



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: A2835W1H3-D01-8D2AA1

Report Type: 6000 Hours Test Report		Product Type: LED Package	
Test Engineer:	Pote Wang <i>Pote Wang</i>		
Report Number:	RSZ160930505-10-M3		
Test Date:	2016-10-09 to 2017-06-18		
Report Date:	2017-10-27		
Reviewed By:	Daniel Duan / EE Manager <i>Daniel Duan</i>		
Revised Note:	The previous report RSZ160930505-10-M2 is replaced by this report on 2017-10-27		
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:

90 PCS samples were received on 2016-09-30. The samples were numbered from 1 to 30, 31 to 60 and 61 to 90.

Manufacturer: Hongli Zhihui Group Co.,Ltd.
Part Number: A2835W1H3-D01-8D2AA1
Part Type: LED Package
Drive Level: DC 90mA
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)

Test Model Number	Multiple Models	Details
A2835W1H3-D01-8D2AA1	A2835W*H3-D01-8D2AA2	1. Only different Model name for different market. 2. “*” is a number from 1 to 9 which stand for CCT. 1 means 2600-2800K, 2 means 2800-3100K, 3 means 3800-4250K, 4 means 4750-5300K, 5 means 5700-6500K, 6 means 6000-7000K, 7 means 2100-2300K, 8 means 3200-3800K, 9 means 5050-5650K.
	A2835W*H3-D01-8D2AA3	
	A2835W*H3-D01-8D2AA4	
	A2835W*H3-D01-8D2AA5	
	A2835W*H5-D01-8D2AA4	
	A2835W*H6-D01-8D2AA4	
	P2835W*H5-D01-8D3A01	
	P2835W*H6-D01-8D3A01	
	HL-A-2835HW-S1-08HL-HR3	
	HL-AM-2835HW-S1-08HL-HR3	
	HL-A-2835HW-S1-08HL-HR3(R9)	
	HL-AM-2835HW-S1-08HL-HR3(R9)	
	HL-AM-2835HW-S1-08-HR3	
	HL-AM-2835HW-S1-08-HR3(R9)	

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
Integral Sphere	EVERFINE	Diameter 0.3m	1011119	0.3m	2017-03-09	2018-03-08
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	15V/2000mA	2017-03-03	2018-03-02
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2017-03-09	2018-03-08
Standard Light Source	EVERFINE	D062	1011093	3000K	2016-09-13	2017-09-12
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987C J7321114	300VA	2017-03-03	2018-03-02
Multilayer aging machine	BACL	B2-270	20005	25°C~130°C	2016-09-01	2017-09-01
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090009	(50/15A)	2016-12-15	2017-12-14
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090004	(50/15A)	2017-03-03	2018-03-02

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: 55°C, 90mA

Part Number: A2835W1H3-D01-8D2AA1
Number of Units: 30
Case Temperature: >53°C
Ambient Temperature: >50°C
Life Test Drive Current: 90mA
Measurement Current: 90mA

Data Set 2: 85°C, 90mA

Part Number: A2835W1H3-D01-8D2AA1
Number of Units: 30
Case Temperature: >83°C
Ambient Temperature: >80°C
Life Test Drive Current: 90mA
Measurement Current: 90mA

Data Set 3: 105°C, 90mA

Part Number: A2835W1H3-D01-8D2AA1
Number of Units: 30
Case Temperature: >103°C
Ambient Temperature: >100°C
Life Test Drive Current: 90mA
Measurement Current: 90mA

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	Reported TM-21 L ₇₀ Lifetime
1	30	0	1000	6000	>36000 hours
2	30	0	1000	6000	>36000 hours
3	30	0	1000	6000	>36000 hours

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000	2000	3000	4000	5000	6000
1	100.31%	100.14%	99.98%	99.83%	99.62%	99.42%
2	100.20%	99.98%	99.77%	99.60%	99.34%	99.09%
3	100.13%	99.83%	99.56%	99.36%	99.02%	98.72%

Average Color Maintenance

Data Set:	1000	2000	3000	4000	5000	6000
1	0.0004	0.0007	0.0010	0.0011	0.0014	0.0017
2	0.0006	0.0008	0.0012	0.0013	0.0016	0.0019
3	0.0007	0.0010	0.0014	0.0015	0.0018	0.0021

3 - Test Data

3.1 Data Set 1, 55°C, 90mA (Lumen Maintenance)

No.	Φ (lm)	Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	42.33	100.33	100.12	99.86	99.74	99.50	99.29
2	42.11	100.36	100.19	100.07	99.98	99.79	99.62
3	41.99	100.33	100.17	99.95	99.81	99.69	99.45
4	42.38	100.24	100.19	100.09	99.74	99.62	99.46
5	41.75	100.19	100.02	99.95	99.76	99.50	99.26
6	42.17	100.43	100.38	100.14	99.95	99.60	99.26
7	42.38	100.24	100.17	99.81	99.72	99.48	99.17
8	41.71	100.41	100.31	100.05	99.98	99.83	99.57
9	42.12	100.33	100.05	99.98	99.79	99.72	99.57
10	41.96	100.31	100.14	99.88	99.79	99.52	99.31
11	41.54	100.39	100.22	100.14	99.93	99.66	99.52
12	42.57	100.31	100.21	99.93	99.84	99.69	99.44
13	41.82	100.36	100.29	100.12	99.78	99.76	99.62
14	41.99	100.29	100.14	100.10	99.98	99.67	99.43
15	42.05	100.40	100.17	99.95	99.86	99.67	99.41
16	41.83	100.24	100.10	99.83	99.78	99.62	99.43
17	42.61	100.38	100.12	99.95	99.74	99.58	99.48
18	41.37	100.34	100.15	99.93	99.85	99.56	99.49
19	42.03	100.43	100.21	100.02	99.81	99.60	99.50
20	41.81	100.38	100.17	99.90	99.71	99.38	99.16
21	42.68	100.37	100.19	100.02	99.93	99.88	99.70
22	41.62	100.19	100.07	100.05	99.90	99.74	99.59
23	41.56	100.26	100.14	100.10	99.98	99.59	99.40
24	42.42	100.09	99.95	99.88	99.72	99.41	99.08
25	42.35	100.21	99.91	99.79	99.67	99.50	99.29
26	42.44	100.33	100.07	99.95	99.84	99.51	99.34
27	42.31	100.26	99.95	99.79	99.67	99.36	99.10
28	41.87	100.36	100.19	100.17	99.95	99.74	99.57
29	41.67	100.24	100.12	100.02	99.88	99.78	99.62
30	42.35	100.38	100.17	99.93	99.81	99.67	99.36
Ave.	42.06	100.31	100.14	99.98	99.83	99.62	99.42
Med.	42.04	100.33	100.16	99.95	99.81	99.62	99.43
st dev	0.35	0.0808	0.1013	0.1094	0.0970	0.1318	0.1627
Min.	41.37	100.09	99.91	99.79	99.67	99.36	99.08
Max.	42.68	100.43	100.38	100.17	99.98	99.88	99.70

TM-21 Projection:

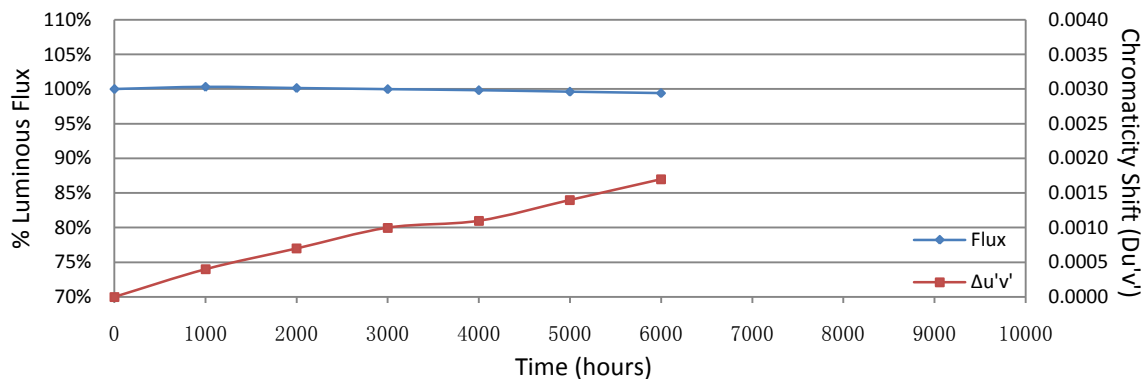
Test Duration: 6000 hours
Failures Observed: 0
 α : 1.762E-06
 β : 1.005
Reported L₇₀: >36000 hours

3.2 Data Set 1, 55°C, 90mA (Forward Voltage)

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	2.981	2.983	2.988	2.999	2.984	2.990	2.984
2	2.987	2.953	2.957	2.989	2.957	2.959	2.953
3	2.985	2.982	2.986	3.009	2.987	2.992	2.984
4	2.980	2.978	2.981	2.989	2.995	2.987	2.982
5	2.981	2.981	2.984	3.009	2.987	2.989	2.982
6	2.952	2.990	2.993	3.001	2.993	2.999	2.990
7	2.975	2.975	2.978	2.979	2.983	2.983	2.978
8	2.976	2.975	2.977	2.980	2.999	2.984	2.975
9	2.972	2.970	2.975	2.974	2.976	2.981	2.971
10	2.975	2.974	2.978	2.979	2.975	2.982	2.977
11	2.978	2.977	2.980	2.982	2.982	2.986	2.975
12	2.994	2.993	2.998	3.004	2.995	3.001	2.990
13	2.981	2.978	2.984	2.986	2.981	2.987	2.980
14	2.994	2.992	2.996	3.002	2.995	2.999	2.993
15	2.980	2.976	2.981	2.987	2.986	2.987	2.979
16	2.987	2.987	2.992	2.993	2.995	2.996	2.989
17	2.969	2.967	2.972	2.974	2.970	2.974	2.968
18	2.988	2.986	2.989	2.992	2.993	2.994	2.987
19	2.992	2.989	2.993	2.994	2.989	2.998	2.992
20	2.991	2.986	2.992	2.990	2.994	2.995	2.987
21	2.979	2.976	2.981	2.983	2.980	2.985	2.979
22	2.991	2.985	2.990	2.991	2.989	2.993	2.987
23	2.980	2.978	2.983	2.985	2.980	2.987	2.981
24	2.954	2.949	2.953	2.956	2.954	2.955	2.950
25	2.987	2.984	2.990	2.990	2.987	2.993	2.987
26	2.992	2.987	2.993	2.994	2.993	2.997	2.995
27	2.996	2.991	2.998	2.999	2.996	3.002	2.996
28	2.982	2.983	2.987	3.001	2.985	2.993	2.985
29	2.975	2.972	2.979	2.982	2.974	2.984	2.975
30	2.977	2.978	2.982	2.988	2.981	2.985	2.980
Ave.	2.981	2.979	2.984	2.989	2.985	2.988	2.981
Med.	2.981	2.980	2.984	2.990	2.987	2.988	2.982
st dev	0.010	0.010	0.010	0.011	0.011	0.011	0.011
Min.	2.952	2.949	2.953	2.956	2.954	2.955	2.950
Max.	2.996	2.993	2.998	3.009	2.999	3.002	2.996

3.3 Data Set 1, 55°C, 90mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.2625	0.5250	2709	0.0004	0.0005	0.0006	0.0010	0.0013	0.0016
2	0.2627	0.5255	2703	0.0003	0.0004	0.0007	0.0008	0.0009	0.0011
3	0.2616	0.5254	2728	0.0004	0.0009	0.0009	0.0010	0.0014	0.0016
4	0.2615	0.5254	2729	0.0004	0.0008	0.0009	0.0010	0.0014	0.0016
5	0.2619	0.5242	2726	0.0004	0.0009	0.0011	0.0012	0.0014	0.0016
6	0.2615	0.5254	2728	0.0009	0.0011	0.0017	0.0019	0.0024	0.0025
7	0.2615	0.5245	2733	0.0004	0.0005	0.0011	0.0012	0.0015	0.0017
8	0.2610	0.5237	2746	0.0004	0.0006	0.0010	0.0011	0.0014	0.0016
9	0.2623	0.5253	2713	0.0004	0.0006	0.0010	0.0011	0.0014	0.0016
10	0.2619	0.5254	2720	0.0004	0.0006	0.0010	0.0011	0.0014	0.0016
11	0.2634	0.5241	2694	0.0004	0.0005	0.0009	0.0011	0.0013	0.0016
12	0.2611	0.5256	2736	0.0005	0.0007	0.0010	0.0012	0.0014	0.0017
13	0.2608	0.5246	2748	0.0004	0.0006	0.0011	0.0011	0.0013	0.0016
14	0.2625	0.5245	2711	0.0004	0.0006	0.0009	0.0012	0.0013	0.0016
15	0.2613	0.5246	2737	0.0004	0.0007	0.0010	0.0012	0.0014	0.0015
16	0.2619	0.5223	2734	0.0004	0.0006	0.0010	0.0012	0.0014	0.0016
17	0.2613	0.5242	2738	0.0004	0.0006	0.0011	0.0013	0.0014	0.0017
18	0.2607	0.5240	2752	0.0005	0.0007	0.0010	0.0012	0.0014	0.0017
19	0.2610	0.5235	2747	0.0004	0.0006	0.0010	0.0011	0.0013	0.0015
20	0.2627	0.5253	2704	0.0004	0.0006	0.0010	0.0013	0.0015	0.0017
21	0.2607	0.5243	2752	0.0004	0.0007	0.0010	0.0013	0.0013	0.0016
22	0.2621	0.5256	2715	0.0004	0.0006	0.0010	0.0011	0.0014	0.0016
23	0.2638	0.5238	2687	0.0004	0.0006	0.0010	0.0010	0.0013	0.0016
24	0.2615	0.5260	2726	0.0004	0.0006	0.0010	0.0011	0.0014	0.0016
25	0.2615	0.5251	2731	0.0004	0.0006	0.0011	0.0011	0.0014	0.0016
26	0.2631	0.5252	2697	0.0004	0.0006	0.0010	0.0011	0.0014	0.0016
27	0.2605	0.5252	2751	0.0005	0.0007	0.0010	0.0012	0.0015	0.0016
28	0.2632	0.5249	2696	0.0005	0.0007	0.0012	0.0012	0.0016	0.0017
29	0.2610	0.5243	2745	0.0004	0.0006	0.0010	0.0012	0.0014	0.0016
30	0.2631	0.5239	2703	0.0005	0.0007	0.0011	0.0013	0.0014	0.0016
Ave.	0.2619	0.5247	2725	0.0004	0.0007	0.0010	0.0011	0.0014	0.0017
Med.	0.2616	0.5248	2728	0.0004	0.0006	0.0010	0.0011	0.0014	0.0016
st dev	0.0009	0.0008	19	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002
Min.	0.2605	0.5223	2687	0.0003	0.0004	0.0006	0.0008	0.0009	0.0011
Max.	0.2638	0.5260	2752	0.0009	0.0011	0.0017	0.0019	0.0024	0.0025



3.4 Data Set 2, 85°C, 90mA (Lumen Maintenance)

No.	Φ (lm)	Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
31	41.25	100.36	100.24	100.07	99.83	99.64	99.42
32	42.54	100.26	100.12	99.95	99.76	99.44	99.27
33	41.95	100.17	100.02	99.83	99.71	99.64	99.38
34	41.48	100.34	100.12	99.93	99.86	99.59	99.40
35	42.13	100.07	99.76	99.43	99.26	99.10	98.74
36	42.09	100.10	99.88	99.71	99.55	99.22	99.03
37	42.07	100.24	99.90	99.64	99.57	99.26	98.84
38	41.83	100.17	99.98	99.81	99.57	99.21	98.83
39	42.44	100.21	99.95	99.74	99.55	99.29	99.08
40	42.70	100.16	99.93	99.81	99.65	99.48	99.25
41	41.72	100.24	100.12	99.78	99.47	99.14	98.92
42	42.29	100.21	100.02	99.79	99.62	99.46	99.13
43	42.31	100.26	100.07	99.76	99.69	99.46	99.36
44	42.17	100.36	100.05	99.86	99.72	99.41	99.10
45	42.42	100.21	99.95	99.69	99.53	99.13	98.75
46	42.35	100.24	99.93	99.86	99.62	99.24	98.96
47	41.59	100.12	99.78	99.59	99.42	99.09	98.82
48	41.83	100.02	99.69	99.50	99.12	99.00	98.73
49	41.74	100.36	100.22	100.07	99.95	99.57	99.35
50	42.28	100.14	100.02	99.91	99.79	99.48	99.24
51	42.49	100.02	99.81	99.60	99.41	99.20	98.92
52	42.15	100.12	99.88	99.67	99.48	99.31	99.05
53	42.04	100.05	99.76	99.50	99.17	98.98	98.88
54	42.17	100.07	99.98	99.88	99.64	99.29	99.12
55	42.29	100.14	99.91	99.76	99.62	99.34	99.01
56	42.28	100.26	100.09	99.74	99.62	99.34	99.20
57	41.75	100.29	99.95	99.64	99.57	99.33	99.11
58	42.77	100.33	100.07	99.84	99.67	99.49	99.37
59	42.43	100.28	100.12	99.86	99.69	99.39	99.22
60	41.37	100.27	100.07	99.90	99.73	99.56	99.35
Ave.	42.10	100.20	99.98	99.77	99.60	99.34	99.09
Med.	42.16	100.21	99.98	99.79	99.62	99.33	99.11
st dev	0.38	0.1014	0.1357	0.1556	0.1877	0.1839	0.2186
Min.	41.25	100.02	99.69	99.43	99.12	98.98	98.73
Max.	42.77	100.36	100.24	100.07	99.95	99.64	99.42

TM-21 Projection:

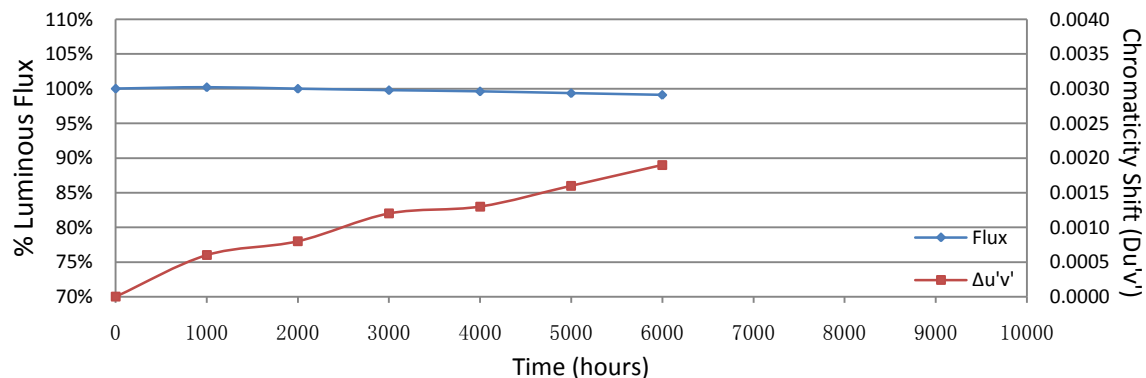
Test Duration: 6000 hours
Failures Observed: 0
 α : 2.191E-06
 β : 1.004
Reported L₇₀: >36000 hours

3.5 Data Set 2, 85°C, 90mA (Forward Voltage)

No.	Forward Voltage (V)						
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
31	2.983	2.982	2.987	2.995	2.984	2.992	2.982
32	2.978	2.978	2.982	3.006	2.979	2.985	2.982
33	2.972	2.972	2.978	2.983	2.974	2.980	2.975
34	2.986	2.981	2.987	2.989	2.985	2.990	2.984
35	2.995	2.993	3.000	3.033	3.001	3.002	2.994
36	2.950	2.949	2.955	2.960	2.956	2.957	2.950
37	2.980	2.979	2.985	2.985	2.985	2.986	2.981
38	2.989	2.988	2.994	2.997	2.993	2.996	2.987
39	2.989	2.987	2.992	2.991	2.990	2.993	2.986
40	2.975	2.974	2.980	2.996	2.987	2.981	2.977
41	2.979	2.977	2.983	2.992	2.981	2.984	2.978
42	2.982	2.983	2.987	2.990	2.990	2.990	2.980
43	2.988	2.987	2.992	2.992	2.989	2.993	2.986
44	2.991	2.989	2.996	2.997	2.998	2.998	2.992
45	2.989	2.988	2.994	3.017	2.989	2.995	2.989
46	2.979	2.978	2.984	2.995	2.980	2.987	2.981
47	2.977	2.974	2.982	2.993	2.977	2.983	2.978
48	2.952	2.950	2.957	2.958	2.953	2.956	2.957
49	2.972	2.971	2.976	2.981	2.971	2.976	2.980
50	2.978	2.977	2.982	2.987	2.980	2.983	2.983
51	2.982	2.981	2.987	2.991	2.984	2.988	2.983
52	2.976	2.973	2.980	2.983	2.979	2.981	2.994
53	2.980	2.977	2.982	2.984	2.985	2.983	2.982
54	2.983	2.982	2.989	2.991	2.981	2.985	2.986
55	2.964	2.962	2.970	2.970	2.963	2.967	2.976
56	2.985	2.983	2.992	2.993	2.989	2.987	2.992
57	2.993	2.992	2.997	2.998	2.994	2.998	3.014
58	2.981	2.978	2.985	2.989	2.981	2.985	2.987
59	2.987	2.989	2.993	2.996	2.988	2.993	2.993
60	2.986	2.987	2.993	2.993	2.989	2.992	2.994
Ave.	2.980	2.979	2.985	2.991	2.983	2.986	2.983
Med.	2.982	2.980	2.986	2.992	2.985	2.987	2.983
st dev	0.010	0.011	0.010	0.014	0.011	0.011	0.011
Min.	2.950	2.949	2.955	2.958	2.953	2.956	2.950
Max.	2.995	2.993	3.000	3.033	3.001	3.002	3.014

3.6 Data Set 2, 85°C, 90mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
31	0.2618	0.5216	2739	0.0006	0.0009	0.0013	0.0012	0.0016	0.0018
32	0.2625	0.5246	2711	0.0006	0.0008	0.0011	0.0012	0.0016	0.0018
33	0.2614	0.5247	2733	0.0006	0.0008	0.0011	0.0011	0.0016	0.0018
34	0.2617	0.5233	2734	0.0005	0.0007	0.0010	0.0011	0.0015	0.0017
35	0.2633	0.5245	2694	0.0006	0.0008	0.0012	0.0012	0.0016	0.0018
36	0.2614	0.5242	2735	0.0007	0.0008	0.0013	0.0012	0.0016	0.0018
37	0.2629	0.5249	2701	0.0005	0.0008	0.0012	0.0011	0.0014	0.0017
38	0.2619	0.5242	2725	0.0006	0.0008	0.0013	0.0012	0.0016	0.0019
39	0.2616	0.5245	2731	0.0007	0.0008	0.0013	0.0014	0.0017	0.0019
40	0.2606	0.5248	2750	0.0006	0.0009	0.0013	0.0013	0.0017	0.0019
41	0.2611	0.5240	2744	0.0005	0.0008	0.0012	0.0013	0.0015	0.0018
42	0.2612	0.5236	2744	0.0006	0.0008	0.0013	0.0013	0.0016	0.0019
43	0.2614	0.5255	2732	0.0006	0.0008	0.0012	0.0015	0.0016	0.0018
44	0.2619	0.5248	2724	0.0007	0.0009	0.0014	0.0015	0.0017	0.0019
45	0.2622	0.5240	2720	0.0005	0.0008	0.0011	0.0013	0.0015	0.0018
46	0.2604	0.5247	2755	0.0006	0.0008	0.0012	0.0014	0.0016	0.0019
47	0.2629	0.5267	2695	0.0007	0.0009	0.0013	0.0014	0.0017	0.0019
48	0.2620	0.5245	2723	0.0006	0.0009	0.0013	0.0015	0.0017	0.0019
49	0.2619	0.5239	2728	0.0006	0.0009	0.0013	0.0016	0.0017	0.0019
50	0.2619	0.5238	2726	0.0006	0.0008	0.0011	0.0013	0.0015	0.0017
51	0.2611	0.5249	2738	0.0006	0.0008	0.0012	0.0014	0.0016	0.0019
52	0.2615	0.5258	2727	0.0007	0.0009	0.0013	0.0015	0.0016	0.0019
53	0.2614	0.5238	2737	0.0006	0.0008	0.0011	0.0014	0.0016	0.0018
54	0.2606	0.5251	2750	0.0006	0.0008	0.0012	0.0014	0.0016	0.0018
55	0.2614	0.5257	2731	0.0005	0.0007	0.0011	0.0013	0.0016	0.0018
56	0.2613	0.5228	2744	0.0006	0.0008	0.0012	0.0014	0.0016	0.0019
57	0.2608	0.5247	2747	0.0006	0.0009	0.0013	0.0015	0.0016	0.0019
58	0.2613	0.5256	2733	0.0006	0.0009	0.0013	0.0015	0.0016	0.0019
59	0.2620	0.5251	2720	0.0006	0.0008	0.0012	0.0014	0.0015	0.0017
60	0.2631	0.5247	2698	0.0006	0.0008	0.0011	0.0014	0.0015	0.0018
Ave.	0.2617	0.5245	2729	0.0006	0.0008	0.0012	0.0013	0.0016	0.0019
Med.	0.2616	0.5247	2732	0.0006	0.0008	0.0012	0.0014	0.0016	0.0018
st dev	0.0007	0.0010	16	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2604	0.5216	2694	0.0005	0.0007	0.0010	0.0011	0.0014	0.0017
Max.	0.2633	0.5267	2755	0.0007	0.0009	0.0014	0.0016	0.0017	0.0019



3.7 Data Set 3, 105°C, 90mA (Lumen Maintenance)

No.	Φ (lm)	Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
61	42.03	100.17	99.95	99.81	99.60	99.26	98.95
62	42.12	100.26	99.86	99.60	99.50	99.12	98.96
63	41.75	100.14	99.88	99.62	99.38	99.16	98.97
64	41.38	100.24	100.02	99.86	99.59	99.37	99.11
65	42.01	99.98	99.76	99.52	99.33	99.10	98.64
66	42.21	100.07	99.81	99.64	99.53	99.15	98.91
67	41.26	100.05	99.59	99.35	99.25	98.96	98.69
68	41.30	100.15	99.76	99.39	99.30	99.18	98.86
69	41.42	99.98	99.73	99.40	99.35	98.89	98.43
70	42.47	100.14	99.84	99.41	99.27	99.03	98.75
71	42.05	100.05	99.69	99.45	99.17	98.91	98.69
72	41.65	100.07	99.64	99.30	99.18	98.73	98.39
73	41.80	100.14	99.81	99.50	99.28	99.02	98.71
74	41.73	100.22	99.93	99.54	99.35	98.85	98.66
75	42.57	100.07	99.77	99.53	99.27	98.75	98.33
76	42.48	100.14	99.79	99.46	99.13	98.82	98.59
77	41.79	100.07	99.76	99.62	99.52	99.07	98.73
78	42.14	100.19	99.91	99.81	99.69	99.26	98.84
79	41.63	100.02	99.78	99.71	99.54	99.14	98.85
80	42.00	100.12	99.76	99.50	99.17	98.86	98.55
81	41.94	100.07	99.71	99.36	99.09	98.78	98.43
82	41.79	100.02	99.86	99.52	99.28	99.02	98.73
83	42.11	100.26	99.93	99.62	99.34	99.03	98.81
84	41.35	100.27	99.90	99.83	99.61	99.40	98.98
85	42.19	100.19	99.88	99.50	99.36	98.91	98.60
86	41.84	100.24	99.83	99.43	99.14	98.83	98.47
87	41.66	100.22	99.88	99.57	99.26	98.80	98.46
88	41.51	100.24	100.02	99.74	99.61	99.16	98.84
89	42.07	100.17	100.07	99.81	99.60	99.36	99.03
90	41.89	100.07	99.74	99.45	99.21	98.83	98.62
Ave.	41.87	100.13	99.83	99.56	99.36	99.02	98.72
Med.	41.87	100.14	99.82	99.53	99.33	99.02	98.72
st dev	0.35	0.0868	0.1117	0.1571	0.1728	0.1931	0.2064
Min.	41.26	99.98	99.59	99.30	99.09	98.73	98.33
Max.	42.57	100.27	100.07	99.86	99.69	99.40	99.11

TM-21 Projection:

Test Duration: 6000 hours

Failures Observed: 0

α : 2.782E-06

β : 1.004

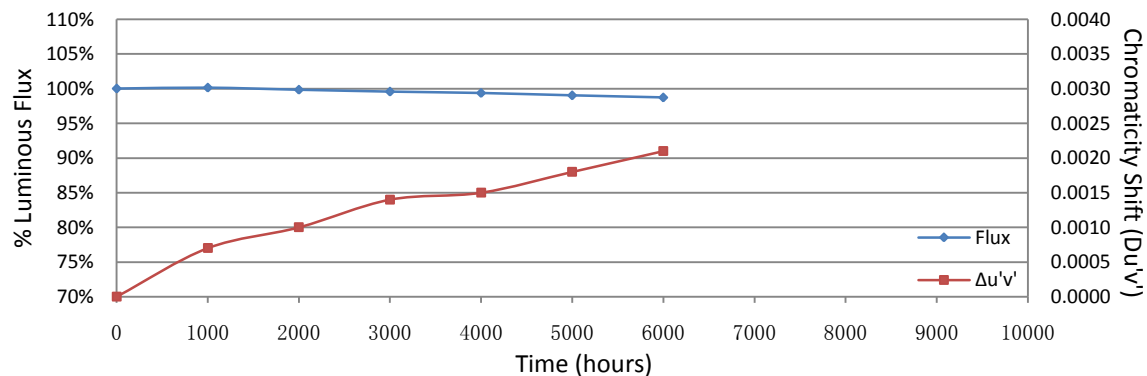
Reported L₇₀: >36000 hours

3.8 Data Set 3, 105°C, 90mA (Forward Voltage)

No.	Forward Voltage (V)						
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
61	2.981	2.984	2.986	2.988	2.983	2.990	2.986
62	2.970	2.973	2.975	2.981	2.970	2.976	2.975
63	2.973	2.971	2.978	2.982	2.974	2.980	2.980
64	2.974	2.973	2.980	2.981	2.975	2.981	2.977
65	2.975	2.976	2.983	2.983	2.979	2.982	2.977
66	2.981	2.981	2.986	2.992	2.983	2.987	2.982
67	2.947	2.945	2.949	2.953	2.947	2.951	2.956
68	2.953	2.951	2.956	2.958	2.951	2.956	2.952
69	2.991	2.989	2.995	2.996	2.991	2.995	2.992
70	2.978	2.976	2.982	2.992	2.979	2.982	2.978
71	2.960	2.957	2.962	2.966	2.958	2.964	2.960
72	2.980	2.977	2.983	2.984	2.978	2.981	2.981
73	2.977	2.975	2.981	2.987	2.977	2.982	2.977
74	2.981	2.977	2.986	2.987	2.984	2.986	2.981
75	2.980	2.977	2.983	2.986	2.989	2.987	2.980
76	2.987	2.986	2.994	2.992	2.993	2.993	2.990
77	2.952	2.948	2.955	2.956	2.954	2.956	2.952
78	2.982	2.981	2.986	2.993	2.989	2.988	2.983
79	2.983	2.980	2.987	2.989	2.986	2.989	2.983
80	2.984	2.983	2.991	2.990	2.989	2.991	2.984
81	2.991	2.987	2.994	2.994	2.988	2.996	2.989
82	2.992	2.988	2.997	2.997	2.992	2.997	2.994
83	2.991	2.989	2.997	2.999	2.993	2.999	2.996
84	2.989	2.989	2.999	3.000	2.992	2.997	2.993
85	2.985	2.983	2.991	2.993	2.984	2.990	2.989
86	2.979	2.976	2.987	2.990	2.980	2.986	2.981
87	2.984	2.982	2.990	2.992	2.987	2.992	2.991
88	2.983	2.980	2.987	2.995	2.985	2.989	2.988
89	3.001	2.998	3.005	3.013	3.002	3.007	3.006
90	2.974	2.974	2.980	2.983	2.975	2.980	2.978
Ave.	2.979	2.977	2.984	2.986	2.980	2.984	2.981
Med.	2.981	2.979	2.986	2.990	2.984	2.987	2.982
st dev	0.012	0.012	0.013	0.013	0.013	0.013	0.013
Min.	2.947	2.945	2.949	2.953	2.947	2.951	2.952
Max.	3.001	2.998	3.005	3.013	3.002	3.007	3.006

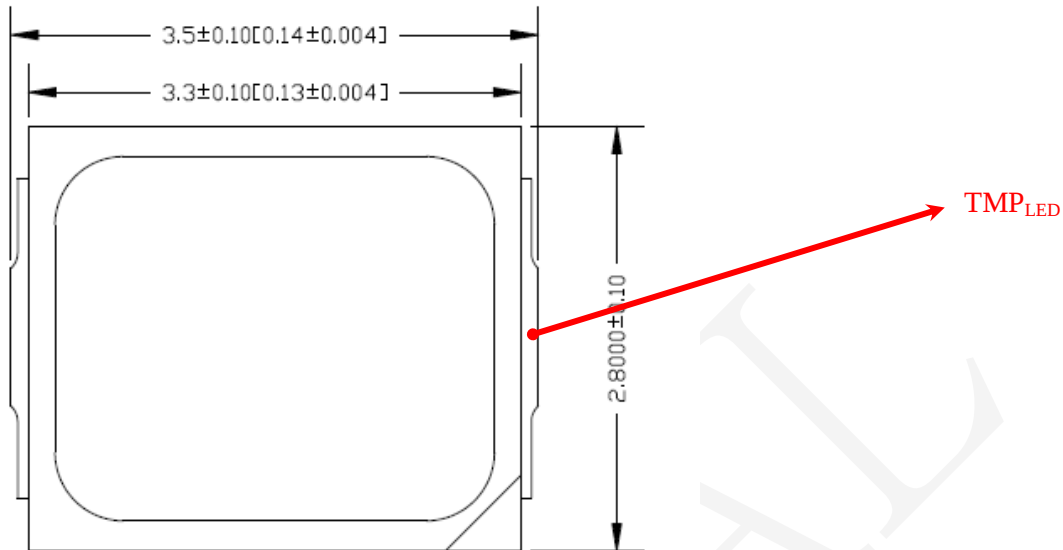
3.9 Data Set 3, 105°C, 90mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
61	0.2604	0.5247	2755	0.0008	0.0010	0.0015	0.0014	0.0019	0.0020
62	0.2612	0.5250	2737	0.0008	0.0010	0.0015	0.0015	0.0019	0.0022
63	0.2616	0.5257	2726	0.0007	0.0009	0.0015	0.0017	0.0018	0.0021
64	0.2626	0.5239	2713	0.0007	0.0009	0.0013	0.0014	0.0017	0.0019
65	0.2606	0.5238	2756	0.0007	0.0009	0.0014	0.0015	0.0018	0.0020
66	0.2604	0.5241	2759	0.0007	0.0009	0.0013	0.0015	0.0017	0.0019
67	0.2623	0.5240	2717	0.0007	0.0009	0.0012	0.0015	0.0017	0.0019
68	0.2607	0.5240	2752	0.0007	0.0010	0.0013	0.0015	0.0018	0.0021
69	0.2618	0.5261	2719	0.0008	0.0011	0.0013	0.0015	0.0016	0.0019
70	0.2608	0.5253	2744	0.0007	0.0010	0.0013	0.0015	0.0018	0.0020
71	0.2611	0.5237	2744	0.0007	0.0010	0.0013	0.0016	0.0017	0.0022
72	0.2611	0.5236	2745	0.0008	0.0010	0.0014	0.0015	0.0018	0.0022
73	0.2609	0.5252	2743	0.0007	0.0010	0.0013	0.0016	0.0017	0.0020
74	0.2609	0.5242	2746	0.0007	0.0009	0.0012	0.0015	0.0017	0.0019
75	0.2616	0.5245	2731	0.0007	0.0010	0.0014	0.0016	0.0018	0.0021
76	0.2602	0.5248	2758	0.0007	0.0010	0.0013	0.0015	0.0017	0.0020
77	0.2600	0.5241	2767	0.0007	0.0010	0.0013	0.0015	0.0017	0.0020
78	0.2610	0.5243	2745	0.0008	0.0010	0.0014	0.0016	0.0018	0.0022
79	0.2623	0.5228	2722	0.0007	0.0009	0.0012	0.0015	0.0017	0.0020
80	0.2606	0.5245	2752	0.0007	0.0010	0.0013	0.0015	0.0016	0.0021
81	0.2606	0.5242	2753	0.0007	0.0010	0.0014	0.0015	0.0013	0.0021
82	0.2612	0.5233	2745	0.0007	0.0011	0.0015	0.0016	0.0018	0.0022
83	0.2608	0.5239	2750	0.0007	0.0010	0.0013	0.0016	0.0017	0.0020
84	0.2609	0.5249	2744	0.0008	0.0010	0.0013	0.0015	0.0015	0.0018
85	0.2603	0.5250	2757	0.0008	0.0011	0.0015	0.0016	0.0018	0.0022
86	0.2623	0.5250	2713	0.0008	0.0010	0.0014	0.0016	0.0018	0.0021
87	0.2618	0.5245	2726	0.0008	0.0011	0.0015	0.0017	0.0018	0.0022
88	0.2605	0.5243	2755	0.0008	0.0011	0.0014	0.0016	0.0018	0.0021
89	0.2606	0.5238	2755	0.0007	0.0010	0.0013	0.0016	0.0018	0.0021
90	0.2605	0.5250	2753	0.0008	0.0010	0.0013	0.0016	0.0017	0.0020
Ave.	0.2611	0.5244	2743	0.0007	0.0010	0.0014	0.0015	0.0018	0.0021
Med.	0.2609	0.5243	2745	0.0007	0.0010	0.0013	0.0015	0.0018	0.0021
st dev	0.0007	0.0007	15	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2600	0.5228	2713	0.0007	0.0009	0.0012	0.0014	0.0013	0.0018
Max.	0.2626	0.5261	2767	0.0008	0.0011	0.0015	0.0017	0.0019	0.0022



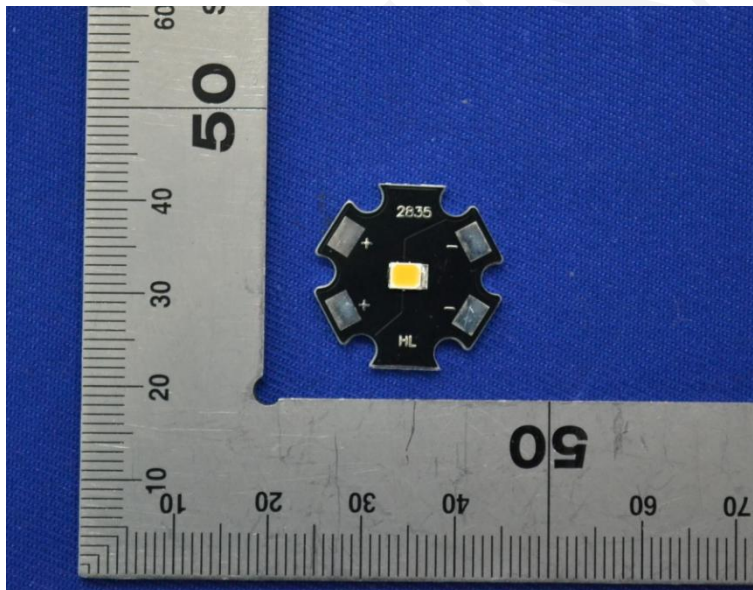
4 - EUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 EUT Photo



5 - Report Revision

Report Number	Report Date	Contents
RSZ160930505-10	2017-06-26	Original report.
RSZ160930505-10-M1	2017-07-05	Revise the case and ambient temperature of 85°C in page 6.
RSZ160930505-10-M2	2017-08-16	Update the Family Declaration in page3.
RSZ160930505-10-M3	2017-10-27	Add family products in page3.

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

FINAL