

# Photometric Test Report

## Relevant Standards

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

## Prepared For

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## Project Number

**DLF2111120**

## Report Number

**DLF2111120-3a**

## Test Date

**2021/11/22**

## Issue Date

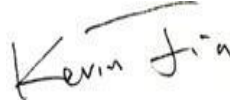
**2021/11/23**

## 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		6048
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 105	Premium 120	128.7
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		47.0
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	3.08%
		20.00%	277V	6.76%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.999
		0.9	277V	0.953
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	3045±175	3130
		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%		99.89%
Input Voltage (V)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		120
(Goniophotometer - Section 4.2)		Non-Worst Case		277
Input Current (A)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		0.392
(Goniophotometer - Section 4.2)		Non-Worst Case		0.174
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		47.0
(Goniophotometer - Section 4.2)		Non-Worst Case		45.9

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2021/11/22	FFLEDS @ 39W / 3000K	C1
2	Goniophotometer Test	2021/11/22	FFLEDS @ 39W / 3000K	C1
3	THD and PF Test	2021/11/22	FFLEDS @ 39W / 3000K	C1

### 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:** FFLEDS @ 39W / 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.	FFLEDS @ 39W / 3000K	Sample ID.	C1
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
120.04	60	0.389	46.7	0.999
277.04	60	0.173	45.6	0.953

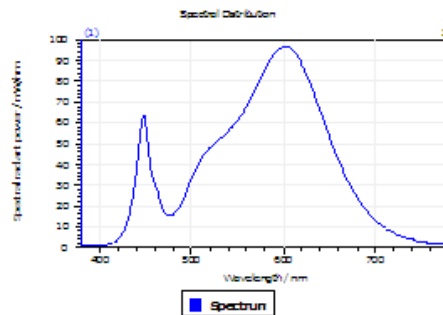
#### Test Result

CCT (K)	CRI	R9	Duv
3130	82	5	0.00079

Rf	Rg	IES Rcs,h1
84	98	-11%

## 4.1 Integrating Sphere Test

### Results



#### Spectral values

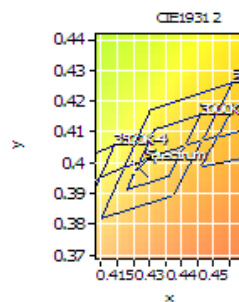
DominantWavelength	582.59 nm
Purity	0.477
PeakWavelength	601.71 nm
Radiant Power	14.56 W
Width50%	133.53 nm

#### Color Coordinates

Correlated Color Temperat 3130 K

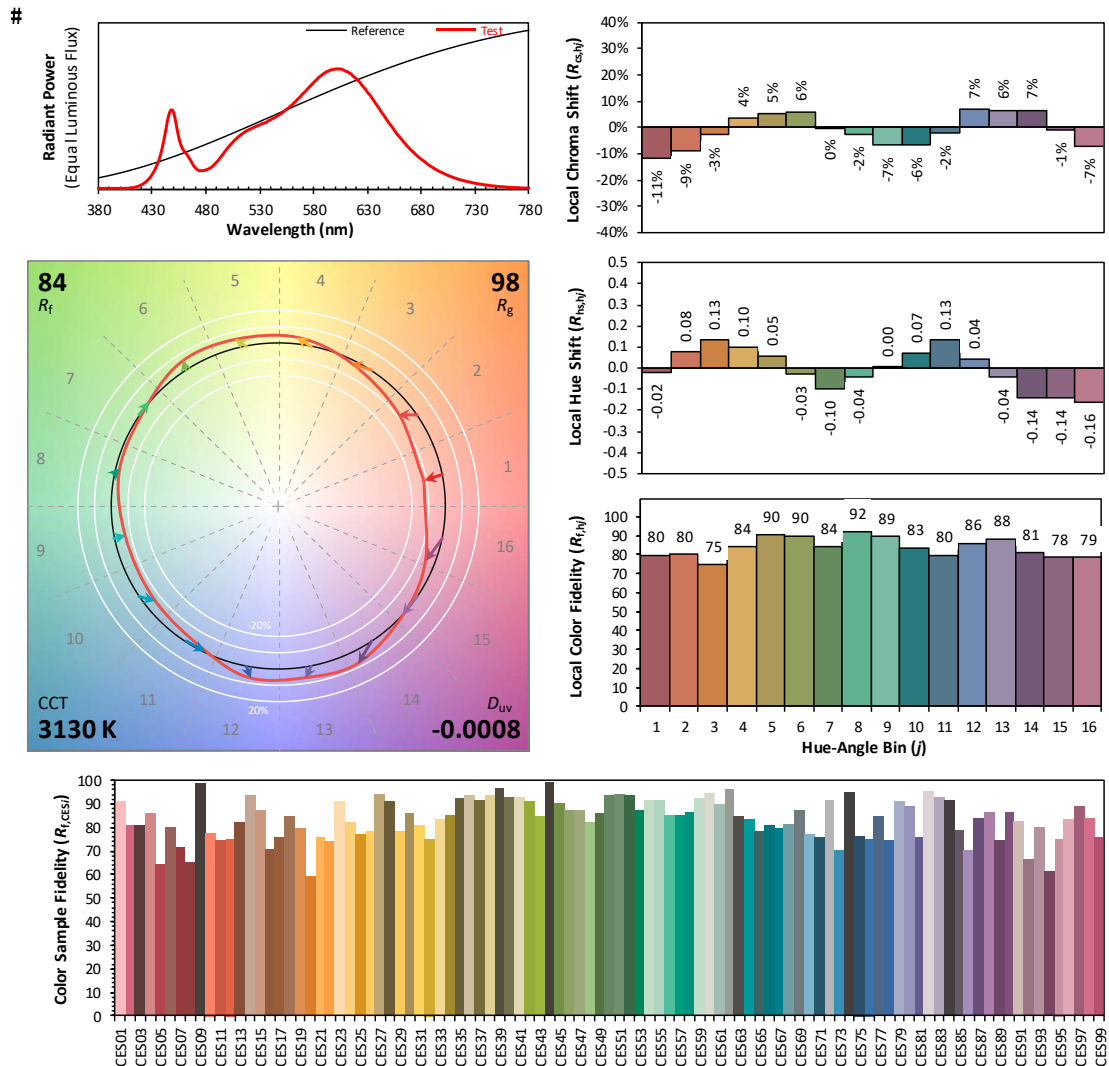
x: 0.4269 u: 0.2465 u': 0.2465  
y: 0.3984 v: 0.3451 v': 0.5176

ResultsCRICRI01	80.7	ResultsCRICRI09	5.3
ResultsCRICRI02	89.4	ResultsCRICRI10	75.8
ResultsCRICRI03	96.5	ResultsCRICRI11	81.6
ResultsCRICRI04	81.7	ResultsCRICRI12	69.7
ResultsCRICRI05	80.9	ResultsCRICRI13	82.6
ResultsCRICRI06	86.4	ResultsCRICRI14	98.2
ResultsCRICRI07	83.6	ResultsCRICRI15	73.4
ResultsCRICRI08	60.0	ResultsCRICRI16	71.7
ResultsCRI	82.4		



PlanckDistance 7.9E-004

## 4.1 Integrating Sphere Test



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

$x$  0.4269  
 $y$  0.3984  
 $u'$  0.2465  
 $v'$  0.5176

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.	FFLEDS @ 39W / 3000K	Sample ID.	C1
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  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , 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	120.07	60	0.392	47.0	0.998
NON-WORST CASE	276.98	60	0.174	45.9	0.952

#### Test Result

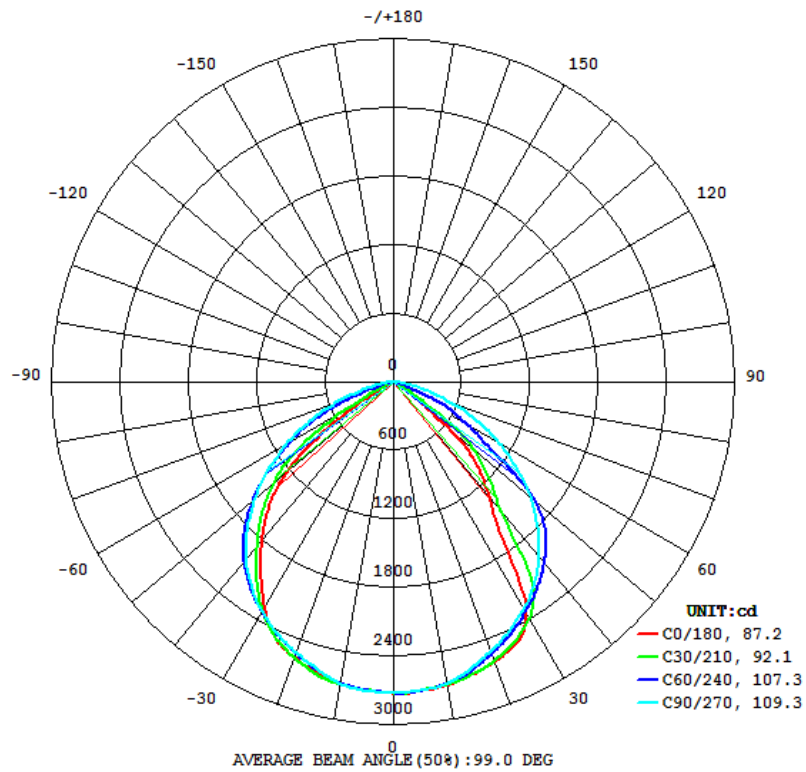
Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
6048	113.4	151.1	87.2	109.3	128.7

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

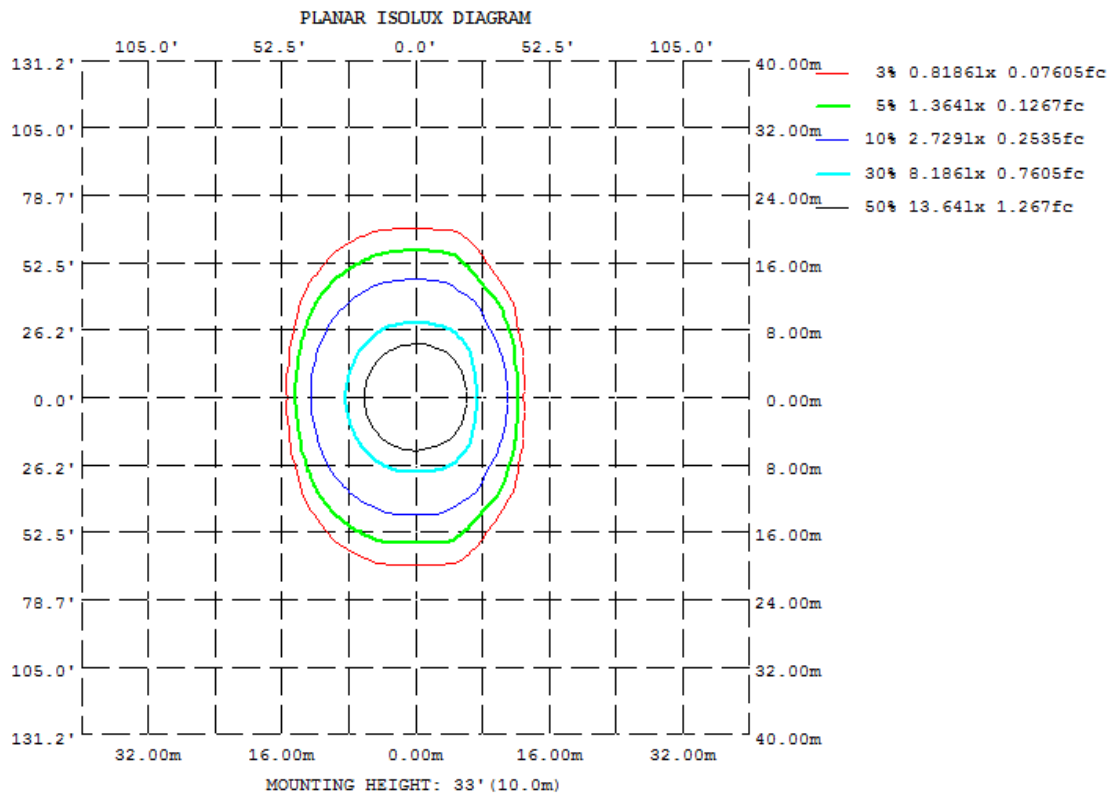
99.89%

## 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	2693	2685	2680	2673	2690	2683	2682	2684
20	2601	2560	2506	2541	2564	2537	2517	2556
30	2343	2359	2298	2310	2270	2328	2314	2372
40	1325	2021	1998	1938	1799	1963	2016	2021
50	622.0	1096	1585	1470	1232	1494	1592	1096
60	48.90	402.1	1082	832.4	236.5	886.8	1094	381.7
70	2.011	14.64	550.2	74.85	42.23	76.15	548.2	15.35
80	0.0415	0.0879	109.1	17.92	13.42	16.85	99.71	0.0546
90	0.0502	0.1550	0.4517	3.983	2.074	3.012	0.1587	0.0586
100	0.1625	0.3378	0.4518	1.116	4.261	1.056	0.6078	0.3159
110	0.3946	0.4991	0.7129	0.4134	0.2936	0.6358	0.9388	0.5649
120	0.6582	0.7168	0.7728	0.7045	0.4808	0.9121	0.9897	0.8075
130	1.031	1.043	1.179	0.9508	0.9174	1.191	1.446	1.187
140	1.353	1.384	1.332	1.215	1.457	1.632	1.696	1.576
150	1.650	1.660	1.437	1.517	1.745	1.795	1.876	1.930
160	1.803	1.688	1.563	1.642	2.130	1.964	1.960	2.056
170	1.802	1.642	1.557	1.659	2.003	2.012	1.819	1.823
180	2.075	1.919	1.871	2.004	2.075	1.989	1.882	1.957
DEG	LUMINOUS INTENSITY:cd							

	Zonal (lm)		Total (lm)	Percent
0-10	258.26	0 - 10	258.26	4.27%
10-20	743.08	0 - 20	1001.34	16.56%
20-30	1133.75	0 - 30	2135.09	35.30%
30-40	1316.03	0 - 40	3451.12	57.06%
40-50	1234.04	0 - 50	4685.16	77.47%
50-60	865.60	0 - 60	5550.76	91.78%
60-70	384.33	0 - 70	5935.09	98.14%
70-80	98.11	0 - 80	6033.20	99.76%
80-90	7.75	0 - 90	6040.95	99.89%
90-100	1.28	0 - 100	6042.23	99.91%
100-110	0.59	0 - 110	6042.83	99.92%
110-120	0.65	0 - 120	6043.48	99.93%
120-130	0.84	0 - 130	6044.32	99.94%
130-140	1.00	0 - 140	6045.32	99.96%
140-150	1.00	0 - 150	6046.33	99.97%
150-160	0.83	0 - 160	6047.16	99.99%
160-170	0.52	0 - 170	6047.68	100.00%
170-180	0.18	0 - 180	6047.86	100.00%

## 4.2 Goniophotometer Test

### Axial Candela

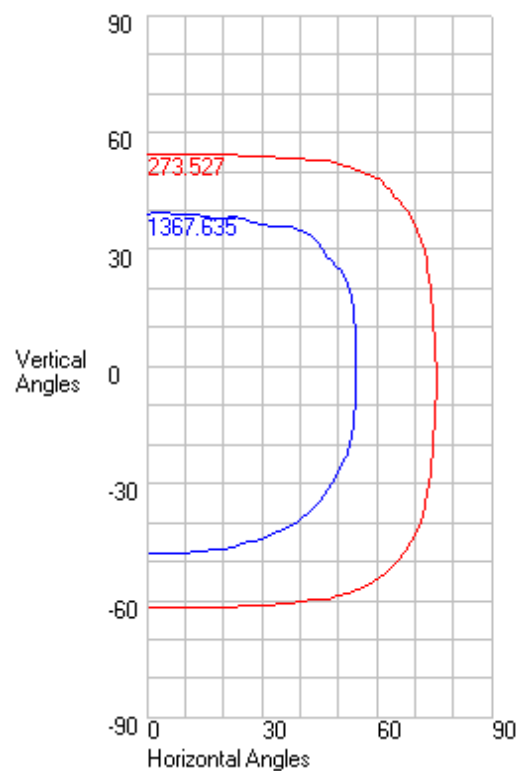
DEG.	HOR.	DEG.	VERT.
90	0.16	90	0.05
85	3.39	85	0.05
75	289.72	75	0.07
65	814.41	65	12.23
55	1348.95	55	220.44
47.5	1703.37	47.5	899.095
42.5	1920.865	42.5	1186.765
37.5	2102.905	37.5	1456.48
33	2241.22	33	1978.27
29	2338	29	2403.15
25.5	2416.595	25.5	2522.37
22.5	2475.16	22.5	2570.485
19.5	2525.34	19.5	2606.58
17	2568.3	17	2634.34
15	2601.63	15	2651.99
13	2638.07	13	2671.37
11	2671.07	11	2688.76
9	2691.77	9	2697.33
7	2707.43	7	2708.34
5	2715.55	5	2710.01
3	2717.19	3	2725.6
1	2719.4	1	2735.27
0	2721.003	0	2721.003
-1	2718.35	-1	2721.4
-3	2712.83	-3	2714.42
-5	2708.39	-5	2709.84
-7	2700.14	-7	2700.6
-9	2688.68	-9	2692.02
-11	2669.83	-11	2683.73
-13	2638.68	-13	2660.23
-15	2601.27	-15	2631.58
-17	2563.52	-17	2605.63
-19.5	2514.205	-19.5	2570.285
-22.5	2458.365	-22.5	2523.185
-25.5	2397.935	-25.5	2446.455
-29	2319.23	-29	2313.74
-33	2219.86	-33	2127.01
-37.5	2084.27	-37.5	1915.305
-42.5	1903.555	-42.5	1678.83
-47.5	1691.25	-47.5	1404.945
-55	1334.88	-55	715.47
-65	813.43	-65	61.54
-75	301.9	-75	23.77
-85	10.68	-85	7.55
-90	0.452	-90	2.051

## 4.2 Goniophotometer Test

### Characteristics

NEMA Type	7 H x 6 V
Maximum Candela	2735.27
Maximum Candela Angle	0 H 1 V
Horizontal Beam Angle (50%)	109
Vertical Beam Angle (50%)	87.1
Horizontal Field Angle (10%)	151.4
Vertical Field Angle (10%)	116.2
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Beam Lumens	4693
Beam Efficiency	N.A.
Field Lumens	5945
Field Efficiency	N.A.
Spill Lumens	103
Luminaire Lumens	6048
Total Efficiency	N.A.
Total Luminaire Watts	46.9757
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	0.05	0.049	0.046	0.043	0.041	0.038	0.035	0.033	0.03	0.031	0.033	0.035	0.037	0.039	0.044	0.05	0.057	0.065	0.08	0.093	0.1	0.14	0.16
85	0.05	0.049	0.048	0.047	0.045	0.044	0.043	0.041	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.043	0.054	0.07	0.09	0.139	0.16
75	0.07	0.071	0.072	0.073	0.073	0.073	0.073	0.072	0.074	0.085	0.087	0.083	0.082	0.073	0.14	0.113	0.068	0.215	0.129	0.588	0.091	0.147	0.16
65	12.23	12.33	12.53	12.543	12.561	12.516	12.406	12.232	12.258	12.341	12.351	12.208	11.75	12.307	12.522	11.368	10.737	14.588	8.052	13.669	3.217	0.183	0.16
55	220.44	223.882	230.763	230.27	230.091	227.589	222.795	220.47	223.037	223.042	218.585	207.449	196.995	214.086	190.789	168.685	180.65	189.466	94.779	97.991	18.039	0.25	0.16
47.5	899.095 *	904.073 *	910.663 *	912.953 *	911.176 *	903.732 *	892.016 *	885.821 *	877.008 *	866.699 *	842.01 *	823.663 *	797.224 *	734.851 *	691.852 *	663.56 *	523.657 *	484.623 *	384.142 *	201.12	44.776	0.302	0.16
42.5	1186.765 *	1190.815 *	1195.912 *	1196.721 *	1192.926 *	1185.55 *	1178.052 *	1177.723 *	1167.228 *	1156.008 *	1129.728 *	1106.189 *	1078.657 *	1041.789 *	985.351 *	944.485 *	812.75 *	700.454 *	592.876 *	288.337 *	66.548	0.337	0.16
37.5	1456.48 *	1460.675 *	1464.635 *	1461.977 *	1455.603 *	1439.503 *	1447.685 *	1444.724 *	1423.858 *	1402.634 *	1376.053 *	1419.525 *	1388.653 *	1298.946 *	1246.361 *	1268.803 *	1104.81 *	895.571 *	772.585 *	407.444 *	104.157	0.375	0.16
33	1978.27 *	1996.836 *	2014.211 *	2017.096 *	2004.252 *	1993.938 *	1966.729 *	1957.791 *	1947.303 *	1916.618 *	1841.922 *	1801.084 *	1819.391 *	1728.967 *	1572.43 *	1533.891 *	1440.27 *	1107 *	924.435 *	542.217 *	135.573	0.849	0.16
29	2403.15 *	2406.479 *	2405.23 *	2398.981 *	2387.937 *	2368.715 *	2346.742 *	2320.869 *	2295.807 *	2264.627 *	2217.178 *	2164.641 *	2127.805 *	2037.818 *	1872.597 *	1787.384 *	1636.072 *	1321.603 *	1055.15 *	625.487 *	161.806	1.315	0.16
25.5	2522.37 *	2522.421 *	2520.501 *	2516.048 *	2507.252 *	2489.064 *	2464.53 *	2439.522 *	2411.677 *	2378.779 *	2334.46 *	2292.12 *	2234.375 *	2143.81 *	2037.939 *	1941.845 *	1722.23 *	1463.18 *	1166.064 *	677.514 *	185.258	1.696	0.16
22.5	2570.485 *	2569.777 *	2566.821 *	2562.312 *	2551.477 *	2535.218 *	2514.594 *	2489.139 *	2459.264 *	2428.241 *	2387.242 *	2337.133 *	2280.542 *	2203.979 *	2108.256 *	1980.86 *	1786.127 *	1547.188 *	1253.1 *	714.547 *	203.797	2.001	0.16
19.5	2606.58 *	2605.431 *	2601.413 *	2595.15 *	2587.596 *	2575.483 *	2556.855 *	2526.022 *	2492.96 *	2458.642 *	2419.828 *	2369.431 *	2312.786 *	2237.429 *	2142.071 *	2012.058 *	1822.911 *	1602.247 *	1279.795 *	745.876 *	220.729	2.282	0.16
17	2634.34 *	2632.698 *	2626.967 *	2620.786 *	2613.627 *	2602.906 *	2581.433 *	2550.663 *	2516.418 *	2482.647 *	2442.56 *	2391.814 *	2335.027 *	2261.479 *	2163.395 *	2032.1 *	1848.987 *	1635.182 *	1299.449 *	768.147 *	233.535	2.497	0.16
15	2651.99 *	2650.192 *	2644.133 *	2639.311 *	2633.633 *	2621.781 *	2597.431 *	2567.774 *	2534.187 *	2501.313 *	2460.491 *	2407.644 *	2349.979 *	2278.155 *	2177.547 *	2045.037 *	1865.178 *	1654.541 *	1313.617 *	782.543 *	242.973	2.656	0.16
13	2671.37 *	2668.85 *	2660.964 *	2657.137 *	2651.981 *	2637.339 *	2615.897 *	2584.861 *	2551.147 *	2516.699 *	2474.62 *	2422.405 *	2364.125 *	2291.767 *	2190.281 *	2056.146 *	1884.73 *	1670.403 *	1327.14 *	793.855 *	251.679	2.802	0.16
11	2688.76 *	2684.7 *	2674.745 *	2673.462 *	2667.282 *	2652.075 *	2630.39 *	2599.287 *	2563.855 *	2529.745 *	2487.313 *	2435.92 *	2376.922 *	2302.317 *	2201.668 *	2067.829 *	1895.464 *	1682.526 *	1335.832 *	802.804 *	259.642	3.189	0.16
9	2697.33 *	2692.33 *	2684.185 *	2681.09 *	2675.508 *	2662.485 *	2640.75 *	2608.232 *	2571.965 *	2539.036 *	2497.747 *	2445.55 *	2387.795 *	2310.09 *	2215.919 *	2080.484 *	1906.584 *	1692.103 *	1343.424 *	809.484 *	266.851	3.225	0.16
7	2708.34 *	2700.379 *	2691.781 *	2688.669 *	2684.725 *	2668.72 *	2647.992 *	2617.707 *	2580.848 *	2545.924 *	2504.658 *	2452.59 *	2395.91 *	2319.669 *	2224.975 *	2092.528 *	1914.861 *	1699.157 *	1348.777 *	813.998 *	273.296	3.261	0.16
5	2710.01 *	2700.678 *	2696.017 *	2693.039 *	2689.057 *	2674.332 *	2658.057 *	2626.57 *	2587.195 *	2549.871 *	2509.141 *	2461.634 *	2405.673 *	2328.181 *	2233.367 *	2097.977 *	1920.194 *	1703.712 *	1351.822 *	816.458 *	281.452 *	3.298	0.16
3	2725.6 *	2712.588 *	2712.294 *	2710.255 *	2701.774 *	2689.051 *	2667.158 *	2632.761 *	2595.013 *	2559.031 *	2517.661 *	2468.97 *	2412.134 *	2334.172 *	2238.846 *	2102.151 *	1922.691 *	1705.626 *	1355.278 *	818.872 *	284.754 *	3.335	0.16
1	2735.27 *	2721.641 *	2721.817 *	2718.867 *	2708.401 *	2693.573 *	2671.908 *	2638.332 *	2601.362 *	2566.699 *	2523.561 *	2473.839 *	2415.808 *	2337.81 *	2241.645 *	2103.378 *	1922.235 *	1704.818 *	1351.061 *	815.898 *	288.064 *	3.39	0.16
0	2721.003 *	2719.4 *	2717.19 *	2715.55 *	2707.43 *	2691.77 *	2671.07 *	2638.07 *	2601.63 *	2568.3 *	2525.34 *	2475.16 *	2416.595 *	2338 *	2241.22 *	2102.905 *	1920.865 *	1703.37 *	1348.95 *	814.41 *	289.72 *	3.39	0.16
-1	2721.4 *	2717.321 *	2713.214 *	2708.593 *	2702.689 *	2689.251 *	2668.296 *	2635.773 *	2599.655 *	2565.874 *	2523.15 *	2473.098 *	2415.08 *	2337.069 *	2241.242 *	2103.142 *	1922.136 *	1705.768 *	1351.066 *	816.357 *	290.107 *	3.418	0.16
-3	2714.42 *	2712.653 *	2709.76 *	2703.383 *	2695.678 *	2681.094 *	2656.796 *	2625.157 *	2590.424 *	2556.631 *	2516.322 *	2466.621 *	2409.884 *	2331.961 *	2237.622 *	2101.509 *	1922.43 *	1708.443 *	1355.294 *	820.246 *	290.881 *	3.475	0.16
-5	2709.84 *	2708.028 *	2703.679 *	2699.04 *	2689.896 *	2675.711 *	2653.172 *	2618.428 *	2581.695 *	2546.146 *	2506.599 *	2457.341 *	2401.708 *	2324.53 *	2231.29 *	2097.127 *	1919.873 *	1708.29 *	1351.94 *	818.995 *	291.654 *	3.531	0.16
-7	2700.6 *	2699.72 *	2695.648 *	2691.087 *	2683.866 *	2668.282 *	2644.156 *	2610.342 *	2575.107 *	2541.695 *	2500.932 *	2447.276 *	2389.694 *	2314.627 *	2221.987 *	2091.704 *	1914.651 *	1705.322 *	1349.064 *	817.876 *	287.567 *	3.588	0.16
-9	2692.02 *	2691.184 *	2687.993 *	2683.573 *	2674.911 *	2659.72 *	2636.006 *	2601.92 *	2565.578 *	2534.253 *	2493.126 *	2439.873 *	2379.296 *	2303.29 *	2211.973 *	2079.488 *	1906.615 *	1699.384 *	1344.001 *	815.025 *	285.171 *	3.644	0.16
-11	2683.73 *	2683.012 *	2678.788 *	2674.922 *	2666.168 *	2648.664 *	2626.789 *	2591.96 *	2555.447 *	2522.172 *	2481.435 *	2428.837 *	2367.552 *	2292.219 *	2195.567 *	2066.696 *	1895.931 *	1690.182 *	1336.852 *	810.417 *	281.991 *	3.699	0.16
-13	2660.23 *	2660.751 *	2657.096 *	2652.66 *	2645.975 *	2628.577 *	2605.654 *	2572.865 *	2537.322 *	2505.355 *	2465.723 *	2413.389 *	2352.816 *	2278.776 *	2179.807 *	2051.162 *	1885.769 *	1677.724 *	1328.752 *	804.034 *	278.031 *	3.372	0.16
-15	2631.58 *	2632.596 *	2631.095 *	2627.089 *	2618.906 *	2605.44 *	2580.72 *	2548.235 *	2516.362 *	2483.127 *	2444.61 *	2393.063 *	2335.587 *	2261.238 *	2161.415 *	2033.311 *	1865.183 *	1661.904 *	1316.082 *	795.86 *	273.298	3.3	0.16
-17	2605.63 *	2606.739 *	2605.34 *	2601.157 *	2592.687 *	2579.779 *	2555.39 *	2524.278 *	2490.048 *	2457.411 *	2420.805 *	2370.305 *	2314.177 *	2239.822 *	2140.677 *	2013.125 *	1842.966 *	1643.126 *	1302.965 *	784.765 *	267.799	3.209	0.16
-19.5	2570.285 *	2570.962 *	2570.263 *	2566.785 *	2557.14 *	2541.661 *	2519.472 *	2489.413 *	2457.989 *	2425.997 *	2387.56 *	2338.621 *	2280.734 *	2208.13 *	2110.628 *	1983.328 *	1810.686 *	1609.205 *	1283.299 *	766.94 *	259.862	3.07	0.16
-22.5	2523.185 *	2524.33 *	2524.277 *	2521.69 *	2510.017 *	2490.848 *	2466.814 *	2438.523 *	2407.548 *	2376.673 *	2339.376 *	2291.129 *	2230.566 *	2156.457 *	2066.528 *	1939.376 *	1767.871 *	1561.304 *	1253.757 *	741.844 *	248.195	2.864	0.16
-25.5	2446.455 *	2448.781 *	2450.128 *	2447.376 *	2437.897 *	2416.949 *	2391.356 *	2362.217 *	2332.528 *	2304.711 *	2267.794 *	2223.149 *	2162.91 *	2083.39 *	1995.646 *	1884.24 *	1705.553 *	1503.426 *	1200.853 *	708.772 *	234.161	2.617	0.16
-29	2313.74 *	2317.507 *	2318.811 *	2315.151 *	2305.809 *	2287.962 *	2265.921 *	2240.317 *	2211.492 *	2183.49 *	2150.223 *	2111.002 *	2056.488 *	1983.967 *	1892.567 *	1791.454 *	1624.994 *	1425.447 *	1131.128 *	668.434 *	215.34	2.278	0.16
-33	2127.01 *	2129.905 *	2129.856 *	2125.16 *	2115.135 *	2104.672 *	2085.03 *	2065.434 *	2042.618 *	2014.959 *	1985.829 *	1948.52 *	1901.734 *	1833.644 *	1756.274 *	1656.408 *	1513.865 *	1326.239 *	1046.581 *	620.376 *	193.29	1.822	0.16
-37.5	1915.305 *	1916.835 *	1916.718 *	1912.292 *	1905.997 *	1891.076 *	1879.587 *	1865.049 *	1847.127 *	1826.823 *	1797.175 *	1764.373 *	1721.683 *	1664.726 *	1590.789 *	1496.538 *	1359.286 *	1198.166 *	941.334 *	543.826 *	165.182	1.334	0.16
-42.5	1678.83 *	1680.501 *	1681.085 *	1677.913 *	1670.908 *	1660.266 *	1648.896 *	1642.71 *	1625.595 *	1608.859 *	1582.697 *	1552.675 *	1511.558 *	1461.036 *	1394.011 *	1306.867 *	1180.902 *	1030.611 *	797.914 *	435.243 *	129.314	1.255	0.16
-47.5	1404.945 *	1407.6 *	1409.801 *	1408.01 *	1402.427 *	1393.108 *	1380.131 *	1371.813 *	1361.634 *	1348.956 *	1328.175 *	1299.544 *	1262.409 *	1212.666 *	1154.713 *	1083.804 *	947.772 *	820.522 *	635.412 *	330.07 *	91.893	1.147	0.16
-55	715.47 *	722.971 *	737.964 *	735.973 *	727.443 *	714.75 *	706.459 *	706.433 *	704.623 *	696.388 *	675.952 *	643.649 *	626.126 *	604.183 *	558.288 *	478.334 *	431.749 *	333.001 *	183.536 *	44.598	0.929	0.16	
-65	61.54	61.863	62.509	62																			

## 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	0	0	0	0	0
75	0	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
65	0.4	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.9	1	0.9	1.1	1.2	1.1	1.2	1.1	1.2	0.9	0.4	0	0	0
55	1.28 *	2.59 *	2.60 *	2.59 *	2.57 *	2.52 *	2.48 *	2.45 *	2.40 *	2.92 *	3.37 *	3.20 *	3.49 *	3.63 *	3.67 *	3.44 *	2.87 *	3.24 *	2.4	0.8	0.1	0	0
47.5	1.59 *	3.20 *	3.20 *	3.19 *	3.16 *	3.11 *	3.07 *	3.03 *	2.97 *	3.60 *	4.16 *	3.98 *	4.34 *	4.52 *	4.62 *	4.33 *	3.43 *	3.94 *	2.89 *	0.8	0.1	0	0
42.5	2.02 *	4.04 *	4.04 *	4.02 *	3.97 *	3.94 *	3.91 *	3.85 *	3.77 *	4.58 *	5.36 *	5.20 *	5.69 *	5.97 *	6.22 *	6.04 *	4.76 *	5.34 *	4.01 *	1.2	0.1	0	0
37.5	2.36 *	4.75 *	4.75 *	4.72 *	4.67 *	4.61 *	4.56 *	4.50 *	4.40 *	5.31 *	6.17 *	6.03 *	6.63 *	6.85 *	7.08 *	7.03 *	5.53 *	5.96 *	4.57 *	1.45 *	0.2	0	0
33	2.68 *	5.37 *	5.37 *	5.33 *	5.27 *	5.20 *	5.11 *	5.03 *	4.92 *	5.94 *	6.83 *	6.60 *	7.30 *	7.50 *	7.56 *	7.48 *	5.94 *	6.28 *	4.80 *	1.57 *	0.2	0	0
29	2.63 *	5.25 *	5.23 *	5.20 *	5.15 *	5.08 *	4.99 *	4.90 *	4.79 *	5.81 *	6.71 *	6.42 *	7.07 *	7.37 *	7.45 *	7.23 *	5.79 *	6.23 *	4.70 *	1.54 *	0.2	0	0
25.5	2.33 *	4.65 *	4.64 *	4.61 *	4.56 *	4.50 *	4.43 *	4.34 *	4.25 *	5.16 *	5.97 *	5.70 *	6.28 *	6.63 *	6.75 *	6.48 *	5.26 *	5.79 *	4.35 *	1.42 *	0.2	0	0
22.5	2.37 *	4.72 *	4.71 *	4.68 *	4.64 *	4.58 *	4.51 *	4.42 *	4.32 *	5.25 *	6.07 *	5.80 *	6.40 *	6.78 *	6.89 *	6.63 *	5.44 *	6.06 *	4.54 *	1.49 *	0.2	0	0
19.5	2.00 *	3.98 *	3.97 *	3.95 *	3.91 *	3.87 *	3.81 *	3.73 *	3.64 *	4.43 *	5.12 *	4.90 *	5.40 *	5.72 *	5.82 *	5.60 *	4.63 *	5.17 *	3.88 *	1.29 *	0.2	0	0
17	1.61 *	3.21 *	3.20 *	3.18 *	3.16 *	3.12 *	3.07 *	3.01 *	2.94 *	3.57 *	4.13 *	3.95 *	4.36 *	4.62 *	4.69 *	4.53 *	3.76 *	4.19 *	3.15 *	1.06 *	0.1	0	0
15	1.62 *	3.24 *	3.22 *	3.21 *	3.18 *	3.14 *	3.09 *	3.03 *	2.96 *	3.60 *	4.16 *	3.98 *	4.39 *	4.65 *	4.72 *	4.56 *	3.80 *	4.24 *	3.19 *	1.09 *	0.1	0	0
13	1.63 *	3.26 *	3.24 *	3.23 *	3.20 *	3.16 *	3.11 *	3.05 *	2.98 *	3.62 *	4.18 *	4.00 *	4.41 *	4.68 *	4.75 *	4.60 *	3.83 *	4.27 *	3.22 *	1.10 *	0.1	0	0
11	1.64 *	3.27 *	3.26 *	3.24 *	3.21 *	3.18 *	3.12 *	3.06 *	2.99 *	3.63 *	4.20 *	4.02 *	4.43 *	4.70 *	4.78 *	4.62 *	3.85 *	4.30 *	3.25 *	1.12 *	0.2	0	0
9	1.65 *	3.28 *	3.27 *	3.25 *	3.22 *	3.19 *	3.13 *	3.07 *	3.00 *	3.64 *	4.21 *	4.03 *	4.45 *	4.72 *	4.80 *	4.65 *	3.87 *	4.32 *	3.27 *	1.13 *	0.2	0	0
7	1.65 *	3.29 *	3.28 *	3.26 *	3.23 *	3.19 *	3.14 *	3.08 *	3.01 *	3.65 *	4.22 *	4.04 *	4.46 *	4.74 *	4.82 *	4.66 *	3.88 *	4.34 *	3.28 *	1.14 *	0.2	0	0
5	1.65 *	3.30 *	3.29 *	3.27 *	3.24 *	3.21 *	3.15 *	3.09 *	3.01 *	3.66 *	4.24 *	4.05 *	4.48 *	4.75 *	4.83 *	4.67 *	3.89 *	4.35 *	3.29 *	1.15 *	0.2	0	0
3	1.66 *	3.31 *	3.30 *	3.28 *	3.25 *	3.21 *	3.16 *	3.09 *	3.02 *	3.67 *	4.25 *	4.06 *	4.48 *	4.76 *	4.84 *	4.68 *	3.89 *	4.35 *	3.29 *	1.15 *	0.2	0	0
1	0.83 *	1.66 *	1.65 *	1.64 *	1.63 *	1.61 *	1.58 *	1.55 *	1.51 *	1.84 *	2.13 *	2.03 *	2.24 *	2.38 *	2.42 *	2.34 *	1.94 *	2.17 *	1.64 *	0.58 *	0.1	0	0
0																							

-1	0.83 *	1.65 *	1.65 *	1.64 *	1.63 *	1.61 *	1.58 *	1.55 *	1.51 *	1.84 *	2.13 *	2.03 *	2.24 *	2.38 *	2.42 *	2.34 *	1.94 *	2.17 *	1.64 *	0.58 *	0.1	0	0
-3	1.65 *	3.30 *	3.29 *	3.27 *	3.24 *	3.21 *	3.15 *	3.09 *	3.02 *	3.67 *	4.25 *	4.06 *	4.48 *	4.76 *	4.84 *	4.67 *	3.89 *	4.35 *	3.29 *	1.16 *	0.2	0	0
-5	1.65 *	3.29 *	3.28 *	3.26 *	3.24 *	3.20 *	3.15 *	3.08 *	3.01 *	3.66 *	4.23 *	4.05 *	4.47 *	4.75 *	4.83 *	4.67 *	3.89 *	4.36 *	3.29 *	1.16 *	0.2	0	0
-7	1.65 *	3.28 *	3.27 *	3.25 *	3.23 *	3.19 *	3.14 *	3.07 *	3.00 *	3.65 *	4.22 *	4.04 *	4.46 *	4.73 *	4.82 *	4.66 *	3.89 *	4.35 *	3.29 *	1.16 *	0.2	0	0
-9	1.64 *	3.27 *	3.26 *	3.25 *	3.22 *	3.18 *	3.13 *	3.06 *	2.99 *	3.64 *	4.21 *	4.02 *	4.44 *	4.72 *	4.80 *	4.64 *	3.88 *	4.34 *	3.27 *	1.15 *	0.2	0	0
-11	1.64 *	3.26 *	3.25 *	3.23 *	3.21 *	3.17 *	3.12 *	3.05 *	2.98 *	3.63 *	4.19 *	4.00 *	4.42 *	4.69 *	4.77 *	4.62 *	3.86 *	4.32 *	3.26 *	1.14 *	0.2	0	0
-13	1.63 *	3.25 *	3.23 *	3.22 *	3.19 *	3.15 *	3.10 *	3.03 *	2.96 *	3.60 *	4.17 *	3.98 *	4.39 *	4.66 *	4.74 *	4.59 *	3.84 *	4.29 *	3.24 *	1.13 *	0.2	0	0
-15	1.61 *	3.22 *	3.20 *	3.19 *	3.16 *	3.12 *	3.07 *	3.01 *	2.94 *	3.58 *	4.13 *	3.95 *	4.36 *	4.62 *	4.70 *	4.56 *	3.80 *	4.26 *	3.21 *	1.12 *	0.2	0	0
-17	1.59 *	3.18 *	3.17 *	3.15 *	3.13 *	3.09 *	3.04 *	2.98 *	2.91 *	3.54 *	4.09 *	3.91 *	4.32 *	4.58 *	4.66 *	4.51 *	3.76 *	4.21 *	3.17 *	1.10 *	0.2	0	0
-20	1.97 *	3.93 *	3.92 *	3.89 *	3.86 *	3.82 *	3.76 *	3.68 *	3.59 *	4.37 *	5.06 *	4.83 *	5.33 *	5.66 *	5.75 *	5.55 *	4.63 *	5.19 *	3.91 *	1.35 *	0.2	0	0
-23	2.33 *	4.65 *	4.63 *	4.60 *	4.56 *	4.50 *	4.43 *	4.34 *	4.24 *	5.15 *	5.96 *	5.70 *	6.28 *	6.66 *	6.77 *	6.53 *	5.42 *	6.09 *	4.59 *	1.57 *	0.2	0	0
-26	2.27 *	4.54 *	4.52 *	4.49 *	4.44 *	4.39 *	4.31 *	4.23 *	4.13 *	5.02 *	5.81 *	5.55 *	6.11 *	6.47 *	6.59 *	6.35 *	5.25 *	5.89 *	4.44 *	1.51 *	0.2	0	0
-29	2.54 *	5.07 *	5.05 *	5.02 *	4.97 *	4.90 *	4.82 *	4.72 *	4.62 *	5.61 *	6.50 *	6.21 *	6.83 *	7.23 *	7.36 *	7.10 *	5.86 *	6.55 *	4.92 *	1.67 *	0.2	0	0
-33	2.71 *	5.41 *	5.39 *	5.35 *	5.30 *	5.23 *	5.14 *	5.04 *	4.93 *	6.00 *	6.95 *	6.65 *	7.32 *	7.75 *	7.89 *	7.63 *	6.30 *	6.99 *	5.24 *	1.77 *	0.2	0	0
-38	2.77 *	5.54 *	5.52 *	5.48 *	5.43 *	5.36 *	5.27 *	5.18 *	5.07 *	6.17 *	7.16 *	6.85 *	7.55 *	7.99 *	8.12 *	7.84 *	6.48 *	7.18 *	5.36 *	1.79 *	0.2	0	0
-43	2.74 *	5.47 *	5.45 *	5.42 *	5.36 *	5.29 *	5.22 *	5.13 *	5.03 *	6.13 *	7.10 *	6.79 *	7.48 *	7.91 *	8.02 *	7.70 *	6.34 *	7.00 *	5.13 *	1.66 *	0.2	0	0
-48	2.35 *	4.70 *	4.68 *	4.65 *	4.60 *	4.54 *	4.47 *	4.40 *	4.32 *	5.26 *	6.08 *	5.81 *	6.38 *	6.73 *	6.80 *	6.47 *	5.26 *	5.77 *	4.13 *	1.3	0.2	0	0
-55	2.43 *	4.87 *	4.86 *	4.83 *	4.77 *	4.68 *	4.59 *	4.52 *	4.45 *	5.43 *	6.28 *	5.96 *	6.52 *	6.89 *	6.96 *	6.54 *	5.28 *	5.81 *	4.16 *	1.3	0.2	0	0
-65	1.19 *	2.40 *	2.41 *	2.38 *	2.35 *	2.30 *	2.24 *	2.21 *	2.20 *	2.70 *	3.11 *	2.93 *	3.22 *	3.46 *	3.51 *	3.27 *	2.8	3.1	2.4	0.8	0.1	0	0
-75	0.1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.5	0.3	0	0	0
-85	0.1	0.1	0.1	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	0.1	0.2	0.1	0.1	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	71	142	141	141	139	137	135	133	130	158	183	175	193	203	207	200	165	183	137	46.2	5.8	0.02	3024.05

## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

Model No.	FFLEDS @ 39W / 3000K	Sample ID.	C1
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
120.04	60	0.389	46.7	0.999	3.08%
277.04	60	0.173	45.6	0.953	6.76%

## 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\*\*\*\*\*