

## LM-80 Test Report

### NF2x757xR

<b>Issue Date:</b>	August 29, 2018	<b>Revision Date:</b>	-
<b>Test Initiation Date:</b>	April 24, 2013	<b>Test Completion Date:</b>	June 30, 2014
<b>Test Duration:</b>	10,000 hours	<b>Report Number:</b>	SQETMN558801

**Customer Information:**

Company Name: Nichia Corporation  
 Address: 491-100, Oka, Kaminaka-cho, Anan-shi, Tokushima, 774-8601, JAPAN

**Description of Test Samples:**

Manufacturer's Name: Nichia Corporation  
 Classification: LED Package  
 Model Name: Warm White LED  
 Model Number: NF2L757DR  
 Nominal CCT: 2700 K

**Test Summary:**

Data Set	Case Temperature [°C]	Ambient Temperature [°C]	Drive Current [mA]	Lumen maintenance at 10K hours [%]	Chromaticity Shift ( $\Delta u'v'$ ) at 10K hours	TM-21 Projection $L_{70}(10K)$ [hours]	TM-21 Projection $L_{80}(10K)$ [hours]	TM-21 Projection $L_{90}(10K)$ [hours]
1	55	> 50	100	98.1	0.0014	> 60600	> 60600	> 60600
2	55	> 50	150	98.3	0.0017	> 60400	> 60400	> 60400
3	55	> 50	200	98.2	0.0020	> 60500	> 60500	48300
4	85	> 80	100	96.4	0.0014	> 60600	> 60600	52500
5	85	> 80	150	96.3	0.0020	> 60400	> 60400	38800
6	85	> 80	200	93.9	0.0035	55900	35300	17100
7	105	> 100	100	92.3	0.0019	> 60600	43700	15500
8	105	> 100	150	93.4	0.0027	> 60400	57800	21000
9	105	> 100	200	90.7	0.0034	42800	26200	11600



Approved Signatory:

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Hiroyuki HASHIMOTO, Lab Manager  
**Nichia Corporation LED Testing Laboratory**  
 1-1, Tatsumi-Cho, Anan-Shi, TOKUSHIMA 774-0001, JAPAN

**Applicable Model Numbers:****This LM-80 test report applies to the following models:**

Series	Model Number	Case Temperature [°C]	Forward Current [mA]	Nominal CCT * [K]	Data Set Number
757	NF2L757DR NF2L757DRT	55	100	≥ 2200	1
		55	150	≥ 2200	2
		55	200	≥ 2200	3
		85	100	≥ 2200	4
		85	150	≥ 2200	5
		85	200	≥ 2200	6
		105	100	≥ 2200	7
		105	150	≥ 2200	8
		105	200	≥ 2200	9
757	NF2W757DR NF2W757DRT	55	100	≥ 5000	1
		55	150	≥ 5000	2
		55	200	≥ 5000	3
		85	100	≥ 5000	4
		85	150	≥ 5000	5
		85	200	≥ 5000	6
		105	100	≥ 5000	7
		105	150	≥ 5000	8
		105	200	≥ 5000	9
757	NF2L757DR-V1 NF2L757DRT-V1	55	100	≥ 2200	1
		55	150	≥ 2200	2
		55	200	≥ 2200	3
		85	100	≥ 2200	4
		85	150	≥ 2200	5
		85	200	≥ 2200	6
		105	100	≥ 2200	7
		105	150	≥ 2200	8
		105	200	≥ 2200	9

\* The Nominal CCT category in this document refers ENERGY STAR® Requirements for the Use of LM-80 Data.

**Applicable Model Numbers:****This LM-80 test report applies to the following models:**

Series	Model Number	Case Temperature [°C]	Forward Current [mA]	Nominal CCT * [K]	Data Set Number
757	NF2W757DR-V1 NF2W757DRT-V1	55	100	≥ 5000	1
		55	150	≥ 5000	2
		55	200	≥ 5000	3
		85	100	≥ 5000	4
		85	150	≥ 5000	5
		85	200	≥ 5000	6
		105	100	≥ 5000	7
		105	150	≥ 5000	8
		105	200	≥ 5000	9
757	NF2L757GR-V1 NF2L757GRT-V1	55	100	≥ 2200	1
		55	150	≥ 2200	2
		55	200	≥ 2200	3
		85	100	≥ 2200	4
		85	150	≥ 2200	5
		85	200	≥ 2200	6
		105	100	≥ 2200	7
		105	150	≥ 2200	8
		105	200	≥ 2200	9
757	NF2W757GR-V1 NF2W757GRT-V1	55	100	≥ 5000	1
		55	150	≥ 5000	2
		55	200	≥ 5000	3
		85	100	≥ 5000	4
		85	150	≥ 5000	5
		85	200	≥ 5000	6
		105	100	≥ 5000	7
		105	150	≥ 5000	8
		105	200	≥ 5000	9

\* The Nominal CCT category in this document refers ENERGY STAR® Requirements for the Use of LM-80 Data.

**Applicable Model Numbers:**

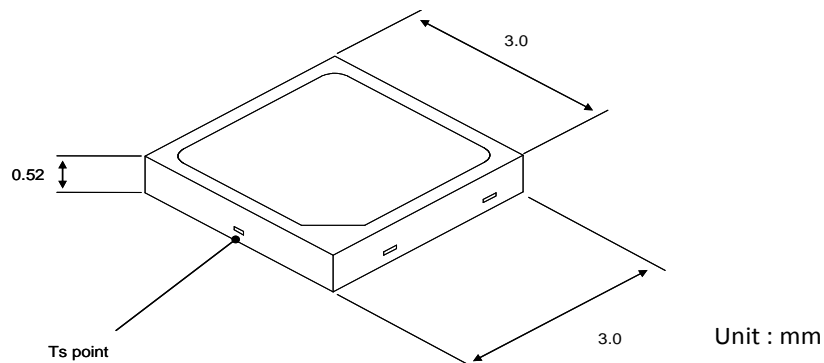
**This LM-80 test report applies to the following models:**

Series	Model Number	Case Temperature [°C]	Forward Current [mA]	Nominal CCT * [K]	Data Set Number
757	NF2W757GR-V3 NF2W757GRT-V3	55	100	≥ 2200	1
		55	150	≥ 2200	2
		55	200	≥ 2200	3
		85	100	≥ 2200	4
		85	150	≥ 2200	5
		85	200	≥ 2200	6
		105	100	≥ 2200	7
		105	150	≥ 2200	8
		105	200	≥ 2200	9

\* The Nominal CCT category in this document refers ENERGY STAR® Requirements for the Use of LM-80 Data.

**IES LM-80 Test Report Requirement :**

<b>1. Number of LED light sources tested</b>	See tables
<b>2. Description of LED light sources</b>	See Description of Test Samples
<b>3. Description of auxiliary equipment</b>	
Active cooling life test system	Consisting of small boxes, in which each box contains a reliability test board, and a water-cooled heat sink or a heater to control device temperature
LED Tester	Consisting of an integrating sphere, a programmable current-source meter, and a spectroradiometer
<b>4. Operating cycle</b>	Constant direct current (DC)
<b>5. Ambient conditions</b>	
Ambient Temperature ( $T_A$ )	See tables Ambient temperature is the temperature of the air at a distance of 1.5 mm above the reliability test board
Air flow	< 0.1 m/s
Relative Humidity	< 65 %
<b>6. Case temperature (Test point temperature)</b>	See tables For the case temperature ( $T_S$ ) measurement point, see the figure 1

Figure 1: The case temperature ( $T_S$ ) measurement point

<b>7. Drive current of the LED light sources during lifetime test</b>	See tables
<b>8. Initial luminous flux, forward voltage and chromaticity coordinates</b>	See tables
<b>9. Lumen maintenance data for each individual LED light source along with average value, median value, standard deviation, minimum and maximum lumen maintenance value for all of the LED light sources</b>	See tables
<b>10. Observation of LED light sources failures including the failure conditions and time of failure</b>	No failure observed
<b>11. LED light source monitoring interval</b>	See tables
<b>12. Photometric measurement uncertainty</b>	
Flux measurement	4.8 % ( $k=2$ )
Lumen maintenance	1.8 % ( $k=2$ )
<b>13. Chromaticity shift reported over the measurement time</b>	See tables
<b>14. Photometric and electrical measurements</b>	
Measurement point temperature	25°C ± 2°C
Temperature measurement point location	Sphere ambient air temperature monitor
Measurement method	See LM-85-14 section 5.3

## ENERGY STAR® LM-80 Cover Sheet

### Administrative Information

Tested subcomponent series :	Warm White LED
Tested subcomponent model number :	NF2L757DR
Report issue date :	August 29, 2018
Report revision date :	-
Testing start date :	April 24, 2013
Testing completion date :	June 30, 2014
LED sampling method :	Comply with LM-80
LED sample size :	25 Packages

### LED Identification

LED manufacturer's name :	Nichia Corporation
LED model number :	NF2L757DR
Description of LED :	LED Package

### LED Characteristics

Total input power (W) :

Average current density per LED die (mA/mm<sup>2</sup>):

Average power density per LED die (W/mm<sup>2</sup>):

Case Temperature [°C]	Drive Current [mA]	Total Input Power [W]	Average Current density per LED die [mA/mm <sup>2</sup> ]	Average Power density per LED die [W/mm <sup>2</sup> ]
55	100	0.60	237	0.71
55	150	0.95	355	1.12
55	200	1.32	473	1.56
85	100	0.60	237	0.71
85	150	0.95	355	1.12
85	200	1.32	473	1.56
105	100	0.60	237	0.71
105	150	0.95	355	1.12
105	200	1.32	473	1.56

Representative CRI (Ra) of the tested sample set : Ra = 81.9

Minimum die edge to die edge spacing : 0.23 mm

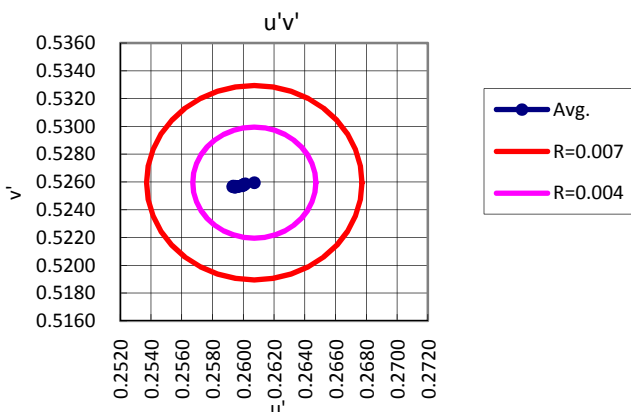
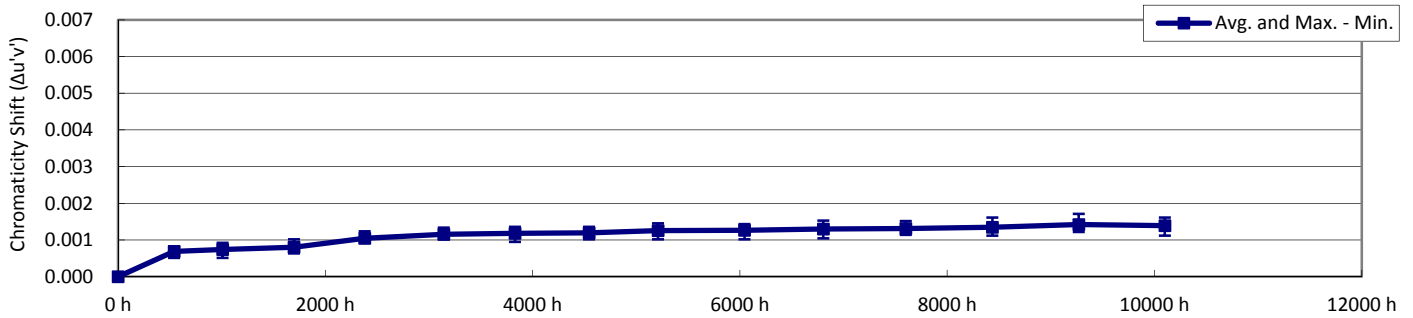
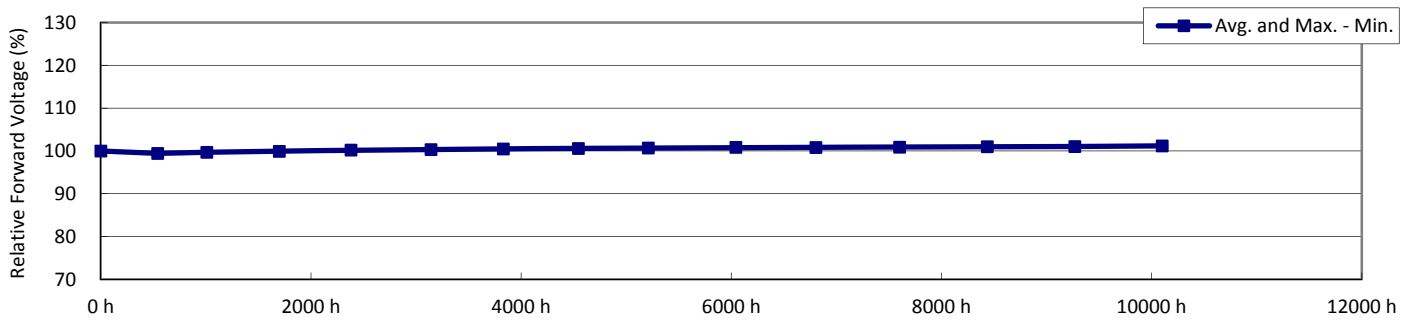
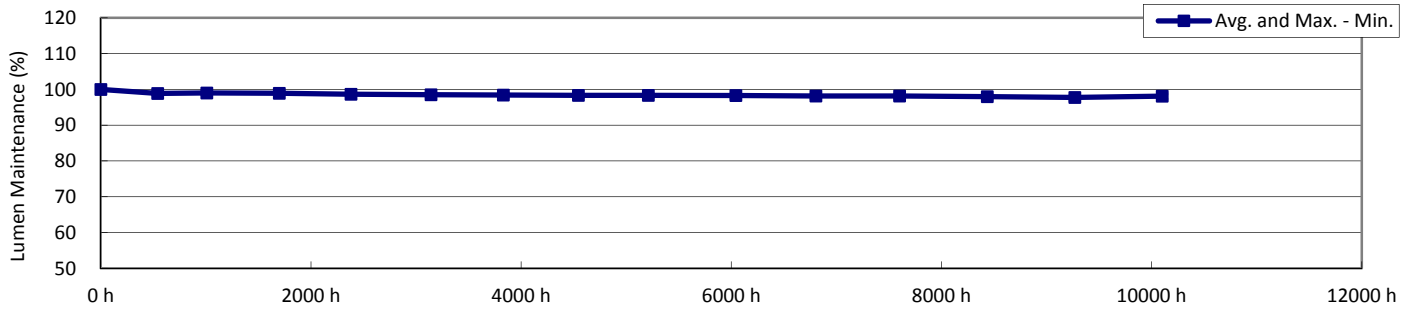


**Data Set 1 : 55 °C, 100 mA**

Actual Case Temperature [T <sub>S</sub> ]	56.8 °C
Actual Ambient Temperature [T <sub>A</sub> ]	55.5 °C
Drive Current [I <sub>F</sub> ]	100 mA
Measurement Current	100 mA

NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0



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### Data Set 1 : 55 °C, 100 mA

Actual Case Temperature [T <sub>s</sub> ]	56.8 °C
Actual Ambient Temperature [T <sub>A</sub> ]	55.5 °C
Drive Current [I <sub>F</sub> ]	100 mA
Measurement Current	100 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 1-1**  
Initial Characteristics

LED No.	Luminous flux	Forward voltage	CCT	Input Power	CIE1931		CIE1976					
	Φ <sub>V</sub> [lm]	V <sub>F</sub> [V]	T <sub>CP</sub> [K]	P [W]	x	y	u'	v'				
1	71.3	6.04	2730	0.60	0.461	0.416	0.261	0.529				
2	70.2	6.03	2852	0.60	0.441	0.394	0.258	0.518				
3	70.5	6.03	2819	0.60	0.445	0.399	0.258	0.520				
4	70.0	6.02	2623	0.60	0.470	0.418	0.266	0.532				
5	69.4	6.03	2585	0.60	0.475	0.423	0.267	0.534				
6	71.0	6.02	2846	0.60	0.441	0.394	0.258	0.518				
7	68.7	6.05	2622	0.60	0.467	0.414	0.266	0.530				
8	72.0	6.02	2776	0.60	0.453	0.408	0.259	0.525				
9	71.3	6.03	2704	0.60	0.461	0.413	0.262	0.528				
10	70.1	6.03	2690	0.60	0.460	0.410	0.263	0.527				
11	70.2	6.03	2713	0.60	0.462	0.416	0.261	0.530				
12	70.7	6.04	2857	0.60	0.444	0.400	0.257	0.521				
13	71.5	6.02	2774	0.60	0.454	0.408	0.259	0.526				
14	69.8	6.03	2761	0.60	0.452	0.404	0.260	0.524				
15	71.1	6.03	2651	0.60	0.471	0.423	0.264	0.534				
16	70.5	6.03	2708	0.60	0.462	0.415	0.262	0.529				
17	69.0	6.03	2723	0.60	0.455	0.405	0.262	0.524				
18	71.9	6.03	2834	0.60	0.449	0.408	0.257	0.525				
19	72.0	6.01	2755	0.60	0.457	0.412	0.260	0.527				
20	70.7	6.02	2683	0.60	0.465	0.418	0.263	0.531				
21	70.7	6.05	2762	0.60	0.454	0.408	0.260	0.525				
22	70.2	6.04	2768	0.60	0.447	0.396	0.261	0.520				
23	70.0	6.03	2789	0.60	0.449	0.402	0.259	0.522				
24	70.4	6.03	2764	0.60	0.452	0.405	0.260	0.524				
25	70.4	6.03	2743	0.60	0.454	0.405	0.261	0.525				
n	25	25	25	25	25	25	25	25				
Avg.	70.6	6.03	2741	0.60	0.456	0.409	0.261	0.526				
Med.	70.5	6.03	2755	0.60	0.454	0.408	0.261	0.525				
σ	0.85	0.008	73.1	0.001	0.0093	0.0083	0.0027	0.0045				
Min.	68.7	6.01	2585	0.60	0.441	0.394	0.257	0.518				
Max.	72.0	6.05	2857	0.60	0.475	0.423	0.267	0.534				



**Data Set 1 : 55 °C, 100 mA**

Actual Case Temperature [T <sub>s</sub> ]	56.8 °C
Actual Ambient Temperature [T <sub>A</sub> ]	55.5 °C
Drive Current [I <sub>F</sub> ]	100 mA
Measurement Current	100 mA

NOTES:  
 T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0

**TABLE 1-2**  
 Lumen Maintenance

LED No.	Lumen Maintenance % ( Normalized to 100 % at 0 hours )														
	0 h	541 h	1008 h	1698 h	2380 h	3142 h	3830 h	4545 h	5210 h	6044 h	6805 h	7601 h	8436 h	9269 h	10100 h
1	100.0	99.1	99.3	99.2	98.8	98.8	98.7	98.5	98.6	98.8	98.6	98.7	98.4	98.3	98.4
2	100.0	98.6	98.8	98.7	98.5	98.3	98.3	98.1	98.2	98.4	98.3	98.4	98.1	97.9	98.1
3	100.0	98.7	98.9	98.7	98.7	98.4	98.3	98.2	98.3	98.5	98.4	98.4	98.1	97.9	98.3
4	100.0	98.8	98.9	98.8	98.7	98.4	98.3	98.2	98.2	98.3	98.1	98.2	97.8	97.4	97.9
5	100.0	98.8	98.9	98.8	98.8	98.5	98.4	98.5	98.5	98.5	98.3	98.4	98.2	98.1	98.7
6	100.0	99.0	99.0	98.9	98.7	98.6	98.4	98.5	98.5	98.2	98.1	98.3	98.0	97.9	98.6
7	100.0	98.7	98.8	98.6	98.3	98.3	98.2	98.1	98.1	97.8	97.6	97.7	97.4	97.5	98.1
8	100.0	98.7	98.9	98.9	98.4	98.6	98.5	98.3	98.4	98.1	97.9	97.9	97.6	97.7	98.0
9	100.0	99.4	99.5	99.4	98.8	99.0	98.8	98.5	98.6	98.5	98.2	98.2	98.0	98.0	98.1
10	100.0	99.3	99.5	99.4	98.9	99.1	98.9	98.7	98.8	98.8	98.6	98.5	98.3	98.3	98.3
11	100.0	98.7	99.0	98.9	98.6	98.4	98.4	98.3	98.2	98.3	98.1	98.0	97.9	97.6	97.7
12	100.0	99.0	99.1	99.1	98.9	98.7	98.6	98.5	98.6	98.7	98.5	98.5	98.4	98.2	98.3
13	100.0	99.0	99.2	99.1	98.9	98.7	98.7	98.5	98.6	98.7	98.6	98.7	98.5	98.2	98.5
14	100.0	98.8	98.8	98.7	98.4	98.2	98.2	98.0	98.0	97.9	97.8	97.9	97.6	97.4	97.7
15	100.0	99.0	99.1	99.1	98.8	98.6	98.5	98.4	98.4	98.2	98.2	98.2	98.1	97.9	98.4
16	100.0	98.6	98.6	98.6	98.4	98.2	98.1	98.3	98.1	97.8	97.7	97.7	97.7	97.5	98.1
17	100.0	98.7	98.7	98.6	98.4	98.1	98.0	98.1	97.9	97.5	97.4	97.3	97.3	97.0	97.6
18	100.0	99.2	99.2	99.2	98.9	98.8	98.7	98.6	98.6	98.3	98.2	98.0	98.1	97.8	98.2
19	100.0	98.8	99.1	99.0	98.7	98.6	98.6	98.5	98.5	98.3	98.1	98.0	98.1	97.7	98.0
20	100.0	99.0	99.2	99.2	98.8	98.7	98.6	98.5	98.5	98.4	98.2	98.1	98.1	97.7	97.9
21	100.0	98.8	98.9	98.9	98.5	98.4	98.4	98.3	98.3	98.4	98.3	98.3	98.2	97.8	97.9
22	100.0	99.1	99.2	99.2	98.9	98.7	98.7	98.6	98.5	98.7	98.5	98.5	98.3	97.9	97.9
23	100.0	98.7	98.7	98.8	98.4	98.3	98.3	98.2	98.2	98.4	98.2	98.2	98.2	97.8	98.1
24	100.0	98.4	98.5	98.5	98.1	97.9	97.8	97.7	97.6	97.7	97.5	97.5	97.4	96.9	97.2
25	100.0	98.9	99.0	99.0	98.7	98.5	98.5	98.6	98.4	98.4	98.3	98.3	98.3	98.0	98.5
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	98.9	99.0	98.9	98.6	98.5	98.4	98.3	98.3	98.3	98.1	98.2	98.0	97.8	98.1
Med.	100.0	98.8	99.0	98.9	98.7	98.5	98.4	98.4	98.4	98.4	98.2	98.2	98.1	97.8	98.1
σ	0.00	0.23	0.25	0.25	0.22	0.27	0.27	0.23	0.27	0.34	0.34	0.36	0.33	0.35	0.34
Min.	100.0	98.4	98.5	98.5	98.1	97.9	97.8	97.7	97.6	97.5	97.4	97.3	97.3	96.9	97.2
Max.	100.0	99.4	99.5	99.4	98.9	99.1	98.9	98.7	98.8	98.8	98.6	98.7	98.5	98.3	98.7

**TM-21 Projection**

Time	4545 h	5210 h	6044 h	6805 h	7601 h	8436 h	9269 h	10100 h								
ln(Avg.)	-0.0167	-0.0168	-0.0172	-0.0187	-0.0186	-0.0203	-0.0225	-0.0191								

Test duration used	4545 h	to	10100 h
B	0.987		
α	8.10E-07		
R <sup>2</sup>	0.653		
Calculated L <sub>70</sub> (10K)	424000	hours	
Reported L <sub>70</sub> (10K)	> 60600	hours	
Calculated L <sub>80</sub> (10K)	260000	hours	
Reported L <sub>80</sub> (10K)	> 60600	hours	
Calculated L <sub>90</sub> (10K)	114000	hours	
Reported L <sub>90</sub> (10K)	> 60600	hours	

Curve-fit equation:  
 $\Phi(t)=Bexp(-\alpha t)$

Lumen maintenance life equation:

$L_{70} = \ln(B/0.7)/\alpha$

$L_{80} = \ln(B/0.8)/\alpha$

$L_{90} = \ln(B/0.9)/\alpha$

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**Data Set 1 : 55 °C, 100 mA**

Actual Case Temperature [T <sub>S</sub> ]	56.8 °C
Actual Ambient Temperature [T <sub>A</sub> ]	55.5 °C
Drive Current [I <sub>F</sub> ]	100 mA
Measurement Current	100 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 1-3**  
Forward Voltage

LED No.	Relative Forward Voltage % ( Normalized to 100 % at 0 hours )														
	0 h	541 h	1008 h	1698 h	2380 h	3142 h	3830 h	4545 h	5210 h	6044 h	6805 h	7601 h	8436 h	9269 h	10100 h
1	100.0	99.4	99.7	100.0	100.3	100.4	100.5	100.7	100.7	100.9	100.9	101.0	101.0	101.1	101.3
2	100.0	99.4	99.8	100.0	100.3	100.4	100.5	100.7	100.8	101.0	100.9	101.0	101.0	101.1	101.3
3	100.0	99.4	99.7	99.9	100.2	100.4	100.5	100.6	100.7	100.9	100.8	100.9	101.0	101.1	101.2
4	100.0	99.3	99.7	99.9	100.2	100.3	100.5	100.6	100.7	100.9	100.8	100.9	101.0	101.0	101.2
5	100.0	99.4	99.7	100.0	100.3	100.4	100.5	100.7	100.8	100.9	100.9	100.9	101.0	101.1	101.3
6	100.0	99.3	99.6	99.9	100.2	100.3	100.4	100.5	100.7	100.9	100.7	100.8	100.9	101.0	101.2
7	100.0	99.4	99.7	99.9	100.2	100.3	100.4	100.5	100.6	100.8	100.7	100.8	100.8	100.9	101.1
8	100.0	99.4	99.7	99.8	100.0	100.1	100.2	100.2	100.3	100.5	100.4	100.5	100.5	100.6	100.8
9	100.0	99.3	99.6	99.9	100.2	100.3	100.5	100.6	100.7	100.9	100.7	100.8	100.9	101.0	101.2
10	100.0	99.3	99.7	99.9	100.2	100.3	100.5	100.6	100.7	100.8	100.8	100.8	100.9	101.0	101.2
11	100.0	99.4	99.6	99.9	100.2	100.2	100.4	100.5	100.6	100.7	100.7	100.8	100.9	100.9	101.0
12	100.0	99.4	99.7	99.9	100.2	100.3	100.5	100.6	100.7	100.9	100.8	101.0	101.1	101.1	101.2
13	100.0	99.4	99.7	99.9	100.2	100.3	100.5	100.6	100.7	100.9	100.8	100.9	101.1	101.1	101.2
14	100.0	99.4	99.7	100.0	100.3	100.4	100.5	100.7	100.8	101.0	100.9	101.0	101.2	101.2	101.3
15	100.0	99.4	99.7	99.9	100.2	100.4	100.5	100.6	100.7	100.9	100.9	100.9	101.1	101.1	101.2
16	100.0	99.4	99.7	100.0	100.3	100.4	100.6	100.7	100.8	101.0	100.9	101.1	101.2	101.2	101.3
17	100.0	99.4	99.7	99.9	100.2	100.3	100.5	100.5	100.7	100.8	100.8	100.9	101.0	101.0	101.1
18	100.0	99.5	99.7	100.0	100.3	100.4	100.6	100.7	100.7	100.9	100.9	101.0	101.1	101.1	101.3
19	100.0	99.5	99.7	99.8	100.1	100.2	100.3	100.4	100.5	100.6	100.5	100.6	100.7	100.7	100.9
20	100.0	99.4	99.7	99.9	100.1	100.2	100.4	100.5	100.6	100.7	100.7	100.7	100.9	100.9	101.0
21	100.0	99.4	99.8	100.0	100.3	100.4	100.6	100.7	100.8	100.9	100.9	101.0	101.1	101.1	101.3
22	100.0	99.4	99.7	100.0	100.2	100.4	100.5	100.6	100.7	100.9	100.9	101.0	101.1	101.1	101.2
23	100.0	99.4	99.7	100.0	100.2	100.4	100.5	100.6	100.7	100.9	100.9	101.0	101.1	101.1	101.3
24	100.0	99.5	99.7	100.0	100.2	100.4	100.5	100.6	100.7	100.9	100.8	100.9	101.1	101.1	101.2
25	100.0	99.4	99.7	99.9	100.2	100.4	100.5	100.6	100.7	100.9	100.9	101.1	101.1	101.1	101.2
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	99.4	99.7	99.9	100.2	100.3	100.5	100.6	100.7	100.9	100.8	100.9	101.0	101.0	101.2
Med.	100.0	99.4	99.7	99.9	100.2	100.4	100.5	100.6	100.7	100.9	100.8	100.9	101.0	101.1	101.2
σ	0.00	0.05	0.04	0.05	0.07	0.08	0.09	0.11	0.11	0.11	0.12	0.15	0.15	0.13	0.14
Min.	100.0	99.3	99.6	99.8	100.0	100.1	100.2	100.2	100.3	100.5	100.4	100.5	100.5	100.6	100.8
Max.	100.0	99.5	99.8	100.0	100.3	100.4	100.6	100.7	100.8	101.0	100.9	101.1	101.2	101.2	101.3



**Data Set 1 : 55 °C, 100 mA**

Actual Case Temperature [T <sub>s</sub> ]	56.8 °C
Actual Ambient Temperature [T <sub>A</sub> ]	55.5 °C
Drive Current [I <sub>F</sub> ]	100 mA
Measurement Current	100 mA

NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0

**TABLE 1-4**  
 Chromaticity Shift

LED No.	Chromaticity Shift Δu'v'														
	0 h	541 h	1008 h	1698 h	2380 h	3142 h	3830 h	4545 h	5210 h	6044 h	6805 h	7601 h	8436 h	9269 h	10100 h
1	0.0000	0.0007	0.0007	0.0008	0.0010	0.0011	0.0012	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013
2	0.0000	0.0007	0.0007	0.0008	0.0010	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0014
3	0.0000	0.0006	0.0007	0.0007	0.0010	0.0011	0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0012	0.0014	0.0014
4	0.0000	0.0007	0.0008	0.0008	0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014
5	0.0000	0.0007	0.0007	0.0008	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0014	0.0013
6	0.0000	0.0008	0.0009	0.0009	0.0010	0.0011	0.0012	0.0011	0.0012	0.0012	0.0012	0.0013	0.0012	0.0014	0.0013
7	0.0000	0.0008	0.0009	0.0010	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0014
8	0.0000	0.0007	0.0008	0.0008	0.0010	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0012	0.0013	0.0013	0.0013
9	0.0000	0.0007	0.0007	0.0009	0.0011	0.0012	0.0013	0.0014	0.0015	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015
10	0.0000	0.0005	0.0006	0.0007	0.0009	0.0010	0.0010	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012
11	0.0000	0.0006	0.0007	0.0007	0.0010	0.0011	0.0011	0.0011	0.0012	0.0013	0.0013	0.0013	0.0013	0.0015	0.0014
12	0.0000	0.0005	0.0005	0.0006	0.0009	0.0010	0.0009	0.0010	0.0010	0.0010	0.0010	0.0011	0.0011	0.0012	0.0011
13	0.0000	0.0007	0.0007	0.0008	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014
14	0.0000	0.0007	0.0007	0.0007	0.0010	0.0011	0.0012	0.0011	0.0013	0.0014	0.0014	0.0014	0.0015	0.0016	0.0016
15	0.0000	0.0007	0.0007	0.0008	0.0011	0.0012	0.0013	0.0013	0.0014	0.0014	0.0015	0.0015	0.0016	0.0017	0.0016
16	0.0000	0.0008	0.0009	0.0009	0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0014
17	0.0000	0.0008	0.0008	0.0009	0.0011	0.0012	0.0014	0.0012	0.0014	0.0013	0.0014	0.0014	0.0014	0.0015	0.0014
18	0.0000	0.0006	0.0006	0.0007	0.0009	0.0010	0.0009	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012
19	0.0000	0.0006	0.0007	0.0007	0.0010	0.0011	0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014
20	0.0000	0.0006	0.0007	0.0007	0.0009	0.0010	0.0011	0.0011	0.0012	0.0013	0.0012	0.0013	0.0013	0.0014	0.0014
21	0.0000	0.0007	0.0007	0.0008	0.0010	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014
22	0.0000	0.0007	0.0007	0.0008	0.0010	0.0012	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013
23	0.0000	0.0007	0.0008	0.0008	0.0010	0.0011	0.0011	0.0012	0.0013	0.0012	0.0012	0.0012	0.0013	0.0014	0.0014
24	0.0000	0.0006	0.0007	0.0009	0.0011	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0015	0.0014	0.0015	0.0015
25	0.0000	0.0007	0.0008	0.0008	0.0010	0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.0000	0.0007	0.0007	0.0008	0.0010	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014
Med.	0.0000	0.0007	0.0007	0.0008	0.0010	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014
σ	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.0000	0.0005	0.0005	0.0006	0.0009	0.0010	0.0009	0.0010	0.0010	0.0010	0.0010	0.0011	0.0011	0.0012	0.0011
Max.	0.0000	0.0008	0.0009	0.0010	0.0012	0.0013	0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.0016	0.0017	0.0016

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 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*

### Data Set 1 : 55 °C, 100 mA

Actual Case Temperature [T <sub>s</sub> ]	56.8 °C
Actual Ambient Temperature [T <sub>A</sub> ]	55.5 °C
Drive Current [I <sub>f</sub> ]	100 mA
Measurement Current	100 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 1-5**  
Chromaticity

LED No.	Chromaticity u'														
	0 h	541 h	1008 h	1698 h	2380 h	3142 h	3830 h	4545 h	5210 h	6044 h	6805 h	7601 h	8436 h	9269 h	10100 h
1	0.2617	0.2610	0.2610	0.2609	0.2607	0.2606	0.2605	0.2606	0.2605	0.2605	0.2605	0.2605	0.2605	0.2604	0.2604
2	0.2585	0.2578	0.2578	0.2577	0.2575	0.2574	0.2574	0.2573	0.2573	0.2573	0.2572	0.2572	0.2572	0.2571	0.2571
3	0.2593	0.2587	0.2586	0.2586	0.2583	0.2582	0.2582	0.2581	0.2581	0.2581	0.2581	0.2581	0.2579	0.2579	0.2579
4	0.2665	0.2658	0.2657	0.2657	0.2654	0.2653	0.2653	0.2653	0.2652	0.2652	0.2652	0.2652	0.2651	0.2651	0.2651
5	0.2679	0.2672	0.2672	0.2671	0.2669	0.2668	0.2668	0.2668	0.2667	0.2667	0.2666	0.2666	0.2666	0.2665	0.2666
6	0.2590	0.2583	0.2582	0.2582	0.2580	0.2579	0.2578	0.2579	0.2578	0.2578	0.2578	0.2579	0.2577	0.2577	0.2577
7	0.2671	0.2663	0.2662	0.2661	0.2659	0.2658	0.2658	0.2658	0.2657	0.2657	0.2657	0.2657	0.2656	0.2656	0.2657
8	0.2603	0.2596	0.2595	0.2595	0.2593	0.2591	0.2591	0.2591	0.2591	0.2591	0.2591	0.2591	0.2590	0.2590	0.2590
9	0.2629	0.2622	0.2622	0.2621	0.2618	0.2617	0.2616	0.2616	0.2615	0.2615	0.2616	0.2615	0.2615	0.2614	0.2614
10	0.2637	0.2632	0.2631	0.2630	0.2628	0.2627	0.2627	0.2627	0.2626	0.2626	0.2626	0.2625	0.2625	0.2625	0.2625
11	0.2622	0.2616	0.2615	0.2615	0.2612	0.2611	0.2611	0.2611	0.2610	0.2609	0.2609	0.2609	0.2609	0.2607	0.2608
12	0.2575	0.2570	0.2570	0.2569	0.2566	0.2565	0.2566	0.2565	0.2565	0.2565	0.2565	0.2564	0.2564	0.2563	0.2564
13	0.2603	0.2596	0.2596	0.2595	0.2593	0.2592	0.2592	0.2592	0.2591	0.2591	0.2590	0.2590	0.2590	0.2589	0.2589
14	0.2613	0.2606	0.2606	0.2606	0.2603	0.2602	0.2601	0.2602	0.2601	0.2600	0.2600	0.2600	0.2599	0.2598	0.2598
15	0.2646	0.2639	0.2639	0.2638	0.2635	0.2634	0.2633	0.2633	0.2632	0.2632	0.2631	0.2631	0.2630	0.2629	0.2630
16	0.2629	0.2621	0.2620	0.2620	0.2618	0.2617	0.2617	0.2617	0.2616	0.2616	0.2616	0.2615	0.2615	0.2614	0.2615
17	0.2630	0.2622	0.2622	0.2622	0.2619	0.2618	0.2617	0.2618	0.2617	0.2617	0.2617	0.2617	0.2616	0.2616	0.2616
18	0.2576	0.2570	0.2570	0.2570	0.2567	0.2566	0.2567	0.2566	0.2566	0.2565	0.2565	0.2565	0.2565	0.2564	0.2564
19	0.2607	0.2601	0.2600	0.2600	0.2597	0.2596	0.2596	0.2595	0.2595	0.2595	0.2594	0.2594	0.2594	0.2593	0.2593
20	0.2634	0.2628	0.2627	0.2627	0.2625	0.2624	0.2623	0.2623	0.2622	0.2621	0.2622	0.2621	0.2621	0.2620	0.2620
21	0.2608	0.2601	0.2601	0.2600	0.2598	0.2597	0.2596	0.2596	0.2596	0.2596	0.2595	0.2595	0.2595	0.2594	0.2594
22	0.2618	0.2611	0.2611	0.2610	0.2608	0.2606	0.2607	0.2606	0.2606	0.2606	0.2606	0.2605	0.2605	0.2605	0.2605
23	0.2602	0.2595	0.2594	0.2594	0.2592	0.2591	0.2591	0.2590	0.2589	0.2590	0.2590	0.2590	0.2589	0.2588	0.2588
24	0.2609	0.2603	0.2602	0.2601	0.2599	0.2598	0.2597	0.2597	0.2597	0.2596	0.2596	0.2595	0.2596	0.2595	0.2595
25	0.2618	0.2611	0.2610	0.2610	0.2608	0.2607	0.2606	0.2606	0.2606	0.2605	0.2605	0.2605	0.2605	0.2604	0.2604
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.2618	0.2612	0.2611	0.2611	0.2608	0.2607	0.2607	0.2607	0.2606	0.2606	0.2606	0.2606	0.2605	0.2604	0.2605
Med.	0.2617	0.2610	0.2610	0.2609	0.2607	0.2606	0.2605	0.2606	0.2605	0.2605	0.2605	0.2605	0.2605	0.2604	0.2604
σ	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027
Min.	0.2575	0.2570	0.2570	0.2569	0.2566	0.2565	0.2566	0.2565	0.2565	0.2565	0.2565	0.2564	0.2564	0.2563	0.2564
Max.	0.2679	0.2672	0.2672	0.2671	0.2669	0.2668	0.2668	0.2668	0.2667	0.2667	0.2666	0.2667	0.2666	0.2665	0.2666

**Data Set 1 : 55 °C, 100 mA**

Actual Case Temperature [T <sub>c</sub> ]	56.8 °C
Actual Ambient Temperature [T <sub>A</sub> ]	55.5 °C
Drive Current [I <sub>f</sub> ]	100 mA
Measurement Current	100 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 1-6**  
Chromaticity

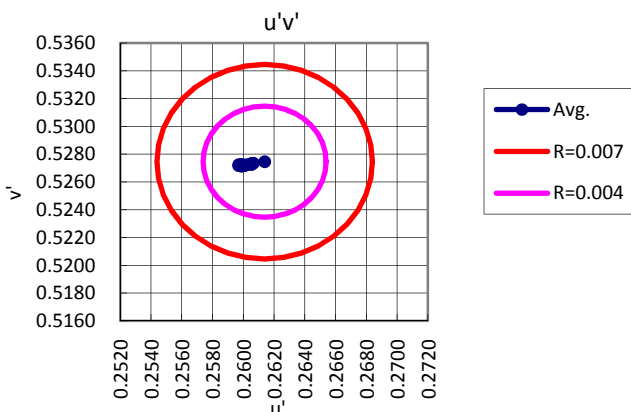
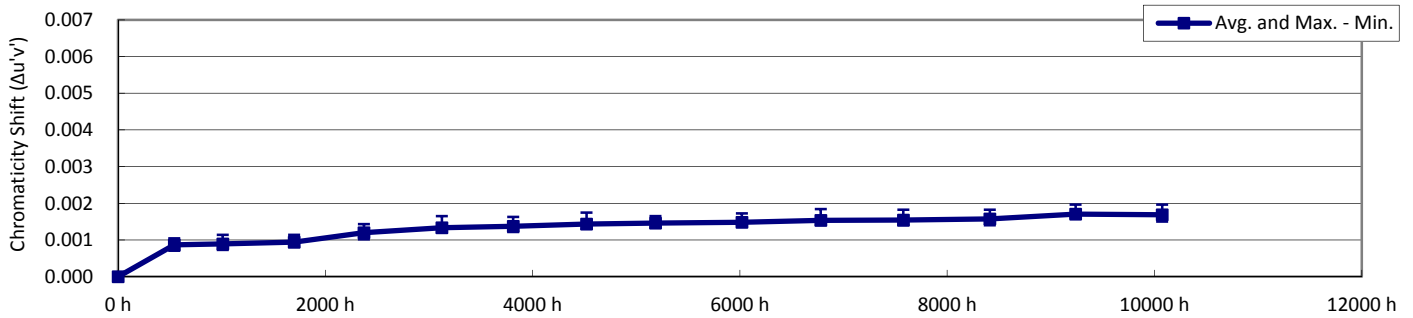
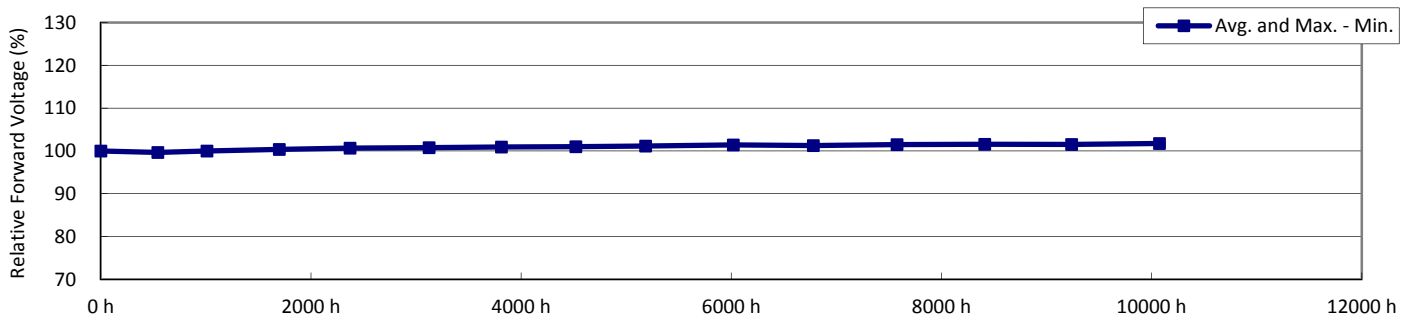
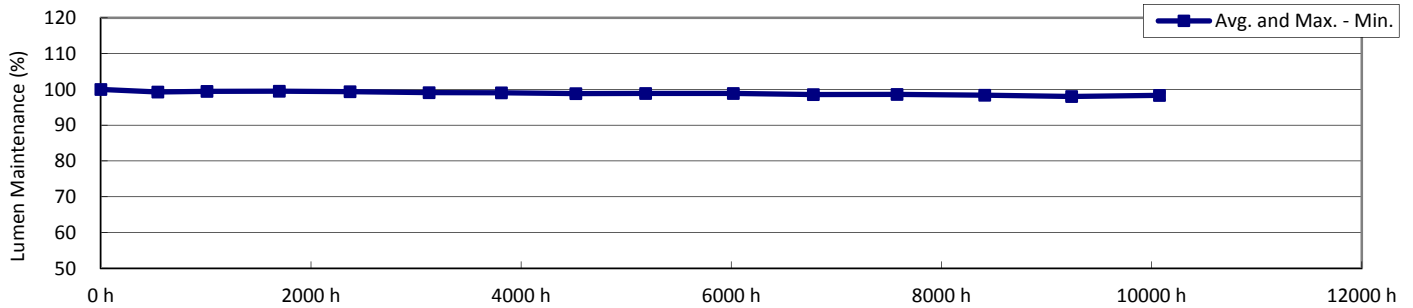
LED No.	Chromaticity v'														
	0 h	541 h	1008 h	1698 h	2380 h	3142 h	3830 h	4545 h	5210 h	6044 h	6805 h	7601 h	8436 h	9269 h	10100 h
1	0.5295	0.5293	0.5293	0.5293	0.5292	0.5292	0.5292	0.5292	0.5292	0.5293	0.5292	0.5292	0.5292	0.5292	0.5293
2	0.5182	0.5181	0.5181	0.5180	0.5180	0.5179	0.5180	0.5179	0.5179	0.5180	0.5179	0.5179	0.5179	0.5179	0.5180
3	0.5206	0.5204	0.5204	0.5204	0.5203	0.5203	0.5203	0.5203	0.5203	0.5203	0.5202	0.5203	0.5203	0.5203	0.5203
4	0.5316	0.5315	0.5315	0.5315	0.5314	0.5315	0.5314	0.5314	0.5314	0.5315	0.5314	0.5314	0.5314	0.5314	0.5315
5	0.5343	0.5342	0.5342	0.5341	0.5341	0.5341	0.5341	0.5341	0.5341	0.5341	0.5341	0.5341	0.5341	0.5341	0.5342
6	0.5185	0.5182	0.5182	0.5182	0.5182	0.5182	0.5182	0.5182	0.5182	0.5182	0.5181	0.5181	0.5181	0.5181	0.5182
7	0.5296	0.5294	0.5294	0.5294	0.5293	0.5293	0.5293	0.5293	0.5293	0.5294	0.5293	0.5293	0.5293	0.5294	0.5294
8	0.5255	0.5253	0.5253	0.5253	0.5252	0.5252	0.5252	0.5252	0.5252	0.5252	0.5251	0.5252	0.5252	0.5252	0.5252
9	0.5285	0.5283	0.5283	0.5282	0.5282	0.5282	0.5282	0.5281	0.5281	0.5282	0.5281	0.5281	0.5281	0.5282	0.5282
10	0.5271	0.5270	0.5270	0.5269	0.5269	0.5269	0.5269	0.5269	0.5269	0.5269	0.5268	0.5269	0.5269	0.5269	0.5269
11	0.5300	0.5299	0.5299	0.5299	0.5298	0.5298	0.5298	0.5298	0.5298	0.5298	0.5298	0.5298	0.5298	0.5298	0.5298
12	0.5210	0.5209	0.5209	0.5208	0.5208	0.5207	0.5207	0.5208	0.5208	0.5208	0.5207	0.5207	0.5208	0.5207	0.5208
13	0.5256	0.5255	0.5255	0.5254	0.5254	0.5254	0.5254	0.5254	0.5254	0.5254	0.5254	0.5254	0.5254	0.5254	0.5254
14	0.5239	0.5238	0.5237	0.5237	0.5236	0.5236	0.5236	0.5236	0.5235	0.5235	0.5235	0.5235	0.5235	0.5235	0.5235
15	0.5336	0.5335	0.5335	0.5334	0.5334	0.5333	0.5334	0.5334	0.5334	0.5334	0.5333	0.5334	0.5334	0.5334	0.5334
16	0.5295	0.5293	0.5293	0.5292	0.5292	0.5292	0.5292	0.5292	0.5292	0.5292	0.5291	0.5292	0.5292	0.5292	0.5292
17	0.5248	0.5246	0.5246	0.5245	0.5245	0.5245	0.5244	0.5245	0.5244	0.5245	0.5244	0.5244	0.5245	0.5244	0.5245
18	0.5253	0.5251	0.5251	0.5250	0.5250	0.5250	0.5250	0.5250	0.5250	0.5250	0.5250	0.5250	0.5250	0.5250	0.5250
19	0.5276	0.5274	0.5274	0.5274	0.5274	0.5273	0.5273	0.5273	0.5273	0.5273	0.5273	0.5273	0.5273	0.5273	0.5273
20	0.5307	0.5306	0.5306	0.5306	0.5305	0.5305	0.5305	0.5305	0.5305	0.5305	0.5304	0.5305	0.5305	0.5305	0.5305
21	0.5254	0.5253	0.5253	0.5252	0.5252	0.5251	0.5251	0.5251	0.5251	0.5252	0.5251	0.5251	0.5252	0.5252	0.5252
22	0.5197	0.5196	0.5195	0.5195	0.5194	0.5194	0.5194	0.5194	0.5194	0.5194	0.5194	0.5194	0.5194	0.5194	0.5194
23	0.5224	0.5223	0.5223	0.5222	0.5222	0.5221	0.5222	0.5221	0.5221	0.5222	0.5221	0.5221	0.5222	0.5221	0.5222
24	0.5245	0.5243	0.5243	0.5242	0.5241	0.5241	0.5241	0.5241	0.5241	0.5241	0.5240	0.5241	0.5241	0.5241	0.5241
25	0.5247	0.5246	0.5246	0.5245	0.5245	0.5244	0.5244	0.5244	0.5244	0.5245	0.5244	0.5244	0.5245	0.5244	0.5245
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.5261	0.5259	0.5259	0.5259	0.5258	0.5258	0.5258	0.5258	0.5258	0.5258	0.5258	0.5258	0.5258	0.5258	0.5258
Med.	0.5255	0.5253	0.5253	0.5253	0.5252	0.5252	0.5252	0.5252	0.5252	0.5252	0.5251	0.5252	0.5252	0.5252	0.5252
σ	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045
Min.	0.5182	0.5181	0.5181	0.5180	0.5180	0.5179	0.5180	0.5179	0.5179	0.5180	0.5179	0.5179	0.5179	0.5179	0.5180
Max.	0.5343	0.5342	0.5342	0.5341	0.5341	0.5341	0.5341	0.5341	0.5341	0.5341	0.5341	0.5341	0.5341	0.5341	0.5342



### Data Set 2 : 55 °C, 150 mA

Actual Case Temperature [T <sub>S</sub> ]	58.4 °C
Actual Ambient Temperature [T <sub>A</sub> ]	56.5 °C
Drive Current [I <sub>F</sub> ]	150 mA
Measurement Current	150 mA

NOTES:  
 T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0



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## Data Set 2 : 55 °C, 150 mA

Actual Case Temperature [T <sub>s</sub> ]	58.4 °C
Actual Ambient Temperature [T <sub>A</sub> ]	56.5 °C
Drive Current [I <sub>F</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 2-1**  
Initial Characteristics

LED No.	Luminous flux	Forward voltage	CCT	Input Power	CIE1931		CIE1976					
	Φ <sub>V</sub> [lm]	V <sub>F</sub> [V]	T <sub>CP</sub> [K]	P [W]	x	y	u'	v'				
1	101.3	6.32	2792	0.95	0.454	0.412	0.258	0.527				
2	101.1	6.32	2799	0.95	0.451	0.406	0.259	0.524				
3	99.1	6.32	2682	0.95	0.461	0.411	0.263	0.528				
4	99.3	6.33	2677	0.95	0.461	0.410	0.264	0.528				
5	98.8	6.32	2640	0.95	0.466	0.413	0.265	0.529				
6	99.3	6.33	2713	0.95	0.460	0.412	0.262	0.528				
7	100.6	6.32	2742	0.95	0.457	0.411	0.261	0.527				
8	99.5	6.31	2644	0.95	0.466	0.414	0.265	0.530				
9	101.3	6.31	2771	0.95	0.453	0.407	0.260	0.525				
10	101.2	6.31	2613	0.95	0.475	0.426	0.265	0.536				
11	101.4	6.31	2757	0.95	0.456	0.411	0.260	0.527				
12	102.3	6.29	2724	0.94	0.459	0.413	0.261	0.528				
13	101.6	6.31	2756	0.95	0.454	0.408	0.260	0.525				
14	100.1	6.34	2652	0.95	0.471	0.424	0.264	0.534				
15	100.9	6.32	2752	0.95	0.459	0.416	0.260	0.529				
16	100.3	6.32	2669	0.95	0.466	0.418	0.263	0.531				
17	100.6	6.31	2732	0.95	0.458	0.412	0.261	0.528				
18	97.8	6.33	2598	0.95	0.474	0.422	0.267	0.534				
19	99.2	6.34	2645	0.95	0.467	0.416	0.265	0.531				
20	100.9	6.32	2737	0.95	0.457	0.410	0.261	0.527				
21	101.4	6.31	2686	0.95	0.466	0.420	0.262	0.532				
22	102.0	6.32	2798	0.95	0.454	0.412	0.258	0.527				
23	99.6	6.33	2677	0.95	0.465	0.417	0.263	0.531				
24	100.4	6.31	2841	0.95	0.442	0.395	0.258	0.518				
25	99.2	6.32	2720	0.95	0.457	0.408	0.262	0.526				
n	25	25	25	25	25	25	25	25				
Avg.	100.4	6.32	2713	0.95	0.460	0.413	0.262	0.528				
Med.	100.6	6.32	2720	0.95	0.459	0.412	0.262	0.528				
σ	1.14	0.010	63.2	0.002	0.0076	0.0064	0.0025	0.0035				
Min.	97.8	6.29	2598	0.94	0.442	0.395	0.258	0.518				
Max.	102.3	6.34	2841	0.95	0.475	0.426	0.267	0.536				





**Data Set 2 : 55 °C, 150 mA**

Actual Case Temperature [T <sub>S</sub> ]	58.4 °C
Actual Ambient Temperature [T <sub>A</sub> ]	56.5 °C
Drive Current [I <sub>F</sub> ]	150 mA
Measurement Current	150 mA

NOTES:  
 T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0

**TABLE 2-2**  
 Lumen Maintenance

LED No.	Lumen Maintenance % ( Normalized to 100 % at 0 hours )														
	0 h	542 h	1010 h	1699 h	2372 h	3124 h	3812 h	4520 h	5185 h	6019 h	6780 h	7577 h	8411 h	9239 h	10074 h
1	100.0	99.6	99.9	99.9	99.7	99.5	99.4	99.2	99.3	99.3	99.0	99.2	98.9	98.6	98.7
2	100.0	99.2	99.4	99.3	99.3	99.0	98.9	98.8	98.8	99.1	98.8	98.8	98.7	98.2	98.4
3	100.0	99.3	99.4	99.4	99.5	99.1	99.0	98.9	98.9	99.3	98.9	98.8	98.8	98.3	98.6
4	100.0	99.4	99.5	99.5	99.7	99.3	99.2	99.2	99.2	99.6	99.2	99.1	99.1	98.6	99.1
5	100.0	99.3	99.3	99.2	99.4	99.0	98.9	98.8	98.7	98.9	98.5	98.3	98.3	97.7	98.3
6	100.0	99.0	99.0	99.0	99.1	98.8	98.7	98.6	98.7	98.5	98.2	98.2	98.1	97.8	98.4
7	100.0	99.2	99.3	99.2	99.2	99.0	98.9	98.7	98.8	98.4	98.1	98.2	98.0	97.8	98.3
8	100.0	99.9	100.1	100.1	99.9	99.8	99.7	99.4	99.6	99.2	98.9	99.0	98.7	98.5	98.7
9	100.0	99.6	99.8	99.8	99.6	99.5	99.4	99.0	99.2	98.9	98.7	98.9	98.5	98.3	98.4
10	100.0	99.9	100.2	100.2	99.9	99.8	99.7	99.3	99.5	99.3	99.0	99.2	98.8	98.5	98.6
11	100.0	99.8	100.0	100.0	99.8	99.6	99.6	99.3	99.3	99.4	99.1	99.1	98.7	98.3	98.4
12	100.0	98.6	98.8	98.9	98.7	98.4	98.4	98.1	98.2	98.4	98.0	97.9	97.6	97.0	97.0
13	100.0	98.9	99.1	99.3	99.1	98.8	98.9	98.6	98.7	98.9	98.6	98.7	98.6	98.1	98.4
14	100.0	99.1	99.2	99.2	99.0	98.7	98.7	98.5	98.5	98.6	98.2	98.1	98.0	97.5	97.9
15	100.0	99.1	99.2	99.2	99.0	98.7	98.7	98.6	98.6	98.5	98.3	98.3	98.2	97.8	98.4
16	100.0	99.0	99.1	99.2	99.1	98.8	98.8	98.7	98.6	98.4	98.1	98.2	98.0	97.7	98.3
17	100.0	99.5	99.6	99.6	99.5	99.3	99.2	99.1	99.0	98.8	98.6	98.6	98.4	98.2	98.7
18	100.0	99.5	99.7	99.8	99.6	99.4	99.2	99.1	99.1	98.8	98.5	98.6	98.3	98.2	98.5
19	100.0	99.6	99.8	99.9	99.7	99.5	99.4	99.2	99.3	99.1	98.8	98.9	98.5	98.4	98.5
20	100.0	99.7	99.9	99.9	99.8	99.6	99.5	99.3	99.4	99.3	99.1	99.2	98.8	98.6	98.7
21	100.0	99.2	99.4	99.5	99.3	99.2	99.1	98.8	98.9	99.1	98.7	98.8	98.6	98.2	98.3
22	100.0	98.9	99.1	99.2	99.1	98.8	98.8	98.6	98.6	98.9	98.6	98.6	98.4	98.0	98.1
23	100.0	98.9	99.0	99.0	98.8	98.5	98.5	98.3	98.2	98.4	98.1	98.1	97.8	97.4	97.6
24	100.0	99.3	99.5	99.4	99.2	99.0	98.9	98.8	98.6	98.6	98.3	98.2	97.9	97.6	97.9
25	100.0	98.9	99.0	99.1	99.0	98.6	98.6	98.6	98.4	98.3	98.1	98.1	97.9	97.7	98.2
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	99.3	99.5	99.5	99.4	99.1	99.0	98.8	98.9	98.9	98.6	98.6	98.4	98.0	98.3
Med.	100.0	99.3	99.4	99.4	99.3	99.0	98.9	98.8	98.8	98.9	98.6	98.6	98.4	98.2	98.4
σ	0.00	0.36	0.38	0.38	0.35	0.40	0.38	0.33	0.38	0.37	0.38	0.41	0.40	0.43	0.42
Min.	100.0	98.6	98.8	98.9	98.7	98.4	98.4	98.1	98.2	98.3	98.0	97.9	97.6	97.0	97.0
Max.	100.0	99.9	100.2	100.2	99.9	99.8	99.7	99.4	99.6	99.6	99.2	99.2	99.1	98.6	99.1

**TM-21 Projection**

Time	4520 h	5185 h	6019 h	6780 h	7577 h	8411 h	9239 h	10074 h							
ln(Avg.)	-0.0116	-0.0113	-0.0112	-0.0145	-0.0141	-0.0163	-0.0198	-0.0168							

Test duration used	4520 h	to	10074 h
B	0.996		
α	1.40E-06		
R <sup>2</sup>	0.792		
Calculated L <sub>70</sub> (10K)	252000	hours	
Reported L <sub>70</sub> (10K)	> 60400	hours	
Calculated L <sub>80</sub> (10K)	157000	hours	
Reported L <sub>80</sub> (10K)	> 60400	hours	
Calculated L <sub>90</sub> (10K)	72300	hours	
Reported L <sub>90</sub> (10K)	> 60400	hours	

Curve-fit equation:  
 $\Phi(t)=Bexp(-\alpha t)$

Lumen maintenance life equation:

$L_{70} = \ln(B/0.7)/\alpha$

$L_{80} = \ln(B/0.8)/\alpha$

$L_{90} = \ln(B/0.9)/\alpha$

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## Data Set 2 : 55 °C, 150 mA

Actual Case Temperature [T <sub>s</sub> ]	58.4 °C
Actual Ambient Temperature [T <sub>A</sub> ]	56.5 °C
Drive Current [I <sub>f</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 2-3**  
Forward Voltage

LED No.	Relative Forward Voltage % ( Normalized to 100 % at 0 hours )														
	0 h	542 h	1010 h	1699 h	2372 h	3124 h	3812 h	4520 h	5185 h	6019 h	6780 h	7577 h	8411 h	9239 h	10074 h
1	100.0	99.7	100.0	100.3	100.7	100.8	101.0	101.1	101.2	101.5	101.3	101.6	101.7	101.6	101.9
2	100.0	99.7	100.0	100.3	100.7	100.8	100.9	101.0	101.2	101.4	101.3	101.4	101.5	101.5	101.7
3	100.0	99.7	100.0	100.3	100.7	100.8	101.0	101.1	101.3	101.6	101.4	101.6	101.7	101.7	101.8
4	100.0	99.7	100.1	100.5	100.8	100.9	101.1	101.2	101.3	101.6	101.4	101.6	101.7	101.7	101.9
5	100.0	99.7	100.0	100.3	100.8	100.9	101.0	101.1	101.3	101.5	101.4	101.6	101.7	101.7	101.9
6	100.0	99.6	99.9	100.3	100.6	100.7	100.9	101.0	101.1	101.4	101.2	101.4	101.5	101.5	101.7
7	100.0	99.7	100.0	100.3	100.7	100.8	101.0	101.0	101.2	101.5	101.3	101.5	101.6	101.6	101.8
8	100.0	99.6	100.0	100.3	100.7	100.8	101.0	101.0	101.2	101.5	101.3	101.5	101.7	101.6	101.8
9	100.0	99.7	99.9	100.2	100.6	100.7	100.9	100.9	101.1	101.3	101.2	101.3	101.4	101.4	101.6
10	100.0	99.7	100.0	100.3	100.7	100.9	101.0	101.1	101.3	101.5	101.4	101.6	101.7	101.6	101.9
11	100.0	99.6	100.0	100.4	100.7	100.8	101.0	101.1	101.2	101.5	101.3	101.5	101.6	101.6	101.8
12	100.0	99.6	99.9	100.2	100.4	100.5	100.6	100.7	100.8	101.0	100.8	101.1	101.1	101.1	101.3
13	100.0	99.6	99.9	100.2	100.5	100.5	100.8	100.8	100.9	101.2	101.0	101.2	101.3	101.3	101.5
14	100.0	99.6	100.0	100.4	100.7	100.8	101.0	101.1	101.2	101.5	101.3	101.6	101.8	101.6	101.8
15	100.0	99.6	100.0	100.4	100.7	100.7	100.9	100.9	101.1	101.4	101.2	101.4	101.5	101.5	101.7
16	100.0	99.7	100.0	100.3	100.6	100.7	100.9	101.0	101.1	101.3	101.2	101.4	101.5	101.4	101.7
17	100.0	99.6	100.0	100.4	100.7	100.8	100.9	101.1	101.2	101.5	101.3	101.5	101.6	101.6	101.8
18	100.0	99.7	100.0	100.4	100.7	100.8	101.0	101.1	101.2	101.5	101.3	101.6	101.6	101.6	101.9
19	100.0	99.6	100.0	100.3	100.6	100.7	100.9	101.0	101.1	101.4	101.2	101.4	101.5	101.5	101.7
20	100.0	99.7	100.0	100.5	100.8	100.8	101.1	101.1	101.3	101.5	101.4	101.6	101.7	101.7	101.9
21	100.0	99.6	99.9	100.3	100.5	100.6	100.8	100.8	101.0	101.2	101.1	101.3	101.3	101.3	101.5
22	100.0	99.7	99.9	100.3	100.6	100.7	100.8	100.9	101.0	101.2	101.1	101.3	101.4	101.4	101.6
23	100.0	99.7	100.0	100.4	100.7	100.8	100.9	101.0	101.2	101.4	101.3	101.5	101.6	101.5	101.8
24	100.0	99.7	100.1	100.4	100.7	100.9	101.0	101.1	101.3	101.5	101.4	101.6	101.7	101.6	101.8
25	100.0	99.7	100.0	100.4	100.7	100.8	100.9	101.0	101.1	101.4	101.2	101.4	101.6	101.5	101.7
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	99.6	100.0	100.3	100.7	100.8	100.9	101.0	101.2	101.4	101.2	101.5	101.6	101.5	101.7
Med.	100.0	99.7	100.0	100.3	100.7	100.8	100.9	101.0	101.2	101.5	101.3	101.5	101.6	101.6	101.8
σ	0.00	0.03	0.05	0.08	0.09	0.10	0.11	0.12	0.12	0.15	0.14	0.14	0.16	0.15	0.16
Min.	100.0	99.6	99.9	100.2	100.4	100.5	100.6	100.7	100.8	101.0	100.8	101.1	101.1	101.1	101.3
Max.	100.0	99.7	100.1	100.5	100.8	100.9	101.1	101.2	101.3	101.6	101.4	101.6	101.8	101.7	101.9

## Data Set 2 : 55 °C, 150 mA

Actual Case Temperature [T <sub>s</sub> ]	58.4 °C
Actual Ambient Temperature [T <sub>A</sub> ]	56.5 °C
Drive Current [I <sub>f</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 2-4**  
Chromaticity Shift

LED No.	Chromaticity Shift Δu'v'														
	0 h	542 h	1010 h	1699 h	2372 h	3124 h	3812 h	4520 h	5185 h	6019 h	6780 h	7577 h	8411 h	9239 h	10074 h
1	0.0000	0.0008	0.0009	0.0010	0.0012	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017
2	0.0000	0.0008	0.0008	0.0009	0.0011	0.0012	0.0013	0.0014	0.0013	0.0014	0.0015	0.0014	0.0014	0.0016	0.0016
3	0.0000	0.0009	0.0009	0.0009	0.0012	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0016	0.0016	0.0018	0.0018
4	0.0000	0.0008	0.0009	0.0009	0.0011	0.0012	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0016	0.0015
5	0.0000	0.0009	0.0009	0.0009	0.0012	0.0013	0.0014	0.0015	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017
6	0.0000	0.0010	0.0009	0.0011	0.0013	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0016	0.0016	0.0018	0.0017
7	0.0000	0.0010	0.0011	0.0011	0.0014	0.0016	0.0016	0.0017	0.0016	0.0017	0.0018	0.0018	0.0018	0.0019	0.0019
8	0.0000	0.0010	0.0010	0.0011	0.0013	0.0014	0.0015	0.0015	0.0015	0.0015	0.0016	0.0015	0.0016	0.0017	0.0017
9	0.0000	0.0009	0.0009	0.0009	0.0012	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0016	0.0016
10	0.0000	0.0008	0.0008	0.0009	0.0011	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0015	0.0016	0.0017	0.0017
11	0.0000	0.0007	0.0007	0.0008	0.0010	0.0012	0.0012	0.0013	0.0014	0.0014	0.0015	0.0014	0.0015	0.0016	0.0016
12	0.0000	0.0008	0.0008	0.0008	0.0011	0.0012	0.0012	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0016	0.0015
13	0.0000	0.0008	0.0008	0.0009	0.0011	0.0012	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0016	0.0016
14	0.0000	0.0008	0.0009	0.0009	0.0011	0.0013	0.0013	0.0013	0.0014	0.0014	0.0015	0.0015	0.0015	0.0017	0.0017
15	0.0000	0.0009	0.0008	0.0009	0.0012	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0014	0.0015	0.0016	0.0016
16	0.0000	0.0009	0.0009	0.0010	0.0012	0.0013	0.0014	0.0014	0.0015	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017
17	0.0000	0.0010	0.0010	0.0011	0.0014	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0017	0.0017	0.0018	0.0018
18	0.0000	0.0008	0.0009	0.0009	0.0011	0.0013	0.0013	0.0014	0.0014	0.0015	0.0015	0.0016	0.0015	0.0016	0.0016
19	0.0000	0.0008	0.0009	0.0009	0.0012	0.0012	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0016	0.0016
20	0.0000	0.0008	0.0009	0.0009	0.0012	0.0013	0.0014	0.0014	0.0014	0.0015	0.0016	0.0015	0.0015	0.0016	0.0016
21	0.0000	0.0008	0.0008	0.0008	0.0011	0.0012	0.0013	0.0013	0.0014	0.0014	0.0015	0.0015	0.0015	0.0017	0.0017
22	0.0000	0.0008	0.0008	0.0008	0.0011	0.0012	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0016	0.0016	0.0017
23	0.0000	0.0008	0.0008	0.0008	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0015	0.0016	0.0016	0.0017	0.0017
24	0.0000	0.0008	0.0009	0.0009	0.0012	0.0014	0.0014	0.0015	0.0016	0.0015	0.0017	0.0017	0.0018	0.0020	0.0020
25	0.0000	0.0009	0.0009	0.0010	0.0012	0.0013	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0016	0.0017	0.0017
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.0000	0.0009	0.0009	0.0009	0.0012	0.0013	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0016	0.0017	0.0017
Med.	0.0000	0.0008	0.0009	0.0009	0.0012	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0015	0.0016	0.0017	0.0017
σ	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.0000	0.0007	0.0007	0.0008	0.0010	0.0012	0.0012	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0016	0.0015
Max.	0.0000	0.0010	0.0011	0.0011	0.0014	0.0016	0.0016	0.0017	0.0016	0.0017	0.0018	0.0018	0.0018	0.0020	0.0020

## Data Set 2 : 55 °C, 150 mA

Actual Case Temperature [T <sub>s</sub> ]	58.4 °C
Actual Ambient Temperature [T <sub>A</sub> ]	56.5 °C
Drive Current [I <sub>f</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 2-5**  
Chromaticity

LED No.	Chromaticity u'														
	0 h	542 h	1010 h	1699 h	2372 h	3124 h	3812 h	4520 h	5185 h	6019 h	6780 h	7577 h	8411 h	9239 h	10074 h
1	0.2591	0.2583	0.2582	0.2581	0.2579	0.2577	0.2577	0.2577	0.2576	0.2576	0.2576	0.2575	0.2575	0.2574	0.2574
2	0.2593	0.2585	0.2585	0.2584	0.2582	0.2581	0.2580	0.2580	0.2580	0.2579	0.2579	0.2579	0.2579	0.2577	0.2577
3	0.2641	0.2632	0.2632	0.2632	0.2629	0.2627	0.2627	0.2626	0.2626	0.2625	0.2625	0.2625	0.2625	0.2623	0.2623
4	0.2645	0.2637	0.2636	0.2636	0.2634	0.2633	0.2632	0.2631	0.2631	0.2631	0.2631	0.2631	0.2631	0.2629	0.2630
5	0.2658	0.2649	0.2649	0.2649	0.2646	0.2645	0.2644	0.2643	0.2644	0.2643	0.2643	0.2642	0.2642	0.2641	0.2641
6	0.2629	0.2619	0.2620	0.2618	0.2616	0.2615	0.2615	0.2614	0.2614	0.2613	0.2613	0.2613	0.2613	0.2611	0.2612
7	0.2617	0.2607	0.2606	0.2606	0.2603	0.2601	0.2601	0.2600	0.2601	0.2600	0.2599	0.2599	0.2599	0.2598	0.2598
8	0.2655	0.2645	0.2645	0.2644	0.2642	0.2641	0.2640	0.2640	0.2640	0.2640	0.2639	0.2640	0.2639	0.2638	0.2638
9	0.2605	0.2596	0.2596	0.2596	0.2593	0.2592	0.2592	0.2591	0.2591	0.2591	0.2591	0.2591	0.2590	0.2589	0.2589
10	0.2660	0.2652	0.2652	0.2651	0.2649	0.2647	0.2647	0.2646	0.2646	0.2646	0.2645	0.2645	0.2644	0.2643	0.2643
11	0.2605	0.2598	0.2598	0.2597	0.2595	0.2593	0.2593	0.2592	0.2591	0.2591	0.2590	0.2591	0.2590	0.2589	0.2589
12	0.2619	0.2611	0.2611	0.2611	0.2608	0.2607	0.2607	0.2606	0.2605	0.2605	0.2605	0.2605	0.2604	0.2603	0.2604
13	0.2609	0.2601	0.2601	0.2600	0.2598	0.2597	0.2596	0.2595	0.2595	0.2595	0.2595	0.2595	0.2594	0.2593	0.2593
14	0.2644	0.2636	0.2635	0.2635	0.2633	0.2631	0.2631	0.2631	0.2630	0.2630	0.2629	0.2629	0.2629	0.2627	0.2627
15	0.2605	0.2596	0.2597	0.2596	0.2593	0.2592	0.2592	0.2591	0.2591	0.2591	0.2590	0.2591	0.2590	0.2589	0.2589
16	0.2643	0.2634	0.2634	0.2633	0.2631	0.2630	0.2629	0.2629	0.2628	0.2628	0.2628	0.2627	0.2627	0.2626	0.2626
17	0.2618	0.2608	0.2608	0.2607	0.2604	0.2603	0.2603	0.2602	0.2602	0.2602	0.2602	0.2601	0.2601	0.2600	0.2600
18	0.2671	0.2663	0.2662	0.2662	0.2660	0.2658	0.2658	0.2657	0.2657	0.2656	0.2656	0.2655	0.2656	0.2655	0.2655
19	0.2652	0.2644	0.2643	0.2643	0.2640	0.2640	0.2639	0.2639	0.2638	0.2638	0.2638	0.2638	0.2637	0.2636	0.2636
20	0.2616	0.2608	0.2608	0.2607	0.2604	0.2603	0.2602	0.2602	0.2602	0.2601	0.2601	0.2601	0.2601	0.2600	0.2600
21	0.2630	0.2622	0.2622	0.2622	0.2619	0.2618	0.2617	0.2617	0.2616	0.2616	0.2615	0.2615	0.2615	0.2613	0.2613
22	0.2587	0.2579	0.2579	0.2579	0.2576	0.2575	0.2574	0.2574	0.2573	0.2573	0.2573	0.2572	0.2571	0.2571	0.2570
23	0.2637	0.2629	0.2629	0.2629	0.2625	0.2624	0.2624	0.2624	0.2623	0.2623	0.2622	0.2621	0.2621	0.2620	0.2620
24	0.2586	0.2578	0.2577	0.2577	0.2574	0.2573	0.2573	0.2572	0.2571	0.2571	0.2570	0.2569	0.2569	0.2567	0.2567
25	0.2626	0.2617	0.2617	0.2616	0.2614	0.2613	0.2612	0.2612	0.2611	0.2611	0.2611	0.2610	0.2610	0.2609	0.2609
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.2626	0.2617	0.2617	0.2616	0.2614	0.2613	0.2612	0.2612	0.2611	0.2611	0.2611	0.2610	0.2610	0.2609	0.2609
Med.	0.2626	0.2617	0.2617	0.2616	0.2614	0.2613	0.2612	0.2612	0.2611	0.2611	0.2611	0.2610	0.2610	0.2609	0.2609
σ	0.0024	0.0024	0.0024	0.0024	0.0024	0.0024	0.0024	0.0024	0.0025	0.0024	0.0024	0.0024	0.0025	0.0025	0.0025
Min.	0.2586	0.2578	0.2577	0.2577	0.2574	0.2573	0.2573	0.2572	0.2571	0.2571	0.2570	0.2569	0.2569	0.2567	0.2567
Max.	0.2671	0.2663	0.2662	0.2662	0.2660	0.2658	0.2658	0.2657	0.2657	0.2656	0.2656	0.2655	0.2656	0.2655	0.2655

## Data Set 2 : 55 °C, 150 mA

Actual Case Temperature [T <sub>c</sub> ]	58.4 °C
Actual Ambient Temperature [T <sub>A</sub> ]	56.5 °C
Drive Current [I <sub>f</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 2-6**  
Chromaticity

LED No.	Chromaticity v'														
	0 h	542 h	1010 h	1699 h	2372 h	3124 h	3812 h	4520 h	5185 h	6019 h	6780 h	7577 h	8411 h	9239 h	10074 h
1	0.5272	0.5271	0.5270	0.5270	0.5270	0.5269	0.5269	0.5269	0.5269	0.5270	0.5269	0.5269	0.5270	0.5269	0.5270
2	0.5246	0.5244	0.5244	0.5243	0.5243	0.5243	0.5243	0.5242	0.5243	0.5244	0.5242	0.5243	0.5244	0.5243	0.5244
3	0.5274	0.5273	0.5272	0.5272	0.5272	0.5271	0.5271	0.5271	0.5271	0.5272	0.5271	0.5272	0.5272	0.5272	0.5272
4	0.5274	0.5273	0.5273	0.5273	0.5273	0.5273	0.5273	0.5273	0.5273	0.5274	0.5272	0.5273	0.5273	0.5273	0.5273
5	0.5293	0.5291	0.5291	0.5291	0.5291	0.5290	0.5290	0.5290	0.5290	0.5291	0.5290	0.5291	0.5291	0.5290	0.5291
6	0.5280	0.5278	0.5278	0.5278	0.5277	0.5277	0.5277	0.5277	0.5278	0.5278	0.5277	0.5277	0.5278	0.5277	0.5278
7	0.5274	0.5272	0.5271	0.5271	0.5271	0.5270	0.5271	0.5270	0.5271	0.5271	0.5270	0.5271	0.5271	0.5271	0.5271
8	0.5297	0.5295	0.5295	0.5295	0.5294	0.5294	0.5294	0.5294	0.5294	0.5295	0.5294	0.5295	0.5295	0.5294	0.5295
9	0.5251	0.5250	0.5249	0.5249	0.5249	0.5248	0.5248	0.5248	0.5249	0.5249	0.5248	0.5249	0.5249	0.5248	0.5249
10	0.5354	0.5353	0.5353	0.5353	0.5353	0.5352	0.5353	0.5353	0.5353	0.5354	0.5352	0.5353	0.5353	0.5353	0.5354
11	0.5272	0.5271	0.5270	0.5271	0.5270	0.5270	0.5270	0.5269	0.5269	0.5270	0.5269	0.5270	0.5270	0.5270	0.5270
12	0.5282	0.5280	0.5280	0.5281	0.5280	0.5279	0.5280	0.5279	0.5279	0.5280	0.5279	0.5280	0.5280	0.5280	0.5280
13	0.5256	0.5255	0.5254	0.5255	0.5254	0.5254	0.5254	0.5254	0.5254	0.5254	0.5254	0.5254	0.5255	0.5254	0.5255
14	0.5336	0.5335	0.5335	0.5336	0.5335	0.5335	0.5335	0.5335	0.5335	0.5335	0.5334	0.5335	0.5335	0.5335	0.5336
15	0.5295	0.5293	0.5293	0.5294	0.5293	0.5292	0.5293	0.5292	0.5293	0.5293	0.5292	0.5293	0.5293	0.5292	0.5293
16	0.5312	0.5310	0.5310	0.5311	0.5310	0.5310	0.5310	0.5310	0.5310	0.5310	0.5309	0.5310	0.5310	0.5310	0.5311
17	0.5277	0.5274	0.5274	0.5274	0.5274	0.5273	0.5273	0.5273	0.5273	0.5274	0.5273	0.5274	0.5274	0.5273	0.5274
18	0.5334	0.5333	0.5333	0.5333	0.5333	0.5332	0.5333	0.5332	0.5333	0.5333	0.5332	0.5333	0.5333	0.5333	0.5333
19	0.5305	0.5304	0.5303	0.5304	0.5303	0.5303	0.5303	0.5302	0.5303	0.5304	0.5302	0.5303	0.5303	0.5303	0.5304
20	0.5270	0.5268	0.5267	0.5268	0.5267	0.5267	0.5267	0.5267	0.5267	0.5268	0.5266	0.5268	0.5267	0.5267	0.5268
21	0.5316	0.5315	0.5315	0.5315	0.5315	0.5314	0.5314	0.5314	0.5315	0.5315	0.5314	0.5315	0.5315	0.5314	0.5315
22	0.5269	0.5267	0.5267	0.5268	0.5267	0.5266	0.5266	0.5266	0.5266	0.5267	0.5266	0.5267	0.5267	0.5266	0.5267
23	0.5306	0.5304	0.5305	0.5305	0.5304	0.5304	0.5304	0.5304	0.5304	0.5305	0.5303	0.5304	0.5304	0.5304	0.5305
24	0.5185	0.5183	0.5183	0.5183	0.5182	0.5181	0.5181	0.5181	0.5181	0.5182	0.5180	0.5181	0.5180	0.5180	0.5180
25	0.5263	0.5261	0.5261	0.5261	0.5261	0.5260	0.5260	0.5260	0.5260	0.5260	0.5259	0.5260	0.5260	0.5259	0.5260
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.5284	0.5282	0.5282	0.5282	0.5282	0.5281	0.5281	0.5281	0.5281	0.5282	0.5281	0.5282	0.5282	0.5281	0.5282
Med.	0.5277	0.5274	0.5274	0.5274	0.5274	0.5273	0.5273	0.5273	0.5273	0.5274	0.5273	0.5274	0.5274	0.5273	0.5274
σ	0.0034	0.0034	0.0034	0.0034	0.0034	0.0035	0.0035	0.0035	0.0035	0.0035	0.0035	0.0035	0.0035	0.0035	0.0035
Min.	0.5185	0.5183	0.5183	0.5183	0.5182	0.5181	0.5181	0.5181	0.5181	0.5182	0.5180	0.5181	0.5180	0.5180	0.5180
Max.	0.5354	0.5353	0.5353	0.5353	0.5353	0.5352	0.5353	0.5353	0.5353	0.5354	0.5352	0.5353	0.5353	0.5353	0.5354

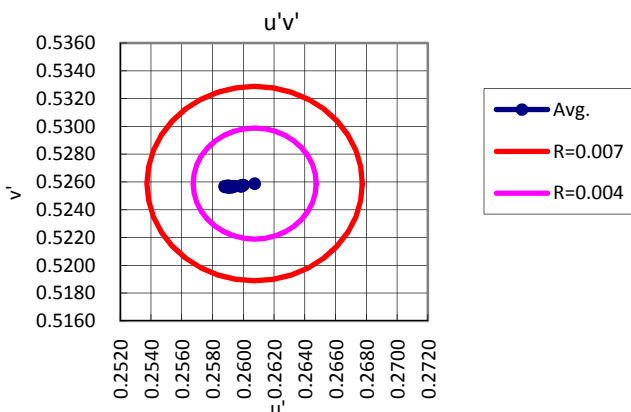
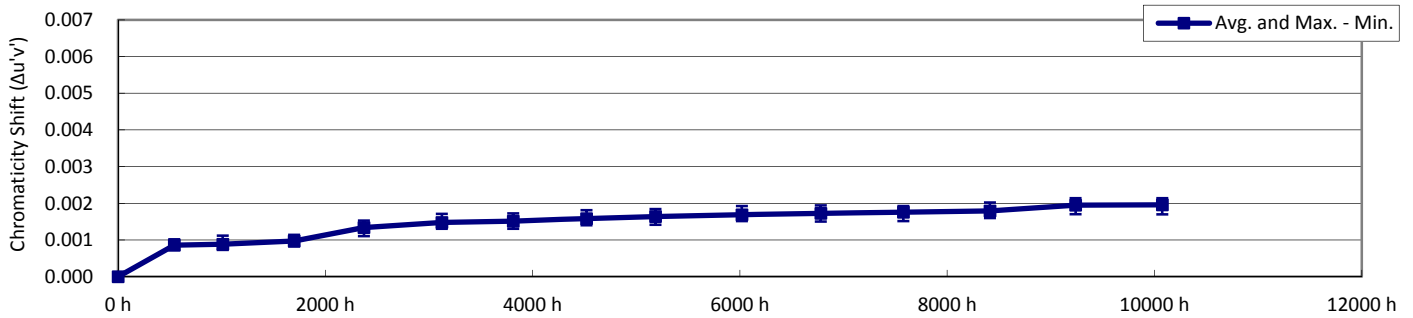
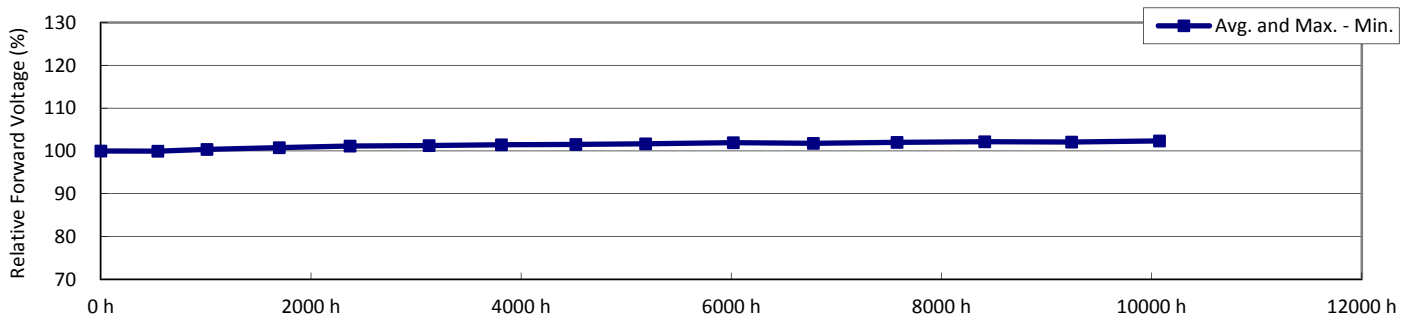
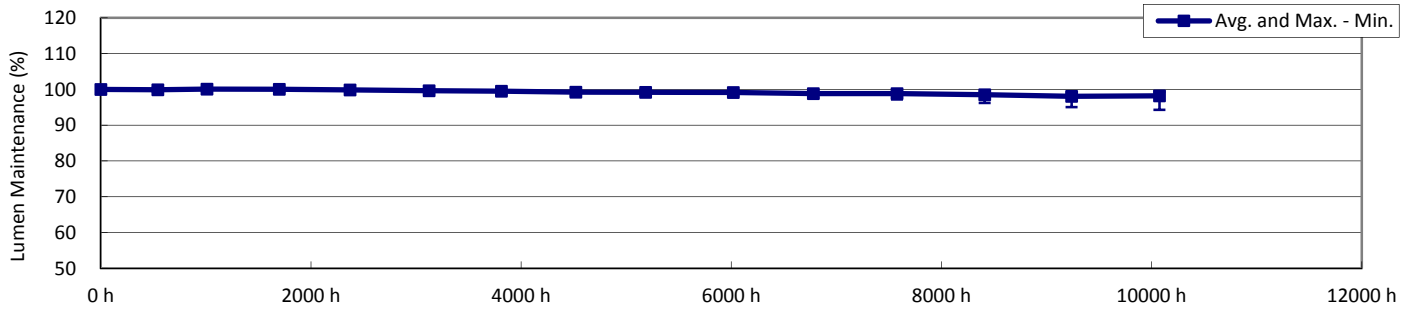


### Data Set 3 : 55 °C, 200 mA

Actual Case Temperature [T <sub>S</sub> ]	60.3 °C
Actual Ambient Temperature [T <sub>A</sub> ]	57.5 °C
Drive Current [I <sub>F</sub> ]	200 mA
Measurement Current	200 mA

NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0



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### Data Set 3 : 55 °C, 200 mA

Actual Case Temperature [T <sub>s</sub> ]	60.3 °C
Actual Ambient Temperature [T <sub>A</sub> ]	57.5 °C
Drive Current [I <sub>F</sub> ]	200 mA
Measurement Current	200 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 3-1**  
Initial Characteristics

LED No.	Luminous flux	Forward voltage	CCT	Input Power	CIE1931		CIE1976					
	Φ <sub>V</sub> [lm]	V <sub>F</sub> [V]	T <sub>CP</sub> [K]	P [W]	x	y	u'	v'				
1	129.3	6.58	2782	1.32	0.453	0.408	0.259	0.525				
2	128.9	6.57	2783	1.31	0.449	0.401	0.260	0.522				
3	127.5	6.59	2648	1.32	0.469	0.419	0.264	0.532				
4	129.9	6.57	2842	1.31	0.444	0.400	0.257	0.521				
5	128.4	6.57	2765	1.31	0.453	0.406	0.260	0.524				
6	128.8	6.58	2807	1.32	0.449	0.403	0.259	0.523				
7	126.4	6.59	2818	1.32	0.445	0.397	0.259	0.520				
8	128.1	6.60	2794	1.32	0.450	0.404	0.259	0.523				
9	127.5	6.58	2774	1.32	0.450	0.401	0.260	0.522				
10	127.8	6.60	2630	1.32	0.471	0.420	0.265	0.533				
11	127.8	6.59	2649	1.32	0.467	0.416	0.264	0.531				
12	128.9	6.57	2758	1.31	0.456	0.412	0.260	0.527				
13	129.0	6.59	2747	1.32	0.456	0.410	0.260	0.526				
14	125.8	6.59	2600	1.32	0.474	0.423	0.266	0.534				
15	128.9	6.58	2751	1.32	0.454	0.407	0.261	0.525				
16	128.5	6.60	2714	1.32	0.463	0.417	0.261	0.530				
17	126.2	6.59	2755	1.32	0.453	0.404	0.261	0.524				
18	126.5	6.59	2747	1.32	0.452	0.402	0.261	0.523				
19	126.4	6.59	2665	1.32	0.464	0.414	0.264	0.529				
20	128.6	6.57	2815	1.31	0.448	0.403	0.258	0.523				
21	127.4	6.58	2815	1.32	0.446	0.400	0.258	0.521				
22	126.6	6.58	2802	1.32	0.445	0.396	0.259	0.520				
23	128.8	6.57	2684	1.31	0.467	0.421	0.262	0.532				
24	128.5	6.57	2653	1.31	0.469	0.421	0.264	0.533				
25	128.1	6.60	2786	1.32	0.449	0.402	0.259	0.523				
n	25	25	25	25	25	25	25	25				
Avg.	128.0	6.58	2743	1.32	0.456	0.408	0.261	0.526				
Med.	128.1	6.58	2758	1.32	0.453	0.406	0.260	0.524				
σ	1.11	0.010	68.4	0.002	0.0092	0.0083	0.0024	0.0045				
Min.	125.8	6.57	2600	1.31	0.444	0.396	0.257	0.520				
Max.	129.9	6.60	2842	1.32	0.474	0.423	0.266	0.534				



**Data Set 3 : 55 °C, 200 mA**

Actual Case Temperature [T <sub>S</sub> ]	60.3 °C
Actual Ambient Temperature [T <sub>A</sub> ]	57.5 °C
Drive Current [I <sub>F</sub> ]	200 mA
Measurement Current	200 mA

NOTES:  
 T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0

**TABLE 3-2**  
 Lumen Maintenance

LED No.	Lumen Maintenance % ( Normalized to 100 % at 0 hours )														
	0 h	542 h	1010 h	1699 h	2372 h	3124 h	3812 h	4520 h	5185 h	6019 h	6780 h	7577 h	8412 h	9239 h	10075 h
1	100.0	100.0	100.2	100.2	100.0	99.8	99.7	99.3	99.4	99.4	99.0	99.2	98.9	98.5	98.4
2	100.0	99.3	99.4	99.3	99.1	98.7	98.6	98.3	98.2	98.3	97.7	97.2	96.2	95.0	94.3
3	100.0	99.9	100.0	100.0	100.0	99.5	99.4	99.3	99.1	99.5	99.2	99.1	98.8	98.3	98.7
4	100.0	99.6	99.6	99.5	99.5	98.9	98.9	98.7	98.5	98.7	98.4	98.3	98.0	97.6	98.0
5	100.0	100.3	100.4	100.4	100.4	99.9	99.8	99.7	99.5	99.6	99.4	99.3	99.1	98.8	99.3
6	100.0	100.0	100.0	99.9	99.8	99.4	99.3	99.0	98.9	98.5	97.8	97.2	96.5	95.7	95.6
7	100.0	99.8	99.8	99.7	99.6	99.4	99.2	98.9	99.0	98.7	98.3	98.4	98.1	97.9	98.2
8	100.0	100.4	100.7	100.6	100.3	100.2	100.1	99.6	99.8	99.5	99.1	99.3	99.0	98.7	98.8
9	100.0	100.0	100.3	100.1	99.9	99.8	99.7	99.1	99.3	99.0	98.4	98.6	98.1	97.7	97.3
10	100.0	100.4	100.7	100.6	100.4	100.3	100.2	99.7	99.9	99.8	99.4	99.6	99.3	99.1	98.9
11	100.0	100.1	100.4	100.3	100.0	99.8	99.7	99.3	99.4	99.6	99.3	99.4	99.1	98.7	98.7
12	100.0	99.8	100.1	100.1	99.8	99.7	99.7	99.5	99.4	99.6	99.3	99.4	99.2	98.7	98.9
13	100.0	99.6	99.8	99.9	99.6	99.4	99.4	99.2	99.1	99.3	99.0	99.0	98.9	98.4	98.7
14	100.0	99.5	99.6	99.6	99.4	99.2	99.1	99.0	98.7	98.7	98.4	98.2	97.8	97.1	97.5
15	100.0	99.8	99.9	100.0	99.8	99.5	99.5	99.3	99.1	99.0	98.6	98.5	98.2	97.7	98.2
16	100.0	99.5	99.5	99.5	99.3	99.1	99.0	98.8	98.8	98.6	98.3	98.4	98.2	97.9	98.3
17	100.0	99.8	99.9	99.8	99.7	99.4	99.3	99.1	99.0	98.7	98.5	98.5	98.3	98.0	98.4
18	100.0	100.3	100.4	100.4	100.2	100.0	99.9	99.5	99.6	99.3	99.0	99.1	98.9	98.6	98.7
19	100.0	100.2	100.4	100.4	100.2	99.9	99.8	99.3	99.5	98.8	98.8	99.0	98.7	98.5	98.5
20	100.0	100.2	100.4	100.4	100.1	99.9	99.8	99.4	99.5	99.5	99.2	99.2	99.0	98.6	98.4
21	100.0	100.0	100.2	100.3	100.0	99.8	99.8	99.4	99.4	99.5	99.1	99.2	98.9	98.4	98.4
22	100.0	99.9	100.1	100.2	99.9	99.7	99.7	99.4	99.4	99.6	99.2	99.3	99.0	98.6	98.7
23	100.0	99.8	100.0	100.1	99.8	99.5	99.4	99.1	99.0	99.2	98.9	98.9	98.6	98.3	98.4
24	100.0	100.0	100.2	100.2	100.1	99.9	99.8	99.5	99.5	99.6	99.3	99.3	99.1	98.8	99.1
25	100.0	99.8	99.9	99.9	99.7	99.5	99.3	99.1	99.0	99.0	98.6	98.6	98.4	98.1	98.4
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	99.9	100.1	100.1	99.9	99.6	99.5	99.2	99.2	99.2	98.8	98.8	98.5	98.1	98.2
Med.	100.0	99.9	100.1	100.1	99.9	99.7	99.7	99.3	99.3	99.3	99.0	99.0	98.8	98.4	98.4
σ	0.00	0.29	0.33	0.34	0.33	0.38	0.38	0.33	0.40	0.44	0.49	0.63	0.77	0.94	1.08
Min.	100.0	99.3	99.4	99.3	99.1	98.7	98.6	98.3	98.2	98.3	97.7	97.2	96.2	95.0	94.3
Max.	100.0	100.4	100.7	100.6	100.4	100.3	100.2	99.7	99.9	99.8	99.4	99.6	99.3	99.1	99.3

**TM-21 Projection**

Time	4520 h	5185 h	6019 h	6780 h	7577 h	8412 h	9239 h	10075 h								
ln(Avg.)	-0.0078	-0.0080	-0.0084	-0.0120	-0.0120	-0.0152	-0.0195	-0.0183								

Test duration used	4520 h	to	10075 h
B	1.004		
α	2.25E-06		
R <sup>2</sup>	0.917		
Calculated L <sub>70</sub> (10K)	160000	hours	
Reported L <sub>70</sub> (10K)	> 60500	hours	
Calculated L <sub>80</sub> (10K)	101000	hours	
Reported L <sub>80</sub> (10K)	> 60500	hours	
Calculated L <sub>90</sub> (10K)	48300	hours	
Reported L <sub>90</sub> (10K)	48300	hours	

Curve-fit equation:  
 $\Phi(t)=Bexp(-\alpha t)$

Lumen maintenance life equation:  
 $L_{70} = \ln(B/0.7)/\alpha$

$L_{80} = \ln(B/0.8)/\alpha$

$L_{90} = \ln(B/0.9)/\alpha$

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 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*



### Data Set 3 : 55 °C, 200 mA

Actual Case Temperature [T <sub>c</sub> ]	60.3 °C
Actual Ambient Temperature [T <sub>A</sub> ]	57.5 °C
Drive Current [I <sub>F</sub> ]	200 mA
Measurement Current	200 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 3-3**  
Forward Voltage

LED No.	Relative Forward Voltage % ( Normalized to 100 % at 0 hours )														
	0 h	542 h	1010 h	1699 h	2372 h	3124 h	3812 h	4520 h	5185 h	6019 h	6780 h	7577 h	8412 h	9239 h	10075 h
1	100.0	99.9	100.4	100.7	101.2	101.3	101.5	101.5	101.7	102.0	101.8	102.1	102.2	102.1	102.4
2	100.0	99.9	100.2	100.5	100.9	101.0	101.2	101.2	101.4	101.6	101.5	101.7	101.8	101.7	101.9
3	100.0	100.0	100.4	100.8	101.2	101.3	101.5	101.6	101.8	102.0	101.9	102.2	102.2	102.2	102.4
4	100.0	99.9	100.2	100.5	100.9	101.0	101.2	101.3	101.4	101.7	101.5	101.8	101.9	101.8	102.0
5	100.0	99.9	100.3	100.6	101.1	101.2	101.4	101.5	101.6	101.9	101.8	102.0	102.1	102.1	102.3
6	100.0	100.0	100.4	100.7	101.2	101.3	101.5	101.6	101.8	102.0	101.8	102.1	102.2	102.1	102.4
7	100.0	99.9	100.3	100.6	101.1	101.2	101.4	101.4	101.6	101.9	101.7	101.9	102.1	102.0	102.3
8	100.0	99.9	100.4	100.7	101.2	101.3	101.4	101.6	101.8	102.0	101.8	102.1	102.2	102.1	102.4
9	100.0	99.9	100.3	100.6	101.1	101.2	101.4	101.5	101.6	101.9	101.7	101.9	102.0	102.0	102.2
10	100.0	99.9	100.3	100.7	101.1	101.2	101.5	101.5	101.7	102.0	101.8	102.0	102.1	102.1	102.3
11	100.0	99.9	100.4	100.8	101.1	101.3	101.4	101.5	101.7	101.9	101.8	102.0	102.2	102.1	102.3
12	100.0	99.9	100.4	100.8	101.1	101.3	101.4	101.6	101.7	102.0	101.8	102.1	102.2	102.1	102.4
13	100.0	100.0	100.4	100.8	101.2	101.2	101.5	101.5	101.7	102.0	101.8	102.0	102.2	102.1	102.3
14	100.0	100.0	100.5	100.9	101.2	101.3	101.5	101.6	101.8	102.0	101.9	102.1	102.2	102.2	102.4
15	100.0	100.0	100.4	100.8	101.1	101.3	101.5	101.5	101.7	101.9	101.8	102.0	102.2	102.1	102.3
16	100.0	99.9	100.3	100.7	101.0	101.1	101.3	101.4	101.5	101.8	101.6	101.9	102.0	101.9	102.1
17	100.0	100.0	100.4	100.8	101.2	101.3	101.5	101.6	101.7	102.0	101.8	102.1	102.2	102.2	102.4
18	100.0	100.0	100.4	100.8	101.2	101.3	101.5	101.6	101.7	102.0	101.8	102.1	102.2	102.1	102.4
19	100.0	100.0	100.4	100.9	101.2	101.3	101.5	101.6	101.7	102.0	101.8	102.1	102.2	102.1	102.4
20	100.0	100.0	100.4	100.8	101.2	101.3	101.4	101.6	101.7	102.0	101.8	102.1	102.2	102.1	102.4
21	100.0	99.9	100.4	100.8	101.1	101.3	101.4	101.5	101.7	101.9	101.8	102.0	102.2	102.2	102.4
22	100.0	100.0	100.4	100.8	101.2	101.3	101.5	101.6	101.7	102.0	101.8	102.1	102.2	102.2	102.4
23	100.0	100.0	100.4	100.8	101.2	101.3	101.5	101.6	101.7	102.0	101.8	102.1	102.2	102.2	102.4
24	100.0	99.9	100.4	100.8	101.1	101.3	101.4	101.5	101.7	101.8	101.7	102.0	102.1	102.1	102.3
25	100.0	100.0	100.4	100.9	101.2	101.3	101.5	101.6	101.8	102.0	101.9	102.1	102.2	102.2	102.4
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	99.9	100.4	100.8	101.1	101.2	101.4	101.5	101.7	101.9	101.8	102.0	102.1	102.1	102.3
Med.	100.0	99.9	100.4	100.8	101.2	101.3	101.5	101.5	101.7	102.0	101.8	102.1	102.2	102.1	102.4
σ	0.00	0.04	0.07	0.10	0.08	0.09	0.09	0.10	0.10	0.10	0.10	0.11	0.12	0.12	0.12
Min.	100.0	99.9	100.2	100.5	100.9	101.0	101.2	101.2	101.4	101.6	101.5	101.7	101.8	101.7	101.9
Max.	100.0	100.0	100.5	100.9	101.2	101.3	101.5	101.6	101.8	102.0	101.9	102.2	102.2	102.2	102.4

### Data Set 3 : 55 °C, 200 mA

Actual Case Temperature [T <sub>S</sub> ]	60.3 °C
Actual Ambient Temperature [T <sub>A</sub> ]	57.5 °C
Drive Current [I <sub>F</sub> ]	200 mA
Measurement Current	200 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 3-4**  
Chromaticity Shift

LED No.	Chromaticity Shift Δu'v'														
	0 h	542 h	1010 h	1699 h	2372 h	3124 h	3812 h	4520 h	5185 h	6019 h	6780 h	7577 h	8412 h	9239 h	10075 h
1	0.0000	0.0008	0.0008	0.0010	0.0013	0.0015	0.0015	0.0015	0.0016	0.0017	0.0017	0.0018	0.0018	0.0020	0.0020
2	0.0000	0.0008	0.0009	0.0010	0.0013	0.0015	0.0016	0.0017	0.0017	0.0018	0.0018	0.0018	0.0019	0.0019	0.0018
3	0.0000	0.0009	0.0009	0.0009	0.0013	0.0015	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0017	0.0018	0.0018
4	0.0000	0.0008	0.0007	0.0009	0.0013	0.0014	0.0015	0.0016	0.0017	0.0017	0.0018	0.0018	0.0019	0.0020	0.0021
5	0.0000	0.0009	0.0009	0.0010	0.0014	0.0016	0.0017	0.0018	0.0018	0.0018	0.0018	0.0019	0.0019	0.0021	0.0020
6	0.0000	0.0010	0.0010	0.0011	0.0015	0.0016	0.0017	0.0017	0.0018	0.0018	0.0019	0.0019	0.0019	0.0021	0.0021
7	0.0000	0.0009	0.0010	0.0011	0.0015	0.0016	0.0017	0.0017	0.0018	0.0019	0.0019	0.0019	0.0020	0.0021	0.0021
8	0.0000	0.0009	0.0009	0.0009	0.0013	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016	0.0017	0.0017	0.0018	0.0018
9	0.0000	0.0008	0.0009	0.0010	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0018	0.0018	0.0020	0.0020
10	0.0000	0.0008	0.0008	0.0009	0.0012	0.0014	0.0014	0.0015	0.0015	0.0016	0.0015	0.0016	0.0016	0.0017	0.0017
11	0.0000	0.0009	0.0009	0.0010	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0018	0.0018	0.0019	0.0020
12	0.0000	0.0007	0.0007	0.0009	0.0012	0.0013	0.0014	0.0015	0.0015	0.0016	0.0016	0.0016	0.0017	0.0019	0.0018
13	0.0000	0.0008	0.0008	0.0009	0.0013	0.0014	0.0014	0.0015	0.0015	0.0016	0.0017	0.0017	0.0017	0.0019	0.0019
14	0.0000	0.0008	0.0009	0.0009	0.0013	0.0014	0.0015	0.0015	0.0016	0.0017	0.0018	0.0018	0.0018	0.0020	0.0020
15	0.0000	0.0009	0.0009	0.0010	0.0014	0.0015	0.0015	0.0016	0.0017	0.0017	0.0018	0.0018	0.0018	0.0019	0.0020
16	0.0000	0.0010	0.0011	0.0011	0.0015	0.0017	0.0017	0.0017	0.0018	0.0018	0.0018	0.0018	0.0019	0.0020	0.0020
17	0.0000	0.0009	0.0010	0.0011	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0019	0.0019	0.0019	0.0021	0.0021
18	0.0000	0.0008	0.0008	0.0009	0.0013	0.0014	0.0015	0.0015	0.0016	0.0016	0.0016	0.0017	0.0017	0.0018	0.0019
19	0.0000	0.0009	0.0009	0.0010	0.0013	0.0014	0.0015	0.0016	0.0016	0.0016	0.0016	0.0015	0.0016	0.0017	0.0019
20	0.0000	0.0008	0.0008	0.0009	0.0013	0.0014	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0016	0.0018	0.0018
21	0.0000	0.0008	0.0008	0.0009	0.0013	0.0014	0.0014	0.0015	0.0016	0.0017	0.0017	0.0018	0.0019	0.0020	0.0021
22	0.0000	0.0008	0.0008	0.0008	0.0012	0.0013	0.0013	0.0014	0.0014	0.0015	0.0015	0.0015	0.0016	0.0018	0.0018
23	0.0000	0.0008	0.0008	0.0009	0.0012	0.0013	0.0014	0.0015	0.0015	0.0016	0.0017	0.0017	0.0017	0.0019	0.0019
24	0.0000	0.0008	0.0008	0.0009	0.0011	0.0013	0.0013	0.0014	0.0015	0.0016	0.0016	0.0017	0.0017	0.0019	0.0019
25	0.0000	0.0008	0.0008	0.0009	0.0013	0.0014	0.0014	0.0015	0.0016	0.0017	0.0017	0.0018	0.0019	0.0021	0.0021
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.0000	0.0009	0.0009	0.0010	0.0013	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0018	0.0018	0.0019	0.0020
Med.	0.0000	0.0008	0.0009	0.0009	0.0013	0.0014	0.0015	0.0015	0.0016	0.0017	0.0017	0.0018	0.0018	0.0019	0.0020
σ	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.0000	0.0007	0.0007	0.0008	0.0011	0.0013	0.0013	0.0014	0.0014	0.0015	0.0015	0.0015	0.0016	0.0017	0.0017
Max.	0.0000	0.0010	0.0011	0.0011	0.0015	0.0017	0.0017	0.0018	0.0018	0.0019	0.0019	0.0019	0.0020	0.0021	0.0021

### Data Set 3 : 55 °C, 200 mA

Actual Case Temperature [T <sub>c</sub> ]	60.3 °C
Actual Ambient Temperature [T <sub>A</sub> ]	57.5 °C
Drive Current [I <sub>f</sub> ]	200 mA
Measurement Current	200 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 3-5**  
Chromaticity

LED No.	Chromaticity u'														
	0 h	542 h	1010 h	1699 h	2372 h	3124 h	3812 h	4520 h	5185 h	6019 h	6780 h	7577 h	8412 h	9239 h	10075 h
1	0.2595	0.2587	0.2587	0.2585	0.2582	0.2580	0.2580	0.2580	0.2579	0.2578	0.2578	0.2577	0.2577	0.2575	0.2575
2	0.2603	0.2595	0.2594	0.2593	0.2590	0.2588	0.2587	0.2586	0.2586	0.2585	0.2585	0.2585	0.2584	0.2584	0.2585
3	0.2649	0.2640	0.2640	0.2640	0.2636	0.2634	0.2634	0.2634	0.2633	0.2633	0.2632	0.2632	0.2632	0.2631	0.2631
4	0.2579	0.2571	0.2572	0.2570	0.2566	0.2565	0.2564	0.2563	0.2562	0.2562	0.2561	0.2561	0.2560	0.2559	0.2558
5	0.2608	0.2599	0.2599	0.2598	0.2594	0.2592	0.2591	0.2590	0.2590	0.2590	0.2590	0.2589	0.2589	0.2587	0.2588
6	0.2594	0.2584	0.2584	0.2583	0.2579	0.2578	0.2577	0.2577	0.2576	0.2576	0.2575	0.2575	0.2575	0.2573	0.2573
7	0.2594	0.2585	0.2584	0.2583	0.2579	0.2578	0.2577	0.2577	0.2576	0.2575	0.2575	0.2575	0.2574	0.2573	0.2573
8	0.2598	0.2589	0.2589	0.2589	0.2585	0.2583	0.2583	0.2583	0.2582	0.2582	0.2582	0.2581	0.2581	0.2580	0.2580
9	0.2607	0.2599	0.2598	0.2597	0.2593	0.2592	0.2592	0.2591	0.2591	0.2590	0.2590	0.2589	0.2589	0.2587	0.2587
10	0.2656	0.2648	0.2648	0.2647	0.2644	0.2642	0.2642	0.2641	0.2641	0.2640	0.2641	0.2640	0.2640	0.2639	0.2639
11	0.2648	0.2639	0.2639	0.2638	0.2634	0.2633	0.2633	0.2632	0.2632	0.2631	0.2631	0.2630	0.2630	0.2629	0.2628
12	0.2601	0.2594	0.2594	0.2592	0.2589	0.2588	0.2587	0.2586	0.2586	0.2585	0.2585	0.2585	0.2584	0.2582	0.2583
13	0.2609	0.2601	0.2601	0.2600	0.2596	0.2595	0.2595	0.2594	0.2594	0.2593	0.2592	0.2592	0.2592	0.2590	0.2590
14	0.2668	0.2660	0.2659	0.2659	0.2655	0.2654	0.2653	0.2653	0.2652	0.2651	0.2650	0.2650	0.2650	0.2648	0.2648
15	0.2611	0.2602	0.2602	0.2601	0.2597	0.2596	0.2596	0.2595	0.2594	0.2594	0.2593	0.2593	0.2593	0.2592	0.2591
16	0.2621	0.2611	0.2610	0.2610	0.2606	0.2604	0.2604	0.2604	0.2603	0.2603	0.2603	0.2603	0.2602	0.2601	0.2601
17	0.2613	0.2604	0.2603	0.2602	0.2598	0.2597	0.2597	0.2596	0.2595	0.2595	0.2594	0.2594	0.2594	0.2592	0.2592
18	0.2616	0.2608	0.2608	0.2607	0.2603	0.2602	0.2601	0.2601	0.2600	0.2600	0.2600	0.2599	0.2599	0.2598	0.2597
19	0.2644	0.2635	0.2635	0.2634	0.2631	0.2630	0.2629	0.2628	0.2628	0.2628	0.2628	0.2629	0.2628	0.2627	0.2626
20	0.2586	0.2578	0.2578	0.2577	0.2573	0.2572	0.2572	0.2572	0.2571	0.2571	0.2570	0.2570	0.2570	0.2568	0.2568
21	0.2589	0.2581	0.2581	0.2580	0.2576	0.2575	0.2575	0.2574	0.2573	0.2572	0.2572	0.2571	0.2570	0.2569	0.2568
22	0.2599	0.2591	0.2591	0.2591	0.2587	0.2586	0.2586	0.2585	0.2585	0.2584	0.2584	0.2584	0.2583	0.2581	0.2581
23	0.2629	0.2621	0.2621	0.2620	0.2617	0.2616	0.2615	0.2614	0.2614	0.2613	0.2612	0.2612	0.2612	0.2610	0.2610
24	0.2643	0.2635	0.2635	0.2634	0.2632	0.2630	0.2630	0.2629	0.2628	0.2627	0.2627	0.2626	0.2626	0.2624	0.2624
25	0.2600	0.2592	0.2592	0.2591	0.2587	0.2586	0.2586	0.2585	0.2584	0.2583	0.2583	0.2582	0.2581	0.2579	0.2579
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.2614	0.2606	0.2606	0.2605	0.2601	0.2600	0.2599	0.2599	0.2598	0.2598	0.2597	0.2597	0.2597	0.2595	0.2595
Med.	0.2608	0.2599	0.2599	0.2598	0.2594	0.2592	0.2592	0.2591	0.2591	0.2590	0.2590	0.2589	0.2589	0.2587	0.2588
σ	0.0024	0.0024	0.0024	0.0024	0.0024	0.0024	0.0024	0.0024	0.0024	0.0024	0.0024	0.0024	0.0025	0.0025	0.0025
Min.	0.2579	0.2571	0.2572	0.2570	0.2566	0.2565	0.2564	0.2563	0.2562	0.2562	0.2561	0.2561	0.2560	0.2559	0.2558
Max.	0.2668	0.2660	0.2659	0.2659	0.2655	0.2654	0.2653	0.2653	0.2652	0.2651	0.2650	0.2650	0.2650	0.2648	0.2648



**Data Set 3 : 55 °C, 200 mA**

Actual Case Temperature [T <sub>c</sub> ]	60.3 °C
Actual Ambient Temperature [T <sub>A</sub> ]	57.5 °C
Drive Current [I <sub>f</sub> ]	200 mA
Measurement Current	200 mA

NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0

**TABLE 3-6**  
 Chromaticity

LED No.	Chromaticity v'														
	0 h	542 h	1010 h	1699 h	2372 h	3124 h	3812 h	4520 h	5185 h	6019 h	6780 h	7577 h	8412 h	9239 h	10075 h
1	0.5255	0.5254	0.5253	0.5253	0.5254	0.5253	0.5254	0.5254	0.5254	0.5255	0.5253	0.5254	0.5254	0.5254	0.5254
2	0.5221	0.5219	0.5219	0.5219	0.5218	0.5218	0.5218	0.5217	0.5218	0.5218	0.5217	0.5219	0.5219	0.5219	0.5218
3	0.5318	0.5316	0.5316	0.5317	0.5317	0.5316	0.5316	0.5316	0.5317	0.5318	0.5316	0.5317	0.5317	0.5317	0.5318
4	0.5211	0.5209	0.5209	0.5209	0.5209	0.5208	0.5208	0.5208	0.5208	0.5208	0.5207	0.5209	0.5208	0.5208	0.5208
5	0.5245	0.5244	0.5244	0.5244	0.5244	0.5243	0.5243	0.5243	0.5243	0.5244	0.5243	0.5244	0.5244	0.5244	0.5245
6	0.5230	0.5228	0.5227	0.5227	0.5228	0.5227	0.5227	0.5226	0.5226	0.5227	0.5226	0.5227	0.5227	0.5226	0.5226
7	0.5200	0.5198	0.5197	0.5197	0.5197	0.5196	0.5197	0.5196	0.5197	0.5197	0.5196	0.5197	0.5197	0.5196	0.5197
8	0.5232	0.5230	0.5230	0.5230	0.5230	0.5229	0.5230	0.5230	0.5230	0.5230	0.5229	0.5230	0.5230	0.5229	0.5230
9	0.5226	0.5224	0.5224	0.5223	0.5223	0.5223	0.5223	0.5223	0.5223	0.5223	0.5222	0.5223	0.5223	0.5223	0.5223
10	0.5322	0.5321	0.5321	0.5321	0.5321	0.5321	0.5321	0.5321	0.5321	0.5322	0.5321	0.5322	0.5322	0.5321	0.5322
11	0.5305	0.5304	0.5304	0.5304	0.5303	0.5303	0.5303	0.5303	0.5303	0.5304	0.5303	0.5304	0.5305	0.5304	0.5305
12	0.5275	0.5273	0.5273	0.5273	0.5273	0.5272	0.5272	0.5272	0.5272	0.5273	0.5272	0.5273	0.5273	0.5273	0.5273
13	0.5266	0.5264	0.5264	0.5264	0.5264	0.5263	0.5263	0.5263	0.5263	0.5264	0.5263	0.5264	0.5264	0.5263	0.5264
14	0.5339	0.5338	0.5338	0.5338	0.5338	0.5337	0.5338	0.5338	0.5338	0.5338	0.5337	0.5338	0.5338	0.5338	0.5339
15	0.5252	0.5250	0.5250	0.5250	0.5250	0.5249	0.5249	0.5249	0.5249	0.5250	0.5249	0.5250	0.5250	0.5249	0.5250
16	0.5305	0.5303	0.5303	0.5303	0.5303	0.5303	0.5303	0.5303	0.5303	0.5303	0.5302	0.5303	0.5304	0.5303	0.5304
17	0.5244	0.5242	0.5242	0.5241	0.5241	0.5240	0.5241	0.5241	0.5240	0.5241	0.5240	0.5241	0.5241	0.5240	0.5241
18	0.5228	0.5226	0.5226	0.5226	0.5226	0.5225	0.5225	0.5225	0.5225	0.5226	0.5225	0.5226	0.5226	0.5225	0.5225
19	0.5290	0.5289	0.5289	0.5289	0.5289	0.5289	0.5289	0.5289	0.5289	0.5290	0.5289	0.5290	0.5290	0.5289	0.5290
20	0.5229	0.5227	0.5227	0.5227	0.5227	0.5226	0.5226	0.5226	0.5226	0.5227	0.5226	0.5227	0.5227	0.5226	0.5227
21	0.5213	0.5212	0.5211	0.5212	0.5211	0.5211	0.5211	0.5210	0.5211	0.5211	0.5210	0.5211	0.5211	0.5210	0.5210
22	0.5197	0.5195	0.5195	0.5195	0.5195	0.5195	0.5195	0.5195	0.5195	0.5195	0.5194	0.5195	0.5195	0.5194	0.5194
23	0.5321	0.5320	0.5319	0.5320	0.5320	0.5319	0.5319	0.5319	0.5319	0.5320	0.5319	0.5320	0.5320	0.5320	0.5320
24	0.5324	0.5323	0.5323	0.5323	0.5323	0.5323	0.5323	0.5323	0.5323	0.5324	0.5323	0.5324	0.5324	0.5323	0.5324
25	0.5223	0.5222	0.5221	0.5222	0.5221	0.5221	0.5221	0.5221	0.5221	0.5222	0.5220	0.5221	0.5221	0.5220	0.5220
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.5259	0.5257	0.5257	0.5257	0.5257	0.5256	0.5257	0.5256	0.5257	0.5257	0.5256	0.5257	0.5257	0.5257	0.5257
Med.	0.5245	0.5244	0.5244	0.5244	0.5244	0.5243	0.5243	0.5243	0.5243	0.5244	0.5243	0.5244	0.5244	0.5244	0.5245
σ	0.0044	0.0044	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045
Min.	0.5197	0.5195	0.5195	0.5195	0.5195	0.5195	0.5195	0.5195	0.5195	0.5195	0.5194	0.5195	0.5195	0.5194	0.5194
Max.	0.5339	0.5338	0.5338	0.5338	0.5338	0.5337	0.5338	0.5338	0.5338	0.5338	0.5337	0.5338	0.5338	0.5338	0.5339

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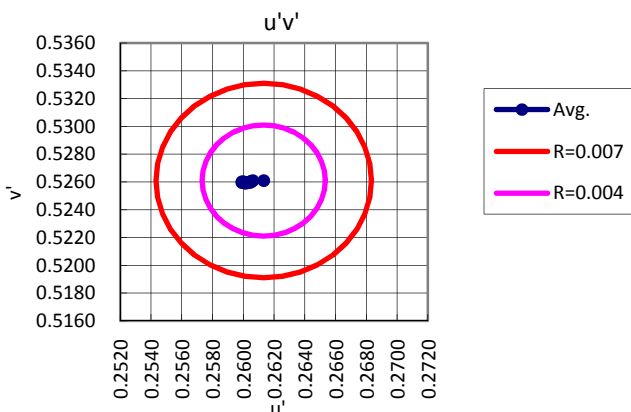
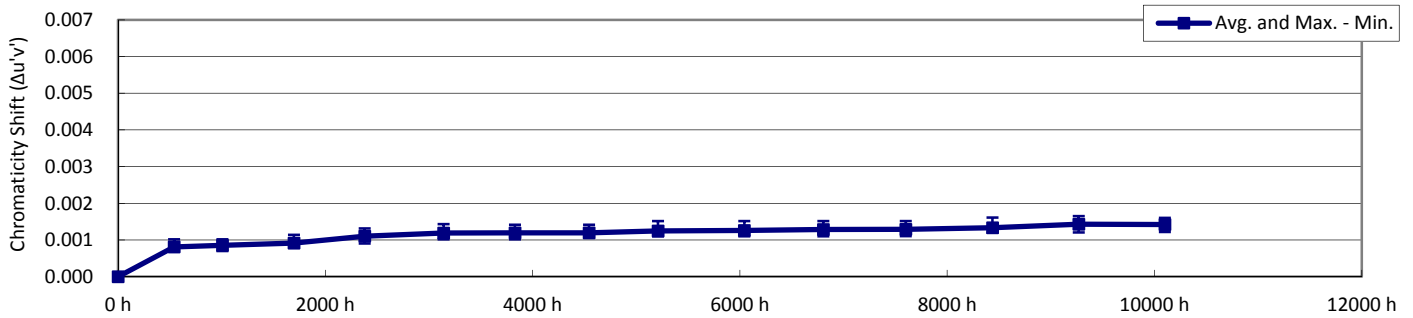
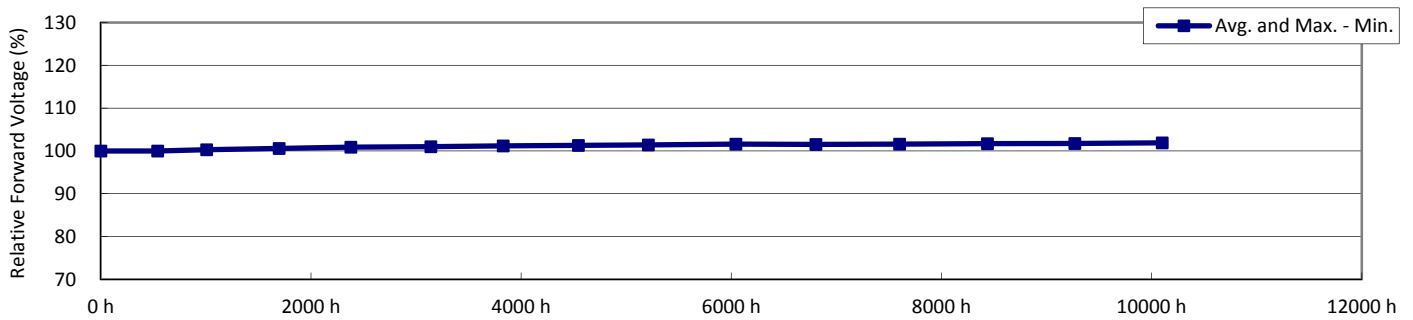
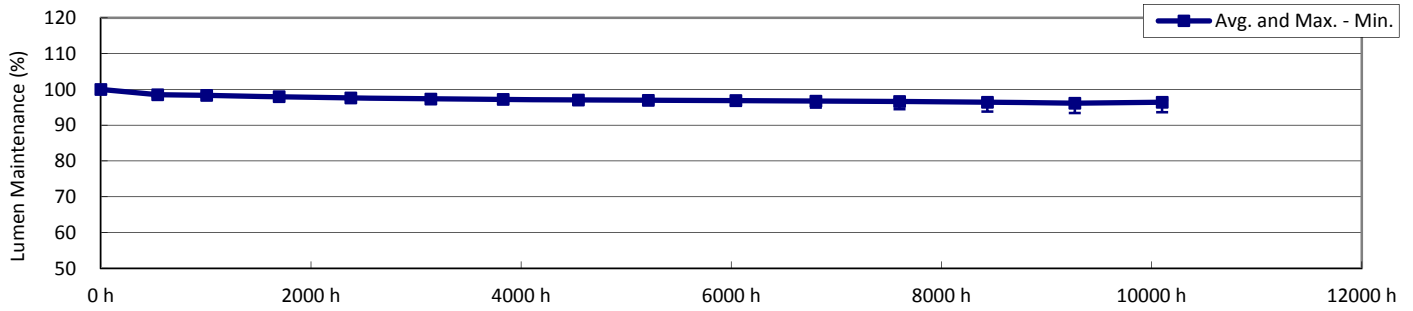


### Data Set 4 : 85 °C, 100 mA

Actual Case Temperature [T <sub>S</sub> ]	86.5 °C
Actual Ambient Temperature [T <sub>A</sub> ]	84.6 °C
Drive Current [I <sub>F</sub> ]	100 mA
Measurement Current	100 mA

NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0



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### Data Set 4 : 85 °C, 100 mA

Actual Case Temperature [T <sub>s</sub> ]	86.5 °C
Actual Ambient Temperature [T <sub>A</sub> ]	84.6 °C
Drive Current [I <sub>F</sub> ]	100 mA
Measurement Current	100 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 4-1**  
Initial Characteristics

LED No.	Luminous flux	Forward voltage	CCT	Input Power	CIE1931		CIE1976					
	Φ <sub>V</sub> [lm]	V <sub>F</sub> [V]	T <sub>CP</sub> [K]	P [W]	x	y	u'	v'				
1	70.7	6.03	2824	0.60	0.444	0.397	0.258	0.520				
2	71.4	6.02	2699	0.60	0.464	0.417	0.262	0.530				
3	70.5	6.02	2659	0.60	0.466	0.417	0.264	0.531				
4	70.0	6.02	2620	0.60	0.472	0.421	0.265	0.533				
5	70.2	6.01	2742	0.60	0.453	0.403	0.261	0.523				
6	69.5	6.02	2643	0.60	0.468	0.417	0.265	0.531				
7	70.6	6.02	2675	0.60	0.465	0.417	0.263	0.531				
8	71.2	6.01	2695	0.60	0.463	0.416	0.262	0.530				
9	70.3	6.01	2693	0.60	0.459	0.408	0.263	0.526				
10	70.1	6.02	2792	0.60	0.449	0.402	0.259	0.522				
11	69.9	6.03	2759	0.60	0.452	0.404	0.261	0.524				
12	69.8	6.03	2765	0.60	0.451	0.402	0.260	0.523				
13	70.9	6.01	2816	0.60	0.446	0.399	0.259	0.521				
14	70.3	6.02	2787	0.60	0.451	0.405	0.259	0.524				
15	71.7	6.03	2719	0.60	0.462	0.416	0.261	0.530				
16	71.4	6.02	2768	0.60	0.452	0.405	0.260	0.524				
17	70.8	6.03	2732	0.60	0.455	0.405	0.262	0.524				
18	71.7	6.02	2840	0.60	0.445	0.400	0.257	0.521				
19	70.5	6.02	2817	0.60	0.444	0.397	0.259	0.520				
20	70.3	6.02	2650	0.60	0.467	0.417	0.264	0.531				
21	69.2	6.03	2588	0.60	0.473	0.419	0.267	0.533				
22	70.3	6.02	2774	0.60	0.450	0.402	0.260	0.523				
23	70.4	6.02	2701	0.60	0.462	0.415	0.262	0.530				
24	71.3	6.01	2763	0.60	0.454	0.407	0.260	0.525				
25	71.1	6.04	2819	0.60	0.447	0.401	0.258	0.522				
n	25	25	25	25	25	25	25	25				
Avg.	70.6	6.02	2734	0.60	0.456	0.408	0.261	0.526				
Med.	70.5	6.02	2742	0.60	0.454	0.405	0.261	0.524				
σ	0.66	0.007	69.5	0.001	0.0090	0.0079	0.0025	0.0044				
Min.	69.2	6.01	2588	0.60	0.444	0.397	0.257	0.520				
Max.	71.7	6.04	2840	0.60	0.473	0.421	0.267	0.533				



**Data Set 4 : 85 °C, 100 mA**

Actual Case Temperature [T <sub>S</sub> ]	86.5 °C
Actual Ambient Temperature [T <sub>A</sub> ]	84.6 °C
Drive Current [I <sub>F</sub> ]	100 mA
Measurement Current	100 mA

NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0

**TABLE 4-2**  
Lumen Maintenance

LED No.	Lumen Maintenance % ( Normalized to 100 % at 0 hours )														
	0 h	541 h	1007 h	1697 h	2379 h	3141 h	3829 h	4544 h	5210 h	6043 h	6805 h	7601 h	8437 h	9269 h	10100 h
1	100.0	98.5	98.5	98.2	97.7	97.5	97.5	97.1	97.1	97.2	96.9	96.9	96.5	96.3	96.4
2	100.0	98.5	98.3	97.9	97.6	97.3	97.2	97.0	96.9	97.2	97.0	96.9	96.6	96.4	96.6
3	100.0	98.4	98.3	97.9	97.6	97.1	97.0	96.9	96.7	97.0	96.9	96.7	96.5	96.2	96.4
4	100.0	98.4	98.2	97.8	97.6	96.9	96.9	96.9	96.7	96.9	96.8	96.5	96.3	96.1	96.3
5	100.0	98.4	98.3	98.1	97.9	97.5	97.4	97.4	97.2	97.2	97.1	97.0	96.8	96.7	97.1
6	100.0	98.5	98.3	97.9	97.6	97.3	97.2	97.3	97.0	96.7	96.7	96.6	96.4	96.3	96.9
7	100.0	98.4	98.2	97.6	97.1	96.9	96.6	96.4	96.1	95.4	94.9	94.5	93.8	93.4	93.6
8	100.0	98.7	98.6	98.2	97.7	97.7	97.5	97.1	97.3	97.0	96.7	96.7	96.4	96.3	96.7
9	100.0	99.1	98.9	98.3	97.6	97.5	97.3	96.7	96.8	96.3	95.8	95.6	94.9	94.6	94.7
10	100.0	98.9	98.8	98.4	97.7	97.7	97.5	97.0	97.2	97.1	96.8	96.9	96.4	96.3	96.6
11	100.0	98.4	98.2	97.8	97.4	97.1	97.0	96.7	96.7	96.8	96.6	96.6	96.3	95.9	96.0
12	100.0	98.4	98.2	97.9	97.5	97.2	97.1	96.9	96.9	97.1	97.0	96.9	96.8	96.4	96.5
13	100.0	98.5	98.3	98.0	97.7	97.4	97.3	97.2	97.0	97.3	97.2	97.1	97.0	96.7	96.9
14	100.0	98.3	98.1	97.7	97.3	97.0	96.9	96.9	96.7	96.8	96.7	96.6	96.5	96.3	96.5
15	100.0	98.6	98.4	98.1	97.7	97.4	97.3	97.4	97.1	97.1	97.0	96.9	96.8	96.6	97.0
16	100.0	98.0	97.8	97.5	97.2	96.9	96.9	97.0	96.6	96.5	96.4	96.3	96.2	95.9	96.4
17	100.0	98.3	98.1	97.8	97.5	97.2	97.1	97.1	96.9	96.6	96.4	96.4	96.3	96.0	96.5
18	100.0	98.7	98.6	98.3	98.0	97.8	97.8	97.5	97.6	97.3	97.1	97.0	96.9	96.5	96.9
19	100.0	99.0	98.8	98.4	97.9	97.6	97.5	97.1	97.2	97.0	96.8	96.7	96.6	96.2	96.5
20	100.0	98.8	98.7	98.4	97.9	97.5	97.4	97.0	97.1	96.9	96.7	96.6	96.4	96.0	96.2
21	100.0	98.7	98.6	98.3	97.8	97.5	97.4	97.2	97.2	97.3	97.2	97.2	97.1	96.7	96.8
22	100.0	98.4	98.1	97.8	97.5	97.1	97.0	96.9	96.8	97.0	96.8	96.7	96.6	96.2	96.3
23	100.0	98.2	98.0	97.7	97.6	97.2	97.1	97.1	96.9	97.2	97.0	97.0	96.9	96.5	97.0
24	100.0	98.5	98.3	98.0	97.7	97.3	97.2	97.2	97.0	97.0	96.8	96.8	96.6	96.2	96.7
25	100.0	98.5	98.3	98.0	97.8	97.4	97.3	97.3	97.0	97.0	96.9	96.8	96.6	96.3	97.0
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	98.5	98.4	98.0	97.6	97.3	97.2	97.0	97.0	96.9	96.7	96.6	96.4	96.1	96.4
Med.	100.0	98.5	98.3	98.0	97.6	97.3	97.2	97.1	97.0	97.0	96.8	96.7	96.5	96.3	96.5
σ	0.00	0.25	0.26	0.25	0.21	0.25	0.26	0.25	0.28	0.40	0.48	0.55	0.68	0.71	0.75
Min.	100.0	98.0	97.8	97.5	97.1	96.9	96.6	96.4	96.1	95.4	94.9	94.5	93.8	93.4	93.6
Max.	100.0	99.1	98.9	98.4	98.0	97.8	97.8	97.5	97.6	97.3	97.2	97.2	97.1	96.7	97.1

**TM-21 Projection**

Time	4544 h	5210 h	6043 h	6805 h	7601 h	8437 h	9269 h	10100 h								
ln(Avg.)	-0.0299	-0.0309	-0.0314	-0.0332	-0.0342	-0.0366	-0.0395	-0.0366								

Test duration used	4544 h	to	10100 h
B	0.978		
α	1.57E-06		
R <sup>2</sup>	0.868		
Calculated L <sub>70</sub> (10K)	212000	hours	
Reported L <sub>70</sub> (10K)	> 60600	hours	
Calculated L <sub>80</sub> (10K)	127000	hours	
Reported L <sub>80</sub> (10K)	> 60600	hours	
Calculated L <sub>90</sub> (10K)	52500	hours	
Reported L <sub>90</sub> (10K)	52500	hours	

Curve-fit equation:  
 $\Phi(t)=Bexp(-\alpha t)$

Lumen maintenance life equation:

$L_{70} = \ln(B/0.7)/\alpha$

$L_{80} = \ln(B/0.8)/\alpha$

$L_{90} = \ln(B/0.9)/\alpha$

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**Data Set 4 : 85 °C, 100 mA**

Actual Case Temperature [T <sub>s</sub> ]	86.5 °C
Actual Ambient Temperature [T <sub>A</sub> ]	84.6 °C
Drive Current [I <sub>f</sub> ]	100 mA
Measurement Current	100 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 4-3**  
Forward Voltage

LED No.	Relative Forward Voltage % ( Normalized to 100 % at 0 hours )														
	0 h	541 h	1007 h	1697 h	2379 h	3141 h	3829 h	4544 h	5210 h	6043 h	6805 h	7601 h	8437 h	9269 h	10100 h
1	100.0	99.9	100.2	100.4	100.7	100.8	100.9	101.0	101.1	101.2	101.2	101.2	101.3	101.4	101.5
2	100.0	99.9	100.3	100.5	100.9	101.0	101.3	101.3	101.5	101.6	101.6	101.6	101.7	101.8	101.9
3	100.0	99.9	100.3	100.5	100.9	101.1	101.3	101.3	101.5	101.6	101.6	101.6	101.7	101.8	101.9
4	100.0	100.0	100.4	100.6	101.0	101.1	101.3	101.4	101.6	101.7	101.7	101.7	101.8	101.9	102.1
5	100.0	99.9	100.2	100.4	100.6	100.7	100.9	101.0	101.1	101.2	101.1	101.1	101.2	101.3	101.4
6	100.0	99.9	100.3	100.6	100.9	101.1	101.3	101.4	101.5	101.7	101.6	101.7	101.7	101.8	102.0
7	100.0	99.9	100.4	100.6	100.9	101.1	101.3	101.4	101.5	101.7	101.7	101.7	101.8	101.9	102.0
8	100.0	99.9	100.3	100.5	100.8	100.9	101.1	101.1	101.2	101.4	101.3	101.3	101.4	101.5	101.6
9	100.0	99.9	100.3	100.6	100.9	101.1	101.3	101.3	101.5	101.7	101.6	101.6	101.7	101.8	102.0
10	100.0	100.0	100.3	100.6	100.9	101.1	101.3	101.4	101.5	101.7	101.6	101.7	101.7	101.8	102.0
11	100.0	100.0	100.4	100.7	101.0	101.2	101.4	101.5	101.6	101.8	101.7	101.8	102.0	102.0	102.1
12	100.0	100.0	100.3	100.6	100.9	101.1	101.3	101.4	101.4	101.6	101.6	101.7	101.8	101.8	102.0
13	100.0	100.0	100.3	100.6	100.9	101.0	101.2	101.3	101.4	101.6	101.6	101.7	101.8	101.8	101.9
14	100.0	100.0	100.3	100.6	100.9	101.1	101.3	101.4	101.5	101.7	101.6	101.7	101.9	101.8	102.0
15	100.0	99.9	100.3	100.5	100.9	101.0	101.2	101.3	101.4	101.6	101.5	101.7	101.8	101.8	101.9
16	100.0	100.0	100.2	100.5	100.7	100.9	101.0	101.0	101.1	101.3	101.3	101.4	101.5	101.4	101.6
17	100.0	100.0	100.3	100.6	100.8	100.9	101.1	101.2	101.3	101.4	101.4	101.5	101.6	101.6	101.7
18	100.0	99.9	100.3	100.4	100.7	100.8	100.9	101.0	101.0	101.2	101.2	101.2	101.3	101.3	101.4
19	100.0	99.9	100.3	100.6	100.9	101.0	101.2	101.3	101.4	101.6	101.6	101.7	101.8	101.8	101.9
20	100.0	100.0	100.3	100.6	100.9	101.1	101.3	101.4	101.5	101.7	101.6	101.7	101.9	101.9	102.0
21	100.0	100.1	100.4	100.7	101.0	101.1	101.3	101.5	101.6	101.7	101.7	101.8	101.9	101.9	102.1
22	100.0	100.0	100.4	100.7	101.0	101.1	101.3	101.4	101.5	101.7	101.6	101.8	101.9	101.9	102.0
23	100.0	100.1	100.4	100.6	100.9	101.1	101.2	101.3	101.4	101.6	101.6	101.7	101.8	101.8	101.9
24	100.0	99.9	100.3	100.6	100.9	101.0	101.2	101.3	101.4	101.6	101.6	101.7	101.8	101.8	102.0
25	100.0	100.0	100.3	100.6	100.9	101.1	101.3	101.3	101.5	101.7	101.6	101.7	101.9	101.8	102.0
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	100.0	100.3	100.6	100.9	101.0	101.2	101.3	101.4	101.6	101.5	101.6	101.7	101.7	101.9
Med.	100.0	100.0	100.3	100.6	100.9	101.1	101.3	101.3	101.5	101.6	101.6	101.7	101.8	101.8	102.0
σ	0.00	0.05	0.05	0.08	0.10	0.12	0.14	0.15	0.16	0.17	0.18	0.20	0.21	0.20	0.21
Min.	100.0	99.9	100.2	100.4	100.6	100.7	100.9	101.0	101.0	101.2	101.1	101.1	101.2	101.3	101.4
Max.	100.0	100.1	100.4	100.7	101.0	101.2	101.4	101.5	101.6	101.8	101.7	101.8	102.0	102.0	102.1



### Data Set 4 : 85 °C, 100 mA

Actual Case Temperature [T <sub>s</sub> ]	86.5 °C
Actual Ambient Temperature [T <sub>A</sub> ]	84.6 °C
Drive Current [I <sub>F</sub> ]	100 mA
Measurement Current	100 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 4-4**  
Chromaticity Shift

LED No.	Chromaticity Shift Δu'v'														
	0 h	541 h	1007 h	1697 h	2379 h	3141 h	3829 h	4544 h	5210 h	6043 h	6805 h	7601 h	8437 h	9269 h	10100 h
1	0.0000	0.0007	0.0007	0.0008	0.0009	0.0010	0.0011	0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0015	0.0015
2	0.0000	0.0009	0.0008	0.0009	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012	0.0011	0.0012	0.0013	0.0013	0.0014
3	0.0000	0.0009	0.0009	0.0010	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015
4	0.0000	0.0008	0.0008	0.0009	0.0011	0.0011	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0015	0.0015
5	0.0000	0.0007	0.0008	0.0009	0.0011	0.0012	0.0011	0.0011	0.0012	0.0011	0.0012	0.0011	0.0013	0.0013	0.0014
6	0.0000	0.0010	0.0010	0.0011	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0014
7	0.0000	0.0010	0.0010	0.0011	0.0012	0.0013	0.0013	0.0012	0.0013	0.0013	0.0013	0.0012	0.0013	0.0013	0.0012
8	0.0000	0.0008	0.0009	0.0009	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0016	0.0016
9	0.0000	0.0009	0.0009	0.0011	0.0013	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016
10	0.0000	0.0008	0.0009	0.0009	0.0012	0.0013	0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.0016	0.0016	0.0016
11	0.0000	0.0008	0.0009	0.0009	0.0011	0.0011	0.0011	0.0012	0.0012	0.0011	0.0012	0.0012	0.0013	0.0014	0.0014
12	0.0000	0.0008	0.0008	0.0008	0.0010	0.0012	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013
13	0.0000	0.0007	0.0008	0.0008	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013
14	0.0000	0.0008	0.0008	0.0009	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0014	0.0014
15	0.0000	0.0008	0.0008	0.0009	0.0011	0.0011	0.0012	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0014	0.0013
16	0.0000	0.0010	0.0010	0.0011	0.0012	0.0014	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0016	0.0015
17	0.0000	0.0008	0.0009	0.0009	0.0011	0.0012	0.0012	0.0011	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014
18	0.0000	0.0008	0.0008	0.0009	0.0011	0.0012	0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0015	0.0015
19	0.0000	0.0007	0.0008	0.0009	0.0011	0.0012	0.0013	0.0012	0.0014	0.0014	0.0014	0.0014	0.0014	0.0016	0.0015
20	0.0000	0.0007	0.0008	0.0008	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012	0.0011	0.0011	0.0012	0.0012	0.0013
21	0.0000	0.0007	0.0008	0.0008	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013
22	0.0000	0.0007	0.0008	0.0008	0.0010	0.0011	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0013	0.0013
23	0.0000	0.0008	0.0008	0.0008	0.0010	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0013	0.0014
24	0.0000	0.0007	0.0008	0.0008	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0014	0.0013
25	0.0000	0.0008	0.0009	0.0009	0.0010	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.0000	0.0008	0.0009	0.0009	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014
Med.	0.0000	0.0008	0.0008	0.0009	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014
σ	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.0000	0.0007	0.0007	0.0008	0.0009	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012
Max.	0.0000	0.0010	0.0010	0.0011	0.0013	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016

### Data Set 4 : 85 °C, 100 mA

Actual Case Temperature [T <sub>S</sub> ]	86.5 °C
Actual Ambient Temperature [T <sub>A</sub> ]	84.6 °C
Drive Current [I <sub>F</sub> ]	100 mA
Measurement Current	100 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 4-5**  
Chromaticity

LED No.	Chromaticity u'														
	0 h	541 h	1007 h	1697 h	2379 h	3141 h	3829 h	4544 h	5210 h	6043 h	6805 h	7601 h	8437 h	9269 h	10100 h
1	0.2592	0.2585	0.2585	0.2584	0.2583	0.2582	0.2581	0.2581	0.2580	0.2580	0.2580	0.2579	0.2579	0.2577	0.2577
2	0.2628	0.2619	0.2620	0.2619	0.2618	0.2617	0.2617	0.2617	0.2617	0.2616	0.2617	0.2616	0.2615	0.2615	0.2614
3	0.2648	0.2639	0.2639	0.2638	0.2636	0.2635	0.2635	0.2635	0.2635	0.2634	0.2634	0.2634	0.2634	0.2633	0.2633
4	0.2663	0.2655	0.2655	0.2654	0.2652	0.2652	0.2651	0.2651	0.2650	0.2650	0.2650	0.2650	0.2649	0.2648	0.2648
5	0.2623	0.2616	0.2615	0.2614	0.2612	0.2611	0.2612	0.2612	0.2611	0.2612	0.2612	0.2612	0.2610	0.2610	0.2609
6	0.2660	0.2650	0.2650	0.2649	0.2647	0.2647	0.2647	0.2647	0.2646	0.2646	0.2646	0.2646	0.2646	0.2645	0.2646
7	0.2642	0.2632	0.2632	0.2631	0.2630	0.2629	0.2629	0.2630	0.2629	0.2629	0.2629	0.2630	0.2629	0.2629	0.2630
8	0.2631	0.2623	0.2622	0.2622	0.2619	0.2618	0.2618	0.2618	0.2618	0.2617	0.2617	0.2617	0.2616	0.2615	0.2615
9	0.2638	0.2629	0.2629	0.2627	0.2625	0.2624	0.2624	0.2624	0.2623	0.2623	0.2623	0.2623	0.2622	0.2622	0.2622
10	0.2601	0.2593	0.2592	0.2592	0.2589	0.2588	0.2587	0.2587	0.2586	0.2587	0.2586	0.2586	0.2585	0.2585	0.2585
11	0.2613	0.2605	0.2604	0.2604	0.2602	0.2602	0.2602	0.2601	0.2601	0.2602	0.2601	0.2601	0.2600	0.2599	0.2599
12	0.2612	0.2604	0.2604	0.2604	0.2602	0.2600	0.2601	0.2601	0.2600	0.2600	0.2600	0.2600	0.2600	0.2599	0.2599
13	0.2593	0.2586	0.2585	0.2585	0.2583	0.2582	0.2582	0.2582	0.2581	0.2581	0.2581	0.2581	0.2580	0.2580	0.2580
14	0.2599	0.2591	0.2591	0.2590	0.2588	0.2588	0.2588	0.2587	0.2587	0.2587	0.2586	0.2586	0.2586	0.2585	0.2585
15	0.2620	0.2612	0.2612	0.2611	0.2609	0.2609	0.2608	0.2609	0.2608	0.2608	0.2608	0.2608	0.2608	0.2606	0.2607
16	0.2611	0.2601	0.2601	0.2600	0.2599	0.2598	0.2598	0.2598	0.2598	0.2597	0.2597	0.2597	0.2596	0.2595	0.2596
17	0.2626	0.2618	0.2617	0.2617	0.2615	0.2614	0.2614	0.2615	0.2614	0.2613	0.2613	0.2613	0.2613	0.2612	0.2612
18	0.2583	0.2575	0.2575	0.2574	0.2572	0.2571	0.2572	0.2571	0.2571	0.2571	0.2570	0.2570	0.2570	0.2568	0.2568
19	0.2595	0.2588	0.2587	0.2586	0.2584	0.2583	0.2582	0.2583	0.2581	0.2581	0.2581	0.2581	0.2581	0.2579	0.2580
20	0.2651	0.2644	0.2643	0.2643	0.2641	0.2640	0.2640	0.2640	0.2640	0.2639	0.2640	0.2640	0.2639	0.2639	0.2638
21	0.2679	0.2672	0.2671	0.2671	0.2669	0.2668	0.2668	0.2668	0.2668	0.2667	0.2667	0.2667	0.2667	0.2666	0.2666
22	0.2607	0.2600	0.2599	0.2599	0.2597	0.2596	0.2597	0.2596	0.2596	0.2596	0.2596	0.2595	0.2595	0.2594	0.2594
23	0.2629	0.2621	0.2621	0.2621	0.2619	0.2618	0.2618	0.2618	0.2618	0.2618	0.2618	0.2617	0.2617	0.2616	0.2615
24	0.2609	0.2602	0.2601	0.2601	0.2599	0.2599	0.2598	0.2598	0.2598	0.2598	0.2597	0.2597	0.2597	0.2595	0.2596
25	0.2592	0.2584	0.2583	0.2583	0.2582	0.2581	0.2580	0.2580	0.2580	0.2580	0.2579	0.2579	0.2579	0.2578	0.2578
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.2622	0.2614	0.2613	0.2613	0.2611	0.2610	0.2610	0.2610	0.2609	0.2609	0.2609	0.2609	0.2609	0.2608	0.2608
Med.	0.2620	0.2612	0.2612	0.2611	0.2609	0.2609	0.2608	0.2609	0.2608	0.2608	0.2608	0.2608	0.2608	0.2606	0.2607
σ	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Min.	0.2583	0.2575	0.2575	0.2574	0.2572	0.2571	0.2572	0.2571	0.2571	0.2571	0.2570	0.2570	0.2570	0.2568	0.2568
Max.	0.2679	0.2672	0.2671	0.2671	0.2669	0.2668	0.2668	0.2668	0.2668	0.2667	0.2667	0.2667	0.2667	0.2666	0.2666

### Data Set 4 : 85 °C, 100 mA

Actual Case Temperature [T <sub>c</sub> ]	86.5 °C
Actual Ambient Temperature [T <sub>A</sub> ]	84.6 °C
Drive Current [I <sub>f</sub> ]	100 mA
Measurement Current	100 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 4-6**  
Chromaticity

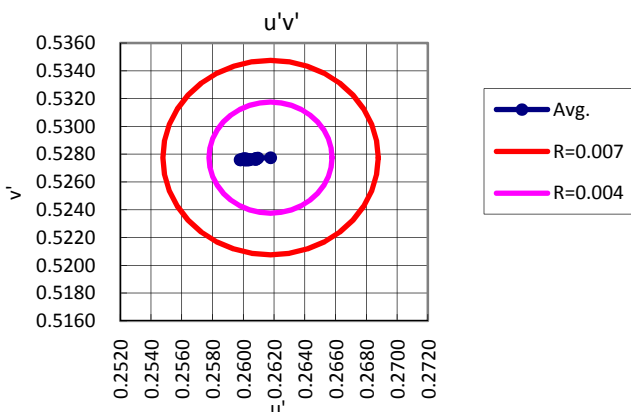
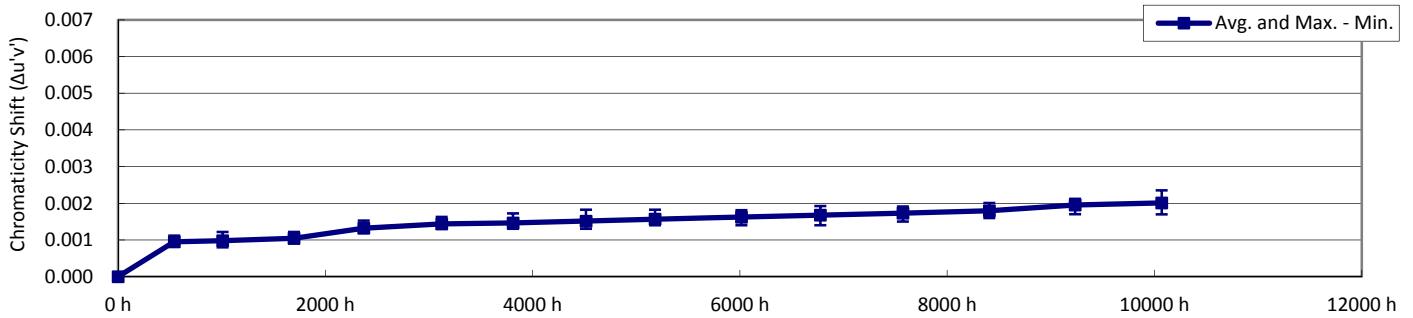
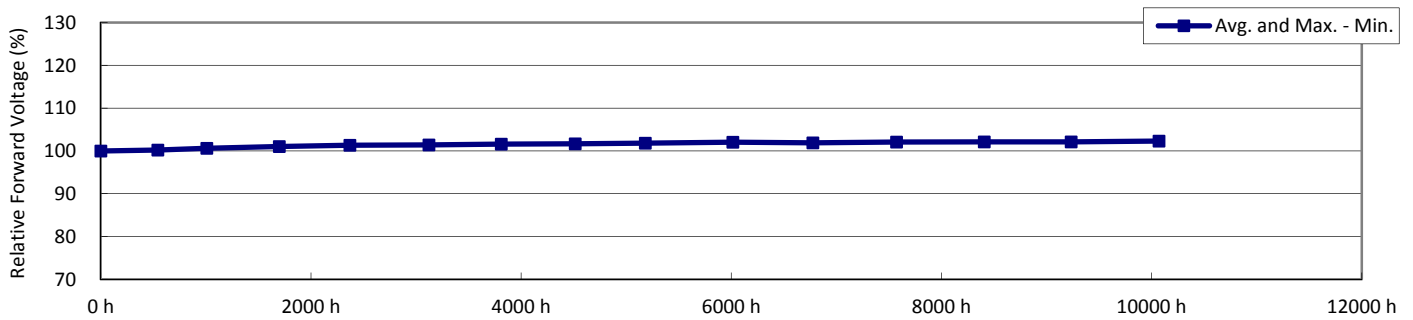
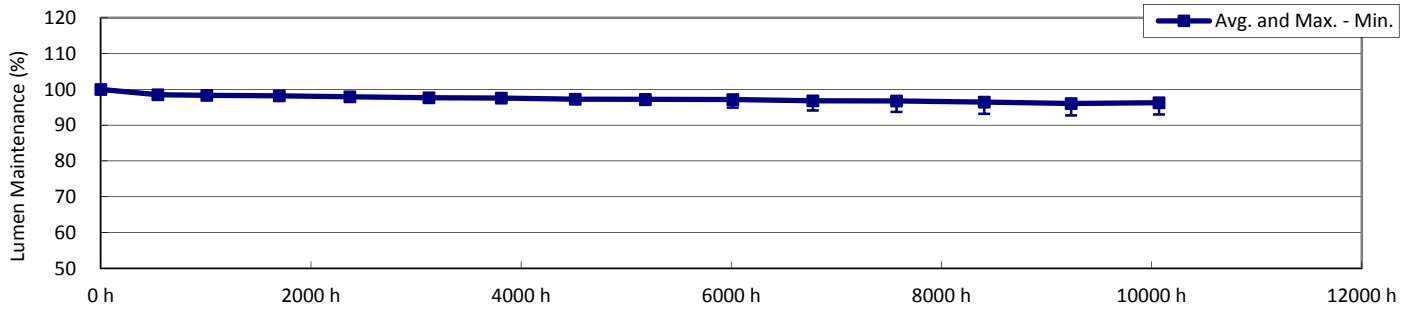
LED No.	Chromaticity v'														
	0 h	541 h	1007 h	1697 h	2379 h	3141 h	3829 h	4544 h	5210 h	6043 h	6805 h	7601 h	8437 h	9269 h	10100 h
1	0.5197	0.5197	0.5197	0.5196	0.5196	0.5195	0.5195	0.5195	0.5195	0.5195	0.5194	0.5194	0.5194	0.5194	0.5194
2	0.5305	0.5305	0.5304	0.5304	0.5304	0.5304	0.5304	0.5304	0.5305	0.5305	0.5305	0.5305	0.5305	0.5305	0.5305
3	0.5305	0.5305	0.5305	0.5304	0.5305	0.5304	0.5305	0.5305	0.5305	0.5305	0.5305	0.5305	0.5305	0.5305	0.5305
4	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5332
5	0.5234	0.5233	0.5233	0.5233	0.5232	0.5232	0.5232	0.5233	0.5233	0.5232	0.5233	0.5232	0.5232	0.5232	0.5233
6	0.5310	0.5309	0.5309	0.5308	0.5308	0.5309	0.5309	0.5309	0.5309	0.5309	0.5309	0.5309	0.5309	0.5309	0.5310
7	0.5309	0.5308	0.5308	0.5307	0.5307	0.5307	0.5308	0.5308	0.5308	0.5309	0.5308	0.5309	0.5310	0.5310	0.5311
8	0.5301	0.5300	0.5300	0.5299	0.5299	0.5299	0.5300	0.5300	0.5300	0.5300	0.5299	0.5300	0.5300	0.5300	0.5300
9	0.5267	0.5266	0.5265	0.5265	0.5265	0.5264	0.5265	0.5265	0.5265	0.5265	0.5265	0.5265	0.5265	0.5266	0.5266
10	0.5223	0.5223	0.5223	0.5222	0.5222	0.5222	0.5222	0.5222	0.5222	0.5222	0.5222	0.5222	0.5222	0.5222	0.5222
11	0.5238	0.5237	0.5237	0.5237	0.5236	0.5236	0.5237	0.5236	0.5236	0.5237	0.5236	0.5237	0.5237	0.5237	0.5237
12	0.5229	0.5229	0.5228	0.5228	0.5228	0.5228	0.5228	0.5228	0.5228	0.5228	0.5228	0.5228	0.5229	0.5228	0.5228
13	0.5209	0.5209	0.5208	0.5208	0.5208	0.5207	0.5208	0.5207	0.5208	0.5208	0.5207	0.5208	0.5208	0.5207	0.5207
14	0.5242	0.5242	0.5241	0.5241	0.5241	0.5240	0.5240	0.5240	0.5240	0.5240	0.5240	0.5240	0.5241	0.5240	0.5240
15	0.5296	0.5296	0.5296	0.5296	0.5295	0.5295	0.5296	0.5296	0.5295	0.5296	0.5295	0.5296	0.5296	0.5296	0.5296
16	0.5247	0.5245	0.5245	0.5244	0.5244	0.5243	0.5244	0.5244	0.5244	0.5244	0.5244	0.5244	0.5245	0.5243	0.5244
17	0.5246	0.5244	0.5244	0.5244	0.5244	0.5243	0.5243	0.5244	0.5243	0.5244	0.5243	0.5243	0.5244	0.5243	0.5244
18	0.5215	0.5213	0.5213	0.5213	0.5213	0.5212	0.5213	0.5212	0.5212	0.5213	0.5213	0.5212	0.5213	0.5212	0.5213
19	0.5197	0.5196	0.5196	0.5196	0.5195	0.5195	0.5195	0.5195	0.5195	0.5195	0.5194	0.5195	0.5195	0.5194	0.5195
20	0.5306	0.5306	0.5305	0.5305	0.5305	0.5305	0.5305	0.5305	0.5305	0.5306	0.5305	0.5305	0.5305	0.5305	0.5306
21	0.5323	0.5322	0.5322	0.5322	0.5322	0.5322	0.5322	0.5322	0.5322	0.5323	0.5323	0.5323	0.5323	0.5323	0.5324
22	0.5230	0.5229	0.5229	0.5228	0.5229	0.5228	0.5228	0.5228	0.5229	0.5229	0.5228	0.5228	0.5229	0.5228	0.5229
23	0.5297	0.5296	0.5296	0.5296	0.5296	0.5295	0.5296	0.5296	0.5296	0.5297	0.5296	0.5297	0.5297	0.5297	0.5298
24	0.5254	0.5253	0.5253	0.5253	0.5253	0.5252	0.5253	0.5253	0.5252	0.5253	0.5252	0.5253	0.5253	0.5252	0.5253
25	0.5216	0.5215	0.5215	0.5215	0.5214	0.5214	0.5215	0.5214	0.5214	0.5215	0.5214	0.5214	0.5215	0.5214	0.5215
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.5261	0.5260	0.5260	0.5260	0.5260	0.5259	0.5260	0.5260	0.5260	0.5260	0.5260	0.5260	0.5260	0.5260	0.5260
Med.	0.5247	0.5245	0.5245	0.5244	0.5244	0.5243	0.5244	0.5244	0.5244	0.5244	0.5244	0.5244	0.5245	0.5243	0.5244
σ	0.0043	0.0043	0.0043	0.0043	0.0043	0.0043	0.0043	0.0043	0.0043	0.0043	0.0044	0.0044	0.0043	0.0044	0.0044
Min.	0.5197	0.5196	0.5196	0.5196	0.5195	0.5195	0.5195	0.5195	0.5195	0.5195	0.5194	0.5194	0.5194	0.5194	0.5194
Max.	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5331	0.5332



### Data Set 5 : 85 °C, 150 mA

Actual Case Temperature [T <sub>S</sub> ]	88.0 °C
Actual Ambient Temperature [T <sub>A</sub> ]	85.4 °C
Drive Current [I <sub>F</sub> ]	150 mA
Measurement Current	150 mA

NOTES:  
 T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0



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### Data Set 5 : 85 °C, 150 mA

Actual Case Temperature [T <sub>S</sub> ]	88.0 °C
Actual Ambient Temperature [T <sub>A</sub> ]	85.4 °C
Drive Current [I <sub>F</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 5-1**  
Initial Characteristics

LED No.	Luminous flux	Forward voltage	CCT	Input Power	CIE1931		CIE1976					
	Φ <sub>V</sub> [lm]	V <sub>F</sub> [V]	T <sub>CP</sub> [K]	P [W]	x	y	u'	v'				
1	100.1	6.33	2650	0.95	0.470	0.422	0.264	0.533				
2	100.2	6.31	2772	0.95	0.450	0.401	0.260	0.522				
3	101.9	6.31	2809	0.95	0.450	0.406	0.258	0.524				
4	100.7	6.32	2773	0.95	0.451	0.404	0.260	0.524				
5	101.0	6.31	2726	0.95	0.459	0.412	0.261	0.528				
6	100.6	6.31	2832	0.95	0.443	0.397	0.258	0.520				
7	100.8	6.31	2753	0.95	0.454	0.407	0.260	0.525				
8	100.0	6.31	2692	0.95	0.463	0.416	0.262	0.530				
9	101.2	6.31	2723	0.95	0.462	0.417	0.261	0.530				
10	101.1	6.31	2784	0.95	0.452	0.407	0.259	0.525				
11	100.2	6.33	2696	0.95	0.463	0.416	0.262	0.530				
12	101.6	6.31	2744	0.95	0.457	0.411	0.260	0.527				
13	99.1	6.31	2732	0.95	0.455	0.405	0.262	0.525				
14	100.9	6.31	2722	0.95	0.460	0.413	0.261	0.528				
15	99.4	6.31	2761	0.95	0.452	0.404	0.260	0.524				
16	99.6	6.32	2767	0.95	0.453	0.406	0.260	0.524				
17	100.3	6.30	2763	0.95	0.452	0.404	0.260	0.524				
18	100.1	6.32	2663	0.95	0.466	0.417	0.264	0.531				
19	99.0	6.31	2631	0.95	0.468	0.416	0.265	0.531				
20	100.1	6.31	2599	0.95	0.474	0.422	0.266	0.534				
21	100.2	6.30	2690	0.95	0.465	0.418	0.262	0.531				
22	100.8	6.31	2662	0.95	0.467	0.418	0.264	0.531				
23	100.6	6.31	2759	0.95	0.452	0.404	0.261	0.523				
24	98.4	6.31	2613	0.95	0.471	0.418	0.266	0.532				
25	99.3	6.31	2652	0.95	0.466	0.416	0.264	0.530				
n	25	25	25	25	25	25	25	25				
Avg.	100.3	6.31	2719	0.95	0.459	0.411	0.262	0.527				
Med.	100.2	6.31	2726	0.95	0.459	0.412	0.261	0.528				
σ	0.83	0.007	61.8	0.001	0.0080	0.0070	0.0023	0.0038				
Min.	98.4	6.30	2599	0.95	0.443	0.397	0.258	0.520				
Max.	101.9	6.33	2832	0.95	0.474	0.422	0.266	0.534				



### Data Set 5 : 85 °C, 150 mA

Actual Case Temperature [T <sub>c</sub> ]	88.0 °C
Actual Ambient Temperature [T <sub>A</sub> ]	85.4 °C
Drive Current [I <sub>F</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 5-2**  
Lumen Maintenance

LED No.	Lumen Maintenance % ( Normalized to 100 % at 0 hours )														
	0 h	542 h	1009 h	1698 h	2370 h	3123 h	3811 h	4515 h	5181 h	6014 h	6776 h	7573 h	8407 h	9234 h	10070 h
1	100.0	98.6	98.5	98.4	98.0	97.8	97.7	97.3	97.4	97.4	97.0	97.0	96.5	95.9	95.7
2	100.0	98.6	98.6	98.4	98.0	97.7	97.6	97.3	97.3	97.5	97.2	97.1	96.9	96.3	96.4
3	100.0	98.2	97.9	97.8	97.6	97.2	97.2	96.9	96.8	97.0	96.6	96.4	96.1	95.6	95.8
4	100.0	98.4	98.2	98.0	97.8	97.4	97.4	97.3	97.2	97.5	97.2	97.1	97.0	96.6	97.1
5	100.0	98.2	98.1	98.0	97.8	97.5	97.5	97.3	97.2	97.3	97.0	96.9	96.6	96.2	96.5
6	100.0	98.3	98.1	98.0	97.7	97.4	97.3	97.1	97.0	96.8	96.5	96.4	96.1	95.7	96.1
7	100.0	98.5	98.3	98.1	97.9	97.7	97.6	97.3	97.3	97.0	96.6	96.6	96.3	96.1	96.5
8	100.0	99.1	98.9	98.8	98.6	98.3	98.2	97.7	97.9	97.5	97.3	97.4	97.0	96.9	97.1
9	100.0	98.9	98.8	98.6	98.3	98.1	98.0	97.5	97.6	97.3	97.0	97.1	96.7	96.5	96.6
10	100.0	98.9	98.8	98.7	98.4	98.2	98.1	97.6	97.8	97.7	97.3	97.4	97.1	96.8	96.8
11	100.0	98.5	98.5	98.3	98.0	97.8	97.7	97.4	97.4	97.5	97.2	97.2	96.9	96.6	96.6
12	100.0	98.3	98.2	98.0	97.7	97.4	97.4	97.2	97.1	97.3	97.0	97.0	96.7	96.1	96.3
13	100.0	98.4	98.3	98.1	97.9	97.6	97.5	97.3	97.3	97.4	97.2	97.2	96.9	96.5	96.8
14	100.0	98.2	97.9	97.8	97.5	97.1	97.1	97.0	96.8	96.8	96.5	96.5	96.0	95.6	95.9
15	100.0	98.6	98.3	98.1	97.8	97.4	97.1	96.7	96.4	95.9	95.2	94.8	94.3	93.8	94.2
16	100.0	98.1	97.8	97.5	97.3	96.8	96.5	96.0	95.7	94.9	94.1	93.7	93.2	92.7	93.0
17	100.0	98.6	98.4	98.1	97.9	97.6	97.6	97.2	97.2	96.9	96.6	96.6	96.3	96.1	96.5
18	100.0	99.1	98.9	98.8	98.5	98.3	98.2	97.8	97.9	97.6	97.4	97.3	97.1	96.9	97.1
19	100.0	99.0	98.9	98.8	98.4	98.2	98.1	97.6	97.8	97.6	97.3	97.2	97.1	96.8	96.9
20	100.0	98.8	98.6	98.5	98.1	97.9	97.8	97.4	97.5	97.5	97.2	97.2	97.0	96.6	96.5
21	100.0	98.7	98.6	98.4	98.1	98.0	97.9	97.6	97.7	97.8	97.6	97.7	97.3	97.0	97.1
22	100.0	98.2	98.1	97.9	97.7	97.4	97.3	97.1	97.0	97.3	97.1	97.0	96.7	96.3	96.5
23	100.0	98.3	98.2	98.0	97.8	97.5	97.3	97.1	97.0	97.3	96.9	96.7	96.3	95.7	95.8
24	100.0	98.1	97.9	97.8	97.6	97.3	97.2	97.1	96.9	97.2	96.8	96.7	96.5	96.1	96.6
25	100.0	98.3	98.1	97.9	97.7	97.5	97.4	97.3	97.2	97.4	96.9	96.9	96.6	96.3	96.9
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	98.5	98.4	98.2	97.9	97.6	97.6	97.3	97.2	97.2	96.8	96.8	96.5	96.1	96.3
Med.	100.0	98.5	98.3	98.1	97.9	97.6	97.5	97.3	97.2	97.3	97.0	97.0	96.7	96.3	96.5
σ	0.00	0.31	0.34	0.35	0.34	0.39	0.40	0.37	0.49	0.61	0.73	0.84	0.91	0.96	0.92
Min.	100.0	98.1	97.8	97.5	97.3	96.8	96.5	96.0	95.7	94.9	94.1	93.7	93.2	92.7	93.0
Max.	100.0	99.1	98.9	98.8	98.6	98.3	98.2	97.8	97.9	97.8	97.6	97.7	97.3	97.0	97.1

#### TM-21 Projection

Time	4515 h	5181 h	6014 h	6776 h	7573 h	8407 h	9234 h	10070 h							
ln(Avg.)	-0.0279	-0.0281	-0.0286	-0.0323	-0.0330	-0.0361	-0.0402	-0.0379							

Test duration used	4515 h	to	10070 h
B			0.984
α			2.29E-06
R <sup>2</sup>			0.908
Calculated L <sub>70</sub> (10K)	148000	hours	
Reported L <sub>70</sub> (10K)	> 60400	hours	
Calculated L <sub>80</sub> (10K)	90200	hours	
Reported L <sub>80</sub> (10K)	> 60400	hours	
Calculated L <sub>90</sub> (10K)	38800	hours	
Reported L <sub>90</sub> (10K)	38800	hours	

Curve-fit equation:

$$\Phi(t) = B \exp(-\alpha t)$$

Lumen maintenance life equation:

$$L_{70} = \ln(B/0.7)/\alpha$$

$$L_{80} = \ln(B/0.8)/\alpha$$

$$L_{90} = \ln(B/0.9)/\alpha$$

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**Data Set 5 : 85 °C, 150 mA**

Actual Case Temperature [T <sub>s</sub> ]	88.0 °C
Actual Ambient Temperature [T <sub>A</sub> ]	85.4 °C
Drive Current [I <sub>f</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 5-3**  
Forward Voltage

LED No.	Relative Forward Voltage % ( Normalized to 100 % at 0 hours )														
	0 h	542 h	1009 h	1698 h	2370 h	3123 h	3811 h	4515 h	5181 h	6014 h	6776 h	7573 h	8407 h	9234 h	10070 h
1	100.0	100.2	100.6	101.1	101.4	101.5	101.7	101.7	101.9	102.1	102.0	102.2	102.2	102.2	102.4
2	100.0	100.1	100.6	101.0	101.3	101.4	101.6	101.7	101.8	102.0	101.9	102.1	102.1	102.1	102.4
3	100.0	100.2	100.6	101.1	101.4	101.5	101.7	101.8	101.9	102.1	101.9	102.2	102.2	102.2	102.4
4	100.0	100.2	100.6	101.0	101.4	101.5	101.7	101.7	101.9	102.1	101.9	102.1	102.2	102.2	102.4
5	100.0	100.1	100.4	100.8	101.0	101.1	101.2	101.3	101.4	101.6	101.5	101.7	101.7	101.7	101.8
6	100.0	100.2	100.5	101.0	101.2	101.3	101.5	101.5	101.6	101.9	101.7	101.9	101.9	101.9	102.2
7	100.0	100.1	100.5	100.9	101.2	101.3	101.5	101.5	101.6	101.9	101.7	101.9	101.9	101.9	102.2
8	100.0	100.2	100.6	101.1	101.4	101.5	101.7	101.7	101.9	102.1	101.9	102.1	102.2	102.2	102.4
9	100.0	100.2	100.6	101.1	101.4	101.5	101.7	101.8	101.9	102.1	102.0	102.2	102.2	102.2	102.4
10	100.0	100.2	100.6	101.0	101.4	101.4	101.6	101.7	101.8	102.1	101.9	102.1	102.2	102.2	102.4
11	100.0	100.2	100.6	100.9	101.2	101.3	101.4	101.5	101.6	101.8	101.7	101.9	101.9	101.9	102.1
12	100.0	100.2	100.7	101.1	101.4	101.5	101.7	101.8	101.9	102.1	102.0	102.2	102.2	102.2	102.4
13	100.0	100.3	100.7	101.1	101.4	101.5	101.7	101.8	101.9	102.1	102.0	102.2	102.3	102.3	102.5
14	100.0	100.2	100.6	101.0	101.3	101.4	101.8	101.7	101.8	102.0	101.9	102.1	102.2	102.2	102.3
15	100.0	100.3	100.7	101.1	101.4	101.5	101.7	101.8	101.9	102.1	102.0	102.2	102.3	102.2	102.4
16	100.0	100.3	100.7	101.1	101.4	101.5	101.7	101.8	101.9	102.1	101.9	102.1	102.2	102.2	102.4
17	100.0	100.2	100.6	101.1	101.3	101.5	101.6	101.7	101.8	102.1	101.9	102.1	102.2	102.2	102.4
18	100.0	100.2	100.7	101.1	101.4	101.5	101.6	101.7	101.9	102.1	101.9	102.1	102.2	102.1	102.4
19	100.0	100.2	100.6	101.1	101.3	101.5	101.6	101.8	101.9	102.1	101.9	102.1	102.2	102.2	102.4
20	100.0	100.2	100.6	101.1	101.3	101.5	101.6	101.7	101.9	102.1	101.9	102.1	102.2	102.2	102.4
21	100.0	100.2	100.7	101.1	101.3	101.5	101.6	101.7	101.8	102.1	102.0	102.1	102.2	102.2	102.4
22	100.0	100.2	100.6	100.9	101.2	101.3	101.4	101.5	101.6	101.8	101.7	101.9	101.9	101.9	102.1
23	100.0	100.2	100.7	101.1	101.4	101.5	101.7	101.7	101.9	102.1	102.0	102.1	102.1	102.2	102.4
24	100.0	100.2	100.6	101.0	101.2	101.4	101.5	101.6	101.7	101.9	101.8	102.0	102.0	102.0	102.2
25	100.0	100.2	100.6	101.0	101.2	101.3	101.5	101.6	101.7	101.9	101.8	102.0	102.0	102.0	102.2
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	100.2	100.6	101.0	101.3	101.4	101.6	101.7	101.8	102.0	101.9	102.1	102.1	102.1	102.3
Med.	100.0	100.2	100.6	101.1	101.3	101.5	101.6	101.7	101.9	102.1	101.9	102.1	102.2	102.2	102.4
σ	0.00	0.05	0.07	0.08	0.10	0.11	0.12	0.12	0.13	0.13	0.13	0.13	0.15	0.15	0.15
Min.	100.0	100.1	100.4	100.8	101.0	101.1	101.2	101.3	101.4	101.6	101.5	101.7	101.7	101.7	101.8
Max.	100.0	100.3	100.7	101.1	101.4	101.5	101.8	101.8	101.9	102.1	102.0	102.2	102.3	102.3	102.5



### Data Set 5 : 85 °C, 150 mA

Actual Case Temperature [T <sub>s</sub> ]	88.0 °C
Actual Ambient Temperature [T <sub>A</sub> ]	85.4 °C
Drive Current [I <sub>f</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 5-4**  
Chromaticity Shift

LED No.	Chromaticity Shift Δu'v'														
	0 h	542 h	1009 h	1698 h	2370 h	3123 h	3811 h	4515 h	5181 h	6014 h	6776 h	7573 h	8407 h	9234 h	10070 h
1	0.0000	0.0009	0.0010	0.0010	0.0013	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0021	0.0024
2	0.0000	0.0009	0.0009	0.0010	0.0013	0.0015	0.0015	0.0016	0.0017	0.0017	0.0018	0.0019	0.0020	0.0021	0.0022
3	0.0000	0.0010	0.0010	0.0011	0.0013	0.0015	0.0015	0.0015	0.0016	0.0017	0.0017	0.0018	0.0019	0.0020	0.0020
4	0.0000	0.0010	0.0010	0.0011	0.0014	0.0016	0.0016	0.0017	0.0017	0.0018	0.0018	0.0019	0.0019	0.0020	0.0021
5	0.0000	0.0009	0.0009	0.0010	0.0013	0.0014	0.0013	0.0014	0.0015	0.0015	0.0015	0.0016	0.0017	0.0019	0.0020
6	0.0000	0.0010	0.0010	0.0010	0.0013	0.0015	0.0014	0.0016	0.0016	0.0016	0.0018	0.0017	0.0019	0.0021	0.0021
7	0.0000	0.0011	0.0011	0.0011	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0018	0.0019	0.0020	0.0020
8	0.0000	0.0009	0.0010	0.0010	0.0013	0.0015	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0018	0.0020	0.0020
9	0.0000	0.0009	0.0009	0.0010	0.0013	0.0014	0.0015	0.0015	0.0016	0.0017	0.0017	0.0018	0.0018	0.0020	0.0020
10	0.0000	0.0009	0.0009	0.0010	0.0013	0.0013	0.0014	0.0014	0.0015	0.0015	0.0015	0.0016	0.0017	0.0018	0.0019
11	0.0000	0.0009	0.0009	0.0010	0.0013	0.0014	0.0015	0.0015	0.0016	0.0017	0.0018	0.0018	0.0018	0.0020	0.0021
12	0.0000	0.0009	0.0009	0.0010	0.0012	0.0013	0.0013	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0018	0.0019
13	0.0000	0.0009	0.0010	0.0010	0.0013	0.0014	0.0014	0.0015	0.0015	0.0016	0.0017	0.0017	0.0018	0.0019	0.0020
14	0.0000	0.0010	0.0010	0.0011	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0020	0.0022
15	0.0000	0.0010	0.0010	0.0011	0.0013	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0016	0.0017	0.0018	0.0019
16	0.0000	0.0011	0.0012	0.0012	0.0015	0.0016	0.0017	0.0018	0.0018	0.0018	0.0019	0.0019	0.0019	0.0020	0.0021
17	0.0000	0.0010	0.0010	0.0011	0.0014	0.0015	0.0015	0.0015	0.0015	0.0016	0.0017	0.0018	0.0018	0.0020	0.0019
18	0.0000	0.0010	0.0010	0.0010	0.0013	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0018	0.0020	0.0020
19	0.0000	0.0009	0.0010	0.0011	0.0013	0.0015	0.0016	0.0016	0.0016	0.0017	0.0017	0.0018	0.0018	0.0019	0.0020
20	0.0000	0.0009	0.0009	0.0010	0.0012	0.0014	0.0014	0.0014	0.0015	0.0016	0.0016	0.0016	0.0017	0.0018	0.0019
21	0.0000	0.0009	0.0010	0.0011	0.0013	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0019	0.0019
22	0.0000	0.0009	0.0009	0.0010	0.0013	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0018	0.0019	0.0019
23	0.0000	0.0009	0.0008	0.0009	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0016	0.0017	0.0017
24	0.0000	0.0009	0.0009	0.0010	0.0013	0.0013	0.0013	0.0014	0.0014	0.0015	0.0015	0.0016	0.0017	0.0019	0.0019
25	0.0000	0.0009	0.0010	0.0011	0.0013	0.0014	0.0014	0.0015	0.0015	0.0016	0.0017	0.0017	0.0018	0.0020	0.0020
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.0000	0.0010	0.0010	0.0010	0.0013	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0018	0.0020	0.0020
Med.	0.0000	0.0009	0.0010	0.0010	0.0013	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0018	0.0020	0.0020
σ	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.0000	0.0009	0.0008	0.0009	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0016	0.0017	0.0017
Max.	0.0000	0.0011	0.0012	0.0012	0.0015	0.0016	0.0017	0.0018	0.0018	0.0018	0.0019	0.0019	0.0020	0.0021	0.0024



**Data Set 5 : 85 °C, 150 mA**

Actual Case Temperature [T <sub>s</sub> ]	88.0 °C
Actual Ambient Temperature [T <sub>A</sub> ]	85.4 °C
Drive Current [I <sub>f</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 5-5**  
Chromaticity

LED No.	Chromaticity u'														
	0 h	542 h	1009 h	1698 h	2370 h	3123 h	3811 h	4515 h	5181 h	6014 h	6776 h	7573 h	8407 h	9234 h	10070 h
1	0.2646	0.2637	0.2636	0.2636	0.2633	0.2632	0.2631	0.2631	0.2630	0.2630	0.2629	0.2628	0.2628	0.2625	0.2623
2	0.2608	0.2599	0.2599	0.2598	0.2595	0.2593	0.2593	0.2592	0.2591	0.2591	0.2590	0.2589	0.2588	0.2587	0.2586
3	0.2588	0.2578	0.2578	0.2577	0.2575	0.2573	0.2573	0.2573	0.2572	0.2571	0.2571	0.2570	0.2569	0.2568	0.2568
4	0.2605	0.2595	0.2595	0.2594	0.2591	0.2589	0.2589	0.2588	0.2588	0.2587	0.2587	0.2586	0.2586	0.2585	0.2584
5	0.2619	0.2610	0.2610	0.2609	0.2606	0.2605	0.2605	0.2605	0.2604	0.2604	0.2604	0.2603	0.2602	0.2600	0.2599
6	0.2591	0.2581	0.2581	0.2581	0.2578	0.2577	0.2577	0.2576	0.2576	0.2575	0.2574	0.2574	0.2573	0.2571	0.2571
7	0.2614	0.2603	0.2603	0.2603	0.2600	0.2599	0.2599	0.2598	0.2598	0.2597	0.2597	0.2596	0.2595	0.2594	0.2594
8	0.2631	0.2622	0.2621	0.2621	0.2618	0.2616	0.2616	0.2616	0.2615	0.2615	0.2614	0.2614	0.2613	0.2611	0.2611
9	0.2615	0.2606	0.2606	0.2605	0.2602	0.2601	0.2600	0.2600	0.2599	0.2598	0.2598	0.2597	0.2597	0.2595	0.2595
10	0.2598	0.2589	0.2589	0.2588	0.2585	0.2585	0.2584	0.2584	0.2583	0.2583	0.2583	0.2582	0.2581	0.2580	0.2579
11	0.2628	0.2619	0.2619	0.2618	0.2615	0.2614	0.2613	0.2613	0.2612	0.2611	0.2610	0.2610	0.2610	0.2608	0.2607
12	0.2610	0.2601	0.2601	0.2600	0.2598	0.2597	0.2597	0.2596	0.2595	0.2595	0.2594	0.2594	0.2593	0.2592	0.2591
13	0.2622	0.2613	0.2612	0.2612	0.2609	0.2608	0.2608	0.2607	0.2606	0.2606	0.2605	0.2605	0.2604	0.2603	0.2602
14	0.2619	0.2609	0.2609	0.2608	0.2605	0.2605	0.2604	0.2604	0.2603	0.2603	0.2602	0.2601	0.2601	0.2599	0.2597
15	0.2611	0.2601	0.2601	0.2600	0.2598	0.2597	0.2597	0.2596	0.2596	0.2595	0.2595	0.2595	0.2594	0.2593	0.2592
16	0.2610	0.2599	0.2598	0.2598	0.2595	0.2594	0.2593	0.2592	0.2592	0.2592	0.2591	0.2591	0.2591	0.2590	0.2589
17	0.2612	0.2602	0.2602	0.2601	0.2598	0.2597	0.2597	0.2597	0.2597	0.2596	0.2595	0.2594	0.2594	0.2592	0.2593
18	0.2643	0.2633	0.2633	0.2633	0.2630	0.2629	0.2628	0.2628	0.2627	0.2627	0.2626	0.2626	0.2625	0.2623	0.2623
19	0.2658	0.2649	0.2648	0.2647	0.2645	0.2643	0.2642	0.2642	0.2642	0.2641	0.2641	0.2640	0.2640	0.2639	0.2638
20	0.2668	0.2659	0.2659	0.2658	0.2656	0.2654	0.2654	0.2654	0.2653	0.2652	0.2652	0.2652	0.2651	0.2650	0.2649
21	0.2630	0.2621	0.2620	0.2619	0.2617	0.2615	0.2615	0.2615	0.2615	0.2614	0.2614	0.2613	0.2613	0.2611	0.2611
22	0.2642	0.2633	0.2633	0.2632	0.2629	0.2628	0.2628	0.2627	0.2627	0.2626	0.2626	0.2625	0.2624	0.2623	0.2623
23	0.2611	0.2602	0.2603	0.2602	0.2599	0.2598	0.2598	0.2598	0.2597	0.2597	0.2597	0.2596	0.2595	0.2594	0.2594
24	0.2666	0.2657	0.2657	0.2656	0.2653	0.2653	0.2653	0.2652	0.2652	0.2651	0.2651	0.2650	0.2649	0.2647	0.2647
25	0.2650	0.2641	0.2640	0.2639	0.2637	0.2636	0.2636	0.2635	0.2635	0.2634	0.2633	0.2633	0.2632	0.2630	0.2630
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.2624	0.2614	0.2614	0.2613	0.2611	0.2610	0.2609	0.2609	0.2608	0.2608	0.2607	0.2607	0.2606	0.2604	0.2604
Med.	0.2619	0.2609	0.2609	0.2608	0.2605	0.2605	0.2604	0.2604	0.2603	0.2603	0.2602	0.2601	0.2601	0.2599	0.2597
σ	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022
Min.	0.2588	0.2578	0.2578	0.2577	0.2575	0.2573	0.2573	0.2573	0.2572	0.2571	0.2571	0.2570	0.2569	0.2568	0.2568
Max.	0.2668	0.2659	0.2659	0.2658	0.2656	0.2654	0.2654	0.2654	0.2653	0.2652	0.2652	0.2652	0.2651	0.2650	0.2649

### Data Set 5 : 85 °C, 150 mA

Actual Case Temperature [T <sub>c</sub> ]	88.0 °C
Actual Ambient Temperature [T <sub>A</sub> ]	85.4 °C
Drive Current [I <sub>f</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 5-6**  
Chromaticity

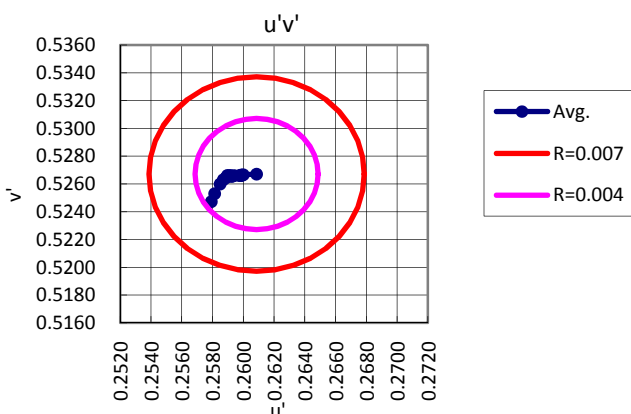
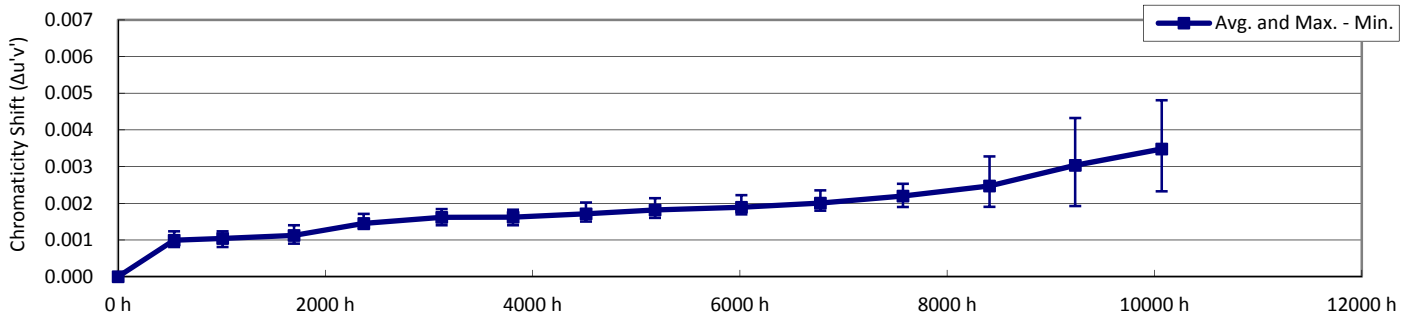
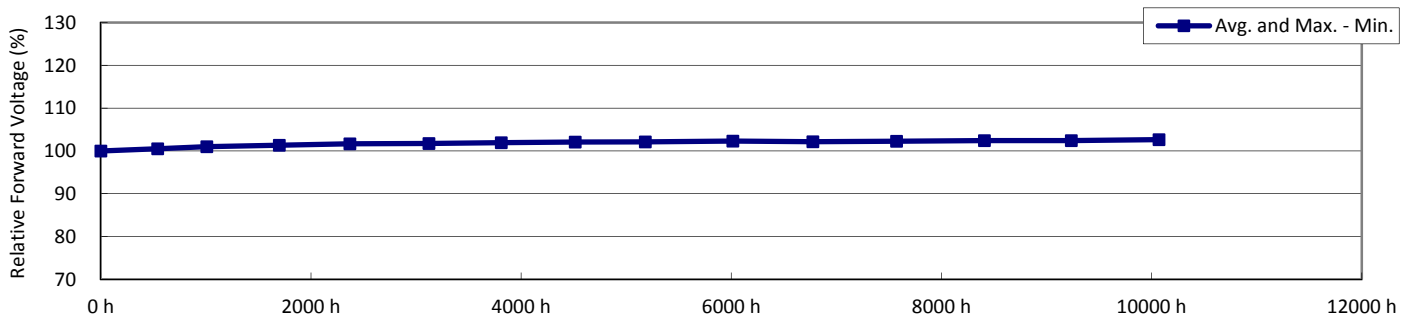
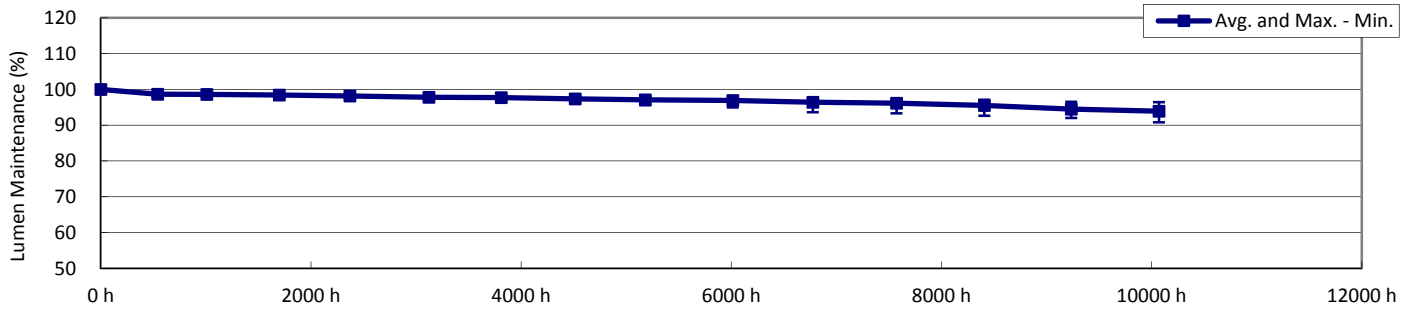
LED No.	Chromaticity v'														
	0 h	542 h	1009 h	1698 h	2370 h	3123 h	3811 h	4515 h	5181 h	6014 h	6776 h	7573 h	8407 h	9234 h	10070 h
1	0.5333	0.5332	0.5331	0.5332	0.5332	0.5331	0.5332	0.5332	0.5332	0.5333	0.5331	0.5332	0.5331	0.5330	0.5328
2	0.5223	0.5222	0.5222	0.5223	0.5222	0.5221	0.5221	0.5221	0.5221	0.5222	0.5220	0.5221	0.5221	0.5220	0.5219
3	0.5243	0.5241	0.5241	0.5242	0.5241	0.5240	0.5241	0.5240	0.5241	0.5241	0.5240	0.5241	0.5240	0.5239	0.5240
4	0.5240	0.5239	0.5238	0.5239	0.5238	0.5238	0.5238	0.5238	0.5238	0.5238	0.5237	0.5239	0.5238	0.5238	0.5239
5	0.5281	0.5280	0.5280	0.5281	0.5280	0.5280	0.5280	0.5280	0.5280	0.5281	0.5280	0.5280	0.5280	0.5279	0.5278
6	0.5199	0.5197	0.5196	0.5197	0.5196	0.5195	0.5196	0.5195	0.5195	0.5196	0.5194	0.5195	0.5194	0.5192	0.5192
7	0.5258	0.5257	0.5256	0.5257	0.5256	0.5256	0.5256	0.5256	0.5256	0.5257	0.5255	0.5256	0.5256	0.5255	0.5256
8	0.5297	0.5296	0.5296	0.5297	0.5297	0.5296	0.5296	0.5296	0.5296	0.5297	0.5296	0.5297	0.5297	0.5296	0.5297
9	0.5301	0.5300	0.5300	0.5300	0.5300	0.5300	0.5300	0.5300	0.5300	0.5301	0.5299	0.5301	0.5301	0.5300	0.5301
10	0.5250	0.5249	0.5249	0.5250	0.5249	0.5249	0.5249	0.5249	0.5249	0.5250	0.5249	0.5250	0.5249	0.5248	0.5249
11	0.5295	0.5295	0.5295	0.5295	0.5295	0.5294	0.5295	0.5295	0.5295	0.5295	0.5294	0.5295	0.5295	0.5295	0.5294
12	0.5273	0.5272	0.5272	0.5272	0.5271	0.5271	0.5271	0.5271	0.5271	0.5272	0.5271	0.5272	0.5271	0.5271	0.5271
13	0.5245	0.5244	0.5244	0.5245	0.5244	0.5244	0.5244	0.5244	0.5244	0.5245	0.5243	0.5244	0.5244	0.5244	0.5243
14	0.5287	0.5285	0.5285	0.5285	0.5285	0.5285	0.5285	0.5285	0.5285	0.5285	0.5284	0.5286	0.5286	0.5285	0.5284
15	0.5239	0.5239	0.5238	0.5238	0.5238	0.5237	0.5238	0.5237	0.5237	0.5238	0.5237	0.5238	0.5238	0.5238	0.5238
16	0.5250	0.5248	0.5248	0.5248	0.5247	0.5247	0.5247	0.5247	0.5247	0.5248	0.5247	0.5249	0.5249	0.5248	0.5248
17	0.5240	0.5238	0.5237	0.5237	0.5237	0.5237	0.5237	0.5237	0.5237	0.5237	0.5236	0.5237	0.5237	0.5236	0.5236
18	0.5306	0.5305	0.5305	0.5305	0.5305	0.5305	0.5305	0.5305	0.5305	0.5306	0.5305	0.5306	0.5306	0.5305	0.5305
19	0.5306	0.5306	0.5305	0.5306	0.5306	0.5305	0.5306	0.5305	0.5306	0.5306	0.5305	0.5306	0.5306	0.5305	0.5306
20	0.5336	0.5335	0.5335	0.5335	0.5335	0.5335	0.5335	0.5336	0.5336	0.5336	0.5336	0.5337	0.5337	0.5337	0.5336
21	0.5308	0.5307	0.5308	0.5307	0.5307	0.5307	0.5307	0.5307	0.5307	0.5308	0.5308	0.5308	0.5309	0.5308	0.5309
22	0.5311	0.5310	0.5310	0.5310	0.5310	0.5309	0.5310	0.5310	0.5310	0.5311	0.5310	0.5311	0.5311	0.5310	0.5311
23	0.5234	0.5233	0.5234	0.5233	0.5233	0.5233	0.5233	0.5233	0.5233	0.5234	0.5233	0.5234	0.5234	0.5233	0.5234
24	0.5317	0.5316	0.5316	0.5316	0.5316	0.5316	0.5316	0.5316	0.5316	0.5317	0.5316	0.5317	0.5317	0.5317	0.5317
25	0.5302	0.5301	0.5301	0.5301	0.5301	0.5301	0.5301	0.5301	0.5301	0.5302	0.5301	0.5301	0.5301	0.5301	0.5301
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.5275	0.5274	0.5274	0.5274	0.5274	0.5273	0.5274	0.5273	0.5274	0.5274	0.5273	0.5274	0.5274	0.5273	0.5273
Med.	0.5281	0.5280	0.5280	0.5281	0.5280	0.5280	0.5280	0.5280	0.5280	0.5281	0.5280	0.5280	0.5280	0.5279	0.5278
σ	0.0037	0.0037	0.0037	0.0037	0.0038	0.0038	0.0038	0.0038	0.0038	0.0038	0.0038	0.0038	0.0038	0.0038	0.0038
Min.	0.5199	0.5197	0.5196	0.5197	0.5196	0.5195	0.5196	0.5195	0.5195	0.5196	0.5194	0.5195	0.5194	0.5192	0.5192
Max.	0.5336	0.5335	0.5335	0.5335	0.5335	0.5335	0.5335	0.5336	0.5336	0.5336	0.5336	0.5337	0.5337	0.5337	0.5336



### Data Set 6 : 85 °C, 200 mA

Actual Case Temperature [T <sub>s</sub> ]	89.6 °C
Actual Ambient Temperature [T <sub>A</sub> ]	86.5 °C
Drive Current [I <sub>f</sub> ]	200 mA
Measurement Current	200 mA

NOTES:  
 T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0



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### Data Set 6 : 85 °C, 200 mA

Actual Case Temperature [T <sub>S</sub> ]	89.6 °C
Actual Ambient Temperature [T <sub>A</sub> ]	86.5 °C
Drive Current [I <sub>F</sub> ]	200 mA
Measurement Current	200 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 6-1**  
Initial Characteristics

LED No.	Luminous flux	Forward voltage	CCT	Input Power	CIE1931		CIE1976					
	Φ <sub>V</sub> [lm]	V <sub>F</sub> [V]	T <sub>CP</sub> [K]	P [W]	x	y	u'	v'				
1	130.7	6.57	2794	1.31	0.454	0.411	0.258	0.527				
2	129.1	6.58	2796	1.32	0.450	0.405	0.259	0.524				
3	128.4	6.58	2802	1.32	0.447	0.401	0.259	0.522				
4	126.4	6.59	2624	1.32	0.470	0.418	0.265	0.532				
5	128.8	6.57	2835	1.31	0.446	0.401	0.258	0.522				
6	130.4	6.59	2754	1.32	0.459	0.415	0.260	0.529				
7	127.2	6.58	2665	1.32	0.465	0.416	0.264	0.530				
8	128.2	6.58	2707	1.32	0.460	0.412	0.262	0.528				
9	129.0	6.59	2849	1.32	0.443	0.399	0.257	0.520				
10	129.1	6.59	2816	1.32	0.450	0.407	0.258	0.525				
11	127.7	6.59	2760	1.32	0.453	0.406	0.260	0.525				
12	128.8	6.57	2715	1.31	0.459	0.410	0.262	0.527				
13	129.5	6.57	2791	1.31	0.451	0.406	0.259	0.524				
14	127.4	6.60	2747	1.32	0.454	0.405	0.261	0.524				
15	129.5	6.58	2717	1.32	0.463	0.418	0.261	0.531				
16	129.4	6.58	2729	1.32	0.460	0.414	0.261	0.529				
17	128.7	6.58	2791	1.32	0.452	0.408	0.259	0.525				
18	129.0	6.58	2744	1.32	0.456	0.409	0.261	0.526				
19	128.8	6.59	2807	1.32	0.448	0.402	0.259	0.522				
20	127.5	6.57	2603	1.31	0.473	0.420	0.266	0.533				
21	126.7	6.59	2606	1.32	0.476	0.427	0.266	0.536				
22	128.0	6.59	2682	1.32	0.464	0.416	0.263	0.530				
23	127.3	6.58	2671	1.32	0.462	0.411	0.264	0.528				
24	128.2	6.58	2736	1.32	0.456	0.408	0.261	0.526				
25	128.7	6.61	2755	1.32	0.456	0.410	0.260	0.527				
n	25	25	25	25	25	25	25	25				
Avg.	128.5	6.58	2740	1.32	0.457	0.410	0.261	0.527				
Med.	128.7	6.58	2747	1.32	0.456	0.410	0.261	0.527				
σ	1.05	0.010	68.8	0.002	0.0084	0.0068	0.0026	0.0038				
Min.	126.4	6.57	2603	1.31	0.443	0.399	0.257	0.520				
Max.	130.7	6.61	2849	1.32	0.476	0.427	0.266	0.536				



**Data Set 6 : 85 °C, 200 mA**

Actual Case Temperature [T <sub>s</sub> ]	89.6 °C
Actual Ambient Temperature [T <sub>A</sub> ]	86.5 °C
Drive Current [I <sub>F</sub> ]	200 mA
Measurement Current	200 mA

NOTES:  
 T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0

**TABLE 6-2**  
 Lumen Maintenance

LED No.	Lumen Maintenance % ( Normalized to 100 % at 0 hours )														
	0 h	541 h	1009 h	1698 h	2370 h	3123 h	3811 h	4515 h	5181 h	6014 h	6776 h	7573 h	8408 h	9235 h	10070 h
1	100.0	98.7	98.8	98.6	98.3	98.1	98.0	97.7	97.6	97.6	97.4	96.9	96.4	95.4	94.5
2	100.0	98.8	98.8	98.7	98.4	98.1	98.0	97.7	97.6	97.8	97.4	97.2	96.8	95.6	95.3
3	100.0	98.3	98.3	98.1	98.0	97.4	97.4	97.2	97.0	97.2	96.7	96.6	95.7	94.5	94.0
4	100.0	98.4	98.4	98.3	98.3	97.8	97.7	97.5	97.4	97.7	97.1	97.1	96.6	95.6	95.1
5	100.0	98.5	98.4	98.1	97.9	97.3	97.2	96.6	95.8	94.9	93.6	93.3	92.8	92.1	91.9
6	100.0	98.2	98.0	97.8	97.7	97.3	97.1	96.7	96.1	95.5	94.8	94.4	94.0	92.8	92.6
7	100.0	99.1	99.0	98.9	98.7	98.5	98.4	98.3	98.1	97.7	97.5	97.3	97.1	96.5	96.4
8	100.0	98.9	99.0	98.9	98.5	98.4	98.4	98.1	97.9	97.4	97.3	96.9	96.6	96.1	96.0
9	100.0	99.1	99.1	98.9	98.3	98.3	98.2	97.8	97.6	97.1	96.9	96.6	96.2	95.7	94.7
10	100.0	98.7	98.6	98.4	97.9	97.7	97.6	97.3	97.1	96.8	96.6	96.4	96.2	95.7	95.5
11	100.0	98.6	98.7	98.5	98.2	98.0	97.8	97.6	97.4	97.4	97.1	97.0	96.6	95.8	94.6
12	100.0	98.7	98.8	98.6	98.3	98.0	97.9	97.6	97.4	97.5	97.1	96.9	96.2	95.5	94.4
13	100.0	98.7	98.7	98.5	98.3	98.0	97.9	97.7	97.5	97.5	97.1	97.0	96.1	94.8	93.7
14	100.0	98.9	98.8	98.7	98.4	98.1	98.0	97.7	97.5	97.5	97.1	96.9	96.0	94.8	94.4
15	100.0	98.7	98.6	98.5	98.2	97.9	97.8	97.6	97.4	97.3	96.8	96.8	96.1	95.3	94.7
16	100.0	98.5	98.4	98.2	98.1	97.7	97.6	97.3	97.1	96.8	96.4	96.1	95.3	93.9	93.3
17	100.0	98.6	98.5	98.3	98.0	97.6	97.5	97.0	96.6	96.1	95.5	95.3	94.6	93.9	93.8
18	100.0	98.6	98.5	98.1	97.7	97.3	97.0	96.0	95.7	95.0	94.0	93.5	92.6	92.0	90.8
19	100.0	99.0	99.0	98.8	98.5	98.3	98.2	97.8	97.8	97.4	97.1	96.6	96.3	95.9	95.2
20	100.0	98.8	98.7	98.5	98.2	97.9	97.7	97.4	97.3	97.1	96.7	96.2	95.7	94.9	94.2
21	100.0	98.5	98.5	98.2	97.8	97.6	97.4	97.0	96.8	96.6	96.2	96.0	95.1	93.8	92.8
22	100.0	98.5	98.6	98.5	98.2	97.9	97.8	97.6	97.5	97.5	97.0	96.6	95.3	93.5	92.7
23	100.0	98.4	98.4	98.3	98.1	97.7	97.6	97.3	97.0	97.0	96.5	96.0	95.0	92.9	92.1
24	100.0	98.4	98.3	98.1	97.8	97.4	97.3	97.0	96.8	96.8	96.3	96.1	95.4	93.4	92.9
25	100.0	98.3	98.2	98.1	97.7	97.2	96.9	96.1	95.6	95.1	94.4	94.1	93.2	92.3	92.0
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	98.6	98.6	98.4	98.1	97.8	97.7	97.3	97.1	96.9	96.4	96.2	95.5	94.5	93.9
Med.	100.0	98.6	98.6	98.5	98.2	97.9	97.7	97.5	97.4	97.2	96.8	96.6	96.0	94.8	94.2
σ	0.00	0.25	0.28	0.29	0.27	0.36	0.41	0.55	0.66	0.88	1.10	1.14	1.22	1.36	1.40
Min.	100.0	98.2	98.0	97.8	97.7	97.2	96.9	96.0	95.6	94.9	93.6	93.3	92.6	92.0	90.8
Max.	100.0	99.1	99.1	98.9	98.7	98.5	98.4	98.3	98.1	97.8	97.5	97.3	97.1	96.5	96.4

**TM-21 Projection**

Time	4515 h	5181 h	6014 h	6776 h	7573 h	8408 h	9235 h	10070 h								
ln(Avg.)	-0.0269	-0.0294	-0.0314	-0.0366	-0.0393	-0.0460	-0.0565	-0.0629								

Test duration used	4515 h	to	10070 h
B	1.006		
α	6.49E-06		
R <sup>2</sup>	0.948		
Calculated L <sub>70</sub> (10K)	55900	hours	
Reported L <sub>70</sub> (10K)	55900	hours	
Calculated L <sub>80</sub> (10K)	35300	hours	
Reported L <sub>80</sub> (10K)	35300	hours	
Calculated L <sub>90</sub> (10K)	17100	hours	
Reported L <sub>90</sub> (10K)	17100	hours	

Curve-fit equation:  
 $\Phi(t)=Bexp(-\alpha t)$   
 Lumen maintenance life equation:  
 $L_{70}=\ln(B/0.7)/\alpha$   
 $L_{80}=\ln(B/0.8)/\alpha$   
 $L_{90}=\ln(B/0.9)/\alpha$

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### Data Set 6 : 85 °C, 200 mA

Actual Case Temperature [T <sub>c</sub> ]	89.6 °C
Actual Ambient Temperature [T <sub>A</sub> ]	86.5 °C
Drive Current [I <sub>F</sub> ]	200 mA
Measurement Current	200 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 6-3**  
Forward Voltage

LED No.	Relative Forward Voltage % ( Normalized to 100 % at 0 hours )														
	0 h	541 h	1009 h	1698 h	2370 h	3123 h	3811 h	4515 h	5181 h	6014 h	6776 h	7573 h	8408 h	9235 h	10070 h
1	100.0	100.3	100.7	101.0	101.3	101.4	101.5	101.7	101.7	101.8	101.7	101.8	102.0	102.0	102.1
2	100.0	100.5	101.0	101.3	101.7	101.8	102.0	102.2	102.2	102.4	102.3	102.3	102.5	102.5	102.7
3	100.0	100.4	100.8	101.1	101.5	101.5	101.7	101.9	101.9	102.1	101.9	102.0	102.2	102.2	102.4
4	100.0	100.5	101.0	101.3	101.6	101.7	101.9	102.0	102.1	102.3	102.1	102.2	102.4	102.4	102.6
5	100.0	100.6	101.1	101.4	101.8	101.8	102.0	102.2	102.2	102.4	102.3	102.4	102.5	102.5	102.8
6	100.0	100.5	100.9	101.2	101.5	101.6	101.8	101.9	101.9	102.1	102.0	102.0	102.2	102.2	102.4
7	100.0	100.5	100.9	101.3	101.7	101.7	101.9	102.1	102.1	102.4	102.2	102.3	102.5	102.5	102.7
8	100.0	100.4	100.9	101.2	101.6	101.6	101.8	102.0	102.0	102.2	102.1	102.1	102.3	102.3	102.5
9	100.0	100.5	101.0	101.4	101.8	101.8	102.0	102.2	102.2	102.5	102.3	102.4	102.5	102.5	102.8
10	100.0	100.5	101.0	101.3	101.7	101.8	101.9	102.1	102.1	102.4	102.2	102.3	102.5	102.5	102.7
11	100.0	100.6	101.1	101.5	101.8	101.9	102.1	102.3	102.3	102.5	102.4	102.5	102.6	102.6	102.9
12	100.0	100.5	101.0	101.4	101.7	101.8	102.0	102.1	102.1	102.4	102.2	102.4	102.5	102.5	102.7
13	100.0	100.5	101.0	101.4	101.7	101.8	102.0	102.1	102.2	102.4	102.2	102.4	102.5	102.5	102.7
14	100.0	100.6	101.1	101.5	101.8	101.9	102.0	102.2	102.2	102.5	102.3	102.4	102.6	102.6	102.8
15	100.0	100.6	101.1	101.4	101.8	101.9	102.1	102.2	102.2	102.5	102.3	102.4	102.6	102.6	102.8
16	100.0	100.6	101.1	101.4	101.7	101.8	102.0	102.2	102.2	102.4	102.3	102.4	102.5	102.5	102.7
17	100.0	100.6	101.1	101.4	101.8	101.9	102.0	102.2	102.2	102.4	102.3	102.4	102.5	102.5	102.7
18	100.0	100.4	100.8	101.0	101.3	101.4	101.5	101.7	101.7	101.9	101.7	101.8	101.9	101.9	102.1
19	100.0	100.6	101.0	101.4	101.7	101.8	102.0	102.2	102.2	102.4	102.2	102.3	102.5	102.5	102.7
20	100.0	100.4	100.8	101.1	101.4	101.5	101.6	101.8	101.8	101.9	101.8	101.9	102.0	102.0	102.2
21	100.0	100.6	101.1	101.5	101.8	101.9	102.1	102.2	102.3	102.5	102.4	102.5	102.6	102.7	102.8
22	100.0	100.5	101.0	101.3	101.6	101.7	101.8	102.0	102.0	102.2	102.1	102.2	102.3	102.4	102.5
23	100.0	100.6	101.1	101.4	101.8	101.9	102.1	102.2	102.3	102.4	102.3	102.4	102.6	102.6	102.8
24	100.0	100.6	101.1	101.4	101.8	101.9	102.0	102.2	102.3	102.4	102.3	102.4	102.6	102.7	102.8
25	100.0	100.6	101.2	101.5	101.8	101.9	102.1	102.2	102.3	102.4	102.3	102.4	102.5	102.6	102.8
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	100.5	101.0	101.3	101.7	101.8	101.9	102.1	102.1	102.3	102.2	102.3	102.4	102.4	102.6
Med.	100.0	100.5	101.0	101.4	101.7	101.8	102.0	102.2	102.2	102.4	102.2	102.4	102.5	102.5	102.7
σ	0.00	0.08	0.11	0.14	0.15	0.17	0.17	0.18	0.19	0.20	0.20	0.21	0.21	0.22	0.22
Min.	100.0	100.3	100.7	101.0	101.3	101.4	101.5	101.7	101.7	101.8	101.7	101.8	101.9	101.9	102.1
Max.	100.0	100.6	101.2	101.5	101.8	101.9	102.1	102.3	102.3	102.5	102.4	102.5	102.6	102.7	102.9



### Data Set 6 : 85 °C, 200 mA

Actual Case Temperature [T <sub>s</sub> ]	89.6 °C
Actual Ambient Temperature [T <sub>A</sub> ]	86.5 °C
Drive Current [I <sub>f</sub> ]	200 mA
Measurement Current	200 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 6-4**  
Chromaticity Shift

LED No.	Chromaticity Shift Δu'v'														
	0 h	541 h	1009 h	1698 h	2370 h	3123 h	3811 h	4515 h	5181 h	6014 h	6776 h	7573 h	8408 h	9235 h	10070 h
1	0.0000	0.0009	0.0010	0.0010	0.0014	0.0015	0.0015	0.0016	0.0017	0.0017	0.0018	0.0022	0.0024	0.0029	0.0037
2	0.0000	0.0010	0.0010	0.0011	0.0014	0.0016	0.0016	0.0017	0.0017	0.0018	0.0019	0.0022	0.0023	0.0032	0.0035
3	0.0000	0.0010	0.0010	0.0012	0.0015	0.0017	0.0017	0.0018	0.0019	0.0020	0.0024	0.0025	0.0033	0.0039	0.0044
4	0.0000	0.0009	0.0010	0.0010	0.0013	0.0015	0.0015	0.0016	0.0017	0.0018	0.0018	0.0020	0.0022	0.0023	0.0028
5	0.0000	0.0010	0.0011	0.0011	0.0015	0.0016	0.0017	0.0018	0.0018	0.0018	0.0018	0.0019	0.0019	0.0019	0.0023
6	0.0000	0.0010	0.0011	0.0012	0.0015	0.0017	0.0017	0.0018	0.0019	0.0020	0.0021	0.0024	0.0024	0.0031	0.0034
7	0.0000	0.0011	0.0012	0.0012	0.0015	0.0016	0.0017	0.0017	0.0018	0.0019	0.0019	0.0019	0.0021	0.0026	0.0029
8	0.0000	0.0010	0.0011	0.0012	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0019	0.0020	0.0021	0.0024	0.0025
9	0.0000	0.0010	0.0010	0.0011	0.0014	0.0016	0.0016	0.0017	0.0017	0.0018	0.0019	0.0022	0.0022	0.0025	0.0033
10	0.0000	0.0010	0.0011	0.0013	0.0016	0.0018	0.0018	0.0020	0.0021	0.0022	0.0022	0.0022	0.0023	0.0027	0.0027
11	0.0000	0.0010	0.0010	0.0011	0.0014	0.0016	0.0016	0.0016	0.0018	0.0018	0.0019	0.0020	0.0021	0.0025	0.0035
12	0.0000	0.0009	0.0009	0.0010	0.0013	0.0014	0.0015	0.0015	0.0016	0.0017	0.0018	0.0020	0.0021	0.0024	0.0030
13	0.0000	0.0009	0.0009	0.0011	0.0013	0.0015	0.0014	0.0016	0.0017	0.0019	0.0022	0.0024	0.0027	0.0037	0.0048
14	0.0000	0.0008	0.0008	0.0009	0.0013	0.0015	0.0015	0.0016	0.0017	0.0017	0.0018	0.0022	0.0026	0.0037	0.0043
15	0.0000	0.0009	0.0010	0.0010	0.0013	0.0016	0.0015	0.0017	0.0018	0.0019	0.0019	0.0021	0.0024	0.0025	0.0031
16	0.0000	0.0012	0.0012	0.0014	0.0017	0.0018	0.0018	0.0019	0.0021	0.0021	0.0022	0.0024	0.0030	0.0039	0.0045
17	0.0000	0.0012	0.0012	0.0013	0.0016	0.0018	0.0018	0.0019	0.0020	0.0021	0.0023	0.0024	0.0028	0.0033	0.0034
18	0.0000	0.0011	0.0012	0.0013	0.0017	0.0018	0.0018	0.0019	0.0021	0.0021	0.0022	0.0023	0.0025	0.0026	0.0029
19	0.0000	0.0009	0.0010	0.0011	0.0015	0.0016	0.0016	0.0017	0.0018	0.0019	0.0020	0.0022	0.0024	0.0027	0.0032
20	0.0000	0.0009	0.0009	0.0009	0.0013	0.0014	0.0014	0.0015	0.0016	0.0017	0.0018	0.0021	0.0023	0.0026	0.0027
21	0.0000	0.0009	0.0010	0.0011	0.0015	0.0016	0.0017	0.0017	0.0018	0.0020	0.0021	0.0021	0.0023	0.0028	0.0030
22	0.0000	0.0010	0.0010	0.0010	0.0014	0.0015	0.0015	0.0016	0.0017	0.0018	0.0019	0.0022	0.0029	0.0039	0.0040
23	0.0000	0.0010	0.0011	0.0011	0.0014	0.0016	0.0016	0.0017	0.0018	0.0019	0.0020	0.0025	0.0028	0.0043	0.0047
24	0.0000	0.0009	0.0010	0.0010	0.0013	0.0015	0.0015	0.0016	0.0017	0.0018	0.0020	0.0024	0.0027	0.0040	0.0045
25	0.0000	0.0011	0.0011	0.0012	0.0015	0.0017	0.0017	0.0018	0.0019	0.0020	0.0021	0.0022	0.0029	0.0033	0.0038
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.0000	0.0010	0.0010	0.0011	0.0015	0.0016	0.0016	0.0017	0.0018	0.0019	0.0020	0.0022	0.0025	0.0030	0.0035
Med.	0.0000	0.0010	0.0010	0.0011	0.0014	0.0016	0.0016	0.0017	0.0018	0.0019	0.0019	0.0022	0.0024	0.0028	0.0034
σ	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0006	0.0007
Min.	0.0000	0.0008	0.0008	0.0009	0.0013	0.0014	0.0014	0.0015	0.0016	0.0017	0.0018	0.0019	0.0019	0.0019	0.0023
Max.	0.0000	0.0012	0.0012	0.0014	0.0017	0.0018	0.0018	0.0020	0.0021	0.0022	0.0024	0.0025	0.0033	0.0043	0.0048

### Data Set 6 : 85 °C, 200 mA

Actual Case Temperature [T <sub>S</sub> ]	89.6 °C
Actual Ambient Temperature [T <sub>A</sub> ]	86.5 °C
Drive Current [I <sub>F</sub> ]	200 mA
Measurement Current	200 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

TABLE 6-5

Chromaticity

LED No.	Chromaticity u'														
	0 h	541 h	1009 h	1698 h	2370 h	3123 h	3811 h	4515 h	5181 h	6014 h	6776 h	7573 h	8408 h	9235 h	10070 h
1	0.2588	0.2579	0.2578	0.2578	0.2574	0.2573	0.2573	0.2572	0.2571	0.2571	0.2570	0.2567	0.2565	0.2562	0.2558
2	0.2594	0.2584	0.2584	0.2583	0.2580	0.2578	0.2578	0.2577	0.2577	0.2576	0.2575	0.2573	0.2572	0.2566	0.2565
3	0.2594	0.2584	0.2584	0.2582	0.2579	0.2577	0.2577	0.2576	0.2575	0.2574	0.2571	0.2570	0.2566	0.2563	0.2562
4	0.2659	0.2650	0.2649	0.2649	0.2646	0.2644	0.2644	0.2643	0.2642	0.2641	0.2641	0.2639	0.2637	0.2636	0.2633
5	0.2582	0.2572	0.2571	0.2571	0.2567	0.2566	0.2565	0.2564	0.2564	0.2564	0.2564	0.2563	0.2563	0.2563	0.2561
6	0.2605	0.2595	0.2594	0.2593	0.2590	0.2588	0.2588	0.2587	0.2586	0.2585	0.2584	0.2582	0.2582	0.2577	0.2576
7	0.2644	0.2633	0.2632	0.2632	0.2629	0.2628	0.2627	0.2627	0.2626	0.2625	0.2625	0.2625	0.2623	0.2619	0.2618
8	0.2626	0.2616	0.2615	0.2614	0.2611	0.2610	0.2610	0.2609	0.2608	0.2608	0.2607	0.2606	0.2605	0.2603	0.2603
9	0.2577	0.2567	0.2567	0.2566	0.2563	0.2561	0.2561	0.2560	0.2560	0.2559	0.2558	0.2556	0.2556	0.2554	0.2551
10	0.2583	0.2573	0.2572	0.2570	0.2567	0.2565	0.2565	0.2563	0.2562	0.2561	0.2561	0.2561	0.2560	0.2557	0.2558
11	0.2607	0.2597	0.2597	0.2596	0.2593	0.2591	0.2591	0.2591	0.2589	0.2589	0.2588	0.2587	0.2586	0.2584	0.2579
12	0.2623	0.2614	0.2614	0.2613	0.2610	0.2609	0.2608	0.2608	0.2607	0.2606	0.2605	0.2603	0.2602	0.2600	0.2597
13	0.2595	0.2586	0.2586	0.2584	0.2582	0.2580	0.2581	0.2579	0.2578	0.2576	0.2574	0.2572	0.2570	0.2565	0.2560
14	0.2612	0.2604	0.2604	0.2603	0.2599	0.2597	0.2597	0.2596	0.2595	0.2595	0.2594	0.2591	0.2588	0.2582	0.2579
15	0.2616	0.2607	0.2606	0.2606	0.2603	0.2600	0.2601	0.2599	0.2598	0.2597	0.2597	0.2595	0.2593	0.2592	0.2589
16	0.2617	0.2605	0.2605	0.2603	0.2600	0.2599	0.2599	0.2598	0.2596	0.2596	0.2595	0.2593	0.2588	0.2583	0.2581
17	0.2594	0.2582	0.2582	0.2581	0.2578	0.2576	0.2576	0.2575	0.2574	0.2573	0.2572	0.2571	0.2568	0.2565	0.2564
18	0.2611	0.2600	0.2599	0.2598	0.2594	0.2593	0.2593	0.2592	0.2590	0.2590	0.2589	0.2588	0.2587	0.2586	0.2584
19	0.2590	0.2581	0.2580	0.2579	0.2575	0.2574	0.2574	0.2573	0.2572	0.2571	0.2570	0.2569	0.2568	0.2566	0.2563
20	0.2667	0.2658	0.2658	0.2658	0.2654	0.2653	0.2653	0.2652	0.2651	0.2650	0.2649	0.2646	0.2644	0.2642	0.2642
21	0.2661	0.2652	0.2651	0.2650	0.2646	0.2645	0.2644	0.2644	0.2643	0.2641	0.2640	0.2640	0.2638	0.2634	0.2633
22	0.2633	0.2623	0.2623	0.2623	0.2619	0.2618	0.2618	0.2617	0.2616	0.2615	0.2614	0.2612	0.2607	0.2602	0.2602
23	0.2643	0.2633	0.2632	0.2632	0.2629	0.2627	0.2627	0.2626	0.2625	0.2624	0.2623	0.2619	0.2617	0.2607	0.2605
24	0.2615	0.2606	0.2605	0.2605	0.2602	0.2600	0.2600	0.2599	0.2598	0.2597	0.2595	0.2592	0.2590	0.2584	0.2582
25	0.2606	0.2595	0.2595	0.2594	0.2591	0.2589	0.2589	0.2588	0.2587	0.2586	0.2585	0.2584	0.2579	0.2577	0.2574
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.2614	0.2604	0.2603	0.2603	0.2599	0.2598	0.2598	0.2597	0.2596	0.2595	0.2594	0.2592	0.2590	0.2587	0.2585
Med.	0.2611	0.2600	0.2599	0.2598	0.2594	0.2593	0.2593	0.2592	0.2590	0.2590	0.2589	0.2588	0.2587	0.2583	0.2579
σ	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026
Min.	0.2577	0.2567	0.2567	0.2566	0.2563	0.2561	0.2561	0.2560	0.2560	0.2559	0.2558	0.2556	0.2556	0.2554	0.2551
Max.	0.2667	0.2658	0.2658	0.2658	0.2654	0.2653	0.2653	0.2652	0.2651	0.2650	0.2649	0.2646	0.2644	0.2642	0.2642



### Data Set 6 : 85 °C, 200 mA

Actual Case Temperature [T <sub>c</sub> ]	89.6 °C
Actual Ambient Temperature [T <sub>A</sub> ]	86.5 °C
Drive Current [I <sub>f</sub> ]	200 mA
Measurement Current	200 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 6-6**  
Chromaticity

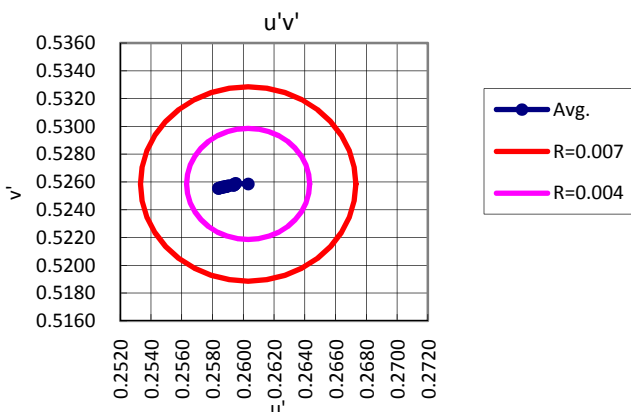
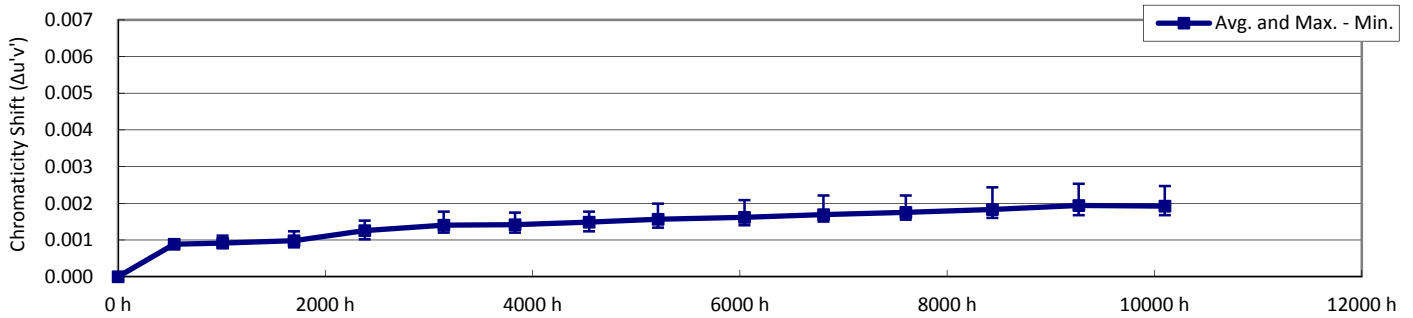
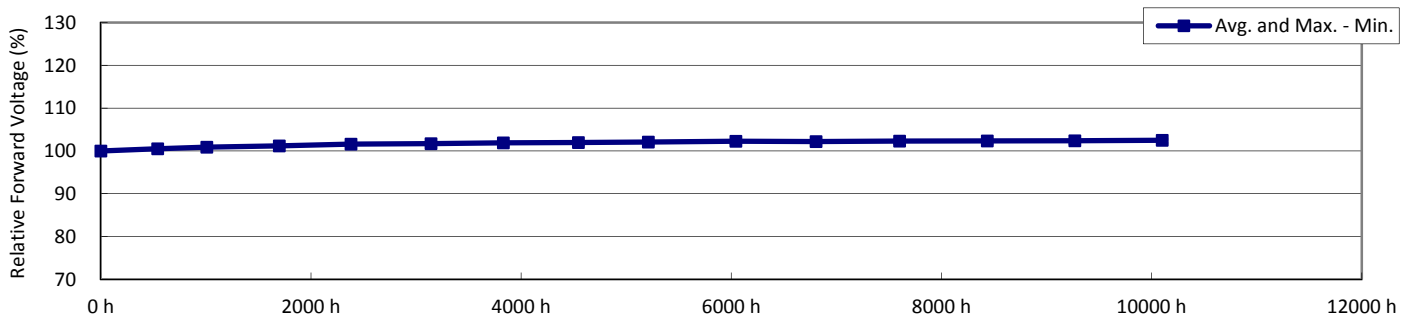
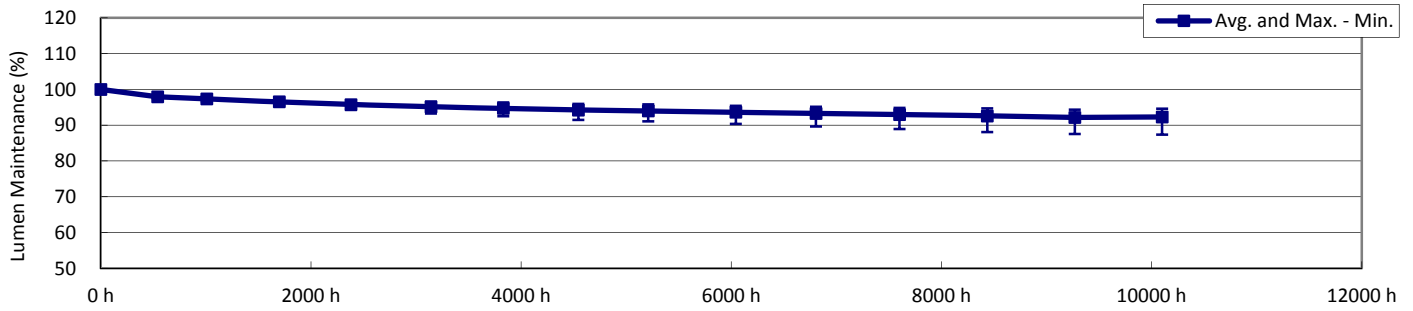
LED No.	Chromaticity v'														
	0 h	541 h	1009 h	1698 h	2370 h	3123 h	3811 h	4515 h	5181 h	6014 h	6776 h	7573 h	8408 h	9235 h	10070 h
1	0.5270	0.5269	0.5269	0.5269	0.5269	0.5268	0.5269	0.5270	0.5269	0.5270	0.5269	0.5265	0.5263	0.5258	0.5248
2	0.5239	0.5239	0.5238	0.5238	0.5238	0.5237	0.5237	0.5238	0.5237	0.5237	0.5236	0.5234	0.5233	0.5224	0.5219
3	0.5216	0.5215	0.5215	0.5215	0.5214	0.5213	0.5214	0.5214	0.5213	0.5214	0.5211	0.5208	0.5199	0.5192	0.5186
4	0.5316	0.5316	0.5317	0.5317	0.5317	0.5316	0.5317	0.5317	0.5317	0.5318	0.5317	0.5316	0.5313	0.5312	0.5305
5	0.5216	0.5214	0.5214	0.5214	0.5214	0.5213	0.5213	0.5214	0.5214	0.5216	0.5215	0.5216	0.5215	0.5213	0.5206
6	0.5292	0.5290	0.5290	0.5290	0.5290	0.5290	0.5290	0.5291	0.5290	0.5291	0.5290	0.5287	0.5286	0.5278	0.5274
7	0.5302	0.5300	0.5300	0.5300	0.5300	0.5300	0.5300	0.5301	0.5300	0.5301	0.5299	0.5299	0.5299	0.5294	0.5289
8	0.5283	0.5282	0.5282	0.5282	0.5282	0.5281	0.5282	0.5282	0.5282	0.5283	0.5281	0.5281	0.5279	0.5275	0.5274
9	0.5200	0.5199	0.5198	0.5198	0.5198	0.5197	0.5197	0.5198	0.5197	0.5198	0.5196	0.5195	0.5193	0.5189	0.5180
10	0.5248	0.5246	0.5246	0.5246	0.5245	0.5244	0.5245	0.5245	0.5244	0.5245	0.5244	0.5244	0.5244	0.5240	0.5239
11	0.5249	0.5247	0.5248	0.5247	0.5247	0.5247	0.5247	0.5248	0.5247	0.5247	0.5247	0.5247	0.5246	0.5240	0.5228
12	0.5269	0.5268	0.5268	0.5268	0.5268	0.5268	0.5268	0.5268	0.5268	0.5268	0.5267	0.5266	0.5265	0.5262	0.5254
13	0.5242	0.5241	0.5241	0.5241	0.5242	0.5241	0.5241	0.5241	0.5241	0.5240	0.5237	0.5236	0.5231	0.5221	0.5209
14	0.5239	0.5238	0.5238	0.5238	0.5238	0.5237	0.5238	0.5238	0.5237	0.5237	0.5236	0.5234	0.5228	0.5218	0.5211
15	0.5302	0.5302	0.5302	0.5302	0.5302	0.5302	0.5302	0.5302	0.5302	0.5302	0.5301	0.5300	0.5297	0.5295	0.5287
16	0.5290	0.5289	0.5289	0.5289	0.5289	0.5289	0.5289	0.5289	0.5289	0.5289	0.5288	0.5286	0.5281	0.5270	0.5263
17	0.5255	0.5252	0.5252	0.5252	0.5252	0.5251	0.5252	0.5252	0.5251	0.5252	0.5250	0.5249	0.5245	0.5239	0.5238
18	0.5263	0.5261	0.5262	0.5261	0.5261	0.5261	0.5261	0.5262	0.5262	0.5263	0.5260	0.5259	0.5258	0.5255	0.5252
19	0.5218	0.5218	0.5218	0.5217	0.5217	0.5217	0.5217	0.5217	0.5216	0.5217	0.5215	0.5212	0.5209	0.5206	0.5201
20	0.5325	0.5325	0.5325	0.5325	0.5325	0.5325	0.5325	0.5326	0.5326	0.5326	0.5325	0.5322	0.5321	0.5317	0.5316
21	0.5358	0.5358	0.5358	0.5358	0.5358	0.5358	0.5358	0.5358	0.5358	0.5358	0.5357	0.5358	0.5356	0.5350	0.5346
22	0.5300	0.5300	0.5301	0.5300	0.5301	0.5300	0.5300	0.5301	0.5300	0.5301	0.5299	0.5295	0.5288	0.5277	0.5275
23	0.5278	0.5278	0.5278	0.5279	0.5278	0.5278	0.5278	0.5279	0.5278	0.5278	0.5276	0.5273	0.5269	0.5254	0.5250
24	0.5259	0.5258	0.5258	0.5258	0.5258	0.5257	0.5257	0.5257	0.5257	0.5257	0.5255	0.5252	0.5248	0.5233	0.5229
25	0.5265	0.5264	0.5264	0.5264	0.5264	0.5263	0.5264	0.5264	0.5264	0.5264	0.5262	0.5261	0.5254	0.5249	0.5244
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.5268	0.5267	0.5267	0.5267	0.5267	0.5266	0.5266	0.5267	0.5266	0.5267	0.5265	0.5264	0.5261	0.5254	0.5249
Med.	0.5265	0.5264	0.5264	0.5264	0.5264	0.5263	0.5264	0.5264	0.5264	0.5264	0.5262	0.5261	0.5258	0.5254	0.5248
σ	0.0038	0.0038	0.0038	0.0038	0.0038	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0040	0.0041
Min.	0.5200	0.5199	0.5198	0.5198	0.5198	0.5197	0.5197	0.5198	0.5197	0.5198	0.5196	0.5195	0.5193	0.5189	0.5180
Max.	0.5358	0.5358	0.5358	0.5358	0.5358	0.5358	0.5358	0.5358	0.5358	0.5358	0.5357	0.5358	0.5356	0.5350	0.5346



### Data Set 7 : 105 °C, 100 mA

Actual Case Temperature [T <sub>S</sub> ]	106.2 °C
Actual Ambient Temperature [T <sub>A</sub> ]	103.5 °C
Drive Current [I <sub>F</sub> ]	100 mA
Measurement Current	100 mA

NOTES:  
 T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0



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### Data Set 7 : 105 °C, 100 mA

Actual Case Temperature [T <sub>s</sub> ]	106.2 °C
Actual Ambient Temperature [T <sub>A</sub> ]	103.5 °C
Drive Current [I <sub>F</sub> ]	100 mA
Measurement Current	100 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 7-1**  
Initial Characteristics

LED No.	Luminous flux	Forward voltage	CCT	Input Power	CIE1931		CIE1976					
	Φ <sub>V</sub> [lm]	V <sub>F</sub> [V]	T <sub>CP</sub> [K]	P [W]	x	y	u'	v'				
1	70.5	6.03	2826	0.60	0.445	0.398	0.258	0.520				
2	71.5	6.02	2789	0.60	0.453	0.409	0.259	0.526				
3	70.3	6.02	2716	0.60	0.457	0.408	0.262	0.526				
4	70.3	6.02	2711	0.60	0.455	0.404	0.263	0.524				
5	70.8	6.03	2738	0.60	0.459	0.414	0.261	0.528				
6	72.0	6.02	2743	0.60	0.459	0.415	0.260	0.529				
7	70.9	6.02	2818	0.60	0.447	0.401	0.258	0.522				
8	71.2	6.03	2740	0.60	0.459	0.414	0.260	0.529				
9	70.6	6.02	2841	0.60	0.442	0.396	0.258	0.519				
10	70.1	6.03	2761	0.60	0.454	0.408	0.260	0.525				
11	71.2	6.02	2793	0.60	0.450	0.404	0.259	0.524				
12	71.3	6.03	2613	0.60	0.474	0.424	0.266	0.534				
13	70.9	6.02	2749	0.60	0.457	0.412	0.260	0.527				
14	71.6	6.02	2773	0.60	0.453	0.407	0.260	0.525				
15	71.1	6.02	2766	0.60	0.453	0.406	0.260	0.525				
16	70.9	6.03	2775	0.60	0.455	0.412	0.259	0.527				
17	70.8	6.02	2803	0.60	0.447	0.400	0.259	0.521				
18	70.2	6.01	2684	0.60	0.460	0.409	0.263	0.527				
19	71.5	6.02	2718	0.60	0.461	0.416	0.261	0.530				
20	71.2	6.01	2786	0.60	0.451	0.405	0.259	0.524				
21	71.1	6.03	2727	0.60	0.461	0.416	0.261	0.530				
22	70.4	6.02	2688	0.60	0.461	0.411	0.263	0.528				
23	71.1	6.03	2679	0.60	0.467	0.421	0.263	0.532				
24	69.4	6.04	2800	0.60	0.446	0.397	0.259	0.520				
25	70.9	6.03	2777	0.60	0.452	0.406	0.260	0.524				
n	25	25	25	25	25	25	25	25				
Avg.	70.9	6.02	2753	0.60	0.455	0.408	0.260	0.526				
Med.	70.9	6.02	2761	0.60	0.455	0.408	0.260	0.526				
σ	0.56	0.006	52.9	0.001	0.0072	0.0071	0.0019	0.0038				
Min.	69.4	6.01	2613	0.60	0.442	0.396	0.258	0.519				
Max.	72.0	6.04	2841	0.60	0.474	0.424	0.266	0.534				



### Data Set 7 : 105 °C, 100 mA

Actual Case Temperature [T <sub>s</sub> ]	106.2 °C
Actual Ambient Temperature [T <sub>A</sub> ]	103.5 °C
Drive Current [I <sub>F</sub> ]	100 mA
Measurement Current	100 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 7-2**  
Lumen Maintenance

LED No.	Lumen Maintenance % ( Normalized to 100 % at 0 hours )														
	0 h	541 h	1008 h	1698 h	2380 h	3142 h	3830 h	4545 h	5210 h	6044 h	6806 h	7601 h	8436 h	9269 h	10100 h
1	100.0	97.9	97.3	96.6	95.8	95.2	94.8	94.2	94.0	94.0	93.6	93.2	92.7	92.4	92.4
2	100.0	98.0	97.6	96.9	96.4	95.8	95.6	95.1	95.0	95.0	94.7	94.5	94.2	93.9	94.0
3	100.0	97.5	96.7	95.5	94.7	93.9	93.5	93.1	92.7	92.6	92.2	91.8	91.5	91.1	91.3
4	100.0	97.9	97.3	96.4	95.8	95.1	94.7	94.5	94.1	94.0	93.6	93.3	93.0	92.6	92.8
5	100.0	98.0	97.3	96.5	95.9	95.2	94.9	94.5	94.2	93.9	93.5	93.2	92.9	92.7	93.0
6	100.0	97.9	97.2	96.4	95.7	95.1	94.7	94.3	94.2	93.6	93.2	92.9	92.6	92.3	92.7
7	100.0	97.9	97.3	96.7	96.0	95.5	95.2	94.8	94.8	94.2	93.9	93.7	93.4	93.3	93.7
8	100.0	98.4	97.7	96.9	96.0	95.3	94.8	94.1	93.9	93.3	93.0	92.7	92.2	92.0	92.3
9	100.0	98.4	97.8	97.0	96.2	95.6	95.2	94.5	94.5	93.9	93.5	93.2	92.6	92.3	92.4
10	100.0	97.9	96.9	95.6	94.3	93.3	92.5	91.5	91.1	90.4	89.6	88.9	88.1	87.5	87.3
11	100.0	98.2	97.6	96.8	95.8	95.2	94.9	94.3	94.1	93.8	93.5	93.2	92.9	92.3	92.2
12	100.0	97.9	97.3	96.5	95.6	94.9	94.6	94.0	93.7	93.6	93.1	92.8	92.4	91.8	91.7
13	100.0	97.9	97.3	96.6	95.9	95.3	95.1	94.7	94.4	94.5	94.2	94.1	93.9	93.5	93.6
14	100.0	97.7	96.9	96.2	95.3	94.6	94.4	93.9	93.5	93.4	92.9	92.8	92.3	92.0	92.0
15	100.0	98.0	97.3	96.5	95.7	95.0	94.7	94.2	93.9	93.6	93.3	93.1	92.7	92.4	92.6
16	100.0	97.5	96.8	96.0	95.2	94.5	94.1	93.8	93.4	93.0	92.6	92.4	92.1	91.7	92.0
17	100.0	97.7	96.9	95.8	94.7	93.7	93.1	92.4	92.0	91.2	90.7	90.2	89.8	89.4	89.7
18	100.0	98.4	98.1	97.5	96.9	96.5	96.3	95.9	95.8	95.4	95.1	94.8	94.7	94.3	94.6
19	100.0	98.3	98.0	97.3	96.5	96.0	95.8	95.2	95.2	94.8	94.6	94.4	94.3	93.9	94.2
20	100.0	98.4	98.0	97.4	96.6	96.1	95.9	95.4	95.4	95.2	95.0	94.8	94.7	94.3	94.5
21	100.0	98.0	97.6	96.9	96.0	95.5	95.2	94.6	94.4	94.1	93.7	93.3	92.5	92.2	92.2
22	100.0	97.8	97.3	96.6	95.7	95.0	94.6	94.1	93.7	93.4	92.8	92.1	91.4	90.8	90.7
23	100.0	97.5	97.0	96.3	95.5	94.9	94.4	94.0	93.6	93.4	92.9	92.5	92.0	91.3	91.4
24	100.0	97.8	97.1	96.5	95.7	95.1	94.8	94.4	94.0	93.9	93.6	93.2	92.9	92.3	92.6
25	100.0	97.8	97.1	96.4	95.6	95.0	94.5	94.1	93.8	93.3	93.0	92.5	92.1	91.6	91.8
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	97.9	97.3	96.6	95.7	95.1	94.7	94.2	94.0	93.7	93.3	93.0	92.5	92.2	92.3
Med.	100.0	97.9	97.3	96.5	95.8	95.1	94.8	94.3	94.0	93.8	93.5	93.2	92.6	92.3	92.4
σ	0.00	0.28	0.39	0.50	0.60	0.72	0.83	0.90	1.00	1.10	1.19	1.30	1.42	1.48	1.55
Min.	100.0	97.5	96.7	95.5	94.3	93.3	92.5	91.5	91.1	90.4	89.6	88.9	88.1	87.5	87.3
Max.	100.0	98.4	98.1	97.5	96.9	96.5	96.3	95.9	95.8	95.4	95.1	94.8	94.7	94.3	94.6

#### TM-21 Projection

Time	4545 h	5210 h	6044 h	6806 h	7601 h	8436 h	9269 h	10100 h							
ln(Avg.)	-0.0595	-0.0621	-0.0655	-0.0696	-0.0731	-0.0775	-0.0816	-0.0801							

Test duration used	4545 h	to	10100 h
B	0.960		
α	4.17E-06		
R <sup>2</sup>	0.967		
Calculated L <sub>70</sub> (10K)	75700	hours	
Reported L <sub>70</sub> (10K)	> 60600	hours	
Calculated L <sub>80</sub> (10K)	43700	hours	
Reported L <sub>80</sub> (10K)	43700	hours	
Calculated L <sub>90</sub> (10K)	15500	hours	
Reported L <sub>90</sub> (10K)	15500	hours	

Curve-fit equation:

$$\Phi(t) = B \exp(-\alpha t)$$

Lumen maintenance life equation:

$$L_{70} = \ln(B/0.7)/\alpha$$

$$L_{80} = \ln(B/0.8)/\alpha$$

$$L_{90} = \ln(B/0.9)/\alpha$$

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The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.

### Data Set 7 : 105 °C, 100 mA

Actual Case Temperature [T <sub>s</sub> ]	106.2 °C
Actual Ambient Temperature [T <sub>A</sub> ]	103.5 °C
Drive Current [I <sub>f</sub> ]	100 mA
Measurement Current	100 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 7-3**  
Forward Voltage

LED No.	Relative Forward Voltage % ( Normalized to 100 % at 0 hours )														
	0 h	541 h	1008 h	1698 h	2380 h	3142 h	3830 h	4545 h	5210 h	6044 h	6806 h	7601 h	8436 h	9269 h	10100 h
1	100.0	100.6	101.0	101.3	101.8	101.8	102.0	102.2	102.3	102.5	102.4	102.5	102.5	102.6	102.7
2	100.0	100.4	100.6	100.9	101.2	101.2	101.5	101.5	101.6	101.7	101.7	101.7	101.7	101.8	101.9
3	100.0	100.5	100.8	101.1	101.5	101.5	101.7	101.8	101.9	102.0	101.9	102.1	102.0	102.1	102.2
4	100.0	100.5	100.9	101.2	101.7	101.8	102.0	102.1	102.2	102.4	102.3	102.4	102.4	102.5	102.7
5	100.0	100.5	100.9	101.2	101.7	101.8	102.0	102.2	102.3	102.4	102.4	102.5	102.5	102.6	102.7
6	100.0	100.5	100.8	101.2	101.7	101.7	102.0	102.1	102.2	102.4	102.3	102.4	102.4	102.5	102.6
7	100.0	100.5	100.8	101.0	101.4	101.5	101.7	101.8	101.8	102.0	101.9	102.0	102.0	102.0	102.2
8	100.0	100.5	100.9	101.2	101.6	101.7	101.9	102.0	102.1	102.3	102.2	102.3	102.2	102.4	102.5
9	100.0	100.5	100.9	101.2	101.7	101.8	102.0	102.1	102.2	102.4	102.3	102.5	102.4	102.6	102.7
10	100.0	100.6	101.0	101.3	101.8	101.9	102.1	102.2	102.3	102.4	102.4	102.5	102.5	102.6	102.8
11	100.0	100.6	100.9	101.3	101.7	101.8	102.0	102.1	102.2	102.5	102.4	102.5	102.6	102.6	102.7
12	100.0	100.5	100.9	101.3	101.7	101.8	102.0	102.1	102.2	102.4	102.4	102.5	102.6	102.6	102.7
13	100.0	100.5	100.9	101.2	101.5	101.7	101.9	102.0	102.1	102.2	102.2	102.3	102.4	102.4	102.5
14	100.0	100.5	100.9	101.2	101.6	101.7	102.0	102.0	102.2	102.3	102.3	102.4	102.5	102.5	102.6
15	100.0	100.5	100.9	101.2	101.6	101.8	102.0	102.1	102.2	102.4	102.3	102.4	102.5	102.5	102.7
16	100.0	100.6	101.0	101.3	101.7	101.8	102.0	102.1	102.2	102.4	102.3	102.4	102.5	102.5	102.6
17	100.0	100.6	100.9	101.2	101.6	101.7	101.9	102.0	102.1	102.3	102.2	102.3	102.4	102.4	102.5
18	100.0	100.4	100.6	100.9	101.2	101.2	101.4	101.4	101.5	101.6	101.6	101.7	101.7	101.7	101.8
19	100.0	100.6	100.8	101.1	101.4	101.5	101.7	101.8	101.8	102.0	102.0	102.0	102.2	102.1	102.2
20	100.0	100.4	100.7	100.9	101.3	101.3	101.5	101.5	101.6	101.7	101.7	101.8	101.9	101.8	101.9
21	100.0	100.6	100.9	101.3	101.6	101.8	102.0	102.1	102.2	102.4	102.3	102.5	102.5	102.5	102.6
22	100.0	100.5	100.9	101.3	101.6	101.8	102.0	102.1	102.2	102.4	102.4	102.5	102.5	102.6	102.7
23	100.0	100.5	100.9	101.3	101.6	101.8	102.0	102.1	102.2	102.4	102.4	102.5	102.6	102.6	102.7
24	100.0	100.6	100.9	101.3	101.6	101.8	101.9	102.0	102.2	102.3	102.3	102.4	102.5	102.5	102.6
25	100.0	100.6	101.0	101.3	101.7	101.9	102.1	102.1	102.2	102.5	102.4	102.6	102.6	102.6	102.8
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	100.5	100.9	101.2	101.6	101.7	101.9	102.0	102.1	102.2	102.2	102.3	102.3	102.4	102.5
Med.	100.0	100.5	100.9	101.2	101.6	101.8	102.0	102.1	102.2	102.4	102.3	102.4	102.5	102.5	102.6
σ	0.00	0.06	0.09	0.13	0.17	0.19	0.21	0.22	0.24	0.26	0.25	0.27	0.28	0.28	0.30
Min.	100.0	100.4	100.6	100.9	101.2	101.2	101.4	101.4	101.5	101.6	101.6	101.7	101.7	101.7	101.8
Max.	100.0	100.6	101.0	101.3	101.8	101.9	102.1	102.2	102.3	102.5	102.4	102.6	102.6	102.6	102.8

### Data Set 7 : 105 °C, 100 mA

Actual Case Temperature [T <sub>s</sub> ]	106.2 °C
Actual Ambient Temperature [T <sub>A</sub> ]	103.5 °C
Drive Current [I <sub>f</sub> ]	100 mA
Measurement Current	100 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 7-4**  
Chromaticity Shift

LED No.	Chromaticity Shift Δu'v'														
	0 h	541 h	1008 h	1698 h	2380 h	3142 h	3830 h	4545 h	5210 h	6044 h	6806 h	7601 h	8436 h	9269 h	10100 h
1	0.0000	0.0008	0.0008	0.0008	0.0010	0.0012	0.0012	0.0013	0.0013	0.0014	0.0015	0.0016	0.0017	0.0018	0.0018
2	0.0000	0.0009	0.0009	0.0010	0.0012	0.0014	0.0014	0.0015	0.0015	0.0016	0.0018	0.0018	0.0019	0.0020	0.0021
3	0.0000	0.0009	0.0010	0.0010	0.0013	0.0014	0.0014	0.0015	0.0016	0.0016	0.0018	0.0018	0.0020	0.0021	0.0021
4	0.0000	0.0009	0.0009	0.0010	0.0012	0.0014	0.0014	0.0014	0.0015	0.0014	0.0015	0.0016	0.0016	0.0017	0.0017
5	0.0000	0.0009	0.0009	0.0010	0.0013	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0018
6	0.0000	0.0010	0.0011	0.0012	0.0014	0.0016	0.0016	0.0017	0.0017	0.0018	0.0018	0.0018	0.0019	0.0020	0.0020
7	0.0000	0.0009	0.0010	0.0011	0.0013	0.0016	0.0016	0.0016	0.0017	0.0018	0.0019	0.0020	0.0021	0.0022	0.0021
8	0.0000	0.0008	0.0009	0.0009	0.0013	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0018	0.0018
9	0.0000	0.0008	0.0008	0.0008	0.0011	0.0012	0.0012	0.0012	0.0014	0.0014	0.0016	0.0016	0.0017	0.0017	0.0017
10	0.0000	0.0009	0.0009	0.0010	0.0013	0.0014	0.0015	0.0016	0.0017	0.0017	0.0017	0.0018	0.0019	0.0020	0.0020
11	0.0000	0.0009	0.0009	0.0010	0.0013	0.0014	0.0015	0.0016	0.0017	0.0017	0.0017	0.0018	0.0019	0.0020	0.0020
12	0.0000	0.0008	0.0008	0.0009	0.0012	0.0014	0.0014	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0020	0.0020
13	0.0000	0.0009	0.0009	0.0009	0.0012	0.0013	0.0013	0.0014	0.0014	0.0015	0.0015	0.0016	0.0017	0.0018	0.0018
14	0.0000	0.0008	0.0008	0.0009	0.0012	0.0013	0.0013	0.0014	0.0015	0.0016	0.0016	0.0017	0.0017	0.0019	0.0018
15	0.0000	0.0009	0.0010	0.0011	0.0014	0.0015	0.0015	0.0016	0.0017	0.0017	0.0018	0.0018	0.0019	0.0020	0.0019
16	0.0000	0.0010	0.0010	0.0010	0.0014	0.0015	0.0015	0.0015	0.0016	0.0017	0.0018	0.0018	0.0019	0.0020	0.0019
17	0.0000	0.0010	0.0011	0.0012	0.0015	0.0018	0.0017	0.0018	0.0020	0.0021	0.0022	0.0022	0.0024	0.0025	0.0025
18	0.0000	0.0010	0.0010	0.0011	0.0013	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0020	0.0020
19	0.0000	0.0008	0.0009	0.0009	0.0012	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0018	0.0018
20	0.0000	0.0009	0.0009	0.0010	0.0013	0.0015	0.0015	0.0015	0.0016	0.0017	0.0017	0.0018	0.0018	0.0019	0.0019
21	0.0000	0.0008	0.0008	0.0008	0.0011	0.0012	0.0012	0.0013	0.0014	0.0014	0.0015	0.0016	0.0017	0.0018	0.0018
22	0.0000	0.0008	0.0008	0.0009	0.0011	0.0013	0.0013	0.0014	0.0015	0.0016	0.0017	0.0018	0.0019	0.0020	0.0020
23	0.0000	0.0008	0.0008	0.0008	0.0011	0.0012	0.0012	0.0013	0.0014	0.0014	0.0015	0.0016	0.0016	0.0018	0.0018
24	0.0000	0.0009	0.0009	0.0009	0.0012	0.0013	0.0013	0.0013	0.0014	0.0015	0.0016	0.0017	0.0017	0.0019	0.0018
25	0.0000	0.0009	0.0009	0.0010	0.0012	0.0013	0.0014	0.0014	0.0015	0.0016	0.0016	0.0017	0.0018	0.0019	0.0020
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.0000	0.0009	0.0009	0.0010	0.0013	0.0014	0.0014	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0019	0.0019
Med.	0.0000	0.0009	0.0009	0.0010	0.0012	0.0014	0.0014	0.0015	0.0015	0.0016	0.0017	0.0018	0.0018	0.0019	0.0019
σ	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002	0.0002
Min.	0.0000	0.0008	0.0008	0.0008	0.0010	0.0012	0.0012	0.0012	0.0013	0.0014	0.0015	0.0016	0.0016	0.0017	0.0017
Max.	0.0000	0.0010	0.0011	0.0012	0.0015	0.0018	0.0017	0.0018	0.0020	0.0021	0.0022	0.0022	0.0024	0.0025	0.0025

**Data Set 7 : 105 °C, 100 mA**

Actual Case Temperature [T <sub>S</sub> ]	106.2 °C
Actual Ambient Temperature [T <sub>A</sub> ]	103.5 °C
Drive Current [I <sub>F</sub> ]	100 mA
Measurement Current	100 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 7-5**  
Chromaticity

LED No.	Chromaticity u'														
	0 h	541 h	1008 h	1698 h	2380 h	3142 h	3830 h	4545 h	5210 h	6044 h	6806 h	7601 h	8436 h	9269 h	10100 h
1	0.2589	0.2581	0.2581	0.2581	0.2579	0.2577	0.2577	0.2576	0.2576	0.2575	0.2574	0.2574	0.2573	0.2572	0.2572
2	0.2596	0.2587	0.2587	0.2586	0.2584	0.2582	0.2582	0.2581	0.2581	0.2580	0.2578	0.2578	0.2577	0.2576	0.2575
3	0.2629	0.2620	0.2619	0.2619	0.2616	0.2615	0.2615	0.2614	0.2613	0.2613	0.2611	0.2612	0.2610	0.2609	0.2609
4	0.2636	0.2627	0.2627	0.2626	0.2624	0.2622	0.2622	0.2622	0.2621	0.2622	0.2621	0.2620	0.2620	0.2619	0.2619
5	0.2613	0.2604	0.2604	0.2603	0.2600	0.2599	0.2599	0.2598	0.2598	0.2597	0.2597	0.2596	0.2595	0.2595	0.2595
6	0.2613	0.2603	0.2602	0.2601	0.2599	0.2597	0.2597	0.2596	0.2596	0.2595	0.2595	0.2595	0.2594	0.2593	0.2593
7	0.2593	0.2584	0.2583	0.2582	0.2580	0.2578	0.2577	0.2577	0.2576	0.2575	0.2575	0.2574	0.2573	0.2572	0.2573
8	0.2611	0.2603	0.2602	0.2602	0.2598	0.2597	0.2597	0.2596	0.2596	0.2595	0.2595	0.2594	0.2594	0.2593	0.2593
9	0.2587	0.2579	0.2579	0.2579	0.2576	0.2575	0.2575	0.2575	0.2573	0.2573	0.2572	0.2572	0.2571	0.2571	0.2571
10	0.2609	0.2600	0.2600	0.2599	0.2596	0.2595	0.2594	0.2593	0.2592	0.2592	0.2592	0.2591	0.2590	0.2589	0.2589
11	0.2597	0.2588	0.2588	0.2587	0.2584	0.2583	0.2582	0.2581	0.2580	0.2580	0.2580	0.2579	0.2578	0.2577	0.2577
12	0.2662	0.2654	0.2654	0.2653	0.2650	0.2648	0.2648	0.2647	0.2646	0.2646	0.2645	0.2644	0.2644	0.2642	0.2642
13	0.2610	0.2601	0.2601	0.2601	0.2598	0.2597	0.2597	0.2596	0.2596	0.2595	0.2595	0.2594	0.2593	0.2592	0.2592
14	0.2603	0.2595	0.2595	0.2594	0.2591	0.2590	0.2590	0.2589	0.2588	0.2587	0.2587	0.2586	0.2586	0.2584	0.2585
15	0.2608	0.2599	0.2598	0.2597	0.2594	0.2593	0.2593	0.2592	0.2591	0.2591	0.2590	0.2590	0.2589	0.2588	0.2589
16	0.2601	0.2591	0.2591	0.2591	0.2587	0.2586	0.2586	0.2586	0.2585	0.2584	0.2583	0.2583	0.2582	0.2581	0.2582
17	0.2600	0.2590	0.2589	0.2588	0.2585	0.2583	0.2583	0.2583	0.2581	0.2580	0.2579	0.2579	0.2577	0.2576	0.2577
18	0.2642	0.2632	0.2632	0.2631	0.2629	0.2628	0.2627	0.2627	0.2626	0.2626	0.2625	0.2624	0.2624	0.2622	0.2622
19	0.2619	0.2611	0.2610	0.2610	0.2607	0.2605	0.2605	0.2604	0.2604	0.2603	0.2603	0.2602	0.2602	0.2601	0.2601
20	0.2599	0.2590	0.2590	0.2589	0.2586	0.2584	0.2584	0.2584	0.2583	0.2582	0.2582	0.2581	0.2581	0.2580	0.2580
21	0.2615	0.2607	0.2607	0.2607	0.2604	0.2603	0.2603	0.2602	0.2601	0.2601	0.2600	0.2599	0.2598	0.2597	0.2597
22	0.2637	0.2629	0.2629	0.2628	0.2626	0.2624	0.2624	0.2623	0.2622	0.2621	0.2620	0.2619	0.2618	0.2617	0.2617
23	0.2633	0.2625	0.2625	0.2625	0.2622	0.2621	0.2621	0.2620	0.2619	0.2619	0.2618	0.2617	0.2617	0.2615	0.2615
24	0.2603	0.2594	0.2594	0.2594	0.2591	0.2590	0.2590	0.2590	0.2590	0.2589	0.2588	0.2587	0.2587	0.2585	0.2586
25	0.2603	0.2594	0.2594	0.2593	0.2591	0.2590	0.2589	0.2589	0.2588	0.2587	0.2587	0.2586	0.2585	0.2585	0.2584
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.2612	0.2604	0.2603	0.2603	0.2600	0.2598	0.2598	0.2598	0.2597	0.2596	0.2596	0.2595	0.2594	0.2593	0.2593
Med.	0.2609	0.2600	0.2600	0.2599	0.2596	0.2595	0.2594	0.2593	0.2592	0.2592	0.2592	0.2591	0.2590	0.2589	0.2589
σ	0.0018	0.0018	0.0019	0.0018	0.0019	0.0018	0.0019	0.0018	0.0018	0.0019	0.0019	0.0018	0.0019	0.0018	0.0018
Min.	0.2587	0.2579	0.2579	0.2579	0.2576	0.2575	0.2575	0.2575	0.2573	0.2573	0.2572	0.2572	0.2571	0.2571	0.2571
Max.	0.2662	0.2654	0.2654	0.2653	0.2650	0.2648	0.2648	0.2647	0.2646	0.2646	0.2645	0.2644	0.2644	0.2642	0.2642

**Data Set 7 : 105 °C, 100 mA**

Actual Case Temperature [T <sub>c</sub> ]	106.2 °C
Actual Ambient Temperature [T <sub>A</sub> ]	103.5 °C
Drive Current [I <sub>f</sub> ]	100 mA
Measurement Current	100 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 7-6**  
Chromaticity

LED No.	Chromaticity v'														
	0 h	541 h	1008 h	1698 h	2380 h	3142 h	3830 h	4545 h	5210 h	6044 h	6806 h	7601 h	8436 h	9269 h	10100 h
1	0.5203	0.5202	0.5201	0.5201	0.5201	0.5200	0.5201	0.5200	0.5200	0.5200	0.5200	0.5199	0.5198	0.5198	0.5198
2	0.5257	0.5257	0.5257	0.5257	0.5258	0.5256	0.5257	0.5256	0.5256	0.5257	0.5256	0.5257	0.5256	0.5256	0.5256
3	0.5259	0.5259	0.5258	0.5258	0.5258	0.5256	0.5256	0.5256	0.5255	0.5254	0.5254	0.5254	0.5254	0.5254	0.5254
4	0.5240	0.5239	0.5239	0.5239	0.5239	0.5238	0.5238	0.5238	0.5238	0.5238	0.5238	0.5237	0.5237	0.5237	0.5238
5	0.5285	0.5285	0.5284	0.5284	0.5285	0.5284	0.5284	0.5284	0.5284	0.5285	0.5284	0.5284	0.5284	0.5284	0.5285
6	0.5291	0.5290	0.5290	0.5289	0.5289	0.5289	0.5289	0.5289	0.5289	0.5289	0.5288	0.5289	0.5288	0.5289	0.5290
7	0.5221	0.5219	0.5219	0.5218	0.5218	0.5217	0.5217	0.5217	0.5217	0.5217	0.5216	0.5216	0.5216	0.5216	0.5216
8	0.5287	0.5287	0.5288	0.5287	0.5288	0.5286	0.5287	0.5287	0.5287	0.5288	0.5287	0.5288	0.5288	0.5288	0.5289
9	0.5191	0.5191	0.5191	0.5190	0.5190	0.5189	0.5189	0.5188	0.5188	0.5188	0.5187	0.5187	0.5186	0.5186	0.5186
10	0.5253	0.5253	0.5253	0.5252	0.5252	0.5251	0.5251	0.5250	0.5250	0.5250	0.5249	0.5249	0.5249	0.5249	0.5249
11	0.5237	0.5236	0.5236	0.5236	0.5236	0.5235	0.5235	0.5235	0.5235	0.5235	0.5234	0.5234	0.5234	0.5234	0.5234
12	0.5342	0.5342	0.5342	0.5342	0.5341	0.5341	0.5342	0.5342	0.5342	0.5342	0.5342	0.5342	0.5342	0.5342	0.5342
13	0.5275	0.5275	0.5274	0.5274	0.5274	0.5274	0.5274	0.5274	0.5274	0.5274	0.5274	0.5274	0.5275	0.5274	0.5275
14	0.5248	0.5247	0.5247	0.5246	0.5246	0.5245	0.5245	0.5245	0.5245	0.5246	0.5245	0.5245	0.5245	0.5244	0.5245
15	0.5248	0.5247	0.5247	0.5246	0.5246	0.5245	0.5246	0.5245	0.5245	0.5246	0.5245	0.5246	0.5246	0.5245	0.5246
16	0.5275	0.5273	0.5273	0.5272	0.5272	0.5272	0.5272	0.5272	0.5272	0.5272	0.5271	0.5272	0.5272	0.5271	0.5272
17	0.5217	0.5216	0.5215	0.5214	0.5214	0.5212	0.5213	0.5212	0.5211	0.5211	0.5210	0.5210	0.5209	0.5209	0.5208
18	0.5267	0.5267	0.5267	0.5267	0.5266	0.5266	0.5266	0.5266	0.5266	0.5266	0.5266	0.5266	0.5266	0.5265	0.5266
19	0.5298	0.5297	0.5298	0.5297	0.5297	0.5297	0.5297	0.5297	0.5297	0.5297	0.5296	0.5297	0.5298	0.5297	0.5298
20	0.5242	0.5242	0.5242	0.5242	0.5241	0.5240	0.5241	0.5240	0.5240	0.5241	0.5240	0.5240	0.5241	0.5240	0.5240
21	0.5295	0.5295	0.5295	0.5295	0.5295	0.5295	0.5295	0.5295	0.5296	0.5295	0.5295	0.5295	0.5295	0.5294	0.5294
22	0.5277	0.5277	0.5277	0.5277	0.5277	0.5277	0.5276	0.5276	0.5276	0.5276	0.5276	0.5275	0.5275	0.5274	0.5274
23	0.5323	0.5323	0.5323	0.5323	0.5323	0.5323	0.5323	0.5323	0.5323	0.5323	0.5323	0.5323	0.5324	0.5323	0.5323
24	0.5199	0.5198	0.5198	0.5198	0.5197	0.5196	0.5197	0.5196	0.5195	0.5195	0.5195	0.5194	0.5194	0.5193	0.5193
25	0.5243	0.5242	0.5241	0.5241	0.5241	0.5241	0.5241	0.5240	0.5240	0.5240	0.5239	0.5239	0.5239	0.5238	0.5238
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.5259	0.5258	0.5258	0.5258	0.5258	0.5257	0.5257	0.5257	0.5257	0.5257	0.5256	0.5257	0.5256	0.5256	0.5256
Med.	0.5257	0.5257	0.5257	0.5257	0.5258	0.5256	0.5256	0.5256	0.5255	0.5256	0.5255	0.5254	0.5254	0.5254	0.5254
σ	0.0037	0.0038	0.0038	0.0038	0.0038	0.0038	0.0038	0.0038	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039
Min.	0.5191	0.5191	0.5191	0.5190	0.5190	0.5189	0.5189	0.5188	0.5188	0.5188	0.5187	0.5187	0.5186	0.5186	0.5186
Max.	0.5342	0.5342	0.5342	0.5342	0.5341	0.5341	0.5342	0.5342	0.5342	0.5342	0.5342	0.5342	0.5342	0.5342	0.5342

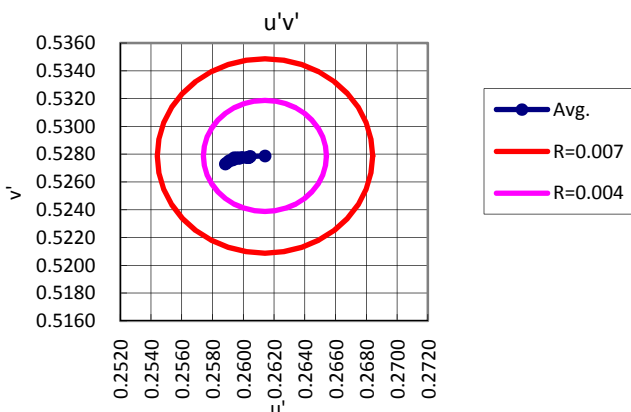
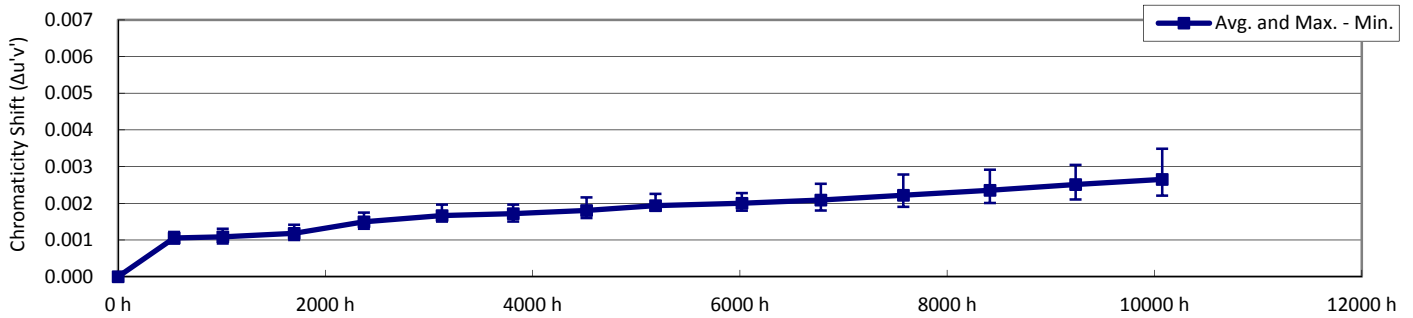
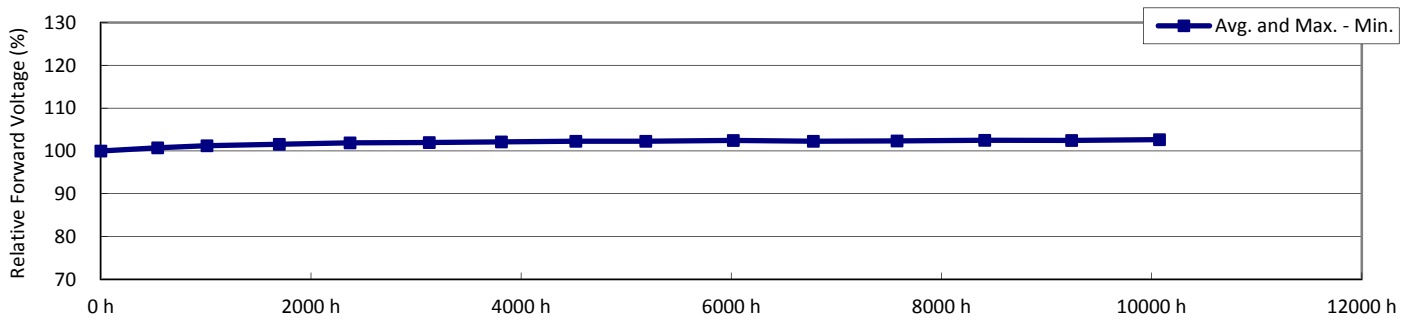
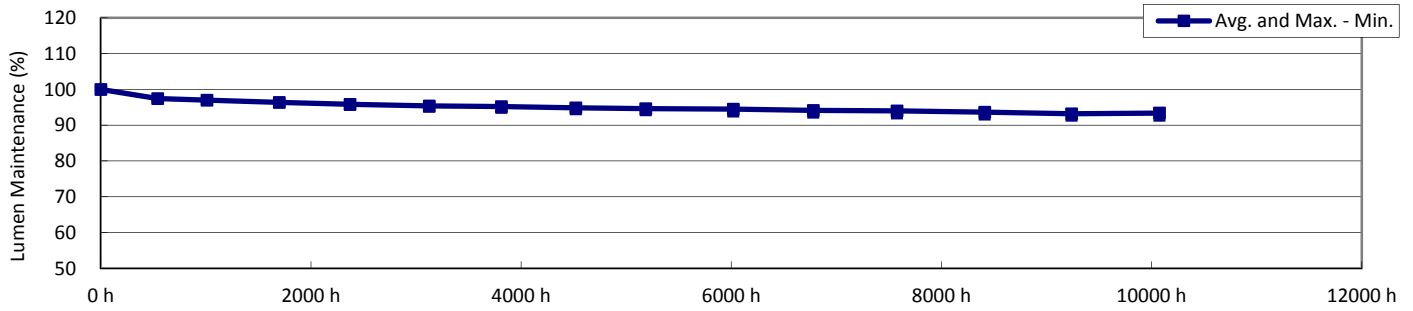




### Data Set 8 : 105 °C, 150 mA

Actual Case Temperature [T <sub>S</sub> ]	106.9 °C
Actual Ambient Temperature [T <sub>A</sub> ]	103.4 °C
Drive Current [I <sub>F</sub> ]	150 mA
Measurement Current	150 mA

NOTES:  
 T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0



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### Data Set 8 : 105 °C, 150 mA

Actual Case Temperature [T <sub>s</sub> ]	106.9 °C
Actual Ambient Temperature [T <sub>A</sub> ]	103.4 °C
Drive Current [I <sub>F</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 8-1**  
Initial Characteristics

LED No.	Luminous flux	Forward voltage	CCT	Input Power	CIE1931		CIE1976					
	Φ <sub>V</sub> [lm]	V <sub>F</sub> [V]	T <sub>CP</sub> [K]	P [W]	x	y	u'	v'				
1	100.2	6.32	2672	0.95	0.466	0.418	0.263	0.531				
2	101.6	6.31	2751	0.95	0.456	0.410	0.260	0.526				
3	101.3	6.31	2769	0.95	0.454	0.408	0.260	0.525				
4	99.9	6.32	2646	0.95	0.470	0.421	0.264	0.533				
5	98.7	6.32	2651	0.95	0.466	0.416	0.264	0.530				
6	102.3	6.31	2811	0.95	0.453	0.412	0.257	0.527				
7	102.0	6.31	2734	0.95	0.461	0.418	0.260	0.530				
8	99.3	6.33	2668	0.95	0.464	0.413	0.264	0.529				
9	101.2	6.32	2690	0.95	0.465	0.419	0.262	0.531				
10	100.1	6.31	2714	0.95	0.459	0.411	0.262	0.527				
11	101.3	6.31	2712	0.95	0.463	0.418	0.261	0.531				
12	99.5	6.32	2695	0.95	0.460	0.411	0.263	0.528				
13	102.1	6.31	2850	0.95	0.446	0.403	0.257	0.522				
14	101.2	6.31	2826	0.95	0.446	0.401	0.258	0.521				
15	98.9	6.32	2610	0.95	0.470	0.417	0.266	0.532				
16	99.9	6.32	2761	0.95	0.453	0.405	0.260	0.524				
17	101.1	6.31	2839	0.95	0.444	0.398	0.258	0.520				
18	100.9	6.31	2737	0.95	0.459	0.415	0.260	0.529				
19	102.8	6.33	2762	0.95	0.457	0.414	0.259	0.528				
20	101.2	6.31	2711	0.95	0.461	0.414	0.262	0.529				
21	101.4	6.30	2735	0.95	0.459	0.414	0.261	0.529				
22	102.6	6.31	2819	0.95	0.449	0.406	0.258	0.524				
23	100.7	6.32	2795	0.95	0.446	0.397	0.260	0.520				
24	100.3	6.30	2621	0.95	0.471	0.420	0.266	0.533				
25	99.6	6.31	2655	0.95	0.468	0.420	0.264	0.532				
n	25	25	25	25	25	25	25	25				
Avg.	100.8	6.31	2729	0.95	0.459	0.412	0.261	0.528				
Med.	101.1	6.31	2734	0.95	0.459	0.414	0.261	0.529				
σ	1.13	0.007	69.0	0.001	0.0083	0.0070	0.0026	0.0039				
Min.	98.7	6.30	2610	0.95	0.444	0.397	0.257	0.520				
Max.	102.8	6.33	2850	0.95	0.471	0.421	0.266	0.533				



### Data Set 8 : 105 °C, 150 mA

Actual Case Temperature [T <sub>S</sub> ]	106.9 °C
Actual Ambient Temperature [T <sub>A</sub> ]	103.4 °C
Drive Current [I <sub>F</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 8-2**  
Lumen Maintenance

LED No.	Lumen Maintenance % ( Normalized to 100 % at 0 hours )														
	0 h	541 h	1010 h	1699 h	2372 h	3125 h	3812 h	4520 h	5186 h	6019 h	6781 h	7577 h	8412 h	9239 h	10074 h
1	100.0	97.3	96.8	96.2	95.7	95.3	95.0	94.6	94.4	94.4	94.1	93.8	93.6	93.1	93.2
2	100.0	97.4	97.0	96.3	95.8	95.4	95.2	94.9	94.7	94.9	94.6	94.4	94.2	93.7	93.9
3	100.0	97.3	96.8	96.2	95.7	95.1	94.9	94.5	94.3	94.6	94.1	94.0	93.7	93.0	93.4
4	100.0	97.4	96.9	96.4	96.0	95.4	95.3	95.1	94.9	95.1	94.7	94.6	94.4	93.8	94.4
5	100.0	97.3	96.9	96.3	96.0	95.6	95.5	95.3	95.1	95.2	94.9	94.8	94.6	94.1	94.5
6	100.0	97.4	97.0	96.5	96.1	95.7	95.5	95.3	95.2	95.0	94.7	94.6	94.5	94.1	94.8
7	100.0	97.6	97.2	96.6	96.2	95.8	95.6	95.3	95.1	94.7	94.4	94.2	93.9	93.7	94.2
8	100.0	97.9	97.5	97.1	96.7	96.4	96.2	95.9	95.8	95.3	95.1	94.8	94.5	94.4	94.6
9	100.0	98.0	97.5	97.0	96.4	96.0	95.9	95.5	95.3	94.9	94.6	94.4	94.1	93.9	93.9
10	100.0	97.0	96.2	95.2	94.4	93.8	93.5	93.1	92.9	92.5	92.2	92.0	91.6	91.4	91.3
11	100.0	97.5	97.0	96.5	95.9	95.5	95.3	94.9	94.7	94.7	94.4	94.2	93.6	93.0	92.9
12	100.0	97.5	97.0	96.5	95.9	95.4	95.3	94.9	94.8	95.0	94.8	94.7	94.4	94.0	94.0
13	100.0	96.6	96.2	95.5	94.9	94.3	94.2	93.8	93.6	93.7	93.3	93.2	92.9	92.5	92.7
14	100.0	97.0	96.4	95.6	95.1	94.5	94.3	93.9	93.7	93.7	93.1	93.0	92.7	92.2	92.4
15	100.0	97.4	96.9	96.4	95.9	95.4	95.3	95.0	94.8	94.7	94.2	94.0	93.8	93.5	94.0
16	100.0	97.1	96.4	95.7	95.2	94.6	94.3	93.9	93.6	93.3	92.8	92.7	92.2	91.8	92.1
17	100.0	97.5	96.9	96.1	95.4	94.9	94.6	94.3	94.0	93.6	93.2	92.9	92.6	92.2	92.5
18	100.0	97.7	97.1	96.5	95.9	95.5	95.2	94.9	94.7	94.3	94.0	93.7	93.4	93.0	93.3
19	100.0	98.0	97.5	96.9	96.3	95.8	95.6	95.2	95.0	94.7	94.5	94.2	93.9	93.4	93.6
20	100.0	97.7	97.2	96.7	96.2	95.8	95.6	95.2	94.9	94.3	94.1	94.3	93.9	93.4	93.3
21	100.0	97.8	97.4	96.8	96.3	95.9	95.8	95.4	95.2	95.2	94.8	94.6	94.2	93.5	93.3
22	100.0	97.5	97.1	96.5	95.8	95.4	95.2	94.7	94.5	94.5	94.1	93.9	93.2	92.5	92.2
23	100.0	97.4	97.1	96.6	96.0	95.7	95.6	95.2	95.1	95.2	94.9	94.7	94.3	93.7	93.7
24	100.0	97.5	97.1	96.6	96.1	95.5	95.2	94.7	94.3	94.2	93.7	93.4	92.9	92.3	92.5
25	100.0	97.5	97.1	96.6	96.2	95.9	95.8	95.5	95.2	95.0	94.5	94.3	94.0	93.5	93.7
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	97.5	97.0	96.4	95.8	95.4	95.2	94.8	94.6	94.5	94.1	94.0	93.7	93.2	93.4
Med.	100.0	97.5	97.0	96.5	95.9	95.5	95.3	94.9	94.8	94.7	94.4	94.2	93.9	93.4	93.4
σ	0.00	0.32	0.37	0.45	0.51	0.57	0.61	0.64	0.66	0.69	0.72	0.73	0.78	0.79	0.88
Min.	100.0	96.6	96.2	95.2	94.4	93.8	93.5	93.1	92.9	92.5	92.2	92.0	91.6	91.4	91.3
Max.	100.0	98.0	97.5	97.1	96.7	96.4	96.2	95.9	95.8	95.3	95.1	94.8	94.6	94.4	94.8

#### TM-21 Projection

Time	4520 h	5186 h	6019 h	6781 h	7577 h	8412 h	9239 h	10074 h							
ln(Avg.)	-0.0530	-0.0551	-0.0566	-0.0604	-0.0622	-0.0655	-0.0705	-0.0685							

Test duration used	4520 h	to	10074 h
B			0.962
α			3.20E-06
R <sup>2</sup>			0.956
Calculated L <sub>70</sub> (10K)	99600	hours	
Reported L <sub>70</sub> (10K)	> 60400	hours	
Calculated L <sub>80</sub> (10K)	57800	hours	
Reported L <sub>80</sub> (10K)	57800	hours	
Calculated L <sub>90</sub> (10K)	21000	hours	
Reported L <sub>90</sub> (10K)	21000	hours	

Curve-fit equation:

$$\Phi(t) = B \exp(-\alpha t)$$

Lumen maintenance life equation:

$$L_{70} = \ln(B/0.7)/\alpha$$

$$L_{80} = \ln(B/0.8)/\alpha$$

$$L_{90} = \ln(B/0.9)/\alpha$$

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### Data Set 8 : 105 °C, 150 mA

Actual Case Temperature [T <sub>s</sub> ]	106.9 °C
Actual Ambient Temperature [T <sub>A</sub> ]	103.4 °C
Drive Current [I <sub>f</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 8-3**  
Forward Voltage

LED No.	Relative Forward Voltage % ( Normalized to 100 % at 0 hours )														
	0 h	541 h	1010 h	1699 h	2372 h	3125 h	3812 h	4520 h	5186 h	6019 h	6781 h	7577 h	8412 h	9239 h	10074 h
1	100.0	100.9	101.4	101.8	102.2	102.2	102.4	102.6	102.5	102.7	102.6	102.6	102.8	102.7	102.9
2	100.0	100.7	101.2	101.6	102.0	102.1	102.2	102.4	102.3	102.6	102.4	102.5	102.6	102.5	102.8
3	100.0	100.7	101.2	101.6	101.9	102.0	102.2	102.3	102.3	102.6	102.4	102.4	102.6	102.5	102.8
4	100.0	100.8	101.3	101.7	102.1	102.2	102.3	102.5	102.5	102.7	102.5	102.6	102.7	102.7	102.9
5	100.0	100.7	101.1	101.4	101.8	101.9	102.0	102.1	102.1	102.3	102.1	102.2	102.3	102.3	102.5
6	100.0	100.6	101.1	101.4	101.7	101.8	101.9	102.1	102.0	102.2	102.0	102.1	102.2	102.2	102.4
7	100.0	100.7	101.3	101.6	102.0	102.1	102.2	102.4	102.4	102.6	102.4	102.5	102.6	102.6	102.8
8	100.0	100.6	101.1	101.3	101.7	101.7	101.8	102.0	102.0	102.1	102.0	102.0	102.2	102.1	102.3
9	100.0	100.7	101.2	101.6	102.0	102.1	102.2	102.4	102.4	102.6	102.4	102.5	102.6	102.5	102.8
10	100.0	100.7	101.2	101.6	102.0	102.1	102.2	102.4	102.4	102.6	102.4	102.5	102.6	102.6	102.8
11	100.0	100.8	101.2	101.6	102.0	102.1	102.2	102.4	102.3	102.5	102.4	102.5	102.6	102.6	102.8
12	100.0	100.8	101.3	101.6	102.0	102.1	102.2	102.4	102.4	102.6	102.4	102.5	102.6	102.6	102.8
13	100.0	100.8	101.3	101.7	102.0	102.1	102.2	102.4	102.4	102.6	102.5	102.5	102.7	102.6	102.8
14	100.0	100.7	101.1	101.4	101.8	101.9	101.9	102.1	102.1	102.3	102.1	102.1	102.3	102.2	102.4
15	100.0	100.8	101.3	101.6	102.0	102.1	102.2	102.4	102.4	102.6	102.4	102.6	102.6	102.6	102.8
16	100.0	100.9	101.3	101.7	102.1	102.2	102.3	102.5	102.5	102.7	102.5	102.6	102.7	102.7	102.9
17	100.0	100.7	101.3	101.6	102.0	102.1	102.2	102.4	102.4	102.6	102.4	102.5	102.6	102.6	102.8
18	100.0	100.8	101.3	101.7	102.0	102.1	102.2	102.4	102.4	102.6	102.5	102.5	102.7	102.6	102.9
19	100.0	100.7	101.2	101.6	102.0	102.1	102.2	102.4	102.4	102.6	102.4	102.5	102.6	102.6	102.7
20	100.0	100.7	101.2	101.6	101.9	102.1	102.2	102.3	102.4	102.5	102.4	102.4	102.6	102.5	102.8
21	100.0	100.7	101.1	101.4	101.7	101.8	101.9	102.0	102.1	102.2	102.1	102.1	102.2	102.2	102.4
22	100.0	100.7	101.2	101.6	101.9	102.0	102.2	102.3	102.3	102.5	102.4	102.4	102.6	102.6	102.7
23	100.0	100.6	100.9	101.2	101.4	101.5	101.6	101.7	101.7	101.9	101.7	101.8	101.9	101.9	102.0
24	100.0	100.6	101.0	101.2	101.5	101.6	101.6	101.8	101.8	101.9	101.7	101.8	101.9	101.9	102.0
25	100.0	100.7	101.1	101.4	101.7	101.8	101.9	102.1	102.1	102.2	102.0	102.1	102.2	102.2	102.4
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	100.7	101.2	101.5	101.9	102.0	102.1	102.3	102.3	102.4	102.3	102.4	102.5	102.4	102.7
Med.	100.0	100.7	101.2	101.6	102.0	102.1	102.2	102.4	102.4	102.6	102.4	102.5	102.6	102.6	102.8
σ	0.00	0.08	0.11	0.15	0.18	0.20	0.21	0.22	0.22	0.24	0.24	0.24	0.25	0.25	0.26
Min.	100.0	100.6	100.9	101.2	101.4	101.5	101.6	101.7	101.7	101.9	101.7	101.8	101.9	101.9	102.0
Max.	100.0	100.9	101.4	101.8	102.2	102.2	102.4	102.6	102.5	102.7	102.6	102.6	102.8	102.7	102.9



### Data Set 8 : 105 °C, 150 mA

Actual Case Temperature [T <sub>s</sub> ]	106.9 °C
Actual Ambient Temperature [T <sub>A</sub> ]	103.4 °C
Drive Current [I <sub>F</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 8-4**  
Chromaticity Shift

LED No.	Chromaticity Shift Δu'v'														
	0 h	541 h	1010 h	1699 h	2372 h	3125 h	3812 h	4520 h	5186 h	6019 h	6781 h	7577 h	8412 h	9239 h	10074 h
1	0.0000	0.0010	0.0010	0.0011	0.0014	0.0016	0.0016	0.0017	0.0018	0.0018	0.0019	0.0019	0.0020	0.0021	0.0022
2	0.0000	0.0010	0.0010	0.0011	0.0015	0.0016	0.0017	0.0017	0.0018	0.0019	0.0019	0.0020	0.0021	0.0022	0.0023
3	0.0000	0.0010	0.0011	0.0012	0.0015	0.0017	0.0018	0.0019	0.0020	0.0021	0.0021	0.0022	0.0023	0.0025	0.0025
4	0.0000	0.0010	0.0010	0.0011	0.0014	0.0016	0.0016	0.0017	0.0018	0.0019	0.0020	0.0020	0.0021	0.0022	0.0023
5	0.0000	0.0012	0.0012	0.0014	0.0017	0.0018	0.0019	0.0019	0.0021	0.0022	0.0022	0.0023	0.0024	0.0025	0.0027
6	0.0000	0.0012	0.0012	0.0013	0.0016	0.0017	0.0018	0.0019	0.0020	0.0021	0.0022	0.0024	0.0025	0.0026	0.0026
7	0.0000	0.0012	0.0012	0.0012	0.0015	0.0017	0.0017	0.0018	0.0019	0.0020	0.0021	0.0021	0.0023	0.0024	0.0024
8	0.0000	0.0012	0.0012	0.0013	0.0016	0.0017	0.0018	0.0019	0.0020	0.0021	0.0022	0.0023	0.0024	0.0025	0.0026
9	0.0000	0.0010	0.0010	0.0011	0.0015	0.0016	0.0017	0.0017	0.0019	0.0020	0.0020	0.0021	0.0022	0.0023	0.0023
10	0.0000	0.0011	0.0013	0.0014	0.0017	0.0018	0.0019	0.0021	0.0021	0.0022	0.0023	0.0024	0.0024	0.0026	0.0026
11	0.0000	0.0009	0.0010	0.0010	0.0014	0.0015	0.0015	0.0016	0.0018	0.0018	0.0019	0.0020	0.0021	0.0024	0.0027
12	0.0000	0.0010	0.0010	0.0012	0.0015	0.0017	0.0017	0.0018	0.0019	0.0020	0.0020	0.0021	0.0022	0.0023	0.0025
13	0.0000	0.0011	0.0011	0.0012	0.0015	0.0017	0.0017	0.0018	0.0019	0.0019	0.0021	0.0021	0.0022	0.0024	0.0024
14	0.0000	0.0009	0.0010	0.0011	0.0014	0.0016	0.0017	0.0018	0.0020	0.0021	0.0021	0.0024	0.0026	0.0027	0.0029
15	0.0000	0.0010	0.0011	0.0012	0.0014	0.0016	0.0017	0.0018	0.0020	0.0020	0.0021	0.0022	0.0023	0.0025	0.0026
16	0.0000	0.0010	0.0010	0.0011	0.0014	0.0016	0.0016	0.0017	0.0019	0.0019	0.0021	0.0021	0.0023	0.0025	0.0026
17	0.0000	0.0012	0.0012	0.0013	0.0017	0.0020	0.0020	0.0022	0.0023	0.0023	0.0025	0.0028	0.0029	0.0030	0.0032
18	0.0000	0.0011	0.0011	0.0011	0.0015	0.0017	0.0017	0.0017	0.0018	0.0018	0.0019	0.0020	0.0021	0.0022	0.0023
19	0.0000	0.0010	0.0011	0.0011	0.0015	0.0017	0.0017	0.0018	0.0019	0.0020	0.0021	0.0024	0.0025	0.0026	0.0027
20	0.0000	0.0010	0.0010	0.0011	0.0014	0.0015	0.0016	0.0017	0.0018	0.0018	0.0018	0.0020	0.0021	0.0023	0.0025
21	0.0000	0.0009	0.0009	0.0011	0.0014	0.0016	0.0016	0.0017	0.0018	0.0019	0.0020	0.0022	0.0025	0.0026	0.0028
22	0.0000	0.0010	0.0010	0.0011	0.0013	0.0015	0.0016	0.0017	0.0018	0.0019	0.0020	0.0023	0.0027	0.0030	0.0035
23	0.0000	0.0011	0.0011	0.0012	0.0015	0.0017	0.0018	0.0019	0.0020	0.0021	0.0022	0.0024	0.0027	0.0029	0.0033
24	0.0000	0.0010	0.0010	0.0011	0.0014	0.0015	0.0016	0.0017	0.0018	0.0019	0.0020	0.0022	0.0025	0.0026	0.0028
25	0.0000	0.0011	0.0011	0.0012	0.0015	0.0017	0.0017	0.0018	0.0021	0.0022	0.0023	0.0024	0.0025	0.0027	0.0029
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.0000	0.0011	0.0011	0.0012	0.0015	0.0017	0.0017	0.0018	0.0019	0.0020	0.0021	0.0022	0.0024	0.0025	0.0027
Med.	0.0000	0.0010	0.0011	0.0011	0.0015	0.0017	0.0017	0.0018	0.0019	0.0020	0.0021	0.0022	0.0023	0.0025	0.0026
σ	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0003
Min.	0.0000	0.0009	0.0009	0.0010	0.0013	0.0015	0.0015	0.0016	0.0018	0.0018	0.0018	0.0019	0.0020	0.0021	0.0022
Max.	0.0000	0.0012	0.0013	0.0014	0.0017	0.0020	0.0020	0.0022	0.0023	0.0023	0.0025	0.0028	0.0029	0.0030	0.0035

### Data Set 8 : 105 °C, 150 mA

Actual Case Temperature [T <sub>s</sub> ]	106.9 °C
Actual Ambient Temperature [T <sub>A</sub> ]	103.4 °C
Drive Current [I <sub>f</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

TABLE 8-5

Chromaticity

LED No.	Chromaticity u'														
	0 h	541 h	1010 h	1699 h	2372 h	3125 h	3812 h	4520 h	5186 h	6019 h	6781 h	7577 h	8412 h	9239 h	10074 h
1	0.2638	0.2628	0.2628	0.2627	0.2624	0.2622	0.2622	0.2621	0.2620	0.2620	0.2619	0.2619	0.2618	0.2617	0.2616
2	0.2610	0.2600	0.2600	0.2599	0.2595	0.2594	0.2593	0.2593	0.2592	0.2591	0.2591	0.2590	0.2589	0.2588	0.2587
3	0.2604	0.2594	0.2593	0.2592	0.2589	0.2587	0.2586	0.2585	0.2584	0.2583	0.2583	0.2582	0.2581	0.2580	0.2579
4	0.2647	0.2637	0.2637	0.2636	0.2633	0.2631	0.2631	0.2630	0.2629	0.2628	0.2627	0.2627	0.2626	0.2625	0.2624
5	0.2651	0.2639	0.2639	0.2637	0.2634	0.2633	0.2632	0.2632	0.2630	0.2629	0.2629	0.2628	0.2627	0.2626	0.2624
6	0.2585	0.2573	0.2573	0.2572	0.2569	0.2568	0.2567	0.2566	0.2565	0.2564	0.2563	0.2561	0.2560	0.2559	0.2559
7	0.2612	0.2600	0.2600	0.2600	0.2597	0.2595	0.2595	0.2594	0.2593	0.2592	0.2591	0.2591	0.2589	0.2588	0.2588
8	0.2646	0.2634	0.2634	0.2633	0.2630	0.2629	0.2628	0.2627	0.2626	0.2625	0.2624	0.2623	0.2622	0.2621	0.2620
9	0.2629	0.2619	0.2619	0.2618	0.2614	0.2613	0.2612	0.2612	0.2610	0.2609	0.2609	0.2608	0.2607	0.2606	0.2606
10	0.2627	0.2616	0.2614	0.2613	0.2610	0.2609	0.2608	0.2606	0.2606	0.2605	0.2604	0.2603	0.2603	0.2601	0.2601
11	0.2619	0.2610	0.2609	0.2609	0.2605	0.2604	0.2604	0.2603	0.2601	0.2601	0.2600	0.2599	0.2598	0.2595	0.2593
12	0.2633	0.2623	0.2623	0.2621	0.2618	0.2616	0.2616	0.2615	0.2614	0.2613	0.2613	0.2612	0.2611	0.2610	0.2609
13	0.2572	0.2561	0.2561	0.2560	0.2557	0.2555	0.2555	0.2554	0.2553	0.2553	0.2552	0.2552	0.2551	0.2549	0.2549
14	0.2585	0.2576	0.2575	0.2574	0.2571	0.2569	0.2568	0.2567	0.2566	0.2565	0.2565	0.2562	0.2561	0.2560	0.2559
15	0.2668	0.2658	0.2657	0.2656	0.2654	0.2652	0.2651	0.2650	0.2648	0.2648	0.2647	0.2646	0.2645	0.2643	0.2642
16	0.2611	0.2601	0.2601	0.2600	0.2597	0.2595	0.2595	0.2594	0.2592	0.2592	0.2591	0.2590	0.2589	0.2587	0.2587
17	0.2584	0.2572	0.2572	0.2571	0.2567	0.2565	0.2565	0.2563	0.2562	0.2562	0.2560	0.2558	0.2557	0.2556	0.2555
18	0.2611	0.2600	0.2600	0.2600	0.2596	0.2594	0.2594	0.2594	0.2593	0.2593	0.2592	0.2591	0.2590	0.2589	0.2588
19	0.2600	0.2590	0.2589	0.2589	0.2585	0.2583	0.2583	0.2582	0.2581	0.2580	0.2579	0.2576	0.2575	0.2574	0.2573
20	0.2623	0.2613	0.2613	0.2612	0.2609	0.2608	0.2607	0.2606	0.2605	0.2605	0.2605	0.2603	0.2602	0.2600	0.2599
21	0.2611	0.2602	0.2602	0.2600	0.2597	0.2595	0.2595	0.2594	0.2593	0.2592	0.2591	0.2589	0.2587	0.2586	0.2584
22	0.2583	0.2573	0.2573	0.2572	0.2570	0.2568	0.2567	0.2566	0.2565	0.2564	0.2563	0.2561	0.2558	0.2556	0.2552
23	0.2603	0.2592	0.2592	0.2591	0.2588	0.2586	0.2585	0.2584	0.2583	0.2582	0.2582	0.2580	0.2578	0.2577	0.2574
24	0.2661	0.2651	0.2651	0.2650	0.2647	0.2646	0.2645	0.2644	0.2643	0.2642	0.2641	0.2639	0.2637	0.2636	0.2634
25	0.2645	0.2634	0.2634	0.2633	0.2630	0.2628	0.2628	0.2627	0.2624	0.2623	0.2622	0.2621	0.2620	0.2618	0.2617
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.2618	0.2608	0.2608	0.2607	0.2603	0.2602	0.2601	0.2600	0.2599	0.2598	0.2598	0.2596	0.2595	0.2594	0.2593
Med.	0.2612	0.2602	0.2602	0.2600	0.2597	0.2595	0.2595	0.2594	0.2593	0.2593	0.2592	0.2591	0.2590	0.2589	0.2588
σ	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0027	0.0027	0.0027
Min.	0.2572	0.2561	0.2561	0.2560	0.2557	0.2555	0.2555	0.2554	0.2553	0.2553	0.2552	0.2552	0.2551	0.2549	0.2549
Max.	0.2668	0.2658	0.2657	0.2656	0.2654	0.2652	0.2651	0.2650	0.2648	0.2648	0.2647	0.2646	0.2645	0.2643	0.2642

**Data Set 8 : 105 °C, 150 mA**

Actual Case Temperature [T <sub>c</sub> ]	106.9 °C
Actual Ambient Temperature [T <sub>A</sub> ]	103.4 °C
Drive Current [I <sub>f</sub> ]	150 mA
Measurement Current	150 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 8-6**  
Chromaticity

LED No.	Chromaticity v'														
	0 h	541 h	1010 h	1699 h	2372 h	3125 h	3812 h	4520 h	5186 h	6019 h	6781 h	7577 h	8412 h	9239 h	10074 h
1	0.5310	0.5310	0.5310	0.5310	0.5310	0.5310	0.5310	0.5311	0.5310	0.5311	0.5310	0.5311	0.5312	0.5311	0.5312
2	0.5263	0.5262	0.5263	0.5262	0.5263	0.5262	0.5262	0.5262	0.5261	0.5262	0.5261	0.5262	0.5263	0.5262	0.5262
3	0.5253	0.5252	0.5252	0.5251	0.5252	0.5251	0.5251	0.5251	0.5250	0.5250	0.5249	0.5250	0.5250	0.5248	0.5249
4	0.5329	0.5329	0.5329	0.5329	0.5330	0.5329	0.5329	0.5330	0.5329	0.5330	0.5329	0.5330	0.5330	0.5330	0.5331
5	0.5301	0.5300	0.5300	0.5300	0.5301	0.5300	0.5300	0.5301	0.5300	0.5301	0.5300	0.5301	0.5301	0.5299	0.5298
6	0.5271	0.5269	0.5269	0.5269	0.5269	0.5268	0.5269	0.5269	0.5269	0.5270	0.5268	0.5268	0.5267	0.5266	0.5266
7	0.5306	0.5304	0.5305	0.5304	0.5305	0.5304	0.5304	0.5305	0.5305	0.5305	0.5304	0.5305	0.5305	0.5304	0.5304
8	0.5287	0.5285	0.5285	0.5286	0.5286	0.5285	0.5285	0.5286	0.5285	0.5286	0.5284	0.5285	0.5285	0.5284	0.5284
9	0.5310	0.5310	0.5310	0.5310	0.5310	0.5310	0.5310	0.5310	0.5310	0.5311	0.5310	0.5310	0.5311	0.5310	0.5310
10	0.5273	0.5272	0.5272	0.5271	0.5271	0.5271	0.5271	0.5271	0.5271	0.5271	0.5270	0.5272	0.5272	0.5271	0.5272
11	0.5306	0.5305	0.5306	0.5306	0.5306	0.5305	0.5305	0.5306	0.5306	0.5306	0.5305	0.5305	0.5304	0.5302	0.5300
12	0.5277	0.5277	0.5276	0.5276	0.5276	0.5275	0.5276	0.5276	0.5275	0.5276	0.5275	0.5275	0.5275	0.5274	0.5272
13	0.5226	0.5224	0.5224	0.5224	0.5224	0.5223	0.5223	0.5223	0.5222	0.5223	0.5221	0.5221	0.5221	0.5219	0.5218
14	0.5216	0.5214	0.5214	0.5214	0.5213	0.5213	0.5212	0.5212	0.5211	0.5211	0.5209	0.5208	0.5207	0.5205	0.5204
15	0.5314	0.5313	0.5313	0.5313	0.5313	0.5313	0.5313	0.5313	0.5313	0.5314	0.5313	0.5313	0.5314	0.5313	0.5313
16	0.5243	0.5240	0.5240	0.5240	0.5240	0.5239	0.5239	0.5239	0.5239	0.5239	0.5238	0.5239	0.5237	0.5235	0.5234
17	0.5200	0.5198	0.5198	0.5197	0.5196	0.5195	0.5195	0.5195	0.5195	0.5194	0.5192	0.5190	0.5189	0.5188	0.5186
18	0.5289	0.5288	0.5288	0.5288	0.5288	0.5288	0.5288	0.5288	0.5288	0.5289	0.5288	0.5288	0.5288	0.5287	0.5287
19	0.5282	0.5281	0.5281	0.5281	0.5281	0.5281	0.5281	0.5281	0.5281	0.5282	0.5281	0.5280	0.5280	0.5279	0.5279
20	0.5290	0.5289	0.5289	0.5289	0.5289	0.5289	0.5289	0.5289	0.5288	0.5290	0.5289	0.5288	0.5288	0.5287	0.5285
21	0.5287	0.5286	0.5286	0.5286	0.5287	0.5286	0.5287	0.5287	0.5287	0.5287	0.5284	0.5283	0.5282	0.5280	0.5278
22	0.5240	0.5239	0.5239	0.5240	0.5239	0.5239	0.5238	0.5238	0.5238	0.5238	0.5236	0.5235	0.5230	0.5228	0.5224
23	0.5197	0.5196	0.5196	0.5196	0.5195	0.5194	0.5194	0.5194	0.5193	0.5193	0.5191	0.5189	0.5187	0.5185	0.5181
24	0.5324	0.5324	0.5324	0.5324	0.5324	0.5323	0.5324	0.5324	0.5323	0.5323	0.5322	0.5320	0.5319	0.5317	0.5316
25	0.5321	0.5321	0.5321	0.5321	0.5321	0.5321	0.5322	0.5322	0.5321	0.5321	0.5319	0.5319	0.5318	0.5317	0.5315
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.5277	0.5276	0.5276	0.5275	0.5276	0.5275	0.5275	0.5275	0.5275	0.5275	0.5274	0.5274	0.5273	0.5272	0.5271
Med.	0.5287	0.5285	0.5285	0.5286	0.5286	0.5285	0.5285	0.5286	0.5285	0.5286	0.5284	0.5283	0.5282	0.5280	0.5279
σ	0.0038	0.0039	0.0039	0.0039	0.0039	0.0039	0.0040	0.0040	0.0040	0.0040	0.0040	0.0041	0.0041	0.0042	0.0042
Min.	0.5197	0.5196	0.5196	0.5196	0.5195	0.5194	0.5194	0.5194	0.5193	0.5193	0.5191	0.5189	0.5187	0.5185	0.5181
Max.	0.5329	0.5329	0.5329	0.5329	0.5330	0.5329	0.5329	0.5330	0.5329	0.5330	0.5329	0.5330	0.5330	0.5330	0.5331

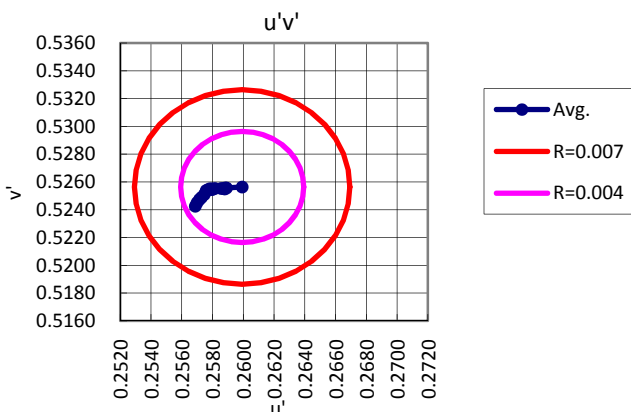
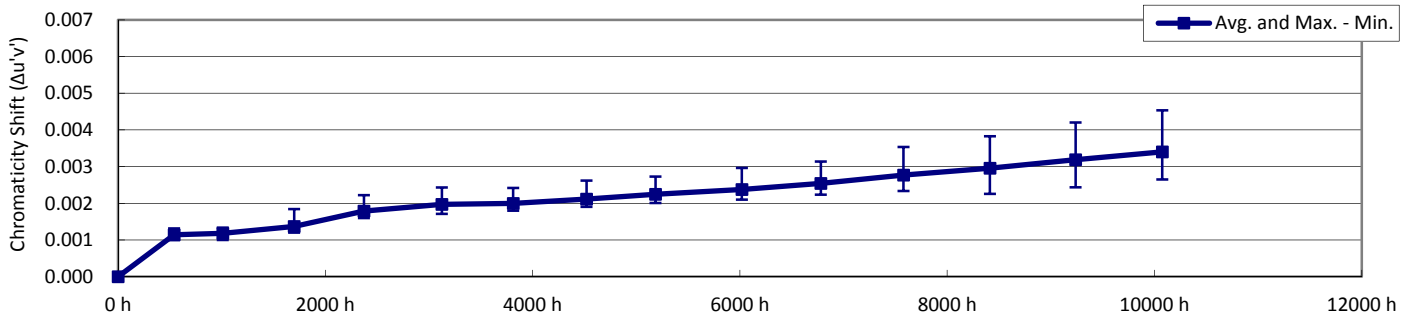
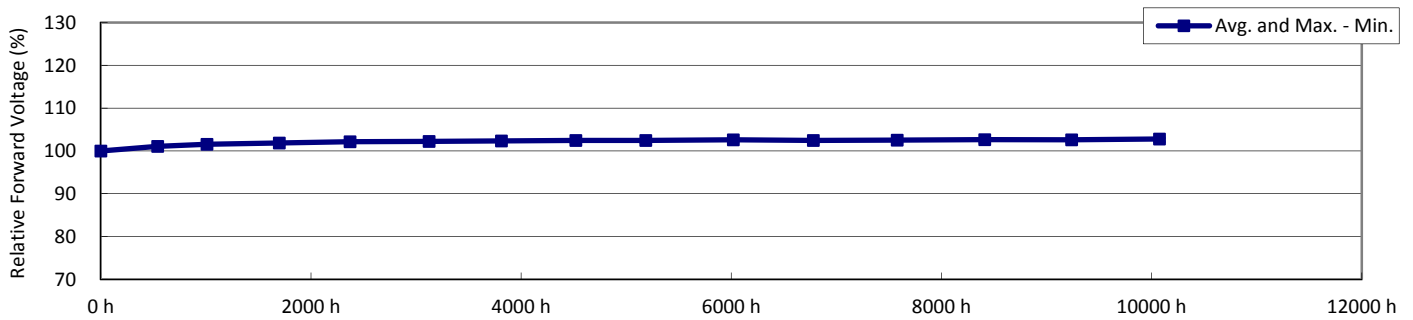
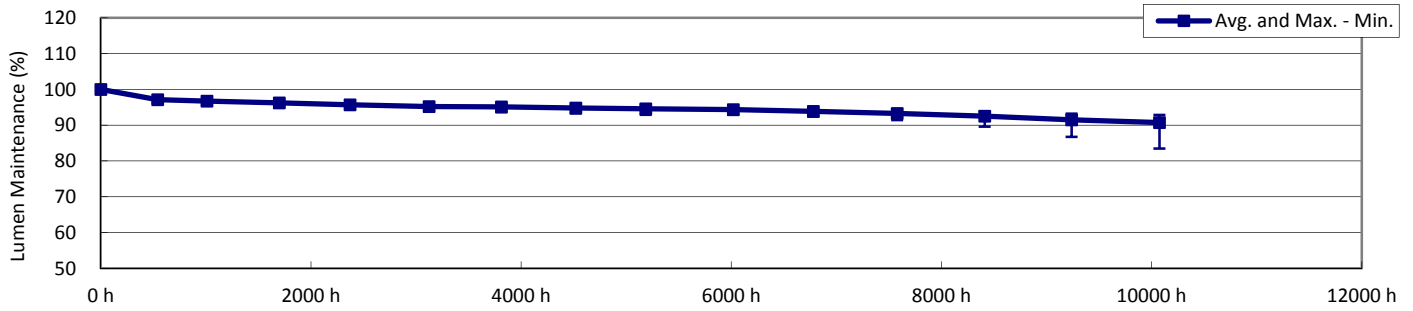


### Data Set 9 : 105 °C, 200 mA

Actual Case Temperature [T <sub>S</sub> ]	108.8 °C
Actual Ambient Temperature [T <sub>A</sub> ]	105.6 °C
Drive Current [I <sub>F</sub> ]	200 mA
Measurement Current	200 mA

NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0



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### Data Set 9 : 105 °C, 200 mA

Actual Case Temperature [T <sub>s</sub> ]	108.8 °C
Actual Ambient Temperature [T <sub>A</sub> ]	105.6 °C
Drive Current [I <sub>F</sub> ]	200 mA
Measurement Current	200 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 9-1**  
Initial Characteristics

LED No.	Luminous flux	Forward voltage	CCT	Input Power	CIE1931		CIE1976					
	Φ <sub>V</sub> [lm]	V <sub>F</sub> [V]	T <sub>CP</sub> [K]	P [W]	x	y	u'	v'				
1	128.0	6.60	2783	1.32	0.452	0.406	0.259	0.524				
2	129.7	6.57	2777	1.31	0.454	0.410	0.259	0.526				
3	129.7	6.60	2729	1.32	0.460	0.414	0.261	0.529				
4	129.6	6.57	2802	1.31	0.451	0.407	0.258	0.525				
5	128.2	6.58	2806	1.32	0.446	0.398	0.259	0.520				
6	128.9	6.58	2775	1.32	0.453	0.408	0.259	0.525				
7	129.8	6.59	2731	1.32	0.460	0.415	0.261	0.529				
8	128.2	6.58	2792	1.32	0.451	0.407	0.259	0.525				
9	129.0	6.60	2687	1.32	0.464	0.416	0.263	0.530				
10	128.8	6.57	2765	1.31	0.456	0.411	0.260	0.527				
11	128.9	6.60	2716	1.32	0.461	0.415	0.261	0.529				
12	129.2	6.60	2734	1.32	0.461	0.417	0.260	0.530				
13	129.3	6.57	2772	1.31	0.454	0.409	0.259	0.526				
14	129.5	6.58	2728	1.32	0.460	0.415	0.261	0.529				
15	130.8	6.58	2757	1.32	0.459	0.416	0.259	0.529				
16	128.5	6.58	2760	1.32	0.454	0.407	0.260	0.525				
17	127.3	6.59	2815	1.32	0.447	0.401	0.258	0.522				
18	129.0	6.57	2811	1.31	0.442	0.392	0.259	0.518				
19	127.3	6.59	2764	1.32	0.452	0.405	0.260	0.524				
20	127.5	6.58	2686	1.32	0.466	0.419	0.262	0.532				
21	128.8	6.57	2809	1.31	0.448	0.402	0.259	0.522				
22	129.3	6.58	2637	1.32	0.475	0.428	0.264	0.536				
23	128.0	6.57	2828	1.31	0.447	0.404	0.258	0.523				
24	127.9	6.58	2831	1.32	0.444	0.398	0.258	0.520				
25	129.4	6.57	2825	1.31	0.447	0.403	0.258	0.523				
n	25	25	25	25	25	25	25	25				
Avg.	128.8	6.58	2765	1.32	0.455	0.409	0.260	0.526				
Med.	128.9	6.58	2772	1.32	0.454	0.408	0.259	0.525				
σ	0.86	0.011	49.6	0.002	0.0076	0.0080	0.0016	0.0042				
Min.	127.3	6.57	2637	1.31	0.442	0.392	0.258	0.518				
Max.	130.8	6.60	2831	1.32	0.475	0.428	0.264	0.536				



### Data Set 9 : 105 °C, 200 mA

Actual Case Temperature [T <sub>c</sub> ]	108.8 °C
Actual Ambient Temperature [T <sub>A</sub> ]	105.6 °C
Drive Current [I <sub>F</sub> ]	200 mA
Measurement Current	200 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 9-2**  
Lumen Maintenance

LED No.	Lumen Maintenance % ( Normalized to 100 % at 0 hours )														
	0 h	541 h	1010 h	1699 h	2372 h	3124 h	3812 h	4520 h	5186 h	6019 h	6781 h	7578 h	8412 h	9239 h	10075 h
1	100.0	97.2	96.8	96.3	95.7	95.3	95.2	94.9	94.7	94.6	94.2	93.9	93.4	92.7	92.4
2	100.0	97.0	96.8	96.3	95.7	95.2	95.2	95.0	94.8	95.0	94.6	94.1	93.7	92.9	92.5
3	100.0	96.8	96.7	96.0	95.7	95.1	95.0	94.7	94.4	94.5	93.8	92.8	91.5	89.8	88.1
4	100.0	96.8	96.6	95.9	95.6	94.9	94.8	94.6	94.4	94.4	93.9	93.1	91.9	90.5	88.9
5	100.0	96.9	96.6	96.0	95.6	95.0	94.9	94.6	94.4	94.0	93.1	91.4	89.6	86.7	83.5
6	100.0	97.3	96.8	96.3	95.9	95.4	95.3	95.1	95.0	94.4	94.1	93.6	93.0	92.2	91.4
7	100.0	97.0	96.7	96.2	95.6	95.2	95.2	94.9	94.8	94.2	93.8	93.2	92.5	91.6	91.2
8	100.0	97.7	97.2	96.9	96.3	96.1	96.0	95.7	95.5	95.0	94.4	94.0	93.0	91.7	90.4
9	100.0	97.6	97.0	96.7	96.1	95.9	95.8	95.5	95.3	94.7	94.0	93.3	92.1	90.5	88.8
10	100.0	97.6	97.1	96.8	96.0	95.8	95.7	95.4	95.2	95.0	94.6	94.3	93.6	92.7	92.0
11	100.0	97.1	96.8	96.4	95.8	95.4	95.3	95.0	94.8	94.6	94.1	93.8	93.2	92.3	91.7
12	100.0	97.2	96.9	96.6	96.1	95.7	95.6	95.2	95.0	95.0	94.5	93.7	92.9	91.9	91.1
13	100.0	97.2	96.8	96.4	95.9	95.4	95.3	95.1	94.8	94.9	94.4	93.7	93.0	91.6	91.0
14	100.0	97.1	96.8	96.4	95.9	95.4	95.4	95.1	94.9	94.8	94.4	93.5	92.5	91.5	91.0
15	100.0	97.1	96.7	96.3	95.8	95.2	95.1	94.7	94.5	94.3	93.8	93.0	92.2	91.2	90.7
16	100.0	97.0	96.5	96.0	95.6	95.1	95.0	94.6	94.4	94.0	93.6	93.1	92.6	91.8	91.6
17	100.0	97.2	96.7	96.1	95.5	95.0	95.0	94.7	94.5	94.1	93.6	93.3	92.9	92.3	92.2
18	100.0	97.4	96.9	96.2	95.4	94.9	94.7	94.2	93.9	93.4	92.8	92.4	91.9	91.1	90.5
19	100.0	97.7	97.4	96.9	96.2	95.8	95.7	95.3	95.1	94.8	94.3	94.2	93.8	93.2	92.9
20	100.0	97.1	96.9	96.3	95.4	94.9	94.7	94.3	94.1	93.8	93.3	93.1	92.5	91.8	91.2
21	100.0	97.3	96.8	96.3	95.7	95.3	95.3	95.0	94.8	94.8	94.3	94.0	93.5	92.9	92.6
22	100.0	96.3	95.7	95.0	94.4	93.9	93.7	93.3	92.9	92.9	92.4	92.0	91.5	90.7	90.4
23	100.0	96.9	96.4	95.9	95.3	94.8	94.7	94.4	94.3	94.3	93.7	93.1	92.5	91.7	91.5
24	100.0	96.7	96.2	95.6	95.0	94.4	94.3	93.9	93.7	93.6	93.1	92.7	92.1	91.2	90.7
25	100.0	97.3	96.8	96.1	95.7	95.3	95.2	94.9	94.6	94.2	93.7	93.0	92.0	91.0	90.4
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	97.1	96.7	96.2	95.7	95.2	95.1	94.8	94.6	94.4	93.9	93.3	92.5	91.5	90.7
Med.	100.0	97.1	96.8	96.3	95.7	95.2	95.2	94.9	94.7	94.4	93.9	93.3	92.5	91.7	91.1
σ	0.00	0.32	0.33	0.41	0.40	0.48	0.49	0.51	0.55	0.55	0.57	0.69	0.90	1.31	1.92
Min.	100.0	96.3	95.7	95.0	94.4	93.9	93.7	93.3	92.9	92.9	92.4	91.4	89.6	86.7	83.5
Max.	100.0	97.7	97.4	96.9	96.3	96.1	96.0	95.7	95.5	95.0	94.6	94.3	93.8	93.2	92.9

#### TM-21 Projection

Time	4520 h	5186 h	6019 h	6781 h	7578 h	8412 h	9239 h	10075 h							
ln(Avg.)	-0.0534	-0.0556	-0.0579	-0.0634	-0.0694	-0.0775	-0.0888	-0.0971							

Test duration used	4520 h	to	10075 h
B			0.988
α			8.04E-06
R <sup>2</sup>			0.953
Calculated L <sub>70</sub> (10K)	42800	hours	
Reported L <sub>70</sub> (10K)	42800	hours	
Calculated L <sub>80</sub> (10K)	26200	hours	
Reported L <sub>80</sub> (10K)	26200	hours	
Calculated L <sub>90</sub> (10K)	11600	hours	
Reported L <sub>90</sub> (10K)	11600	hours	

Curve-fit equation:

$$\Phi(t) = B \exp(-\alpha t)$$

Lumen maintenance life equation:

$$L_{70} = \ln(B/0.7)/\alpha$$

$$L_{80} = \ln(B/0.8)/\alpha$$

$$L_{90} = \ln(B/0.9)/\alpha$$

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### Data Set 9 : 105 °C, 200 mA

Actual Case Temperature [T <sub>S</sub> ]	108.8 °C
Actual Ambient Temperature [T <sub>A</sub> ]	105.6 °C
Drive Current [I <sub>F</sub> ]	200 mA
Measurement Current	200 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 9-3**  
Forward Voltage

LED No.	Relative Forward Voltage % ( Normalized to 100 % at 0 hours )														
	0 h	541 h	1010 h	1699 h	2372 h	3124 h	3812 h	4520 h	5186 h	6019 h	6781 h	7578 h	8412 h	9239 h	10075 h
1	100.0	101.1	101.6	101.9	102.2	102.3	102.4	102.5	102.5	102.7	102.5	102.6	102.7	102.7	102.9
2	100.0	101.0	101.4	101.7	102.0	102.0	102.1	102.3	102.2	102.4	102.2	102.3	102.4	102.3	102.5
3	100.0	101.0	101.5	101.8	102.1	102.1	102.2	102.3	102.3	102.4	102.3	102.4	102.4	102.4	102.6
4	100.0	101.1	101.6	102.0	102.3	102.3	102.4	102.6	102.6	102.7	102.5	102.6	102.7	102.7	102.9
5	100.0	101.0	101.6	101.9	102.3	102.3	102.4	102.6	102.5	102.7	102.5	102.7	102.7	102.6	102.9
6	100.0	101.1	101.6	101.9	102.2	102.3	102.4	102.5	102.5	102.7	102.5	102.6	102.8	102.7	102.9
7	100.0	101.0	101.6	101.9	102.3	102.3	102.4	102.6	102.6	102.7	102.5	102.6	102.8	102.7	102.9
8	100.0	100.9	101.4	101.7	102.0	102.0	102.1	102.2	102.2	102.4	102.2	102.3	102.4	102.3	102.5
9	100.0	101.1	101.6	101.9	102.3	102.3	102.4	102.6	102.5	102.7	102.6	102.6	102.7	102.6	102.8
10	100.0	101.0	101.6	101.9	102.2	102.3	102.4	102.5	102.5	102.6	102.5	102.6	102.8	102.7	102.9
11	100.0	101.1	101.5	101.8	102.1	102.1	102.2	102.3	102.3	102.5	102.4	102.4	102.5	102.5	102.6
12	100.0	101.0	101.4	101.8	102.0	102.1	102.2	102.3	102.2	102.5	102.3	102.4	102.5	102.4	102.6
13	100.0	100.9	101.3	101.6	101.8	101.8	101.9	102.0	102.0	102.2	102.0	102.1	102.2	102.1	102.3
14	100.0	101.1	101.5	101.9	102.2	102.2	102.3	102.5	102.4	102.7	102.5	102.6	102.7	102.7	103.0
15	100.0	101.1	101.5	101.9	102.2	102.2	102.4	102.5	102.6	102.7	102.5	102.6	102.7	102.7	102.9
16	100.0	101.1	101.6	101.9	102.2	102.3	102.5	102.5	102.6	102.8	102.6	102.7	102.8	102.8	103.0
17	100.0	101.1	101.6	101.9	102.2	102.2	102.3	102.5	102.5	102.7	102.5	102.6	102.7	102.7	102.8
18	100.0	100.9	101.2	101.5	101.7	101.7	101.8	101.9	101.9	102.0	101.9	102.0	102.0	102.0	102.1
19	100.0	101.1	101.6	102.0	102.3	102.3	102.5	102.5	102.6	102.7	102.6	102.7	102.8	102.8	102.9
20	100.0	101.2	101.6	101.9	102.2	102.3	102.4	102.5	102.5	102.6	102.5	102.6	102.7	102.6	102.8
21	100.0	101.1	101.6	102.0	102.3	102.3	102.4	102.5	102.5	102.7	102.6	102.7	102.8	102.7	102.9
22	100.0	101.2	101.7	102.0	102.3	102.4	102.5	102.6	102.6	102.8	102.6	102.7	102.8	102.8	102.9
23	100.0	101.1	101.6	102.0	102.3	102.4	102.5	102.6	102.6	102.8	102.6	102.7	102.8	102.8	103.0
24	100.0	101.2	101.7	102.1	102.3	102.4	102.5	102.6	102.6	102.8	102.6	102.7	102.8	102.7	102.9
25	100.0	101.1	101.6	101.9	102.2	102.3	102.5	102.5	102.5	102.7	102.5	102.6	102.8	102.7	102.9
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	100.0	101.1	101.5	101.9	102.2	102.2	102.3	102.4	102.4	102.6	102.5	102.5	102.6	102.6	102.8
Med.	100.0	101.1	101.6	101.9	102.2	102.3	102.4	102.5	102.5	102.7	102.5	102.6	102.7	102.7	102.9
σ	0.00	0.08	0.12	0.14	0.16	0.17	0.18	0.18	0.19	0.20	0.20	0.20	0.21	0.21	0.22
Min.	100.0	100.9	101.2	101.5	101.7	101.7	101.8	101.9	101.9	102.0	101.9	102.0	102.0	102.0	102.1
Max.	100.0	101.2	101.7	102.1	102.3	102.4	102.5	102.6	102.6	102.8	102.6	102.7	102.8	102.8	103.0

### Data Set 9 : 105 °C, 200 mA

Actual Case Temperature [T <sub>s</sub> ]	108.8 °C
Actual Ambient Temperature [T <sub>A</sub> ]	105.6 °C
Drive Current [I <sub>F</sub> ]	200 mA
Measurement Current	200 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 9-4**  
Chromaticity Shift

LED No.	Chromaticity Shift Δu'v'														
	0 h	541 h	1010 h	1699 h	2372 h	3124 h	3812 h	4520 h	5186 h	6019 h	6781 h	7578 h	8412 h	9239 h	10075 h
1	0.0000	0.0011	0.0011	0.0012	0.0016	0.0017	0.0018	0.0019	0.0020	0.0021	0.0022	0.0023	0.0025	0.0026	0.0027
2	0.0000	0.0012	0.0012	0.0014	0.0019	0.0021	0.0020	0.0022	0.0022	0.0023	0.0024	0.0025	0.0027	0.0028	0.0030
3	0.0000	0.0011	0.0012	0.0013	0.0017	0.0019	0.0020	0.0021	0.0022	0.0023	0.0024	0.0027	0.0029	0.0031	0.0033
4	0.0000	0.0011	0.0012	0.0014	0.0018	0.0019	0.0019	0.0020	0.0022	0.0022	0.0024	0.0024	0.0025	0.0027	0.0031
5	0.0000	0.0012	0.0012	0.0014	0.0018	0.0020	0.0020	0.0021	0.0022	0.0027	0.0031	0.0035	0.0038	0.0042	0.0045
6	0.0000	0.0012	0.0013	0.0014	0.0018	0.0020	0.0020	0.0021	0.0022	0.0026	0.0027	0.0030	0.0031	0.0034	0.0038
7	0.0000	0.0013	0.0013	0.0015	0.0019	0.0020	0.0020	0.0021	0.0022	0.0024	0.0024	0.0029	0.0032	0.0034	0.0033
8	0.0000	0.0012	0.0012	0.0014	0.0018	0.0020	0.0020	0.0021	0.0022	0.0023	0.0027	0.0029	0.0034	0.0038	0.0041
9	0.0000	0.0010	0.0010	0.0012	0.0016	0.0018	0.0019	0.0019	0.0021	0.0021	0.0023	0.0023	0.0023	0.0024	0.0027
10	0.0000	0.0011	0.0012	0.0013	0.0017	0.0019	0.0019	0.0021	0.0021	0.0022	0.0023	0.0024	0.0024	0.0025	0.0026
11	0.0000	0.0011	0.0011	0.0013	0.0017	0.0019	0.0019	0.0020	0.0022	0.0024	0.0025	0.0026	0.0027	0.0030	0.0032
12	0.0000	0.0011	0.0011	0.0013	0.0017	0.0019	0.0019	0.0020	0.0022	0.0022	0.0023	0.0026	0.0030	0.0031	0.0033
13	0.0000	0.0011	0.0011	0.0013	0.0018	0.0020	0.0020	0.0021	0.0022	0.0024	0.0027	0.0032	0.0035	0.0039	0.0044
14	0.0000	0.0010	0.0010	0.0012	0.0016	0.0018	0.0018	0.0020	0.0021	0.0022	0.0023	0.0029	0.0033	0.0036	0.0037
15	0.0000	0.0011	0.0011	0.0013	0.0018	0.0019	0.0020	0.0022	0.0023	0.0024	0.0025	0.0029	0.0032	0.0035	0.0038
16	0.0000	0.0012	0.0013	0.0014	0.0018	0.0020	0.0021	0.0022	0.0023	0.0023	0.0025	0.0027	0.0028	0.0031	0.0032
17	0.0000	0.0012	0.0013	0.0015	0.0019	0.0022	0.0022	0.0023	0.0025	0.0026	0.0028	0.0030	0.0031	0.0034	0.0035
18	0.0000	0.0011	0.0012	0.0014	0.0019	0.0021	0.0021	0.0023	0.0025	0.0026	0.0028	0.0029	0.0031	0.0035	0.0038
19	0.0000	0.0011	0.0011	0.0013	0.0017	0.0019	0.0019	0.0020	0.0021	0.0022	0.0024	0.0025	0.0026	0.0028	0.0029
20	0.0000	0.0012	0.0012	0.0013	0.0018	0.0019	0.0020	0.0021	0.0022	0.0023	0.0023	0.0024	0.0025	0.0026	0.0027
21	0.0000	0.0011	0.0012	0.0013	0.0017	0.0019	0.0019	0.0021	0.0022	0.0023	0.0024	0.0027	0.0028	0.0030	0.0033
22	0.0000	0.0011	0.0011	0.0013	0.0017	0.0019	0.0019	0.0020	0.0023	0.0024	0.0025	0.0025	0.0026	0.0027	0.0027
23	0.0000	0.0011	0.0012	0.0014	0.0018	0.0020	0.0021	0.0022	0.0022	0.0024	0.0027	0.0032	0.0034	0.0037	0.0039
24	0.0000	0.0011	0.0012	0.0014	0.0018	0.0020	0.0021	0.0021	0.0023	0.0024	0.0026	0.0027	0.0029	0.0033	0.0037
25	0.0000	0.0012	0.0012	0.0018	0.0022	0.0024	0.0024	0.0026	0.0027	0.0030	0.0031	0.0033	0.0035	0.0036	0.0038
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.0000	0.0011	0.0012	0.0014	0.0018	0.0020	0.0020	0.0021	0.0022	0.0024	0.0025	0.0028	0.0030	0.0032	0.0034
Med.	0.0000	0.0011	0.0012	0.0013	0.0018	0.0019	0.0020	0.0021	0.0022	0.0023	0.0025	0.0027	0.0029	0.0031	0.0033
σ	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005	0.0005
Min.	0.0000	0.0010	0.0010	0.0012	0.0016	0.0017	0.0018	0.0019	0.0020	0.0021	0.0022	0.0023	0.0023	0.0024	0.0026
Max.	0.0000	0.0013	0.0013	0.0018	0.0022	0.0024	0.0024	0.0026	0.0027	0.0030	0.0031	0.0035	0.0038	0.0042	0.0045

### Data Set 9 : 105 °C, 200 mA

Actual Case Temperature [T <sub>c</sub> ]	108.8 °C
Actual Ambient Temperature [T <sub>A</sub> ]	105.6 °C
Drive Current [I <sub>f</sub> ]	200 mA
Measurement Current	200 mA

## NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.

Number of LED failures: 0

**TABLE 9-5**  
Chromaticity

LED No.	Chromaticity u'														
	0 h	541 h	1010 h	1699 h	2372 h	3124 h	3812 h	4520 h	5186 h	6019 h	6781 h	7578 h	8412 h	9239 h	10075 h
1	0.2599	0.2588	0.2588	0.2587	0.2583	0.2582	0.2581	0.2580	0.2579	0.2578	0.2577	0.2576	0.2575	0.2574	0.2573
2	0.2596	0.2584	0.2584	0.2582	0.2577	0.2575	0.2576	0.2574	0.2574	0.2573	0.2572	0.2571	0.2570	0.2569	0.2568
3	0.2615	0.2604	0.2603	0.2602	0.2598	0.2596	0.2595	0.2594	0.2593	0.2592	0.2591	0.2588	0.2587	0.2586	0.2585
4	0.2588	0.2577	0.2576	0.2574	0.2570	0.2569	0.2569	0.2568	0.2566	0.2566	0.2565	0.2565	0.2564	0.2563	0.2561
5	0.2597	0.2585	0.2585	0.2583	0.2579	0.2577	0.2577	0.2576	0.2575	0.2571	0.2568	0.2566	0.2565	0.2564	0.2563
6	0.2604	0.2592	0.2591	0.2590	0.2586	0.2584	0.2584	0.2583	0.2582	0.2579	0.2578	0.2576	0.2575	0.2573	0.2571
7	0.2615	0.2602	0.2602	0.2600	0.2596	0.2595	0.2595	0.2594	0.2593	0.2591	0.2591	0.2587	0.2585	0.2584	0.2585
8	0.2594	0.2582	0.2582	0.2580	0.2576	0.2574	0.2574	0.2573	0.2572	0.2571	0.2568	0.2566	0.2562	0.2560	0.2558
9	0.2629	0.2619	0.2619	0.2617	0.2613	0.2611	0.2610	0.2610	0.2608	0.2608	0.2606	0.2606	0.2607	0.2606	0.2604
10	0.2600	0.2589	0.2588	0.2587	0.2583	0.2581	0.2581	0.2579	0.2579	0.2578	0.2577	0.2576	0.2576	0.2575	0.2574
11	0.2619	0.2608	0.2608	0.2606	0.2602	0.2600	0.2600	0.2599	0.2597	0.2595	0.2594	0.2593	0.2592	0.2590	0.2589
12	0.2609	0.2598	0.2598	0.2596	0.2592	0.2590	0.2590	0.2589	0.2587	0.2587	0.2586	0.2584	0.2581	0.2580	0.2579
13	0.2599	0.2588	0.2588	0.2586	0.2581	0.2579	0.2579	0.2578	0.2577	0.2575	0.2573	0.2569	0.2567	0.2565	0.2562
14	0.2611	0.2601	0.2601	0.2599	0.2595	0.2593	0.2593	0.2591	0.2590	0.2589	0.2588	0.2584	0.2581	0.2579	0.2579
15	0.2598	0.2587	0.2587	0.2585	0.2580	0.2579	0.2578	0.2576	0.2575	0.2574	0.2573	0.2570	0.2568	0.2566	0.2564
16	0.2609	0.2597	0.2596	0.2595	0.2591	0.2589	0.2588	0.2587	0.2586	0.2586	0.2585	0.2583	0.2582	0.2580	0.2580
17	0.2591	0.2579	0.2578	0.2576	0.2572	0.2570	0.2570	0.2569	0.2567	0.2566	0.2565	0.2563	0.2562	0.2560	0.2559
18	0.2599	0.2588	0.2587	0.2585	0.2580	0.2579	0.2578	0.2577	0.2575	0.2574	0.2573	0.2572	0.2570	0.2567	0.2565
19	0.2607	0.2596	0.2596	0.2594	0.2590	0.2588	0.2588	0.2587	0.2586	0.2585	0.2584	0.2583	0.2582	0.2581	0.2580
20	0.2627	0.2615	0.2615	0.2614	0.2609	0.2608	0.2607	0.2606	0.2605	0.2604	0.2604	0.2603	0.2602	0.2601	0.2600
21	0.2590	0.2579	0.2578	0.2577	0.2573	0.2571	0.2571	0.2569	0.2568	0.2567	0.2566	0.2564	0.2563	0.2561	0.2559
22	0.2644	0.2633	0.2633	0.2631	0.2627	0.2625	0.2625	0.2624	0.2621	0.2620	0.2619	0.2619	0.2618	0.2617	0.2617
23	0.2580	0.2569	0.2568	0.2566	0.2562	0.2560	0.2559	0.2558	0.2558	0.2556	0.2554	0.2551	0.2549	0.2547	0.2546
24	0.2585	0.2574	0.2573	0.2571	0.2567	0.2565	0.2564	0.2564	0.2562	0.2561	0.2560	0.2559	0.2557	0.2554	0.2552
25	0.2582	0.2570	0.2570	0.2564	0.2560	0.2558	0.2558	0.2556	0.2555	0.2553	0.2552	0.2551	0.2549	0.2549	0.2548
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.2603	0.2592	0.2592	0.2590	0.2586	0.2584	0.2584	0.2582	0.2581	0.2580	0.2579	0.2577	0.2576	0.2574	0.2573
Med.	0.2599	0.2588	0.2588	0.2587	0.2583	0.2581	0.2581	0.2579	0.2579	0.2578	0.2577	0.2576	0.2575	0.2573	0.2571
σ	0.0015	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0017	0.0017	0.0017
Min.	0.2580	0.2569	0.2568	0.2564	0.2560	0.2558	0.2558	0.2556	0.2555	0.2553	0.2552	0.2551	0.2549	0.2547	0.2546
Max.	0.2644	0.2633	0.2633	0.2631	0.2627	0.2625	0.2625	0.2624	0.2621	0.2620	0.2619	0.2619	0.2618	0.2617	0.2617



**Data Set 9 : 105 °C, 200 mA**

Actual Case Temperature [T <sub>c</sub> ]	108.8 °C
Actual Ambient Temperature [T <sub>A</sub> ]	105.6 °C
Drive Current [I <sub>f</sub> ]	200 mA
Measurement Current	200 mA

NOTES:

T<sub>S</sub> and T<sub>A</sub> were measured during initial setup.  
 Number of LED failures: 0

**TABLE 9-6**  
 Chromaticity

LED No.	Chromaticity v'														
	0 h	541 h	1010 h	1699 h	2372 h	3124 h	3812 h	4520 h	5186 h	6019 h	6781 h	7578 h	8412 h	9239 h	10075 h
1	0.5241	0.5240	0.5240	0.5240	0.5240	0.5239	0.5239	0.5239	0.5239	0.5239	0.5237	0.5237	0.5236	0.5234	0.5233
2	0.5267	0.5265	0.5266	0.5266	0.5266	0.5265	0.5266	0.5266	0.5266	0.5266	0.5263	0.5262	0.5261	0.5259	0.5257
3	0.5286	0.5286	0.5286	0.5286	0.5287	0.5286	0.5287	0.5287	0.5286	0.5286	0.5283	0.5281	0.5279	0.5275	0.5273
4	0.5251	0.5249	0.5249	0.5249	0.5249	0.5248	0.5249	0.5249	0.5249	0.5248	0.5245	0.5245	0.5243	0.5240	0.5236
5	0.5203	0.5202	0.5202	0.5202	0.5202	0.5201	0.5201	0.5201	0.5199	0.5197	0.5191	0.5186	0.5182	0.5177	0.5173
6	0.5254	0.5252	0.5252	0.5252	0.5252	0.5251	0.5252	0.5252	0.5251	0.5248	0.5246	0.5244	0.5243	0.5241	0.5236
7	0.5290	0.5288	0.5289	0.5289	0.5289	0.5288	0.5289	0.5290	0.5290	0.5289	0.5287	0.5282	0.5279	0.5277	0.5277
8	0.5247	0.5246	0.5246	0.5246	0.5246	0.5245	0.5245	0.5246	0.5245	0.5245	0.5240	0.5239	0.5235	0.5230	0.5227
9	0.5299	0.5298	0.5299	0.5299	0.5300	0.5299	0.5299	0.5300	0.5300	0.5299	0.5296	0.5295	0.5294	0.5291	0.5288
10	0.5271	0.5270	0.5270	0.5271	0.5271	0.5270	0.5271	0.5271	0.5271	0.5271	0.5269	0.5268	0.5268	0.5268	0.5266
11	0.5292	0.5291	0.5291	0.5292	0.5293	0.5292	0.5293	0.5293	0.5293	0.5291	0.5289	0.5288	0.5287	0.5285	0.5282
12	0.5297	0.5296	0.5297	0.5297	0.5297	0.5297	0.5297	0.5297	0.5297	0.5296	0.5293	0.5289	0.5287	0.5285	0.5283
13	0.5258	0.5257	0.5257	0.5257	0.5257	0.5257	0.5257	0.5257	0.5256	0.5255	0.5251	0.5247	0.5245	0.5239	0.5235
14	0.5290	0.5290	0.5290	0.5290	0.5290	0.5290	0.5290	0.5290	0.5289	0.5289	0.5286	0.5280	0.5276	0.5273	0.5271
15	0.5294	0.5293	0.5293	0.5294	0.5294	0.5293	0.5294	0.5293	0.5293	0.5292	0.5289	0.5285	0.5283	0.5281	0.5278
16	0.5251	0.5249	0.5249	0.5250	0.5250	0.5249	0.5249	0.5249	0.5248	0.5248	0.5245	0.5244	0.5243	0.5240	0.5238
17	0.5217	0.5214	0.5214	0.5214	0.5213	0.5212	0.5212	0.5212	0.5211	0.5210	0.5207	0.5206	0.5205	0.5204	0.5202
18	0.5176	0.5173	0.5173	0.5173	0.5173	0.5171	0.5172	0.5171	0.5170	0.5169	0.5167	0.5166	0.5165	0.5162	0.5158
19	0.5240	0.5239	0.5239	0.5239	0.5239	0.5238	0.5238	0.5238	0.5237	0.5237	0.5235	0.5233	0.5233	0.5231	0.5229
20	0.5315	0.5314	0.5315	0.5315	0.5316	0.5316	0.5316	0.5317	0.5317	0.5317	0.5316	0.5316	0.5314	0.5314	0.5312
21	0.5222	0.5220	0.5221	0.5221	0.5220	0.5219	0.5220	0.5220	0.5220	0.5220	0.5218	0.5216	0.5215	0.5214	0.5212
22	0.5360	0.5360	0.5360	0.5361	0.5361	0.5361	0.5362	0.5362	0.5361	0.5360	0.5359	0.5359	0.5359	0.5359	0.5358
23	0.5231	0.5230	0.5229	0.5230	0.5229	0.5229	0.5229	0.5229	0.5228	0.5228	0.5223	0.5217	0.5216	0.5214	0.5212
24	0.5199	0.5196	0.5197	0.5196	0.5196	0.5195	0.5195	0.5195	0.5195	0.5195	0.5193	0.5192	0.5190	0.5187	0.5182
25	0.5229	0.5227	0.5227	0.5225	0.5226	0.5225	0.5226	0.5226	0.5225	0.5223	0.5220	0.5218	0.5217	0.5215	0.5211
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	0.5259	0.5258	0.5258	0.5258	0.5258	0.5257	0.5258	0.5258	0.5257	0.5257	0.5254	0.5252	0.5250	0.5248	0.5245
Med.	0.5254	0.5252	0.5252	0.5252	0.5252	0.5251	0.5252	0.5252	0.5251	0.5248	0.5246	0.5245	0.5243	0.5240	0.5236
σ	0.0041	0.0042	0.0042	0.0042	0.0043	0.0043	0.0043	0.0043	0.0043	0.0043	0.0044	0.0044	0.0044	0.0045	0.0045
Min.	0.5176	0.5173	0.5173	0.5173	0.5173	0.5171	0.5172	0.5171	0.5170	0.5169	0.5167	0.5166	0.5165	0.5162	0.5158
Max.	0.5360	0.5360	0.5360	0.5361	0.5361	0.5361	0.5362	0.5362	0.5361	0.5360	0.5359	0.5359	0.5359	0.5359	0.5358

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