

LM-79-08 Test Report

For

IKIO LED LIGHTING**(Brand Name: IKIO)**8470 Allison Pointe Blvd, Suite 128
Indianapolis, IN 46250**Replacement Lamps for High-Bay Luminaires for
Commercial and Industrial Buildings (Type B)**

Model name(s): IK-HBKT-L120-0100-XX

Representative (Tested) Model: IK-HBKT-L120-0100-27
IK-HBKT-L120-0100-57

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

S

Test & Report By:

Bill Luo

Engineer: Bill Luo

Date: May.23,2017

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.

Laboratory: Standard-Tech Co. Ltd Testing Center
NVLAP CODE: 201011-0

Report Format Number STD/QR4909-A/2

Address: Standard-Tech Building, No.6 Guanhong Road, Guangzhou Science City, Guangzhou 510663, China

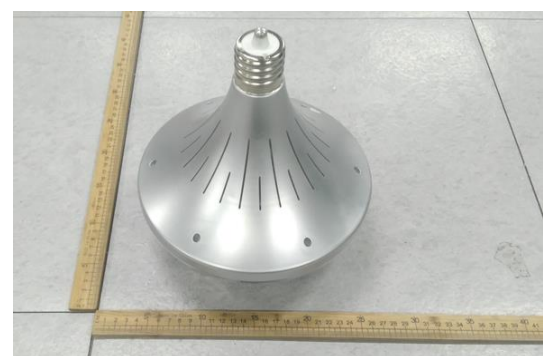
Tel: 8620-3229 0320

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1.1 Product Information:

Organization Name	IKIO LED LIGHTING	
Brand Name	IKIO	
Model Number	IK-HBKT-L120-0100-XX	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Replacement Lamps for High-Bay Luminaires for Commercial and Industrial Buildings (Type B)	
Rated Voltage / Frequency	100 -277Vac, 60 Hz	
Nominal Power	100W	
Rated Initial Lamp Lumen	--	
Declared CCT	2700K,3000K,3500K,4000K,4500K,5700K	
LED Manufacturer	Samsung Electronics Co., LTD.	
LED Model	SPMWH1228xxxxxxxxxx	
Sample Number	GZE1704163-A1(2700K), A2(5700K)	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

Photo


1.2 Test Specifications:

Date of Receipt	May.16,2017
Date of Test	May.19,2017
Test item	<ol style="list-style-type: none"> 1. Total Luminous Flux 2. Luminous Distribution Intensity 3. Luminous Efficacy 4. Correlated Color Temperature 5. Color Rendering Index 6. Chromaticity Coordinate 7. Electrical Parameters
Reference Standard	<ol style="list-style-type: none"> 1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products 2. ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products 3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources 4. CIE 15-2004 Technical Report Colorimetry 5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source 6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems
Reference Work Instruction	QD25

1.3 Test Methods

1) Photometric and Light Distribution Measurement – Goniophotometer Method: Photometric parameters were measured using the 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 sample was operated at 120 or rated 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) Chromaticity Measurement – Sphere-Spectroradiometer Method: Chromaticity 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 sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral power distribution taken at 5 nm intervals over the range of 380 to 780 nm.
3) Electrical Measurements: Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Voltage, frequency, current, power, power factor and total harmonic distortion were measured by and read from the power meter.

2.1 Electrical, Photometric and Chromaticity Measurements
(Refer to Work Instruction QD25)

Test date	2017-05-19	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	IK-HBKT-L120-0100-27		

Electrical Measurement in Lithonia THD 400S A15:

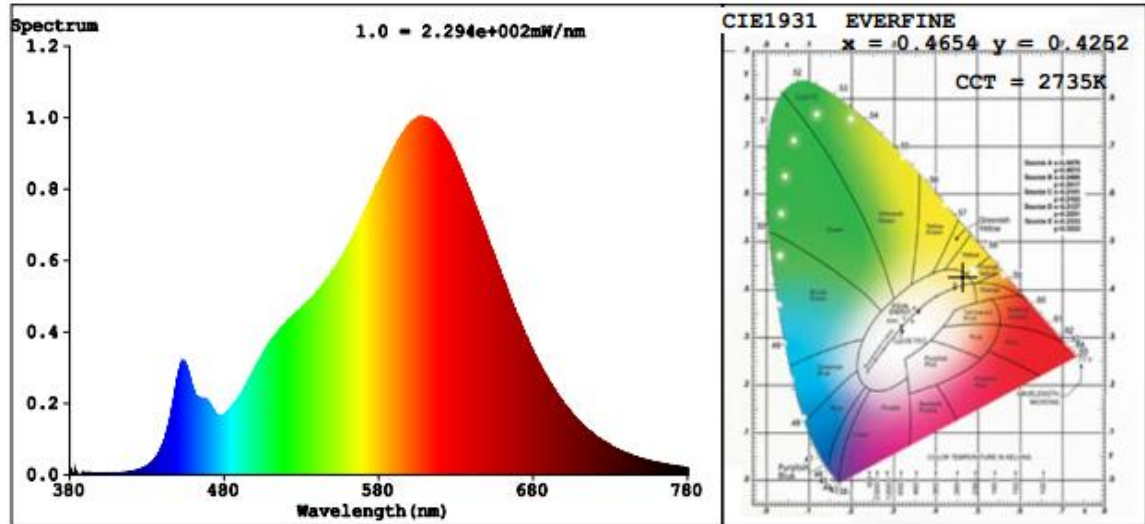
Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170416	120.0	60	0.8199	97.68	0.9928	7.36
3-A1	277.0	60	0.3764	96.00	0.9208	15.43
DLC Pass Criteria					$\geq 0.9(-3\%)$	$\leq 20(+5)$

Chromaticity Measurement - Sphere-Spectroradiometer Method in Lithonia THD 400S A15:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	83	R9	15
Frequency (Hz)	60	R2	92	R10	81
CCT (K)	2735	R3	98	R11	82
Duv	0.0048	R4	82	R12	72
Chromaticity (x, y)	x=0.4654 y=0.4252	R5	82	R13	84
Chromaticity (u', v')	u'=0.2596 v'=0.5336	R6	91	R14	99
Color Rendering Index (CRI)	84.3	R7	85	R15	74
R9	15	R8	62	--	--

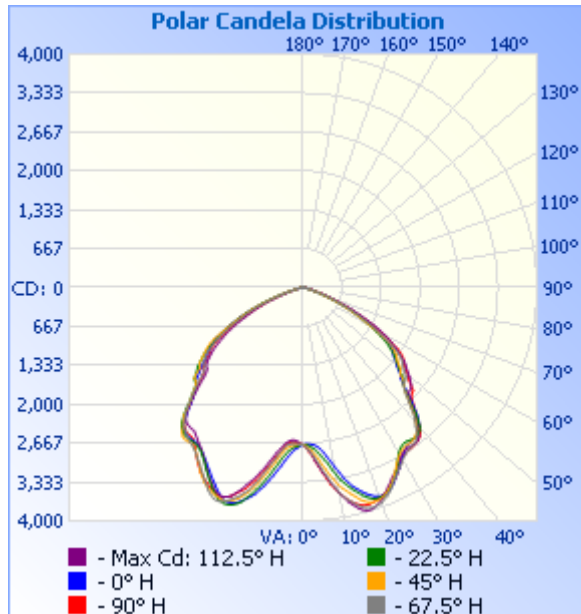
Photometric Measurement – Goniophotometer Method in Lithonia THD 400S A15:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	10084	10025	$\geq 10000(-10\%)$	
Luminous Efficacy (lm/W)	103.24	104.43	Standard: $\geq 105(-3\%)$	Premium: $\geq 130(-3\%)$
Most Worst Luminous/Highest Watts	102.63			
Zonal lumens in the 20-50 °zone (%)	57.0	--	$\geq 30\%(-10\%)$	
Beam Angle (°)	110.8	--	--	
Center Beam Candle Power (cd)	2692	--	--	

Spectral Power Distribution & Chromaticity Diagram

Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	3,014.1	29.9%
0-40	5,041.9	50%
0-60	8,811.3	87.4%
60-90	1,257.9	12.5%
70-100	276.6	2.7%
90-120	4.2	0%
0-90	10,069.2	99.9%
90-180	13.8	0.1%
0-180	10,083.0	100%

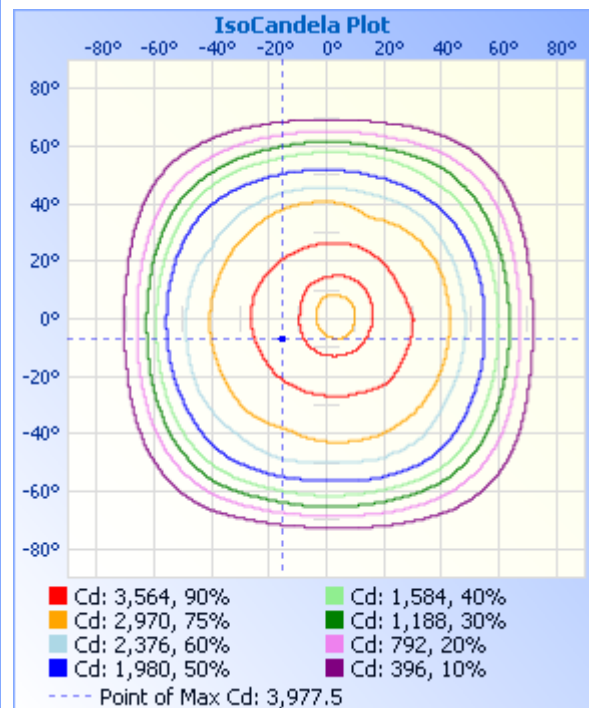
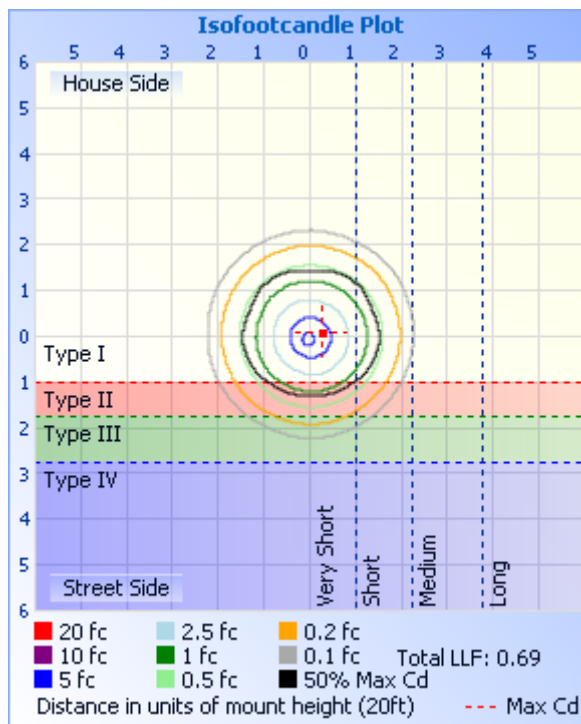
Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-10	285.4	2.8%	90-100	1.5	0%
10-20	1,039.0	10.3%	100-110	1.1	0%
20-30	1,689.8	16.8%	110-120	1.6	0%
30-40	2,027.8	20.1%	120-130	2.1	0%
40-50	2,027.7	20.1%	130-140	2.3	0%
50-60	1,741.6	17.3%	140-150	2.2	0%
60-70	982.8	9.7%	150-160	1.7	0%
70-80	232.6	2.3%	160-170	1.0	0%
80-90	42.6	0.4%	170-180	0.4	0%

Photometric Data


Illuminance at a Distance

	Center Beam fc	Beam Width	
17.0ft	9.32 fc	44.9 ft	48.8 ft
34.0ft	2.33 fc	89.8 ft	97.7 ft
51.0ft	1.04 fc	134.7 ft	146.5 ft
68.0ft	0.58 fc	179.6 ft	195.3 ft
85.0ft	0.37 fc	224.5 ft	244.2 ft
102.0ft	0.26 fc	269.5 ft	293.0 ft

■ Vert. Spread: 105.7°
 ■ Horiz. Spread: 110.3°



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	2692	2692	2692	2692	2692	2692	2692	2692	2692	2692	2692	2692	2692	2692	2692	2692	2692
1	2678	2690	2709	2740	2737	2718	2712	2711	2706	2693	2680	2684	2680	2665	2663	2671	2678
2	2684	2709	2759	2795	2811	2789	2784	2777	2748	2727	2696	2678	2666	2641	2642	2659	2684
3	2689	2744	2801	2855	2875	2861	2856	2829	2778	2730	2705	2675	2651	2621	2637	2651	2689
4	2704	2775	2868	2941	2987	2977	2952	2909	2836	2764	2711	2679	2651	2619	2627	2654	2704
5	2731	2834	2937	3027	3076	3068	3034	2984	2906	2810	2739	2693	2667	2637	2648	2676	2731
6	2778	2892	3045	3147	3194	3180	3153	3085	2982	2872	2773	2722	2697	2667	2680	2714	2778
7	2839	2969	3132	3244	3294	3267	3235	3174	3079	2944	2843	2783	2764	2720	2725	2763	2839
8	2929	3046	3241	3364	3410	3374	3336	3271	3162	3046	2919	2853	2848	2792	2795	2850	2929
9	3016	3161	3323	3459	3489	3465	3418	3343	3263	3136	3026	2958	2925	2855	2865	2937	3016
10	3127	3254	3426	3577	3579	3577	3509	3437	3349	3254	3118	3041	3028	2953	2960	3044	3127
11	3217	3358	3498	3650	3645	3655	3582	3518	3457	3348	3234	3154	3114	3040	3050	3121	3217
12	3338	3427	3560	3719	3719	3755	3663	3618	3534	3462	3329	3257	3220	3155	3166	3225	3338
13	3421	3507	3626	3773	3775	3825	3718	3682	3623	3548	3445	3381	3306	3241	3259	3307	3421
14	3510	3572	3686	3842	3820	3892	3792	3741	3686	3647	3536	3482	3410	3348	3371	3397	3510
15	3570	3635	3760	3889	3858	3942	3834	3781	3748	3726	3634	3593	3494	3434	3446	3458	3570
16	3639	3707	3807	3929	3876	3975	3862	3816	3797	3816	3702	3663	3581	3517	3512	3525	3639
17	3692	3758	3848	3946	3880	3978	3871	3839	3850	3869	3776	3736	3645	3619	3578	3601	3692
18	3741	3802	3863	3951	3871	3960	3858	3849	3882	3911	3823	3789	3705	3694	3626	3649	3741
19	3785	3822	3868	3942	3849	3925	3836	3854	3896	3933	3868	3846	3775	3774	3693	3706	3785
20	3808	3828	3858	3923	3827	3890	3811	3844	3892	3939	3885	3890	3816	3817	3731	3741	3808
21	3817	3824	3828	3884	3805	3830	3775	3818	3867	3923	3888	3926	3842	3841	3759	3764	3817
22	3806	3796	3798	3849	3784	3776	3745	3783	3816	3895	3875	3939	3843	3836	3769	3761	3806
23	3780	3760	3747	3793	3751	3709	3695	3732	3765	3844	3860	3925	3823	3804	3753	3756	3780
24	3734	3703	3695	3736	3718	3657	3656	3685	3701	3794	3833	3883	3797	3762	3718	3741	3734
25	3680	3647	3637	3666	3667	3595	3599	3618	3646	3722	3805	3836	3764	3698	3668	3702	3680
26	3611	3586	3558	3609	3615	3551	3552	3561	3591	3663	3772	3766	3733	3643	3626	3659	3611
27	3558	3510	3489	3556	3564	3506	3497	3499	3526	3589	3734	3708	3701	3584	3584	3608	3558
28	3504	3434	3410	3503	3497	3446	3455	3426	3475	3530	3674	3640	3655	3513	3526	3539	3504
29	3427	3340	3352	3461	3443	3400	3410	3371	3418	3458	3619	3584	3615	3456	3476	3481	3427

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30	3379	3276	3299	3406	3386	3347	3357	3311	3373	3402	3543	3520	3554	3385	3408	3408	3379
31	3328	3218	3266	3368	3353	3312	3319	3268	3323	3354	3482	3472	3503	3333	3352	3350	3328
32	3288	3191	3240	3334	3332	3284	3276	3225	3288	3303	3426	3425	3433	3279	3282	3291	3288
33	3250	3175	3229	3312	3316	3278	3253	3193	3252	3276	3363	3373	3371	3238	3233	3216	3250
34	3234	3176	3229	3300	3309	3280	3245	3164	3230	3253	3323	3338	3303	3201	3191	3158	3234
35	3221	3190	3226	3284	3300	3286	3247	3148	3224	3239	3292	3303	3255	3161	3137	3094	3221
36	3212	3204	3210	3269	3290	3286	3248	3129	3224	3241	3286	3282	3205	3125	3087	3046	3212
37	3203	3200	3185	3229	3270	3268	3254	3114	3223	3244	3293	3254	3188	3087	3054	3002	3203
38	3187	3192	3148	3175	3237	3222	3234	3089	3216	3238	3293	3228	3186	3079	3037	2969	3187
39	3137	3162	3100	3056	3188	3127	3184	3047	3205	3233	3274	3182	3174	3078	3017	2953	3137
40	3090	3108	2990	2981	3092	3046	3097	2986	3173	3201	3223	3156	3145	3067	2993	2900	3090
41	3007	2990	2901	2886	2995	2932	3007	2893	3121	3168	3134	3100	3103	3047	2972	2848	3007
42	2908	2870	2768	2747	2874	2818	2908	2827	2999	3094	3068	3031	3041	3001	2898	2756	2908
43	2765	2695	2650	2635	2784	2677	2810	2744	2897	3001	2989	2942	2924	2924	2810	2669	2765
44	2654	2559	2534	2530	2689	2620	2723	2676	2773	2874	2835	2858	2820	2786	2696	2551	2654
45	2505	2451	2447	2447	2618	2554	2616	2608	2669	2725	2727	2721	2684	2673	2595	2456	2505
46	2388	2390	2398	2382	2596	2528	2523	2542	2569	2649	2635	2630	2598	2536	2468	2344	2388
47	2288	2348	2358	2375	2575	2528	2499	2490	2502	2540	2532	2502	2470	2412	2370	2247	2288
48	2245	2302	2253	2352	2466	2489	2449	2481	2469	2469	2465	2405	2365	2275	2278	2164	2245
49	2170	2197	2203	2330	2397	2429	2358	2440	2433	2449	2426	2291	2275	2188	2213	2125	2170
50	2096	2139	2171	2273	2337	2374	2315	2382	2355	2427	2432	2212	2212	2143	2147	2089	2096
51	2047	2079	2105	2207	2276	2307	2270	2350	2280	2370	2363	2170	2215	2134	2063	2030	2047
52	2010	2018	2047	2164	2211	2247	2204	2312	2221	2302	2238	2142	2151	2088	1987	1972	2010
53	1935	1960	2011	2126	2160	2191	2122	2212	2145	2263	2214	2115	2095	2028	1949	1935	1935
54	1902	1906	1966	2075	2120	2137	2084	2147	2061	2196	2187	2078	2038	1959	1879	1884	1902
55	1866	1820	1916	2010	2085	2036	2042	2060	2025	2109	2120	2021	1955	1894	1824	1835	1866
56	1819	1757	1848	1928	2014	1954	2010	1988	1956	2050	2057	1952	1916	1806	1748	1790	1819
57	1750	1676	1779	1799	1928	1887	1971	1902	1911	1982	1993	1883	1846	1719	1647	1721	1750
58	1631	1565	1638	1687	1790	1790	1880	1827	1862	1869	1932	1811	1748	1624	1562	1643	1631
59	1537	1469	1513	1554	1690	1703	1789	1748	1780	1777	1858	1684	1638	1542	1487	1524	1537
60	1422	1360	1384	1445	1562	1596	1670	1642	1706	1676	1764	1597	1535	1437	1422	1401	1422
61	1302	1252	1236	1345	1434	1504	1575	1553	1588	1588	1630	1483	1447	1344	1319	1253	1302

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62	1184	1128	1128	1216	1333	1379	1461	1444	1501	1481	1494	1404	1326	1237	1234	1138	1184
63	1095	1036	1014	1106	1189	1238	1351	1336	1392	1369	1382	1284	1229	1119	1119	1025	1095
64	965	931	923	977	1072	1129	1252	1230	1280	1275	1260	1171	1104	1038	1025	931	965
65	872	842	808	881	940	1000	1130	1100	1195	1158	1165	1086	976	937	893	827	872
66	758	723	722	768	842	904	1019	1003	1069	1068	1038	980	883	849	797	746	758
67	661	632	622	679	728	781	885	884	973	955	947	892	775	744	689	640	661
68	547	529	543	579	638	666	757	766	837	831	829	772	698	662	606	556	547
69	472	449	450	506	537	576	660	672	696	741	720	668	589	552	511	463	472
70	379	365	383	417	460	474	552	560	600	633	632	588	507	464	438	397	379
71	322	313	310	357	378	402	472	475	493	555	524	494	418	384	352	316	322
72	261	248	260	293	325	334	389	388	418	448	452	423	348	328	290	262	261
73	207	198	203	246	265	274	320	305	338	375	372	348	297	265	228	207	207
74	167	157	156	190	223	234	271	254	284	302	305	278	237	225	188	159	167
75	124	119	131	153	179	192	218	201	227	242	258	228	195	175	150	128	124
76	106	105	114	137	153	172	183	166	177	200	203	175	150	139	117	104	106
77	92	92	103	120	138	151	157	136	143	155	164	139	126	123	104	93	92
78	82	82	90	108	122	133	138	119	116	127	135	124	114	108	91	81	82
79	71	71	80	94	109	120	125	108	102	114	120	108	99	97	81	71	71
80	60	63	69	81	95	105	109	95	91	100	105	97	87	84	70	62	60
81	53	53	58	71	84	90	95	83	80	87	92	84	77	75	62	53	53
82	44	44	50	59	70	78	84	74	69	78	82	73	67	65	52	46	44
83	37	37	40	50	58	65	70	63	61	67	71	65	57	55	43	38	37
84	29	29	33	39	48	52	58	54	51	58	62	54	49	47	37	32	29
85	24	23	25	32	37	43	49	44	44	48	51	44	39	38	29	25	24
86	17	16	19	23	29	32	38	36	35	39	41	36	30	31	23	18	17
87	9	8	10	13	20	22	30	29	28	32	34	28	23	22	16	12	9
88	4	3	3	6	11	12	19	21	22	24	25	19	15	16	9	5	4
89	2	2	2	2	3	3	8	12	14	15	15	12	7	7	3	2	2
90	1	1	1	1	1	2	3	5	5	8	7	3	2	2	1	1	1
91	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1
92	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1
93	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1

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94	1	1	1	1	1	2	2	2	2	2	2	2	1	1	1	1	1
95	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1
96	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1
97	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
98	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
99	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
100	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
101	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
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Laboratory: Standard-Tech Co. Ltd Testing Center

NVLAP CODE: 201011-0

Report Format Number STD/QR4909-A/2

Address: Standard-Tech Building, No.6 Guanhong Road, Guangzhou Science City, Guangzhou 510663, China

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126	2	2	2	2	2	3	3	2	2	2	2	2	3	3	3	2	2
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Laboratory: Standard-Tech Co. Ltd Testing Center

NVLAP CODE: 201011-0

Report Format Number STD/QR4909-A/2

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158	4	4	4	3	3	4	4	4	3	4	4	4	4	4	4	4	4
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Laboratory: Standard-Tech Co. Ltd Testing Center

NVLAP CODE: 201011-0

Report Format Number STD/QR4909-A/2

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2.2 Electrical, Photometric and Chromaticity Measurements
(Refer to Work Instruction QD25)

Test date	2017-05-19	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	IK-HBKT-L120-0100-57		

Electrical Measurement in Lithonia THD 400S A15:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170416	120.0	60	0.8280	98.73	0.9936	7.88
3-A2	277.0	60	0.3823	97.59	0.9215	15.19
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

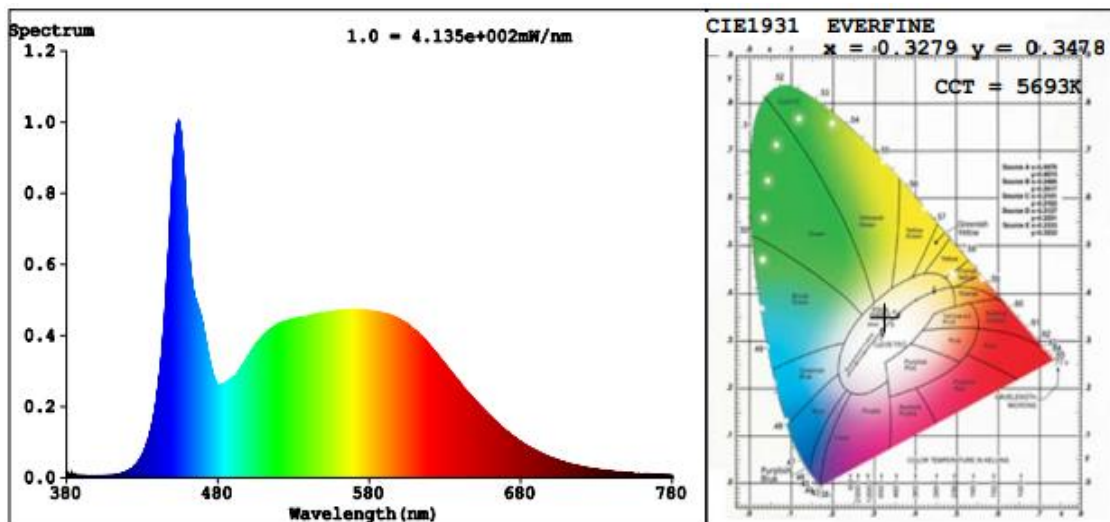
Chromaticity Measurement - Sphere-Spectroradiometer Method in Lithonia THD 400S A15:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	83	R9	15
Frequency (Hz)	60	R2	92	R10	79
CCT (K)	5693	R3	95	R11	82
Duv	0.0054	R4	83	R12	59
Chromaticity (x, y)	x=0.3279 y=0.3478	R5	84	R13	86
Chromaticity (u', v')	u'=0.2013 v'=0.4802	R6	87	R14	98
Color Rendering Index (CRI)	85.2	R7	88	R15	78
R9	15	R8	70	--	--

Photometric Measurement – Sphere-Spectroradiometer Method in Lithonia THD 400S A15:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	11612	11547	>=10000(-10%)	
Luminous Efficacy (lm/W)	117.61	118.32	Standard: >=	Premium: >=
Most Worst Luminous/Highest Watts	116.96		105(-3%)	130(-3%)

Spectral Power Distribution & Chromaticity Diagram



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NVLAP CODE: 201011-0

Report Format Number STD/QR4909-A/2

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Tel: 8620-3229 0320 Fax: 8620-32290422 <http://www.standard-tech.com>

2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
IK-HBKT-L120-0100-27	2700K	10084	97.68	103.24
IK-HBKT-L120-0100-30	3000K	10339 ^{*1}	98.21 ^{*2}	105.27 ^{*3}
IK-HBKT-L120-0100-35	3500K	10594 ^{*1}	98.21 ^{*2}	107.87 ^{*3}
IK-HBKT-L120-0100-40	4000K	10849 ^{*1}	98.21 ^{*2}	110.47 ^{*3}
IK-HBKT-L120-0100-45	4500K	11104 ^{*1}	98.21 ^{*2}	113.06 ^{*3}
IK-HBKT-L120-0100-50	5000K	11359 ^{*1}	98.21 ^{*2}	115.66 ^{*3}
IK-HBKT-L120-0100-57	5700K	11612	98.73	117.61

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

$$10339 = (11612 - 10084) / 6 + 10084$$

$$10594 = (11612 - 10084) / 6 + 10339$$

$$10849 = (11612 - 10084) / 6 + 10594$$

$$11104 = (11612 - 10084) / 6 + 10849$$

$$11359 = (11612 - 10084) / 6 + 11104$$

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

$$98.21 = (97.68 + 98.73) / 2$$

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

$$105.27 = 10339 / 98.21$$

$$107.87 = 10594 / 98.21$$

$$110.47 = 10849 / 98.21$$

$$113.06 = 11104 / 98.21$$

$$115.66 = 11359 / 98.21$$

3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-331	2 meter Integrating Sphere	2016-07-01	2017-06-30
ST-R-327	Spectral analysis system HAAS-2000	2016-07-01	2017-06-30
D204	Standard Lamp	2016-07-12	2017-07-11
PF2010	Power Meter for Integrating Sphere	2016-07-01	2017-06-30
GO-R5000	Goniophotometer system	2016-07-01	2017-06-30
D908S	Standard Lamp	2016-07-12	2017-07-11
PF210	Power Meter for Goniophotometer	2016-07-07	2017-07-06
Expand Uncertainty: Photometric Measurement (Sphere):2.04%, k=2 Chromaticity Measurement(Sphere):28.8K, k=2 Photometric Measurement(Goniophotometer):2.36%, k=2			

******* END OF REPORT *******