



TEST REPORT

ACCORDING TO ANSI/IES LM-80-15
For

FUJIAN LIGHTNING OPTOELECTRONIC Co.,LTD

Optoelectronic Industry Park, Hutou town, Anxi County Quanzhou city, Fujian province
362411, P.R. China

#Model: T2827831Q

Report Type: 12000 Hours Test Report		Product Type: LED Package
Test Engineer:	Pote Wang	<i>Pote Wang</i>
Report Number:	RSZ160603510-10-12000-M1	
Test Date:	2016-06-14 to 2018-12-02	
Report Date:	2020-04-08	
Revised Note:	The previous report RSZ160603510-10-12000 is replaced by this report on 2020-04-08	
Reviewed By:	Bill Xiong / EE Engineer	
Test Facility:	Test facility was located at No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China	
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-0769-86858888 Fax: +86-0769-86858588	
Accreditation:	The IAS Accreditation Number TL-460.	

TABLE OF CONTENTS

1 -	General Information	3
1.1	Description of LED Light Sources	3
1.2	Standards Used:	11
1.3	Testing Equipment	11
1.4	Drive Level.....	11
1.5	Ambient Conditions for Maintenance Test.....	11
1.6	Measurement Uncertainty	12
1.7	Statement of Traceability.....	12
1.8	Sample Set.....	13
2 -	Summary of Test Result	14
3 -	Test Data	15
3.1	Data Set 1, 55°C, 120mA (Lumen Maintenance)	15
3.2	Data Set 1, 55°C, 120mA (Forward Voltage)	16
3.3	Data Set 1, 55°C, 120mA (Chromaticity Shift)	17
3.4	Data Set 2, 105°C, 120mA (Lumen Maintenance)	18
3.5	Data Set 2, 105°C, 120mA (Forward Voltage)	19
3.6	Data Set 2, 105°C, 120mA (Chromaticity Shift).....	20
3.7	Data Set 3, 115°C, 120mA (Lumen Maintenance)	21
3.8	Data Set 3, 115°C, 120mA (Forward Voltage).....	22
3.9	Data Set 3, 115°C, 120mA (Chromaticity Shift).....	23
4 -	EUT Photo.....	24
4.1	Mechanical Dimensions.....	24
4.2	EUT Photo	24
5 -	Report Revision	25
	Directions.....	26

1 - General Information

1.1 Description of LED Light Sources

Sample Size:

75 PCS test samples were in good condition and received on 2016-06-03. The samples were numbered from 1 to 25, 26 to 50 and 51 to 75.

#Manufacturer:	FUJIAN LIGHTNING OPTOELECTRONIC Co.,LTD
#Part Number:	T2827831Q
#Part Type:	LED Package
#Drive Level:	DC 120mA
#Nominal CCT:	2700K
#Power:	1.2W
#Average Current Density per LED die:	620.001mA/mm ²
#Average Power Density per LED die:	1.860W/mm ²
#CRI:	80
#Die Spacing:	0.12mm

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:

Series Name	Model Name	CCT (K)	Current (mA)	Power (W)	Power Density (W/mm ²)	Current Density(mA/mm ²)	Die Spacing (mm)
2835 PCT	T2822731*_*****	2200	120	1.200	0.122	620.001	0.12
2835 PCT	T2822831*_*****	2200	120	1.200	0.122	620.001	0.12
2835 PCT	T2822931*_*****	2200	120	1.200	0.122	620.001	0.12
2835 PCT	T2822721*_*****	2200	120	0.720	0.073	620.001	0.12
2835 PCT	T2822821*_*****	2200	120	0.720	0.073	620.001	0.12
2835 PCT	T2822921*_*****	2200	120	0.720	0.073	620.001	0.12

Series Name	Model Name	CCT (K)	Current (mA)	Power (W)	Power Density (W/mm ²)	Current Density(mA/mm ²)	Die Spacing (mm)
2835 PCT	T2822711*-*****	2200	120	0.360	0.037	620.001	N/A
2835 PCT	T2822811*-*****	2200	120	0.360	0.037	620.001	N/A
2835 PCT	T2822911*-*****	2200	120	0.360	0.037	620.001	N/A
2835 PCT	T2822712*-*****	2200	240	0.720	0.073	620.001	0.12
2835 PCT	T2822812*-*****	2200	240	0.720	0.073	620.001	0.12
2835 PCT	T2822912*-*****	2200	240	0.720	0.073	620.001	0.12
2835 PCT	T2825731*-*****	2500	120	1.200	0.122	620.001	0.12
2835 PCT	T2825831*-*****	2500	120	1.200	0.122	620.001	0.12
2835 PCT	T2825931*-*****	2500	120	1.200	0.122	620.001	0.12
2835 PCT	T2825721*-*****	2500	120	0.720	0.073	620.001	0.12
2835 PCT	T2825821*-*****	2500	120	0.720	0.073	620.001	0.12
2835 PCT	T2825921*-*****	2500	120	0.720	0.073	620.001	0.12
2835 PCT	T2825711*-*****	2500	120	0.360	0.037	620.001	N/A
2835 PCT	T2825811*-*****	2500	120	0.360	0.037	620.001	N/A
2835 PCT	T2825911*-*****	2500	120	0.360	0.037	620.001	N/A
2835 PCT	T2825712*-*****	2500	240	0.720	0.073	620.001	0.12
2835 PCT	T2825812*-*****	2500	240	0.720	0.073	620.001	0.12
2835 PCT	T2825912*-*****	2500	240	0.720	0.073	620.001	0.12
2835 PCT	T2827731*-*****	2700	120	1.200	0.122	620.001	0.12
2835 PCT	T2827831*-*****	2700	120	1.200	0.122	620.001	0.12
2835 PCT	T2827931*-*****	2700	120	1.200	0.122	620.001	0.12
2835 PCT	T2827721*-*****	2700	120	0.720	0.073	620.001	0.12
2835 PCT	T2827821*-*****	2700	120	0.720	0.073	620.001	0.12
2835 PCT	T2827921*-*****	2700	120	0.720	0.073	620.001	0.12
2835 PCT	T2827711*-*****	2700	120	0.360	0.037	620.001	N/A

Series Name	Model Name	CCT (K)	Current (mA)	Power (W)	Power Density (W/mm ²)	Current Density(mA/mm ²)	Die Spacing (mm)
2835 PCT	T2827811*-*****	2700	120	0.360	0.037	620.001	N/A
2835 PCT	T2827911*-*****	2700	120	0.360	0.037	620.001	N/A
2835 PCT	T2827712*-*****	2700	240	0.720	0.073	620.001	0.12
2835 PCT	T2827812*-*****	2700	240	0.720	0.073	620.001	0.12
2835 PCT	T2827912*-*****	2700	240	0.720	0.073	620.001	0.12
2835 PCT	T2830731*-*****	3000	120	1.200	0.122	620.001	0.12
2835 PCT	T2830831*-*****	3000	120	1.200	0.122	620.001	0.12
2835 PCT	T2830931*-*****	3000	120	1.200	0.122	620.001	0.12
2835 PCT	T2830721*-*****	3000	120	0.720	0.073	620.001	0.12
2835 PCT	T2830821*-*****	3000	120	0.720	0.073	620.001	0.12
2835 PCT	T2830921*-*****	3000	120	0.720	0.073	620.001	0.12
2835 PCT	T2830711*-*****	3000	120	0.360	0.037	620.001	N/A
2835 PCT	T2830811*-*****	3000	120	0.360	0.037	620.001	N/A
2835 PCT	T2830911*-*****	3000	120	0.360	0.037	620.001	N/A
2835 PCT	T2830712*-*****	3000	240	0.720	0.073	620.001	0.12
2835 PCT	T2830812*-*****	3000	240	0.720	0.073	620.001	0.12
2835 PCT	T2830912*-*****	3000	240	0.720	0.073	620.001	0.12
2835 PCT	T2835731*-*****	3500	120	1.200	0.122	620.001	0.12
2835 PCT	T2835831*-*****	3500	120	1.200	0.122	620.001	0.12
2835 PCT	T2835931*-*****	3500	120	1.200	0.122	620.001	0.12
2835 PCT	T2835721*-*****	3500	120	0.720	0.073	620.001	0.12
2835 PCT	T2835821*-*****	3500	120	0.720	0.073	620.001	0.12
2835 PCT	T2835921*-*****	3500	120	0.720	0.073	620.001	0.12
2835 PCT	T2835711*-*****	3500	120	0.360	0.037	620.001	N/A
2835 PCT	T2835811*-*****	3500	120	0.360	0.037	620.001	N/A

Series Name	Model Name	CCT (K)	Current (mA)	Power (W)	Power Density (W/mm ²)	Current Density(mA/mm ²)	Die Spacing (mm)
2835 PCT	T2835911*-*****	3500	120	0.360	0.037	620.001	N/A
2835 PCT	T2835712*-*****	3500	240	0.720	0.073	620.001	0.12
2835 PCT	T2835812*-*****	3500	240	0.720	0.073	620.001	0.12
2835 PCT	T2835912*-*****	3500	240	0.720	0.073	620.001	0.12
2835 PCT	T2840731*-*****	4000	120	1.200	0.122	620.001	0.12
2835 PCT	T2840831*-*****	4000	120	1.200	0.122	620.001	0.12
2835 PCT	T2840931*-*****	4000	120	1.200	0.122	620.001	0.12
2835 PCT	T2840721*-*****	4000	120	0.720	0.073	620.001	0.12
2835 PCT	T2840821*-*****	4000	120	0.720	0.073	620.001	0.12
2835 PCT	T2840921*-*****	4000	120	0.720	0.073	620.001	0.12
2835 PCT	T2840711*-*****	4000	120	0.360	0.037	620.001	N/A
2835 PCT	T2840811*-*****	4000	120	0.360	0.037	620.001	N/A
2835 PCT	T2840911*-*****	4000	120	0.360	0.037	620.001	N/A
2835 PCT	T2840712*-*****	4000	240	0.720	0.073	620.001	0.12
2835 PCT	T2840812*-*****	4000	240	0.720	0.073	620.001	0.12
2835 PCT	T2840912*-*****	4000	240	0.720	0.073	620.001	0.12
2835 PCT	T2845731*-*****	4500	120	1.200	0.122	620.001	0.12
2835 PCT	T2845831*-*****	4500	120	1.200	0.122	620.001	0.12
2835 PCT	T2845931*-*****	4500	120	1.200	0.122	620.001	0.12
2835 PCT	T2845721*-*****	4500	120	0.720	0.073	620.001	0.12
2835 PCT	T2845821*-*****	4500	120	0.720	0.073	620.001	0.12
2835 PCT	T2845921*-*****	4500	120	0.720	0.073	620.001	0.12
2835 PCT	T2845711*-*****	4500	120	0.360	0.037	620.001	N/A
2835 PCT	T2845811*-*****	4500	120	0.360	0.037	620.001	N/A
2835 PCT	T2845911*-*****	4500	120	0.360	0.037	620.001	N/A

Series Name	Model Name	CCT (K)	Current (mA)	Power (W)	Power Density (W/mm ²)	Current Density(mA/mm ²)	Die Spacing (mm)
2835 PCT	T2845712*-*****	4500	240	0.720	0.073	620.001	0.12
2835 PCT	T2845812*-*****	4500	240	0.720	0.073	620.001	0.12
2835 PCT	T2845912*-*****	4500	240	0.720	0.073	620.001	0.12
2835 PCT	T2850731*-*****	5000	120	1.200	0.122	620.001	0.12
2835 PCT	T2850831*-*****	5000	120	1.200	0.122	620.001	0.12
2835 PCT	T2850931*-*****	5000	120	1.200	0.122	620.001	0.12
2835 PCT	T2850721*-*****	5000	120	0.720	0.073	620.001	0.12
2835 PCT	T2850821*-*****	5000	120	0.720	0.073	620.001	0.12
2835 PCT	T2850921*-*****	5000	120	0.720	0.073	620.001	0.12
2835 PCT	T2850711*-*****	5000	120	0.360	0.037	620.001	N/A
2835 PCT	T2850811*-*****	5000	120	0.360	0.037	620.001	N/A
2835 PCT	T2850911*-*****	5000	120	0.360	0.037	620.001	N/A
2835 PCT	T2850712*-*****	5000	240	0.720	0.073	620.001	0.12
2835 PCT	T2850812*-*****	5000	240	0.720	0.073	620.001	0.12
2835 PCT	T2850912*-*****	5000	240	0.720	0.073	620.001	0.12
2835 PCT	T2857731*-*****	5700	120	1.200	0.122	620.001	0.12
2835 PCT	T2857831*-*****	5700	120	1.200	0.122	620.001	0.12
2835 PCT	T2857931*-*****	5700	120	1.200	0.122	620.001	0.12
2835 PCT	T2857721*-*****	5700	120	0.720	0.073	620.001	0.12
2835 PCT	T2857821*-*****	5700	120	0.720	0.073	620.001	0.12
2835 PCT	T2857921*-*****	5700	120	0.720	0.073	620.001	0.12
2835 PCT	T2857711*-*****	5700	120	0.360	0.037	620.001	N/A
2835 PCT	T2857811*-*****	5700	120	0.360	0.037	620.001	N/A
2835 PCT	T2857911*-*****	5700	120	0.360	0.037	620.001	N/A
2835 PCT	T2857712*-*****	5700	240	0.720	0.073	620.001	0.12

Series Name	Model Name	CCT (K)	Current (mA)	Power (W)	Power Density (W/mm ²)	Current Density(mA/mm ²)	Die Spacing (mm)
2835 PCT	T2857812*-*****	5700	240	0.720	0.073	620.001	0.12
2835 PCT	T2857912*-*****	5700	240	0.720	0.073	620.001	0.12
2835 PCT	T2865731*-*****	6500	120	1.200	0.122	620.001	0.12
2835 PCT	T2865831*-*****	6500	120	1.200	0.122	620.001	0.12
2835 PCT	T2865931*-*****	6500	120	1.200	0.122	620.001	0.12
2835 PCT	T2865721*-*****	6500	120	0.720	0.073	620.001	0.12
2835 PCT	T2865821*-*****	6500	120	0.720	0.073	620.001	0.12
2835 PCT	T2865921*-*****	6500	120	0.720	0.073	620.001	0.12
2835 PCT	T2865711*-*****	6500	120	0.360	0.037	620.001	N/A
2835 PCT	T2865811*-*****	6500	120	0.360	0.037	620.001	N/A
2835 PCT	T2865911*-*****	6500	120	0.360	0.037	620.001	N/A
2835 PCT	T2865712*-*****	6500	240	0.720	0.073	620.001	0.12
2835 PCT	T2865812*-*****	6500	240	0.720	0.073	620.001	0.12
2835 PCT	T2865912*-*****	6500	240	0.720	0.073	620.001	0.12
PCT-2835	T2827821*-*****	2700	145	0.87	0.089	604.168	0.12
PCT-2835	T2830821*-*****	3000	145	0.87	0.089	604.168	0.12
PCT-2835	T2840821*-*****	4000	145	0.87	0.089	604.168	0.12
PCT-2835	T2850821*-*****	5000	145	0.87	0.089	604.168	0.12
PCT-2835	T2857821*-*****	5700	145	0.87	0.089	604.168	0.12
PCT-2835	T2865821*-*****	6500	145	0.87	0.089	604.168	0.12
PCT-2835	T2827921*-*****	2700	145	0.87	0.089	604.168	0.12
PCT-2835	T2830921*-*****	3000	145	0.87	0.089	604.168	0.12
PCT-2835	T2840921*-*****	4000	145	0.87	0.089	604.168	0.12
PCT-2835	T2850921*-*****	5000	145	0.87	0.089	604.168	0.12
PCT-2835	T2857921*-*****	5700	145	0.87	0.089	604.168	0.12

Series Name	Model Name	CCT (K)	Current (mA)	Power (W)	Power Density (W/mm ²)	Current Density(mA/mm ²)	Die Spacing (mm)
PCT-2835	T2865921*-*****	6500	145	0.87	0.089	604.168	0.12
PCT-2835	T2827811*-*****	2700	240	0.72	0.073	483.118	N/A
PCT-2835	T2830811*-*****	3000	240	0.72	0.073	483.118	N/A
PCT-2835	T2840811*-*****	4000	240	0.72	0.073	483.118	N/A
PCT-2835	T2850811*-*****	5000	240	0.72	0.073	483.118	N/A
PCT-2835	T2857811*-*****	5700	240	0.72	0.073	483.118	N/A
PCT-2835	T2865811*-*****	6500	240	0.72	0.073	483.118	N/A
PCT-2835	T2827911*-*****	2700	240	0.72	0.073	483.118	N/A
PCT-2835	T2830911*-*****	3000	240	0.72	0.073	483.118	N/A
PCT-2835	T2840911*-*****	4000	240	0.72	0.073	483.118	N/A
PCT-2835	T2850911*-*****	5000	240	0.72	0.073	483.118	N/A
PCT-2835	T2857911*-*****	5700	240	0.72	0.073	483.118	N/A
PCT-2835	T2865911*-*****	6500	240	0.72	0.073	483.118	N/A
PCT-2835	T2827721*-*****	2700	200	1.2	0.122	402.598	0.12
PCT-2835	T2830721*-*****	3000	200	1.2	0.122	402.598	0.12
PCT-2835	T2840721*-*****	4000	200	1.2	0.122	402.598	0.12
PCT-2835	T2850721*-*****	5000	200	1.2	0.122	402.598	0.12
PCT-2835	T2857721*-*****	5700	200	1.2	0.122	402.598	0.12
PCT-2835	T2865721*-*****	6500	200	1.2	0.122	402.598	0.12
PCT-2835	T2827821*-*****	2700	200	1.2	0.122	402.598	0.12
PCT-2835	T2830821*-*****	3000	200	1.2	0.122	402.598	0.12
PCT-2835	T2840821*-*****	4000	200	1.2	0.122	402.598	0.12
PCT-2835	T2850821*-*****	5000	200	1.2	0.122	402.598	0.12
PCT-2835	T2857821*-*****	5700	200	1.2	0.122	402.598	0.12
PCT-2835	T2865821*-*****	6500	200	1.2	0.122	402.598	0.12

Series Name	Model Name	CCT (K)	Current (mA)	Power (W)	Power Density (W/mm ²)	Current Density(mA/mm ²)	Die Spacing (mm)
PCT-2835	T2827921*-*****	2700	200	1.2	0.122	402.598	0.12
PCT-2835	T2830921*-*****	3000	200	1.2	0.122	402.598	0.12
PCT-2835	T2840921*-*****	4000	200	1.2	0.122	402.598	0.12
PCT-2835	T2850921*-*****	5000	200	1.2	0.122	402.598	0.12
PCT-2835	T2857921*-*****	5700	200	1.2	0.122	402.598	0.12
PCT-2835	T2865921*-*****	6500	200	1.2	0.122	402.598	0.12
PCT-2835	T2827712*-*****	2700	240	0.72	0.073	500.001	0.12
PCT-2835	T2830712*-*****	3000	240	0.72	0.073	500.001	0.12
PCT-2835	T2840712*-*****	4000	240	0.72	0.073	500.001	0.12
PCT-2835	T2850712*-*****	5000	240	0.72	0.073	500.001	0.12
PCT-2835	T2857712*-*****	5700	240	0.72	0.073	500.001	0.12
PCT-2835	T2865712*-*****	6500	240	0.72	0.073	500.001	0.12
PCT-2835	T2827812*-*****	2700	240	0.72	0.073	500.001	0.12
PCT-2835	T2830812*-*****	3000	240	0.72	0.073	500.001	0.12
PCT-2835	T2840812*-*****	4000	240	0.72	0.073	500.001	0.12
PCT-2835	T2850812*-*****	5000	240	0.72	0.073	500.001	0.12
PCT-2835	T2857812*-*****	5700	240	0.72	0.073	500.001	0.12
PCT-2835	T2865812*-*****	6500	240	0.72	0.073	500.001	0.12
PCT-2835	T2827912*-*****	2700	240	0.72	0.073	500.001	0.12
PCT-2835	T2830912*-*****	3000	240	0.72	0.073	500.001	0.12
PCT-2835	T2840912*-*****	4000	240	0.72	0.073	500.001	0.12
PCT-2835	T2850912*-*****	5000	240	0.72	0.073	500.001	0.12
PCT-2835	T2857912*-*****	5700	240	0.72	0.073	500.001	0.12
PCT-2835	T2865912*-*****	6500	240	0.72	0.073	500.001	0.12

1.2 Standards Used:

- 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	2018-03-18	2019-03-18
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	2018-03-26	2019-03-26
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	2018-03-18	2019-03-18
Standard Light Source	EVERFINE	D062	1011064	2018-01-15	2019-01-15
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987CJ7321114	2018-03-26	2019-03-26
Multilayer aging machine	BACL	B2-270	20015	2018-03-13	2019-03-13
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090007	2018-03-26	2019-03-26
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090005	2018-03-26	2019-03-26
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090006	2018-03-26	2019-03-26

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 $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, RH <65%.

1.6 Measurement Uncertainty

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).

1.8 Sample Set

Data Set 1: 55°C, 120mA

Part Number: T2827831Q

Number of Units: 25

Case Temperature: >53°C

Ambient Temperature: >50°C

Life Test Drive Current: 120mA

Measurement Current: 120mA

Data Set 2: 105°C, 120mA

Part Number: T2827831Q

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: T2827831Q

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	Reported TM-21 L ₇₀ Lifetime
1	25	0	1000	12000	>72000hours
2	25	0	1000	12000	>72000hours
3	25	0	1000	12000	>72000hours

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
1	100.32%	100.11%	99.93%	99.74%	99.55%	99.33%	99.15%	98.95%	98.74%	98.46%	98.17%	97.85%
2	100.16%	99.75%	99.40%	99.12%	98.83%	98.50%	98.18%	97.90%	97.61%	97.26%	96.93%	96.56%
3	100.06%	99.58%	99.19%	98.84%	98.43%	98.04%	97.71%	97.39%	97.05%	96.65%	96.26%	95.87%

Average Color Maintenance

Data Set:	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
1	0.0002	0.0004	0.0005	0.0008	0.0011	0.0014	0.0017	0.0020	0.0024	0.0024	0.0025	0.0027
2	0.0003	0.0008	0.0009	0.0011	0.0013	0.0018	0.0022	0.0024	0.0028	0.0029	0.0030	0.0032
3	0.0005	0.0010	0.0012	0.0014	0.0016	0.0021	0.0025	0.0028	0.0031	0.0032	0.0032	0.0034

3 - Test Data

3.1 Data Set 1, 55°C, 120mA (Lumen Maintenance)

No.	Φ (lm)	Lumen Maintenance (%)											
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
1	157.1	100.38	100.19	99.94	99.62	99.43	99.17	98.98	98.85	98.60	98.28	97.77	97.39
2	157.2	100.45	100.32	100.06	99.81	99.68	99.49	99.24	99.05	98.79	98.66	98.47	98.16
3	157.8	100.44	100.19	99.94	99.87	99.62	99.43	99.18	99.11	98.99	98.73	98.61	98.29
4	156.4	100.38	100.32	100.19	100.06	99.74	99.49	99.42	99.23	99.04	98.98	98.85	98.66
5	157.5	100.32	100.19	100.13	99.81	99.68	99.43	99.30	99.11	99.05	98.79	98.73	98.41
6	157.3	100.19	99.94	99.81	99.75	99.55	99.43	99.36	99.24	99.05	98.66	98.47	98.28
7	158.1	100.38	100.06	99.75	99.62	99.49	99.30	99.11	99.05	98.86	98.73	98.55	98.36
8	156.0	100.32	100.13	99.87	99.55	99.29	99.10	99.04	98.85	98.78	98.53	98.33	98.08
9	155.9	100.38	100.26	100.13	99.87	99.55	99.23	98.97	98.72	98.40	98.01	97.82	97.50
10	156.6	100.26	100.19	99.94	99.74	99.55	99.36	99.23	98.98	98.79	98.28	98.15	97.70
11	155.1	100.39	100.13	100.06	99.94	99.61	99.29	99.10	98.97	98.65	98.19	97.87	97.68
12	157.3	100.25	100.13	99.94	99.81	99.68	99.55	99.24	99.11	98.86	98.60	98.16	97.84
13	156.5	100.26	99.94	99.81	99.74	99.55	99.36	99.11	98.79	98.47	98.21	97.96	97.70
14	155.9	100.45	100.19	100.06	99.94	99.74	99.68	99.62	99.42	99.23	98.97	98.65	98.20
15	156.3	100.32	100.13	99.94	99.62	99.55	99.30	99.10	98.98	98.91	98.46	97.89	97.50
16	155.6	100.19	99.94	99.81	99.61	99.42	99.23	99.10	98.78	98.52	98.14	97.94	97.69
17	156.5	100.32	100.19	100.13	99.94	99.62	99.30	99.11	98.91	98.72	98.66	98.34	97.96
18	155.4	100.19	99.94	99.74	99.68	99.42	99.03	98.84	98.58	98.46	98.20	98.01	97.81
19	156.3	100.32	100.13	99.94	99.87	99.81	99.55	99.42	99.10	98.91	98.78	98.46	98.21
20	155.7	100.19	100.06	99.74	99.61	99.42	99.23	99.17	98.91	98.65	98.07	97.62	97.43
21	156.8	100.26	100.06	99.68	99.49	99.30	99.17	98.98	98.85	98.60	98.28	98.09	97.70
22	157.8	100.32	99.94	99.75	99.49	99.18	98.99	98.73	98.54	98.29	97.97	97.47	97.08
23	156.5	100.38	100.26	100.13	99.74	99.55	99.30	99.04	98.72	98.47	98.40	97.83	97.25
24	157.5	100.44	100.13	100.06	99.81	99.68	99.37	99.17	98.92	98.60	98.54	98.10	97.78
25	155.1	100.26	99.94	99.68	99.55	99.48	99.36	99.10	98.90	98.77	98.39	98.07	97.68
Ave.	156.6	100.32	100.11	99.93	99.74	99.55	99.33	99.15	98.95	98.74	98.46	98.17	97.85
Med.	156.5	100.32	100.13	99.94	99.74	99.55	99.30	99.11	98.92	98.77	98.46	98.10	97.78
st dev	0.9	0.0849	0.1223	0.1591	0.1538	0.1534	0.1644	0.1889	0.2048	0.2372	0.2925	0.3638	0.3950
Min.	155.1	100.19	99.94	99.68	99.49	99.18	98.99	98.73	98.54	98.29	97.97	97.47	97.08
Max.	158.1	100.45	100.32	100.19	100.06	99.81	99.68	99.62	99.42	99.23	98.98	98.85	98.66

TM-21 Projection:

Test Duration: 12000 hours

Failures Observed: 0

α : 2.495E-06

β : 1.009

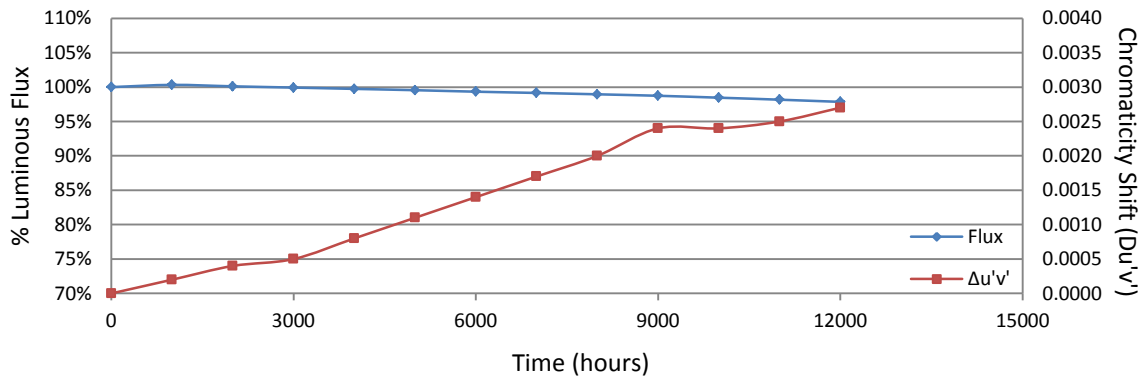
Reported L₇₀: >72000 hours

3.2 Data Set 1, 55°C, 120mA (Forward Voltage)

No.	Forward Voltage (V)												
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
1	9.652	9.793	9.681	9.659	9.612	9.597	9.597	9.591	9.593	9.597	9.617	9.613	9.598
2	9.683	9.714	9.686	9.662	9.608	9.600	9.595	9.591	9.595	9.600	9.613	9.611	9.595
3	9.713	9.713	9.694	9.673	9.619	9.605	9.604	9.585	9.517	9.608	9.634	9.627	9.605
4	9.638	9.727	9.627	9.597	9.547	9.542	9.535	9.534	9.533	9.533	9.561	9.559	9.544
5	9.649	9.798	9.693	9.669	9.613	9.608	9.594	9.589	9.588	9.609	9.621	9.617	9.607
6	9.691	9.778	9.723	9.698	9.653	9.638	9.638	9.625	9.588	9.648	9.671	9.653	9.648
7	9.589	9.602	9.675	9.650	9.596	9.590	9.584	9.568	9.590	9.587	9.619	9.596	9.592
8	9.748	9.769	9.677	9.650	9.591	9.592	9.584	9.573	9.589	9.588	9.604	9.604	9.589
9	9.806	9.715	9.780	9.754	9.593	9.593	9.596	9.667	9.682	9.589	9.604	9.602	9.587
10	9.677	9.701	9.652	9.631	9.573	9.569	9.568	9.553	9.550	9.571	9.592	9.584	9.572
11	9.745	9.749	9.670	9.648	9.592	9.590	9.578	9.570	9.568	9.590	9.609	9.602	9.596
12	9.648	9.685	9.644	9.616	9.560	9.560	9.551	9.534	9.550	9.555	9.575	9.586	9.563
13	9.606	9.732	9.621	9.594	9.540	9.540	9.528	9.517	9.489	9.531	9.554	9.548	9.552
14	9.655	9.668	9.640	9.613	9.559	9.560	9.541	9.540	9.493	9.550	9.579	9.571	9.562
15	9.865	9.851	9.783	9.855	9.697	9.629	9.684	9.673	9.683	9.584	9.607	9.607	9.607
16	9.859	9.797	9.774	9.849	9.682	9.628	9.677	9.668	9.674	9.578	9.602	9.594	9.594
17	9.701	9.843	9.657	9.630	9.575	9.569	9.564	9.548	9.563	9.572	9.592	9.586	9.582
18	9.934	9.921	9.939	9.921	9.763	9.702	9.751	9.733	9.745	9.557	9.575	9.575	9.572
19	9.748	9.819	9.670	9.646	9.583	9.587	9.576	9.567	9.575	9.588	9.602	9.600	9.580
20	9.720	9.767	9.657	9.636	9.580	9.578	9.567	9.556	9.585	9.571	9.590	9.584	9.595
21	9.887	9.845	9.832	9.791	9.646	9.648	9.692	9.720	9.685	9.638	9.667	9.667	9.663
22	9.780	9.817	9.719	9.701	9.636	9.637	9.633	9.620	9.621	9.629	9.653	9.650	9.645
23	9.712	9.849	9.679	9.654	9.604	9.604	9.583	9.578	9.582	9.586	9.619	9.609	9.612
24	9.695	9.707	9.712	9.687	9.631	9.631	9.611	9.607	9.609	9.612	9.653	9.636	9.632
25	9.911	9.866	9.897	9.897	9.673	9.669	9.763	9.741	9.733	9.654	9.688	9.682	9.672
Ave.	9.732	9.769	9.711	9.695	9.613	9.603	9.608	9.602	9.599	9.589	9.612	9.607	9.599
Med.	9.712	9.769	9.681	9.659	9.604	9.597	9.594	9.585	9.588	9.588	9.607	9.602	9.595
st dev	0.096	0.074	0.081	0.094	0.052	0.039	0.062	0.064	0.068	0.032	0.034	0.032	0.033
Min.	9.589	9.602	9.621	9.594	9.540	9.540	9.528	9.517	9.489	9.531	9.554	9.548	9.544
Max.	9.934	9.921	9.939	9.921	9.763	9.702	9.763	9.741	9.745	9.654	9.688	9.682	9.672

3.3 Data Set 1, 55°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	10000hrs	11000hrs	12000hrs
1	0.2637	0.5278	2674	0.0002	0.0003	0.0005	0.0008	0.0010	0.0013	0.0015	0.0019	0.0022	0.0023	0.0027	0.0027
2	0.2612	0.5270	2729	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0018	0.0021	0.0024	0.0024	0.0028	0.0030
3	0.2612	0.5268	2728	0.0002	0.0003	0.0004	0.0007	0.0010	0.0012	0.0016	0.0018	0.0022	0.0025	0.0029	0.0030
4	0.2624	0.5275	2701	0.0003	0.0003	0.0005	0.0008	0.0010	0.0013	0.0016	0.0019	0.0023	0.0024	0.0027	0.0028
5	0.2610	0.5246	2742	0.0003	0.0002	0.0004	0.0008	0.0010	0.0012	0.0016	0.0018	0.0022	0.0021	0.0024	0.0025
6	0.2613	0.5275	2724	0.0002	0.0002	0.0005	0.0008	0.0010	0.0012	0.0016	0.0018	0.0022	0.0022	0.0025	0.0027
7	0.2601	0.5268	2753	0.0003	0.0003	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0024	0.0026	0.0025	0.0028
8	0.2612	0.5273	2727	0.0002	0.0003	0.0005	0.0007	0.0010	0.0014	0.0017	0.0019	0.0024	0.0023	0.0025	0.0028
9	0.2627	0.5271	2697	0.0002	0.0004	0.0006	0.0008	0.0010	0.0013	0.0017	0.0021	0.0025	0.0024	0.0025	0.0027
10	0.2601	0.5262	2756	0.0001	0.0002	0.0004	0.0006	0.0009	0.0013	0.0016	0.0018	0.0021	0.0021	0.0023	0.0026
11	0.2609	0.5274	2733	0.0002	0.0003	0.0004	0.0007	0.0010	0.0012	0.0017	0.0019	0.0023	0.0022	0.0024	0.0026
12	0.2593	0.5278	2765	0.0002	0.0003	0.0004	0.0007	0.0010	0.0013	0.0017	0.0018	0.0022	0.0022	0.0024	0.0026
13	0.2626	0.5282	2694	0.0002	0.0003	0.0004	0.0008	0.0010	0.0013	0.0014	0.0017	0.0023	0.0023	0.0025	0.0027
14	0.2638	0.5278	2672	0.0002	0.0005	0.0006	0.0009	0.0012	0.0016	0.0019	0.0022	0.0026	0.0025	0.0026	0.0028
15	0.2612	0.5265	2730	0.0003	0.0005	0.0006	0.0009	0.0011	0.0016	0.0019	0.0022	0.0025	0.0025	0.0027	0.0029
16	0.2601	0.5253	2760	0.0004	0.0008	0.0010	0.0011	0.0016	0.0021	0.0024	0.0027	0.0030	0.0031	0.0035	0.0037
17	0.2616	0.5276	2718	0.0003	0.0005	0.0006	0.0009	0.0011	0.0014	0.0018	0.0021	0.0024	0.0023	0.0024	0.0027
18	0.2606	0.5286	2734	0.0003	0.0004	0.0006	0.0008	0.0011	0.0014	0.0018	0.0020	0.0024	0.0022	0.0022	0.0024
19	0.2614	0.5272	2724	0.0001	0.0003	0.0004	0.0006	0.0009	0.0013	0.0016	0.0018	0.0021	0.0022	0.0023	0.0025
20	0.2637	0.5274	2675	0.0003	0.0004	0.0005	0.0008	0.0010	0.0013	0.0016	0.0019	0.0022	0.0023	0.0023	0.0025
21	0.2595	0.5261	2768	0.0001	0.0003	0.0004	0.0006	0.0009	0.0013	0.0016	0.0019	0.0022	0.0022	0.0024	0.0026
22	0.2622	0.5281	2704	0.0001	0.0004	0.0005	0.0007	0.0009	0.0013	0.0016	0.0018	0.0023	0.0023	0.0025	0.0027
23	0.2628	0.5262	2699	0.0002	0.0004	0.0005	0.0008	0.0010	0.0013	0.0016	0.0019	0.0023	0.0023	0.0024	0.0025
24	0.2620	0.5273	2711	0.0001	0.0004	0.0006	0.0008	0.0010	0.0014	0.0018	0.0020	0.0024	0.0024	0.0024	0.0027
25	0.2611	0.5275	2729	0.0003	0.0007	0.0006	0.0008	0.0011	0.0014	0.0018	0.0021	0.0025	0.0025	0.0025	0.0028
Ave.	0.2615	0.5271	2722	0.0002	0.0004	0.0005	0.0008	0.0011	0.0014	0.0017	0.0020	0.0024	0.0024	0.0025	0.0027
Med.	0.2612	0.5273	2727	0.0002	0.0003	0.0005	0.0008	0.0010	0.0013	0.0017	0.0019	0.0023	0.0023	0.0025	0.0027
st dev	0.0013	0.0009	28	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003
Min.	0.2593	0.5246	2672	0.0001	0.0002	0.0004	0.0006	0.0009	0.0012	0.0014	0.0017	0.0021	0.0021	0.0022	0.0024
Max.	0.2638	0.5286	2768	0.0004	0.0008	0.0010	0.0011	0.0016	0.0021	0.0024	0.0027	0.0030	0.0031	0.0035	0.0037



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	11000hrs	12000hrs
26	154.4	100.32	99.81	99.42	99.22	99.03	98.70	98.38	98.19	97.93	97.67	97.41	97.09
27	155.1	100.26	99.94	99.61	99.29	99.16	98.77	98.52	98.19	97.81	97.36	97.10	96.84
28	156.8	100.13	99.68	99.36	98.98	98.53	98.21	98.02	97.64	97.32	96.68	96.30	96.05
29	157.8	100.19	99.94	99.68	99.43	99.11	98.86	98.48	98.23	98.04	97.59	97.28	96.83
30	156.9	100.13	99.62	99.43	99.24	99.04	98.92	98.53	98.28	98.02	97.58	97.39	97.20
31	156.5	100.26	99.94	99.55	99.23	98.91	98.59	98.34	97.89	97.70	97.06	96.68	96.23
32	156.3	100.19	99.81	99.49	99.30	98.91	98.66	98.40	98.27	98.02	97.50	97.18	96.67
33	156.1	100.32	99.87	99.49	99.23	98.98	98.65	98.27	98.01	97.89	97.44	97.12	96.73
34	156.9	100.19	99.87	99.43	99.17	98.85	98.60	98.34	98.02	97.77	97.26	96.94	96.62
35	157.7	100.13	99.68	99.30	99.05	98.92	98.48	98.29	98.03	97.78	97.27	97.21	96.83
36	157.0	100.19	99.68	99.36	99.04	98.79	98.41	98.09	97.90	97.71	97.39	97.26	97.01
37	156.0	100.13	99.68	99.29	99.04	98.85	98.40	98.08	97.82	97.44	97.31	97.05	96.67
38	157.8	100.06	99.68	99.37	98.92	98.61	98.29	97.78	97.47	97.02	96.83	96.51	96.07
39	156.7	100.19	99.68	99.36	98.92	98.53	98.21	97.77	97.51	97.06	96.81	96.36	96.11
40	157.6	100.13	99.75	99.49	99.18	98.98	98.60	98.16	97.84	97.53	97.27	96.89	96.45
41	156.3	99.94	99.68	99.36	99.04	98.85	98.46	97.95	97.50	97.18	96.93	96.48	96.10
42	157.1	100.19	99.75	99.49	99.24	98.98	98.66	98.28	98.03	97.84	97.45	97.01	96.56
43	156.8	100.26	99.74	99.30	98.98	98.79	98.60	98.09	97.70	97.51	97.07	96.56	95.98
44	156.6	100.13	99.81	99.49	99.23	98.79	98.53	98.15	97.89	97.57	97.32	96.87	96.62
45	155.3	100.06	99.74	99.36	99.10	98.78	98.45	98.07	97.75	97.30	97.23	96.72	96.33
46	156.3	100.19	99.68	99.42	99.04	98.66	98.27	98.02	97.89	97.57	97.31	96.93	96.42
47	157.8	100.06	99.68	99.30	98.99	98.61	98.16	97.97	97.72	97.34	97.21	96.89	96.58
48	155.8	100.26	99.81	99.36	99.04	98.59	98.20	98.01	97.75	97.37	97.11	96.92	96.73
49	156.4	100.06	99.62	99.10	99.04	98.59	98.27	98.02	97.83	97.63	97.19	96.74	96.36
50	156.8	100.13	99.62	99.23	99.11	98.79	98.60	98.47	98.15	97.96	97.70	97.39	97.07
Ave.	156.6	100.16	99.75	99.40	99.12	98.83	98.50	98.18	97.90	97.61	97.26	96.93	96.56
Med.	156.7	100.19	99.74	99.37	99.10	98.85	98.53	98.15	97.89	97.63	97.27	96.93	96.62
st dev	0.9	0.0892	0.1005	0.1219	0.1322	0.1823	0.2122	0.2194	0.2397	0.3006	0.2642	0.3218	0.3502
Min.	154.4	99.94	99.62	99.10	98.92	98.53	98.16	97.77	97.47	97.02	96.68	96.30	95.98
Max.	157.8	100.32	99.94	99.68	99.43	99.16	98.92	98.53	98.28	98.04	97.70	97.41	97.20

TM-21 Projection:

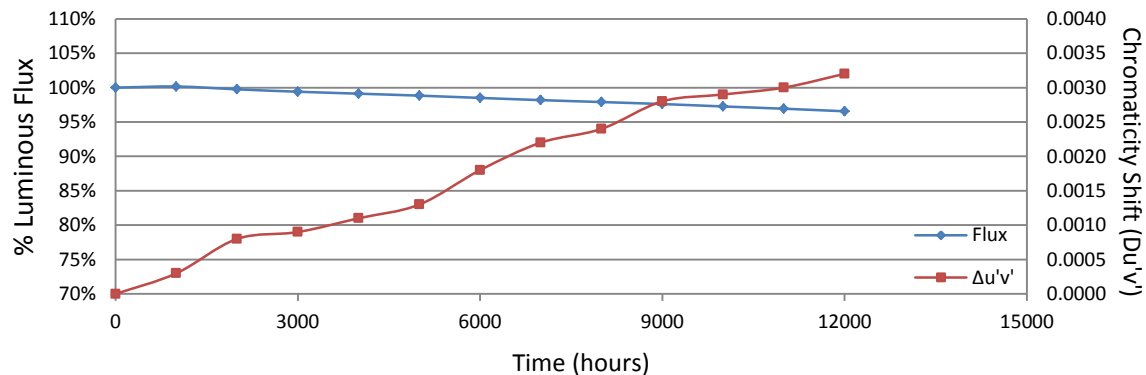
Test Duration: 12000 hours
Failures Observed: 0
 α : 3.281E-06
 β : 1.005
Reported L₇₀: >72000 hours

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

No.	Forward Voltage (V)												
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
26	9.802	9.776	9.805	9.767	9.787	9.736	9.745	9.754	9.770	9.778	9.752	9.746	9.761
27	9.745	9.676	9.778	9.727	9.754	9.706	9.702	9.730	9.694	9.743	9.719	9.719	9.734
28	9.827	9.846	9.864	9.820	9.843	9.800	9.792	9.812	9.826	9.824	9.809	9.807	9.822
29	9.777	9.707	9.803	9.763	9.783	9.742	9.728	9.759	9.769	9.774	9.750	9.748	9.763
30	9.872	9.849	9.853	9.814	9.840	9.787	9.786	9.815	9.791	9.820	9.798	9.805	9.820
31	9.817	9.795	9.781	9.739	9.752	9.716	9.701	9.727	9.739	9.747	9.723	9.725	9.740
32	9.867	9.821	9.817	9.774	9.794	9.757	9.752	9.776	9.779	9.792	9.767	9.765	9.780
33	9.714	9.741	9.771	9.721	9.747	9.700	9.690	9.723	9.688	9.737	9.717	9.713	9.728
34	9.788	9.784	9.864	9.824	9.847	9.799	9.794	9.819	9.825	9.831	9.813	9.807	9.822
35	9.826	9.868	9.865	9.820	9.854	9.806	9.791	9.822	9.831	9.829	9.817	9.809	9.824
36	9.823	9.829	9.875	9.835	9.857	9.806	9.804	9.822	9.835	9.842	9.823	9.821	9.836
37	9.736	9.880	9.749	9.808	9.832	9.779	9.775	9.801	9.813	9.816	9.800	9.794	9.809
38	9.731	9.766	9.804	9.761	9.775	9.740	9.725	9.758	9.765	9.773	9.752	9.748	9.763
39	9.803	9.928	9.865	9.821	9.845	9.793	9.790	9.813	9.819	9.824	9.805	9.796	9.811
40	9.683	9.839	9.690	9.747	9.770	9.724	9.713	9.741	9.696	9.749	9.734	9.736	9.751
41	9.753	9.716	9.795	9.754	9.775	9.733	9.719	9.750	9.755	9.765	9.746	9.800	9.815
42	9.640	9.846	9.624	9.783	9.706	9.760	9.740	9.777	9.786	9.788	9.775	9.769	9.754
43	9.733	9.769	9.800	9.767	9.784	9.740	9.721	9.759	9.762	9.767	9.750	9.757	9.772
44	9.740	9.845	9.798	9.758	9.778	9.732	9.714	9.747	9.761	9.758	9.740	9.738	9.753
45	9.777	9.796	9.803	9.750	9.781	9.731	9.722	9.752	9.765	9.760	9.740	9.746	9.761
46	9.912	9.929	9.859	9.809	9.834	9.780	9.767	9.798	9.767	9.817	9.794	9.803	9.818
47	9.922	9.888	9.896	9.843	9.791	9.719	9.713	9.738	9.766	9.750	9.736	9.734	9.749
48	9.816	9.738	9.789	9.740	9.769	9.719	9.705	9.743	9.774	9.755	9.727	9.736	9.751
49	9.899	10.020	9.855	9.856	9.884	9.835	9.822	9.843	9.796	9.854	9.844	9.838	9.853
50	9.722	9.787	9.728	9.736	9.753	9.713	9.695	9.733	9.747	9.738	9.725	9.715	9.730
Ave.	9.789	9.818	9.805	9.781	9.797	9.754	9.744	9.772	9.773	9.785	9.766	9.767	9.781
Med.	9.788	9.821	9.803	9.767	9.784	9.740	9.728	9.759	9.769	9.774	9.752	9.757	9.763
st dev	0.071	0.078	0.062	0.040	0.044	0.038	0.040	0.036	0.041	0.036	0.038	0.037	0.038
Min.	9.640	9.676	9.624	9.721	9.706	9.700	9.690	9.723	9.688	9.737	9.717	9.713	9.728
Max.	9.922	10.020	9.896	9.856	9.884	9.835	9.822	9.843	9.835	9.854	9.844	9.838	9.853

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	10000hrs	11000hrs	12000hrs
26	0.2627	0.5280	2692	0.0002	0.0005	0.0007	0.0009	0.0011	0.0016	0.0020	0.0023	0.0025	0.0029	0.0029	0.0030
27	0.2629	0.5290	2685	0.0002	0.0007	0.0008	0.0010	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0028	0.0030
28	0.2603	0.5262	2752	0.0003	0.0008	0.0010	0.0012	0.0015	0.0019	0.0023	0.0026	0.0029	0.0032	0.0032	0.0033
29	0.2619	0.5279	2710	0.0004	0.0010	0.0011	0.0013	0.0015	0.0020	0.0024	0.0027	0.0030	0.0028	0.0029	0.0031
30	0.2609	0.5269	2734	0.0003	0.0007	0.0008	0.0010	0.0012	0.0017	0.0021	0.0024	0.0026	0.0026	0.0027	0.0028
31	0.2632	0.5286	2681	0.0004	0.0008	0.0010	0.0012	0.0014	0.0018	0.0023	0.0025	0.0030	0.0032	0.0031	0.0032
32	0.2623	0.5273	2704	0.0004	0.0008	0.0008	0.0010	0.0012	0.0017	0.0021	0.0023	0.0027	0.0026	0.0029	0.0032
33	0.2616	0.5271	2721	0.0004	0.0008	0.0008	0.0010	0.0013	0.0017	0.0021	0.0024	0.0026	0.0026	0.0030	0.0031
34	0.2617	0.5261	2721	0.0004	0.0009	0.0010	0.0012	0.0015	0.0019	0.0023	0.0027	0.0030	0.0028	0.0031	0.0034
35	0.2631	0.5280	2686	0.0004	0.0008	0.0009	0.0011	0.0013	0.0017	0.0022	0.0025	0.0028	0.0027	0.0030	0.0032
36	0.2617	0.5260	2723	0.0003	0.0007	0.0008	0.0010	0.0012	0.0017	0.0022	0.0024	0.0027	0.0030	0.0030	0.0032
37	0.2617	0.5274	2716	0.0003	0.0007	0.0008	0.0010	0.0012	0.0017	0.0020	0.0023	0.0026	0.0027	0.0028	0.0031
38	0.2620	0.5268	2712	0.0003	0.0009	0.0009	0.0012	0.0014	0.0018	0.0023	0.0025	0.0029	0.0029	0.0031	0.0032
39	0.2619	0.5274	2713	0.0005	0.0010	0.0011	0.0013	0.0016	0.0021	0.0025	0.0027	0.0031	0.0031	0.0034	0.0035
40	0.2624	0.5274	2703	0.0003	0.0007	0.0008	0.0010	0.0012	0.0017	0.0021	0.0024	0.0026	0.0027	0.0029	0.0030
41	0.2627	0.5279	2694	0.0003	0.0007	0.0008	0.0010	0.0012	0.0017	0.0021	0.0023	0.0027	0.0025	0.0026	0.0029
42	0.2609	0.5258	2740	0.0003	0.0007	0.0008	0.0010	0.0012	0.0017	0.0021	0.0024	0.0026	0.0027	0.0028	0.0029
43	0.2618	0.5289	2708	0.0003	0.0009	0.0009	0.0011	0.0013	0.0018	0.0022	0.0025	0.0028	0.0029	0.0030	0.0032
44	0.2601	0.5251	2759	0.0002	0.0006	0.0007	0.0009	0.0011	0.0016	0.0020	0.0022	0.0026	0.0030	0.0029	0.0031
45	0.2625	0.5267	2702	0.0003	0.0008	0.0010	0.0011	0.0013	0.0019	0.0023	0.0025	0.0030	0.0033	0.0033	0.0034
46	0.2618	0.5272	2714	0.0003	0.0007	0.0009	0.0010	0.0012	0.0017	0.0021	0.0023	0.0026	0.0028	0.0031	0.0033
47	0.2616	0.5302	2706	0.0004	0.0008	0.0010	0.0012	0.0014	0.0017	0.0022	0.0025	0.0028	0.0029	0.0032	0.0034
48	0.2609	0.5274	2733	0.0004	0.0007	0.0009	0.0011	0.0013	0.0018	0.0022	0.0025	0.0028	0.0029	0.0033	0.0034
49	0.2616	0.5265	2723	0.0004	0.0010	0.0011	0.0012	0.0015	0.0020	0.0024	0.0027	0.0031	0.0031	0.0034	0.0036
50	0.2606	0.5269	2742	0.0004	0.0009	0.0009	0.0011	0.0013	0.0018	0.0022	0.0024	0.0027	0.0028	0.0031	0.0033
Ave.	0.2618	0.5273	2715	0.0003	0.0008	0.0009	0.0011	0.0013	0.0018	0.0022	0.0024	0.0028	0.0029	0.0030	0.0032
Med.	0.2618	0.5273	2713	0.0003	0.0008	0.0009	0.0011	0.0013	0.0017	0.0022	0.0024	0.0027	0.0029	0.0030	0.0032
st dev	0.0008	0.0011	20	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002
Min.	0.2601	0.5251	2681	0.0002	0.0005	0.0007	0.0009	0.0011	0.0015	0.0020	0.0022	0.0025	0.0025	0.0026	0.0028
Max.	0.2632	0.5302	2759	0.0005	0.0010	0.0011	0.0013	0.0016	0.0021	0.0025	0.0027	0.0031	0.0033	0.0034	0.0036



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	11000hrs	12000hrs
51	156.0	100.19	99.68	99.23	98.85	98.53	98.14	97.88	97.50	97.24	96.99	96.79	96.60
52	156.4	100.13	99.49	99.17	98.98	98.59	98.15	97.76	97.63	97.25	97.19	96.93	96.68
53	155.4	99.94	99.42	98.91	98.58	98.26	97.68	97.23	97.04	96.78	96.40	96.27	95.88
54	155.8	100.19	99.81	99.36	98.84	98.46	98.07	97.75	97.24	96.92	96.60	96.47	96.15
55	156.2	100.26	99.74	99.42	99.30	98.78	98.40	97.95	97.63	97.18	96.41	96.22	95.77
56	155.5	99.94	99.68	99.16	98.91	98.46	98.01	97.62	97.36	96.91	96.27	95.69	95.18
57	157.3	100.19	99.75	99.30	98.98	98.60	98.35	98.16	97.97	97.65	97.01	96.57	96.12
58	156.0	100.06	99.55	99.29	98.97	98.65	98.27	97.95	97.69	97.44	97.24	96.86	96.41
59	155.5	99.87	99.49	99.16	98.78	98.33	98.07	97.75	97.43	97.17	96.85	96.33	95.95
60	156.2	99.94	99.42	99.10	98.66	98.27	97.82	97.57	97.31	96.93	96.80	96.54	96.09
61	158.4	100.13	99.56	99.12	98.67	98.23	97.73	97.47	97.16	96.72	96.21	95.83	95.45
62	156.9	100.06	99.55	99.17	98.66	98.22	97.83	97.45	97.07	96.75	96.37	95.79	95.41
63	158.6	100.13	99.50	99.05	98.68	98.23	97.86	97.41	96.97	96.66	96.47	95.90	95.52
64	156.4	99.87	99.49	99.17	98.72	98.34	97.89	97.63	97.19	96.80	96.29	96.16	95.72
65	155.9	99.94	99.36	99.10	98.78	98.20	97.82	97.50	97.18	96.86	96.28	95.77	95.25
66	155.9	100.06	99.62	99.17	98.85	98.46	98.14	97.75	97.50	97.11	96.66	96.54	96.09
67	157.5	100.13	99.75	99.43	99.11	98.79	98.35	98.10	97.78	97.46	96.95	96.57	96.19
68	156.2	100.19	99.68	99.30	98.85	98.34	97.95	97.63	97.38	97.12	96.54	96.22	95.77
69	156.9	99.87	99.55	99.11	98.98	98.60	98.28	97.90	97.64	97.45	97.20	96.69	96.30
70	157.4	100.06	99.49	98.98	98.60	98.16	97.84	97.52	97.14	96.82	96.44	96.12	95.81
71	157.4	100.13	99.68	99.30	98.86	98.48	98.03	97.78	97.40	97.14	96.76	96.19	95.87
72	155.8	100.06	99.55	99.17	98.78	98.40	97.88	97.63	97.30	96.92	96.47	95.89	95.57
73	157.7	99.94	99.30	98.86	98.54	98.10	97.78	97.46	97.21	96.83	96.39	95.88	95.43
74	156.3	100.06	99.68	99.30	99.04	98.59	98.14	97.76	97.38	96.87	96.61	96.03	95.59
75	156.4	100.13	99.68	99.30	99.10	98.72	98.47	98.02	97.76	97.38	96.87	96.29	95.84
Ave.	156.6	100.06	99.58	99.19	98.84	98.43	98.04	97.71	97.39	97.05	96.65	96.26	95.87
Med.	156.3	100.06	99.55	99.17	98.85	98.46	98.03	97.75	97.38	96.93	96.60	96.22	95.84
st dev	0.9	0.1151	0.1315	0.1433	0.1859	0.1998	0.2250	0.2294	0.2573	0.2736	0.3156	0.3616	0.3970
Min.	155.4	99.87	99.30	98.86	98.54	98.10	97.68	97.23	96.97	96.66	96.21	95.69	95.18
Max.	158.6	100.26	99.81	99.43	99.30	98.79	98.47	98.16	97.97	97.65	97.24	96.93	96.68

TM-21 Projection:

Test Duration: 12000 hours

Failures Observed: 0

α: 3.738E-06

β: 1.003

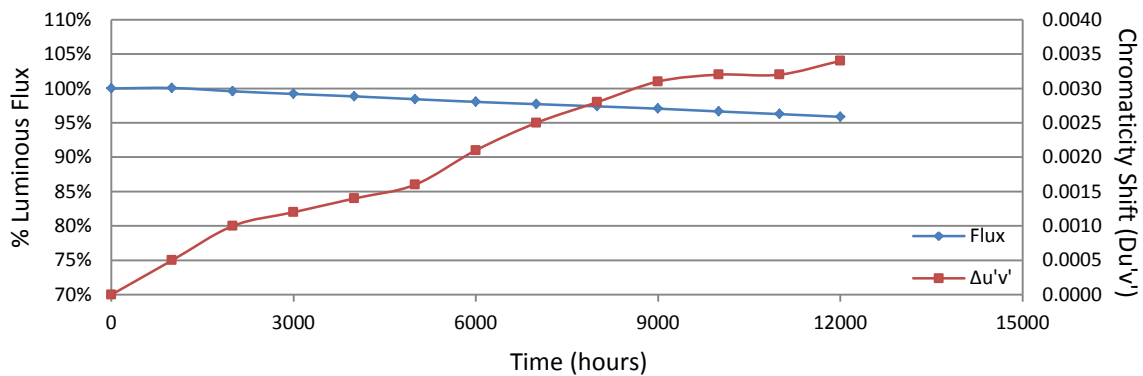
Reported L₇₀: >72000 hours

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

No.	Forward Voltage (V)												
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
51	9.704	9.758	9.742	9.693	9.690	9.656	9.715	9.714	9.716	9.697	9.707	9.703	9.702
52	9.573	9.653	9.655	9.610	9.605	9.572	9.637	9.633	9.635	9.622	9.623	9.611	9.632
53	9.765	9.785	9.699	9.754	9.647	9.613	9.689	9.679	9.677	9.660	9.663	9.663	9.674
54	9.898	9.886	9.894	9.846	9.737	9.699	9.702	9.714	9.722	9.658	9.654	9.663	9.672
55	9.777	9.772	9.705	9.762	9.657	9.625	9.683	9.678	9.682	9.663	9.661	9.667	9.671
56	9.706	9.748	9.691	9.642	9.643	9.609	9.664	9.665	9.663	9.655	9.652	9.650	9.665
57	9.633	9.647	9.690	9.652	9.641	9.612	9.670	9.670	9.667	9.658	9.650	9.657	9.672
58	9.698	9.862	9.742	9.700	9.690	9.654	9.720	9.714	9.688	9.697	9.705	9.703	9.725
59	9.688	9.778	9.745	9.696	9.697	9.660	9.721	9.719	9.719	9.709	9.707	9.707	9.727
60	9.811	9.897	9.723	9.774	9.671	9.640	9.701	9.693	9.702	9.684	9.684	9.686	9.730
61	9.750	9.813	9.692	9.649	9.638	9.610	9.675	9.661	9.666	9.655	9.654	9.657	9.669
62	9.565	9.623	9.609	9.660	9.658	9.628	9.688	9.682	9.684	9.672	9.671	9.669	9.690
63	9.720	9.894	9.681	9.632	9.622	9.591	9.654	9.650	9.653	9.645	9.648	9.638	9.689
64	9.685	9.894	9.717	9.676	9.672	9.643	9.703	9.691	9.663	9.688	9.688	9.686	9.718
65	9.755	9.835	9.780	9.738	9.731	9.704	9.765	9.754	9.763	9.743	9.748	9.748	9.778
66	9.754	9.682	9.695	9.652	9.644	9.615	9.674	9.667	9.681	9.659	9.650	9.657	9.685
67	9.756	9.700	9.735	9.694	9.687	9.652	9.717	9.709	9.732	9.701	9.703	9.694	9.723
68	9.701	9.787	9.672	9.622	9.613	9.586	9.652	9.638	9.663	9.638	9.634	9.636	9.664
69	9.772	9.815	9.777	9.742	9.729	9.702	9.766	9.757	9.759	9.748	9.751	9.742	9.789
70	9.788	9.853	9.721	9.686	9.675	9.647	9.700	9.695	9.707	9.685	9.688	9.682	9.705
71	9.676	9.640	9.692	9.649	9.637	9.611	9.668	9.665	9.672	9.651	9.650	9.661	9.676
72	9.826	9.791	9.784	9.746	9.629	9.647	9.669	9.652	9.669	9.645	9.652	9.652	9.669
73	9.796	9.886	9.718	9.771	9.664	9.639	9.702	9.684	9.695	9.683	9.680	9.680	9.701
74	9.725	9.705	9.685	9.697	9.686	9.658	9.726	9.721	9.718	9.708	9.711	9.698	9.720
75	9.766	9.772	9.752	9.713	9.706	9.668	9.728	9.731	9.731	9.712	9.709	9.717	9.720
Ave.	9.732	9.779	9.720	9.698	9.667	9.638	9.696	9.689	9.693	9.677	9.678	9.677	9.699
Med.	9.750	9.785	9.717	9.694	9.664	9.640	9.700	9.684	9.684	9.672	9.671	9.669	9.690
st dev	0.074	0.087	0.054	0.057	0.036	0.035	0.032	0.033	0.033	0.032	0.033	0.032	0.036
Min.	9.565	9.623	9.609	9.610	9.605	9.572	9.637	9.633	9.635	9.622	9.623	9.611	9.632
Max.	9.898	9.897	9.894	9.846	9.737	9.704	9.766	9.757	9.763	9.748	9.751	9.748	9.789

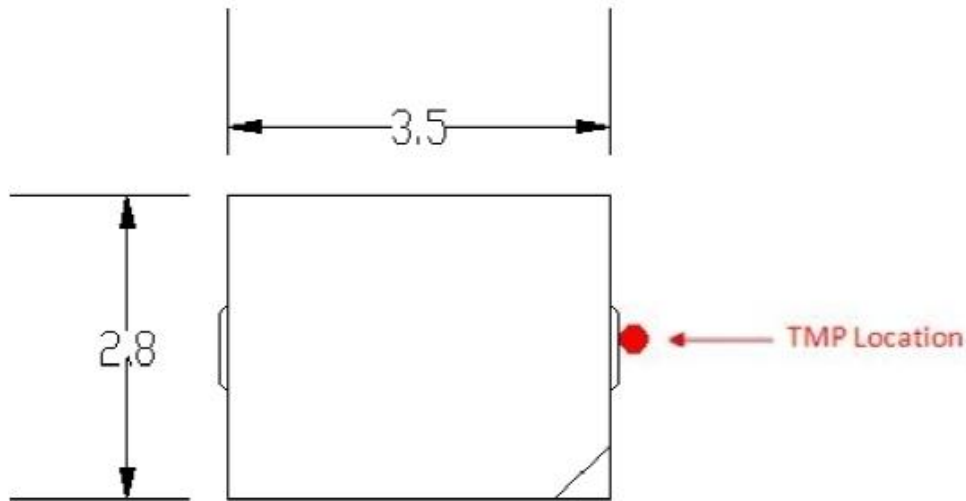
3.9 Data Set 3, 115° C, 120mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)											
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
51	0.2624	0.5272	2703	0.0004	0.0008	0.0010	0.0012	0.0014	0.0019	0.0024	0.0026	0.0029	0.0025	0.0028	0.0030
52	0.2614	0.5268	2726	0.0004	0.0009	0.0011	0.0013	0.0016	0.0020	0.0024	0.0027	0.0031	0.0029	0.0032	0.0034
53	0.2621	0.5261	2714	0.0005	0.0010	0.0012	0.0014	0.0017	0.0021	0.0026	0.0028	0.0032	0.0031	0.0032	0.0035
54	0.2609	0.5259	2739	0.0004	0.0009	0.0011	0.0013	0.0015	0.0020	0.0024	0.0027	0.0030	0.0030	0.0031	0.0032
55	0.2620	0.5278	2710	0.0005	0.0009	0.0011	0.0012	0.0016	0.0020	0.0025	0.0027	0.0030	0.0031	0.0030	0.0032
56	0.2629	0.5307	2679	0.0005	0.0011	0.0014	0.0016	0.0020	0.0025	0.0029	0.0031	0.0035	0.0034	0.0033	0.0036
57	0.2631	0.5283	2683	0.0004	0.0009	0.0012	0.0013	0.0015	0.0020	0.0024	0.0026	0.0030	0.0032	0.0031	0.0032
58	0.2626	0.5270	2700	0.0005	0.0011	0.0013	0.0014	0.0016	0.0022	0.0027	0.0029	0.0032	0.0033	0.0033	0.0034
59	0.2630	0.5274	2689	0.0005	0.0009	0.0012	0.0014	0.0016	0.0021	0.0026	0.0029	0.0032	0.0033	0.0033	0.0036
60	0.2598	0.5268	2760	0.0004	0.0009	0.0010	0.0012	0.0014	0.0019	0.0023	0.0026	0.0029	0.0030	0.0030	0.0032
61	0.2628	0.5297	2684	0.0004	0.0010	0.0011	0.0013	0.0015	0.0020	0.0024	0.0027	0.0031	0.0031	0.0030	0.0031
62	0.2607	0.5267	2740	0.0004	0.0009	0.0011	0.0013	0.0015	0.0020	0.0024	0.0027	0.0030	0.0031	0.0031	0.0032
63	0.2606	0.5256	2748	0.0004	0.0010	0.0011	0.0013	0.0016	0.0020	0.0025	0.0028	0.0030	0.0030	0.0031	0.0032
64	0.2622	0.5276	2705	0.0005	0.0010	0.0012	0.0014	0.0016	0.0021	0.0025	0.0027	0.0031	0.0030	0.0031	0.0032
65	0.2622	0.5274	2706	0.0006	0.0011	0.0013	0.0015	0.0016	0.0022	0.0027	0.0029	0.0032	0.0033	0.0034	0.0035
66	0.2630	0.5264	2695	0.0008	0.0013	0.0016	0.0017	0.0019	0.0024	0.0028	0.0032	0.0036	0.0036	0.0036	0.0038
67	0.2617	0.5270	2718	0.0005	0.0010	0.0012	0.0014	0.0016	0.0021	0.0024	0.0029	0.0032	0.0033	0.0034	0.0035
68	0.2606	0.5262	2744	0.0006	0.0013	0.0014	0.0015	0.0017	0.0023	0.0026	0.0030	0.0033	0.0034	0.0034	0.0036
69	0.2611	0.5277	2728	0.0005	0.0010	0.0012	0.0014	0.0016	0.0020	0.0023	0.0028	0.0030	0.0031	0.0032	0.0033
70	0.2633	0.5269	2685	0.0005	0.0010	0.0012	0.0014	0.0016	0.0022	0.0024	0.0028	0.0031	0.0031	0.0031	0.0033
71	0.2619	0.5265	2717	0.0004	0.0009	0.0011	0.0013	0.0014	0.0019	0.0022	0.0027	0.0030	0.0030	0.0029	0.0032
72	0.2627	0.5268	2697	0.0005	0.0011	0.0012	0.0014	0.0016	0.0021	0.0024	0.0029	0.0032	0.0032	0.0032	0.0034
73	0.2616	0.5278	2717	0.0005	0.0013	0.0016	0.0018	0.0020	0.0024	0.0029	0.0033	0.0035	0.0037	0.0036	0.0038
74	0.2621	0.5273	2707	0.0002	0.0003	0.0013	0.0015	0.0017	0.0020	0.0024	0.0030	0.0032	0.0033	0.0032	0.0034
75	0.2626	0.5297	2689	0.0002	0.0006	0.0012	0.0014	0.0016	0.0019	0.0023	0.0028	0.0031	0.0030	0.0030	0.0033
Ave.	0.2620	0.5273	2711	0.0005	0.0010	0.0012	0.0014	0.0016	0.0021	0.0025	0.0028	0.0031	0.0032	0.0032	0.0034
Med.	0.2621	0.5270	2707	0.0005	0.0010	0.0012	0.0014	0.0016	0.0020	0.0024	0.0028	0.0031	0.0031	0.0032	0.0033
st dev	0.0009	0.0012	22	0.0001	0.0002	0.0002	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.2598	0.5256	2679	0.0002	0.0003	0.0010	0.0012	0.0014	0.0019	0.0022	0.0026	0.0029	0.0025	0.0028	0.0030
Max.	0.2633	0.5307	2760	0.0008	0.0013	0.0016	0.0018	0.0020	0.0025	0.0029	0.0033	0.0036	0.0037	0.0036	0.0038



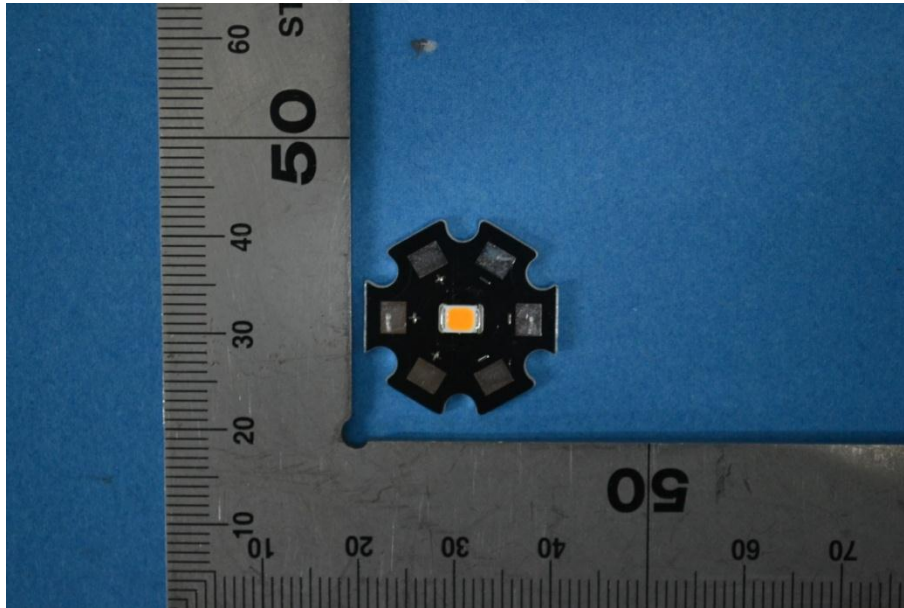
4 - EUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 EUT Photo



5 - Report Revision

Report Number	Report Date	Contents
RSZ160603510-10-12000	2018-12-12	Original report.
RSZ160603510-10-12000-M1	2020-04-08	Update Family products covered in this report.

FINAL

Directions

1. The information marked “superscript #” is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
5. This report cannot be reproduced except in full, without prior written approval of the Company.
6. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

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