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 GOYM Optoelectronics Technology CO.,LTD.
Address.....	:	5/F,9th Bld,Henglong Industrial District,4th Industrial zone,Shuitian Village,Shiyan Town,Baoan,Shenzhen ,China
Model.....	:	KR4052-27
Brand Name.....	:	GOYM
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.....	:	CA2004600L 01001
Test Date.....	:	2019-02-25 to 2020-04-18
Report Date.....	:	2020-04-29

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.

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

ENERGY STAR® LM-80 Cover Sheet

Administrative Information

Tested subcomponent series:	N/A
Tested subcomponent model number:	KR4052-27
Report issue date:	2020-04-29
Report revision date(if applicable):	N/A
Testing start date:	2019-02-25
Testing completion date:	2020-04-18

DUT Identification

DUT manufacture's name:	N/A
DUT identification,e.g., model number:	KR4052-27
Description of DUT,including if the DUT is an LED package or module:	LED Array

DUT Characteristics

Total input power(W):	105 W
Average current density per LED die(mA/mm^2):	162.05 mA/mm^2
Average power density per LED die(W/mm^2):	0.4567 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:	0.35 mm

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone, Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

Table of Contents

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone,
Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

1.General Information

1.1 Description of LED Light Sources

Sample Size:

24Pcs samples were received on 2019-02-20 ,is undamaged condition;The samples were numbered from S1 to S12 , S13 to S24 .

Part Number: KR4052-27

Part Type: LED Array

Drive Level: DC 2070mA

Nominal CCT: 2700K

Power: 105W

CRI: 80

Note：

1. The applicant Shenzhen GOYM Optoelectronics Technology CO.,LTD. declare that their products with model KR4052-27 are the same to the products in report #CA1904027L 01001 and is authorized by original applicant to use their test data,Family products Only the model name is different.

2. All the data in previous report (CA1904027L 01001) is shared in this report.

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.
Each Sample is soldered to all of the reliability stress boards for a given set of IESNA LM-80 tests.

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:

Model name	Current（mA）	Power（W）	CRI	CCT (K)	Number of dies	Current density per die (mA/mm^2)	Power density per PCB (W/mm^2)	Die Spacing (mm)	Series	Parallel	Driver current of die
Test Model KR4052-27	2070	105	80	2200-6500	396	162.05	0.1862	0.35	18	22	94.1
GYM-B405227-1822	2070	105	80	2200-6500	396	162.05	0.1862	0.35	18	22	94.1
GYM-B405227-1722	2070	100	80	2200-6500	374	162.05	0.1774	0.35	17	22	94.1
GYM-B405227-1617	1550	70	80	2200-6500	272	157.03	0.1242	0.52	16	17	91.2
GYM-B405227-1616	1500	65	80	2200-6500	256	161.46	0.1153	0.65	16	16	93.8
GYM-B405227-1612	1100	50	80	2200-6500	192	157.87	0.0887	0.75	16	12	91.7
GYM-B405227-1609	800	35	80	2200-6500	144	153.09	0.0621	0.78	16	9	88.9
GYM-BD4022-1814	1300	65	80	2200-6500	252	159.92	0.1711	0.35	18	14	92.9

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone, Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

GYM-BD4832-1822	2070	105	80	2200-6500	396	162.05	0.1306	0.38	18	22	94.1
GYM-BD3312-1206	560	20	80	2200-6500	72	160.74	0.1769	0.35	12	6	93.3
GYM-BD3314-1208	750	26	80	2200-6500	96	161.46	0.1690	0.45	12	8	93.8
GYM-BD3310-1204	350	12	80	2200-6500	48	150.69	0.1529	0.35	12	4	87.5
GYM-B283519-1010	940	26	80	2200-6500	100	161.89	0.0917	0.35	10	10	94.0
GYM-B4040-1015	1400	40	80	2200-6500	150	160.74	0.0826	0.35	10	15	93.3
GYM-B4040-1107	650	20	80	2200-6500	77	159.92	0.0413	0.35	11	7	92.9
GYM-B4040-1109	840	26	80	2200-6500	99	160.74	0.0537	0.35	11	9	93.3
GYM-B4040-1004	370	11	80	2200-6500	40	159.31	0.0227	1.2	10	4	92.5
GYM-B4040-1006	560	16	80	2200-6500	60	160.74	0.0331	1.2	10	6	93.3
GYM-B4040-1010	940	27	80	2200-6500	100	161.89	0.0558	1.2	10	10	94.0
GYM-B4040-1020	1800	51	80	2200-6500	200	155.00	0.1054	0.42	10	20	90.0
GYM-B4046-1004	370	11	80	2200-6500	40	159.31	0.0227	1.2	10	4	92.5
GYM-B4040-1006	560	16	80	2200-6500	60	160.74	0.0331	1.2	10	6	93.3
GYM-B4040-1010	940	27	80	2200-6500	100	161.89	0.0558	1.2	10	10	94.0
GYM-B4040-1020	1800	51	80	2200-6500	200	155.00	0.1054	0.42	10	20	90.0
GYM-B383832-1208	750	26	80	2200-6500	96	161.46	0.0323	0.9	12	8	93.8
GYM-B383832-1225	2300	78	80	2200-6500	300	158.44	0.0970	0.6	12	25	92.0
GYM-B383832-1811	1000	50	80	2200-6500	198	156.57	0.0622	0.5	18	11	90.9
GYM-B383832-1812	1100	56	80	2200-6500	216	157.87	0.0697	0.45	18	12	91.7
GYM-B383832-1813	1200	60	80	2200-6500	234	158.97	0.0746	0.43	18	13	92.3
GYM-B383832-1814	1300	66	80	2200-6500	252	159.92	0.0821	0.44	18	14	92.9
GYM-B383832-1817	1550	78	80	2200-6500	306	157.03	0.0970	0.8	18	17	91.2
GYM-B383832-1818	1650	83	80	2200-6500	324	157.87	0.1033	0.58	18	18	91.7
GYM-B383832-1819	1750	88	80	2200-6500	342	158.63	0.1095	0.56	18	19	92.1
GYM-B383832-1820	1800	91	80	2200-6500	360	155.00	0.1132	0.55	18	20	90.0
GYM-B383832-1822	2070	105	80	2200-6500	396	162.05	0.1306	0.35	18	22	94.1
GYM-B383832-1619	1750	78	80	2200-6500	304	158.63	0.0970	0.79	16	19	92.1
GYM-B383832-1414	1300	51	80	2200-6500	196	159.92	0.0634	0.69	14	14	92.9
GYM-B383832-1421	1950	77	80	2200-6500	294	159.92	0.0958	0.6	14	21	92.9
GYM-B383832-1422	2070	82	80	2200-6500	308	162.05	0.1020	0.57	14	22	94.1
GYM-B383832-1713	1200	58	80	2200-6500	221	158.97	0.0722	0.49	17	13	92.3
GYM-B383832-1719	1750	84	80	2200-6500	323	158.63	0.1045	0.65	17	19	92.1
GYM-B383832-1722	2070	99	80	2200-6500	374	162.05	0.1232	0.4	17	22	94.1
GYM-B282822-1208	750	26	80	2200-6500	96	161.46	0.0547	0.85	12	8	93.8

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone, Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

GYM-B282822-12 10	940	32	80	2200-6500	120	161.89	0.0674	0.75	12	10	94.0
GYM-B282822-12 12	1100	37	80	2200-6500	144	157.87	0.0779	0.71	12	12	91.7
GYM-B282822-12 14	1300	44	80	2200-6500	168	159.92	0.0926	0.65	12	14	92.9
GYM-B282822-12 18	1650	55	80	2200-6500	216	157.87	0.1158	0.37	12	18	91.7
GYM-B282822-12 20	1850	63	80	2200-6500	240	159.31	0.1326	0.35	12	20	92.5
GYM-B282822-18 07	650	33	80	2200-6500	126	159.92	0.0695	0.8	18	7	92.9
GYM-B282822-18 09	800	41	80	2200-6500	162	153.09	0.0863	0.57	18	9	88.9
GYM-B282822-18 12	1100	56	80	2200-6500	216	157.87	0.1179	0.5	18	12	91.7
GYM-B282822-18 14	1300	66	80	2200-6500	252	159.92	0.1389	0.4	18	14	92.9
GYM-B282822-18 18	1650	83	80	2200-6500	324	157.87	0.1747	0.37	18	18	91.7
GYM-B282822-18 19	1750	88	80	2200-6500	342	158.63	0.1853	0.35	18	19	92.1
GYM-B282822-08 40	3700	83	80	2200-6500	320	159.31	0.1747	0.35	8	40	92.5
GYM-B282822-10 10	940	26	80	2200-6500	100	161.89	0.0547	0.82	10	10	94.0
GYM-B282822-10 06	550	16	80	2200-6500	100	94.72	0.0337	1.1	10	10	55.0
GYM-B191914-12 10	940	32	80	2200-6500	120	161.89	0.1812	0.35	12	10	94.0
GYM-B191914-12 08	750	26	80	2200-6500	96	161.46	0.1472	0.43	12	8	93.8
GYM-B191914-12 07	650	22	80	2200-6500	84	159.92	0.1246	0.47	12	7	92.9
GYM-B191914-12 06	560	19	80	2200-6500	72	160.74	0.1076	0.49	12	6	93.3
GYM-B191914-12 05	470	16	80	2200-6500	60	161.89	0.0906	0.67	12	5	94.0
GYM-B191914-12 04	370	13	80	2200-6500	48	159.31	0.0736	0.7	12	4	92.5
GYM-B191914-12 03	280	10	80	2200-6500	36	160.74	0.0566	0.78	12	3	93.3
GYM-B191914-36 02	180	19	80	2200-6500	72	155.00	0.1076	0.57	36	2	90.0
GYM-B191914-30 02	180	16	80	2200-6500	60	155.00	0.0906	0.46	30	2	90.0
GYM-B191914-24 02	180	12	80	2200-6500	48	155.00	0.0679	0.59	24	2	90.0
GYM-B191914-18 02	180	10	80	2200-6500	36	155.00	0.0566	0.86	18	2	90.0
GYM-B191914-32 03	280	25	80	2200-6500	96	160.74	0.1415	0.45	32	3	93.3
GYM-B191914-29 03	280	23	80	2200-6500	87	160.74	0.1302	0.49	29	3	93.3
GYM-B191914-26 03	280	21	80	2200-6500	78	160.74	0.1189	0.54	26	3	93.3
GYM-B191912-12 06	560	19	80	2200-6500	72	160.74	0.1681	0.37	12	6	93.3
GYM-B191912-12 04	370	13	80	2200-6500	48	159.31	0.1150	0.4	12	4	92.5
GYM-B191912-36 02	180	19	80	2200-6500	72	155.00	0.1681	0.37	36	2	90.0
GYM-B191912-24 02	180	12	80	2200-6500	48	155.00	0.1062	0.4	24	2	90.0
GYM-B191912-24 01	90	6	80	2200-6500	24	155.00	0.0531	1	24	1	90.0
GYM-B191909-12 04	370	13	80	2200-6500	48	159.31	0.1806	0.35	12	4	92.5
GYM-B191909-12 02	180	6	80	2200-6500	24	155.00	0.0833	0.68	12	2	90.0

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone, Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

GYM-B191909-24 02	180	12	80	2200-6500	48	155.00	0.1667	0.35	24	2	90.0
GYM-B191909-48 01	90	12	80	2200-6500	48	155.00	0.1667	0.35	48	1	90.0
GYM-B191906-12 02	180	7	80	2200-6500	24	155.00	0.1842	0.36	12	2	90.0
GYM-B141410-12 01	90	3	80	2200-6500	12	155.00	0.0417	0.96	12	1	90.0
GYM-B141410-12 02	180	6	80	2200-6500	24	155.00	0.0833	0.58	12	2	90.0
GYM-B141410-12 03	280	10	80	2200-6500	36	160.74	0.1389	0.4	12	3	93.3
GYM-B141410-12 04	370	13	80	2200-6500	48	159.31	0.1806	0.36	12	4	92.5
GYM-B141410-15 02	180	8	80	2200-6500	30	155.00	0.1111	0.42	15	2	90.0
GYM-B141410-15 03	280	12	80	2200-6500	45	160.74	0.1667	0.38	15	3	93.3
GYM-B141410-11 03	280	10	80	2200-6500	39	160.74	0.1389	0.4	13	3	93.3
GYM-B141410-10 03	280	8	80	2200-6500	33	160.74	0.1111	0.45	11	3	93.3
GYM-B141410-09 03	280	7	80	2200-6500	27	160.74	0.0972	0.47	9	3	93.3
GYM-B141410-08 03	280	6	80	2200-6500	24	160.74	0.0833	0.49	8	3	93.3
GYM-B141410-07 03	280	5	80	2200-6500	21	160.74	0.0694	0.51	7	3	93.3
GYM-B141410-05 03	280	4	80	2200-6500	15	160.74	0.0556	0.35	5	3	93.3
GYM-B141410-06 04	370	7	80	2200-6500	24	159.31	0.0972	0.49	6	4	92.5
GYM-B141406-03 03	280	3	80	2200-6500	9	160.74	0.0789	0.59	3	3	93.3
GYM-B141406-03 04	370	4	80	2200-6500	12	159.31	0.1053	0.53	3	4	92.5
GYM-B141406-03 05	470	5	80	2200-6500	15	161.89	0.1316	0.38	3	5	94.0
GYM-B141406-04 06	560	7	80	2200-6500	24	160.74	0.1842	0.35	4	6	93.3
GYM-B141406-10 02	180	6	80	2200-6500	20	155.00	0.1579	0.38	10	2	90.0
GYM-B141406-12 02	180	7	80	2200-6500	24	155.00	0.1842	0.36	12	2	90.0
GYM-B141406-12 01	90	3	80	2200-6500	12	155.00	0.0789	0.35	12	1	90.0
GYM-B141406-06 02	180	3	80	2200-6500	12	155.00	0.0789	0.35	6	2	90.0
GYM-B242419-12 16	1500	51	80	2200-6500	192	161.46	0.1855	0.35	12	16	93.8
GYM-B242419-12 12	1100	37	80	2200-6500	144	157.87	0.1345	0.47	12	12	91.7
GYM-B242419-12 10	940	32	80	2200-6500	120	161.89	0.1164	0.65	12	10	94.0
GYM-B242419-12 08	750	26	80	2200-6500	96	161.46	0.0945	0.6	12	8	93.8
GYM-B242419-12 07	650	22	80	2200-6500	84	159.92	0.0800	0.89	12	7	92.9
GYM-B242419-12 06	560	19	80	2200-6500	72	160.74	0.0691	0.96	12	6	93.3
GYM-B242419-12 05	470	16	80	2200-6500	60	161.89	0.0582	1.1	12	5	94.0
GYM-B242419-13 08	750	28	80	2200-6500	104	161.46	0.1018	0.58	13	8	93.8
GYM-B242419-13 07	650	24	80	2200-6500	91	159.92	0.0873	0.58	13	7	92.9
GYM-B181812-12 07	650	22	80	2200-6500	84	159.92	0.1833	0.36	12	7	92.9
GYM-B181812-12 06	560	19	80	2200-6500	72	160.74	0.1583	0.37	12	6	93.3

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone, Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

GYM-B181812-12 05	470	16	80	2200-6500	60	161.89	0.1333	0.36	12	5	94.0
GYM-B181812-12 04	370	13	80	2200-6500	48	159.31	0.1083	0.56	12	4	92.5
GYM-B181812-12 03	280	10	80	2200-6500	36	160.74	0.0833	0.76	12	3	93.3
GYM-B161609-12 04	370	13	80	2200-6500	48	159.31	0.1806	0.36	12	4	92.5
GYM-B161609-12 03	280	10	80	2200-6500	36	160.74	0.1389	0.4	12	3	93.3
GYM-B161609-12 02	180	6	80	2200-6500	24	155.00	0.0833	0.58	12	2	90.0
GYM-B161609-12 01	90	3	80	2200-6500	12	155.00	0.0417	0.96	12	1	90.0
GYM-B161609-15 02	180	8	80	2200-6500	30	155.00	0.1111	0.42	15	2	90.0
GYM-B161609-15 03	280	12	80	2200-6500	45	160.74	0.1667	0.38	15	3	93.3
GYM-B161609-11 03	280	10	80	2200-6500	39	160.74	0.1389	0.4	13	3	93.3
GYM-B161609-10 03	280	8	80	2200-6500	33	160.74	0.1111	0.45	11	3	93.3
GYM-B161609-09 03	280	7	80	2200-6500	27	160.74	0.0972	0.47	9	3	93.3
GYM-B161609-08 03	280	6	80	2200-6500	24	160.74	0.0833	0.49	8	3	93.3
GYM-B161609-07 03	280	5	80	2200-6500	21	160.74	0.0694	0.51	7	3	93.3
GYM-B161609-05 03	280	4	80	2200-6500	15	160.74	0.0556	0.35	5	3	93.3
GYM-B161609-06 04	370	7	80	2200-6500	24	159.31	0.0972	0.49	6	4	92.5
GYM-B141410-06 04	370	7	80	2200-6500	24	159.31	0.0972	0.49	6	4	92.5
GYM-B131306-03 03	280	3	80	2200-6500	9	160.74	0.0789	0.59	3	3	93.3
GYM-B131306-03 04	370	4	80	2200-6500	12	159.31	0.1053	0.53	3	4	92.5
GYM-B131306-03 05	470	5	80	2200-6500	15	161.89	0.1316	0.38	3	5	94.0
GYM-B131306-04 06	560	7	80	2200-6500	24	160.74	0.1842	0.35	4	6	93.3
GYM-B131306-10 02	180	6	80	2200-6500	20	155.00	0.1579	0.38	10	2	90.0
GYM-B131306-12 02	180	7	80	2200-6500	24	155.00	0.1842	0.36	12	2	90.0
GYM-B131306-12 01	90	3	80	2200-6500	12	155.00	0.0789	0.35	12	1	90.0
GYM-B131306-06 02	180	3	80	2200-6500	12	155.00	0.0789	0.35	6	2	90.0
GYM-B222206-12 02	180	7	80	2200-6500	24	155.00	0.1842	0.36	12	2	90.0
GYM-B212112-40 02	180	21	80	2200-6500	80	155.00	0.1750	0.35	40	2	90.0

Disclaimer:

The truthfulness and accuracy of all the technical information above for the covered LED products is ensured by manufacturer of LED light source.Guangdong Meide Testing Technology Co., Ltd. isn't responsible or gives any guarantees for the truthfulness of the technical information.

1.2 Standards Used

- ANSI/IES LM-80-15 IES Approved Method for Luminous Flux and Color Maintenance of LED Packages,Arrays and

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone, Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

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-E029	2m	2020/10/06
Standard Light Source	MD-E012	D204	2021/02/19
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-E006	WY12010	2020/10/06
Temperature Tester	MD-E038	UFS-D8036	2020/06/02

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).

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

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone, Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

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=0.6°C(K=2),at the 95% confidence level.

1.7 Sample Set

Data Set 1:85°C,2070mA	
Part number：	KR4052-27
Number of Units:	12
Case Temperature(T_S):	＞83°C
Ambient Temperature(T_A):	＞80°C
Life Test Drive Current:	2070mA
Measurement Current:	2070mA

Data Set 2:105°C,2070mA	
Part number：	KR4052-27
Number of Units:	12
Case Temperature(T_S):	＞103°C
Ambient Temperature(T_A):	＞100°C
Life Test Drive Current:	2070mA
Measurement Current:	2070mA

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone, Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

2. SUMMARY OF TEST RESULT

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	α	β	Reported TM-21 L_{70} Lifetime
1	12	0	1000hrs	10000hrs	2.151E-06	0.994	＞55000hrs
2	12	0	1000hrs	10000hrs	2.431E-06	0.986	＞55000hrs

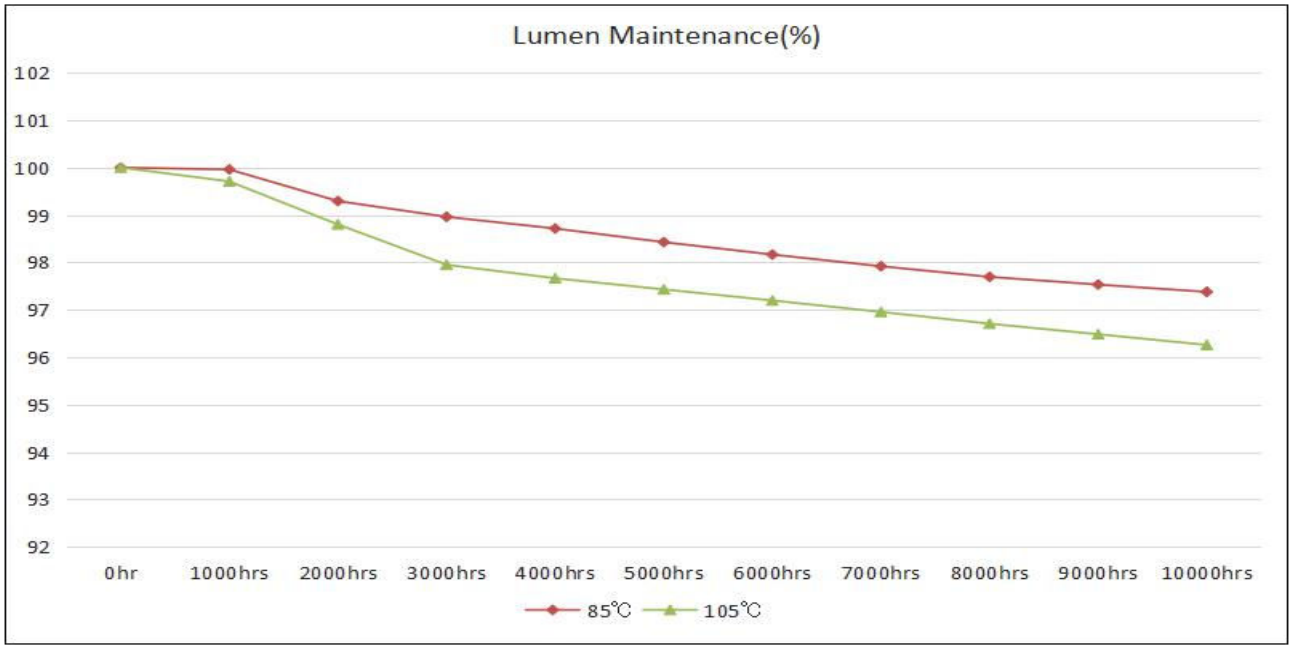
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

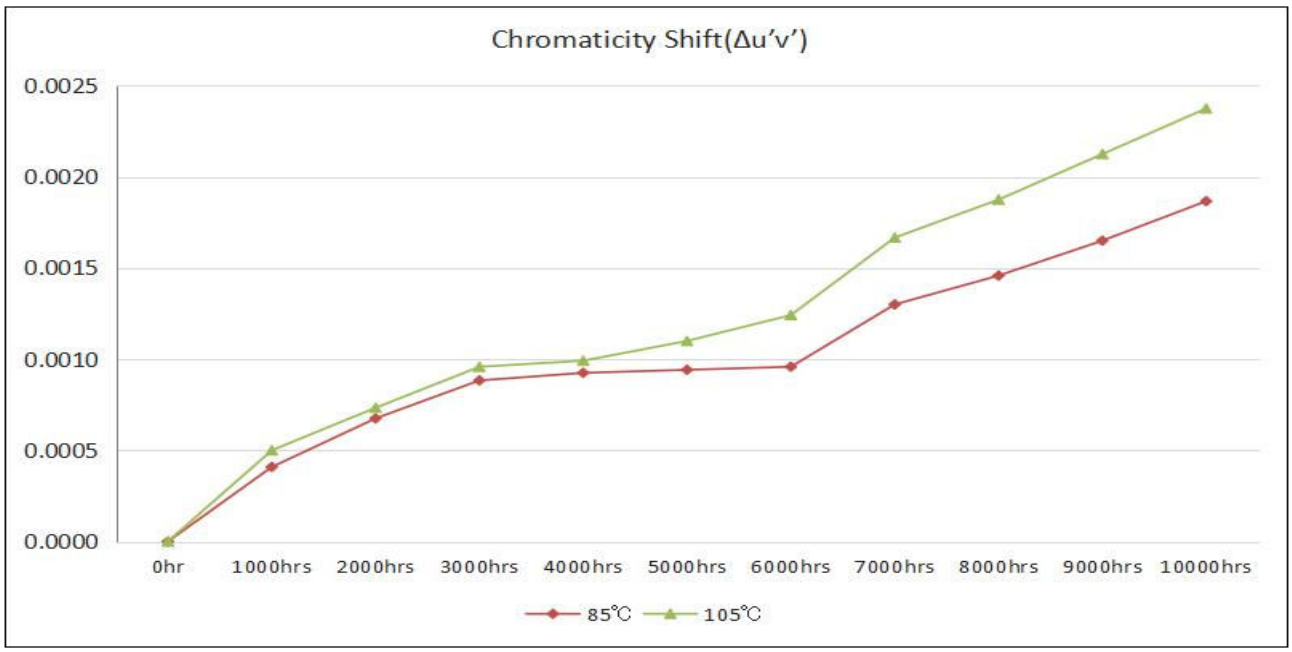
Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	99.96%	99.29%	98.96%	98.72%	98.43%	98.17%	97.92%	97.70%	97.53%	97.38%
2	99.71%	98.80%	97.95%	97.67%	97.43%	97.20%	96.96%	96.71%	96.49%	96.26%

Average Chromaticity Shift (Δu'v')

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	0.0004	0.0007	0.0009	0.0009	0.0009	0.0010	0.0013	0.0015	0.0017	0.0019
2	0.0005	0.0007	0.0010	0.0010	0.0011	0.0012	0.0017	0.0019	0.0021	0.0024

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone, Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/





Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone,
Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

3. Test Data

3.1 Data Set 1, 85°C, 2070mA (Lumen Maintenance)

Sample Number	Φ(lm)	Lumen Maintenance (%)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
S1	14484	99.86	99.24	98.83	98.77	98.43	98.06	97.82	97.66	97.51	97.43
S2	14214	100.14	99.46	99.11	99.00	98.69	98.42	98.16	97.84	97.75	97.66
S3	14203	99.81	99.07	98.72	98.31	97.66	97.31	97.08	96.94	96.81	96.69
S4	14417	100.12	99.23	98.61	98.53	98.29	97.89	97.66	97.64	97.55	97.38
S5	14547	100.18	99.38	99.04	98.84	98.77	98.45	98.09	97.91	97.78	97.62
S6	14454	99.94	99.50	99.26	99.08	98.95	98.77	98.61	98.45	98.23	98.05
S7	14361	99.80	98.89	98.53	98.12	97.85	97.62	97.33	96.96	96.78	96.55
S8	14383	99.91	99.64	99.33	99.05	98.81	98.65	98.34	98.12	97.84	97.75
S9	14494	100.09	99.54	99.23	98.84	98.56	98.45	98.29	97.91	97.83	97.66
S10	14705	99.85	98.91	98.75	98.54	98.21	97.91	97.69	97.52	97.31	97.08
S11	14554	99.92	99.55	99.38	99.11	98.79	98.52	98.23	97.84	97.61	97.42
S12	14544	99.89	99.11	98.74	98.39	98.12	97.94	97.72	97.55	97.39	97.25
Ave.	14447	99.96	99.29	98.96	98.72	98.43	98.17	97.92	97.70	97.53	97.38
Med.	14469	99.92	99.31	98.94	98.81	98.50	98.24	97.96	97.75	97.58	97.43
St dev	143.7373	0.1358	0.2567	0.2984	0.3310	0.4087	0.4457	0.4468	0.4318	0.4203	0.4344
Min.	14203	99.80	98.89	98.53	98.12	97.66	97.31	97.08	96.94	96.78	96.55
Max.	14705	100.18	99.64	99.38	99.11	98.95	98.77	98.61	98.45	98.23	98.05

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone,
Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

3.2 Data Set 1, 85°C, 2070mA (Forward Voltage)

Sample Number	Forward Voltage(V)										
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
S1	50.35	50.31	50.29	50.33	50.35	50.35	50.31	50.33	50.35	50.34	50.34
S2	50.27	50.29	50.28	50.30	50.28	50.26	50.26	50.30	50.29	50.30	50.27
S3	50.03	50.06	50.03	50.03	50.02	50.05	50.03	50.05	50.03	50.03	50.04
S4	50.29	50.28	50.26	50.29	50.30	50.28	50.26	50.27	50.28	50.28	50.29
S5	50.19	50.20	50.18	50.19	50.19	50.18	50.20	50.19	50.19	50.18	50.19
S6	50.22	50.21	50.22	50.22	50.23	50.22	50.21	50.22	50.22	50.22	50.21
S7	50.29	50.28	50.28	50.29	50.28	50.27	50.28	50.28	50.26	50.28	50.28
S8	50.24	50.24	50.25	50.23	50.23	50.24	50.23	50.22	50.23	50.24	50.24
S9	50.35	50.34	50.35	50.33	50.35	50.34	50.36	50.35	50.35	50.33	50.34
S10	50.26	50.27	50.26	50.26	50.25	50.27	50.26	50.26	50.27	50.26	50.27
S11	50.33	50.34	50.33	50.34	50.33	50.34	50.33	50.34	50.33	50.32	50.34
S12	50.28	50.29	50.28	50.28	50.29	50.28	50.28	50.29	50.29	50.29	50.28
Ave.	50.26	50.26	50.25	50.26	50.26	50.26	50.25	50.26	50.26	50.26	50.26
Med.	50.28	50.28	50.27	50.29	50.28	50.27	50.26	50.28	50.28	50.28	50.28
St dev	0.0870	0.0766	0.0826	0.0854	0.0898	0.0822	0.0837	0.0823	0.0872	0.0849	0.0838
Min.	50.03	50.06	50.03	50.03	50.02	50.05	50.03	50.05	50.03	50.03	50.04
Max.	50.35	50.34	50.35	50.34	50.35	50.35	50.36	50.35	50.35	50.34	50.34

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone, Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

3.3 Data Set 1, 85°C, 2070mA (Chromaticity Shift)

Sample Number	u'	v'	CCT (K)	Chromaticity Shift (Δu'v')									
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
S1	0.2594	0.5282	2762	0.0003	0.0006	0.0009	0.0008	0.0009	0.0006	0.0010	0.0011	0.0013	0.0016
S2	0.2598	0.5293	2749	0.0005	0.0006	0.0008	0.0009	0.0008	0.0008	0.0012	0.0013	0.0015	0.0017
S3	0.2600	0.5298	2743	0.0005	0.0006	0.0008	0.0008	0.0011	0.0009	0.0013	0.0015	0.0016	0.0018
S4	0.2593	0.5281	2764	0.0004	0.0005	0.0007	0.0009	0.0008	0.0009	0.0012	0.0015	0.0017	0.0018
S5	0.2604	0.5303	2733	0.0004	0.0008	0.0009	0.0009	0.0011	0.0009	0.0015	0.0016	0.0018	0.0021
S6	0.2605	0.5307	2728	0.0005	0.0007	0.0010	0.0010	0.0012	0.0010	0.0016	0.0019	0.0020	0.0022
S7	0.2594	0.5284	2760	0.0004	0.0005	0.0008	0.0008	0.0008	0.0010	0.0012	0.0013	0.0015	0.0017
S8	0.2600	0.5296	2744	0.0005	0.0010	0.0009	0.0009	0.0007	0.0011	0.0012	0.0014	0.0015	0.0018
S9	0.2604	0.5292	2736	0.0004	0.0008	0.0010	0.0011	0.0010	0.0010	0.0015	0.0016	0.0018	0.0019
S10	0.2600	0.5280	2750	0.0003	0.0006	0.0008	0.0008	0.0009	0.0011	0.0013	0.0014	0.0016	0.0019
S11	0.2605	0.5296	2732	0.0004	0.0008	0.0009	0.0012	0.0010	0.0011	0.0014	0.0015	0.0018	0.0021
S12	0.2599	0.5282	2751	0.0003	0.0006	0.0011	0.0010	0.0010	0.0011	0.0012	0.0014	0.0017	0.0018
Ave.	0.2600	0.5291	2746	0.0004	0.0007	0.0009	0.0009	0.0009	0.0010	0.0013	0.0015	0.0017	0.0019
Med.	0.2600	0.5293	2747	0.0004	0.0006	0.0009	0.0009	0.0010	0.0010	0.0013	0.0015	0.0017	0.0018
St dev	0.0004	0.0009	12.1655	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.2593	0.5280	2728	0.0003	0.0005	0.0007	0.0008	0.0007	0.0006	0.0010	0.0011	0.0013	0.0016
Max.	0.2605	0.5307	2764	0.0005	0.0010	0.0011	0.0012	0.0012	0.0011	0.0016	0.0019	0.0020	0.0022

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone, Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

3.4 Data Set 2, 105°C, 2070mA (Lumen Maintenance)

Sample Number	Φ(lm)	Lumen Maintenance (%)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
S13	14742	99.72	99.13	98.36	97.92	97.72	97.15	96.88	96.54	96.33	96.12
S14	14535	99.78	98.84	98.12	97.88	97.66	97.34	97.06	96.92	96.74	96.59
S15	14401	99.81	98.76	97.85	97.71	97.59	97.36	97.13	96.88	96.72	96.50
S16	14574	99.66	98.72	97.76	97.39	96.89	96.72	96.65	96.32	96.07	95.88
S17	14474	99.73	99.06	98.49	98.21	97.92	97.81	97.61	97.45	97.11	96.69
S18	14453	99.68	98.63	97.71	97.60	97.45	97.18	96.85	96.66	96.42	96.19
S19	14431	99.59	98.61	97.59	97.18	96.89	96.77	96.42	96.23	95.91	95.69
S20	14505	99.64	98.79	97.68	97.33	97.06	96.84	96.71	96.55	96.51	96.23
S21	14388	99.79	99.15	98.22	97.94	97.81	97.59	97.23	96.91	96.79	96.63
S22	14474	99.68	98.72	98.06	97.81	97.65	97.51	97.29	96.93	96.77	96.51
S23	14461	99.65	98.61	97.91	97.78	97.65	97.39	97.12	96.81	96.54	96.34
S24	14510	99.77	98.59	97.65	97.24	96.88	96.71	96.52	96.29	95.91	95.75
Ave.	14496	99.71	98.80	97.95	97.67	97.43	97.20	96.96	96.71	96.49	96.26
Med.	14474	99.70	98.74	97.88	97.75	97.62	97.26	96.97	96.74	96.53	96.29
St dev	94.0757	0.0691	0.2046	0.2972	0.3202	0.3893	0.3680	0.3478	0.3484	0.3754	0.3454
Min.	14388	99.59	98.59	97.59	97.18	96.88	96.71	96.42	96.23	95.91	95.69
Max.	14742	99.81	99.15	98.49	98.21	97.92	97.81	97.61	97.45	97.11	96.69

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone, Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

3.5 Data Set 2, 105°C, 2070mA (Forward Voltage)

Sample Number	Forward Voltage(V)										
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
S13	50.28	50.27	50.28	50.26	50.26	50.27	50.28	50.28	50.27	50.28	50.28
S14	50.31	50.32	50.33	50.30	50.31	50.32	50.31	50.30	50.31	50.31	50.30
S15	50.11	50.12	50.10	50.11	50.11	50.12	50.10	50.12	50.11	50.11	50.12
S16	50.19	50.19	50.20	50.18	50.19	50.20	50.18	50.19	50.18	50.19	50.18
S17	50.27	50.26	50.27	50.26	50.28	50.29	50.28	50.27	50.26	50.28	50.27
S18	50.32	50.30	50.31	50.30	50.34	50.32	50.33	50.31	50.32	50.33	50.31
S19	50.18	50.19	50.20	50.18	50.18	50.19	50.18	50.19	50.18	50.19	50.20
S20	50.24	50.24	50.23	50.24	50.25	50.26	50.24	50.23	50.24	50.23	50.24
S21	50.08	50.10	50.09	50.10	50.09	50.10	50.10	50.08	50.08	50.09	50.08
S22	50.22	50.21	50.22	50.21	50.23	50.22	50.21	50.20	50.21	50.22	50.22
S23	50.27	50.25	50.28	50.26	50.25	50.26	50.25	50.27	50.28	50.29	50.28
S24	50.17	50.18	50.19	50.18	50.17	50.18	50.19	50.18	50.17	50.19	50.17
Ave.	50.22	50.22	50.23	50.22	50.22	50.23	50.22	50.22	50.22	50.23	50.22
Med.	50.23	50.23	50.23	50.23	50.24	50.24	50.23	50.22	50.23	50.23	50.23
St dev	0.0762	0.0672	0.0755	0.0668	0.0760	0.0721	0.0749	0.0717	0.0761	0.0761	0.0730
Min.	50.08	50.10	50.09	50.10	50.09	50.10	50.10	50.08	50.08	50.09	50.08
Max.	50.32	50.32	50.33	50.30	50.34	50.32	50.33	50.31	50.32	50.33	50.31

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone, Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

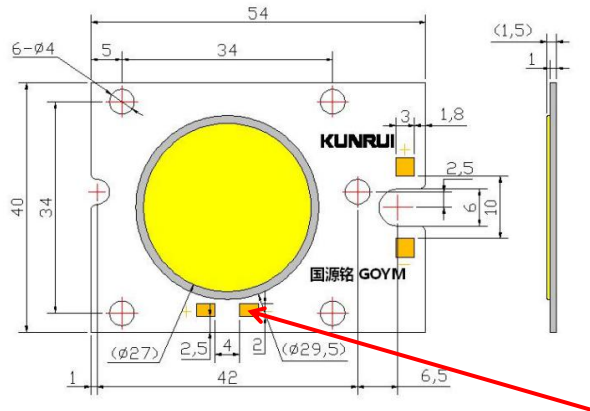
3.6 Data Set 2, 105°C, 2070mA (Chromaticity Shift)

Sample Number	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')									
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
S13	0.2600	0.5282	2749	0.0006	0.0005	0.0009	0.0009	0.0011	0.0012	0.0018	0.0020	0.0022	0.0025
S14	0.2594	0.5288	2760	0.0005	0.0007	0.0010	0.0010	0.0012	0.0019	0.0023	0.0024	0.0026	0.0028
S15	0.2603	0.5294	2738	0.0005	0.0007	0.0011	0.0010	0.0007	0.0008	0.0012	0.0014	0.0017	0.0020
S16	0.2603	0.5291	2740	0.0005	0.0008	0.0010	0.0010	0.0015	0.0014	0.0019	0.0021	0.0024	0.0024
S17	0.2595	0.5273	2763	0.0004	0.0005	0.0008	0.0008	0.0009	0.0008	0.0011	0.0012	0.0015	0.0017
S18	0.2596	0.5298	2750	0.0003	0.0007	0.0009	0.0010	0.0009	0.0013	0.0016	0.0018	0.0021	0.0023
S19	0.2602	0.5289	2743	0.0005	0.0008	0.0010	0.0010	0.0012	0.0012	0.0019	0.0024	0.0025	0.0025
S20	0.2586	0.5265	2785	0.0006	0.0008	0.0011	0.0011	0.0013	0.0010	0.0016	0.0018	0.0019	0.0022
S21	0.2596	0.5277	2758	0.0005	0.0008	0.0009	0.0011	0.0010	0.0010	0.0015	0.0016	0.0019	0.0024
S22	0.2594	0.5284	2761	0.0006	0.0008	0.0011	0.0010	0.0009	0.0012	0.0016	0.0019	0.0023	0.0026
S23	0.2597	0.5294	2750	0.0006	0.0008	0.0009	0.0011	0.0012	0.0015	0.0016	0.0019	0.0020	0.0026
S24	0.2598	0.5300	2746	0.0004	0.0009	0.0008	0.0009	0.0013	0.0016	0.0019	0.0020	0.0024	0.0025
Ave.	0.2597	0.5286	2754	0.0005	0.0007	0.0010	0.0010	0.0011	0.0012	0.0017	0.0019	0.0021	0.0024
Med.	0.2597	0.5289	2750	0.0005	0.0008	0.0010	0.0010	0.0012	0.0012	0.0016	0.0019	0.0022	0.0025
St dev	0.0005	0.0011	12.9155	0.0001	0.0001	0.0001	0.0001	0.0002	0.0003	0.0003	0.0004	0.0003	0.0003
Min.	0.2586	0.5265	2738	0.0003	0.0005	0.0008	0.0008	0.0007	0.0008	0.0011	0.0012	0.0015	0.0017
Max.	0.2603	0.5300	2785	0.0006	0.0009	0.0011	0.0011	0.0015	0.0019	0.0023	0.0024	0.0026	0.0028

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone, Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/

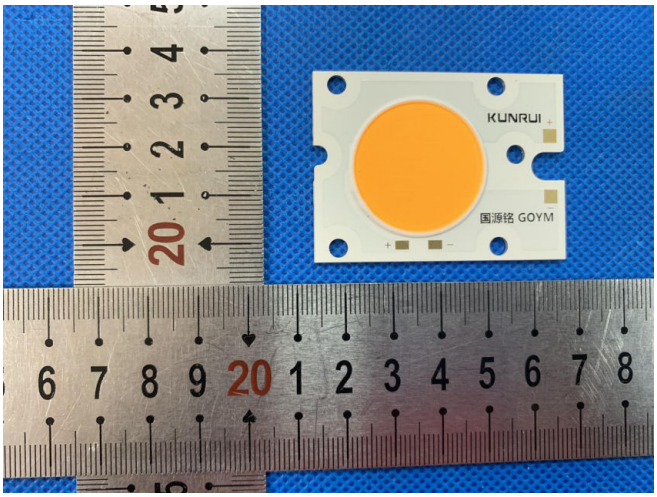
4. EUT PHOTO

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 EUT Photo



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

Laboratory:Guangdong Meide Testing Technology Co., Ltd.
Add:1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,SongshanLake Hi-techIndustrial DevelopmentZone, Dongguan City,Guangdong Pr., China.
Tel: 86-769-8507 5888 Fax: 86-769-8507 5898 E-mail:meidetest@meidetest.com http://www.meidetest.com/