



TEST REPORT

ACCORDING TO IES LM-80-2015
For

Hongli Zhihui Group Co.,Ltd.

No.1, Xianke Yi Road, Huadong Town, Huadu District, Guangzhou, China

Model: HL-LM002H384W-9B4C12(Ra5)

Report Type: 10000 Hours Test Report		Product Type: LED Array	
Test Engineer:	Pote Wang	<i>Pote Wang</i>	
Report Number:	RSZ160329509-10-10000-M2		
Test Date:	2016-04-05 to 2017-05-27		
Report Date:	2017-12-11		
Revised Note:	The previous report RSZ160329509-10-10000-M1 is replaced by this report on 2017-12-11		
Reviewed By:	Daniel Duan / EE Manager	<i>Daniel Duan</i>	
Test Facility:	Test facility was located at No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China.		
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Note: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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1 - General Information

1.1 Description of LED Light Sources

Sample Size:

40 PCS samples were received on 2016-03-29. The samples were numbered from 1 to 20 and 21 to 40.

Manufacturer: Hongli Zhihui Group Co.,Ltd.
Part Number: HL-LM002H384W-9B4C12(Ra5)
Part Type: LED Array
Drive Level: DC 600mA
Nominal CCT: 2700K

Family products covered by this report:

According to ENERGY STAR® Program Guidance Regarding LED Package, LED Array and LED Module Lumen Maintenance Performance Data Supporting Qualification of Lighting Products, the following products can be covered by this report base on the declaration letter of manufacturer. The information of these models shows that the covered products meet all section 3 item 7 requirements of ENERGY STAR® Program Guidance Regarding LED Package, LED Array and LED Module Lumen Maintenance Performance Data Supporting Qualification of Lighting Products (September 9, 2011)

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)
Tested model	HL-LM002H384W-9B4C12(Ra5)	95	2700K	12	4	0.1251	553.57	150	0.26	600
Multiple models	HL-LM002H384W-9B4C12(Ra5)	95	3000K	12	4	0.1251	553.57	150	0.26	600
		95	3500K	12	4	0.1251	553.57	150	0.26	600
		95	4000K	12	4	0.1251	553.57	150	0.26	600
		95	5000K	12	4	0.1251	553.57	150	0.26	600
		95	5700K	12	4	0.1251	553.57	150	0.26	600
		95	6000K	12	4	0.1251	553.57	150	0.26	600
Multiple models	HL-LM002H384W-7B3C12(Ra5)	95	2700K	12	3	0.0939	553.57	150	0.43	450
		95	3000K	12	3	0.0939	553.57	150	0.43	450
		95	3500K	12	3	0.0939	553.57	150	0.43	450
		95	4000K	12	3	0.0939	553.57	150	0.43	450
		95	5000K	12	3	0.0939	553.57	150	0.43	450

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)
		95	5700K	12	3	0.0939	553.57	150	0.43	450
		95	6000K	12	3	0.0939	553.57	150	0.43	450
		95	6500K	12	3	0.0939	553.57	150	0.43	450
Multiple models	HL-LM002H384W-5B2C12(Ra5)	95	2700K	12	2	0.0626	553.57	150	0.6	300
		95	3000K	12	2	0.0626	553.57	150	0.6	300
		95	3500K	12	2	0.0626	553.57	150	0.6	300
		95	4000K	12	2	0.0626	553.57	150	0.6	300
		95	5000K	12	2	0.0626	553.57	150	0.6	300
		95	5700K	12	2	0.0626	553.57	150	0.6	300
		95	6000K	12	2	0.0626	553.57	150	0.6	300
		95	6500K	12	2	0.0626	553.57	150	0.6	300
Multiple models	HL-LM002H384W-5B5C3(Ra5)	95	2700K	3	5	0.0389	553.57	150	0.86	750
		95	3000K	3	5	0.0389	553.57	150	0.86	750
		95	3500K	3	5	0.0389	553.57	150	0.86	750
		95	4000K	3	5	0.0389	553.57	150	0.86	750
		95	5000K	3	5	0.0389	553.57	150	0.86	750
		95	5700K	3	5	0.0389	553.57	150	0.86	750
		95	6000K	3	5	0.0389	553.57	150	0.86	750
		95	6500K	3	5	0.0389	553.57	150	0.86	750
Multiple models	HL-LM002H384W-5B1C10(Ra5)	95	2700K	10	1	0.0260	553.57	150	1.48	150
		95	3000K	10	1	0.0260	553.57	150	1.48	150
		95	3500K	10	1	0.0260	553.57	150	1.48	150
		95	4000K	10	1	0.0260	553.57	150	1.48	150
		95	5000K	10	1	0.0260	553.57	150	1.48	150
		95	5700K	10	1	0.0260	553.57	150	1.48	150

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)
		95	6000K	10	1	0.0260	553.57	150	1.48	150
		95	6500K	10	1	0.0260	553.57	150	1.48	150
Multiple models	HL-LM002H384W-6B4C3(Ra5)	95	2700K	3	4	0.0312	553.57	150	1.28	600
		95	3000K	3	4	0.0312	553.57	150	1.28	600
		95	3500K	3	4	0.0312	553.57	150	1.28	600
		95	4000K	3	4	0.0312	553.57	150	1.28	600
		95	5000K	3	4	0.0312	553.57	150	1.28	600
		95	5700K	3	4	0.0312	553.57	150	1.28	600
		95	6000K	3	4	0.0312	553.57	150	1.28	600
		95	6500K	3	4	0.0312	553.57	150	1.28	600
Multiple models	HL-LM002H384W-7B2C7(Ra5)	95	2700K	7	2	0.0545	553.57	150	0.89	300
		95	3000K	7	2	0.0545	553.57	150	0.89	300
		95	3500K	7	2	0.0545	553.57	150	0.89	300
		95	4000K	7	2	0.0545	553.57	150	0.89	300
		95	5000K	7	2	0.0545	553.57	150	0.89	300
		95	5700K	7	2	0.0545	553.57	150	0.89	300
		95	6000K	7	2	0.0545	553.57	150	0.89	300
		95	6500K	7	2	0.0545	553.57	150	0.89	300
Multiple models	HL-LM002H384W-7B1C14(Ra5)	95	2700K	14	1	0.0545	553.57	150	1.22	150
		95	3000K	14	1	0.0545	553.57	150	1.22	150
		95	3500K	14	1	0.0545	553.57	150	1.22	150
		95	4000K	14	1	0.0545	553.57	150	1.22	150
		95	5000K	14	1	0.0545	553.57	150	1.22	150
		95	5700K	14	1	0.0545	553.57	150	1.22	150
		95	6000K	14	1	0.0545	553.57	150	1.22	150

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)
		95	6500K	14	1	0.0545	553.57	150	1.22	150
Multiple models	HL-LM002H384W-7B1C24(Ra5)	95	2700K	24	1	0.0623	553.57	150	0.79	150
		95	3000K	24	1	0.0623	553.57	150	0.79	150
		95	3500K	24	1	0.0623	553.57	150	0.79	150
		95	4000K	24	1	0.0623	553.57	150	0.79	150
		95	5000K	24	1	0.0623	553.57	150	0.79	150
		95	5700K	24	1	0.0623	553.57	150	0.79	150
		95	6000K	24	1	0.0623	553.57	150	0.79	150
		95	6500K	24	1	0.0623	553.57	150	0.79	150
Multiple models	HL-LM002H384W-8B1C16(Ra5)	95	2700K	16	1	0.0395	553.57	150	1.22	150
		95	3000K	16	1	0.0395	553.57	150	1.22	150
		95	3500K	16	1	0.0395	553.57	150	1.22	150
		95	4000K	16	1	0.0395	553.57	150	1.22	150
		95	5000K	16	1	0.0395	553.57	150	1.22	150
		95	5700K	16	1	0.0395	553.57	150	1.22	150
		95	6000K	16	1	0.0395	553.57	150	1.22	150
		95	6500K	16	1	0.0395	553.57	150	1.22	150
Multiple models	HL-LM002H384W-9B1C18(Ra5)	95	2700K	18	1	0.0467	553.57	150	0.58	150
		95	3000K	18	1	0.0467	553.57	150	0.58	150
		95	3500K	18	1	0.0467	553.57	150	0.58	150
		95	4000K	18	1	0.0467	553.57	150	0.58	150
		95	5000K	18	1	0.0467	553.57	150	0.58	150
		95	5700K	18	1	0.0467	553.57	150	0.58	150
		95	6000K	18	1	0.0467	553.57	150	0.58	150
		95	6500K	18	1	0.0467	553.57	150	0.58	150

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- LM002H384W - 10B2C10(Ra5)	95	2700K	10	2	0.0519	553.57	150	0.52	300
		95	3000K	10	2	0.0519	553.57	150	0.52	300
		95	3500K	10	2	0.0519	553.57	150	0.52	300
		95	4000K	10	2	0.0519	553.57	150	0.52	300
		95	5000K	10	2	0.0519	553.57	150	0.52	300
		95	5700K	10	2	0.0519	553.57	150	0.52	300
		95	6000K	10	2	0.0519	553.57	150	0.52	300
		95	6500K	10	2	0.0519	553.57	150	0.52	300
Multiple models	HL- LM002H384W - 10B1C20(Ra5)	95	2700K	20	1	0.0519	553.57	150	0.8	150
		95	3000K	20	1	0.0519	553.57	150	0.8	150
		95	3500K	20	1	0.0519	553.57	150	0.8	150
		95	4000K	20	1	0.0519	553.57	150	0.8	150
		95	5000K	20	1	0.0519	553.57	150	0.8	150
		95	5700K	20	1	0.0519	553.57	150	0.8	150
		95	6000K	20	1	0.0519	553.57	150	0.8	150
		95	6500K	20	1	0.0519	553.57	150	0.8	150
Multiple models	HL- LM002H384W - 10B2C24(Ra5)	95	2700K	24	2	0.1251	553.57	150	0.28	300
		95	3000K	24	2	0.1251	553.57	150	0.28	300
		95	3500K	24	2	0.1251	553.57	150	0.28	300
		95	4000K	24	2	0.1251	553.57	150	0.28	300
		95	5000K	24	2	0.1251	553.57	150	0.28	300
		95	5700K	24	2	0.1251	553.57	150	0.28	300
		95	6000K	24	2	0.1251	553.57	150	0.28	300
		95	6500K	24	2	0.1251	553.57	150	0.28	300
Multiple models	HL- LM002H384W	95	2700K	15	2	0.0778	553.57	150	0.79	300

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)
	15B2C15(Ra5)	95	3000K	15	2	0.0778	553.57	150	0.79	300
		95	3500K	15	2	0.0778	553.57	150	0.79	300
		95	4000K	15	2	0.0778	553.57	150	0.79	300
		95	5000K	15	2	0.0778	553.57	150	0.79	300
		95	5700K	15	2	0.0778	553.57	150	0.79	300
		95	6000K	15	2	0.0778	553.57	150	0.79	300
		95	6500K	15	2	0.0778	553.57	150	0.79	300
Multiple models	HL- LM002H384W - 15B1C30(Ra5)	95	2700K	30	1	0.0778	553.57	150	0.58	150
		95	3000K	30	1	0.0778	553.57	150	0.58	150
		95	3500K	30	1	0.0778	553.57	150	0.58	150
		95	4000K	30	1	0.0778	553.57	150	0.58	150
		95	5000K	30	1	0.0778	553.57	150	0.58	150
		95	5700K	30	1	0.0778	553.57	150	0.58	150
		95	6000K	30	1	0.0778	553.57	150	0.58	150
		95	6500K	30	1	0.0778	553.57	150	0.58	150
Multiple models	HL- LM002H384W - 18B2C18(Ra5)	95	2700K	18	2	0.0934	553.57	150	0.59	300
		95	3000K	18	2	0.0934	553.57	150	0.59	300
		95	3500K	18	2	0.0934	553.57	150	0.59	300
		95	4000K	18	2	0.0934	553.57	150	0.59	300
		95	5000K	18	2	0.0934	553.57	150	0.59	300
		95	5700K	18	2	0.0934	553.57	150	0.59	300
		95	6000K	18	2	0.0934	553.57	150	0.59	300
		95	6500K	18	2	0.0934	553.57	150	0.59	300
Multiple models	HL- LM002H384W - 18B1C36(Ra5)	95	2700K	36	1	0.0934	553.57	150	0.67	150
		95	3000K	36	1	0.0934	553.57	150	0.67	150

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)
		95	3500K	36	1	0.0934	553.57	150	0.67	150
		95	4000K	36	1	0.0934	553.57	150	0.67	150
		95	5000K	36	1	0.0934	553.57	150	0.67	150
		95	5700K	36	1	0.0934	553.57	150	0.67	150
		95	6000K	36	1	0.0934	553.57	150	0.67	150
		95	6500K	36	1	0.0934	553.57	150	0.67	150
Multiple models	HL- LM002H384W - 20B2C20(Ra5)	95	2700K	20	2	0.1037	553.57	150	0.55	300
		95	3000K	20	2	0.1037	553.57	150	0.55	300
		95	3500K	20	2	0.1037	553.57	150	0.55	300
		95	4000K	20	2	0.1037	553.57	150	0.55	300
		95	5000K	20	2	0.1037	553.57	150	0.55	300
		95	5700K	20	2	0.1037	553.57	150	0.55	300
		95	6000K	20	2	0.1037	553.57	150	0.55	300
		95	6500K	20	2	0.1037	553.57	150	0.55	300
Multiple models	HL- LM002H384W - 20B1C40(Ra5)	95	2700K	40	1	0.1037	553.57	150	0.55	150
		95	3000K	40	1	0.1037	553.57	150	0.55	150
		95	3500K	40	1	0.1037	553.57	150	0.55	150
		95	4000K	40	1	0.1037	553.57	150	0.55	150
		95	5000K	40	1	0.1037	553.57	150	0.55	150
		95	5700K	40	1	0.1037	553.57	150	0.55	150
		95	6000K	40	1	0.1037	553.57	150	0.55	150
		95	6500K	40	1	0.1037	553.57	150	0.55	150
Multiple models	HL- LM002H9VW- 6B1C29(Ra5)	95	2700K	29	1	0.0502	242.19	35	0.93	35
		95	3000K	29	1	0.0502	242.19	35	0.93	35
		95	3500K	29	1	0.0502	242.19	35	0.93	35

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)
		95	4000K	29	1	0.0502	242.19	35	0.93	35
		95	5000K	29	1	0.0502	242.19	35	0.93	35
		95	5700K	29	1	0.0502	242.19	35	0.93	35
		95	6000K	29	1	0.0502	242.19	35	0.93	35
		95	6500K	29	1	0.0502	242.19	35	0.93	35
Multiple models	HL-LM002H431W-4B1C12(Ra5)	95	2700K	12	1	0.0203	516.67	100	1.28	100
		95	3000K	12	1	0.0203	516.67	100	1.28	100
		95	3500K	12	1	0.0203	516.67	100	1.28	100
		95	4000K	12	1	0.0203	516.67	100	1.28	100
		95	5000K	12	1	0.0203	516.67	100	1.28	100
		95	5700K	12	1	0.0203	516.67	100	1.28	100
		95	6000K	12	1	0.0203	516.67	100	1.28	100
		95	6500K	12	1	0.0203	516.67	100	1.28	100
Multiple models	HL-LM065D94W-6B1C12(Ra5)	95	2700K	12	1	0.0300	264.21	150	0.5	150
		95	3000K	12	1	0.0300	264.21	150	0.5	150
		95	3500K	12	1	0.0300	264.21	150	0.5	150
		95	4000K	12	1	0.0300	264.21	150	0.5	150
		95	5000K	12	1	0.0300	264.21	150	0.5	150
		95	5700K	12	1	0.0300	264.21	150	0.5	150
		95	6000K	12	1	0.0300	264.21	150	0.5	150
		95	6500K	12	1	0.0300	264.21	150	0.5	150
Multiple models	HL-LM065D94W-8B2C8(Ra5)	95	2700K	8	2	0.0400	264.21	150	0.37	300
		95	3000K	8	2	0.0400	264.21	150	0.37	300
		95	3500K	8	2	0.0400	264.21	150	0.37	300
		95	4000K	8	2	0.0400	264.21	150	0.37	300

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)
		95	5000K	8	2	0.0400	264.21	150	0.37	300
		95	5700K	8	2	0.0400	264.21	150	0.37	300
		95	6000K	8	2	0.0400	264.21	150	0.37	300
		95	6500K	8	2	0.0400	264.21	150	0.37	300
Multiple models	HL-LM065D94W-10B3C8(Ra5)	95	2700K	8	3	0.0600	264.21	150	0.28	450
		95	3000K	8	3	0.0600	264.21	150	0.28	450
		95	3500K	8	3	0.0600	264.21	150	0.28	450
		95	4000K	8	3	0.0600	264.21	150	0.28	450
		95	5000K	8	3	0.0600	264.21	150	0.28	450
		95	5700K	8	3	0.0600	264.21	150	0.28	450
		95	6000K	8	3	0.0600	264.21	150	0.28	450
		95	6500K	8	3	0.0600	264.21	150	0.28	450
Multiple models	HL-LM065D94W-10B2C12(Ra5)	95	2700K	12	2	0.0600	264.21	150	0.28	300
		95	3000K	12	2	0.0600	264.21	150	0.28	300
		95	3500K	12	2	0.0600	264.21	150	0.28	300
		95	4000K	12	2	0.0600	264.21	150	0.28	300
		95	5000K	12	2	0.0600	264.21	150	0.28	300
		95	5700K	12	2	0.0600	264.21	150	0.28	300
		95	6000K	12	2	0.0600	264.21	150	0.28	300
		95	6500K	12	2	0.0600	264.21	150	0.28	300
Multiple models	HL-LM065D42W-6B1C12(Ra5)	95	2700K	12	1	0.0300	301.95	150	0.51	150
		95	3000K	12	1	0.0300	301.95	150	0.51	150
		95	3500K	12	1	0.0300	301.95	150	0.51	150
		95	4000K	12	1	0.0300	301.95	150	0.51	150
		95	5000K	12	1	0.0300	301.95	150	0.51	150

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)
		95	5700K	12	1	0.0300	301.95	150	0.51	150
		95	6000K	12	1	0.0300	301.95	150	0.51	150
		95	6500K	12	1	0.0300	301.95	150	0.51	150
Multiple models	HL-LM065D42W-8B2C8(Ra5)	95	2700K	8	2	0.0400	301.95	150	0.38	300
		95	3000K	8	2	0.0400	301.95	150	0.38	300
		95	3500K	8	2	0.0400	301.95	150	0.38	300
		95	4000K	8	2	0.0400	301.95	150	0.38	300
		95	5000K	8	2	0.0400	301.95	150	0.38	300
		95	5700K	8	2	0.0400	301.95	150	0.38	300
		95	6000K	8	2	0.0400	301.95	150	0.38	300
		95	6500K	8	2	0.0400	301.95	150	0.38	300
Multiple models	HL-LM065D42W-10B3C8(Ra5)	95	2700K	8	3	0.0600	301.95	150	0.29	450
		95	3000K	8	3	0.0600	301.95	150	0.29	450
		95	3500K	8	3	0.0600	301.95	150	0.29	450
		95	4000K	8	3	0.0600	301.95	150	0.29	450
		95	5000K	8	3	0.0600	301.95	150	0.29	450
		95	5700K	8	3	0.0600	301.95	150	0.29	450
		95	6000K	8	3	0.0600	301.95	150	0.29	450
		95	6500K	8	3	0.0600	301.95	150	0.29	450
Multiple models	HL-LM065D42W-10B2C12(Ra5)	95	2700K	12	2	0.0600	301.95	150	0.29	300
		95	3000K	12	2	0.0600	301.95	150	0.29	300
		95	3500K	12	2	0.0600	301.95	150	0.29	300
		95	4000K	12	2	0.0600	301.95	150	0.29	300
		95	5000K	12	2	0.0600	301.95	150	0.29	300
		95	5700K	12	2	0.0600	301.95	150	0.29	300

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)
		95	6000K	12	2	0.0600	301.95	150	0.29	300
		95	6500K	12	2	0.0600	301.95	150	0.29	300
Multiple models	HL-LM002D42W-10B3C12(Ra5)	95	2700K	12	3	0.0895	301.95	150	0.43	450
		95	3000K	12	3	0.0895	301.95	150	0.43	450
		95	3500K	12	3	0.0895	301.95	150	0.43	450
		95	4000K	12	3	0.0895	301.95	150	0.43	450
		95	5000K	12	3	0.0895	301.95	150	0.43	450
		95	5700K	12	3	0.0895	301.95	150	0.43	450
		95	6000K	12	3	0.0895	301.95	150	0.43	450
		95	6500K	12	3	0.0895	301.95	150	0.43	450
Multiple models	HL-LMH02D90W-9B4C12(Ra5)	95	2700K	12	4	0.1202	325.63	150	0.28	600
		95	3000K	12	4	0.1202	325.63	150	0.28	600
		95	3500K	12	4	0.1202	325.63	150	0.28	600
		95	4000K	12	4	0.1202	325.63	150	0.28	600
		95	5000K	12	4	0.1202	325.63	150	0.28	600
		95	5700K	12	4	0.1202	325.63	150	0.28	600
		95	6000K	12	4	0.1202	325.63	150	0.28	600
		95	6500K	12	4	0.1202	325.63	150	0.28	600
Multiple models	HL-LMH02D90W-7B3C12(Ra5)	95	2700K	12	3	0.0901	325.63	150	0.5	450
		95	3000K	12	3	0.0901	325.63	150	0.5	450
		95	3500K	12	3	0.0901	325.63	150	0.5	450
		95	4000K	12	3	0.0901	325.63	150	0.5	450
		95	5000K	12	3	0.0901	325.63	150	0.5	450
		95	5700K	12	3	0.0901	325.63	150	0.5	450
		95	6000K	12	3	0.0901	325.63	150	0.5	450

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)
		95	6500K	12	3	0.0901	325.63	150	0.5	450
Multiple models	HL-LMH02D90W-5B2C12(Ra5)	95	2700K	12	2	0.0601	325.63	150	0.75	300
		95	3000K	12	2	0.0601	325.63	150	0.75	300
		95	3500K	12	2	0.0601	325.63	150	0.75	300
		95	4000K	12	2	0.0601	325.63	150	0.75	300
		95	5000K	12	2	0.0601	325.63	150	0.75	300
		95	5700K	12	2	0.0601	325.63	150	0.75	300
		95	6000K	12	2	0.0601	325.63	150	0.75	300
		95	6500K	12	2	0.0601	325.63	150	0.75	300
Multiple models	HL-LMH02D90W-3B1C12(Ra5)	95	2700K	12	1	0.0300	325.63	150	1.33	150
		95	3000K	12	1	0.0300	325.63	150	1.33	150
		95	3500K	12	1	0.0300	325.63	150	1.33	150
		95	4000K	12	1	0.0300	325.63	150	1.33	150
		95	5000K	12	1	0.0300	325.63	150	1.33	150
		95	5700K	12	1	0.0300	325.63	150	1.33	150
		95	6000K	12	1	0.0300	325.63	150	1.33	150
		95	6500K	12	1	0.0300	325.63	150	1.33	150
Multiple models	HL-LM002D94W-9B4C12(Ra5)	95	2700K	12	4	0.1185	264.21	150	0.26	600
		95	3000K	12	4	0.1185	264.21	150	0.26	600
		95	3500K	12	4	0.1185	264.21	150	0.26	600
		95	4000K	12	4	0.1185	264.21	150	0.26	600
		95	5000K	12	4	0.1185	264.21	150	0.26	600
		95	5700K	12	4	0.1185	264.21	150	0.26	600
		95	6000K	12	4	0.1185	264.21	150	0.26	600
		95	6500K	12	4	0.1185	264.21	150	0.26	600

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-LM002D94W-7B3C12(Ra5)	95	2700K	12	3	0.0889	264.21	150	0.44	450
		95	3000K	12	3	0.0889	264.21	150	0.44	450
		95	3500K	12	3	0.0889	264.21	150	0.44	450
		95	4000K	12	3	0.0889	264.21	150	0.44	450
		95	5000K	12	3	0.0889	264.21	150	0.44	450
		95	5700K	12	3	0.0889	264.21	150	0.44	450
		95	6000K	12	3	0.0889	264.21	150	0.44	450
		95	6500K	12	3	0.0889	264.21	150	0.44	450
Multiple models	HL-LM002D94W-5B2C12(Ra5)	95	2700K	12	2	0.0593	264.21	150	0.71	300
		95	3000K	12	2	0.0593	264.21	150	0.71	300
		95	3500K	12	2	0.0593	264.21	150	0.71	300
		95	4000K	12	2	0.0593	264.21	150	0.71	300
		95	5000K	12	2	0.0593	264.21	150	0.71	300
		95	5700K	12	2	0.0593	264.21	150	0.71	300
		95	6000K	12	2	0.0593	264.21	150	0.71	300
		95	6500K	12	2	0.0593	264.21	150	0.71	300
Multiple models	HL-LM002D94W-3B1C12(Ra5)	95	2700K	12	1	0.0296	264.21	150	1.27	150
		95	3000K	12	1	0.0296	264.21	150	1.27	150
		95	3500K	12	1	0.0296	264.21	150	1.27	150
		95	4000K	12	1	0.0296	264.21	150	1.27	150
		95	5000K	12	1	0.0296	264.21	150	1.27	150
		95	5700K	12	1	0.0296	264.21	150	1.27	150
		95	6000K	12	1	0.0296	264.21	150	1.27	150
		95	6500K	12	1	0.0296	264.21	150	1.27	150
Multiple models	HL-LM002D42W-	95	2700K	12	4	0.1202	301.95	150	0.28	600

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)
	9B4C12(Ra5)	95	3000K	12	4	0.1202	301.95	150	0.28	600
		95	3500K	12	4	0.1202	301.95	150	0.28	600
		95	4000K	12	4	0.1202	301.95	150	0.28	600
		95	5000K	12	4	0.1202	301.95	150	0.28	600
		95	5700K	12	4	0.1202	301.95	150	0.28	600
		95	6000K	12	4	0.1202	301.95	150	0.28	600
		95	6500K	12	4	0.1202	301.95	150	0.28	600
Multiple models	HL- LM002D42W- 7B3C12(Ra5)	95	2700K	12	3	0.0901	301.95	150	0.5	450
		95	3000K	12	3	0.0901	301.95	150	0.5	450
		95	3500K	12	3	0.0901	301.95	150	0.5	450
		95	4000K	12	3	0.0901	301.95	150	0.5	450
		95	5000K	12	3	0.0901	301.95	150	0.5	450
		95	5700K	12	3	0.0901	301.95	150	0.5	450
		95	6000K	12	3	0.0901	301.95	150	0.5	450
Multiple models	HL- LM002D42W- 5B2C12(Ra5)	95	2700K	12	2	0.0601	301.95	150	0.75	300
		95	3000K	12	2	0.0601	301.95	150	0.75	300
		95	3500K	12	2	0.0601	301.95	150	0.75	300
		95	4000K	12	2	0.0601	301.95	150	0.75	300
		95	5000K	12	2	0.0601	301.95	150	0.75	300
		95	5700K	12	2	0.0601	301.95	150	0.75	300
		95	6000K	12	2	0.0601	301.95	150	0.75	300
		95	6500K	12	2	0.0601	301.95	150	0.75	300
Multiple models	HL- LM002D42W- 3B1C12(Ra5)	95	2700K	12	1	0.0300	301.95	150	1.33	150
		95	3000K	12	1	0.0300	301.95	150	1.33	150

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)
		95	3500K	12	1	0.0300	301.95	150	1.33	150
		95	4000K	12	1	0.0300	301.95	150	1.33	150
		95	5000K	12	1	0.0300	301.95	150	1.33	150
		95	5700K	12	1	0.0300	301.95	150	1.33	150
		95	6000K	12	1	0.0300	301.95	150	1.33	150
		95	6500K	12	1	0.0300	301.95	150	1.33	150
Multiple models	HL- LML02H421W -9B4C12(Ra5)	95	2700K	12	4	0.0731	516.67	90	0.57	360
		95	3000K	12	4	0.0731	516.67	90	0.57	360
		95	3500K	12	4	0.0731	516.67	90	0.57	360
		95	4000K	12	4	0.0731	516.67	90	0.57	360
		95	5000K	12	4	0.0731	516.67	90	0.57	360
		95	5700K	12	4	0.0731	516.67	90	0.57	360
		95	6000K	12	4	0.0731	516.67	90	0.57	360
		95	6500K	12	4	0.0731	516.67	90	0.57	360
Multiple models	HL- LML02H421W -7B3C12(Ra5)	95	2700K	12	3	0.0548	516.67	90	0.77	270
		95	3000K	12	3	0.0548	516.67	90	0.77	270
		95	3500K	12	3	0.0548	516.67	90	0.77	270
		95	4000K	12	3	0.0548	516.67	90	0.77	270
		95	5000K	12	3	0.0548	516.67	90	0.77	270
		95	5700K	12	3	0.0548	516.67	90	0.77	270
		95	6000K	12	3	0.0548	516.67	90	0.77	270
		95	6500K	12	3	0.0548	516.67	90	0.77	270
Multiple models	HL- LML02H421W -5B2C12(Ra5)	95	2700K	12	2	0.0365	516.67	90	1.04	180
		95	3000K	12	2	0.0365	516.67	90	1.04	180
		95	3500K	12	2	0.0365	516.67	90	1.04	180

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)
		95	4000K	12	2	0.0365	516.67	90	1.04	180
		95	5000K	12	2	0.0365	516.67	90	1.04	180
		95	5700K	12	2	0.0365	516.67	90	1.04	180
		95	6000K	12	2	0.0365	516.67	90	1.04	180
		95	6500K	12	2	0.0365	516.67	90	1.04	180
Multiple models	HL- LML02H421W -3B1C12(Ra5)	95	2700K	12	1	0.0183	516.67	90	1.6	90
		95	3000K	12	1	0.0183	516.67	90	1.6	90
		95	3500K	12	1	0.0183	516.67	90	1.6	90
		95	4000K	12	1	0.0183	516.67	90	1.6	90
		95	5000K	12	1	0.0183	516.67	90	1.6	90
		95	5700K	12	1	0.0183	516.67	90	1.6	90
		95	6000K	12	1	0.0183	516.67	90	1.6	90
		95	6500K	12	1	0.0183	516.67	90	1.6	90
Multiple models	HL- LM021H384W -3B1C6(Ra5)	95	2700K	6	1	0.0148	553.57	150	1.09	150
		95	3000K	6	1	0.0148	553.57	150	1.09	150
		95	3500K	6	1	0.0148	553.57	150	1.09	150
		95	4000K	6	1	0.0148	553.57	150	1.09	150
		95	5000K	6	1	0.0148	553.57	150	1.09	150
		95	5700K	6	1	0.0148	553.57	150	1.09	150
		95	6000K	6	1	0.0148	553.57	150	1.09	150
		95	6500K	6	1	0.0148	553.57	150	1.09	150
Multiple models	HL- LM021H384W -5B1C10(Ra5)	95	2700K	10	1	0.0247	553.57	150	0.74	150
		95	3000K	10	1	0.0247	553.57	150	0.74	150
		95	3500K	10	1	0.0247	553.57	150	0.74	150
		95	4000K	10	1	0.0247	553.57	150	0.74	150

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)
		95	5000K	10	1	0.0247	553.57	150	0.74	150
		95	5700K	10	1	0.0247	553.57	150	0.74	150
		95	6000K	10	1	0.0247	553.57	150	0.74	150
		95	6500K	10	1	0.0247	553.57	150	0.74	150
Multiple models	HL- LM021H384W -7B1C14(Ra5)	95	2700K	14	1	0.0346	553.57	150	0.49	150
		95	3000K	14	1	0.0346	553.57	150	0.49	150
		95	3500K	14	1	0.0346	553.57	150	0.49	150
		95	4000K	14	1	0.0346	553.57	150	0.49	150
		95	5000K	14	1	0.0346	553.57	150	0.49	150
		95	5700K	14	1	0.0346	553.57	150	0.49	150
		95	6000K	14	1	0.0346	553.57	150	0.49	150
		95	6500K	14	1	0.0346	553.57	150	0.49	150
Multiple models	HL- LM021H384W -10B1C20(Ra5)	95	2700K	20	1	0.0494	553.57	150	0.32	150
		95	3000K	20	1	0.0494	553.57	150	0.32	150
		95	3500K	20	1	0.0494	553.57	150	0.32	150
		95	4000K	20	1	0.0494	553.57	150	0.32	150
		95	5000K	20	1	0.0494	553.57	150	0.32	150
		95	5700K	20	1	0.0494	553.57	150	0.32	150
		95	6000K	20	1	0.0494	553.57	150	0.32	150
		95	6500K	20	1	0.0494	553.57	150	0.32	150
Multiple models	HL- LM021H384W -12B1C24(Ra5)	95	2700K	24	1	0.0593	553.57	150	0.32	150
		95	3000K	24	1	0.0593	553.57	150	0.32	150
		95	3500K	24	1	0.0593	553.57	150	0.32	150
		95	4000K	24	1	0.0593	553.57	150	0.32	150
		95	5000K	24	1	0.0593	553.57	150	0.32	150

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)
		95	5700K	24	1	0.0593	553.57	150	0.32	150
		95	6000K	24	1	0.0593	553.57	150	0.32	150
		95	6500K	24	1	0.0593	553.57	150	0.32	150
Multiple models	HL-LM021H384W-3B2C3(Ra5)	95	2700K	3	2	0.0148	553.57	150	1.09	300
		95	3000K	3	2	0.0148	553.57	150	1.09	300
		95	3500K	3	2	0.0148	553.57	150	1.09	300
		95	4000K	3	2	0.0148	553.57	150	1.09	300
		95	5000K	3	2	0.0148	553.57	150	1.09	300
		95	5700K	3	2	0.0148	553.57	150	1.09	300
		95	6000K	3	2	0.0148	553.57	150	1.09	300
		95	6500K	3	2	0.0148	553.57	150	1.09	300
Multiple models	HL-LM021H384W-5B2C5(Ra5)	95	2700K	5	2	0.0247	553.57	150	0.74	300
		95	3000K	5	2	0.0247	553.57	150	0.74	300
		95	3500K	5	2	0.0247	553.57	150	0.74	300
		95	4000K	5	2	0.0247	553.57	150	0.74	300
		95	5000K	5	2	0.0247	553.57	150	0.74	300
		95	5700K	5	2	0.0247	553.57	150	0.74	300
		95	6000K	5	2	0.0247	553.57	150	0.74	300
		95	6500K	5	2	0.0247	553.57	150	0.74	300
Multiple models	HL-LM021H384W-7B2C7(Ra5)	95	2700K	7	2	0.0346	553.57	150	0.49	300
		95	3000K	7	2	0.0346	553.57	150	0.49	300
		95	3500K	7	2	0.0346	553.57	150	0.49	300
		95	4000K	7	2	0.0346	553.57	150	0.49	300
		95	5000K	7	2	0.0346	553.57	150	0.49	300
		95	5700K	7	2	0.0346	553.57	150	0.49	300

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)
		95	6000K	7	2	0.0346	553.57	150	0.49	300
		95	6500K	7	2	0.0346	553.57	150	0.49	300
Multiple models	HL- LM021H384W - 10B2C10(Ra5)	95	2700K	10	2	0.0494	553.57	150	0.32	300
		95	3000K	10	2	0.0494	553.57	150	0.32	300
		95	3500K	10	2	0.0494	553.57	150	0.32	300
		95	4000K	10	2	0.0494	553.57	150	0.32	300
		95	5000K	10	2	0.0494	553.57	150	0.32	300
		95	5700K	10	2	0.0494	553.57	150	0.32	300
		95	6000K	10	2	0.0494	553.57	150	0.32	300
		95	6500K	10	2	0.0494	553.57	150	0.32	300
Multiple models	HL- LM021H384W - 12B2C12(Ra5)	95	2700K	12	2	0.0593	553.57	150	0.32	300
		95	3000K	12	2	0.0593	553.57	150	0.32	300
		95	3500K	12	2	0.0593	553.57	150	0.32	300
		95	4000K	12	2	0.0593	553.57	150	0.32	300
		95	5000K	12	2	0.0593	553.57	150	0.32	300
		95	5700K	12	2	0.0593	553.57	150	0.32	300
		95	6000K	12	2	0.0593	553.57	150	0.32	300
		95	6500K	12	2	0.0593	553.57	150	0.32	300
Multiple models	HL- LM021D90W- 3B2C3(Ra5)	95	2700K	3	2	0.0148	316.33	150	0.97	300
		95	3000K	3	2	0.0148	316.33	150	0.97	300
		95	3500K	3	2	0.0148	316.33	150	0.97	300
		95	4000K	3	2	0.0148	316.33	150	0.97	300
		95	5000K	3	2	0.0148	316.33	150	0.97	300
		95	5700K	3	2	0.0148	316.33	150	0.97	300
		95	6000K	3	2	0.0148	316.33	150	0.97	300

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)
		95	6500K	3	2	0.0148	316.33	150	0.97	300
Multiple models	HL-LM021D90W-5B2C5(Ra5)	95	2700K	5	2	0.0247	316.33	150	0.62	300
		95	3000K	5	2	0.0247	316.33	150	0.62	300
		95	3500K	5	2	0.0247	316.33	150	0.62	300
		95	4000K	5	2	0.0247	316.33	150	0.62	300
		95	5000K	5	2	0.0247	316.33	150	0.62	300
		95	5700K	5	2	0.0247	316.33	150	0.62	300
		95	6000K	5	2	0.0247	316.33	150	0.62	300
		95	6500K	5	2	0.0247	316.33	150	0.62	300
Multiple models	HL-LM021D90W-7B2C7(Ra5)	95	2700K	7	2	0.0346	316.33	150	0.37	300
		95	3000K	7	2	0.0346	316.33	150	0.37	300
		95	3500K	7	2	0.0346	316.33	150	0.37	300
		95	4000K	7	2	0.0346	316.33	150	0.37	300
		95	5000K	7	2	0.0346	316.33	150	0.37	300
		95	5700K	7	2	0.0346	316.33	150	0.37	300
		95	6000K	7	2	0.0346	316.33	150	0.37	300
		95	6500K	7	2	0.0346	316.33	150	0.37	300
Multiple models	HL-LM021D90W-10B2C10(Ra5)	95	2700K	10	2	0.0494	316.33	150	0.27	300
		95	3000K	10	2	0.0494	316.33	150	0.27	300
		95	3500K	10	2	0.0494	316.33	150	0.27	300
		95	4000K	10	2	0.0494	316.33	150	0.27	300
		95	5000K	10	2	0.0494	316.33	150	0.27	300
		95	5700K	10	2	0.0494	316.33	150	0.27	300
		95	6000K	10	2	0.0494	316.33	150	0.27	300
		95	6500K	10	2	0.0494	316.33	150	0.27	300

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-LM021D90W-3B1C6(Ra5)	95	2700K	6	1	0.0148	316.33	150	0.97	150
		95	3000K	6	1	0.0148	316.33	150	0.97	150
		95	3500K	6	1	0.0148	316.33	150	0.97	150
		95	4000K	6	1	0.0148	316.33	150	0.97	150
		95	5000K	6	1	0.0148	316.33	150	0.97	150
		95	5700K	6	1	0.0148	316.33	150	0.97	150
		95	6000K	6	1	0.0148	316.33	150	0.97	150
		95	6500K	6	1	0.0148	316.33	150	0.97	150
Multiple models	HL-LM021D90W-5B1C10(Ra5)	95	2700K	10	1	0.0247	316.33	150	0.62	150
		95	3000K	10	1	0.0247	316.33	150	0.62	150
		95	3500K	10	1	0.0247	316.33	150	0.62	150
		95	4000K	10	1	0.0247	316.33	150	0.62	150
		95	5000K	10	1	0.0247	316.33	150	0.62	150
		95	5700K	10	1	0.0247	316.33	150	0.62	150
		95	6000K	10	1	0.0247	316.33	150	0.62	150
		95	6500K	10	1	0.0247	316.33	150	0.62	150
Multiple models	HL-LM021D90W-7B1C14(Ra5)	95	2700K	14	1	0.0346	316.33	150	0.37	150
		95	3000K	14	1	0.0346	316.33	150	0.37	150
		95	3500K	14	1	0.0346	316.33	150	0.37	150
		95	4000K	14	1	0.0346	316.33	150	0.37	150
		95	5000K	14	1	0.0346	316.33	150	0.37	150
		95	5700K	14	1	0.0346	316.33	150	0.37	150
		95	6000K	14	1	0.0346	316.33	150	0.37	150
		95	6500K	14	1	0.0346	316.33	150	0.37	150
Multiple models	HL-LM021D90W-	95	2700K	20	1	0.0494	316.33	150	0.27	150

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)
	10B1C20(Ra5)	95	3000K	20	1	0.0494	316.33	150	0.27	150
		95	3500K	20	1	0.0494	316.33	150	0.27	150
		95	4000K	20	1	0.0494	316.33	150	0.27	150
		95	5000K	20	1	0.0494	316.33	150	0.27	150
		95	5700K	20	1	0.0494	316.33	150	0.27	150
		95	6000K	20	1	0.0494	316.33	150	0.27	150
		95	6500K	20	1	0.0494	316.33	150	0.27	150

Disclaimer:

The truthfulness and accuracy of all the technical information above for the covered LED products is ensured by manufacturer of LED light source. Bay Area Compliance Laboratories Corp. (Dongguan) isn't responsible or gives any guarantees for the truthfulness of the technical information.

1.2 Standards Used:

- IESNA LM-80-15: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- ENERGY STAR® Program Guidance Regarding LED Package, LED Array and LED Module Lumen Maintenance Performance Data Supporting Qualification of Lighting Products(This test method was not accredited by IAS)

1.3 Testing 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	2016-07-11	2017-07-10
spectroradiometer	SENSING	SCD-20008	N/A	N/A	2016-07-11	2017-07-10
DC Power Supply	Hanshenpuyuan	HSPY-100-05	2013010210003	N/A	2017-05-05	2018-05-04
Standard Light Source	EVERFINE	D062	1011093	3000K	2016-09-13	2017-09-12
Multilayer aging machine	BACL	B2-270	20005	25°C~110°C	2016-09-01	2017-09-01

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090006	(50/15A)	2017-03-03	2018-03-02
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090009	(50/15A)	2016-12-15	2017-12-14

1.4 Drive Level

Samples are driven with a constant direct current (DC) during maintenance test, photometric and electrical measurement. The current value was regulated to within $\pm 3\%$ of the specified value of the manufacturer during maintenance test, and was within $\pm 0.5\%$ during photometric and electrical measurement test.

1.5 Ambient Conditions for Maintenance Test

For lumen maintenance test, samples within one data set, were installed on cooling boards in thermal chambers with minimal ambient airflow. The case temperature and ambient temperature was monitored by thermocouples which one was soldered to the coldest DUTs' case (TMP_{LED}) location, while the other is mounted at a distance of 5 mm above the TMP location.

During life testing, TMP_{LED} of the coldest LEDs were maintained at a temperature that was greater than or equal to 2°C below the corresponding nominal case temperature. Surrounding air was maintained at a temperature that was greater than or equal to 5°C below the corresponding nominal case temperature. Thermocouples were shielded from direct DUT optical radiation and comply with ASTM E230 Table 1 "Special Limits".

Samples were connected to DC power supply in series circuits with a constant current. The forward current was regulated to within $\pm 3\%$ of the specified value of the manufacturer.

The relative humidity within chamber was kept less than 65% during test.

For photometry measurement, the ambient temperature during test was set to $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, RH $< 65\%$.

1.6 Measurement Uncertainty

The uncertainty of the light output measurements is $U=1.59\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=21\text{K}$ ($K=2$), at the 95% confidence level.

The uncertainty of the temperature is $U=0.8671^{\circ}\text{C}$ ($K=2$), at the 95% confidence level.

1.7 Statement of Traceability

Bay Area Compliance Laboratories Corp. (Dongguan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

1.8 Sample Set

Data Set 1: 85°C,600mA

Part Number: HL-LM002H384W-9B4C12(Ra5)

Number of Units: 20

Case Temperature: >83°C

Ambient Temperature: >80°C

Life Test Drive Current: 600mA

Measurement Current: 600mA

Data Set 2: 105°C,600mA

Part Number: HL-LM002H384W-9B4C12(Ra5)

Number of Units: 20

Case Temperature: >105°C

Ambient Temperature: >102°C

Life Test Drive Current: 600mA

Measurement Current: 600mA

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	Reported TM-21 L ₇₀ Lifetime
1	20	0	1000	10000	>60,000hours
2	20	0	1000	10000	52,000hours

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
1	99.58%	99.13%	98.72%	98.30%	97.94%	97.48%	96.97%	96.37%	95.87%	95.44%
2	99.24%	98.65%	98.15%	97.62%	97.20%	96.65%	95.93%	95.19%	94.53%	93.90%

Average Color Maintenance

Data Set:	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
1	0.0011	0.0014	0.0016	0.0019	0.0021	0.0025	0.0029	0.0031	0.0036	0.0041
2	0.0010	0.0015	0.0019	0.0023	0.0021	0.0025	0.0028	0.0030	0.0034	0.0039

3 - Test Data

3.1 Data Set 1, 85°C, 600mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	1859.05	99.84	99.46	99.21	98.98	98.66	98.09	97.43	96.44	95.99	95.55
2	1853.74	99.83	99.64	98.99	98.73	98.20	98.05	97.61	96.89	96.47	96.04
3	1859.05	99.74	99.34	99.01	98.63	98.23	98.12	97.65	97.10	96.67	96.20
4	1859.05	99.65	99.43	99.21	98.71	98.57	98.44	97.78	97.28	96.62	96.25
5	1864.37	99.66	99.15	98.57	98.39	98.07	97.52	96.99	96.31	95.92	95.49
6	1853.74	99.44	98.82	98.60	98.18	98.02	97.29	96.63	96.03	95.61	95.32
7	1853.74	99.54	99.11	98.57	98.21	97.85	97.23	96.54	96.05	95.56	95.24
8	1859.05	99.24	98.52	98.29	97.74	97.26	96.86	96.35	95.75	95.23	94.75
9	1864.37	99.76	99.41	98.99	98.71	98.24	97.59	97.10	96.33	95.72	95.23
10	1853.74	99.43	99.08	98.66	98.04	97.57	96.88	96.63	96.26	95.85	95.34
11	1874.99	99.49	99.00	98.36	97.92	97.58	97.07	96.60	96.05	95.50	94.97
12	1864.37	99.76	99.27	98.91	98.48	97.95	97.36	96.68	96.23	95.90	95.49
13	1853.74	99.73	99.14	98.67	98.03	97.58	97.13	96.49	96.05	95.48	95.01
14	1864.37	99.46	98.96	98.41	97.87	97.64	97.10	96.60	96.10	95.54	95.05
15	1853.74	99.24	98.64	98.20	97.75	97.18	96.69	96.26	95.82	95.39	94.99
16	1843.12	99.81	99.35	98.86	98.52	98.36	97.72	97.30	96.64	96.16	95.73
17	1864.37	99.27	98.84	98.63	98.07	97.67	97.52	97.28	96.77	96.08	95.77
18	1859.05	99.65	99.12	98.90	98.56	98.45	98.02	97.59	96.88	96.29	95.79
19	1853.74	99.13	98.80	98.28	97.89	97.49	97.45	96.99	96.17	95.68	95.29
20	1859.05	99.84	99.51	99.01	98.51	98.14	97.45	96.97	96.27	95.76	95.39
Ave.	1858.52	99.58	99.13	98.72	98.30	97.94	97.48	96.97	96.37	95.87	95.44
Med.	1859.05	99.65	99.13	98.66	98.30	97.98	97.45	96.98	96.27	95.80	95.36
st dev	6.65	0.2263	0.3033	0.3106	0.3717	0.4275	0.4768	0.4723	0.4227	0.4084	0.4165
Min.	1843.12	99.13	98.52	98.20	97.74	97.18	96.69	96.26	95.75	95.23	94.75
Max.	1874.99	99.84	99.64	99.21	98.98	98.66	98.44	97.78	97.28	96.67	96.25

TM-21 Projection:

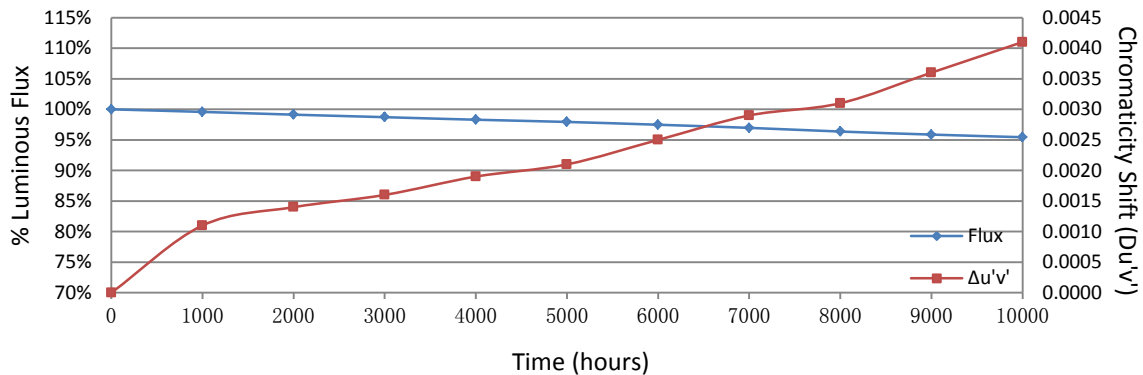
Test Duration: 10000 hours
Failures Observed: 0
 α : 5.299E-06
 β : 1.006
Reported L₇₀: >60,000 hours

3.2 Data Set 1, 85°C, 600mA (Forward Voltage)

No.	Forward Voltage (V)										
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	38.10	38.16	38.22	38.17	38.18	37.69	38.25	38.72	38.03	37.73	37.88
2	38.04	38.10	38.16	38.17	38.24	37.83	38.20	38.72	38.33	37.50	37.82
3	38.00	38.10	38.08	38.14	38.18	37.33	38.08	38.57	38.33	37.58	37.71
4	38.06	38.09	38.08	38.13	38.17	38.04	38.11	38.53	38.35	37.59	37.71
5	37.99	38.14	38.08	38.10	38.06	37.67	38.04	38.48	38.26	37.59	37.71
6	38.00	38.09	38.06	38.15	38.21	37.49	37.80	38.65	38.31	37.66	37.70
7	38.03	38.07	38.06	38.19	38.31	37.88	38.02	38.49	38.31	37.69	37.71
8	38.04	38.05	38.05	38.21	38.37	37.74	38.15	38.44	38.32	37.61	37.68
9	38.07	38.12	38.11	38.19	38.26	37.80	38.23	38.39	38.36	37.59	37.88
10	38.02	38.06	38.05	38.18	38.30	37.91	38.11	38.39	38.33	37.60	37.78
11	38.06	38.15	38.06	37.84	37.53	37.95	38.08	38.41	38.35	37.60	37.73
12	38.10	38.19	38.02	37.99	37.79	38.21	37.80	38.37	38.33	37.57	37.72
13	38.04	38.09	37.96	37.95	37.81	38.07	37.95	38.35	38.25	37.38	37.67
14	37.99	38.20	37.97	37.97	37.74	37.97	38.23	38.35	38.13	37.54	37.65
15	38.04	38.09	37.89	38.02	37.95	37.95	38.00	38.39	38.33	37.52	37.66
16	37.85	38.08	37.82	38.01	37.94	37.93	38.04	38.43	38.10	37.51	37.75
17	38.06	38.15	37.82	38.02	37.89	38.04	38.01	38.44	38.33	37.46	37.97
18	38.09	38.19	37.83	37.97	37.75	37.96	38.00	38.41	38.32	37.42	37.79
19	37.97	38.08	37.77	37.97	37.86	37.96	37.96	38.38	38.35	37.46	37.80
20	37.95	38.14	37.84	38.00	37.86	38.06	37.72	38.35	38.33	37.52	37.75
Ave.	38.03	38.12	38.00	38.07	38.02	37.87	38.04	38.46	38.29	37.56	37.75
Med.	38.04	38.10	38.05	38.06	38.01	37.94	38.04	38.42	38.33	37.58	37.73
st dev	0.06	0.05	0.13	0.11	0.24	0.21	0.15	0.12	0.09	0.09	0.08
Min.	37.85	38.05	37.77	37.84	37.53	37.33	37.72	38.35	38.03	37.38	37.65
Max.	38.10	38.20	38.22	38.21	38.37	38.21	38.25	38.72	38.36	37.73	37.97

3.3 Data Set 1, 85°C, 600mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)									
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.2600	0.5289	2746	0.0010	0.0014	0.0017	0.0021	0.0027	0.0028	0.0028	0.0030	0.0034	0.0035
2	0.2596	0.5286	2756	0.0008	0.0011	0.0017	0.0022	0.0020	0.0023	0.0025	0.0027	0.0033	0.0038
3	0.2600	0.5286	2748	0.0011	0.0012	0.0014	0.0016	0.0022	0.0024	0.0023	0.0024	0.0028	0.0031
4	0.2598	0.5288	2752	0.0014	0.0016	0.0018	0.0021	0.0028	0.0033	0.0035	0.0037	0.0044	0.0051
5	0.2606	0.5288	2734	0.0012	0.0013	0.0015	0.0018	0.0021	0.0025	0.0031	0.0034	0.0040	0.0044
6	0.2602	0.5285	2742	0.0007	0.0011	0.0015	0.0018	0.0020	0.0023	0.0024	0.0028	0.0031	0.0037
7	0.2607	0.5289	2732	0.0017	0.0017	0.0022	0.0026	0.0021	0.0025	0.0030	0.0032	0.0034	0.0038
8	0.2604	0.5285	2740	0.0014	0.0018	0.0019	0.0021	0.0018	0.0024	0.0024	0.0024	0.0026	0.0032
9	0.2594	0.5288	2760	0.0009	0.0009	0.0011	0.0013	0.0018	0.0021	0.0025	0.0028	0.0032	0.0034
10	0.2597	0.5285	2752	0.0008	0.0010	0.0011	0.0013	0.0021	0.0025	0.0031	0.0034	0.0039	0.0044
11	0.2592	0.5284	2764	0.0013	0.0016	0.0020	0.0024	0.0021	0.0026	0.0028	0.0027	0.0033	0.0039
12	0.2601	0.5288	2744	0.0011	0.0013	0.0014	0.0016	0.0021	0.0022	0.0027	0.0030	0.0034	0.0041
13	0.2612	0.5292	2718	0.0009	0.0013	0.0017	0.0021	0.0022	0.0028	0.0036	0.0037	0.0038	0.0043
14	0.2600	0.5283	2748	0.0008	0.0013	0.0017	0.0021	0.0021	0.0023	0.0031	0.0034	0.0040	0.0045
15	0.2599	0.5287	2748	0.0010	0.0011	0.0014	0.0016	0.0020	0.0021	0.0024	0.0026	0.0029	0.0031
16	0.2609	0.5289	2726	0.0010	0.0014	0.0019	0.0025	0.0023	0.0027	0.0035	0.0035	0.0040	0.0043
17	0.2598	0.5285	2752	0.0017	0.0021	0.0023	0.0025	0.0018	0.0023	0.0025	0.0028	0.0032	0.0046
18	0.2604	0.5285	2738	0.0017	0.0019	0.0020	0.0022	0.0023	0.0031	0.0038	0.0040	0.0047	0.0052
19	0.2606	0.5287	2734	0.0007	0.0009	0.0010	0.0012	0.0019	0.0026	0.0036	0.0038	0.0045	0.0051
20	0.2592	0.5281	2766	0.0009	0.0011	0.0012	0.0014	0.0020	0.0022	0.0024	0.0026	0.0032	0.0036
Ave.	0.2601	0.5287	2745	0.0011	0.0014	0.0016	0.0019	0.0021	0.0025	0.0029	0.0031	0.0036	0.0041
Med.	0.2600	0.5287	2747	0.0010	0.0013	0.0017	0.0021	0.0021	0.0025	0.0028	0.0030	0.0034	0.0040
st dev	0.0005	0.0003	12	0.0003	0.0003	0.0004	0.0004	0.0003	0.0003	0.0005	0.0005	0.0006	0.0007
Min.	0.2592	0.5281	2718	0.0007	0.0009	0.0010	0.0012	0.0018	0.0021	0.0023	0.0024	0.0026	0.0031
Max.	0.2612	0.5292	2766	0.0017	0.0021	0.0023	0.0026	0.0028	0.0033	0.0038	0.0040	0.0047	0.0052



3.4 Data Set 2, 105°C, 600mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
21	1853.74	98.93	98.27	97.90	97.56	97.46	97.04	96.31	95.35	94.53	93.89
22	1853.74	99.06	98.46	97.78	97.20	96.66	96.12	95.45	94.48	93.89	93.33
23	1853.74	98.76	98.17	97.48	97.11	96.52	95.70	95.06	94.54	94.03	93.50
24	1864.37	98.95	98.29	97.83	97.11	96.25	95.79	95.01	94.32	93.50	92.76
25	1859.05	98.77	98.27	97.71	97.04	96.88	96.51	95.74	94.86	94.20	93.61
26	1848.43	99.24	98.74	98.16	97.61	97.25	96.80	96.12	95.33	94.72	94.13
27	1859.05	99.26	98.64	98.09	97.51	96.88	96.50	95.78	95.20	94.40	93.73
28	1853.74	99.35	98.62	98.29	97.89	97.46	96.72	95.91	95.34	94.68	94.06
29	1864.37	99.18	98.76	98.22	97.70	97.21	96.89	96.10	95.22	94.63	94.22
30	1874.99	99.39	98.68	98.05	97.28	96.97	96.43	95.87	95.43	94.73	93.89
31	1848.43	99.73	99.04	98.37	97.78	97.13	96.75	95.94	95.24	94.34	93.77
32	1853.74	98.95	98.46	98.07	97.54	97.46	96.88	96.16	95.55	94.94	94.23
33	1853.74	99.55	98.84	98.36	97.91	97.77	97.22	96.63	95.57	94.85	94.06
34	1874.99	99.00	98.49	98.04	97.45	97.41	96.72	96.03	95.05	94.42	94.00
35	1816.56	99.29	98.69	98.37	98.00	97.37	96.79	96.15	95.52	94.93	94.26
36	1890.92	99.33	98.56	98.12	97.68	96.89	96.43	95.75	95.27	94.67	94.15
37	1853.74	99.74	99.34	98.89	98.33	97.59	96.72	95.94	95.06	94.47	93.98
38	1869.68	99.62	98.99	98.62	98.21	97.99	97.59	96.84	96.20	95.55	94.79
39	1869.68	99.38	98.89	98.30	97.63	97.38	96.85	96.06	95.44	94.86	94.14
40	1853.74	99.33	98.75	98.36	97.91	97.49	96.50	95.67	94.85	94.25	93.44
Ave.	1858.52	99.24	98.65	98.15	97.62	97.20	96.65	95.93	95.19	94.53	93.90
Med.	1853.74	99.28	98.66	98.14	97.62	97.31	96.72	95.94	95.26	94.58	93.99
st dev	14.61	0.2907	0.2930	0.3222	0.3611	0.4308	0.4389	0.4381	0.4307	0.4401	0.4293
Min.	1816.56	98.76	98.17	97.48	97.04	96.25	95.70	95.01	94.32	93.50	92.76
Max.	1890.92	99.74	99.34	98.89	98.33	97.99	97.59	96.84	96.20	95.55	94.79

TM-21 Projection:

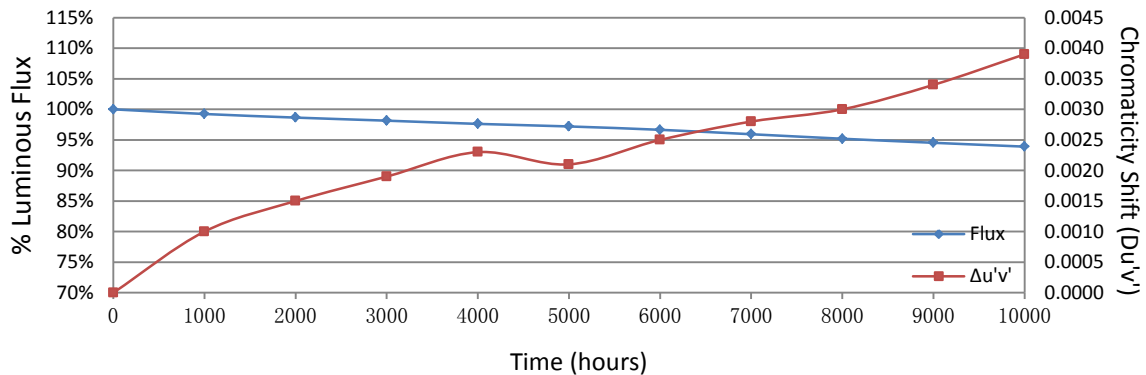
Test Duration: 10000 hours
Failures Observed: 0
 α : 7.057E-06
 β : 1.008
Reported L₇₀: 52,000 hours

3.5 Data Set 2, 105°C, 600mA (Forward Voltage)

No.	Forward Voltage (V)										
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
21	38.08	38.05	38.48	38.13	38.21	38.04	38.11	38.05	38.45	37.95	38.15
22	37.97	38.19	38.45	38.00	37.81	38.00	37.91	38.19	38.33	38.11	38.10
23	37.86	38.21	38.38	37.98	37.75	37.66	37.83	38.21	38.33	37.91	38.00
24	37.91	38.02	38.39	38.04	38.06	37.97	37.86	38.02	38.28	37.84	38.07
25	38.13	38.16	38.36	38.00	37.84	37.95	37.80	38.16	38.35	37.82	37.97
26	38.00	38.09	38.24	37.98	37.87	37.94	37.57	38.09	38.28	37.84	38.06
27	37.93	38.17	38.19	37.98	37.79	37.93	37.49	38.17	38.30	37.83	38.04
28	37.93	38.13	38.16	38.04	37.95	37.77	37.66	38.13	38.34	37.82	37.97
29	38.01	38.13	38.22	38.02	37.91	38.22	37.75	38.13	38.32	37.82	38.11
30	38.02	38.16	38.22	38.00	37.84	38.00	37.78	38.16	38.32	37.80	38.11
31	37.95	38.09	37.93	37.86	37.63	37.97	37.77	37.93	38.12	37.76	38.07
32	37.95	38.07	37.93	37.82	37.57	38.04	37.85	37.93	38.33	37.77	37.97
33	37.80	38.10	37.93	37.81	37.52	37.84	37.77	37.93	38.22	37.84	37.97
34	38.09	38.10	37.91	37.82	37.54	38.21	37.57	37.91	38.32	37.83	38.04
35	38.17	38.06	37.88	37.91	37.76	37.82	37.78	37.88	38.28	38.08	37.95
36	38.06	38.16	38.11	37.88	37.60	37.99	37.57	38.11	38.29	37.88	37.95
37	37.97	38.08	38.11	37.86	37.64	38.09	37.66	38.11	38.37	37.81	37.95
38	38.12	38.10	38.12	37.84	37.58	38.23	37.69	38.12	38.22	37.84	38.00
39	37.98	38.06	38.10	37.80	37.54	37.93	37.51	38.10	38.23	37.84	37.94
40	37.80	37.99	38.10	37.80	37.61	37.77	37.67	38.10	38.36	37.82	37.93
Ave.	37.99	38.11	38.16	37.93	37.75	37.97	37.73	38.07	38.30	37.86	38.02
Med.	37.98	38.10	38.14	37.95	37.76	37.97	37.76	38.11	38.32	37.84	38.00
st dev	0.10	0.06	0.19	0.10	0.19	0.15	0.15	0.10	0.07	0.09	0.07
Min.	37.80	37.99	37.88	37.80	37.52	37.66	37.49	37.88	38.12	37.76	37.93
Max.	38.17	38.21	38.48	38.13	38.21	38.23	38.11	38.21	38.45	38.11	38.15

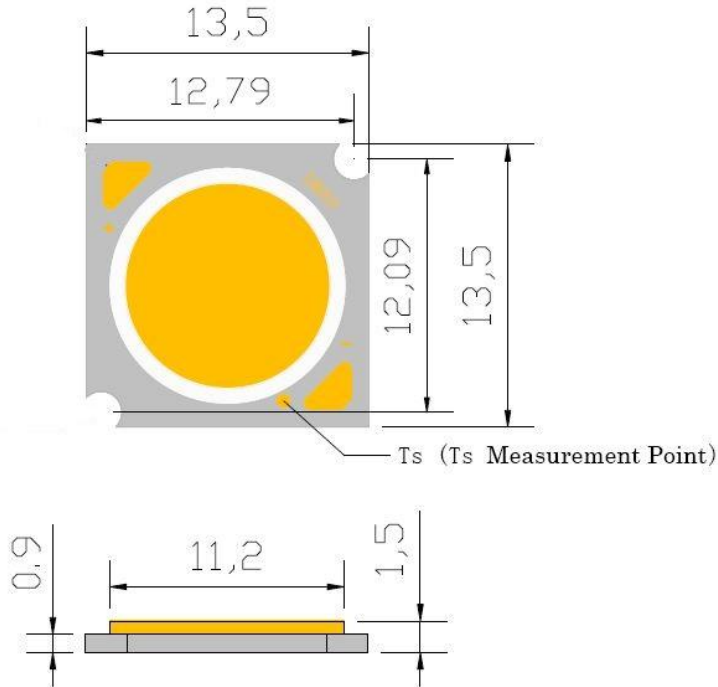
3.6 Data Set 2, 105°C, 600mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)									
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
21	0.2610	0.5287	2726	0.0006	0.0009	0.0012	0.0015	0.0021	0.0025	0.0027	0.0029	0.0033	0.0037
22	0.2601	0.5285	2746	0.0008	0.0013	0.0014	0.0016	0.0020	0.0022	0.0026	0.0028	0.0032	0.0034
23	0.2609	0.5292	2726	0.0011	0.0016	0.0020	0.0024	0.0022	0.0025	0.0028	0.0028	0.0033	0.0037
24	0.2591	0.5284	2766	0.0009	0.0009	0.0012	0.0017	0.0022	0.0027	0.0032	0.0033	0.0036	0.0038
25	0.2595	0.5291	2756	0.0012	0.0019	0.0024	0.0029	0.0021	0.0025	0.0027	0.0029	0.0033	0.0036
26	0.2607	0.5285	2734	0.0010	0.0014	0.0017	0.0020	0.0021	0.0024	0.0027	0.0028	0.0031	0.0039
27	0.2605	0.5290	2734	0.0014	0.0019	0.0023	0.0027	0.0020	0.0023	0.0026	0.0029	0.0032	0.0036
28	0.2608	0.5286	2730	0.0014	0.0018	0.0025	0.0032	0.0020	0.0026	0.0029	0.0030	0.0035	0.0042
29	0.2595	0.5287	2756	0.0010	0.0015	0.0016	0.0017	0.0025	0.0031	0.0035	0.0035	0.0039	0.0046
30	0.2587	0.5314	2762	0.0007	0.0013	0.0016	0.0019	0.0019	0.0025	0.0026	0.0030	0.0034	0.0035
31	0.2612	0.5290	2720	0.0012	0.0018	0.0021	0.0025	0.0022	0.0025	0.0031	0.0034	0.0041	0.0045
32	0.2607	0.5290	2730	0.0013	0.0021	0.0027	0.0033	0.0022	0.0029	0.0030	0.0032	0.0037	0.0042
33	0.2603	0.5282	2744	0.0012	0.0017	0.0021	0.0025	0.0022	0.0025	0.0031	0.0033	0.0037	0.0044
34	0.2596	0.5285	2756	0.0015	0.0019	0.0024	0.0029	0.0023	0.0025	0.0025	0.0027	0.0031	0.0036
35	0.2599	0.5287	2750	0.0008	0.0013	0.0017	0.0022	0.0020	0.0024	0.0024	0.0026	0.0033	0.0039
36	0.2580	0.5311	2778	0.0007	0.0011	0.0016	0.0020	0.0018	0.0020	0.0024	0.0026	0.0030	0.0036
37	0.2607	0.5287	2732	0.0009	0.0013	0.0016	0.0019	0.0018	0.0023	0.0024	0.0024	0.0028	0.0034
38	0.2599	0.5287	2748	0.0011	0.0012	0.0016	0.0020	0.0028	0.0034	0.0034	0.0035	0.0039	0.0045
39	0.2600	0.5285	2746	0.0010	0.0016	0.0020	0.0024	0.0021	0.0022	0.0028	0.0031	0.0033	0.0036
40	0.2595	0.5287	2756	0.0008	0.0011	0.0014	0.0017	0.0019	0.0026	0.0027	0.0030	0.0032	0.0036
Ave.	0.2600	0.5290	2745	0.0010	0.0015	0.0019	0.0023	0.0021	0.0025	0.0028	0.0030	0.0034	0.0039
Med.	0.2601	0.5287	2746	0.0010	0.0015	0.0017	0.0021	0.0021	0.0025	0.0027	0.0030	0.0033	0.0037
st dev	0.0008	0.0008	15	0.0003	0.0004	0.0004	0.0005	0.0002	0.0003	0.0003	0.0003	0.0003	0.0004
Min.	0.2580	0.5282	2720	0.0006	0.0009	0.0012	0.0015	0.0018	0.0020	0.0024	0.0024	0.0028	0.0034
Max.	0.2612	0.5314	2778	0.0015	0.0021	0.0027	0.0033	0.0028	0.0034	0.0035	0.0035	0.0041	0.0046



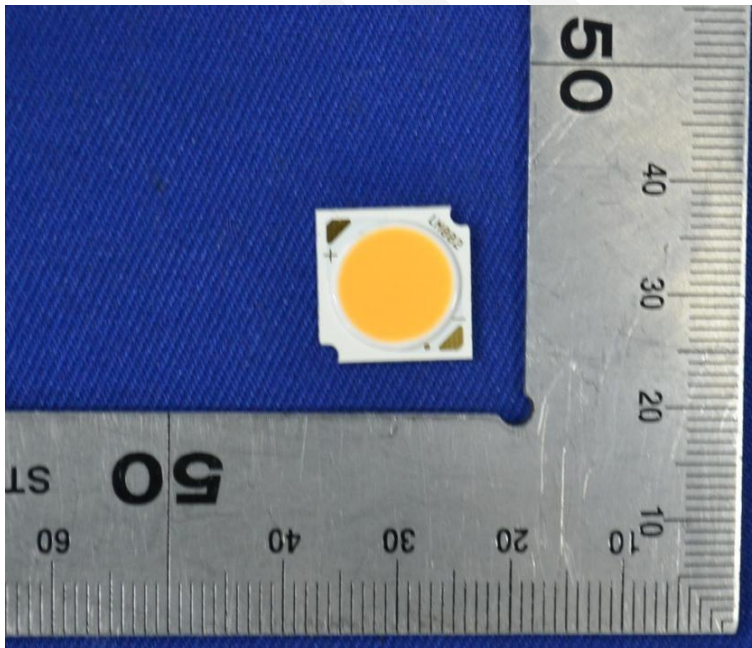
4 - EUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 EUT Photo



Report Revision

Report Number	Report Date	Contents
RSZ160329509-10-10000	2017-06-14	Original report.
RSZ160329509-10-10000-M2	2017-12-05	Update the Reported TM-21 L ₇₀ Lifetime in page 21.
RSZ160329509-10-10000-M2	2017-12-11	Update the Family Declaration in page 3 to 22.

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

FINAL