

# Photometric Test Report

## Relevant Standards

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

## Prepared For

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## Project Number

**DLF2111120**

## Report Number

**DLF2111120-10a**

## Test Date

**2021/11/22**

## Issue Date

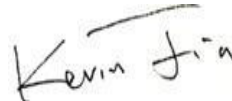
**2021/11/23**

## 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		25291
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 105	Premium 120	148.8
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		170.0
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%		11.43%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9		0.926
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	3045±175	3140
		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	≥-40		5
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%		99.90%
Input Voltage (V) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		480
Input Current (A) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		0.384

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2021/11/22	FFLEDL @ 180W / 3000K/480	J1
2	Goniophotometer Test	2021/11/22	FFLEDL @ 180W / 3000K/480	J1
3	THD and PF Test	2021/11/22	FFLEDL @ 180W / 3000K/480	J1

### Remark(If any)

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- 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:** FFLEDL @ 180W / 3000K/480

**Electrical Specification:** 480V,50/60HZ

### Photos of Luminaire Characteristics



## 4.0 LM-79 Measurement and Test Results

### 4.1 Integrating Sphere Test

Model No.	FFLEDL @ 180W / 3000K/480	Sample ID.	J1
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
480.03	60	0.385	171.1	0.926

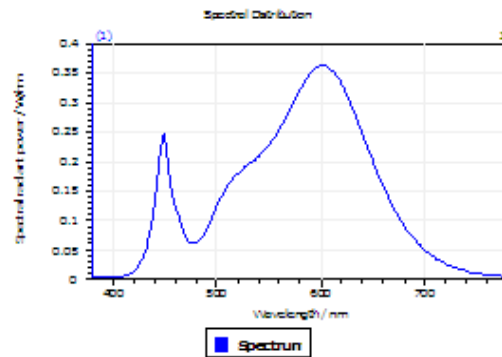
#### Test Result

CCT (K)	CRI	R9	Duv
3140	82	5	0.0012

Rf	Rg	IES Rcs,h1
84	98	-11%

## 4.1 Integrating Sphere Test

### Results



#### Spectral values

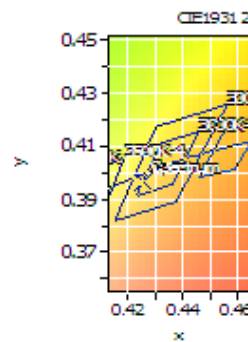
DominantWavelength	582.72 nm
Purity	0.469
PeakWavelength	601.50 nm
Radiant Power	54.76 W
Width50%	132.86 nm

#### Color Coordinates

Correlated Color Temperat 3140 K

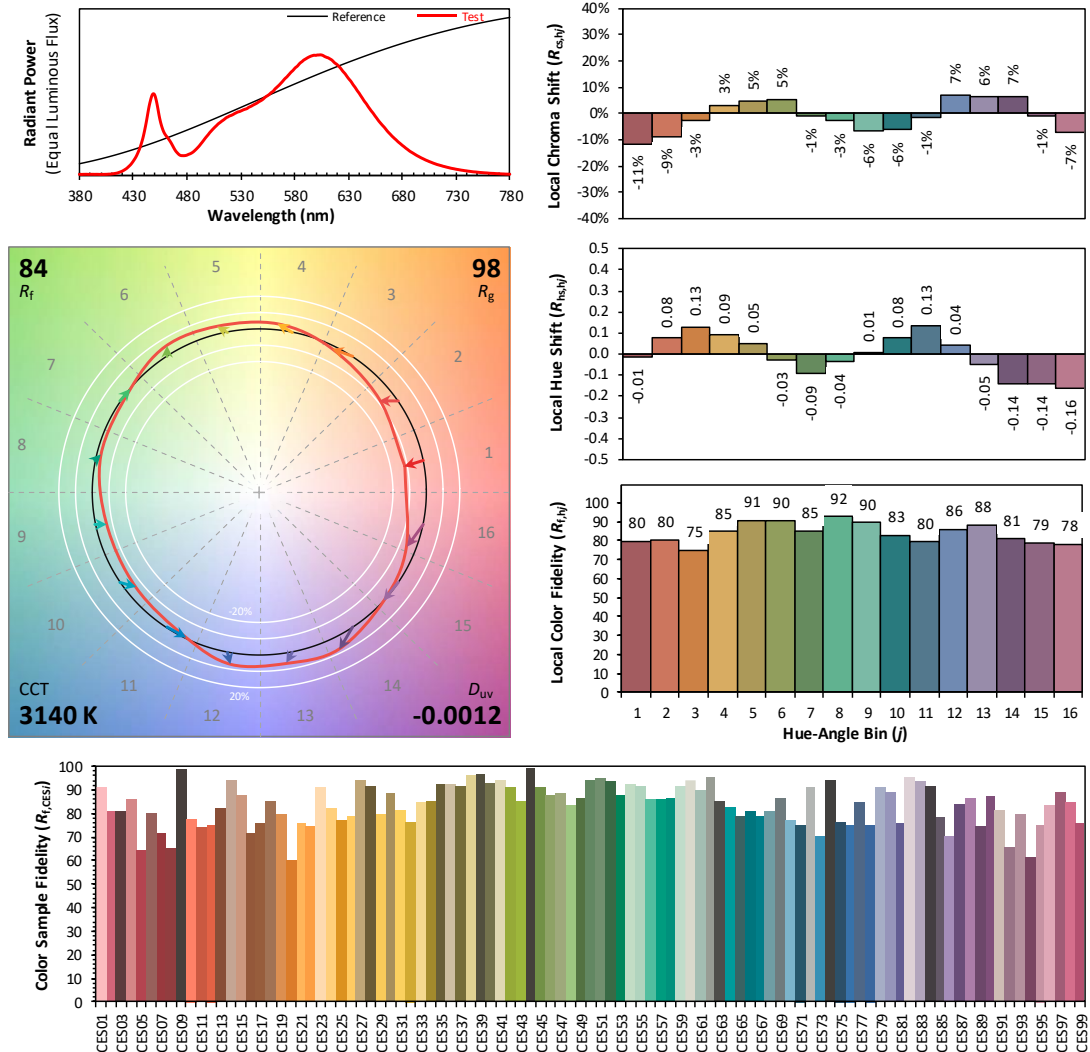
x: 0.4256 u: 0.2463 u': 0.2463  
y: 0.3969 v: 0.3446 v': 0.5168

ResultsCRICRI01	80.9	ResultsCRICRI09	5.2
ResultsCRICRI02	89.9	ResultsCRICRI10	76.9
ResultsCRICRI03	98.5	ResultsCRICRI11	81.2
ResultsCRICRI04	81.3	ResultsCRICRI12	70.3
ResultsCRICRI05	81.0	ResultsCRICRI13	83.0
ResultsCRICRI06	87.1	ResultsCRICRI14	98.4
ResultsCRICRI07	83.2	ResultsCRICRI15	73.5
ResultsCRICRI08	59.6	ResultsCRICRI16	71.6
ResultsCRI	82.4		



PlanckDistance 1.2E-003

## 4.1 Integrating Sphere Test



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

$x$  0.4256  
 $y$  0.3969  
 $u'$  0.2463  
 $v'$  0.5168

CIE 13.3-1995  
(CRI)

$R_a$  82  
 $R_g$  4

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.0

## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

Model No.	FFLEDL @ 180W / 3000K/480	Sample ID.	J1
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° vertical intervals and 10° horizontal intervals.

#### Test Conditions

Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
WORST CASE	480.00	60	0.384	170.0	0.921

#### Test Result

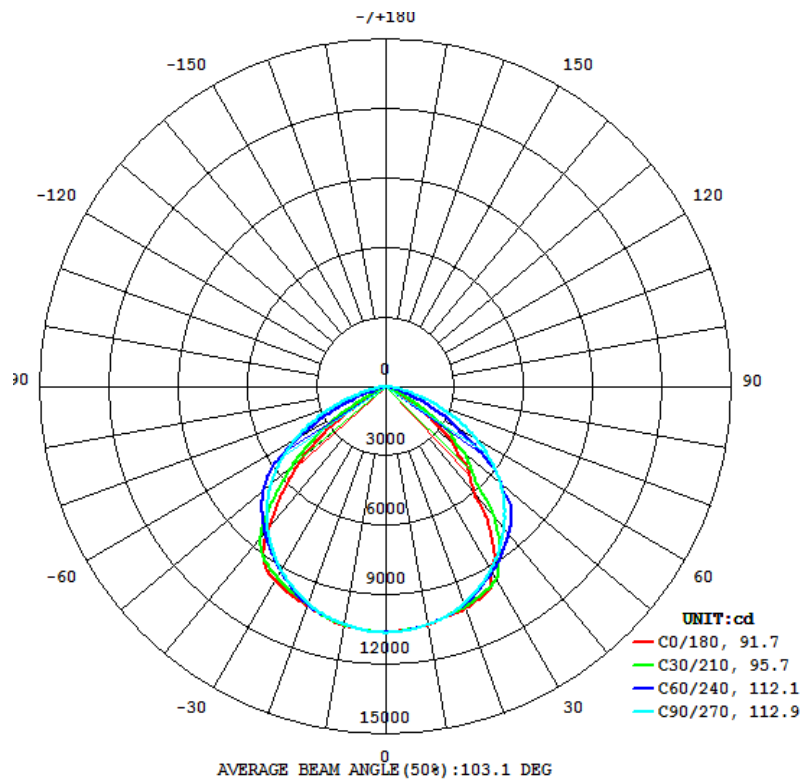
Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
25291	119.0	152.1	91.7	112.9	148.8

Zonal Lumen Requirement (0°-90°)

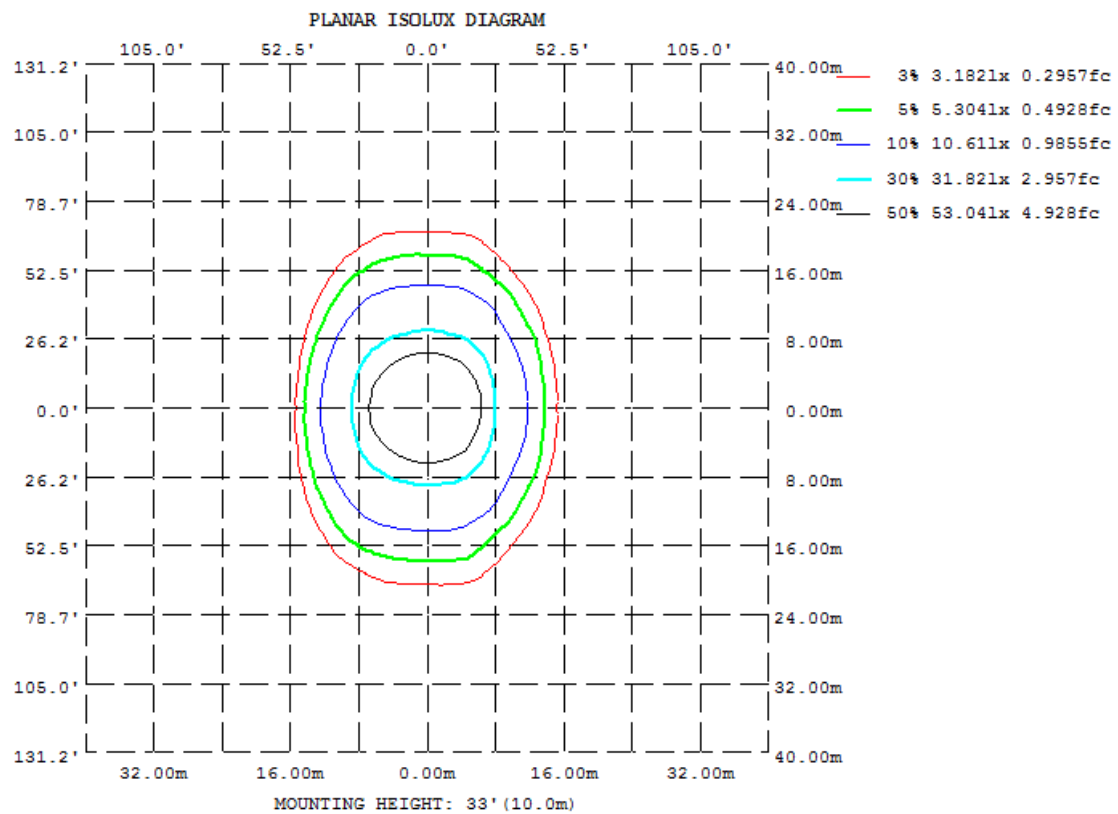
99.90%

## 4.2 Goniophotometer Test

### Light Distrubtion Curve



### Isolux Plot





## 4.2 Goniophotometer Test

### Zonal Lumen Summary

$\gamma$	C0	C45	C90	C135	C180	C225	C270	C315
10	1045	1042	1044	1045	1047	1044	1044	1045
20	1017	1001	995.7	1004	1006	1001	995.9	1001
30	912.7	942.5	913.7	931.6	966.3	930.5	912.9	938.9
40	604.1	804.7	800.8	851.5	796.4	850.0	799.5	799.7
50	383.9	495.5	653.5	666.3	466.2	633.6	650.3	505.2
60	96.87	278.3	461.1	348.1	87.71	309.1	456.6	278.2
70	3.383	23.44	242.8	36.29	9.540	21.49	229.9	26.84
80	0.2202	0.3288	50.79	4.442	4.712	4.138	35.89	0.2282
90	0.0265	0.0829	0.0837	0.0718	0.2671	0.0840	0.0843	0.0456
100	0.0680	0.1383	0.1490	0.1479	0.2342	0.2795	0.2339	0.1536
110	0.1571	0.2075	0.2586	0.2036	0.1570	0.2812	0.3630	0.2582
120	0.2783	0.2844	0.3344	0.2889	0.2525	0.3591	0.4032	0.3252
130	0.4199	0.3813	0.4403	0.4006	0.4290	0.5329	0.5715	0.4644
140	0.5387	0.5165	0.5238	0.5104	0.6608	0.7109	0.6869	0.6254
150	0.6406	0.6215	0.5613	0.6009	0.7558	0.7712	0.7748	0.7569
160	0.7078	0.6616	0.6047	0.6534	0.8758	0.8345	0.7838	0.8018
170	0.7297	0.6797	0.6275	0.6729	0.8074	0.8257	0.7439	0.7418
180	0.8630	0.8238	0.7575	0.8115	0.8611	0.8448	0.7663	0.7920
DEG	LUMINOUS INTENSITY: *10cd							

	Zonal (lm)		Total (lm)	Percent
0-10	1006.65	0 - 10	1006.65	3.98%
10-20	2907.12	0 - 20	3913.77	15.48%
20-30	4498.50	0 - 30	8412.27	33.26%
30-40	5472.33	0 - 40	13884.59	54.90%
40-50	5256.83	0 - 50	19141.42	75.69%
50-60	3881.15	0 - 60	23022.56	91.03%
60-70	1777.32	0 - 70	24799.89	98.06%
70-80	437.91	0 - 80	25237.80	99.79%
80-90	27.22	0 - 90	25265.02	99.90%
90-100	3.01	0 - 100	25268.03	99.91%
100-110	2.06	0 - 110	25270.09	99.92%
110-120	2.70	0 - 120	25272.79	99.93%
120-130	3.41	0 - 130	25276.19	99.94%
130-140	4.09	0 - 140	25280.28	99.96%
140-150	4.06	0 - 150	25284.34	99.98%
150-160	3.35	0 - 160	25287.68	99.99%
160-170	2.09	0 - 170	25289.78	100.00%
170-180	0.72	0 - 180	25290.50	100.00%

## 4.2 Goniophotometer Test

### Axial Candela

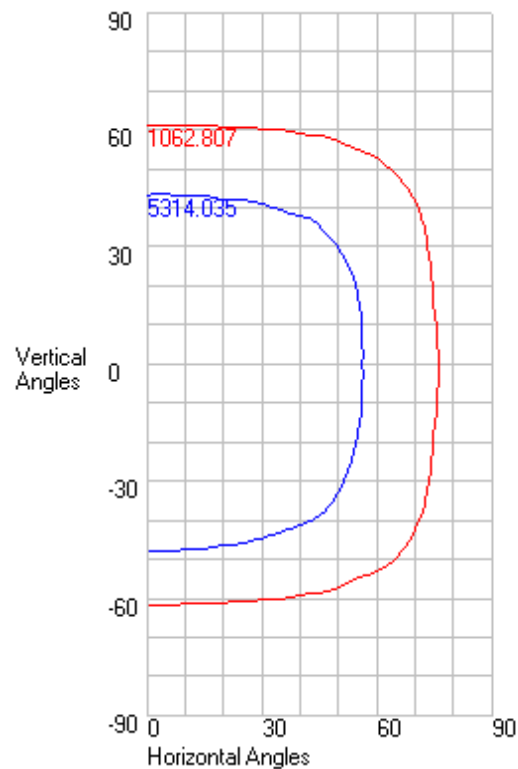
DEG.	HOR.	DEG.	VERT.
90	0.84	90	0.28
85	22.43	85	2.07
75	1187.93	75	4.1
65	3436.81	65	148.93
55	5586.96	55	2374.09
47.5	6926.06	47.5	4260.38
42.5	7660.25	42.5	5512.03
37.5	8307.9	37.5	7288.72
33	8824.01	33	8735.84
29	9224.85	29	9427.07
25.5	9535.85	25.5	9950.1
22.5	9777.31	22.5	10067.68
19.5	9991.78	19.5	10182.73
17	10147.43	17	10252
15	10251.47	15	10282.97
13	10337.52	13	10339.71
11	10406.59	11	10420.39
9	10469.31	9	10470.63
7	10525.83	7	10508.37
5	10573.5	5	10542.88
3	10609.76	3	10575.76
1	10623.98	1	10602.8
0	10622.93	0	10622.93
-1	10620.68	-1	10606.85
-3	10600.91	-3	10591.81
-5	10569.49	-5	10559.87
-7	10522.68	-7	10522.24
-9	10470.04	-9	10488.54
-11	10406.88	-11	10452.51
-13	10333.46	-13	10376.7
-15	10251.77	-15	10287.65
-17	10144.5	-17	10189.21
-19.5	9990.56	-19.5	10077.95
-22.5	9780.94	-22.5	9974.47
-25.5	9544.37	-25.5	9859.88
-29	9236.01	-29	9708.29
-33	8827.29	-33	9469.11
-37.5	8314.76	-37.5	8718.3
-42.5	7676.63	-42.5	7091.53
-47.5	6950.72	-47.5	5478.61
-55	5617.82	-55	2769.73
-65	3526.6	-65	185.56
-75	1352.67	-75	61.98
-85	51.09	-85	26.88
-90	0.84	-90	2.66

## 4.2 Goniophotometer Test

### Characteristics

NEMA Type	7 H x 6 V
Maximum Candela	10628.07
Maximum Candela Angle	1 H 1 V
Horizontal Beam Angle (50%)	112.8
Vertical Beam Angle (50%)	91.3
Horizontal Field Angle (10%)	153.2
Vertical Field Angle (10%)	122.6
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Beam Lumens	20158
Beam Efficiency	N.A.
Field Lumens	24959
Field Efficiency	N.A.
Spill Lumens	332
Luminaire Lumens	25291
Total Efficiency	N.A.
Total Luminaire Watts	170.005
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	0.28	0.28	0.28	0.28	0.29	0.29	0.29	0.29	0.29	0.29	0.28	0.28	0.27	0.26	0.3	0.36	0.43	0.54	0.76	0.84	0.69	0.79	0.84
85	2.07	2.07	2.07	2.07	2.07	2.08	2.08	2.08	2.07	2.07	2.06	2.04	2.03	2.01	1.98	1.92	1.85	1.76	1.59	1.21	0.75	0.79	0.84
75	4.1	4.13	4.18	4.23	4.1	4.04	3.94	3.82	3.86	4.34	4.52	4.47	4.24	3.36	5.53	5.74	3.26	6.32	5.61	9	1.28	0.84	0.84
65	148.93	154.77	166.44	172.62	178.45	181.8	182.39	179.99	184.84	189.72	189.93	181.48	168.23	174.25	189.85	175.09	121.88	202.94	126.36	152.1	23.49	0.98	0.84
55	2374.09 *	2388.77 *	2418.12 *	2409.42 *	2402.5 *	2383.83 *	2353.62 *	2345.14 *	2354.39 *	2326.34 *	2255.85 *	2175.03 *	2099.8 *	2090.2 *	2003.71 *	1761.77 *	1613.75 *	1408.78 *	1062.3	572.84	131.66	1.2	0.84
47.5	4260.38 *	4286.29 *	4324.19 *	4333.26 *	4301.5 *	4254.41 *	4213.83 *	4236.75 *	4265.26 *	4287.46 *	4206.16 *	3974.88 *	3891.23 *	3847.76 *	3745.38 *	3352.14 *	3085.35 *	2673.42 *	2148.75 *	1143.46 *	296.89	1.61	0.84
42.5	5512.03 *	5523.91 *	5536.66 *	5533.34 *	5512.4 *	5480.15 *	5461.2 *	5455.65 *	5398.84 *	5330.84 *	5220.78 *	5188.91 *	5201.76 *	4922.71 *	4550.83 *	4516.51 *	4157.74 *	3463.42 *	2906.58 *	1627.16 *	416.19	1.92	0.84
37.5	7288.72 *	7315.56 *	7345.63 *	7347.78 *	7343.42 *	7270.06 *	7243.12 *	7124.49 *	7009.75 *	6975.02 *	6931.77 *	6678.17 *	6472.04 *	6373.5 *	6049.26 *	5473.49 *	5281.19 *	4593.8 *	3482.01 *	2144.76 *	540.08	2.25	0.84
33	8735.84 *	8746.49 *	8735.2 *	8712.42 *	8686.94 *	8666.97 *	8536.01 *	8441.81 *	8375.77 *	8335.46 *	8221.18 *	7909.49 *	7703.67 *	7565.13 *	7081.91 *	6709.43 *	6125.72 *	5303.83 *	4011.45 *	2520.8 *	662.59	5.52	0.84
29	9427.07 *	9468.45 *	9505.87 *	9503.04 *	9451.24 *	9358.55 *	9302.04 *	9317.01 *	9253.92 *	9000.72 *	8826.07 *	8775.36 *	8654.19 *	8057.62 *	7750.79 *	7384.31 *	6651.82 *	5839.55 *	4482.34 *	2777.64 *	765.06	8.71	0.84
25.5	9950.1 *	9946.99 *	9935.93 *	9918.26 *	9886.55 *	9829.5 *	9766.85 *	9697.06 *	9608.57 *	9492.81 *	9324.98 *	9104.17 *	8911.51 *	8575.27 *	8082.7 *	7729.77 *	7074.12 *	6145.99 *	4876.64 *	2985.99 *	846.59	11.3	0.84
22.5	10067.68 *	10066.3 *	10058.23 *	10043.49 *	10005.63 *	9951.77 *	9891.07 *	9816.61 *	9725.16 *	9619.04 *	9461.31 *	9253.52 *	9033.91 *	8739.54 *	8318.01 *	7850.11 *	7238.14 *	6351.67 *	5147.14 *	3147.32 *	910.78	13.36	0.84
19.5	10182.73 *	10182.71 *	10177.68 *	10165.49 *	10117.9 *	10062.93 *	10000.64 *	9920.87 *	9834.34 *	9733.4 *	9576.27 *	9358.07 *	9131.56 *	8836.56 *	8449.89 *	7958.26 *	7330 *	6528.9 *	5270.48 *	3238.21 *	969.55	15.25	0.84
17	10252 *	10253.79 *	10251.5 *	10235.22 *	10185.75 *	10132.22 *	10069.99 *	9991.71 *	9905.39 *	9810.9 *	9657.21 *	9431.85 *	9198.25 *	8920.29 *	8537.71 *	8036.77 *	7397.91 *	6646.04 *	5359.46 *	3304.6 *	1014	16.68	0.84
15	10282.97 *	10288.3 *	10292.72 *	10273.17 *	10226.55 *	10174.07 *	10118.87 *	10040.12 *	9958.53 *	9866.87 *	9715.81 *	9483.24 *	9254.26 *	8981.88 *	8597.32 *	8091.16 *	7441.16 *	6713.47 *	5420.67 *	3348.58 *	1046.29	17.73	0.84
13	10339.71 *	10351.39 *	10360.34 *	10336.19 *	10290.11 *	10239.08 *	10183.83 *	10102.78 *	10018.88 *	9927.25 *	9774.05 *	9543.17 *	9319.62 *	9038.15 *	8649.06 *	8136.3 *	7504.55 *	6772.71 *	5477.38 *	3383.97 *	1075.59 *	18.69	0.84
11	10420.39 *	10433.28 *	10444.31 *	10413.34 *	10368.87 *	10313.38 *	10254.34 *	10178.7 *	10087.9 *	9989.45 *	9834.23 *	9613.69 *	9380.25 *	9088.72 *	8690.68 *	8182.1 *	7546.62 *	6823.13 *	5516.2 *	3412.03 *	1101.82 *	21.29	0.84
9	10470.63 *	10488.28 *	10493.55 *	10459.16 *	10415.59 *	10366.15 *	10305.12 *	10234.25 *	10149.02 *	10041.3 *	9886.62 *	9669.67 *	9433.5 *	9130.54 *	8740.37 *	8229.12 *	7589.88 *	6864.55 *	5550.16 *	3432.78 *	1124.91 *	21.5	0.84
7	10508.37 *	10530.49 *	10527.94 *	10493.34 *	10452.69 *	10400.99 *	10339.72 *	10272.43 *	10187.28 *	10080.2 *	9924.44 *	9710.72 *	9475.59 *	9169.7 *	8772.24 *	8272.64 *	7623.26 *	6895.98 *	5574.86 *	3446.24 *	1144.77 *	21.7	0.84
5	10542.88 *	10571.56 *	10559.58 *	10524.09 *	10483.19 *	10429.46 *	10370.51 *	10297.93 *	10214.37 *	10107.2 *	9951.5 *	9745.04 *	9507.6 *	9199.61 *	8800.96 *	8291.36 *	7646.56 *	6917.07 *	5590.19 *	3452.46 *	1172.16 *	21.91	0.84
3	10575.76 *	10612.01 *	10588.29 *	10554.23 *	10508.5 *	10450.83 *	10387.29 *	10317.8 *	10234.85 *	10131.46 *	9977.03 *	9765.8 *	9527.83 *	9218.44 *	8818.66 *	8306.02 *	7659.79 *	6928.28 *	5606.79 *	3459.36 *	1178.46 *	22.12	0.84
1	10602.8 *	10628.07 *	10608.54 *	10572.42 *	10524.29 *	10467.42 *	10404.8 *	10335.48 *	10250.52 *	10147.09 *	9990.07 *	9776.57 *	9536.25 *	9227.19 *	8826.52 *	8310 *	7662.71 *	6929.37 *	5593.57 *	3444.33 *	1184.77 *	22.43	0.84
0	10622.93 *	10623.98 *	10609.76 *	10573.5 *	10525.83 *	10469.31 *	10406.59 *	10337.52 *	10251.47 *	10147.43 *	9991.78 *	9777.31 *	9535.85 *	9224.85 *	8824.01 *	8307.9 *	7660.25 *	6926.06 *	5586.96 *	3436.81 *	1187.93 *	22.43	0.84
-1	10606.85 *	10611.5 *	10606.28 *	10574.54 *	10526.41 *	10469.02 *	10405.5 *	10336.1 *	10250.33 *	10146.24 *	9989.35 *	9775.42 *	9535.17 *	9227.09 *	8826.99 *	8309.31 *	7662.38 *	6928.22 *	5593.57 *	3446.83 *	1188.13 *	22.35	0.84
-3	10591.81 *	10590.7 *	10578.79 *	10551.49 *	10508.97 *	10453.34 *	10389.93 *	10319.15 *	10233.66 *	10129 *	9974.67 *	9762.04 *	9524.59 *	9218.2 *	8820.04 *	8303.89 *	7658.78 *	6924.82 *	5606.76 *	3466.84 *	1188.52 *	22.2	0.84
-5	10559.87 *	10560.18 *	10548.65 *	10518.85 *	10477.47 *	10426.39 *	10368 *	10294.56 *	10210.26 *	10103.91 *	9946.98 *	9737.81 *	9502.2 *	9199.37 *	8803.13 *	8287.61 *	7644.81 *	6911.28 *	5590.54 *	3464.93 *	1188.91 *	22.05	0.84
-7	10522.24 *	10523.77 *	10511.01 *	10481.54 *	10443.21 *	10394.14 *	10333.69 *	10264.16 *	10182.22 *	10081.13 *	9922.21 *	9703.29 *	9468.72 *	9169.67 *	8775.03 *	8267.06 *	7620.66 *	6887.84 *	5575.9 *	3463.7 *	1167.09 *	21.9	0.84
-9	10488.54 *	10489.63 *	10479.6 *	10450.95 *	10411.6 *	10358.2 *	10299.2 *	10227.77 *	10148.74 *	10048.63 *	9887.59 *	9667.44 *	9428.41 *	9128.62 *	8743.6 *	8222.53 *	7585.8 *	6853.9 *	5552.4 *	3455.23 *	1152.65 *	21.75	0.84
-11	10452.51 *	10452.98 *	10440.7 *	10413.1 *	10365.71 *	10311.19 *	10251.54 *	10177.82 *	10094.94 *	9996.78 *	9837.7 *	9616.07 *	9374.16 *	9074.74 *	8684.82 *	8174.79 *	7540.45 *	6809.67 *	5520.3 *	3439.48 *	1134.27 *	21.6	0.84
-13	10376.7 *	10378.28 *	10366.3 *	10335.54 *	10290.49 *	10238.1 *	10179.31 *	10109.12 *	10022.72 *	9920.5 *	9767.95 *	9548.84 *	9306.7 *	9007.77 *	8623.9 *	8124.33 *	7495.92 *	6756.2 *	5483.99 *	3416.41 *	1111.88 *	19.05	0.84
-15	10287.65 *	10288.34 *	10274.86 *	10246.07 *	10201.4 *	10147.67 *	10091.15 *	10021.07 *	9941.59 *	9834.68 *	9683.13 *	9468.6 *	9225.82 *	8930.38 *	8554 *	8072.05 *	7428.4 *	6694.47 *	5430.9 *	3386.01 *	1085.41 *	18.14	0.84
-17	10189.21 *	10188.67 *	10175.07 *	10149.55 *	10107.63 *	10052.84 *	9993.25 *	9928.2 *	9844.72 *	9737.9 *	9591.62 *	9387.95 *	9147.27 *	8844.86 *	8482.04 *	8012.26 *	7378.87 *	6625.25 *	5374.17 *	3347.65 *	1054.81 *	17.14	0.84
-19.5	10077.95 *	10074.05 *	10059.68 *	10036.39 *	9996.15 *	9945.14 *	9884.15 *	9819.68 *	9736 *	9627.52 *	9478.49 *	9289.67 *	9059.76 *	8743.17 *	8387.81 *	7926.67 *	7305.58 *	6562.66 *	5289.85 *	3289.19 *	1010.68	15.77	0.84
-22.5	9974.47 *	9968.69 *	9953.01 *	9932.58 *	9893.89 *	9842.12 *	9786.09 *	9717.74 *	9623.86 *	9515.4 *	9367.64 *	9177.49 *	8952.56 *	8659.32 *	8270.97 *	7810.98 *	7211.55 *	6461.04 *	5169.53 *	3208.53 *	950.29	13.95	0.84
-25.5	9859.88 *	9853.95 *	9837.44 *	9814.65 *	9782.04 *	9730.18 *	9668.88 *	9597.96 *	9508.85 *	9405.38 *	9260.12 *	9063.21 *	8842 *	8550.34 *	8165.37 *	7681.06 *	7084.78 *	6330.47 *	4987.84 *	3097.41 *	882.19	11.96	0.84
-29	9708.29 *	9702.62 *	9684.72 *	9661.49 *	9632.04 *	9579.64 *	9515.68 *	9443.9 *	9363.41 *	9261.63 *	9113.32 *	8919.72 *	8696.7 *	8417.84 *	7986.31 *	7490.61 *	6927.48 *	6129.86 *	4725.15 *	2949.97 *	792.12	9.43	0.84
-33	9469.11 *	9465.36 *	9444.99 *	9416.13 *	9378.76 *	9334.28 *	9251.56 *	9175.11 *	9092.05 *	9001.4 *	8830.8 *	8600.01 *	8381.75 *	8128.51 *	7645.27 *	7083.65 *	6607.38 *	5797.63 *	4342.41 *	2740.96 *	678.51	6.31	0.84
-37.5	8718.3 *	8723.12 *	8716.47 *	8689.79 *	8657.34 *	8567.01 *	8495.99 *	8415.06 *	8332.95 *	8231.9 *	8088.04 *	7831.56 *	7594.54 *	7374.03 *	6928 *	6352.94 *	5877.26 *	5229.4 *	3836.1 *	2351.16 *	537.78	3.1	0.84
-42.5	7091.53 *	7104.81 *	7111.47 *	7091.58 *	7045.27 *	6972.54 *	6903.36 *	6889.68 *	6802.66 *	6715.44 *	6570.78 *	6409.38 *	6241.64 *	6016.24 *	5666.85 *	5261.06 *	4857.14 *	4248.26 *	3170.71 *	1801.42 *	381.84	2.79	0.84
-47.5	5478.61 *	5488.49 *	5493.41 *	5478.79 *	5444.98 *	5389.67 *	5312.78 *	5277.15 *	5229 *	5163.87 *	5059.72 *	4903.73 *	4775.18 *	4585.72 *	4317.84 *	4014.37 *	3606.87 *	3151.3 *	2372.84 *	1266.46 *	250.77	2.49	0.84
-55	2769.73 *	2786.18 *	2819.06 *	2791.03 *	2766.01 *	2722.34 *	2660.44 *	2616.06 *	2586.24 *	2552.85 *	2496.17 *	2396.19 *	2258.51 *	2175.77 *	2061.82 *	1875.74 *	1622.06 *	1458.71 *	1025.07	623.06	82.82	2.04	0.84
-65	185.56	186.53	188.47	186.9	185.48	182.97	179.37	174.71	176.36	178.19	178.18	173.9	164.07	166.23	173.62	161.65	128.8	187.25	93.55	138.73	20.23	1.64	0.84
-75	61.98	62.03	62.13	62.23	61.34	60.79	60.09	59.22	58.35	57.8	57.07	56.21	54.64	51.42	51.28	50.05	43.8	42.78	36.17	22.32	5.17	1.49	0.84
-85	26.88	26.83																					

## 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
85		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0
75		0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.8	0.7	0.8	1	1	0.9	0.9	1.1	1	0.5	0	0	0
65		3.86 *	7.79 *	7.82 *	7.78 *	7.71 *	7.59 *	7.47 *	7.40 *	7.31 *	8.87 *	10.13 *	9.56 *	10.66 *	11.50 *	11	11	8.9	9.8	7.1	2.3	0.2	0	0
55		7.60 *	15.30 *	15.33 *	15.23 *	15.04 *	14.81 *	14.65 *	14.59 *	14.46 *	17.59 *	20.02 *	18.94 *	21.19 *	22.72 *	22.59 *	21.36 *	17.68 *	19.48 *	13.94 *	4.2	0.4	0	0
47.5		7.45 *	14.95 *	14.95 *	14.86 *	14.70 *	14.51 *	14.38 *	14.26 *	14.06 *	17.13 *	19.73 *	18.96 *	21.04 *	22.13 *	22.50 *	21.94 *	17.95 *	19.88 *	14.69 *	4.5	0.5	0	0
42.5		9.76 *	19.56 *	19.54 *	19.44 *	19.24 *	18.98 *	18.71 *	18.34 *	17.99 *	21.98 *	25.41 *	24.34 *	26.97 *	28.26 *	28.58 *	28.17 *	23.28 *	25.60 *	19.22 *	6.15 *	0.7	0	0
37.5		10.99 *	22.00 *	21.95 *	21.83 *	21.62 *	21.30 *	20.90 *	20.49 *	20.15 *	24.64 *	28.29 *	26.84 *	29.86 *	31.56 *	31.55 *	30.74 *	25.60 *	27.93 *	20.92 *	6.91 *	0.8	0	0
33		11.08 *	22.18 *	22.12 *	21.96 *	21.74 *	21.46 *	21.17 *	20.86 *	20.41 *	24.80 *	28.74 *	27.51 *	30.24 *	31.82 *	32.30 *	31.26 *	25.71 *	28.13 *	21.11 *	7.06 *	0.8	0	0
29		10.34 *	20.69 *	20.64 *	20.50 *	20.29 *	20.06 *	19.85 *	19.55 *	19.10 *	23.18 *	26.95 *	25.89 *	28.31 *	29.71 *	30.46 *	29.47 *	24.17 *	26.80 *	20.23 *	6.79 *	0.8	0	0
25.5		9.14 *	18.26 *	18.20 *	18.10 *	17.95 *	17.75 *	17.51 *	17.23 *	16.90 *	20.58 *	23.81 *	22.79 *	25.10 *	26.46 *	26.99 *	26.21 *	21.67 *	24.31 *	18.52 *	6.21 *	0.8	0	0
22.5		9.25 *	18.48 *	18.42 *	18.31 *	18.15 *	17.95 *	17.72 *	17.43 *	17.10 *	20.84 *	24.13 *	23.08 *	25.47 *	26.98 *	27.46 *	26.70 *	22.28 *	25.18 *	19.26 *	6.52 *	0.8	0	0
19.5		7.78 *	15.54 *	15.49 *	15.39 *	15.26 *	15.10 *	14.89 *	14.66 *	14.39 *	17.54 *	20.30 *	19.41 *	21.42 *	22.73 *	23.14 *	22.49 *	18.88 *	21.43 *	16.41 *	5.62 *	0.7	0	0
17		6.25 *	12.50 *	12.46 *	12.38 *	12.27 *	12.14 *	11.98 *	11.79 *	11.58 *	14.13 *	16.35 *	15.62 *	17.26 *	18.33 *	18.65 *	18.12 *	15.26 *	17.37 *	13.33 *	4.60 *	0.6	0	0
15		6.28 *	12.56 *	12.52 *	12.44 *	12.33 *	12.21 *	12.05 *	11.86 *	11.65 *	14.21 *	16.44 *	15.71 *	17.37 *	18.44 *	18.76 *	18.22 *	15.38 *	17.54 *	13.49 *	4.69 *	0.6	0	0
13		6.32 *	12.64 *	12.60 *	12.52 *	12.41 *	12.28 *	12.12 *	11.93 *	11.72 *	14.29 *	16.54 *	15.81 *	17.47 *	18.54 *	18.85 *	18.33 *	15.48 *	17.67 *	13.61 *	4.76 *	0.6	0	0
11		6.37 *	12.72 *	12.68 *	12.60 *	12.49 *	12.36 *	12.20 *	12.01 *	11.79 *	14.37 *	16.63 *	15.91 *	17.56 *	18.63 *	18.95 *	18.42 *	15.57 *	17.78 *	13.71 *	4.82 *	0.6	0	0
9		6.39 *	12.78 *	12.73 *	12.65 *	12.55 *	12.41 *	12.25 *	12.06 *	11.84 *	14.43 *	16.71 *	15.98 *	17.64 *	18.71 *	19.04 *	18.52 *	15.64 *	17.86 *	13.78 *	4.87 *	0.7	0	0
7		6.42 *	12.82 *	12.77 *	12.69 *	12.58 *	12.45 *	12.29 *	12.10 *	11.87 *	14.47 *	16.77 *	16.04 *	17.70 *	18.78 *	19.11 *	18.58 *	15.70 *	17.92 *	13.83 *	4.91 *	0.7	0	0
5		6.44 *	12.87 *	12.81 *	12.73 *	12.62 *	12.48 *	12.32 *	12.13 *	11.90 *	14.51 *	16.81 *	16.09 *	17.75 *	18.82 *	19.15 *	18.62 *	15.73 *	17.95 *	13.87 *	4.94 *	0.7	0	0
3		6.46 *	12.90 *	12.85 *	12.76 *	12.65 *	12.51 *	12.34 *	12.15 *	11.93 *	14.55 *	16.85 *	16.12 *	17.78 *	18.85 *	19.18 *	18.64 *	15.74 *	17.95 *	13.86 *	4.95 *	0.7	0	0
1		3.23 *	6.46 *	6.43 *	6.39 *	6.33 *	6.26 *	6.18 *	6.08 *	5.97 *	7.28 *	8.43 *	8.06 *	8.89 *	9.43 *	9.59 *	9.32 *	7.87 *	8.97 *	6.91 *	2.47 *	0.3	0	0
0																								

-1	3.23 *	6.46 *	6.43 *	6.39 *	6.33 *	6.26 *	6.18 *	6.08 *	5.97 *	7.28 *	8.43 *	8.06 *	8.89 *	9.43 *	9.59 *	9.32 *	7.86 *	8.96 *	6.91 *	2.47 *	0.4	0	0
-3	6.46 *	12.91 *	12.86 *	12.77 *	12.66 *	12.52 *	12.35 *	12.16 *	11.93 *	14.55 *	16.85 *	16.11 *	17.78 *	18.85 *	19.18 *	18.64 *	15.73 *	17.94 *	13.86 *	4.96 *	0.7	0	0
-5	6.45 *	12.88 *	12.83 *	12.74 *	12.63 *	12.49 *	12.33 *	12.14 *	11.91 *	14.52 *	16.81 *	16.08 *	17.75 *	18.82 *	19.15 *	18.61 *	15.71 *	17.92 *	13.86 *	4.97 *	0.7	0	0
-7	6.42 *	12.84 *	12.79 *	12.70 *	12.60 *	12.46 *	12.30 *	12.10 *	11.88 *	14.48 *	16.77 *	16.03 *	17.69 *	18.77 *	19.10 *	18.57 *	15.67 *	17.87 *	13.83 *	4.96 *	0.7	0	0
-9	6.40 *	12.79 *	12.75 *	12.66 *	12.56 *	12.42 *	12.26 *	12.07 *	11.85 *	14.44 *	16.71 *	15.98 *	17.63 *	18.70 *	19.03 *	18.49 *	15.60 *	17.80 *	13.78 *	4.93 *	0.7	0	0
-11	6.38 *	12.75 *	12.70 *	12.62 *	12.51 *	12.38 *	12.21 *	12.02 *	11.80 *	14.39 *	16.65 *	15.91 *	17.54 *	18.60 *	18.93 *	18.39 *	15.52 *	17.70 *	13.71 *	4.90 *	0.7	0	0
-13	6.35 *	12.68 *	12.64 *	12.55 *	12.44 *	12.31 *	12.15 *	11.95 *	11.73 *	14.30 *	16.55 *	15.81 *	17.43 *	18.48 *	18.81 *	18.28 *	15.42 *	17.57 *	13.62 *	4.85 *	0.7	0	0
-15	6.30 *	12.58 *	12.54 *	12.46 *	12.35 *	12.21 *	12.05 *	11.87 *	11.64 *	14.19 *	16.43 *	15.69 *	17.30 *	18.34 *	18.68 *	18.16 *	15.29 *	17.42 *	13.50 *	4.80 *	0.7	0	0
-17	6.24 *	12.46 *	12.42 *	12.35 *	12.24 *	12.10 *	11.94 *	11.76 *	11.54 *	14.06 *	16.28 *	15.56 *	17.15 *	18.18 *	18.54 *	18.03 *	15.16 *	17.25 *	13.36 *	4.73 *	0.6	0	0
-20	7.72 *	15.42 *	15.37 *	15.27 *	15.14 *	14.97 *	14.78 *	14.55 *	14.27 *	17.39 *	20.15 *	19.27 *	21.22 *	22.50 *	22.95 *	22.34 *	18.78 *	21.31 *	16.47 *	5.80 *	0.8	0	0
-23	9.16 *	18.30 *	18.24 *	18.13 *	17.98 *	17.78 *	17.54 *	17.26 *	16.93 *	20.62 *	23.89 *	22.86 *	25.19 *	26.68 *	27.20 *	26.48 *	22.26 *	25.18 *	19.38 *	6.77 *	0.9	0	0
-26	9.06 *	18.10 *	18.04 *	17.94 *	17.78 *	17.58 *	17.35 *	17.06 *	16.73 *	20.38 *	23.61 *	22.58 *	24.90 *	26.36 *	26.80 *	26.07 *	21.90 *	24.64 *	18.85 *	6.53 *	0.8	0	0
-29	10.43 *	20.83 *	20.75 *	20.64 *	20.47 *	20.23 *	19.95 *	19.63 *	19.25 *	23.46 *	27.17 *	25.97 *	28.64 *	30.29 *	30.71 *	29.80 *	24.98 *	27.86 *	21.14 *	7.26 *	0.9	0	0
-33	11.68 *	23.33 *	23.24 *	23.10 *	22.91 *	22.64 *	22.31 *	21.95 *	21.54 *	26.23 *	30.32 *	28.94 *	31.94 *	33.71 *	33.94 *	32.89 *	27.55 *	30.31 *	22.76 *	7.74 *	0.9	0	0
-38	12.47 *	24.91 *	24.83 *	24.68 *	24.46 *	24.14 *	23.77 *	23.37 *	22.93 *	27.94 *	32.20 *	30.63 *	33.81 *	35.68 *	35.66 *	34.35 *	28.87 *	31.48 *	23.24 *	7.79 *	0.9	0	0
-43	12.05 *	24.12 *	24.06 *	23.92 *	23.66 *	23.33 *	23.02 *	22.66 *	22.21 *	27.05 *	31.20 *	29.69 *	32.76 *	34.59 *	34.59 *	33.26 *	27.97 *	30.43 *	22.07 *	7.17 *	0.8	0	0
-48	9.58 *	19.20 *	19.18 *	19.06 *	18.84 *	18.57 *	18.33 *	18.08 *	17.73 *	21.57 *	24.89 *	23.76 *	26.22 *	27.64 *	27.79 *	26.79 *	22.33 *	24.34 *	17.49 *	5.5	0.6	0	0
-55	9.44 *	18.98 *	18.98 *	18.85 *	18.63 *	18.31 *	17.99 *	17.73 *	17.42 *	21.23 *	24.47 *	23.25 *	25.56 *	27.01 *	27.24 *	26.04 *	21.51 *	23.65 *	16.98 *	5.1	0.5	0	0
-65	4.52 *	9.13 *	9.16 *	9.08 *	8.96 *	8.78 *	8.58 *	8.44 *	8.34 *	10.22 *	11.79 *	11.09 *	12.15 *	13.08 *	13.33 *	13	11	12	8.9	2.8	0.3	0	0
-75	0.4	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.9	1.1	1	1.1	1.4	1.5	1.3	1.4	1.8	1.6	0.7	0.1	0	0
-85	0.1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.4	0.3	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.1	0	0	0
-90	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0
Total	293	585	584	580	575	568	560	551	541	660	762	728	804	851	862	835	700	785	594	203	25	0.09	12645.5

## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

Model No.	FFLEDL @ 180W / 3000K/480	Sample ID.	J1
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
480.03	60	0.385	171.1	0.926	11.43%

## 5.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last Calibration Date	Calibration Due Date
DLF107	Integrating Sphere System	2020/12/26	2021/12/25
DLF108	Auxiliary Lamp	2020/12/26	2021/12/25
DLF122	Measurement Standard Lamp Standard Lamp Type: 220 V, 0.4720 A, Tungsten, Omni-derectional	2020/12/26	2021/12/25
DLF116	AC Power Source	2020/12/26	2021/12/25
DLF113	Power Meter	2020/12/26	2021/12/25
DLF112	Temperature Recorder	2020/12/26	2021/12/25
DLF114	Temperature & Humidity Datalogger	2020/12/26	2021/12/25
DLF101	Goniophotometer	2020/12/26	2021/12/25
DLF125	Standard Lamp Standard Lamp Type: 76.58 V, 6.7875 A, Tungsten, Omni-derectional	2020/12/26	2021/12/25
DLF104	AC Power Source	2020/12/26	2021/12/25
DLF507	DC Power Source	2020/12/26	2021/12/25
DLF102	Power Meter	2020/12/26	2021/12/25
DLF111	Temperature & Humidity Datalogger	2020/12/26	2021/12/25
DLF119	Power Meter	2020/12/26	2021/12/25
DLF031	Temperature data logger	2020/12/26	2021/12/25
DLF022	Digital power meter	2020/12/26	2021/12/25
DLF003	Temperature & Humidity Datalogger	2020/12/26	2021/12/25

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