NVLAP LAB CODE 201011-0

LM-79-08 Test Report

For

CEA GROUP INTERNATIONAL CO.,LTD

(Brand Name: CEA/EAEC)

Sanjiali Industrial Zone Zhucheng Road Panshi North baixiang Yueqing Zhejiang China

High-Bay Luminaires for Commercial and Industrial buildings

Model name(s): HBL3-100-DRHB410PC

Representative (Tested) Model: HBL3-100-DRHB410PC(2700K)
HBL3-100-DRHB410PC(5700K)

Model Different: All construction and rating are the same, except CCT

Test & Report By:

Johnson Sun

Engineer: Johnson Sun

Date: Mar.05, 2016

Review By:

Tommy Liang

Manager: Tommy Liang

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
HBL3-100-DRHB410PC(2700K)	2700K	9780.0	101.0	96.83
HBL3-100-DRHB410PC(3000K)	3000K	9862.2*1	101.4*2	97.26*3
HBL3-100-DRHB410PC(3500K)	3500K	9944.3*1	101.4*2	98.07*3
HBL3-100-DRHB410PC(4000K)	4000K	10027*1	101.4*2	98.88*3
HBL3-100-DRHB410PC(4500K)	4500K	10109*1	101.4*2	99.69*3
HBL3-100-DRHB410PC(5000K)	5000K	10191*1	101.4*2	100.50*3
HBL3-100-DRHB410PC(5700K)	5700K	10273	101.8	100.91

*1: This value is calculated and the calculation formula is as below:

9862.2= (10273-9780.0) /6 +9780.0

9944.3= (10273-9780.0) /6 +9862.2

10027= (10273-9780.0) /6 +9944.3

10109= (10273-9780.0) /6 +10027

10191= (10273-9780.0) /6 +10109

*2: This value is calculated and the calculation formula is as below:

101.4= (101.8+101.0) /2

*3: This value is calculated and the calculation formula is as below:

97.26=9862.2/101.4

98.07=9944.3/101.4

98.88=10027/101.4

99.69=10109/101.4

100.50=10191/101.4

U.S. Department of Energy

Lighting Facts™ Uniform LM-79 Reporting Template

Laboratory Information:

Name of Test Laboratory	Standard-Tech Co. Ltd
Date of Test Report	Mar.05, 2016
Test Report No.	STD150803NB-AX
Laboratory Contact Name	Tommy Liang

Product Information:

Organization Name	CEA GROUP INTERNATIONAL CO.,LTD	
Brand Name	CEA/EAEC	
Model Number	HBL3-100-DRHB410PC(2700K)	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	High-Bay Luminaires for Commercial and Industrial buildings	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

Electrical Measurements:	**Integrating Sphere Output**	**Goniophotometer Output**	
Input Wattage	--	101.0	W
Input Current	--	0.8478	A
Input Voltage (ac)	--	120.0	V
Power Factor	--	0.9928	
Off-State Power	--	0	W
Photometric Characteristics			
Total Initial Lumen Output	--	9780.0	lm
Initial Lumen Efficacy	--	96.83	lm/w
Correlated color temperature / CCT	2746		K
Color rendering index / CRI	80.3		
R9 Value	0		
Duv	-0.0017		
Luminous Intensity Distribution			
Center beam candlepower (if applicable)	-----	4744	cd
Beam angle (if applicable)		78.5	°
Zonal lumens in the 0 °-60 °zone		84.9	%
Zonal lumens in the 60 °-90 °zone		9.9	%
Zonal lumens in the 90 °-120 °zone		2.6	%
Zonal lumens in the 120 °-180 °zone		2.6	%

U.S. Department of Energy

Lighting Facts™ Uniform LM-79 Reporting Template

Laboratory Information:

Name of Test Laboratory	Standard-Tech Co. Ltd
Date of Test Report	Mar.05, 2016
Test Report No.	STD150803NB-AX
Laboratory Contact Name	Tommy Liang

Product Information:

Organization Name	CEA GROUP INTERNATIONAL CO.,LTD	
Brand Name	CEA/EAEC	
Model Number	HBL3-100-DRHB410PC(5700K)	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	High-Bay Luminaires for Commercial and Industrial buildings	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

Electrical Measurements:	**Integrating Sphere Output**	**Goniophotometer Output**	
Input Wattage	101.8	--	W
Input Current	0.8537	--	A
Input Voltage (ac)	120.0	--	V
Power Factor	0.9937	--	
Off-State Power	0	--	W
Photometric Characteristics			
Total Initial Lumen Output	10273	--	lm
Initial Lumen Efficacy	100.91	--	lm/w
Correlated color temperature / CCT	5339	--	K
Color rendering index / CRI	83.8	--	
R9 Value	10	--	
Duv	0.0007	--	
Luminous Intensity Distribution			
Center beam candlepower (if applicable)	-----		cd
Beam angle (if applicable)			°
Zonal lumens in the 0 °-60 °zone			%
Zonal lumens in the 60 °-90 °zone			%
Zonal lumens in the 90 °-120 °zone			%
Zonal lumens in the 120 °-180 °zone			%

Test Specifications:	
Date of Receipt	: 2016-03-01
Date of Test	: 2016-03-02
Test item	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
Reference Standard	IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources CIE 15-2004 Technical Report Colorimetry IESNA LM-16-93 Practical Guide to Colorimetry of Light Source IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems
Reference Work Instruction	QD25

Test Methods

1. Photometric and Electrical measurements – Light Distribution Method:

Photometric parameters were measured using the 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 sample was operated at 120 Volts AC, 60Hz. It was stabilized before measurement was made. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1 °vertical intervals and 22.5 °horizontal intervals.

2. Photometric and Electrical Measurements – Integrating Sphere Method:

Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 ºC ±1 ºC. 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 sample was operated at 120 Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at least 5 nm intervals over the range of 380 to 780 nm.

1. Product Information:

Brand Name	CEA/EAEC
Model Number	HBL3-100-DRHB410PC
Luminaire Type	High-Bay Luminaires for Commercial and Industrial buildings
Rated Voltage / Frequency	100~ 277Vac, 50/60Hz
Nominal Power	100W
Rated Initial Lamp Lumen	--
Declared CCT	2700K,3000K,3500K,4000K,4500K,5000K,5700K
LED Manufacturer	SHENZHEN MTC LIGHTING CO., LTD.
LED Model	MTRC-3528WB
Sample Receipt Date	Mar.01, 2016
Sample Number	STD150803NB-AX1(2700K),AX2(5700K)
Photo	

2.1 Electrical, Photometric and Chromaticity Measurements *(Refer to Work Instruction QD25)*	**IES LM-79 2008**

Test date	2016-03-02	**Test Ambient:**	25.2 ℃
Test Orientation	As intended	**Stabilization Time (min)**	90
Model Number	HBL3-100-DRHB410PC(2700K)		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
STD150803	120.0	60	0.8478	101.0	0.9928	10.17
NB-AX1	277.0	60	0.3941	99.23	0.9091	13.05

Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Color Rendering Index (CRI)	80.3
R9	0
CCT (K)	2746
Chromaticity (x, y)	x=0.4533 y=0.4044
Chromaticity (u', v')	u'=0.2610 v'=0.5240
Duv	-0.0017

Special Color Rendering Indices			
R1	79	R9	0
R2	92	R10	80
R3	93	R11	75
R4	77	R12	75
R5	79	R13	81
R6	91	R14	97
R7	79	R15	70
R8	52	--	--

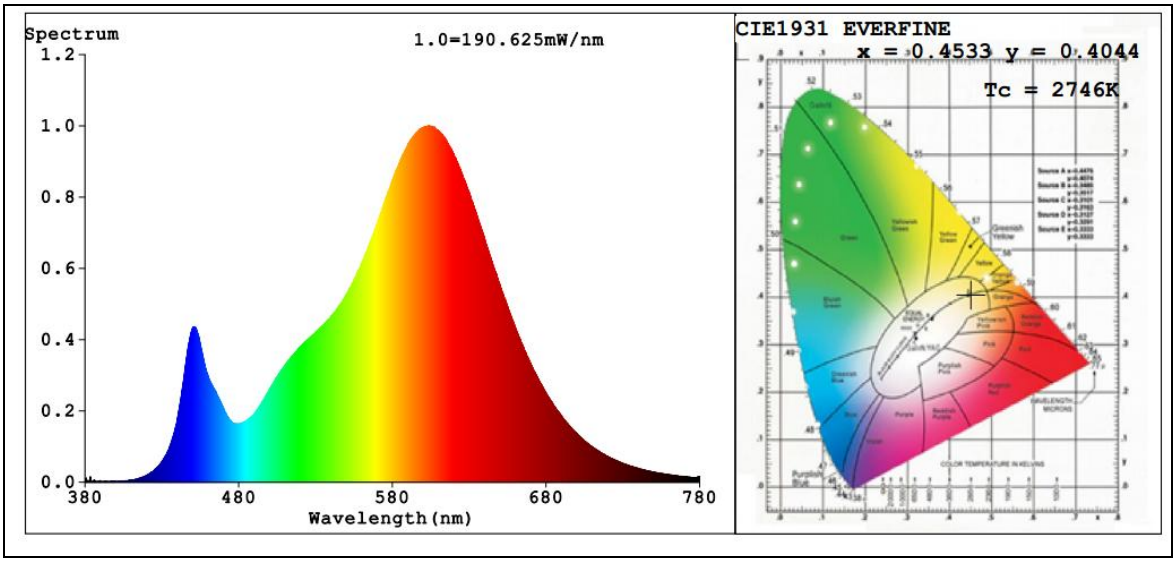
Goniophotometer Method:

Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	9780.0
Luminous Efficacy (lm/W)	96.83
Beam Angle °	78.5
Center Beam Candle Power (cd)	4744

Goniophotometer Method:

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	9682.7
Luminous Efficacy (lm/W)	97.58

Spectral Power Distribution & Chromaticity Diagram

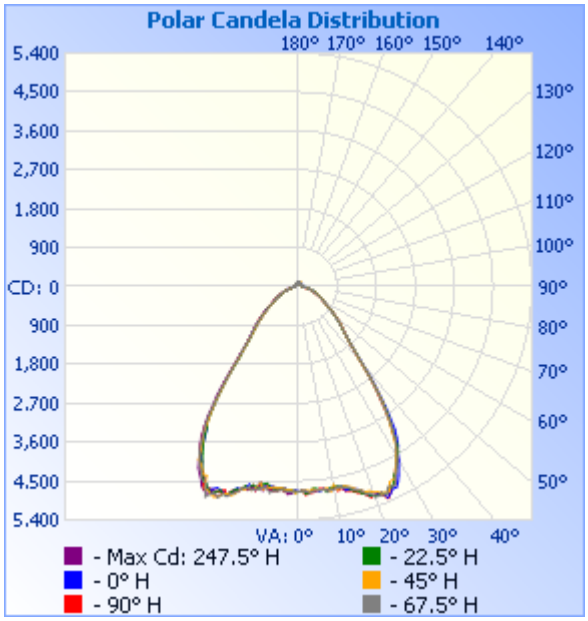


Zonal Lumen Tabulation

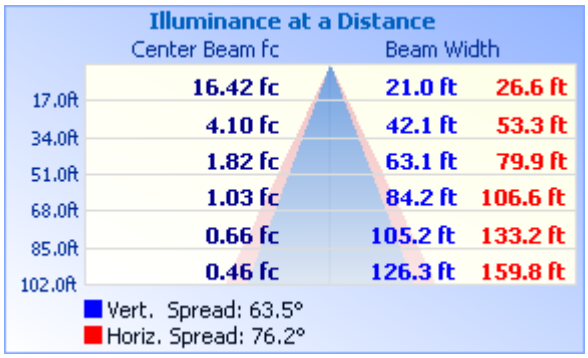
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	4,140.5	42.3%
0-40	6,299.2	64.4%
0-60	8,302.7	84.9%
60-90	966.7	9.9%
70-100	556.3	5.7%
90-120	258.4	2.6%
0-90	9,269.4	94.8%
90-180	509.4	5.2%
0-180	9,778.8	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	450.9	4.6%	90-100	101.5	1%
10-20	1,386.4	14.2%	100-110	88.0	0.9%
20-30	2,303.1	23.6%	110-120	69.0	0.7%
30-40	2,158.8	22.1%	120-130	70.3	0.7%
40-50	1,208.2	12.4%	130-140	61.2	0.6%
50-60	795.3	8.1%	140-150	46.6	0.5%
60-70	511.9	5.2%	150-160	36.4	0.4%
70-80	304.5	3.1%	160-170	28.4	0.3%
80-90	150.3	1.5%	170-180	8.0	0.1%

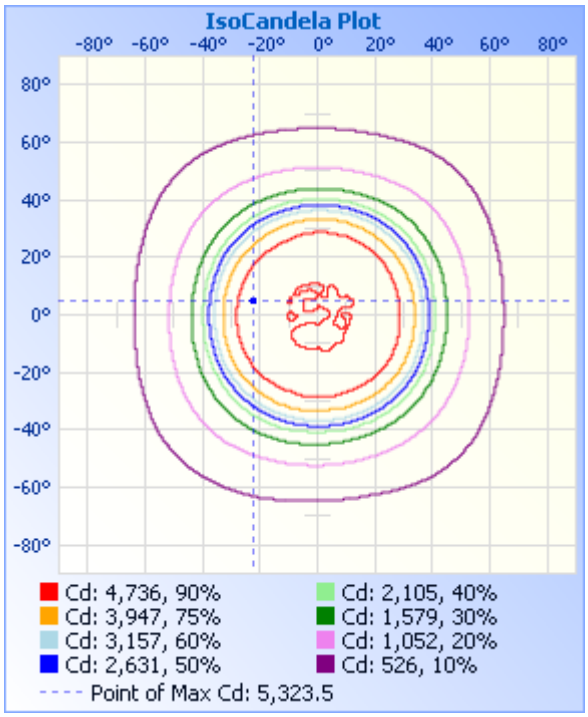
Photometric Data



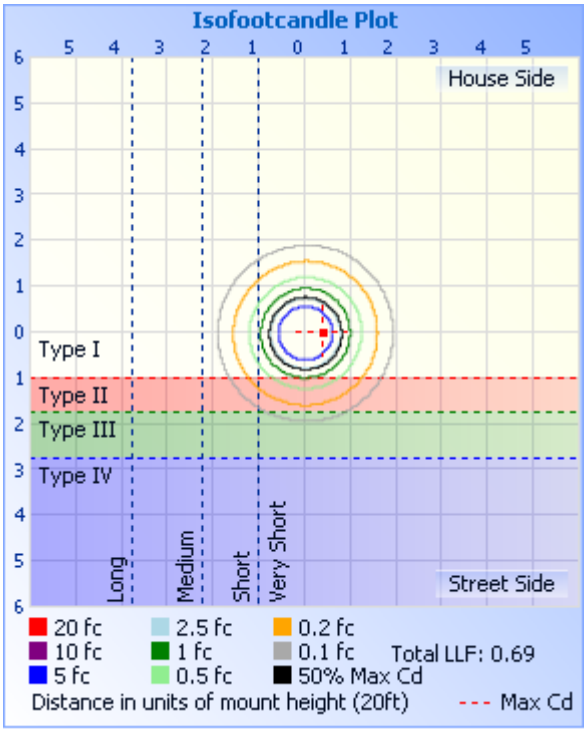
Illuminance Plots



ISOCANDELA DIAGRAM



ISOLUX DIAGRAM



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Candela Table - Type C

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
0	4744	4744	4744	4744	4744	4744	4744	4744	4744	4744	4744	4744	4744	4744	4744	4744	4744
1	4703	4731	4723	4735	4733	4729	4797	4715	4695	4763	4774	4718	4742	4790	4734	4739	4703
2	4743	4789	4709	4723	4819	4756	4724	4722	4798	4697	4712	4763	4733	4709	4798	4783	4743
3	4749	4772	4738	4784	4779	4765	4738	4743	4710	4732	4720	4750	4777	4749	4802	4811	4749
4	4726	4679	4694	4745	4770	4771	4710	4730	4678	4696	4688	4741	4754	4725	4682	4711	4726
5	4721	4691	4719	4730	4743	4718	4707	4754	4701	4696	4684	4715	4709	4710	4674	4677	4721
6	4756	4733	4720	4739	4699	4763	4738	4677	4713	4700	4695	4762	4746	4752	4749	4709	4756
7	4717	4727	4726	4715	4711	4769	4709	4677	4666	4718	4667	4757	4756	4709	4733	4738	4717
8	4745	4800	4705	4783	4761	4744	4702	4676	4668	4687	4708	4818	4734	4740	4708	4762	4745
9	4735	4711	4795	4758	4761	4736	4714	4650	4641	4608	4685	4729	4720	4692	4716	4671	4735
10	4698	4699	4649	4764	4705	4743	4692	4689	4728	4636	4757	4711	4705	4870	4774	4795	4698
11	4768	4701	4783	4710	4813	4757	4675	4747	4615	4762	4611	4761	4689	4639	4740	4675	4768
12	4721	4744	4745	4746	4768	4739	4746	4683	4745	4738	4748	4787	4827	4751	4783	4820	4721
13	4835	4738	4723	4758	4845	4842	4733	4773	4762	4708	4833	4833	4708	4746	4722	4773	4835
14	4830	4809	4772	4784	4860	4750	4809	4733	4712	4807	4790	4797	4818	4733	4830	4850	4830
15	4845	4884	4811	4850	4897	4882	4784	4781	4816	4771	4862	4814	4790	4831	4852	4823	4845
16	4878	4908	4885	4897	4958	4922	4854	4826	4870	4894	4867	4892	4899	4889	4887	4894	4878
17	4919	4993	4914	4920	4979	4944	4890	4974	4876	4898	5009	4979	4939	4869	4944	4938	4919
18	5016	5029	4999	5058	5059	5049	4989	4979	4993	4980	5071	5044	4965	4990	4944	4984	5016
19	5109	5107	4999	5050	5154	5143	4991	5007	5119	5079	5064	5134	5095	5008	5056	5082	5109
20	5130	5143	5060	5175	5134	5108	5065	5016	5085	5107	5095	5098	5003	5080	5020	5065	5130
21	5143	5173	5084	5187	5124	5201	5179	5134	5042	5046	5198	5230	5076	5022	5012	5182	5143
22	5138	5152	5151	5190	5193	5114	5194	5188	5017	5113	5241	5152	5106	5018	5072	5191	5138
23	5300	5212	5178	5215	5321	5084	5167	5147	5088	5206	5213	5208	5101	5098	5018	5143	5300
24	5231	5116	5167	5073	5218	5150	5091	5065	5138	5131	5152	**5324**	5113	5114	5041	5228	5231
25	5155	5109	4985	5101	5107	5235	4986	5038	5074	5044	5161	5057	5177	5086	5178	5195	5155
26	5166	5030	4965	5100	5079	5056	5029	4940	4938	5015	4860	5017	5041	5022	5019	5123	5166
27	5066	4887	4947	4933	4905	4907	4905	4844	4883	4918	4875	4962	4853	4874	4892	4980	5066
28	4929	4792	4769	4836	4777	4847	4755	4779	4789	4767	4770	4825	4777	4811	4855	4892	4929

29	4769	4673	4640	4677	4675	4645	4646	4611	4614	4608	4668	4726	4627	4699	4717	4786	4769
30	4639	4537	4509	4547	4597	4572	4508	4487	4517	4445	4627	4562	4507	4578	4636	4608	4639
31	4446	4467	4383	4394	4398	4440	4355	4289	4338	4298	4386	4465	4433	4407	4461	4448	4446
32	4345	4277	4195	4250	4247	4257	4202	4185	4105	4128	4214	4260	4274	4285	4260	4285	4345
33	4170	4021	3960	4011	3985	4036	4010	4051	3892	3902	4047	4047	4075	4095	4106	4137	4170
34	3978	3791	3774	3808	3782	3823	3738	3792	3805	3789	3751	3865	3877	3871	3863	3890	3978
35	3687	3588	3523	3525	3507	3513	3469	3479	3545	3512	3530	3620	3572	3599	3577	3668	3687
36	3404	3312	3306	3256	3233	3204	3199	3214	3265	3235	3244	3317	3268	3344	3339	3366	3404
37	3106	3026	3043	3019	2958	2895	2929	2950	2985	2958	2957	3014	2997	3108	3124	3134	3106
38	2822	2730	2732	2703	2683	2647	2646	2685	2705	2683	2671	2712	2725	2816	2823	2814	2822
39	2526	2446	2440	2447	2382	2345	2381	2396	2443	2362	2415	2447	2467	2529	2502	2525	2526
40	2234	2166	2164	2210	2149	2123	2159	2190	2143	2109	2153	2203	2185	2264	2244	2238	2234
41	2006	2014	1986	1964	1964	1967	2002	2013	1968	1975	1963	2019	1992	2069	2028	2055	2006
42	1845	1823	1823	1826	1804	1845	1843	1884	1850	1801	1815	1842	1848	1901	1877	1850	1845
43	1706	1693	1677	1698	1680	1736	1718	1761	1725	1663	1700	1712	1714	1759	1747	1703	1706
44	1603	1588	1585	1593	1581	1614	1620	1642	1607	1569	1566	1605	1629	1665	1648	1606	1603
45	1500	1484	1492	1489	1501	1530	1550	1545	1529	1491	1487	1537	1545	1572	1549	1510	1500
46	1422	1412	1429	1425	1438	1466	1492	1482	1458	1416	1418	1457	1461	1480	1451	1413	1422
47	1354	1351	1363	1364	1376	1406	1406	1420	1384	1351	1351	1387	1401	1415	1387	1340	1354
48	1286	1287	1306	1296	1312	1339	1343	1351	1318	1292	1275	1311	1343	1340	1319	1277	1286
49	1222	1229	1237	1236	1245	1269	1279	1273	1249	1215	1204	1240	1273	1282	1251	1216	1222
50	1156	1159	1169	1173	1186	1202	1209	1202	1175	1145	1130	1168	1210	1215	1183	1147	1156
51	1093	1095	1104	1110	1122	1140	1142	1131	1110	1089	1069	1111	1139	1146	1122	1083	1093
52	1035	1040	1041	1048	1056	1078	1079	1061	1051	1024	1010	1048	1085	1090	1060	1030	1035
53	981	985	988	993	996	1017	1015	1003	991	964	947	983	1024	1032	1006	973	981
54	929	929	929	937	935	954	952	942	931	906	891	919	969	970	952	925	929
55	875	875	873	880	877	896	891	885	877	850	837	862	908	916	897	870	875
56	827	821	820	823	822	839	834	833	822	796	788	805	853	860	846	821	827
57	779	775	774	779	773	787	784	782	773	748	742	760	801	806	797	773	779
58	738	733	730	731	723	738	736	740	724	705	703	719	750	755	752	725	738
59	700	695	693	695	684	699	698	698	688	670	671	683	707	713	711	691	700
60	668	664	659	659	649	663	667	669	654	634	641	652	672	673	674	656	668

61	639	635	634	629	621	634	636	642	623	607	617	624	639	639	645	627	639
62	615	612	610	601	592	606	608	614	598	580	591	598	608	610	616	603	615
63	589	587	582	574	561	573	578	585	563	550	564	568	575	579	588	577	589
64	563	559	556	545	533	544	545	555	531	516	534	538	542	547	557	550	563
65	537	531	528	515	503	512	514	525	500	487	504	509	508	516	527	524	537
66	508	504	501	487	473	481	483	491	469	456	477	480	476	485	496	495	508
67	480	478	475	460	445	450	453	467	438	431	451	450	446	456	467	470	480
68	455	454	450	435	423	424	426	438	410	406	424	427	416	432	442	445	455
69	434	431	428	413	400	400	401	414	388	381	400	406	390	410	417	424	434
70	413	412	407	392	380	378	379	390	368	363	381	387	370	390	397	402	413
71	396	396	389	376	361	356	360	370	348	343	363	367	350	370	378	384	396
72	381	380	372	358	342	338	338	349	326	325	341	346	334	352	361	367	381
73	362	360	353	338	324	316	317	327	307	305	320	327	313	332	341	348	362
74	342	342	334	320	304	292	293	302	285	285	299	305	293	313	321	328	342
75	325	325	315	301	284	272	271	280	263	268	278	285	272	293	303	310	325
76	306	306	296	280	262	250	249	252	241	243	256	265	253	271	283	290	306
77	284	285	275	258	241	229	225	227	217	224	234	242	232	249	264	270	284
78	266	263	253	237	219	206	204	204	196	200	211	221	214	233	242	250	266
79	243	241	230	216	199	187	184	182	175	181	187	200	194	210	219	232	243
80	226	221	212	197	181	171	169	168	159	166	171	183	177	193	201	214	226
81	210	207	197	182	168	160	155	154	148	157	160	169	166	179	186	200	210
82	198	196	186	170	158	150	144	143	138	147	148	158	156	170	175	188	198
83	186	183	175	159	147	139	137	136	129	136	139	148	147	159	165	177	186
84	173	172	161	148	139	132	129	128	122	129	129	138	138	147	152	163	173
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123	80	76	67	74	79	77	72	80	87	82	72	79	80	77	71	74	80
124	84	80	67	74	80	77	74	85	89	86	73	78	80	77	73	79	84

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179	64	68	76	73	79	79	74	70	63	70	70	73	75	75	72	59	64
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2.3 Electrical, Photometric and Chromaticity Measurements *(Refer to Work Instruction QD25)*	**IES LM-79 2008**

Test date	2016-03-02	**Test Ambient:**	25.2 ℃
Test Orientation	As intended	**Stabilization Time (min)**	90
Model Number	HBL3-100-DRHB410PC(5700K)		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
STD150803	120.0	60	0.8537	101.8	0.9937	10.12
-AD2	277.0	60	0.3973	100.2	0.9105	12.98

Sphere-Spectroradiometer Method:

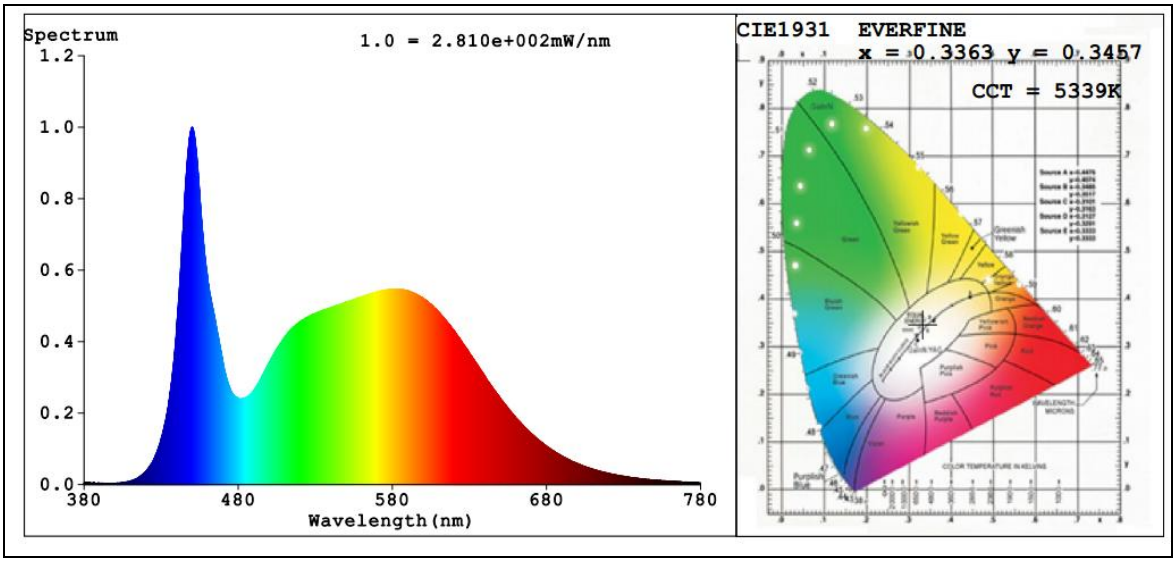
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Color Rendering Index (CRI)	83.8
R9	10
CCT (K)	5339
Chromaticity (x, y)	x=0.3363 y=0.3457
Chromaticity (u', v')	u'=0.2077 v'=0.4805
Duv	0.0007
Total Initial Lumen Output(lm)	10273
Initial Lumen Efficacy(lm/w)	100.91

Special Color Rendering Indices			
R1	82	R9	10
R2	89	R10	73
R3	92	R11	83
R4	84	R12	63
R5	83	R13	84
R6	84	R14	96
R7	87	R15	78
R8	69	--	--

Sphere-Spectroradiometer Method for 277V:

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Initial Lumen Output(lm)	10175
Initial Lumen Efficacy(lm/w)	101.55

Spectral Power Distribution & Chromaticity Diagram



3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-336	2 meter Integrating Sphere	2015-07-01	2016-06-30
ST-R-331	Spectral analysis system HAAS-2000	2015-07-01	2016-06-30
D204	Standard Lamp	2015-07-01	2016-06-30
PF2010	Power Meter for Integrating Sphere	2015-07-01	2016-06-30
EE-09	Goniophotometer system	2015-07-01	2016-06-30
D908S	Standard Lamp	2015-07-01	2016-06-30
PF210	Power Meter for Goniophotometer	2015-07-01	2016-06-30
ST-R-181A	Temperature Tester	2015-07-01	2016-06-30
Uncertainty: Photometric Measurement (Sphere):1.74% Chromaticity Measurement(Sphere):14.3K Photometric Measurement(Goniophotometer):1.62%			

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