Photometric Test Report

Relevant Standards

☑IES LM-79-2008
☑ANSI C82.77:2014

Prepared For

RAB Lighting Inc.

Room 6A33, No.1388, Wuzhong road,Shanghai ,China

Xiao Xiang,15921313292,Gary.Xiao@rabweb.com

Prepared By

Deliver Co.， Ltd.
Block 11, 78 Keling Road, SSTP, Suzhou, China
0512-66801950,kevin.jia@szdeliver.com

Project Number

DLF1910117

Report Number

DLF1910117-2a

Test Date

2019/10/25

Issue Date

2019/10/30

Prepared By	**Approved By**
Wangzun Zhu	Kevin Jia

The results contained in this report pertain only to the tested sample.
This report shall not be reproduced, except in full, without written approval of Deliver Co.,Ltd.
This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP.

1.0 Test Summary

DLC Technical Requirements v4.4

Indoor - Troffer/2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces				
Requirement Category	**Test Method**	**Requirements**		**Test value**
Luminaire Output (lm) (Goniophotometer - Section 4.2)	IES LM-79-2008	3000		3266
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 100	Premium 125	115.4
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		28.3
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	277V	10.85%
		20.00%	120V	5.56%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	277V	0.963
		0.9	120V	0.996
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	5000		3452
Minimum CRI (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	80		82
Zonal Lumen Requirement (0°-60°) (Goniophotometer - Section 4.2)	IES LM-79-2008	75%		74.96%
SC: 0-180° (Goniophotometer - Section 4.2)	IES LM-79-2008	1.0-2.0		1.30
SC: 90-270° (Goniophotometer - Section 4.2)	IES LM-79-2008	1.0-2.0		1.36
Input Voltage (V)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		277
(Goniophotometer - Section 4.2)		Non-Wrost Case		120
Input Current (A)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		0.106
(Goniophotometer - Section 4.2)		Non-Wrost Case		0.235
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		28.3
(Goniophotometer - Section 4.2)		Non-Wrost Case		28.0

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2019/10/25	SWISHFA-EDGE2X2-835U @ 29W input	B1
2	Goniophotometer Test	2019/10/25	SWISHFA-EDGE2X2-835U @ 29W input	B1
3	THD and PF Test	2019/10/25	SWISHFA-EDGE2X2-835U @ 29W input	B1

Remark(If any)
1、This report shall not be used by the client to claim product endorsement by NVLAP, NIST or any agency of the US government.
2、The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products. This report does not imply that the product(s) has met the criteria for certification.

3.0 Production Description

Luminaire Description: SWISHFA-EDGE2X2-835U @ 29W input

Electrical Specification: 120V-277V,50/60HZ

Photos of Luminaire Characteristics

4.0 LM-79 Measurement and Test Results

4.1 Integrating Sphere Test

Model No.	SWISHFA-EDGE2X2-835U @ 29W input	Sample ID.	B1
Opreate time (Min.)	90	Stabilization time (Min.)	45
Temperature (°C)	25.3	Humidity (%RH)	56.0

Test Method
The samples were tested according to the IES LM-79-2008.
Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25º C ± 1º C.
The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere.
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.
The sample was measured using 4π geometry and operated at rated voltage and was stabilized before measurement. 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 780 nm.

Test Result

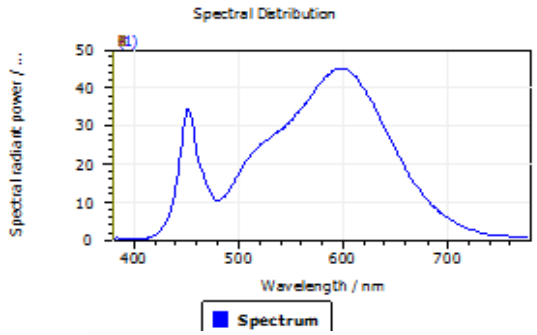
Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
277.00	60	0.106	28.3	0.963
120.06	60	0.234	28.0	0.996

Test Result

CCT (K)	CRI	Duv
3452	82	0.00048

4.1 Integrating Sphere Test

Results



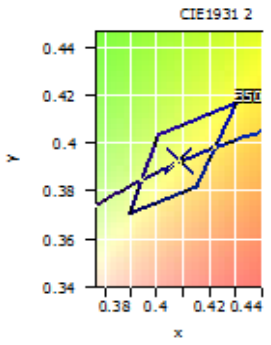
Spectral values

DominantWavelength	580.86 nm
Purity	0.407
PeakWavelength	597.59 nm
Radiant Power	7.166 W
Width50%:	

Date: 2019/10/25 13:10:10

Color Coordinates

Correlated Color Temperatu	3452 K		
x: 0.4086	u: 0.2367	u': 0.2367	
y: 0.3934	v: 0.3419	v': 0.5129	
CRI01	80.0	CRI09	3.2
CRI02	89.7	CRI10	76.1
CRI03	96.2	CRI11	79.2
CRI04	80.3	CRI12	65.3
CRI05	80.4	CRI13	82.3
CRI06	86.6	CRI14	98.3
CRI07	83.7	CRI15	72.7
CRI08	59.8	CRI16	70.4
ResultsCRI	82.1		



PlanckDistance 4.8E-004

SPD Table

Wavel Length (nm)	Spectral Power (W/nm)	Wavel Length (nm)	Spectral Power (W/nm)	Wavel Length (nm)	Spectral Power (W/nm)	Wavel Length (nm)	Spectral Power (W/nm)	Wavel Length (nm)	Spectral Power (W/nm)
380	0.00054	421	0.00150	461	0.02142	501	0.01807	541	0.02920
381	0.00053	422	0.00171	462	0.02027	502	0.01855	542	0.02945
382	0.00054	423	0.00195	463	0.01937	503	0.01903	543	0.02973
383	0.00055	424	0.00221	464	0.01863	504	0.01955	544	0.02995
384	0.00054	425	0.00250	465	0.01794	505	0.02003	545	0.03018
385	0.00053	426	0.00281	466	0.01728	506	0.02044	546	0.03041
386	0.00052	427	0.00317	467	0.01664	507	0.02083	547	0.03064
387	0.00052	428	0.00359	468	0.01593	508	0.02123	548	0.03090
388	0.00052	429	0.00405	469	0.01522	509	0.02162	549	0.03115
389	0.00050	430	0.00454	470	0.01452	510	0.02197	550	0.03146
390	0.00049	431	0.00509	471	0.01383	511	0.02234	551	0.03178
391	0.00048	432	0.00572	472	0.01316	512	0.02266	552	0.03206
392	0.00047	433	0.00643	473	0.01253	513	0.02296	553	0.03235
393	0.00046	434	0.00720	474	0.01193	514	0.02331	554	0.03266
394	0.00046	435	0.00804	475	0.01143	515	0.02365	555	0.03298
395	0.00045	436	0.00898	476	0.01109	516	0.02394	556	0.03331
396	0.00044	437	0.01005	477	0.01082	517	0.02419	557	0.03363
397	0.00043	438	0.01128	478	0.01065	518	0.02442	558	0.03395
398	0.00042	439	0.01267	479	0.01058	519	0.02474	559	0.03429
399	0.00040	440	0.01428	480	0.01059	520	0.02503	560	0.03465
400	0.00039	441	0.01608	481	0.01066	521	0.02522	561	0.03503
401	0.00039	442	0.01805	482	0.01077	522	0.02541	562	0.03542
402	0.00038	443	0.02014	483	0.01091	523	0.02564	563	0.03580
403	0.00038	444	0.02234	484	0.01107	524	0.02587	564	0.03613
404	0.00038	445	0.02468	485	0.01130	525	0.02607	565	0.03650
405	0.00038	446	0.02704	486	0.01156	526	0.02627	566	0.03689
406	0.00039	447	0.02920	487	0.01184	527	0.02641	567	0.03721
407	0.00039	448	0.03113	488	0.01212	528	0.02658	568	0.03754
408	0.00040	449	0.03281	489	0.01246	529	0.02684	569	0.03796
409	0.00043	450	0.03410	490	0.01283	530	0.02709	570	0.03836
410	0.00046	451	0.03465	491	0.01321	531	0.02728	571	0.03878
411	0.00048	452	0.03464	492	0.01360	532	0.02741	572	0.03917
412	0.00052	453	0.03414	493	0.01403	533	0.02761	573	0.03953
413	0.00058	454	0.03320	494	0.01451	534	0.02781	574	0.03987
414	0.00064	455	0.03165	495	0.01502	535	0.02799	575	0.04019
415	0.00071	456	0.02980	496	0.01555	536	0.02820	576	0.04054
416	0.00080	457	0.02789	497	0.01606	537	0.02842	577	0.04089
417	0.00090	458	0.02600	498	0.01657	538	0.02865	578	0.04126
418	0.00103	459	0.02431	499	0.01709	539	0.02885	579	0.04165
419	0.00117	460	0.02277	500	0.01758	540	0.02902	580	0.04200
420	0.00132								

Wavel Length (nm)	Spectral Power (W/nm)	Wavel Length (nm)	Spectral Power (W/nm)	Wavel Length (nm)	Spectral Power (W/nm)	Wavel Length (nm)	Spectral Power (W/nm)	Wavel Length (nm)	Spectral Power (W/nm)
581	0.04228	621	0.03931	661	0.01828	701	0.00572	741	0.00151
582	0.04259	622	0.03888	662	0.01775	702	0.00554	742	0.00147
583	0.04290	623	0.03843	663	0.01723	703	0.00534	743	0.00143
584	0.04315	624	0.03792	664	0.01671	704	0.00517	744	0.00140
585	0.04341	625	0.03740	665	0.01621	705	0.00501	745	0.00136
586	0.04366	626	0.03693	666	0.01577	706	0.00485	746	0.00132
587	0.04392	627	0.03641	667	0.01541	707	0.00470	747	0.00128
588	0.04418	628	0.03592	668	0.01501	708	0.00452	748	0.00126
589	0.04437	629	0.03548	669	0.01461	709	0.00438	749	0.00123
590	0.04457	630	0.03497	670	0.01423	710	0.00424	750	0.00119
591	0.04471	631	0.03445	671	0.01385	711	0.00408	751	0.00116
592	0.04480	632	0.03394	672	0.01347	712	0.00396	752	0.00113
593	0.04489	633	0.03343	673	0.01311	713	0.00383	753	0.00110
594	0.04497	634	0.03289	674	0.01279	714	0.00370	754	0.00107
595	0.04504	635	0.03231	675	0.01243	715	0.00357	755	0.00104
596	0.04508	636	0.03176	676	0.01208	716	0.00344	756	0.00101
597	0.04513	637	0.03123	677	0.01176	717	0.00332	757	0.00099
598	0.04523	638	0.03070	678	0.01145	718	0.00320	758	0.00096
599	0.04524	639	0.03019	679	0.01113	719	0.00309	759	0.00093
600	0.04514	640	0.02963	680	0.01080	720	0.00299	760	0.00091
601	0.04505	641	0.02903	681	0.01049	721	0.00288	761	0.00088
602	0.04499	642	0.02845	682	0.01018	722	0.00278	762	0.00085
603	0.04491	643	0.02787	683	0.00991	723	0.00268	763	0.00083
604	0.04476	644	0.02729	684	0.00963	724	0.00259	764	0.00081
605	0.04462	645	0.02672	685	0.00934	725	0.00250	765	0.00078
606	0.04448	646	0.02616	686	0.00906	726	0.00241	766	0.00076
607	0.04422	647	0.02562	687	0.00881	727	0.00232	767	0.00074
608	0.04393	648	0.02509	688	0.00857	728	0.00224	768	0.00071
609	0.04369	649	0.02455	689	0.00831	729	0.00217	769	0.00069
610	0.04343	650	0.02401	690	0.00807	730	0.00210	770	0.00067
611	0.04315	651	0.02346	691	0.00784	731	0.00204	771	0.00065
612	0.04289	652	0.02293	692	0.00759	732	0.00197	772	0.00063
613	0.04259	653	0.02240	693	0.00736	733	0.00190	773	0.00061
614	0.04225	654	0.02188	694	0.00716	734	0.00184	774	0.00059
615	0.04185	655	0.02135	695	0.00694	735	0.00179	775	0.00058
616	0.04143	656	0.02082	696	0.00674	736	0.00175	776	0.00056
617	0.04097	657	0.02029	697	0.00655	737	0.00170	777	0.00054
618	0.04057	658	0.01976	698	0.00637	738	0.00164	778	0.00053
619	0.04017	659	0.01925	699	0.00615	739	0.00159	779	0.00052
620	0.03975	660	0.01878	700	0.00591	740	0.00154	780	0.00050

4.0 LM-79 Measurement and Test Results

4.2 Goniophotometer Test

Model No.	SWISHFA-EDGE2X2-835U @ 29W input	Sample ID.	B1
Opreate time (Min.)	90	Stabilization time (Min.)	45
Temperature (°C)	25.3	Humidity (%RH)	54.0

Test Method
The samples were tested according to the IES LM-79-2008.
Photometric paramters were measured using a type C goniophotometer and software.
The ambient temperature shall be maintained at 25° C ± 1° C, measured at a point not more than 1 m from the sample and at the same height as the sample.
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.
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 0.5^{o} vertical intervals and 10^{o} horizontal intervals.

Test Conditions

Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
WROST CASE	277.02	60	0.106	28.3	0.963
NON-WROST CASE	120.03	60	0.235	28.0	0.995

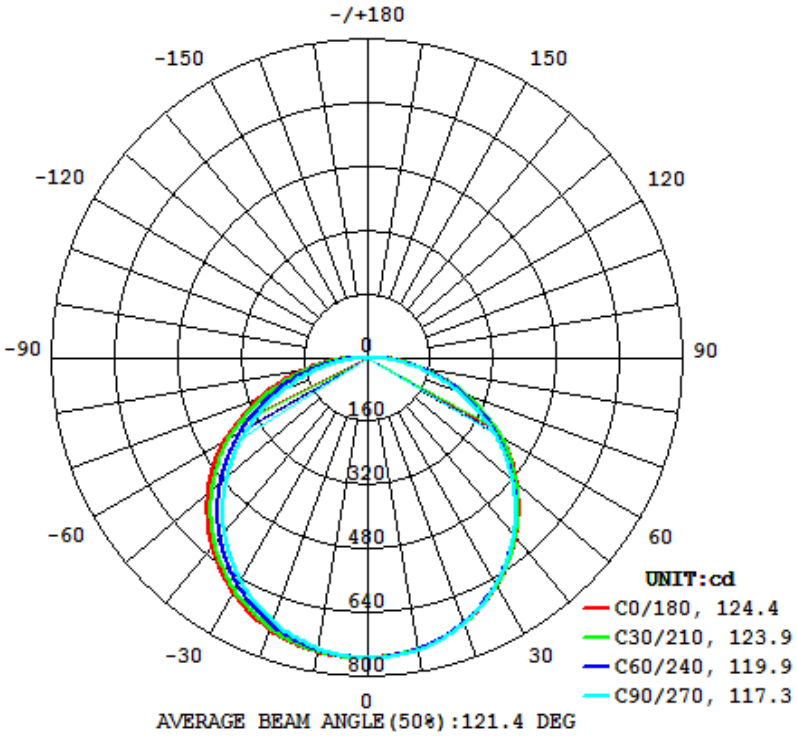
Test Result

Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
3266	171.9	165.7	124.4	117.3	115.4

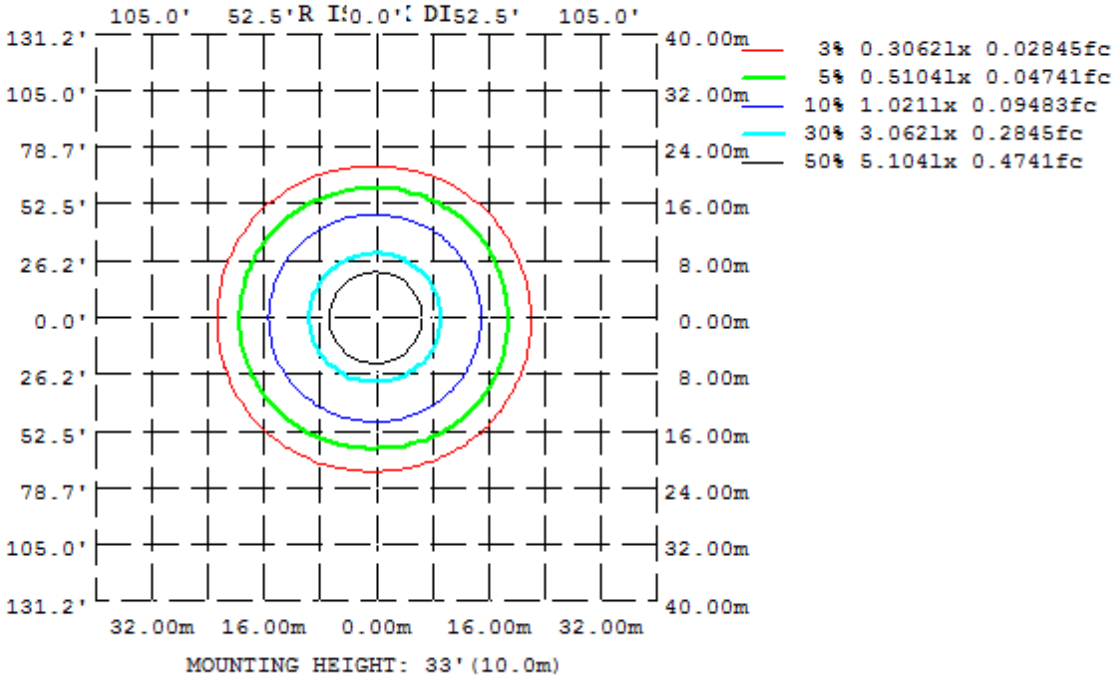
Zonal Lumen Requirement (0°-60°)	SC:0-180°	SC:90°-270°
74.96%	1.30	1.36

4.2 Goniophotometer Test

Light Distrubtion Curve



Isolux Plot



4.2 Goniophotometer Test

Zonal Lumen Summary

γ	C0	C45	C90	C135	C180	C225	C270	C315
10	1005	1005	1009	1017	1017	1012	1005	1002
20	961.7	960.9	964.1	981.0	985.9	973.8	955.9	956.9
30	891.6	889.3	889.3	915.3	925.1	906.8	876.9	882.3
40	795.5	789.7	785.8	821.1	834.9	808.1	768.1	778.2
50	675.4	665.3	655.0	698.8	718.3	682.5	634.2	650.1
60	527.3	520.6	501.2	553.5	575.1	536.2	477.6	503.6
70	353.5	351.6	331.7	386.1	394.8	364.7	306.1	330.6
80	183.0	177.8	159.9	204.2	215.5	185.2	136.7	159.1
90	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0
DEG	LUMINOUS INTENSITY:cd							

UGR Table

ceiling/cavity		0.7	0.7	0.5	0.5	0.3	0.7	0.7	0.5	0.5	0.3
walls		0.5	0.3	0.5	0.3	0.3	0.5	0.3	0.5	0.3	0.3
working plane		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Room dimensions		Viewed crosswise					Viewed endwise				
x = 2H	y = 2H	14.6	16.2	14.9	16.4	16.6	14.4	15.9	14.6	16.1	16.4
	3H	16.4	17.8	16.7	18.1	18.3	16.1	17.5	16.4	17.8	18.0
	4H	17.1	18.5	17.5	18.8	19.1	16.8	18.2	17.1	18.4	18.7
	6H	17.8	19.1	18.1	19.4	19.7	17.4	18.7	17.7	19.0	19.3
	8H	18.1	19.3	18.4	19.6	19.9	17.6	18.9	17.9	19.2	19.5
	12H	18.3	19.5	18.7	19.8	20.1	17.8	19.0	18.1	19.3	19.6
4H	2H	15.3	16.7	15.6	16.9	17.2	15.1	16.5	15.4	16.7	17.0
	3H	17.2	18.5	17.6	18.8	19.1	17.0	18.2	17.4	18.5	18.8
	4H	18.2	19.3	18.5	19.6	19.9	17.9	19.0	18.2	19.3	19.7
	6H	19.0	20.0	19.4	20.3	20.7	18.6	19.6	19.0	20.0	20.3
	8H	19.3	20.3	19.7	20.6	21.0	18.9	19.8	19.3	20.2	20.6
	12H	19.6	20.5	20.1	20.9	21.3	19.1	20.0	19.5	20.4	20.8
8H	4H	18.5	19.4	18.9	19.8	20.2	18.2	19.2	18.7	19.6	19.9
	6H	19.5	20.3	20.0	20.7	21.1	19.2	20.0	19.6	20.4	20.8
	8H	20.0	20.7	20.4	21.1	21.6	19.6	20.3	20.0	20.7	21.1
	12H	20.4	21.0	20.9	21.5	22.0	19.9	20.5	20.4	21.0	21.4
12H	4H	18.5	19.4	19.0	19.8	20.2	18.3	19.2	18.7	19.5	20.0
	6H	19.6	20.3	20.1	20.7	21.2	19.3	20.0	19.7	20.4	20.9
	8H	20.1	20.7	20.6	21.2	21.7	19.7	20.3	20.2	20.8	21.3
Variations with the observer position at spacings:											
S = 1.0H		+ 0.1 / - 0.2					+ 0.1 / - 0.2				
1.5H		+ 0.2 / - 0.3					+ 0.2 / - 0.3				
2.0H		+ 0.2 / - 0.4					+ 0.1 / - 0.3				

4.2 Goniophotometer Test

ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	96.93	0 - 10	96.93	2.97%
10-20	280.18	0 - 20	377.11	11.55%
20-30	431.69	0 - 30	808.80	24.76%
30-40	532.51	0 - 40	1341.31	41.06%
40-50	569.55	0 - 50	1910.86	58.50%
50-60	537.76	0 - 60	2448.62	74.96%
60-70	435.94	0 - 70	2884.56	88.31%
70-80	280.27	0 - 80	3164.83	96.89%
80-90	101.58	0 - 90	3266.41	100.00%
90-100	0.00	0 - 100	3266.41	100.00%
100-110	0.00	0 - 110	3266.41	100.00%
110-120	0.00	0 - 120	3266.41	100.00%
120-130	0.00	0 - 130	3266.41	100.00%
130-140	0.00	0 - 140	3266.41	100.00%
140-150	0.00	0 - 150	3266.41	100.00%
150-160	0.00	0 - 160	3266.41	100.00%
160-170	0.00	0 - 170	3266.41	100.00%
170-180	0.00	0 - 180	3266.41	100.00%

4.2 Goniophotometer Test

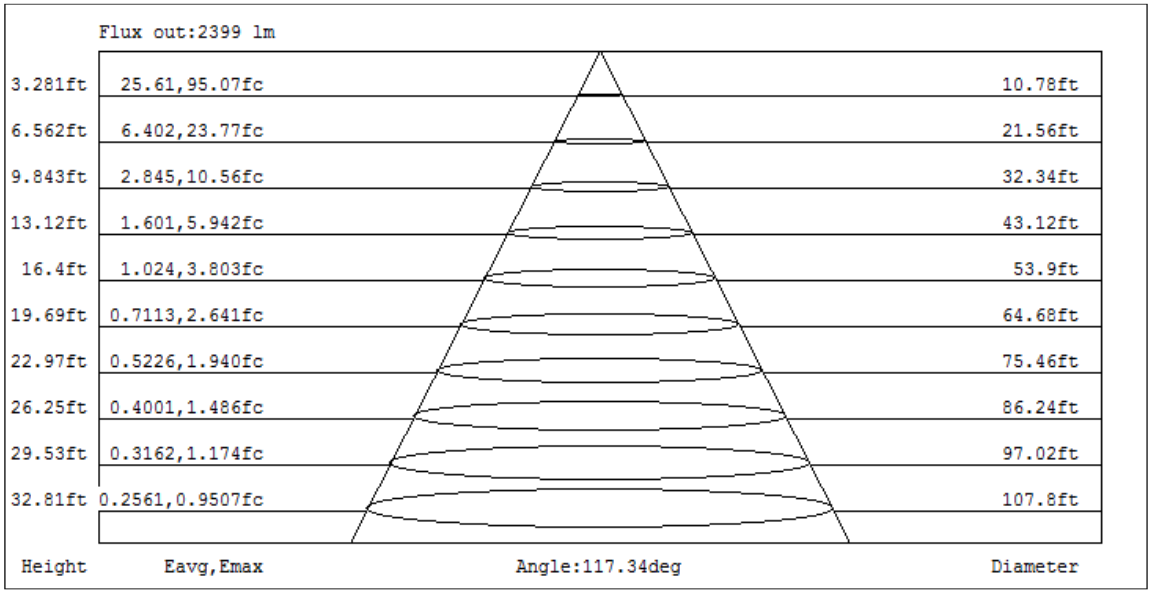
COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

Coefficients Of Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance 0.20

RC	80				70				50			30			10			0
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	108	102	98	94	105	100	96	92	96	92	89	92	89	86	88	86	84	82
2	97	89	81	75	95	87	80	74	83	77	73	80	75	71	77	73	69	67
3	88	77	69	62	86	76	68	61	73	66	60	70	64	59	67	62	58	56
4	81	68	59	52	78	67	58	52	64	57	51	62	55	50	60	54	49	47
5	74	61	51	44	72	60	51	44	57	50	44	55	48	43	53	47	43	40
6	68	54	45	39	66	53	45	38	52	44	38	50	43	38	48	42	37	35
7	63	49	40	34	61	48	40	34	47	39	33	45	38	33	44	38	33	31
8	59	45	36	30	57	44	36	30	43	35	30	42	35	30	40	34	29	27
9	55	41	33	27	53	40	32	27	39	32	27	38	31	27	37	31	26	25
10	51	38	30	24	50	37	30	24	36	29	24	35	29	24	34	28	24	22

CONE OF LIGHT DIAGRAM



4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	SWISHFA-EDGE2X2-835U @ 29W input	Sample ID.	B1
Temperature (°C)	25.3	Humidity (%RH)	56.0

Test Method
The samples were tested according to the ANSI C82.77:2002. The total harmonic distortion shall be measured to the 40th order. The ambient temperature condition was maintained at 25º C ± 1º 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 were calculated.

Test Results					
Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD
277.00	60	0.106	28.3	0.963	10.85%
120.06	60	0.234	28.0	0.996	5.56%

5.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last Calibration Date	Calibration Due Date
DLF107	Integrating Sphere System	2018/12/26	2019/12/25
DLF108	Auxiliary Lamp	2018/12/26	2019/12/25
DLF122	Measurement Standard Lamp Standard Lamp Type: 220 V, 0.4720 A, Tungsten, Omni-derectional	2018/12/26	2019/12/25
DLF116	AC Power Source	2018/12/26	2019/12/25
DLF113	Power Meter	2018/12/26	2019/12/25
DLF112	Temperature Recorder	2018/12/26	2019/12/25
DLF114	Temperature & Humidity Datalogger	2018/12/26	2019/12/25
DLF101	Goniophotometer	2018/12/26	2019/12/25
DLF125	Standard Lamp Standard Lamp Type: 76.58 V, 6.7875 A, Tungsten, Omni-derectional	2018/12/26	2019/12/25
DLF104	AC Power Source	2018/12/26	2019/12/25
DLF507	DC Power Source	2018/12/26	2019/12/25
DLF102	Power Meter	2018/12/26	2019/12/25
DLF111	Temperature & Humidity Datalogger	2018/12/26	2019/12/25
DLF119	Power Meter	2018/12/26	2019/12/25
DLF031	Temperature data logger	2018/12/26	2019/12/25
DLF022	Digital power meter	2018/12/26	2019/12/25
DLF003	Temperature & Humidity Datalogger	2018/12/26	2019/12/25

********** End of Test Report**********