



# TEST REPORT

According to ANSI/IES LM-80-15  
For

## Shenzhen Refond Optoelectronic Co., Ltd.

1 to 8th Floor, Building #1, 10th Industrial Zone, Tian Liao Community, Gong Ming Area, Guang Ming New

**Model: RF-27TI32DS-DF-N**

<b>Report Type:</b> 9000 Hours Test Report		<b>Product Type:</b> LED Package	
<b>Test Engineer:</b>	Pote Wang <i>Pote Wang</i>		
<b>Report Number:</b>	R2DG161221050-10-M1		
<b>Test Date:</b>	2016-12-24 to 2018-01-04		
<b>Report Date:</b>	2018-07-30		
<b>Reviewed By:</b>	Daniel Duan / EE Manager <i>Daniel Duan</i>		
<b>Revised Note:</b>	The previous report R2DG161221050-10 is replaced by this report on 2018-07-30		
<b>Test Facility:</b>	Test facility was located at No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China.		
<b>Prepared By:</b>	Bay Area Compliance Laboratories Corp. (Dongguan). No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588		
<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).

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 - 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 Photometric Measurement Method and Uncertainty.....	4
1.7 Statement of Traceability .....	4
1.8 Sample Set.....	5
<b>2 - Summary of Test Result</b> .....	<b>6</b>
<b>3 - Test Data</b> .....	<b>7</b>
3.1 Data Set 1, 55°C, 60mA (Lumen Maintenance) .....	7
3.2 Data Set 1, 55°C, 60mA (Forward Voltage).....	8
3.3 Data Set 1, 55°C, 60mA (Chromaticity Shift) .....	9
3.4 Data Set 2, 85°C, 60mA (Lumen Maintenance) .....	10
3.5 Data Set 2, 85°C, 60mA (Forward Voltage).....	11
3.6 Data Set 2, 85°C, 60mA (Chromaticity Shift).....	12
3.7 Data Set 3, 105°C, 60mA (Lumen Maintenance) .....	13
3.8 Data Set 3, 105°C, 60mA (Forward Voltage).....	14
3.9 Data Set 3, 105°C, 60mA (Chromaticity Shift).....	15
<b>4 - DUT Photo</b> .....	<b>16</b>
4.1 Mechanical Dimensions .....	16
4.2 DUT Photo.....	16
Report Revision.....	16

## 1 - General Information

### 1.1 Description of LED Light Sources

#### Sample Size:

90 PCS samples were received on 2016-12-21. The samples were numbered from 1 to 30, 31 to 60 and 61 to 90.

Manufacturer:	Shenzhen Refond Optoelectronic Co., Ltd.
Part Number:	RF-27T132DS-DF-N
Part Type:	LED Package
Drive Level:	DC 60mA
Nominal CCT:	2700K
Power:	0.2W
Current Density per LED die:	320mA/mm <sup>2</sup>
Power Density per LED die:	1.067W/mm <sup>2</sup>
CRI:	90
Die Spacing:	N/A

#### Sampling Method:

LED samples for IESNA LM-80 testing consist of units built from a minimum of three manufacturing lots with each manufacturing lot built from different wafer lots built on non-consecutive days.

These manufacturing lots are picked to represent a wide parametric distribution.

#### Family products covered by this report:

According to *ENERGY STAR® Requirements for the Use of LM-80 Data*, the following products can be covered by this report base on the information and declaration provided by manufacturer. The information of these models shows that the covered products meet all section 4 requirements of *ENERGY STAR® Requirements for the Use of LM-80 Data* (September 28, 2017)

This report covers the following models:

Testing Model	Multiple Model	Difference	Details
RF-27T132DS-DF-N	R*-***32DS-**-**(-Y)-**	CCT & Internal management code	All models are identical except the CCT and Internal management code.

Identifiers Information (if any):

- The first \* can be F or T, It is an internal Market code which does not affect property.
- The second \* represent customer name, it can be C, D, H, K, L, M, P, S, T, W, Y, which also can be excluded.
- The third to fourth \* represent CCT, it can be 22, 24, 27, 30, 35, 40, 45, 50, 57, 60, 62, 65, 82; \*\* don't mean only two numbers, it maybe also as mentioned 2, 3, 4, 5, 6, 7, 8.
- The fifth \* represent Chromogenic index, it can be R, M, H, T, or Q&S which does not affect product property.
- The sixth \* represent power, it can be I&P.
- The seventh to eighth \* can be AF, BF, CF, DF, EF, FF, FD or FH, it is an internal Market code which does not affect product property.
- The ninth to tenth \*\* can be N, 2N, 3N or J, it is an internal Market code which does not affect product property.
- The letter "Y" on behalf of the centrifugal power equipment is not used, No "Y" on behalf of using centrifugal power equipment.
- The eleventh to twelfth \*\* represent project code, not specified, it can be blank, \* or \*\* and number or letter

### 1.2 Standards Used:

- ANSI/IES LM-80-15: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- CIE 127:2007: Measurement of LEDs
- ENERGY STAR® Requirements for the Use of LM-80 Data (This standard was not accredited by IAS)

### 1.3 Testing Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
0.3m integrating sphere	EVERFINE	Diameter 0.3m	1011119	2017-03-09	2018-03-09

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	2017-03-03	2018-03-03
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	2017-03-09	2018-03-09
Standard Light Source	EVERFINE	D062	1011093	2017-09-13	2018-09-13
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987CJ7321114	2017-03-03	2018-03-03
Multilayer aging machine	BACL	B2-270	20005	2017-09-01	2018-09-01
Multilayer aging machine	BACL	B2-270	20022	2017-12-08	2018-12-08
Multilayer aging machine	BACL	B2-270	20013	2017-09-01	2018-09-01
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090007	2017-03-03	2018-03-03
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090005	2017-03-03	2018-03-03
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090006	2017-03-03	2018-03-03

#### 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  $2^{\circ}C$  below the corresponding nominal case temperature. Surrounding air was maintained at a temperature that was greater than or equal to  $5^{\circ}C$  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  $25^{\circ}C \pm 2^{\circ}C$ , RH <65%.

#### 1.6 Photometric Measurement Method and Uncertainty

Integrating sphere and spectroradiometer is used to measure luminous flux and chromaticity coordinate u'v'.  $2\pi$  measurement was used and sample was driven by DC power supply. The forward current was regulated to within  $\pm 0.5\%$  of the nominal value. The test system was calibrated by halogen reference lamp. The ambient temperature during test was set to  $25^{\circ}C \pm 2^{\circ}C$ , RH <65%. The temperature measurement point was located in the sphere and the temperature was detected by a temperature probe.

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  $U=21K$  ( $K=2$ ), at the 95% confidence level.

The uncertainty of the temperature is  $U=0.8671^{\circ}C$  ( $K=2$ ), 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, 60mA

Part Number: RF-27T132DS-DF-N  
Number of Units: 30  
Case Temperature: >53°C  
Ambient Temperature: >50°C  
Life Test Drive Current: 60mA  
Measurement Current: 60mA

### Data Set 2: 85°C, 60mA

Part Number: RF-27T132DS-DF-N  
Number of Units: 30  
Case Temperature: >83°C  
Ambient Temperature: >80°C  
Life Test Drive Current: 60mA  
Measurement Current: 60mA

### Data Set 3: 105°C, 60mA

Part Number: RF-27T132DS-DF-N  
Number of Units: 30  
Case Temperature: >103°C  
Ambient Temperature: >100°C  
Life Test Drive Current: 60mA  
Measurement Current: 60mA

## 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	30	0	1000hrs	6000hrs	2.018E-06	1.004	>54000hours	>54000hours
2	30	0	1000hrs	6000hrs	2.529E-06	1.003	>54000hours	43,000hours
3	30	0	1000hrs	6000hrs	2.783E-06	1.000	>54000hours	38,000hours

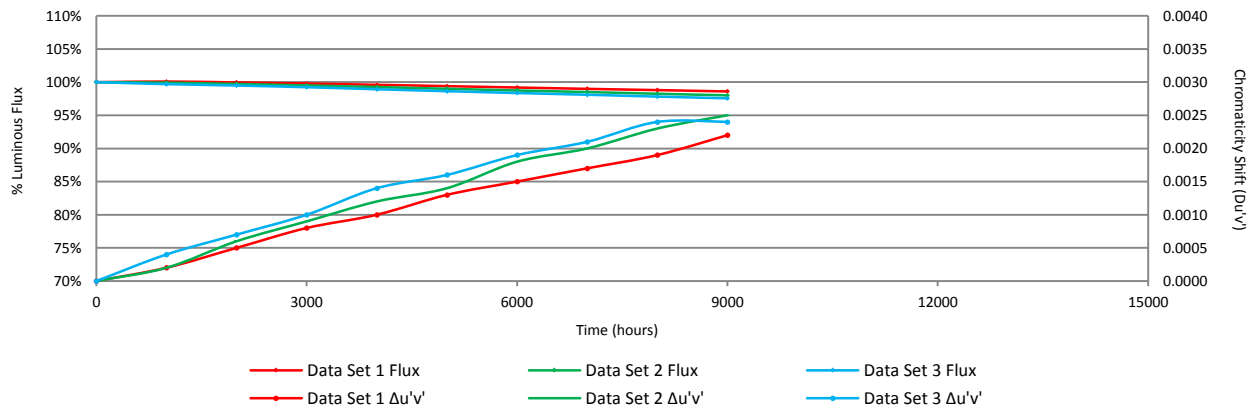
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	100.09%	99.96%	99.79%	99.60%	99.40%	99.19%	98.99%	98.80%	98.60%
2	99.92%	99.73%	99.50%	99.26%	99.00%	98.74%	98.51%	98.25%	98.01%
3	99.70%	99.49%	99.24%	98.93%	98.64%	98.36%	98.10%	97.82%	97.56%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.0002	0.0005	0.0008	0.0010	0.0013	0.0015	0.0017	0.0019	0.0022
2	0.0002	0.0006	0.0009	0.0012	0.0014	0.0018	0.0020	0.0023	0.0025
3	0.0004	0.0007	0.0010	0.0014	0.0016	0.0019	0.0021	0.0024	0.0024

Average Lumen Maintenance and Chromaticity Shift VS. Time



### 3 - Test Data

#### 3.1 Data Set 1, 55°C, 60mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	23.36	100.09	100.04	99.83	99.61	99.49	99.27	99.19	99.06	98.76
2	23.67	100.13	100.08	99.83	99.58	99.37	99.20	98.99	98.90	98.73
3	23.59	100.04	99.83	99.62	99.45	99.11	98.90	98.73	98.56	98.43
4	23.66	100.13	100.00	99.83	99.54	99.37	98.99	98.73	98.56	98.39
5	23.33	100.04	99.74	99.57	99.31	99.14	98.97	98.84	98.59	98.29
6	23.30	100.09	100.04	99.83	99.61	99.57	99.31	99.06	98.80	98.45
7	23.51	100.04	99.79	99.62	99.45	99.28	99.19	98.94	98.77	98.43
8	23.64	99.96	99.83	99.58	99.45	99.41	99.15	99.03	98.65	98.60
9	23.69	100.04	99.92	99.58	99.54	99.37	99.07	98.86	98.65	98.52
10	23.02	99.83	99.78	99.48	99.26	99.22	98.96	98.83	98.52	98.31
11	23.52	100.17	100.09	99.91	99.70	99.53	99.19	99.06	98.94	98.60
12	23.77	100.04	99.96	99.71	99.58	99.45	99.24	99.07	98.82	98.49
13	23.73	100.17	100.04	99.87	99.71	99.45	99.03	98.86	98.74	98.61
14	23.64	99.92	99.83	99.79	99.58	99.32	99.11	98.82	98.73	98.60
15	23.56	100.08	99.92	99.87	99.66	99.49	99.28	98.94	98.64	98.47
16	23.69	100.04	99.79	99.70	99.58	99.37	99.24	99.07	98.86	98.73
17	23.44	100.09	100.04	99.83	99.53	99.45	99.27	98.98	98.93	98.81
18	23.75	100.08	100.04	99.87	99.66	99.37	99.16	99.12	98.91	98.74
19	23.23	100.17	100.09	99.87	99.78	99.48	99.35	99.14	99.10	98.84
20	23.41	100.26	100.17	100.13	99.91	99.66	99.44	99.23	99.06	98.85
21	23.81	99.92	99.75	99.62	99.50	99.33	99.12	98.95	98.74	98.57
22	23.88	100.08	99.83	99.75	99.62	99.37	99.12	99.04	98.79	98.53
23	23.50	100.26	100.17	99.83	99.62	99.40	99.23	99.06	98.89	98.64
24	23.75	100.21	100.04	99.87	99.79	99.58	99.41	99.16	99.07	98.74
25	23.59	100.13	99.92	99.87	99.66	99.41	99.32	99.03	98.94	98.90
26	23.61	100.25	100.17	100.04	99.87	99.58	99.53	99.24	99.03	98.81
27	23.57	99.96	99.75	99.66	99.36	99.11	98.85	98.77	98.68	98.47
28	23.23	100.26	100.17	99.91	99.70	99.40	99.14	99.01	98.88	98.58
29	23.80	100.08	100.04	99.83	99.54	99.45	99.16	98.78	98.53	98.45
30	23.67	100.13	100.08	100.04	99.75	99.58	99.37	99.24	98.82	98.61
Ave.	23.56	100.09	99.96	99.79	99.60	99.40	99.19	98.99	98.80	98.60
Med.	23.60	100.09	100.02	99.83	99.60	99.41	99.19	99.02	98.81	98.60
st dev	0.2006	0.1065	0.1426	0.1532	0.1508	0.1367	0.1613	0.1517	0.1715	0.1642
Min.	23.02	99.83	99.74	99.48	99.26	99.11	98.85	98.73	98.52	98.29
Max.	23.88	100.26	100.17	100.13	99.91	99.66	99.53	99.24	99.10	98.90

**3.2 Data Set 1, 55°C, 60mA (Forward Voltage)**

No.	Forward Voltage (V)									
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2.849	2.854	2.856	2.854	2.850	2.857	2.849	2.852	2.854	2.850
2	2.839	2.843	2.846	2.846	2.841	2.845	2.841	2.842	2.844	2.841
3	2.869	2.876	2.876	2.868	2.869	2.877	2.867	2.868	2.874	2.869
4	2.872	2.875	2.878	2.874	2.872	2.875	2.872	2.872	2.876	2.873
5	2.859	2.864	2.865	2.860	2.860	2.861	2.859	2.863	2.864	2.861
6	2.864	2.869	2.870	2.864	2.863	2.867	2.864	2.866	2.869	2.865
7	2.842	2.847	2.849	2.844	2.844	2.847	2.842	2.846	2.847	2.846
8	2.843	2.848	2.849	2.848	2.844	2.848	2.846	2.849	2.849	2.845
9	2.841	2.844	2.846	2.843	2.841	2.843	2.840	2.843	2.846	2.843
10	2.865	2.871	2.871	2.867	2.864	2.868	2.865	2.872	2.870	2.866
11	2.864	2.871	2.871	2.868	2.863	2.867	2.864	2.868	2.870	2.866
12	2.864	2.871	2.871	2.867	2.864	2.867	2.863	2.868	2.869	2.864
13	2.865	2.870	2.870	2.865	2.863	2.866	2.863	2.875	2.871	2.865
14	2.844	2.849	2.851	2.849	2.844	2.848	2.844	2.847	2.852	2.845
15	2.865	2.869	2.871	2.866	2.863	2.866	2.864	2.869	2.870	2.865
16	2.863	2.867	2.869	2.865	2.863	2.866	2.864	2.874	2.869	2.864
17	2.862	2.869	2.869	2.865	2.863	2.867	2.864	2.871	2.868	2.863
18	2.879	2.883	2.884	2.878	2.876	2.881	2.877	2.876	2.882	2.879
19	2.841	2.844	2.847	2.844	2.842	2.845	2.840	2.843	2.846	2.843
20	2.844	2.848	2.850	2.851	2.845	2.847	2.845	2.846	2.849	2.846
21	2.878	2.882	2.884	2.881	2.877	2.881	2.878	2.881	2.882	2.877
22	2.861	2.866	2.867	2.864	2.862	2.865	2.861	2.864	2.866	2.862
23	2.877	2.882	2.882	2.877	2.877	2.880	2.877	2.887	2.881	2.879
24	2.862	2.868	2.868	2.864	2.863	2.866	2.863	2.876	2.867	2.866
25	2.864	2.868	2.869	2.878	2.863	2.866	2.863	2.864	2.869	2.865
26	2.863	2.868	2.869	2.872	2.863	2.865	2.863	2.869	2.867	2.863
27	2.841	2.845	2.850	2.845	2.843	2.848	2.842	2.846	2.847	2.841
28	2.843	2.846	2.849	2.845	2.843	2.850	2.842	2.847	2.848	2.842
29	2.863	2.869	2.868	2.865	2.863	2.865	2.863	2.864	2.868	2.862
30	2.851	2.854	2.857	2.855	2.852	2.884	2.851	2.856	2.856	2.850
Ave.	2.858	2.863	2.864	2.861	2.858	2.863	2.858	2.862	2.863	2.859
Med.	2.863	2.868	2.869	2.865	2.863	2.866	2.863	2.865	2.868	2.863
st dev	0.0123	0.0128	0.0120	0.0117	0.0115	0.0122	0.0119	0.0129	0.0119	0.0120
Min.	2.839	2.843	2.846	2.843	2.841	2.843	2.840	2.842	2.844	2.841
Max.	2.879	2.883	2.884	2.881	2.877	2.884	2.878	2.887	2.882	2.879



**3.3 Data Set 1, 55°C, 60mA (Chromaticity Shift)**

No.	u'	v'	CCT(K)	Chromaticity Shift ( $\Delta u'v'$ )								
	Ohr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.2585	0.5223	2809	0.0001	0.0002	0.0004	0.0009	0.0009	0.0012	0.0017	0.0019	0.0018
2	0.2584	0.5226	2808	0.0001	0.0004	0.0004	0.0009	0.0010	0.0013	0.0014	0.0018	0.0019
3	0.2599	0.5264	2758	0.0003	0.0007	0.0007	0.0009	0.0009	0.0012	0.0014	0.0016	0.0018
4	0.2610	0.5245	2745	0.0005	0.0009	0.0012	0.0012	0.0014	0.0014	0.0016	0.0019	0.0021
5	0.2620	0.5252	2719	0.0004	0.0007	0.0010	0.0010	0.0014	0.0014	0.0016	0.0016	0.0019
6	0.2626	0.5281	2694	0.0003	0.0005	0.0010	0.0009	0.0013	0.0014	0.0013	0.0015	0.0021
7	0.2591	0.5242	2786	0.0002	0.0005	0.0009	0.0011	0.0013	0.0016	0.0016	0.0015	0.0020
8	0.2597	0.5232	2778	0.0002	0.0005	0.0007	0.0010	0.0014	0.0015	0.0016	0.0017	0.0019
9	0.2589	0.5228	2797	0.0002	0.0004	0.0006	0.0009	0.0012	0.0014	0.0017	0.0017	0.0017
10	0.2578	0.5259	2807	0.0001	0.0006	0.0009	0.0011	0.0014	0.0017	0.0018	0.0019	0.0021
11	0.2594	0.5251	2776	0.0003	0.0006	0.0009	0.0011	0.0014	0.0015	0.0019	0.0021	0.0021
12	0.2609	0.5268	2737	0.0001	0.0004	0.0007	0.0009	0.0012	0.0015	0.0017	0.0018	0.0019
13	0.2601	0.5259	2756	0.0001	0.0004	0.0007	0.0009	0.0013	0.0015	0.0017	0.0018	0.0019
14	0.2608	0.5254	2744	0.0003	0.0005	0.0007	0.0010	0.0013	0.0015	0.0017	0.0018	0.0019
15	0.2604	0.5261	2749	0.0001	0.0004	0.0007	0.0010	0.0013	0.0016	0.0017	0.0019	0.0021
16	0.2613	0.5263	2730	0.0004	0.0006	0.0007	0.0010	0.0014	0.0015	0.0018	0.0019	0.0021
17	0.2589	0.5267	2780	0.0001	0.0003	0.0007	0.0009	0.0012	0.0014	0.0015	0.0016	0.0020
18	0.2591	0.5242	2786	0.0001	0.0004	0.0007	0.0010	0.0013	0.0016	0.0018	0.0018	0.0024
19	0.2617	0.5254	2724	0.0002	0.0004	0.0007	0.0009	0.0012	0.0015	0.0018	0.0024	0.0022
20	0.2587	0.5239	2797	0.0001	0.0007	0.0009	0.0011	0.0015	0.0017	0.0019	0.0024	0.0024
21	0.2586	0.5266	2785	0.0001	0.0004	0.0007	0.0009	0.0013	0.0015	0.0017	0.0021	0.0024
22	0.2611	0.5261	2735	0.0002	0.0004	0.0007	0.0009	0.0014	0.0015	0.0018	0.0021	0.0024
23	0.2607	0.5281	2735	0.0002	0.0004	0.0009	0.0009	0.0013	0.0016	0.0017	0.0021	0.0026
24	0.2595	0.5252	2774	0.0001	0.0004	0.0007	0.0010	0.0012	0.0015	0.0016	0.0021	0.0026
25	0.2598	0.5259	2763	0.0001	0.0004	0.0008	0.0010	0.0013	0.0016	0.0017	0.0021	0.0025
26	0.2610	0.5260	2737	0.0001	0.0004	0.0007	0.0010	0.0012	0.0015	0.0016	0.0019	0.0025
27	0.2593	0.5254	2775	0.0002	0.0005	0.0008	0.0010	0.0013	0.0015	0.0017	0.0021	0.0027
28	0.2622	0.5257	2713	0.0002	0.0006	0.0009	0.0011	0.0014	0.0017	0.0018	0.0022	0.0026
29	0.2617	0.5269	2719	0.0002	0.0005	0.0007	0.0009	0.0012	0.0016	0.0017	0.0020	0.0026
30	0.2590	0.5231	2793	0.0001	0.0004	0.0008	0.0010	0.0015	0.0016	0.0018	0.0022	0.0025
Ave.	0.2601	0.5253	2760	0.0002	0.0005	0.0008	0.0010	0.0013	0.0015	0.0017	0.0019	0.0022
Med.	0.2599	0.5256	2761	0.0002	0.0004	0.0007	0.0010	0.0013	0.0015	0.0017	0.0019	0.0021
st dev	0.0013	0.0015	31.7198	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	0.0002	0.0003
Min.	0.2578	0.5223	2694	0.0001	0.0002	0.0004	0.0009	0.0009	0.0012	0.0013	0.0015	0.0017
Max.	0.2626	0.5281	2809	0.0005	0.0009	0.0012	0.0012	0.0015	0.0017	0.0019	0.0024	0.0027

**3.4 Data Set 2, 85°C, 60mA (Lumen Maintenance)**

No.	Φ(lm)	Lumen Maintenance (%)								
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	23.46	99.96	99.91	99.79	99.62	99.45	99.23	98.93	98.68	98.59
32	23.30	99.74	99.57	99.40	99.36	99.14	98.84	98.76	98.37	98.20
33	23.64	99.96	99.79	99.58	99.37	99.11	98.90	98.69	98.39	98.18
34	23.68	99.92	99.79	99.45	99.20	99.16	98.94	98.73	98.56	98.27
35	23.38	99.79	99.49	99.27	98.93	98.80	98.46	98.20	97.99	97.69
36	23.76	99.87	99.75	99.58	99.37	99.07	98.86	98.53	98.19	98.06
37	23.31	100.17	99.96	99.70	99.27	99.10	98.76	98.54	98.24	97.94
38	23.64	100.04	99.96	99.66	99.32	98.90	98.73	98.48	98.10	97.76
39	23.80	100.13	99.83	99.54	99.37	98.95	98.61	98.45	98.28	97.98
40	23.30	100.04	99.87	99.74	99.57	99.31	99.01	98.80	98.50	98.28
41	23.80	100.13	99.92	99.75	99.66	99.41	99.24	98.87	98.61	98.49
42	23.31	99.96	99.66	99.40	99.23	99.01	98.84	98.80	98.50	98.41
43	23.37	100.04	99.79	99.44	99.36	99.06	98.84	98.76	98.63	98.29
44	23.42	99.87	99.74	99.49	99.10	98.93	98.63	98.33	98.21	98.16
45	23.54	99.96	99.79	99.49	99.15	98.81	98.43	98.17	97.92	97.75
46	23.17	99.91	99.74	99.57	99.27	98.79	98.49	98.23	97.80	97.41
47	23.33	99.79	99.66	99.53	99.31	98.93	98.76	98.41	98.16	97.86
48	23.68	99.87	99.70	99.49	99.20	98.90	98.52	98.18	97.80	97.64
49	23.69	99.79	99.66	99.37	99.20	99.03	98.69	98.35	98.06	97.89
50	23.33	99.83	99.70	99.36	99.14	98.97	98.67	98.41	98.11	97.94
51	23.50	100.09	99.87	99.62	99.32	99.11	98.94	98.55	98.26	98.09
52	23.49	99.79	99.49	99.28	99.11	98.85	98.64	98.25	98.04	97.83
53	23.31	99.70	99.40	99.14	98.88	98.67	98.50	98.16	97.81	97.60
54	23.78	99.83	99.66	99.45	99.20	98.91	98.65	98.49	98.36	98.02
55	23.53	99.96	99.75	99.53	99.24	99.02	98.68	98.60	98.34	98.09
56	23.53	99.92	99.66	99.41	99.19	98.85	98.64	98.51	98.22	98.05
57	23.56	100.17	99.87	99.62	99.28	98.90	98.51	98.47	98.22	97.88
58	23.32	99.91	99.66	99.61	99.36	98.97	98.67	98.46	98.37	97.98
59	23.61	99.83	99.75	99.53	99.24	98.90	98.64	98.48	98.39	98.01
60	23.62	99.66	99.41	99.15	98.98	98.86	98.77	98.56	98.35	98.05
Ave.	23.51	99.92	99.73	99.50	99.26	99.00	98.74	98.51	98.25	98.01
Med.	23.52	99.91	99.74	99.51	99.25	98.96	98.69	98.48	98.25	98.02
st dev	0.1786	0.1363	0.1491	0.1614	0.1744	0.1771	0.2034	0.2163	0.2416	0.2664
Min.	23.17	99.66	99.40	99.14	98.88	98.67	98.43	98.16	97.80	97.41
Max.	23.80	100.17	99.96	99.79	99.66	99.45	99.24	98.93	98.68	98.59

**3.5 Data Set 2, 85°C, 60mA (Forward Voltage)**

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	2.838	2.841	2.843	2.840	2.839	2.849	2.839	2.838	2.843	2.837
32	2.842	2.848	2.849	2.847	2.844	2.851	2.843	2.844	2.848	2.844
33	2.839	2.845	2.847	2.844	2.842	2.845	2.840	2.848	2.846	2.840
34	2.837	2.842	2.845	2.839	2.838	2.849	2.839	2.840	2.842	2.838
35	2.867	2.873	2.875	2.871	2.869	2.877	2.869	2.869	2.874	2.870
36	2.865	2.872	2.873	2.869	2.867	2.873	2.866	2.866	2.872	2.866
37	2.864	2.870	2.870	2.866	2.863	2.869	2.864	2.865	2.871	2.863
38	2.870	2.875	2.876	2.871	2.869	2.873	2.869	2.872	2.875	2.870
39	2.844	2.847	2.849	2.845	2.845	2.852	2.844	2.845	2.848	2.843
40	2.865	2.871	2.872	2.869	2.868	2.875	2.867	2.869	2.932	2.865
41	2.838	2.842	2.844	2.841	2.839	2.846	2.838	2.843	2.843	2.838
42	2.840	2.842	2.845	2.842	2.841	2.849	2.840	2.870	2.844	2.839
43	2.861	2.866	2.869	2.864	2.869	2.867	2.863	2.883	2.869	2.863
44	2.871	2.875	2.878	2.872	2.874	2.879	2.871	2.884	2.880	2.870
45	2.841	2.845	2.848	2.844	2.845	2.850	2.843	2.841	2.846	2.841
46	2.863	2.869	2.880	2.865	2.865	2.873	2.866	2.866	2.869	2.865
47	2.862	2.866	2.869	2.865	2.863	2.869	2.863	2.864	2.868	2.863
48	2.847	2.852	2.854	2.850	2.850	2.851	2.850	2.853	2.853	2.849
49	2.865	2.870	2.874	2.869	2.869	2.876	2.867	2.888	2.871	2.866
50	2.868	2.873	2.876	2.872	2.870	2.874	2.869	2.875	2.873	2.869
51	2.852	2.859	2.858	2.854	2.853	2.858	2.855	2.854	2.858	2.852
52	2.844	2.846	2.847	2.843	2.846	2.848	2.844	2.842	2.847	2.843
53	2.864	2.870	2.871	2.866	2.866	2.868	2.866	2.865	2.869	2.863
54	2.847	2.850	2.853	2.848	2.847	2.852	2.849	2.850	2.851	2.847
55	2.867	2.872	2.873	2.869	2.871	2.870	2.866	2.880	2.871	2.867
56	2.838	2.842	2.845	2.842	2.840	2.844	2.841	2.846	2.844	2.840
57	2.863	2.869	2.869	2.864	2.863	2.868	2.863	2.867	2.868	2.864
58	2.855	2.858	2.861	2.856	2.857	2.858	2.856	2.858	2.859	2.854
59	2.865	2.871	2.869	2.869	2.869	2.872	2.867	2.870	2.872	2.867
60	2.862	2.869	2.870	2.865	2.864	2.869	2.864	2.868	2.869	2.863
Ave.	2.855	2.860	2.862	2.857	2.857	2.862	2.856	2.8608	2.8625	2.8553
Med.	2.862	2.866	2.869	2.864	2.863	2.868	2.863	2.8650	2.8680	2.8630
st dev	0.0120	0.0128	0.0128	0.0121	0.0123	0.0117	0.0119	0.0145	0.0181	0.0122
Min.	2.837	2.841	2.843	2.839	2.838	2.844	2.838	2.8380	2.8420	2.8370
Max.	2.871	2.875	2.880	2.872	2.874	2.879	2.871	2.8880	2.9320	2.8700

**3.6 Data Set 2, 85°C, 60mA (Chromaticity Shift)**

No.	u'	v'	CCT(K)	Chromaticity Shift ( $\Delta u'v'$ )								
	Ohr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	0.2624	0.5276	2702	0.0004	0.0006	0.0008	0.0012	0.0014	0.0018	0.0018	0.0023	0.0027
32	0.2604	0.5248	2755	0.0001	0.0005	0.0007	0.0011	0.0013	0.0017	0.0018	0.0022	0.0026
33	0.2601	0.5246	2762	0.0002	0.0004	0.0009	0.0013	0.0014	0.0018	0.0018	0.0021	0.0025
34	0.2599	0.5252	2763	0.0002	0.0006	0.0006	0.0010	0.0012	0.0016	0.0017	0.0020	0.0022
35	0.2621	0.5253	2717	0.0003	0.0006	0.0007	0.0011	0.0013	0.0017	0.0017	0.0020	0.0024
36	0.2607	0.5271	2740	0.0001	0.0005	0.0007	0.0011	0.0013	0.0017	0.0020	0.0021	0.0024
37	0.2586	0.5258	2789	0.0002	0.0006	0.0008	0.0012	0.0014	0.0017	0.0021	0.0022	0.0024
38	0.2611	0.5276	2729	0.0002	0.0007	0.0007	0.0011	0.0012	0.0017	0.0019	0.0020	0.0024
39	0.2585	0.5228	2806	0.0002	0.0006	0.0008	0.0014	0.0016	0.0019	0.0023	0.0024	0.0026
40	0.2624	0.5246	2714	0.0002	0.0006	0.0006	0.0011	0.0013	0.0019	0.0021	0.0024	0.0027
41	0.2598	0.5286	2752	0.0003	0.0007	0.0009	0.0012	0.0013	0.0017	0.0021	0.0020	0.0022
42	0.2628	0.5263	2699	0.0003	0.0007	0.0010	0.0012	0.0014	0.0017	0.0021	0.0020	0.0023
43	0.2626	0.5271	2699	0.0002	0.0007	0.0010	0.0012	0.0014	0.0017	0.0022	0.0024	0.0026
44	0.2619	0.5295	2704	0.0002	0.0006	0.0009	0.0012	0.0014	0.0017	0.0019	0.0022	0.0025
45	0.2598	0.5264	2761	0.0001	0.0006	0.0009	0.0012	0.0014	0.0018	0.0022	0.0024	0.0025
46	0.2625	0.5259	2706	0.0003	0.0008	0.0010	0.0013	0.0014	0.0018	0.0021	0.0024	0.0026
47	0.2607	0.5259	2744	0.0001	0.0005	0.0009	0.0011	0.0013	0.0017	0.0019	0.0024	0.0026
48	0.2583	0.5224	2812	0.0001	0.0005	0.0009	0.0013	0.0014	0.0018	0.0022	0.0024	0.0025
49	0.2605	0.5280	2740	0.0002	0.0004	0.0009	0.0012	0.0013	0.0017	0.0019	0.0021	0.0022
50	0.2619	0.5284	2709	0.0004	0.0009	0.0011	0.0013	0.0016	0.0019	0.0021	0.0024	0.0024
51	0.2589	0.5230	2797	0.0003	0.0008	0.0011	0.0014	0.0017	0.0020	0.0023	0.0027	0.0028
52	0.2621	0.5273	2709	0.0001	0.0006	0.0010	0.0012	0.0014	0.0018	0.0021	0.0025	0.0024
53	0.2620	0.5259	2715	0.0002	0.0006	0.0009	0.0012	0.0014	0.0017	0.0021	0.0023	0.0023
54	0.2587	0.5235	2798	0.0002	0.0007	0.0008	0.0011	0.0012	0.0017	0.0020	0.0022	0.0024
55	0.2613	0.5272	2725	0.0002	0.0005	0.0009	0.0011	0.0013	0.0017	0.0022	0.0023	0.0024
56	0.2595	0.5246	2776	0.0001	0.0006	0.0010	0.0012	0.0014	0.0017	0.0020	0.0021	0.0023
57	0.2619	0.5270	2715	0.0004	0.0006	0.0009	0.0012	0.0014	0.0016	0.0021	0.0022	0.0024
58	0.2621	0.5255	2715	0.0006	0.0009	0.0013	0.0016	0.0018	0.0021	0.0025	0.0027	0.0028
59	0.2619	0.5282	2709	0.0002	0.0005	0.0009	0.0011	0.0013	0.0017	0.0021	0.0024	0.0025
60	0.2567	0.5258	2830	0.0001	0.0004	0.0009	0.0010	0.0012	0.0016	0.0019	0.0022	0.0022
Ave.	0.2607	0.5261	2743	0.0002	0.0006	0.0009	0.0012	0.0014	0.0018	0.0020	0.0023	0.0025
Med.	0.2609	0.5259	2735	0.0002	0.0006	0.0009	0.0012	0.0014	0.0017	0.0021	0.0023	0.0024
st dev	0.0016	0.0018	38.5397	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002
Min.	0.2567	0.5224	2699	0.0001	0.0004	0.0006	0.0010	0.0012	0.0016	0.0017	0.0020	0.0022
Max.	0.2628	0.5295	2830	0.0006	0.0009	0.0013	0.0016	0.0018	0.0021	0.0025	0.0027	0.0028

**3.7 Data Set 3, 105°C, 60mA (Lumen Maintenance)**

No.	Φ(lm)	Lumen Maintenance (%)								
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
61	23.55	99.92	99.87	99.45	99.02	98.81	98.64	98.39	98.13	98.09
62	23.82	99.58	99.50	99.24	98.95	98.74	98.49	98.28	97.94	97.86
63	23.41	99.91	99.66	99.44	98.97	98.85	98.46	98.08	97.99	97.69
64	23.55	99.87	99.83	99.53	99.19	98.90	98.64	98.26	98.05	97.96
65	23.80	99.96	99.66	99.50	99.33	99.12	98.61	98.28	98.07	97.77
66	23.33	99.74	99.61	99.31	99.10	98.76	98.59	98.24	97.94	97.69
67	23.72	99.66	99.45	99.11	98.86	98.65	98.44	98.19	97.93	97.85
68	23.44	99.53	99.19	98.85	98.55	98.12	97.87	97.74	97.57	97.18
69	23.75	99.49	99.12	98.86	98.48	98.15	97.89	97.81	97.47	97.22
70	23.79	99.66	99.58	99.41	99.12	98.70	98.28	98.02	97.81	97.60
71	23.60	99.75	99.62	99.49	99.24	99.03	98.73	98.43	98.31	98.01
72	23.38	99.62	99.40	99.14	98.85	98.59	98.16	97.86	97.48	97.35
73	23.72	99.87	99.83	99.70	99.54	99.41	99.03	98.82	98.40	98.02
74	23.40	99.57	99.27	99.19	98.97	98.50	98.29	98.12	97.82	97.35
75	23.84	99.71	99.29	99.04	98.66	98.28	98.07	97.61	97.36	97.23
76	23.69	99.62	99.41	99.16	98.86	98.52	98.18	97.93	97.64	97.05
77	23.93	99.71	99.50	99.29	98.91	98.37	98.24	97.95	97.70	97.24
78	23.55	99.62	99.45	99.11	98.90	98.51	98.17	97.83	97.37	96.94
79	23.29	99.70	99.36	99.10	98.75	98.58	98.41	97.98	97.72	97.47
80	23.83	99.71	99.50	99.16	98.91	98.66	98.36	98.07	97.82	97.57
81	23.07	99.65	99.39	99.09	98.70	98.61	98.22	97.88	97.75	97.53
82	23.47	99.62	99.40	99.19	98.98	98.51	98.38	98.30	98.00	97.83
83	23.65	99.83	99.41	99.15	98.90	98.60	98.44	98.27	98.01	97.84
84	23.46	99.74	99.53	99.32	99.02	98.68	98.29	98.00	97.57	97.19
85	23.34	99.66	99.57	99.27	98.89	98.71	98.41	98.24	97.86	97.60
86	23.26	99.79	99.53	99.36	99.01	98.75	98.54	98.28	97.89	97.51
87	23.39	99.57	99.40	99.23	98.97	98.72	98.46	98.20	97.95	97.82
88	23.38	99.79	99.53	99.27	98.89	98.59	98.46	98.29	98.08	97.60
89	23.52	99.57	99.49	99.19	98.77	98.30	98.04	97.79	97.58	97.41
90	23.47	99.66	99.36	98.93	98.72	98.34	98.00	97.83	97.49	97.23
Ave.	23.55	99.70	99.49	99.24	98.93	98.64	98.36	98.10	97.82	97.56
Med.	23.54	99.68	99.49	99.21	98.91	98.63	98.40	98.10	97.84	97.58
st dev	0.2087	0.1211	0.1753	0.1963	0.2181	0.2726	0.2548	0.2545	0.2642	0.3115
Min.	23.07	99.49	99.12	98.85	98.48	98.12	97.87	97.61	97.36	96.94
Max.	23.93	99.96	99.87	99.70	99.54	99.41	99.03	98.82	98.40	98.09

**3.8 Data Set 3, 105°C, 60mA (Forward Voltage)**

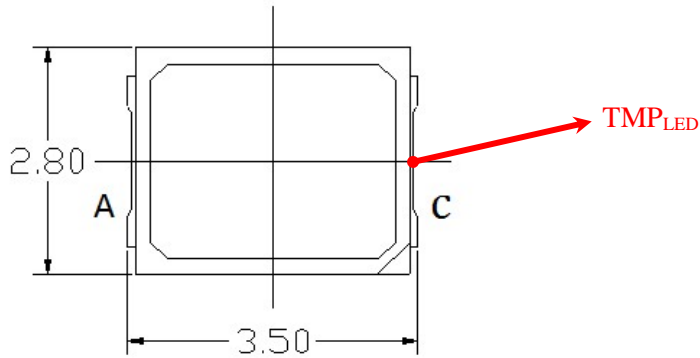
No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
61	2.848	2.853	2.856	2.852	2.851	2.856	2.849	2.854	2.858	2.850
62	2.873	2.877	2.880	2.874	2.874	2.879	2.874	2.875	2.882	2.873
63	2.841	2.844	2.847	2.843	2.845	2.844	2.842	2.844	2.865	2.841
64	2.842	2.846	2.848	2.844	2.844	2.848	2.844	2.844	2.849	2.843
65	2.863	2.869	2.870	2.865	2.863	2.880	2.864	2.865	2.871	2.863
66	2.866	2.872	2.873	2.868	2.868	2.876	2.867	2.868	2.875	2.866
67	2.862	2.868	2.869	2.864	2.863	2.878	2.863	2.866	2.868	2.862
68	2.865	2.872	2.873	2.868	2.868	2.875	2.867	2.868	2.873	2.868
69	2.862	2.866	2.868	2.863	2.863	2.868	2.863	2.863	2.869	2.861
70	2.837	2.845	2.843	2.840	2.840	2.841	2.837	2.843	2.843	2.837
71	2.844	2.847	2.850	2.846	2.847	2.850	2.844	2.851	2.851	2.844
72	2.843	2.847	2.849	2.846	2.843	2.859	2.843	2.850	2.850	2.843
73	2.841	2.845	2.848	2.844	2.843	2.878	2.843	2.858	2.849	2.843
74	2.863	2.868	2.869	2.865	2.863	2.867	2.863	2.873	2.871	2.863
75	2.865	2.870	2.869	2.867	2.865	2.871	2.864	2.864	2.873	2.865
76	2.860	2.866	2.868	2.863	2.861	2.871	2.863	2.862	2.868	2.861
77	2.857	2.860	2.863	2.860	2.868	2.863	2.858	2.857	2.864	2.857
78	2.860	2.865	2.867	2.862	2.861	2.866	2.862	2.863	2.868	2.861
79	2.864	2.870	2.871	2.867	2.866	2.867	2.864	2.864	2.874	2.865
80	2.863	2.868	2.869	2.865	2.865	2.865	2.863	2.865	2.871	2.863
81	2.841	2.844	2.846	2.843	2.843	2.844	2.841	2.843	2.847	2.841
82	2.865	2.869	2.845	2.866	2.864	2.868	2.865	2.865	2.872	2.865
83	2.868	2.873	2.864	2.870	2.869	2.871	2.868	2.870	2.875	2.868
84	2.857	2.861	2.864	2.859	2.858	2.861	2.857	2.865	2.864	2.857
85	2.857	2.861	2.863	2.859	2.859	2.861	2.858	2.860	2.863	2.858
86	2.865	2.870	2.871	2.868	2.865	2.869	2.867	2.873	2.873	2.865
87	2.860	2.865	2.868	2.863	2.865	2.863	2.861	2.862	2.872	2.862
88	2.852	2.857	2.858	2.855	2.858	2.856	2.854	2.854	2.861	2.853
89	2.865	2.872	2.873	2.869	2.873	2.870	2.869	2.866	2.876	2.868
90	2.880	2.884	2.886	2.882	2.882	2.884	2.882	2.881	2.890	2.880
Ave.	2.858	2.862	2.863	2.860	2.860	2.865	2.859	2.8612	2.8662	2.8582
Med.	2.861	2.866	2.868	2.863	2.863	2.867	2.863	2.8635	2.8685	2.8615
st dev	0.0108	0.0112	0.0113	0.0106	0.0107	0.0113	0.0110	0.0098	0.0110	0.0108
Min.	2.837	2.844	2.843	2.840	2.840	2.841	2.837	2.8430	2.8430	2.8370
Max.	2.880	2.884	2.886	2.882	2.882	2.884	2.882	2.8810	2.8900	2.8800

**3.9 Data Set 3, 105°C, 60mA (Chromaticity Shift)**

No.	u'	v'	CCT(K)	Chromaticity Shift ( $\Delta u'v'$ )								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
61	0.2597	0.5230	2779	0.0005	0.0006	0.0011	0.0015	0.0015	0.0021	0.0022	0.0024	0.0026
62	0.2606	0.5276	2739	0.0004	0.0006	0.0008	0.0013	0.0014	0.0019	0.0022	0.0024	0.0024
63	0.2603	0.5251	2757	0.0005	0.0007	0.0010	0.0014	0.0014	0.0020	0.0021	0.0024	0.0026
64	0.2605	0.5249	2753	0.0004	0.0007	0.0009	0.0013	0.0016	0.0018	0.0020	0.0021	0.0024
65	0.2605	0.5277	2740	0.0004	0.0006	0.0009	0.0013	0.0016	0.0018	0.0019	0.0022	0.0024
66	0.2624	0.5286	2696	0.0003	0.0007	0.0008	0.0013	0.0015	0.0018	0.0019	0.0021	0.0022
67	0.2616	0.5281	2716	0.0004	0.0006	0.0009	0.0014	0.0016	0.0019	0.0021	0.0022	0.0022
68	0.2620	0.5275	2709	0.0006	0.0007	0.0009	0.0014	0.0017	0.0020	0.0021	0.0023	0.0023
69	0.2613	0.5274	2725	0.0004	0.0006	0.0010	0.0014	0.0017	0.0020	0.0021	0.0023	0.0025
70	0.2594	0.5260	2772	0.0005	0.0007	0.0010	0.0013	0.0016	0.0018	0.0022	0.0024	0.0025
71	0.2606	0.5248	2751	0.0004	0.0006	0.0009	0.0014	0.0016	0.0019	0.0019	0.0022	0.0024
72	0.2596	0.5235	2778	0.0004	0.0006	0.0009	0.0015	0.0017	0.0019	0.0022	0.0024	0.0027
73	0.2576	0.5230	2826	0.0006	0.0006	0.0012	0.0016	0.0018	0.0021	0.0025	0.0027	0.0027
74	0.2595	0.5227	2783	0.0003	0.0006	0.0008	0.0013	0.0016	0.0018	0.0021	0.0022	0.0026
75	0.2598	0.5256	2764	0.0004	0.0010	0.0011	0.0014	0.0016	0.0019	0.0020	0.0023	0.0024
76	0.2609	0.5255	2740	0.0003	0.0007	0.0008	0.0012	0.0015	0.0018	0.0019	0.0022	0.0024
77	0.2598	0.5251	2767	0.0004	0.0007	0.0009	0.0014	0.0014	0.0019	0.0021	0.0022	0.0025
78	0.2611	0.5275	2729	0.0004	0.0007	0.0009	0.0014	0.0016	0.0019	0.0025	0.0023	0.0024
79	0.2628	0.5251	2703	0.0004	0.0006	0.0010	0.0014	0.0016	0.0020	0.0024	0.0025	0.0026
80	0.2595	0.5264	2767	0.0004	0.0006	0.0009	0.0013	0.0016	0.0019	0.0022	0.0025	0.0023
81	0.2591	0.5261	2777	0.0004	0.0005	0.0010	0.0015	0.0017	0.0020	0.0023	0.0026	0.0024
82	0.2610	0.5278	2730	0.0004	0.0006	0.0010	0.0014	0.0017	0.0019	0.0021	0.0024	0.0022
83	0.2604	0.5261	2750	0.0004	0.0016	0.0017	0.0014	0.0016	0.0018	0.0020	0.0023	0.0022
84	0.2579	0.5259	2804	0.0003	0.0007	0.0008	0.0013	0.0015	0.0018	0.0022	0.0023	0.0024
85	0.2598	0.5234	2774	0.0004	0.0006	0.0008	0.0012	0.0015	0.0019	0.0021	0.0024	0.0023
86	0.2588	0.5279	2775	0.0003	0.0007	0.0009	0.0012	0.0016	0.0018	0.0020	0.0024	0.0023
87	0.2601	0.5245	2762	0.0003	0.0007	0.0009	0.0014	0.0016	0.0019	0.0021	0.0025	0.0026
88	0.2611	0.5243	2743	0.0004	0.0007	0.0011	0.0014	0.0017	0.0020	0.0024	0.0026	0.0027
89	0.2615	0.5273	2721	0.0004	0.0007	0.0008	0.0012	0.0016	0.0018	0.0021	0.0024	0.0026
90	0.2586	0.5253	2792	0.0005	0.0006	0.0011	0.0014	0.0017	0.0020	0.0024	0.0025	0.0026
Ave.	0.2603	0.5258	2754	0.0004	0.0007	0.0010	0.0014	0.0016	0.0019	0.0021	0.0024	0.0024
Med.	0.2604	0.5258	2755	0.0004	0.0007	0.0009	0.0014	0.0016	0.0019	0.0021	0.0024	0.0024
st dev	0.0012	0.0017	30.3451	0.0001	0.0002	0.0002	0.0001	0.0001	0.0001	0.0002	0.0001	0.0002
Min.	0.2576	0.5227	2696	0.0003	0.0005	0.0008	0.0012	0.0014	0.0018	0.0019	0.0021	0.0022
Max.	0.2628	0.5286	2826	0.0006	0.0016	0.0017	0.0016	0.0018	0.0021	0.0025	0.0027	0.0027

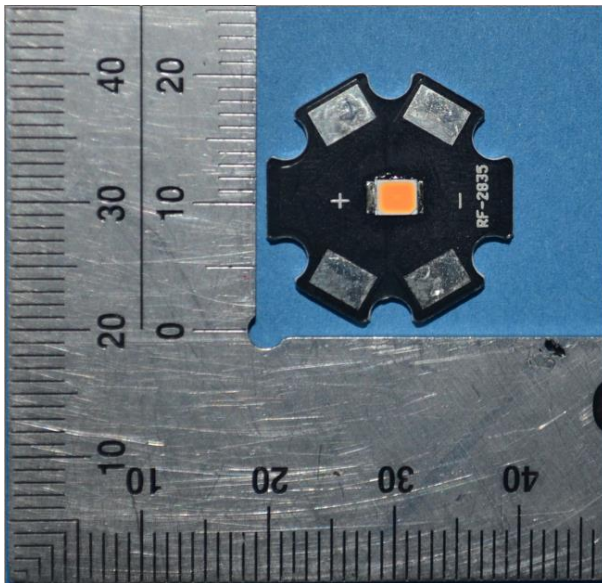
## 4 - DUT Photo

### 4.1 Mechanical Dimensions



All dimensions are in millimeter

### 4.2 DUT Photo



### Report Revision

Report Number	Report Date	Contents
R2DG161221050-10	2018-02-05	Original report.
R2DG161221050-10-M1	2018-07-30	Add the covered model in page 3 and Reported TM-21 L <sub>90</sub> Lifetime in page 6.

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