

Photometric Test Report

Relevant Standards

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

Prepared For RAB Lighting Inc.

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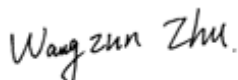
Test Date

2018/4/16

Issue Date

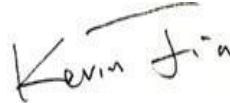
2018/4/16

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	2154	P
Zonal Lumen Requirement (0°-90°)	IES LM-79-2008	≥85%	100.00%	P
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	90	103.9	P
Allowable CCTs* (K)	IES LM-79-2008	5700	3049	P
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	65	70.1	P
Power Factor	ANSI C82.77:2014	0.873	0.916	P
Total Harmonic Distortion (A%)	ANSI C82.77:2014	25.00%	19.05%	P

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2018/4/16	HNLED18Y	W1
2	Goniophotometer Test	2018/4/16	HNLED18Y	W1
3	THD and PF Test	2018/4/16	HNLED18Y	W1

Remark(If any)

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3.0 Production Description

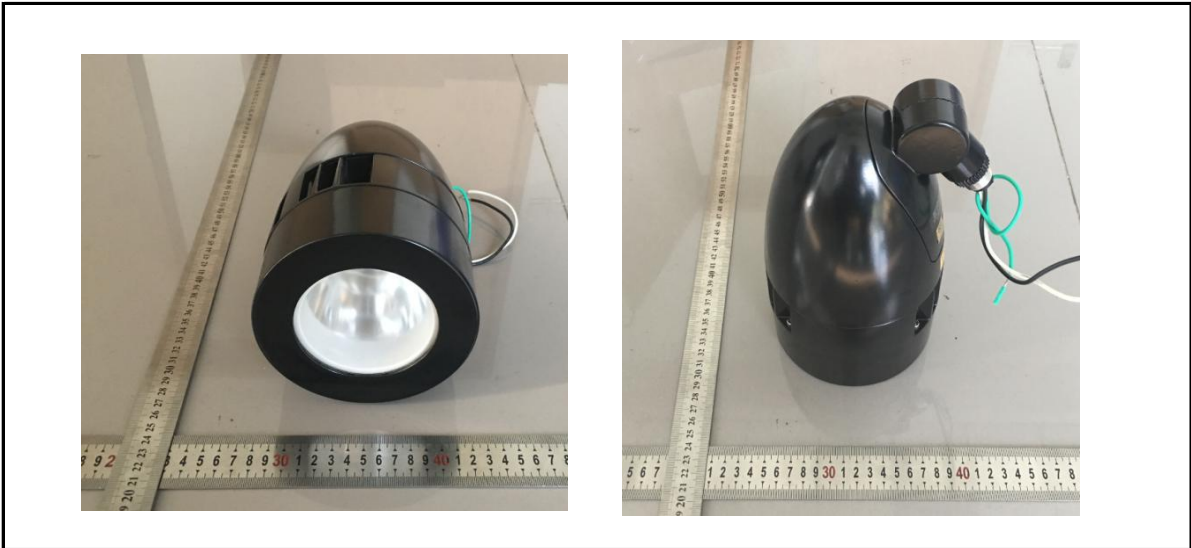
Luminaire Description:

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.	HNLED18Y	Sample ID.	W1
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	277.03	60	0.082	20.74	0.916

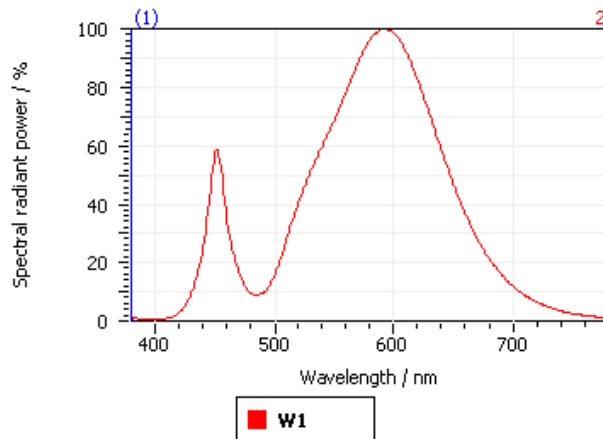
Test Result

CCT (K)	CRI (Ra)	Duv
3049	70.1	2.5E-03

4.1 Integrating Sphere Test

Spectroradiometric Parameters

Results



Spectral values

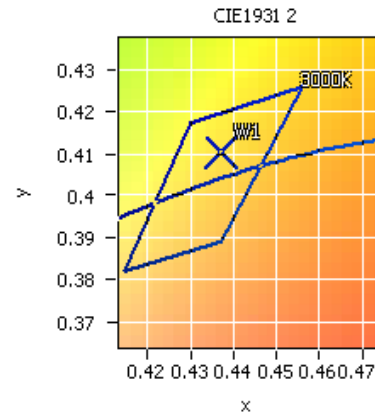
DominantWavelength	581.77 nm
Purity	0.544
PeakWavelength	592.60 nm
Width50%:	118.17 nm

Color Coordinates

Correlated Color Temperature 3049 K

x: 0.4371 u: 0.2480 u': 0.2480
y: 0.4104 v: 0.3493 v': 0.5239

ResultsCRICRI01	66.2	ResultsCRICRI09	-34.4
ResultsCRICRI02	79.9	ResultsCRICRI10	52.6
ResultsCRICRI03	91.3	ResultsCRICRI11	58.0
ResultsCRICRI04	65.5	ResultsCRICRI12	39.0
ResultsCRICRI05	64.2	ResultsCRICRI13	68.4
ResultsCRICRI06	70.5	ResultsCRICRI14	94.9
ResultsCRICRI07	79.2	ResultsCRICRI15	59.0
ResultsCRICRI08	44.3	ResultsCRICRI16	58.7
ResultsCRI	70.1		



Nominal CCT: 3000K

PlanckDistance 2.5E-003

4.0 LM-79 Measurement and Test Results

4.3 Goniophotometer Test

Model No.	HNLED18Y	Sample ID.	W1
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

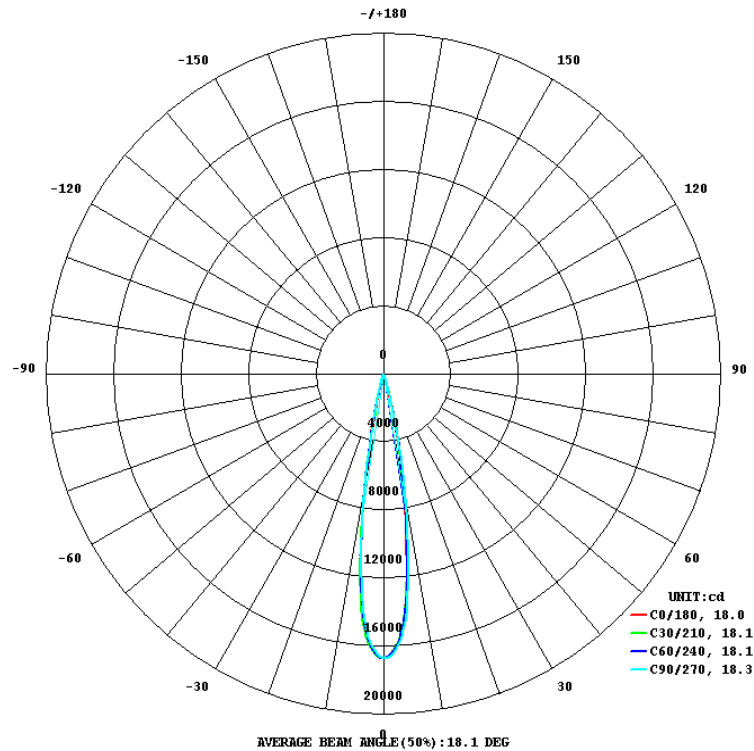
Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
25.1	277.03	60	0.082	20.73	0.911	Light Down

Test Result

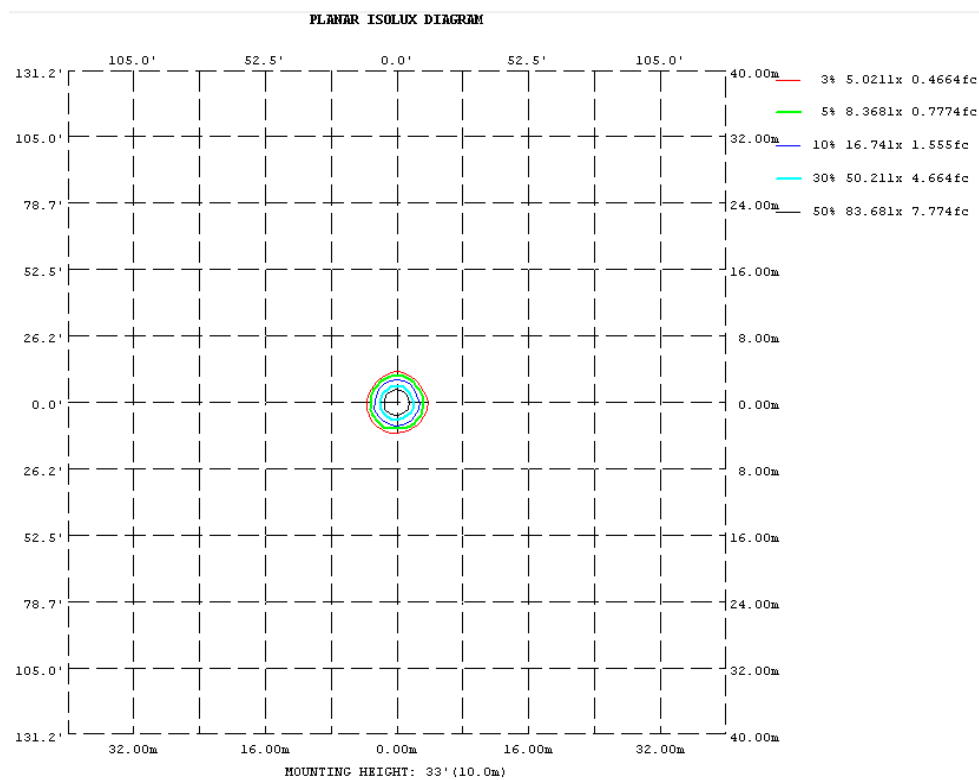
Flux(lm)	Zonal Lumen Requirement (0° - 90°)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
		Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	
2154	100.00%	30.7	30.4	18.3	18	103.9

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	699.0	717.3	743.3	801.5	670.4	665.7	664.1	619.0
20	60.82	60.97	58.61	66.77	53.09	50.87	57.24	50.64
30	17.21	16.97	16.78	17.92	17.48	17.75	17.77	16.67
40	10.03	9.948	10.63	10.28	10.10	10.26	9.865	10.45
50	7.597	7.552	7.765	7.631	7.645	7.745	7.322	7.651
60	5.296	5.284	5.263	5.332	5.312	5.348	5.275	5.228
70	2.854	2.814	2.846	2.998	2.865	2.884	2.800	2.672
80	0.6380	0.6346	0.6815	0.7441	0.6412	0.6058	0.5583	0.5485
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: *10cd less than 35% Percent = 2.2 %							

4.3 Goniophotometer Test

ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0 - 10	1099.96	0 - 10	1099.96	51.07%
10 - 20	650.09	0 - 20	1750.05	81.25%
20 - 30	139.07	0 - 30	1889.13	87.70%
30 - 40	81.23	0 - 40	1970.36	91.47%
40 - 50	67.51	0 - 50	2037.87	94.61%
50 - 60	55.77	0 - 60	2093.64	97.20%
60 - 70	40.20	0 - 70	2133.83	99.06%
70 - 80	17.59	0 - 80	2151.42	99.88%
80 - 90	2.57	0 - 90	2153.99	100.00%
90 - 100	0.00	0 - 100	2153.99	100.00%
100 - 110	0.00	0 - 110	2153.99	100.00%
110 - 120	0.00	0 - 120	2153.99	100.00%
120 - 130	0.00	0 - 130	2153.99	100.00%
130 - 140	0.00	0 - 140	2153.99	100.00%
140 - 150	0.00	0 - 150	2153.99	100.00%
150 - 160	0.00	0 - 160	2153.99	100.00%
160 - 170	0.00	0 - 170	2153.99	100.00%
170 - 180	0.00	0 - 180	2153.99	100.00%

4.3 Goniophotometer Test

Axial Candela

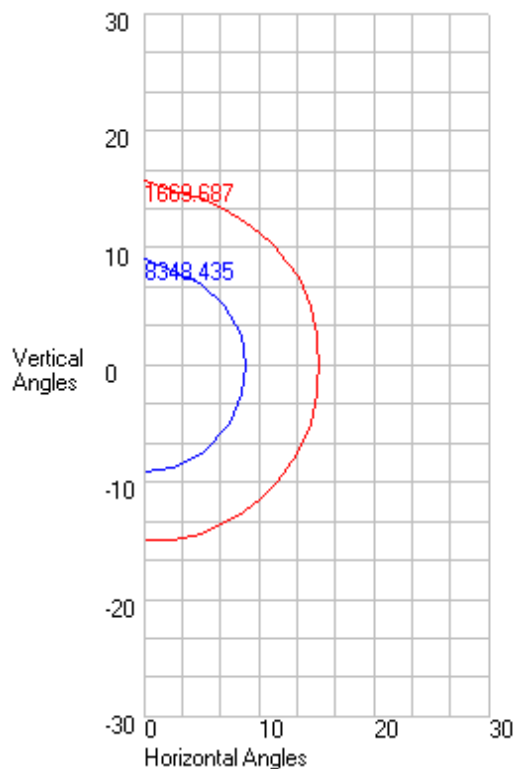
DEG.	HOR.	DEG.	VERT.
90	0	90	0.01
85	0.43	85	1.18
75	15.38	75	15.64
65	41.82	65	42.86
55	61.69	55	61.9
47.5	78.75	47.5	81.74
42.5	90.61	42.5	93.85
37.5	110.46	37.5	108.98
33	147.06	33	143.39
29	189.99	29	184.02
25.5	261.27	25.5	254.79
22.5	387.6	22.5	401.87
19.5	624.88	19.5	667.39
17	1030.39	17	1116.85
15	1720.43	15	1922.63
13	3097.6	13	3545.36
11	5307.87	11	5773.25
9	8148.82	9	8365.44
7	11278.4	7	11537.83
5	14056.86	5	14216.99
3	15774.26	3	15849.8
1	16564.16	1	16556.289
0	16683.391	0	16683.391
-1	16627.07	-1	16640.26
-3	16057.05	-3	16041.62
-5	14651.37	-5	14531.2
-7	12155.02	-7	11659.96
-9	9004.7	-9	8275.14
-11	5995.38	-11	5252.28
-13	3709.54	-13	2931.21
-15	1995.46	-15	1654.54
-17	1136.03	-17	959.63
-19.5	647.63	-19.5	577.89
-22.5	386.79	-22.5	375.66
-25.5	251.12	-25.5	255.01
-29	178.09	-29	185.48
-33	144	-33	146.3
-37.5	115.55	-37.5	110.5
-42.5	98.87	-42.5	94.42
-47.5	85.17	-47.5	82.55
-55	62.75	-55	62.35
-65	41.95	-65	43.07
-75	16.08	-75	15.84
-85	1.04	-85	1.08
-90	0.02	-90	0

4.3 Goniophotometer Test

Characteristics

NEMA Type	3 H x 3 V
Maximum Candela	16696.869
Maximum Candela Angle	-1 H -1 V
Horizontal Beam Angle (50%)	18.4
Vertical Beam Angle (50%)	18.4
Horizontal Field Angle (10%)	31
Vertical Field Angle (10%)	30.9
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Beam Lumens	993
Beam Efficiency	N.A.
Field Lumens	1596
Field Efficiency	N.A.
Spill Lumens	558
Luminaire Lumens	2154
Total Efficiency	N.A.
Total Luminaire Watts	20.7273
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	0.01	0.009	0.008	0.007	0.005	0.004	0.003	0.001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85	1.18	1.148	1.084	1.019	0.955	0.891	0.827	0.708	0.632	0.61	0.58	0.539	0.491	0.435	0.355	0.27	0.167	0.089	0.03	0.001	0	0	0
75	15.64	15.534	15.323	15.112	14.657	14.29	13.886	13.447	13.078	12.764	12.378	11.842	11.23	10.428	9.484	8.366	7.008	5.578	3.498	1.249	0.098	0	0
65	42.86	42.694	42.361	41.734	41.123	40.422	39.635	38.773	38.046	37.317	36.331	34.901	33.501	31.18	28.641	25.516	21.88	18.176	12.756	5.896	1.2	0.002	0
55	61.9	61.793	61.58	60.969	60.383	59.822	58.968	58.28	57.644	56.992	56.15	55.092	53.951	52.356	49.864	46.097	40.859	34.787	25.004	12.913	3.464	0.017	0
47.5	81.74	81.766	81.819	81.394	80.963	80.355	79.577	78.693	77.586	76.267	74.374	71.56	68.475	64.578	60.286	56.494	52.15	46.51	35.045	18.697	5.6	0.043	0
42.5	93.85	93.943	94.128	93.705	93.308	92.732	92.012	91.425	90.439	89.013	87.229	84.763	81.242	76.727	70.78	63.811	57.608	52.269	41.26	22.613	7.112	0.076	0
37.5	108.98	109.023	108.726	108.123	107.368	105.98	104.926	103.749	102.482	101.129	99.431	96.092	92.549	88.125	81.673	73.349	64.012	56.923	46.518	26.438	8.622	0.12	0
33	143.39	143.079	141.363	138.792	135.235	131.656	127.438	122.521	118.609	115.169	111.079	106.369	101.943	96.816	89.863	81.495	70.904	61.003	50.247	29.691	9.912	0.166	0
29	184.02	183.125	179.748	175.364	170.215	164.687	158.467	152.421	145.273	138.538	129.767	120.483	112.079	104.321	96.705	88.085	76.716	65.334	52.875	32.313	11.034	0.209	0
25.5	254.79	250.789	238.293	223.805	210.38	199.237	188.418	178.433	169.972	162.243	152.009	138.798	124.897	111.966	101.422	92.276	81.191	69.15	54.774	34.632	11.979	0.245	0
22.5	401.87	392.655	363.767	330.197	298.376	266.956	237.68	213.515	197.49	184.739	171.141	156.094	140.122	121.777	106.396	96.126	84.429	72.138	56.23	36.104	12.705	0.285	0
19.5	667.39	648.077	586.514	514.927	461.214	404.499	347.042	299.36	255.547	221.9	195.123	174.663	155.962	133.245	112.089	98.672	87.203	74.877	57.538	37.522	13.35	0.321	0
17	1116.85	1072.68	935.04	800.706	696.155	588.035	491.801	408.991	339.625	281.28	229.272	193.435	169.59	143.908	117.595	101.065	89.059	76.754	58.53	38.496	13.822	0.347	0
15	1922.63	1824.63	1520.58	1274.56	1016.23	823.006	667.6	530.455	431.07	349.501	271.21	212.891	180.604	151.71	122.032	103.047	90.769	77.725	59.25	39.224	14.207	0.366	0
13	3545.36	3296.46	2544.24	2056.60	1709.16	1306.72	922.407	702.719	546.102	430.957	324.508	237.177	192.242	159.685	126.856	104.896	91.639	78.494	59.937	39.853	14.451	0.382	0
11	5773.25	5404.81	4275.86	3677.77	2777.10	1974.91	1420.98	956.19	705.346	530.362	383.428	266.298	204.631	166.242	132.637	106.517	91.804	79.057	60.452	40.398	14.706	0.431	0
9	8365.44	7851.01	6566.41	5654.80	4441.78	3140.81	2054.75	1420.96	902.529	644.327	445.425	298.666	218.087	172.804	137.145	107.806	91.956	79.393	60.906	40.853	14.92	0.431	0
7	11537.8	10833.3	9363.32	8162.16	6347.64	4605.18	3016.87	1859.05	1194.16	766.843	508.248	330.506	231.877	178.676	140.433	109.192	91.937	79.547	61.271	41.22	15.094	0.43	0
5	14216.9	13368.1	12180.9	10658.6	8464.66	6053.34	4064.99	2377.17	1461.19	891.61	564.285	358.323	243.975	183.514	143.495	109.865	91.789	79.531	61.525	41.5	15.357	0.43	0
3	15849.8	15234.4	14414.1	12483.1	10040.9	7267.55	4834.28	2850.45	1635.76	980.741	603.058	376.222	253.724	187.207	145.643	110.427	91.689	79.51	61.785	41.789	15.366	0.43	0
1	16556.2	16312.0	15540.0	13837.8	11197.3	8097.85	5306.55	3110.30	1726.26	1031.97	625.414	387.212	260.3	189.65	146.958	110.628	90.97	79.003	61.722	41.81	15.375	0.43	0
0	16683.3	16564.1	15774.2	14056.8	11278.4	8148.82	5307.87	3097.6	1720.43	1030.39	624.88	387.6	261.27	189.99	147.06	110.46	90.61	78.75	61.69	41.82	15.38	0.43	0
-1	16640.2	16548.4	15762.1	14141.8	11301.0	8132.93	5269.22	3058.28	1722.05	1024.25	622.111	387.286	261.46	190.083	147.065	110.361	90.572	78.77	61.7	41.836	15.375	0.43	0
-3	16041.6	15968.2	15197.1	13153.5	10494.5	7344.30	4677.37	2710.76	1621.32	960.187	593.956	376.98	257.031	188.462	145.941	109.599	90.497	78.809	61.719	41.869	15.364	0.43	0
-5	14531.2	14587.0	13497.4	11586.2	9009.70	6168.39	3968.93	2273.31	1436.99	865.047	551.214	361.032	248.985	185.482	143.926	108.404	89.804	78.401	61.422	41.635	15.353	0.431	0
-7	11659.9	11712.2	10780.1	9074.42	6830.95	4737.08	2977.83	1820.92	1171.3	748.995	497.959	336.888	238.344	181.152	140.898	107.014	89.165	78.02	61.136	41.41	15.087	0.431	0
-9	8275.14	8278.96	7501.12	6250.03	4767.98	3277.06	2093.90	1431.33	891.633	631.253	440.785	307.808	224.352	175.465	137.542	104.754	88.393	77.52	60.747	41.099	14.908	0.431	0
-11	5252.28	5262.84	4759.51	3991.20	2976.82	2078.21	1517.26	976.897	700.04	522.477	386.806	277.017	210.573	168.771	132.802	102.458	87.477	76.904	60.278	40.703	14.688	0.431	0
-13	2931.21	2935.98	2657.12	2223.58	1780.43	1403.98	961.966	711.438	542.728	432.777	386.625	247.237	197.504	162.022	126.401	100.38	86.619	76.145	59.758	40.214	14.426	0.383	0
-15	1654.54	1657.18	1558.43	1380.86	1123.79	841.476	663.61	525.606	436.559	364.438	289.531	222.434	185.28	153.85	120.5	98.467	85.704	75.245	59.059	39.64	14.172	0.367	0
-17	959.63	955.94	895.154	798.536	684.25	564.604	475.691	408.915	356.908	306.903	247.016	202.437	174.029	145.497	115.178	96.656	84.806	74.201	58.347	38.958	13.774	0.349	0
-19.5	577.89	571.632	538.051	490.061	441.158	393.131	351.041	317.979	279.744	242.363	209.694	183.348	160.719	134.156	109.291	94.807	83.728	73.035	57.382	38.03	13.282	0.323	0
-22.5	375.66	371.182	354.72	333.99	310.279	284.272	255.111	227.064	208.947	195.348	181.647	164.153	144.95	121.031	103.591	92.313	82.256	71.197	56.14	36.691	12.608	0.288	0
-25.5	255.01	252.275	241.694	228.047	214.352	203.214	192.928	183.816	176.019	169.284	159.339	145.883	127.402	110.419	98.628	90.125	79.983	68.871	54.85	35.313	11.844	0.247	0
-29	185.48	184.518	181.144	176.915	172.021	167.463	162.312	156.927	150.278	144.046	135.021	122.603	111.592	102.12	93.916	86.696	76.787	65.666	53.238	33.038	10.848	0.212	0
-33	146.3	146.148	144.779	142.663	139.766	136.823	132.839	127.237	121.816	116.908	111.385	105.379	99.853	94.567	88.744	81.465	71.893	61.592	51.01	30.465	9.685	0.169	0
-37.5	110.5	110.669	110.549	110.076	109.441	108.072	106.45	104.519	102.414	100.281	97.702	94.38	91.195	87.346	81.862	74.429	65.151	57.367	47.708	27.26	8.321	0.122	0
-42.5	94.42	94.55	94.81	94.507	94.222	93.772	93.008	92.023	90.735	89.025	86.991	84.502	81.507	77.64	72.197	65.174	58.256	53.142	42.69	23.307	6.818	0.078	0
-47.5	82.55	82.631	82.794	82.453	82.121	81.618	80.94	79.955	78.79	77.474	75.636	73.032	70.103	66.199	61.557	57.196	53.224	48.228	36.57	19.006	5.336	0.045	0
-55	62.35	62.343	62.328	61.892	61.476	60.93	60.297	59.616	58.829	58.055	57.087	55.933	54.88	53.601	51.655	48.351	43.117	36.771	26.352	12.758	3.296	0.019	0
-65	43.07	43.088	43.123	42.87	42.633	42.309	41.9	41.39	40.765	40.041	39.074	37.598	36.117	33.784	31.038	27.684	23.755	19.444	12.871	5.52	1.171	0.002	0
-75	15.84	15.847	15.861	15.875	15.649	15.507	15.325	15.105	14.893	14.549	14.124	13.535	12.865	11.976	10.713	9.308	7.687	5.941	3.511	1.242	0.107	0	0
-85	1.08	1.076	1.068	1.06	1.052	1.044	1.036	0.961	0.931	0.9	0.857	0.798	0.731	0.652	0.538	0.419	0.296	0.181	0.054	0.004	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	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	0	0	0	
75		0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0	0	0	
65		0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.1	0	0	
55		0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.3	0.1	0	0	
47.5		0.1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.2	0.1	0	0	
42.5		0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.1	0	0	
37.5		0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.1	0	0	
33		0.2	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.1	0	0	
29		0.2	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.1	0	0	
25.5		0.3	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0	0	
22.5		0.5	0.9	0.9	0.8	0.7	0.6	0.5	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.1	0	0	
19.5		0.7	1.3	1.2	1	0.9	0.8	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0	0	
17		0.9	1.7	1.5	1.3	1.1	0.9	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
15		1.64 *	3.01 *	2.55 *	2.1	1.7	1.3	0.9	0.7	0.6	0.5	0.5	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
13		2.80 *	5.11 *	4.37 *	3.58 *	2.69 *	1.9	1.3	0.9	0.7	0.6	0.5	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
11		4.24 *	7.83 *	6.83 *	5.65 *	4.24 *	2.92 *	1.9	1.3	0.9	0.8	0.6	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
9		5.97 *	11.11 *	9.78 *	8.11 *	6.14 *	4.24 *	2.70 *	1.7	1.1	0.9	0.7	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
7		7.72 *	14.51 *	12.96 *	10.83 *	8.19 *	5.69 *	3.60 *	2.14 *	1.3	1	0.8	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
5		9.04 *	17.25 *	15.66 *	13.19 *	10.08 *	7.01 *	4.44 *	2.58 *	1.5	1.1	0.8	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
3		9.79 *	18.96 *	17.48 *	14.91 *	11.52 *	8.03 *	5.08 *	2.94 *	1.7	1.2	0.9	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
1		5.04 *	9.83 *	9.14 *	7.86 *	6.09 *	4.25 *	2.69 *	1.55 *	0.9	0.6	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0	0	0	
0																								

-1	5.07 *	9.90 *	9.22 *	7.93 *	6.14 *	4.28 *	2.70 *	1.56 *	0.9	0.6	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0	0	0	
-3	9.97 *	19.53 *	18.07 *	15.43 *	11.88 *	8.23 *	5.18 *	2.99 *	1.7	1.2	0.9	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
-5	9.38 *	18.39 *	16.78 *	14.10 *	10.69 *	7.34 *	4.60 *	2.67 *	1.6	1.2	0.8	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
-7	8.09 *	15.92 *	14.38 *	11.86 *	8.84 *	6.03 *	3.78 *	2.22 *	1.4	1.1	0.8	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
-9	6.18 *	12.26 *	11.02 *	8.94 *	6.63 *	4.50 *	2.85 *	1.8	1.1	0.9	0.7	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
-11	4.20 *	8.40 *	7.59 *	6.12 *	4.52 *	3.09 *	2	1.3	0.9	0.8	0.7	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
-13	2.55 *	5.14 *	4.69 *	3.80 *	2.83 *	2	1.4	1	0.7	0.7	0.6	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
-15	1.43 *	2.89 *	2.67 *	2.2	1.7	1.3	1	0.8	0.6	0.6	0.5	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
-17	0.8	1.6	1.6	1.4	1.1	0.9	0.7	0.6	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0	0	
-20	0.6	1.2	1.2	1.1	0.9	0.8	0.7	0.6	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0	0	
-23	0.4	0.9	0.9	0.8	0.7	0.7	0.6	0.5	0.4	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.1	0	0	
-26	0.3	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0	0	
-29	0.2	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.1	0	0	
-33	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.1	0	0	
-38	0.2	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.1	0	0	
-43	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.1	0	0	
-48	0.1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.1	0	0	
-55	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.3	0.1	0	0	
-65	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.3	0.4	0.2	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	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	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	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	100	194	177	149	115	83	56	37	25	23	20	15	15	14	13	12	9.4	10	7.6	2.7	0.4	0	1077

5.0 THD and PF Test

Model No.	HNLED18Y	Sample ID.	W1
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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	20.74	0.916	19.05%
25.1	120	60	0.171	20.30	0.992	10.06%

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*****