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Model type	Model name	CRI (typ.)	CCT (typ.)	Series	Parallel	Power density（W/mm^2）	Current density per LED die（mA/mm^2）	Current per die (mA)	Distance between of dies	Current (mA)
Multiple models	HL-LML04H421W-22B11C12(Ra2)	80	2700K	12	11	0.0354	401.85	70	0.95	770
		80	3000K	12	11	0.0354	401.85	70	0.95	770
		80	3500K	12	11	0.0354	401.85	70	0.95	770
		80	4000K	12	11	0.0354	401.85	70	0.95	770
		80	5000K	12	11	0.0354	401.85	70	0.95	770
		80	5700K	12	11	0.0354	401.85	70	0.95	770
		80	6000K	12	11	0.0354	401.85	70	0.95	770
		80	6500K	12	11	0.0354	401.85	70	0.95	770
Multiple models	HL-LM024H384W-40B2C40(Ra2)	80	2700K	40	2	0.0367	442.86	120	1.15	240
		80	3000K	40	2	0.0110	442.86	120	1.15	240
		80	3500K	40	2	0.0110	442.86	120	1.15	240
		80	4000K	40	2	0.0110	442.86	120	1.15	240
		80	5000K	40	2	0.0110	442.86	120	1.15	240
		80	5700K	40	2	0.0110	442.86	120	1.15	240
		80	6000K	40	2	0.0110	442.86	120	1.15	240
		80	6500K	40	2	0.0110	442.86	120	1.15	240
Multiple models	HL-LM024H384W-50B2C50(Ra2)	80	2700K	50	2	0.0459	442.86	120	1.05	240
		80	3000K	50	2	0.0110	442.86	120	1.05	240
		80	3500K	50	2	0.0110	442.86	120	1.05	240
		80	4000K	50	2	0.0110	442.86	120	1.05	240
		80	5000K	50	2	0.0110	442.86	120	1.05	240
		80	5700K	50	2	0.0110	442.86	120	1.05	240
		80	6000K	50	2	0.0110	442.86	120	1.05	240
		80	6500K	50	2	0.0110	442.86	120	1.05	240
Multiple models	HL-LM024H384W-60B2C60(Ra2)	80	2700K	50	2	0.0459	442.86	120	0.88	240
		80	3000K	50	2	0.0110	442.86	120	0.88	240
		80	3500K	50	2	0.0110	442.86	120	0.88	240
		80	4000K	50	2	0.0110	442.86	120	0.88	240
		80	5000K	50	2	0.0110	442.86	120	0.88	240
		80	5700K	50	2	0.0110	442.86	120	0.88	240
		80	6000K	50	2	0.0110	442.86	120	0.88	240
		80	6500K	50	2	0.0110	442.86	120	0.88	240
Multiple models	HL-LM024D90W-40B2C40(Ra2)	80	2700K	40	2	0.0459	316.33	150	1.04	300
		80	3000K	40	2	0.0138	316.33	150	1.04	300
		80	3500K	40	2	0.0138	316.33	150	1.04	300
		80	4000K	40	2	0.0138	316.33	150	1.04	300
		80	5000K	40	2	0.0138	316.33	150	1.04	300
		80	5700K	40	2	0.0138	316.33	150	1.04	300
		80	6000K	40	2	0.0138	316.33	150	1.04	300
		80	6500K	40	2	0.0138	316.33	150	1.04	300
Multiple models	HL-LM024D90W-50B2C50(Ra2)	80	2700K							

1.2 Standards Used:

IESNA LM-80-08: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
CIE 127:2007: Measurement of LEDs (This standard was not accredited by IAS).
ENERGY STAR® Requirements for the Use of LM-80 Data (This standard was not accredited by IAS)

1.3 Test Facility

The testing facility used by Bay Area Compliance Laboratories Corp. (Dongguan). is located at No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

1.4 Description of Auxiliary Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
1.0m integrating sphere	SENSING	SCD-20008	N/A	N/A	2015-07-17	2016-07-16
spectroradiometer	SENSING	SCD-20008	N/A	N/A	2015-07-17	2016-07-16
DC Power Supply	Hanshenpuyuan	HSPY-100-05	2013010210003	N/A	2015-05-05	2016-05-04
Standard Light Source	EVERFINE	D062	1011093	3000K	2015-09-17	2016-09-16
Multi-channel DC source	Taishan Xingguang	T01000F2	ST04392	0~5V,0~40A	2015-09-17	2016-09-16
Adjustable constant-current DC switching power supply	GUTE	DK-60V50A	120 5037	3000W	2015-09-23	2016-09-22
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11060010	(50/15A)	2016-03-04	2017-03-03

1.5 Operating Cycle

Samples are driven with a constant direct current (DC)

1.6 Ambient Conditions

For lumen maintenance test, samples were operated in thermal chambers with minimal ambient airflow. For long term reliability test, the case temperature was controlled by mounting several thermocouples on a sample reliability stress board at the designated thermal measurement point, as shown in APPENDIX. The ambient temperature T_A was measured by several thermocouples at a distance of 5 mm above the reliability test board. The relative humidity within chamber was less than 65%.

For photometry measurement, temperature was set to 25℃ ± 2℃, RH <65%.

1.7 Pha BT1 0 0trtlasuess(itioTBT1 0 0 1 224.21 161.78 Tm[P)11(ha)TBT1 0 0 1 229.73 161.78 Tm[P)11(ha

1.8 Sample Set

Sampling Method:

LED samples for IESNA LM-80 testing consist of units built from a minimum of three manufacturing lots with each manufacturing lot built from different wafer lots built on non-consecutive days.
These manufacturing lots are picked to represent a wide parametric distribution.

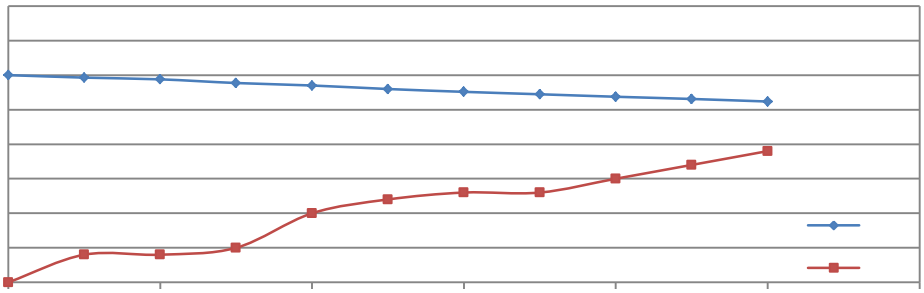
Sample Size:
Total 30Pcs;
Each Ts test condition 15Pcs
The samples tested at Ts 85℃ and Ts 105℃ were received at 2015-03-09 and tested during 2015-03-11 to 2016-05-05. The samples were numbered from 1to 15 and 16 to 30.

Data Set 1: 85°C,2160mA	
Part Number:	HL-LM004H384W-40B18C12(Ra2)
Number of Units:	15
Actual Case Temperature(T_S):	T_S =84.1℃
Actual Ambient Temperature(T_A):	T_A =82.5℃
Life Test Drive Current:	I_F =2160mA
Measurement Current:	I_F = 2160mA

Data Set 2: 105°C, 2160mA	
Part Number:	HL-LM004H384W-40B18C12(Ra2)
Number of Units:	15
Actual Case Temperature(T_S):	T_S =104.5℃
Actual Ambient Temperature(T_A):	T_A =103.1℃
Life Test Drive Current:	I_F = 2160mA
Measurement Current:	I_F = 2160mA

3.2 Data Set 1, 85°C, 2160mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')									
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	0.2627	0.5288	2690	0.0006	0.0009	0.0011	0.0018	0.0023	0.0020	0.0023	0.0027	0.0030	0.0033
2	0.2630	0.5299	2680	0.0004	0.0006	0.0009	0.0017	0.0018	0.0018	0.0019	0.0016	0.0014	0.0014
3	0.2630	0.5295	2680	0.0004	0.0007	0.0009	0.0011	0.0013	0.0013	0.0013	0.0017	0.0025	0.0029
4	0.2645	0.5286	2654	0.0004	0.0005	0.0009	0.0011	0.0013	0.0016	0.0017	0.0017	0.0023	0.0024
5	0.2637	0.5294	2668	0.0005	0.0005	0.0014	0.0013	0.0016	0.0018	0.0018	0.0016	0.0014	0.0014
6	0.2655	0.5293	2632	0.0001	0.0002	0.0004	0.0011	0.0014	0.0015	0.0016	0.0018	0.0018	0.0020
7	0.2636	0.5297	2668	0.0003	0.0001	0.0003	0.0010	0.0011	0.0009	0.0011	0.0017	0.0019	0.0021
8	0.2641	0.5292	2660	0.0004	0.0005	0.0001	0.0007	0.0008	0.0013	0.0012	0.0017	0.0019	0.0022
9	0.2632	0.5295	2678	0.0006	0.0005	0.0002	0.0009	0.0010	0.0015	0.0013	0.0012	0.0011	0.0013
10	0.2630	0.5291	2684	0.0002	0.0000	0.0004	0.0009	0.0014	0.0018	0.0016	0.0013	0.0013	0.0014
11	0.2626	0.5272	2700	0.0004	0.0002	0.0002	0.0009	0.0010	0.0006	0.0005	0.0006	0.0010	0.0013
12	0.2648	0.5290	2648	0.0004	0.0001	0.0001	0.0007	0.0008	0.0009	0.0008	0.0017	0.0017	0.0018
13	0.2649	0.5288	2646	0.0005	0.0006	0.0001	0.0004	0.0005	0.0008	0.0009	0.0009	0.0010	0.0012
14	0.2634	0.5297	2672	0.0004	0.0004	0.0005	0.0003	0.0007	0.0009	0.0008	0.0011	0.0014	0.0020
15	0.2624	0.5299	2694	0.0003	0.0002	0.0005	0.0006	0.0010	0.0009	0.0010	0.0015	0.0019	0.0019
Ave.	0.2636	0.5292	2670	0.0004	0.0004	0.0005	0.0010	0.0012	0.0013	0.0013	0.0015	0.0017	0.0019
Med.	0.2634	0.5293	2672	0.0004	0.0005	0.0004	0.0009	0.0011	0.0013	0.0013	0.0016	0.0017	0.0019
st dev	0.0009	0.0007	19.2853	0.0001	0.0003	0.0004	0.0004	0.0005	0.0004	0.0005	0.0005	0.0006	0.0006
Min.	0.2624	0.5272	2632	0.0001	0.0000	0.0001	0.0003	0.0005	0.0006	0.0005	0.0006	0.0010	0.0012
Max.	0.2655	0.5299	2700	0.0006	0.0009	0.0014	0.0018	0.0023	0.0020	0.0023	0.0027	0.0030	0.0033



3.4 Data Set 2, 105°C, 2160mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')									
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
16	0.2635	0.5299	2670	0.0002	0.0008	0.0009	0.0005	0.0009	0.0009	0.0012	0.0014	0.0021	0.0025
17	0.2632	0.5290	2680	0.0001	0.0004	0.0003	0.0003	0.0013	0.0016	0.0019	0.0016	0.0020	0.0022
18	0.2633	0.5276	2682	0.0003	0.0004	0.0006	0.0007	0.0011	0.0012	0.0015	0.0019	0.0024	0.0026
19	0.2643	0.5298	2654	0.0001	0.0005	0.0006	0.0006	0.0009	0.0011	0.0012	0.0013	0.0015	0.0016
20	0.2645	0.5276	2658	0.0005	0.0008	0.0010	0.0010	0.0016	0.0019	0.0021	0.0026	0.0032	0.0036
21	0.2631	0.5296	2680	0.0002	0.0009	0.0009	0.0009	0.0010	0.0010	0.0012	0.0017	0.0019	0.0018
22	0.2643	0.5303	2652	0.0025	0.0021	0.0021	0.0021	0.0024	0.0024	0.0025	0.0021	0.0021	0.0014
23	0.2627	0.5292	2690	0.0004	0.0004	0.0004	0.0006	0.0010	0.0011	0.0013	0.0016	0.0022	0.0025
24	0.2636	0.5281	2676	0.0006	0.0006	0.0006	0.0007	0.0014	0.0015	0.0017	0.0020	0.0025	0.0024

Attachment A ± EUT Photo

A.1 Mechanical Dimensions (Ta = 25°C)

Attachment B ± Report Revision

Report Number	Report Date	Contents
RSZ150309507-10-10000	2017-05-11	Original report.
RSZ150309507-10-10000-M1	2017-12-11	Update the Family Declaration in page 3 to 12.
RSZ150309507-10-10000-M2	2018-01-25	Update the Description of LED Light Sources in page 3. Update the Standards Used in page 8. Update the Mechanical Dimensions Photo in page 15.
RSZ150309507-10-10000-M3	2019-01-12	Update Company name and address on page 1. Update the Power Density per LED die on page 3.

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