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1 - General Information

1.1 Description of LED Light Sources

Sample Size:

50 PCS samples were received on 2018-11-03. The samples were numbered from 1 to 25 and 26 to 50.

#Manufacturer:	Hongli Zhihui Group Co.,Ltd. Guangzhou Branch
#Part Number:	HL-AS-2835HW-3C-S1-08L-PCT-HR5
#Part Type:	LED Package
#Drive Level:	DC 100mA
#Nominal CCT:	2700K
#Power:	1 W
#Average Current Density per LED die:	620.001mA/mm2
#Average Power Density per LED die:	2.067 W/mm2
#CRI:	90
#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:

Model name	CRI	CCT (K)	Series	Parallel	Power density (W/mm^2)	Current density per LED die (mA/mm^2)	Current per die (mA)	Distance between of dies(mm)	Current (mA)
HL-AS-2835HW-3C-S1-08L-PCT-HR5	90	2700K	3	1	0.1021	620.00	100	0.15	100
HL-AS-2835HW-3C-S1-08L-PCT-HR5(R9)	90	2700K	3	1	0.1021	620.00	100	0.15	100
HL-AS-2835HW-3C-S1-08-PCT-HR5	90	2700K	3	1	0.1021	620.00	100	0.15	100
HL-AS-2835HW-3C-S1-08-PCT-HR5(R9)	90	2700K	3	1	0.1021	620.00	100	0.15	100
HL-AS-2835DW-3C-S1-08L-PCT-HR5	90	2700K	3	1	0.1021	620.00	100	0.15	100
HL-AS-2835DW-3C-S1-08L-PCT-HR5(R9)	90	2700K	3	1	0.1021	620.00	100	0.15	100
HL-AS-2835DW-3C-S1-08-PCT-HR5	90	2700K	3	1	0.1021	620.00	100	0.15	100
HL-AS-2835DW-3C-S1-08-PCT-HR5(R9)	90	2700							

Model name	CRI	CCT (K)	Series	Parallel	Power density (W/mm^2)	Current density per LED die (mA/mm^2)	Current per die (mA)	Distance between of dies(mm)	Current (mA)
HL-AS-2835HW-2C-S1-08-PCT-HR5	90	2700K	2	1	0.1021	605.47	150	0.15	150
HL-AS-2835HW-2C-S1-08-PCT-HR5(R9)	90	2700K	2	1	0.1021	605.47	150	0.15	150
HL-AS-2835DW-2C-S1-08L-PCT-HR5	90	2700K	2	1	0.1021	605.47	150	0.15	150
HL-AS-2835DW-2C-S1-08L-PCT-HR5(R9)	90	2700K	2	1	0.1021	605.47	150	0.15	150
HL-AS-2835DW-2C-S1-08-PCT-HR5	90	2700K	2	1	0.1021	605.47	150	0.15	150
HL-AS-2835DW-2C-S1-08-PCT-HR5(R9)	90	2700K	2	1	0.1021	605.47	150	0.15	150
HL-AS-2835HW-S1-08L-PCT-HR5	90	2700K	1	1	0.0204	620.00	60	/	60
HL-AS-2835HW-S1-08L-PCT-HR5(R9)	90	2700K	1	1	0.0204	620.00	60	/	60
HL-AS-2835HW-S1-08-PCT-HR5	90	2700K	1	1	0.0204	620.00	60	/	60
HL-AS-2835HW-S1-08-PCT-HR5(R9)	90	2700K	1	1	0.0204	620.00	60	/	60
HL-AS-2835DW-S1-08L-PCT-HR5	90	2700K	1	1	0.0510	605.47	150	/	150
HL-AS-2835DW-S1-08L-PCT-HR5(R9)	90	2700K	1	1	0.0510	605.47	150	/	150
HL-AS-2835DW-S1-08-PCT-HR5	90	2700K	1	1	0.0510	605.47	150	/	150
HL-AS-2835DW-S1-08-PCT-HR5(R9)	90	2700K	1	1	0.0510	605.47	150	/	150
HL-A-2835DW-2-S1-08L-HR5	90	2700K	1	2	0.0510	445.40	75	0.15	150
HL-A-2835DW-2-S1-08L-HR5(R9)	90	2700K	1	2	0.0510	445.40	75	0.15	150
HL-A-2835DW-2-S1-08-HR5	90	2700K	1	2	0.0510	445.40	75	0.15	150
HL-A-2835DW-2-S1-08-HR5(R9)	90	2700K	1	2	0.0510	445.40	75	0.15	150
HL-A-2835DW-2-S1-08L-HR5	90	2700K	1	2	0.0204	178.16	30	0.15	60
HL-A-2835DW-2-S1-08L-HR5(R9)	90	2700K	1	2	0.0204	178.16	30	0.15	60
HL-A-2835DW-2-S1-08-HR5	90	2700K	1	2	0.0204	178.16	30	0.15	60
HL-A-2835DW-2-S1-08-HR5(R9)	90	2700K	1	2	0.0204	178.16	30	0.15	60
HL-A-2835HW-2-S1-08L-HR5	90	2700K	1	2	0.0204	387.50	30	0.15	60
HL-A-2835HW-2-S1-08L-HR5(R9)	90	2700K	1	2	0.0204	387.50	30	0.15	60
HL-A-2835HW-2-S1-08-HR5	90	2700K	1	2	0.0204	387.50	30	0.15	60
HL-A-2835HW-2-S1-08-HR5(R9)	90	2700K	1	2	0.0204	387.50	30	0.15	60
HL-A-2835DW-S1-08L-HR5	90	2700K	1	1	0.0510	620.00	150	/	150

Model name	CRI	CCT (K)	Series	Parallel	Power density (W/mm^2)	Current density per LED die (mA/mm^2)	Current per die (mA)	Distance between of dies(mm)	Current (mA)
HL-A-2835DW-S1-08L-HR5(R9)	90	2700K	1	1	0.0510	620.00	150	/	150
HL-A-2835DW-S1-08-HR5	90	2700K	1	1	0.0510	620.00	150	/	150
HL-A-2835DW-S1-08-HR5(R9)	90	2700K	1	1	0.0510	620.00	150	/	150

g. The first * is the letters I, N, W representing CCT. I means less than 3700K; N means 3700-4700K;

W For more than 4700K. The second * is different product solutions (color coordination and application, special solutions, etc.).The third * and the fourth * and the fifth * are different version numbers.

h. The first and second * of SL-**D2835FTA-31KA****-APH*** is a numbers 27, 30,40,50,65, which stand for CCT. Number. From three to six * is a different product solution *
is different version numbers.

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
0.3m integrating sphere	EVERFINE	Diameter 0.3m	1011119	2019-03-18	2020-03-17
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	2019-03-26	2020-03-25
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	2019-03-18	2020-03-17
Standard Light Source	EVERFINE	D062	G100278CJ7351206	2018-12-24	2019-12-24
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987CJ7321114	2019-03-26	2020-03-25
Multilayer aging machine	BACL	B2-270	20023	2019-03-13	2020-03-12
DC Power Supply	BACL	B12001-12	90023	2018-12-17	2019-12-17

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 monitored by thermocouples which one was soldered to the $_{LED}$) 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 .

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 . 2 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 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, 100mA

Part Number:	HL-AS-2835HW-3C-S1-08L-PCT-HR5
Number of Units:	25
Case Temperature:	>83°C
Ambient Temperature:	>80°C
Life Test Drive Current:	100mA
Measurement Current:	100mA

Data Set 2: 105°C, 100mA

Part Number:	HL-AS-2835HW-3C-S1-08L-PCT-HR5
Number of Units:	25
Case Temperature:	>103°C
Ambient Temperature:	>100°C
Life Test Drive Current:	100mA
Measurement Current:	100mA

3 - Test Data

3.1 Data Set 1, 85°C, 100mA (Lumen Maintenance)

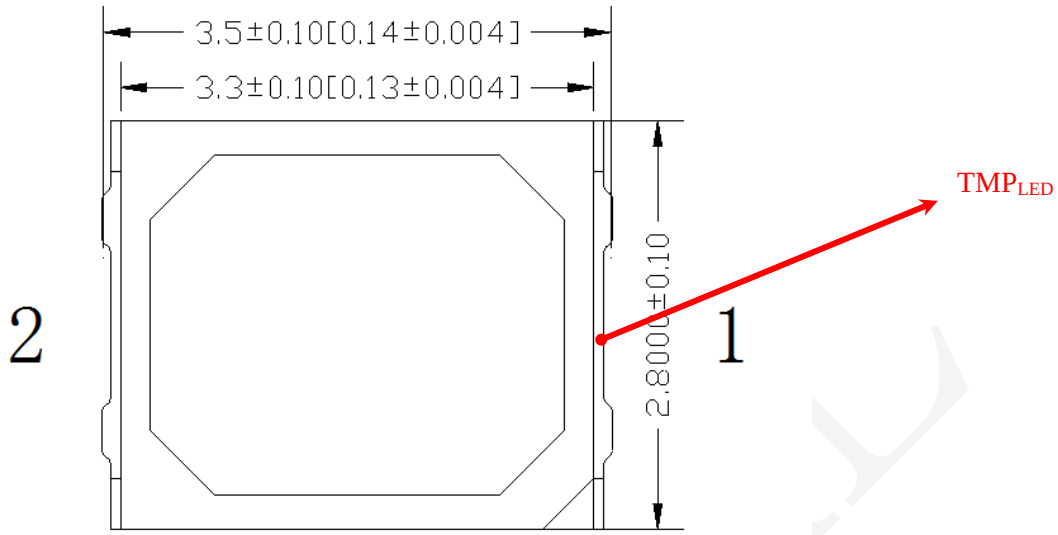
No.		Lumen Maintenance (%)			
	0hr(Initial)	1000hrs	2000hrs	3000hrs	

3.2 Data Set 1, 85°C, 100mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	9.313	9.264	9.256	9.252	9.255	9.254	9.273	9.268	9.264	9.257
2	9.260	9.223	9.217	9.217	9.220	9.212	9.231	9.220	9.224	9.219
3	9.259	9.226	9.219	9.219	9.220	9.215	9.226	9.226	9.220	9.220
4	9.268	9.246	9.247	9.240	9.239	9.229	9.266	9.247	9.245	9.247
5	9.252	9.225	9.219	9.220	9.221	9.214	9.236	9.226	9.228	9.224
6	9.276	9.243	9.244							

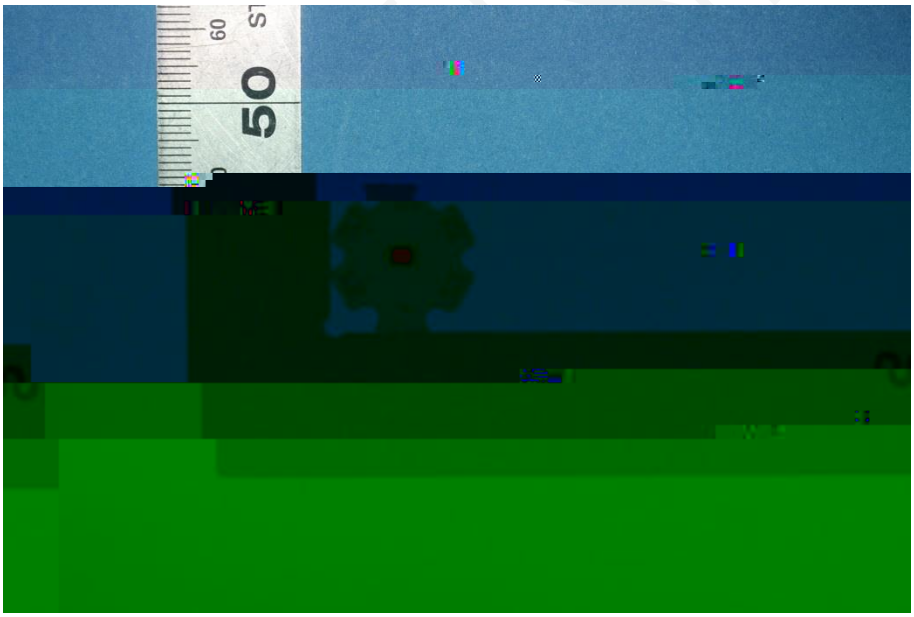
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



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