

IES LM-80-08 Report

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Product : **CLU056-3626C1-273H1D7**
Issue Date : **2016/7/19**
Initial Test Date : **2014/4/2**
Complete Test Date : **-**
Test Duration : **15,000 H**
Report Number : **LMI400105**



CONTENTS


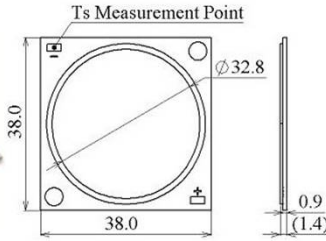
1.	Description of LED Light Sources Tested	P.2
2.	Applicable Product Series	P.2
3.	IES LM-80-08 Report Requirement	P.3
4.	IES TM-21-11 Prediction	P.5
5.	IES LM-80-08 Test Summary	P.6
6.	IES LM-80-08 Test Result	P.7

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1. Description of LED light sources Tested

Table 1

Product	Nominal CCT	Die Count	Die Spacing	Drive Current	Power Density	Product Picture	Mechanical Drawing
CLU056-3626C1-273H1D7	2,700K	936pcs	0.20mm	4680mA (180mA/die)	0.402W/mm ²		

2. Applicable Product Series

Applicable product series of this IES LM-80-08 report shows in Appendix report.

Identical construction process is used for the applicable product series.

Approved Signatory

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M. Hada

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3. IES LM-80-08 Reports Requirements

1. Number of LED light sources tested

20 samples are selected for each test condition.

(Nominal Ts = 55C, 85C, 105C)

2. Description of LED sources

Classification : LED Array

Product : CLU056-3626C1-273H1D7
2,700K

3. Description of auxiliary equipment

~ Life test equipment ~

Thermal controlled life test system

LED arrays are tested in a thermal chamber which controls the case temperature (Ts) and ambient temperature (Ta) by water cooling system.

~ Measuring equipment ~

Table 2

Measurement Item	Equipment Name	Part Number	Manufacturer	Measurement Range	Calibration Date	Next Calibration Date
Temperature	Thermo regulator	LSCC-20A	KYUSHU NISSHO	0C~120C	2016/6/24	2017/6/30
	Data logger	LR8400	HIOKI	0C~120C	2016/6/24	2017/6/30
Temperature and humidity	Data logger	TR-72S	T&D Corporation	0C~ 50C, 10~95% RH	2015/8/1	2016/8/31
Drive current	Digital multimeter	34401A	Agilent Technologies	10mA~3A	2015/10/17	2016/10/30
Input power	DC power supply	PAS320-3	Kikusui Electronics	10mA~3A	-	-
Voltage	Oscilloscope	DPO2012-D1	Tektronix	10mV~100V	2015/12/24	2016/12/31
Luminous flux	Integrating sphere	MCPD7000	Otsuka Electronics	3lm~30,000lm	2015/11/12	2016/11/30

4. Operating cycle

LED arrays are driven with constant direct current (DC).

5. Ambient conditions including airflow temperature and relative humidity

LED arrays are operated in environmental control chambers. The data of the ambient conditions is shown in the tables of individual conditions. The ambient condition complies with the requirements of IES LM-80-08.

Surrounding Air temperature for life test : controlled to within -5°C of the case temperature (T_s)

Humidity : $< 65\%$ RH

Minimal air flow

Ambient temperature for Photometry measurement : maintained at $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$

6. Case temperature (T_s)

See data tables for individual test conditions.

The case temperature measurement point and detailed mechanical drawing are shown in table 1 of 1. Description of LED Light Sources Tested.

7. Drive current (I_f)

See data tables for individual test conditions.

8. Initial luminous flux, forward voltage and CCT

See data tables for individual test conditions.

9. Lumen maintenance data

See data tables for individual test conditions.

Ambient temperature during lumen measurements is maintained at $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

10. Observation of LED light source failures

No failures observed during test.

11. LED light source monitoring interval

Measurements have been taken at each 1,000 hours.

12. Photometric measurement uncertainty

Uncertainty for relative luminous flux measurement is $\pm 2\%$.

Long term measurement uncertainty is based on reproducibility tests done over a period of one year, calculated to $k=2$ coverage (i.e. 95% coverage).

13. Chromaticity shift reported over the measurement time

See data tables for individual test conditions.

Ambient temperature during chromaticity testing set to $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

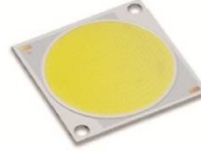
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4. IES TM-21-11 Prediction

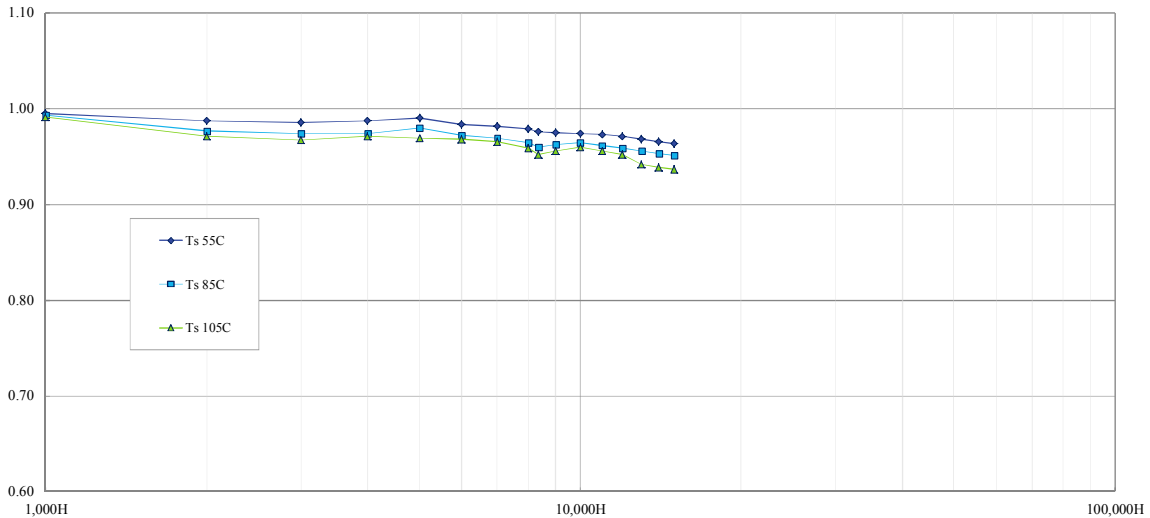
Test condition	55C	85C	105C
Sample size	20pcs	20pcs	20pcs
Number of failures	0pcs	0pcs	0pcs
DUT drive current used in the test	4680mA	4680mA	4680mA
Test duration	15,000H	15,000H	15,000H
Test duration used for projection	7,000H - 15,000H	7,000H - 15,000H	7,000H - 15,000H
Tested case temperature Tc	55C	85C	105C
α	2.11189E-06	2.0462E-06	2.10413E-06
B	0.995	0.981	0.976
Reported L70 (15k) (hour)	>90000	>90000	>90000
Reported L80 (15k) (hour)	>90000	>90000	>90000
Reported L90 (15k) (hour)	48,000	39,000	36,000

5. IES LM-80-08 Test Summary

Product : CLU056-3626C1-273H1D7.
Issue Date : 2016/7/19
Initial Test Date : 2014/4/2
Complete Test Date : -
Test Duration : 15,000 H
Report Number : LM1400105



Case temperature	Lumen Maintenance (normalized value)																					
	-	0H	1,000H	2,000H	3,000H	4,000H	5,000H	6,000H	7,000H	8,000H	8,335H	9,000H	10,000H	11,000H	12,000H	13,000H	14,000H	15,000H	16,000H	17,000H	18,000H	
55C	Max.	1.000	1.013	1.010	1.006	1.017	1.022	1.024	1.021	1.018	1.016	1.015	1.014	1.008	1.001	0.997	0.995	0.993				
	Ave.	1.000	0.995	0.988	0.986	0.987	0.991	0.984	0.982	0.979	0.976	0.975	0.974	0.973	0.971	0.968	0.966	0.964				
	Min.	1.000	0.978	0.975	0.969	0.964	0.958	0.951	0.950	0.946	0.944	0.943	0.942	0.941	0.938	0.935	0.933	0.931				
	Std.dev.	0.000	0.007	0.008	0.008	0.013	0.016	0.018	0.018	0.018	0.018	0.018	0.018	0.017	0.018	0.018	0.017	0.017				
	Median	1.000	0.995	0.986	0.985	0.989	0.992	0.986	0.984	0.981	0.979	0.978	0.977	0.976	0.975	0.972	0.970	0.968				
85C	Max.	1.000	1.001	0.992	0.984	0.984	0.993	0.983	0.980	0.975	0.970	0.973	0.976	0.975	0.971	0.968	0.966	0.964				
	Ave.	1.000	0.994	0.977	0.974	0.974	0.980	0.973	0.970	0.965	0.960	0.963	0.965	0.961	0.959	0.956	0.953	0.951				
	Min.	1.000	0.983	0.959	0.964	0.964	0.960	0.960	0.958	0.953	0.948	0.947	0.950	0.947	0.944	0.941	0.939	0.937				
	Std.dev.	0.000	0.005	0.008	0.006	0.006	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.009	0.009	0.009	0.009				
	Median	1.000	0.995	0.977	0.975	0.975	0.982	0.976	0.973	0.968	0.963	0.965	0.968	0.964	0.960	0.957	0.954	0.952				
105C	Max.	1.000	1.017	0.999	0.993	1.004	0.997	0.997	0.994	0.987	0.980	0.984	0.988	0.985	0.985	0.982	0.979	0.977				
	Ave.	1.000	0.991	0.971	0.968	0.971	0.970	0.968	0.966	0.959	0.952	0.956	0.959	0.956	0.952	0.949	0.947	0.945				
	Min.	1.000	0.963	0.924	0.922	0.950	0.946	0.946	0.943	0.936	0.928	0.932	0.935	0.932	0.931	0.928	0.925	0.923				
	Std.dev.	0.000	0.010	0.014	0.015	0.012	0.014	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015				
	Median	1.000	0.991	0.972	0.966	0.968	0.971	0.970	0.967	0.960	0.953	0.956	0.959	0.955	0.951	0.948	0.946	0.944				



6. IES LM80-08 Test Result

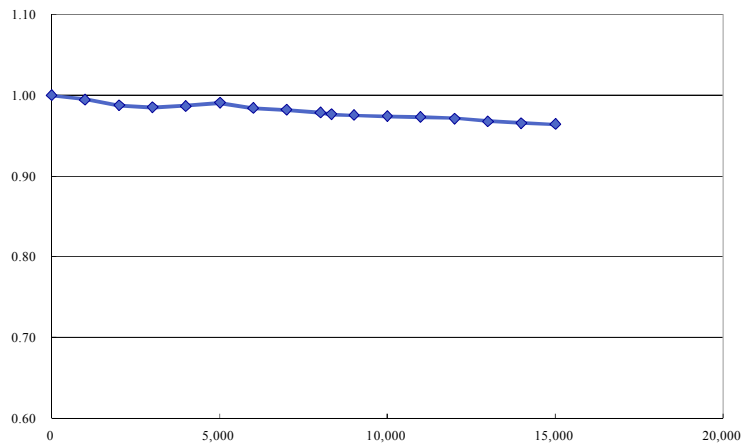
6-1. Test condition 1 : 55C

6-1-1. Lumen Maintenance

Actual case temperature (Ts)	55.2C
Actual ambient temperature (Ta)	54.6C
Drive current (If)	4,680mA

Sample No.	Luminous Flux (lm)	Lumen Maintenance (normalized value)																			
		0H	1,000 H	2,000 H	3,000 H	4,000 H	5,000 H	6,000 H	7,000 H	8,000 H	8,335 H	9,000 H	10,000 H	11,000 H	12,000 H	13,000 H	14,000 H	15,000 H	16,000 H	17,000 H	18,000 H
1	40,778	1.000	0.978	0.975	0.969	0.991	0.997	0.989	0.987	0.984	0.981	0.980	0.979	0.978	0.977	0.974	0.972	0.970			
2	41,211	1.000	0.994	0.988	0.981	0.973	0.976	0.973	0.971	0.967	0.964	0.963	0.962	0.961	0.960	0.957	0.955	0.953			
3	40,707	1.000	0.993	0.985	0.985	0.988	0.991	0.987	0.985	0.982	0.979	0.978	0.977	0.976	0.975	0.972	0.970	0.968			
4	40,891	1.000	0.995	0.985	0.984	0.989	0.992	0.988	0.985	0.982	0.979	0.978	0.977	0.976	0.975	0.972	0.971	0.969			
5	41,878	1.000	0.996	0.989	0.990	0.977	0.986	0.976	0.974	0.970	0.968	0.967	0.966	0.965	0.964	0.961	0.959	0.957			
6	41,478	1.000	0.997	0.989	0.986	0.977	0.990	0.981	0.979	0.976	0.973	0.972	0.971	0.968	0.965	0.962	0.960	0.958			
7	41,001	1.000	0.996	0.988	0.989	0.972	0.984	0.972	0.969	0.967	0.965	0.964	0.963	0.962	0.961	0.957	0.955	0.953			
8	40,345	1.000	0.998	0.991	0.988	0.988	0.997	0.983	0.980	0.978	0.975	0.974	0.973	0.972	0.971	0.968	0.966	0.964			
9	40,587	1.000	0.997	0.986	0.982	0.992	0.988	0.986	0.984	0.981	0.979	0.978	0.977	0.976	0.975	0.972	0.970	0.968			
10	41,888	1.000	0.996	0.986	0.985	0.978	0.962	0.952	0.950	0.946	0.944	0.944	0.943	0.942	0.938	0.935	0.933	0.931			
11	39,583	1.000	0.992	0.985	0.985	0.998	1.007	0.998	0.996	0.993	0.991	0.990	0.989	0.988	0.987	0.984	0.982	0.980			
12	40,227	1.000	0.992	0.985	0.982	0.998	1.004	1.000	0.998	0.995	0.992	0.991	0.990	0.989	0.988	0.985	0.983	0.981			
13	41,070	1.000	0.993	0.977	0.978	0.973	0.982	0.972	0.970	0.967	0.965	0.964	0.963	0.962	0.958	0.956	0.954	0.952			
14	40,654	1.000	0.989	0.982	0.983	0.989	1.005	0.993	0.991	0.988	0.986	0.985	0.984	0.983	0.982	0.979	0.977	0.975			
15	41,100	1.000	0.992	0.983	0.978	0.994	0.997	0.990	0.988	0.985	0.982	0.981	0.980	0.979	0.978	0.974	0.972	0.970			
16	41,253	1.000	0.991	0.990	0.990	0.978	0.958	0.951	0.950	0.947	0.944	0.943	0.942	0.941	0.940	0.936	0.934	0.933			
17	39,752	1.000	0.996	0.990	0.989	1.004	1.008	1.024	1.021	1.018	1.016	1.015	1.014	1.008	1.001	0.997	0.995	0.993			
18	41,811	1.000	0.995	0.984	0.979	0.964	0.969	0.956	0.954	0.952	0.950	0.949	0.948	0.947	0.942	0.938	0.936	0.935			
19	40,136	1.000	1.013	1.010	1.004	1.017	1.022	1.010	1.008	1.005	1.003	1.002	1.001	1.000	0.999	0.995	0.993	0.991			
20	40,599	1.000	1.009	1.004	1.006	1.003	1.001	1.000	0.998	0.995	0.993	0.992	0.991	0.990	0.989	0.988	0.983	0.981			
Max.		1.000	1.013	1.010	1.006	1.017	1.022	1.024	1.021	1.018	1.016	1.015	1.014	1.008	1.001	0.997	0.995	0.993			
Ave.		1.000	0.995	0.988	0.986	0.987	0.991	0.984	0.982	0.979	0.976	0.975	0.974	0.973	0.971	0.968	0.966	0.964			
Min.		1.000	0.978	0.975	0.969	0.964	0.958	0.951	0.950	0.946	0.944	0.943	0.942	0.941	0.938	0.935	0.933	0.931			
Std. dev.		0.000	0.007	0.008	0.008	0.013	0.016	0.018	0.018	0.018	0.018	0.018	0.018	0.017	0.018	0.018	0.017	0.017			
Median		1.000	0.995	0.986	0.985	0.989	0.992	0.986	0.984	0.981	0.979	0.978	0.977	0.976	0.975	0.972	0.970	0.968			

Lumen Maintenance (normalized value)



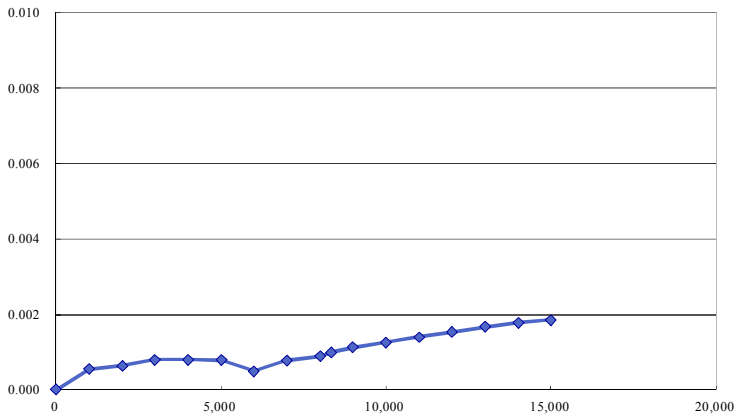
6-1. Test condition 1 : 55C

6-1-2. Chromaticity Shift ($\Delta u'v'$)

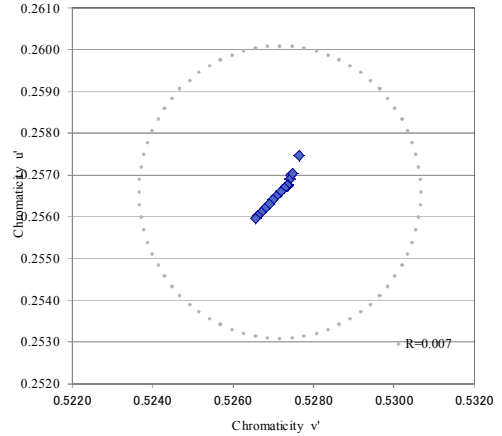
Actual case temperature (Ts)	55.2C
Actual ambient temperature (Ta)	54.6C
Drive current (If)	4,680mA

Sample No.	x		y		Chromaticity Shift ($\Delta u'v'$)																			
	0H	0H	0H	0H	1,000 H	2,000 H	3,000 H	4,000 H	5,000 H	6,000 H	7,000 H	8,000 H	8,335 H	9,000 H	10,000 H	11,000 H	12,000 H	13,000 H	14,000 H	15,000 H	16,000 H	17,000 H	18,000 H	
1	0.4552	0.4138	-	0.0020	0.0021	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0018	0.0016	0.0017	0.0018	0.0020	0.0021	0.0023	0.0024	0.0025				
2	0.4551	0.4145	-	0.0005	0.0008	0.0007	0.0007	0.0006	0.0004	0.0010	0.0011	0.0012	0.0014	0.0015	0.0016	0.0018	0.0019	0.0020	0.0019					
3	0.4528	0.4135	-	0.0002	0.0004	0.0005	0.0005	0.0005	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0010	0.0011	0.0012	0.0014	0.0015					
4	0.4532	0.4125	-	0.0004	0.0004	0.0005	0.0005	0.0005	0.0002	0.0004	0.0005	0.0006	0.0008	0.0009	0.0010	0.0012	0.0013	0.0013	0.0013	0.0013				
5	0.4542	0.4130	-	0.0004	0.0005	0.0005	0.0005	0.0005	0.0004	0.0006	0.0007	0.0009	0.0010	0.0012	0.0013	0.0014	0.0016	0.0017	0.0018					
6	0.4536	0.4142	-	0.0004	0.0006	0.0006	0.0006	0.0006	0.0003	0.0006	0.0007	0.0009	0.0010	0.0011	0.0013	0.0014	0.0016	0.0017	0.0018					
7	0.4546	0.4134	-	0.0004	0.0001	0.0006	0.0006	0.0005	0.0003	0.0006	0.0007	0.0009	0.0010	0.0011	0.0013	0.0014	0.0015	0.0017	0.0017					
8	0.4552	0.4144	-	0.0005	0.0005	0.0007	0.0007	0.0008	0.0003	0.0006	0.0007	0.0009	0.0010	0.0011	0.0013	0.0014	0.0015	0.0017	0.0017					
9	0.4531	0.4131	-	0.0004	0.0004	0.0006	0.0006	0.0006	0.0002	0.0005	0.0007	0.0008	0.0009	0.0010	0.0012	0.0013	0.0015	0.0016	0.0017					
10	0.4540	0.4128	-	0.0006	0.0005	0.0008	0.0008	0.0009	0.0004	0.0008	0.0009	0.0010	0.0012	0.0013	0.0014	0.0016	0.0017	0.0017	0.0018					
11	0.4549	0.4140	-	0.0004	0.0005	0.0007	0.0007	0.0006	0.0003	0.0007	0.0008	0.0009	0.0011	0.0012	0.0013	0.0015	0.0016	0.0017	0.0019					
12	0.4551	0.4129	-	0.0003	0.0005	0.0006	0.0006	0.0006	0.0004	0.0006	0.0008	0.0009	0.0010	0.0012	0.0013	0.0014	0.0016	0.0017	0.0018					
13	0.4500	0.4134	-	0.0005	0.0005	0.0008	0.0008	0.0007	0.0006	0.0009	0.0011	0.0012	0.0013	0.0015	0.0016	0.0018	0.0019	0.0020	0.0022					
14	0.4532	0.4140	-	0.0002	0.0003	0.0005	0.0005	0.0004	0.0002	0.0005	0.0006	0.0008	0.0009	0.0010	0.0012	0.0013	0.0014	0.0016	0.0017					
15	0.4544	0.4131	-	0.0004	0.0003	0.0006	0.0006	0.0009	0.0003	0.0006	0.0007	0.0008	0.0010	0.0011	0.0013	0.0014	0.0015	0.0014	0.0013					
16	0.4557	0.4142	-	0.0004	0.0006	0.0007	0.0007	0.0007	0.0004	0.0007	0.0008	0.0010	0.0011	0.0012	0.0014	0.0015	0.0017	0.0018	0.0019					
17	0.4550	0.4127	-	0.0004	0.0004	0.0007	0.0007	0.0005	0.0002	0.0005	0.0006	0.0008	0.0009	0.0010	0.0012	0.0013	0.0015	0.0016	0.0017					
18	0.4528	0.4152	-	0.0004	0.0005	0.0007	0.0007	0.0007	0.0003	0.0006	0.0007	0.0008	0.0010	0.0011	0.0012	0.0014	0.0015	0.0015	0.0014					
19	0.4555	0.4141	-	0.0016	0.0020	0.0018	0.0018	0.0019	0.0015	0.0018	0.0019	0.0020	0.0022	0.0023	0.0024	0.0026	0.0027	0.0029	0.0030					
20	0.4551	0.4137	-	0.0008	0.0011	0.0013	0.0013	0.0011	0.0007	0.0010	0.0012	0.0013	0.0014	0.0016	0.0017	0.0019	0.0020	0.0021	0.0023					
Max.	-	-	-	0.0020	0.0021	0.0023	0.0023	0.0023	0.0023	0.0023	0.0019	0.0020	0.0022	0.0023	0.0024	0.0026	0.0027	0.0029	0.0030					
Ave.	-	-	-	0.0006	0.0006	0.0008	0.0008	0.0008	0.0005	0.0008	0.0009	0.0010	0.0011	0.0013	0.0014	0.0015	0.0017	0.0018	0.0019					
Min.	-	-	-	0.0002	0.0001	0.0005	0.0005	0.0004	0.0002	0.0004	0.0005	0.0006	0.0007	0.0008	0.0010	0.0011	0.0012	0.0013	0.0013					
Std. dev.	-	-	-	0.0004	0.0005	0.0005	0.0005	0.0005	0.0005	0.0004	0.0004	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	0.0004					
Median	-	-	-	0.0004	0.0005	0.0007	0.0007	0.0006	0.0003	0.0006	0.0007	0.0009	0.0010	0.0011	0.0013	0.0014	0.0016	0.0017	0.0018					

Chromaticity Shift ($\Delta u'v'$)



$u'v'$



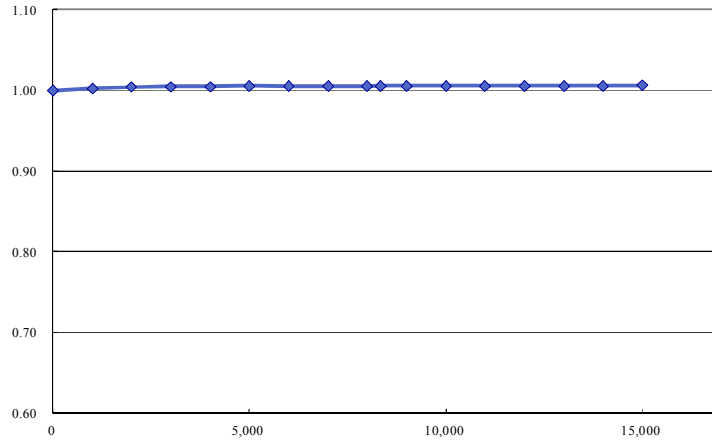
6-1. Test condition 1 : 55C

6-1-3. Forward Voltage

Actual case temperature (Ts)	55.2C
Actual ambient temperature (Ta)	54.6C
Drive current (If)	4,680mA

Sample No.	Forward Voltage (V)	Forward Voltage (normalized value)																			
		0H	1,000 H	2,000 H	3,000 H	4,000 H	5,000 H	6,000 H	7,000 H	8,000 H	8,335 H	9,000 H	10,000 H	11,000 H	12,000 H	13,000 H	14,000 H	15,000 H	16,000 H	17,000 H	18,000 H
1	114.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
2	115.12	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
3	114.53	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
4	115.05	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
5	113.59	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
6	113.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
7	113.47	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
8	114.82	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
9	113.86	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
10	113.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
11	112.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
12	113.48	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
13	113.94	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
14	113.20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
15	113.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
16	113.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
17	112.99	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
18	114.84	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
19	114.36	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
20	113.44	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01			
Max.		1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
Ave.		1.00	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
Min.		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Std. dev.		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Median		1.00	1.00	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01			

Forward Voltage (normalized value)



6-1. Test condition 1 : 55C

6-1-4. Calculated CCT

Actual case temperature (Ts)	55.2C
Actual ambient temperature (Ta)	54.6C
Drive current (If)	4,680mA

Sample No.	ANSI Target CCT (K)	Calculated CCT (K)																			
		0H	1,000 H	2,000 H	3,000 H	4,000 H	5,000 H	6,000 H	7,000 H	8,000 H	8,335 H	9,000 H	10,000 H	11,000 H	12,000 H	13,000 H	14,000 H	15,000 H	16,000 H	17,000 H	18,000 H
1	2,700	2,791	2,849	2,859	2,859	2,860	2,860	2,860	2,860	2,854	2,857	2,813	2,815	2,818	2,821	2,824	2,826	2,829			
2	2,700	2,798	2,809	2,816	2,813	2,813	2,813	2,808	2,820	2,815	2,818	2,821	2,823	2,826	2,829	2,832	2,834	2,832			
3	2,700	2,825	2,828	2,833	2,835	2,835	2,835	2,826	2,834	2,828	2,831	2,834	2,837	2,839	2,842	2,845	2,848	2,850			
4	2,700	2,811	2,819	2,819	2,823	2,823	2,823	2,815	2,819	2,814	2,817	2,820	2,823	2,825	2,828	2,831	2,829	2,831			
5	2,700	2,800	2,810	2,811	2,812	2,812	2,811	2,809	2,814	2,810	2,812	2,815	2,818	2,820	2,823	2,826	2,829	2,831			
6	2,700	2,818	2,827	2,832	2,830	2,830	2,831	2,822	2,832	2,827	2,830	2,833	2,836	2,838	2,841	2,844	2,847	2,849			
7	2,700	2,797	2,806	2,800	2,810	2,810	2,809	2,803	2,810	2,805	2,808	2,811	2,813	2,816	2,819	2,822	2,824	2,826			
8	2,700	2,796	2,807	2,806	2,811	2,811	2,813	2,803	2,809	2,804	2,807	2,810	2,813	2,815	2,818	2,821	2,823	2,825			
9	2,700	2,817	2,826	2,825	2,831	2,831	2,830	2,822	2,829	2,825	2,828	2,830	2,833	2,836	2,839	2,841	2,844	2,847			
10	2,700	2,802	2,814	2,813	2,819	2,819	2,821	2,810	2,819	2,815	2,817	2,820	2,823	2,825	2,828	2,831	2,829	2,832			
11	2,700	2,797	2,805	2,807	2,811	2,811	2,811	2,802	2,812	2,808	2,810	2,813	2,816	2,818	2,821	2,824	2,827	2,829			
12	2,700	2,786	2,794	2,797	2,801	2,801	2,800	2,795	2,800	2,795	2,798	2,801	2,804	2,806	2,809	2,812	2,814	2,817			
13	2,700	2,866	2,876	2,877	2,885	2,885	2,882	2,879	2,887	2,884	2,887	2,890	2,892	2,895	2,898	2,901	2,904	2,907			
14	2,700	2,822	2,825	2,828	2,833	2,833	2,831	2,825	2,833	2,829	2,832	2,835	2,837	2,840	2,843	2,846	2,848	2,851			
15	2,700	2,799	2,807	2,806	2,812	2,812	2,818	2,805	2,812	2,807	2,810	2,812	2,815	2,818	2,820	2,823	2,820	2,818			
16	2,700	2,788	2,797	2,800	2,804	2,804	2,804	2,796	2,803	2,799	2,801	2,804	2,807	2,809	2,812	2,815	2,818	2,820			
17	2,700	2,786	2,794	2,794	2,801	2,801	2,797	2,791	2,798	2,793	2,795	2,798	2,801	2,803	2,806	2,809	2,811	2,814			
18	2,700	2,837	2,846	2,848	2,852	2,852	2,852	2,843	2,850	2,846	2,849	2,852	2,855	2,857	2,860	2,863	2,865	2,862			
19	2,700	2,790	2,825	2,833	2,829	2,829	2,831	2,822	2,828	2,824	2,826	2,829	2,832	2,835	2,837	2,840	2,843	2,846			
20	2,700	2,793	2,809	2,815	2,820	2,820	2,816	2,807	2,816	2,811	2,814	2,816	2,819	2,822	2,825	2,827	2,830	2,833			
Max.		2,866	2,876	2,877	2,885	2,885	2,882	2,879	2,887	2,884	2,887	2,890	2,892	2,895	2,898	2,901	2,904	2,907			
Ave.		2,806	2,819	2,821	2,825	2,825	2,824	2,817	2,824	2,820	2,822	2,823	2,826	2,828	2,831	2,834	2,836	2,838			
Min.		2,786	2,794	2,794	2,801	2,801	2,797	2,791	2,798	2,793	2,795	2,798	2,801	2,803	2,806	2,809	2,811	2,814			
Std. dev.		20	20	21	20	21	20	21	21	21	21	20	20	20	20	20	20	20			
Median		2,798	2,812	2,816	2,820	2,820	2,819	2,809	2,819	2,814	2,817	2,818	2,821	2,824	2,826	2,829	2,829	2,832			

6-1. Test condition 1 : 55C

6-1-5. Ra

Actual case temperature (Ts)	55.2C
Actual ambient temperature (Ta)	54.6C
Drive current (If)	4,680mA

Sample No.	Ra	Ra																				
		0H	0H	1,000 H	2,000 H	3,000 H	4,000 H	5,000 H	6,000 H	7,000 H	8,000 H	8,335 H	9,000 H	10,000 H	11,000 H	12,000 H	13,000 H	14,000 H	15,000 H	16,000 H	17,000 H	18,000 H
1	92	92	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94				
2	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
3	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
4	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
5	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
6	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
7	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
8	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
9	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
10	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
11	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
12	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
13	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
14	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
15	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
16	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
17	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
18	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
19	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
20	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
Max.		92	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94				
Ave.		92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
Min.		92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
Std. dev.		0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Median		92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				

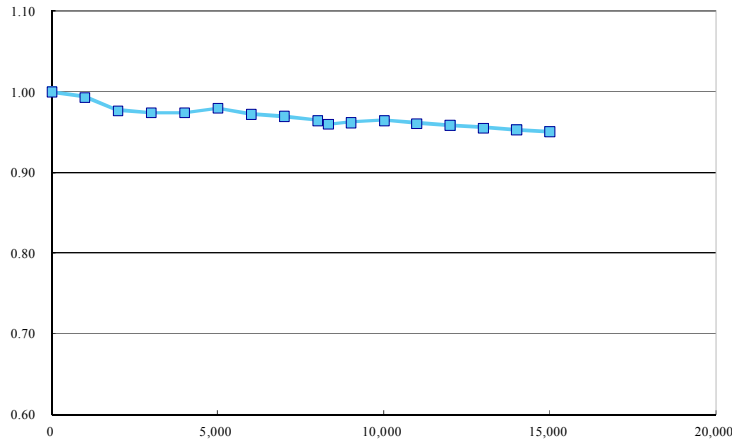
6-2. Test condition 2 : 85C

6-2-1. Lumen Maintenance

Actual case temperature (Ts)	82.3C
Actual ambient temperature (Ta)	81.8C
Drive current (If)	4,680mA

Sample No.	Luminous Flux (lm)	Lumen Maintenance (normalized value)																				
		0H	1,000 H	2,000 H	3,000 H	4,000 H	5,000 H	6,000 H	7,000 H	8,000 H	8,335 H	9,000 H	10,000 H	11,000 H	12,000 H	13,000 H	14,000 H	15,000 H	16,000 H	17,000 H	18,000 H	
1	40,488	1.000	0.987	0.974	0.970	0.970	0.984	0.969	0.966	0.961	0.956	0.959	0.963	0.960	0.956	0.953	0.951	0.949				
2	40,258	1.000	0.995	0.984	0.976	0.976	0.988	0.981	0.978	0.973	0.968	0.970	0.973	0.969	0.965	0.962	0.959	0.957				
3	37,913	1.000	0.993	0.967	0.970	0.970	0.976	0.968	0.965	0.960	0.955	0.956	0.959	0.954	0.949	0.946	0.944	0.942				
4	40,916	1.000	0.991	0.977	0.976	0.976	0.982	0.980	0.977	0.972	0.968	0.971	0.975	0.975	0.971	0.968	0.966	0.964				
5	40,299	1.000	0.983	0.972	0.968	0.968	0.979	0.970	0.967	0.962	0.957	0.960	0.961	0.959	0.959	0.956	0.953	0.951				
6	40,193	1.000	0.990	0.976	0.975	0.975	0.982	0.977	0.974	0.969	0.964	0.967	0.969	0.967	0.965	0.962	0.959	0.958				
7	40,304	1.000	0.996	0.974	0.977	0.977	0.986	0.980	0.977	0.973	0.968	0.971	0.970	0.969	0.968	0.965	0.962	0.960				
8	39,016	1.000	0.995	0.979	0.974	0.974	0.986	0.979	0.976	0.971	0.966	0.971	0.971	0.967	0.967	0.965	0.962	0.960				
9	39,624	1.000	1.001	0.981	0.978	0.978	0.984	0.979	0.977	0.972	0.967	0.970	0.973	0.970	0.970	0.967	0.964	0.962				
10	40,092	1.000	0.998	0.982	0.982	0.982	0.982	0.978	0.976	0.971	0.966	0.969	0.969	0.964	0.959	0.956	0.953	0.951				
11	40,354	1.000	0.997	0.984	0.984	0.984	0.987	0.983	0.980	0.975	0.970	0.973	0.976	0.970	0.966	0.963	0.960	0.958				
12	40,642	1.000	1.001	0.981	0.980	0.980	0.978	0.977	0.974	0.969	0.964	0.964	0.968	0.964	0.961	0.958	0.955	0.953				
13	39,328	1.000	0.994	0.970	0.970	0.970	0.960	0.960	0.958	0.953	0.948	0.947	0.950	0.947	0.944	0.941	0.939	0.937				
14	40,548	1.000	0.999	0.992	0.983	0.983	0.981	0.980	0.977	0.972	0.967	0.969	0.972	0.967	0.963	0.960	0.958	0.956				
15	41,340	1.000	0.994	0.978	0.965	0.965	0.977	0.961	0.958	0.953	0.948	0.950	0.951	0.951	0.948	0.945	0.943					
16	39,607	1.000	0.997	0.981	0.976	0.976	0.982	0.968	0.965	0.960	0.955	0.959	0.962	0.957	0.953	0.950	0.947	0.945				
17	38,582	1.000	0.993	0.972	0.971	0.971	0.978	0.964	0.962	0.957	0.952	0.954	0.957	0.951	0.947	0.944	0.941	0.940				
18	39,906	1.000	0.996	0.990	0.981	0.981	0.993	0.975	0.972	0.967	0.962	0.965	0.968	0.968	0.964	0.961	0.958	0.956				
19	39,073	1.000	0.989	0.968	0.969	0.969	0.967	0.962	0.959	0.954	0.949	0.954	0.955	0.950	0.945	0.942	0.940	0.938				
20	40,197	1.000	0.985	0.959	0.964	0.964	0.968	0.961	0.958	0.953	0.949	0.952	0.955	0.951	0.946	0.943	0.940	0.938				
Max.		1.000	1.001	0.992	0.984	0.984	0.993	0.983	0.980	0.975	0.970	0.973	0.976	0.975	0.971	0.968	0.966	0.964				
Ave.		1.000	0.994	0.977	0.974	0.974	0.980	0.973	0.970	0.965	0.960	0.963	0.965	0.961	0.959	0.956	0.953	0.951				
Min.		1.000	0.983	0.959	0.964	0.964	0.960	0.960	0.958	0.953	0.948	0.947	0.950	0.947	0.944	0.941	0.939	0.937				
Std. dev.		0.000	0.005	0.008	0.006	0.006	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.009	0.009	0.009	0.009				
Median		1.000	0.995	0.977	0.975	0.975	0.982	0.976	0.973	0.968	0.963	0.965	0.968	0.964	0.960	0.957	0.954	0.952				

Lumen Maintenance (normalized value)



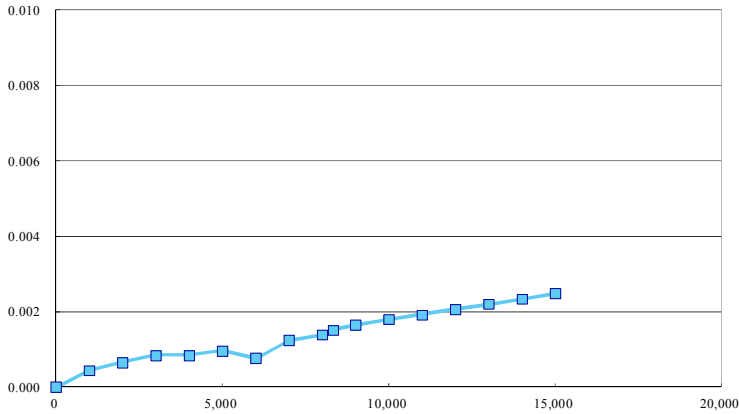
6-2. Test condition 2 : 85C

6-2-2. Chromaticity Shift ($\Delta u'v'$)

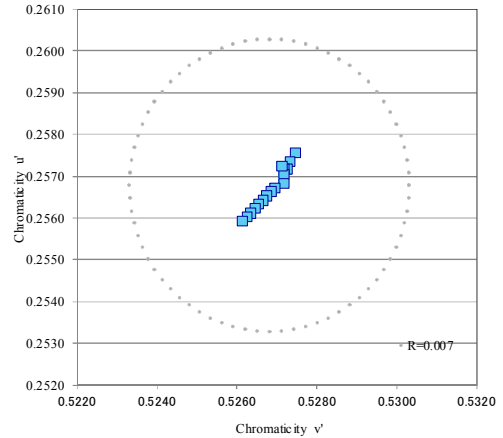
Actual case temperature (Ts)	82.3C
Actual ambient temperature (Ta)	81.8C
Drive current (If)	4,680mA

Sample No.	x		y		Chromaticity Shift ($\Delta u'v'$)																			
	0H	0H	0H	0H	1,000 H	2,000 H	3,000 H	4,000 H	5,000 H	6,000 H	7,000 H	8,000 H	8,335 H	9,000 H	10,000 H	11,000 H	12,000 H	13,000 H	14,000 H	15,000 H	16,000 H	17,000 H	18,000 H	
1	0.4548	0.4121	-	0.0003	0.0008	0.0009	0.0009	0.0009	0.0012	0.0009	0.0012	0.0014	0.0015	0.0017	0.0018	0.0019	0.0021	0.0022	0.0023	0.0025				
2	0.4540	0.4134	-	0.0004	0.0009	0.0008	0.0008	0.0010	0.0007	0.0013	0.0014	0.0015	0.0017	0.0018	0.0019	0.0021	0.0022	0.0023	0.0025					
3	0.4553	0.4101	-	0.0003	0.0006	0.0008	0.0008	0.0008	0.0005	0.0010	0.0011	0.0013	0.0014	0.0016	0.0017	0.0018	0.0020	0.0021	0.0023					
4	0.4546	0.4141	-	0.0004	0.0005	0.0008	0.0008	0.0009	0.0008	0.0010	0.0012	0.0013	0.0014	0.0016	0.0017	0.0019	0.0020	0.0021	0.0023					
5	0.4540	0.4133	-	0.0003	0.0006	0.0005	0.0005	0.0006	0.0005	0.0009	0.0011	0.0012	0.0013	0.0015	0.0016	0.0017	0.0019	0.0020	0.0022					
6	0.4552	0.4139	-	0.0005	0.0005	0.0008	0.0008	0.0008	0.0007	0.0011	0.0012	0.0013	0.0015	0.0016	0.0018	0.0019	0.0020	0.0022	0.0023					
7	0.4554	0.4133	-	0.0005	0.0006	0.0009	0.0009	0.0011	0.0009	0.0014	0.0015	0.0017	0.0018	0.0019	0.0021	0.0022	0.0023	0.0025	0.0026					
8	0.4545	0.4135	-	0.0004	0.0008	0.0008	0.0008	0.0009	0.0006	0.0010	0.0011	0.0013	0.0014	0.0015	0.0017	0.0018	0.0020	0.0021	0.0022					
9	0.4544	0.4131	-	0.0004	0.0002	0.0004	0.0004	0.0005	0.0002	0.0006	0.0008	0.0009	0.0010	0.0012	0.0013	0.0014	0.0016	0.0017	0.0019					
10	0.4542	0.4140	-	0.0004	0.0005	0.0008	0.0008	0.0009	0.0007	0.0012	0.0013	0.0014	0.0015	0.0017	0.0018	0.0020	0.0021	0.0022	0.0024					
11	0.4561	0.4131	-	0.0005	0.0006	0.0009	0.0009	0.0009	0.0007	0.0012	0.0013	0.0015	0.0016	0.0017	0.0019	0.0020	0.0021	0.0023	0.0024					
12	0.4535	0.4122	-	0.0007	0.0006	0.0009	0.0009	0.0010	0.0007	0.0013	0.0014	0.0016	0.0017	0.0019	0.0020	0.0021	0.0023	0.0024	0.0026					
13	0.4542	0.4134	-	0.0006	0.0007	0.0011	0.0011	0.0010	0.0011	0.0018	0.0019	0.0021	0.0022	0.0024	0.0025	0.0026	0.0028	0.0029	0.0030					
14	0.4542	0.4133	-	0.0006	0.0010	0.0010	0.0010	0.0011	0.0009	0.0014	0.0015	0.0017	0.0018	0.0019	0.0021	0.0022	0.0024	0.0025	0.0026					
15	0.4538	0.4126	-	0.0004	0.0009	0.0009	0.0009	0.0011	0.0009	0.0016	0.0017	0.0018	0.0020	0.0021	0.0022	0.0024	0.0025	0.0027	0.0028					
16	0.4554	0.4128	-	0.0004	0.0008	0.0009	0.0009	0.0012	0.0009	0.0015	0.0016	0.0017	0.0019	0.0020	0.0022	0.0023	0.0024	0.0026	0.0027					
17	0.4544	0.4130	-	0.0005	0.0007	0.0011	0.0011	0.0012	0.0011	0.0017	0.0018	0.0020	0.0021	0.0022	0.0024	0.0025	0.0026	0.0028	0.0029					
18	0.4546	0.4129	-	0.0005	0.0011	0.0009	0.0009	0.0010	0.0007	0.0009	0.0010	0.0012	0.0013	0.0014	0.0016	0.0017	0.0019	0.0020	0.0021					
19	0.4546	0.4127	-	0.0005	0.0007	0.0011	0.0011	0.0011	0.0011	0.0015	0.0016	0.0018	0.0019	0.0020	0.0022	0.0023	0.0024	0.0026	0.0027					
20	0.4546	0.4133	-	0.0002	0.0002	0.0008	0.0008	0.0010	0.0008	0.0014	0.0015	0.0017	0.0018	0.0019	0.0021	0.0022	0.0024	0.0025	0.0026					
Max.	-	-	-	0.0007	0.0011	0.0011	0.0011	0.0012	0.0011	0.0018	0.0019	0.0021	0.0022	0.0024	0.0025	0.0026	0.0028	0.0029	0.0030					
Ave.	-	-	-	0.0004	0.0007	0.0009	0.0009	0.0010	0.0008	0.0012	0.0014	0.0015	0.0017	0.0018	0.0019	0.0021	0.0022	0.0023	0.0025					
Min.	-	-	-	0.0002	0.0002	0.0004	0.0004	0.0005	0.0002	0.0006	0.0008	0.0009	0.0010	0.0012	0.0013	0.0014	0.0016	0.0017	0.0019					
Std. dev.	-	-	-	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003					
Median	-	-	-	0.0004	0.0007	0.0009	0.0009	0.0010	0.0008	0.0012	0.0014	0.0015	0.0017	0.0018	0.0019	0.0021	0.0022	0.0023	0.0025					

Chromaticity Shift ($\Delta u'v'$)



$u'v'$



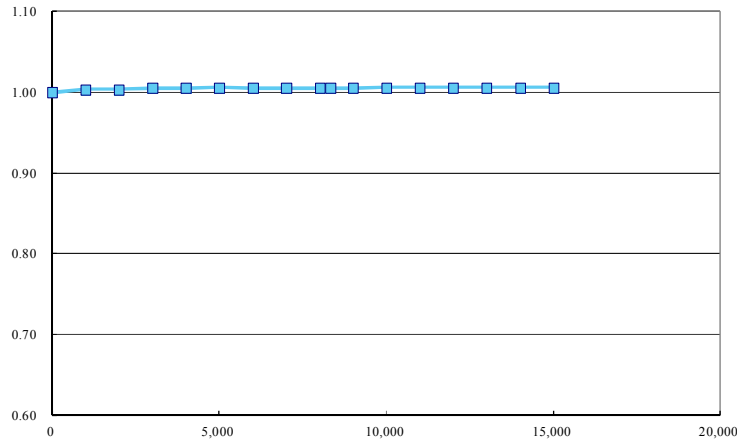
6-2. Test condition 2 : 85C

6-2-3. Forward Voltage

Actual case temperature (Ts)	82.3C
Actual ambient temperature (Ta)	81.8C
Drive current (If)	4,680mA

Sample No.	Forward Voltage (V)	Forward Voltage (normalized value)																			
		0H	1,000 H	2,000 H	3,000 H	4,000 H	5,000 H	6,000 H	7,000 H	8,000 H	8,335 H	9,000 H	10,000 H	11,000 H	12,000 H	13,000 H	14,000 H	15,000 H	16,000 H	17,000 H	18,000 H
1	114.20	1.00	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
2	113.91	1.00	1.00	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.01			
3	114.91	1.00	1.00	1.00	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
4	114.15	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
5	113.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01			
6	113.24	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
7	113.02	1.00	1.01	1.01	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
8	113.50	1.00	1.00	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.01			
9	112.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
10	113.28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.01			
11	113.27	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
12	113.43	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
13	113.32	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
14	113.42	1.00	1.00	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
15	113.87	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
16	113.02	1.00	1.00	1.00	1.01	1.01	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
17	112.79	1.00	1.00	1.00	1.01	1.01	1.01	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
18	113.33	1.00	1.00	1.00	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
19	115.06	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
20	113.49	1.00	1.00	1.00	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.01			
Max.		1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
Ave.		1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
Min.		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Std. dev.		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Median		1.00	1.00	1.00	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.01			

Forward Voltage (normalized value)



6-2. Test condition 2 : 85C

6-2-4. Calculated CCT

Actual case temperature (Ts)	82.3C
Actual ambient temperature (Ta)	81.8C
Drive current (If)	4,680mA

Sample No.	ANSI Target CCT (K)	Calculated CCT (K)																			
		0H	1,000 H	2,000 H	3,000 H	4,000 H	5,000 H	6,000 H	7,000 H	8,000 H	8,335 H	9,000 H	10,000 H	11,000 H	12,000 H	13,000 H	14,000 H	15,000 H	16,000 H	17,000 H	18,000 H
1	2,700	2,784	2,790	2,800	2,803	2,803	2,809	2,803	2,810	2,805	2,808	2,811	2,813	2,816	2,819	2,821	2,824	2,827			
2	2,700	2,806	2,816	2,826	2,824	2,824	2,828	2,822	2,834	2,830	2,833	2,836	2,838	2,841	2,844	2,847	2,849	2,852			
3	2,700	2,791	2,797	2,804	2,807	2,807	2,808	2,801	2,812	2,807	2,810	2,812	2,815	2,818	2,821	2,823	2,826	2,829			
4	2,700	2,803	2,812	2,815	2,820	2,820	2,822	2,820	2,825	2,820	2,823	2,826	2,828	2,831	2,834	2,837	2,839	2,842			
5	2,700	2,805	2,800	2,820	2,817	2,817	2,819	2,816	2,826	2,822	2,825	2,828	2,830	2,833	2,836	2,839	2,841	2,844			
6	2,700	2,793	2,803	2,804	2,810	2,810	2,811	2,807	2,816	2,812	2,815	2,817	2,820	2,823	2,825	2,828	2,831	2,834			
7	2,700	2,784	2,794	2,798	2,804	2,804	2,808	2,804	2,815	2,810	2,813	2,815	2,818	2,821	2,824	2,826	2,829	2,832			
8	2,700	2,800	2,810	2,817	2,818	2,818	2,821	2,814	2,823	2,818	2,821	2,824	2,827	2,829	2,832	2,835	2,838	2,840			
9	2,700	2,798	2,806	2,800	2,806	2,806	2,808	2,802	2,812	2,807	2,810	2,812	2,815	2,818	2,821	2,823	2,826	2,829			
10	2,700	2,808	2,818	2,820	2,827	2,827	2,828	2,823	2,834	2,829	2,832	2,835	2,838	2,840	2,843	2,846	2,849	2,852			
11	2,700	2,773	2,784	2,785	2,792	2,792	2,793	2,789	2,799	2,794	2,797	2,799	2,802	2,805	2,807	2,810	2,813	2,816			
12	2,700	2,804	2,819	2,818	2,825	2,825	2,826	2,821	2,832	2,828	2,831	2,833	2,836	2,839	2,842	2,844	2,847	2,850			
13	2,700	2,803	2,815	2,818	2,826	2,826	2,826	2,827	2,842	2,838	2,841	2,844	2,846	2,849	2,852	2,855	2,858	2,860			
14	2,700	2,803	2,815	2,824	2,824	2,824	2,827	2,823	2,833	2,829	2,832	2,835	2,837	2,840	2,843	2,846	2,848	2,851			
15	2,700	2,803	2,812	2,822	2,823	2,823	2,828	2,823	2,837	2,833	2,836	2,838	2,841	2,844	2,847	2,849	2,852	2,855			
16	2,700	2,781	2,790	2,797	2,801	2,801	2,806	2,800	2,813	2,808	2,811	2,813	2,816	2,819	2,822	2,824	2,827	2,830			
17	2,700	2,798	2,810	2,814	2,822	2,822	2,825	2,822	2,835	2,831	2,834	2,836	2,839	2,842	2,845	2,848	2,850	2,853			
18	2,700	2,793	2,805	2,816	2,813	2,813	2,815	2,809	2,812	2,808	2,810	2,813	2,816	2,819	2,821	2,824	2,827	2,830			
19	2,700	2,792	2,803	2,806	2,816	2,816	2,816	2,814	2,824	2,819	2,822	2,825	2,827	2,830	2,833	2,836	2,838	2,841			
20	2,700	2,797	2,801	2,802	2,814	2,814	2,820	2,815	2,829	2,824	2,827	2,830	2,832	2,835	2,838	2,841	2,843	2,846			
Max.		2,808	2,819	2,826	2,827	2,827	2,828	2,827	2,842	2,838	2,841	2,844	2,846	2,849	2,852	2,855	2,858	2,860			
Ave.		2,796	2,805	2,810	2,815	2,815	2,817	2,813	2,823	2,819	2,821	2,824	2,827	2,830	2,832	2,835	2,838	2,841			
Min.		2,773	2,784	2,785	2,792	2,792	2,793	2,789	2,799	2,794	2,797	2,799	2,802	2,805	2,807	2,810	2,813	2,816			
Std. dev.		9	10	11	10	10	9	10	11	11	11	12	12	12	12	12	12	12			
Median		2,798	2,805	2,814	2,816	2,816	2,820	2,815	2,824	2,820	2,822	2,825	2,828	2,831	2,833	2,836	2,839	2,842			

6-2. Test condition 2 : 85C

6-2-5. Ra

Actual case temperature (Ts)	82.3C
Actual ambient temperature (Ta)	81.8C
Drive current (If)	4,680mA

Sample No.	Ra																				
	0H	0H	1,000 H	2,000 H	3,000 H	4,000 H	5,000 H	6,000 H	7,000 H	8,000 H	8,335 H	9,000 H	10,000 H	11,000 H	12,000 H	13,000 H	14,000 H	15,000 H	16,000 H	17,000 H	18,000 H
1	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
2	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
3	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
4	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
5	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
6	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
7	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
8	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
9	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
10	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
11	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
12	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
13	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
14	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
15	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
16	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
17	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
18	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
19	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
20	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
Max.	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
Ave.	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
Min.	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
Std. dev.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Median	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			

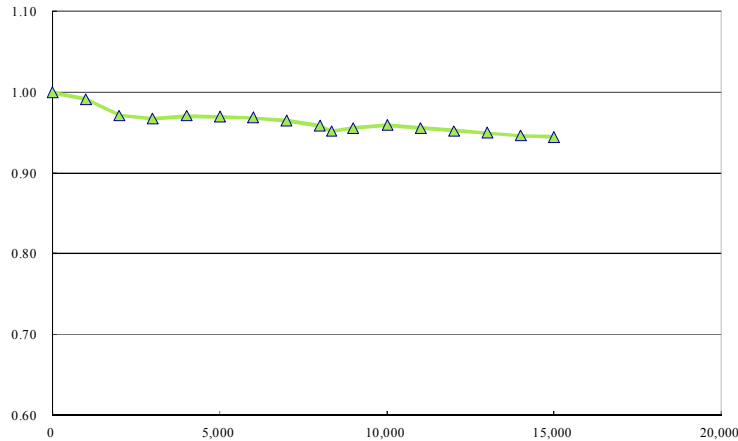
6-3. Test condition 3 : 105C

6-3-1. Lumen Maintenance

Actual case temperature (Ts)	104.4C
Actual ambient temperature (Ta)	102.4C
Drive current (If)	4,680mA

Sample No.	Luminous Flux (lm)	Lumen Maintenance (normalized value)																			
		0H	1,000 H	2,000 H	3,000 H	4,000 H	5,000 H	6,000 H	7,000 H	8,000 H	8,335 H	9,000 H	10,000 H	11,000 H	12,000 H	13,000 H	14,000 H	15,000 H	16,000 H	17,000 H	18,000 H
1	39,869	1.000	0.988	0.974	0.973	0.984	0.974	0.970	0.967	0.960	0.954	0.958	0.961	0.958	0.954	0.951	0.948	0.946			
2	40,868	1.000	0.983	0.968	0.966	0.966	0.971	0.971	0.968	0.961	0.955	0.960	0.965	0.961	0.958	0.955	0.952	0.950			
3	40,223	1.000	0.998	0.979	0.975	0.975	0.975	0.975	0.972	0.965	0.958	0.963	0.968	0.963	0.958	0.955	0.953	0.951			
4	40,375	1.000	0.991	0.973	0.963	0.963	0.960	0.959	0.956	0.949	0.942	0.946	0.950	0.950	0.950	0.947	0.944	0.942			
5	39,680	1.000	0.981	0.967	0.963	0.963	0.964	0.970	0.967	0.960	0.954	0.957	0.961	0.956	0.952	0.949	0.946	0.944			
6	40,353	1.000	0.990	0.968	0.959	0.959	0.951	0.947	0.944	0.937	0.931	0.934	0.938	0.934	0.932	0.930	0.927	0.925			
7	39,813	1.000	0.963	0.924	0.922	0.950	0.946	0.946	0.943	0.936	0.928	0.932	0.935	0.932	0.931	0.928	0.925	0.923			
8	39,621	1.000	0.991	0.970	0.963	0.963	0.961	0.959	0.956	0.949	0.943	0.947	0.950	0.947	0.943	0.940	0.937	0.935			
9	40,183	1.000	0.992	0.971	0.964	0.964	0.954	0.951	0.948	0.942	0.935	0.939	0.943	0.940	0.937	0.934	0.931	0.929			
10	40,226	1.000	0.997	0.985	0.990	0.990	0.993	0.997	0.994	0.987	0.980	0.984	0.988	0.983	0.978	0.976	0.973	0.971			
11	40,273	1.000	0.994	0.970	0.966	0.977	0.968	0.966	0.963	0.955	0.948	0.951	0.955	0.950	0.944	0.941	0.938	0.936			
12	39,883	1.000	0.994	0.976	0.973	0.973	0.974	0.968	0.965	0.959	0.952	0.955	0.958	0.954	0.951	0.948	0.945	0.943			
13	39,268	1.000	0.984	0.954	0.956	0.966	0.951	0.952	0.949	0.942	0.936	0.940	0.943	0.940	0.936	0.933	0.930	0.928			
14	39,869	1.000	0.994	0.975	0.975	0.975	0.981	0.985	0.982	0.975	0.968	0.972	0.976	0.971	0.966	0.963	0.960	0.958			
15	39,298	1.000	0.989	0.977	0.972	0.972	0.973	0.976	0.973	0.967	0.960	0.964	0.968	0.968	0.968	0.965	0.962	0.960			
16	40,071	1.000	0.990	0.968	0.962	0.962	0.957	0.951	0.948	0.942	0.935	0.939	0.943	0.938	0.933	0.930	0.928	0.926			
17	39,148	1.000	0.997	0.979	0.970	0.970	0.972	0.971	0.968	0.960	0.953	0.954	0.956	0.951	0.945	0.942	0.939	0.937			
18	38,848	1.000	1.017	0.999	0.993	1.004	0.997	0.994	0.991	0.984	0.977	0.981	0.985	0.985	0.985	0.982	0.979	0.977			
19	39,198	1.000	0.986	0.967	0.959	0.959	0.975	0.970	0.967	0.960	0.954	0.957	0.961	0.956	0.952	0.949	0.946	0.944			
20	38,434	1.000	1.007	0.986	0.987	0.987	0.997	0.991	0.988	0.981	0.974	0.979	0.984	0.979	0.974	0.971	0.968	0.966			
Max.	1.000	1.017	0.999	0.993	1.004	0.997	0.997	0.994	0.987	0.980	0.984	0.988	0.985	0.985	0.982	0.979	0.977				
Ave.	1.000	0.991	0.971	0.968	0.971	0.970	0.968	0.966	0.959	0.952	0.956	0.959	0.956	0.952	0.949	0.947	0.945				
Mm.	1.000	0.963	0.924	0.922	0.950	0.946	0.946	0.943	0.936	0.928	0.932	0.935	0.932	0.931	0.928	0.925	0.923				
Std. dev	0.000	0.010	0.014	0.015	0.012	0.014	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015				
Median	1.000	0.991	0.972	0.966	0.968	0.971	0.970	0.967	0.960	0.953	0.956	0.959	0.955	0.951	0.948	0.946	0.944				

Lumen Maintenance (normalized value)



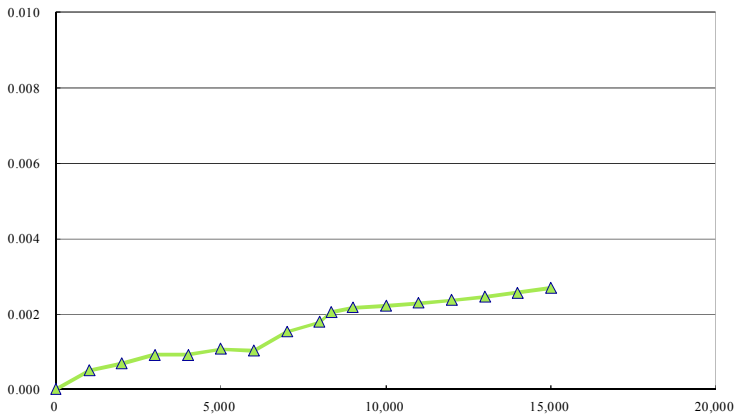
6-3. Test condition 3 : 105C

6-3-2. Chromaticity Shift ($\Delta u'v'$)

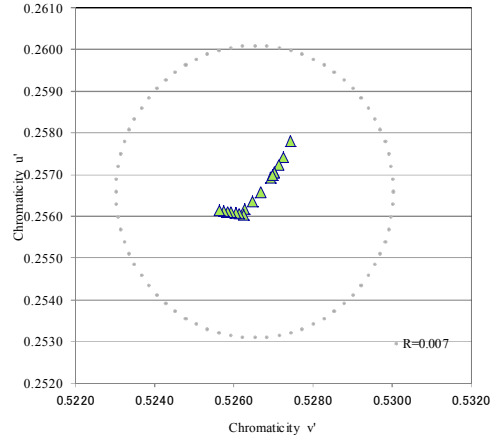
Actual case temperature (Ts)	104.4C
Actual ambient temperature (Ta)	102.4C
Drive current (If)	4,680mA

Sample No.	x		y		Chromaticity Shift ($\Delta u'v'$)																			
	0H	0H	0H	0H	1,000 H	2,000 H	3,000 H	4,000 H	5,000 H	6,000 H	7,000 H	8,000 H	8,335 H	9,000 H	10,000 H	11,000 H	12,000 H	13,000 H	14,000 H	15,000 H	16,000 H	17,000 H	18,000 H	
1	0.4549	0.4132	-	0.0004	0.0007	0.0009	0.0009	0.0009	0.0011	0.0010	0.0016	0.0019	0.0022	0.0025	0.0024	0.0024	0.0025	0.0025	0.0026	0.0027				
2	0.4541	0.4131	-	0.0003	0.0004	0.0006	0.0006	0.0007	0.0007	0.0012	0.0015	0.0018	0.0018	0.0018	0.0018	0.0019	0.0021	0.0022	0.0024					
3	0.4551	0.4138	-	0.0007	0.0004	0.0007	0.0007	0.0009	0.0009	0.0012	0.0015	0.0018	0.0021	0.0023	0.0026	0.0029	0.0032	0.0035	0.0038					
4	0.4541	0.4122	-	0.0006	0.0005	0.0009	0.0009	0.0011	0.0012	0.0020	0.0023	0.0025	0.0028	0.0027	0.0025	0.0024	0.0023	0.0021	0.0020					
5	0.4532	0.4126	-	0.0003	0.0005	0.0007	0.0007	0.0010	0.0012	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026	0.0028	0.0031					
6	0.4544	0.4125	-	0.0002	0.0005	0.0009	0.0009	0.0014	0.0014	0.0021	0.0024	0.0027	0.0024	0.0021	0.0017	0.0014	0.0012	0.0010	0.0009					
7	0.4519	0.4117	-	0.0003	0.0006	0.0007	0.0007	0.0007	0.0007	0.0007	0.0008	0.0009	0.0011	0.0013	0.0016	0.0018	0.0021	0.0023	0.0026					
8	0.4542	0.4138	-	0.0002	0.0003	0.0008	0.0008	0.0009	0.0009	0.0015	0.0017	0.0020	0.0023	0.0026	0.0029	0.0031	0.0034	0.0037	0.0040					
9	0.4542	0.4129	-	0.0005	0.0007	0.0010	0.0010	0.0012	0.0012	0.0023	0.0026	0.0029	0.0028	0.0027	0.0026	0.0025	0.0024	0.0024	0.0023					
10	0.4547	0.4133	-	0.0005	0.0007	0.0010	0.0010	0.0007	0.0005	0.0009	0.0012	0.0014	0.0017	0.0014	0.0012	0.0009	0.0007	0.0005	0.0004					
11	0.4543	0.4132	-	0.0005	0.0008	0.0010	0.0010	0.0016	0.0015	0.0020	0.0023	0.0025	0.0025	0.0025	0.0025	0.0025	0.0026	0.0026	0.0027					
12	0.4544	0.4131	-	0.0003	0.0006	0.0007	0.0007	0.0012	0.0011	0.0018	0.0021	0.0024	0.0024	0.0022	0.0019	0.0017	0.0014	0.0012	0.0010					
13	0.4533	0.4126	-	0.0003	0.0003	0.0008	0.0008	0.0012	0.0011	0.0018	0.0021	0.0024	0.0025	0.0025	0.0026	0.0027	0.0029	0.0030	0.0031					
14	0.4541	0.4126	-	0.0004	0.0005	0.0007	0.0007	0.0007	0.0007	0.0010	0.0013	0.0015	0.0017	0.0019	0.0022	0.0024	0.0027	0.0030	0.0033					
15	0.4537	0.4131	-	0.0002	0.0008	0.0008	0.0008	0.0008	0.0009	0.0012	0.0014	0.0017	0.0018	0.0021	0.0023	0.0026	0.0029	0.0032	0.0034					
16	0.4538	0.4136	-	0.0003	0.0006	0.0008	0.0008	0.0008	0.0008	0.0020	0.0023	0.0026	0.0026	0.0026	0.0025	0.0025	0.0026	0.0027	0.0027					
17	0.4559	0.4127	-	0.0006	0.0010	0.0009	0.0009	0.0011	0.0011	0.0018	0.0021	0.0024	0.0027	0.0026	0.0026	0.0027	0.0027	0.0028	0.0029					
18	0.4547	0.4124	-	0.0011	0.0013	0.0014	0.0014	0.0014	0.0010	0.0016	0.0018	0.0020	0.0022	0.0025	0.0027	0.0030	0.0032	0.0035	0.0037					
19	0.4565	0.4147	-	0.0018	0.0021	0.0022	0.0022	0.0019	0.0019	0.0017	0.0020	0.0022	0.0025	0.0026	0.0027	0.0028	0.0030	0.0032	0.0034					
20	0.4556	0.4139	-	0.0006	0.0008	0.0010	0.0010	0.0012	0.0009	0.0016	0.0018	0.0021	0.0018	0.0021	0.0024	0.0027	0.0030	0.0032	0.0035					
Max.	-	-	-	0.0018	0.0021	0.0022	0.0022	0.0019	0.0019	0.0023	0.0026	0.0029	0.0028	0.0027	0.0029	0.0031	0.0034	0.0037	0.0040					
Ave.	-	-	-	0.0005	0.0007	0.0009	0.0009	0.0011	0.0010	0.0015	0.0018	0.0021	0.0022	0.0022	0.0023	0.0024	0.0025	0.0026	0.0027					
Min.	-	-	-	0.0002	0.0003	0.0006	0.0006	0.0007	0.0005	0.0006	0.0008	0.0009	0.0011	0.0013	0.0012	0.0009	0.0007	0.0005	0.0004					
Std. dev.	-	-	-	0.0004	0.0004	0.0003	0.0003	0.0003	0.0003	0.0005	0.0005	0.0005	0.0005	0.0004	0.0004	0.0005	0.0007	0.0008	0.0010					
Median	-	-	-	0.0004	0.0006	0.0009	0.0009	0.0011	0.0010	0.0016	0.0019	0.0021	0.0023	0.0024	0.0025	0.0026	0.0027	0.0028						

Chromaticity Shift ($\Delta u'v'$)



$u'v'$



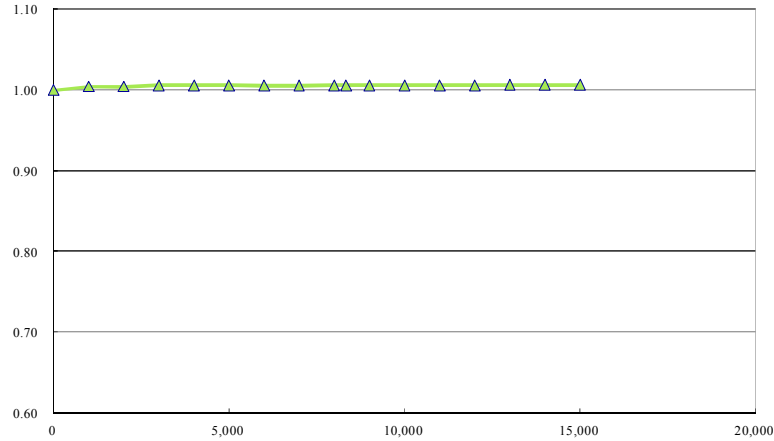
6-3. Test condition 3 : 105C

6-3-3. Forward Voltage

Actual case temperature (Ts)	104.4C
Actual ambient temperature (Ta)	102.4C
Drive current (If)	4,680mA

Sample No.	Forward Voltage (V)	Forward Voltage (normalized value)																				
		0H	1,000 H	2,000 H	3,000 H	4,000 H	5,000 H	6,000 H	7,000 H	8,000 H	8,335 H	9,000 H	10,000 H	11,000 H	12,000 H	13,000 H	14,000 H	15,000 H	16,000 H	17,000 H	18,000 H	
1	113.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
2	113.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
3	113.42	1.00	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
4	113.59	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
5	113.58	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
6	113.53	1.00	1.00	1.01	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
7	114.12	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
8	113.07	1.00	1.01	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
9	114.18	1.00	1.00	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
10	113.66	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
11	113.77	1.00	1.00	1.00	1.01	1.01	1.01	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
12	113.56	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
13	113.60	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
14	113.55	1.00	1.00	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
15	113.40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
16	113.51	1.00	1.01	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
17	114.46	1.00	1.01	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
18	113.74	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
19	113.85	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
20	112.71	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Max.		1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
Ave.		1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
Min.		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Std. dev.		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Median		1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			

Forward Voltage (normalized value)



6-3. Test condition 3 : 105C

6-3-4. Calculated CCT

Actual case temperature (Ts)	104.4C
Actual ambient temperature (Ta)	102.4C
Drive current (If)	4,680mA

Sample No.	ANSI Target CCT (K)	Calculated CCT (K)																			
		0H	1,000 H	2,000 H	3,000 H	4,000 H	5,000 H	6,000 H	7,000 H	8,000 H	8,335 H	9,000 H	10,000 H	11,000 H	12,000 H	13,000 H	14,000 H	15,000 H	16,000 H	17,000 H	18,000 H
1	2,700	2,791	2,799	2,806	2,810	2,810	2,814	2,813	2,826	2,846	2,874	2,835	2,831	2,828	2,824	2,821	2,817	2,814			
2	2,700	2,802	2,809	2,810	2,816	2,816	2,818	2,818	2,828	2,849	2,877	2,829	2,825	2,822	2,818	2,814	2,811	2,807			
3	2,700	2,793	2,808	2,802	2,808	2,808	2,812	2,812	2,820	2,838	2,867	2,827	2,833	2,838	2,844	2,850	2,855	2,861			
4	2,700	2,795	2,808	2,806	2,815	2,815	2,818	2,821	2,836	2,857	2,885	2,846	2,843	2,840	2,837	2,834	2,832	2,829			
5	2,700	2,811	2,817	2,821	2,827	2,827	2,832	2,837	2,823	2,844	2,872	2,833	2,838	2,844	2,849	2,855	2,860	2,866			
6	2,700	2,792	2,796	2,803	2,812	2,812	2,821	2,822	2,837	2,858	2,886	2,835	2,829	2,823	2,817	2,811	2,806	2,800			
7	2,700	2,824	2,818	2,826	2,820	2,820	2,819	2,812	2,814	2,834	2,862	2,823	2,829	2,834	2,840	2,845	2,851	2,857			
8	2,700	2,807	2,811	2,814	2,823	2,823	2,826	2,826	2,837	2,858	2,887	2,847	2,853	2,858	2,864	2,870	2,875	2,881			
9	2,700	2,800	2,811	2,814	2,820	2,820	2,824	2,825	2,848	2,869	2,898	2,851	2,850	2,849	2,848	2,847	2,846	2,845			
10	2,700	2,795	2,807	2,810	2,817	2,817	2,811	2,807	2,815	2,835	2,863	2,824	2,818	2,813	2,808	2,802	2,797	2,792			
11	2,700	2,800	2,812	2,817	2,823	2,823	2,835	2,833	2,843	2,864	2,893	2,848	2,844	2,840	2,837	2,833	2,830	2,826			
12	2,700	2,798	2,804	2,811	2,814	2,814	2,823	2,821	2,837	2,858	2,886	2,845	2,839	2,834	2,828	2,823	2,817	2,812			
13	2,700	2,810	2,816	2,817	2,827	2,827	2,836	2,835	2,850	2,871	2,900	2,858	2,859	2,860	2,861	2,862	2,863	2,864			
14	2,700	2,798	2,807	2,809	2,814	2,814	2,814	2,813	2,821	2,841	2,869	2,828	2,833	2,839	2,844	2,850	2,856	2,861			
15	2,700	2,808	2,813	2,825	2,825	2,825	2,825	2,826	2,834	2,855	2,883	2,841	2,847	2,853	2,858	2,864	2,869	2,875			
16	2,700	2,810	2,817	2,823	2,828	2,828	2,828	2,828	2,835	2,874	2,903	2,861	2,857	2,854	2,850	2,846	2,843	2,839			
17	2,700	2,802	2,814	2,824	2,822	2,822	2,825	2,825	2,840	2,861	2,890	2,850	2,846	2,843	2,839	2,836	2,832	2,828			
18	2,700	2,788	2,806	2,809	2,813	2,813	2,815	2,801	2,822	2,842	2,870	2,831	2,836	2,842	2,848	2,853	2,859	2,864			
19	2,700	2,780	2,807	2,815	2,818	2,818	2,808	2,812	2,802	2,822	2,849	2,811	2,807	2,804	2,800	2,796	2,793	2,789			
20	2,700	2,787	2,799	2,804	2,808	2,808	2,813	2,805	2,819	2,839	2,867	2,817	2,823	2,828	2,834	2,839	2,845	2,850			
Max.		2,824	2,818	2,826	2,828	2,828	2,836	2,837	2,853	2,874	2,903	2,861	2,859	2,860	2,864	2,870	2,875	2,881			
Ave.		2,800	2,809	2,813	2,818	2,818	2,821	2,820	2,830	2,851	2,879	2,837	2,837	2,837	2,837	2,838	2,838	2,838			
Min.		2,780	2,796	2,802	2,808	2,808	2,808	2,801	2,802	2,822	2,849	2,811	2,807	2,804	2,800	2,796	2,793	2,789			
Std. dev.		10	6	7	6	6	8	10	13	14	14	13	13	14	17	20	24	28			
Median		2,799	2,809	2,813	2,818	2,818	2,820	2,821	2,831	2,852	2,880	2,835	2,837	2,839	2,839	2,842	2,844	2,842			

6-3. Test condition 3 : 105C

6-3-5. Ra

Actual case temperature (Ts)	104.4C
Actual ambient temperature (Ta)	102.4C
Drive current (If)	4,680mA


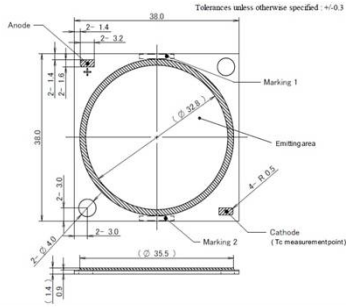
Sample No.	Ra																					
	0H	0H	1,000 H	2,000 H	3,000 H	4,000 H	5,000 H	6,000 H	7,000 H	8,000 H	8,335 H	9,000 H	10,000 H	11,000 H	12,000 H	13,000 H	14,000 H	15,000 H	16,000 H	17,000 H	18,000 H	
1	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
2	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
3	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
4	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
5	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
6	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
7	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
8	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
9	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
10	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
11	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
12	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
13	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
14	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
15	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
16	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
17	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
18	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
19	91	91	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
20	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
Max.	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
Ave.	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
Min.	91	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				
Std. dev.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Median	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92				

~CLU056 LM-80report Appendix~ Applicable product series

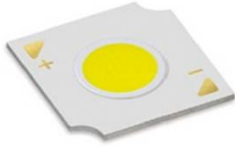
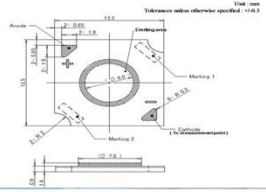

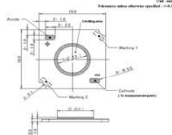

The per-chip current density of the maximum forward current in Table

Identical construction process is used for the products in Table below.

~ LED light sources Tested ~

Product	Nominal CCT	Die Count	Die Spacing	Drive Current	Power Density	Product Picture	Mechanical Drawing
CLU056-3626	2,700K	936pcs	0.20mm	4,680mA (180mA/die)	0.402W/mm ²		

~ Applicable Product Series ~

Product	Die Count	Die Spacing	Maximum Forward Current	Maximum Power Density	Product Picture	Mechanical Drawing
CLU700 -1002 series	20 pcs	0.25mm	360 mA	0.068 W/mm ²		
CLU701 -1002 series	20 pcs	0.25mm	360 mA	0.068 W/mm ²		
CLU700 -0603 series	18 pcs	0.35mm	540 mA	0.062 W/mm ²		
CLU710 1204series	48 pcs	0.25mm	720 mA	0.083 W/mm ²		
CLU711 1204series	48 pcs	0.25mm	720 mA	0.083 W/mm ²		
CLU720 1206series	72 pcs	0.34mm	1,080 mA	0.139 W/mm ²		
CLU721 1206series	72 pcs	0.34mm	1,080 mA	0.139 W/mm ²		
CLU730 1210series	120 pcs	0.26mm	1,800 mA	0.095 W/mm ²		
CLU731 1210series	120 pcs	0.26mm	1,800 mA	0.095 W/mm ²		

Product	Die Count	Die Spacing	Maximum Forward Current	Maximum Power Density	Product Picture	Mechanical Drawing
CLU026 1201series	12 pcs	1.25mm	180 mA	0.039 W/mm ²		
CLU026 1202series	24 pcs	0.35mm	360 mA	0.079 W/mm ²		
CLU026 1203series	36 pcs	0.36mm	540 mA	0.118 W/mm ²		
CLU026 1204series	48 pcs	0.35mm	720 mA	0.157 W/mm ²		
CLU028 1201series	12 pcs	1.25mm	180 mA	0.039 W/mm ²		
CLU028 1202series	24 pcs	0.35mm	360 mA	0.079 W/mm ²		
CLU028 1203series	36 pcs	0.36mm	540 mA	0.118 W/mm ²		
CLU028 1204series	48 pcs	0.35mm	720 mA	0.157 W/mm ²		
CLU036 1205series	60 pcs	0.57mm	900 mA	0.103 W/mm ²		
CLU036 1206series	72 pcs	0.65mm	1,080 mA	0.124 W/mm ²		
CLU036 1208series	96 pcs	0.37mm	1,440 mA	0.165 W/mm ²		
CLU038 1205series	60 pcs	0.57mm	900 mA	0.103 W/mm ²		
CLU038 1206series	72 pcs	0.65mm	1,080 mA	0.124 W/mm ²		
CLU038 1208series	96 pcs	0.37mm	1,440 mA	0.165 W/mm ²		
CLU038 1210series	120 pcs	0.30mm	1,800 mA	0.207 W/mm ²		
CLU038 1006series	60 pcs	0.66mm	1,080 mA	0.103 W/mm ²		
CLU046 1212series	144 pcs	0.60mm	2,160 mA	0.114 W/mm ²		
CLU046 1812series	216 pcs	0.34mm	2,160 mA	0.171 W/mm ²		
CLU046 1818series	324 pcs	0.28mm	3,240 mA	0.257 W/mm ²		
CLU048 1212series	144 pcs	0.60mm	2,160 mA	0.114 W/mm ²		
CLU048 1812series	216 pcs	0.34mm	2,160 mA	0.171 W/mm ²		
CLU048 1818series	324 pcs	0.28mm	3,240 mA	0.257 W/mm ²		
CLU048 1211series	132 pcs	0.85mm	1,980 mA	0.105 W/mm ²		
CLU056 1825series	450 pcs	0.40mm	4,500 mA	0.193 W/mm ²		
CLU056 3618series	648 pcs	0.39mm	3,240 mA	0.278 W/mm ²		
CLU058 1825series	450 pcs	0.40mm	4,500 mA	0.193 W/mm ²		
CLU058 3618series	648 pcs	0.39mm	3,240 mA	0.278 W/mm ²		
CLU027 0303series	9 pcs	0.60mm	540 mA	0.029 W/mm ²		
CLU550 3626series	936 pcs	0.20mm	4,680 mA	0.402 W/mm ²		