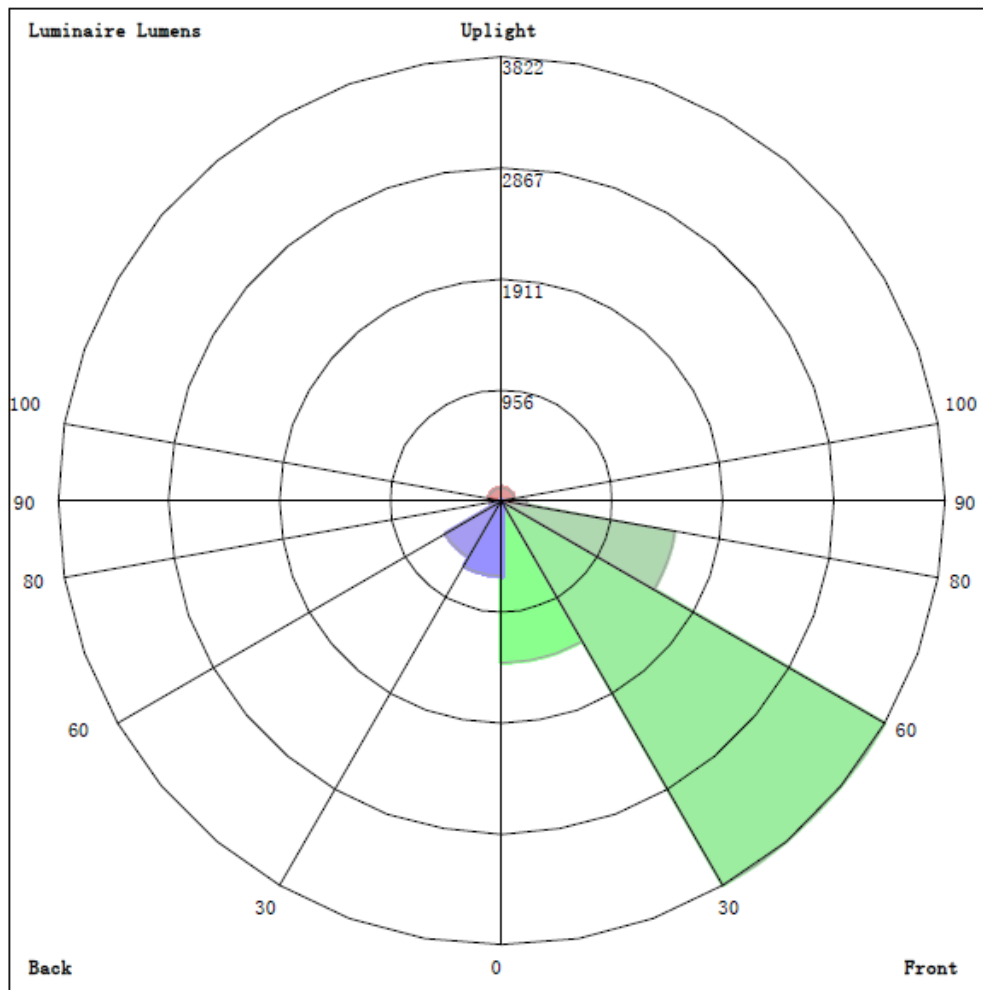
ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	± zone	± total	%lum, lamp
10	2584	3023	3133	3023	2584	2200	1957	2200	0- 10	243.0	243.0	2.87,2.87
20	2332	3211	4053	3211	2332	1514	822.5	1514	10- 20	693.2	936.2	11.1,11.1
30	2045	3971	4761	3971	2045	623.6	397.8	623.6	20- 30	1099	2036	24.1,24.1
40	1673	4219	4832	4219	1673	368.5	120.1	368.5	30- 40	1449	3484	41.2,41.2
50	1309	3666	3725	3666	1309	150.2	68.71	150.2	40- 50	1553	5037	59.5,59.5
60	914.8	2729	2868	2729	914.8	68.19	26.07	68.19	50- 60	1379	6416	75.8,75.8
70	567.7	1767	1689	1767	567.7	8.479	1.311	8.479	60- 70	1046	7462	88.2,88.2
80	302.9	748.7	789.1	748.7	302.9	3.441	1.807	3.441	70- 80	566.8	8028	94.9,94.9
90	28.44	232.1	388.9	232.1	28.44	2.220	2.065	2.220	80- 90	228.5	8257	97.6,97.6
100	23.90	96.69	382.2	96.69	23.90	2.844	2.606	2.844	90-100	94.06	8351	98.7,98.7
110	14.21	21.58	65.57	21.58	14.21	2.234	2.863	2.234	100-110	41.54	8393	99.2,99.2
120	11.58	66.37	29.98	66.37	11.58	2.165	2.777	2.165	110-120	19.87	8412	99.4,99.4
130	6.384	55.50	66.66	55.50	6.384	2.319	3.229	2.319	120-130	22.63	8435	99.7,99.7
140	2.007	34.35	54.15	34.35	2.007	2.558	3.367	2.558	130-140	16.01	8451	99.9,99.9
150	1.558	16.78	28.35	16.78	1.558	2.875	3.363	2.875	140-150	8.126	8459	100,100
160	1.603	1.351	11.03	1.351	1.603	3.041	2.984	3.041	150-160	2.830	8462	100,100
170	1.876	1.779	1.923	1.779	1.876	2.483	2.322	2.483	160-170	0.7496	8463	100,100
180	2.279	2.209	1.865	2.209	2.279	2.094	1.982	2.094	170-180	0.2039	8463	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

	Zonal (lm)		Total (lm)	Percent
0-10	242.98	0-10	242.98	2.87%
10-20	693.20	0-20	936.18	11.06%
20-30	1099.38	0-30	2035.56	24.05%
30-40	1448.69	0-40	3484.25	41.17%
40-50	1552.55	0-50	5036.80	59.52%
50-60	1378.78	0-60	6415.58	75.81%
60-70	1046.14	0-70	7461.72	88.17%
70-80	566.75	0-80	8028.47	94.87%
80-90	228.46	0-90	8256.93	97.57%
90-100	94.06	0-100	8350.99	98.68%
100-110	41.54	0-110	8392.53	99.17%
110-120	19.87	0-120	8412.40	99.41%
120-130	22.63	0-130	8435.03	99.67%
130-140	16.01	0-140	8451.04	99.86%
140-150	8.13	0-150	8459.17	99.96%
150-160	2.83	0-160	8462.00	99.99%
160-170	0.75	0-170	8462.75	100.00%
170-180	0.20	0-180	8462.95	100.00%

## 4.2 Goniophotometer Test

LCS/BUG

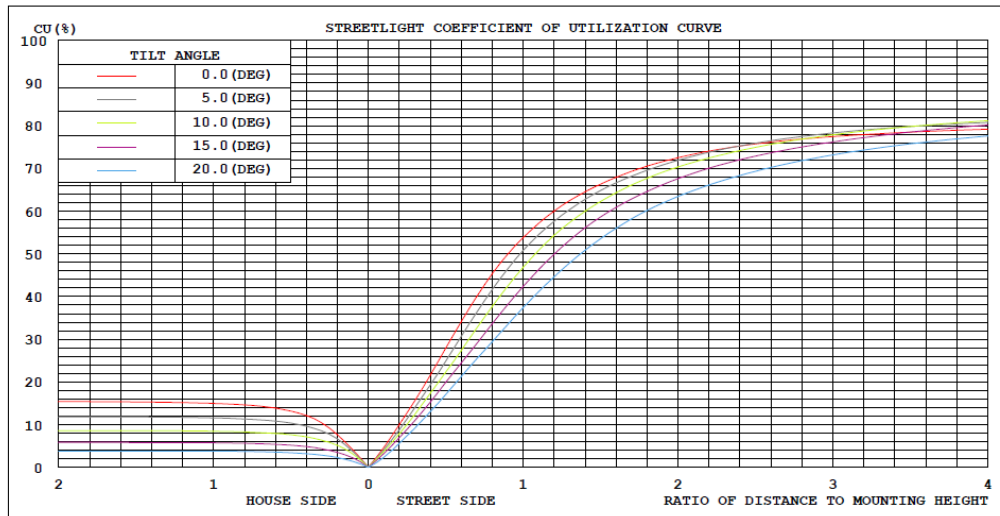


### LUMINAIRE CLASSIFICATION SYSTEM (LCS)

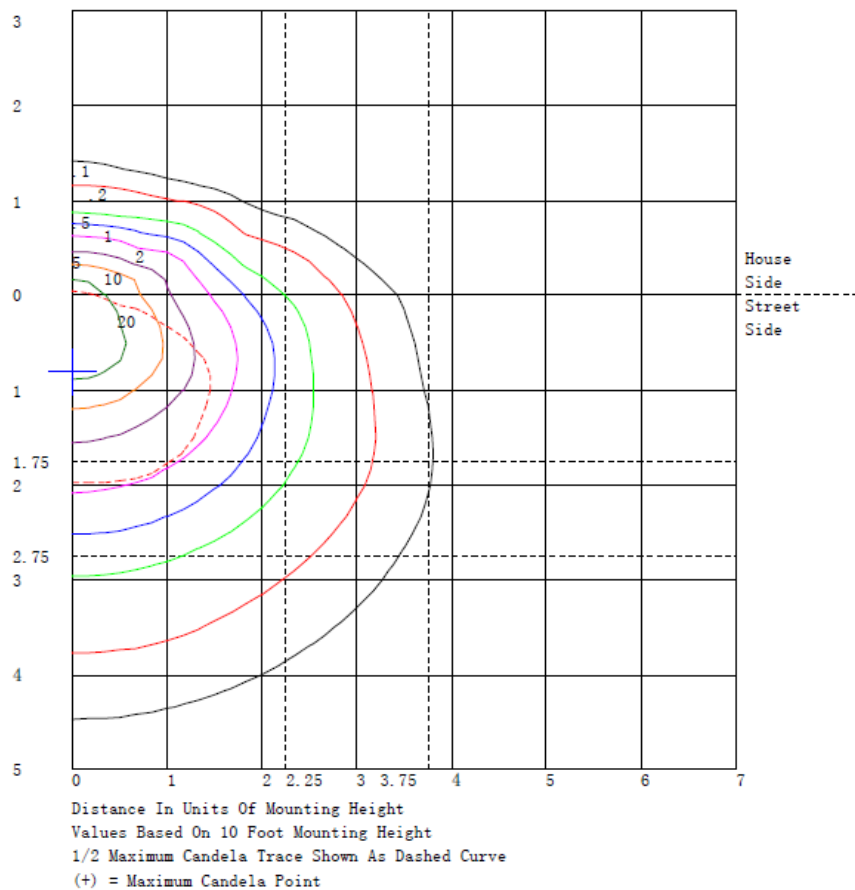
	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	1391.0	N.A.	16.4
FM - Front-Medium (30-60)	3822.2	N.A.	45.2
FH - Front-High (60-80)	1518.3	N.A.	17.9
FVH - Front-Very High (80-90)	218.0	N.A.	2.6
BL - Back-Low (0-30)	644.6	N.A.	7.6
BM - Back-Medium (30-60)	557.8	N.A.	6.6
BH - Back-High (60-80)	94.6	N.A.	1.1
BVH - Back-Very High (80-90)	10.4	N.A.	0.1
UL - Uplight-Low (90-100)	94.1	N.A.	1.1
UH - Uplight-High (100-180)	112.0	N.A.	1.3
Total	8463.0	N.A.	100.0
BUG Rating	B2-U3-G2		

## 4.2 Goniophotometer Test

### Coefficients of Utilization



### Isolines



## 4.2 Goniophotometer Test

### Luminous Distribution Intensity Data

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
0	2679	2680	2680	2680	2680	2680	2680	2681	2682	2683	2682	2681	2681	2681	2681	2681	2682	2683	2683
5	2675	2634	2610	2605	2635	2671	2698	2666	2628	2600	2638	2686	2732	2733	2724	2711	2715	2720	2724
10	2584	2582	2586	2598	2606	2629	2675	2778	2898	3023	3138	3233	3297	3279	3235	3182	3158	3142	3133
15	2470	2457	2490	2568	2732	2911	3075	3131	3158	3170	3214	3254	3283	3277	3263	3248	3256	3266	3272
20	2332	2378	2454	2560	2727	2902	3060	3130	3176	3211	3257	3316	3399	3561	3734	3893	3984	4038	4053
25	2201	2356	2508	2658	2809	2954	3089	3173	3268	3398	3682	3981	4251	4357	4414	4445	4521	4583	4620
30	2045	2370	2629	2821	2877	2919	2997	3297	3638	3971	4172	4328	4450	4565	4656	4722	4753	4764	4761
35	1851	2144	2414	2662	2873	3074	3276	3517	3765	4014	4269	4503	4701	4815	4886	4922	4934	4927	4908
40	1673	1972	2262	2545	2812	3076	3343	3651	3948	4219	4411	4564	4687	4806	4895	4948	4927	4882	4832
45	1521	1784	2063	2359	2690	3023	3345	3643	3901	4102	4182	4213	4215	4246	4264	4260	4192	4118	4059
50	1309	1548	1823	2132	2528	2920	3268	3462	3589	3666	3713	3737	3748	3779	3803	3815	3790	3757	3725
55	1102	1340	1601	1887	2236	2578	2885	3073	3204	3286	3332	3344	3329	3284	3231	3182	3173	3173	3173
60	915	1189	1453	1708	1969	2209	2417	2557	2659	2729	2765	2788	2811	2887	2960	3011	2974	2919	2868
65	767	1008	1229	1430	1611	1773	1918	2056	2173	2265	2307	2327	2334	2351	2365	2377	2389	2397	2400
70	568	703	846	998	1172	1343	1500	1616	1706	1767	1782	1778	1764	1767	1768	1763	1738	1711	1689
75	429	480	552	643	779	918	1041	1096	1125	1136	1142	1142	1144	1165	1187	1205	1206	1201	1193
80	303	307	330	371	442	522	602	663	713	749	760	761	758	765	773	780	785	788	789
85	122	117	127	153	202	260	320	365	406	442	471	496	516	532	544	552	556	556	554
90	28.4	42.7	59.3	78.1	99.6	123	148	175	203	232	262	291	318	340	358	372	382	388	389
95	22.4	30.0	38.4	47.3	56.4	66.5	78.0	91.3	107	124	145	168	192	215	237	255	267	274	275
100	23.9	24.6	26.2	28.6	30.1	33.7	40.9	53.6	72.0	96.7	132	173	216	261	302	338	362	377	382
105	17.8	18.3	19.8	19.4	19.1	19.6	21.7	27.5	35.3	44.8	58.0	70.5	80.3	78.1	74.3	72.1	82.7	95.4	107
110	14.2	10.7	10.9	14.8	26.8	39.1	48.2	39.9	29.5	21.6	31.7	45.2	58.5	61.2	61.3	60.4	62.4	64.3	65.6
115	17.0	10.7	8.94	11.6	22.2	34.8	46.6	52.1	53.9	51.7	39.9	27.2	17.4	22.2	30.8	40.9	48.0	53.0	54.8
120	11.6	6.61	5.87	9.36	19.7	32.3	45.2	54.1	61.2	66.4	70.0	71.0	68.8	59.1	47.7	36.9	31.8	29.5	30.0
125	8.66	4.53	4.17	7.59	16.8	28.2	40.4	50.2	58.9	66.2	71.3	74.6	76.2	75.2	72.9	70.1	67.3	65.0	63.7
130	6.38	3.50	3.56	6.56	14.0	23.3	33.3	41.3	48.8	55.5	61.6	66.7	70.3	71.1	70.7	69.6	68.3	67.2	66.7
135	2.10	0.00	0.00	0.98	8.20	17.2	26.6	33.3	39.5	45.2	51.5	57.1	61.5	63.0	63.3	63.0	62.9	62.8	
140	2.01	3.59	5.70	8.34	11.6	15.3	19.5	24.3	29.3	34.3	39.1	43.3	47.0	49.2	50.8	51.9	53.1	53.8	54.2
145	1.97	2.30	3.26	4.82	7.12	9.95	13.2	17.0	21.0	24.8	27.9	30.6	33.0	35.1	36.9	38.5	40.1	41.4	42.0
150	1.56	1.57	1.57	1.59	0.86	0.69	1.64	6.22	11.6	16.8	19.4	21.2	22.5	23.9	25.1	26.1	27.1	27.9	28.3
155	1.45	1.43	1.49	1.62	1.62	1.86	2.50	4.10	6.10	8.33	10.6	12.8	14.8	15.9	16.6	17.1	17.8	18.3	18.6
160	1.60	1.53	1.51	1.55	1.73	1.91	2.03	1.57	1.26	1.35	2.85	4.73	6.70	8.15	9.37	10.3	10.8	11.0	11.0
165	1.73	1.74	1.74	1.73	1.68	1.64	1.65	1.82	2.04	2.31	2.70	3.00	3.13	2.66	2.05	1.48	1.36	1.36	1.45
170	1.88	1.89	1.89	1.89	1.88	1.87	1.85	1.83	1.80	1.78	1.76	1.74	1.73	1.76	1.79	1.83	1.85	1.88	1.92
175	2.02	2.03	2.04	2.05	2.05	2.04	2.03	2.02	2.00	1.98	1.97	1.94	1.92	1.89	1.87	1.84	1.80	1.77	1.75
180	2.28	2.29	2.30	2.30	2.29	2.28	2.26	2.25	2.23	2.21	2.17	2.12	2.07	2.04	2.01	1.98	1.93	1.89	1.86

C (DEG)															UNIT: cd				
γ (DEG)	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
0	2683	2682	2681	2681	2681	2681	2681	2682	2683	2682	2681	2680	2680	2680	2680	2680	2680	2679	2684
5	2720	2715	2711	2724	2733	2732	2686	2638	2600	2628	2666	2698	2671	2635	2605	2610	2634	2675	2568
10	3142	3158	3182	3235	3279	3297	3233	3138	3023	2898	2778	2675	2629	2606	2598	2586	2582	2584	2501
15	3266	3256	3248	3263	3277	3283	3254	3214	3170	3158	3131	3075	2911	2732	2568	2490	2457	2470	2271
20	4038	3984	3893	3734	3561	3399	3316	3257	3211	3176	3130	3060	2902	2727	2560	2454	2378	2332	2152
25	4583	4521	4445	4414	4357	4251	3981	3682	3398	3268	3173	3089	2954	2809	2658	2508	2356	2201	2131
30	4764	4753	4722	4656	4565	4450	4328	4172	3971	3638	3297	2997	2919	2877	2821	2629	2370	2045	2014
35	4927	4934	4922	4886	4815	4701	4503	4269	4014	3765	3517	3276	3074	2873	2662	2414	2144	1851	1881
40	4882	4927	4948	4895	4806	4687	4564	4411	4219	3948	3651	3343	3076	2812	2545	2262	1972	1673	1687
45	4118	4192	4260	4264	4246	4215	4213	4182	4102	3901	3643	3345	3023	2690	2359	2063	1784	1521	1468
50	3757	3790	3815	3803	3779	3748	3737	3713	3666	3589	3462	3268	2920	2528	2132	1823	1548	1309	1181
55	3173	3173	3182	3231	3284	3329	3344	3332	3286	3204	3073	2885	2578	2236	1887	1601	1340	1102	911
60	2919	2974	3011	2960	2887	2811	2788	2765	2729	2659	2557	2417	2209	1969	1708	1453	1189	915	690
65	2397	2389	2377	2365	2351	2334	2327	2307	2265	2173	2056	1918	1773	1611	1430	1229	1008	767	559
70	1711	1738	1763	1768	1767	1764	1778	1782	1767	1706	1616	1500	1343	1172	998	846	703	568	426
75	1201	1206	1205	1187	1165	1144	1142	1142	1136	1125	1096	1041	918	779	643	552	480	429	308
80	788	785	780	773	765	758	761	760	749	713	663	602	522	442	371	330	307	303	206
85	556	556	552	544	532	516	496	471	442	406	365	320	260	202	153	127	117	122	87.5
90	388	382	372	358	340	318	291	262	232	203	175	148	123	99.6	78.1	59.3	42.7	28.4	26.3
95	274	267	255	237	215	192	168	145	124	107	91.3	78.0	66.5	56.4	47.3	38.4	30.0	22.4	19.5
100	377	362	338	302	261	216	173	132	96.7	72.0	53.6	40.9	33.7	30.1	28.6	26.2	24.6	23.9	18.9
105	95.4	82.7	72.1	74.3	78.1	80.3	70.5	58.0	44.8	35.3	27.5	21.7	19.6	19.1	19.4	18.8	18.3	17.8	13.7
110	64.3	62.4	60.4	61.3	61.2	58.5	45.2	31.7	21.6	29.5	39.9	48.2	39.1	26.8	14.8	10.9	10.7	14.2	10.8
115	53.0	48.0	40.9	30.8	22.2	17.4	27.2	39.9	51.7	53.9	52.1	46.6	34.8	22.2	11.6	8.94	10.7	17.0	12.1
120	29.5	31.8	36.9	47.7	59.1	68.8	71.0	70.0	66.4	61.2	54.1	45.2	32.3	19.7	9.36	5.87	6.61	11.6	8.83
125	65.0	67.3	70.1	72.9	75.2	76.2	74.6	71.3	66.2	58.9	50.2	40.4	28.2	16.8	7.59	4.17	4.53	8.66	6.84
130	67.2	68.3	69.6	70.7	71.1	70.3	66.7	61.6	55.5	48.8	41.3	33.3	23.3	14.0	6.56	3.56	3.50	6.38	5.21
135	62.9	63.0	63.0	63.3	63.0	61.5	57.1	51.5	45.2	39.5	33.3	26.6	17.2	8.20	0.98	0.00	0.00	2.10	2.62
140	53.8	53.1	51.9	50.8	49.2	47.0	43.9	40.1	34.3	29.3	24.3	19.5	15.3	11.6	8.34	5.70	3.59	2.01	2.36
145	41.4	40.1	38.5	36.9	35.1	33.0	30.6	27.9	24.8	21.0	17.0	13.2	9.95	7.12	4.82	3.26	2.30	1.97	2.23
150	27.9	27.1	26.1	25.1	23.9	22.5	21.2	19.4	16.8	11.6	6.22	1.64	0.67	0.86	1.59	1.87	1.57	1.56	1.99
155	18.3	17.8	17.1	16.6	15.9	14.8	12.8	10.6	8.33	6.10	4.10	2.50	1.86	1.62	1.62	1.49	1.43	1.45	2.07
160	11.0	10.8	10.3	9.37	8.15	6.70	4.73	2.85	1.35	1.26	1.57	2.03	1.91	1.73	1.55	1.51	1.53	1.60	2.29
165	1.36	1.36	1.48	2.05	2.66	3.13	3.00	2.70	2.31	2.04	1.82	1.65	1.64	1.68	1.73	1.74	1.74	1.73	2.41
170	1.88	1.85	1.83	1.79	1.76	1.73	1.74	1.76	1.78	1.80	1.83	1.85	1.87	1.88	1.89	1.89	1.89	1.88	2.39
175	1.77	1.80	1.84	1.87	1.89	1.92	1.94	1.97	1.98	2.00	2.02	2.03	2.04	2.05	2.05	2.04	2.03	2.02	2.37
180	1.89	1.93	1.98	2.01	2.04	2.07	2.12	2.17	2.21	2.23	2.25	2.26	2.28	2.29	2.30	2.30	2.29	2.28	2.27



Table--3

UNIT: cd

C (DEG) γ (DEG)	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280
0	2688	2690	2690	2690	2689	2688	2687	2686	2686	2685	2684	2683	2682	2682	2682	2683	2683	2683	2682
5	2488	2436	2436	2445	2444	2360	2267	2183	2166	2170	2182	2183	2183	2181	2176	2171	2168	2171	2176
10	2420	2341	2250	2172	2118	2132	2164	2200	2207	2200	2178	2122	2060	2002	1976	1961	1957	1961	1976
15	2122	2023	2004	2012	2024	1976	1919	1860	1828	1797	1760	1688	1616	1556	1549	1557	1572	1557	1549
20	2014	1918	1899	1897	1883	1775	1647	1514	1422	1337	1253	1149	1048	958	891	845	823	845	891
25	2049	1957	1857	1744	1614	1448	1270	1092	919	766	644	595	575	572	559	551	548	551	559
30	1945	1838	1682	1496	1289	1047	817	624	549	517	508	476	448	426	410	401	398	401	410
35	1835	1713	1458	1169	887	720	594	501	433	384	349	310	278	253	238	230	228	230	238
40	1623	1481	1194	880	589	472	406	368	305	250	203	171	147	132	123	120	120	120	123
45	1367	1216	968	706	467	353	282	239	189	151	124	112	107	107	103	100	98.8	100	103
50	1042	891	709	530	369	269	198	150	121	104	96.4	85.9	78.4	73.4	70.3	68.8	68.7	68.8	70.3
55	741	591	463	354	264	196	145	108	84.0	69.5	61.8	56.1	53.3	52.4	50.8	49.9	49.5	49.9	50.8
60	506	362	270	209	168	126	92.7	68.2	52.7	43.2	38.1	34.3	32.2	31.1	29.0	27.3	26.1	27.3	29.0
65	390	260	181	132	102	72.6	51.6	36.5	23.0	13.1	6.26	2.62	1.02	0.77	0.49	0.65	1.02	0.65	0.49
70	308	212	145	95.8	61.8	35.8	18.6	8.48	2.70	0.59	0.75	0.30	0.44	0.89	1.02	1.16	1.31	1.16	1.02
75	208	131	81.1	49.1	30.0	15.9	8.29	5.00	2.15	0.99	0.92	0.67	0.74	1.00	1.17	1.38	1.58	1.38	1.17
80	129	71.8	40.6	23.9	16.8	9.23	5.15	3.44	1.88	1.22	1.14	0.97	1.00	1.16	1.36	1.59	1.81	1.59	1.36
85	59.2	37.4	24.0	15.5	10.6	6.43	3.86	2.50	1.63	1.33	1.36	1.26	1.26	1.35	1.53	1.73	1.93	1.73	1.53
90	23.6	20.3	15.9	11.4	7.30	4.90	3.25	2.22	1.71	1.55	1.60	1.55	1.56	1.63	1.75	1.90	2.06	1.90	1.75
95	16.7	13.9	10.9	8.18	5.78	4.16	3.00	2.24	1.90	1.80	1.85	1.82	1.84	1.89	1.98	2.09	2.23	2.09	1.98
100	14.7	11.2	8.48	6.44	4.94	3.90	3.23	2.84	2.60	2.49	2.46	2.38	2.34	2.33	2.38	2.47	2.61	2.47	2.38
105	10.2	7.28	4.89	3.11	1.97	1.89	2.24	2.75	2.79	2.77	2.72	2.68	2.65	2.65	2.70	2.78	2.91	2.78	2.70
110	7.99	5.84	4.52	3.68	3.18	2.69	2.38	2.23	2.30	2.46	2.65	2.71	2.75	2.78	2.80	2.83	2.86	2.83	2.80
115	8.19	5.29	3.76	2.99	2.71	2.39	2.24	2.22	2.26	2.34	2.44	2.47	2.50	2.53	2.57	2.62	2.66	2.62	2.57
120	6.57	4.79	3.59	2.81	2.35	2.13	2.09	2.17	2.24	2.35	2.47	2.53	2.58	2.62	2.68	2.74	2.78	2.74	2.68
125	5.32	4.10	3.23	2.63	2.25	2.11	2.11	2.21	2.33	2.46	2.60	2.67	2.72	2.76	2.84	2.91	2.96	2.91	2.84
130	4.22	3.42	2.82	2.41	2.16	2.12	2.19	2.32	2.41	2.51	2.62	2.74	2.86	2.97	3.08	3.17	3.23	3.17	3.08
135	2.94	3.05	2.82	2.50	2.19	2.20	2.29	2.43	2.55	2.67	2.79	2.89	2.98	3.06	3.15	3.22	3.27	3.22	3.15
140	2.59	2.70	2.62	2.48	2.34	2.37	2.45	2.56	2.64	2.73	2.82	2.92	3.02	3.12	3.22	3.30	3.37	3.30	3.22
145	2.42	2.55	2.58	2.57	2.55	2.59	2.64	2.71	2.81	2.91	3.00	3.06	3.12	3.17	3.27	3.35	3.42	3.35	3.27
150	2.32	2.56	2.66	2.69	2.70	2.76	2.82	2.87	2.93	2.98	3.03	3.07	3.10	3.15	3.22	3.30	3.36	3.30	3.22
155	2.55	2.88	3.00	3.03	2.99	2.96	2.93	2.91	2.93	2.95	3.00	3.06	3.12	3.17	3.17	3.16	3.14	3.16	3.17
160	2.81	3.16	3.28	3.27	3.19	3.15	3.09	3.04	3.04	3.04	3.05	3.01	2.97	2.93	2.94	2.96	2.98	2.96	2.94
165	2.91	3.24	3.31	3.26	3.15	3.09	3.03	2.97	2.94	2.92	2.88	2.78	2.69	2.61	2.63	2.67	2.71	2.67	2.63
170	2.77	3.00	3.03	2.95	2.82	2.70	2.59	2.48	2.44	2.42	2.41	2.38	2.35	2.32	2.32	2.32	2.32	2.32	2.32
175	2.62	2.77	2.79	2.75	2.64	2.50	2.36	2.23	2.22	2.23	2.24	2.18	2.11	2.06	2.08	2.11	2.15	2.11	2.08
180	2.26	2.25	2.24	2.23	2.21	2.18	2.14	2.09	2.05	2.00	1.95	1.92	1.90	1.90	1.92	1.95	1.98	1.95	1.92

																UNIT: cd			
C (DEG) γ (DEG)		285	290	295	300	305	310	315	320	325	330	335	340	345	350	355			
0		2682	2682	2683	2684	2685	2686	2686	2687	2688	2689	2690	2690	2690	2688	2684			
5		2181	2183	2183	2182	2170	2166	2183	2267	2360	2444	2445	2436	2436	2488	2568			
10		2002	2060	2122	2178	2200	2207	2200	2164	2132	2118	2172	2250	2341	2420	2501			
15		1556	1616	1688	1760	1797	1828	1860	1919	1976	2024	2012	2004	2023	2122	2271			
20		958	1048	1149	1253	1337	1422	1514	1647	1775	1883	1897	1899	1918	2014	2152			
25		572	575	595	644	766	919	1092	1270	1448	1614	1744	1857	1957	2049	2131			
30		426	448	476	508	517	549	624	817	1047	1289	1496	1682	1838	1945	2014			
35		253	278	310	349	384	433	501	594	720	887	1169	1458	1713	1835	1881			
40		132	147	171	203	250	305	368	406	472	589	880	1194	1481	1623	1687			
45		107	107	112	124	151	189	239	282	353	467	706	968	1216	1367	1468			
50		73.4	78.4	85.9	96.4	104	121	150	198	269	369	530	709	891	1042	1181			
55		52.4	53.3	56.1	61.8	69.5	84.0	108	145	196	264	354	463	591	741	911			
60		31.1	32.2	34.3	38.1	43.2	52.7	68.2	92.7	126	168	209	270	362	506	690			
65		0.77	1.02	2.62	6.26	13.1	23.0	36.5	51.6	72.6	102	132	181	260	390	559			
70		0.89	0.44	0.30	0.75	0.59	2.70	8.48	18.6	35.8	61.8	95.8	145	212	308	426			
75		1.00	0.74	0.67	0.92	0.99	2.15	5.00	8.29	15.9	30.0	49.1	81.1	131	208	308			
80		1.16	1.00	0.97	1.14	1.22	1.88	3.44	5.15	9.23	16.8	23.9	40.6	71.8	129	206			
85		1.35	1.26	1.26	1.36	1.33	1.63	2.50	3.86	6.43	10.6	15.5	24.0	37.4	59.2	87.5			
90		1.63	1.56	1.55	1.60	1.55	1.71	2.22	3.25	4.90	7.30	11.4	15.9	20.3	23.6	26.3			
95		1.89	1.84	1.82	1.85	1.80	1.90	2.24	3.00	4.16	5.78	8.18	10.9	13.9	16.7	19.5			
100		2.33	2.34	2.38	2.46	2.49	2.60	2.84	3.23	3.90	4.94	6.44	8.48	11.2	14.7	18.9			
105		2.65	2.65	2.68	2.72	2.77	2.79	2.75	2.24	1.89	1.97	3.11	4.89	7.28	10.2	13.7			
110		2.78	2.75	2.71	2.65	2.46	2.30	2.23	2.38	2.69	3.18	3.68	4.52	5.84	7.99	10.8			
115		2.53	2.50	2.47	2.44	2.34	2.26	2.22	2.24	2.39	2.71	2.99	3.76	5.29	8.19	12.1			
120		2.62	2.58	2.53	2.47	2.35	2.24	2.17	2.09	2.13	2.35	2.81	3.59	4.79	6.57	8.83			
125		2.76	2.72	2.67	2.60	2.46	2.33	2.21	2.11	2.11	2.25	2.63	3.23	4.10	5.32	6.84			
130		2.97	2.86	2.74	2.62	2.51	2.41	2.32	2.19	2.12	2.16	2.41	2.82	3.42	4.22	5.21			
135		3.06	2.98	2.89	2.79	2.67	2.55	2.43	2.29	2.20	2.19	2.50	2.82	3.05	2.94	2.62			
140		3.12	3.02	2.92	2.82	2.73	2.64	2.56	2.45	2.37	2.34	2.48	2.62	2.70	2.59	2.36			
145		3.17	3.12	3.06	3.00	2.91	2.81	2.71	2.64	2.59	2.55	2.57	2.58	2.55	2.42	2.23			
150		3.15	3.10	3.07	3.03	2.98	2.93	2.87	2.82	2.76	2.70	2.69	2.66	2.56	2.32	1.99			
155		3.17	3.12	3.06	3.00	2.95	2.93	2.91	2.93	2.96	2.99	3.03	3.00	2.88	2.55	2.07			
160		2.93	2.97	3.01	3.05	3.04	3.04	3.04	3.09	3.15	3.19	3.27	3.28	3.16	2.81	2.29			
165		2.61	2.69	2.78	2.88	2.92	2.94	2.97	3.03	3.09	3.15	3.26	3.31	3.24	2.91	2.41			
170		2.32	2.35	2.38	2.41	2.42	2.44	2.48	2.59	2.70	2.82	2.95	3.03	3.00	2.77	2.39			
175		2.06	2.11	2.18	2.24	2.23	2.22	2.23	2.36	2.50	2.64	2.75	2.79	2.77	2.62	2.37			
180		1.90	1.90	1.92	1.95	2.00	2.05	2.09	2.14	2.18	2.21	2.23	2.24	2.25	2.26	2.27			

## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

<b>Model No.</b>	WPX2 @ 60W / 4000K	<b>Sample ID</b>	231101003-S1
<b>Temperature (°C)</b>	25.4	<b>Humidity (%RH)</b>	41.0

<b>Test Method</b>
<p>The samples were tested according to the ANSI C82.77:2014</p> <p>The total harmonic distortion shall be measured to the 40th order.</p> <p>The ambient temperature shall be maintained at 25±1°C. The sample measurements were made using a digital power meter and power supply. The sample was operated at rated voltage and was stabilized before measurement. The total harmonic distortion was calculated.</p>

### Test Results

Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	iTHD(%)
120.0	60	0.469	56.0	0.996	2.03
277.0	60	0.219	55.1	0.910	12.03



## 5.0 Equipment List:

Equipment ID	Equipment Name	Last Cal.	Due Cal.
NTC-F01-001	Goniophotometer System	2022-11-09	2023-11-08
NTC-F01-006	2.0 meter Integrating Sphere	2022-11-09	2023-11-08
NTC-F01-012	Standard Lamp	2022-11-09	2023-11-08
NTC-F01-013	Standard Lamp	2022-11-09	2023-11-08
NTC-F01-031	Digital Power Meter	2023-08-25	2024-08-24
NTC-F01-019	Temperature & Humidity Meter	2022-11-12	2023-11-11

\*\*\*\*\*End of Report\*\*\*\*\*