



TEST REPORT

According to ANSI/IES LM-80-15
For

Limited liability company «Tekhnologiya»

Zvorykina str., 2, bldg. 2, room 3, Gusev, Kaliningrad region, 238050, Russian Federation

Model: LED GSLED 2835.V3A.05.40A.70.62

Report Type: 6000 Hours Test Report		Product Type: LED Package	
Reviewed By:	Pote Wang	<i>Pote Wang</i>	
Report Number:	DG3230420-20859E-EE-6000		
Test Date:	2023-04-25 to 2024-01-03		
Report Date:	2024-04-19		
Approved by:	Blake Zhang / EE Engineer		
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1 - General Information

1.1 Description of LED Light Sources[#]

Sample Size:

50 PCS test samples were in good condition and received on 2023-04-20. The samples were numbered from 1 to 25 and 26 to 50.

Manufacturer:	Limited liability company «Tekhnologiya»
Part Number:	LED GSLED 2835.V3A.05.40A.70.62
Part Type:	LED Package
Drive Level:	DC 150mA
Nominal CCT:	4000K
Power:	0.47W
Average Current Density per LED die:	441mA/mm ²
Average Power Density per LED die:	1.37W/mm ²
CRI:	70
Die Spacing:	/

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.

1.2 Standards and Reference Documentations

- 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
High Accuracy Array Spectroradiometer	EVERFINE	HAAS 2000	P600674CM5391140	2023-09-02	2024-09-11
0.5M Integrating Sphere	EVERFINE	0.5m	NA	2023-09-02	2024-09-11
LED Test Source	EVERFINE	LTS-300	P185616CJ1391143	2023-09-02	2024-09-11
Standard Light Source	EVERFINE	D062	M133799CM1381112	2023-05-12	2025-05-11
Multilayer aging machine	BACL	B2-384	N/A	2023-10-13	2024-10-12
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090006	2023-10-16	2024-10-15

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°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 and Uncertainty

Integrating sphere and spectroradiometer is used to measure luminous flux and chromaticity coordinate u'v'. 2π measurement was used and sample was driven 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 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°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, 150mA

Part Number: LED GSLED 2835.V3A.05.40A.70.62
Number of Units: 25
Case Temperature: >53°C
Ambient Temperature: >50°C
Life Test Drive Current: 150mA
Measurement Current: 150mA

Data Set 2: 85°C, 150mA

Part Number: LED GSLED 2835.V3A.05.40A.70.62
Number of Units: 25
Case Temperature: >83°C
Ambient Temperature: >80°C
Life Test Drive Current: 150mA
Measurement Current: 150mA

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	α	β	Reported TM-21 L ₇₀ Lifetime
1	25	0	1000hrs	6000hrs	2.045E-06	1.003	>36000 hours
2	25	0	1000hrs	6000hrs	2.385E-06	1.003	>36000 hours

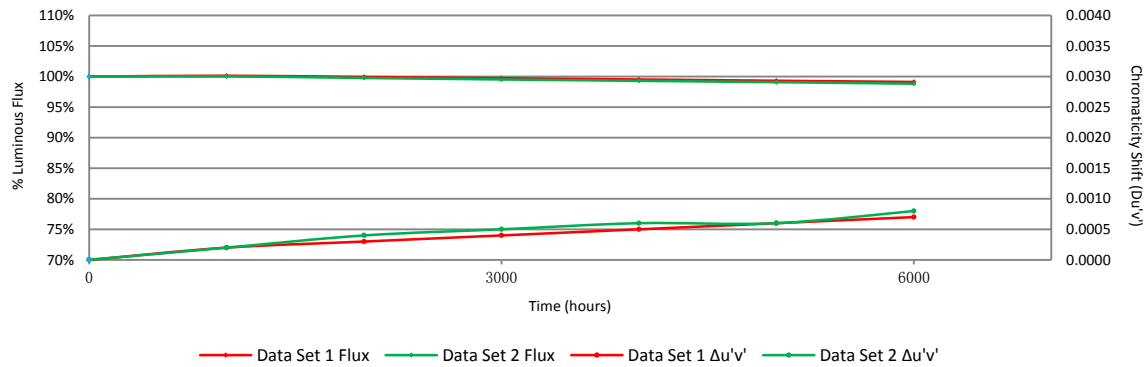
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	100.14%	99.93%	99.73%	99.53%	99.32%	99.12%
2	100.03%	99.77%	99.53%	99.30%	99.08%	98.83%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007
2	0.0002	0.0004	0.0005	0.0006	0.0006	0.0008

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

3.1 Data Set 1, 55°C, 150mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	80.00	100.18	99.91	99.74	99.55	99.46	99.19
2	79.90	100.16	100.01	99.77	99.54	99.37	99.24
3	79.10	100.09	99.82	99.58	99.23	99.08	98.86
4	79.53	100.05	99.91	99.74	99.50	99.26	99.23
5	79.92	100.11	99.89	99.67	99.39	99.22	99.17
6	79.30	99.94	99.66	99.47	99.19	98.97	98.85
7	79.66	99.99	99.82	99.67	99.47	99.31	99.22
8	79.78	100.04	99.92	99.81	99.74	99.72	99.59
9	79.10	99.96	99.70	99.53	99.33	99.06	98.75
10	78.50	100.06	99.90	99.75	99.71	99.30	99.01
11	79.96	99.96	99.85	99.61	99.42	99.15	98.90
12	80.08	100.09	99.89	99.59	99.33	99.13	98.85
13	78.26	100.03	99.82	99.54	99.46	99.13	98.88
14	79.55	100.24	100.11	100.01	99.96	99.55	99.36
15	79.08	100.28	100.16	99.94	99.72	99.53	99.34
16	79.33	100.16	99.86	99.63	99.55	99.53	99.32
17	79.82	100.19	99.89	99.67	99.56	99.32	99.15
18	79.99	100.15	99.99	99.80	99.35	99.31	99.01
19	79.33	100.21	99.95	99.72	99.50	99.28	98.90
20	79.15	100.15	99.91	99.75	99.63	99.29	98.99
21	78.74	100.11	99.77	99.66	99.39	99.23	99.10
22	79.01	100.32	100.00	99.76	99.46	99.29	99.11
23	79.36	100.38	100.25	100.08	99.85	99.60	99.26
24	79.04	100.32	100.13	99.76	99.48	99.18	99.01
25	80.04	100.35	100.19	99.99	99.89	99.75	99.59
Avg.	79.42	100.14	99.93	99.73	99.53	99.32	99.12
Med.	79.36	100.15	99.91	99.74	99.50	99.29	99.11
st dev	0.50	0.12	0.15	0.15	0.20	0.20	0.22
Min.	78.26	99.94	99.66	99.47	99.19	98.97	98.75
Max.	80.08	100.38	100.25	100.08	99.96	99.75	99.59

3.2 Data Set 1, 55°C, 150mA (Forward Voltage)

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	3.107	3.099	3.089	3.093	3.096	3.100	3.152
2	3.089	3.088	3.072	3.089	3.098	3.108	3.129
3	3.091	3.089	3.069	3.069	3.075	3.078	3.132
4	3.092	3.089	3.093	3.068	3.078	3.081	3.131
5	3.088	3.084	3.089	3.059	3.066	3.066	3.126
6	3.092	3.089	3.084	3.086	3.089	3.092	3.133
7	3.094	3.090	3.076	3.086	3.094	3.104	3.129
8	3.091	3.085	3.096	3.079	3.089	3.090	3.126
9	3.096	3.091	3.093	3.086	3.090	3.095	3.133
10	3.088	3.085	3.090	3.086	3.095	3.100	3.125
11	3.092	3.087	3.083	3.079	3.084	3.091	3.131
12	3.094	3.093	3.082	3.089	3.090	3.091	3.136
13	3.085	3.085	3.079	3.087	3.090	3.099	3.124
14	3.094	3.088	3.083	3.079	3.082	3.084	3.129
15	3.090	3.087	3.086	3.088	3.092	3.094	3.123
16	3.103	3.096	3.093	3.093	3.099	3.105	3.129
17	3.092	3.092	3.085	3.078	3.082	3.088	3.126
18	3.093	3.093	3.069	3.089	3.097	3.103	3.125
19	3.090	3.089	3.076	3.079	3.089	3.094	3.123
20	3.088	3.088	3.086	3.086	3.088	3.096	3.120
21	3.091	3.092	3.087	3.087	3.097	3.105	3.125
22	3.084	3.086	3.098	3.093	3.103	3.111	3.120
23	3.093	3.095	3.065	3.089	3.090	3.100	3.134
24	3.092	3.093	3.068	3.073	3.074	3.079	3.126
25	3.093	3.091	3.089	3.089	3.092	3.092	3.126
Avg.	3.092	3.090	3.083	3.083	3.089	3.094	3.129
Med.	3.092	3.089	3.085	3.086	3.090	3.094	3.126
st dev	0.005	0.004	0.009	0.009	0.009	0.011	0.006
Min.	3.084	3.084	3.065	3.059	3.066	3.066	3.120
Max.	3.107	3.099	3.098	3.093	3.103	3.111	3.152

3.3 Data Set 1, 55°C, 150mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs
1	0.2261	0.5082	3856	0.0002	0.0000	0.0005	0.0005	0.0006	0.0007
2	0.2272	0.5076	3829	0.0001	0.0001	0.0003	0.0003	0.0004	0.0007
3	0.2264	0.5074	3859	0.0002	0.0002	0.0003	0.0004	0.0005	0.0005
4	0.2261	0.5065	3884	0.0002	0.0003	0.0002	0.0004	0.0005	0.0006
5	0.2269	0.5079	3834	0.0001	0.0002	0.0003	0.0005	0.0006	0.0007
6	0.2269	0.5082	3830	0.0001	0.0002	0.0004	0.0005	0.0006	0.0008
7	0.2267	0.5050	3885	0.0002	0.0002	0.0004	0.0005	0.0007	0.0009
8	0.2274	0.5064	3838	0.0001	0.0004	0.0003	0.0004	0.0005	0.0008
9	0.2256	0.5065	3901	0.0002	0.0001	0.0002	0.0003	0.0004	0.0006
10	0.2274	0.5083	3809	0.0002	0.0001	0.0004	0.0004	0.0005	0.0006
11	0.2263	0.5076	3858	0.0002	0.0004	0.0004	0.0006	0.0007	0.0007
12	0.2272	0.5074	3830	0.0001	0.0002	0.0004	0.0004	0.0005	0.0006
13	0.2273	0.5044	3874	0.0002	0.0001	0.0001	0.0003	0.0004	0.0001
14	0.2277	0.5073	3814	0.0002	0.0003	0.0004	0.0005	0.0006	0.0006
15	0.2266	0.5076	3850	0.0001	0.0001	0.0004	0.0005	0.0005	0.0006
16	0.2261	0.5082	3858	0.0001	0.0004	0.0006	0.0007	0.0008	0.0008
17	0.2263	0.5066	3875	0.0002	0.0004	0.0004	0.0004	0.0006	0.0008
18	0.2265	0.5093	3828	0.0002	0.0003	0.0007	0.0007	0.0007	0.0008
19	0.2265	0.5073	3858	0.0002	0.0004	0.0002	0.0004	0.0006	0.0008
20	0.2266	0.5045	3899	0.0003	0.0003	0.0003	0.0003	0.0004	0.0006
21	0.2250	0.5038	3966	0.0001	0.0004	0.0006	0.0006	0.0007	0.0009
22	0.2258	0.5073	3881	0.0003	0.0003	0.0004	0.0004	0.0006	0.0008
23	0.2263	0.5080	3854	0.0002	0.0002	0.0004	0.0005	0.0006	0.0008
24	0.2281	0.5056	3828	0.0003	0.0004	0.0004	0.0004	0.0005	0.0006
25	0.2263	0.5075	3859	0.0002	0.0004	0.0006	0.0006	0.0006	0.0006
Avg.	0.2266	0.5070	3858	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007
Med.	0.2265	0.5074	3858	0.0002	0.0003	0.0004	0.0004	0.0006	0.0007
st dev	0.0007	0.0014	34	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002
Min.	0.2250	0.5038	3809	0.0001	0.0000	0.0001	0.0003	0.0004	0.0001
Max.	0.2281	0.5093	3966	0.0003	0.0004	0.0007	0.0007	0.0008	0.0009

3.4 Data Set 2, 85°C, 150mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)					
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	78.61	100.14	99.67	99.29	98.80	98.73	98.49
27	79.49	100.18	99.96	99.92	99.91	99.57	99.25
28	79.47	99.99	99.72	99.46	99.28	98.85	98.53
29	78.71	100.19	100.05	99.76	99.62	99.53	99.25
30	78.18	100.04	99.83	99.67	99.50	99.26	99.07
31	79.41	100.08	99.76	99.52	99.32	98.92	98.70
32	78.73	100.13	99.92	99.81	99.58	99.48	99.33
33	78.97	100.19	99.82	99.81	99.73	99.43	99.15
34	77.78	100.04	99.81	99.33	98.95	98.70	98.35
35	77.97	100.10	99.95	99.79	99.67	99.58	99.33
36	80.00	100.13	99.75	99.58	99.45	99.25	99.08
37	78.85	100.06	99.92	99.63	99.39	99.02	98.85
38	78.32	99.90	99.53	99.40	99.22	99.16	98.79
39	79.48	99.99	99.76	99.33	98.84	98.68	98.38
40	79.66	100.09	99.76	99.64	99.59	99.46	99.31
41	79.25	100.05	99.89	99.70	99.27	99.05	98.74
42	77.92	100.05	99.74	99.72	99.29	98.99	98.77
43	79.09	100.06	99.80	99.72	99.34	98.98	98.72
44	79.84	99.86	99.70	99.39	99.25	99.00	98.71
45	79.48	99.90	99.64	99.01	98.91	98.64	98.47
46	79.20	99.94	99.61	99.49	99.08	98.94	98.70
47	78.48	99.87	99.55	99.39	99.32	99.27	98.90
48	79.29	99.95	99.61	99.37	99.22	99.08	98.76
49	78.49	99.73	99.57	98.87	98.50	98.18	98.08
50	79.38	100.16	99.96	99.65	99.42	99.24	98.94
Avg.	78.96	100.03	99.77	99.53	99.30	99.08	98.83
Med.	79.09	100.05	99.76	99.58	99.32	99.05	98.77
st dev	0.62	0.12	0.14	0.25	0.32	0.34	0.34
Min.	77.78	99.73	99.53	98.87	98.50	98.18	98.08
Max.	80.00	100.19	100.05	99.92	99.91	99.58	99.33

3.5 Data Set 2, 85°C, 150mA (Forward Voltage)

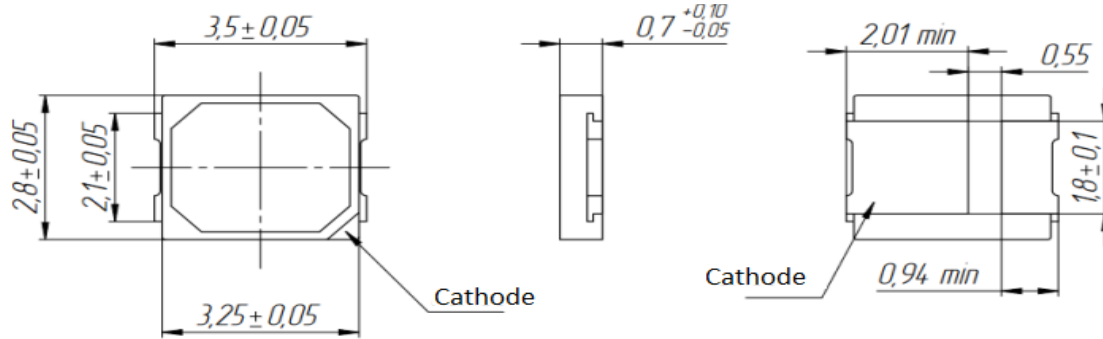
No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	3.092	3.093	3.092	3.089	3.091	3.100	3.125
27	3.087	3.091	3.086	3.085	3.091	3.097	3.129
28	3.094	3.096	3.089	3.087	3.089	3.096	3.128
29	3.091	3.095	3.076	3.073	3.076	3.083	3.137
30	3.086	3.090	3.083	3.082	3.092	3.097	3.128
31	3.087	3.092	3.079	3.078	3.087	3.090	3.126
32	3.087	3.092	3.086	3.085	3.094	3.095	3.125
33	3.094	3.099	3.089	3.087	3.087	3.095	3.129
34	3.083	3.085	3.093	3.086	3.095	3.097	3.119
35	3.088	3.092	3.092	3.086	3.096	3.102	3.129
36	3.087	3.090	3.089	3.086	3.089	3.098	3.126
37	3.080	3.083	3.076	3.072	3.072	3.073	3.116
38	3.083	3.087	3.085	3.082	3.090	3.094	3.121
39	3.095	3.100	3.098	3.097	3.099	3.106	3.134
40	3.090	3.094	3.085	3.083	3.087	3.087	3.126
41	3.094	3.099	3.092	3.089	3.094	3.102	3.131
42	3.089	3.092	3.087	3.083	3.093	3.097	3.125
43	3.089	3.092	3.089	3.079	3.087	3.097	3.123
44	3.089	3.093	3.092	3.088	3.089	3.091	3.123
45	3.091	3.094	3.092	3.087	3.097	3.102	3.128
46	3.092	3.095	3.094	3.092	3.095	3.099	3.139
47	3.083	3.087	3.085	3.085	3.094	3.097	3.131
48	3.091	3.095	3.082	3.078	3.087	3.095	3.138
49	3.091	3.095	3.093	3.094	3.092	3.101	3.136
50	3.085	3.089	3.086	3.087	3.094	3.101	3.131
Avg.	3.089	3.092	3.088	3.085	3.090	3.096	3.128
Med.	3.089	3.092	3.089	3.086	3.091	3.097	3.128
st dev	0.004	0.004	0.006	0.006	0.006	0.007	0.006
Min.	3.080	3.083	3.076	3.072	3.072	3.073	3.116
Max.	3.095	3.100	3.098	3.097	3.099	3.106	3.139

3.6 Data Set 2, 85°C, 150mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	0.2256	0.5067	3899	0.0001	0.0004	0.0005	0.0005	0.0006	0.0008
27	0.2262	0.5088	3844	0.0002	0.0002	0.0004	0.0006	0.0006	0.0007
28	0.2258	0.5073	3881	0.0005	0.0002	0.0002	0.0004	0.0005	0.0006
29	0.2273	0.5072	3832	0.0002	0.0004	0.0005	0.0005	0.0006	0.0010
30	0.2263	0.5046	3906	0.0001	0.0001	0.0003	0.0003	0.0004	0.0008
31	0.2267	0.5062	3868	0.0003	0.0001	0.0002	0.0004	0.0005	0.0007
32	0.2259	0.5076	3873	0.0002	0.0002	0.0004	0.0004	0.0005	0.0008
33	0.2272	0.5088	3813	0.0002	0.0001	0.0004	0.0006	0.0006	0.0008
34	0.2266	0.5053	3884	0.0002	0.0005	0.0005	0.0005	0.0006	0.0007
35	0.2277	0.5080	3806	0.0003	0.0002	0.0004	0.0006	0.0006	0.0007
36	0.2266	0.5070	3859	0.0002	0.0004	0.0004	0.0005	0.0006	0.0009
37	0.2283	0.5100	3756	0.0002	0.0006	0.0006	0.0006	0.0007	0.0007
38	0.2263	0.5066	3874	0.0002	0.0004	0.0006	0.0007	0.0007	0.0008
39	0.2277	0.5074	3815	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008
40	0.2273	0.5049	3866	0.0003	0.0004	0.0004	0.0005	0.0006	0.0008
41	0.2275	0.5072	3824	0.0001	0.0004	0.0004	0.0004	0.0005	0.0007
42	0.2267	0.5075	3848	0.0003	0.0004	0.0004	0.0005	0.0006	0.0004
43	0.2274	0.5065	3837	0.0001	0.0004	0.0005	0.0005	0.0006	0.0008
44	0.2274	0.5093	3798	0.0001	0.0006	0.0006	0.0008	0.0009	0.0009
45	0.2271	0.5074	3834	0.0002	0.0005	0.0006	0.0006	0.0006	0.0008
46	0.2272	0.5073	3834	0.0003	0.0004	0.0004	0.0005	0.0006	0.0007
47	0.2253	0.5069	3904	0.0002	0.0004	0.0006	0.0006	0.0007	0.0005
48	0.2249	0.5077	3909	0.0002	0.0006	0.0006	0.0007	0.0007	0.0010
49	0.2261	0.5080	3862	0.0001	0.0005	0.0006	0.0007	0.0008	0.0009
50	0.2269	0.5055	3872	0.0001	0.0003	0.0006	0.0007	0.0007	0.0006
Avg.	0.2267	0.5072	3852	0.0002	0.0004	0.0005	0.0006	0.0006	0.0008
Med.	0.2267	0.5073	3859	0.0002	0.0004	0.0005	0.0005	0.0006	0.0008
st dev	0.0008	0.0013	38	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2249	0.5046	3756	0.0001	0.0001	0.0002	0.0003	0.0004	0.0004
Max.	0.2283	0.5100	3909	0.0005	0.0006	0.0006	0.0008	0.0009	0.0010

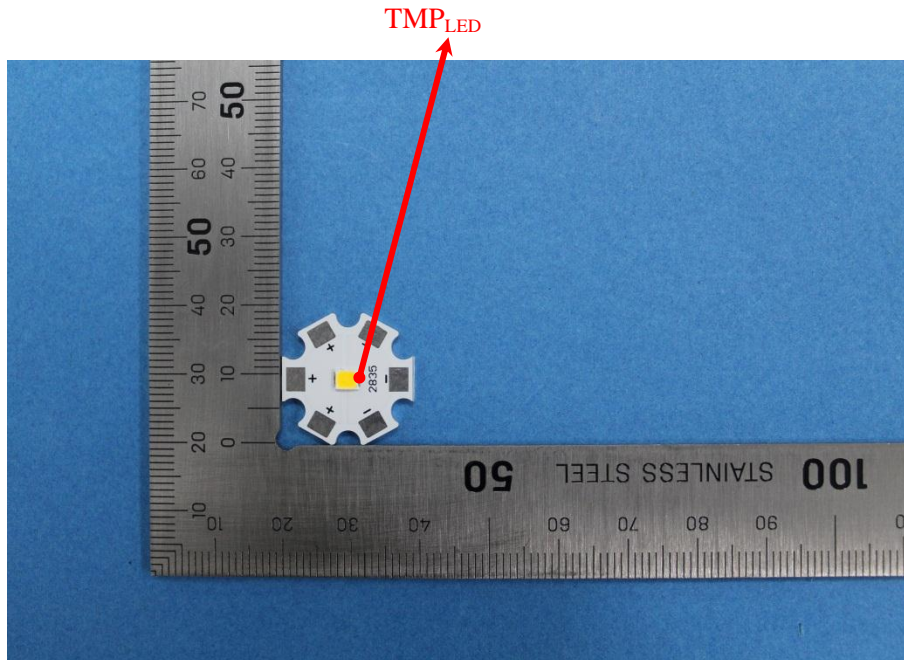
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



Directions

1. The information marked “superscript #” is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor $K=2$ with the 95% confidence interval.
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*****END OF REPORT*****