



TEST REPORT

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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-LH023D101W-40B2C54(Ra2)-S-FC

Report Type: 10000 Hours Test Report	Product Type: LED Module
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Test Engineer: Pote Wang

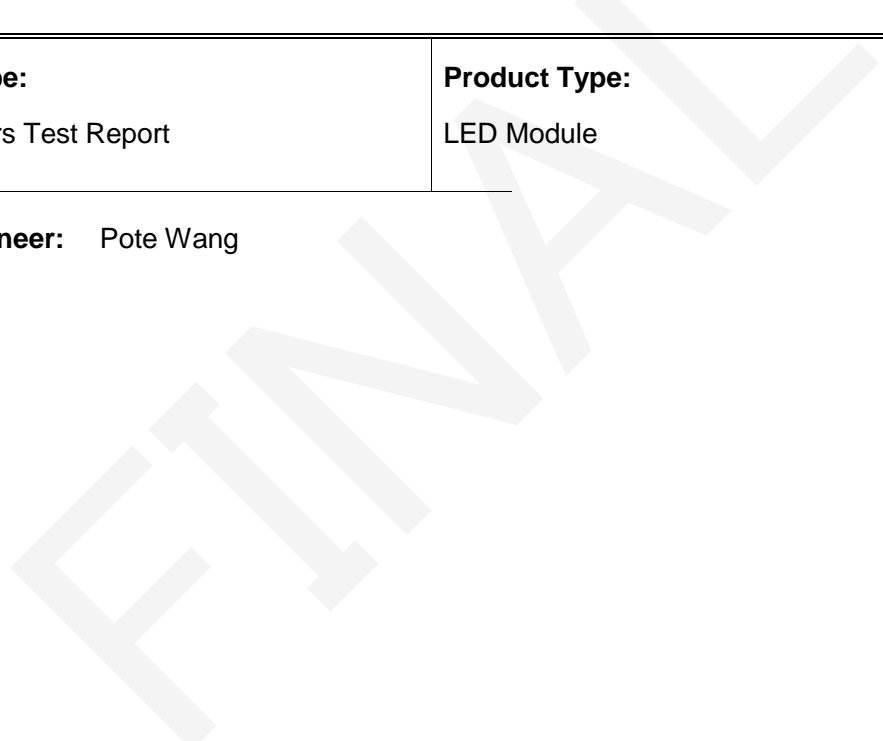


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Bay Area Compliance Laboratories Corp. (Dongguan)

No.69, Pulongcun, Puxinhu Industrial Area Tangxia ,

Dongguan, Guangdong, China.

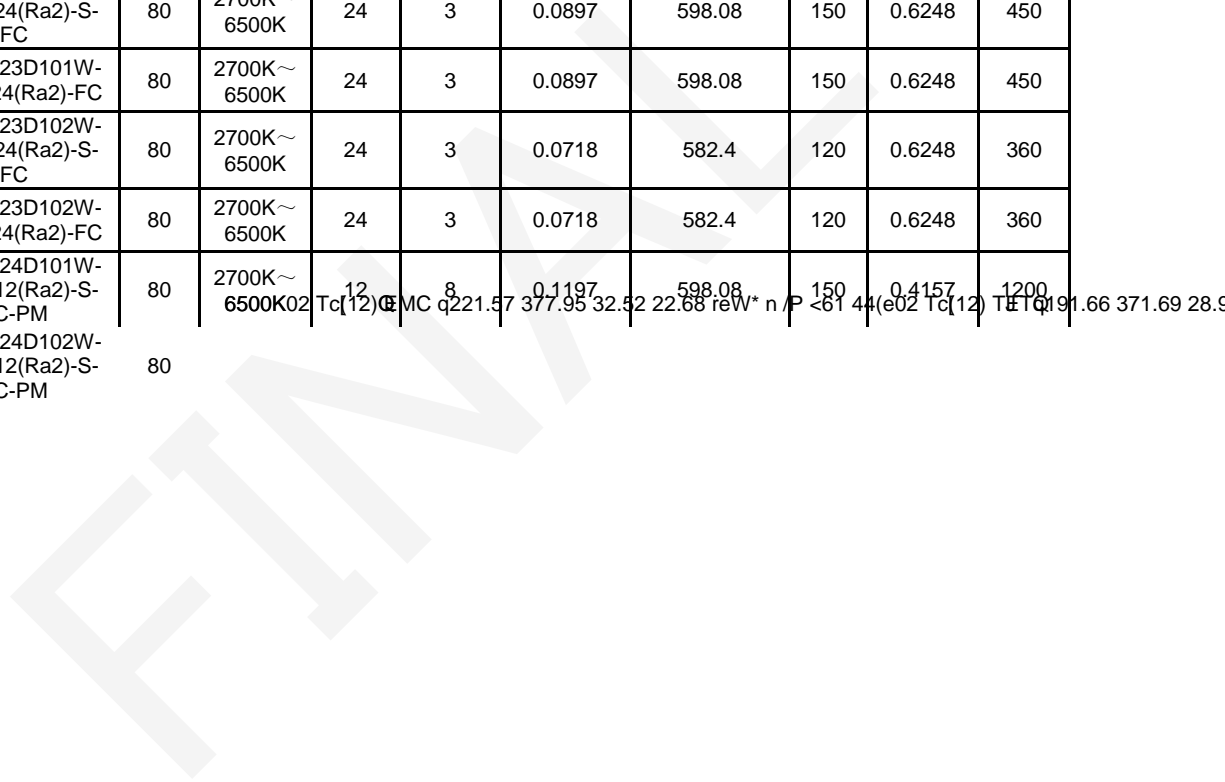
The IAS Accreditation Number TL-460

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Multiple models	HL-LH022D101W-20B2C21(Ra2)-S-FC	80	2700K~6500K	21	2	0.1037	598.08	150	0.4832	300
Multiple models	HL-LH022D101W-20B2C21(Ra2)-FC	80	2700K~6500K	21	2	0.1037	598.08	150	0.4832	300
Multiple models	HL-LH022D102W-12B2C21(Ra2)-S-FC	80	2700K~6500K	21	2	0.083	582.4	120	0.4832	240
Multiple models	HL-LH022D102W-12B2C21(Ra2)-FC	80	2700K~6500K	21	2	0.083	582.4	120	0.4832	240
Multiple models	HL-LH022D101W-15B1C32(Ra2)-S-FC	80	2700K~6500K	32	1	0.079	598.08	150	0.500	150
Multiple models	HL-LH022D101W-15B1C32(Ra2)-FC	80	2700K~6500K	32	1	0.079	598.08	150	0.500	150
Multiple models	HL-LH022D102W-10B1C32(Ra2)-S-FC	80	2700K~6500K	32	1	0.0632	582.4	120	0.500	120
Multiple models	HL-LH022D102W-10B1C32(Ra2)-FC	80	2700K~6500K	32	1	0.0632	582.4	120	0.500	120
Multiple models	HL-LH023D101W-24B1C54(Ra2)-S-FC	80	2700K~6500K	54	1	0.0673	598.08	150	0.6039	150
Multiple models	HL-LH023D101W-24B1C54(Ra2)-FC	80	2700K~6500K	54	1	0.0673	598.08	150	0.6039	150
Multiple models	HL-LH023D102W-15B1C54(Ra2)-S-FC	80	2700K~6500K	54	1	0.1067	582.4	120	0.6039	120
Multiple models	HL-LH023D102W-15B1C54(Ra2)-FC	80	2700K~6500K	54	1	0.1067	582.4	120	0.6039	120
Multiple models	HL-LH023D101W-25B1C60(Ra2)-S-FC	80	2700K~6500K	60	1	0.0748	598.08	150	0.4344	150
Multiple models	HL-LH023D101W-25B1C60(Ra2)-FC	80	2700K~6500K	60	1	0.0748	598.08	150	0.4344	150
Multiple models	HL-LH023D102W-18B1C60(Ra2)-S-FC	80	2700K~6500K	60	1	0.1186	582.4	120	0.4344	120
Multiple models	HL-LH023D102W-18B1C60(Ra2)-FC	80	2700K~6500K	60	1	0.1186	582.4	120	0.4344	120
Multiple models	HL-LH023D101W-24B1C86(Ra2)-S-FC	80	2700K~6500K	86	1	0.1072	598.08	150	0.4052	150
Multiple models	HL-LH023D102W-18B1C86(Ra2)-S-FC	80	2700K~6500K	86	1	0.0858	582.4	120	0.4052	120
Multiple models	HL-LH023D101W-28B2C30(Ra2)-S-FC	80	2700K~6500K	30	2	0.0748	598.08	150	0.5469	300
Multiple models	HL-LH023D101W-28B2C30(Ra2)-FC	80	2700K~6500K	30	2	0.0748	598.08	150	0.5469	300
Multiple models	HL-LH023D102W-18B2C30(Ra2)-S-FC	80	2700K~6500K	30	2	0.0599	582.4	120	0.5469	240
Multiple models	HL-LH023D102W-18B2C30(Ra2)-FC	80	2700K~6500K	30	2	0.0599	582.4	120	0.5469	240
Multiple models	HL-LH023D101W-30B2C36(Ra2)-S-FC	80	2700K~6500K	36	2	0.0897	598.08	150	0.6248	300
Multiple models	HL-LH023D101W-30B2C36(Ra2)-FC	80	2700K~6500K	36	2	0.0897	598.08	150	0.6248	300

Multiple models	HL-LH023D102W-20B2C36(Ra2)-S-FC	80	2700K~6500K	36	2	0.0718	582.4	120	0.6248	240
Multiple models	HL-LH023D102W-20B2C36(Ra2)-FC	80	2700K~6500K	36	2	0.0718	582.4	120	0.6248	240
Multiple models	HL-LH023D101W-36B2C39(Ra2)-S-FC	80	2700K~6500K	39	2	0.0972	598.08	150	0.5762	300
Multiple models	HL-LH023D101W-36B2C39(Ra2)-FC	80	2700K~6500K	39	2	0.0972	598.08	150	0.5762	300
Multiple models	HL-LH023D102W-22B2C39(Ra2)-S-FC	80	2700K~6500K	39	2	0.0778	582.4	120	0.5762	240
Multiple models	HL-LH023D102W-22B2C39(Ra2)-FC	80	2700K~6500K	39	2	0.0778	582.4	120	0.5762	240
Multiple models	HL-LH023D101W-15B3C24(Ra2)-S-FC	80	2700K~6500K	24	3	0.0897	598.08	150	0.6248	450
Multiple models	HL-LH023D101W-15B3C24(Ra2)-FC	80	2700K~6500K	24	3	0.0897	598.08	150	0.6248	450
Multiple models	HL-LH023D102W-15B3C24(Ra2)-S-FC	80	2700K~6500K	24	3	0.0718	582.4	120	0.6248	360
Multiple models	HL-LH023D102W-15B3C24(Ra2)-FC	80	2700K~6500K	24	3	0.0718	582.4	120	0.6248	360
Multiple models	HL-LH024D101W-36B8C12(Ra2)-S-FC-PM	80	2700K~6500K	36	8	0.1197	598.08	150	0.4157	1200
Multiple models	HL-LH024D102W-28B8C12(Ra2)-S-FC-PM	80	2700K~6500K	28	8	0.1197	598.08	150	0.4157	1200

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Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Standard Light Source	EVERFINE	D204	N/A	2019-07-19	2020-07-18
DC Power Supply	BACL	B25001	90020	2020-01-07	2021-01-07
Multilayer aging machine	BACL	B2-270	20022	2020-03-11	2021-03-10
Programmable dc power supply	Xinnuoer	PDF 1200-300	N/A	2020-07-01	2021-06-30

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 (ing)2156.8f*d(e)4()T&TBT1 0 0 1463.35 477.19 Tm7(b)yor

1.8 Sample Set

Data Set 1: 85°C, 300mA

Part Number: HL LH023D101W-40B2C54(Ra2)-S-FC
Number of Units: 12
Case Temperature: >83°C
Ambient Temperature: >80°C
Life Test Drive Current: 300mA
Measurement Current: 300mA

Data Set 2: 105°C, 300mA

Part Number: HL LH023D101W-40B2C54(Ra2)-S-FC
Number of Units: 12
Case Temperature: >103°C
Ambient Temperature: >100°C
Life Test Drive Current: 300mA
Measurement Current: 300mA

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed	Test Interval	Test Duration			Reported TM-21 L ₇₀ Lifetime	Reported TM-21 L ₈₀ Lifetime	Reported TM-21 L ₉₀ Lifetime
1	12	0	1000hrs	10000hrs	3.341E-06	0.993	>55000 hours	>55000 hours	30000 hours
2	12	0	1000hrs	10000hrs	4.445E-06	0.991	>55000 hours	48000 hours	22000 hours

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	98.99%	98.71%	98.40%	98.08%	97.72%	97.37%	97.04%	96.71%	96.42%	96.09%
2	98.59%	98.19%	97.77%	97.35%	96.92%	96.47%	96.05%	95.62%	95.21%	94.78%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs

3 - Test Data

3.1 Data Set 1, 85°C, 300mA (Lumen Maintenance)

No.	0hr(Initial)	Lumen Maintenance (%)									
		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	4990.29	99.36	99.07	98.69	98.45	97.84	97.58	97.21	97.01	96.68	96.47
2	5201.40	99.52	99.37	99.06	98.92	98.62	98.18	97.83	97.16	96.81	96.41
3	5224.86	98.75	98.63	98.35	97.86	97.71	97.23	97.09	96.75	96.48	96.11

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3.2 Data Set 1, 85°C, 300mA (Forward Voltage)

No.	Forward Voltage (V)										
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	159.38	158.77	158.36	158.60	158.53	158.70	158.80	158.77	158.54	158.58	158.39
2	159.96	159.06	157.96	158.03	157.60	157.24	156.45	156.50	156.76	157.07	157.64
3	160.44	159.93	158.42	158.68	158.03	157.64	156.60	156.87	156.10	156.26	155.65
4	161.73	160.51	159.08	159.68	159.45	159.32	158.96	158.17	157.02	157.08	155.99

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3.4 Data Set 2, 105°C, 300mA (Lumen Maintenance)

No.	Ohr(Initial)	Lumen Maintenance (%)									
		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
13	5324.54	98.69	98.26	97.70	97.28	96.76	96.41	95.89	95.48%	95.02%	94.45%
14	5166.21	98.60	98.29	97.63	97.08	96.48	96.00	95.48	95.28%	94.70%	94.27%
15	5201.40	98.27	97.78	97.45	97.06	96.69	96.27	95.95	95.48%	94.89%	94.53%
16	5195.54	98.21	97.87	97.28	97.13	96.60	96.11	95.91	95.48%	95.25%	94.75%
17	5142.76	98.79	98.44	98.09	97.70	97.24	96.89	96.36	95.87%	95.43%	94.86%
18	5177.94	98.66	98.30	97.99	97.33	96.78	96.20	95.92	95.48%	94.93%	94.59%
19	5189.67	98.45	97.85	97.37	96.99	96.54	96.23	95.91	95.48%	95.22%	94.84%
20	5136.89	98.93	98.63								

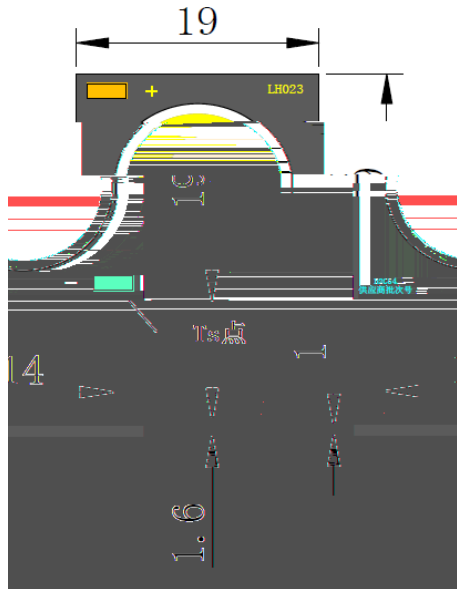
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3.5 Data Set 2, 105°C, 300mA (Forward Voltage)

No.	Forward Voltage (V)										
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
13	160.68	158.67	157.94	158.05	157.73	157.52	156.99	156.75	155.98	155.97	155.89
14	159.90	157.92	157.50	157.58	157.54	157.58	157.58	157.62	157.66	157.74	157.86
15	160.85	159.53	158.86	159.18	159.13	159.14	159.10	159.07	159.00	158.90	158.73
16	160.45	158.30	158.16	158.38	158.76	158.36	158.34	157.92	157.48	157.62	157.32
17	160.12	156.39	156.43	156.15	156.21	156.29	156.43	156.65	157.01	157.59	157.63
18	159.87	158.22	157.67	157.79	157.66	157.65	157.51	157.36	157.07	156.93	156.50
19	160.06	157.39	157.18	157.61	158.13	158.08	158.55	158.47	158.26	158.37	158.27
20	159.93	158.65	157.94	157.82	157.29	156.64	156.46	156.63	156.62	156.78	156.93
21	159.84	158.62	157.91	158.04	157.76	157.61	157.18	156.96	156.31	156.44	156.52
22	160.03	158.56	157.74	157.77	157.28	156.82	156.87	156.46	156.10	156.33	156.20
23	160.25	157.72	157.08	157.25	157.08	157.08	156.91	156.74	156.40	156.59	156.44
24	159.90	157.11	156.66	156.56	156.31	156.46	156.36	156.41	156.36	156.36	156.31
Avg.	160.16	158.09	157.59	157.68	157.57	157.44	157.36	157.25	157.02	157.14	157.05
Med.	160.05	158.26	157.71	157.78	157.60	157.55	157.09	156.86	156.82	156.86	156.73
st dev	0.34	0.84	0.67	0.79	0.86	0.84	0.89	0.86	0.93	0.90	0.90

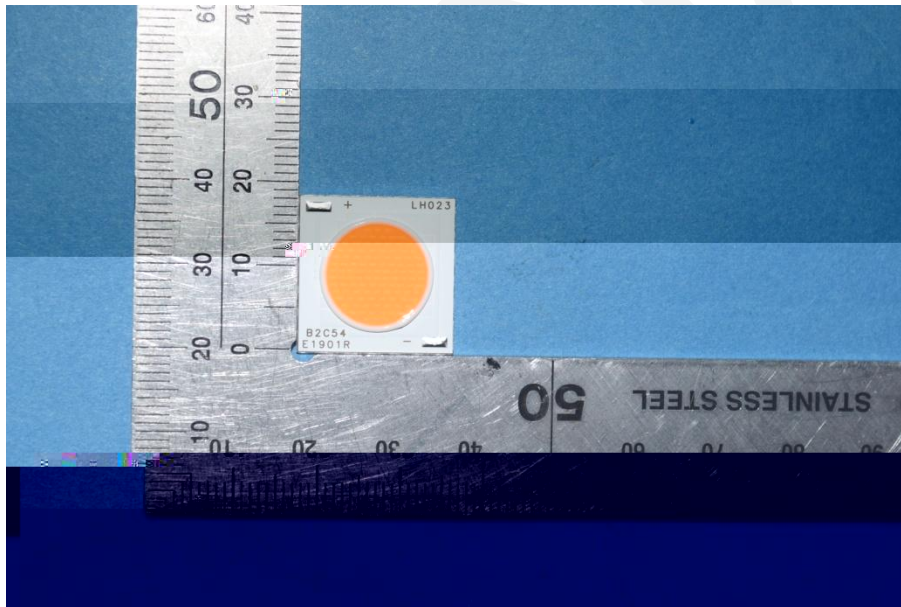
4 - DUT Photo

4.1 #Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



Directions

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