

Photometric Test Report

Relevant Standards

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

Prepared For

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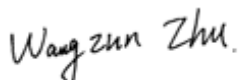
Test Date

2018/4/16

Issue Date

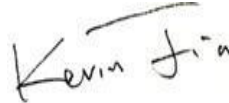
2018/4/16

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	1732	P
Zonal Lumen Requirement (0°-90°)	IES LM-79-2008	≥85%	100.00%	P
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	110	111.3	P
Allowable CCTs* (K)	IES LM-79-2008	5700	3047	P
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	70	70.7	P
Power Factor	ANSI C82.77:2014	0.873	0.926	P
Total Harmonic Distortion (A%)	ANSI C82.77:2014	25.00%	11.04%	P

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2018/4/16	HBLED13Y	G1
2	Goniophotometer Test	2018/4/16	HBLED13Y	G1
3	THD and PF Test	2018/4/16	HBLED13Y	G1

Remark(If any)

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3.0 Production Description

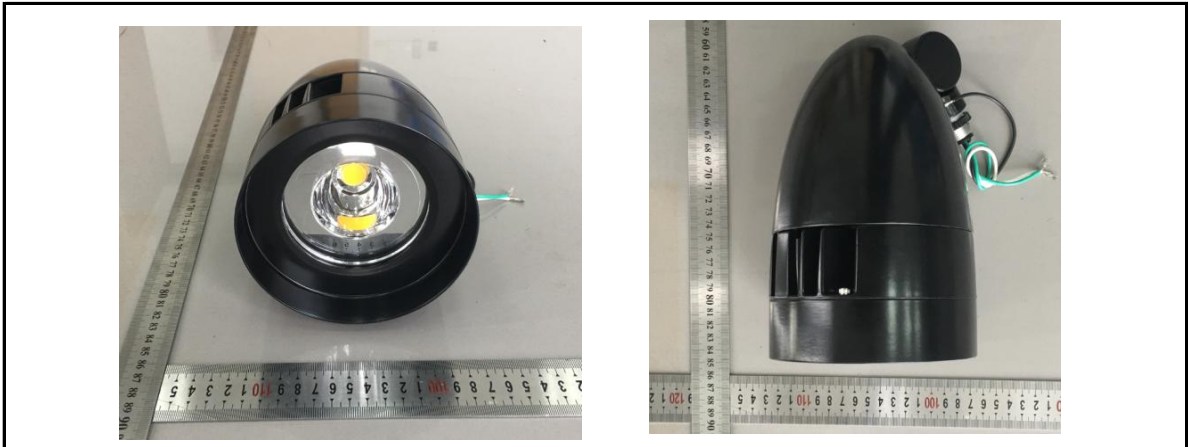
Luminaire Description:

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.	HBLED13Y	Sample ID.	G1
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 ± 0.2 percent under load.

The sample was measured using 4π 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	276.93	60	0.060	15.48	0.926

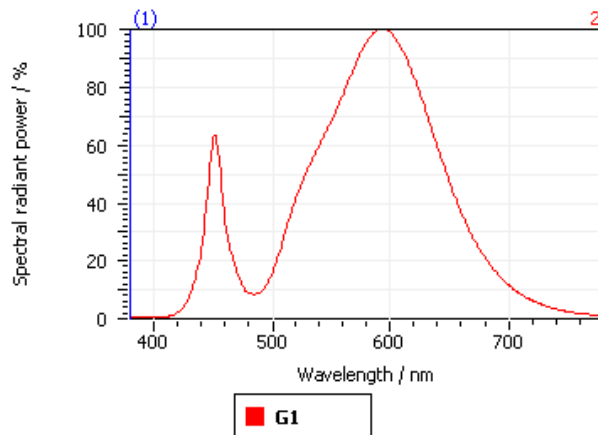
Test Result

CCT (K)	CRI (Ra)	Duv
3047	70.7	2.3E-03

4.1 Integrating Sphere Test

Spectroradiometric Parameters

Results



Spectral values

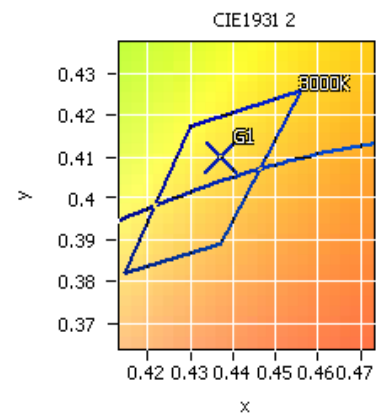
DominantWavelength	581.84 nm
Purity	0.542
PeakWavelength	593.62 nm
Width50%:	119.28 nm

Color Coordinates

Correlated Color Temperature 3047 K

x: 0.4369 u: 0.2481 u': 0.2481
y: 0.4099 v: 0.3491 v': 0.5236

ResultsCRICRI01	67.0	ResultsCRICRI09	-32.4
ResultsCRICRI02	80.3	ResultsCRICRI10	53.4
ResultsCRICRI03	91.3	ResultsCRICRI11	59.5
ResultsCRICRI04	66.5	ResultsCRICRI12	39.3
ResultsCRICRI05	65.0	ResultsCRICRI13	69.2
ResultsCRICRI06	71.1	ResultsCRICRI14	94.9
ResultsCRICRI07	79.4	ResultsCRICRI15	59.8
ResultsCRICRI08	45.2	ResultsCRICRI16	59.3
ResultsCRI	70.7		



Nominal CCT: 3000K

PlanckDistance 2.3E-003

4.0 LM-79 Measurement and Test Results

4.3 Goniophotometer Test

Model No.	HBLED13Y	Sample ID.	G1
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 ± 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

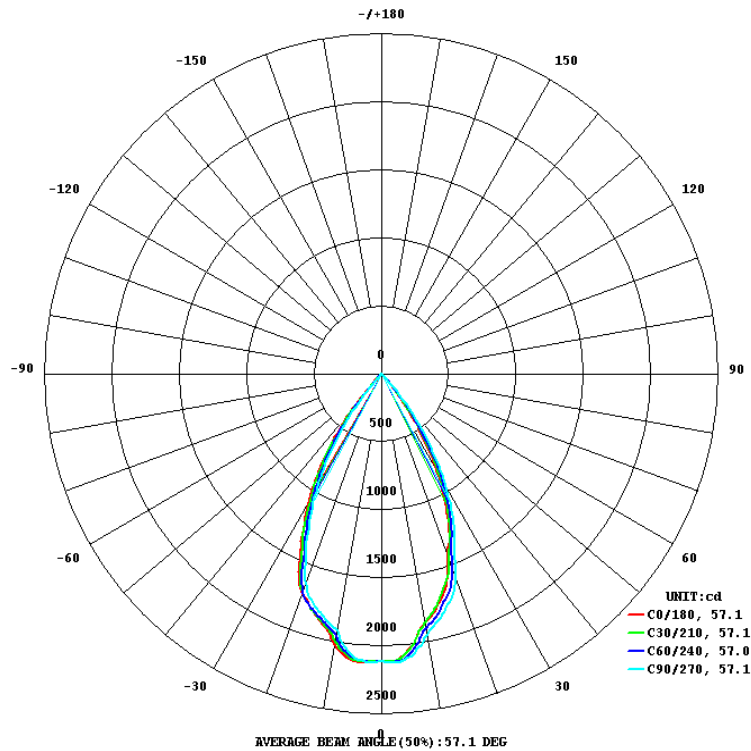
Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
25.1	277.06	60	0.060	15.56	0.933	Light Down

Test Result

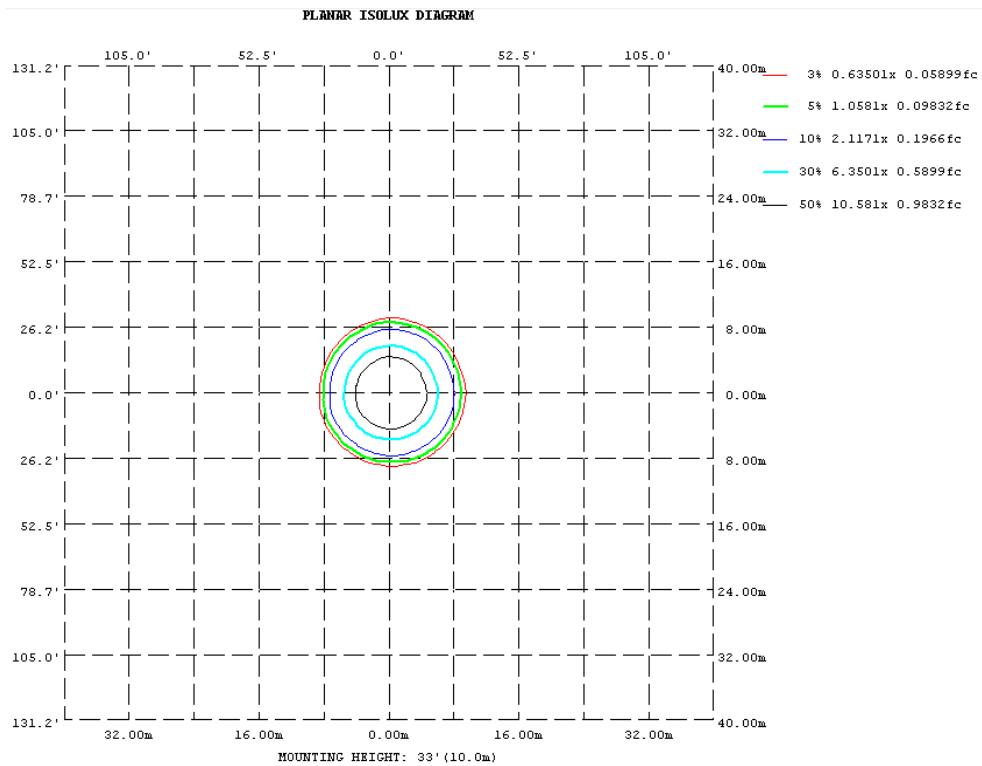
Flux(lm)	Zonal Lumen Requirement (0° - 90°)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
		Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	
1732	100.00%	81.7	81.3	57.1	57.1	111.3

4.3 Goniophotometer Test

Light Distrubtion Curve



Isolux Plot



4.3 Goniophotometer Test

Zonal Lumen Summary

DEG	C0	C45	C90	C135	C180	C225	C270	C315
7	2020	1978	1919	1909	1858	1878	1947	1978
10	1726	1730	1647	1579	1459	1508	1616	1697
20	1091	1034	960.7	899.9	832.5	887.7	960.4	1023
30	372.7	321.6	252.7	204.1	156.5	197.0	272.3	326.9
40	13.65	12.56	8.362	7.356	5.639	6.419	9.200	12.28
50	1.047	1.250	1.172	1.177	1.093	1.172	1.211	1.178
60	0.1702	0.5600	0.5627	0.5467	0.1325	0.6058	0.6458	0.5695
70	0.0233	0.0138	0.0137	0.0132	0.0105	0.0108	0.0155	0.0171
80	0	0	0	0	0	0	0	0
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 = 3.5 %							

4.3 Goniophotometer Test

ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0 - 10	194.38	0 - 10	194.38	11.22%
10 - 20	501.43	0 - 20	695.81	40.17%
20 - 30	589.43	0 - 30	1285.24	74.21%
30 - 40	372.59	0 - 40	1657.84	95.72%
40 - 50	69.02	0 - 50	1726.86	99.71%
50 - 60	3.98	0 - 60	1730.84	99.93%
60 - 70	0.93	0 - 70	1731.77	99.99%
70 - 80	0.19	0 - 80	1731.96	100.00%
80 - 90	0.01	0 - 90	1731.97	100.00%
90 - 100	0.00	0 - 100	1731.97	100.00%
100 - 110	0.00	0 - 110	1731.97	100.00%
110 - 120	0.00	0 - 120	1731.97	100.00%
120 - 130	0.00	0 - 130	1731.97	100.00%
130 - 140	0.00	0 - 140	1731.97	100.00%
140 - 150	0.00	0 - 150	1731.97	100.00%
150 - 160	0.00	0 - 160	1731.97	100.00%
160 - 170	0.00	0 - 170	1731.97	100.00%
170 - 180	0.00	0 - 180	1731.97	100.00%

4.3 Goniophotometer Test

Axial Candela

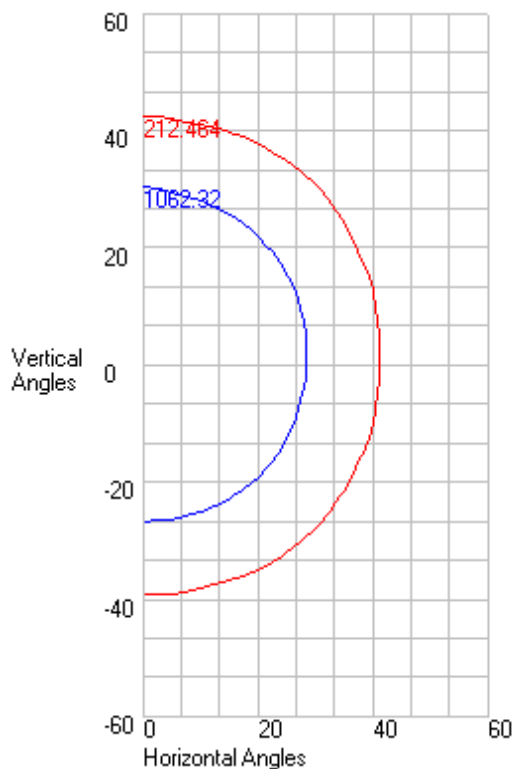
DEG.	HOR.	DEG.	VERT.
90	0	90	0
85	0	85	0
75	0.11	75	0.04
65	1.09	65	0.75
55	3.05	55	3.58
47.5	18.37	47.5	34.39
42.5	142.08	42.5	207.79
37.5	435.69	37.5	546.85
33	759.89	33	886.47
29	1029.96	29	1157.27
25.5	1261	25.5	1393.42
22.5	1426.64	22.5	1610.76
19.5	1645.31	19.5	1735.65
17	1745.58	17	1802.91
15	1805.4	15	1852.61
13	1863.33	13	1905
11	1912.11	11	1979.83
9	1994.76	9	2053.04
7	2060.21	7	2102.41
5	2099.74	5	2124.64
3	2122.5	3	2117.73
1	2118.52	1	2111.98
0	2114.809	0	2114.809
-1	2116.86	-1	2114.52
-3	2120.03	-3	2106.14
-5	2104.92	-5	2058.1
-7	2054.03	-7	1991.91
-9	1977.36	-9	1888.55
-11	1894.5	-11	1834.29
-13	1853.51	-13	1781.75
-15	1805.15	-15	1714.13
-17	1756.02	-17	1639.67
-19.5	1672.59	-19.5	1496.57
-22.5	1479.98	-22.5	1329
-25.5	1274.49	-25.5	1140.16
-29	1031.58	-29	905.29
-33	739.87	-33	610.96
-37.5	417.14	-37.5	296.05
-42.5	115.69	-42.5	63.65
-47.5	16.43	-47.5	8.74
-55	3.29	-55	1.51
-65	1.11	-65	0.67
-75	0.06	-75	0.04
-85	0	-85	0
-90	0	-90	0

4.3 Goniophotometer Test

Characteristics

NEMA Type	5 H x 5 V
Maximum Candela	2124.64
Maximum Candela Angle	0 H 5 V
Horizontal Beam Angle (50%)	56.7
Vertical Beam Angle (50%)	57.1
Horizontal Field Angle (10%)	82
Vertical Field Angle (10%)	81.7
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Beam Lumens	1206
Beam Efficiency	N.A.
Field Lumens	1675
Field Efficiency	N.A.
Spill Lumens	56
Luminaire Lumens	1732
Total Efficiency	N.A.
Total Luminaire Watts	15.556
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.037	0.03	0.03	0.03	0.028	0.02	0.02	0.01	0	0	0	0
65	0.75	0.755	0.765	0.766	0.766	0.763	0.758	0.741	0.729	0.723	0.72	0.722	0.684	0.64	0.591	0.529	0.48	0.154	0.091	0.02	0	0	0
55	3.58	3.571	3.553	3.449	3.321	3.131	2.878	2.626	2.402	2.083	1.615	1.377	1.278	1.164	1.061	0.996	0.957	0.918	0.568	0.097	0.01	0	0
47.5	34.39	33.14	30.644	26.46	23.217	20.324	17.97	16.506	14.935	13.231	10.947	8.373	6.697	5.017	3.28	1.56	1.177	1.028	0.938	0.157	0.02	0	0
42.5	207.79	204.565	198.123	179.069	160.809	139.085	116.292	98.992	81.541	62.057	39.9	22.299	18.557	12.935	7.574	4.424	1.91	1.187	0.986	0.502	0.02	0	0
37.5	546.85	542.075	525.284	502.799	477.636	439.34	408.595	372.786	331.691	287.227	235.173	160.498	91.873	39.255	18.254	8.832	4.321	1.559	1.02	0.585	0.027	0	0
33	886.47	879.89	858.114	829.908	793.446	757.543	719.09	668.331	617.62	565.598	488.099	383.622	275.534	159.429	55.707	17.929	7.409	2.975	1.102	0.702	0.03	0	0
29	1157.27	1150.47	1127.69	1097.71	1058.03	1021.4	982.584	939.307	878.39	811.324	719.481	606.699	471.498	323.587	155.3	38.995	11.941	4.706	1.226	0.795	0.032	0	0
25.5	1393.42	1387.04	1365.21	1334.42	1292.08	1250.74	1200.81	1144.87	1080.11	1010.70	914.732	781.856	642.353	466.878	264.726	83.193	17.417	6.248	1.349	0.922	0.045	0	0
22.5	1610.76	1602.28	1571.21	1527.39	1471.63	1418.70	1378.03	1327.86	1254.31	1173.53	1062.16	926.955	776.643	596.434	367.441	146.426	22.682	7.674	1.47	0.983	0.073	0	0
19.5	1735.65	1734.30	1725.02	1705.88	1680.60	1640.25	1575.93	1479.97	1395.46	1329.81	1211.76	1054.63	899.4 *	702.288	465.686	212.918	37.179	9.193	1.644	1.033	0.092	0	0
17	1802.91	1799.68	1785.40	1767.91	1756.30	1742.1	1702.65	1632.81	1537.22	1422.82	1323.33	1161.15	987.211	785.894	537.762	260.893	54.533	11.515	1.949	1.042	0.099	0	0
15	1852.61	1850.59	1840.25	1828.27	1807.84	1776.15	1749.78	1709.77	1638.95	1524.73	1381.05	1235.30	1053.14	844.22	589.307	301.337	72.8	13.106	2.18	1.048	0.105	0	0
13	1905 *	1898.95	1879.64	1869.63	1858.31	1831.06	1786.91	1745.31	1695.85	1606.14	1446.54	1300.55	1115.17	896.692	634.761	337.075	87.08	14.502	2.385	1.053	0.107	0	0
11	1979.83	1964.04	1923.17	1914.26	1892.43	1871.10	1835.77	1775.88	1727.99	1661.00	1520.11	1346.18	1165.18	937.09	679.569	368.894	98.202	15.697	2.55	1.06	0.108	0	0
9	2053.04	2044.28	2016.26	1973.15	1925.55	1892.41	1855.98	1803.14	1747.96	1693.51	1576.68	1371.70	1204.86	974.073	711.519	394.811	112.901	16.686	2.708	1.065	0.109	0	0
7	2102.41	2094.75	2075.33	2051.48	1984.86	1913.34	1864.39	1818.34	1764.91	1710.37	1612.30	1399.53	1234.19	1001.11	730.956	418.488	126	17.407	2.864	1.07	0.11	0	0
5	2124.64	2121.02	2109.50	2095.51	2036.40	1946.25	1883.54	1830.69	1778.48	1717.98	1632.35	1420.93	1253.56	1019.32	748.712	428.888	135.368	17.907	2.972	1.076	0.112	0	0
3	2117.73	2123.15	2117.79	2104.44	2052.90	1985.17	1896.82	1842.40	1791.11	1731.91	1642.79	1432.41	1263.62	1030.07	758.982	436.493	144.978	18.491	3.079	1.082	0.111	0	0
1	2111.98	2117.72	2124.17	2105.2	2063.65	1996.82	1911.20	1859.14	1803.30	1743.36	1648.09	1433.46	1265.40	1033.35	762.556	438.364	143.047	18.41	3.06	1.087	0.11	0	0
0	2114.80	2118.52	2122.5	2099.74	2060.21	1994.76	1912.11	1863.33	1805.4	1745.58	1645.31	1426.64	1261 *	1029.96	759.89	435.69	142.08	18.37	3.05	1.09	0.11	0	0
-1	2114.52	2116.63	2119.59	2098.83	2054.65	1982.52	1908.63	1858.55	1798.22	1740.53	1641.06	1421.10	1256.89	1026.73	756.555	433.164	140.686	18.31	3.043	1.089	0.11	0	0
-3	2106.14	2102.86	2099.60	2071.47	2014.59	1935.09	1891.79	1838.23	1774.01	1724.32	1618.87	1396.77	1238.11	1010.38	740.973	421.083	137.905	18.189	3.028	1.088	0.109	0	0
-5	2058.1	2058.83	2038.87	2014.58	1954.35	1893.72	1861.76	1807.74	1745.93	1703.37	1584.46	1365.58	1211.19	986.962	718.704	403.775	124.035	17.305	2.904	1.087	0.108	0	0
-7	1991.91	1988.29	1961.35	1922.12	1882.10	1852.27	1821.23	1766.77	1719.37	1664.77	1529.02	1332.22	1175.22	956.36	688.208	384.315	110.764	16.434	2.792	1.087	0.105	0	0
-9	1888.55	1887.98	1872.71	1851.53	1830.53	1801.64	1766.66	1723.72	1682.24	1606.37	1454.76	1302.07	1134.57	918.444	654.481	352.916	96.987	15.299	2.657	1.086	0.103	0	0
-11	1834.29	1835.19	1825.44	1803.58	1773.43	1743.80	1713.48	1676.60	1619.63	1531.92	1379.52	1249.59	1085.00	873.764	610.695	319.88	83.443	13.895	2.394	1.087	0.1	0	0
-13	1781.75	1778.80	1760.37	1735.88	1704.96	1681.69	1653.15	1604.79	1536.66	1436.48	1318.65	1187.72	1025.48	822.814	555.537	282.156	72.34	12.213	2.075	1.081	0.098	0	0
-15	1714.13	1708.23	1685.77	1662.49	1639.33	1610.40	1574.98	1517.04	1439.07	1349.05	1259.03	1120.03	958.43	755.191	502.229	241.585	58.902	10.276	1.795	1.074	0.095	0	0
-17	1639.67	1634.40	1613.15	1589.77	1564.55	1526.49	1475.66	1410.42	1341.98	1279.79	1182.09	1041.65	885.972	684.791	444.981	201.428	42.135	8.48	1.646	1.06	0.086	0	0
-19.5	1496.57	1497.68	1484.21	1460.53	1427.74	1387.81	1344.44	1299.99	1239.58	1171.88	1070.67	934.97	785.171	587.418	364.855	157.71	24.677	7.145	1.557	1.033	0.075	0	0
-22.5	1329 *	1329.42	1322.13	1311.51	1280.75	1242.25	1198.93	1148.21	1086.66	1016.93	922.892	793.177	646.597	471.321	264.512	94.312	18.566	5.952	1.43	0.956	0.058	0	0
-25.5	1140.16	1141.44	1133.52	1117.42	1091.30	1059.14	1018.97	972.034	916.799	851.605	760.323	634.336	497.147	337.374	176.255	56.798	12.829	5.169	1.289	0.892	0.036	0	0
-29	905.29	907.048	900.573	886.241	862.928	833.561	796.346	753.801	695.769	633.355	550.455	444.754	323.008	202.681	87.863	22.626	7.51	3.589	1.168	0.782	0.031	0	0
-33	610.96	612.484	606.594	594.177	574.906	554.781	524.029	478.36	432.419	382.163	313.396	228.014	154.955	82.932	31.865	11.86	5.199	2.32	1.082	0.679	0.03	0	0
-37.5	296.05	297.53	293.984	285.294	274.129	251.496	227.59	202.49	175.699	145.863	108.892	73.973	45.248	20.692	11.398	5.446	3.014	1.416	1.056	0.576	0.023	0	0
-42.5	63.65	64.328	65.682	60.619	55.888	49.487	42.045	36.117	28.813	22.372	18.291	14.755	10.051	6.476	4.581	2.898	1.481	1.145	1.104	0.445	0.02	0	0
-47.5	8.74	8.905	9.233	8.969	8.628	8.111	7.436	6.84	6.311	5.89	5.548	4.804	3.566	2.926	1.911	1.382	1.154	1.076	0.903	0.12	0.014	0	0
-55	1.51	1.51	1.51	1.489	1.468	1.441	1.416	1.398	1.379	1.359	1.327	1.283	1.234	1.175	1.127	1.109	1.181	0.895	0.551	0.044	0.01	0	0
-65	0.67	0.674	0.681	0.68	0.68	0.679	0.677	0.672	0.678	0.684	0.685	0.658	0.642	0.644	0.535	0.445	0.254	0.111	0.032	0.013	0	0	0
-75	0.04	0.039	0.038	0.037	0.035	0.034	0.032	0.031	0.03	0.03	0.03	0.03	0.03	0.022	0.02	0.02	0.01	0.01	0.007	0	0	0	0
-85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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	0	0	0	0	0	0	0	0	
55		0	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
47.5		0.2	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	
42.5		0.57 *	1.13 *	1.09 *	1.03 *	0.95 *	0.87 *	0.78 *	0.68 *	0.6	0.6	0.5	0.3	0.2	0.1	0.1	0	0	0	0	0	0	0	
37.5		0.98 *	1.93 *	1.88 *	1.81 *	1.72 *	1.61 *	1.49 *	1.35 *	1.21 *	1.30 *	1.23 *	0.86 *	0.6	0.3	0.1	0.1	0	0	0	0	0	0	
33		1.24 *	2.46 *	2.40 *	2.33 *	2.23 *	2.13 *	2.01 *	1.86 *	1.70 *	1.89 *	1.88 *	1.45 *	1.16 *	0.7	0.3	0.1	0	0	0	0	0	0	
29		1.36 *	2.69 *	2.64 *	2.57 *	2.48 *	2.37 *	2.25 *	2.11 *	1.96 *	2.20 *	2.27 *	1.83 *	1.57 *	1.09 *	0.5	0.2	0	0	0	0	0	0	
25.5		1.37 *	2.72 *	2.67 *	2.60 *	2.50 *	2.39 *	2.28 *	2.15 *	2.00 *	2.27 *	2.37 *	1.96 *	1.75 *	1.30 *	0.70 *	0.2	0	0	0	0	0	0	
22.5		1.53 *	3.03 *	2.99 *	2.93 *	2.84 *	2.73 *	2.60 *	2.44 *	2.28 *	2.60 *	2.73 *	2.29 *	2.10 *	1.64 *	0.97 *	0.4	0.1	0	0	0	0	0	
19.5		1.35 *	2.68 *	2.65 *	2.62 *	2.58 *	2.51 *	2.40 *	2.26 *	2.10 *	2.40 *	2.54 *	2.14 *	1.99 *	1.60 *	1.01 *	0.4	0.1	0	0	0	0	0	
17		1.11 *	2.21 *	2.19 *	2.17 *	2.14 *	2.10 *	2.04 *	1.95 *	1.82 *	2.06 *	2.18 *	1.85 *	1.73 *	1.42 *	0.92 *	0.4	0.1	0	0	0	0	0	
15		1.14 *	2.27 *	2.25 *	2.23 *	2.20 *	2.15 *	2.10 *	2.03 *	1.92 *	2.18 *	2.30 *	1.96 *	1.85 *	1.53 *	1.01 *	0.5	0.1	0	0	0	0	0	
13		1.18 *	2.34 *	2.31 *	2.28 *	2.25 *	2.20 *	2.14 *	2.07 *	1.98 *	2.28 *	2.41 *	2.05 *	1.94 *	1.63 *	1.10 *	0.50 *	0.1	0	0	0	0	0	
11		1.23 *	2.42 *	2.38 *	2.34 *	2.29 *	2.24 *	2.18 *	2.11 *	2.03 *	2.37 *	2.50 *	2.12 *	2.02 *	1.71 *	1.18 *	0.54 *	0.1	0	0	0	0	0	
9		1.26 *	2.51 *	2.47 *	2.41 *	2.33 *	2.26 *	2.20 *	2.13 *	2.05 *	2.42 *	2.57 *	2.18 *	2.09 *	1.77 *	1.23 *	0.59 *	0.1	0	0	0	0	0	
7		1.29 *	2.56 *	2.53 *	2.47 *	2.38 *	2.29 *	2.22 *	2.14 *	2.06 *	2.44 *	2.62 *	2.23 *	2.14 *	1.81 *	1.28 *	0.62 *	0.2	0	0	0	0	0	
5		1.29 *	2.58 *	2.56 *	2.51 *	2.42 *	2.31 *	2.23 *	2.16 *	2.07 *	2.46 *	2.65 *	2.26 *	2.17 *	1.84 *	1.30 *	0.64 *	0.2	0	0	0	0	0	
3		1.29 *	2.58 *	2.56 *	2.52 *	2.44 *	2.33 *	2.24 *	2.16 *	2.08 *	2.47 *	2.66 *	2.28 *	2.18 *	1.86 *	1.32 *	0.65 *	0.2	0	0	0	0	0	
1		0.64 *	1.29 *	1.28 *	1.26 *	1.22 *	1.17 *	1.12 *	1.08 *	1.04 *	1.23 *	1.33 *	1.14 *	1.09 *	0.93 *	0.66 *	0.32 *	0.1	0	0	0	0	0	
0																								

-1	0.64 *	1.29 *	1.28 *	1.26 *	1.22 *	1.16 *	1.12 *	1.08 *	1.04 *	1.23 *	1.33 *	1.13 *	1.09 *	0.93 *	0.66 *	0.32 *	0.1	0	0	0	0	0	
-3	1.29 *	2.57 *	2.55 *	2.49 *	2.40 *	2.30 *	2.22 *	2.15 *	2.07 *	2.45 *	2.63 *	2.25 *	2.16 *	1.84 *	1.30 *	0.64 *	0.2	0	0	0	0	0	
-5	1.27 *	2.54 *	2.50 *	2.44 *	2.35 *	2.27 *	2.20 *	2.12 *	2.04 *	2.41 *	2.58 *	2.20 *	2.11 *	1.80 *	1.26 *	0.61 *	0.2	0	0	0	0	0	
-7	1.24 *	2.46 *	2.43 *	2.37 *	2.30 *	2.23 *	2.16 *	2.09 *	2.01 *	2.37 *	2.52 *	2.15 *	2.06 *	1.74 *	1.21 *	0.58 *	0.1	0	0	0	0	0	
-9	1.18 *	2.36 *	2.34 *	2.29 *	2.24 *	2.19 *	2.12 *	2.05 *	1.97 *	2.29 *	2.44 *	2.09 *	1.99 *	1.68 *	1.15 *	0.53 *	0.1	0	0	0	0	0	
-11	1.14 *	2.28 *	2.26 *	2.23 *	2.19 *	2.14 *	2.08 *	2.01 *	1.91 *	2.20 *	2.34 *	2.01 *	1.91 *	1.59 *	1.07 *	0.48 *	0.1	0	0	0	0	0	
-13	1.10 *	2.21 *	2.20 *	2.17 *	2.12 *	2.07 *	2.02 *	1.94 *	1.83 *	2.09 *	2.22 *	1.91 *	1.81 *	1.49 *	0.98 *	0.4	0.1	0	0	0	0	0	
-15	1.07 *	2.13 *	2.12 *	2.09 *	2.05 *	2.00 *	1.94 *	1.84 *	1.72 *	1.98 *	2.11 *	1.80 *	1.69 *	1.37 *	0.88 *	0.4	0.1	0	0	0	0	0	
-17	1.02 *	2.05 *	2.04 *	2.01 *	1.97 *	1.91 *	1.83 *	1.72 *	1.62 *	1.86 *	1.98 *	1.68 *	1.56 *	1.24 *	0.77 *	0.3	0.1	0	0	0	0	0	
-20	1.20 *	2.40 *	2.39 *	2.35 *	2.29 *	2.20 *	2.10 *	1.99 *	1.87 *	2.15 *	2.27 *	1.91 *	1.75 *	1.36 *	0.81 *	0.3	0.1	0	0	0	0	0	
-23	1.29 *	2.59 *	2.58 *	2.54 *	2.47 *	2.37 *	2.27 *	2.15 *	2.01 *	2.29 *	2.40 *	1.99 *	1.78 *	1.32 *	0.73 *	0.2	0	0	0	0	0	0	
-26	1.13 *	2.26 *	2.25 *	2.22 *	2.16 *	2.07 *	1.97 *	1.85 *	1.72 *	1.95 *	2.00 *	1.62 *	1.40 *	0.98 *	0.5	0.2	0	0	0	0	0	0	
-29	1.09 *	2.19 *	2.17 *	2.14 *	2.08 *	1.99 *	1.88 *	1.75 *	1.61 *	1.79 *	1.80 *	1.41 *	1.14 *	0.7	0.3	0.1	0	0	0	0	0	0	
-33	0.93 *	1.86 *	1.84 *	1.81 *	1.75 *	1.67 *	1.56 *	1.43 *	1.28 *	1.39 *	1.34 *	0.98 *	0.7	0.4	0.2	0.1	0	0	0	0	0	0	
-38	0.62 *	1.25 *	1.24 *	1.22 *	1.17 *	1.10 *	1.01 *	0.90 *	0.78 *	0.81 *	0.7	0.5	0.3	0.2	0.1	0	0	0	0	0	0	0	
-43	0.3	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0	0	0	0	0	0	0	0	
-48	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	0	
-55	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	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	
-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	36	71	70	69	67	64	62	58	55	63	66	55	50	40	26	11	2.5	0.7	0.2	0	0	0	865.8

5.0 THD and PF Test

Model No.	HBLED13Y	Sample ID.	G1
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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	276.93	60	0.060	15.48	0.926	11.04%
25.1	119.98	60	0.122	14.50	0.992	8.29%

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-derectional	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-derectional	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*****