Photometric Test Report

Relevant Standards

☑IES LM-79-2008
☑ANSI C82.77:2014

Prepared For

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2018/8/28

Prepared By	**Approved By**
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1.0 Test Summary

DLC Technical Requirements v4.3

Replacement for HID lamps in Outdoor Full Cut-off Wall-mounted Area Luminaires (UL Type B)				
Requirement Category	**Test Method**	**Requirements**	**Test value**	**Results (Fail/Pass)**
Lamp Output (lm)	IES LM-79-2008	300	5662	P
Zonal Lumen Requirement (0°-90°)	IES LM-79-2008	≥97%	99.74%	P
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	90	95.2	P
Alowable CCTs* (K)	IES LM-79-2008	≤5700	2969	P
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	≥65	84.1	P
Power Factor	ANSI C82.77:2014	0.9	0.914	P
Total Harmonic Distortion (A%)	ANSI C82.77:2014	≤25%	14.80%	P

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2018/8/28	HID-60-H-EX39-830-BYP-WP/HID-60-H-EX39-850-BYP-WP	I1/I2
2	Goniophotometer Test	2018/8/28	HID-60-H-EX39-830-BYP-WP	I1
3	THD and PF Test	2018/8/28	HID-60-H-EX39-830-BYP-WP	I1

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:HID-60-H-EX39-830-BYP-WP/HID-60-H-EX39-850-BYP-WP

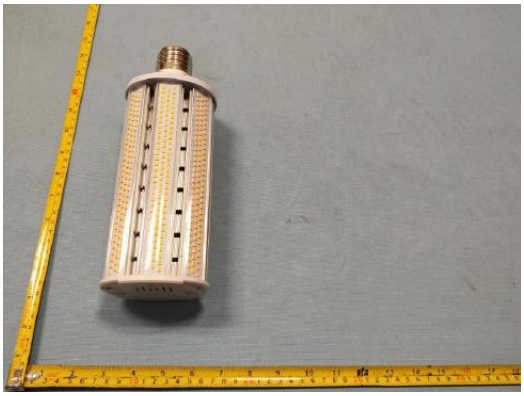
Electrical Specification: 100V-277V,50/60HZ, 60W

Test in fixture: SML-311

Light source: SPMWH1228FD5WAW0xx

Manufacturer Of Light Source: Samsung Electronics Co., LTD.

Photos of Luminaire Characteristics



4.0 LM-79 Measurement and Test Results

4.1 Integrating Sphere Test

Model No.	HID-60-H-EX39-830-BYP-WP	Sample ID.	I1
Model No.	HID-60-H-EX39-850-BYP-WP		I2
Opreate time (Min.)	90	Stabilization time (Min.)	45

Test Method
The samples were tested according to the IES LM-79-2008.
Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25º C ± 1º 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

Model No.	Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
HID-60-H-EX39-830-BYP-WP	25.1	120.00	60	0.505	59.50	0.982
HID-60-H-EX39-850-BYP-WP	25.1	120.00	60	0.490	58.00	0.987

Test Result

Model No.	CCT (K)	CRI (Ra)	Duv
HID-60-H-EX39-830-BYP-WP	2969	84.1	0.0E+00
HID-60-H-EX39-850-BYP-WP	4938	83.1	2.0E-03

4.1 Integrating Sphere Test

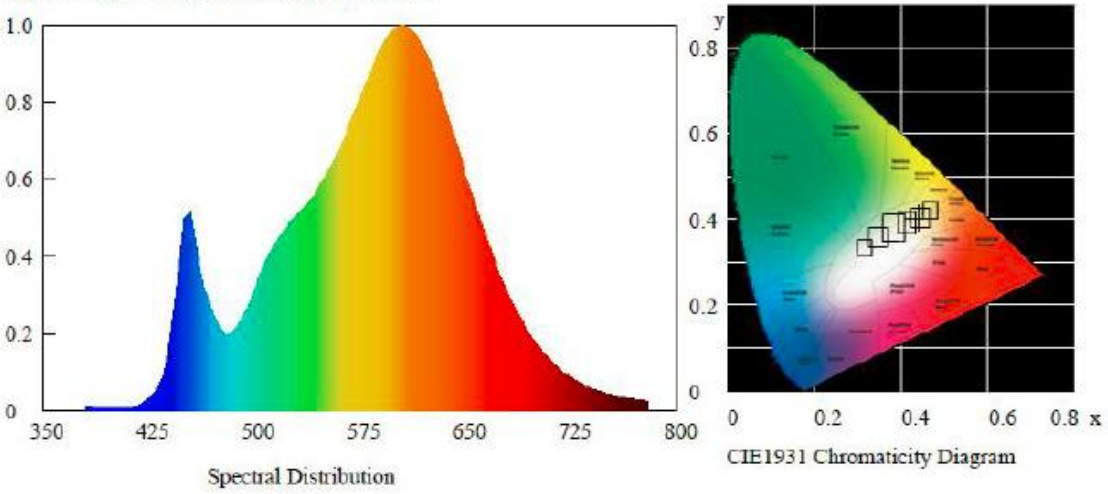
HID-60-H-EX39-830-BYP-WP

Test Condition

Temperature: 25°C RH: 58%

Spectrum Range: 380-780 nm Scan Step: 5 nm

Spectroradiometric Parameters



Chromaticity Coordinates: x=0.4388 y=0.4040 u'=0.2518 v'=0.5216

Correlated Color Temperature: 2969 K Dominant Wavelength: 582.0 nm(E)

Colour Fidelity Index: Rf=83 Gamut Index: Rg=95

Luminous Flux: 5658.45 lm Purity: 0.5300

Chromaticity Difference: 0.000Duv Peak Wavelength: 605.0 nm

Color Ratio: Kr=45.2% Kg=47.5% Kb=7.3%

Bandwidth: 136.2nm Radiant Flux: 26.871 W

Photosynthetically Active Radiation(PAR): 25.88W Photosynthetic Photon Flux(PPF):126.15μmol/s

Rendering Index: Ra=84.1

R1=83	R2=92	R3=96	R4=82	R5=83	R6=91	R7=84	R8=62
R9=15	R10=82	R11=82	R12=72	R13=86	R14=99	R15=76	Re=79

4.1 Integrating Sphere Test

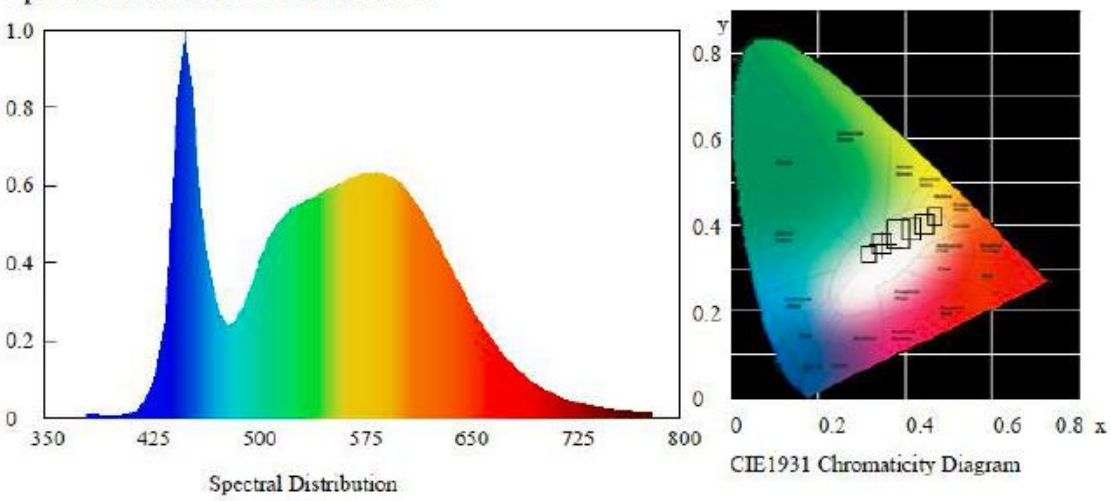
HID-60-H-EX39-850-BYP-WP

Test Condition

Temperature: 25°C RH: 58%

Spectrum Range: 380-780 nm Scan Step: 5 nm

Spectroradiometric Parameters



Chromaticity Coordinates: x=0.3473 y=0.3572 u'=0.2107 v'=0.4877

Correlated Color Temperature: 4938 K Dominant Wavelength: 570.0 nm(E)

Colour Fidelity Index: Rf=81 Gamut Index: Rg=95

Luminous Flux: 6211.80 lm Purity: 0.1132

Chromaticity Difference: 0.002Duv Peak Wavelength: 450.0 nm

Color Ratio: Kr=34.1% Kg=54.9% Kb=11.1%

Bandwidth: 21.5nm Radiant Flux: 27.113 W

Photosynthetically Active Radiation(PAR): 26.50W Photosynthetic Photon Flux(PPF):122.54μmol/s

Rendering Index: Ra=83.1

R1=81	R2=88	R3=92	R4=83	R5=81	R6=82	R7=88	R8=69
R9=11	R10=71	R11=81	R12=57	R13=84	R14=96	R15=76	Re=76

4.0 LM-79 Measurement and Test Results

4.3 Goniophotometer Test

Model No.	HID-60-H-EX39-830-BYP-WP	Sample ID.	I1
Opreate time (Min.)	90	Stabilization time (Min.)	45

Test Method
The samples were tested according to the IES LM-79-2008.
Photometric paramters were measured using a type C goniophotometer and software.
The ambient temperature shall be maintained at 25° C ± 1° C, measured at a point not more than 1 m from the sample and at the same height as the sample.
The voltage of an AC power supply (RMS voltage)or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.
The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 0.5^{o} vertical intervals and 10^{o} horizontal intervals.

Test Conditions

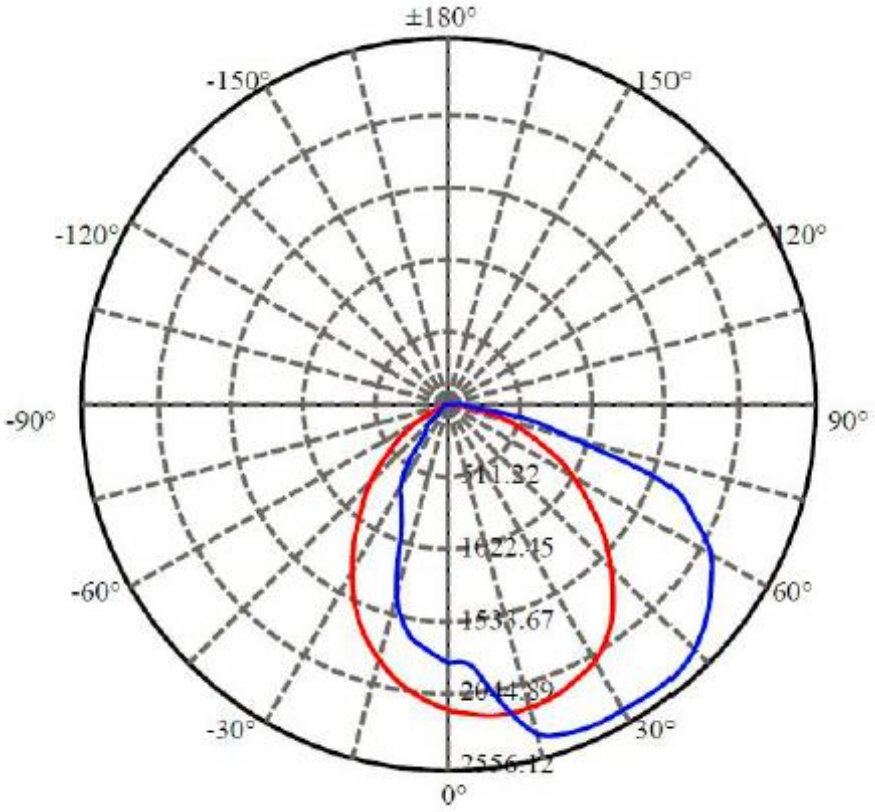
Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
25.1	120.07	60	0.517	59.50	0.958	Light Down

Test Result

Flux(lm)	Zonal Lumen Requiremen t(0°-90°)	Luminous Efficacy (lm/W)
5662	99.74%	95.2

4.3 Goniophotometer Test

Light Distrubtion Curve



C0/C180:

C90/C270:

Field angle(10%Imax):C0/180Left:71.4 Right:70.7

:C90/270Left:81.1 Right:43.9

Beam Angle(50%Imax):C0/180Left:46.1 Right:47.9

:C90/270Left:56.7 Right:32.4

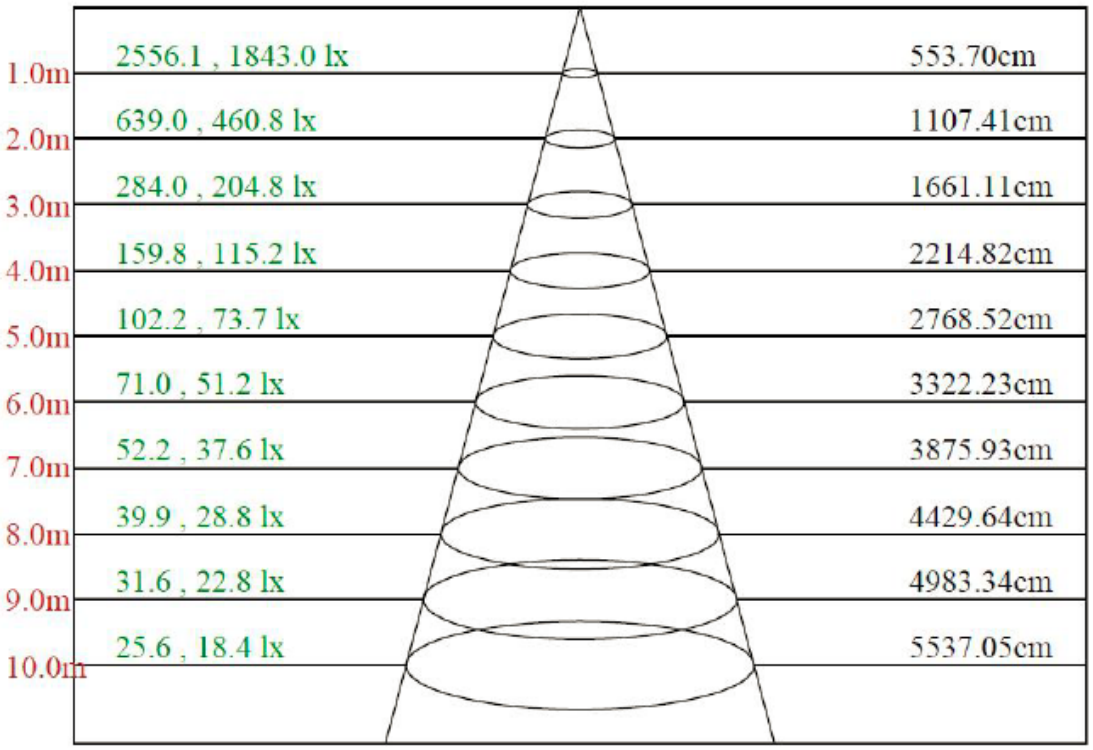
4.3 Goniophotometer Test

Zonal Lumen Summary

γ(°)	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	1856.597	.000	.000	.000%	.000%
5.0	1876.726	44.631	44.631	.788%	.788%
10.0	1912.891	135.567	180.197	2.394%	3.183%
15.0	1926.315	227.739	407.937	4.022%	7.205%
20.0	1838.965	310.312	718.249	5.481%	12.686%
25.0	1712.928	372.528	1090.777	6.580%	19.266%
30.0	1603.493	419.696	1510.472	7.413%	26.678%
35.0	1483.890	454.639	1965.111	8.030%	34.708%
40.0	1351.431	473.052	2438.163	8.355%	43.064%
45.0	1219.486	476.026	2914.189	8.408%	51.471%
50.0	1105.019	469.700	3383.890	8.296%	59.767%
55.0	1001.041	457.928	3841.817	8.088%	67.855%
60.0	899.045	439.200	4281.017	7.757%	75.613%
65.0	785.800	409.589	4690.605	7.234%	82.847%
70.0	658.013	365.583	5056.188	6.457%	89.304%
75.0	431.639	284.818	5341.005	5.031%	94.334%
80.0	245.807	181.266	5522.271	3.202%	97.536%
85.0	90.233	91.310	5613.581	1.613%	99.149%
90.0	32.819	33.693	5647.273	.595%	99.744%
95.0	9.151	11.492	5658.765	.203%	99.947%
100.0	.000	2.486	5661.251	.044%	99.991%
105.0	.000	.000	5661.251	.000%	99.991%
110.0	.000	.000	5661.251	.000%	99.991%
115.0	.013	.003	5661.255	.000%	99.991%
120.0	.064	.019	5661.273	.000%	99.991%
125.0	.142	.048	5661.321	.001%	99.992%
130.0	.193	.073	5661.394	.001%	99.993%
135.0	.180	.075	5661.470	.001%	99.995%
140.0	.219	.074	5661.543	.001%	99.996%
145.0	.245	.077	5661.621	.001%	99.997%
150.0	.232	.070	5661.691	.001%	99.998%
155.0	.129	.046	5661.736	.001%	99.999%
160.0	.064	.020	5661.756	.000%	100.000%
165.0	.052	.010	5661.766	.000%	100.000%
170.0	.052	.006	5661.772	.000%	100.000%
175.0	.013	.002	5661.775	.000%	100.000%
180.0	.052	.001	5661.776	.000%	100.000%

4.3 Goniophotometer Test

Lux Distance Curve



Max , Ave Beam angle of C45plane106.13

luminous intensity distribution data

C/γ(°)	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0
0.0	2130.47	2174.13	2200.69	2198.84	2170.63	2128.21	2061.28	1951.94	1797.91
22.5	1881.10	2140.36	2164.25	2347.52	2371.40	2420.62	2472.10	2352.67	2251.56
45.0	1817.27	2003.01	2156.63	2367.70	2556.12	2491.25	2477.87	2432.36	2373.67
67.5	1819.53	1878.84	2144.68	2393.85	2488.57	2497.22	2471.48	2475.19	2457.89
90.0	1803.68	1831.68	2119.56	2384.79	2448.63	2459.33	2453.98	2458.30	2461.60
112.5	1810.06	1827.97	2079.20	2310.66	2407.23	2408.68	2383.55	2364.61	2349.37
135.0	1803.06	1890.78	2064.99	2259.38	2393.23	2331.66	2286.56	2213.87	2153.13
157.5	1787.61	2022.98	2053.67	2164.86	2190.60	2197.19	2177.43	2057.78	1947.00
180.0	2130.47	2066.84	1968.62	1848.16	1692.07	1526.50	1334.38	1144.11	948.69
202.5	1881.10	1759.20	1686.09	1539.89	1371.44	1198.47	1006.55	807.42	558.05
225.0	1817.27	1738.19	1650.26	1525.06	1361.56	1039.29	684.28	506.78	377.46
247.5	1819.53	1734.69	1639.14	1463.08	1064.21	783.54	662.25	523.87	314.44
270.0	1803.68	1723.98	1623.49	1370.62	953.63	754.91	640.21	448.29	265.85
292.5	1810.06	1739.22	1652.94	1464.32	1056.38	784.57	669.04	526.96	326.80
315.0	1803.06	1736.13	1681.98	1573.87	1402.74	1045.06	737.82	566.70	437.38
337.5	1787.61	1759.61	1720.07	1608.46	1495.00	1340.35	1137.10	911.41	602.12
360.0	2130.47	2174.13	2200.69	2198.84	2170.63	2128.21	2061.28	1951.94	1797.91

C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	1622.26	1425.19	1218.65	1011.49	828.43	608.91	407.11	239.90	106.26
22.5	2149.83	2003.83	1850.63	1682.39	1478.32	1235.74	891.23	543.02	223.84
45.0	2308.19	2231.99	2135.83	1993.95	1791.32	1587.05	1217.62	750.59	303.94
67.5	2429.27	2360.28	2228.08	2110.09	1938.97	1700.71	1054.12	607.06	219.72
90.0	2415.47	2328.78	2220.26	2097.12	1884.19	1587.25	839.13	548.17	159.38
112.5	2302.63	2215.93	2079.61	1951.32	1733.46	1538.86	856.43	510.28	158.35
135.0	2068.49	1981.59	1850.42	1666.53	1494.59	1252.42	992.96	442.94	178.74
157.5	1809.24	1638.53	1468.85	1307.20	1124.34	875.79	619.00	290.97	93.49
180.0	755.12	575.76	420.29	254.11	134.88	75.78	18.95	0.00	0.00
202.5	284.38	145.18	100.49	70.84	43.45	17.92	2.06	0.00	0.00
225.0	230.63	123.14	69.19	36.04	17.30	5.97	0.82	0.00	0.00
247.5	188.01	120.67	71.46	34.80	14.83	5.15	0.62	0.00	0.00
270.0	175.65	115.93	64.45	31.71	14.42	5.56	0.82	0.00	0.00
292.5	203.04	130.14	73.72	36.24	16.06	5.97	1.03	0.00	0.00
315.0	275.73	143.94	75.37	37.68	17.92	7.21	1.44	0.00	0.00
337.5	293.85	139.41	89.37	63.22	40.36	17.92	2.88	0.00	0.00
360.0	1622.26	1425.19	1218.65	1011.49	828.43	608.91	407.11	239.90	106.26

C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	29.04	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22.5	40.77	7.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45.0	61.37	15.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
67.5	106.67	39.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90.0	113.67	36.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00
112.5	93.49	31.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135.0	48.19	9.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00
157.5	31.92	4.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
202.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
225.0	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.21	0.41
247.5	0.00	0.00	0.00	0.00	0.00	0.21	0.21	0.41	0.62
270.0	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.62	0.41
292.5	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.62	0.62
315.0	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.41	0.41
337.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62
360.0	29.04	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00

C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
67.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
112.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
157.5	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00
180.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
202.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
225.0	0.21	0.41	0.41	0.41	0.21	0.00	0.00	0.00	0.00
247.5	0.62	0.41	1.03	0.62	0.21	0.00	0.00	0.00	0.00
270.0	0.41	0.62	0.82	0.62	0.21	0.21	0.00	0.00	0.00
292.5	0.82	0.62	0.62	0.62	0.62	0.41	0.00	0.21	0.00
315.0	0.62	0.82	0.41	0.82	0.41	0.21	0.41	0.41	0.21
337.5	0.21	0.62	0.62	0.62	0.41	0.21	0.21	0.21	0.00
360.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

C/γ(°)	180.0
0.0	0.00
22.5	0.00
45.0	0.00
67.5	0.00
90.0	0.00
112.5	0.00
135.0	0.21
157.5	0.21
180.0	0.00
202.5	0.00
225.0	0.00
247.5	0.00
270.0	0.00
292.5	0.00
315.0	0.21
337.5	0.21
360.0	0.00

5.0 THD and PF Test

Model No.	HID-60-H-EX39-830-BYP-WP	Sample ID.	I1

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 25º C ± 1º 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)	Power Factor	THD
25.1	277.00	60	0.914	14.80%

6.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last Calibration Date	Calibration Due Date
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**********