

# Photometric Test Report

## Relevant Standards

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

## Prepared For RAB Lighting Inc.

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## Project Number

**DLF2208102**

## Report Number

**DLF2208102-4a**

## Test Date

**2022/8/2**

## Issue Date

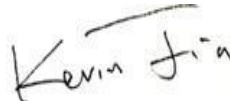
**2022/8/3**

## Prepared By



Wangzun Zhu

## Approved By



Kevin Jia

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## 1.0 Test Summary

DLC Technical Requirements v5.1

Outdoor - Architectural Flood and Spot Luminaires				
Requirement Category	Test Method	Requirements		Test value
Luminaire Output (lm) (Goniophotometer - Section 4.2)	IES LM-79-2008	1000		1862
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 105	Premium 120	143.2
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		13.0
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	5.20%
		20.00%	277V	9.97%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.992
		0.9	277V	0.928
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	3045±175	3066
		4 step	3045±100	
Minimum CRI (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥70		82
Minimum R9 (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	-		4
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		98
Minimum IES Rcs,h1 (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	-18%≤IES Rcs,h1≤+23%		-11%
Zonal Lumen Requirement (0°-90°) (Goniophotometer - Section 4.2)	IES LM-79-2008	85%		100.00%
Input Voltage (V)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		277
(Goniophotometer - Section 4.2)		Non-Worst Case		120
Input Current (A)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		0.051
(Goniophotometer - Section 4.2)		Non-Worst Case		0.103
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		13.0
(Goniophotometer - Section 4.2)		Non-Worst Case		12.2

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2022/8/2	FFLEDXS @ 13W / 3000K	D1
2	Goniophotometer Test	2022/8/2	FFLEDXS @ 13W / 3000K	D1
3	THD and PF Test	2022/8/2	FFLEDXS @ 13W / 3000K	D1

### Remark(If any)

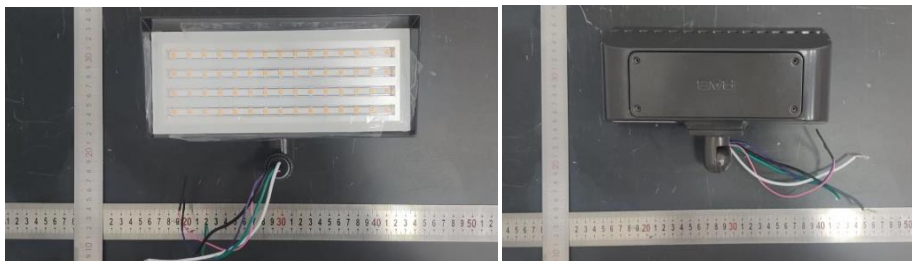
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## 3.0 Production Description

**Luminaire Description:** FFLEDXS @ 13W / 3000K

**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.	FFLEDXS @ 13W / 3000K	Sample ID.	D1
Operate time (Min.)	90	Stabilization time (Min.)	45
Temperature (°C)	25.4	Humidity (%RH)	54.0

#### Test Method

The samples were tested according to the IES LM-79-2008.

Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ .

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  $\pm 0.2$  percent under load.

The sample was measured using  $4\pi$  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
120.00	60	0.101	12.0	0.992
277.02	60	0.050	12.8	0.928

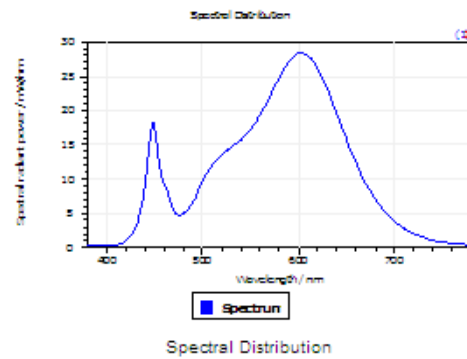
#### Test Result

CCT (K)	CRI	R9	Duv
3066	82	4	0.0015

Rf	Rg	IES Rcs,h1
84	98	-11%

## 4.1 Integrating Sphere Test

### Results

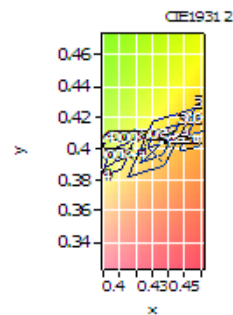


#### Spectral values

DominantWavelength 583.11 nm  
Purity 0.488  
PeakWavelength 602.77 nm  
Radiant Power 4.214 W  
Width50%:

#### Color Coordinates

Correlated Color Temperat 3066 K  
x: 0.4302 u: 0.2488 u': 0.2488  
y: 0.3980 v: 0.3453 v': 0.5180  
CRI01 81.0 CRI09 4.2  
CRI02 90.8 CRI10 79.4  
CRI03 95.9 CRI11 81.0  
CRI04 80.8 CRI12 73.4  
CRI05 81.3 CRI13 83.4  
CRI06 89.0 CRI14 98.3  
CRI07 82.0 CRI15 73.1  
CRI08 57.9 CRI16 70.7  
ResultsCRI 82.3



FluorDistance 1.5E-003

## 4.1 Integrating Sphere Test

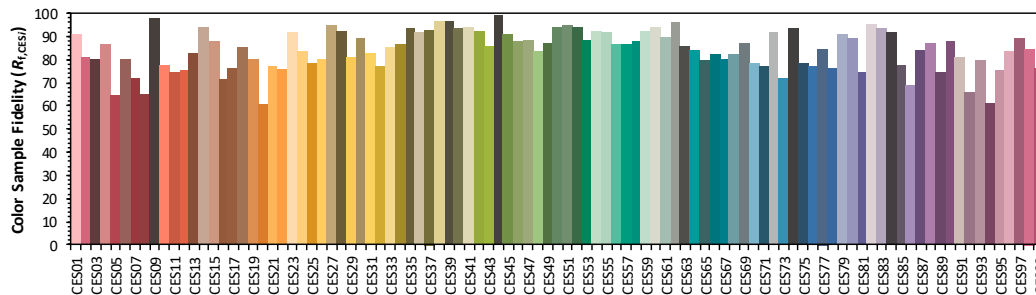
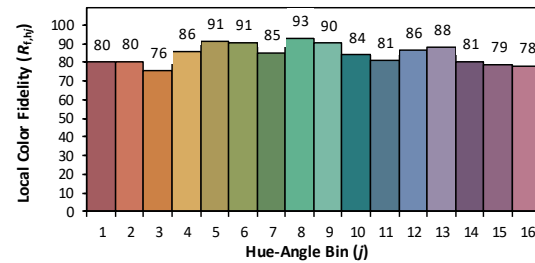
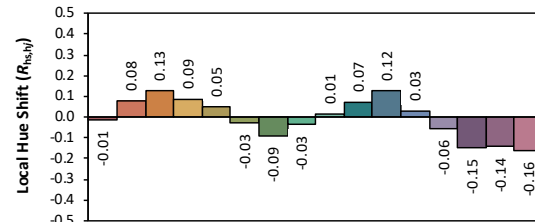
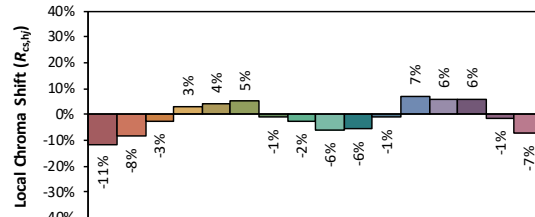
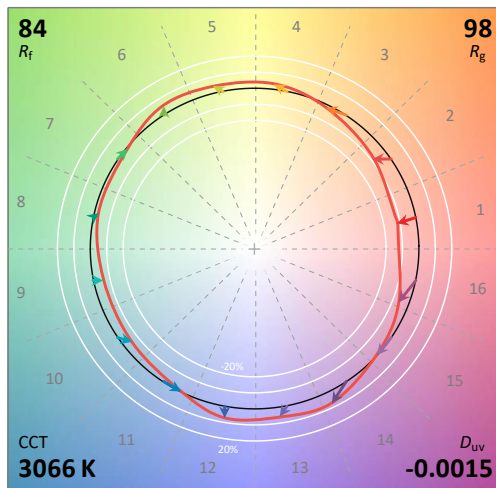
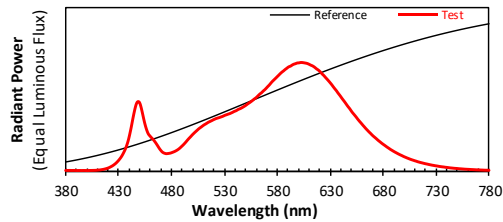
### IES TM-30-18 Color Rendition Report

Source: DLF2208102-4a

Manufacturer: RAB Lighting Inc.

Date: 2022/8/2

Model: FFLEDXS @ 13W / 3000K



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

$x$  0.4302  
 $y$  0.3980  
 $u'$  0.2488  
 $v'$  0.5180

CIE 13.3-1995  
(CRI)

$R_a$  83  
 $R_g$  9

## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

Model No.	FFLEDXS @ 13W / 3000K	Sample ID.	D1
Operate 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 parameters were measured using a type C goniophotometer and software.

The ambient temperature shall be maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , 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  $\pm 0.2$  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  $0.5^{\circ}$  vertical intervals and  $10^{\circ}$  horizontal intervals.

#### Test Conditions

Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
WORST CASE	276.98	60	0.051	13.0	0.925
NON-WORST CASE	120.00	60	0.103	12.2	0.989

#### Test Result

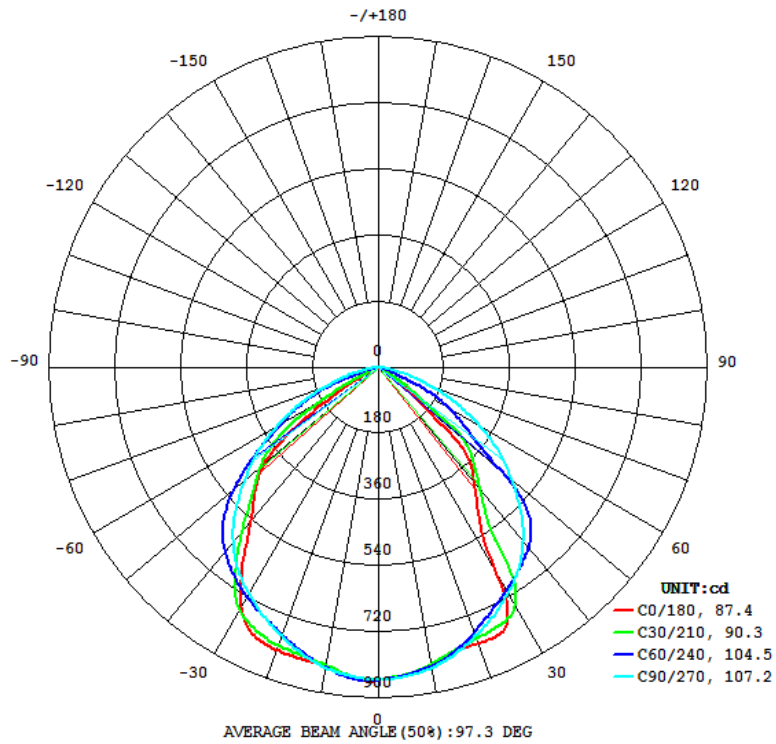
Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
1862	113.8	150.1	87.4	107.2	143.2

Zonal Lumen Requirement  
( $0^{\circ}$ - $90^{\circ}$ )

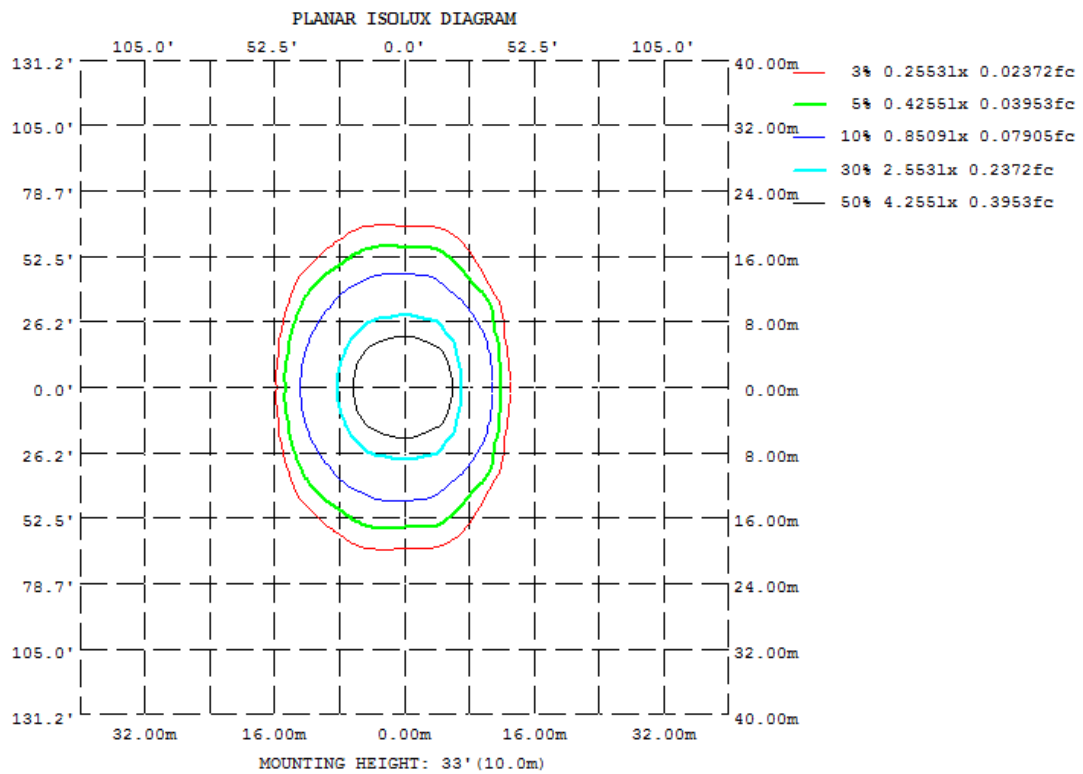
100.00%

## 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	822.0	823.4	832.0	825.1	826.1	825.1	832.0	823.4
20	799.1	770.3	777.5	788.9	818.7	788.9	777.5	770.3
30	652.5	729.5	711.3	744.0	750.9	744.0	711.3	729.5
40	408.9	532.5	618.3	638.9	543.7	638.9	618.3	532.5
50	159.0	334.2	477.8	443.4	409.0	443.4	477.8	334.2
60	10.63	103.8	324.4	288.0	86.82	288.0	324.4	103.8
70	0.3621	5.173	158.8	28.76	18.88	28.76	158.8	5.173
80	0.0295	0.0362	29.68	7.184	6.253	7.184	29.68	0.0362
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							

	Zonal (lm)		Total (lm)	Percent
0-10	80.25	0 - 10	80.25	4.31%
10-20	228.78	0 - 20	309.03	16.60%
20-30	353.41	0 - 30	662.44	35.58%
30-40	403.75	0 - 40	1066.19	57.27%
40-50	378.10	0 - 50	1444.29	77.58%
50-60	266.13	0 - 60	1710.42	91.87%
60-70	118.44	0 - 70	1828.86	98.23%
70-80	30.20	0 - 80	1859.06	99.85%
80-90	2.71	0 - 90	1861.77	100.00%
90-100	0.00	0 - 100	1861.77	100.00%
100-110	0.00	0 - 110	1861.77	100.00%
110-120	0.00	0 - 120	1861.77	100.00%
120-130	0.00	0 - 130	1861.77	100.00%
130-140	0.00	0 - 140	1861.77	100.00%
140-150	0.00	0 - 150	1861.77	100.00%
150-160	0.00	0 - 160	1861.77	100.00%
160-170	0.00	0 - 170	1861.77	100.00%
170-180	0.00	0 - 180	1861.77	100.00%

## 4.2 Goniophotometer Test

### Axial Candela

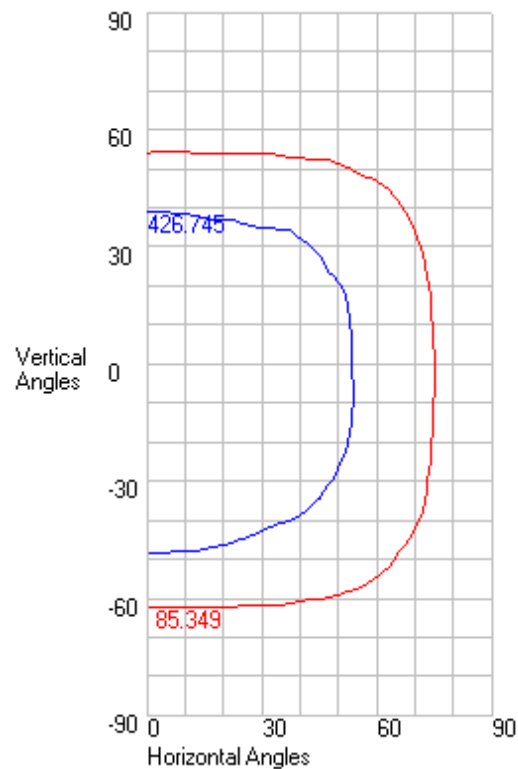
DEG.	HOR.	DEG.	VERT.
90	0	90	0
85	3.23	85	0.03
75	85.62	75	0.04
65	242.53	65	4.51
55	404.07	55	63.58
47.5	515.61	47.5	255.7
42.5	587.72	42.5	383.85
37.5	645.15	37.5	442.81
33	687.7	33	518.4
29	718.7	29	722.17
25.5	743.67	25.5	793
22.5	762.36	22.5	800.22
19.5	780.59	19.5	799.02
17	796.81	17	799.68
15	807.6	15	803.09
13	818.09	13	808.61
11	828.21	11	816.2
9	834.84	9	826.87
7	839.39	7	833.79
5	844.16	5	840.48
3	848.42	3	844.71
1	850.35	1	848.34
0	850.91	0	850.91
-1	850.35	-1	853.49
-3	848.42	-3	853.04
-5	844.16	-5	843.87
-7	839.39	-7	836.11
-9	834.84	-9	828.42
-11	828.21	-11	824.47
-13	818.09	-13	823.1
-15	807.6	-15	821.96
-17	796.81	-17	820.95
-19.5	780.59	-19.5	819.05
-22.5	762.36	-22.5	814.36
-25.5	743.67	-25.5	802.95
-29	718.7	-29	767.24
-33	687.7	-33	689.5
-37.5	645.15	-37.5	591.31
-42.5	587.72	-42.5	507.23
-47.5	515.61	-47.5	447.2
-55	404.07	-55	260.01
-65	242.53	-65	25.59
-75	85.62	-75	10.67
-85	3.23	-85	2.68
-90	0	-90	0

## 4.2 Goniophotometer Test

### Characteristics

NEMA Type	7 H x 6 V
Maximum Candela	853.49
Maximum Candela Angle	0 H -1 V
Horizontal Beam Angle (50%)	107.1
Vertical Beam Angle (50%)	87.2
Horizontal Field Angle (10%)	150.1
Vertical Field Angle (10%)	116.6
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Beam Lumens	1429
Beam Efficiency	N.A.
Field Lumens	1830
Field Efficiency	N.A.
Spill Lumens	32
Luminaire Lumens	1862
Total Efficiency	N.A.
Total Luminaire Watts	13
Ballast Factor	1

### ISOCANDELA CURVES



## Axial Candela

	0	1	3	5	7	9	11	13	15	17	19.5	22.5	25.5	29	33	37.5	42.5	47.5	55	65	75	85	90
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.04	0.08	0
75	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.04	0.08	0.06	0.29	0.11	0.21	0
65	4.51	4.54	4.61	4.53	4.48	4.42	4.37	4.33	4.35	4.21	3.96	3.81	3.97	3.95	3.62	3.6	3.6	4.18	3.21	4.49	1.21	0.32	0
55	63.58	64.7	66.93	66.85	66.72	65.69	63.69	62.62	64.07	64.74	64.19	61.03	56.6	58.61	57.72	50.67	52.76	47.88	30.28	29.89	6.18	0.48	0
47.5	255.7 *	259.64 *	264.45 *	266.37 *	266.87 *	264.07 *	252.01 *	240.01 *	239.57 *	245.65 *	253.29 *	241.38 *	210.1 *	212.01 *	220.1 *	184.78 *	151.92 *	150.41 *	98.34 *	58.84	13.81	0.8	0
42.5	383.85 *	384.15 *	384.13 *	383.33 *	381.79 *	379.18 *	376.15 *	373.82 *	368.78 *	364.36 *	358.48 *	351.95 *	340.62 *	324.59 *	306.7 *	288.01 *	244.42 *	209.3 *	173.49 *	84.48	21.23	1.05	0
37.5	442.81 *	443.47 *	443.85 *	442.94 *	441.44 *	437.36 *	435.6 *	431.91 *	426.98 *	422.57 *	415.25 *	408.66 *	399.28 *	384.69 *	376.79 *	353.16 *	306.91 *	268.59 *	233.77 *	112.65 *	32.38	1.32	0
33	518.4 *	520.29 *	521.62 *	520.85 *	517.56 *	519.28 *	520.42 *	512.92 *	502.12 *	492.67 *	507.69 *	510.65 *	477.82 *	448.45 *	462.04 *	455.85 *	362.78 *	319.5 *	276.96 *	138.79 *	41.25	1.61	0
29	722.17 *	725.53 *	724.12 *	719.63 *	714.03 *	701.32 *	688.24 *	684.63 *	685.2 *	659.96 *	626.98 *	631.35 *	635.95 *	559.89 *	538.39 *	545.32 *	448.47 *	366.14 *	313.43 *	164.52 *	48.7	1.89	0
25.5	793 *	792.49 *	791.01 *	789.4 *	785.41 *	778.43 *	770.24 *	763.9 *	754.08 *	738.53 *	720.92 *	707.03 *	687.82 *	647.49 *	601.46 *	598.49 *	507.97 *	405.09 *	344.27 *	185.26 *	55.57	2.12	0
22.5	800.22 *	799.1 *	796.93 *	794.92 *	791.05 *	785.64 *	780.02 *	772.78 *	761.71 *	749.72 *	735.08 *	719.47 *	699.34 *	671.43 *	642.99 *	606.86 *	535.46 *	437.27 *	371.54 *	200.56 *	61.03	2.31	0
19.5	799.02 *	797.99 *	795.97 *	793.99 *	789.99 *	785.71 *	780.89 *	771.79 *	761.42 *	750.06 *	736.45 *	720.32 *	701.41 *	677.03 *	650.46 *	611.7 *	547.24 *	464.89 *	381.28 *	212.39 *	65.96	2.48	0
17	799.68 *	798.84 *	796.76 *	794.06 *	790.91 *	786.97 *	780.46 *	772.6 *	762.68 *	751.38 *	738.84 *	721.58 *	701.69 *	680.87 *	654.06 *	614.28 *	553.65 *	481.41 *	387.79 *	220.93 *	69.59	2.62	0
15	803.09 *	802.43 *	800.45 *	797.59 *	794.03 *	789.73 *	783.45 *	774.51 *	765.45 *	755.76 *	741.85 *	723.19 *	705.18 *	685.61 *	657.36 *	615.76 *	556.52 *	488.45 *	392.03 *	226.65 *	72.27	2.72	0
13	808.61 *	808.24 *	806.32 *	803.09 *	799.06 *	794.92 *	788.57 *	779.79 *	771.13 *	760.64 *	745.43 *	727.66 *	711.76 *	690.47 *	660.83 *	616.86 *	562.94 *	494.8 *	396.03 *	231.39 *	74.74	2.81	0
11	816.2 *	816.19 *	814.06 *	811.17 *	806.33 *	803.17 *	796.27 *	788.06 *	778.91 *	767.18 *	750.91 *	735.26 *	718.22 *	695.28 *	664.09 *	620.34 *	568.15 *	500.42 *	398.64 *	235.24 *	77	3.04	0
9	826.87 *	826.66 *	824.12 *	820.6 *	816.67 *	812.27 *	805.18 *	796.04 *	786.18 *	775.09 *	759.01 *	741.9 *	724.33 *	700.1 *	669.62 *	626.74 *	573.62 *	505.24 *	401.02 *	238.24 *	79.05	3.07	0
7	833.79 *	833.56 *	831.38 *	828 *	823.84 *	819.25 *	812.75 *	803.03 *	792.65 *	781.75 *	765.9 *	747.92 *	729.77 *	705.58 *	674.71 *	632.9 *	578.3 *	509.12 *	402.82 *	240.44 *	80.89	3.11	0
5	840.48 *	840.1 *	837.03 *	833.83 *	828.94 *	824.74 *	818.59 *	808.02 *	797.49 *	786.86 *	771.25 *	753.47 *	734.92 *	710.45 *	679.55 *	637.14 *	582.09 *	512.05 *	404.02 *	241.88 *	83.21	3.14	0
3	844.71 *	843.72 *	841.73 *	837.82 *	832.99 *	828.12 *	822.04 *	812.44 *	801.98 *	791.68 *	775.98 *	757.71 *	739.13 *	714.44 *	683.5 *	641.04 *	585.03 *	514.13 *	405.38 *	243.28 *	84.17	3.18	0
1	848.34 *	847.58 *	845.59 *	842.03 *	837.23 *	832.73 *	826.68 *	816.87 *	806.22 *	795.63 *	779.38 *	761.06 *	742.39 *	717.63 *	686.65 *	644.02 *	587.06 *	515.34 *	404.51 *	242.78 *	85.14	3.23	0
0	850.91 *	850.35 *	848.42 *	844.16 *	839.39 *	834.84 *	828.21 *	818.09 *	807.6 *	796.81 *	780.59 *	762.36 *	743.67 *	718.7 *	687.7 *	645.15 *	587.72 *	515.61 *	404.07 *	242.53 *	85.62 *	3.23	0
-1	853.49 *	853.13 *	850.89 *	847.51 *	842.52 *	837.29 *	829.89 *	819.4 *	808.32 *	797.05 *	780.28 *	761.76 *	742.87 *	718.02 *	687.01 *	644.8 *	588.11 *	516.83 *	405.41 *	243.46 *	85.69 *	3.23	0
-3	853.04 *	852.39 *	850.45 *	846.28 *	841.87 *	837.47 *	831.03 *	819.84 *	808.04 *	795.73 *	778.64 *	759.73 *	740.55 *	715.58 *	684.63 *	643.38 *	588.2 *	518.6 *	408.08 *	245.31 *	85.83 *	3.24	0
-5	843.87 *	843.82 *	841.76 *	837.36 *	834.2 *	829.14 *	824.06 *	814.28 *	804.17 *	792.42 *	775.6 *	756.63 *	737.29 *	712.28 *	681.54 *	641.06 *	587.43 *	519.5 *	408.47 *	245.35 *	85.97 *	3.25	0
-7	836.11 *	836.25 *	834.08 *	830.33 *	825.62 *	821.76 *	815.29 *	805.99 *	796.66 *	786.12 *	771.48 *	752.53 *	732.94 *	707.97 *	677.7 *	638.43 *	585.91 *	519.55 *	408.98 *	245.42 *	84.76	3.26	0
-9	828.42 *	828.36 *	826.67 *	822.8 *	819.29 *	813.9 *	808.83 *	799.99 *	788.95 *	779.79 *	766.4 *	749.18 *	730.44 *	703.84 *	673.75 *	634.08 *	583.63 *	518.64 *	408.8 *	244.84 *	84.02	3.27	0
-11	824.47 *	824.11 *	822.6 *	819.21 *	815.2 *	810.61 *	804.43 *	796.39 *	786.93 *	775.44 *	760.78 *	745.96 *	728.07 *	702.96 *	670.66 *	629.6 *	580.74 *	516.79 *	407.96 *	243.6 *	83.05	3.27	0
-13	823.1 *	822.5 *	821.03 *	817.57 *	813.61 *	808.9 *	802.1 *	794.38 *	785.21 *	774.05 *	758.77 *	742.5 *	725.4 *	701.7 *	670.46 *	627.61 *	578.2 *	514.12 *	406.79 *	241.69 *	81.88	3.08	0
-15	821.96 *	821.27 *	819.61 *	816.66 *	812.64 *	807.87 *	801.32 *	793.38 *	784.02 *	773.26 *	759.05 *	740.64 *	722.82 *	700.16 *	669.6 *	627.31 *	574.11 *	510.58 *	404.06 *	239.08 *	80.48	3.02	0
-17	820.95 *	820.09 *	818.19 *	815.66 *	811.6 *	807.47 *	801.38 *	792.57 *	782.94 *	772.5 *	758.19 *	739.61 *	721.15 *	698.52 *	668.18 *	626.39 *	571.68 *	506.18 *	400.96 *	235.85 *	78.87	2.96	0
-19.5	819.05 *	818.11 *	816.09 *	813.72 *	809.73 *	805.33 *	799.84 *	790.39 *	780.56 *	769.92 *	755.29 *	737.58 *	718.61 *	695.76 *	665.48 *	623.72 *	566.73 *	498.46 *	396.01 *	230.98 *	76.56	2.86	0
-22.5	814.36 *	813.35 *	811.06 *	808.31 *	804.35 *	799.09 *	792.95 *	785.63 *	774.99 *	763.78 *	749.93 *	732.58 *	712.82 *	688.8 *	659.42 *	617.89 *	558.41 *	485.88 *	388.49 *	224.2 *	73.19	2.73	0
-25.5	802.95 *	802.18 *	800.07 *	797.33 *	793.24 *	787.32 *	780.47 *	773.4 *	764.02 *	751.87 *	736.79 *	721.15 *	701.5 *	672.72 *	640.77 *	608.53 *	543.09 *	468.68 *	370.94 *	216.02 *	69.24	2.58	0
-29	767.24 *	767.58 *	766.06 *	763.03 *	758.48 *	752.53 *	746.05 *	738.51 *	730.36 *	718.46 *	702.44 *	688.22 *	673.17 *	642.57 *	607.32 *	576.9 *	519.15 *	442.97 *	348.15 *	204.53 *	64.1	2.38	0
-33	689.5 *	690.54 *	690.11 *	687.77 *	683.31 *	679.67 *	673.56 *	666.8 *	657.99 *	648.23 *	637.53 *	624.37 *	608.26 *	585.26 *	554.65 *	523.17 *	478.96 *	406.68 *	319.62 *	188 *	57.86	2.12	0
-37.5	591.31 *	592.27 *	592.74 *	591.25 *	588.93 *	582.7 *	579.45 *	575.2 *	568.9 *	561.21 *	549.28 *	540.94 *	529.66 *	510.65 *	483.41 *	458.76 *	417.79 *	357.99 *	282.84 *	163.06 *	49.98	1.85	0
-42.5	507.23 *	507.45 *	507.14 *	505.79 *	503.32 *	500.08 *	496.83 *	494.76 *	488.99 *	482.6 *	473.06 *	464.44 *	455.1 *	438.3 *	414.06 *	393.2 *	357.35 *	304.71 *	241.96 *	129.17 *	40.28	1.57	0
-47.5	447.2 *	447.2 *	446.6 *	445.19 *	443 *	439.93 *	436.11 *	432.38 *	427.67 *	422.21 *	414.28 *	404.08 *	392.9 *	376.61 *	355.65 *	334.53 *	294.19 *	247.79 *	197.27 *	95.92 *	29.83	1.29	0
-55	260.01 *	262.06 *	266.17 *	264.51 *	263.19 *	260.18 *	255.53 *	252.12 *	250.06 *	248.06 *	244.38 *	237.57 *	226.74 *	215.62 *	205.99 *	191.84 *	158.36 *	137.89 *	108.7 *	54.57	15.33	0.91	0
-65	25.59	25.67	25.82	25.82	25.81	25.71	25.53	25.25	25.92	26.65	26.75	25.34	24.34	25.77	28.07	24.42	21.76	29.88	17.85	21.23	5.93	0.66	0
-75	10.67	10.7	10.76	10.82	10.74	10.71	10.64	10.56	10.48	10.5	10.46	10.34	10.14	9.77	9.66	9.25	8.48	8.13	7.2	4.99	2.48	0.48	0
-85	2.68	2.67	2.66	2.64	2.63	2.61	2.6	2.57	2.56	2.52	2.48	2.42	2.37	2.29	2.23	2.11	1.97	1.89	1.75	1.36	0.88	0.18	0
-90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.01	0	0	0	0

## LUMEN TABULATION

	0	1	3	5	7	9	11	13	15	17	20	23	26	29	33	38	43	48	55	65	75	85	90	Total
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.1	0	0	0	0
55	0.37 *	0.75 *	0.76 *	0.76 *	0.75 *	0.73 *	0.69 *	0.67 *	0.67 *	0.85 *	0.99 *	0.89 *	0.95 *	1.07 *	1.08 *	0.96 *	0.81 *	0.9	0.6	0.2	0	0	0	0
47.5	0.49 *	0.98 *	0.99 *	0.98 *	0.97 *	0.95 *	0.93 *	0.90 *	0.89 *	1.10 *	1.29 *	1.19 *	1.29 *	1.39 *	1.40 *	1.27 *	1.02 *	1.13 *	0.79 *	0.2	0	0	0	0
42.5	0.63 *	1.26 *	1.26 *	1.25 *	1.24 *	1.22 *	1.20 *	1.18 *	1.16 *	1.41 *	1.64 *	1.57 *	1.72 *	1.82 *	1.85 *	1.74 *	1.39 *	1.58 *	1.15 *	0.3	0	0	0	0
37.5	0.66 *	1.32 *	1.32 *	1.31 *	1.30 *	1.29 *	1.27 *	1.25 *	1.22 *	1.50 *	1.77 *	1.69 *	1.82 *	1.96 *	2.07 *	1.94 *	1.52 *	1.77 *	1.30 *	0.4	0.1	0	0	0
33	0.76 *	1.52 *	1.51 *	1.50 *	1.48 *	1.46 *	1.43 *	1.41 *	1.37 *	1.65 *	1.94 *	1.88 *	2.01 *	2.10 *	2.24 *	2.11 *	1.61 *	1.82 *	1.36 *	0.41 *	0.1	0	0	0
29	0.81 *	1.62 *	1.61 *	1.59 *	1.57 *	1.54 *	1.52 *	1.49 *	1.45 *	1.74 *	2.01 *	1.94 *	2.10 *	2.14 *	2.24 *	2.14 *	1.63 *	1.79 *	1.34 *	0.41 *	0.1	0	0	0
25.5	0.73 *	1.45 *	1.45 *	1.44 *	1.42 *	1.40 *	1.38 *	1.35 *	1.32 *	1.60 *	1.84 *	1.76 *	1.92 *	2.01 *	2.06 *	1.97 *	1.52 *	1.67 *	1.26 *	0.39 *	0.1	0	0	0
22.5	0.73 *	1.46 *	1.45 *	1.44 *	1.43 *	1.41 *	1.39 *	1.36 *	1.33 *	1.61 *	1.86 *	1.78 *	1.95 *	2.07 *	2.11 *	2.01 *	1.60 *	1.77 *	1.33 *	0.42 *	0.1	0	0	0
19.5	0.61 *	1.21 *	1.21 *	1.20 *	1.19 *	1.18 *	1.16 *	1.13 *	1.11 *	1.35 *	1.56 *	1.48 *	1.64 *	1.74 *	1.77 *	1.70 *	1.38 *	1.53 *	1.14 *	0.37 *	0.1	0	0	0
17	0.49 *	0.97 *	0.97 *	0.96 *	0.95 *	0.94 *	0.93 *	0.91 *	0.89 *	1.08 *	1.25 *	1.19 *	1.31 *	1.40 *	1.42 *	1.36 *	1.12 *	1.25 *	0.93 *	0.31 *	0	0	0	0
15	0.49 *	0.98 *	0.97 *	0.97 *	0.96 *	0.95 *	0.93 *	0.91 *	0.89 *	1.09 *	1.25 *	1.20 *	1.32 *	1.41 *	1.43 *	1.37 *	1.13 *	1.27 *	0.95 *	0.31 *	0	0	0	0
13	0.49 *	0.99 *	0.98 *	0.98 *	0.97 *	0.95 *	0.94 *	0.92 *	0.90 *	1.09 *	1.26 *	1.21 *	1.33 *	1.42 *	1.43 *	1.38 *	1.14 *	1.28 *	0.96 *	0.32 *	0	0	0	0
11	0.50 *	1.00 *	0.99 *	0.99 *	0.98 *	0.96 *	0.95 *	0.93 *	0.91 *	1.10 *	1.27 *	1.22 *	1.34 *	1.42 *	1.44 *	1.39 *	1.16 *	1.29 *	0.97 *	0.33 *	0	0	0	0
9	0.51 *	1.01 *	1.00 *	1.00 *	0.99 *	0.97 *	0.96 *	0.94 *	0.92 *	1.11 *	1.29 *	1.23 *	1.36 *	1.44 *	1.46 *	1.41 *	1.17 *	1.30 *	0.98 *	0.33 *	0	0	0	0
7	0.51 *	1.02 *	1.01 *	1.00 *	0.99 *	0.98 *	0.97 *	0.95 *	0.92 *	1.12 *	1.30 *	1.24 *	1.37 *	1.45 *	1.47 *	1.42 *	1.17 *	1.31 *	0.98 *	0.34 *	0	0	0	0
5	0.51 *	1.02 *	1.02 *	1.01 *	1.00 *	0.99 *	0.97 *	0.95 *	0.93 *	1.13 *	1.30 *	1.25 *	1.37 *	1.46 *	1.48 *	1.43 *	1.18 *	1.31 *	0.98 *	0.34 *	0.1	0	0	0
3	0.52 *	1.03 *	1.02 *	1.01 *	1.00 *	0.99 *	0.98 *	0.96 *	0.94 *	1.14 *	1.31 *	1.25 *	1.38 *	1.46 *	1.49 *	1.43 *	1.19 *	1.31 *	0.99 *	0.34 *	0.1	0	0	0
1	0.26 *	0.52 *	0.51 *	0.51 *	0.50 *	0.50 *	0.49 *	0.48 *	0.47 *	0.57 *	0.66 *	0.63 *	0.69 *	0.73 *	0.75 *	0.72 *	0.59 *	0.66 *	0.49 *	0.17 *	0	0	0	0
0	0.26 *	0.52 *	0.52 *	0.51 *	0.51 *	0.50 *	0.49 *	0.48 *	0.47 *	0.57 *	0.66 *	0.63 *	0.69 *	0.73 *	0.75 *	0.72 *	0.59 *	0.66 *	0.49 *	0.17 *	0	0	0	0

-1	0.52 *	1.04 *	1.03 *	1.02 *	1.01 *	1.00 *	0.98 *	0.96 *	0.94 *	1.14 *	1.31 *	1.25 *	1.38 *	1.46 *	1.49 *	1.44 *	1.19 *	1.32 *	0.99 *	0.34 *	0.1	0	0
-3	0.52 *	1.03 *	1.03 *	1.02 *	1.01 *	1.00 *	0.98 *	0.96 *	0.94 *	1.14 *	1.31 *	1.25 *	1.38 *	1.46 *	1.48 *	1.43 *	1.19 *	1.33 *	0.99 *	0.34 *	0.1	0	0
-5	0.51 *	1.02 *	1.02 *	1.01 *	1.00 *	0.99 *	0.97 *	0.95 *	0.93 *	1.13 *	1.30 *	1.24 *	1.37 *	1.45 *	1.48 *	1.43 *	1.19 *	1.33 *	1.00 *	0.34 *	0.1	0	0
-7	0.51 *	1.01 *	1.01 *	1.00 *	0.99 *	0.98 *	0.96 *	0.94 *	0.92 *	1.12 *	1.30 *	1.24 *	1.36 *	1.44 *	1.47 *	1.42 *	1.19 *	1.33 *	0.99 *	0.34 *	0.1	0	0
-9	0.50 *	1.01 *	1.00 *	0.99 *	0.98 *	0.97 *	0.96 *	0.94 *	0.92 *	1.11 *	1.29 *	1.23 *	1.36 *	1.44 *	1.46 *	1.42 *	1.18 *	1.32 *	0.99 *	0.34 *	0.1	0	0
-11	0.50 *	1.00 *	1.00 *	0.99 *	0.98 *	0.97 *	0.95 *	0.93 *	0.91 *	1.11 *	1.28 *	1.23 *	1.35 *	1.43 *	1.45 *	1.41 *	1.18 *	1.32 *	0.99 *	0.34 *	0.1	0	0
-13	0.50 *	1.00 *	1.00 *	0.99 *	0.98 *	0.97 *	0.95 *	0.93 *	0.91 *	1.11 *	1.28 *	1.22 *	1.35 *	1.43 *	1.45 *	1.40 *	1.17 *	1.31 *	0.98 *	0.33 *	0	0	0
-15	0.50 *	1.00 *	0.99 *	0.99 *	0.98 *	0.97 *	0.95 *	0.93 *	0.91 *	1.11 *	1.28 *	1.22 *	1.35 *	1.43 *	1.45 *	1.40 *	1.16 *	1.30 *	0.97 *	0.33 *	0	0	0
-17	0.62 *	1.25 *	1.24 *	1.23 *	1.22 *	1.21 *	1.19 *	1.16 *	1.14 *	1.38 *	1.59 *	1.52 *	1.68 *	1.78 *	1.81 *	1.74 *	1.44 *	1.61 *	1.20 *	0.40 *	0.1	0	0
-20	0.75 *	1.49 *	1.48 *	1.47 *	1.46 *	1.44 *	1.42 *	1.39 *	1.36 *	1.65 *	1.90 *	1.82 *	2.00 *	2.12 *	2.15 *	2.07 *	1.70 *	1.90 *	1.41 *	0.47 *	0.1	0	0
-23	0.74 *	1.47 *	1.47 *	1.46 *	1.44 *	1.42 *	1.40 *	1.37 *	1.34 *	1.63 *	1.88 *	1.80 *	1.97 *	2.08 *	2.12 *	2.04 *	1.66 *	1.84 *	1.37 *	0.45 *	0.1	0	0
-26	0.84 *	1.67 *	1.66 *	1.65 *	1.63 *	1.61 *	1.58 *	1.55 *	1.52 *	1.84 *	2.13 *	2.03 *	2.23 *	2.34 *	2.38 *	2.29 *	1.86 *	2.04 *	1.52 *	0.50 *	0.1	0	0
-29	0.89 *	1.77 *	1.77 *	1.75 *	1.73 *	1.71 *	1.68 *	1.65 *	1.61 *	1.96 *	2.26 *	2.17 *	2.38 *	2.50 *	2.53 *	2.45 *	1.99 *	2.17 *	1.61 *	0.54 *	0.1	0	0
-33	0.88 *	1.76 *	1.75 *	1.74 *	1.72 *	1.70 *	1.67 *	1.64 *	1.61 *	1.95 *	2.26 *	2.16 *	2.38 *	2.51 *	2.54 *	2.47 *	2.01 *	2.20 *	1.63 *	0.54 *	0.1	0	0
-38	0.84 *	1.67 *	1.67 *	1.66 *	1.64 *	1.62 *	1.60 *	1.57 *	1.54 *	1.87 *	2.16 *	2.08 *	2.29 *	2.41 *	2.45 *	2.37 *	1.94 *	2.12 *	1.55 *	0.50 *	0.1	0	0
-43	0.73 *	1.45 *	1.45 *	1.44 *	1.42 *	1.40 *	1.39 *	1.36 *	1.33 *	1.62 *	1.87 *	1.79 *	1.97 *	2.07 *	2.09 *	2.01 *	1.62 *	1.77 *	1.26 *	0.4	0.1	0	0
-48	0.81 *	1.62 *	1.62 *	1.61 *	1.59 *	1.57 *	1.54 *	1.51 *	1.48 *	1.80 *	2.08 *	1.97 *	2.15 *	2.26 *	2.28 *	2.14 *	1.69 *	1.85 *	1.30 *	0.4	0.1	0	0
-55	0.44 *	0.88 *	0.88 *	0.88 *	0.87 *	0.85 *	0.83 *	0.82 *	0.81 *	0.99 *	1.14 *	1.07 *	1.17 *	1.24 *	1.26 *	1.16 *	0.94 *	1.1	0.8	0.3	0	0	0
-65	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0	0	0
-75	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	0
-85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	22.1	44.2	44	43.7	43.2	42.7	41.9	41.1	40.2	48.9	56.6	54	59.3	62.7	63.9	61.2	49.8	55.3	41.1	13.5	1.72	0.01	931.06

## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

Model No.	FFLEDXS @ 13W / 3000K	Sample ID.	D1
Temperature (°C)	25.4	Humidity (%RH)	54.0

#### 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  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . 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
120.00	60	0.101	12.0	0.992	5.20%
277.02	60	0.050	12.8	0.928	9.97%

## 5.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last Calibration Date	Calibration Due Date
DLF107	Integrating Sphere System	2021/12/26	2022/12/25
DLF108	Auxiliary Lamp	2021/12/26	2022/12/25
DLF122	Measurement Standard Lamp Standard Lamp Type: 220 V, 0.4720 A, Tungsten, Omni-derectional	2021/12/26	2022/12/25
DLF116	AC Power Source	2021/12/26	2022/12/25
DLF113	Power Meter	2021/12/26	2022/12/25
DLF112	Temperature Recorder	2021/12/26	2022/12/25
DLF114	Temperature & Humidity Datalogger	2021/12/26	2022/12/25
DLF101	Goniophotometer	2021/12/26	2022/12/25
DLF125	Standard Lamp Standard Lamp Type: 76.58 V, 6.7875 A, Tungsten, Omni-derectional	2021/12/26	2022/12/25
DLF104	AC Power Source	2021/12/26	2022/12/25
DLF507	DC Power Source	2021/12/26	2022/12/25
DLF102	Power Meter	2021/12/26	2022/12/25
DLF111	Temperature & Humidity Datalogger	2021/12/26	2022/12/25
DLF119	Power Meter	2021/12/26	2022/12/25
DLF031	Temperature data logger	2021/12/26	2022/12/25
DLF022	Digital power meter	2021/12/26	2022/12/25
DLF003	Temperature & Humidity Datalogger	2021/12/26	2022/12/25

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