



TEST REPORT

ACCORDING TO IESNA LM-80-15
For

Hongli Zhihui Group Co.,Ltd. Guangzhou Branch

Room 316, Building 2, No.1, Xianke Yi Road, Huadong Town, Huadu District, Guangzhou, China

Model: HL-LM003H384W-20B10C12(Ra5)

Report Type: 10000 Hours Test Report		Product Type: LED Array	
Test Engineer:	Pote Wang	<i>Pote Wang</i>	
Report Number:	RSZ160329510-10-10000-M3		
Test Date:	2016-04-05 to 2017-05-28		
Report Date:	2019-01-14		
Reviewed By:	Daniel Duan / EE Manager	<i>Daniel Duan.</i>	
Revised Note:	The previous report RSZ160329510-10-10000-M2 is replaced by this report on 2019-01-14		
Test Facility:	Test facility was located at No.69, Pulongcun, Puxinhu Industry 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. Guangzhou Branch
Part Number:	HL-LM003H384W-20B10C12(Ra5)
Part Type:	LED Array
Drive Level:	DC 1200mA
Nominal CCT:	2700K
Power:	43.92W
Current Density per LED die:	442.86mA/mm ²
Power Density per LED die:	1.3507W/mm ²
CRI:	95
Die Spacing:	0.24mm

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.

Family products covered by this report:

According to ENERGY STAR® Requirements for the Use of LM-80 Data, the following products can be covered by this report base on the information and declaration provided by manufacturer. The information of these models shows that the covered products meet all section 4 requirements of ENERGY STAR® Requirements for the Use of LM-80 Data (September 28, 2017)

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-LM003H384W-20B10C12(Ra5)	95	2700K	12	10	0.1245	442.86	120	0.24	1200
Multiple models	HL-LM003H384W-20B10C12(Ra5)	95	3000K	12	10	0.1245	442.86	120	0.24	1200
		95	3500K	12	10	0.1245	442.86	120	0.24	1200
		95	4000K	12	10	0.1245	442.86	120	0.24	1200
		95	5000K	12	10	0.1245	442.86	120	0.24	1200
		95	5700K	12	10	0.1245	442.86	120	0.24	1200
		95	6000K	12	10	0.1245	442.86	120	0.24	1200
		95	6500K	12	10	0.1245	442.86	120	0.24	1200
Multiple models	HL-LM003H384W-17B8C12(Ra5)	95	2700K	12	8	0.0998	442.86	120	0.45	960
		95	3000K	12	8	0.0998	442.86	120	0.45	960
		95	3500K	12	8	0.0998	442.86	120	0.45	960
		95	4000K	12	8	0.0998	442.86	120	0.45	960
		95	5000K	12	8	0.0998	442.86	120	0.45	960
		95	5700K	12	8	0.0998	442.86	120	0.45	960
		95	6000K	12	8	0.0998	442.86	120	0.45	960
		95	6500K	12	8	0.0998	442.86	120	0.45	960

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-LM003H384W-15B7C12(Ra5)	95	2700K	12	7	0.0873	442.86	120	0.57	840
		95	3000K	12	7	0.0873	442.86	120	0.57	840
		95	3500K	12	7	0.0873	442.86	120	0.57	840
		95	4000K	12	7	0.0873	442.86	120	0.57	840
		95	5000K	12	7	0.0873	442.86	120	0.57	840
		95	5700K	12	7	0.0873	442.86	120	0.57	840
		95	6000K	12	7	0.0873	442.86	120	0.57	840
		95	6500K	12	7	0.0873	442.86	120	0.57	840
Multiple models	HL-LM003H384W-13B6C12(Ra5)	95	2700K	12	6	0.0748	442.86	120	0.84	720
		95	3000K	12	6	0.0748	442.86	120	0.84	720
		95	3500K	12	6	0.0748	442.86	120	0.84	720
		95	4000K	12	6	0.0748	442.86	120	0.84	720
		95	5000K	12	6	0.0748	442.86	120	0.84	720
		95	5700K	12	6	0.0748	442.86	120	0.84	720
		95	6000K	12	6	0.0748	442.86	120	0.84	720
		95	6500K	12	6	0.0748	442.86	120	0.84	720
Multiple models	HL-LM003H384W-11B5C12(Ra5)	95	2700K	12	5	0.0624	442.86	120	0.93	600
		95	3000K	12	5	0.0624	442.86	120	0.93	600
		95	3500K	12	5	0.0624	442.86	120	0.93	600
		95	4000K	12	5	0.0624	442.86	120	0.93	600
		95	5000K	12	5	0.0624	442.86	120	0.93	600
		95	5700K	12	5	0.0624	442.86	120	0.93	600
		95	6000K	12	5	0.0624	442.86	120	0.93	600
		95	6500K	12	5	0.0624	442.86	120	0.93	600
Multiple models	HL-LM003H384W-9B4C12(Ra5)	95	2700K	12	4	0.0499	442.86	120	0.93	480
		95	3000K	12	4	0.0499	442.86	120	0.93	480
		95	3500K	12	4	0.0499	442.86	120	0.93	480
		95	4000K	12	4	0.0499	442.86	120	0.93	480
		95	5000K	12	4	0.0499	442.86	120	0.93	480
		95	5700K	12	4	0.0499	442.86	120	0.93	480
		95	6000K	12	4	0.0499	442.86	120	0.93	480
		95	6500K	12	4	0.0499	442.86	120	0.93	480
Multiple models	HL-LM003H384W-15B3C24(Ra5)	95	2700K	24	3	0.0748	442.86	120	0.76	360
		95	3000K	24	3	0.0748	442.86	120	0.76	360
		95	3500K	24	3	0.0748	442.86	120	0.76	360
		95	4000K	24	3	0.0748	442.86	120	0.76	360
		95	5000K	24	3	0.0748	442.86	120	0.76	360
		95	5700K	24	3	0.0748	442.86	120	0.76	360
		95	6000K	24	3	0.0748	442.86	120	0.76	360
		95	6500K	24	3	0.0748	442.86	120	0.76	360
Multiple models	HL-LM003H384W-18B3C28(Ra5)	95	2700K	28	3	0.0873	442.86	120	0.57	360
		95	3000K	28	3	0.0873	442.86	120	0.57	360
		95	3500K	28	3	0.0873	442.86	120	0.57	360
		95	4000K	28	3	0.0873	442.86	120	0.57	360
		95	5000K	28	3	0.0873	442.86	120	0.57	360
		95	5700K	28	3	0.0873	442.86	120	0.57	360
		95	6000K	28	3	0.0873	442.86	120	0.57	360
		95	6500K	28	3	0.0873	442.86	120	0.57	360
Multiple models	HL-LM003H384W-20B1C40(Ra5)	95	2700K	40	1	0.0416	442.86	120	0.89	120
		95	3000K	40	1	0.0416	442.86	120	0.89	120
		95	3500K	40	1	0.0416	442.86	120	0.89	120
		95	4000K	40	1	0.0416	442.86	120	0.89	120

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	40	1	0.0416	442.86	120	0.89	120		
		95	5700K	40	1	0.0416	442.86	120	0.89	120		
		95	6000K	40	1	0.0416	442.86	120	0.89	120		
		95	6500K	40	1	0.0416	442.86	120	0.89	120		
Multiple models	HL-LM003H384W-20B2C20(Ra5)	95	2700K	20	2	0.0416	442.86	120	0.89	240		
		95	3000K	20	2	0.0416	442.86	120	0.89	240		
		95	3500K	20	2	0.0416	442.86	120	0.89	240		
		95	4000K	20	2	0.0416	442.86	120	0.89	240		
		95	5000K	20	2	0.0416	442.86	120	0.89	240		
		95	5700K	20	2	0.0416	442.86	120	0.89	240		
		95	6000K	20	2	0.0416	442.86	120	0.89	240		
		95	6500K	20	2	0.0416	442.86	120	0.89	240		
		Multiple models	HL-LM003H384W-24B2C24(Ra5)	95	2700K	24	2	0.0499	442.86	120	1.02	240
				95	3000K	24	2	0.0499	442.86	120	1.02	240
95	3500K			24	2	0.0499	442.86	120	1.02	240		
95	4000K			24	2	0.0499	442.86	120	1.02	240		
95	5000K			24	2	0.0499	442.86	120	1.02	240		
95	5700K			24	2	0.0499	442.86	120	1.02	240		
95	6000K			24	2	0.0499	442.86	120	1.02	240		
95	6500K			24	2	0.0499	442.86	120	1.02	240		
Multiple models	HL-LM003H384W-24B2C25(Ra5)	95	2700K	25	2	0.052	442.86	120	1.02	240		
		95	3000K	25	2	0.052	442.86	120	1.02	240		
		95	3500K	25	2	0.052	442.86	120	1.02	240		
		95	4000K	25	2	0.052	442.86	120	1.02	240		
		95	5000K	25	2	0.052	442.86	120	1.02	240		
		95	5700K	25	2	0.052	442.86	120	1.02	240		
		95	6000K	25	2	0.052	442.86	120	1.02	240		
		95	6500K	25	2	0.052	442.86	120	1.02	240		
Multiple models	HL-LM003H384W-30B2C30(Ra5)	95	2700K	30	2	0.0624	442.86	120	0.83	240		
		95	3000K	30	2	0.0624	442.86	120	0.83	240		
		95	3500K	30	2	0.0624	442.86	120	0.83	240		
		95	4000K	30	2	0.0624	442.86	120	0.83	240		
		95	5000K	30	2	0.0624	442.86	120	0.83	240		
		95	5700K	30	2	0.0624	442.86	120	0.83	240		
		95	6000K	30	2	0.0624	442.86	120	0.83	240		
		95	6500K	30	2	0.0624	442.86	120	0.83	240		
Multiple models	HL-LM003H384W-30B2C32(Ra5)	95	2700K	32	2	0.0665	442.86	120	0.5	240		
		95	3000K	32	2	0.0665	442.86	120	0.5	240		
		95	3500K	32	2	0.0665	442.86	120	0.5	240		
		95	4000K	32	2	0.0665	442.86	120	0.5	240		
		95	5000K	32	2	0.0665	442.86	120	0.5	240		
		95	5700K	32	2	0.0665	442.86	120	0.5	240		
		95	6000K	32	2	0.0665	442.86	120	0.5	240		
		95	6500K	32	2	0.0665	442.86	120	0.5	240		
Multiple models	HL-LM003H384W-35B2C35(Ra5)	95	2700K	35	2	0.0728	442.86	120	0.81	240		
		95	3000K	35	2	0.0728	442.86	120	0.81	240		
		95	3500K	35	2	0.0728	442.86	120	0.81	240		
		95	4000K	35	2	0.0728	442.86	120	0.81	240		
		95	5000K	35	2	0.0728	442.86	120	0.81	240		
		95	5700K	35	2	0.0728	442.86	120	0.81	240		
		95	6000K	35	2	0.0728	442.86	120	0.81	240		
		95	6500K	35	2	0.0728	442.86	120	0.81	240		

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-LM003H384W-36B2C36(Ra5)	95	2700K	36	2	0.0748	442.86	120	0.79	240
		95	3000K	36	2	0.0748	442.86	120	0.79	240
		95	3500K	36	2	0.0748	442.86	120	0.79	240
		95	4000K	36	2	0.0748	442.86	120	0.79	240
		95	5000K	36	2	0.0748	442.86	120	0.79	240
		95	5700K	36	2	0.0748	442.86	120	0.79	240
		95	6000K	36	2	0.0748	442.86	120	0.79	240
		95	6500K	36	2	0.0748	442.86	120	0.79	240
Multiple models	HL-LM003H384W-40B2C40(Ra5)	95	2700K	40	2	0.0832	442.86	120	0.68	240
		95	3000K	40	2	0.0832	442.86	120	0.68	240
		95	3500K	40	2	0.0832	442.86	120	0.68	240
		95	4000K	40	2	0.0832	442.86	120	0.68	240
		95	5000K	40	2	0.0832	442.86	120	0.68	240
		95	5700K	40	2	0.0832	442.86	120	0.68	240
		95	6000K	40	2	0.0832	442.86	120	0.68	240
		95	6500K	40	2	0.0832	442.86	120	0.68	240
Multiple models	HL-LM003D87W-16B12C8(Ra5)	95	2700K	8	12	0.0998	179.71	120	0.24	1440
		95	3000K	8	12	0.0998	179.71	120	0.24	1440
		95	3500K	8	12	0.0998	179.71	120	0.24	1440
		95	4000K	8	12	0.0998	179.71	120	0.24	1440
		95	5000K	8	12	0.0998	179.71	120	0.24	1440
		95	5700K	8	12	0.0998	179.71	120	0.24	1440
		95	6000K	8	12	0.0998	179.71	120	0.24	1440
		95	6500K	8	12	0.0998	179.71	120	0.24	1440
Multiple models	HL-LM003D94W-24B10C12(Ra5)	95	2700K	12	10	0.1245	211.36	120	0.24	1200
		95	3000K	12	10	0.1245	211.36	120	0.24	1200
		95	3500K	12	10	0.1245	211.36	120	0.24	1200
		95	4000K	12	10	0.1245	211.36	120	0.24	1200
		95	5000K	12	10	0.1245	211.36	120	0.24	1200
		95	5700K	12	10	0.1245	211.36	120	0.24	1200
		95	6000K	12	10	0.1245	211.36	120	0.24	1200
		95	6500K	12	10	0.1245	211.36	120	0.24	1200
Multiple models	HL-LM066D42W-12B3C12(Ra5)	95	2700K	12	3	0.0427	241.56	120	0.37	360
		95	3000K	12	3	0.0427	241.56	120	0.37	360
		95	3500K	12	3	0.0427	241.56	120	0.37	360
		95	4000K	12	3	0.0427	241.56	120	0.37	360
		95	5000K	12	3	0.0427	241.56	120	0.37	360
		95	5700K	12	3	0.0427	241.56	120	0.37	360
		95	6000K	12	3	0.0427	241.56	120	0.37	360
		95	6500K	12	3	0.0427	241.56	120	0.36	360
Multiple models	HL-LM066D94W-12B3C12(Ra5)	95	2700K	12	3	0.0427	211.36	120	0.36	360
		95	3000K	12	3	0.0427	211.36	120	0.36	360
		95	3500K	12	3	0.0427	211.36	120	0.36	360
		95	4000K	12	3	0.0427	211.36	120	0.36	360
		95	5000K	12	3	0.0427	211.36	120	0.36	360
		95	5700K	12	3	0.0427	211.36	120	0.36	360
		95	6000K	12	3	0.0427	211.36	120	0.36	360
		95	6500K	12	3	0.0427	211.36	120	0.36	360
Multiple models	HL-LM066D42W-18B4C12(Ra5)	95	2700K	12	4	0.0569	241.56	120	0.27	480
		95	3000K	12	4	0.0569	241.56	120	0.27	480
		95	3500K	12	4	0.0569	241.56	120	0.27	480
		95	4000K	12	4	0.0569	241.56	120	0.27	480

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	12	4	0.0569	241.56	120	0.27	480		
		95	5700K	12	4	0.0569	241.56	120	0.27	480		
		95	6000K	12	4	0.0569	241.56	120	0.27	480		
		95	6500K	12	4	0.0569	241.56	120	0.27	480		
Multiple models	HL-LM066D94W-18B4C12(Ra5)	95	2700K	12	4	0.0569	211.36	120	0.26	480		
		95	3000K	12	4	0.0569	211.36	120	0.26	480		
		95	3500K	12	4	0.0569	211.36	120	0.26	480		
		95	4000K	12	4	0.0569	211.36	120	0.26	480		
		95	5000K	12	4	0.0569	211.36	120	0.26	480		
		95	5700K	12	4	0.0569	211.36	120	0.26	480		
		95	6000K	12	4	0.0569	211.36	120	0.26	480		
		95	6500K	12	4	0.0569	211.36	120	0.26	480		
		Multiple models	HL-LM067D42W-24B5C12(Ra5)	95	2700K	12	5	0.0711	241.56	120	0.31	600
				95	3000K	12	5	0.0711	241.56	120	0.31	600
95	3500K			12	5	0.0711	241.56	120	0.31	600		
95	4000K			12	5	0.0711	241.56	120	0.31	600		
95	5000K			12	5	0.0711	241.56	120	0.31	600		
95	5700K			12	5	0.0711	241.56	120	0.31	600		
95	6000K			12	5	0.0711	241.56	120	0.31	600		
95	6500K			12	5	0.0711	241.56	120	0.31	600		
Multiple models	HL-LM067D94W-24B5C12(Ra5)	95	2700K	12	5	0.0711	211.36	120	0.3	600		
		95	3000K	12	5	0.0711	211.36	120	0.3	600		
		95	3500K	12	5	0.0711	211.36	120	0.3	600		
		95	4000K	12	5	0.0711	211.36	120	0.3	600		
		95	5000K	12	5	0.0711	211.36	120	0.3	600		
		95	5700K	12	5	0.0711	211.36	120	0.3	600		
		95	6000K	12	5	0.0711	211.36	120	0.3	600		
		95	6500K	12	5	0.0711	211.36	120	0.3	600		
Multiple models	HL-LM068D42W-24B5C12(Ra5)	95	2700K	12	5	0.045	241.56	120	0.5	600		
		95	3000K	12	5	0.045	241.56	120	0.5	600		
		95	3500K	12	5	0.045	241.56	120	0.5	600		
		95	4000K	12	5	0.045	241.56	120	0.5	600		
		95	5000K	12	5	0.045	241.56	120	0.5	600		
		95	5700K	12	5	0.045	241.56	120	0.5	600		
		95	6000K	12	5	0.045	241.56	120	0.5	600		
		95	6500K	12	5	0.045	241.56	120	0.5	600		
Multiple models	HL-LM068D94W-24B5C12(Ra5)	95	2700K	12	5	0.045	211.36	120	0.49	600		
		95	3000K	12	5	0.045	211.36	120	0.49	600		
		95	3500K	12	5	0.045	211.36	120	0.49	600		
		95	4000K	12	5	0.045	211.36	120	0.49	600		
		95	5000K	12	5	0.045	211.36	120	0.49	600		
		95	5700K	12	5	0.045	211.36	120	0.49	600		
		95	6000K	12	5	0.045	211.36	120	0.49	600		
		95	6500K	12	5	0.045	211.36	120	0.49	600		
Multiple models	HL-LM068D42W-32B8C12(Ra5)	95	2700K	12	8	0.072	241.56	120	0.27	960		
		95	3000K	12	8	0.072	241.56	120	0.27	960		
		95	3500K	12	8	0.072	241.56	120	0.27	960		
		95	4000K	12	8	0.072	241.56	120	0.27	960		
		95	5000K	12	8	0.072	241.56	120	0.27	960		
		95	5700K	12	8	0.072	241.56	120	0.27	960		
		95	6000K	12	8	0.072	241.56	120	0.27	960		
		95	6500K	12	8	0.072	241.56	120	0.27	960		

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-LM068D94W-32B8C12(Ra5)	95	2700K	12	8	0.072	211.36	120	0.26	960
		95	3000K	12	8	0.072	211.36	120	0.26	960
		95	3500K	12	8	0.072	211.36	120	0.26	960
		95	4000K	12	8	0.072	211.36	120	0.26	960
		95	5000K	12	8	0.072	211.36	120	0.26	960
		95	5700K	12	8	0.072	211.36	120	0.26	960
		95	6000K	12	8	0.072	211.36	120	0.26	960
		95	6500K	12	8	0.072	211.36	120	0.26	960
Multiple models	HL-LM069D42W-32B8C12(Ra5)	95	2700K	12	8	0.072	241.56	120	0.4	960
		95	3000K	12	8	0.072	241.56	120	0.4	960
		95	3500K	12	8	0.072	241.56	120	0.4	960
		95	4000K	12	8	0.072	241.56	120	0.4	960
		95	5000K	12	8	0.072	241.56	120	0.4	960
		95	5700K	12	8	0.072	241.56	120	0.4	960
		95	6000K	12	8	0.072	241.56	120	0.4	960
		95	6500K	12	8	0.072	241.56	120	0.4	960
Multiple models	HL-LM069D94W-32B8C12(Ra5)	95	2700K	12	8	0.072	211.36	120	0.39	960
		95	3000K	12	8	0.072	211.36	120	0.39	960
		95	3500K	12	8	0.072	211.36	120	0.39	960
		95	4000K	12	8	0.072	211.36	120	0.39	960
		95	5000K	12	8	0.072	211.36	120	0.39	960
		95	5700K	12	8	0.072	211.36	120	0.39	960
		95	6000K	12	8	0.072	211.36	120	0.39	960
		95	6500K	12	8	0.072	211.36	120	0.39	960
Multiple models	HL-LM003D42W-24B10C12(Ra5)	95	2700K	12	10	0.1245	241.56	120	0.25	1200
		95	3000K	12	10	0.1245	241.56	120	0.25	1200
		95	3500K	12	10	0.1245	241.56	120	0.25	1200
		95	4000K	12	10	0.1245	241.56	120	0.25	1200
		95	5000K	12	10	0.1245	241.56	120	0.25	1200
		95	5700K	12	10	0.1245	241.56	120	0.25	1200
		95	6000K	12	10	0.1245	241.56	120	0.25	1200
		95	6500K	12	10	0.1245	241.56	120	0.25	1200
Multiple models	HL-LMH03D90W-20B10C12(Ra5)	95	2700K	12	10	0.1197	260.50	120	0.39	1200
		95	3000K	12	10	0.1197	260.50	120	0.39	1200
		95	3500K	12	10	0.1197	260.50	120	0.39	1200
		95	4000K	12	10	0.1197	260.50	120	0.39	1200
		95	5000K	12	10	0.1197	260.50	120	0.39	1200
		95	5700K	12	10	0.1197	260.50	120	0.39	1200
		95	6000K	12	10	0.1197	260.50	120	0.39	1200
		95	6500K	12	10	0.1197	260.50	120	0.39	1200
Multiple models	HL-LMH03D90W-17B8C12(Ra5)	95	2700K	12	8	0.0957	260.50	120	0.38	960
		95	3000K	12	8	0.0957	260.50	120	0.38	960
		95	3500K	12	8	0.0957	260.50	120	0.38	960
		95	4000K	12	8	0.0957	260.50	120	0.38	960
		95	5000K	12	8	0.0957	260.50	120	0.38	960
		95	5700K	12	8	0.0957	260.50	120	0.38	960
		95	6000K	12	8	0.0957	260.50	120	0.38	960
		95	6500K	12	8	0.0957	260.50	120	0.38	960
Multiple models	HL-LMH03D90W-15B7C12(Ra5)	95	2700K	12	7	0.0838	260.50	120	0.48	840
		95	3000K	12	7	0.0838	260.50	120	0.48	840
		95	3500K	12	7	0.0838	260.50	120	0.48	840
		95	4000K	12	7	0.0838	260.50	120	0.48	840

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	12	7	0.0838	260.50	120	0.48	840		
		95	5700K	12	7	0.0838	260.50	120	0.48	840		
		95	6000K	12	7	0.0838	260.50	120	0.48	840		
		95	6500K	12	7	0.0838	260.50	120	0.48	840		
Multiple models	HL-LMH03D90W-13B6C12(Ra5)	95	2700K	12	6	0.0718	260.50	120	0.65	720		
		95	3000K	12	6	0.0718	260.50	120	0.65	720		
		95	3500K	12	6	0.0718	260.50	120	0.65	720		
		95	4000K	12	6	0.0718	260.50	120	0.65	720		
		95	5000K	12	6	0.0718	260.50	120	0.65	720		
		95	5700K	12	6	0.0718	260.50	120	0.65	720		
		95	6000K	12	6	0.0718	260.50	120	0.65	720		
		95	6500K	12	6	0.0718	260.50	120	0.65	720		
		Multiple models	HL-LMH03D90W-11B5C12(Ra5)	95	2700K	12	5	0.0598	260.50	120	0.67	600
				95	3000K	12	5	0.0598	260.50	120	0.67	600
95	3500K			12	5	0.0598	260.50	120	0.67	600		
95	4000K			12	5	0.0598	260.50	120	0.67	600		
95	5000K			12	5	0.0598	260.50	120	0.67	600		
95	5700K			12	5	0.0598	260.50	120	0.67	600		
95	6000K			12	5	0.0598	260.50	120	0.67	600		
95	6500K			12	5	0.0598	260.50	120	0.67	600		
Multiple models	HL-LM003D94W-20B10C12(Ra5)	95	2700K	12	10	0.118	211.36	120	0.26	1200		
		95	3000K	12	10	0.118	211.36	120	0.26	1200		
		95	3500K	12	10	0.118	211.36	120	0.26	1200		
		95	4000K	12	10	0.118	211.36	120	0.26	1200		
		95	5000K	12	10	0.118	211.36	120	0.26	1200		
		95	5700K	12	10	0.118	211.36	120	0.26	1200		
		95	6000K	12	10	0.118	211.36	120	0.26	1200		
		95	6500K	12	10	0.118	211.36	120	0.26	1200		
Multiple models	HL-LM003D94W-17B8C12(Ra5)	95	2700K	12	8	0.0944	211.36	120	0.4	960		
		95	3000K	12	8	0.0944	211.36	120	0.4	960		
		95	3500K	12	8	0.0944	211.36	120	0.4	960		
		95	4000K	12	8	0.0944	211.36	120	0.4	960		
		95	5000K	12	8	0.0944	211.36	120	0.4	960		
		95	5700K	12	8	0.0944	211.36	120	0.4	960		
		95	6000K	12	8	0.0944	211.36	120	0.4	960		
		95	6500K	12	8	0.0944	211.36	120	0.4	960		
Multiple models	HL-LM003D94W-15B7C12(Ra5)	95	2700K	12	7	0.0826	211.36	120	0.36	840		
		95	3000K	12	7	0.0826	211.36	120	0.36	840		
		95	3500K	12	7	0.0826	211.36	120	0.36	840		
		95	4000K	12	7	0.0826	211.36	120	0.36	840		
		95	5000K	12	7	0.0826	211.36	120	0.36	840		
		95	5700K	12	7	0.0826	211.36	120	0.36	840		
		95	6000K	12	7	0.0826	211.36	120	0.36	840		
		95	6500K	12	7	0.0826	211.36	120	0.36	840		
Multiple models	HL-LM003D94W-13B6C12(Ra5)	95	2700K	12	6	0.0708	211.36	120	0.63	720		
		95	3000K	12	6	0.0708	211.36	120	0.63	720		
		95	3500K	12	6	0.0708	211.36	120	0.63	720		
		95	4000K	12	6	0.0708	211.36	120	0.63	720		
		95	5000K	12	6	0.0708	211.36	120	0.63	720		
		95	5700K	12	6	0.0708	211.36	120	0.63	720		
		95	6000K	12	6	0.0708	211.36	120	0.63	720		
		95	6500K	12	6	0.0708	211.36	120	0.63	720		

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-LM003D94W-11B5C12(Ra5)	95	2700K	12	5	0.059	211.36	120	0.51	600
		95	3000K	12	5	0.059	211.36	120	0.51	600
		95	3500K	12	5	0.059	211.36	120	0.51	600
		95	4000K	12	5	0.059	211.36	120	0.51	600
		95	5000K	12	5	0.059	211.36	120	0.51	600
		95	5700K	12	5	0.059	211.36	120	0.51	600
		95	6000K	12	5	0.059	211.36	120	0.51	600
Multiple models	HL-LM003D42W-20B10C12(Ra5)	95	2700K	12	10	0.1197	241.56	120	0.39	1200
		95	3000K	12	10	0.1197	241.56	120	0.39	1200
		95	3500K	12	10	0.1197	241.56	120	0.39	1200
		95	4000K	12	10	0.1197	241.56	120	0.39	1200
		95	5000K	12	10	0.1197	241.56	120	0.39	1200
		95	5700K	12	10	0.1197	241.56	120	0.39	1200
		95	6000K	12	10	0.1197	241.56	120	0.39	1200
Multiple models	HL-LM003D42W-17B8C12(Ra5)	95	2700K	12	8	0.0957	241.56	120	0.38	960
		95	3000K	12	8	0.0957	241.56	120	0.38	960
		95	3500K	12	8	0.0957	241.56	120	0.38	960
		95	4000K	12	8	0.0957	241.56	120	0.38	960
		95	5000K	12	8	0.0957	241.56	120	0.38	960
		95	5700K	12	8	0.0957	241.56	120	0.38	960
		95	6000K	12	8	0.0957	241.56	120	0.38	960
Multiple models	HL-LM003D42W-15B7C12(Ra5)	95	2700K	12	7	0.0838	241.56	120	0.48	840
		95	3000K	12	7	0.0838	241.56	120	0.48	840
		95	3500K	12	7	0.0838	241.56	120	0.48	840
		95	4000K	12	7	0.0838	241.56	120	0.48	840
		95	5000K	12	7	0.0838	241.56	120	0.48	840
		95	5700K	12	7	0.0838	241.56	120	0.48	840
		95	6000K	12	7	0.0838	241.56	120	0.48	840
Multiple models	HL-LM003D42W-13B6C12(Ra5)	95	2700K	12	6	0.0718	241.56	120	0.65	720
		95	3000K	12	6	0.0718	241.56	120	0.65	720
		95	3500K	12	6	0.0718	241.56	120	0.65	720
		95	4000K	12	6	0.0718	241.56	120	0.65	720
		95	5000K	12	6	0.0718	241.56	120	0.65	720
		95	5700K	12	6	0.0718	241.56	120	0.65	720
		95	6000K	12	6	0.0718	241.56	120	0.65	720
Multiple models	HL-LM003D42W-11B5C12(Ra5)	95	2700K	12	5	0.0598	241.56	120	0.67	600
		95	3000K	12	5	0.0598	241.56	120	0.67	600
		95	3500K	12	5	0.0598	241.56	120	0.67	600
		95	4000K	12	5	0.0598	241.56	120	0.67	600
		95	5000K	12	5	0.0598	241.56	120	0.67	600
		95	5700K	12	5	0.0598	241.56	120	0.67	600
		95	6000K	12	5	0.0598	241.56	120	0.67	600
Multiple models	HL-LML03H421W-20B10C12(Ra5)	95	2700K	12	10	0.0698	401.85	70	0.56	700
		95	3000K	12	10	0.0698	401.85	70	0.56	700
		95	3500K	12	10	0.0698	401.85	70	0.56	700
		95	4000K	12	10	0.0698	401.85	70	0.56	700

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	12	10	0.0698	401.85	70	0.56	700		
		95	5700K	12	10	0.0698	401.85	70	0.56	700		
		95	6000K	12	10	0.0698	401.85	70	0.56	700		
		95	6500K	12	10	0.0698	401.85	70	0.56	700		
Multiple models	HL-LML03H421W-17B8C12(Ra5)	95	2700K	12	8	0.0558	401.85	70	0.56	560		
		95	3000K	12	8	0.0558	401.85	70	0.56	560		
		95	3500K	12	8	0.0558	401.85	70	0.56	560		
		95	4000K	12	8	0.0558	401.85	70	0.56	560		
		95	5000K	12	8	0.0558	401.85	70	0.56	560		
		95	5700K	12	8	0.0558	401.85	70	0.56	560		
		95	6000K	12	8	0.0558	401.85	70	0.56	560		
		95	6500K	12	8	0.0558	401.85	70	0.56	560		
		Multiple models	HL-LML03H421W-15B7C12(Ra5)	95	2700K	12	7	0.0489	401.85	70	0.69	490
				95	3000K	12	7	0.0489	401.85	70	0.69	490
95	3500K			12	7	0.0489	401.85	70	0.69	490		
95	4000K			12	7	0.0489	401.85	70	0.69	490		
95	5000K			12	7	0.0489	401.85	70	0.69	490		
95	5700K			12	7	0.0489	401.85	70	0.69	490		
95	6000K			12	7	0.0489	401.85	70	0.69	490		
95	6500K			12	7	0.0489	401.85	70	0.69	490		
Multiple models	HL-LML03H421W-13B6C12(Ra5)	95	2700K	12	6	0.0419	401.85	70	0.94	420		
		95	3000K	12	6	0.0419	401.85	70	0.94	420		
		95	3500K	12	6	0.0419	401.85	70	0.94	420		
		95	4000K	12	6	0.0419	401.85	70	0.94	420		
		95	5000K	12	6	0.0419	401.85	70	0.94	420		
		95	5700K	12	6	0.0419	401.85	70	0.94	420		
		95	6000K	12	6	0.0419	401.85	70	0.94	420		
		95	6500K	12	6	0.0419	401.85	70	0.94	420		
Multiple models	HL-LMH03D90W-11B5C12(Ra5)	95	2700K	12	5	0.0615	260.50	120	0.84	600		
		95	3000K	12	5	0.0615	260.50	120	0.84	600		
		95	3500K	12	5	0.0615	260.50	120	0.84	600		
		95	4000K	12	5	0.0615	260.50	120	0.84	600		
		95	5000K	12	5	0.0615	260.50	120	0.84	600		
		95	5700K	12	5	0.0615	260.50	120	0.84	600		
		95	6000K	12	5	0.0615	260.50	120	0.84	600		
		95	6500K	12	5	0.0615	260.50	120	0.84	600		
Multiple models	HL-LM022H384W-15B2C15(Ra5)	95	2700K	15	2	0.0299	442.86	120	0.56	240		
		95	3000K	15	2	0.0299	442.86	120	0.56	240		
		95	3500K	15	2	0.0299	442.86	120	0.56	240		
		95	4000K	15	2	0.0299	442.86	120	0.56	240		
		95	5000K	15	2	0.0299	442.86	120	0.56	240		
		95	5700K	15	2	0.0299	442.86	120	0.56	240		
		95	6000K	15	2	0.0299	442.86	120	0.56	240		
		95	6500K	15	2	0.0299	442.86	120	0.56	240		
Multiple models	HL-LM022H384W-18B2C18(Ra5)	95	2700K	18	2	0.0359	442.86	120	0.55	240		
		95	3000K	18	2	0.0359	442.86	120	0.55	240		
		95	3500K	18	2	0.0359	442.86	120	0.55	240		
		95	4000K	18	2	0.0359	442.86	120	0.55	240		
		95	5000K	18	2	0.0359	442.86	120	0.55	240		
		95	5700K	18	2	0.0359	442.86	120	0.55	240		
		95	6000K	18	2	0.0359	442.86	120	0.55	240		
		95	6500K	18	2	0.0359	442.86	120	0.55	240		

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-LM022H384W-20B2C20(Ra5)	95	2700K	20	2	0.0399	442.86	120	0.5	240
		95	3000K	20	2	0.0399	442.86	120	0.5	240
		95	3500K	20	2	0.0399	442.86	120	0.5	240
		95	4000K	20	2	0.0399	442.86	120	0.5	240
		95	5000K	20	2	0.0399	442.86	120	0.5	240
		95	5700K	20	2	0.0399	442.86	120	0.5	240
		95	6000K	20	2	0.0399	442.86	120	0.5	240
		95	6500K	20	2	0.0399	442.86	120	0.5	240
Multiple models	HL-LM022H384W-15B3C12(Ra5)	95	2700K	12	3	0.0359	442.86	120	0.5	360
		95	3000K	12	3	0.0359	442.86	120	0.5	360
		95	3500K	12	3	0.0359	442.86	120	0.5	360
		95	4000K	12	3	0.0359	442.86	120	0.5	360
		95	5000K	12	3	0.0359	442.86	120	0.5	360
		95	5700K	12	3	0.0359	442.86	120	0.5	360
		95	6000K	12	3	0.0359	442.86	120	0.5	360
		95	6500K	12	3	0.0359	442.86	120	0.5	360
Multiple models	HL-LM022D90W-15B2C15(Ra5)	95	2700K	15	2	0.0374	316.33	150	0.45	300
		95	3000K	15	2	0.0374	316.33	150	0.45	300
		95	3500K	15	2	0.0374	316.33	150	0.45	300
		95	4000K	15	2	0.0374	316.33	150	0.45	300
		95	5000K	15	2	0.0374	316.33	150	0.45	300
		95	5700K	15	2	0.0374	316.33	150	0.45	300
		95	6000K	15	2	0.0374	316.33	150	0.45	300
		95	6500K	15	2	0.0374	316.33	150	0.45	300
Multiple models	HL-LM022D90W-18B2C18(Ra5)	95	2700K	18	2	0.0449	316.33	150	0.44	300
		95	3000K	18	2	0.0449	316.33	150	0.44	300
		95	3500K	18	2	0.0449	316.33	150	0.44	300
		95	4000K	18	2	0.0449	316.33	150	0.44	300
		95	5000K	18	2	0.0449	316.33	150	0.44	300
		95	5700K	18	2	0.0449	316.33	150	0.44	300
		95	6000K	18	2	0.0449	316.33	150	0.44	300
		95	6500K	18	2	0.0449	316.33	150	0.44	300
Multiple models	HL-LM022D90W-20B2C20(Ra5)	95	2700K	20	2	0.0499	316.33	150	0.43	300
		95	3000K	20	2	0.0499	316.33	150	0.43	300
		95	3500K	20	2	0.0499	316.33	150	0.43	300
		95	4000K	20	2	0.0499	316.33	150	0.43	300
		95	5000K	20	2	0.0499	316.33	150	0.43	300
		95	5700K	20	2	0.0499	316.33	150	0.43	300
		95	6000K	20	2	0.0499	316.33	150	0.43	300
		95	6500K	20	2	0.0499	316.33	150	0.43	300
Multiple models	HL-LM022D90W-15B3C12(Ra5)	95	2700K	12	3	0.0449	316.33	150	0.43	450
		95	3000K	12	3	0.0449	316.33	150	0.43	450
		95	3500K	12	3	0.0449	316.33	150	0.43	450
		95	4000K	12	3	0.0449	316.33	150	0.43	450
		95	5000K	12	3	0.0449	316.33	150	0.43	450
		95	5700K	12	3	0.0449	316.33	150	0.43	450
		95	6000K	12	3	0.0449	316.33	150	0.43	450
		95	6500K	12	3	0.0449	316.33	150	0.43	450
Multiple models	HL-LM022D90W-30B1C48(Ra5)	95	2700K	48	1	0.0798	421.77	200	0.25	200
		95	3000K	48	1	0.0798	421.77	200	0.25	200
		95	3500K	48	1	0.0798	421.77	200	0.25	200
		95	4000K	48	1	0.0798	421.77	200	0.25	200

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	48	1	0.0798	421.77	200	0.25	200
		95	5700K	48	1	0.0798	421.77	200	0.25	200
		95	6000K	48	1	0.0798	421.77	200	0.25	200
		95	6500K	48	1	0.0798	421.77	200	0.25	200
Multiple models	HL-LM023H384W-24B2C24(Ra5)	95	2700K	24	2	0.0479	442.86	120	0.72	240
		95	3000K	24	2	0.0479	442.86	120	0.72	240
		95	3500K	24	2	0.0479	442.86	120	0.72	240
		95	4000K	24	2	0.0479	442.86	120	0.72	240
		95	5000K	24	2	0.0479	442.86	120	0.72	240
		95	5700K	24	2	0.0479	442.86	120	0.72	240
		95	6000K	24	2	0.0479	442.86	120	0.72	240
		95	6500K	24	2	0.0479	442.86	120	0.66	240
		Multiple models	HL-LM023H384W-30B2C30(Ra5)	95	2700K	30	2	0.0598	442.86	120
95	3000K			30	2	0.0598	442.86	120	0.66	240
95	3500K			30	2	0.0598	442.86	120	0.66	240
95	4000K			30	2	0.0598	442.86	120	0.66	240
95	5000K			30	2	0.0598	442.86	120	0.66	240
95	5700K			30	2	0.0598	442.86	120	0.66	240
95	6000K			30	2	0.0598	442.86	120	0.66	240
Multiple models	HL-LM023H384W-36B2C36(Ra5)	95	2700K	36	2	0.0718	442.86	120	0.56	240
		95	3000K	36	2	0.0718	442.86	120	0.56	240
		95	3500K	36	2	0.0718	442.86	120	0.56	240
		95	4000K	36	2	0.0718	442.86	120	0.56	240
		95	5000K	36	2	0.0718	442.86	120	0.56	240
		95	5700K	36	2	0.0718	442.86	120	0.56	240
		95	6000K	36	2	0.0718	442.86	120	0.56	240
		95	6500K	36	2	0.0718	442.86	120	0.56	240
Multiple models	HL-LM023D90W-24B2C24(Ra5)	95	2700K	24	2	0.0598	316.33	150	0.61	300
		95	3000K	24	2	0.0598	316.33	150	0.61	300
		95	3500K	24	2	0.0598	316.33	150	0.61	300
		95	4000K	24	2	0.0598	316.33	150	0.61	300
		95	5000K	24	2	0.0598	316.33	150	0.61	300
		95	5700K	24	2	0.0598	316.33	150	0.61	300
		95	6000K	24	2	0.0598	316.33	150	0.61	300
		95	6500K	24	2	0.0598	316.33	150	0.61	300
Multiple models	HL-LM023D90W-30B2C30(Ra5)	95	2700K	30	2	0.0748	316.33	150	0.61	300
		95	3000K	30	2	0.0748	316.33	150	0.61	300
		95	3500K	30	2	0.0748	316.33	150	0.61	300
		95	4000K	30	2	0.0748	316.33	150	0.61	300
		95	5000K	30	2	0.0748	316.33	150	0.61	300
		95	5700K	30	2	0.0748	316.33	150	0.61	300
		95	6000K	30	2	0.0748	316.33	150	0.61	300
Multiple models	HL-LM023D90W-36B2C36(Ra5)	95	2700K	36	2	0.0898	316.33	150	0.45	300
		95	3000K	36	2	0.0898	316.33	150	0.45	300
		95	3500K	36	2	0.0898	316.33	150	0.45	300
		95	4000K	36	2	0.0898	316.33	150	0.45	300
		95	5000K	36	2	0.0898	316.33	150	0.45	300
		95	5700K	36	2	0.0898	316.33	150	0.45	300
		95	6000K	36	2	0.0898	316.33	150	0.45	300
		95	6500K	36	2	0.0898	316.33	150	0.45	300

1.2 Standards Used:

- IESNA LM-80-15: 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 Testing Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
1.0m integrating sphere	SENSING	SCD-20008	N/A	2016-07-11	2017-07-10
spectroradiometer	SENSING	SCD-20008	N/A	2016-07-11	2017-07-10
DC Power Supply	Hanshenpuyuan	HSPY-100-05	2013010210003	2017-05-05	2018-05-04
Standard Light Source	EVERFINE	D062	1011093	2016-09-13	2017-09-12
Multilayer aging machine	BACL	B2-270	20015	2017-03-03	2018-03-02
Adjustable constant-current DC switching power supply	GUTE	DK-60V20A	120 5036	2016-08-29	2017-08-29
DC Power Supply	BACL	B12001-12	90023	2016-12-21	2017-12-20

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, 1200mA

Part Number: HL-LM003H384W-20B10C12(Ra5)
Number of Units: 20
Case Temperature: >83°C
Ambient Temperature: >80°C
Life Test Drive Current: 1200mA
Measurement Current: 1200mA

Data Set 2: 105°C, 1200mA

Part Number: HL-LM003H384W-20B10C12(Ra5)
Number of Units: 20
Case Temperature: >103°C
Ambient Temperature: >100°C
Life Test Drive Current: 1200mA
Measurement Current: 1200mA

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	>60000 hours
2	20	0	1000	10000	50000 hours

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
1	99.61%	99.18%	98.78%	98.30%	97.93%	97.55%	96.90%	96.32%	95.78%	95.25%
2	99.45%	98.92%	98.37%	97.81%	97.36%	96.89%	96.06%	95.32%	94.63%	93.91%

Average Color Maintenance

Data Set:	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
1	0.0012	0.0014	0.0017	0.0020	0.0021	0.0022	0.0024	0.0026	0.0029	0.0031
2	0.0012	0.0016	0.0019	0.0023	0.0023	0.0026	0.0028	0.0032	0.0036	0.0038

3 - Test Data

3.1 Data Set 1, 85°C, 1200mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)									
		0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	3914.64	99.37	99.23	98.83	98.47	98.22	97.73	97.02	96.45	96.00	95.57
2	3898.70	99.77	99.21	98.97	98.36	97.86	97.41	96.73	96.15	95.56	94.98
3	3935.88	99.68	99.24	98.59	98.10	97.64	97.34	96.63	96.27	95.66	95.11
4	3946.51	99.61	99.32	98.96	98.50	98.10	97.64	97.00	96.42	95.99	95.58
5	3925.26	99.61	99.31	99.00	98.56	98.16	97.69	97.03	96.44	96.01	95.61
6	3919.95	99.47	99.00	98.49	98.13	97.73	97.25	96.67	96.21	95.62	94.99
7	3882.77	99.72	99.36	98.94	98.43	98.07	98.04	97.32	96.38	95.74	95.12
8	3904.01	99.46	98.92	98.40	97.96	97.68	97.08	96.44	95.96	95.35	94.71
9	3909.33	99.85	99.37	99.01	98.49	98.24	98.03	97.43	96.39	95.98	95.58
10	3925.26	99.75	99.11	98.60	98.11	97.60	97.04	96.33	96.18	95.59	95.07
11	3872.14	99.91	99.22	98.77	98.24	97.85	97.22	96.58	96.19	95.52	94.99
12	3957.13	99.61	98.97	98.46	97.94	97.69	97.29	96.61	96.14	95.49	94.83
13	3909.33	99.58	99.42	99.07	98.71	98.40	98.18	97.60	96.50	95.98	95.48
14	3909.33	99.34	98.89	98.34	97.89	97.44	97.01	96.39	96.50	95.88	95.26
15	3893.39	99.60	99.06	98.59	98.19	97.81	97.69	97.07	96.35	95.77	95.22
16	3930.57	99.49	99.12	98.63	98.13	97.76	97.65	97.07	96.31	95.82	95.32
17	3824.34	99.88	99.42	99.23	98.55	98.27	98.15	97.56	96.45	96.00	95.52
18	3930.57	99.78	99.31	99.07	98.52	98.07	97.79	97.17	96.40	95.89	95.39
19	3930.57	99.24	99.12	98.87	98.34	97.91	97.50	96.79	96.34	95.92	95.47
20	3930.57	99.51	99.07	98.68	98.31	98.02	97.36	96.59	96.31	95.78	95.22
Ave.	3912.51	99.61	99.18	98.78	98.30	97.93	97.55	96.90	96.32	95.78	95.25
Med.	3917.30	99.61	99.21	98.80	98.32	97.89	97.57	96.90	96.34	95.80	95.24
st dev	29.3166	0.1857	0.1636	0.2549	0.2335	0.2613	0.3644	0.3843	0.1426	0.2015	0.2701
Min.	3824.34	99.24	98.89	98.34	97.89	97.44	97.01	96.33	95.96	95.35	94.71
Max.	3957.13	99.91	99.42	99.23	98.71	98.40	98.18	97.60	96.50	96.01	95.61

TM-21 Projection:

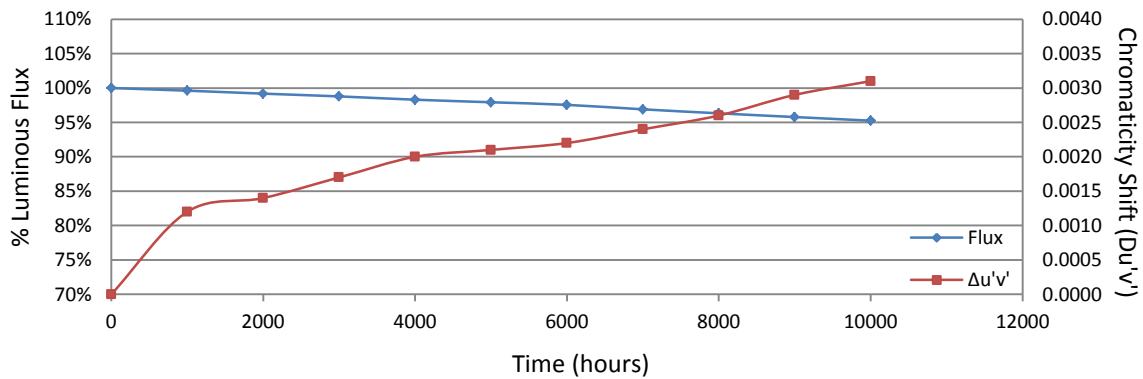
Test Duration: 10000 hours
Failures Observed: 0
 α : 5.705E-06
 β : 1.008
Reported L₇₀: >60000 hours

3.2 Data Set 1, 85°C, 1200mA (Forward Voltage)

No.	Forward Voltage (V)										
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	36.65	37.03	36.70	36.98	36.75	36.34	36.94	36.96	37.13	37.24	36.58
2	36.72	36.87	36.59	37.00	36.46	36.32	37.68	36.76	37.02	37.13	36.39
3	36.35	36.82	36.47	36.70	36.59	36.14	36.96	36.56	37.02	37.00	36.57
4	36.91	36.81	36.48	37.24	36.05	36.68	37.04	36.41	37.02	36.91	36.51
5	36.70	36.80	36.47	37.03	36.24	36.52	37.05	36.26	36.90	36.84	37.02
6	36.67	36.76	36.47	36.96	36.27	36.28	37.02	36.14	36.92	36.94	36.25
7	36.69	36.70	36.45	36.94	36.21	36.52	37.38	36.02	36.98	36.85	36.72
8	36.71	36.72	36.45	36.98	36.19	36.58	37.29	35.90	36.88	36.80	35.90
9	36.60	36.73	36.47	36.86	36.34	36.39	37.40	35.80	36.83	36.81	35.80
10	36.69	36.80	36.47	37.02	36.25	36.57	37.47	37.59	36.96	36.74	37.59
11	36.58	36.66	36.47	36.77	36.36	36.51	37.25	37.50	36.82	36.67	37.50
12	36.69	36.80	36.46	37.03	36.23	37.02	37.31	36.79	36.80	36.76	36.79
13	36.45	36.68	36.41	36.72	36.37	36.25	36.73	36.56	36.81	36.78	36.56
14	36.50	36.68	36.37	36.81	36.24	36.72	37.13	36.40	36.71	36.68	36.40
15	36.56	36.66	36.36	36.86	36.16	36.45	37.36	36.25	36.68	36.68	36.25
16	36.69	36.74	36.36	37.07	36.03	36.81	37.00	36.12	36.66	36.74	36.41
17	36.58	36.63	36.35	36.86	36.12	36.29	37.35	35.99	36.62	36.70	36.26
18	36.49	36.87	36.37	36.99	36.25	36.24	36.93	35.88	36.59	36.63	36.14
19	36.84	36.83	36.37	37.30	35.90	36.58	37.16	35.80	36.58	36.58	36.02
20	36.48	36.83	36.37	36.94	36.26	36.30	37.16	35.77	36.58	36.61	35.90
Ave.	36.63	36.77	36.45	36.95	36.26	36.48	37.18	36.37	36.83	36.80	36.48
Med.	36.66	36.78	36.46	36.97	36.25	36.48	37.16	36.26	36.83	36.77	36.41
st dev	0.1335	0.0950	0.0854	0.1516	0.1896	0.2199	0.2279	0.5329	0.1696	0.1711	0.4801
Min.	36.35	36.63	36.35	36.70	35.90	36.14	36.73	35.77	36.58	36.58	35.80
Max.	36.91	37.03	36.70	37.30	36.75	37.02	37.68	37.59	37.13	37.24	37.59

3.3 Data Set 1, 85°C, 1200mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)									
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	0.2605	0.5261	2748	0.0013	0.0016	0.0018	0.0020	0.0017	0.0015	0.0017	0.0022	0.0019	0.0020
2	0.2610	0.5268	2734	0.0008	0.0010	0.0011	0.0013	0.0018	0.0022	0.0028	0.0036	0.0041	0.0044
3	0.2598	0.5267	2760	0.0010	0.0013	0.0016	0.0018	0.0019	0.0021	0.0025	0.0028	0.0031	0.0034
4	0.2602	0.5254	2756	0.0014	0.0016	0.0018	0.0021	0.0018	0.0022	0.0028	0.0030	0.0033	0.0035
5	0.2601	0.5263	2754	0.0009	0.0014	0.0017	0.0021	0.0017	0.0020	0.0018	0.0022	0.0024	0.0026
6	0.2605	0.5262	2746	0.0012	0.0015	0.0016	0.0017	0.0017	0.0020	0.0019	0.0017	0.0019	0.0018
7	0.2617	0.5263	2720	0.0010	0.0014	0.0018	0.0022	0.0028	0.0021	0.0023	0.0016	0.0021	0.0021
8	0.2629	0.5286	2688	0.0008	0.0010	0.0015	0.0019	0.0025	0.0027	0.0026	0.0030	0.0033	0.0035
9	0.2609	0.5263	2738	0.0018	0.0022	0.0026	0.0030	0.0024	0.0025	0.0024	0.0021	0.0022	0.0025
10	0.2600	0.5266	2756	0.0009	0.0010	0.0011	0.0012	0.0015	0.0023	0.0024	0.0027	0.0027	0.0029
11	0.2620	0.5267	2714	0.0013	0.0016	0.0020	0.0024	0.0027	0.0031	0.0036	0.0040	0.0043	0.0045
12	0.2594	0.5263	2770	0.0012	0.0015	0.0018	0.0021	0.0026	0.0001	0.0002	0.0004	0.0008	0.0009
13	0.2612	0.5277	2726	0.0008	0.0011	0.0014	0.0017	0.0020	0.0025	0.0028	0.0031	0.0035	0.0037
14	0.2602	0.5259	2754	0.0016	0.0019	0.0020	0.0021	0.0025	0.0030	0.0034	0.0033	0.0037	0.0039
15	0.2609	0.5262	2738	0.0013	0.0014	0.0019	0.0024	0.0027	0.0035	0.0034	0.0036	0.0043	0.0045
16	0.2605	0.5264	2746	0.0014	0.0018	0.0020	0.0022	0.0028	0.0009	0.0014	0.0017	0.0013	0.0014
17	0.2637	0.5267	2678	0.0006	0.0008	0.0011	0.0015	0.0016	0.0021	0.0023	0.0025	0.0028	0.0031
18	0.2605	0.5267	2746	0.0012	0.0013	0.0012	0.0012	0.0017	0.0020	0.0025	0.0028	0.0032	0.0034
19	0.2596	0.5254	2770	0.0015	0.0018	0.0018	0.0019	0.0016	0.0021	0.0024	0.0021	0.0025	0.0027
20	0.2602	0.5264	2752	0.0011	0.0014	0.0018	0.0023	0.0028	0.0029	0.0032	0.0035	0.0039	0.0041
Ave.	0.2608	0.5265	2740	0.0012	0.0014	0.0017	0.0020	0.0021	0.0022	0.0024	0.0026	0.0029	0.0031
Med.	0.2605	0.5264	2746	0.0012	0.0014	0.0018	0.0021	0.0019	0.0022	0.0025	0.0028	0.0030	0.0033
st dev	0.0011	0.0007	24.3680	0.0003	0.0004	0.0004	0.0004	0.0005	0.0008	0.0008	0.0009	0.0010	0.0010
Min.	0.2594	0.5254	2678	0.0006	0.0008	0.0011	0.0012	0.0015	0.0001	0.0002	0.0004	0.0008	0.0009
Max.	0.2637	0.5286	2770	0.0018	0.0022	0.0026	0.0030	0.0028	0.0035	0.0036	0.0040	0.0043	0.0045



3.4 Data Set 2, 105°C, 1200mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
21	3925.26	99.39	98.82	98.14	97.60	97.11	96.69	95.92	95.29	94.65	94.01
22	3909.33	98.82	98.36	97.83	97.47	96.96	96.37	95.48	94.94	94.34	93.68
23	3866.83	99.48	98.90	98.26	97.55	97.09	96.72	95.85	95.42	94.59	93.73
24	3872.14	99.63	99.20	98.63	98.01	97.79	97.16	96.29	95.27	94.48	93.65
25	3957.13	99.65	99.16	98.65	98.13	97.82	97.10	96.40	95.66	94.80	93.91
26	3893.39	99.59	99.04	98.54	98.10	97.69	96.97	96.10	95.40	94.69	93.99
27	3893.39	99.58	98.82	98.34	97.67	97.25	96.55	95.66	95.32	94.58	93.82
28	3888.08	99.43	98.76	98.18	97.57	97.19	96.82	95.87	95.20	94.61	94.03
29	3919.95	99.18	98.67	98.11	97.54	97.12	96.88	96.23	95.19	94.48	93.74
30	3893.39	99.44	99.06	98.58	98.01	97.43	97.28	96.47	95.65	95.12	94.55
31	3919.95	99.32	98.77	98.29	97.79	97.38	97.05	96.33	95.19	94.42	93.61
32	3935.88	99.48	99.03	98.67	98.12	97.72	97.67	96.84	95.75	95.09	94.40
33	3904.01	99.73	99.36	98.90	98.23	97.82	97.79	96.97	96.20	95.60	94.97
34	3888.08	99.57	99.10	98.51	97.92	97.34	97.05	96.22	95.48	94.88	94.25
35	3877.46	99.01	98.31	97.69	97.08	96.62	96.16	95.20	94.42	93.74	93.01
36	3909.33	99.32	98.78	98.18	97.68	97.25	96.80	95.99	95.60	94.84	94.06
37	3877.46	99.86	99.32	98.94	98.40	98.05	97.17	96.32	95.61	94.80	93.94
38	3909.33	99.74	99.13	98.57	97.98	97.38	96.66	95.70	94.78	94.03	93.25
39	3925.26	99.53	98.78	98.13	97.59	97.11	96.41	95.59	94.96	94.39	93.82
40	3872.14	99.35	98.98	98.33	97.73	97.14	96.52	95.75	95.05	94.40	93.73
Ave.	3901.89	99.45	98.92	98.37	97.81	97.36	96.89	96.06	95.32	94.63	93.91
Med.	3898.70	99.48	98.94	98.34	97.76	97.30	96.85	96.05	95.31	94.60	93.87
st dev	23.9661	0.2481	0.2792	0.3229	0.3173	0.3554	0.4129	0.4435	0.3892	0.3978	0.4297
Min.	3866.83	98.82	98.31	97.69	97.08	96.62	96.16	95.20	94.42	93.74	93.01
Max.	3957.13	99.86	99.36	98.94	98.40	98.05	97.79	96.97	96.20	95.60	94.97

TM-21 Projection:

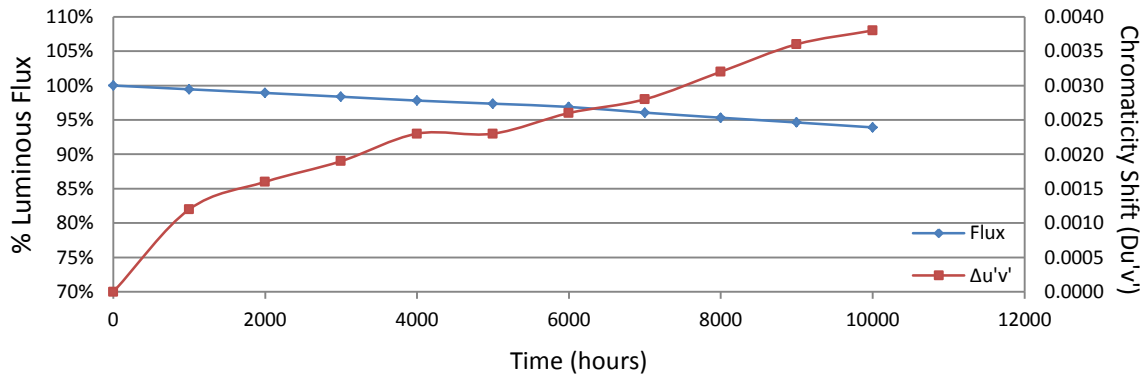
Test Duration: 10000 hours
Failures Observed: 0
 α : 7.398E-06
 β : 1.011
Reported L₇₀: 50,000 hours

3.5 Data Set 2, 105°C, 1200mA (Forward Voltage)

No.	Forward Voltage (V)										
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
21	36.94	36.52	36.81	36.65	36.78	36.79	37.58	37.49	37.08	36.65	36.05
22	36.32	36.47	36.58	36.21	35.95	36.05	36.80	37.49	36.94	36.57	36.51
23	36.59	36.42	36.56	36.45	36.48	36.51	37.40	37.31	37.03	36.48	36.78
24	36.60	36.45	36.57	36.48	36.51	36.78	36.86	37.11	36.85	36.43	36.51
25	36.72	36.56	36.56	36.72	36.88	36.51	37.46	36.90	36.82	36.37	36.69
26	36.58	36.41	36.56	36.43	36.45	36.69	36.95	36.67	36.70	36.34	36.76
27	36.68	36.43	36.55	36.56	36.69	36.76	37.09	36.51	36.83	36.34	36.46
28	36.54	36.41	36.54	36.41	36.41	36.46	37.04	36.51	36.72	36.32	36.39
29	36.70	36.45	36.56	36.59	36.73	36.39	37.53	36.39	36.65	36.30	36.50
30	36.68	36.43	36.54	36.57	36.71	36.50	37.38	36.28	36.62	36.34	36.62
31	36.72	36.47	36.60	36.59	36.71	36.58	37.22	36.98	36.59	36.41	36.59
32	36.64	36.52	36.62	36.54	36.56	36.55	37.41	36.70	36.82	36.34	36.82
33	36.55	36.47	36.58	36.44	36.41	36.34	37.22	36.47	36.75	36.32	36.75
34	36.70	36.41	36.55	36.56	36.71	36.64	37.20	36.26	36.72	36.30	36.72
35	36.29	36.32	36.54	36.07	35.82	36.02	36.81	36.26	36.65	36.26	36.65
36	36.56	36.42	36.52	36.46	36.50	36.49	37.32	36.16	36.63	36.39	36.71
37	36.44	36.40	36.54	36.30	36.20	36.44	37.13	35.99	36.57	36.38	36.56
38	36.70	36.45	36.54	36.61	36.77	36.28	37.55	35.85	36.56	36.36	36.41
39	36.31	36.52	36.51	36.32	36.12	36.23	36.73	35.74	36.59	36.32	36.71
40	36.55	36.39	36.49	36.45	36.51	36.41	37.11	35.68	36.58	36.30	35.82
Ave.	36.59	36.45	36.57	36.47	36.50	36.47	37.19	36.54	36.74	36.38	36.55
Med.	36.60	36.44	36.56	36.47	36.51	36.50	37.21	36.49	36.71	36.34	36.61
st dev	0.1593	0.0553	0.0645	0.1557	0.2846	0.2156	0.2650	0.5451	0.1538	0.0956	0.2479
Min.	36.29	36.32	36.49	36.07	35.82	36.02	36.73	35.68	36.56	36.26	35.82
Max.	36.94	36.56	36.81	36.72	36.88	36.79	37.58	37.49	37.08	36.65	36.82

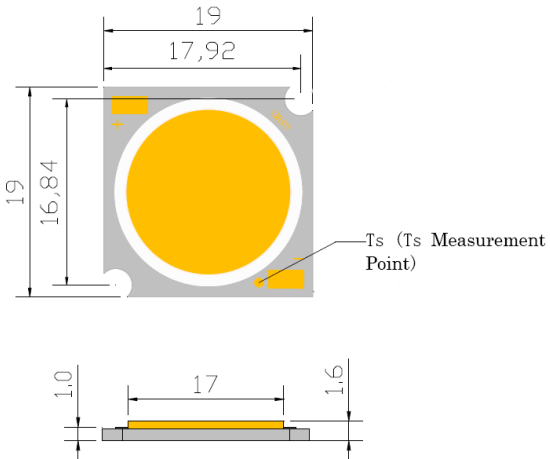
3.6 Data Set 2, 105°C, 1200mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)									
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
21	0.2603	0.5269	2748	0.0009	0.0012	0.0016	0.0020	0.0017	0.0018	0.0024	0.0028	0.0030	0.0032
22	0.2618	0.5281	2712	0.0014	0.0017	0.0020	0.0024	0.0025	0.0019	0.0019	0.0020	0.0023	0.0025
23	0.2632	0.5287	2682	0.0010	0.0013	0.0017	0.0020	0.0025	0.0029	0.0032	0.0034	0.0036	0.0039
24	0.2625	0.5281	2696	0.0014	0.0018	0.0021	0.0023	0.0026	0.0030	0.0031	0.0035	0.0040	0.0043
25	0.2607	0.5263	2742	0.0009	0.0009	0.0013	0.0017	0.0017	0.0021	0.0024	0.0028	0.0031	0.0032
26	0.2607	0.5263	2744	0.0010	0.0017	0.0020	0.0024	0.0023	0.0025	0.0028	0.0033	0.0038	0.0041
27	0.2615	0.5264	2726	0.0014	0.0018	0.0019	0.0021	0.0021	0.0028	0.0031	0.0034	0.0039	0.0040
28	0.2618	0.5271	2716	0.0014	0.0018	0.0020	0.0022	0.0017	0.0019	0.0022	0.0025	0.0029	0.0031
29	0.2607	0.5270	2738	0.0012	0.0015	0.0017	0.0019	0.0014	0.0017	0.0020	0.0022	0.0025	0.0026
30	0.2620	0.5275	2710	0.0011	0.0016	0.0021	0.0026	0.0025	0.0028	0.0031	0.0036	0.0042	0.0043
31	0.2601	0.5263	2756	0.0013	0.0015	0.0022	0.0029	0.0027	0.0028	0.0031	0.0038	0.0040	0.0042
32	0.2598	0.5259	2762	0.0013	0.0018	0.0022	0.0026	0.0030	0.0031	0.0031	0.0026	0.0027	0.0027
33	0.2608	0.5264	2740	0.0016	0.0019	0.0021	0.0024	0.0026	0.0034	0.0037	0.0042	0.0047	0.0048
34	0.2623	0.5280	2702	0.0013	0.0018	0.0022	0.0026	0.0028	0.0031	0.0028	0.0035	0.0039	0.0041
35	0.2621	0.5287	2702	0.0012	0.0016	0.0019	0.0023	0.0026	0.0029	0.0033	0.0037	0.0039	0.0042
36	0.2603	0.5264	2750	0.0008	0.0011	0.0014	0.0017	0.0022	0.0025	0.0026	0.0027	0.0031	0.0034
37	0.2618	0.5268	2718	0.0008	0.0013	0.0016	0.0018	0.0020	0.0029	0.0030	0.0033	0.0038	0.0040
38	0.2613	0.5265	2728	0.0012	0.0016	0.0019	0.0023	0.0023	0.0028	0.0030	0.0034	0.0040	0.0044
39	0.2604	0.5272	2744	0.0015	0.0020	0.0024	0.0028	0.0030	0.0034	0.0035	0.0041	0.0045	0.0046
40	0.2630	0.5285	2686	0.0009	0.0012	0.0016	0.0020	0.0019	0.0023	0.0026	0.0034	0.0039	0.0043
Ave.	0.2614	0.5272	2725	0.0012	0.0016	0.0019	0.0023	0.0023	0.0026	0.0028	0.0032	0.0036	0.0038
Med.	0.2614	0.5270	2727	0.0012	0.0016	0.0020	0.0023	0.0024	0.0028	0.0030	0.0034	0.0039	0.0041
st dev	0.0010	0.0009	23.7219	0.0002	0.0003	0.0003	0.0003	0.0005	0.0005	0.0005	0.0006	0.0007	0.0007
Min.	0.2598	0.5259	2682	0.0008	0.0009	0.0013	0.0017	0.0014	0.0017	0.0019	0.0020	0.0023	0.0025
Max.	0.2632	0.5287	2762	0.0016	0.0020	0.0024	0.0029	0.0030	0.0034	0.0037	0.0042	0.0047	0.0048



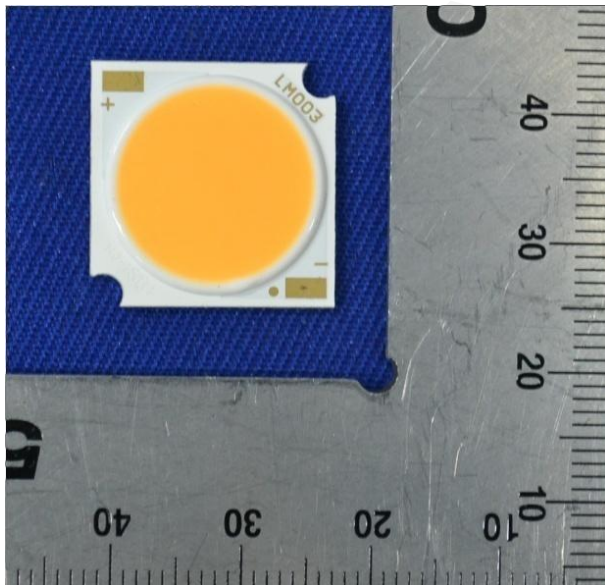
4 - EUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 EUT Photo



5 - Report Revision

Report Number	Report Date	Contents
RSZ160329510-10-10000	2017-06-14	Original report.
RSZ160329510-10-10000-M1	2017-12-11	Update the Family Declaration in page 3 to 24.
RSZ160329510-10-10000-M2	2018-01-29	Update the Description of LED Light Sources in page 3. Update the Standards Used in page 14. Update the Mechanical Dimensions Photo in page 24.
RSZ160329510-10-10000-M3	2019-01-14	Update the Logo of lab on the Page1 Update Company name and address on page 1.

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