

# Photometric Test Report

## Relevant Standards

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

## Prepared For

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## Project Number

**DLF2111120**

## Report Number

**DLF2111120-4a**

## Test Date

**2021/11/22**

## Issue Date

**2021/11/23**

## Prepared By



Wangzun Zhu

## Approved By



Kevin Jia

The results contained in this report pertain only to the tested sample.

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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		7467
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 105	Premium 120	133.8
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		55.8
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	3.44%
		20.00%	277V	7.18%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.998
		0.9	277V	0.925
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	3045±175	3147
		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		3
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		97
Minimum IES Rcs,h1 (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	-18%≤IES Rcs,h1≤+23%		-12%
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		0.467
(Goniophotometer - Section 4.2)		Non-Worst Case		0.214
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		55.8
(Goniophotometer - Section 4.2)		Non-Worst Case		54.8

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2021/11/22	FFLEDMD @ 52W / 3000K	D1
2	Goniophotometer Test	2021/11/22	FFLEDMD @ 52W / 3000K	D1
3	THD and PF Test	2021/11/22	FFLEDMD @ 52W / 3000K	D1

### 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:** FFLEDMD @ 52W / 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.	FFLED @ 52W / 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
120.02	60	0.470	56.3	0.998
277.02	60	0.216	55.3	0.925

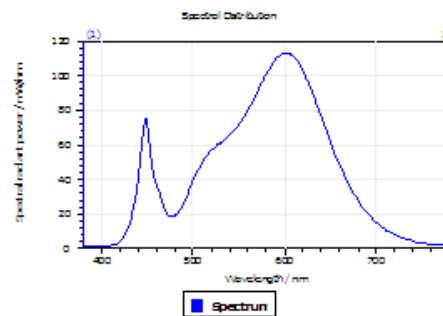
#### Test Result

CCT (K)	CRI	R9	Duv
3147	82	3	0.00021

Rf	Rg	IES Rcs,h1
84	97	-12%

## 4.1 Integrating Sphere Test

### Results



#### Spectral values

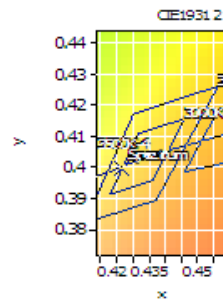
DominantWavelength	582.30 nm
Purity	0.480
PeakWavelength	601.23 nm
Radiant Power	17.01 W
Width50%	133.91 nm

#### Color Coordinates

Correlated Color Temperat: 3147 K

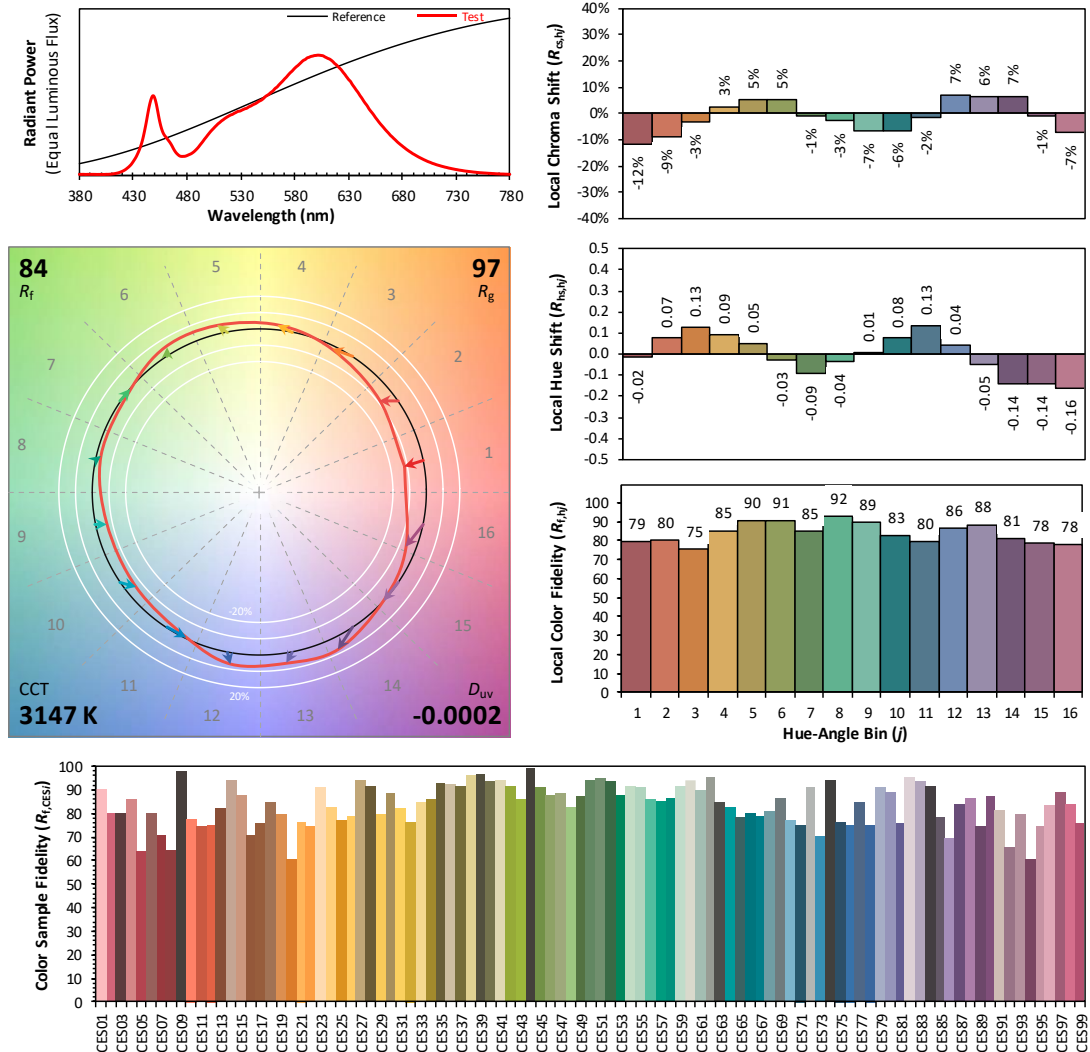
x: 0.4266 u: 0.2457 u': 0.2457  
y: 0.3997 v: 0.3454 v': 0.5181

ResultsCRICRI01	80.2	ResultsCRICRI09	2.7
ResultsCRICRI02	89.3	ResultsCRICRI10	75.8
ResultsCRICRI03	96.6	ResultsCRICRI11	80.7
ResultsCRICRI04	80.9	ResultsCRICRI12	69.1
ResultsCRICRI05	80.2	ResultsCRICRI13	82.2
ResultsCRICRI06	86.4	ResultsCRICRI14	98.4
ResultsCRICRI07	83.2	ResultsCRICRI15	72.4
ResultsCRICRI08	58.7	ResultsCRICRI16	70.5
ResultsCRI	81.9		



PlanckDistance 2.1E-004

## 4.1 Integrating Sphere Test



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

$x$  0.4266  
 $y$  0.3997  
 $u'$  0.2457  
 $v'$  0.5181

CIE 13.3-1995  
 (CRI)

$R_a$  82  
 $R_g$  2

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.	FFLED @ 52W / 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	120.01	60	0.467	55.8	0.997
NON-WORST CASE	277.00	60	0.214	54.8	0.924

#### Test Result

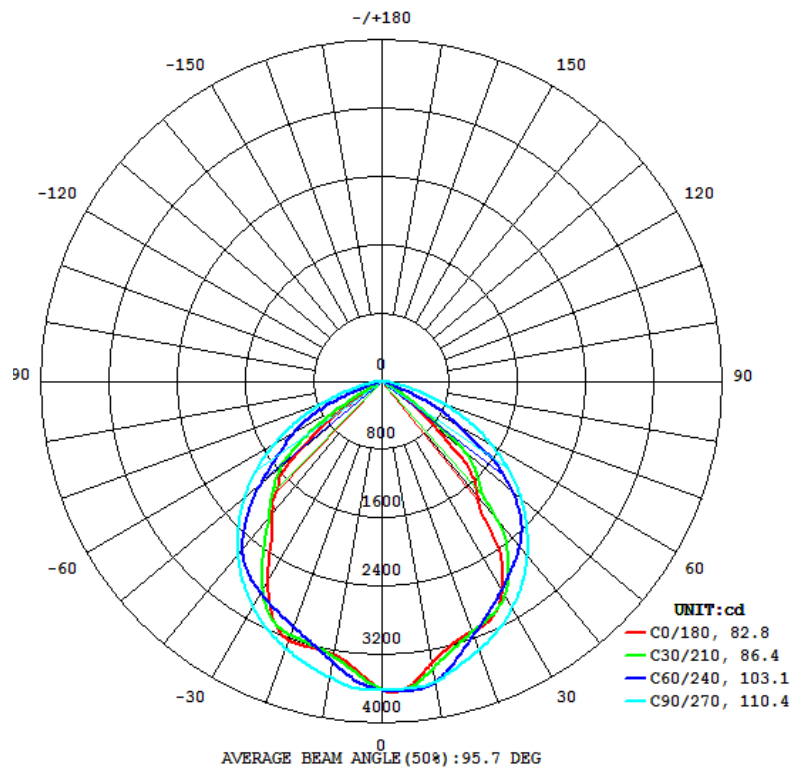
Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
7467	111.6	152.0	82.8	110.4	133.8

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

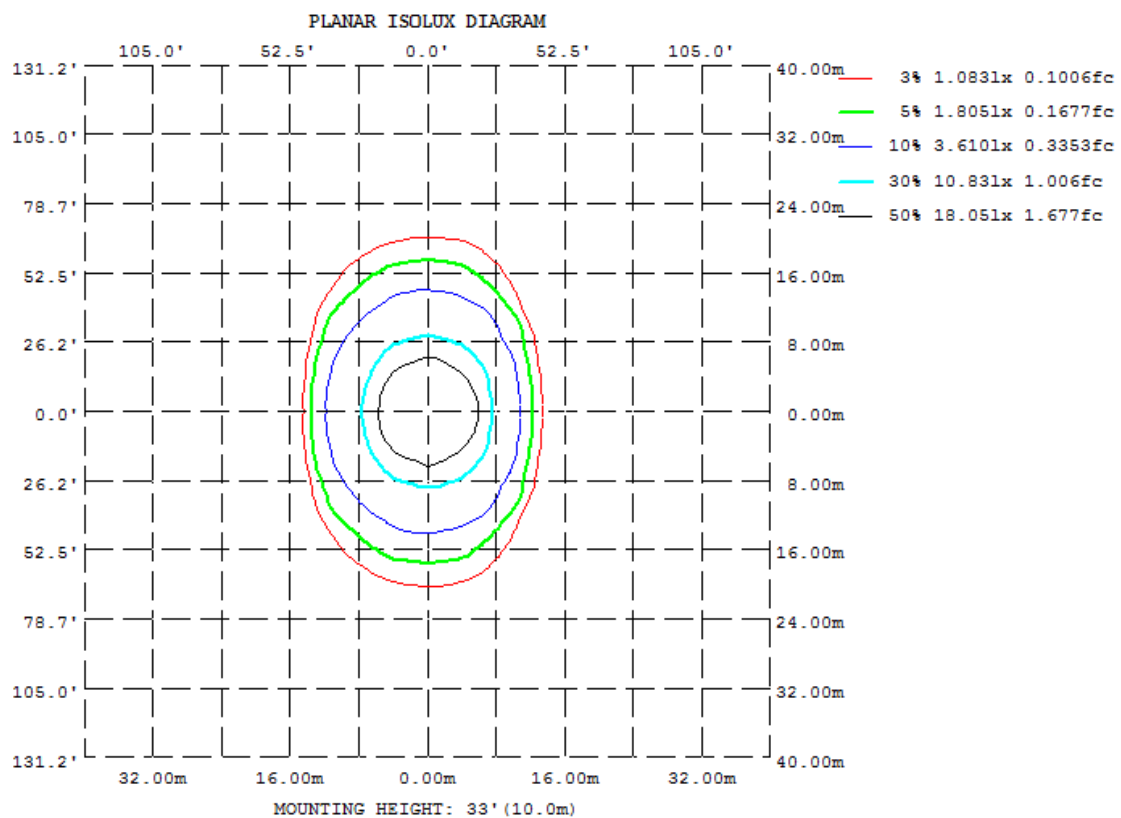
99.89%

## 4.2 Goniophotometer Test

### Light Distrubtion Curve



### Isolux Plot





## 4.2 Goniophotometer Test

### Zonal Lumen Summary

γ	C0	C45	C90	C135	C180	C225	C270	C315
10	3359	3496	3573	3329	3253	3291	3520	3481
20	3112	3095	3342	3116	3222	3089	3323	3069
30	2836	2862	3067	2933	2682	2917	3038	2847
40	1765	2448	2670	2312	2018	2288	2634	2449
50	786.1	1461	2150	1660	1306	1639	2103	1457
60	52.28	547.6	1498	912.2	132.6	910.4	1459	555.5
70	3.934	21.98	800.0	55.04	33.63	47.28	757.4	21.46
80	1.179	0.9191	163.1	15.97	10.58	14.97	143.4	1.145
90	0.9589	0.8028	0.5937	3.700	1.227	3.205	0.7339	0.9691
100	0.8755	0.4789	0.5192	1.011	2.899	1.412	0.9358	0.4020
110	0.4025	0.5835	1.094	0.6465	0.4933	1.022	1.725	0.6091
120	0.7095	0.8243	1.348	0.8533	0.5959	1.145	1.873	0.8816
130	1.168	1.161	1.670	1.132	1.140	1.521	2.266	1.387
140	1.591	1.602	1.756	1.493	1.812	2.040	2.528	1.926
150	2.006	1.987	1.933	1.876	2.191	2.270	2.569	2.365
160	2.251	2.043	1.954	2.024	2.702	2.478	2.445	2.541
170	2.248	2.014	1.925	2.043	2.509	2.501	2.257	2.257
180	2.568	2.426	2.352	2.480	2.562	2.486	2.362	2.442
DEG	LUMINOUS INTENSITY:cd							

	Zonal (lm)		Total (lm)	Percent
0-10	335.28	0 - 10	335.28	4.49%
10-20	928.38	0 - 20	1263.67	16.92%
20-30	1404.68	0 - 30	2668.35	35.73%
30-40	1621.92	0 - 40	4290.27	57.46%
40-50	1516.59	0 - 50	5806.86	77.77%
50-60	1052.47	0 - 60	6859.32	91.86%
60-70	467.36	0 - 70	7326.68	98.12%
70-80	123.00	0 - 80	7449.69	99.77%
80-90	9.01	0 - 90	7458.70	99.89%
90-100	1.26	0 - 100	7459.96	99.90%
100-110	0.83	0 - 110	7460.79	99.92%
110-120	0.83	0 - 120	7461.63	99.93%
120-130	1.05	0 - 130	7462.68	99.94%
130-140	1.25	0 - 140	7463.93	99.96%
140-150	1.25	0 - 150	7465.19	99.97%
150-160	1.04	0 - 160	7466.23	99.99%
160-170	0.65	0 - 170	7466.88	100.00%
170-180	0.22	0 - 180	7467.10	100.00%

## 4.2 Goniophotometer Test

### Axial Candela

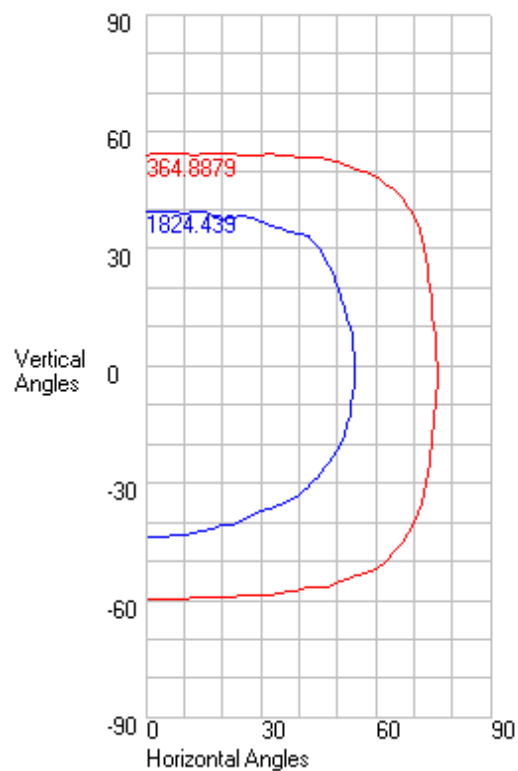
DEG.	HOR.	DEG.	VERT.
90	0.73	90	0.96
85	9.34	85	1.08
75	407.14	75	1.26
65	1109.06	65	20.22
55	1803.6	55	273.89
47.5	2241.965	47.5	1062.075
42.5	2510.8	42.5	1639.885
37.5	2745.55	37.5	1948.07
33	2927.01	33	2609.33
29	3071.61	29	2899.22
25.5	3181.045	25.5	3042.865
22.5	3260.435	22.5	3092.215
19.5	3333.4	19.5	3115.575
17	3386.3	17	3147.41
15	3427.15	15	3187.58
13	3463.1	13	3241.21
11	3501.48	11	3314.64
9	3539.46	9	3403.77
7	3576.84	7	3505.14
5	3605.92	5	3593.45
3	3614.6	3	3634.19
1	3612.16	1	3629.71
0	3611.528	0	3611.528
-1	3607.2	-1	3577.93
-3	3606.98	-3	3489.74
-5	3607.82	-5	3398.04
-7	3605.41	-7	3321.15
-9	3588.11	-9	3268.01
-11	3551.15	-11	3238.99
-13	3500.92	-13	3223.91
-15	3453.31	-15	3224.19
-17	3407.71	-17	3229.15
-19.5	3352.635	-19.5	3226.03
-22.5	3283.685	-22.5	3161.91
-25.5	3206.7	-25.5	3010.17
-29	3099.66	-29	2763.31
-33	2958.57	-33	2431.88
-37.5	2780.78	-37.5	2123.355
-42.5	2546.005	-42.5	1900.28
-47.5	2285.055	-47.5	1607.64
-55	1840.64	-55	620.23
-65	1156.81	-65	50.83
-75	440.69	-75	19.62
-85	15.9	-85	6.23
-90	0.592	-90	1.222

## 4.2 Goniophotometer Test

### Characteristics

NEMA Type	7 H x 6 V
Maximum Candela	3648.879
Maximum Candela Angle	3 H 3 V
Horizontal Beam Angle (50%)	109.5
Vertical Beam Angle (50%)	83.4
Horizontal Field Angle (10%)	152.6
Vertical Field Angle (10%)	114.2
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Beam Lumens	5507
Beam Efficiency	N.A.
Field Lumens	7271
Field Efficiency	N.A.
Spill Lumens	196
Luminaire Lumens	7467
Total Efficiency	N.A.
Total Luminaire Watts	55.8124
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	0.96	0.961	0.964	0.967	0.969	0.972	0.975	0.977	0.98	0.981	0.983	0.985	0.987	0.989	0.986	0.98	0.973	0.962	0.937	0.893	0.84	0.767	0.73
85	1.08	1.081	1.084	1.087	1.089	1.092	1.095	1.094	1.095	1.095	1.095	1.096	1.096	1.096	1.09	1.08	1.064	1.034	0.986	0.915	0.833	0.762	0.73
75	1.26	1.262	1.266	1.27	1.271	1.273	1.274	1.275	1.277	1.282	1.279	1.269	1.258	1.235	1.254	1.238	1.173	1.36	1.117	1.916	0.875	0.76	0.73
65	20.22	20.338	20.575	20.398	20.295	20.135	19.947	19.758	19.697	19.618	19.521	19.514	19.033	19.077	18.453	17.669	18.029	20.466	13.304	24.43	5.812	0.776	0.73
55	273.89	284.4	305.408	310.289	312.638	305.754	288.208	272.571	291.177	305.303	316.044	314.891	255.848	281.219	297.944	278.723	262.426	243.656	159.682	149.962	29.619	0.814	0.73
47.5	1062.075	* 1073.386	* 1087.932	* 1092.821	* 1089.403	* 1077.563	* 1048.403	* 1045.265	* 1063.178	* 1087.717	* 1086.359	* 1012.827	* 953.057	* 979.554	* 1001.246	* 827.525	* 752.475	* 725.139	* 499.117	* 289.405	69.562	0.84	0.73
42.5	1639.885	* 1641.602	* 1642.069	* 1638.739	* 1631.817	* 1620.778	* 1609.653	* 1603.592	* 1581.447	* 1560.452	* 1534.074	* 1523.085	* 1467.425	* 1396.244	* 1333.688	* 1338.02	* 1133.982	* 989.676	* 821.618	* 442.524	* 104.154	0.855	0.73
37.5	1948.07	* 1959.815	* 1972.339	* 1965.937	* 1945.709	* 1917.835	* 1949.585	* 1982.083	* 1979.068	* 1923.577	* 1830.114	* 1864.952	* 1902.839	* 1839.429	* 1629.2	* 1633.241	* 1566.655	* 1261.336	* 1043.888	* 625.498	* 147.003	0.872	0.73
33	2609.33	* 2613.701	* 2612.955	* 2604.78	* 2588.166	* 2574.608	* 2553.141	* 2531.132	* 2503.311	* 2469.44	* 2435.726	* 2372.137	* 2278.663	* 2247.322	* 2110.096	* 1919.114	* 1837.266	* 1579.997	* 1211.08	* 752.294	* 194.44	2.205	0.73
29	2899.22	* 2901.773	* 2898.268	* 2888.657	* 2872.592	* 2848.905	* 2822.984	* 2794.275	* 2764.911	* 2728.137	* 2678.781	* 2632.481	* 2575.529	* 2462.792	* 2331.228	* 2203.809	* 2007.47	* 1741.986	* 1349.226	* 834.104	* 235.155	3.517	0.73
25.5	3042.865	* 3043.085	* 3040.863	* 3035.162	* 3020.735	* 2991.492	* 2959.227	* 2928.168	* 2894.753	* 2856.9	* 2809.042	* 2760.172	* 2685.725	* 2573.969	* 2455.875	* 2339.525	* 2102.155	* 1840.392	* 1466.916	* 896.043	* 267.624	4.592	0.73
22.5	3092.215	* 3092.913	* 3093.114	* 3091.9	* 3071.91	* 3040.051	* 3007.971	* 2976.431	* 2943.264	* 2907.343	* 2863.436	* 2809.512	* 2734.179	* 2636.757	* 2524.953	* 2387.058	* 2166.981	* 1907.649	* 1558.85	* 943.365	* 292.788	5.449	0.73
19.5	3115.575	* 3117.858	* 3120.674	* 3120.458	* 3095.587	* 3063.883	* 3030.14	* 3004.709	* 2972.564	* 2935.325	* 2894.519	* 2842.578	* 2768.361	* 2668.331	* 2571.296	* 2426.652	* 2207.907	* 1959.518	* 1606.807	* 984.6	* 315.402	6.242	0.73
17	3147.41	* 3151.811	* 3155.915	* 3150.85	* 3127.041	* 3094.913	* 3066.794	* 3037.974	* 3003.164	* 2968.782	* 2932.416	* 2874.691	* 2795.829	* 2713.083	* 2612.999	* 2457.828	* 2236.202	* 1992.628	* 1645.063	* 1015.323	* 332.517	6.848	0.73
15	3187.58	* 3193.661	* 3198.509	* 3190.082	* 3167.462	* 3137.898	* 3110.426	* 3076.652	* 3044.307	* 3015.913	* 2972.707	* 2905.67	* 2839.064	* 2761.764	* 2648.182	* 2483.085	* 2254.54	* 2031.395	* 1673.76	* 1036.256	* 345.152	7.295	0.73
13	3241.21	* 3249.004	* 3254.063	* 3245.411	* 3221.76	* 3196.608	* 3162.77	* 3126.06	* 3103.889	* 3071.126	* 3018.736	* 2956.126	* 2902.517	* 2813.742	* 2684.759	* 2506.733	* 2292.073	* 2067.879	* 1701.43	* 1053.789	* 356.814	7.705	0.73
11	3314.64	* 3323.885	* 3326.873	* 3322.533	* 3299.699	* 3267.5	* 3227.91	* 3204.581	* 3173.247	* 3132.439	* 3082.481	* 3032.451	* 2967.671	* 2867.353	* 2723.261	* 2540.913	* 2331.082	* 2101.885	* 1722.821	* 1068.857	* 367.478	* 8.808	0.73
9	3403.77	* 3414.131	* 3416.505	* 3407.768	* 3389.216	* 3352.374	* 3321.67	* 3287.927	* 3248.403	* 3212.964	* 3168.129	* 3108.422	* 3034.177	* 2921.274	* 2770.802	* 2586.854	* 2371.288	* 2133.62	* 1743.344	* 1081.486	* 377.117	* 8.904	0.73
7	3505.14	* 3515.568	* 3516.086	* 3508.952	* 3486.448	* 3451.07	* 3414.723	* 3372.256	* 3334.585	* 3298.482	* 3250.654	* 3182.798	* 3095.28	* 2966.328	* 2811.32	* 2631.437	* 2408.465	* 2162.973	* 1761.505	* 1091.703	* 385.704	* 9	0.73
5	3593.45	* 3603.937	* 3603.496	* 3599.732	* 3567.963	* 3531.087	* 3486.427	* 3445.109	* 3410.57	* 3376.377	* 3315.017	* 3224.007	* 3127.986	* 3003.204	* 2850.145	* 2667.183	* 2442.168	* 2189.57	* 1777.104	* 1099.547	* 396.775	* 9.097	0.73
3	3634.19	* 3644.402	* 3648.879	* 3638.442	* 3605.474	* 3565.552	* 3530.453	* 3485.222	* 3439.824	* 3391.492	* 3327.446	* 3242.431	* 3153.19	* 3034.39	* 2884.245	* 2701.479	* 2472.384	* 2213.026	* 1793.49	* 1107.57	* 400.915	* 9.194	0.73
1	3629.71	* 3637	* 3637.275	* 3625.339	* 3596.352	* 3555.331	* 3514.139	* 3472.85	* 3433.664	* 3390.17	* 3332.799	* 3255.693	* 3172.958	* 3060.933	* 2914.353	* 2731.85	* 2498.941	* 2233.177	* 1800.227	* 1108.563	* 405.064	* 9.34	0.73
0	3611.528	* 3612.16	* 3614.6	* 3605.92	* 3576.84	* 3539.46	* 3501.48	* 3463.1	* 3427.15	* 3386.3	* 3333.4	* 3260.435	* 3181.045	* 3071.61	* 2927.01	* 2745.55	* 2510.8	* 2241.965	* 1803.6	* 1109.06	* 407.14	* 9.34	0.73
-1	3577.93	* 3579.861	* 3584.477	* 3574.204	* 3544.513	* 3504.909	* 3465.953	* 3427.674	* 3391.002	* 3350.801	* 3298.061	* 3227.097	* 3149.817	* 3044.366	* 2904.214	* 2727.549	* 2499.053	* 2235.928	* 1802.704	* 1107.697	* 406.519	* 9.341	0.73
-3	3489.74	* 3492.321	* 3495.028	* 3487.41	* 3460.686	* 3424.024	* 3384.977	* 3348.799	* 3312.254	* 3273.933	* 3224.085	* 3157.293	* 3084.357	* 2985.348	* 2854.304	* 2688.816	* 2472.91	* 2221.351	* 1800.914	* 1104.973	* 405.278	* 9.343	0.73
-5	3398.04	* 3406.171	* 3404.175	* 3396.864	* 3372.545	* 3335.488	* 3306.28	* 3272.107	* 3238.185	* 3196.532	* 3145.39	* 3084.175	* 3015.196	* 2923.446	* 2801.656	* 2646.873	* 2443.678	* 2203.686	* 1789.297	* 1095.161	* 404.04	* 9.344	0.73
-7	3321.15	* 3327.6	* 3329.153	* 3320.588	* 3295.271	* 3267.552	* 3231.129	* 3198.833	* 3173.94	* 3141.939	* 3093.292	* 3020.853	* 2942.76	* 2858.717	* 2746.346	* 2604.351	* 2411.891	* 2183.237	* 1778.32	* 1085.489	* 395.857	* 9.346	0.73
-9	3268.01	* 3274.058	* 3276.432	* 3267.414	* 3246.406	* 3212.271	* 3185.225	* 3152.716	* 3113.539	* 3089.178	* 3051.183	* 2990.965	* 2915.511	* 2805.336	* 2691.426	* 2555.529	* 2377.675	* 2160.271	* 1764.53	* 1073.369	* 390.143	* 9.348	0.73
-11	3238.99	* 3243.147	* 3247.061	* 3237.273	* 3216.6	* 3184.971	* 3149.16	* 3124.911	* 3094.198	* 3054.969	* 3012.395	* 2963.939	* 2897.287	* 2797.55	* 2658.985	* 2507.203	* 2341.805	* 2135.063	* 1748.061	* 1058.746	* 383.357	* 9.35	0.73
-13	3223.91	* 3226.705	* 3231.66	* 3220.706	* 3199.03	* 3171.58	* 3138.932	* 3107.894	* 3080.786	* 3047.163	* 2996.796	* 2939.372	* 2881.433	* 2789.801	* 2657.166	* 2483.544	* 2308.045	* 2107.93	* 1730.402	* 1041.571	* 375.52	* 8.311	0.73
-15	3224.19	* 3225.682	* 3228.954	* 3219.438	* 3195.347	* 3168.376	* 3139.631	* 3106.565	* 3075.104	* 3044.258	* 2996.698	* 2931.677	* 2868.844	* 2781.752	* 2651.973	* 2475.333	* 2273.388	* 2078.789	* 1706.656	* 1021.802	* 366.656	* 7.98	0.73
-17	3229.15	* 3229.703	* 3231.244	* 3225.903	* 3200.028	* 3171.469	* 3140.923	* 3108.566	* 3075.746	* 3043.501	* 2996.641	* 2927.954	* 2858.194	* 2773.347	* 2643.353	* 2461.192	* 2247.268	* 2047.882	* 1681.695	* 999.332	* 356.786	* 7.606	0.73
-19.5	3226.03	* 3226.683	* 3227.104	* 3225.982	* 3196.264	* 3165.82	* 3136.092	* 3098.868	* 3062.475	* 3031.196	* 2988.114	* 2909.442	* 2829.504	* 2749.994	* 2624.906	* 2431.719	* 2203.415	* 1991.6	* 1645.44	* 967.67	* 343.072	* 7.081	0.73
-22.5	3161.91	* 3163.917	* 3163.69	* 3159.182	* 3134.571	* 3104.067	* 3073.959	* 3038.033	* 2997.942	* 2961.996	* 2922.295	* 2852.801	* 2759.139	* 2670.205	* 2577.376	* 2376.639	* 2136.859	* 1910.981	* 1594.622	* 925.956	* 325.075	* 6.37	0.73
-25.5	3010.17	* 3013.751	* 3014.263	* 3006.081	* 2988.104	* 2963.604	* 2932.368	* 2897.766	* 2860.76	* 2825.649	* 2784.341	* 2729.877	* 2641.527	* 2541.557	* 2439.972	* 2295.886	* 2039.6	* 1816.043	* 1504.444	* 874.53	* 305.249	* 5.575	0.73
-29	2763.31	* 2768.723	* 2768.125	* 2758.816	* 2739.816	* 2719.93	* 2695.494	* 2665.345	* 2630.056	* 2598.508	* 2559.671	* 2514.369	* 2442.586	* 2354.33	* 2245.078	* 2125.407	* 1904.67	* 1687.49	* 1394.998	* 810.463	* 279.445	* 4.547	0.73
-33	2431.88	* 2436.458	* 2435.805	* 2427.363	* 2409.995	* 2396.756	* 2375.907	* 2354.245	* 2326.703	* 2292.618	* 2263.502	* 2218.349	* 2173.984	* 2078.401	* 1994.313	* 1908.398	* 1719.15	* 1523.238	* 1267.504	* 733.209	* 246.041	* 3.249	0.73
-37.5	2123.355	* 2123.266	* 2119.389	* 2111.603	* 2103.665	* 2096.549	* 2092.367	* 2074.038	* 2047.974	* 2020.706	* 1987.933	* 1968.528	* 1906.238	* 1825.941	* 1771.092	* 1676.039	* 1517.003	* 1354.75	* 1115.033	* 627.881	* 204.234	* 1.907	0.73
-42.5	1900.28	* 1898.593	* 1893.17	* 1885.554	* 1876.388	* 1862.128	* 1851.257	* 1842.435	* 1815.809	* 1788.482	* 1751.287	* 1731.298											

## 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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0	0	0
65	0.5	1	1	1	1	1	0.9	0.9	0.9	1.2	1.4	1.3	1.4	1.6	1.7	1.7	1.5	1.6	1.4	0.6	0.1	0	0
55	1.54 *	3.15 *	3.20 *	3.20 *	3.16 *	3.07 *	2.97 *	2.97 *	3.02 *	3.81 *	4.38 *	3.97 *	4.37 *	4.98 *	5.01 *	4.59 *	3.99 *	4.40 *	3.2	1.1	0.1	0	0
47.5	2.06 *	4.15 *	4.16 *	4.14 *	4.09 *	4.02 *	3.96 *	3.92 *	3.89 *	4.78 *	5.52 *	5.18 *	5.69 *	6.14 *	6.27 *	5.87 *	4.82 *	5.43 *	3.96 *	1.2	0.1	0	0
42.5	2.74 *	5.49 *	5.49 *	5.45 *	5.38 *	5.33 *	5.33 *	5.29 *	5.17 *	6.21 *	7.21 *	7.06 *	7.84 *	8.10 *	8.31 *	8.26 *	6.64 *	7.35 *	5.63 *	1.8	0.2	0	0
37.5	3.13 *	6.28 *	6.27 *	6.22 *	6.15 *	6.09 *	6.06 *	5.99 *	5.86 *	7.06 *	8.17 *	7.91 *	8.82 *	9.20 *	9.20 *	9.15 *	7.57 *	8.20 *	6.28 *	2.06 *	0.2	0	0
33	3.36 *	6.72 *	6.70 *	6.66 *	6.59 *	6.50 *	6.40 *	6.28 *	6.14 *	7.47 *	8.65 *	8.24 *	9.07 *	9.57 *	9.61 *	9.32 *	7.74 *	8.44 *	6.38 *	2.15 *	0.2	0	0
29	3.17 *	6.34 *	6.32 *	6.28 *	6.21 *	6.12 *	6.02 *	5.91 *	5.78 *	7.02 *	8.14 *	7.80 *	8.55 *	9.00 *	9.17 *	8.86 *	7.28 *	8.05 *	6.12 *	2.08 *	0.3	0	0
25.5	2.80 *	5.60 *	5.59 *	5.56 *	5.50 *	5.42 *	5.33 *	5.23 *	5.11 *	6.22 *	7.21 *	6.90 *	7.58 *	8.01 *	8.18 *	7.90 *	6.51 *	7.30 *	5.61 *	1.92 *	0.2	0	0
22.5	2.84 *	5.67 *	5.66 *	5.63 *	5.57 *	5.49 *	5.40 *	5.30 *	5.18 *	6.31 *	7.32 *	7.00 *	7.71 *	8.18 *	8.36 *	8.08 *	6.69 *	7.59 *	5.88 *	2.03 *	0.3	0	0
19.5	2.39 *	4.77 *	4.76 *	4.74 *	4.69 *	4.63 *	4.55 *	4.46 *	4.36 *	5.32 *	6.17 *	5.90 *	6.51 *	6.93 *	7.08 *	6.84 *	5.68 *	6.48 *	5.05 *	1.76 *	0.2	0	0
17	1.93 *	3.86 *	3.85 *	3.83 *	3.80 *	3.75 *	3.68 *	3.61 *	3.54 *	4.31 *	5.00 *	4.78 *	5.28 *	5.63 *	5.74 *	5.53 *	4.61 *	5.29 *	4.13 *	1.45 *	0.2	0	0
15	1.96 *	3.92 *	3.91 *	3.89 *	3.86 *	3.80 *	3.74 *	3.67 *	3.59 *	4.38 *	5.07 *	4.86 *	5.38 *	5.72 *	5.80 *	5.59 *	4.68 *	5.38 *	4.21 *	1.49 *	0.2	0	0
13	2.00 *	4.00 *	3.99 *	3.97 *	3.93 *	3.88 *	3.81 *	3.74 *	3.66 *	4.46 *	5.17 *	4.96 *	5.49 *	5.81 *	5.88 *	5.67 *	4.76 *	5.47 *	4.27 *	1.52 *	0.2	0	0
11	2.05 *	4.10 *	4.09 *	4.07 *	4.03 *	3.97 *	3.91 *	3.83 *	3.75 *	4.56 *	5.29 *	5.08 *	5.60 *	5.91 *	5.97 *	5.77 *	4.84 *	5.55 *	4.33 *	1.54 *	0.2	0	0
9	2.11 *	4.22 *	4.20 *	4.18 *	4.14 *	4.08 *	4.01 *	3.93 *	3.84 *	4.68 *	5.43 *	5.19 *	5.70 *	6.01 *	6.07 *	5.86 *	4.92 *	5.62 *	4.37 *	1.57 *	0.2	0	0
7	2.16 *	4.33 *	4.32 *	4.29 *	4.25 *	4.19 *	4.11 *	4.02 *	3.94 *	4.79 *	5.54 *	5.28 *	5.79 *	6.09 *	6.16 *	5.95 *	4.99 *	5.69 *	4.42 *	1.59 *	0.2	0	0
5	2.20 *	4.41 *	4.40 *	4.37 *	4.32 *	4.26 *	4.18 *	4.09 *	4.00 *	4.86 *	5.60 *	5.33 *	5.85 *	6.17 *	6.24 *	6.03 *	5.05 *	5.75 *	4.46 *	1.60 *	0.2	0	0
3	2.21 *	4.43 *	4.42 *	4.39 *	4.34 *	4.28 *	4.20 *	4.11 *	4.01 *	4.87 *	5.63 *	5.37 *	5.91 *	6.24 *	6.32 *	6.11 *	5.11 *	5.80 *	4.48 *	1.61 *	0.2	0	0
1	1.10 *	2.20 *	2.20 *	2.19 *	2.16 *	2.13 *	2.09 *	2.05 *	2.00 *	2.44 *	2.82 *	2.70 *	2.97 *	3.14 *	3.19 *	3.08 *	2.57 *	2.91 *	2.25 *	0.81 *	0.1	0	0
0																							

-1	1.09 *	2.19 *	2.18 *	2.17 *	2.15 *	2.12 *	2.08 *	2.04 *	1.99 *	2.42 *	2.81 *	2.69 *	2.96 *	3.13 *	3.18 *	3.08 *	2.57 *	2.92 *	2.25 *	0.81 *	0.1	0	0
-3	2.15 *	4.31 *	4.30 *	4.27 *	4.23 *	4.16 *	4.09 *	4.00 *	3.92 *	4.77 *	5.52 *	5.29 *	5.84 *	6.19 *	6.29 *	6.10 *	5.12 *	5.81 *	4.49 *	1.62 *	0.2	0	0
-5	2.10 *	4.20 *	4.19 *	4.17 *	4.13 *	4.07 *	3.99 *	3.91 *	3.83 *	4.66 *	5.40 *	5.17 *	5.72 *	6.07 *	6.19 *	6.02 *	5.07 *	5.78 *	4.46 *	1.61 *	0.2	0	0
-7	2.05 *	4.10 *	4.09 *	4.07 *	4.03 *	3.97 *	3.90 *	3.83 *	3.75 *	4.56 *	5.28 *	5.06 *	5.59 *	5.95 *	6.08 *	5.93 *	5.01 *	5.73 *	4.43 *	1.59 *	0.2	0	0
-9	2.01 *	4.02 *	4.01 *	3.99 *	3.95 *	3.90 *	3.83 *	3.76 *	3.68 *	4.49 *	5.20 *	4.97 *	5.48 *	5.83 *	5.96 *	5.83 *	4.95 *	5.68 *	4.39 *	1.57 *	0.2	0	0
-11	1.98 *	3.97 *	3.96 *	3.94 *	3.90 *	3.85 *	3.78 *	3.71 *	3.63 *	4.43 *	5.14 *	4.93 *	5.43 *	5.75 *	5.86 *	5.74 *	4.88 *	5.62 *	4.35 *	1.55 *	0.2	0	0
-13	1.97 *	3.94 *	3.94 *	3.91 *	3.88 *	3.82 *	3.76 *	3.69 *	3.61 *	4.39 *	5.10 *	4.89 *	5.41 *	5.72 *	5.80 *	5.65 *	4.81 *	5.55 *	4.29 *	1.53 *	0.2	0	0
-15	1.96 *	3.93 *	3.92 *	3.90 *	3.86 *	3.81 *	3.74 *	3.67 *	3.60 *	4.38 *	5.08 *	4.87 *	5.38 *	5.70 *	5.77 *	5.59 *	4.74 *	5.48 *	4.23 *	1.50 *	0.2	0	0
-17	1.97 *	3.93 *	3.93 *	3.90 *	3.86 *	3.81 *	3.74 *	3.67 *	3.60 *	4.38 *	5.07 *	4.85 *	5.36 *	5.69 *	5.75 *	5.54 *	4.68 *	5.40 *	4.16 *	1.47 *	0.2	0	0
-20	2.46 *	4.92 *	4.91 *	4.88 *	4.83 *	4.76 *	4.68 *	4.58 *	4.48 *	5.47 *	6.32 *	6.03 *	6.66 *	7.07 *	7.14 *	6.84 *	5.74 *	6.61 *	5.09 *	1.78 *	0.3	0	0
-23	2.92 *	5.84 *	5.83 *	5.80 *	5.73 *	5.65 *	5.55 *	5.43 *	5.31 *	6.48 *	7.49 *	7.13 *	7.85 *	8.35 *	8.44 *	8.05 *	6.69 *	7.69 *	5.92 *	2.06 *	0.3	0	0
-26	2.82 *	5.65 *	5.64 *	5.61 *	5.54 *	5.46 *	5.37 *	5.25 *	5.14 *	6.26 *	7.25 *	6.90 *	7.57 *	8.05 *	8.18 *	7.79 *	6.42 *	7.36 *	5.66 *	1.95 *	0.3	0	0
-29	3.08 *	6.17 *	6.16 *	6.12 *	6.06 *	5.97 *	5.87 *	5.75 *	5.62 *	6.84 *	7.93 *	7.57 *	8.31 *	8.80 *	8.97 *	8.60 *	7.07 *	8.06 *	6.19 *	2.13 *	0.3	0	0
-33	3.17 *	6.35 *	6.34 *	6.29 *	6.23 *	6.15 *	6.05 *	5.93 *	5.80 *	7.06 *	8.19 *	7.84 *	8.62 *	9.11 *	9.32 *	9.00 *	7.42 *	8.45 *	6.49 *	2.23 *	0.3	0	0
-38	3.12 *	6.25 *	6.23 *	6.20 *	6.15 *	6.08 *	6.00 *	5.88 *	5.75 *	7.00 *	8.14 *	7.81 *	8.56 *	9.06 *	9.31 *	9.02 *	7.46 *	8.51 *	6.50 *	2.20 *	0.3	0	0
-43	3.06 *	6.12 *	6.10 *	6.06 *	6.01 *	5.95 *	5.89 *	5.77 *	5.64 *	6.85 *	7.98 *	7.65 *	8.37 *	8.85 *	9.05 *	8.74 *	7.23 *	8.20 *	6.14 *	2.01 *	0.3	0	0
-48	2.67 *	5.34 *	5.31 *	5.28 *	5.23 *	5.17 *	5.09 *	4.99 *	4.86 *	5.90 *	6.86 *	6.55 *	7.12 *	7.49 *	7.64 *	7.30 *	5.93 *	6.67 *	4.87 *	1.5	0.2	0	0
-55	2.55 *	5.13 *	5.14 *	5.11 *	5.05 *	4.97 *	4.87 *	4.78 *	4.68 *	5.70 *	6.60 *	6.24 *	6.78 *	7.19 *	7.37 *	6.94 *	5.65 *	6.37 *	4.67 *	1.5	0.2	0	0
-65	1	2.1	2.1	2.1	2.1	2	2	2	2	2.4	2.8	2.6	2.9	3.1	3.2	3	2.7	3.1	2.5	0.9	0.1	0	0
-75	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.3	0	0	0
-85	0	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	0.1	0.1	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	87	173	173	172	170	168	165	162	159	194	224	214	236	250	254	246	205	232	178	61.8	8.05	0.03	3733.65

## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

Model No.	FFLED @ 52W / 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
120.02	60	0.470	56.3	0.998	3.44%
277.02	60	0.216	55.3	0.925	7.18%

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