TEST REPORT OF ANSI/IES LM-80-15

Approved Method for Measuring Luminous Flux and Color Maintenance of LED Packages,Arrays and Modules

Client.....	:	Shenzhen Tongyifang Optoelectronic Technology Co., Ltd.
Address.....	:	No.4 Building,XinLianHe Industrial Park, JinCheng Road, ShaJing Town, BaoAn District,ShenZhen City
Test Model.....	:	DGY-S-P2-10-12
Brand Name.....	:	同一方 TYF LED
Testing Laboratory....	:	Guangdong Meide Testing Technology Co., Ltd.
Address.....	:	1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-tech Industrial Development Zone,Dongguan City,Guangdong Pr., China.
Testing Location.....	:	As above
Report No.....	:	CA1909148L 02001
Test Date.....	:	2019-08-15 to 2020-08-25
Report Date.....	:	2020-08-30

Tested by:	Checked by:	Approved by:
Tim Qian/ Test Engineer	Luke Lei/ Project Engineer	Jessie Li/ Technical Manager

Note 1: 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 use in part without prior written consent from Guangdong Meide Testing Technology Co., Ltd. This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP,NIST, or any agency of the Federal Government.
Note 2: This report does not imply product certification, approval, or endorsement by NVLAP, NIST,or any agency of theFederal Government.

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ENERGY STAR® LM-80 Cover Sheet

Administrative Information

Tested subcomponent series:	N/A
Tested subcomponent model number:	DGY-S-P2-10-12
Report issue date:	2020-08-30
Report revision date(if applicable):	N/A
Testing start date:	2019-08-15
Testing completion date:	2020-08-25

DUT Identification

DUT manufacture's name:	Shenzhen Tongyifang Optoelectronic Technology Co., Ltd.
DUT identification,e.g., model number:	DGY-S-P2-10-12
Description of DUT,including if the DUT is an LED package or module:	LED Package

DUT Characteristics

Total input power(W):	1.0 W
Average current density per LED die(mA/mm^2):	775 mA/mm^2
Average power density per LED die(W/mm^2):	2.58 W/mm^2
Representative CRI(Ra) of the tested sample set: (Indicate whether the reported value is the mean or Median value of the sample set,or per unit)	80
Minimum die edge to die edge spacing:	0.12mm

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1.General Information

1.1 Description of LED Light Sources

Sample Size:

50Pcs samples were received on 2019-08-05 ,The samples were numbered from S1 to S25 and S26 to S50.

Manufacture:	Shenzhen Tongyifang Optoelectronic Technology Co., Ltd.
Part Number:	DGY-S-P2-10-12
Part Type:	LED Package
Drive Level:	DC 300mA
Nominal CCT:	2700K
Power:	1.0W
CRI:	80

Sampling Method:

LED samples for IESNA LM-80 testing consist of units built from 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.

1.2 Standards Used

- ANSI/IES LM-80-15 IES Approved Method for Luminous Flux and Color Maintenance of LED Packages,Arrays and Modules
- ENERGY STAR® Requirements for the use of LM-80 Data(This standard was not accredited by NVLAP)

1.3 Test equipment list

Test Equipment	Serial No	Model No	Calibration due date
Integrating Sphere System	MD-E033	0.5m	2021/05/19
Standard Light Source	MD-E034	D062	2021/05/19
High Accuracy Array Spectroradio Meter	MD-E011	HAAS-3000	2020/10/06
Digital Power Meter	MD-E008	PF310	2020/10/06
Precision digital stabilized DC power supply	MD-E009	WY305	2020/10/06
Temperature Tester	MD-E038	UFS-D8036	2021/06/17

Statement of Traceability: Guangdong Meide Testing Technology Co., Ltd.attested that all calibration has been performed using suitable standards traceable to national primary standards and International System of Unit(SI).

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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 ±3% of the specified value of the manufacturer during maintenance test, and was within ±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 monitoredby 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 ±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°C ± 2°C, RH＜65%.

1.6 Photometric Measurement Method

Integrating sphere and spectroradiometer is used to measure luminous flux and chromaticity coordinate u'v'.2π measurement was used and sample was drived by DC power supply. The forward current was regulated to within ±0.5% of the nominal value. The test system was calibrated by halogen reference lamp.The ambient temperature during test was set to 25°C ± 2°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(luminous flux) measurements is U=2.1%(K=2),at the 95% confidence level.The uncertainty of the correlated color temperature measurements is U=18K(K=2),at the 95% confidence level.The uncertainty of the temperature is U=0.5°C(K=2),at the 95% confidence level.

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1.7 Sample Set

Data Set 1:85°C,300mA	
Part number：	DGY-S-P2-10-12
Number of Units:	25
Case Temperature(T_S):	＞83°C
Ambient Temperature(T_A):	＞80°C
Life Test Drive Current:	300mA
Measurement Current:	300mA

Data Set 2:105°C,300mA	
Part number：	DGY-S-P2-10-12
Number of Units:	25
Case Temperature(T_S):	＞103°C
Ambient Temperature(T_A):	＞100°C
Life Test Drive Current:	300mA
Measurement Current:	300mA

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2. SUMMARY OF TEST RESULT

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	α	β	Reported TM-21 L_{70} Lifetime	Reported TM-21 L_{90} Lifetime
1	25	0	1000hrs	9000hrs	2.501E-06	1.005	>54000hours	44000hours
2	25	0	1000hrs	9000hrs	3.056E-06	1.005	>54000hours	36000hours

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	100.25%	100.01%	99.79%	99.54%	99.27%	99.01%	98.80%	98.55%	98.28%
2	100.07%	99.83%	99.52%	99.25%	98.98%	98.75%	98.44%	98.12%	97.72%

Average Photosynthetic Photon Flux Maintenance (Percentage of Initial Photosynthetic Photon Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	100.20%	100.03%	99.82%	99.60%	99.30%	98.98%	98.76%	98.51%	98.25%
2	99.99%	99.80%	99.48%	99.30%	99.01%	98.79%	98.48%	98.16%	97.76%

Average Chromaticity Shift (Δu'v')

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.0002	0.0005	0.0005	0.0008	0.0011	0.0014	0.0015	0.0017	0.0019
2	0.0003	0.0004	0.0007	0.0010	0.0013	0.0016	0.0019	0.0020	0.0022

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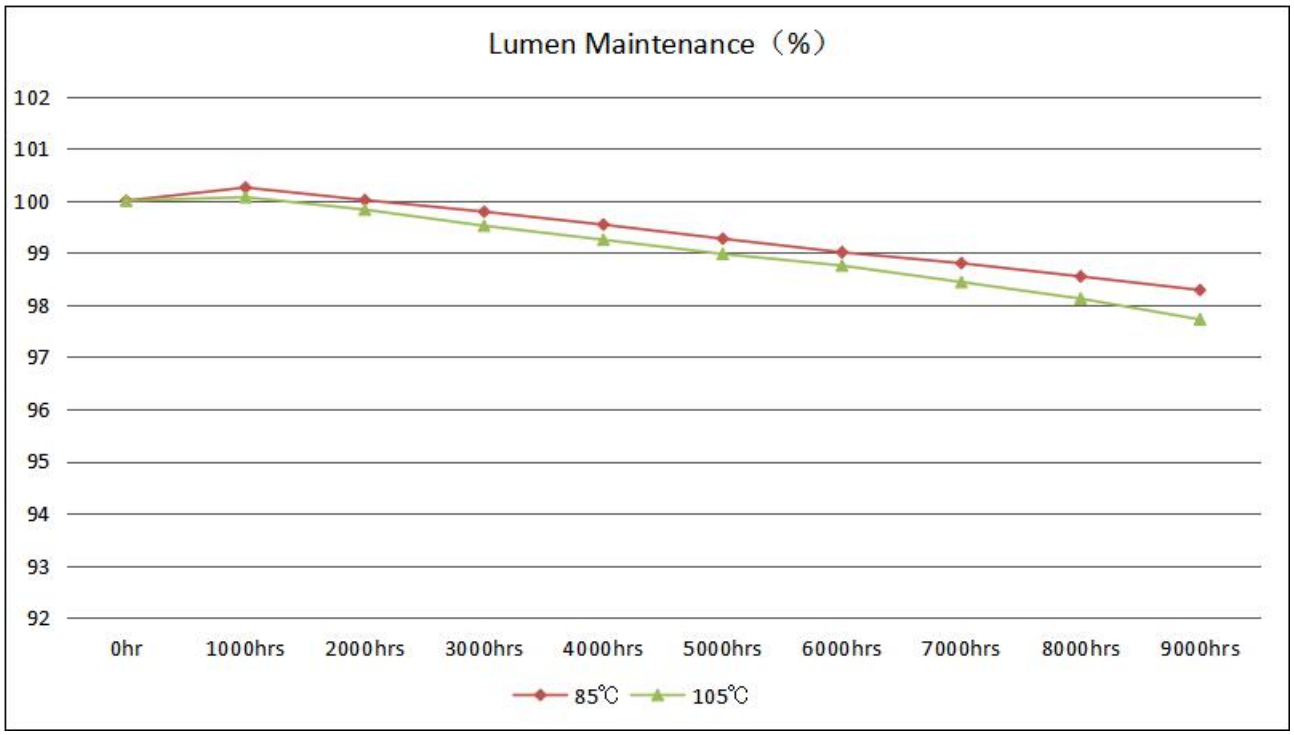

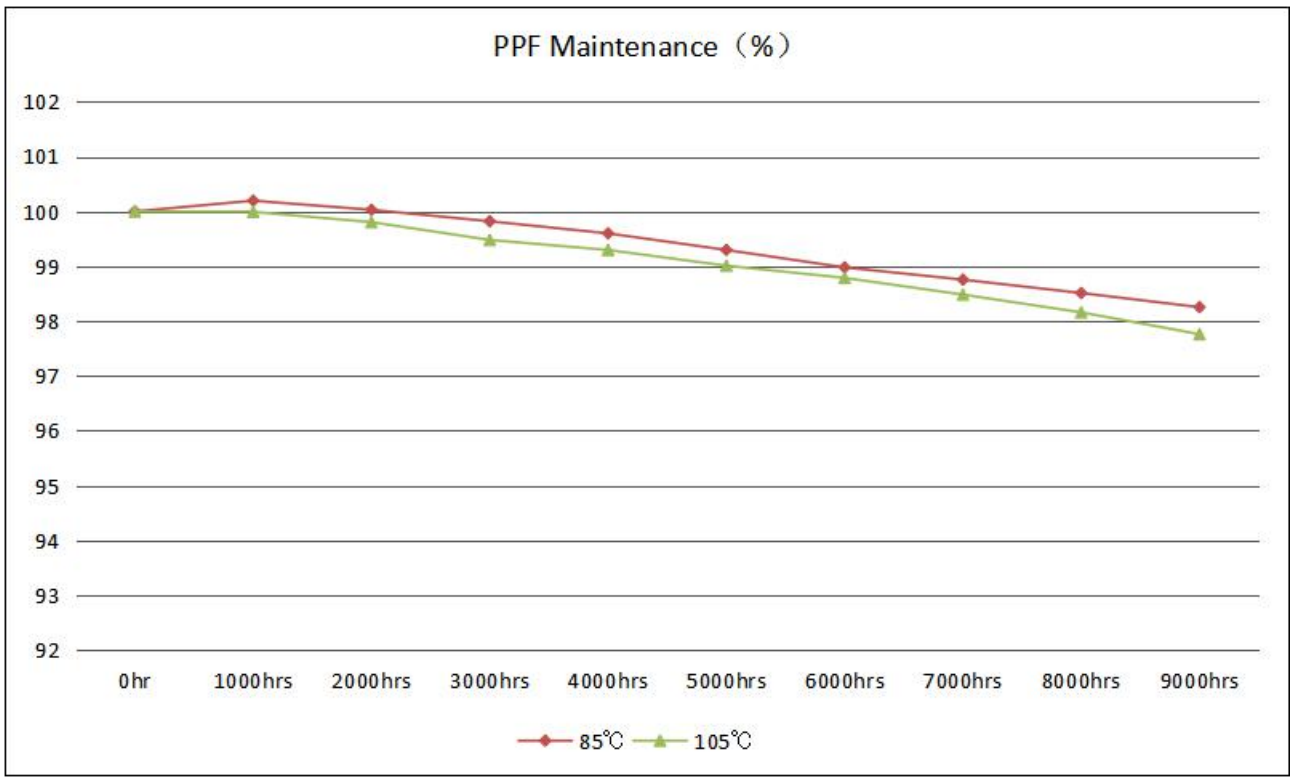

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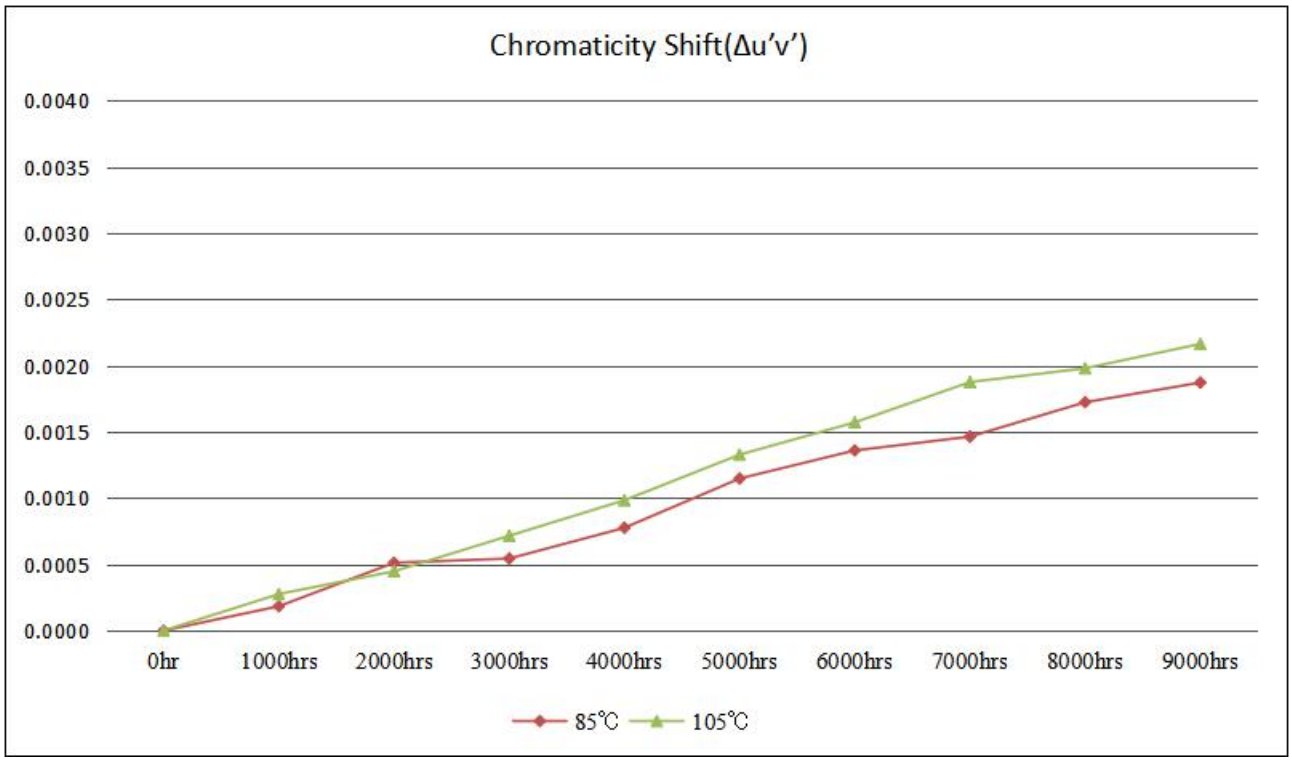

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3.Test Data

3.1 Data Set 1, 85°C, 300mA (Lumen Maintenance)

Sample Number	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
S1	145.1	100.28	100.04	99.86	99.62	99.40	99.11	98.80	98.56	98.25
S2	142.4	100.29	100.07	99.84	99.63	99.34	99.11	98.78	98.50	98.24
S3	139.4	100.35	100.13	99.80	99.56	99.24	98.94	98.81	98.52	98.28
S4	138.9	100.31	100.10	99.86	99.64	99.30	99.05	98.84	98.58	98.24
S5	139.2	100.28	100.07	99.85	99.63	99.32	99.10	98.82	98.62	98.30
S6	138.6	100.27	99.96	99.80	99.59	99.28	99.10	98.87	98.57	98.30
S7	138.1	100.31	100.10	99.88	99.66	99.47	99.20	98.97	98.71	98.38
S8	137.6	100.13	99.87	99.63	99.42	99.23	98.98	98.79	98.48	98.24
S9	137.2	100.10	99.83	99.61	99.42	99.22	98.92	98.74	98.49	98.28
S10	139.3	99.97	99.78	99.55	99.35	99.15	98.94	98.72	98.50	98.26
S11	138.8	100.28	100.08	99.86	99.50	99.28	99.01	98.82	98.56	98.29
S12	138.4	100.21	99.97	99.76	99.54	99.29	98.99	98.82	98.53	98.23
S13	138.1	100.20	99.97	99.75	99.52	99.32	99.12	98.84	98.61	98.36
S14	137.8	100.23	99.89	99.75	99.51	99.21	98.98	98.82	98.60	98.30
S15	140.4	100.32	100.08	99.85	99.62	99.31	99.07	98.82	98.53	98.30
S16	138.9	100.27	100.04	99.86	99.48	99.21	98.88	98.72	98.50	98.29
S17	138.9	100.30	100.09	99.88	99.55	99.24	99.02	98.81	98.56	98.29
S18	139.6	100.33	100.15	99.89	99.60	99.27	98.96	98.74	98.49	98.26
S19	139.0	100.20	99.95	99.70	99.50	99.23	98.94	98.78	98.53	98.31
S20	138.5	100.25	99.96	99.76	99.48	99.19	98.89	98.72	98.48	98.18
S21	138.1	100.30	100.06	99.78	99.52	99.24	98.93	98.76	98.52	98.29
S22	137.7	100.27	100.05	99.82	99.51	99.26	99.04	98.84	98.60	98.35
S23	140.3	100.27	100.08	99.81	99.51	99.21	98.95	98.75	98.51	98.29
S24	139.4	100.29	99.97	99.79	99.57	99.28	98.94	98.78	98.52	98.28
S25	139.0	100.30	100.00	99.77	99.56	99.25	99.06	98.83	98.59	98.32
Ave.	139.1	100.25	100.01	99.79	99.54	99.27	99.01	98.80	98.55	98.28
Med.	138.9	100.28	100.04	99.80	99.54	99.26	98.99	98.81	98.53	98.29
St dev	1.6366	0.0831	0.0951	0.0881	0.0764	0.0679	0.0834	0.0553	0.0547	0.0430
Min.	137.2	99.97	99.78	99.55	99.35	99.15	98.88	98.72	98.48	98.18
Max.	145.1	100.35	100.15	99.89	99.66	99.47	99.20	98.97	98.71	98.38

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3.2 Data Set 1, 85°C, 300mA (Photosynthetic Photon Flux Maintenance)

Sample Number	PPF (μ mol/s)	Photosynthetic Photon Flux Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
S1	2.093	100.30	100.17	99.97	99.62	99.37	99.04	98.81	98.54	98.23
S2	2.053	100.18	100.05	99.86	99.61	99.34	99.00	98.68	98.51	98.23
S3	2.010	100.19	100.02	99.87	99.67	99.40	99.14	98.77	98.62	98.39
S4	2.003	100.26	100.07	99.83	99.64	99.31	99.03	98.78	98.58	98.29
S5	2.006	100.30	99.93	99.79	99.55	99.15	98.76	98.63	98.36	98.06
S6	1.998	100.32	100.14	99.99	99.79	99.41	99.15	98.89	98.72	98.40
S7	1.991	100.30	100.15	100.03	99.77	99.36	99.07	98.71	98.54	98.17
S8	1.984	100.21	100.09	99.90	99.64	99.39	99.05	98.79	98.55	98.16
S9	1.979	100.07	100.01	99.83	99.55	99.10	98.75	98.58	98.39	98.12
S10	2.008	100.20	100.07	99.79	99.47	99.13	98.77	98.52	98.22	97.99
S11	2.001	100.24	100.11	99.96	99.74	99.36	98.95	98.60	98.43	98.33
S12	1.996	100.18	99.97	99.74	99.52	99.21	98.91	98.76	98.47	98.32
S13	1.991	100.03	99.92	99.66	99.49	99.24	99.05	98.92	98.62	98.32
S14	1.987	100.17	99.97	99.73	99.50	99.33	98.98	98.76	98.54	98.46
S15	2.024	100.25	100.08	99.83	99.64	99.47	99.16	98.90	98.60	98.33
S16	2.003	100.19	100.01	99.82	99.66	99.36	99.08	98.86	98.63	98.34
S17	2.004	100.22	100.05	99.88	99.66	99.24	98.89	98.63	98.39	98.10
S18	2.014	100.28	99.97	99.83	99.67	99.35	99.08	98.86	98.57	98.22
S19	2.006	100.17	100.03	99.75	99.57	99.14	98.73	98.77	98.37	98.09
S20	1.999	100.02	99.94	99.67	99.45	99.26	98.93	98.80	98.55	98.24
S21	1.993	100.18	99.97	99.74	99.52	99.21	98.91	98.76	98.47	98.32
S22	1.988	100.28	100.17	99.89	99.61	99.33	98.98	98.71	98.55	98.41
S23	2.023	100.03	99.92	99.66	99.49	99.24	99.05	98.92	98.62	98.32
S24	2.012	100.17	99.97	99.73	99.50	99.33	98.98	98.76	98.54	98.46
S25	2.005	100.17	99.96	99.76	99.67	99.41	99.05	98.73	98.43	98.05
Ave.	2.007	100.20	100.03	99.82	99.60	99.30	98.98	98.76	98.51	98.25
Med.	2.003	100.19	100.02	99.83	99.61	99.33	99.00	98.76	98.54	98.29
St dev	0.0235	0.0859	0.0786	0.1015	0.0945	0.0998	0.1242	0.1070	0.1100	0.1327
Min.	1.9785	100.02	99.92	99.66	99.45	99.10	98.73	98.52	98.22	97.99
Max.	2.093	100.32	100.17	100.03	99.79	99.47	99.16	98.92	98.72	98.46

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3.3 Data Set 1, 85°C, 300mA (Forward Voltage)

Sample Number	Forward Voltage(V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
S1	3.085	3.084	3.082	3.081	3.078	3.082	3.078	3.077	3.081	3.079
S2	3.086	3.090	3.087	3.091	3.089	3.094	3.088	3.090	3.090	3.090
S3	3.076	3.074	3.077	3.071	3.073	3.077	3.073	3.074	3.074	3.077
S4	3.074	3.071	3.078	3.071	3.080	3.073	3.069	3.072	3.082	3.077
S5	3.082	3.082	3.083	3.086	3.087	3.086	3.092	3.089	3.084	3.090
S6	3.079	3.082	3.082	3.085	3.082	3.081	3.088	3.087	3.081	3.090
S7	3.076	3.081	3.080	3.080	3.078	3.076	3.081	3.083	3.078	3.080
S8	3.074	3.080	3.072	3.078	3.073	3.072	3.079	3.076	3.069	3.081
S9	3.072	3.076	3.070	3.070	3.075	3.072	3.076	3.080	3.073	3.075
S10	3.075	3.076	3.076	3.078	3.076	3.084	3.078	3.074	3.077	3.081
S11	3.072	3.065	3.069	3.069	3.074	3.069	3.068	3.072	3.072	3.070
S12	3.070	3.066	3.069	3.068	3.069	3.068	3.068	3.069	3.072	3.074
S13	3.069	3.069	3.073	3.069	3.072	3.070	3.070	3.071	3.069	3.068
S14	3.067	3.068	3.071	3.073	3.069	3.071	3.072	3.074	3.068	3.069
S15	3.080	3.076	3.078	3.077	3.069	3.079	3.074	3.076	3.070	3.077
S16	3.083	3.079	3.076	3.076	3.080	3.076	3.081	3.082	3.075	3.079
S17	3.083	3.076	3.081	3.080	3.081	3.081	3.085	3.084	3.078	3.084
S18	3.079	3.075	3.077	3.079	3.081	3.079	3.078	3.077	3.080	3.082
S19	3.076	3.071	3.077	3.077	3.071	3.076	3.077	3.078	3.081	3.073
S20	3.073	3.074	3.071	3.075	3.075	3.071	3.078	3.079	3.072	3.077
S21	3.071	3.079	3.074	3.077	3.082	3.076	3.074	3.073	3.073	3.073
S22	3.069	3.070	3.072	3.073	3.073	3.072	3.071	3.076	3.070	3.072
S23	3.081	3.086	3.083	3.082	3.083	3.085	3.085	3.087	3.084	3.084
S24	3.077	3.087	3.079	3.082	3.080	3.085	3.087	3.081	3.078	3.081
S25	3.075	3.083	3.079	3.075	3.079	3.083	3.082	3.081	3.077	3.081
Ave.	3.076	3.077	3.077	3.077	3.077	3.078	3.078	3.078	3.076	3.079
Med.	3.076	3.076	3.077	3.077	3.078	3.076	3.078	3.077	3.077	3.079
St dev	0.0053	0.0067	0.0049	0.0058	0.0055	0.0065	0.0068	0.0058	0.0057	0.0062
Min.	3.067	3.065	3.069	3.068	3.069	3.068	3.068	3.069	3.068	3.068
Max.	3.086	3.090	3.087	3.091	3.089	3.094	3.092	3.090	3.090	3.090

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
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3.4 Data Set 1, 85°C, 300mA (Chromaticity Shift)

Sample Number	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
S1	0.2636	0.5281	2675	0.0004	0.0006	0.0005	0.0010	0.0012	0.0015	0.0015	0.0018	0.0015
S2	0.2635	0.5281	2677	0.0001	0.0004	0.0006	0.0007	0.0013	0.0011	0.0011	0.0019	0.0017
S3	0.2622	0.5280	2704	0.0001	0.0004	0.0008	0.0012	0.0012	0.0014	0.0014	0.0019	0.0017
S4	0.2621	0.5283	2705	0.0001	0.0006	0.0007	0.0011	0.0013	0.0017	0.0017	0.0018	0.0019
S5	0.2619	0.5276	2713	0.0001	0.0002	0.0007	0.0011	0.0012	0.0014	0.0014	0.0014	0.0017
S6	0.2630	0.5286	2684	0.0001	0.0003	0.0004	0.0007	0.0013	0.0015	0.0015	0.0017	0.0014
S7	0.2610	0.5281	2727	0.0003	0.0005	0.0006	0.0010	0.0013	0.0015	0.0018	0.0017	0.0021
S8	0.2636	0.5277	2677	0.0004	0.0004	0.0007	0.0010	0.0011	0.0013	0.0014	0.0015	0.0017
S9	0.2634	0.5276	2681	0.0001	0.0004	0.0004	0.0006	0.0010	0.0012	0.0015	0.0017	0.0020
S10	0.2621	0.5280	2707	0.0001	0.0006	0.0006	0.0003	0.0007	0.0010	0.0013	0.0014	0.0016
S11	0.2656	0.5265	2640	0.0002	0.0006	0.0005	0.0008	0.0012	0.0014	0.0014	0.0019	0.0022
S12	0.2617	0.5277	2714	0.0001	0.0006	0.0007	0.0006	0.0011	0.0012	0.0015	0.0018	0.0023
S13	0.2620	0.5277	2710	0.0001	0.0004	0.0005	0.0007	0.0012	0.0014	0.0014	0.0021	0.0022
S14	0.2620	0.5282	2708	0.0002	0.0006	0.0005	0.0007	0.0012	0.0014	0.0014	0.0016	0.0017
S15	0.2621	0.5286	2704	0.0001	0.0004	0.0005	0.0007	0.0010	0.0014	0.0014	0.0019	0.0020
S16	0.2607	0.5271	2739	0.0002	0.0005	0.0007	0.0009	0.0012	0.0015	0.0015	0.0017	0.0019
S17	0.2609	0.5273	2733	0.0004	0.0006	0.0004	0.0008	0.0011	0.0013	0.0013	0.0016	0.0018
S18	0.2605	0.5262	2747	0.0001	0.0003	0.0004	0.0006	0.0009	0.0013	0.0016	0.0013	0.0019
S19	0.2603	0.5258	2753	0.0002	0.0006	0.0006	0.0010	0.0014	0.0016	0.0018	0.0020	0.0018
S20	0.2616	0.5268	2722	0.0003	0.0005	0.0005	0.0006	0.0012	0.0013	0.0015	0.0017	0.0020
S21	0.2595	0.5262	2769	0.0001	0.0006	0.0007	0.0004	0.0010	0.0014	0.0014	0.0018	0.0021
S22	0.2621	0.5258	2714	0.0002	0.0005	0.0002	0.0006	0.0009	0.0014	0.0016	0.0016	0.0014
S23	0.2607	0.5268	2740	0.0001	0.0005	0.0004	0.0008	0.0013	0.0016	0.0017	0.0018	0.0022
S24	0.2603	0.5263	2750	0.0004	0.0007	0.0005	0.0006	0.0011	0.0012	0.0012	0.0019	0.0023
S25	0.2606	0.5263	2744	0.0001	0.0010	0.0005	0.0009	0.0013	0.0010	0.0013	0.0016	0.0017
Ave.	0.2619	0.5273	2713	0.0002	0.0005	0.0005	0.0008	0.0011	0.0014	0.0015	0.0017	0.0019
Med.	0.2620	0.5276	2713	0.0001	0.0005	0.0005	0.0007	0.0012	0.0014	0.0014	0.0017	0.0019
St dev	0.0014	0.0009	30.1567	0.0001	0.0002	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003
Min.	0.2595	0.5258	2640	0.0001	0.0002	0.0002	0.0003	0.0007	0.001	0.0011	0.0013	0.0014
Max.	0.2656	0.5286	2769	0.0004	0.001	0.0008	0.0012	0.0014	0.0017	0.0018	0.0021	0.0023

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3.5 Data Set 2, 105°C, 300mA (Lumen Maintenance)

Sample Number	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
S26	139.0	100.06	99.83	99.52	99.28	98.99	98.73	98.44	98.18	97.74
S27	140.1	100.06	99.87	99.43	99.24	98.93	98.74	98.42	97.95	97.68
S28	139.5	100.06	99.81	99.45	99.27	99.00	98.78	98.47	98.17	97.81
S29	139.0	100.04	99.86	99.52	99.25	99.00	98.75	98.44	98.16	97.69
S30	138.4	100.15	99.92	99.59	99.24	98.94	98.70	98.41	98.18	97.72
S31	138.1	100.06	99.90	99.57	99.20	98.92	98.71	98.39	98.00	97.61
S32	137.6	100.02	99.87	99.60	99.37	99.10	98.81	98.53	98.23	97.80
S33	139.6	99.93	99.76	99.55	99.34	99.13	98.83	98.57	98.25	97.78
S34	140.7	100.13	99.84	99.54	99.27	99.02	98.80	98.51	98.21	97.63
S35	140.0	100.12	99.87	99.52	99.30	99.05	98.81	98.51	98.15	97.66
S36	139.4	100.05	99.83	99.49	99.26	98.93	98.72	98.47	98.13	97.77
S37	139.0	99.94	99.70	99.37	99.04	98.96	98.72	98.37	98.14	97.66
S38	138.5	100.09	99.78	99.42	99.15	98.91	98.69	98.33	97.93	97.52
S39	138.1	100.10	99.79	99.43	99.16	98.94	98.69	98.39	98.00	97.69
S40	137.8	99.98	99.75	99.48	99.14	98.84	98.59	98.27	97.91	97.57
S41	137.4	100.11	99.83	99.57	99.25	98.95	98.70	98.32	98.08	97.75
S42	143.0	100.08	99.74	99.52	99.26	98.99	98.81	98.54	98.23	97.81
S43	143.7	99.92	99.68	99.40	99.23	98.99	98.78	98.48	98.23	97.85
S44	143.2	100.14	99.93	99.57	99.28	98.94	98.80	98.47	98.16	97.82
S45	142.5	100.13	99.86	99.61	99.17	98.84	98.70	98.31	98.12	97.87
S46	141.9	100.13	99.84	99.60	99.32	99.01	98.84	98.43	98.10	97.80
S47	141.4	100.11	99.88	99.60	99.36	99.04	98.82	98.46	97.99	97.64
S48	142.8	99.92	99.73	99.46	99.24	98.93	98.75	98.48	98.20	97.64
S49	142.0	100.16	99.90	99.54	99.30	99.03	98.78	98.46	98.15	97.73
S50	141.5	100.19	99.94	99.61	99.33	99.04	98.82	98.49	98.17	97.76
Ave.	140.17	100.07	99.83	99.52	99.25	98.98	98.75	98.44	98.12	97.72
Med.	139.60	100.08	99.84	99.52	99.26	98.99	98.75	98.46	98.15	97.73
St dev	1.9557	0.0778	0.0715	0.0717	0.0757	0.0696	0.0600	0.0757	0.1005	0.0898
Min.	137.4	99.92	99.68	99.37	99.04	98.84	98.59	98.27	97.91	97.52
Max.	143.7	100.19	99.94	99.61	99.37	99.13	98.84	98.57	98.25	97.87

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3.6 Data Set 2, 105°C, 300mA (Photosynthetic Photon Flux Maintenance)

Sample Number	PPF (μ mol/s)	Photosynthetic Photon Flux Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
S26	2.005	99.99	99.87	99.57	99.44	99.24	99.08	98.70	98.35	98.01
S27	2.021	99.94	99.79	99.46	99.36	99.14	98.86	98.45	98.17	97.65
S28	2.012	100.01	99.78	99.49	99.29	99.05	98.84	98.51	98.25	97.74
S29	2.005	100.02	99.82	99.46	99.33	99.13	98.73	98.39	98.16	97.57
S30	1.998	99.91	99.72	99.39	99.28	98.96	98.80	98.52	98.14	97.84
S31	1.992	100.02	99.79	99.57	99.40	99.14	98.70	98.35	98.16	97.83
S32	1.987	99.93	99.76	99.38	99.27	99.06	98.98	98.69	98.34	97.80
S33	2.014	99.99	99.83	99.52	99.34	99.12	98.82	98.47	98.13	97.85
S34	2.030	100.14	99.85	99.46	99.29	99.04	98.93	98.65	98.30	97.62
S35	2.020	100.14	99.86	99.48	99.31	99.03	98.78	98.55	98.17	97.82
S36	2.012	100.00	99.84	99.50	99.23	98.91	98.77	98.50	98.33	97.99
S37	2.005	100.04	99.83	99.59	99.38	99.06	98.65	98.42	98.01	97.81
S38	1.999	99.93	99.76	99.44	99.27	99.03	98.90	98.40	98.11	97.78
S39	1.993	99.91	99.75	99.46	99.28	98.94	98.80	98.46	98.12	97.71
S40	1.988	99.96	99.81	99.50	99.30	98.86	98.72	98.35	98.12	97.66
S41	1.983	99.98	99.72	99.38	99.21	98.89	98.77	98.47	98.19	97.84
S42	2.062	99.98	99.85	99.67	99.34	99.07	98.98	98.63	98.10	97.67
S43	2.070	99.99	99.76	99.49	99.24	98.94	98.77	98.51	98.20	97.81
S44	2.064	99.91	99.71	99.42	99.27	99.01	98.67	98.37	98.10	97.73
S45	2.055	99.87	99.74	99.40	99.24	98.84	98.63	98.47	97.88	97.59
S46	2.046	100.12	99.94	99.52	99.25	98.99	98.71	98.43	98.06	97.61
S47	2.039	99.96	99.81	99.45	99.30	98.92	98.58	98.41	98.10	97.71
S48	2.058	99.98	99.81	99.48	99.28	98.96	98.65	98.41	98.23	97.85
S49	2.048	99.96	99.81	99.40	99.21	98.87	98.69	98.40	97.96	97.60
S50	2.040	100.13	99.91	99.53	99.31	99.06	98.90	98.57	98.33	97.96
Ave.	2.022	99.99	99.80	99.48	99.30	99.01	98.79	98.48	98.16	97.76
Med.	2.014	99.98	99.81	99.48	99.29	99.03	98.77	98.47	98.16	97.78
St dev	0.0273	0.0743	0.0582	0.0706	0.0572	0.1013	0.1235	0.1010	0.1173	0.1240
Min.	1.983	99.87	99.71	99.38	99.21	98.84	98.58	98.35	97.88	97.57
Max.	2.070	100.14	99.94	99.67	99.44	99.24	99.08	98.7	98.35	98.01

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3.7 Data Set 2, 105°C, 300mA (Forward Voltage)

Sample Number	Forward Voltage(V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
S26	3.074	3.067	3.064	3.069	3.065	3.062	3.068	3.066	3.068	3.070
S27	3.080	3.077	3.068	3.078	3.068	3.071	3.071	3.070	3.068	3.073
S28	3.077	3.074	3.069	3.072	3.071	3.067	3.066	3.067	3.071	3.063
S29	3.074	3.069	3.070	3.070	3.069	3.076	3.071	3.077	3.072	3.073
S30	3.072	3.069	3.057	3.068	3.068	3.062	3.061	3.067	3.062	3.068
S31	3.070	3.067	3.063	3.067	3.067	3.061	3.070	3.068	3.068	3.064
S32	3.068	3.061	3.061	3.057	3.062	3.067	3.060	3.057	3.061	3.062
S33	3.077	3.066	3.068	3.064	3.076	3.074	3.078	3.071	3.066	3.072
S34	3.083	3.079	3.080	3.080	3.076	3.078	3.083	3.076	3.082	3.080
S35	3.079	3.075	3.078	3.077	3.071	3.076	3.072	3.073	3.075	3.074
S36	3.076	3.072	3.077	3.075	3.074	3.080	3.074	3.071	3.073	3.077
S37	3.073	3.075	3.075	3.074	3.065	3.075	3.069	3.062	3.070	3.068
S38	3.071	3.072	3.070	3.065	3.072	3.067	3.067	3.062	3.067	3.068
S39	3.069	3.073	3.066	3.063	3.063	3.067	3.070	3.067	3.066	3.072
S40	3.068	3.067	3.060	3.065	3.068	3.066	3.063	3.067	3.067	3.060
S41	3.066	3.064	3.060	3.065	3.060	3.067	3.069	3.065	3.067	3.066
S42	3.082	3.080	3.080	3.084	3.077	3.075	3.080	3.084	3.084	3.076
S43	3.085	3.086	3.082	3.081	3.083	3.082	3.083	3.082	3.086	3.077
S44	3.083	3.079	3.076	3.082	3.081	3.082	3.082	3.079	3.086	3.081
S45	3.079	3.077	3.077	3.080	3.082	3.079	3.083	3.084	3.079	3.077
S46	3.076	3.069	3.069	3.075	3.069	3.070	3.073	3.069	3.076	3.072
S47	3.073	3.071	3.071	3.070	3.076	3.071	3.072	3.071	3.074	3.075
S48	3.080	3.084	3.073	3.082	3.082	3.080	3.080	3.085	3.084	3.082
S49	3.077	3.079	3.081	3.079	3.079	3.075	3.078	3.083	3.084	3.075
S50	3.074	3.073	3.073	3.077	3.073	3.076	3.077	3.074	3.073	3.082
Ave.	3.075	3.073	3.071	3.073	3.072	3.072	3.073	3.072	3.073	3.072
Med.	3.076	3.073	3.070	3.074	3.071	3.074	3.072	3.071	3.072	3.073
St dev	0.0052	0.0062	0.0072	0.0073	0.0066	0.0064	0.0069	0.0077	0.0076	0.0062
Min.	3.066	3.061	3.057	3.057	3.060	3.061	3.060	3.057	3.061	3.060
Max.	3.085	3.086	3.082	3.084	3.083	3.082	3.083	3.085	3.086	3.082

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3.8 Data Set 2, 105°C, 300mA (Chromaticity Shift)

Sample Number	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
S26	0.2606	0.5263	2745	0.0001	0.0003	0.0006	0.0009	0.0013	0.0011	0.0016	0.0019	0.0021
S27	0.2607	0.5269	2740	0.0002	0.0004	0.0006	0.0009	0.0012	0.0014	0.0019	0.0020	0.0021
S28	0.2608	0.5271	2737	0.0002	0.0002	0.0006	0.0008	0.0012	0.0013	0.0017	0.0018	0.0020
S29	0.2604	0.5261	2749	0.0005	0.0006	0.0008	0.0010	0.0014	0.0017	0.0019	0.0020	0.0021
S30	0.2603	0.5256	2753	0.0003	0.0003	0.0006	0.0008	0.0013	0.0015	0.0019	0.0022	0.0024
S31	0.2613	0.5266	2727	0.0002	0.0004	0.0006	0.0008	0.0012	0.0014	0.0017	0.0018	0.0019
S32	0.2596	0.5261	2767	0.0003	0.0004	0.0008	0.0011	0.0014	0.0017	0.0020	0.0021	0.0022
S33	0.2621	0.5262	2714	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0021	0.0023
S34	0.2620	0.5264	2713	0.0001	0.0001	0.0004	0.0008	0.0011	0.0013	0.0016	0.0018	0.0019
S35	0.2607	0.5265	2742	0.0002	0.0002	0.0005	0.0008	0.0012	0.0014	0.0017	0.0018	0.0019
S36	0.2641	0.5251	2676	0.0003	0.0003	0.0005	0.0009	0.0012	0.0015	0.0017	0.0019	0.0021
S37	0.2605	0.5265	2746	0.0002	0.0005	0.0008	0.0010	0.0016	0.0015	0.0018	0.0020	0.0022
S38	0.2603	0.5262	2752	0.0005	0.0004	0.0007	0.0010	0.0013	0.0016	0.0019	0.0020	0.0022
S39	0.2606	0.5261	2745	0.0001	0.0003	0.0005	0.0008	0.0011	0.0014	0.0017	0.0018	0.0019
S40	0.2605	0.5265	2747	0.0004	0.0005	0.0006	0.0009	0.0012	0.0014	0.0019	0.0020	0.0022
S41	0.2602	0.5255	2756	0.0006	0.0004	0.0008	0.0010	0.0013	0.0016	0.0019	0.0022	0.0024
S42	0.2618	0.5276	2713	0.0001	0.0004	0.0005	0.0008	0.0012	0.0015	0.0018	0.0019	0.0021
S43	0.2619	0.5278	2712	0.0004	0.0009	0.0012	0.0014	0.0017	0.0020	0.0021	0.0023	0.0025
S44	0.2631	0.5288	2683	0.0004	0.0009	0.0012	0.0014	0.0017	0.0020	0.0022	0.0023	0.0025
S45	0.2611	0.5282	2727	0.0003	0.0007	0.0009	0.0012	0.0016	0.0020	0.0023	0.0021	0.0022
S46	0.2635	0.5278	2677	0.0002	0.0006	0.0008	0.0012	0.0014	0.0018	0.0020	0.0018	0.0021
S47	0.2633	0.5277	2682	0.0002	0.0004	0.0007	0.0010	0.0013	0.0016	0.0017	0.0020	0.0022
S48	0.2618	0.5280	2713	0.0003	0.0006	0.0009	0.0013	0.0015	0.0019	0.0023	0.0020	0.0022
S49	0.2623	0.5287	2699	0.0003	0.0005	0.0008	0.0009	0.0013	0.0016	0.0018	0.0017	0.0021
S50	0.2629	0.5284	2688	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0018	0.0020	0.0023
Ave.	0.2615	0.5269	2724	0.0003	0.0004	0.0007	0.0010	0.0013	0.0016	0.0019	0.0020	0.0022
Med.	0.2611	0.5265	2727	0.0003	0.0004	0.0007	0.0009	0.0013	0.0015	0.0019	0.0020	0.0022
St dev	0.0012	0.0010	27.5912	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.2596	0.5251	2676	0.0001	0.0001	0.0004	0.0008	0.0011	0.0011	0.0016	0.0017	0.0019
Max.	0.2641	0.5288	2767	0.0006	0.0009	0.0012	0.0014	0.0017	0.0020	0.0023	0.0023	0.0025

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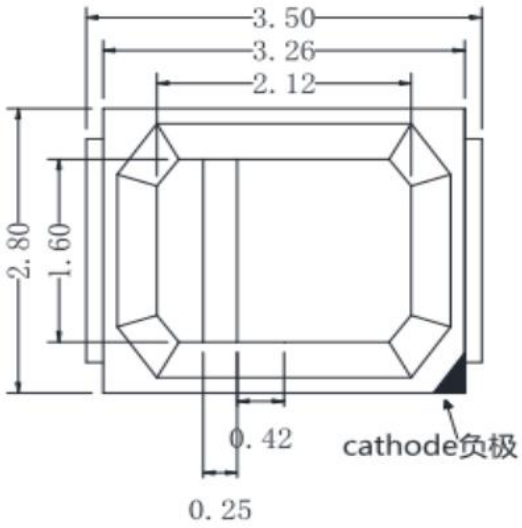
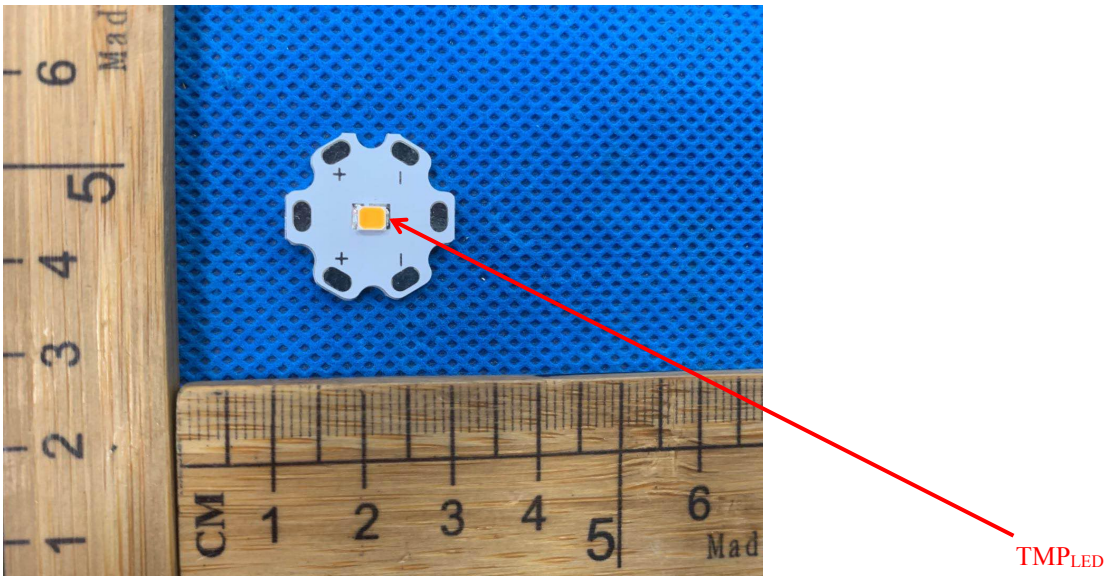
4 . EUT PHOTO

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 EUT Photo



****** END OF THE TEST REPORT******

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