TEST REPORT

According to ANSI/IES LM-80-15
For

Hongli Zhihui Group Co.,Ltd. Guangzhou Branch

Room 316, Building 2, No.1, Xianke Yi Road, Huadong Town, Huadu District, Guangzhou, China

#Model: HL-AS-3528HW-3C-S1-08L-PCT-HR5

Report Type: 9000 Hours Test Report	**Product Type:** LED Package
Test Engineer:	Pote Wang
Report Number:	RSZ190926502-10-9000
Test Date:	2019-09-29 to 2020-08-11
Report Date:	2020-11-20
Reviewed By:	Blake Zhang / EE Engineer
Test Facility:	Test facility was located at No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China.
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
Accreditation:	The IAS Accreditation Number TL-460.

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1 - General Information

1.1 Description of LED Light Sources

Sample Size:

60 PCS test samples were in good condition and received on 2019-09-26. The samples were numbered from 1 to 30 and 31 to 60.

#Manufacturer:	Hongli Zhihui Group Co.,Ltd. Guangzhou Branch
#Part Number:	HL-AS-3528HW-3C-S1-08L-PCT-HR5
#Part Type:	LED Package
#Drive Level:	DC 100mA
#Nominal CCT:	2700K
#Power:	1.04W
#Average Current Density per LED die:	575mA/mm^2
#Average Power Density per LED die:	1.990W/mm^2
#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 (typ.)	CCT (typ.)	Series	Parallel	Power density (W/mm^2)	Current density per LED die (mA/mm^2)	Current per die (mA)	Distance between of dies	Current (mA)
HL-AS-3528HW-3C-S1-08L-PCT-HR5	90	2700K	3	1	0.1061	575	100	0.15	100
HL-AS-3528H***W-3C-S1-08L-PCT-HR5	90	3000K	3	1	0.1061	575	100	0.15	100
	90	4000K	3	1	0.1061	575	100	0.15	100
	90	5000K	3	1	0.1061	575	100	0.15	100
	90	5700K	3	1	0.1061	575	100	0.15	100
	90	6500K	3	1	0.1061	575	100	0.15	100
	90	≥2200K	3	1	0.1061	575	100	0.15	100
HL-AS-3528H***W-3C-S1-08L-PCT-HR5(R9)	90	2700K	3	1	0.1061	575	100	0.15	100
	90	3000K	3	1	0.1061	575	100	0.15	100
	90	4000K	3	1	0.1061	575	100	0.15	100
	90	5000K	3	1	0.1061	575	100	0.15	100
	90	5700K	3	1	0.1061	575	100	0.15	100
	90	6500K	3	1	0.1061	575	100	0.15	100
	90	≥2200K	3	1	0.1061	575	100	0.15	100

HL-AS-3528H***W-3C-S1-08-PCT-HR5	90	2700K	3	1	0.1061	575	100	0.15	100
	90	3000K	3	1	0.1061	575	100	0.15	100
	90	4000K	3	1	0.1061	575	100	0.15	100
	90	5000K	3	1	0.1061	575	100	0.15	100
	90	5700K	3	1	0.1061	575	100	0.15	100
	90	6500K	3	1	0.1061	575	100	0.15	100
	90	≥2200K	3	1	0.1061	575	100	0.15	100
HL-AS-3528H***W-3C-S1-08-PCT-HR5(R9)	90	2700K	3	1	0.1061	575	100	0.15	100
	90	3000K	3	1	0.1061	575	100	0.15	100
	90	4000K	3	1	0.1061	575	100	0.15	100
	90	5000K	3	1	0.1061	575	100	0.15	100
	90	5700K	3	1	0.1061	575	100	0.15	100
	90	6500K	3	1	0.1061	575	100	0.15	100
	90	≥2200K	3	1	0.1061	575	100	0.15	100
HL-AS-3528D***W-3C-S1-08L-PCT-HR5	90	2700K	3	1	0.1061	517	100	0.15	100
	90	3000K	3	1	0.1061	517	100	0.15	100
	90	4000K	3	1	0.1061	517	100	0.15	100
	90	5000K	3	1	0.1061	517	100	0.15	100
	90	5700K	3	1	0.1061	517	100	0.15	100
	90	6500K	3	1	0.1061	517	100	0.15	100
	90	≥2200K	3	1	0.1061	517	100	0.15	100
HL-AS-3528D***W-3C-S1-08L-PCT-HR5(R9)	90	2700K	3	1	0.1061	517	100	0.15	100
	90	3000K	3	1	0.1061	517	100	0.15	100
	90	4000K	3	1	0.1061	517	100	0.15	100
	90	5000K	3	1	0.1061	517	100	0.15	100
	90	5700K	3	1	0.1061	517	100	0.15	100
	90	6500K	3	1	0.1061	517	100	0.15	100
	90	≥2200K	3	1	0.1061	517	100	0.15	100
HL-AS-3528D***W-3C-S1-08-PCT-HR5	90	2700K	3	1	0.1061	517	100	0.15	100
	90	3000K	3	1	0.1061	517	100	0.15	100
	90	4000K	3	1	0.1061	517	100	0.15	100
	90	5000K	3	1	0.1061	517	100	0.15	100
	90	5700K	3	1	0.1061	517	100	0.15	100
	90	6500K	3	1	0.1061	517	100	0.15	100
	90	≥2200K	3	1	0.1061	517	100	0.15	100
HL-AS-3528D***W-3C-S1-08-PCT-HR5(R9)	90	2700K	3	1	0.1061	517	100	0.15	100
	90	3000K	3	1	0.1061	517	100	0.15	100
	90	4000K	3	1	0.1061	517	100	0.15	100
	90	5000K	3	1	0.1061	517	100	0.15	100
	90	5700K	3	1	0.1061	517	100	0.15	100
	90	6500K	3	1	0.1061	517	100	0.15	100
	90	≥2200K	3	1	0.1061	517	100	0.15	100

HL-AS-3528H***W-2C-S1-08L-PCT-HR5	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150
HL-AS-3528H***W-2C-S1-08L-PCT-HR5(R9)	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150
HL-AS-3528H***W-2C-S1-08-PCT-HR5	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150
HL-AS-3528H***W-2C-S1-08-PCT-HR5(R9)	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150
HL-AS-3528D***W-2C-S1-08L-PCT-HR5	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150
HL-AS-3528D***W-2C-S1-08L-PCT-HR5(R9)	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150

HL-AS-3528D***W-2C-S1-08-PCT-HR5	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150
HL-AS-3528D***W-2C-S1-08-PCT-HR5(R9)	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150
HL-AS-3528H***W-S1-08L-PCT-HR5	90	2700K	1	1	0.0209	345	60	/	60
	90	3000K	1	1	0.0209	345	60	/	60
	90	4000K	1	1	0.0209	345	60	/	60
	90	5000K	1	1	0.0209	345	60	/	60
	90	5700K	1	1	0.0209	345	60	/	60
	90	6500K	1	1	0.0209	345	60	/	60
	90	≥2200K	1	1	0.0209	345	60	/	60
HL-AS-3528H***W-S1-08L-PCT-HR5(R9)	90	2700K	1	1	0.0209	345	60	/	60
	90	3000K	1	1	0.0209	345	60	/	60
	90	4000K	1	1	0.0209	345	60	/	60
	90	5000K	1	1	0.0209	345	60	/	60
	90	5700K	1	1	0.0209	345	60	/	60
	90	6500K	1	1	0.0209	345	60	/	60
	90	≥2200K	1	1	0.0209	345	60	/	60
HL-AS-3528H***W-S1-08-PCT-HR5	90	2700K	1	1	0.0209	345	60	/	60
	90	3000K	1	1	0.0209	345	60	/	60
	90	4000K	1	1	0.0209	345	60	/	60
	90	5000K	1	1	0.0209	345	60	/	60
	90	5700K	1	1	0.0209	345	60	/	60
	90	6500K	1	1	0.0209	345	60	/	60
	90	≥2200K	1	1	0.0209	345	60	/	60
HL-AS-3528H***W-S1-08-PCT-HR5(R9)	90	2700K	1	1	0.0209	345	60	/	60
	90	3000K	1	1	0.0209	345	60	/	60
	90	4000K	1	1	0.0209	345	60	/	60
	90	5000K	1	1	0.0209	345	60	/	60
	90	5700K	1	1	0.0209	345	60	/	60
	90	6500K	1	1	0.0209	345	60	/	60
	90	≥2200K	1	1	0.0209	345	60	/	60

HL-AS-3528D***W-S1-08L-PCT-HR5	90	2700K	1	1	0.0521	554	150	/	150
	90	3000K	1	1	0.0521	554	150	/	150
	90	4000K	1	1	0.0521	554	150	/	150
	90	5000K	1	1	0.0521	554	150	/	150
	90	5700K	1	1	0.0521	554	150	/	150
	90	6500K	1	1	0.0521	554	150	/	150
	90	≥2200K	1	1	0.0521	554	150	/	150
HL-AS-3528D***W-S1-08L-PCT-HR5(R9)	90	2700K	1	1	0.0521	554	150	/	150
	90	3000K	1	1	0.0521	554	150	/	150
	90	4000K	1	1	0.0521	554	150	/	150
	90	5000K	1	1	0.0521	554	150	/	150
	90	5700K	1	1	0.0521	554	150	/	150
	90	6500K	1	1	0.0521	554	150	/	150
	90	≥2200K	1	1	0.0521	554	150	/	150
HL-AS-3528D***W-S1-08-PCT-HR5	90	2700K	1	1	0.0521	554	150	/	150
	90	3000K	1	1	0.0521	554	150	/	150
	90	4000K	1	1	0.0521	554	150	/	150
	90	5000K	1	1	0.0521	554	150	/	150
	90	5700K	1	1	0.0521	554	150	/	150
	90	6500K	1	1	0.0521	554	150	/	150
	90	≥2200K	1	1	0.0521	554	150	/	150
HL-AS-3528D***W-S1-08-PCT-HR5(R9)	90	2700K	1	1	0.0521	554	150	/	150
	90	3000K	1	1	0.0521	554	150	/	150
	90	4000K	1	1	0.0521	554	150	/	150
	90	5000K	1	1	0.0521	554	150	/	150
	90	5700K	1	1	0.0521	554	150	/	150
	90	6500K	1	1	0.0521	554	150	/	150
	90	≥2200K	1	1	0.0521	554	150	/	150
HL-AS-3528H***W-S1-2-08L-PCT-HR5	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150
HL-AS-3528H***W-S1-2-08L-PCT-HR5(R9)	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150

HL-AS-3528H***W-S1-2-08-PCT-HR5	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150
HL-AS-3528H***W-S1-2-08-PCT-HR5(R9)	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150
HL-AS-3528D***W-S1-2-08L-PCT-HR5	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150
HL-AS-3528D***W-S1-2-08L-PCT-HR5(R9)	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150
HL-AS-3528D***W-S1-2-08-PCT-HR5	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150
HL-AS-3528D***W-S1-2-08-PCT-HR5(R9)	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150

HL-A-3528H***W-3C-S1-08L-PCT-HR5	90	2700K	3	1	0.1061	575	100	0.15	100
	90	3000K	3	1	0.1061	575	100	0.15	100
	90	4000K	3	1	0.1061	575	100	0.15	100
	90	5000K	3	1	0.1061	575	100	0.15	100
	90	5700K	3	1	0.1061	575	100	0.15	100
	90	6500K	3	1	0.1061	575	100	0.15	100
	90	≥2200K	3	1	0.1061	575	100	0.15	100
HL-A-3528H***W-3C-S1-08L-PCT-HR5(R9)	90	2700K	3	1	0.1061	575	100	0.15	100
	90	3000K	3	1	0.1061	575	100	0.15	100
	90	4000K	3	1	0.1061	575	100	0.15	100
	90	5000K	3	1	0.1061	575	100	0.15	100
	90	5700K	3	1	0.1061	575	100	0.15	100
	90	6500K	3	1	0.1061	575	100	0.15	100
	90	≥2200K	3	1	0.1061	575	100	0.15	100
HL-A-3528H***W-3C-S1-08-PCT-HR5	90	2700K	3	1	0.1061	575	100	0.15	100
	90	3000K	3	1	0.1061	575	100	0.15	100
	90	4000K	3	1	0.1061	575	100	0.15	100
	90	5000K	3	1	0.1061	575	100	0.15	100
	90	5700K	3	1	0.1061	575	100	0.15	100
	90	6500K	3	1	0.1061	575	100	0.15	100
	90	≥2200K	3	1	0.1061	575	100	0.15	100
HL-A-3528H***W-3C-S1-08-PCT-HR5(R9)	90	2700K	3	1	0.1061	575	100	0.15	100
	90	3000K	3	1	0.1061	575	100	0.15	100
	90	4000K	3	1	0.1061	575	100	0.15	100
	90	5000K	3	1	0.1061	575	100	0.15	100
	90	5700K	3	1	0.1061	575	100	0.15	100
	90	6500K	3	1	0.1061	575	100	0.15	100
	90	≥2200K	3	1	0.1061	575	100	0.15	100
HL-A-3528D***W-3C-S1-08L-PCT-HR5	90	2700K	3	1	0.1061	517	100	0.15	100
	90	3000K	3	1	0.1061	517	100	0.15	100
	90	4000K	3	1	0.1061	517	100	0.15	100
	90	5000K	3	1	0.1061	517	100	0.15	100
	90	5700K	3	1	0.1061	517	100	0.15	100
	90	6500K	3	1	0.1061	517	100	0.15	100
	90	≥2200K	3	1	0.1061	517	100	0.15	100
HL-A-3528D***W-3C-S1-08L-PCT-HR5(R9)	90	2700K	3	1	0.1061	517	100	0.15	100
	90	3000K	3	1	0.1061	517	100	0.15	100
	90	4000K	3	1	0.1061	517	100	0.15	100
	90	5000K	3	1	0.1061	517	100	0.15	100
	90	5700K	3	1	0.1061	517	100	0.15	100
	90	6500K	3	1	0.1061	517	100	0.15	100
	90	≥2200K	3	1	0.1061	517	100	0.15	100

HL-A-3528D***W-3C-S1-08-PCT-HR5	90	2700K	3	1	0.1061	517	100	0.15	100
	90	3000K	3	1	0.1061	517	100	0.15	100
	90	4000K	3	1	0.1061	517	100	0.15	100
	90	5000K	3	1	0.1061	517	100	0.15	100
	90	5700K	3	1	0.1061	517	100	0.15	100
	90	6500K	3	1	0.1061	517	100	0.15	100
	90	≥2200K	3	1	0.1061	517	100	0.15	100
HL-A-3528D***W-3C-S1-08-PCT-HR5(R9)	90	2700K	3	1	0.1061	517	100	0.15	100
	90	3000K	3	1	0.1061	517	100	0.15	100
	90	4000K	3	1	0.1061	517	100	0.15	100
	90	5000K	3	1	0.1061	517	100	0.15	100
	90	5700K	3	1	0.1061	517	100	0.15	100
	90	6500K	3	1	0.1061	517	100	0.15	100
	90	≥2200K	3	1	0.1061	517	100	0.15	100
HL-A-3528H***W-2C-S1-08L-PCT-HR5	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150
HL-A-3528H***W-2C-S1-08L-PCT-HR5(R9)	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150
HL-A-3528H***W-2C-S1-08-PCT-HR5	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150
HL-A-3528H***W-2C-S1-08-PCT-HR5(R9)	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150

HL-A-3528D***W-2C-S1-08L-PCT-HR5	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150
HL-A-3528D***W-2C-S1-08L-PCT-HR5(R9)	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150
HL-A-3528D***W-2C-S1-08-PCT-HR5	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150
HL-A-3528D***W-2C-S1-08-PCT-HR5(R9)	90	2700K	2	1	0.1041	554	150	0.15	150
	90	3000K	2	1	0.1041	554	150	0.15	150
	90	4000K	2	1	0.1041	554	150	0.15	150
	90	5000K	2	1	0.1041	554	150	0.15	150
	90	5700K	2	1	0.1041	554	150	0.15	150
	90	6500K	2	1	0.1041	554	150	0.15	150
	90	≥2200K	2	1	0.1041	554	150	0.15	150
HL-A-3528H***W-S1-08L-PCT-HR5	90	2700K	1	1	0.0209	345	60	/	60
	90	3000K	1	1	0.0209	345	60	/	60
	90	4000K	1	1	0.0209	345	60	/	60
	90	5000K	1	1	0.0209	345	60	/	60
	90	5700K	1	1	0.0209	345	60	/	60
	90	6500K	1	1	0.0209	345	60	/	60
	90	≥2200K	1	1	0.0209	345	60	/	60
HL-A-3528H***W-S1-08L-PCT-HR5(R9)	90	2700K	1	1	0.0209	345	60	/	60
	90	3000K	1	1	0.0209	345	60	/	60
	90	4000K	1	1	0.0209	345	60	/	60
	90	5000K	1	1	0.0209	345	60	/	60
	90	5700K	1	1	0.0209	345	60	/	60
	90	6500K	1	1	0.0209	345	60	/	60
	90	≥2200K	1	1	0.0209	345	60	/	60

HL-A-3528H***W-S1-08-PCT-HR5	90	2700K	1	1	0.0209	345	60	/	60
	90	3000K	1	1	0.0209	345	60	/	60
	90	4000K	1	1	0.0209	345	60	/	60
	90	5000K	1	1	0.0209	345	60	/	60
	90	5700K	1	1	0.0209	345	60	/	60
	90	6500K	1	1	0.0209	345	60	/	60
	90	≥2200K	1	1	0.0209	345	60	/	60
HL-A-3528H***W-S1-08-PCT-HR5(R9)	90	2700K	1	1	0.0209	345	60	/	60
	90	3000K	1	1	0.0209	345	60	/	60
	90	4000K	1	1	0.0209	345	60	/	60
	90	5000K	1	1	0.0209	345	60	/	60
	90	5700K	1	1	0.0209	345	60	/	60
	90	6500K	1	1	0.0209	345	60	/	60
	90	≥2200K	1	1	0.0209	345	60	/	60
HL-A-3528D***W-S1-08L-PCT-HR5	90	2700K	1	1	0.0521	554	150	/	150
	90	3000K	1	1	0.0521	554	150	/	150
	90	4000K	1	1	0.0521	554	150	/	150
	90	5000K	1	1	0.0521	554	150	/	150
	90	5700K	1	1	0.0521	554	150	/	150
	90	6500K	1	1	0.0521	554	150	/	150
	90	≥2200K	1	1	0.0521	554	150	/	150
HL-A-3528D***W-S1-08L-PCT-HR5(R9)	90	2700K	1	1	0.0521	554	150	/	150
	90	3000K	1	1	0.0521	554	150	/	150
	90	4000K	1	1	0.0521	554	150	/	150
	90	5000K	1	1	0.0521	554	150	/	150
	90	5700K	1	1	0.0521	554	150	/	150
	90	6500K	1	1	0.0521	554	150	/	150
	90	≥2200K	1	1	0.0521	554	150	/	150
HL-A-3528D***W-S1-08-PCT-HR5	90	2700K	1	1	0.0521	554	150	/	150
	90	3000K	1	1	0.0521	554	150	/	150
	90	4000K	1	1	0.0521	554	150	/	150
	90	5000K	1	1	0.0521	554	150	/	150
	90	5700K	1	1	0.0521	554	150	/	150
	90	6500K	1	1	0.0521	554	150	/	150
	90	≥2200K	1	1	0.0521	554	150	/	150
HL-A-3528D***W-S1-08-PCT-HR5(R9)	90	2700K	1	1	0.0521	554	150	/	150
	90	3000K	1	1	0.0521	554	150	/	150
	90	4000K	1	1	0.0521	554	150	/	150
	90	5000K	1	1	0.0521	554	150	/	150
	90	5700K	1	1	0.0521	554	150	/	150
	90	6500K	1	1	0.0521	554	150	/	150
	90	≥2200K	1	1	0.0521	554	150	/	150

HL-A-3528H***W-S1-2-08L-PCT-HR5	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150
HL-A-3528H***W-S1-2-08L-PCT-HR5(R9)	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150
HL-A-3528H***W-S1-2-08-PCT-HR5	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150
HL-A-3528H***W-S1-2-08-PCT-HR5(R9)	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150
HL-A-3528D***W-S1-2-08L-PCT-HR5	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150
HL-A-3528D***W-S1-2-08L-PCT-HR5(R9)	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150

HL-A-3528D***W-S1-2-08-PCT-HR5	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150
HL-A-3528D***W-S1-2-08-PCT-HR5(R9)	90	2700K	1	2	0.0521	554	75	0.15	150
	90	3000K	1	2	0.0521	554	75	0.15	150
	90	4000K	1	2	0.0521	554	75	0.15	150
	90	5000K	1	2	0.0521	554	75	0.15	150
	90	5700K	1	2	0.0521	554	75	0.15	150
	90	6500K	1	2	0.0521	554	75	0.15	150
	90	≥2200K	1	2	0.0521	554	75	0.15	150
SL-ID2835YTA-31KAG	90	2700	3	1	0.1061	575	100	0.15	100
SL-**2835YTA-31KA*	90	2700	3	1	0.1061	575	100	0.15	100
SL-**2835YTA-31KA*H	90	2700	3	1	0.1061	575	100	0.15	100
SL-**2835YTA-31KA*-**	90	2700	3	1	0.1061	575	100	0.15	100
SL-**2835YTA-31KA*-***	90	2700	3	1	0.1061	575	100	0.15	100
SL-**2835YTA-31KA*-*	90	2700	3	1	0.1061	575	100	0.15	100
SL-**2835YTA-31KA*H-*	90	2700	3	1	0.1061	575	100	0.15	100
SL-**2835YTA-31KA*H-**	90	2700	3	1	0.1061	575	100	0.15	100
SL-**2835YTA-31KAH*H-***	90	2700	3	1	0.1061	575	100	0.15	100
SL-**2835YTA-31KA*/*	90	2700	3	1	0.1061	575	100	0.15	100
SL-**2835YTA-31KA*H/*	90	2700	3	1	0.1061	575	100	0.15	100
SL-***2835YTA-31KA****-APH***	90	2700	3	1	0.1061	575	100	0.15	100
SL-**2835YTA-31CA*	90	2700	3	1	0.0511	463.6	60	0.15	60
SL-**2835YTA-31CA*H	90	2700	3	1	0.0511	463.6	60	0.15	60
SL-**2835YTA-31AD*	90	2700	3	1	0.1021	155	20	0.15	20
SL-**2835YTA-31AD*H	90	2700	3	1	0.1021	155	20	0.15	20
SL-**2835YTA-31AD*-**	90	2700	3	1	0.1021	155	20	0.15	20
SL-**2835YTA-31AD*H-**	90	2700	3	1	0.1021	155	20	0.15	20
SL-**2835YTA-21CC*	90	2700	2	1	0.1021	310	60	0.15	60
SL-**2835YTA-21CC*H	90	2700	2	1	0.1021	310	60	0.15	60
SL-**2835YTA-21CC*-**	90	2700	2	1	0.1021	310	60	0.15	60

SL-**2835YTA-21CC*H-**	90	2700	2	1	0.1021	310	60	0.15	60
SL-**2835YTA-21BD*	90	2700	2	1	0.1021	149.04	30	0.15	30
SL-**2835YTA-21BD*H	90	2700	2	1	0.1021	149.04	30	0.15	30
SL-**2835YTA-21BD*-**	90	2700	2	1	0.1021	149.04	30	0.15	30
SL-**2835YTA-21BD*H-**	90	2700	2	1	0.1021	149.04	30	0.15	30
SL-**2835YTA-21EA*	90	2700	2	1	0.1041	554	150	0.15	150
SL-**2835YTA-21EA*H	90	2700	2	1	0.1041	554	150	0.15	150
SL-**2835YTA-12CA*	90	2700	2	1	0.0204	186	30	0.15	60
SL-**2835YTA-12CA*H	90	2700	1	2	0.0204	186	30	0.15	60
SL-**2835YTA-12EA*	90	2700	1	2	0.0521	554	75	0.15	150
SL-**2835YTA-12EA*H	90	2700	1	2	0.0521	554	75	0.15	150
SL-**2835YTA-12EA*-**	90	2700	1	2	0.0521	554	75	0.15	150
SL-**2835YTA-12EA*H-**	90	2700	1	2	0.0521	554	75	0.15	150
SL-**2835YTA-11KC*	90	2700	1	1	0.1021	469.7	100	/	100
SL-**2835YTA-11KC*H	90	2700	1	1	0.1021	469.7	100	/	100
SL-**2835YTA-11CC*	90	2700	1	1	0.0511	281.82	60	/	60
SL-**2835YTA-11CC*H	90	2700	1	1	0.0511	281.82	60	/	60
SL-**2835YTA-11CC*-**	90	2700	1	1	0.0511	281.82	60	/	60
SL-**2835YTA-11CC*H-**	90	2700	1	1	0.0511	281.82	60	/	60
SL-**2835YTA-11CA*	90	2700	1	1	0.0209	345	60	/	60
SL-**2835YTA-11CA*H	90	2700	1	1	0.0209	345	60	/	60
SL-**2835YTA-11CA*-**	90	2700	1	1	0.0209	345	60	/	60
SL-**2835YTA-11CA*H-**	90	2700	1	1	0.0209	345	60	/	60
SL-**2835YTA-11EA*	90	2700	1	1	0.0521	554	150	/	150
SL-**2835YTA-11EA*H	90	2700	1	1	0.0521	554	150	/	150
SL-**2835YTA-11EA*-**	90	2700	1	1	0.0521	554	150	/	150
SL-**2835YTA-11EA*H-**	90	2700	1	1	0.0521	554	150	/	150

The family models and tested model could meet all the requirements listed as below :

a. The testes model has the greatest number of LED dies. and,
b. Minimum die edge of die edge spacing of the family models is greater than or equal to that of the tested LED package; and,
c. the family models' electrical power density (i.e. W/mm2 of PCB or substrate total area, or equivalent calculation) less than or equal to the tested LED package; and,
d. average current density per LED die (i.e. mA/mm2 of epitaxial structures) less than or equal to the tested LED package; and,
e. identical materials used (note: this does not constrain phosphor quantity and/or dimensional adjustments); and,
f. identical construction processes used;
g. The symbol of "***" in the part numbers H***W and D***W is a number from 1 to 999, which stand for the brightness level;
h. The "**" of the first group represent the color and RA ;

i. The "*" of the second group represents the different chip codes;
j. The "-*" of the third group represents different customer codes;
k. The "-**" of the fourth group represents the combination of different product schemes;
l. The "-***" of the fifth group represents the serial number of different products;
m. The "/*" of the sixth group represents the special customer distinction;
n. The first "***" in this model of product SL-***2835YTA-31KA**** -APH*** represents the color and RA, such as 27D, 27B, 30D, and so on. The second "****" represent different chip codes, such as GY1C, HY1C, and so on. The last "***" represents the version Numbers of different customers, such as 001, 002, K01, and so on.

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	2020-03-08	2021-03-07
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	2020-03-08	2021-03-07
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	2020-03-08	2021-03-07
Standard Light Source	EVERFINE	D062	1011093	2019-11-19	2020-11-18
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987CJ7321114	2020-03-16	2021-03-15
Multilayer aging machine	BACL	B2-270	20015	2020-03-11	2021-03-10
DC Power Supply	BACL	B12001-12	90023	2020-03-16	2021-03-15

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 ±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 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 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-3528HW-3C-S1-08L-PCT-HR5
Number of Units:	30
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-3528HW-3C-S1-08L-PCT-HR5
Number of Units:	30
Case Temperature:	>103°C
Ambient Temperature:	>100°C
Life Test Drive Current:	100mA
Measurement Current:	100mA

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	α	β	Reported TM-21 L_{70} Lifetime
1	30	0	1000hrs	9000hrs	3.020E-06	1.004	>54000 hours
2	30	0	1000hrs	9000hrs	3.405E-06	1.002	>54000 hours

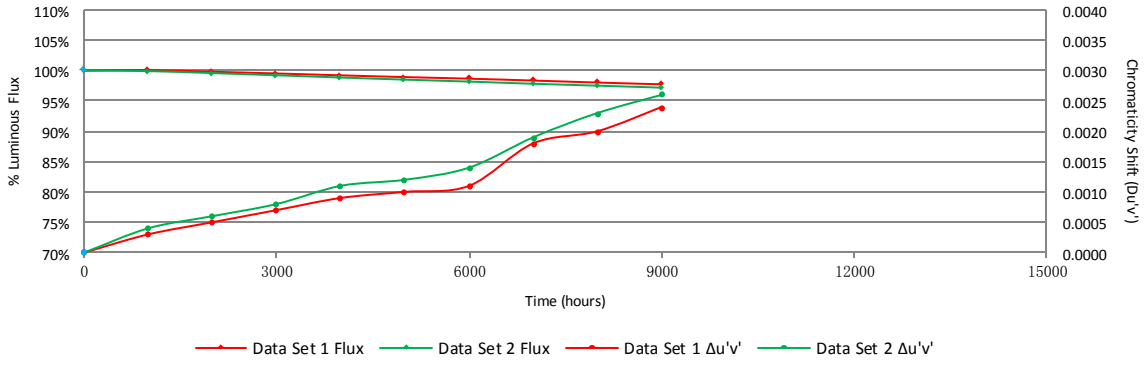
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	100.08%	99.81%	99.53%	99.22%	98.93%	98.67%	98.36%	98.03%	97.74%
2	99.92%	99.59%	99.23%	98.86%	98.51%	98.19%	97.83%	97.52%	97.19%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.0003	0.0005	0.0007	0.0009	0.0010	0.0011	0.0018	0.0020	0.0024
2	0.0004	0.0006	0.0008	0.0011	0.0012	0.0014	0.0019	0.0023	0.0026

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

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

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	107.10	100.09	99.81	99.63	99.35	99.25	98.97	98.51	98.23	98.04
2	106.90	100.28	100.09	99.81	99.53	99.35	99.16	99.06	98.50	98.32
3	106.30	100.09	99.81	99.62	99.25	99.15	98.97	98.68	98.31	97.93
4	103.00	100.10	99.81	99.61	99.42	99.13	98.64	98.06	97.77	97.38
5	107.10	100.09	99.91	99.63	99.16	98.97	98.79	98.32	97.95	97.48
6	108.60	100.09	99.82	99.54	99.26	99.08	98.99	98.71	98.25	97.97
7	108.20	100.09	99.72	99.45	99.08	98.71	98.52	98.43	98.06	97.87
8	108.50	100.18	99.82	99.63	99.35	98.71	98.43	98.34	98.06	97.88
9	107.90	100.09	99.91	99.63	99.35	99.17	98.89	98.61	98.52	98.33
10	108.50	99.82	99.63	99.26	98.99	98.71	98.53	98.16	98.06	97.97
11	106.60	99.91	99.62	99.25	98.97	98.50	98.22	97.94	97.84	97.65
12	105.20	100.10	99.81	99.52	99.43	98.95	98.67	98.19	98.00	97.91
13	107.60	100.09	99.81	99.44	99.07	98.88	98.51	98.33	98.23	98.05
14	106.10	100.19	99.91	99.53	99.25	98.96	98.87	98.49	98.30	98.11
15	102.90	99.81	99.61	99.51	99.13	98.74	98.54	98.15	97.96	97.86
16	107.50	100.09	99.91	99.72	99.44	99.16	98.88	98.51	98.14	97.77
17	105.60	99.91	99.62	99.34	98.96	98.77	98.30	97.92	97.73	97.54
18	107.60	100.09	99.81	99.54	99.26	98.79	98.42	98.14	97.68	97.40
19	108.00	100.19	99.91	99.63	99.17	98.89	98.70	98.43	98.33	98.24
20	105.30	99.81	99.53	99.34	99.15	98.86	98.58	98.01	97.53	97.25
21	107.90	100.19	99.91	99.63	99.26	99.07	98.98	98.52	97.87	97.59
22	104.80	100.10	99.71	99.52	99.33	98.76	98.47	98.19	97.81	97.52
23	106.50	100.09	99.81	99.34	98.97	98.69	98.31	98.22	97.75	97.37
24	101.90	100.10	99.90	99.51	99.21	98.72	98.43	98.14	97.63	97.32
25	106.30	100.09	99.91	99.62	99.25	98.78	98.59	98.02	97.55	97.08
26	105.70	100.19	99.81	99.53	99.24	98.86	98.68	98.39	97.63	97.45
27	107.30	100.09	99.91	99.44	99.07	98.97	98.88	98.79	98.32	97.48
28	106.50	100.09	99.91	99.53	99.34	99.15	98.78	98.59	98.31	97.75
29	106.90	100.09	99.81	99.44	99.06	98.97	98.60	98.41	98.13	97.85
30	106.30	100.28	99.91	99.62	99.25	99.06	98.78	98.49	98.31	97.84
Avg.	106.49	100.08	99.81	99.53	99.22	98.93	98.67	98.36	98.03	97.74
Med.	106.75	100.09	99.81	99.53	99.25	98.92	98.65	98.37	98.06	97.80
st dev	1.67	0.12	0.12	0.13	0.15	0.20	0.24	0.27	0.29	0.33
Min.	101.90	99.81	99.53	99.25	98.96	98.50	98.22	97.92	97.53	97.08
Max.	108.60	100.28	100.09	99.81	99.53	99.35	99.16	99.06	98.52	98.33

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	9.119	9.121	9.121	9.131	9.128	9.124	9.124	9.213	9.201	9.199
2	9.184	9.185	9.192	9.199	9.184	9.187	9.190	9.179	9.169	9.170
3	9.083	9.078	9.090	9.093	9.129	9.091	9.085	9.078	9.073	9.069
4	9.079	9.078	9.086	9.091	9.127	9.092	9.090	9.068	9.066	9.064
5	9.088	9.086	9.092	9.100	9.132	9.095	9.098	9.083	9.073	9.076
6	9.061	9.060	9.069	9.081	9.110	9.116	9.114	9.058	9.051	9.048
7	9.152	9.152	9.158	9.166	9.141	9.142	9.141	9.148	9.138	9.143
8	9.158	9.153	9.162	9.172	9.155	9.152	9.159	9.155	9.151	9.144
9	9.129	9.136	9.138	9.146	9.148	9.131	9.142	9.125	9.122	9.116
10	9.092	9.097	9.103	9.106	9.104	9.103	9.104	9.088	9.084	9.081
11	9.086	9.087	9.096	9.102	9.104	9.095	9.107	9.084	9.073	9.075
12	9.085	9.086	9.093	9.103	9.113	9.109	9.101	9.081	9.073	9.075
13	9.124	9.126	9.138	9.144	9.127	9.127	9.137	9.119	9.112	9.115
14	9.132	9.126	9.124	9.125	9.124	9.135	9.126	9.222	9.216	9.217
15	9.067	9.070	9.080	9.088	9.123	9.087	9.099	9.065	9.055	9.061
16	9.188	9.187	9.195	9.206	9.184	9.184	9.185	9.180	9.174	9.177
17	9.116	9.123	9.125	9.131	9.170	9.123	9.126	9.109	9.108	9.109
18	9.074	9.078	9.087	9.087	9.131	9.093	9.082	9.063	9.057	9.060
19	9.107	9.109	9.127	9.116	9.119	9.124	9.123	9.103	9.098	9.098
20	9.084	9.086	9.097	9.100	9.106	9.093	9.095	9.081	9.077	9.075
21	9.074	9.079	9.086	9.085	9.119	9.085	9.059	9.069	9.063	9.066
22	9.092	9.089	9.106	9.109	9.103	9.117	9.087	9.089	9.079	9.082
23	9.134	9.133	9.146	9.149	9.121	9.135	9.144	9.223	9.220	9.225
24	9.073	9.067	9.085	9.086	9.081	9.082	9.081	9.066	9.058	9.064
25	9.093	9.091	9.107	9.107	9.102	9.102	9.101	9.095	9.086	9.085
26	9.087	9.088	9.096	9.113	9.108	9.097	9.106	9.078	9.073	9.074
27	9.073	9.070	9.083	9.093	9.114	9.107	9.101	9.063	9.061	9.062
28	9.109	9.106	9.113	9.131	9.135	9.127	9.139	9.201	9.197	9.201
29	9.105	9.101	9.115	9.129	9.125	9.127	9.127	9.101	9.092	9.091
30	9.133	9.132	9.145	9.156	9.153	9.135	9.126	9.134	9.125	9.123
Avg.	9.106	9.106	9.115	9.122	9.127	9.117	9.117	9.114	9.108	9.108
Med.	9.093	9.094	9.107	9.111	9.125	9.117	9.111	9.092	9.085	9.084
st dev	0.034	0.034	0.032	0.033	0.024	0.027	0.030	0.052	0.052	0.052
Min.	9.061	9.060	9.069	9.081	9.081	9.082	9.059	9.058	9.051	9.048
Max.	9.188	9.187	9.195	9.206	9.184	9.187	9.190	9.223	9.220	9.225

3.3 Data Set 1, 85°C, 100mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.2562	0.5306	2819	0.0003	0.0005	0.0006	0.0009	0.0011	0.0012	0.0014	0.0021	0.0025
2	0.2575	0.5315	2787	0.0001	0.0004	0.0007	0.0009	0.0009	0.0011	0.0012	0.0018	0.0022
3	0.2599	0.5304	2742	0.0002	0.0005	0.0006	0.0009	0.0012	0.0012	0.0016	0.0021	0.0023
4	0.2580	0.5311	2778	0.0001	0.0004	0.0007	0.0010	0.0008	0.0011	0.0016	0.0019	0.0024
5	0.2583	0.5313	2771	0.0004	0.0006	0.0008	0.0010	0.0007	0.0010	0.0014	0.0020	0.0023
6	0.2572	0.5297	2802	0.0003	0.0006	0.0010	0.0012	0.0011	0.0011	0.0019	0.0023	0.0025
7	0.2581	0.5316	2775	0.0002	0.0005	0.0007	0.0010	0.0011	0.0014	0.0018	0.0023	0.0026
8	0.2584	0.5328	2763	0.0004	0.0006	0.0009	0.0010	0.0012	0.0012	0.0018	0.0021	0.0023
9	0.2582	0.5321	2770	0.0003	0.0006	0.0009	0.0012	0.0011	0.0012	0.0021	0.0020	0.0023
10	0.2589	0.5305	2763	0.0003	0.0005	0.0007	0.0009	0.0009	0.0011	0.0021	0.0022	0.0024
11	0.2600	0.5299	2742	0.0002	0.0004	0.0006	0.0008	0.0008	0.0009	0.0018	0.0020	0.0023
12	0.2634	0.5321	2663	0.0003	0.0006	0.0007	0.0010	0.0012	0.0013	0.0019	0.0021	0.0024
13	0.2576	0.5283	2799	0.0003	0.0006	0.0009	0.0012	0.0009	0.0011	0.0019	0.0020	0.0025
14	0.2597	0.5320	2739	0.0002	0.0004	0.0007	0.0009	0.0011	0.0012	0.0018	0.0019	0.0023
15	0.2581	0.5307	2778	0.0002	0.0003	0.0005	0.0008	0.0008	0.0010	0.0016	0.0018	0.0021
16	0.2579	0.5321	2777	0.0001	0.0004	0.0006	0.0009	0.0005	0.0008	0.0017	0.0018	0.0023
17	0.2583	0.5307	2773	0.0002	0.0005	0.0008	0.0010	0.0011	0.0011	0.0020	0.0021	0.0024
18	0.2618	0.5310	2700	0.0001	0.0004	0.0006	0.0009	0.0014	0.0014	0.0022	0.0023	0.0026
19	0.2581	0.5313	2775	0.0001	0.0003	0.0006	0.0008	0.0009	0.0012	0.0020	0.0021	0.0023
20	0.2618	0.5311	2699	0.0004	0.0005	0.0006	0.0009	0.0008	0.0011	0.0018	0.0020	0.0024
21	0.2589	0.5315	2758	0.0003	0.0005	0.0006	0.0007	0.0007	0.0010	0.0021	0.0023	0.0025
22	0.2591	0.5284	2768	0.0004	0.0005	0.0008	0.0010	0.0006	0.0006	0.0018	0.0018	0.0021
23	0.2612	0.5313	2710	0.0003	0.0006	0.0009	0.0012	0.0008	0.0010	0.0020	0.0021	0.0025
24	0.2591	0.5326	2749	0.0002	0.0005	0.0007	0.0008	0.0007	0.0009	0.0020	0.0020	0.0024
25	0.2620	0.5325	2691	0.0003	0.0005	0.0007	0.0010	0.0009	0.0009	0.0021	0.0022	0.0026
26	0.2608	0.5315	2719	0.0001	0.0003	0.0005	0.0007	0.0013	0.0013	0.0021	0.0020	0.0023
27	0.2610	0.5329	2708	0.0001	0.0003	0.0004	0.0006	0.0015	0.0016	0.0018	0.0021	0.0023
28	0.2614	0.5313	2706	0.0001	0.0002	0.0006	0.0008	0.0014	0.0015	0.0018	0.0020	0.0024
29	0.2595	0.5334	2738	0.0004	0.0005	0.0007	0.0009	0.0011	0.0013	0.0018	0.0018	0.0023
30	0.2610	0.5307	2717	0.0002	0.0005	0.0008	0.0010	0.0014	0.0015	0.0019	0.0021	0.0024
Avg.	0.2594	0.5312	2749	0.0003	0.0005	0.0007	0.0009	0.0010	0.0011	0.0018	0.0020	0.0024
Med.	0.2590	0.5313	2761	0.0002	0.0005	0.0007	0.0009	0.0010	0.0011	0.0018	0.0020	0.0024
st dev	0.0017	0.0012	37	0.0001	0.0001	0.0001	0.0001	0.0003	0.0002	0.0002	0.0001	0.0001
Min.	0.2562	0.5283	2663	0.0001	0.0002	0.0004	0.0006	0.0005	0.0006	0.0012	0.0018	0.0021
Max.	0.2634	0.5334	2819	0.0004	0.0006	0.0010	0.0012	0.0015	0.0016	0.0022	0.0023	0.0026

3.4 Data Set 2, 105°C, 100mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	109.20	99.82	99.54	99.18	98.81	98.35	97.99	97.62	97.44	96.98
32	106.30	99.91	99.53	99.25	98.97	98.49	98.02	97.65	97.46	96.99
33	109.00	99.82	99.45	98.99	98.62	98.26	98.07	97.43	97.16	96.70
34	107.20	99.91	99.63	99.35	98.97	98.79	98.69	98.41	98.13	97.95
35	107.90	100.09	99.72	99.35	98.98	98.52	98.15	97.78	97.68	97.22
36	106.10	99.81	99.43	99.06	98.77	98.30	97.93	97.64	97.27	97.08
37	106.20	99.72	99.34	99.06	98.78	98.31	97.93	97.74	97.55	97.36
38	108.20	100.09	99.91	99.54	99.26	99.08	98.89	98.43	98.15	97.69
39	107.30	99.81	99.63	99.44	98.97	98.79	98.60	98.42	98.04	97.76
40	101.70	99.90	99.61	99.21	98.92	98.62	98.33	97.94	97.54	97.33
41	107.80	100.09	99.63	99.17	98.79	98.42	98.24	98.05	97.59	97.31
42	101.20	99.90	99.51	99.11	98.81	98.67	98.55	97.78	97.32	97.03
43	107.90	99.91	99.54	99.26	98.80	98.33	97.96	97.59	97.41	96.94
44	108.80	99.82	99.54	99.17	98.90	98.71	98.35	98.16	97.89	97.79
45	107.40	100.09	99.81	99.53	99.16	98.70	98.42	98.32	98.04	97.86
46	107.60	99.91	99.54	99.07	98.79	98.42	98.23	97.58	97.30	97.12
47	107.70	99.81	99.44	99.16	98.79	98.14	97.96	97.59	97.21	96.94
48	106.10	99.91	99.53	99.25	98.87	98.68	98.40	97.93	97.46	97.27
49	103.10	99.81	99.42	98.93	98.45	98.25	97.77	97.67	97.28	96.85
50	106.20	99.91	99.62	99.25	98.96	98.40	97.93	97.46	96.99	96.70
51	106.70	100.19	99.81	99.53	99.06	98.97	98.50	97.66	97.38	97.00
52	106.20	99.81	99.53	99.15	98.78	98.49	98.21	97.83	97.65	97.46
53	102.50	99.80	99.51	99.12	98.73	98.54	98.05	97.66	97.32	97.09
54	106.10	100.19	99.91	99.62	99.15	98.68	98.21	97.64	97.17	96.80
55	105.80	99.91	99.53	99.24	98.87	98.39	98.20	97.92	97.73	97.45
56	107.60	100.09	99.91	99.44	98.98	98.70	98.42	98.05	97.77	97.03
57	105.90	100.09	99.72	99.24	98.77	98.58	98.39	98.49	98.02	97.36
58	107.40	99.81	99.44	99.07	98.70	98.23	98.04	97.77	97.49	97.39
59	100.90	99.80	99.41	98.95	98.54	98.05	97.57	97.01	96.90	96.43
60	106.30	99.81	99.53	99.25	98.87	98.31	97.84	97.74	97.37	96.90
Avg.	106.28	99.92	99.59	99.23	98.86	98.51	98.19	97.83	97.52	97.19
Med.	106.50	99.90	99.54	99.23	98.84	98.49	98.21	97.75	97.46	97.11
st dev	2.23	0.13	0.15	0.18	0.17	0.24	0.29	0.34	0.33	0.37
Min.	100.90	99.72	99.34	98.93	98.45	98.05	97.57	97.01	96.90	96.43
Max.	109.20	100.19	99.91	99.62	99.26	99.08	98.89	98.49	98.15	97.95

3.5 Data Set 2, 105°C, 100mA (Forward Voltage)

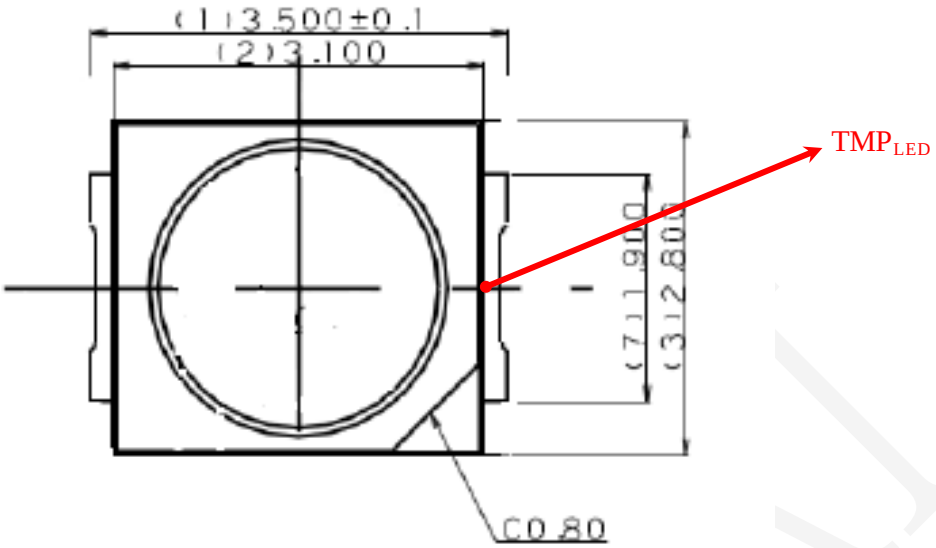
No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	9.126	9.128	9.146	9.155	9.185	9.129	9.134	9.123	9.121	9.120
32	9.121	9.123	9.135	9.138	9.123	9.121	9.122	9.118	9.110	9.116
33	9.062	9.063	9.076	9.087	9.106	9.087	9.106	9.058	9.057	9.059
34	9.109	9.113	9.116	9.115	9.117	9.117	9.123	9.205	9.203	9.203
35	9.073	9.069	9.083	9.092	9.106	9.087	9.105	9.065	9.060	9.061
36	9.101	9.099	9.110	9.124	9.142	9.106	9.091	9.097	9.089	9.091
37	9.078	9.070	9.081	9.090	9.109	9.115	9.119	9.070	9.061	9.064
38	9.103	9.101	9.109	9.122	9.113	9.107	9.106	9.095	9.092	9.093
39	9.065	9.063	9.076	9.088	9.096	9.082	9.091	9.060	9.052	9.055
40	9.065	9.074	9.078	9.089	9.105	9.088	9.074	9.062	9.059	9.056
41	9.070	9.070	9.084	9.086	9.103	9.107	9.108	9.060	9.059	9.055
42	9.064	9.058	9.077	9.080	9.096	9.088	9.090	9.061	9.051	9.045
43	9.130	9.128	9.142	9.139	9.126	9.121	9.126	9.134	9.127	9.127
44	9.061	9.054	9.074	9.067	9.102	9.078	9.088	9.050	9.041	9.045
45	9.107	9.108	9.114	9.125	9.145	9.107	9.124	9.100	9.099	9.093
46	9.135	9.145	9.151	9.159	9.179	9.158	9.164	9.129	9.124	9.127
47	9.090	9.095	9.105	9.109	9.108	9.103	9.104	9.087	9.080	9.077
48	9.088	9.088	9.106	9.105	9.107	9.106	9.095	9.085	9.078	9.084
49	9.095	9.096	9.107	9.115	9.105	9.102	9.088	9.089	9.087	9.087
50	9.195	9.187	9.192	9.196	9.195	9.196	9.183	9.189	9.185	9.187
51	9.091	9.086	9.110	9.106	9.106	9.107	9.118	9.084	9.083	9.086
52	9.091	9.093	9.109	9.103	9.107	9.109	9.092	9.085	9.085	9.084
53	9.079	9.081	9.103	9.103	9.101	9.093	9.102	9.078	9.072	9.074
54	9.084	9.086	9.100	9.109	9.092	9.099	9.102	9.079	9.075	9.079
55	9.071	9.072	9.082	9.089	9.112	9.081	9.101	9.063	9.056	9.058
56	9.090	9.090	9.106	9.106	9.130	9.092	9.105	9.077	9.078	9.081
57	9.102	9.109	9.115	9.115	9.108	9.107	9.118	9.099	9.092	9.095
58	9.071	9.081	9.088	9.092	9.115	9.095	9.098	9.068	9.063	9.065
59	9.088	9.092	9.103	9.111	9.093	9.092	9.102	9.086	9.081	9.081
60	9.111	9.112	9.128	9.136	9.114	9.118	9.125	9.105	9.105	9.105
Avg.	9.094	9.094	9.107	9.112	9.118	9.107	9.110	9.092	9.088	9.088
Med.	9.090	9.091	9.106	9.108	9.108	9.106	9.105	9.085	9.081	9.083
st dev	0.028	0.029	0.027	0.027	0.026	0.024	0.022	0.036	0.037	0.037
Min.	9.061	9.054	9.074	9.067	9.092	9.078	9.074	9.050	9.041	9.045
Max.	9.195	9.187	9.192	9.196	9.195	9.196	9.183	9.205	9.203	9.203

3.6 Data Set 2, 105°C, 100mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	0.2574	0.5308	2794	0.0004	0.0007	0.0009	0.0011	0.0013	0.0014	0.0021	0.0023	0.0028
32	0.2620	0.5298	2700	0.0002	0.0005	0.0007	0.0010	0.0011	0.0013	0.0018	0.0021	0.0026
33	0.2570	0.5296	2806	0.0005	0.0008	0.0010	0.0011	0.0016	0.0017	0.0020	0.0022	0.0026
34	0.2585	0.5310	2768	0.0005	0.0008	0.0009	0.0011	0.0011	0.0013	0.0021	0.0023	0.0025
35	0.2596	0.5316	2742	0.0003	0.0006	0.0009	0.0012	0.0011	0.0012	0.0018	0.0021	0.0025
36	0.2603	0.5304	2732	0.0004	0.0006	0.0009	0.0012	0.0013	0.0015	0.0019	0.0024	0.0027
37	0.2608	0.5317	2717	0.0004	0.0005	0.0008	0.0012	0.0011	0.0012	0.0018	0.0021	0.0025
38	0.2594	0.5339	2738	0.0002	0.0004	0.0007	0.0009	0.0015	0.0017	0.0022	0.0024	0.0027
39	0.2618	0.5298	2705	0.0003	0.0004	0.0006	0.0009	0.0013	0.0013	0.0018	0.0023	0.0025
40	0.2615	0.5322	2702	0.0002	0.0006	0.0009	0.0011	0.0014	0.0014	0.0021	0.0023	0.0026
41	0.2562	0.5296	2825	0.0002	0.0004	0.0007	0.0009	0.0012	0.0015	0.0020	0.0024	0.0026
42	0.2590	0.5294	2765	0.0004	0.0005	0.0007	0.0010	0.0014	0.0016	0.0018	0.0024	0.0025
43	0.2570	0.5298	2805	0.0003	0.0006	0.0009	0.0011	0.0019	0.0022	0.0026	0.0031	0.0033
44	0.2589	0.5318	2756	0.0005	0.0007	0.0009	0.0012	0.0011	0.0013	0.0021	0.0025	0.0027
45	0.2590	0.5321	2753	0.0005	0.0008	0.0011	0.0013	0.0013	0.0014	0.0018	0.0024	0.0027
46	0.2585	0.5324	2764	0.0006	0.0008	0.0009	0.0012	0.0011	0.0012	0.0021	0.0023	0.0026
47	0.2608	0.5322	2715	0.0003	0.0006	0.0009	0.0011	0.0013	0.0015	0.0018	0.0023	0.0025
48	0.2596	0.5304	2748	0.0002	0.0005	0.0008	0.0011	0.0010	0.0012	0.0018	0.0023	0.0024
49	0.2575	0.5291	2798	0.0004	0.0007	0.0009	0.0011	0.0012	0.0014	0.0018	0.0022	0.0025
50	0.2620	0.5326	2690	0.0003	0.0005	0.0007	0.0010	0.0012	0.0015	0.0018	0.0023	0.0025
51	0.2600	0.5294	2743	0.0003	0.0006	0.0007	0.0010	0.0011	0.0014	0.0021	0.0024	0.0027
52	0.2611	0.5318	2710	0.0004	0.0006	0.0008	0.0011	0.0012	0.0013	0.0018	0.0023	0.0026
53	0.2599	0.5300	2744	0.0004	0.0006	0.0009	0.0011	0.0010	0.0013	0.0018	0.0023	0.0025
54	0.2604	0.5301	2732	0.0003	0.0004	0.0007	0.0010	0.0010	0.0013	0.0021	0.0024	0.0025
55	0.2596	0.5306	2747	0.0004	0.0005	0.0007	0.0009	0.0009	0.0012	0.0018	0.0023	0.0025
56	0.2618	0.5295	2706	0.0002	0.0004	0.0005	0.0008	0.0007	0.0010	0.0019	0.0023	0.0026
57	0.2617	0.5286	2712	0.0004	0.0006	0.0009	0.0011	0.0011	0.0013	0.0020	0.0024	0.0027
58	0.2626	0.5341	2672	0.0004	0.0006	0.0008	0.0010	0.0012	0.0013	0.0019	0.0023	0.0025
59	0.2590	0.5291	2766	0.0004	0.0006	0.0010	0.0011	0.0008	0.0010	0.0018	0.0023	0.0023
60	0.2597	0.5307	2745	0.0004	0.0007	0.0010	0.0011	0.0009	0.0011	0.0018	0.0022	0.0025
Avg.	0.2598	0.5308	2743	0.0004	0.0006	0.0008	0.0011	0.0012	0.0014	0.0019	0.0023	0.0026
Med.	0.2597	0.5305	2744	0.0004	0.0006	0.0009	0.0011	0.0012	0.0013	0.0019	0.0023	0.0026
st dev	0.0017	0.0014	37	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.2562	0.5286	2672	0.0002	0.0004	0.0005	0.0008	0.0007	0.0010	0.0018	0.0021	0.0023
Max.	0.2626	0.5341	2825	0.0006	0.0008	0.0011	0.0013	0.0019	0.0022	0.0026	0.0031	0.0033

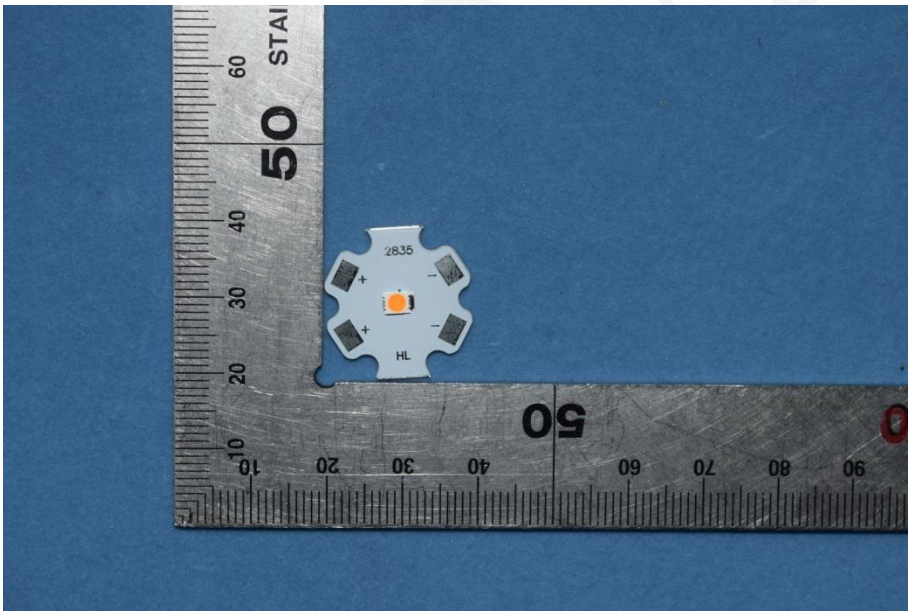
4 - DUT Photo

4.1 #Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



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2. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
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**********END OF REPORT**********