



Photometric Test Report

Relevant Standards

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

Prepared For RAB LIGHTING INC

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1.0 Test Summary

DLC Technical Requirements v4.3

Replacement lamps for High Bay Luminaires (UL Type B)				
Requirement Category	Test Method	Requirements	Test value	Results (Fail/Pass)
Lamp Output (lm)	IES LM-79-2008	5000	12944	P
Zonal Lumen Requirement (20°-50°)	IES LM-79-2008	≥30%	54.48%	P
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	100	117.1	P
Allowable CCTs* (K)	IES LM-79-2008	5700	3011	P
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	70	84.8	P
Power Factor	ANSI C82.77:2014	0.9	0.919	P
Total Harmonic Distortion (A%)	ANSI C82.77:2014	25.00%	14.10%	P

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2018/8/27	HID-115-V-EX39-830-BYP-HB/ HID-115-V-EX39-850-BYP-HB	A1/A2
2	Goniophotometer Test	2018/8/27	HID-115-V-EX39-830-BYP-HB	A1
3	THD and PF Test	2018/8/27	HID-115-V-EX39-830-BYP-HB	A1

Remark(If any)

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3.0 Production Description

Luminaire Description: HID-115-V-EX39-830-BYP-HB/HID-115-V-EX39-850-BYP-HB

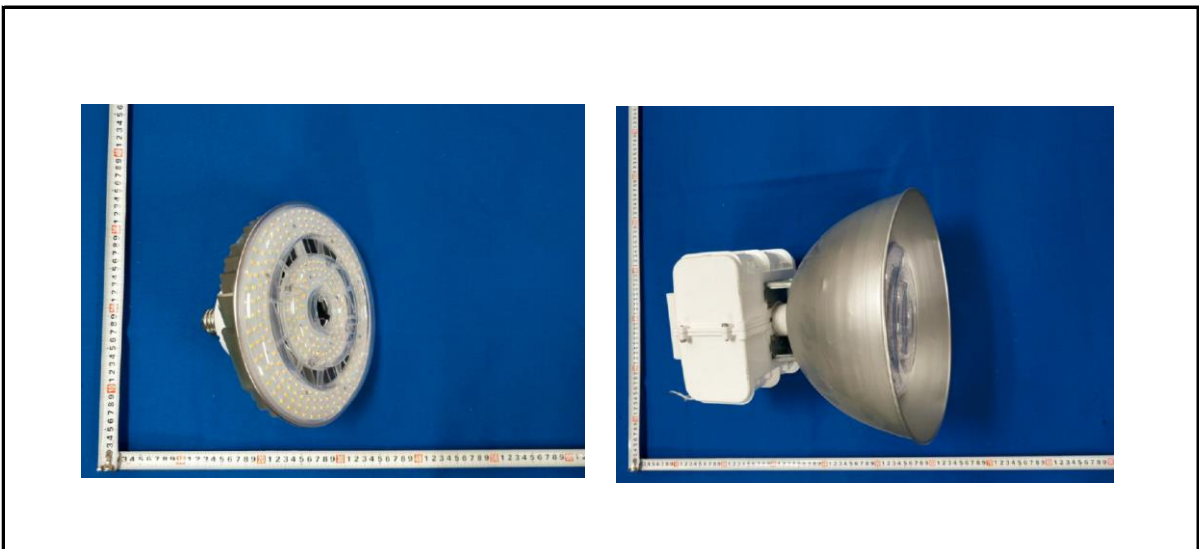
Electrical Specification: 100V-277V,50/60HZ, 115W

Test in fixture: Lithonia THD 400S A15 TB

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-115-V-EX39-830-BYP-HB	Sample ID.	A1
Model No.	HID-115-V-EX39-850-BYP-HB		A2
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

Model No.	Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
HID-115-V-EX39-830-BYP-HB	25.1	120.07	60	0.938	111.42	0.989
HID-115-V-EX39-850-BYP-HB	25.1	120.02	60	0.937	111.23	0.989

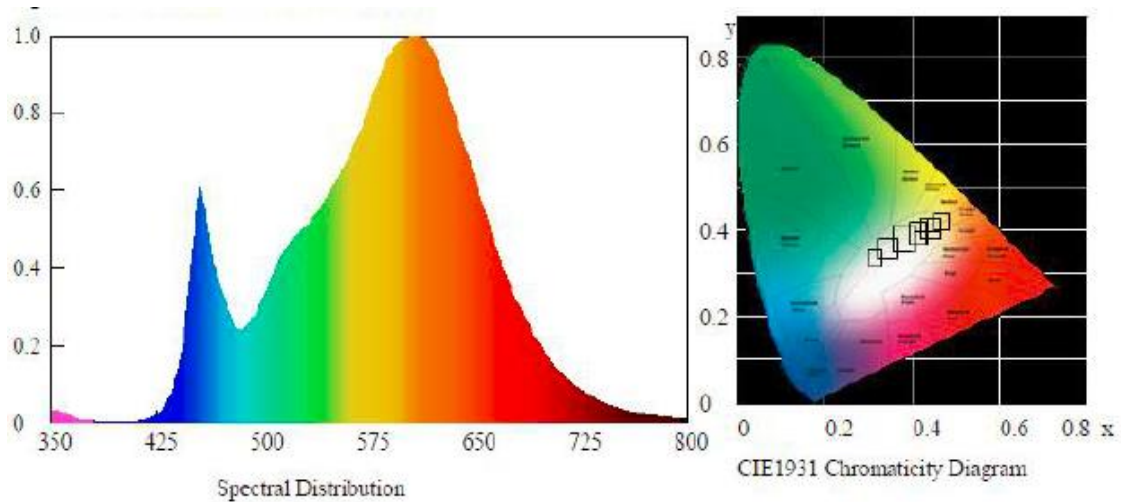
Test Result

Model No.	CCT (K)	CRI (Ra)	Duv
HID-115-V-EX39-830-BYP-HB	3011	84.8	-1.4E-03
HID-115-V-EX39-850-BYP-HB	4956	84.1	-1.9E-03

4.1 Integrating Sphere Test

HID-115-V-EX39-830-BYP-HB

Spectroradiometric Parameters



Chromaticity Coordinates: $x=0.4341$ $y=0.3995$ $u'=0.2507$ $v'=0.5192$

Correlated Color Temperature: 3011 K

Dominant Wavelength: 582.0 nm(E)

Colour Fidelity Index: $R_f=83$

Gamut Index: $R_g=94$

Luminous Flux: 13102.99 lm

Purity: 0.5033

Chromaticity Difference: -0.00143Duv

Peak Wavelength: 610.0 nm

Color Ratio: $K_r=45.1\%$ $K_g=47.2\%$ $K_b=7.7\%$

Bandwidth: 135.2nm

Radiant Flux: 41.511 W

Photosynthetically Active Radiation(PAR): 39.93W

Photosynthetic Photon Flux(PPF):194.26 μ mol/s

Rendering Index: $R_a=84.8$

$R_1=84$ $R_2=94$ $R_3=95$ $R_4=82$ $R_5=84$ $R_6=93$ $R_7=83$ $R_8=63$

$R_9=19$ $R_{10}=87$ $R_{11}=81$ $R_{12}=73$ $R_{13}=88$ $R_{14}=98$ $R_{15}=78$ $R_e=80$

4.1 Integrating Sphere Test
HID-115-V-EX39-850-BYP-HB

Test Condition

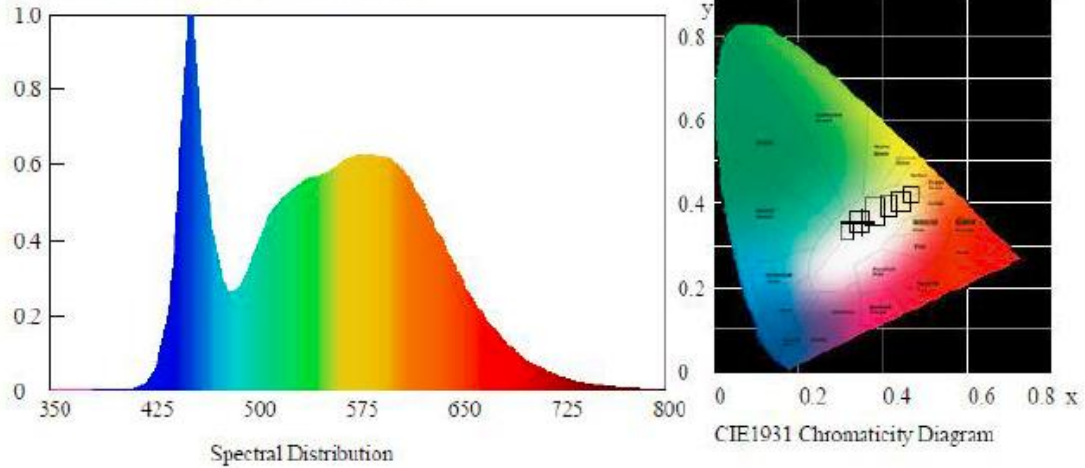
Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

Spectroradiometric Parameters



Chromaticity Coordinates: $x=0.3468$ $y=0.3567$ $u'=0.2106$ $v'=0.4874$

Correlated Color Temperature: 4956 K

Dominant Wavelength: 570.0 nm(E)

Colour Fidelity Index: $R_f=82$

Gamut Index: $R_g=94$

Luminous Flux: 13659.04 lm

Purity: 0.1104

Chromaticity Difference: $+0.00187$ Duv

Peak Wavelength: 450.0 nm

Color Ratio: $K_r=34.1\%$ $K_g=54.5\%$ $K_b=11.3\%$

Bandwidth: 26.7nm

Radiant Flux: 43.628 W

Photosynthetically Active Radiation(PAR): 42.85W

Photosynthetic Photon Flux(PPF):198.24 μ mol/s

Rendering Index: $R_a=84.1$

$R_1=83$ $R_2=90$ $R_3=94$ $R_4=82$ $R_5=82$ $R_6=85$ $R_7=88$ $R_8=69$

$R_9=14$ $R_{10}=75$ $R_{11}=81$ $R_{12}=56$ $R_{13}=85$ $R_{14}=97$ $R_{15}=78$ $R_e=77$

4.0 LM-79 Measurement and Test Results

4.3 Goniophotometer Test

Model No.	HID-115-V-EX39-830-BYP-HB	Sample ID.	A1
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

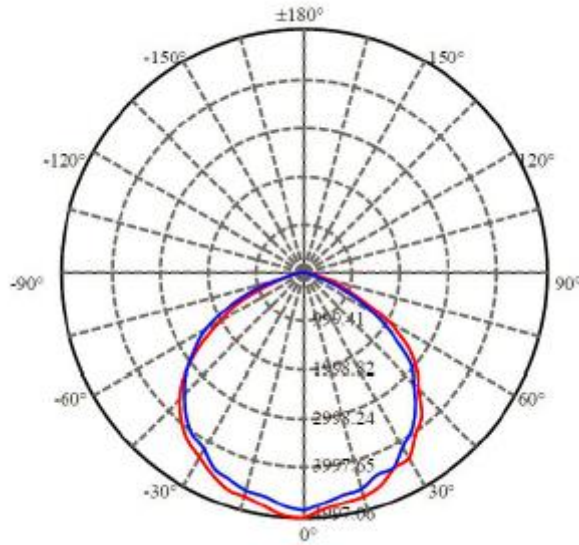
Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
25.1	120.08	60	0.931	110.50	0.988	Light Down

Test Result

Flux(lm)	Zonal Lumen Requirement (20°-50°)	Luminous Efficacy (lm/W)
12944	54.48%	117.1

4.3 Goniophotometer Test

Light Distribution Curve



C0/C180: 

C90/C270: 

Field angle(10%Imax):C0/180Left:74.0 Right:72.8
:C90/270Left:76.2 Right:70.7

Beam Angle(50%Imax):C0/180Left:56.3 Right:55.9
:C90/270Left:59.2 Right:53.7

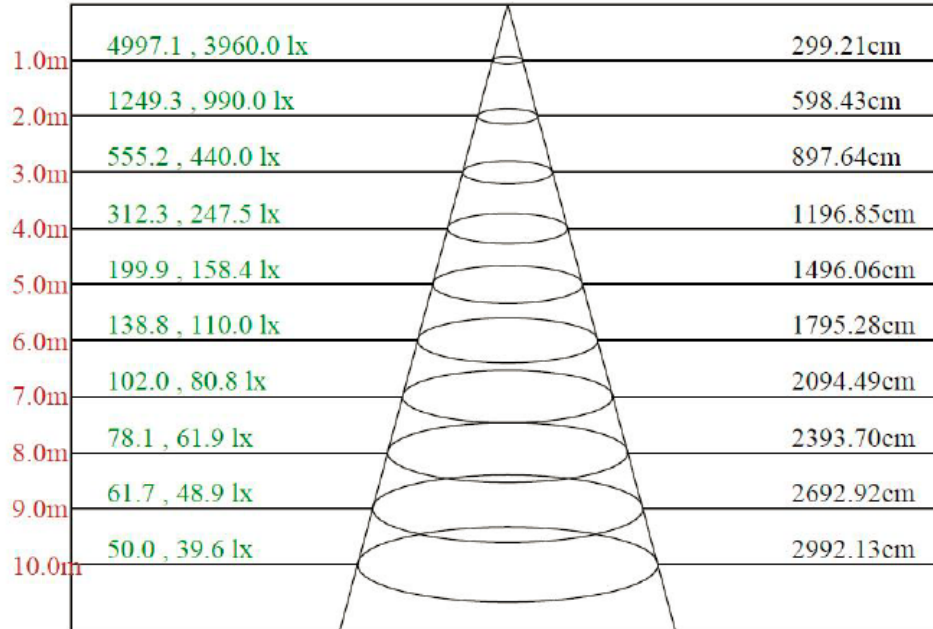
4.3 Goniophotometer Test

Zonal Lumen Summary

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	4852.465	.000	.000	.000%	.000%
5.0	4760.592	114.921	114.921	.888%	.888%
10.0	4648.361	336.588	451.509	2.600%	3.488%
15.0	4596.683	548.410	999.919	4.237%	7.725%
20.0	4483.668	748.348	1748.267	5.781%	13.507%
25.0	4324.299	923.793	2672.061	7.137%	20.643%
30.0	4131.810	1070.128	3742.188	8.267%	28.911%
35.0	3940.508	1188.705	4930.894	9.184%	38.094%
40.0	3709.481	1276.343	6207.236	9.861%	47.955%
45.0	3350.745	1307.258	7514.494	10.099%	58.054%
50.0	3012.589	1285.805	8800.299	9.934%	67.988%
55.0	2545.406	1208.493	10008.790	9.336%	77.325%
60.0	2010.703	1053.132	11061.920	8.136%	85.461%
65.0	1393.874	827.659	11889.580	6.394%	91.855%
70.0	821.051	560.833	12450.420	4.333%	96.188%
75.0	341.066	303.759	12754.170	2.347%	98.534%
80.0	97.511	117.351	12871.530	.907%	99.441%
85.0	29.232	34.439	12905.960	.266%	99.707%
90.0	3.811	9.047	12915.010	.070%	99.777%
95.0	2.258	1.662	12916.670	.013%	99.790%
100.0	2.519	1.298	12917.970	.010%	99.800%
105.0	2.962	1.467	12919.440	.011%	99.811%
110.0	3.328	1.644	12921.080	.013%	99.824%
115.0	3.576	1.748	12922.830	.014%	99.837%
120.0	4.228	1.897	12924.730	.015%	99.852%
125.0	4.737	2.072	12926.800	.016%	99.868%
130.0	5.377	2.199	12929.000	.017%	99.885%
135.0	5.664	2.231	12931.230	.017%	99.902%
140.0	6.408	2.235	12933.470	.017%	99.920%
145.0	7.660	2.347	12935.810	.018%	99.938%
150.0	6.603	2.100	12937.910	.016%	99.954%
155.0	6.799	1.696	12939.610	.013%	99.967%
160.0	7.778	1.529	12941.140	.012%	99.979%
165.0	7.008	1.219	12942.360	.009%	99.988%
170.0	7.321	.850	12943.210	.007%	99.995%
175.0	6.682	.501	12943.710	.004%	99.999%
180.0	6.890	.162	12943.870	.001%	100.000%

4.3 Goniophotometer Test

Lux Distance Curve



Max , Ave Beam angle of C0plane112.48

luminous intensity distribution data

$C/\gamma(^{\circ})$	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0
0.0	4997.06	4836.28	4761.11	4706.83	4604.51	4391.53	4320.54	3993.14	3772.44
22.5	4917.72	4773.64	4677.59	4633.75	4504.29	4301.75	4155.17	3905.02	3683.69
45.0	4873.87	4729.79	4633.75	4617.04	4450.00	4251.64	4114.87	3825.05	3606.23
67.5	4840.46	4713.09	4589.90	4575.28	4401.97	4312.19	4040.12	3850.95	3604.77
90.0	4823.76	4681.77	4600.34	4562.75	4385.27	4362.30	4075.20	3864.73	3543.59
112.5	4804.96	4679.68	4581.54	4552.31	4389.45	4163.73	4030.51	3864.93	3567.81
135.0	4779.91	4671.33	4571.10	4550.22	4431.21	4164.98	4055.78	3879.34	3613.33
157.5	4782.00	4652.54	4541.87	4493.85	4416.59	4162.69	4028.22	3860.55	3582.01
180.0	4997.06	4965.74	4815.40	4727.71	4677.59	4504.29	4301.75	4161.85	3921.73
202.5	4917.72	4921.89	4771.55	4683.86	4612.86	4429.12	4239.11	4051.19	3898.76
225.0	4873.87	4855.08	4729.79	4660.89	4569.02	4391.53	4184.82	4042.83	3865.35
247.5	4840.46	4821.67	4652.54	4602.42	4523.08	4406.15	4157.68	3982.28	3804.80
270.0	4823.76	4767.38	4623.31	4583.63	4477.14	4372.74	4128.44	3992.72	3786.01
292.5	4804.96	4731.88	4619.13	4571.10	4454.18	4339.33	4111.74	3940.52	3731.72
315.0	4779.91	4694.30	4614.95	4525.17	4437.47	4320.54	4097.12	3950.96	3719.19
337.5	4782.00	4673.42	4589.90	4500.11	4404.06	4314.28	4067.89	3882.06	3650.29
360.0	4997.06	4836.28	4761.11	4706.83	4604.51	4391.53	4320.54	3993.14	3772.44
$C/\gamma(^{\circ})$	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	3351.91	3046.43	2607.11	1994.69	1339.89	762.34	293.37	99.18	31.53
22.5	3274.02	2961.66	2522.96	1934.56	1290.19	688.42	232.19	73.71	20.46
45.0	3193.22	2903.40	2440.90	1844.56	1163.66	658.56	199.41	52.41	9.40
67.5	3190.71	2867.07	2363.85	1799.46	1131.92	548.94	161.40	38.84	5.64
90.0	3189.04	2852.45	2256.74	1692.76	1107.70	537.67	138.65	33.20	4.39
112.5	3204.07	2799.00	2257.99	1629.91	1093.29	541.63	136.35	32.78	4.80
135.0	3215.98	2850.15	2219.36	1666.87	1086.61	543.93	157.02	43.85	7.31
157.5	3277.36	2840.76	2236.48	1719.07	1131.29	619.73	198.15	54.92	12.11
180.0	3598.08	3209.71	2652.21	2073.83	1499.62	918.31	393.59	83.10	33.83
202.5	3537.53	3193.01	2769.14	2194.93	1549.73	1040.25	444.75	100.64	34.24
225.0	3522.92	3165.86	2815.08	2240.87	1587.32	1033.99	490.48	130.08	33.83
247.5	3502.04	3132.46	2769.14	2326.48	1704.25	1033.99	534.74	150.76	38.84
270.0	3456.10	3165.86	2750.35	2347.36	1756.45	1067.40	580.68	184.58	49.07
292.5	3408.07	3103.22	2744.08	2332.74	1700.07	1061.13	549.99	175.39	57.63
315.0	3345.43	3078.17	2681.44	2238.78	1647.87	1042.34	503.63	166.83	64.10
337.5	3345.43	3032.23	2639.68	2134.38	1512.15	1038.17	442.66	139.90	60.55
360.0	3351.91	3046.43	2607.11	1994.69	1339.89	762.34	293.37	99.18	31.53
$C/\gamma(^{\circ})$	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	1.67	1.67	2.09	2.30	2.92	3.13	3.76	5.01	5.64
22.5	2.51	2.51	2.51	3.13	3.34	3.34	4.59	5.22	5.64
45.0	2.30	2.51	2.92	3.34	3.97	4.39	5.01	4.39	5.64
67.5	2.30	2.51	2.92	3.34	3.97	3.76	5.01	5.85	6.06
90.0	2.30	2.30	2.51	3.13	3.76	4.18	4.80	5.01	5.64
112.5	2.30	2.51	2.92	3.34	3.76	3.97	5.01	5.43	6.06
135.0	2.30	2.51	2.71	3.34	3.97	4.18	4.39	4.39	5.43
157.5	2.51	2.51	2.92	3.34	3.13	3.34	4.59	5.22	5.64
180.0	2.09	1.88	2.30	2.30	2.92	3.34	3.97	5.01	5.85
202.5	3.34	2.30	2.30	2.92	2.92	3.55	3.76	4.80	5.22
225.0	3.55	2.30	2.51	2.71	2.92	3.55	3.76	3.97	5.01
247.5	5.64	2.09	2.51	2.71	3.13	3.34	4.18	4.59	5.43
270.0	7.93	2.09	2.09	2.71	3.13	3.55	3.97	4.39	4.59
292.5	9.81	2.09	2.30	2.71	3.13	3.34	3.76	4.39	5.01
315.0	7.31	2.30	2.30	2.71	3.13	3.34	3.76	3.76	4.39
337.5	3.13	2.09	2.51	3.34	3.13	2.92	3.34	4.39	4.80
360.0	1.67	1.67	2.09	2.30	2.92	3.13	3.76	5.01	5.64

C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	6.26	6.47	6.89	6.89	6.68	6.89	7.31	6.26	6.26
22.5	6.26	6.89	6.68	6.89	7.10	7.93	7.52	6.89	7.10
45.0	6.06	7.10	6.68	6.47	6.89	7.10	6.68	6.68	6.89
67.5	5.64	5.85	6.06	6.47	6.68	6.68	6.89	6.68	6.68
90.0	5.43	5.85	6.06	6.47	6.47	6.89	6.68	6.68	6.89
112.5	5.22	5.85	15.87	6.68	6.89	6.89	6.68	6.47	6.68
135.0	6.26	10.65	6.89	6.89	6.89	11.69	7.10	6.68	6.89
157.5	6.06	6.68	6.47	6.89	7.10	6.89	7.10	6.68	6.89
180.0	6.06	6.89	7.10	7.52	7.31	7.10	6.89	17.33	6.47
202.5	5.85	6.06	6.47	6.68	6.89	7.31	6.89	6.68	6.68
225.0	5.85	6.06	6.68	6.47	6.68	15.03	7.10	6.89	6.68
247.5	5.01	5.64	9.81	6.26	6.89	6.68	6.68	6.68	6.68
270.0	5.01	5.43	5.64	6.06	6.47	6.68	6.68	6.47	6.47
292.5	4.80	5.22	6.06	6.06	6.47	6.68	6.68	6.68	6.68
315.0	5.43	5.64	12.53	6.26	6.47	7.10	6.68	6.68	6.26
337.5	5.43	6.26	6.68	6.68	6.89	6.89	8.56	6.68	6.68
360.0	6.26	6.47	6.89	6.89	6.68	6.89	7.31	6.26	6.26
C/γ(°)	180.0								
0.0	6.26								
22.5	7.10								
45.0	6.89								
67.5	7.10								
90.0	6.89								
112.5	6.89								
135.0	7.10								
157.5	6.89								
180.0	6.26								
202.5	7.10								
225.0	6.89								
247.5	7.10								
270.0	6.89								
292.5	6.89								
315.0	7.10								
337.5	6.89								
360.0	6.26								

5.0 THD and PF Test

Model No.	HID-115-V-EX39-830-BYP-HB	Sample ID.	A1
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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)	Power Factor	THD
25.1	277.00	60	0.919	14.10%

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*****