

# Photometric Test Report

## Relevant Standards

- ☒ IES LM-79-2008
- ☒ ANSI C82.77:2014
- ☒ UL1598-2008

## Prepared For

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## Project Number

**DLF1804109**

## Report Number

**DLF20180416001-3a**

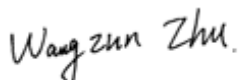
## Test Date

**2018/4/16**

## Issue Date

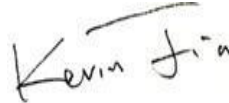
**2018/4/16**

## 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 v4.3

Outdoor - Architectural Flood and Spot Luminaires				
Requirement Category	Test Method	Requirements	Test value	Results (Fail/Pass)
Lamp Output (lm)	IES LM-79-2008	1000	1955	P
Zonal Lumen Requirement (0°-90°)	IES LM-79-2008	≥85%	100.00%	P
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	90	93.7	P
Allowable CCTs* (K)	IES LM-79-2008	5700	3041	P
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	65	70.3	P
Power Factor	ANSI C82.77:2014	0.873	0.918	P
Total Harmonic Distortion (A%)	ANSI C82.77:2014	25.00%	18.68%	P

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2018/4/16	HSLED18Y	C1
2	Goniophotometer Test	2018/4/16	HSLED18Y	C1
3	THD and PF Test	2018/4/16	HSLED18Y	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:**

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

**Light source:** LL725F1212-XXC

**Manufacturer Of Light Source:** Lustrous International Technology Company

#### Photos of Luminaire Characteristics



## 4.0 LM-79 Measurement and Test Results

### 4.1 Integrating Sphere Test

Model No.	HSLED18Y	Sample ID.	C1
Operate time (Min.)	90	Stabilization time (Min.)	45

#### 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 Conditions

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
25.1	277.03	60	0.082	20.83	0.918

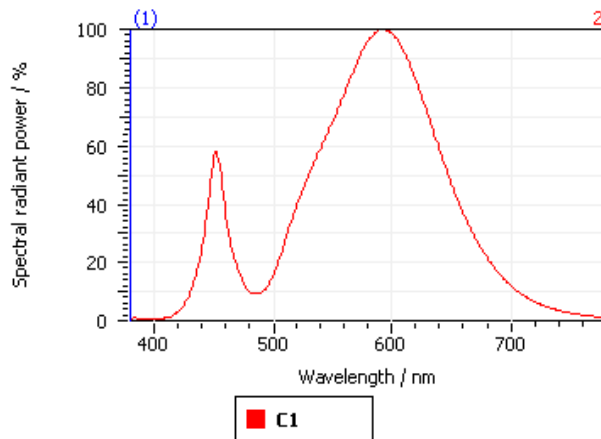
#### Test Result

CCT (K)	CRI (Ra)	Duv
3041	70.3	2.0E-03

## 4.1 Integrating Sphere Test

### Spectroradiometric Parameters

#### Results



#### Spectral values

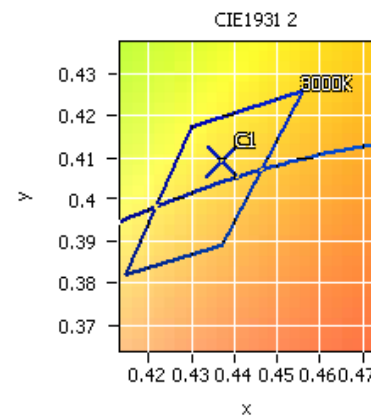
DominantWavelength	581.96 nm
Purity	0.540
PeakWavelength	592.62 nm
Width50%:	117.59 nm

#### Color Coordinates

Correlated Color Temperature 3041 K

x: 0.4369 u: 0.2484 u': 0.2484  
y: 0.4091 v: 0.3489 v': 0.5234

ResultsCRICRI01	66.4	ResultsCRICRI09	-33.5
ResultsCRICRI02	80.1	ResultsCRICRI10	53.1
ResultsCRICRI03	91.5	ResultsCRICRI11	57.8
ResultsCRICRI04	65.5	ResultsCRICRI12	39.7
ResultsCRICRI05	64.4	ResultsCRICRI13	68.6
ResultsCRICRI06	70.8	ResultsCRICRI14	95.0
ResultsCRICRI07	79.2	ResultsCRICRI15	59.4
ResultsCRICRI08	44.6	ResultsCRICRI16	59.1
ResultsCRI	70.3		



Nominal CCT: 3000K

PlanckDistance 2.0E-003

## 4.0 LM-79 Measurement and Test Results

### 4.3 Goniophotometer Test

Model No.	HSLED18Y	Sample ID.	C1
Operate time (Min.)	90	Stabilization time (Min.)	45

#### 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

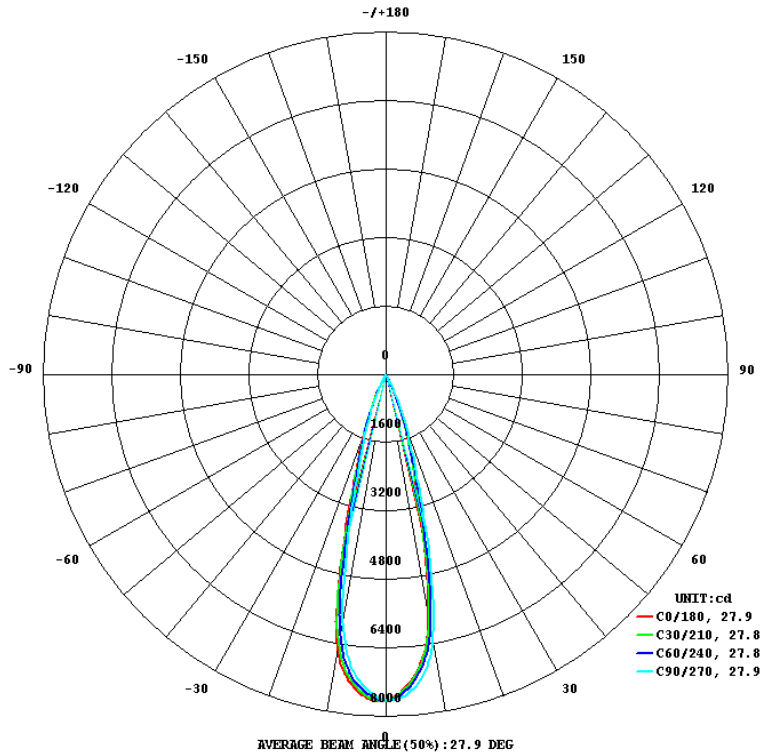
Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
25.1	276.96	60	0.082	20.86	0.913	Light Down

#### Test Result

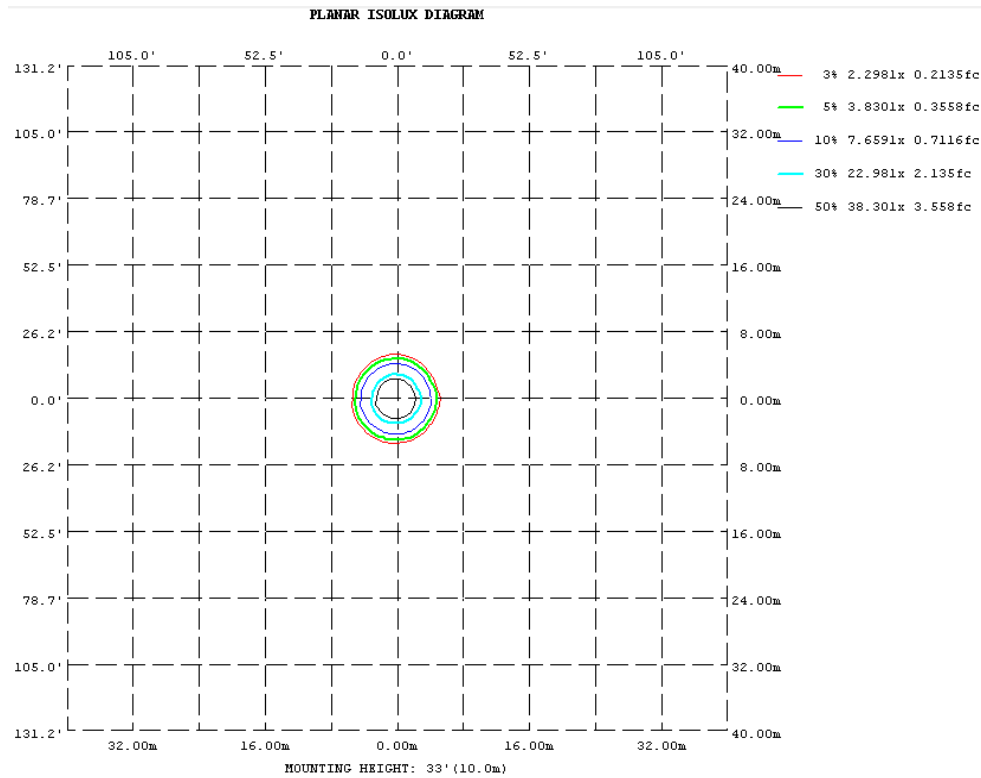
Flux(lm)	Zonal Lumen Requirement ( $0^{\circ}$ - $90^{\circ}$ )	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
		Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	
1955	100.00%	48.6	48.4	27.9	27.9	93.7

### 4.3 Goniophotometer Test

#### Light Distrubtion Curve



#### Isolux Plot



### 4.3 Goniophotometer Test

#### Zonal Lumen Summary

°	C0	C45	C90	C135	C180	C225	C270	C315
10	5760	5928	6328	6696	6546	6323	5878	5416
20	1405	1464	1632	1848	1664	1579	1426	1288
30	108.3	121.8	185.2	257.6	203.5	185.3	147.7	98.86
40	14.80	15.21	17.73	19.49	17.10	16.54	15.80	14.47
50	7.166	7.237	7.847	8.216	7.789	7.648	7.534	7.157
60	5.185	5.177	5.458	5.595	5.446	5.372	5.397	5.214
70	3.891	3.882	4.078	4.235	4.146	4.047	3.909	3.724
80	1.266	1.293	1.359	1.604	1.478	1.394	1.117	1.019
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 less than 35% Percent = 3.0 %							



### 4.3 Goniophotometer Test

#### ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0 - 10	653.21	0 - 10	653.21	33.41%
10 - 20	920.85	0 - 20	1574.06	80.51%
20 - 30	323.09	0 - 30	1897.15	97.04%
30 - 40	35.72	0 - 40	1932.87	98.87%
40 - 50	8.56	0 - 50	1941.43	99.30%
50 - 60	5.64	0 - 60	1947.07	99.59%
60 - 70	4.63	0 - 70	1951.69	99.83%
70 - 80	2.81	0 - 80	1954.50	99.97%
80 - 90	0.52	0 - 90	1955.02	100.00%
90 - 100	0.00	0 - 100	1955.02	100.00%
100 - 110	0.00	0 - 110	1955.02	100.00%
110 - 120	0.00	0 - 120	1955.02	100.00%
120 - 130	0.00	0 - 130	1955.02	100.00%
130 - 140	0.00	0 - 140	1955.02	100.00%
140 - 150	0.00	0 - 150	1955.02	100.00%
150 - 160	0.00	0 - 160	1955.02	100.00%
160 - 170	0.00	0 - 170	1955.02	100.00%
170 - 180	0.00	0 - 180	1955.02	100.00%

### 4.3 Goniophotometer Test

#### Axial Candela

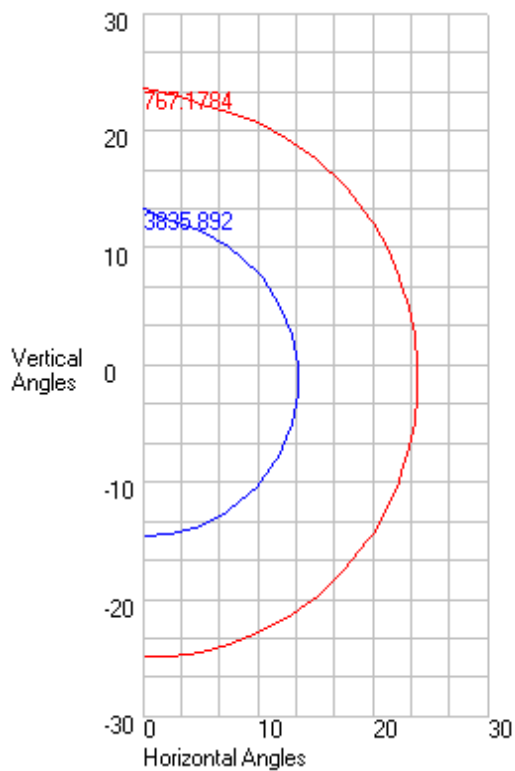
DEG.	HOR.	DEG.	VERT.
90	0	90	0
85	0.09	85	0.22
75	2.61	75	2.69
65	4.79	65	4.65
55	6.15	55	5.91
47.5	8.64	47.5	8.21
42.5	12.61	42.5	11.7
37.5	21.42	37.5	19.85
33	50.85	33	46.87
29	201.42	29	158.18
25.5	528.16	25.5	493.35
22.5	974.83	22.5	937.53
19.5	1518.28	19.5	1502.93
17	2157.12	17	2116.61
15	2960.97	15	2888.61
13	4082.53	13	3944.73
11	5334.6	11	5207.86
9	6289.2	9	6191.7
7	6858.74	7	6776.99
5	7195.71	5	7138.59
3	7426.68	3	7392.57
1	7578.53	1	7578.44
0	7620.137	0	7620.137
-1	7625.08	-1	7649.6
-3	7551.26	-3	7595.93
-5	7380.23	-5	7452.92
-7	7099.73	-7	7225.96
-9	6650.71	-9	6841.69
-11	5884.12	-11	6140.3
-13	4728.13	-13	4949.36
-15	3496.72	-15	3614.26
-17	2538.78	-17	2569.29
-19.5	1751.18	-19.5	1780.38
-22.5	1141.94	-22.5	1172.57
-25.5	649.81	-25.5	670.31
-29	257.64	-29	272.4
-33	65.33	-33	62.79
-37.5	24.8	-37.5	23.9
-42.5	13.62	-42.5	13.37
-47.5	9.15	-47.5	9
-55	6.3	-55	6.27
-65	4.86	-65	4.9
-75	2.86	-75	2.94
-85	0.2	-85	0.31
-90	0	-90	0

### 4.3 Goniophotometer Test

#### Characteristics

NEMA Type	4 H x 4 V
Maximum Candela	7671.784
Maximum Candela Angle	-1 H -3 V
Horizontal Beam Angle (50%)	27.8
Vertical Beam Angle (50%)	28.2
Horizontal Field Angle (10%)	48.6
Vertical Field Angle (10%)	48.7
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Beam Lumens	1114
Beam Efficiency	N.A.
Field Lumens	1780
Field Efficiency	N.A.
Spill Lumens	175
Luminaire Lumens	1955
Total Efficiency	N.A.
Total Luminaire Watts	20.8592
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	0.22	0.213	0.198	0.183	0.168	0.154	0.139	0.114	0.096	0.093	0.088	0.081	0.071	0.062	0.049	0.035	0.019	0.006	0	0	0	0	0
75	2.69	2.669	2.628	2.587	2.513	2.451	2.384	2.311	2.25	2.2	2.139	2.057	1.963	1.843	1.686	1.501	1.277	1.043	0.669	0.249	0.007	0	0
65	4.65	4.642	4.626	4.597	4.568	4.534	4.495	4.45	4.416	4.385	4.343	4.269	4.187	4.042	3.868	3.621	3.275	2.881	2.178	1.13	0.251	0	0
55	5.91	5.898	5.873	5.821	5.772	5.716	5.657	5.603	5.563	5.519	5.456	5.377	5.282	5.18	5.049	4.88	4.637	4.314	3.591	2.23	0.688	0	0
47.5	8.21	8.18	8.121	7.969	7.825	7.663	7.491	7.365	7.23	7.079	6.879	6.632	6.383	6.101	5.805	5.528	5.233	4.949	4.355	2.965	1.095	0	0
42.5	11.7	11.632	11.496	11.144	10.813	10.448	10.108	9.889	9.583	9.197	8.767	8.274	7.732	7.171	6.607	6.089	5.647	5.275	4.714	3.389	1.369	0.004	0
37.5	19.85	19.642	18.983	18.169	17.318	16.224	15.501	14.818	14.114	13.34	12.364	11.018	9.969	8.903	7.836	6.912	6.151	5.624	4.99	3.748	1.632	0.01	0
33	46.87	45.603	41.872	37.638	33.26	30.225	27.97	25.229	22.851	20.619	18.118	15.49	13.446	11.245	9.446	7.937	6.748	5.953	5.197	4.015	1.843	0.022	0
29	158.18	153.921	137.466	114.789	91.449	77.356	65.209	54.911	44.823	37.15	29.687	23.338	18.322	14.605	11.449	9.15	7.397	6.306	5.366	4.212	2.016	0.032	0
25.5	493.35	476.011	423.284	359.336	296.211	252.45	209.469	165.805	118.352	83.115	55.904	36.913	26.087	18.722	13.849	10.371	8.058	6.646	5.506	4.362	2.148	0.041	0
22.5	937.53	911.275	827.628	727.113	636.777	554.256	464.467	369.98	279.513	204.317	126.26	63.468	38.04	24.44	16.314	11.641	8.708	6.964	5.62	4.456	2.245	0.052	0
19.5	1502.93	1468.01	1356.71	1217.50	1116.44	993.383	847.637	698.087	546.879	405.235	254.75	133.392	61.17	32.218	19.528	13.293	9.32	7.283	5.732	4.546	2.33	0.061	0
17	2116.61	2057.07	1874.69	1695.40	1562.88	1412.38	1236.21	1039.27	841.369	637.936	419.972	220.535	97.031	42.367	22.82	14.348	9.873	7.543	5.82	4.6	2.392	0.068	0
15	2888.61	2785.59	2470 *	2219.30	2019.32	1785.38	1559.2	1327.80	1105.1	858.758	578.627	313.726	147.898	53.914	25.869	15.374	10.389	7.744	5.883	4.641	2.441	0.073	0
13	3944.73	3788.49	3303.99	2976.91	2640.70	2281.92	1933.03	1626.14	1348.22	1078.57	751.12	423.567	203.386	70.089	29.419	16.47	10.814	7.934	5.946	4.677	2.475	0.077	0
11	5207.86	5000.81	4354.46	4031.64	3505.89	2943.79	2416.63	1968.66	1611.03	1296.59	925.208	541.535	261.57	88.252	33.682	17.576	11.147	8.11	5.998	4.708	2.511	0.09	0
9	6191.7	6018.53	5554.47	5131.19	4520.08	3770.16	3021.53	2377.71	1880.80	1492.77	1093.18	655.446	327.091	114.726	37.731	18.622	11.535	8.268	6.045	4.734	2.541	0.09	0
7	6776.99	6645.02	6369.47	6087.06	5481.25	4654.37	3714.85	2843.11	2179.63	1693.26	1241.14	765.704	392.463	145.809	41.357	19.703	11.896	8.402	6.083	4.755	2.566	0.09	0
5	7138.59	7029.69	6843.56	6606 *	6187.00	5395.70	4416.78	3311.03	2472.99	1875.67	1360.44	855.771	448.31	170.489	45.197	20.374	12.211	8.508	6.113	4.771	2.603	0.09	0
3	7392.57	7279.90	7145.03	6910.27	6550.15	5923.96	4895.29	3727.52	2728.76	2027.99	1449.40	921.789	492.312	188.106	48.331	20.967	12.54	8.62	6.144	4.787	2.606	0.09	0
1	7578.44	7506.8	7355.30	7143.00	6803.45	6232.27	5272.81	4030.41	2925.65	2138.09	1508.77	967.589	522.568	199.56	50.49	21.361	12.587	8.633	6.148	4.789	2.609	0.09	0
0	7620.13	7578.53	7426.68	7195.71	6858.74	6289.2	5334.6	4082.53	2960.97	2157.12	1518.28	974.83	528.16	201.42	50.85	21.42	12.61	8.64	6.15	4.79	2.61	0.09	0
-1	7649.6	7612.83	7458.84	7244.37	6911.24	6352.51	5405.59	4140.75	2994.94	2174.78	1529.22	982.478	533.649	203.802	51.125	21.471	12.619	8.645	6.151	4.791	2.611	0.09	0
-3	7595.93	7568.84	7432.72	7212.60	6869 *	6292.68	5299.40	4045.20	2919.49	2131.87	1507.61	966.407	524.784	200.623	50.14	21.287	12.638	8.655	6.154	4.792	2.614	0.091	0
-5	7452.92	7434.09	7295.89	7079.62	6725.07	6052.91	5061.05	3782.05	2747.66	2029.57	1450.18	929.878	500.145	190.733	47.925	20.871	12.374	8.565	6.129	4.779	2.617	0.091	0
-7	7225.96	7208.01	7059.44	6821.62	6360.27	5596.71	4514.44	3373.84	2483.11	1876.45	1363.93	860.335	460.907	172.883	44.655	20.341	12.124	8.479	6.104	4.766	2.586	0.091	0
-9	6841.69	6827.82	6660.72	6331.77	5756.71	4879.80	3825.32	2881.49	2184.00	1699.47	1247.18	772.11	404.191	146.963	41.343	19.38	11.792	8.365	6.07	4.75	2.567	0.092	0
-11	6140.3	6130.88	5909.07	5526.93	4818.19	3938.25	3086.28	2390.17	1894.14	1506.96	1103.24	671.589	339.765	115.077	37.3	18.394	11.415	8.223	6.028	4.728	2.542	0.092	0
-13	4949.36	4944.21	4705.5	4259.85	3667.49	3019.38	2438.19	1983.32	1617.41	1309.96	940.965	558.939	272.23	88.363	32.67	17.293	11.108	8.061	5.982	4.702	2.512	0.079	0
-15	3614.26	3604.32	3413.46	3095.88	2717.53	2307.64	1957.56	1643.18	1381.86	1096.60	770.397	443.286	210.789	67.041	28.714	16.193	10.695	7.882	5.92	4.672	2.484	0.075	0
-17	2569.29	2562.57	2450.99	2274.08	2048.99	1813.08	1576.83	1348.52	1115.12	874.097	600.386	331.288	157.187	52.175	25.311	15.104	10.198	7.688	5.859	4.636	2.438	0.071	0
-19.5	1780.38	1777.18	1720.37	1627.80	1499.07	1353.52	1183.64	990.89	797.34	613.127	406.425	213.564	86.688	38.766	21.558	14.001	9.642	7.433	5.776	4.588	2.382	0.064	0
-22.5	1172.57	1170.48	1130.37	1067.31	976.041	862.523	738.075	604.834	475.183	350.746	220.718	100.88	49.663	28.72	17.9	12.404	9.021	7.115	5.67	4.51	2.304	0.055	0
-25.5	670.31	669.457	645.435	603.761	546.435	474.321	396.023	312.998	236.102	170.928	90.698	50.412	32.235	21.497	15.022	10.974	8.361	6.8	5.553	4.43	2.213	0.044	0
-29	272.4	271.659	258.664	236.551	209.855	179.591	142.201	100.943	73.792	55.695	40.265	29.335	21.677	16.486	12.537	9.678	7.677	6.451	5.412	4.289	2.094	0.036	0
-33	62.79	62.595	60.188	56.205	51.054	46.304	40.856	35.133	30.487	26.513	22.265	18.281	15.196	12.592	10.208	8.383	6.993	6.083	5.253	4.11	1.931	0.025	0
-37.5	23.9	23.856	23.421	22.73	21.934	20.671	19.441	18.147	16.845	15.61	14.398	12.694	11.107	9.734	8.401	7.268	6.354	5.731	5.057	3.873	1.73	0.014	0
-42.5	13.37	13.355	13.326	13.016	12.723	12.348	11.896	11.459	10.99	10.435	9.828	9.155	8.438	7.721	7.01	6.352	5.806	5.373	4.812	3.547	1.472	0.007	0
-47.5	9	8.994	8.981	8.859	8.74	8.593	8.422	8.232	8.024	7.801	7.516	7.173	6.837	6.461	6.075	5.721	5.363	5.056	4.499	3.152	1.2	0.002	0
-55	6.27	6.266	6.258	6.216	6.176	6.125	6.069	6.009	5.94	5.867	5.77	5.646	5.525	5.383	5.225	5.038	4.812	4.511	3.835	2.44	0.78	0	0
-65	4.9	4.896	4.887	4.864	4.843	4.819	4.791	4.76	4.729	4.695	4.647	4.581	4.503	4.369	4.205	3.977	3.653	3.249	2.501	1.345	0.306	0	0
-75	2.94	2.94	2.94	2.94	2.908	2.887	2.861	2.83	2.799	2.746	2.68	2.59	2.49	2.355	2.175	1.954	1.686	1.392	0.918	0.354	0.023	0	0
-85	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.29	0.283	0.273	0.26	0.243	0.225	0.205	0.173	0.135	0.085	0.046	0.007	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

## 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	
85		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	
65		0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0	0.1	0	0	0	0	
55		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	
47.5		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
42.5		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
37.5		0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
33		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	0	0	0	0	0	0	0	0	0	
29		0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	
25.5		0.3	0.7	0.6	0.5	0.4	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	
22.5		0.7	1.2	1.1	1	0.9	0.8	0.6	0.5	0.3	0.3	0.2	0.1	0.1	0.1	0	0	0	0	0	0	0	0	
19.5		1.11 *	2.14 *	1.99 *	1.82 *	1.63 *	1.4	1.2	0.9	0.7	0.6	0.4	0.2	0.1	0.1	0.1	0	0	0	0	0	0	0	
17		1.37 *	2.64 *	2.46 *	2.27 *	2.06 *	1.81 *	1.54 *	1.26 *	1	0.9	0.6	0.3	0.2	0.1	0.1	0	0	0	0	0	0	0	
15		1.51 *	2.89 *	2.67 *	2.43 *	2.19 *	1.92 *	1.65 *	1.37 *	1.10 *	1	0.7	0.4	0.2	0.1	0.1	0	0	0	0	0	0	0	
13		2.06 *	3.91 *	3.57 *	3.22 *	2.83 *	2.43 *	2.05 *	1.71 *	1.38 *	1.29 *	1	0.5	0.3	0.1	0.1	0	0	0	0	0	0	0	
11		2.76 *	5.23 *	4.79 *	4.30 *	3.70 *	3.09 *	2.53 *	2.07 *	1.67 *	1.58 *	1.2	0.7	0.3	0.1	0.1	0	0	0	0	0	0	0	
9		3.44 *	6.60 *	6.15 *	5.57 *	4.78 *	3.93 *	3.14 *	2.48 *	1.96 *	1.87 *	1.49 *	0.8	0.4	0.2	0.1	0	0	0	0	0	0	0	
7		3.93 *	7.65 *	7.29 *	6.74 *	5.91 *	4.89 *	3.85 *	2.95 *	2.27 *	2.14 *	1.73 *	1	0.5	0.2	0.1	0	0	0	0	0	0	0	
5		4.22 *	8.30 *	8.03 *	7.59 *	6.85 *	5.81 *	4.59 *	3.45 *	2.59 *	2.39 *	1.94 *	1.1	0.6	0.2	0.1	0	0	0	0	0	0	0	
3		4.41 *	8.70 *	8.48 *	8.11 *	7.49 *	6.52 *	5.23 *	3.92 *	2.89 *	2.61 *	2.11 *	1.3	0.7	0.3	0.1	0	0	0	0	0	0	0	
1		4.54 *	8.98 *	8.78 *	8.44 *	7.89 *	6.99 *	5.70 *	4.29 *	3.12 *	2.78 *	2.23 *	1.3	0.8	0.3	0.1	0	0	0	0	0	0	0	
0		2.31 *	4.57 *	4.47 *	4.31 *	4.04 *	3.61 *	2.97 *	2.24 *	1.62 *	1.43 *	1.14 *	0.7	0.4	0.2	0.1	0	0	0	0	0	0	0	

-1	2.32 *	4.61 *	4.50 *	4.34 *	4.07 *	3.64 *	3.00 *	2.27 *	1.64 *	1.45 *	1.15 *	0.7	0.4	0.2	0.1	0	0	0	0	0	0	0	
-3	4.65 *	9.22 *	9.02 *	8.69 *	8.15 *	7.28 *	5.99 *	4.53 *	3.27 *	2.88 *	2.30 *	1.4	0.8	0.3	0.1	0	0	0	0	0	0	0	
-5	4.59 *	9.14 *	8.93 *	8.59 *	8.02 *	7.11 *	5.80 *	4.35 *	3.15 *	2.80 *	2.24 *	1.3	0.8	0.3	0.1	0	0	0	0	0	0	0	
-7	4.48 *	8.93 *	8.73 *	8.35 *	7.70 *	6.71 *	5.39 *	4.02 *	2.94 *	2.64 *	2.13 *	1.3	0.7	0.3	0.1	0	0	0	0	0	0	0	
-9	4.30 *	8.57 *	8.35 *	7.89 *	7.13 *	6.04 *	4.76 *	3.56 *	2.65 *	2.43 *	1.97 *	1.2	0.6	0.3	0.1	0	0	0	0	0	0	0	
-11	3.97 *	7.95 *	7.70 *	7.12 *	6.25 *	5.15 *	4.01 *	3.05 *	2.33 *	2.18 *	1.77 *	1	0.6	0.2	0.1	0	0	0	0	0	0	0	
-13	3.40 *	6.85 *	6.59 *	5.96 *	5.09 *	4.15 *	3.27 *	2.56 *	2.01 *	1.91 *	1.53 *	0.9	0.5	0.2	0.1	0	0	0	0	0	0	0	
-15	2.64 *	5.32 *	5.11 *	4.59 *	3.92 *	3.24 *	2.63 *	2.13 *	1.72 *	1.62 *	1.3	0.7	0.4	0.1	0.1	0	0	0	0	0	0	0	
-17	1.90 *	3.85 *	3.72 *	3.40 *	2.96 *	2.52 *	2.12 *	1.76 *	1.42 *	1.33 *	1	0.6	0.3	0.1	0.1	0	0	0	0	0	0	0	
-20	1.67 *	3.38 *	3.31 *	3.09 *	2.76 *	2.42 *	2.06 *	1.71 *	1.37 *	1.3	1	0.5	0.2	0.1	0.1	0	0	0	0	0	0	0	
-23	1.36 *	2.74 *	2.70 *	2.55 *	2.31 *	2.04 *	1.73 *	1.4	1.1	1	0.7	0.4	0.2	0.1	0.1	0	0	0	0	0	0	0	
-26	0.85 *	1.71 *	1.68 *	1.59 *	1.4	1.3	1.1	0.8	0.6	0.6	0.4	0.2	0.1	0.1	0.1	0	0	0	0	0	0	0	
-29	0.5	1	1	1	0.9	0.7	0.6	0.5	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	
-33	0.2	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	
-38	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	0	0	0	0	0	0	
-43	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	
-48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
-55	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0	0.1	0	0	0	0	
-65	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0	0.1	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	
-85	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	
Total	70	138	133	125	112	97	79	61	46	42	33	19	11	4.8	2.3	1.5	1.1	1.1	0.9	0.4	0.1	0	977.4

## 5.0 THD and PF Test

Model No.	HSLED18Y	Sample ID.	C1
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### 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

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD
25.1	277.03	60	0.082	20.83	0.918	18.68%
25.1	120.02	60	0.171	20.38	0.993	9.35%

## 6.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last	Calibration Due
DLF107	Integrating Sphere System	2017/12/28	2018/12/27
DLF108	Auxiliary Lamp	2017/12/28	2018/12/27
DLF122	Measurement Standard Lamp Standard Lamp Type: 220 V, 0.4720 A, Tungsten, Omni-directional	2017/12/28	2018/12/27
DLF116	AC Power Source	2017/12/28	2018/12/27
DLF113	Power Meter	2017/12/28	2018/12/27
DLF112	Temperature Recorder	2017/12/28	2018/12/27
DLF114	Temperature & Humidity Datalogger	2017/12/28	2018/12/27
DLF101	Goniophotometer	2017/12/28	2018/12/27
DLF125	Standard Lamp Standard Lamp Type: 76.58 V, 6.7875 A, Tungsten, Omni-directional	2017/12/28	2018/12/27
DLF104	AC Power Source	2017/12/28	2018/12/27
DLF507	DC Power Source	2017/12/28	2018/12/27
DLF102	Power Meter	2017/12/28	2018/12/27
DLF111	Temperature & Humidity Datalogger	2017/12/28	2018/12/27
DLF119	Power Meter	2017/12/28	2018/12/27
DLF031	Temperature data logger	2017/12/28	2018/12/27
DLF022	Digital power meter	2017/12/28	2018/12/27
DLF003	Temperature & Humidity Datalogger	2017/12/28	2018/12/27

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