



TEST REPORT

According to ANSI/IES LM-80-15
For

Jiangxi MTC Optronics Co.,Ltd

199 Hujia road, changdong industrial park, qingshanhu district, nanchang city, jiangxi province.

Model: MKXWM-GX

Report Type: 10000 Hours Test Report	Product Type: LED Package
Reviewed By: Pote Wang	<i>Pote Wang</i>
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Approved by:	Blake Zhang / EE Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.12, Pulong East 1 st Road, Tangxia Town, Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588

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1 - General Information

1.1 Description of LED Light Sources

Sample Size:

75 PCS test samples were in good condition and received on 2020-09-10. The samples were numbered from 1 to 25, 26 to 50 and 51 to 75.

Manufacturer:	Jiangxi MTC Optronics Co.,Ltd
Part Number:	MKXWM-GX
Part Type:	LED Package
#Drive Level:	DC 120mA
#Nominal CCT:	2700K
#Power:	1W
#Average Current Density per LED die:	1056 mA/mm ²
#Average Power Density per LED die:	2.9 W/mm ²
#CRI:	80
#Die Spacing:	0.05mm

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:

Test Models	Multiple Models	Differences Items
MKXWM-GX	MKXxM-xx	x1=CCT, x2,x3=Lm Rank
	MTR-28XxM-xxx	x1=CCT, x2,x3,x4=Product specification

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	2021-09-27	2022-09-26
0.5M Integrating Sphere	EVERFINE	0.5m	NA	2021-09-27	2022-09-26
LED Test Source	EVERFINE	LTS-300	P185616CJ1391143	2021-09-24	2022-09-23
Standard Light Source	EVERFINE	D062	1011093	2021-10-15	2022-10-14
Multilayer aging machine	BACL	B2-270	20022	2021-02-24	2022-02-23
Program-controlled D.C. Stabilized Voltage Supply	Hanshenpu yuan	HSPY-200-01	N/A	2021-06-30	2022-06-29

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 $\pm 3\%$ 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°C \pm 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'. 2 π 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°C \pm 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: 85°C, 120mA

Part Number: MKXWM-GX
Number of Units: 25
Case Temperature: >83°C
Ambient Temperature: >80°C
Life Test Drive Current: 120mA
Measurement Current: 120mA

Data Set 2: 105°C, 120mA

Part Number: MKXWM-GX
Number of Units: 25
Case Temperature: >103°C
Ambient Temperature: >100°C
Life Test Drive Current: 120mA
Measurement Current: 120mA

Data Set 3: 115°C, 120mA

Part Number: MKXWM-GX
Number of Units: 25
Case Temperature: >113°C
Ambient Temperature: >110°C
Life Test Drive Current: 120mA
Measurement Current: 120mA

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	10000hrs	2.135E-06	1.005	>60000 hours
2	25	0	1000hrs	10000hrs	2.471E-06	1.005	>60000 hours
3	25	0	1000hrs	10000hrs	3.007E-06	1.005	>60000 hours

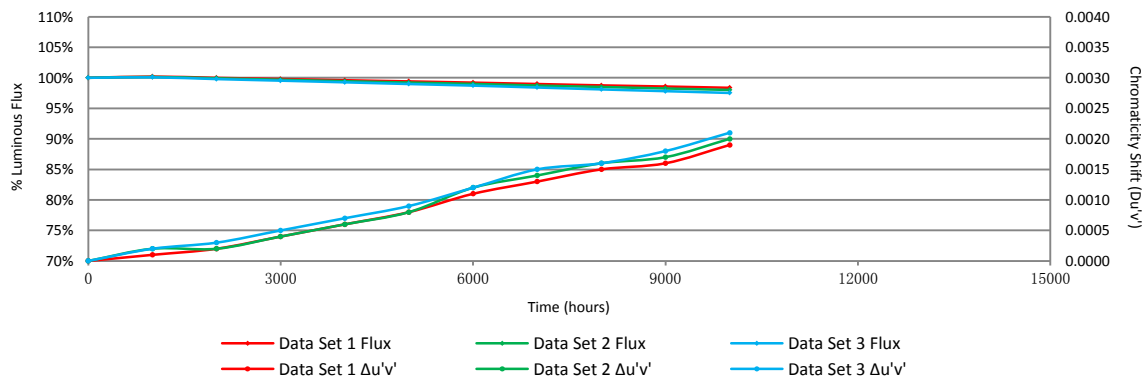
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	100.20%	99.99%	99.80%	99.60%	99.41%	99.21%	98.98%	98.76%	98.57%	98.36%
2	100.14%	99.92%	99.68%	99.44%	99.22%	99.00%	98.73%	98.50%	98.25%	98.01%
3	100.08%	99.79%	99.53%	99.26%	98.98%	98.72%	98.41%	98.10%	97.81%	97.52%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	0.0001	0.0002	0.0004	0.0006	0.0008	0.0011	0.0013	0.0015	0.0016	0.0019
2	0.0002	0.0002	0.0004	0.0006	0.0008	0.0012	0.0014	0.0016	0.0017	0.0020
3	0.0002	0.0003	0.0005	0.0007	0.0009	0.0012	0.0015	0.0016	0.0018	0.0021

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

3.1 Data Set 1, 85°C, 120mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)									
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	148.80	100.13	99.87	99.66	99.40	99.13	99.06	98.79	98.59	98.45	98.32
2	151.40	100.20	100.07	99.80	99.67	99.54	99.21	98.81	98.55	98.35	98.08
3	151.60	100.20	99.93	99.80	99.67	99.41	99.21	99.01	98.94	98.75	98.48
4	153.30	100.39	100.13	99.80	99.61	99.54	99.35	99.09	98.76	98.63	98.50
5	152.10	100.13	99.74	99.61	99.41	99.28	99.01	98.75	98.49	98.36	98.22
6	148.90	100.27	100.07	99.87	99.66	99.46	99.26	99.06	98.86	98.66	98.39
7	150.80	100.20	99.93	99.87	99.67	99.47	99.27	99.14	98.81	98.74	98.47
8	151.00	100.33	100.13	99.74	99.54	99.21	99.07	98.81	98.61	98.41	98.28
9	149.30	100.27	100.07	99.93	99.67	99.46	99.20	98.93	98.66	98.33	98.06
10	151.80	100.20	100.07	99.87	99.67	99.54	99.41	99.21	98.95	98.68	98.48
11	150.00	100.33	100.13	99.93	99.73	99.60	99.33	99.13	98.93	98.73	98.60
12	150.80	100.20	99.93	99.73	99.54	99.47	99.20	98.81	98.54	98.47	98.28
13	148.20	100.34	100.07	99.87	99.53	99.33	99.26	98.99	98.72	98.58	98.18
14	150.60	100.13	100.07	99.93	99.73	99.40	99.07	98.94	98.74	98.61	98.27
15	149.10	100.27	100.07	99.80	99.66	99.60	99.40	99.20	98.93	98.73	98.52
16	151.60	99.93	99.87	99.80	99.60	99.47	99.34	99.08	98.88	98.68	98.55
17	149.10	100.13	100.07	99.80	99.53	99.26	99.06	98.86	98.73	98.52	98.46
18	149.70	100.13	99.93	99.67	99.47	99.27	99.06	98.86	98.66	98.46	98.26
19	151.70	100.07	99.93	99.67	99.47	99.34	99.27	99.01	98.88	98.62	98.42
20	151.90	100.26	100.07	99.93	99.67	99.54	99.47	99.21	98.95	98.62	98.49
21	150.50	100.27	99.93	99.67	99.40	99.20	99.00	98.80	98.60	98.41	98.14
22	151.30	100.07	99.87	99.74	99.60	99.34	99.01	98.74	98.68	98.41	98.28
23	151.10	100.33	100.13	99.87	99.67	99.40	99.21	99.01	98.74	98.48	98.21
24	151.70	100.13	99.93	99.80	99.74	99.67	99.41	99.14	99.01	98.88	98.55
25	149.10	100.07	99.80	99.73	99.66	99.40	99.13	99.06	98.93	98.73	98.46
Avg.	150.62	100.20	99.99	99.80	99.60	99.41	99.21	98.98	98.76	98.57	98.36
Med.	150.80	100.20	100.07	99.80	99.66	99.41	99.21	99.01	98.74	98.61	98.39
st dev	1.29	0.11	0.11	0.10	0.11	0.14	0.14	0.15	0.15	0.15	0.16
Min.	148.20	99.93	99.74	99.61	99.40	99.13	99.00	98.74	98.49	98.33	98.06
Max.	153.30	100.39	100.13	99.93	99.74	99.67	99.47	99.21	99.01	98.88	98.60

3.2 Data Set 1, 85°C, 120mA (Forward Voltage)

No.	Forward Voltage (V)										
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	9.545	9.548	9.548	9.560	9.542	9.550	9.548	9.540	9.546	9.580	9.555
2	9.527	9.524	9.536	9.531	9.525	9.525	9.520	9.544	9.521	9.547	9.542
3	9.558	9.588	9.560	9.562	9.565	9.561	9.558	9.564	9.564	9.557	9.569
4	9.574	9.579	9.585	9.586	9.586	9.574	9.581	9.583	9.584	9.585	9.583
5	9.553	9.558	9.555	9.565	9.555	9.538	9.549	9.554	9.564	9.567	9.564
6	9.588	9.584	9.585	9.582	9.592	9.581	9.580	9.580	9.566	9.588	9.580
7	9.568	9.571	9.570	9.569	9.569	9.569	9.575	9.573	9.589	9.576	9.571
8	9.558	9.557	9.555	9.548	9.553	9.558	9.559	9.564	9.560	9.567	9.563
9	9.552	9.551	9.547	9.544	9.578	9.566	9.569	9.566	9.560	9.566	9.563
10	9.565	9.579	9.564	9.563	9.540	9.569	9.575	9.578	9.553	9.552	9.561
11	9.544	9.547	9.549	9.541	9.549	9.549	9.549	9.548	9.554	9.545	9.547
12	9.561	9.565	9.560	9.563	9.561	9.565	9.560	9.569	9.578	9.563	9.564
13	9.548	9.544	9.545	9.545	9.545	9.541	9.549	9.556	9.548	9.556	9.555
14	9.584	9.570	9.582	9.588	9.580	9.582	9.594	9.581	9.575	9.587	9.579
15	9.562	9.572	9.557	9.578	9.573	9.572	9.579	9.576	9.580	9.577	9.573
16	9.572	9.573	9.573	9.572	9.573	9.575	9.576	9.566	9.560	9.561	9.572
17	9.571	9.580	9.547	9.564	9.561	9.565	9.562	9.563	9.570	9.570	9.560
18	9.546	9.562	9.573	9.560	9.566	9.561	9.569	9.564	9.554	9.563	9.569
19	9.575	9.571	9.585	9.562	9.560	9.562	9.565	9.567	9.562	9.561	9.566
20	9.575	9.573	9.570	9.562	9.558	9.575	9.571	9.575	9.578	9.574	9.576
21	9.572	9.572	9.568	9.562	9.576	9.574	9.566	9.578	9.576	9.576	9.571
22	9.575	9.579	9.572	9.576	9.579	9.566	9.577	9.565	9.569	9.563	9.563
23	9.543	9.559	9.559	9.557	9.556	9.558	9.567	9.557	9.561	9.560	9.566
24	9.569	9.560	9.562	9.561	9.571	9.573	9.566	9.579	9.570	9.563	9.565
25	9.562	9.564	9.568	9.573	9.572	9.570	9.564	9.570	9.576	9.567	9.566
Avg.	9.562	9.565	9.563	9.563	9.563	9.563	9.565	9.566	9.565	9.567	9.566
Med.	9.562	9.570	9.562	9.562	9.565	9.566	9.566	9.566	9.564	9.566	9.566
st dev	0.015	0.015	0.014	0.014	0.016	0.014	0.015	0.012	0.014	0.011	0.010
Min.	9.527	9.524	9.536	9.531	9.525	9.525	9.520	9.540	9.521	9.545	9.542
Max.	9.588	9.588	9.585	9.588	9.592	9.582	9.594	9.583	9.589	9.588	9.583

3.3 Data Set 1, 85°C, 120mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)									
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.2601	0.5228	2770	0.0001	0.0002	0.0004	0.0004	0.0007	0.0009	0.0013	0.0016	0.0018	0.0020
2	0.2598	0.5231	2776	0.0001	0.0002	0.0006	0.0008	0.0011	0.0014	0.0014	0.0016	0.0017	0.0021
3	0.2604	0.5233	2761	0.0001	0.0001	0.0004	0.0004	0.0006	0.0011	0.0010	0.0011	0.0015	0.0018
4	0.2594	0.5250	2776	0.0001	0.0001	0.0005	0.0006	0.0007	0.0011	0.0013	0.0015	0.0016	0.0020
5	0.2613	0.5239	2739	0.0001	0.0002	0.0004	0.0006	0.0007	0.0009	0.0015	0.0017	0.0016	0.0021
6	0.2607	0.5218	2763	0.0003	0.0004	0.0007	0.0010	0.0010	0.0014	0.0016	0.0019	0.0020	0.0022
7	0.2599	0.5235	2772	0.0002	0.0003	0.0004	0.0007	0.0009	0.0012	0.0014	0.0016	0.0019	0.0021
8	0.2585	0.5229	2806	0.0002	0.0002	0.0004	0.0004	0.0009	0.0010	0.0013	0.0015	0.0016	0.0019
9	0.2618	0.5245	2727	0.0001	0.0002	0.0005	0.0006	0.0008	0.0011	0.0012	0.0014	0.0015	0.0017
10	0.2589	0.5234	2794	0.0001	0.0003	0.0006	0.0007	0.0009	0.0012	0.0013	0.0016	0.0015	0.0020
11	0.2620	0.5234	2727	0.0002	0.0004	0.0005	0.0007	0.0009	0.0012	0.0016	0.0018	0.0018	0.0021
12	0.2596	0.5227	2782	0.0001	0.0002	0.0003	0.0005	0.0006	0.0011	0.0013	0.0015	0.0016	0.0019
13	0.2614	0.5217	2746	0.0001	0.0002	0.0003	0.0006	0.0007	0.0009	0.0011	0.0016	0.0015	0.0017
14	0.2600	0.5221	2776	0.0002	0.0002	0.0004	0.0006	0.0008	0.0010	0.0011	0.0014	0.0014	0.0018
15	0.2613	0.5236	2741	0.0001	0.0002	0.0003	0.0007	0.0007	0.0010	0.0012	0.0015	0.0016	0.0019
16	0.2591	0.5247	2784	0.0001	0.0004	0.0005	0.0006	0.0009	0.0013	0.0014	0.0017	0.0017	0.0021
17	0.2596	0.5221	2784	0.0001	0.0002	0.0002	0.0005	0.0016	0.0019	0.0019	0.0021	0.0022	0.0025
18	0.2604	0.5221	2767	0.0001	0.0002	0.0003	0.0007	0.0008	0.0011	0.0014	0.0016	0.0018	0.0020
19	0.2593	0.5223	2791	0.0001	0.0003	0.0004	0.0006	0.0008	0.0011	0.0013	0.0014	0.0016	0.0019
20	0.2597	0.5230	2779	0.0001	0.0001	0.0004	0.0005	0.0006	0.0011	0.0013	0.0014	0.0014	0.0019
21	0.2611	0.5230	2747	0.0001	0.0001	0.0003	0.0004	0.0008	0.0010	0.0012	0.0013	0.0014	0.0017
22	0.2602	0.5222	2771	0.0001	0.0002	0.0004	0.0005	0.0007	0.0008	0.0011	0.0012	0.0015	0.0015
23	0.2614	0.5253	2731	0.0002	0.0002	0.0001	0.0005	0.0006	0.0008	0.0011	0.0012	0.0014	0.0017
24	0.2598	0.5246	2769	0.0002	0.0002	0.0002	0.0005	0.0007	0.0010	0.0011	0.0014	0.0013	0.0021
25	0.2603	0.5226	2766	0.0001	0.0002	0.0002	0.0004	0.0006	0.0010	0.0011	0.0014	0.0014	0.0018
Avg.	0.2602	0.5232	2766	0.0001	0.0002	0.0004	0.0006	0.0008	0.0011	0.0013	0.0015	0.0016	0.0019
Med.	0.2601	0.5230	2770	0.0001	0.0002	0.0004	0.0006	0.0008	0.0011	0.0013	0.0015	0.0016	0.0019
st dev	0.0009	0.0010	21	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.2585	0.5217	2727	0.0001	0.0001	0.0001	0.0004	0.0006	0.0008	0.0010	0.0011	0.0013	0.0015
Max.	0.2620	0.5253	2806	0.0003	0.0004	0.0007	0.0010	0.0016	0.0019	0.0019	0.0021	0.0022	0.0025

3.4 Data Set 2, 105°C, 120mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	152.50	100.20	99.87	99.61	99.41	99.28	99.08	98.75	98.69	98.43	98.16
27	150.10	100.07	99.93	99.67	99.27	99.07	99.00	98.80	98.47	98.20	97.93
28	151.80	100.13	99.87	99.74	99.47	99.28	98.88	98.62	98.42	98.22	98.09
29	151.80	100.26	100.13	99.87	99.60	99.34	99.08	98.81	98.55	98.29	98.02
30	151.50	100.20	100.13	99.74	99.47	99.27	99.01	98.81	98.61	98.42	98.09
31	150.10	100.33	100.07	99.73	99.47	99.27	99.20	98.93	98.60	98.40	98.13
32	151.10	100.20	100.13	99.93	99.74	99.34	99.07	98.81	98.68	98.41	98.21
33	150.60	100.27	100.07	99.87	99.60	99.40	99.14	98.80	98.61	98.34	98.14
34	150.80	99.93	99.87	99.60	99.47	99.27	99.01	98.74	98.54	98.28	98.08
35	150.00	100.20	100.07	99.93	99.87	99.53	99.27	98.93	98.67	98.47	98.27
36	147.60	100.20	99.93	99.66	99.39	99.12	98.85	98.58	98.31	98.10	97.83
37	149.20	100.34	100.07	99.87	99.73	99.46	99.33	98.99	98.66	98.53	98.26
38	148.40	100.07	99.93	99.87	99.73	99.46	99.06	98.79	98.65	98.38	98.25
39	148.10	100.14	99.93	99.73	99.46	99.26	99.05	98.78	98.58	98.38	98.18
40	147.70	100.14	99.93	99.86	99.66	99.32	99.05	98.71	98.44	98.17	97.97
41	149.90	100.07	99.87	99.60	99.33	99.07	98.80	98.53	98.27	98.07	97.87
42	152.30	100.07	99.74	99.61	99.34	99.21	98.95	98.75	98.49	98.16	97.90
43	151.10	99.93	99.74	99.54	99.27	99.01	98.87	98.68	98.35	98.01	97.82
44	151.80	100.07	99.80	99.47	99.28	99.14	98.95	98.68	98.48	98.22	98.02
45	150.30	100.07	99.80	99.47	99.27	99.20	99.07	98.80	98.54	98.14	97.87
46	150.30	100.13	99.87	99.60	99.33	99.27	99.07	98.74	98.60	98.34	98.07
47	151.20	100.26	99.87	99.67	99.40	99.07	98.94	98.54	98.35	98.15	97.88
48	151.40	100.13	99.80	99.60	99.14	98.88	98.68	98.41	98.28	98.08	97.75
49	151.60	100.26	99.87	99.47	99.34	99.14	99.01	98.68	98.55	98.22	97.82
50	150.30	99.93	99.60	99.33	99.07	98.87	98.67	98.54	98.20	97.94	97.74
Avg.	150.46	100.14	99.92	99.68	99.44	99.22	99.00	98.73	98.50	98.25	98.01
Med.	150.60	100.14	99.87	99.67	99.41	99.27	99.01	98.75	98.54	98.22	98.02
st dev	1.38	0.11	0.14	0.16	0.20	0.17	0.16	0.14	0.14	0.15	0.16
Min.	147.60	99.93	99.60	99.33	99.07	98.87	98.67	98.41	98.20	97.94	97.74
Max.	152.50	100.34	100.13	99.93	99.87	99.53	99.33	98.99	98.69	98.53	98.27

3.5 Data Set 2, 105°C, 120mA (Forward Voltage)

No.	Forward Voltage (V)										
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	9.578	9.574	9.584	9.574	9.579	9.575	9.553	9.571	9.571	9.562	9.569
27	9.567	9.563	9.564	9.578	9.561	9.567	9.564	9.567	9.565	9.570	9.564
28	9.567	9.568	9.558	9.563	9.566	9.551	9.569	9.551	9.565	9.563	9.562
29	9.561	9.568	9.563	9.575	9.561	9.564	9.569	9.564	9.564	9.554	9.563
30	9.546	9.547	9.546	9.562	9.563	9.556	9.553	9.557	9.560	9.551	9.561
31	9.562	9.550	9.569	9.568	9.562	9.571	9.569	9.554	9.560	9.563	9.567
32	9.541	9.543	9.547	9.546	9.545	9.553	9.545	9.548	9.544	9.540	9.549
33	9.546	9.546	9.542	9.549	9.544	9.548	9.542	9.541	9.543	9.541	9.546
34	9.571	9.565	9.564	9.561	9.564	9.562	9.567	9.568	9.569	9.567	9.566
35	9.576	9.579	9.560	9.566	9.554	9.562	9.564	9.567	9.565	9.559	9.568
36	9.543	9.549	9.549	9.542	9.549	9.543	9.540	9.549	9.542	9.543	9.545
37	9.569	9.560	9.563	9.555	9.560	9.560	9.571	9.569	9.569	9.560	9.568
38	9.561	9.559	9.562	9.562	9.568	9.565	9.562	9.563	9.566	9.565	9.570
39	9.575	9.561	9.563	9.568	9.570	9.555	9.579	9.575	9.579	9.578	9.581
40	9.572	9.575	9.570	9.570	9.575	9.570	9.573	9.577	9.579	9.570	9.576
41	9.571	9.569	9.560	9.574	9.571	9.569	9.575	9.574	9.571	9.578	9.570
42	9.562	9.560	9.569	9.565	9.561	9.567	9.571	9.568	9.564	9.563	9.566
43	9.554	9.559	9.559	9.562	9.555	9.551	9.560	9.557	9.555	9.557	9.570
44	9.571	9.576	9.573	9.579	9.578	9.575	9.575	9.579	9.575	9.579	9.573
45	9.567	9.565	9.565	9.561	9.569	9.565	9.572	9.564	9.530	9.573	9.560
46	9.561	9.562	9.564	9.562	9.562	9.568	9.570	9.569	9.560	9.567	9.563
47	9.559	9.558	9.559	9.563	9.558	9.557	9.562	9.562	9.565	9.555	9.565
48	9.576	9.576	9.574	9.573	9.565	9.578	9.575	9.576	9.570	9.573	9.575
49	9.569	9.568	9.563	9.572	9.569	9.564	9.568	9.567	9.569	9.564	9.567
50	9.567	9.567	9.563	9.560	9.562	9.563	9.562	9.565	9.567	9.566	9.565
Avg.	9.564	9.563	9.562	9.564	9.563	9.562	9.564	9.564	9.563	9.562	9.565
Med.	9.567	9.563	9.563	9.563	9.562	9.564	9.568	9.567	9.565	9.563	9.566
st dev	0.011	0.010	0.009	0.009	0.009	0.009	0.011	0.010	0.012	0.011	0.009
Min.	9.541	9.543	9.542	9.542	9.544	9.543	9.540	9.541	9.530	9.540	9.545
Max.	9.578	9.579	9.584	9.579	9.579	9.578	9.579	9.579	9.579	9.579	9.581

3.6 Data Set 2, 105°C, 120mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)									
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	0.2587	0.5246	2793	0.0001	0.0001	0.0004	0.0006	0.0008	0.0010	0.0014	0.0013	0.0018	0.0021
27	0.2608	0.5228	2756	0.0003	0.0001	0.0002	0.0004	0.0008	0.0009	0.0013	0.0015	0.0017	0.0020
28	0.2591	0.5241	2787	0.0003	0.0003	0.0004	0.0007	0.0010	0.0014	0.0014	0.0016	0.0018	0.0023
29	0.2604	0.5244	2757	0.0001	0.0002	0.0004	0.0006	0.0008	0.0011	0.0013	0.0015	0.0017	0.0020
30	0.2588	0.5237	2795	0.0003	0.0000	0.0003	0.0006	0.0006	0.0010	0.0011	0.0013	0.0016	0.0020
31	0.2573	0.5222	2835	0.0001	0.0003	0.0004	0.0006	0.0008	0.0011	0.0013	0.0014	0.0017	0.0020
32	0.2581	0.5217	2821	0.0000	0.0004	0.0007	0.0008	0.0008	0.0015	0.0015	0.0016	0.0018	0.0022
33	0.2600	0.5236	2770	0.0001	0.0004	0.0004	0.0007	0.0009	0.0012	0.0013	0.0016	0.0017	0.0021
34	0.2611	0.5225	2751	0.0001	0.0004	0.0006	0.0006	0.0013	0.0017	0.0019	0.0020	0.0021	0.0025
35	0.2610	0.5224	2753	0.0001	0.0002	0.0004	0.0005	0.0008	0.0011	0.0013	0.0015	0.0016	0.0020
36	0.2603	0.5244	2759	0.0002	0.0002	0.0005	0.0006	0.0008	0.0012	0.0016	0.0016	0.0018	0.0021
37	0.2589	0.5229	2797	0.0002	0.0004	0.0008	0.0008	0.0010	0.0012	0.0015	0.0018	0.0018	0.0024
38	0.2590	0.5233	2792	0.0000	0.0001	0.0004	0.0006	0.0008	0.0013	0.0013	0.0018	0.0017	0.0020
39	0.2585	0.5242	2798	0.0002	0.0001	0.0004	0.0005	0.0008	0.0011	0.0013	0.0014	0.0015	0.0017
40	0.2608	0.5243	2749	0.0001	0.0003	0.0004	0.0007	0.0009	0.0014	0.0018	0.0018	0.0019	0.0019
41	0.2606	0.5224	2762	0.0002	0.0003	0.0004	0.0006	0.0010	0.0014	0.0015	0.0016	0.0017	0.0018
42	0.2593	0.5210	2796	0.0002	0.0002	0.0007	0.0007	0.0007	0.0012	0.0014	0.0016	0.0017	0.0018
43	0.2582	0.5229	2812	0.0001	0.0004	0.0006	0.0009	0.0009	0.0014	0.0014	0.0018	0.0019	0.0020
44	0.2603	0.5242	2761	0.0002	0.0001	0.0004	0.0005	0.0007	0.0012	0.0013	0.0015	0.0016	0.0017
45	0.2607	0.5253	2747	0.0002	0.0002	0.0001	0.0004	0.0007	0.0010	0.0012	0.0015	0.0014	0.0016
46	0.2612	0.5220	2751	0.0002	0.0002	0.0004	0.0006	0.0007	0.0011	0.0013	0.0015	0.0016	0.0018
47	0.2594	0.5264	2769	0.0000	0.0002	0.0004	0.0004	0.0007	0.0011	0.0013	0.0014	0.0016	0.0017
48	0.2604	0.5234	2761	0.0002	0.0001	0.0004	0.0005	0.0007	0.0010	0.0013	0.0013	0.0016	0.0017
49	0.2584	0.5232	2807	0.0001	0.0001	0.0003	0.0006	0.0008	0.0010	0.0013	0.0014	0.0016	0.0018
50	0.2608	0.5231	2754	0.0001	0.0002	0.0004	0.0004	0.0007	0.0011	0.0014	0.0014	0.0017	0.0018
Avg.	0.2597	0.5234	2777	0.0002	0.0002	0.0004	0.0006	0.0008	0.0012	0.0014	0.0016	0.0017	0.0020
Med.	0.2600	0.5233	2769	0.0001	0.0002	0.0004	0.0006	0.0008	0.0011	0.0013	0.0015	0.0017	0.0020
st dev	0.0011	0.0012	26	0.0001	0.0001	0.0002	0.0001	0.0001	0.0002	0.0002	0.0002	0.0001	0.0002
Min.	0.2573	0.5210	2747	0.0000	0.0000	0.0001	0.0004	0.0006	0.0009	0.0011	0.0013	0.0014	0.0016
Max.	0.2612	0.5264	2835	0.0003	0.0004	0.0008	0.0009	0.0013	0.0017	0.0019	0.0020	0.0021	0.0025

3.7 Data Set 3, 115°C, 120mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
51	151.60	99.87	99.60	99.34	99.08	99.01	98.68	98.42	98.09	97.82	97.56
52	151.20	100.13	99.80	99.54	99.27	99.14	98.81	98.41	98.08	97.82	97.42
53	151.60	99.93	99.74	99.47	99.21	99.01	98.68	98.28	97.96	97.82	97.49
54	151.20	99.93	99.67	99.34	98.94	98.81	98.68	98.41	98.02	97.88	97.75
55	150.80	100.13	99.93	99.60	99.27	98.94	98.74	98.28	97.88	97.81	97.55
56	150.70	100.20	99.93	99.60	99.27	99.00	98.87	98.54	98.14	97.81	97.68
57	151.40	99.93	99.67	99.47	99.34	99.14	98.94	98.68	98.28	98.02	97.69
58	150.10	100.07	99.80	99.60	99.27	99.07	98.87	98.60	98.27	97.87	97.67
59	151.40	99.93	99.87	99.60	99.27	98.88	98.75	98.48	98.22	97.82	97.56
60	149.80	100.13	99.80	99.73	99.47	99.00	98.73	98.53	98.26	98.00	97.60
61	154.00	99.94	99.74	99.61	99.55	99.29	98.83	98.57	98.25	97.92	97.60
62	152.70	100.20	99.87	99.54	99.35	99.08	98.76	98.49	98.36	98.17	97.90
63	152.90	99.93	99.67	99.48	99.15	98.82	98.56	98.23	98.04	97.71	97.32
64	151.90	100.26	100.07	99.80	99.54	99.28	99.01	98.68	98.29	97.89	97.50
65	150.40	99.93	99.60	99.40	99.14	98.87	98.54	98.20	97.94	97.47	97.14
66	152.10	100.13	99.67	99.41	99.15	98.75	98.42	98.16	97.90	97.50	97.37
67	152.40	100.20	99.74	99.48	99.08	98.75	98.56	98.23	97.77	97.57	97.18
68	152.20	100.13	99.74	99.41	99.08	98.69	98.36	98.09	97.77	97.37	97.11
69	153.20	100.13	99.67	99.54	99.35	99.22	98.89	98.50	98.24	97.98	97.78
70	151.90	100.20	99.93	99.80	99.54	99.21	99.01	98.82	98.42	98.09	97.83
71	149.40	100.13	99.93	99.46	99.06	98.86	98.53	98.19	97.93	97.66	97.39
72	152.30	99.87	99.67	99.41	99.15	98.88	98.56	98.29	97.96	97.57	97.24
73	151.50	100.07	99.87	99.47	99.34	98.94	98.75	98.48	98.15	97.95	97.62
74	150.70	100.27	99.93	99.60	99.20	98.87	98.54	98.21	97.94	97.68	97.28
75	151.20	100.26	99.93	99.60	99.34	99.07	98.88	98.48	98.35	98.08	97.75
Avg.	151.54	100.08	99.79	99.53	99.26	98.98	98.72	98.41	98.10	97.81	97.52
Med.	151.50	100.13	99.80	99.54	99.27	99.00	98.74	98.42	98.09	97.82	97.56
st dev	1.07	0.13	0.13	0.13	0.16	0.17	0.18	0.19	0.19	0.20	0.22
Min.	149.40	99.87	99.60	99.34	98.94	98.69	98.36	98.09	97.77	97.37	97.11
Max.	154.00	100.27	100.07	99.80	99.55	99.29	99.01	98.82	98.42	98.17	97.90

3.8 Data Set 3, 115°C, 120mA (Forward Voltage)

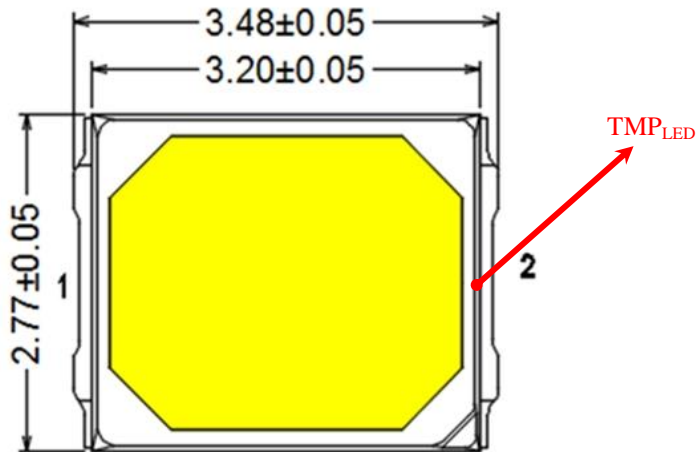
No.	Forward Voltage (V)										
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
51	9.570	9.560	9.578	9.560	9.573	9.546	9.551	9.549	9.559	9.578	9.554
52	9.573	9.572	9.559	9.557	9.567	9.579	9.565	9.559	9.578	9.564	9.571
53	9.573	9.547	9.576	9.571	9.574	9.567	9.565	9.568	9.569	9.552	9.576
54	9.549	9.547	9.545	9.554	9.564	9.576	9.555	9.573	9.569	9.564	9.578
55	9.573	9.576	9.565	9.577	9.580	9.577	9.573	9.550	9.559	9.571	9.555
56	9.587	9.549	9.546	9.564	9.547	9.565	9.571	9.557	9.577	9.570	9.563
57	9.553	9.559	9.580	9.580	9.545	9.577	9.562	9.570	9.549	9.564	9.577
58	9.564	9.576	9.550	9.547	9.549	9.558	9.567	9.562	9.564	9.559	9.577
59	9.561	9.559	9.550	9.568	9.582	9.552	9.555	9.556	9.577	9.557	9.546
60	9.546	9.572	9.553	9.576	9.547	9.577	9.547	9.551	9.562	9.557	9.576
61	9.586	9.564	9.579	9.555	9.561	9.551	9.557	9.572	9.572	9.563	9.560
62	9.564	9.548	9.553	9.567	9.558	9.573	9.577	9.545	9.561	9.560	9.551
63	9.562	9.567	9.570	9.577	9.555	9.577	9.561	9.554	9.556	9.568	9.552
64	9.562	9.579	9.568	9.556	9.579	9.559	9.573	9.546	9.577	9.582	9.555
65	9.563	9.563	9.558	9.575	9.550	9.552	9.572	9.553	9.551	9.579	9.554
66	9.586	9.563	9.546	9.555	9.551	9.555	9.572	9.566	9.558	9.579	9.581
67	9.582	9.550	9.559	9.547	9.548	9.571	9.577	9.548	9.567	9.570	9.569
68	9.541	9.578	9.562	9.559	9.557	9.552	9.567	9.554	9.566	9.569	9.556
69	9.568	9.574	9.548	9.572	9.570	9.561	9.574	9.566	9.561	9.548	9.558
70	9.569	9.574	9.568	9.559	9.575	9.547	9.552	9.558	9.562	9.546	9.555
71	9.571	9.574	9.568	9.558	9.564	9.567	9.560	9.575	9.575	9.557	9.571
72	9.580	9.556	9.569	9.570	9.558	9.565	9.570	9.566	9.556	9.557	9.575
73	9.542	9.565	9.555	9.575	9.572	9.568	9.557	9.559	9.560	9.574	9.575
74	9.571	9.579	9.558	9.550	9.564	9.574	9.555	9.572	9.557	9.561	9.574
75	9.561	9.578	9.580	9.576	9.570	9.568	9.559	9.562	9.575	9.572	9.559
Avg.	9.566	9.565	9.562	9.564	9.562	9.565	9.564	9.560	9.565	9.565	9.565
Med.	9.568	9.565	9.559	9.564	9.564	9.567	9.565	9.559	9.562	9.564	9.563
st dev	0.013	0.011	0.011	0.010	0.012	0.011	0.009	0.009	0.009	0.010	0.011
Min.	9.541	9.547	9.545	9.547	9.545	9.546	9.547	9.545	9.549	9.546	9.546
Max.	9.587	9.579	9.580	9.580	9.582	9.579	9.577	9.575	9.578	9.582	9.581

3.9 Data Set 3, 115°C, 120mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)									
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	0.2593	0.5236	2784	0.0002	0.0001	0.0006	0.0007	0.0008	0.0011	0.0015	0.0016	0.0018	0.0021
52	0.2605	0.5242	2756	0.0001	0.0002	0.0004	0.0006	0.0009	0.0013	0.0014	0.0017	0.0018	0.0022
53	0.2584	0.5237	2805	0.0002	0.0002	0.0003	0.0005	0.0008	0.0011	0.0012	0.0016	0.0016	0.0019
54	0.2591	0.5220	2797	0.0002	0.0004	0.0004	0.0006	0.0008	0.0014	0.0014	0.0016	0.0017	0.0021
55	0.2611	0.5227	2749	0.0002	0.0004	0.0006	0.0008	0.0009	0.0014	0.0016	0.0018	0.0018	0.0022
56	0.2586	0.5211	2812	0.0001	0.0000	0.0003	0.0004	0.0006	0.0012	0.0013	0.0015	0.0015	0.0019
57	0.2584	0.5240	2803	0.0002	0.0005	0.0007	0.0009	0.0009	0.0014	0.0015	0.0017	0.0020	0.0021
58	0.2585	0.5240	2801	0.0002	0.0002	0.0003	0.0005	0.0008	0.0010	0.0014	0.0014	0.0016	0.0018
59	0.2591	0.5235	2789	0.0001	0.0002	0.0004	0.0006	0.0006	0.0012	0.0013	0.0014	0.0016	0.0019
60	0.2608	0.5232	2753	0.0002	0.0004	0.0005	0.0007	0.0008	0.0011	0.0014	0.0016	0.0017	0.0020
61	0.2595	0.5231	2783	0.0002	0.0003	0.0007	0.0007	0.0009	0.0011	0.0014	0.0016	0.0018	0.0021
62	0.2575	0.5224	2830	0.0003	0.0001	0.0003	0.0006	0.0006	0.0010	0.0012	0.0013	0.0017	0.0019
63	0.2602	0.5248	2761	0.0001	0.0002	0.0006	0.0008	0.0009	0.0011	0.0015	0.0016	0.0018	0.0022
64	0.2599	0.5248	2765	0.0001	0.0003	0.0004	0.0007	0.0008	0.0011	0.0015	0.0016	0.0018	0.0020
65	0.2605	0.5239	2757	0.0001	0.0003	0.0005	0.0006	0.0008	0.0012	0.0014	0.0016	0.0018	0.0021
66	0.2602	0.5236	2764	0.0002	0.0003	0.0004	0.0008	0.0009	0.0012	0.0015	0.0016	0.0017	0.0019
67	0.2607	0.5221	2761	0.0001	0.0004	0.0004	0.0006	0.0009	0.0011	0.0014	0.0016	0.0018	0.0020
68	0.2604	0.5245	2757	0.0001	0.0004	0.0006	0.0006	0.0011	0.0014	0.0016	0.0016	0.0021	0.0023
69	0.2596	0.5253	2770	0.0001	0.0004	0.0006	0.0006	0.0007	0.0011	0.0014	0.0015	0.0016	0.0019
70	0.2604	0.5230	2764	0.0004	0.0003	0.0004	0.0005	0.0008	0.0011	0.0014	0.0016	0.0018	0.0021
71	0.2609	0.5240	2748	0.0003	0.0005	0.0006	0.0009	0.0012	0.0014	0.0016	0.0017	0.0019	0.0023
72	0.2599	0.5236	2771	0.0001	0.0003	0.0006	0.0007	0.0011	0.0014	0.0016	0.0018	0.0019	0.0022
73	0.2604	0.5252	2752	0.0001	0.0001	0.0004	0.0004	0.0008	0.0011	0.0013	0.0015	0.0016	0.0019
74	0.2608	0.5235	2752	0.0001	0.0003	0.0005	0.0009	0.0008	0.0012	0.0016	0.0016	0.0018	0.0021
75	0.2611	0.5257	2736	0.0001	0.0004	0.0005	0.0008	0.0011	0.0016	0.0018	0.0020	0.0022	0.0025
Avg.	0.2598	0.5237	2773	0.0002	0.0003	0.0005	0.0007	0.0009	0.0012	0.0015	0.0016	0.0018	0.0021
Med.	0.2602	0.5236	2764	0.0001	0.0003	0.0005	0.0006	0.0008	0.0012	0.0014	0.0016	0.0018	0.0021
st dev	0.0010	0.0011	24	0.0001	0.0001	0.0001	0.0002	0.0002	0.0001	0.0001	0.0001	0.0002	0.0002
Min.	0.2575	0.5211	2736	0.0001	0.0000	0.0003	0.0004	0.0006	0.0010	0.0012	0.0013	0.0015	0.0018
Max.	0.2611	0.5257	2830	0.0004	0.0005	0.0007	0.0009	0.0012	0.0016	0.0018	0.0020	0.0022	0.0025

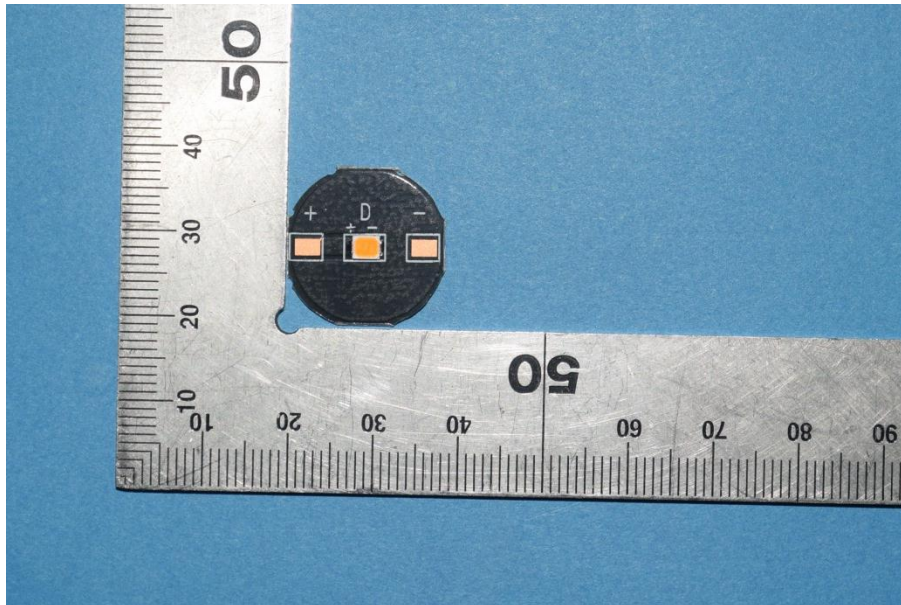
4 - DUT Photo

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.
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*****END OF REPORT*****