

## 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		11183
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-180° zones)	IES LM-79-2008	N/A		139.6
Luminaire Output (lm) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	300		10909
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	Standard	Premium	136.2
		105	120	
Power (Input Wattage) (W) (Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		80.1
Total Harmonic Distortion (A%) (THD & PF – Section 4.3)	ANSI C82.77:2014	20.00%	480V	7.09
Power Factor (THD & PF – Section 4.3)	ANSI C82.77:2014	0.9	480V	0.919
Allowable CCTs* (K) (Integrating Sphere – Section 4.1)	IES LM-79-2008	7 steps	5029±283	5308
		4 steps	5029±220	
Minimum CRI (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	≥70		82.6
Minimum R9 (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	N/A		7
Minimum Rf (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	≥70		83
Minimum Rg (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	≥89		97
IES Rcs,h1 (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	-18%≤IES Rcs,h1≤+23%		-13%
Zonal Lumen Requirement (80°-90°) (Goniophotometer – Section 4.2)	IES LM-79-2008	≤10%		V
Input Voltage (V)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Cast		480.0
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A
Input Current (A)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		0.182
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A
Power (Input Wattage – W)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		80.1
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2023-11-08	WPX2 @ 80W / 5000K 480	231101004-S1
2	Goniophotometer Test	2023-11-08	WPX2 @ 80W / 5000K 480	231101004-S1
3	THD and PF Test	2023-11-08	WPX2 @ 80W / 5000K 480	231101004-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 @ 80W / 5000K 480, color tunable from 3000K, 4000K and 5000K.

Electrical Specification: 480Vac, 50/60Hz

### Photos of Luminaire Characteristics



## 4.0 LM-79 Measurement and Test Results

### 4.1 Integrating Sphere Test

<b>Model No.</b>	WPX2 @ 80W / 5000K 480	<b>Sample ID</b>	231101004-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

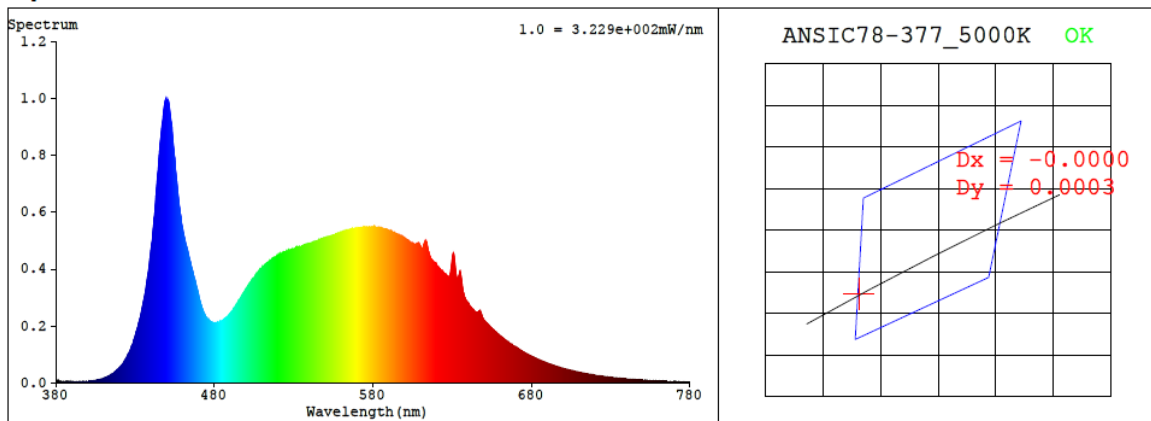
Test Method
<p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25±1°C.</p> <p>The sample measurements were made using 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 4π 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
480.0	60	0.182	80.1	0.919

CCT (K)	CRI	R9	Duv	Rf	Rg	IES Rcs,h1
5308	82.6	7	0.0002	83	97	-13%

## 4.1 Integrating Sphere Test



### Colorimetric Parameters

Chromaticity Coordinate:  $x = 0.3370$   $y = 0.3452$  /  $u' = 0.2084$   $v' = 0.4803$  ( $duv=1.52e-04$ )

CCT= 5308K Prcp WL: Ld=565.3nm Purity=4.7%

Peak WL: Lp=450nm FWHM: =21.1nm Ratio:R=15.2% G=80.2% B=4.6%

Render Index: Ra = 82.6 AvgR = 75.7 TM30:Rf=82 Rg=96

EEI: 0.09981 A++ Highest

R1 =81 R2 =87 R3 =91 R4 =83 R5 =82 R6 =82 R7 =86

R8 =68 R9 =7 R10=69 R11=83 R12=62 R13=83 R14=95 R15=77

## 4.1 Integrating Sphere Test

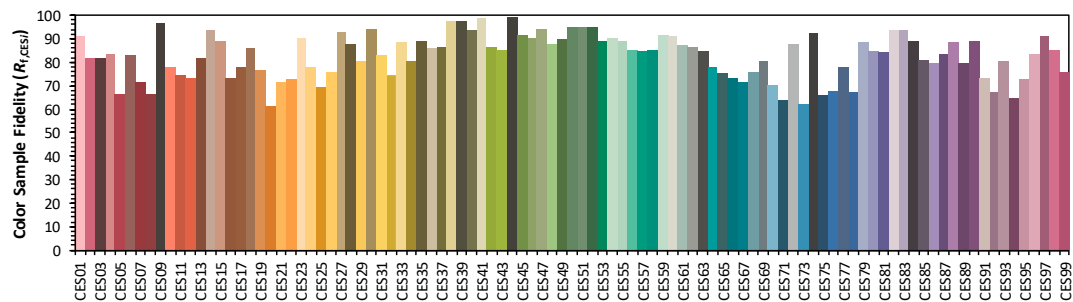
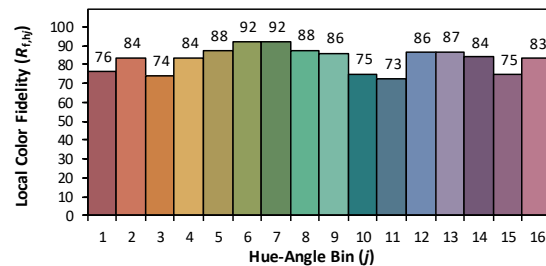
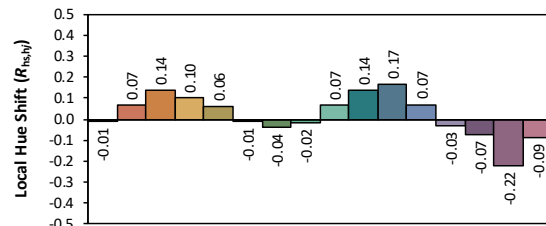
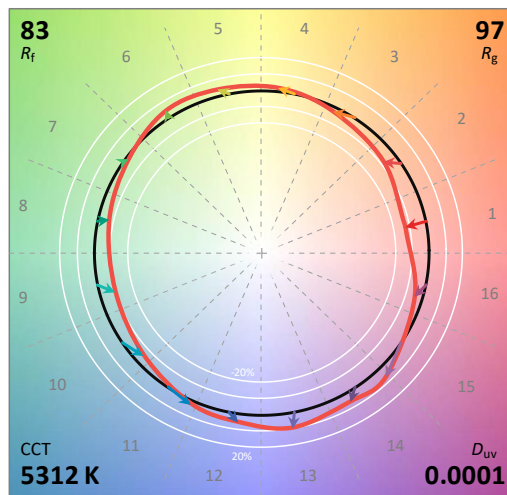
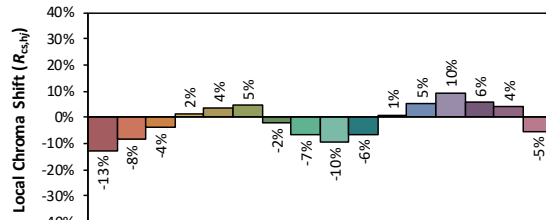
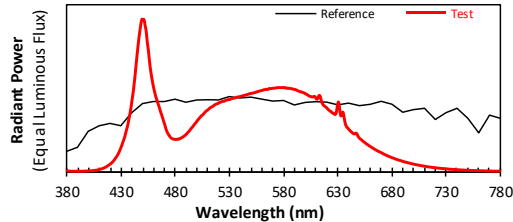
### ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: RAB Lighting Inc.

Date: 2023/11/16

Model: WPX2 @ 80W / 5000K 480



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

$x$  0.3369  
 $y$  0.3451  
 $u'$  0.2084  
 $v'$  0.4802

CIE 13.3-1995  
(CRI)

$R_a$  83  
 $R_g$  7

## 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	7.60E-06	447	9.09E-04	514	4.23E-04	581	5.49E-04	648	2.47E-04	715	3.15E-05
381	5.20E-06	448	9.58E-04	515	4.28E-04	582	5.44E-04	649	2.31E-04	716	3.08E-05
382	4.90E-06	449	9.92E-04	516	4.34E-04	583	5.46E-04	650	2.21E-04	717	2.99E-05
383	5.00E-06	450	9.90E-04	517	4.38E-04	584	5.43E-04	651	2.14E-04	718	2.87E-05
384	3.80E-06	451	9.89E-04	518	4.42E-04	585	5.44E-04	652	2.09E-04	719	2.83E-05
385	4.60E-06	452	9.51E-04	519	4.43E-04	586	5.42E-04	653	2.03E-04	720	2.72E-05
386	4.10E-06	453	9.12E-04	520	4.48E-04	587	5.41E-04	654	1.97E-04	721	2.60E-05
387	4.00E-06	454	8.41E-04	521	4.52E-04	588	5.40E-04	655	1.92E-04	722	2.55E-05
388	4.30E-06	455	7.90E-04	522	4.53E-04	589	5.38E-04	656	1.87E-04	723	2.48E-05
389	4.50E-06	456	7.21E-04	523	4.57E-04	590	5.36E-04	657	1.81E-04	724	2.40E-05
390	3.40E-06	457	6.63E-04	524	4.60E-04	591	5.35E-04	658	1.77E-04	725	2.33E-05
391	4.20E-06	458	6.18E-04	525	4.59E-04	592	5.32E-04	659	1.71E-04	726	2.26E-05
392	3.70E-06	459	5.79E-04	526	4.63E-04	593	5.28E-04	660	1.67E-04	727	2.17E-05
393	4.50E-06	460	5.43E-04	527	4.66E-04	594	5.26E-04	661	1.62E-04	728	2.12E-05
394	4.00E-06	461	5.12E-04	528	4.68E-04	595	5.22E-04	662	1.58E-04	729	2.05E-05
395	4.80E-06	462	4.86E-04	529	4.70E-04	596	5.21E-04	663	1.53E-04	730	1.98E-05
396	4.70E-06	463	4.66E-04	530	4.70E-04	597	5.19E-04	664	1.49E-04	731	1.91E-05
397	5.40E-06	464	4.43E-04	531	4.73E-04	598	5.16E-04	665	1.45E-04	732	1.86E-05
398	5.40E-06	465	4.21E-04	532	4.77E-04	599	5.13E-04	666	1.41E-04	733	1.80E-05
399	5.90E-06	466	3.97E-04	533	4.77E-04	600	5.10E-04	667	1.37E-04	734	1.73E-05
400	6.30E-06	467	3.76E-04	534	4.79E-04	601	5.05E-04	668	1.33E-04	735	1.69E-05
401	7.00E-06	468	3.55E-04	535	4.80E-04	602	5.02E-04	669	1.30E-04	736	1.63E-05
402	7.20E-06	469	3.31E-04	536	4.83E-04	603	4.97E-04	670	1.27E-04	737	1.58E-05
403	7.60E-06	470	3.11E-04	537	4.86E-04	604	4.93E-04	671	1.23E-04	738	1.55E-05
404	8.40E-06	471	2.86E-04	538	4.87E-04	605	4.91E-04	672	1.19E-04	739	1.49E-05
405	9.20E-06	472	2.65E-04	539	4.88E-04	606	4.88E-04	673	1.15E-04	740	1.44E-05
406	1.05E-05	473	2.50E-04	540	4.90E-04	607	4.87E-04	674	1.12E-04	741	1.39E-05
407	1.11E-05	474	2.39E-04	541	4.92E-04	608	4.89E-04	675	1.09E-04	742	1.36E-05
408	1.27E-05	475	2.29E-04	542	4.93E-04	609	4.90E-04	676	1.05E-04	743	1.30E-05
409	1.39E-05	476	2.20E-04	543	4.97E-04	610	4.79E-04	677	1.02E-04	744	1.28E-05
410	1.64E-05	477	2.17E-04	544	4.98E-04	611	4.72E-04	678	9.96E-05	745	1.22E-05
411	1.79E-05	478	2.13E-04	545	4.99E-04	612	4.82E-04	679	9.61E-05	746	1.19E-05
412	2.07E-05	479	2.12E-04	546	5.02E-04	613	4.97E-04	680	9.34E-05	747	1.17E-05
413	2.30E-05	480	2.11E-04	547	5.04E-04	614	4.90E-04	681	9.09E-05	748	1.11E-05
414	2.57E-05	481	2.11E-04	548	5.07E-04	615	4.63E-04	682	8.84E-05	749	1.09E-05
415	2.93E-05	482	2.13E-04	549	5.09E-04	616	4.44E-04	683	8.56E-05	750	1.07E-05
416	3.28E-05	483	2.12E-04	550	5.11E-04	617	4.34E-04	684	8.30E-05	751	1.02E-05
417	3.80E-05	484	2.16E-04	551	5.11E-04	618	4.28E-04	685	8.09E-05	752	1.00E-05
418	4.23E-05	485	2.19E-04	552	5.13E-04	619	4.22E-04	686	7.81E-05	753	9.60E-06
419	4.70E-05	486	2.24E-04	553	5.15E-04	620	4.17E-04	687	7.57E-05	754	9.30E-06
420	5.24E-05	487	2.27E-04	554	5.17E-04	621	4.08E-04	688	7.39E-05	755	9.00E-06
421	5.86E-05	488	2.33E-04	555	5.20E-04	622	4.02E-04	689	7.17E-05	756	8.80E-06
422	6.51E-05	489	2.37E-04	556	5.21E-04	623	3.96E-04	690	6.92E-05	757	8.60E-06
423	7.37E-05	490	2.44E-04	557	5.24E-04	624	3.92E-04	691	6.73E-05	758	8.20E-06
424	8.32E-05	491	2.52E-04	558	5.26E-04	625	3.84E-04	692	6.52E-05	759	8.00E-06
425	9.36E-05	492	2.60E-04	559	5.27E-04	626	3.81E-04	693	6.36E-05	760	7.60E-06
426	1.03E-04	493	2.67E-04	560	5.30E-04	627	3.76E-04	694	6.18E-05	761	7.60E-06
427	1.16E-04	494	2.77E-04	561	5.31E-04	628	3.74E-04	695	5.91E-05	762	7.20E-06
428	1.30E-04	495	2.86E-04	562	5.34E-04	629	3.90E-04	696	5.80E-05	763	7.10E-06
429	1.47E-04	496	2.94E-04	563	5.35E-04	630	4.37E-04	697	5.60E-05	764	6.70E-06
430	1.64E-04	497	3.03E-04	564	5.37E-04	631	4.53E-04	698	5.43E-05	765	6.70E-06
431	1.84E-04	498	3.12E-04	565	5.35E-04	632	4.05E-04	699	5.24E-05	766	6.30E-06
432	2.05E-04	499	3.21E-04	566	5.38E-04	633	3.65E-04	700	5.11E-05	767	6.20E-06
433	2.25E-04	500	3.30E-04	567	5.43E-04	634	3.71E-04	701	4.96E-05	768	6.00E-06
434	2.53E-04	501	3.40E-04	568	5.41E-04	635	3.89E-04	702	4.76E-05	769	5.80E-06
435	2.79E-04	502	3.48E-04	569	5.42E-04	636	3.58E-04	703	4.65E-05	770	5.50E-06
436	3.07E-04	503	3.56E-04	570	5.43E-04	637	3.19E-04	704	4.50E-05	771	5.60E-06
437	3.43E-04	504	3.64E-04	571	5.44E-04	638	2.99E-04	705	4.38E-05	772	5.20E-06
438	3.80E-04	505	3.69E-04	572	5.45E-04	639	2.88E-04	706	4.24E-05	773	5.20E-06
439	4.22E-04	506	3.77E-04	573	5.45E-04	640	2.82E-04	707	4.08E-05	774	4.90E-06
440	4.73E-04	507	3.85E-04	574	5.48E-04	641	2.71E-04	708	3.98E-05	775	5.00E-06
441	5.20E-04	508	3.93E-04	575	5.48E-04	642	2.65E-04	709	3.85E-05	776	4.90E-06
442	5.82E-04	509	3.98E-04	576	5.48E-04	643	2.59E-04	710	3.73E-05	777	4.60E-06
443	6.50E-04	510	4.03E-04	577	5.48E-04	644	2.52E-04	711	3.63E-05	778	4.30E-06
444	7.23E-04	511	4.09E-04	578	5.48E-04	645	2.48E-04	712	3.51E-05	779	4.40E-06
445	7.90E-04	512	4.16E-04	579	5.48E-04	646	2.47E-04	713	3.37E-05	780	4.40E-06
446	8.55E-04	513	4.20E-04	580	5.47E-04	647	2.52E-04	714	3.28E-05	N/A	N/A



## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

<b>Model No.</b>	WPX2 @ 80W / 5000K 480	<b>Sample ID</b>	231101004-S1
<b>Operate time (Min.)</b>	30	<b>Stabilization time (Min.)</b>	60
<b>Temperature (°C)</b>	25.0	<b>Humidity (%RH)</b>	42.1

Test Method
<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>	480.0	60	0.182	80.1	0.919
<b>NON-WORST CASE</b>	N/A	N/A	N/A	N/A	N/A

#### Test Result

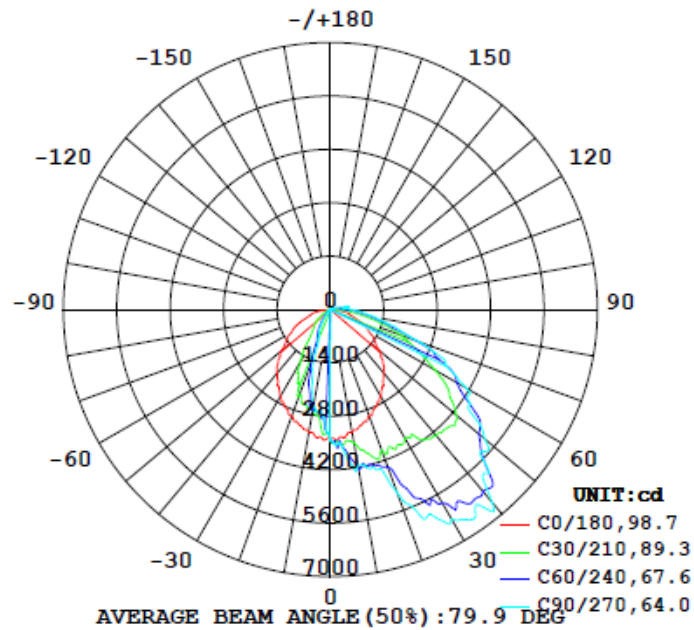
Result Type	Flux (lm)	Field Angle (10%)		Beam Angle (50%)		Luminous Efficacy (lm/W)	Zonal Lumen Requirement	BUG
		C0-180	C90-270	C0-180	C90-270		(80°-90°)	
<b>0°-180° zones</b>	11183	114.2	147.1	65.3	97.2	139.6	2.8%	B2-U3-G3
<b>0°-90° zones</b>	10909	114.2	147.1	65.3	97.2	136.2	2.9%	B2-U3-G3



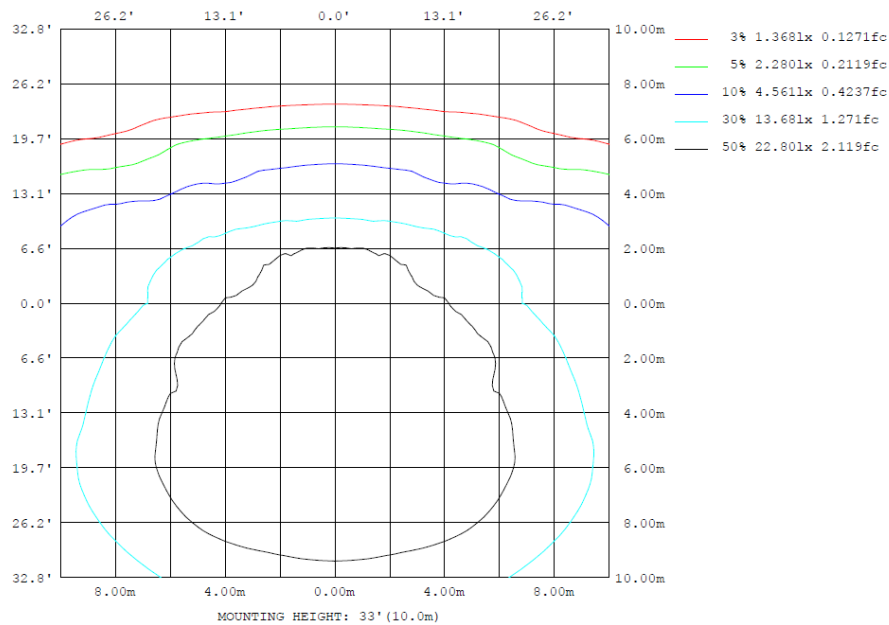
## 4.2 Goniophotometer Test

### Lighting Distribution Curve

**LUMINOUS INTENSITY DISTRIBUTION DIAGRAM**



### Isolux Plot



## 4.2 Goniophotometer Test

### Zonal Lumen Summary

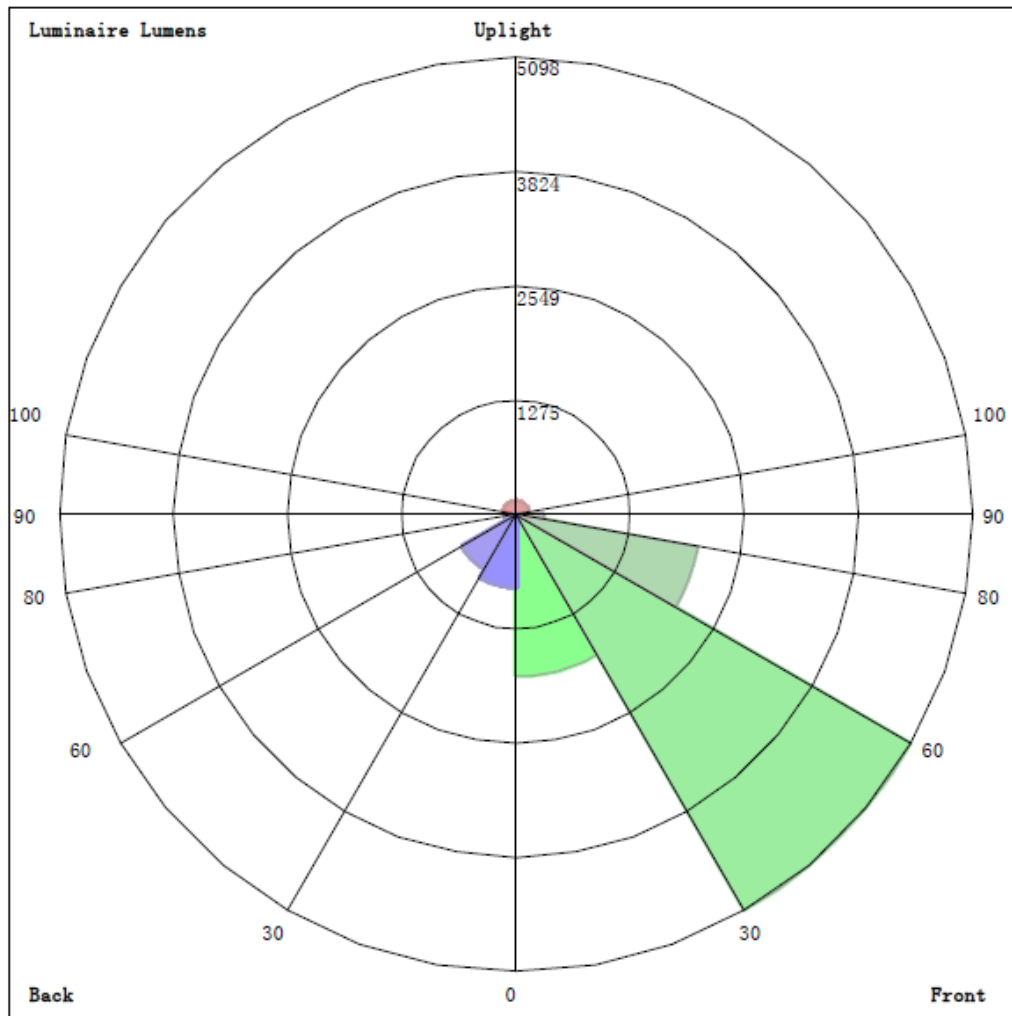
ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%lum, lamp
10	3275	3958	4135	3958	3275	2627	2596	2627	0~ 10	313.2	313.2	2.8,2.8
20	2958	4215	5088	4215	2958	1949	990.1	1949	10~ 20	889.8	1203	10.8,10.8
30	2637	5119	6349	5119	2637	784.5	514.7	784.5	20~ 30	1415	2618	23.4,23.4
40	2180	5559	6590	5559	2180	463.2	163.0	463.2	30~ 40	1895	4513	40.4,40.4
50	1645	4982	5276	4982	1645	193.6	91.68	193.6	40~ 50	2063	6576	58.8,58.8
60	1172	3680	4114	3680	1172	84.08	31.89	84.08	50~ 60	1841	8417	75.3,75.3
70	714.2	2371	2475	2371	714.2	10.76	1.793	10.76	60~ 70	1404	9821	87.8,87.8
80	388.4	1037	1202	1037	388.4	4.603	2.528	4.603	70~ 80	769.7	10591	94.7,94.7
90	36.66	309.2	548.8	309.2	36.66	3.121	2.753	3.121	80~ 90	318.1	10909	97.6,97.6
100	30.86	127.7	497.8	127.7	30.86	3.939	3.521	3.939	90~100	125.8	11035	98.7,98.7
110	21.26	30.86	84.88	30.86	21.26	3.225	3.949	3.225	100~110	55.13	11090	99.2,99.2
120	14.78	86.84	37.54	86.84	14.78	3.088	3.844	3.088	110~120	26.75	11117	99.4,99.4
130	8.538	72.05	85.84	72.05	8.538	3.222	4.439	3.222	120~130	29.38	11146	99.7,99.7
140	2.713	44.91	70.38	44.91	2.713	3.497	4.522	3.497	130~140	20.78	11167	99.9,99.9
150	1.781	22.30	37.96	22.30	1.781	3.898	4.506	3.898	140~150	10.63	11178	100,100
160	2.141	1.775	15.19	1.775	2.141	4.025	3.982	4.025	150~160	3.840	11181	100,100
170	2.463	2.255	2.722	2.255	2.463	3.121	3.032	3.121	160~170	1.045	11183	100,100
180	2.983	2.907	2.395	2.907	2.983	2.738	2.614	2.738	170~180	0.2644	11183	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

	Zonal (lm)		Total (lm)	Percent
0-10	313.16	0-10	313.16	2.80%
10-20	889.83	0-20	1202.99	10.76%
20-30	1414.99	0-30	2617.98	23.41%
30-40	1895.09	0-40	4513.07	40.36%
40-50	2063.20	0-50	6576.27	58.81%
50-60	1840.73	0-60	8417.00	75.27%
60-70	1404.45	0-70	9821.45	87.83%
70-80	769.66	0-80	10591.11	94.71%
80-90	318.12	0-90	10909.23	97.56%
90-100	125.75	0-100	11034.98	98.68%
100-110	55.13	0-110	11090.11	99.17%
110-120	26.75	0-120	11116.86	99.41%
120-130	29.38	0-130	11146.24	99.68%
130-140	20.78	0-140	11167.02	99.86%
140-150	10.63	0-150	11177.65	99.96%
150-160	3.84	0-160	11181.49	99.99%
160-170	1.04	0-170	11182.53	100.00%
170-180	0.26	0-180	11182.79	100.00%

## 4.2 Goniophotometer Test

LCS/BUG

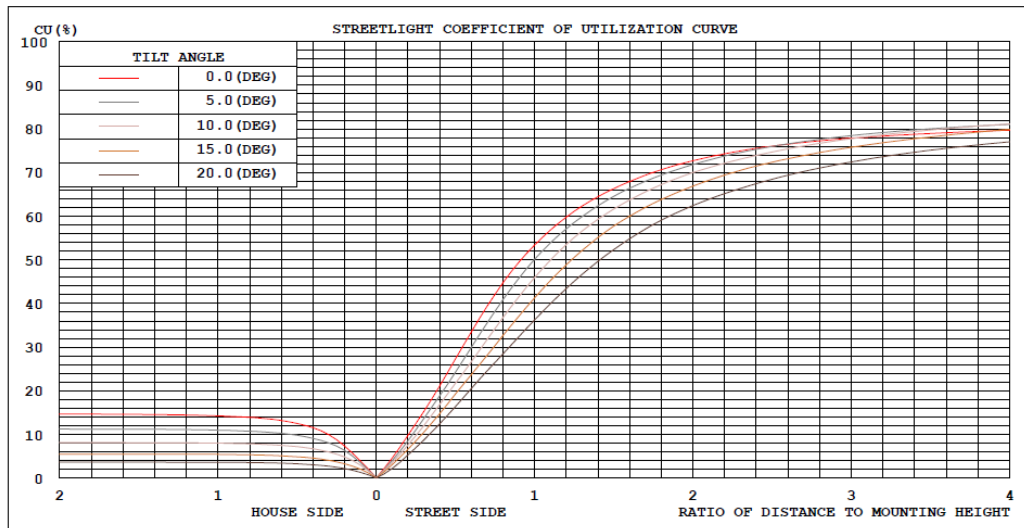


### LUMINAIRE CLASSIFICATION SYSTEM (LCS)

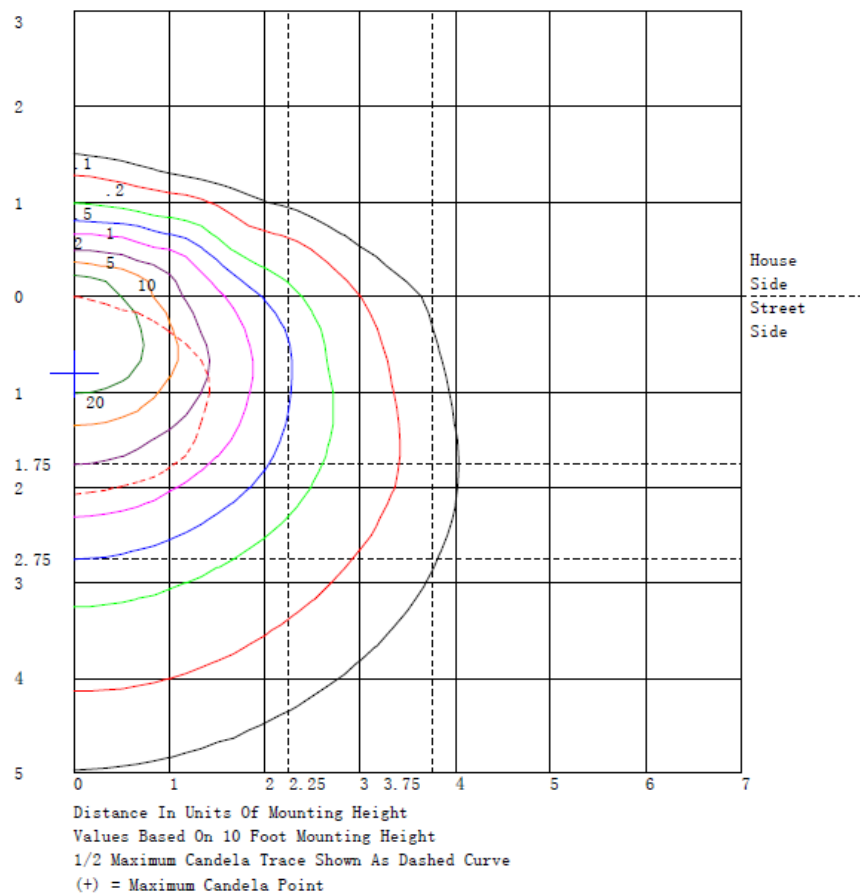
	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	1806.1	N.A.	16.2
FM - Front-Medium (30-60)	5098.1	N.A.	45.6
FH - Front-High (60-80)	2055.1	N.A.	18.4
FVH - Front-Very High (80-90)	304.7	N.A.	2.7
BL - Back-Low (0-30)	811.8	N.A.	7.3
BM - Back-Medium (30-60)	700.9	N.A.	6.3
BH - Back-High (60-80)	119.0	N.A.	1.1
BVH - Back-Very High (80-90)	13.4	N.A.	0.1
UL - Uplight-Low (90-100)	125.8	N.A.	1.1
UH - Uplight-High (100-180)	147.8	N.A.	1.3
Total	11182.7	N.A.	100.0
BUG Rating	B2-U3-G3		

## 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	3413	3414	3416	3417	3419	3421	3423	3425	3427	3429	3431	3434	3437	3440	3442	3444	3446	3447	3449
5	3344	3331	3339	3367	3444	3522	3580	3536	3478	3432	3486	3557	3626	3634	3627	3617	3626	3639	3653
10	3275	3394	3484	3545	3544	3539	3553	3668	3809	3958	4084	4190	4268	4282	4267	4236	4200	4164	4135
15	3139	3157	3221	3328	3520	3727	3918	4007	4064	4101	4145	4182	4213	4242	4264	4280	4284	4281	4272
20	2958	3048	3166	3314	3520	3733	3931	4050	4142	4215	4263	4321	4409	4625	4851	5049	5105	5112	5088
25	2816	3056	3282	3495	3697	3883	4051	4154	4268	4424	4754	5113	5458	5686	5857	5973	6013	6014	5993
30	2637	3002	3306	3549	3662	3766	3912	4285	4704	5119	5408	5653	5858	6045	6195	6305	6347	6357	6349
35	2442	2804	3138	3443	3690	3931	4188	4539	4911	5283	5630	5945	6215	6403	6536	6621	6654	6653	6629
40	2180	2585	2970	3335	3655	3973	4304	4734	5163	5559	5825	6042	6227	6445	6627	6752	6729	6663	6590
45	1939	2292	2665	3058	3491	3930	4361	4781	5155	5461	5615	5701	5742	5789	5817	5828	5817	5800	5786
50	1645	1942	2296	2709	3249	3795	4293	4607	4833	4982	5045	5070	5083	5169	5254	5324	5321	5301	5276
55	1410	1664	1976	2347	2844	3347	3804	4068	4252	4376	4486	4553	4578	4527	4454	4383	4377	4388	4406
60	1172	1486	1807	2136	2500	2851	3165	3387	3557	3680	3742	3783	3822	3932	4042	4133	4144	4133	4114
65	977	1298	1592	1860	2093	2306	2505	2724	2920	3079	3143	3171	3179	3206	3229	3250	3273	3293	3309
70	714	880	1063	1264	1507	1750	1975	2144	2277	2371	2405	2412	2406	2423	2441	2456	2463	2468	2475
75	532	601	698	823	1007	1196	1367	1457	1514	1547	1561	1568	1576	1611	1651	1690	1722	1745	1759
80	388	388	415	471	572	689	807	899	977	1037	1062	1075	1082	1101	1121	1142	1166	1187	1202
85	148	150	169	206	271	346	425	493	555	610	652	688	718	748	774	794	808	816	821
90	36.7	56.4	79.6	106	138	171	206	240	274	309	350	390	429	463	492	516	533	544	549
95	30.0	41.5	53.8	66.9	80.8	95.6	111	127	145	166	195	226	260	294	326	354	372	384	389
100	30.9	32.6	35.2	38.7	40.4	44.9	53.9	71.3	95.7	128	172	222	276	335	391	441	472	491	498
105	20.2	22.2	24.2	26.1	26.7	28.0	31.0	39.3	49.0	58.8	64.6	70.5	77.8	89.7	104	119	142	160	170
110	21.3	16.7	16.8	21.6	36.7	52.2	63.7	53.5	40.7	30.9	43.1	59.6	75.9	79.5	80.1	79.3	81.6	83.6	84.9
115	21.0	14.1	12.6	16.5	30.1	45.9	60.7	67.6	69.8	67.1	52.3	36.8	25.4	34.2	48.1	63.4	72.4	78.3	80.4
120	14.8	8.99	8.44	13.1	26.2	42.1	58.6	70.3	79.9	86.8	91.5	92.4	88.8	74.4	58.1	42.9	37.9	36.4	37.5
125	11.5	6.32	5.98	10.4	22.3	37.0	52.6	65.2	76.4	85.8	92.6	97.0	99.2	97.7	94.7	90.9	87.4	84.6	83.0
130	8.54	4.38	4.17	7.91	17.6	29.8	42.8	53.4	63.2	72.1	80.1	86.7	91.4	92.3	91.7	90.0	88.3	86.8	85.8
135	2.82	0.00	0.00	1.81	11.2	22.7	34.8	43.4	51.2	58.4	66.4	73.4	79.0	80.8	81.2	80.8	81.0	81.1	81.2
140	2.71	4.14	6.54	9.92	14.5	19.9	25.8	32.2	38.6	44.9	50.8	56.1	60.6	63.6	65.8	67.4	68.9	69.9	70.4
145	2.49	2.90	4.17	6.29	9.47	13.3	17.8	22.7	27.8	32.7	36.7	40.2	43.3	45.9	48.2	50.2	52.3	54.0	55.0
150	1.78	1.73	1.68	1.63	0.56	0.25	1.50	7.79	15.1	22.3	25.8	28.3	30.0	31.8	33.3	34.6	36.0	37.2	38.0
155	1.95	1.70	1.77	2.15	2.74	3.72	5.17	7.57	10.3	13.1	15.6	17.9	19.8	21.1	22.2	23.0	24.0	24.7	25.3
160	2.14	2.02	1.98	2.05	2.33	2.61	2.80	2.15	1.68	1.78	3.87	6.50	9.24	11.2	12.8	14.0	14.7	15.1	15.2
165	2.28	2.29	2.29	2.28	2.20	2.15	2.16	2.34	2.63	3.05	3.93	4.71	5.14	4.24	3.07	1.93	1.71	1.73	1.90
170	2.46	2.47	2.48	2.48	2.47	2.45	2.42	2.37	2.31	2.25	2.20	2.17	2.20	2.37	2.57	2.74	2.76	2.75	2.72
175	2.59	2.61	2.63	2.63	2.63	2.62	2.61	2.60	2.59	2.58	2.56	2.54	2.51	2.48	2.44	2.40	2.35	2.31	2.29
180	2.98	3.00	3.00	3.00	2.99	2.97	2.95	2.94	2.93	2.91	2.84	2.77	2.70	2.69	2.67	2.65	2.56	2.46	2.39

UNIT: cd																			
C (DEG) γ (DEG)	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
0	3447	3446	3444	3442	3440	3437	3434	3431	3429	3427	3425	3423	3421	3419	3417	3416	3414	3413	3432
5	3639	3626	3617	3627	3634	3626	3557	3486	3432	3478	3536	3580	3522	3444	3367	3339	3331	3344	3304
10	4164	4200	4236	4267	4282	4268	4190	4084	3958	3809	3668	3553	3539	3544	3545	3484	3394	3275	3162
15	4281	4284	4280	4264	4242	4213	4182	4145	4101	4064	4007	3918	3727	3520	3328	3221	3157	3139	2907
20	5112	5105	5049	4851	4625	4409	4321	4263	4215	4142	4050	3931	3733	3520	3314	3166	3048	2958	2691
25	6014	6013	5973	5857	5686	5458	5113	4754	4424	4268	4154	4051	3883	3697	3495	3282	3056	2816	2716
30	6357	6347	6305	6195	6045	5858	5653	5408	5119	4704	4285	3912	3766	3662	3549	3306	3002	2637	2603
35	6653	6654	6621	6536	6403	6215	5945	5630	5283	4911	4539	4188	3931	3690	3443	3138	2804	2442	2430
40	6663	6729	6752	6627	6445	6227	6042	5825	5559	5163	4734	4304	3973	3655	3335	2970	2585	2180	2159
45	5800	5817	5828	5817	5789	5742	5701	5615	5461	5155	4781	4361	3930	3491	3058	2665	2292	1939	1856
50	5301	5321	5324	5254	5169	5083	5070	5045	4982	4833	4607	4293	3795	3249	2709	2296	1942	1645	1455
55	4388	4377	4383	4454	4527	4578	4553	4486	4376	4252	4068	3804	3347	2844	2347	1976	1664	1410	1146
60	4133	4144	4133	4042	3932	3822	3783	3742	3680	3557	3387	3165	2851	2500	2136	1807	1486	1172	864
65	3293	3273	3250	3229	3206	3179	3171	3143	3079	2920	2724	2505	2306	2093	1860	1592	1298	977	718
70	2468	2463	2456	2441	2423	2406	2412	2405	2371	2277	2144	1975	1750	1507	1264	1063	880	714	535
75	1745	1722	1690	1651	1611	1576	1568	1561	1547	1514	1457	1367	1196	1007	823	698	601	532	381
80	1187	1166	1142	1121	1101	1082	1075	1062	1037	977	899	807	689	572	471	415	388	388	264
85	816	808	794	774	748	718	688	652	610	555	493	425	346	271	206	169	150	148	107
90	544	533	516	492	463	429	390	350	309	274	240	206	171	138	106	79.6	56.4	36.7	33.5
95	384	372	354	326	294	260	226	195	166	145	127	111	95.6	80.8	66.9	53.8	41.5	30.0	25.9
100	491	472	441	391	335	276	222	172	128	95.7	71.3	53.9	44.9	40.4	38.7	35.2	32.6	30.9	24.6
105	160	142	119	104	89.7	77.8	70.5	64.6	58.8	49.0	39.3	31.0	28.0	26.7	26.1	24.2	22.2	20.2	15.8
110	83.6	81.6	79.3	80.1	79.5	75.9	59.6	43.1	30.9	40.7	53.5	63.7	52.2	36.7	21.6	16.8	16.7	21.3	16.2
115	78.3	72.4	63.4	48.1	34.2	25.4	36.8	52.3	67.1	69.8	67.6	60.7	45.9	30.1	16.5	12.6	14.1	21.0	15.4
120	36.4	37.9	42.9	58.1	74.4	88.8	92.4	91.5	86.8	79.9	70.3	58.6	42.1	26.2	13.1	8.44	8.99	14.8	11.5
125	84.6	87.4	90.9	94.7	97.7	99.2	97.0	92.6	85.8	76.4	65.2	52.6	37.0	22.3	10.4	5.98	6.32	11.5	9.10
130	86.8	88.3	90.0	91.7	92.3	91.4	86.7	80.1	72.1	63.2	53.4	42.8	29.8	17.6	7.91	4.17	4.38	8.54	7.00
135	81.1	81.0	80.8	81.2	80.8	79.0	73.4	66.4	58.4	51.2	43.4	34.8	22.7	11.2	1.81	0.00	0.00	2.82	3.35
140	69.3	68.9	67.4	65.8	63.6	60.6	56.1	50.8	44.9	38.6	32.2	25.8	19.9	14.5	9.92	6.54	4.14	2.71	3.11
145	54.0	52.3	50.2	48.2	45.9	43.3	40.2	36.7	32.7	27.8	22.7	17.8	13.3	9.47	6.29	4.17	2.90	2.49	2.99
150	37.2	36.0	34.6	33.3	31.8	30.0	28.3	25.8	22.3	15.1	7.79	1.50	0.25	0.56	1.63	1.68	1.73	1.78	2.50
155	24.7	24.0	23.0	22.2	21.1	19.8	17.9	15.6	13.1	10.3	7.57	1.57	3.72	7.24	2.15	1.77	1.70	1.95	2.88
160	15.1	14.7	14.0	12.8	11.2	9.24	6.50	3.87	1.78	1.68	2.15	2.80	0.61	2.33	2.05	1.98	2.02	2.14	3.03
165	1.73	1.71	1.93	3.07	4.24	5.14	4.71	3.93	0.55	2.63	2.34	2.16	2.15	2.20	2.28	2.29	2.29	2.28	3.11
170	2.75	2.76	2.74	2.57	2.37	2.20	2.17	2.20	2.25	2.31	2.37	2.42	2.45	2.47	2.48	2.48	2.47	2.46	3.11
175	2.31	2.25	2.40	2.44	2.48	2.51	2.54	2.56	2.58	2.59	2.60	2.61	2.62	2.63	2.63	2.63	2.61	2.59	2.30
180	2.46	2.56	2.65	2.67	2.69	2.70	2.77	2.84	2.91	2.93	2.94	2.95	2.97	2.99	3.00	3.00	3.00	2.98	2.99



Table--3

UNIT: cd

C (DEG)	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280
γ (DEG)	0	3447	3456	3459	3459	3457	3457	3457	3457	3457	3456	3456	3456	3455	3453	3451	3449	3451	3453
5	3259	3208	3148	3085	3019	2945	2879	2828	2831	2844	2852	2807	2754	2704	2687	2681	2683	2681	2687
10	3048	2932	2794	2670	2576	2567	2589	2627	2660	2686	2692	2631	2561	2503	2526	2563	2596	2563	2526
15	2728	2603	2554	2541	2548	2552	2546	2516	2410	2283	2154	2058	1978	1914	1872	1847	1842	1847	1872
20	2495	2369	2368	2395	2408	2286	2126	1949	1794	1641	1493	1341	1205	1093	1030	997	990	997	1030
25	2602	2474	2338	2185	2011	1784	1548	1318	1122	955	826	769	744	739	724	715	712	715	724
30	2512	2365	2136	1868	1581	1283	1010	784	699	663	654	614	578	549	530	519	515	519	530
35	2329	2141	1792	1409	1048	861	733	645	560	493	439	390	350	320	302	293	292	293	302
40	2050	1854	1489	1096	737	590	509	463	384	315	257	218	191	174	165	162	163	162	165
45	1717	1521	1214	892	597	452	359	301	239	194	164	148	142	141	136	134	133	134	136
50	1263	1068	853	649	468	347	256	194	156	135	124	111	101	95.3	92.0	91.0	91.7	91.0	92.0
55	915	718	560	431	328	246	183	137	107	88.5	78.2	70.7	67.1	65.9	64.4	63.8	64.0	63.8	64.4
60	615	425	318	252	213	161	117	84.1	64.2	52.2	45.9	41.4	39.3	38.3	35.4	33.1	31.9	33.1	35.4
65	505	340	237	169	127	88.8	61.6	42.5	24.5	11.2	2.50	0.00	0.00	1.05	1.05	1.18	1.38	1.18	1.05
70	386	265	180	119	76.1	43.9	23.0	10.8	3.60	0.92	1.04	0.48	0.66	1.24	1.41	1.60	1.79	1.60	1.41
75	257	161	99.8	60.6	37.4	20.1	10.7	6.58	2.99	1.48	1.31	0.98	1.07	1.41	1.64	1.92	2.19	1.92	1.64
80	165	90.7	51.1	30.2	21.7	12.1	6.87	4.60	2.59	1.74	1.63	1.41	1.44	1.65	1.92	2.23	2.53	2.23	1.92
85	73.5	47.4	30.8	20.1	13.6	8.35	5.14	3.46	2.35	1.93	1.95	1.82	1.82	1.94	2.15	2.39	2.64	2.39	2.15
90	29.8	25.5	20.0	14.5	9.51	6.51	4.43	3.12	2.46	2.24	2.30	2.23	2.25	2.33	2.44	2.58	2.75	2.58	2.44
95	21.9	18.1	14.3	10.8	7.83	5.75	4.24	3.24	2.77	2.62	2.66	2.63	2.65	2.71	2.76	2.85	2.99	2.85	2.76
100	19.2	14.7	11.1	8.27	6.22	4.98	4.28	3.94	3.68	3.57	3.54	3.44	3.36	3.33	3.33	3.39	3.52	3.39	3.33
105	12.1	8.88	6.22	4.20	2.87	2.70	3.02	3.55	3.68	3.78	3.83	3.80	3.76	3.73	3.76	3.83	3.96	3.83	3.76
110	12.1	8.87	6.72	5.28	4.39	3.72	3.36	3.22	3.24	3.36	3.55	3.70	3.84	3.95	3.96	3.95	3.95	3.95	3.96
115	10.9	7.49	5.49	4.34	3.77	3.34	3.17	3.19	3.24	3.36	3.49	3.54	3.57	3.60	3.64	3.69	3.73	3.69	3.64
120	8.74	6.54	4.99	3.92	3.26	2.98	2.96	3.09	3.20	3.35	3.50	3.58	3.64	3.69	3.75	3.80	3.84	3.80	3.75
125	7.12	5.54	4.40	3.61	3.12	2.95	2.98	3.13	3.29	3.47	3.66	3.74	3.81	3.87	3.96	4.03	4.09	4.03	3.96
130	5.71	4.67	3.87	3.31	2.98	2.93	3.03	3.22	3.37	3.53	3.70	3.85	3.99	4.13	4.26	4.37	4.44	4.37	4.26
135	3.99	4.15	3.84	3.40	2.98	3.00	3.13	3.34	3.51	3.69	3.86	3.99	4.12	4.22	4.32	4.40	4.44	4.40	4.32
140	3.51	3.66	3.55	3.36	3.17	3.23	3.34	3.50	3.62	3.74	3.86	3.99	4.12	4.24	4.35	4.45	4.52	4.45	4.35
145	3.22	3.44	3.49	3.48	3.46	3.52	3.60	3.71	3.83	3.96	4.08	4.15	4.20	4.26	4.37	4.48	4.57	4.48	4.37
150	3.08	3.48	3.64	3.69	3.69	3.76	3.83	3.90	3.97	4.04	4.10	4.15	4.20	4.26	4.35	4.43	4.51	4.43	4.35
155	3.45	3.90	4.08	4.12	4.06	4.02	3.97	3.92	3.94	3.98	4.03	4.10	4.16	4.21	4.22	4.22	4.22	4.22	4.22
160	3.76	4.23	4.39	4.39	4.29	4.21	4.11	4.02	4.02	4.04	4.05	4.01	3.96	3.92	3.94	3.96	3.98	3.96	3.94
165	3.86	4.30	4.40	4.34	4.19	4.11	4.01	3.91	3.83	3.75	3.67	3.57	3.50	3.44	3.47	3.52	3.56	3.52	3.47
170	3.68	3.98	4.01	3.89	3.69	3.49	3.29	3.12	3.09	3.09	3.12	3.09	3.06	3.04	3.03	3.02	3.03	3.02	3.03
175	3.36	3.57	3.62	3.58	3.47	3.29	3.10	2.93	2.90	2.90	2.91	2.82	2.73	2.67	2.71	2.78	2.85	2.78	2.71
180	2.96	2.95	2.94	2.93	2.91	2.86	2.80	2.74	2.67	2.61	2.56	2.53	2.50	2.50	2.53	2.57	2.61	2.57	2.53

C (DEG)	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355				
0	3455	3456	3456	3456	3457	3457	3457	3457	3457	3457	3459	3459	3456	3447	3432				
5	2704	2754	2807	2852	2844	2831	2828	2879	2945	3019	3085	3148	3208	3259	3304				
10	2503	2561	2631	2692	2686	2660	2627	2589	2567	2576	2670	2794	2932	3048	3162				
15	1914	1978	2058	2154	2283	2410	2516	2546	2552	2548	2541	2554	2603	2728	2907				
20	1093	1205	1341	1493	1641	1794	1949	2126	2286	2408	2395	2368	2369	2495	2691				
25	739	744	769	826	955	1122	1318	1548	1784	2011	2185	2338	2474	2602	2716				
30	549	578	614	654	663	699	784	1010	1283	1581	1868	2136	2365	2512	2603				
35	320	350	390	439	493	560	645	733	861	1048	1409	1792	2141	2329	2430				
40	174	191	218	257	315	384	463	509	590	737	1096	1489	1854	2050	2159				
45	141	142	148	164	194	239	301	359	452	597	892	1214	1521	1717	1856				
50	95.3	101	111	124	135	156	194	256	347	468	649	853	1068	1263	1455				
55	65.9	67.1	70.7	78.2	88.5	107	137	183	246	328	431	560	718	915	1146				
60	38.3	39.3	41.4	45.9	52.2	64.2	84.1	117	161	213	252	318	425	615	864				
65	1.05	0.00	0.00	2.50	11.2	24.5	42.5	61.6	88.8	127	169	237	340	505	718				
70	1.24	0.66	0.48	1.04	0.92	3.60	10.8	23.0	43.9	76.1	119	180	265	386	535				
75	1.41	1.07	0.98	1.31	1.48	2.99	6.58	10.7	20.1	37.4	60.6	99.8	161	257	381				
80	1.65	1.44	1.41	1.63	1.74	2.59	4.60	6.87	12.1	21.7	30.2	51.1	90.7	165	264				
85	1.94	1.82	1.82	1.95	1.93	2.35	3.46	5.14	8.35	13.6	20.1	30.8	47.4	73.5	107				
90	2.33	2.25	2.23	2.30	2.24	2.46	3.12	4.43	6.51	9.51	14.5	20.0	25.5	29.8	33.5				
95	2.71	2.65	2.63	2.66	2.62	2.77	3.24	4.24	5.75	7.83	10.8	14.3	18.1	21.9	25.9				
100	3.33	3.36	3.44	3.54	3.57	3.68	3.94	4.28	4.98	6.22	8.27	11.1	14.7	19.2	24.6				
105	3.73	3.76	3.80	3.83	3.78	3.68	3.55	3.02	2.70	2.87	4.20	6.22	8.88	12.1	15.8				
110	3.95	3.84	3.70	3.55	3.36	3.24	3.22	3.36	3.72	4.39	5.28	6.72	8.87	12.1	16.2				
115	3.60	3.57	3.54	3.49	3.36	3.24	3.19	3.17	3.34	3.77	4.34	5.49	7.49	10.9	15.4				
120	3.69	3.64	3.58	3.50	3.35	3.20	3.09	2.96	2.98	3.26	3.92	4.99	6.54	8.74	11.5				
125	3.87	3.81	3.74	3.66	3.47	3.29	3.13	2.98	2.95	3.12	3.61	4.40	5.54	7.12	9.10				
130	4.13	3.99	3.85	3.70	3.53	3.37	3.22	3.03	2.93	2.98	3.31	3.87	4.67	5.71	7.00				
135	4.22	4.12	3.99	3.86	3.69	3.51	3.34	3.13	3.00	2.98	3.40	3.84	4.15	3.99	3.54				
140	4.24	4.12	3.99	3.86	3.74	3.62	3.50	3.34	3.23	3.17	3.36	3.55	3.66	3.51	3.19				
145	4.26	4.20	4.15	4.08	3.96	3.83	3.71	3.60	3.52	3.46	3.48	3.49	3.44	3.22	2.91				
150	4.26	4.20	4.15	4.10	4.04	3.97	3.90	3.83	3.76	3.69	3.69	3.64	3.48	3.08	2.51				
155	4.21	4.16	4.10	4.03	3.98	3.94	3.92	3.97	4.02	4.06	4.12	4.08	3.90	3.45	2.80				
160	3.92	3.96	4.01	4.05	4.04	4.02	4.02	4.11	4.21	4.29	4.39	4.39	4.23	3.76	3.06				
165	3.44	3.50	3.57	3.67	3.75	3.83	3.91	4.01	4.11	4.19	4.34	4.40	4.30	3.86	3.19				
170	3.04	3.06	3.09	3.12	3.09	3.09	3.12	3.29	3.49	3.69	3.89	4.01	3.98	3.68	3.17				
175	2.67	2.73	2.82	2.91	2.90	2.90	2.93	3.10	3.29	3.47	3.58	3.62	3.57	3.36	3.04				
180	2.50	2.50	2.53	2.56	2.61	2.67	2.74	2.80	2.86	2.91	2.93	2.94	2.95	2.96	2.97				

## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

<b>Model No.</b>	WPX2 @ 80W / 5000K 480	<b>Sample ID</b>	231101004-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

<b>Voltage (Vac)</b>	<b>Frequency (Hz)</b>	<b>Current (A)</b>	<b>Power (W)</b>	<b>Power Factor</b>	<b>iTHD(%)</b>
480.0	60	0.182	80.1	0.919	7.09



## 5.0 Equipment List:

Equipment ID	Equipment Name	Last Cal.	Due Cal.
NTC-F01-001	Goniophotometer System	2023-11-08	2024-11-07
NTC-F01-006	2.0 meter Integrating Sphere	2023-11-08	2024-11-07
NTC-F01-012	Standard Lamp	2023-11-02	2024-11-01
NTC-F01-013	Standard Lamp	2023-11-02	2024-11-01
NTC-F01-031	Digital Power Meter	2023-08-25	2024-08-24
NTC-F01-019	Temperature & Humidity Meter	2023-11-06	2024-11-05

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