




# TEST REPORT

ACCORDING TO IES LM-80-2015  
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-ES-3032DW-2C-S1-HR3**

<b>Report Type:</b> 6000 Hours Test Report		<b>Product Type:</b> LED Package	
<b>Test Engineer:</b>	Pote Wang		
<b>Report Number:</b>	RSZ151230501-10-M1		
<b>Test Date:</b>	2015-12-30 to 2016-09-05		
<b>Report Date:</b>	2019-01-12		
<b>Revised Note:</b>	The previous report RSZ151230501-10 is replaced by this report on 2019-01-12		
<b>Reviewed By:</b>	Daniel Duan / EE Manager		
<b>Test Facility:</b>	Test facility was located at No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China		
<b>Prepared By:</b>	Bay Area Compliance Laboratories Corp. (Dongguan). No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-0769-86858888 Fax:+86-0769-86858588		

**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).

This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

## TABLE OF CONTENTS

<b>1 -</b>	<b>General Information .....</b>	<b>3</b>
1.1	Description of LED Light Sources .....	3
1.2	Standards Used: .....	3
1.3	Testing Equipment .....	3
1.4	Drive Level.....	4
1.5	Ambient Conditions for Maintenance Test.....	4
1.6	Measurement Uncertainty .....	4
1.7	Statement of Traceability.....	4
1.8	Sample Set.....	5
<b>2 -</b>	<b>Summary of Test Result .....</b>	<b>6</b>
<b>3 -</b>	<b>Test Data .....</b>	<b>7</b>
3.1	Data Set 1, 85°C, 150mA (Lumen Maintenance) .....	7
3.2	Data Set 1, 85°C, 150mA (Forward Voltage) .....	8
3.3	Data Set 1, 85°C, 150mA (Chromaticity Shift) .....	9
3.4	Data Set 2, 105°C, 150mA (Lumen Maintenance) .....	10
3.5	Data Set 2, 105°C, 150mA (Forward Voltage) .....	11
3.6	Data Set 2, 105°C, 150mA (Chromaticity Shift).....	12
<b>4 -</b>	<b>EUT Photo.....</b>	<b>13</b>
4.1	Mechanical Dimensions.....	13
4.2	EUT Photo .....	13
4.3	Report Revision .....	14

## 1 - General Information

---

### 1.1 Description of LED Light Sources

#### Sample Size:

50 PCS samples were received on 2015-12-30. The samples were numbered from 1 to 25 and 26 to 50.

Manufacturer:	Hongli Zhihui Group Co.,Ltd. Guangzhou Branch
Part Number:	HL-ES-3032DW-2C-S1-HR3
Part Type:	LED Package
Drive Level:	DC 150mA
Nominal CCT:	2700K
Power:	1.44W
Average Current Density per LED die:	401.88 mA/mm <sup>2</sup>
Average Power Density per LED die:	1.93 W/mm <sup>2</sup>
CRI:	80
Die Spacing:	0.15mm

#### 1.2 Standards Used:

IESNA LM-80-15: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090008	(50/15A)	2016-07-07	2017-07-06

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 luminance 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 mounted directly on the LED (NGJ<sub>LED</sub>) location while the other is mounted at a distance of 5 mm above the TMP location.

During life testing, TMP<sub>LED</sub> 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 electrical fields.

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 was maintained at 50% ± 5%.

## 1.8 Sample Set

### Data Set 1: 85°C, 150mA

Part Number: HL-ES-3032DW-2C-S1-HR3  
Number of Units: 25  
Case Temperature: >83°C  
Ambient Temperature: >80°C  
Life Test Drive Current: 150mA  
Measurement Current: 150mA

### Data Set 2: 105°C, 150mA

Part Number: HL-ES-3032DW-2C-S1-HR3  
Number of Units: 25  
Case Temperature: >103°C  
Ambient Temperature: >100°C  
Life Test Drive Current: 150mA  
Measurement Current: 150mA



## 2 - Summary of Test Result

---

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	Reported TM-21 L <sub>70</sub> Lifetime
-----------	-------------	--------------------	---------------	---------------	---

6000

>36000 hours

### 3 - Test Data

#### 3.1 Data Set 1, 85°C, 150mA (Lumen Maintenance)

No.	"	Lumen Maintenance (%)					
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	136.6	100.29	99.85	99.56	99.19	98.76	98.32
2	135.2	100.37	100.15	99.85	99.33	98.74	98.30
3	135.9	99.85	99.63	99.41	99.12	98.68	98.31
4	135.9	100.07	99.78	99.48	99.04	98.53	98.23
5	135.7	100.29	99.93	99.56	99.34	98.89	98.53
6	133.4	100.15	99.85	99.63	99.25	98.95	98.58
7	134.6	99.78	99.55	99.11	98.81	98.44	98.14
8	133.0	100.38	100.15	99.92	99.55	99.17	98.80
9	134.0	100.22	100.07	99.85	99.48	99.18	98.81
10	135.1	100.07	99.70	99.26	98.96	98.59	98.30
11	133.8	100.15	99.93	99.55	99.03	98.58	98.21
12	134.1	100.07	99.93	99.70	99.25	98.73	98.51
13	135.7	100.22	99.85	99.56	99.19	98.75	98.38
14	134.5	99.93	99.70	99.55	99.18	98.88	98.44
15	133.7	100.30	99.93	99.55	99.10	98.88	98.50
16	134.2	100.37	100.15	100.00	99.70	99.33	99.03
17	134.9	100.30	99.93	99.63	99.18	98.74	98.52
18	135.4	100.30	99.93	99.56	99.11	98.67	98.30
19	134.3	100.15	99.85	99.55	99.18	98.88	98.44
20	135.8	100.29	100.07	99.85	99.41	99.12	98.82
21	135.2	100.37	99.93	99.56	99.26	98.89	98.59
22	134.5	100.30	100.07	99.78	99.26	98.96	98.51
23	134.6	100.45	100.15	99.78	99.55	99.18	98.81
24	132.6	100.15	99.92	99.55	99.25	98.87	98.57
25	134.8	100.22	99.93	99.70	99.33	99.04	98.66
Ave.	134.7	100.20	99.92	99.62	99.24	98.86	98.50
Med.	134.6	100.22	99.93	99.56	99.25	98.88	98.51
st dev	0.9802	0.1679	0.1620	0.1997	0.1967	0.2251	0.2246
Min.	132.6	99.78	99.55	99.11	98.81	98.44	98.14
Max.	136.6	100.45	100.15	100.00	99.70	99.33	99.03

TM-21 Projection:

**Test Duration:** 6000 hours

**Failures Observed:** 0

3.464E-06

1.006

**Reported L<sub>70</sub>:** >36000 hours

### 3.2 Data Set 1, 85°C, 150mA (Forward Voltage)

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	6.614	6.658	6.493	6.492	6.493	6.489	6.491
2	6.563	6.560	6.534	6.512	6.511	6.508	6.515
3	6.460	6.491	6.420	6.408	6.408	6.406	6.410
4	6.458	6.538	6.452	6.433	6.429	6.428	6.434
5	6.496	6.571	6.449	6.429	6.426	6.422	6.426
6	6.671	6.676	6.550	6.526	6.529	6.526	6.531
7	6.575	6.580	6.535	6.496	6.496	6.496	6.500
8	6.494	6.568	6.490	6.457	6.453	6.448	6.452
9	6.620	6.658	6.492	6.467	6.466	6.466	6.470
10	6.522	6.623	6.547	6.494	6.499	6.500	6.502
11	6.552	6.659	6.479	6.456	6.451	6.458	6.461
12	6.620	6.671	6.521	6.482	6.478	6.479	6.484
13	6.408	6.471	6.367	6.320	6.312	6.312	6.317
14	6.439	6.487	6.464	6.421	6.422	6.419	6.428
15	6.476	6.513	6.488	6.459	6.455	6.457	6.465
16	6.484	6.502	6.533	6.478	6.470	6.478	6.474
17	6.503	6.683	6.580	6.482	6.482	6.484	6.481
18	6.465	6.484	6.516	6.450	6.442	6.447	6.451
19	6.481	6.528	6.599	6.470	6.462	6.466	6.467
20	6.403	6.434	6.447	6.386	6.380	6.379	6.384
21	6.467	6.630	6.547	6.452	6.450	6.454	6.457
22	6.417	6.399	6.518	6.408	6.404	6.415	6.415
23	6.569	6.556	6.644	6.537	6.533	6.544	6.540
24	6.470	6.567	6.572	6.445	6.442	6.444	6.451
25	6.575	6.625	6.641	6.484	6.473	6.477	6.487
Ave.	6.512	6.565	6.515	6.458	6.455	6.456	6.460
Med.	6.494	6.567	6.518	6.459	6.455	6.458	6.465
st dev	0.0727	0.0805	0.0651	0.0468	0.0481	0.0487	0.0478
Min.	6.403	6.399	6.367	6.320	6.312	6.312	6.317
Max.	6.671	6.683	6.644	6.537	6.533	6.544	6.540



### 3.3 Data Set 1, 85°C, 150mA (Chromaticity Shift)

No.			CCT(K)	= M "					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.2619	0.5281	2710	0.0004	0.0007	0.0008	0.0010	0.0014	0.0016
2	0.2612	0.5280	2724	0.0010	0.0011	0.0013	0.0013	0.0016	0.0020
3	0.2587	0.5253	2789	0.0002	0.0006	0.0009	0.0009	0.0011	0.0015
4	0.2597	0.5239	2774	0.0002	0.0008	0.0010	0.0011	0.0013	0.0016
5	0.2592	0.5291	2762	0.0006	0.0006	0.0008	0.0009	0.0011	0.0014

FINAL

**Bay Area Compliance Laboratories Corp. (Dongguan)**

No.69, Pulongcun, Puxinhu Industry Area, Tangxia,  
Dongguan, Guangdong, China

FINAL

### 3.5 Data Set 2, 105°C, 150mA (Forward Voltage)

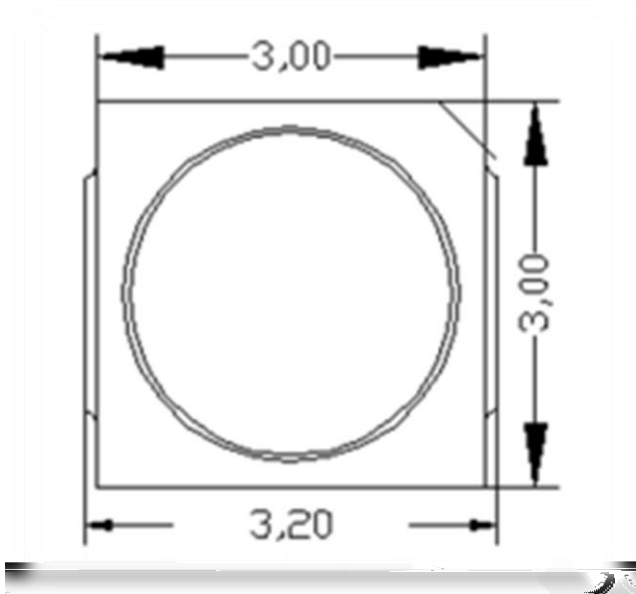
No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	6.469	6.505	6.514	6.453	6.445	6.444	6.451
27	6.514	6.642	6.571	6.500	6.505	6.502	6.507
28	6.434	6.498	6.571	6.415	6.413	6.425	6.417
29	6.515	6.518	6.559	6.506	6.509	6.509	6.508
30	6.453	6.520	6.495	6.439	6.436	6.436	6.443
31	6.494	6.505	6.557	6.485	6.504	6.592	6.487
32	6.502	6.555	6.601	6.490	6.496	6.495	6.494
33	6.316	6.307	6.406	6.304	6.306	6.312	6.310
34	6.523	6.516	6.638	6.514	6.516	6.518	6.517
35	6.385	6.381	6.446	6.370	6.376	6.374	6.374
36	6.474	6.486	6.579	6.470	6.472	6.474	6.471
37	6.482	6.559	6.576	6.451	6.449	6.450	6.453
38	6.425	6.513	6.518	6.409	6.415	6.417	6.414
39	6.518	6.594	6.637	6.501	6.503	6.509	6.508
40	6.485	6.589	6.440	6.477	6.478	6.481	6.476
41	6.491	6.611	6.636	6.481	6.480	6.495	6.485
42	6.465	6.545	6.565	6.451	6.457	6.458	6.454
43	6.458	6.570	6.498	6.428	6.431	6.434	6.431
44	6.469	6.598	6.493	6.440	6.436	6.441	6.440
45	6.495	6.608	6.517	6.440	6.442	6.440	6.443
46	6.431	6.513	6.508	6.412	6.411	6.412	6.411
47	6.475	6.518	6.573	6.468	6.475	6.471	6.466
48	6.539	6.520	6.603	6.530	6.527	6.531	6.526
49	6.331	6.372	6.397	6.301	6.298	6.302	6.303
50	6.557	6.604	6.570	6.422	6.424	6.428	6.423
Ave.	6.468	6.526	6.539	6.446	6.448	6.454	6.448
Med.	6.475	6.520	6.559	6.451	6.449	6.450	6.453
st dev	0.0577	0.0786	0.0676	0.0576	0.0586	0.0638	0.0571
Min.	6.316	6.307	6.397	6.301	6.298	6.302	6.303
Max.	6.557	6.642	6.638	6.530	6.527	6.592	6.526

### 3.6 Data Set 2, 105°C, 150mA (Chromaticity Shift)

No.			CCT(K)	= M "					
		Ohr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	0.2596	0.5304	2749	0.0007	0.0009	0.0011	0.0012	0.0015	0.0017
27	0.2615	0.5266	2725	0.0005	0.0009	0.0013	0.0014	0.0016	0.0018
28	0.2580	0.5247	2808	0.0003	0.0009	0.0012	0.0015	0.0015	0.0017
29	0.2617	0.5302	2704	0.0006	0.0008	0.0012	0.0013	0.0014	0.0017
30	0.2597	0.5284	2755	0.0004	0.0009	0.0013	0.0013	0.0016	0.0018
31	0.2581	0.5242	2808	0.0003	0.0011	0.0015	0.0017	0.0017	0.0020
32	0.2593	0.5226	2788	0.0001	0.0009	0.0013	0.0016	0.0016	0.0018
33	0.2622	0.5287	2701	0.0004	0.0010	0.0014	0.0015	0.0017	0.0018
34	0.2612	0.5306	2713	0.0006	0.0009	0.0012	0.0014	0.0015	0.0017
35	0.2610	0.5270	2732	0.0003	0.0010	0.0014	0.0015	0.0016	0.0018
36	0.2603	0.5265	2749	0.0002	0.0009	0.0013	0.0013	0.0016	0.0017
37	0.2597	0.5249	2770	0.0002	0.0009	0.0013	0.0015	0.0016	0.0018
38	0.2591	0.5283	2767	0.0005	0.0009	0.0013	0.0013	0.0015	0.0017
39	0.2600	0.5289	2745	0.0006	0.0009	0.0013	0.0013	0.0015	0.0017
40	0.2612	0.5285	2722	0.0005	0.0009	0.0012	0.0013	0.0014	0.0017
41	0.2577	0.5274	2802	0.0005	0.0009	0.0013	0.0015	0.0017	0.0018
42	0.2607	0.5275	2736	0.0004	0.0009	0.0012	0.0013	0.0014	0.0017
43	0.2599	0.5282	2751	0.0006	0.0009	0.0013	0.0014	0.0015	0.0017
44	0.2604	0.5305	2731	0.0007	0.0009	0.0013	0.0014	0.0015	0.0017
45	0.2604	0.5230	2764	0.0004	0.0011	0.0015	0.0017	0.0018	0.0021
46	0.2609	0.5256	2741	0.0003	0.0009	0.0013	0.0015	0.0016	0.0018
47	0.2596	0.5260	2768	0.0004	0.0010	0.0014	0.0016	0.0017	0.0019
48	0.2593	0.5291	2759	0.0005	0.0008	0.0012	0.0013	0.0014	0.0016
49	0.2594	0.5255	2773	0.0002	0.0009	0.0012	0.0013	0.0015	0.0017
50	0.2585	0.5246	2797	0.0002	0.0011	0.0014	0.0015	0.0017	0.0019
Ave.	0.2600	0.5271	2754	0.0004	0.0009	0.0013	0.0014	0.0016	0.0018
Med.		0.5274		0.0004	0.0009	0.0013	0.0014		0.0017
st dev	0.0012	0.0023	30.7865	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2577	0.5226	2701	0.0001	0.0008	0.0011	0.0012		

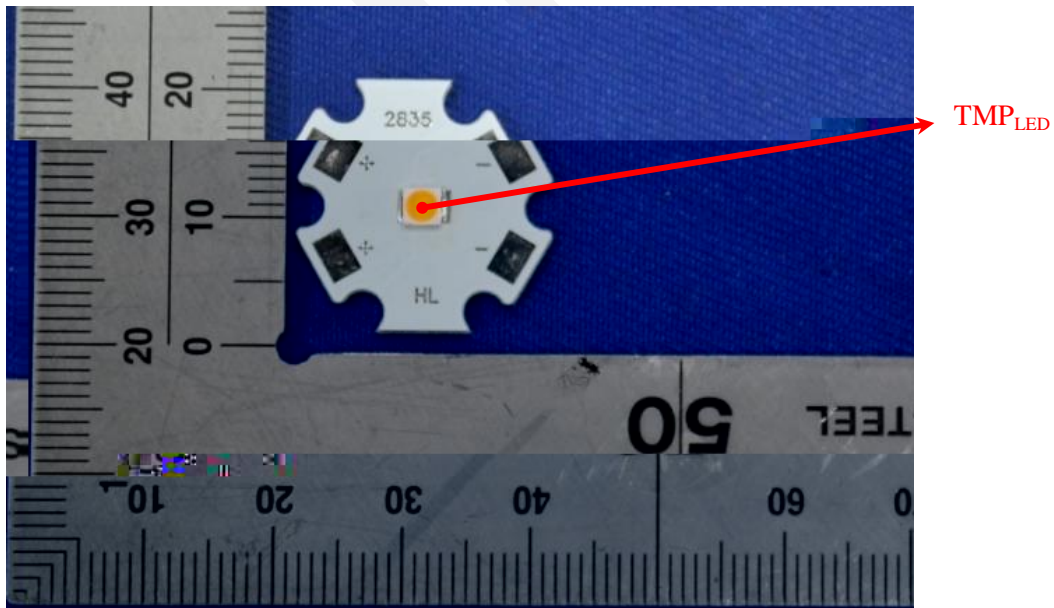
## 4 - EUT Photo

### 4.1 Mechanical Dimensions



All dimensions are in millimeter

### 4.2 EUT Photo



### 4.3 Report Revision

Report Number	Report Date	Contents
RSZ151230501-10	2016-09-20	Original report.
RSZ151230501-10-M1	2019-01-12	Update the Logo and address of lab on the Page1 Update Company name and address on page 1. Add DUT Characteristics on page 3 according to ENERGY STAR requirements

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

FINAL