



TEST REPORT

ACCORDING TO IES LM-80-2015
For

Shenzhen Runlite Technology Co.,Ltd

Building A15, Tantou the 4th Industrial Estate, SongGang Town, BaoAn District, ShenZhen, China.

Model: 38mm Filament LED

Report Type: 6000 Hours Test Report		Product Type: LED Array	
Test Engineer:	Pote Wang	<i>Pote Wang</i>	
Report Number:	RSZ161221557-10		
Test Date:	2017-01-04 to 2017-09-12		
Report Date:	2017-09-23		
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:

24 PCS samples were received on 2016-12-21. The samples were numbered from 1 to 12, and 13 to 24.

Manufacturer: Shenzhen Runlite Technology Co.,Ltd
 Part Number: 38mm Filament LED
 Part Type: LED Array
 Drive Level: DC 15mA
 Nominal CCT: 2700K

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 test method was not accredited by IAS)
- 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
0.3m integrating sphere	EVERFINE	Diameter 0.3m	1011119	0.3m	2017-03-09	2018-03-09
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	15V/2000mA	2017-03-03	2018-03-03
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2017-03-09	2018-03-09
Standard Light Source	EVERFINE	D062	1011093	3000K	2016-09-13	2017-09-13
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987CJ73 21114	300VA	2017-03-03	2018-03-03
Multilayer aging machine	BACL	B2-270	20013	25°C~130°C	2017-09-01	2018-09-01
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11060002	(50/15A)	2016-07-07	2017-07-06
DC Power Supply	BACL	B25001	90020	250V,0~1A	2016-12-21	2017-12-21

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
DC Power Supply	BACL	B12001-12	90023	0~120V	2016-12-21	2017-12-21

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 Photometric Measurement Method and Uncertainty

Integrating sphere and spectroradiometer is used to measure luminous flux and chromaticity coordinate $u'v'$. 2π measurement was used and sample was driven by DC power supply. Luminous flux and chromaticity coordinate was scaled by halogen reference lamp. The ambient temperature during test was set to $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, RH <65%.

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).

FINAL

1.8 Sample Set

Data Set 1: 85°C,15mA

Part Number: 38mm Filament LED
Number of Units: 12
Case Temperature: >83°C
Ambient Temperature: >80°C
Life Test Drive Current: 15mA
Measurement Current: 15mA

Data Set 2: 105°C,15mA

Part Number: 38mm Filament LED
Number of Units: 12
Case Temperature: >103°C
Ambient Temperature: >100°C
Life Test Drive Current: 15mA
Measurement Current: 15mA

FEMNAL

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval(hours)	Test Duration(hours)	Reported TM-21 L ₇₀ Lifetime
1	12	0	1000	6000	>33,000hours
2	12	0	1000	6000	>33,000hours

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000	2000	3000	4000	5000	6000
1	99.71%	99.25%	98.62%	98.00%	97.29%	96.63%
2	99.42%	98.70%	97.88%	97.07%	96.05%	95.21%

Average Color Maintenance

Data Set:	1000	2000	3000	4000	5000	6000
1	0.0003	0.0005	0.0007	0.0009	0.0010	0.0012
2	0.0003	0.0005	0.0007	0.0009	0.0009	0.0013

3 - Test Data

3.1 Data Set 1, 85°C, 15mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	224.38	99.73	99.22	98.65	97.96	97.32	96.72
2	221.38	99.77	99.29	98.68	98.12	97.61	97.07
3	221.38	99.38	99.05	98.37	97.81	97.41	96.84
4	222.42	99.76	99.24	98.61	97.94	97.51	96.56
5	222.81	99.89	99.36	98.73	98.18	97.21	96.50
6	222.55	99.69	99.22	98.59	98.00	97.35	96.76
7	224.64	99.71	99.20	98.58	97.89	97.48	96.67
8	221.64	99.75	99.33	98.69	98.05	97.19	96.66
9	222.16	99.77	99.27	98.68	98.03	97.20	96.38
10	223.07	99.73	99.33	98.68	98.11	96.95	96.37
11	224.90	99.69	99.27	98.65	98.00	97.14	96.69
12	225.16	99.69	99.25	98.57	97.91	97.14	96.32
Ave.	223.04	99.71	99.25	98.62	98.00	97.29	96.63
Med.	222.68	99.73	99.26	98.65	98.00	97.26	96.67
st dev	1.39	0.1192	0.0806	0.0926	0.1070	0.1882	0.2158
Min.	221.38	99.38	99.05	98.37	97.81	96.95	96.32
Max.	225.16	99.89	99.36	98.73	98.18	97.61	97.07

TM-21 Projection:

Test Duration: 6000 hours

Failures Observed: 0

α: 6.372E-06

β: 1.005

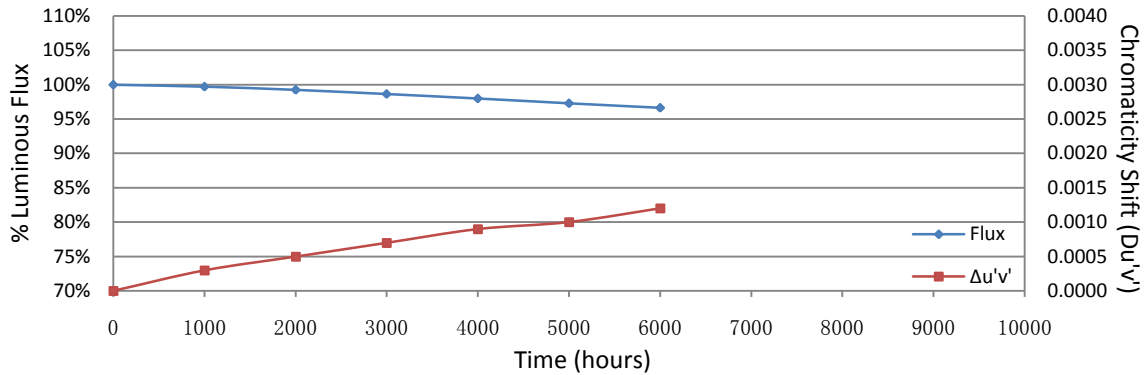
Reported L₇₀: >33000 hours

3.2 Data Set 1, 85°C, 15mA (Forward Voltage)

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	79.57	79.47	79.49	79.47	79.40	79.38	79.33
2	79.48	79.47	79.47	79.50	79.37	79.38	79.29
3	79.48	79.47	79.42	79.45	79.31	79.39	79.27
4	79.58	79.47	79.41	79.40	79.29	79.38	79.28
5	79.52	79.47	79.41	79.46	79.24	79.35	79.27
6	79.56	79.47	79.44	79.45	79.25	79.37	79.30
7	79.69	79.47	79.40	79.47	79.36	79.37	79.27
8	79.49	79.47	79.42	79.46	79.25	79.38	79.24
9	79.56	79.47	79.41	79.47	79.26	79.31	79.25
10	79.89	79.47	79.38	79.47	79.24	79.35	79.25
11	79.68	79.47	79.40	79.48	79.23	79.36	79.09
12	79.64	79.47	79.41	79.44	79.21	79.36	79.24
Ave.	79.60	79.47	79.42	79.46	79.28	79.37	79.26
Med.	79.57	79.47	79.41	79.47	79.26	79.37	79.27
st dev	0.12	0.00	0.03	0.02	0.06	0.02	0.06
Min.	79.48	79.47	79.38	79.40	79.21	79.31	79.09
Max.	79.89	79.47	79.49	79.50	79.40	79.39	79.33

3.3 Data Set 1, 85°C, 15mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs
1	0.2570	0.5292	2808	0.0002	0.0001	0.0002	0.0003	0.0003	0.0009
2	0.2575	0.5288	2800	0.0004	0.0007	0.0010	0.0013	0.0014	0.0018
3	0.2575	0.5288	2800	0.0002	0.0005	0.0004	0.0007	0.0008	0.0009
4	0.2580	0.5293	2788	0.0005	0.0007	0.0009	0.0010	0.0014	0.0011
5	0.2589	0.5299	2764	0.0003	0.0005	0.0009	0.0010	0.0013	0.0013
6	0.2571	0.5287	2808	0.0001	0.0002	0.0003	0.0007	0.0008	0.0010
7	0.2570	0.5270	2820	0.0000	0.0004	0.0009	0.0013	0.0013	0.0014
8	0.2573	0.5284	2806	0.0002	0.0008	0.0010	0.0010	0.0011	0.0015
9	0.2552	0.5237	2868	0.0002	0.0003	0.0004	0.0005	0.0008	0.0008
10	0.2567	0.5275	2824	0.0004	0.0005	0.0009	0.0010	0.0010	0.0012
11	0.2563	0.5269	2836	0.0004	0.0006	0.0008	0.0008	0.0009	0.0014
12	0.2568	0.5265	2826	0.0003	0.0005	0.0006	0.0007	0.0009	0.0010
Ave.	0.2571	0.5279	2812	0.0003	0.0005	0.0007	0.0009	0.0010	0.0012
Med.	0.2571	0.5286	2808	0.0003	0.0005	0.0008	0.0009	0.0010	0.0012
st dev	0.0009	0.0017	26	0.0001	0.0002	0.0003	0.0003	0.0003	0.0003
Min.	0.2552	0.5237	2764	0.0000	0.0001	0.0002	0.0003	0.0003	0.0008
Max.	0.2589	0.5299	2868	0.0005	0.0008	0.0010	0.0013	0.0014	0.0018



3.4 Data Set 2, 105°C, 15mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
13	224.90	99.42	98.63	97.81	97.03	95.76	94.91
14	223.59	99.39	98.51	97.69	96.84	95.72	94.99
15	226.72	99.46	98.64	97.82	96.99	95.92	94.84
16	224.90	99.38	98.78	97.97	97.10	96.66	95.59
17	224.90	99.46	98.80	98.02	97.22	96.11	95.41
18	223.46	99.40	98.74	97.89	97.06	96.18	95.21
19	224.51	99.43	98.80	97.89	97.16	96.37	95.70
20	223.98	99.42	98.68	97.98	97.13	96.47	95.58
21	224.25	99.43	98.68	97.81	96.97	95.95	95.36
22	224.38	99.38	98.71	97.90	97.11	95.80	94.83
23	224.64	99.37	98.74	97.94	97.12	95.71	95.10
24	225.42	99.46	98.68	97.87	97.09	96.01	95.03
Ave.	224.64	99.42	98.70	97.88	97.07	96.05	95.21
Med.	224.58	99.42	98.70	97.89	97.09	95.98	95.16
st dev	0.87	0.0331	0.0844	0.0912	0.1005	0.3130	0.3096
Min.	223.46	99.37	98.51	97.69	96.84	95.71	94.83
Max.	226.72	99.46	98.80	98.02	97.22	96.66	95.70

TM-21 Projection:

Test Duration: 6000 hours

Failures Observed: 0

α: 8.751E-06

β: 1.004

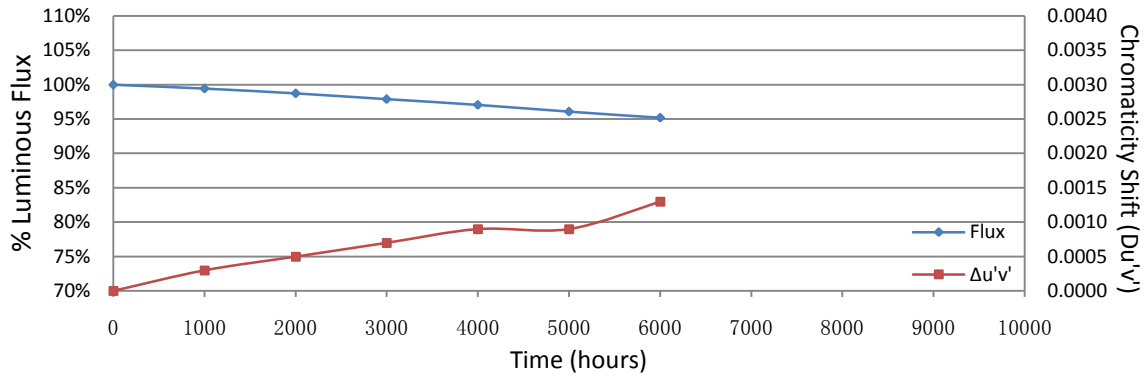
Reported L₇₀: >33000 hours

3.5 Data Set 2, 105°C, 15mA (Forward Voltage)

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
13	79.53	79.46	79.55	79.55	79.29	79.35	79.34
14	79.57	79.46	79.46	79.46	79.33	79.32	79.29
15	79.87	79.46	79.44	79.40	79.31	79.29	79.27
16	79.62	79.46	79.42	79.48	79.31	79.27	79.29
17	79.54	79.46	79.38	79.47	79.29	79.29	79.27
18	79.58	79.46	79.36	79.35	79.27	79.29	79.26
19	79.75	79.46	79.40	79.44	79.30	79.30	79.26
20	79.60	79.45	79.41	79.46	79.34	79.28	79.26
21	79.53	79.45	79.40	79.47	79.28	79.28	79.26
22	79.56	79.45	79.38	79.47	79.24	79.27	79.24
23	79.68	79.45	79.39	79.46	79.24	79.30	79.26
24	79.77	79.45	79.40	79.47	79.32	79.28	79.25
Ave.	79.63	79.46	79.42	79.46	79.29	79.29	79.27
Med.	79.59	79.46	79.40	79.47	79.30	79.29	79.26
st dev	0.11	0.01	0.05	0.05	0.03	0.02	0.03
Min.	79.53	79.45	79.36	79.35	79.24	79.27	79.24
Max.	79.87	79.46	79.55	79.55	79.34	79.35	79.34

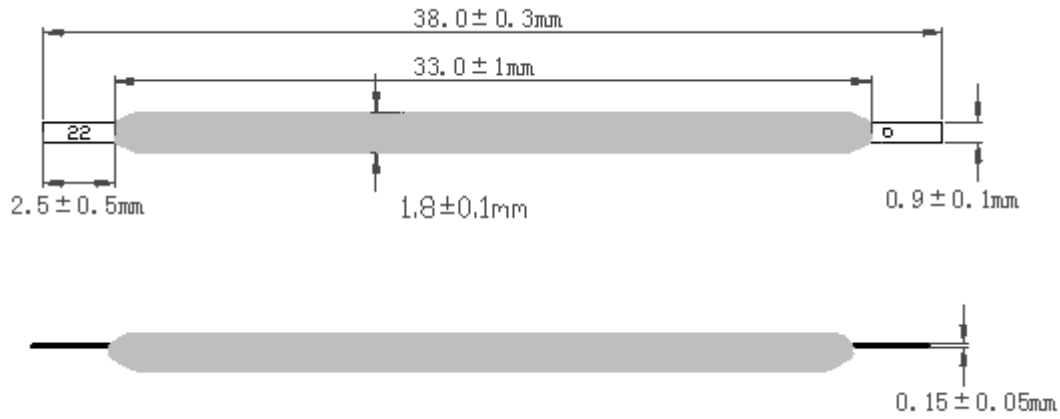
3.6 Data Set 2, 105°C, 15mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs
13	0.2573	0.5296	2802	0.0004	0.0008	0.0011	0.0013	0.0013	0.0020
14	0.2581	0.5296	2782	0.0001	0.0002	0.0003	0.0003	0.0002	0.0006
15	0.2569	0.5299	2806	0.0003	0.0006	0.0006	0.0008	0.0009	0.0013
16	0.2557	0.5255	2856	0.0003	0.0006	0.0005	0.0008	0.0008	0.0010
17	0.2569	0.5262	2824	0.0001	0.0003	0.0007	0.0009	0.0009	0.0010
18	0.2569	0.5262	2826	0.0001	0.0004	0.0009	0.0012	0.0013	0.0014
19	0.2567	0.5279	2820	0.0003	0.0004	0.0009	0.0010	0.0011	0.0015
20	0.2568	0.5263	2828	0.0002	0.0007	0.0006	0.0008	0.0010	0.0014
21	0.2569	0.5287	2814	0.0004	0.0005	0.0008	0.0010	0.0009	0.0014
22	0.2577	0.5292	2792	0.0002	0.0002	0.0004	0.0005	0.0008	0.0012
23	0.2574	0.5286	2804	0.0004	0.0007	0.0009	0.0012	0.0013	0.0014
24	0.2579	0.5291	2790	0.0001	0.0002	0.0005	0.0008	0.0007	0.0010
Ave.	0.2571	0.5281	2812	0.0003	0.0005	0.0007	0.0009	0.0009	0.0013
Med.	0.2569	0.5287	2810	0.0002	0.0005	0.0007	0.0009	0.0009	0.0013
st dev	0.0006	0.0016	20	0.0001	0.0002	0.0003	0.0003	0.0003	0.0003
Min.	0.2557	0.5255	2782	0.0001	0.0002	0.0003	0.0003	0.0002	0.0006
Max.	0.2581	0.5299	2856	0.0004	0.0008	0.0011	0.0013	0.0013	0.0020



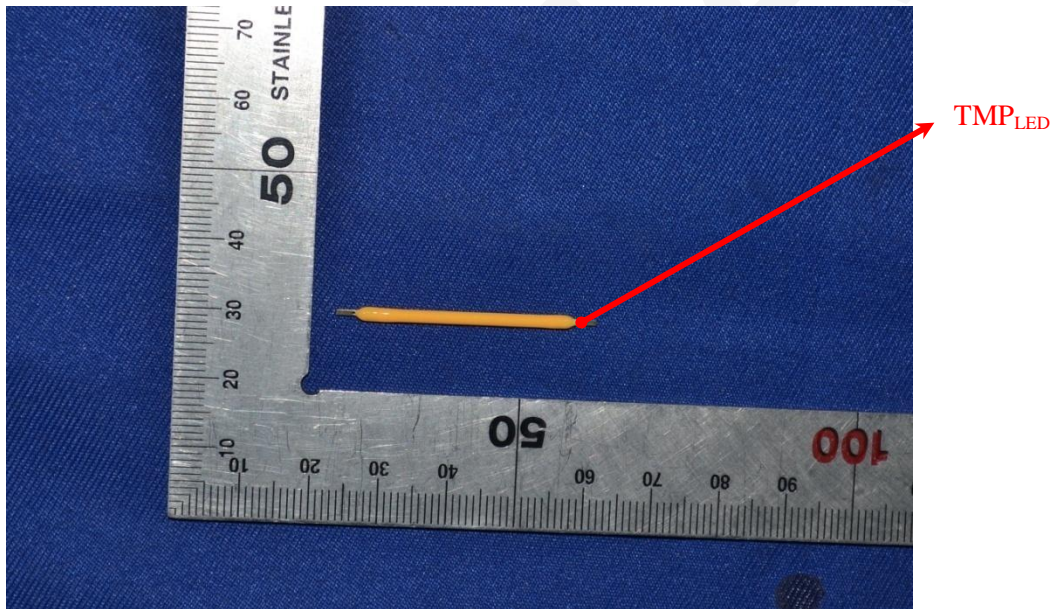
4 - EUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 EUT Photo



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