

# TEST REPORT

According to ANSI/IES LM-80-15  
For

## Shenzhen Refond Optoelectronic Co., Ltd.

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**Model: 5050**

<b>Report Type:</b> 6000 Hours Test Report		<b>Product Type:</b> LED Package	
<b>Test Engineer:</b>	Pote Wang		
<b>Report Number:</b>	R2DG170425053-10		
<b>Test Date:</b>	2017-05-03 to 2018-01-08		
<b>Report Date:</b>	2018-06-09		
<b>Reviewed By:</b>	Blake Zhang / EE Engineer		
<b>Test Facility:</b>	Test facility was located at No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China.		
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<b>Accreditation:</b>	The IAS Accreditation Number TL-460.		

**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**

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### **1.1 Description of LED Light Sources**

**Sample Size:**

75

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## 2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	$\alpha$ :	$\beta$ :	Reported TM-21 L <sub>70</sub> Lifetime	Reported TM-21 L <sub>90</sub> Lifetime
1	25	0	1000hrs	6000hrs	2.118E-06	1.003	>36000hrs	>36000hrs
2	25	0	1000hrs	6000hrs	2.388E-06	1.002	>36000hrs	>36000hrs
3	25	0	1000hrs	6000hrs	2.773E-06	1.001	>36000hrs	>36000hrs

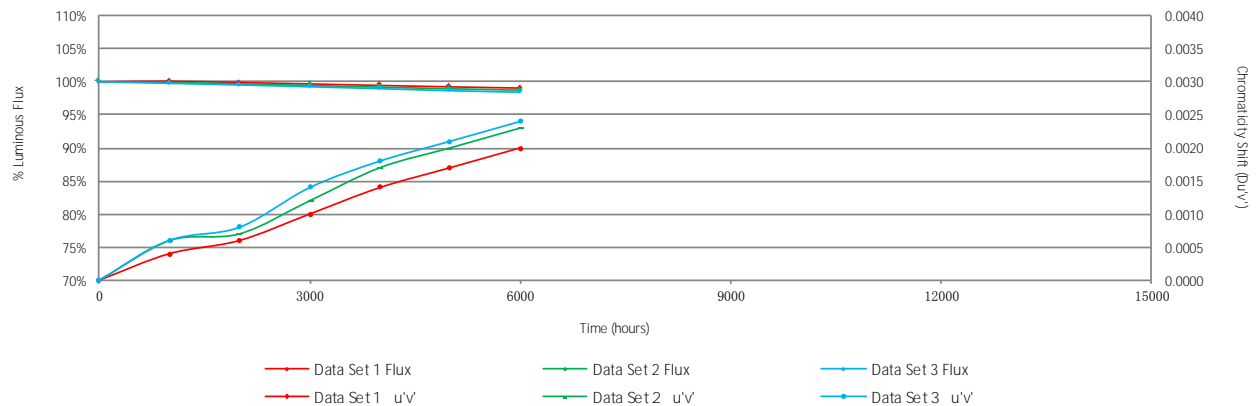
### Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	100.10%	99.90%	99.69%	99.46%	99.25%	99.06%
2	99.91%	99.69%	99.46%	99.20%	98.96%	98.74%
3	99.78%	99.53%	99.26%	98.97%	98.67%	98.43%

### Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.0004	0.0006	0.0010	0.0014	0.0017	0.0020
2	0.0006	0.0007	0.0012	0.0017	0.0020	0.0023
3	0.0006	0.0008	0.0014	0.0018	0.0021	0.0024

### Average Lumen Maintenance and Chromaticity Shift VS. Time



### 3 - Test Data

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#### 3.1 Data Set 1, 55°C, 20mA (Lumen Maintenance) 99.48

No.	Q <sub>d</sub>	Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	13.55	100.15	99.93	99.78	99.63		99.41
2	13.51	100.07	99.93	99.70	99.48	99.19	99.11

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**3.2 Data Set 1, 55°C, 20mA (Forward Voltage)**

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	7.506	7.524	7.496	7.521	7.516	7.515	7.511
2	7.487	7.504	7.484	7.501	7.497	7.485	7.502
3	7.498	7.517	7.490	7.513	7.509	7.498	7.515
4	7.504	7.522	7.495	7.519	7.514	7.513	7.513
5	7.507	7.521	7.500	7.524	7.518	7.517	7.528
6	7.517	7.535	7.517	7.532	7.527	7.521	7.536
7	7.518	7.529	7.514	7.531	7.526	7.520	7.527
8	7.521	7.539	7.517	7.536	7.531	7.528	7.533
9	7.530	7.547	7.522	7.544	7.539	7.527	7.541
10	7.515	7.533	7.514	7.529	7.524	7.512	7.533
11	7.507	7.535	7.516	7.532	7.531	7.515	7.533
12	7.485	7.504	7.477	7.500	7.499	7.485	7.507
13	7.481	7.493	7.480	7.496	7.494	7.480	7.493
14	7.507	7.517	7.503	7.521	7.518	7.513	7.527
15	7.472	7.491	7.479	7.496	7.492	7.488	7.498
16	7.490	7.503	7.482	7.502	7.497	7.483	7.507
17	7.501	7.520	7.494	7.519	7.514	7.510	7.520
18	7.496	7.515	7.493	7.513	7.513	7.496	7.519
19	7.476	7.488	7.469	7.492	7.493	7.476	7.498



**3.3 Data Set 1, 55°C, 20mA (Chromaticity Shift)**

No.	λ <sub>d</sub>	φ <sub>d</sub>	CCT(K)	Ó@ ( 2222 2222 2222 )					
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs
1	0.1838	0.4199	17239	0.0004	0.0008	0.0011	0.0014	0.0017	0.0019
2	0.1850	0.4157	19568	0.0005	0.0004	0.0006	0.0010	0.0011	0.0014
3	0.1825	0.4172	19339	0.0005	0.0010	0.0007	0.0008	0.0013	0.0017
4	0.1832	0.4203	17164	0.0006	0.0008	0.0012	0.0013	0.0016	0.0017
5	0.1821	0.4183	18763	0.0003	0.0003	0.0009	0.0011	0.0013	0.0020
6	0.1812	0.4121	24861	0.0004	0.0007	0.0010	0.0011	0.0015	0.0017
7	0.1830	0.4178	18756	0.0001	0.0001	0.0010	0.0012	0.0014	0.0021
8	0.1822	0.4182	18777	0.0002	0.0003	0.0009	0.0014	0.0016	0.0022
9	0.1832	0.4133	22387	0.0003	0.0006	0.0010	0.0014	0.0017	0.0022
10	0.1820	0.4173	19454	0.0004	0.0007	0.0010	0.0015	0.0017	0.0023
11	0.1815	0.4178	19271	0.0002	0.0004	0.0009	0.0014	0.0016	0.0019
12	0.1843	0.4140	21216	0.0006	0.0012	0.0009	0.0015	0.0016	0.0019
13	0.1830	0.4138	21975	0.0006	0.0013	0.0012	0.0016	0.0018	0.0019
14	0.1829	0.4167	19602	0.0004	0.0006	0.0010	0.0016	0.0018	0.0022
15	0.1825	0.4175	19197	0.0003	0.0006	0.0013	0.0016	0.0017	0.0020
16	0.1839	0.4156	20084	0.0002	0.0005	0.0018	0.0023	0.0027	0.0030
17	0.1826	0.4163	19989	0.0002	0.0006	0.0008	0.0011	0.0013	0.0020
18	0.1847	0.4145	20632	0.0002	0.0006	0.0009	0.0013	0.0014	0.0016
19	0.1843	0.4143	21012	0.0004	0.0006	0.0010	0.0015	0.0018	0.0020

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**3.4 Data Set 2, 85°C, 20mA (Lumen Maintenance)**

No.	Φ D	Lumen Maintenance (%)					
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	13.25	99.85	99.77	99.47	99.17	98.87	98.72
27	13.44	99.93	99.55	99.48	99.33	99.18	98.88
28	13.27	99.77	99.70	99.40	99.10	98.87	98.72
29	13.33	99.55	99.32	99.10	98.87	98.80	98.65
30	13.36	99.85	99.40	99.18	98.95	98.65	98.43
31	13.45	99.93	99.55	99.33	98.96	98.66	98.36
32	13.27	99.77	99.70	99.40	99.17	99.02	98.79
33	13.30	100.15	99.92	99.77	99.47	99.17	98.87
34	13.18	99.70	99.54	99.24	99.17	98.94	98.71
35	13.41	99.85	99.48	99.11	98.81		

**3.5 Data Set 2, 85°C, 20mA (Forward Voltage)**

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	7.490	7.522	7.498	7.518	7.520	7.501	7.519
27	7.497	7.515	7.497	7.511	7.513	7.503	7.5142 43.

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**3.6 Data Set 2, 85°C, 20mA (Chromaticity Shift)**

No.	x	y	CCT(K)	Chromaticity Shift					
				1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	0.1838	0.4160	19812	0.0005	0.0004	0.0010	0.0016	0.0017	0.0023
27	0.1818	0.4158	20693	0.0006	0.0006	0.0013	0.0016	0.0020	0.0023
28	0.1829	0.4140	21914	0.0004	0.0007	0.0009	0.0015	0.0019	0.0022
29	0.1842	0.4140	21310	0.0007	0.0005	0.0017	0.0022	0.0026	0.0028
30	0.1847	0.4145	20652	0.0004	0.0004	0.0009	0.0014	0.0019	0.0022
31	0.1823	0.4162	20186	0.0007	0.0011	0.0012	0.0016	0.0020	0.0023
32	0.1844	0.4136	21554	0.0006	0.0008	0.0015	0.0019	0.0024	0.0027
33	0.1847	0.4162	19292	0.0006	0.0004	0.0009	0.0014	0.0019	0.0022
34	0.1860	0.4135	20958	0.0005	0.0007	0.0013	0.0017	0.0022	0.0025
35	0.1824	0.4161	20219	0.0002	0.0003	0.0011	0.0017	0.0020	0.0022
36	0.1842	0.4129	22327	0.0004	0.0003	0.0011	0.0014	0.0018	0.0022
37	0.1827	0.4152	20869	0.0008	0.0008	0.0013	0.0016	0.0022	0.0025
38	0.1858	0.4153	19568	0.0006	0.0004	0.0010	0.0013	0.0016	0.0019

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**3.7 Data Set 3, 105°C, 20mA (Lumen Maintenance)**

No.	Φ D	Lumen Maintenance (%)					
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
51	13.35	99.93	99.48	99.18	98.95	98.80	98.50
52	13.35	100.07	99.85	99.48	99.18	98.73	98.50
53	13.19	99.92	99.77	99.39	99.01	98.71	98.48
54	13.40	99.78	99.70	99.40	99.10	98.73	98.58
55	13.45	99.70	99.26	99.03	98.88	98.59	98.29
56	13.33	99.55	99.17	99.10	98.80	98.50	98.27
57	13.47	99.48	99.18	98.89	98.74	98.29	98.07
58	13.16	99.54	99.39	99.16	98.94	98.71	98.18
59	13.39	99.70	99.55	99.18	98.81	98.58	98.36
60	13.33	99.92	99.55	99.17	98.87	98.65	98.42
61	13.24	99.77	99.40	99.09	98.79	98.49	98.34
62	13.35	99.85	99.63	99.48	99.25	98.95	98.80
63	13.47	99.78	99.63	99.55	99.18	98.96	98.89
64	13.41	99.70	99.55	99.33	99.11	98.73	98.36
65	13.23	99.85	99.77	99.40	99.09	98.72	98.19

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**3.8 Data Set 3, 105°C, 20mA (Forward Voltage)**

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
51	7.487	7.508	7.485	7.504	7.508	7.501	7.502
52	7.477	7.496	7.478	7.492	7.495	7.481	7.490
53	7.503	7.532	7.507	7.527	7.529	7.524	7.535
54	7.480	7.501	7.490	7.504	7.506	7.498	7.512
55	7.479	7.491	7.473	7.493	7.495	7.480	7.492
56	7.484	7.508	7.496	7.508	7.510	7.504	7.508
57	7.480	7.493	7.481	7.495	7.496	7.491	7.503
58	7.486	7.504	7.479	7.500	7.501	7.496	7.508
59	7.471	7.489	7.465	7.484	7.484	7.479	7.483
60	7.503	7.528	7.510	7.530	7.530	7.518	7.538
61	7.487	7.500	7.480	7.502	7.502	7.497	7.500
62	7.475	7.496	7.478	7.498	7.499	7.486	7.502
63	7.493	7.505	7.490	7.508	7.508	7.494	7.514
64	7.497	7.517	7.490	7.512	7.512	7.497	7.519
65	7.491	7.509	7.490	7.505	7.505	7.491	7.512
66	7.491	7.518	7.491	7.513	7.513	7.502	7.519
67	7.489	7.518	7.491	7.513	7.513	7.507	7.519
68	7.473	7.502	7.483	7.498	7.502	7.492	7.502
69	7.477	7.501	7.480	7.496	7.496	7.488	7.502
70	7.495	7.519	7.498	7.521	7.521	7.513	7.527
71	7.467	7.486	7.466	7.487	7.548	7.481	7.494
72	7.487	7.500	7.480	7.501	7.500	7.495	7.500
73	7.512	7.528	7.509	7.530	7.530	7.524	7.536
74	7.494	7.523	7.503	7.519	7.517	7.502	7.524
75	7.482	7.501	7.480	7.496	7.495	7.482	7.502
Avg.	7.486	7.507	7.487	7.505	7.509	7.497	7.510
Med.	7.487	7.504	7.485	7.504	7.506	7.496	7.508
st dev	0.0108	0.0128	0.0121	0.0127	0.0144	0.0130	0.0146
Min.	7.467	7.486	7.465	7.484	7.484	7.479	7.483
Max.	7.512	7.532	7.510	7.530	7.548	7.524	7.538



3.9 Data Set 3, 105°C, 20mA (Chromaticity Shift)

No.	x	y	CCT(K)	Chromaticity Shift					
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs
51	0.1838	0.4140	21460	0.0008	0.0008	0.0016	0.0020	0.0022	0.0025
52	0.1833	0.4150	20761	0.0006	0.0009	0.0014	0.0019	0.0021	0.0023
53	0.1823		21372	0.0008	0.0010	0.0015	0.0019	0.0023	
54	0.1852	0.4148							

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The IAS Accreditation Number TL-460

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