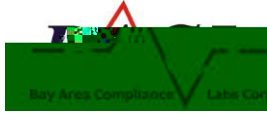


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1 - General Information

1.1 Description of LED Light Sources

Sample Size:

90 PCS samples were received on 2017-11-24. The samples were numbered from 1 to 30, 31 to 60 and 61 to 90.

Manufacturer:	Hongli Zhihui Group Co.,Ltd. Guangzhou Branch
Part Number:	HL-AS-2835VDW-2C-S1-08-PCT-HR3(R9)
Part Type:	LED Package
Drive Level:	DC 30mA
Nominal CCT:	2700K
Power:	1W
Average Current Density per LED die:	134.782mA/mm ²
Average Power Density per LED die:	2.246W/mm ²
CRI:	80
Die Spacing:	0.15mm

Sampling Method:

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

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

Family products covered by this report:

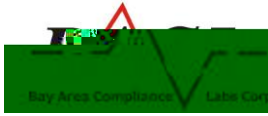
According to *ENERGY STAR® Requirements for the Use of LM-80 Data*, the following products can be covered by this report base on the information and declaration provided by manufacturer. The information of these models shows that the covered products meet all section 4 requirements of *ENERGY STAR® Requirements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

This report covers the following models:

Testing Model	Multiple Models	Differences Details
HL-AS-2835VDW-2C-S1-08-PCT-HR3(R9)	HL-AS-2835VDW-2C-S1-08-PCT-HR3	Only different Model name for different market
	HL-AS-2835VDW-2C-S1-08L-PCT-HR3(R9)	
	HL-AS-2835VDW-2C-S1-08L-PCT-HR3	
	HL-AS-2835DVW-2C-S1-08-PCT-HR3(R9)	
	HL-AS-2835DVW-2C-S1-08-PCT-HR3	
	HL-AS-2835DVW-2C-S1-08L-PCT-HR3(R9)	
	HL-AS-2835DVW-2C-S1-08L-PCT-HR3	
	SL-*B2835FTA-21BD*	
	SL-*B2835FTA-21BD*H	

Note:

- The first - 2 2 color temperature. I means 2200-3700K, N means 3700-4700K, W means above 4700K.
- The second symbol - .



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1.2 Standards and Reference Documentations

FUNVAL



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system was calibrated by halogen reference lamp. The ambient temperature during test was set to $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, RH <65%. The temperature measurement point was located in the sphere and the temperature was detected by a temperature probe.

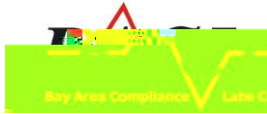
The uncertainty of the light output measurements is $U=1.59\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=21\text{K}$ ($K=2$), at the 95% confidence level.

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

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1.8 Sample Set

Data Set 1: 55°C, 30mA

Part Number: HL-AS-2835VDW-2C-S1-08-PCT-HR3(R9)
Number of Units: 30
Case Temperature: >53°C
Ambient Temperature: >50°C
Life Test Drive Current: 30mA
Measurement Current: 30mA

Data Set 2: 85°C, 30mA

Part Number: HL-AS-2835VDW-2C-S1-08-PCT-HR3(R9)
Number of Units: 30
Case Temperature: >83°C
Ambient Temperature: >80°C
Life Test Drive Current: 30mA
Measurement Current: 30mA

Data Set 3: 105°C, 30mA

Part Number: HL-AS-2835VDW-2C-S1-08-PCT-HR3(R9)
Number of Units: 30
Case Temperature: >103°C
Ambient Temperature: >100°C
Life Test Drive Current: 30mA
Measurement Current: 30mA

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration			Reported TM-21 L ₇₀ Lifetime
1	30	0	1000hrs	9000hrs	3.116E-06	1.003	>54000Hours
2	30	0	1000hrs	9000hrs	3.767E-06	1.001	>54000Hours
3	30	0	1000hrs	9000hrs	4.316E-06	1.000	>54000Hours

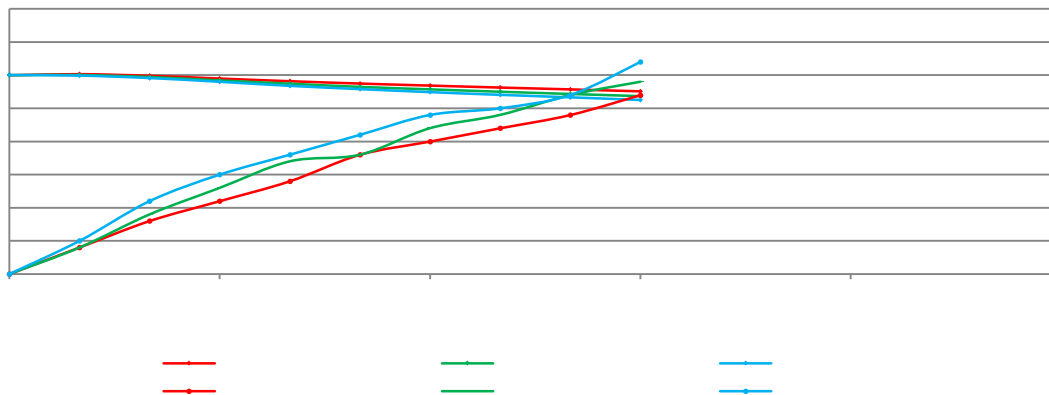
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

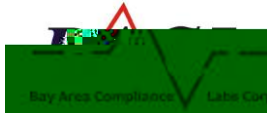
Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	100.17%	99.92%	99.50%	99.09%	98.73%	98.42%	98.12%	97.84%	97.54%
2	100.02%	99.72%	99.21%	98.72%	98.24%	97.87%	97.51%	97.18%	96.85%
3	99.92%	99.55%	98.99%	98.38%	97.89%	97.44%	97.03%	96.66%	96.26%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.0004	0.0008	0.0011	0.0014	0.0018	0.0020	0.0022	0.0024	0.0027
2	0.0004	0.0009	0.0013	0.0017	0.0018	0.0022	0.0024	0.0027	0.0029
3	0.0005	0.0011	0.0015	0.0018	0.0021	0.0024	0.0025	0.0027	0.0032

Average Lumen Maintenance and Chromaticity Shift VS. Time

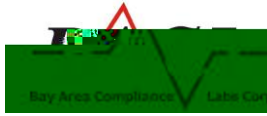




3 - Test Data

3.1 Data Set 1, 55°C, 30mA (Lumen Maintenance) 98.63

No.	+ , Ohr(Initial)	Lumen Maintenance (%)								
		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	146.60	99.86	99.73	99.11	98.84	98.64	98.36	98.02	97.48	97.14
2	148.30	100.07	99.73	99.12	98.72	98.25	97.98	97.57	97.37	97.10
3	145.20	100.14	99.79	99.38	99.04	98.76	98.35	98.07	97.80	97.59
4	149.2	100.34	100.07	99.53	98.99	98.79	98.39	98.26	98.19	97.86
5	148.8	100.13	99.87	99.26	98.86	98.25	98.12	97.92	97.51	97.31
6	147.1	100.07	99.86	99.59	99.18	98.78	98.37	97.89	97.69	97.55
7	149.4	100.13	99.93	99.40	99.06	98.93	98.59	98.33	97.79	97.46
8	145.9	100.14	99.86	99.45	98.97	98.70	98.42	98.22	97.94	97.60
9	149.1	100.13	99.87	99.40	98.99	98.59	98.39	97.99	97.85	97.59
10	149.1	100.13	99.93	99.33	99.06	98.59	98.26	97.99	97.79	97.45
11	147.1	100.07	99.80	99.18	98.64	98.23	97.96	97.62	97.48	97.08
12	148.8	100.20	99.93	99.53	99.06	98.66	98.25	97.98	97.78	97.51
13	147.5	100.27	100.07	99.53	99.12	98.71	98.24	97.97	97.76	97.29
14	147.7	100.27	100.14	99.66	99.26	98.78	98.44	98.10	97.77	97.36
15	149.2	100.07	99.80	99.26	98.99	98.46	98.12	97.99	97.86	97.52
16	146.3	100.27	100.14	99.73	99.25	98.63	98.43	98.02	97.61	97.20
17	146.3	100.27	100.07	99.86	99.32	99.04	98.70	98.36	98.15	97.95
18	150.1	100.07	99.93	99.53	99.20	98.73	98.53	98.13	97.67	97.47
19	147.7	100.20	100.07	99.66	99.19	98.85	98.51	98.31	98.04	97.63
20	146.0	100.27	99.93	99.73	99.25	98.86	98.63	98.49	98.29	98.01
21	145.6	100.34	100.07	99.52	99.11					



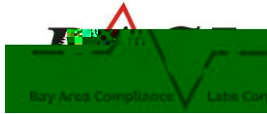
3.2 Data Set 1, 55°C, 30mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	36.54	36.64	36.57	37.61	37.63	37.44	37.68	37.66	37.64	37.62
2	37.23	37.33	37.28	37.16	37.16	36.98	37.16	37.13	37.14	37.33
3	37.12	37.20	37.18	37.04	37.06	36.85	37.04	37.15	37.01	37.20
4	37.18	37.26	37.24	37.10	37.10	36.95	37.08	37.23	37.08	37.27
5	37.31	37.40	37.38	37.23	37.25	37.04	37.24	37.28	37.21	37.42
6	37.30	37.38	37.36	37.23	37.23	37.07	37.21	37.23	37.19	37.41
7	36.99	37.07	37.08	36.91	36.94	36.79	36.93	36.94	36.93	37.14
8	36.66	36.70	36.71	36.56	36.59	37.36	36.59	36.60	36.59	36.75
9	37.17	37.21	37.22	37.06	37.09	36.92	37.07	37.32	37.08	37.25
10	36.87	36.93	36.94	36.79	36.82	36.65	36.79	36.83	36.83	36.99
11	37.40	37.42	37.44	37.28	37.31	37.16	37.28	37.34	37.31	37.48
12	36.79	36.83	36.84	36.66	36.70	36.56	36.67	36.72	36.70	36.90
13	36.60	36.64	36.66	36.51	36.54	36.34	36.51	36.55	36.53	36.71
14	37.43	37.49	37.50	37.33	37.36	37.22	37.33	37.36	37.36	37.54
15	36.82	36.89	36.89	36.72	36.77	36.99	36.73	36.78	36.77	36.95
16	36.85	36.93	36.93	36.76	36.81	36.63	36.78	36.81	36.77	36.97
17	37.23	37.31	37.30	37.12	37.18	37.05	37.13	37.16	37.15	37.33
18	37.22	37.28	37.28	37.10	37.18	37.02	37.14	37.14	37.13	37.31
19	37.38	37.47	37.44	37.27	37.34	37.17	37.32	37.33	37.32	37.51
20	37.27	37.36	37.34	37.18	37.24	37.07	37.21	37.24	37.21	37.41
21	36.72	36.80	36.80	36.64	36.70	37.18	36.67	36.69	36.65	36.84
22	37.20	37.28	37.27	37.09	37.21	37.03	37.15	37.14	37.12	37.33
23	37.29	37.36	37.35	37.18	37.29	37.10	37.24	37.22	37.21	37.40
24	37.20	37.28	37.27	37.10	37.19	37.01	37.17	37.13	37.12	37.30
25	37.36	37.44	37.43	37.25	37.39	37.20	37.34	37.31	37.30	37.49
26	37.18	37.23	37.22	37.06	37.16	36.97	37.12	37.09	37.10	37.29
27	36.67	36.71	36.74	36.56	36.64	36.46	36.63	36.59	36.58	36.77
28	36.79	36.84	36.86	36.68	36.75	36.58	36.75	36.71	36.70	36.91
29	36.81	36.86	36.87	36.72	36.78	37.28	36.77	36.73	36.74	36.91
30	37.34	37.37	37.39	37.23	37.29	37.10	37.29	37.22	37.24	37.42
Avg.	37.06	37.13	37.13	37.00	37.06	36.97	37.03	37.05	37.02	37.21
Med.	37.18	37.25	37.23	37.10	37.16	37.03	37.13	37.14	37.11	37.30
st dev	0.27	0.28	0.27	0.28	0.28	0.26	0.28	0.28	0.28	0.27
Min										

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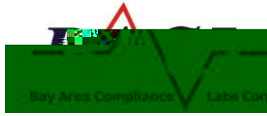
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3.5 Data Set 2, 85°C, 30mA (Forward Voltage)

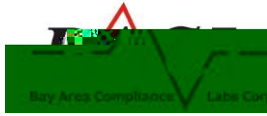
No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	37.38	37.41	37.44	37.26	37.34	37.65	37.33	37.29	37.26	37.47
32	36.94	36.97	36.98	36.83	36.90	37JE>> BI				

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3.6 Data Set 2, 85°C, 30mA (Chromaticity Shift)

No.			CCT(K)	+								
	Ohr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	0.2584	0.5353	2753	0.0003	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0025	0.0029
32	0.2561	0.5330	2811	0.0002	0.0009	0.0013	0.0017	0.0019	0.0023	0.0024	0.0025	0.0030
33	0.2597	0.5354	2725	0.0001	0.0008	0.0011	0.0014	0.0017	0.0020	0.0022	0.0022	0.0028
34	0.2583	0.5301	2777	0.0003	0.0010	0.0014	0.0018	0.0019	0.0022	0.0025	0.0024	0.0031
35	0.2589	0.5342	2747	0.0001	0.0009	0.0012	0.0016	0.0017	0.0022	0.0023	0.0027	0.0028
36	0.2595	0.5342	2734	0.0003	0.0010	0.0013	0.0017	0.0017	0.0021	0.0023	0.0027	0.0029
37	0.2598	0.5356	2722	0.0005	0.0011	0.0013	0.0016	0.0020	0.0021	0.0023	0.0026	0.0031
38	0.2585	0.5342	2755	0.0004	0.0008	0.0010	0.0015	0.0015	0.0020	0.0022	0.0023	0.0029
39	0.2589	0.5334	2749	0.0004	0.0009	0.0013	0.0016	0.0017	0.0021	0.0023	0.0026	0.0029
40	0.2558	0.5317	2823	0.0006	0.0010	0.0012	0.0017	0.0017	0.0022	0.0023	0.0027	0.0030
41	0.2598	0.5348	2725	0.0004	0.0010	0.0013	0.0016	0.0019	0.0023	0.0024	0.0026	0.0030
42	0.2591	0.5320	2753	0.0004	0.0011	0.0017	0.0018	0.0019	0.0024	0.0027	0.0030	0.0031
43	0.2572	0.5322	2791	0.0003	0.0009	0.0013	0.0016	0.0017	0.0021	0.0022	0.0027	0.0029
44	0.2580	0.5316	2777	0.0004	0.0010	0.0014	0.0017	0.0018	0.0023	0.0024	0.0029	0.0035
45	0.2582	0.5346	2758	0.0006	0.0010	0.0015	0.0018	0.0020	0.0025	0.0026	0.0028	0.0026
46	0.2582	0.5341	2762	0.0006	0.0010	0.0013	0.0016	0.0021	0.0023	0.0024	0.0029	0.0029
47	0.2586	0.5325	2760	0.0001	0.0009	0.0013	0.0017	0.0018	0.0023	0.0024	0.0027	0.0032
48	0.2586	0.5329	2759	0.0004	0.0009	0.0013	0.0016	0.0017	0.0022	0.0024	0.0028	0.0033
49	0.2595	0.5345	2732	0.0003	0.0005	0.0013	0.0016	0.0017	0.0021	0.0024	0.0025	0.0029
50	0.2584	0.5317	2767	0.0004	0.0005	0.0013	0.0016	0.0017	0.0021	0.0023	0.0026	0.0031
51	0.2593	0.5342	2738	0.0005	0.0010	0.0012	0.0018	0.0022	0.0025	0.0027	0.0033	0.0038
52	0.2595	0.5347	2732	0.0001	0.0009	0.0013	0.0016	0.0018	0.0021	0.0023	0.0027	0.0033
53	0.2559	0.5334	2813	0.0003	0.0010	0.0013	0.0017	0.0018	0.0021	0.0023	0.0025	0.0030
54	0.2591	0.5334	2746	0.0002	0.0010	0.0014	0.0016	0.0017	0.0020	0.0023	0.0024	0.0027
55	0.2581	0.5309	2776	0.0001	0.0009	0.0011	0.0016	0.0019	0.0021	0.0024	0.0027	0.0025
56	0.2576	0.5348	2771	0.0006	0.0010	0.0013	0.0016	0.0017	0.0021	0.0023	0.0026	0.0026
57	0.2588	0.5340	2749	0.0002	0.0008	0.0011	0.0014	0.0016	0.0019	0.0021	0.0023	0.0025
58	0.2579	0.5321	2777	0.0004	0.0010	0.0014	0.0018	0.0019	0.0023	0.0025	0.0030	0.0028
59	0.2570	0.5314	2800	0.0004	0.0010	0.0016	0.0017	0.0019	0.0021	0.0023	0.0027	0.0026
60	0.2571	0.5324	2791	0.0005	0.0010	0.0014	0.0017	0.0018	0.0021	0.0024	0.0028	0.0027
Avg.	0.2583	0.5333	2762	0.0004	0.0009	0.0013	0.0017	0.0018	0.0022	0.0024	0.0027	0.0029
Med.	0.2585	0.5334	2759	0.0004	0.0010	0.0013	0.0016	0.0018	0.0021	0.0023	0.0027	0.0029
st dev	0.0011	0.0015	27	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0003
				0.0005	0.0010	0.0014	0.0015	0.0019	0.0021	0.0022	0.0025	0.0025
Max.	0.2598	0.5356	2823	0.0006	0.0011	0.0017	0.0018	0.0022	0.0025	0.0027	0.0033	0.0038



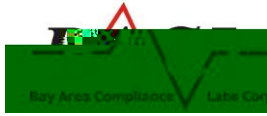
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The IAS Accreditation Number: L-460

3.7 Data Set 3, 105°C, 30mA (Lumen Maintenance) 99.93

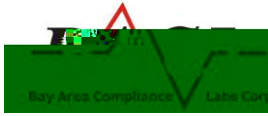
No.	+ , Ohr(Initial)	Lumen Maintenance (%)								
		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
61	143.40	99.93	99.58	98.95	98.33	98.05	97.70	97.35	97.21	96.93
62	146.20	99.73	99.38	98.91	98.15	97.81	97.33	96.99	96.44	95.96
63	146.40	99.93	99.45	98.91	98.22	97.75	97.47	97.27	96.86	96.38
64	146.8									

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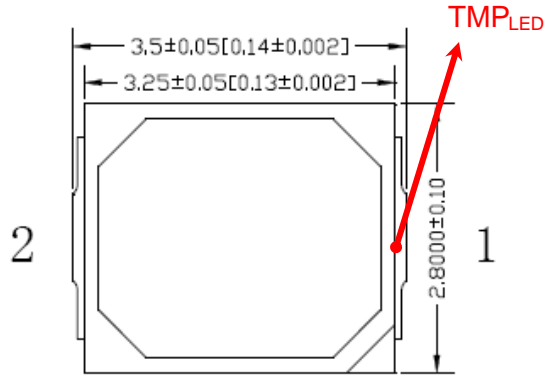
3.9 Data Set 3, 105°C, 30mA (Chromaticity Shift)

No.			CCT(K)	+ ,								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
61	0.2582	0.5322	2768	0.0002	0.0011	0.0014	0.0018	0.0019	0.0022	0.0024	0.0026	0.0031
62	0.2611	0.5340	2703	0.0006	0.0012	0.0015	0.0019	0.0020	0.0024	0.0025	0.0026	0.0033
63	0.2612	0.5353	2695	0.0004	0.0011	0.0013	0.0016	0.0019	0.0021	0.0023	0.0024	0.0030
64	0.2594	0.5333	2741	0.0005	0.0012	0.0014	0.0019	0.0021	0.0024	0.0025	0.0027	0.0033
65	0.2581	0.5338	2765	0.0004	0.0011	0.0013	0.0018	0.0020	0.0023	0.0025	0.0028	0.0032
66	0.2595	0.5324	2742	0.0006	0.0012	0.0014	0.0018	0.0021	0.0023	0.0025	0.0025	0.0031
67	0.2572	0.5322	2790	0.0007	0.0012	0.0016	0.0019	0.0022	0.0024	0.0025	0.0026	0.0033
68	0.2595	0.5333	2737	0.0006	0.0011	0.0014	0.0017	0.0019	0.0021	0.0023	0.0024	0.0031
69	0.2564	0.5329	2805	0.0004	0.0011	0.0014	0.0018	0.0019	0.0022	0.0024	0.0027	0.0031
70	0.2595	0.5321	2742	0.0004	0.0011	0.0013	0.0019	0.0020	0.0022	0.0024	0.0025	0.0030
71	0.2597	0.5366	2720	0.0006	0.0010	0.0013	0.0018	0.0022	0.0023	0.0025	0.0028	0.0032
72	0.2582	0.5336	2763	0.0006	0.0010	0.0015	0.0019	0.0025	0.0024	0.0025	0.0027	0.0030
73	0.2608	0.5350	2706	0.0005	0.0010	0.0015	0.0018	0.0023	0.0024	0.0026	0.0026	0.0031
74	0.2578	0.5331	2775	0.0006	0.0010	0.0016	0.0019	0.0025	0.0024	0.0026	0.0026	0.0033
75	0.2572	0.5337	2784	0.0006	0.0010	0.0015	0.0019	0.0021	0.0024	0.0025	0.0027	0.0032
76	0.2578	0.5331	2774	0.0006	0.0010	0.0014	0.0018	0.0021	0.0025	0.0026	0.0026	0.0032
77	0.2577	0.5323	2779	0.0004	0.0012	0.0016	0.0018	0.0020	0.0025	0.0026	0.0029	0.0033



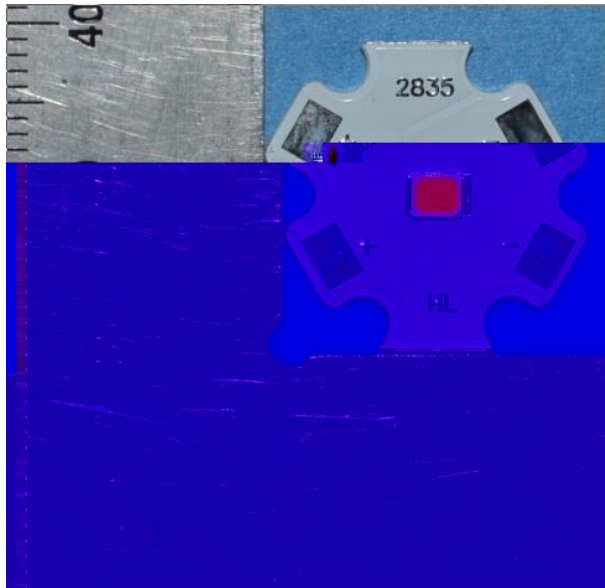
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



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