

## TEST REPORT

The following tested product(s) were submitted and identified by the vendor as:

Applicant : Shenzhen Lepower Opto Electronics Co.,Ltd  
Address of Applicant : Bld B, Tongfukang Industrial Park, Shuitian,Shiyan,  
ShenZhen, China  
Testing Laboratory : SGS Taiwan Ltd., Optics Laboratory  
Laboratory Address : 33, Wu Chyuan Rd., New Taipei Industrial Park, New  
Taipei City, Taiwan 24886  
Product Name : LED lamp bead  
Model / Serial Number : NX3  
Manufacturer : Shenzhen Lepower Opto Electronics Co.,Ltd  
Rating : DC 320 mA, 9 W  
Tested Condition : DC 320 mA (Constant Current)  
Test Standard/Method : IES LM-80-08 Approved Method: Measuring Lumen  
Maintenance of LED Light Sources  
Date of Issue : Apr. 22, 2014

The submitted products have been tested as requested and the following results were obtained, and the report, not applicable for lawsuit, refers only to the unit(s) submitted for test.

Test Results : -PLEASE SEE ATTACHED SHEETS-

Signed for and on behalf of  
SGS TAIWAN Ltd.



Calvin Tzou  
Technical Manager

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**1 SAMPLING DESCRIPTION**

No sampling action and method employed

**2 DATE OF RECEIPT OF SAMPLES**

Jun. 05, 2013

**3 DATE(S) OF PERFORMANCE OF THE TEST**

Jun. 05, 2013 ~ Apr. 12, 2014

**4 IDENTITY OF SAMPLES**

Quantity	Model	Serial Number
25	NX3	# A01 - # A25 (25 °C)
25	NX3	# B01 - # B25 (55 °C)
25	NX3	# C01 - # C25 (85 °C)

**5 TEST ITEMS**

5.1 Data Summary of Lumen and Color Maintenance

Test results were concluded by different Case Temperatures (Ts).

5.2 Lumen Maintenance and Color Maintenance Test

Testing specifications by different case temperatures according to IES LM-80-08 Approved Method: Measuring Lumen Maintenance of LED Light Sources and client's requirements were implemented per the following items.

5.2.1 Total Luminous Flux ( $\Phi_v$ )

The test results of total luminous flux were implemented referring to Clause 2 PROPERTIES OF LEDS & Clause 6 MEASUREMENT OF LUMINOUS FLUX of CIE 127: 2007 2nd edition MEASUREMENT OF LEDS and IES LM-80-08 Approved Method: Measuring Lumen Maintenance of LED Light Sources, when the UUTs were powered with constant current of  $I_F$ .

5.2.2 Correlated Color Temperature (CCT), CIE Color Coordinate (CIEx, CIEy) & Chromaticity Shift ( $\Delta u'v'$ )

The test results of correlated color temperature were implemented referring to CIE 127:2007 2nd edition MEASUREMENT OF LEDS, CIE 15: 2004 COLORIMETRY.

The test results of color coordinate were implemented referring to CIE 127: 2007 2nd edition MEASUREMENT OF LEDS, CIE 15:2004 COLORIMETRY.

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**6 TEST CONDITIONS**

Main Test Equipment:

Name	Brand	Model	S/N	Traceability
Standard Light Source / Spectroradiometer	Labsphere	SCL-600 / CDS 2100	D112 / 0811118355	NIST
Source Meter	Agilent	E3634A	MY40013093	NMI
Handheld Digital Multimeter	Agilent	U1242A	MY48490144	NMI

Environmental Conditions:

Temperature: (25 ± 1) °C  
 Relative Humidity: < 65 % RH

UUT Conditions:

LED Light source: LED  Packages  Arrays  Modules  
 Specification Forward Current (I<sub>F</sub>): DC 320 mA  
 Drive Current during lifetime: DC 320 mA  
 Measurement Current: DC 320 mA  
 Specification Forward Voltage (V<sub>F</sub>): DC 29.5 V (Typical)  
 Specification Power Consumption: 9.5 W  
 Dimension: L 21.5 mm x W 13.4 mm x H 6.5 mm  
 Specification CCT: 3000 K  
 Target CCT: 3000 K  
 Prior Operation: 0 hour  
 Total Operation Duration: 6000 hours  
 Operation Temperature: 25 °C / 55 °C / 85 °C  
 Sample Size: 75 pcs (25 pcs for each temperature)  
 Failed Quantity: 0 pcss

Measurement Conditions:

Interval Time: 0, 1000, 2000, 3000, 4000, 5000, 6000 hours  
 Warm up Time: < 1 minute (initial)  
 Relative measurement uncertainty: 2.8 % (95 % Confidence Level)

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## 7 TEST RESULTS

### 7.1 Data Summary of Lumen and Color Maintenance

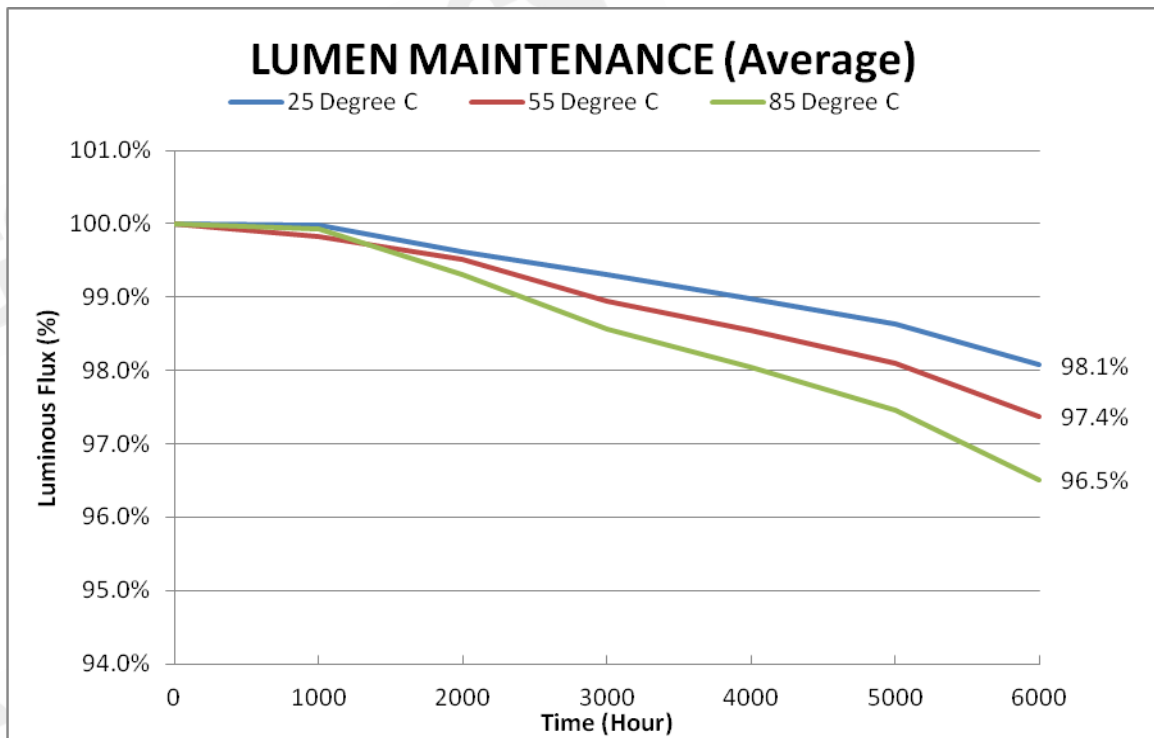
Temp.	Initial (0 hr)		Luminous Maintenance (%)					
	TLF(lm)	V <sub>F</sub> (V)	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
25°C Avg.	843.63	27.51	100.0 %	99.6 %	99.3 %	99.0 %	98.6 %	98.1 %
55°C Avg.	850.98	27.54	99.8 %	99.5 %	98.9 %	98.6 %	98.1 %	97.4 %
85°C Avg.	849.81	27.61	99.9 %	99.3 %	98.6 %	98.0 %	97.5 %	96.5 %

Temp.	Initial (0 hr)			Chromaticity Shift ( $\Delta u'v'$ )					
	CIE <sub>x</sub>	CIE <sub>y</sub>	CCT	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
25°C Avg.	0.4461	0.4129	2919.6	0.0006	0.0011	0.0012	0.0013	0.0013	0.0012
55°C Avg.	0.4457	0.4121	2919.5	0.0002	0.0003	0.0004	0.0004	0.0005	0.0005
85°C Avg.	0.4444	0.4088	2914.6	0.0005	0.0006	0.0005	0.0005	0.0006	0.0007

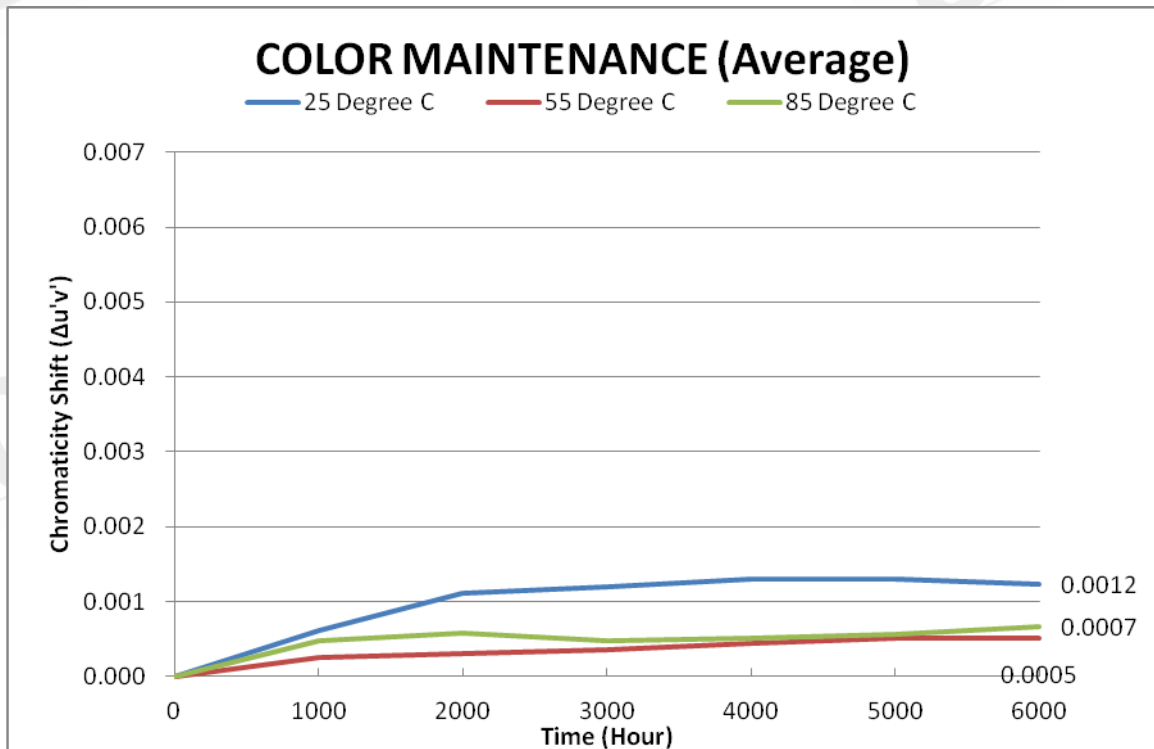
Temp.	Initial (0 hr)			Chromaticity Shift ( $\Delta xy$ )					
	CIE <sub>x</sub>	CIE <sub>y</sub>	CCT	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
25°C Avg.	0.4461	0.4129	2919.6	0.0010	0.0016	0.0017	0.0018	0.0018	0.0018
55°C Avg.	0.4457	0.4121	2919.5	0.0006	0.0007	0.0008	0.0009	0.0011	0.0011
85°C Avg.	0.4444	0.4088	2914.6	0.0010	0.0011	0.0009	0.0010	0.0011	0.0012

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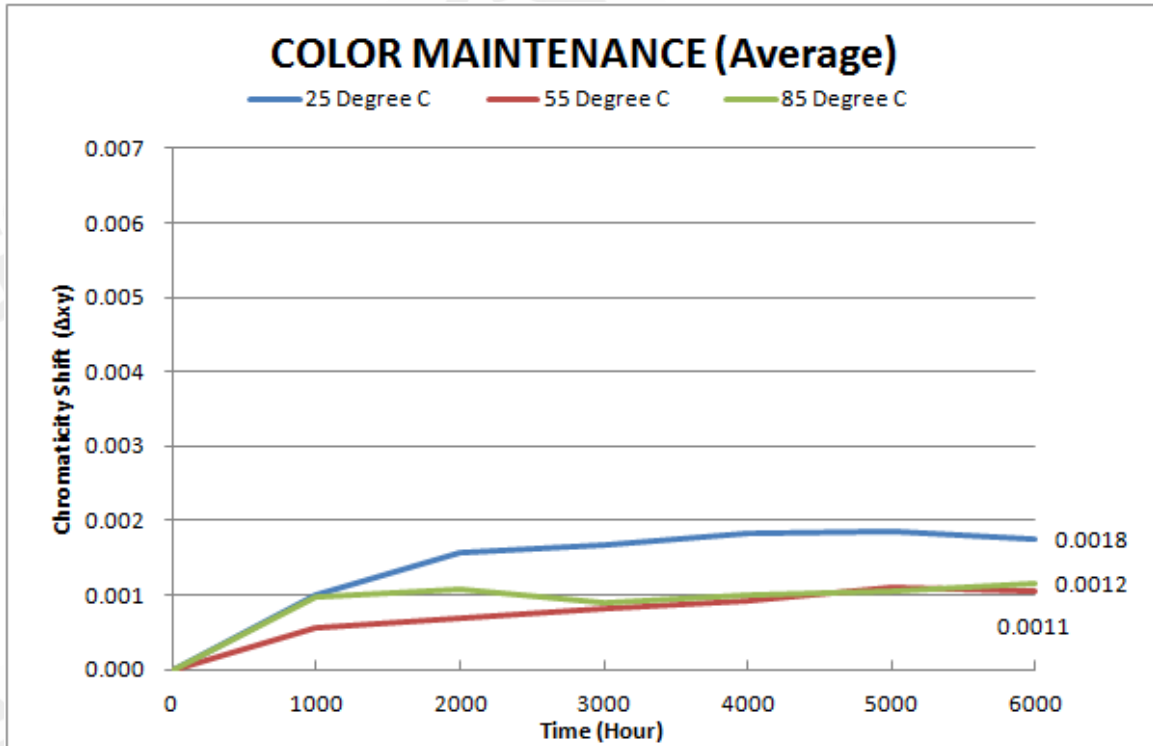
Average Lumen Maintenance diagram



Average Color Maintenance diagram ( $\Delta u'v'$ )

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Average Color Maintenance diagram ( $\Delta xy$ )

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## 7.2 Lumen Maintenance and Color Maintenance Test

**Test Condition:  $T_s = 25\text{ }^\circ\text{C}$** 

	Requirement
Case Temperature [ $T_s$ ]: $\geq 23\text{ }^\circ\text{C}$	Average [ $T_s$ ]: $25.1\text{ }^\circ\text{C}$
Ambient Temperature [ $T_a$ ]: $\geq 20\text{ }^\circ\text{C}$	Average [ $T_a$ ]: $24.3\text{ }^\circ\text{C}$
Driver Current: 320 mA	Air Flow: Minimized
Measurement Current: 320 mA	Relative humidity: $< 65\text{ \% RH}$

 7.2.1 Total Luminous Flux ( $\Phi_V$ )

S/N	Initial (0 hr)		Luminous Maintenance (%)					
	TLF(lm)	$V_F(V)$	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
A01	849.1	27.49	99.9 %	99.6 %	98.9 %	98.5 %	98.2 %	97.7 %
A02	853.5	27.36	99.9 %	99.2 %	99.2 %	99.0 %	98.5 %	97.9 %
A03	852.2	27.47	99.9 %	99.7 %	99.2 %	99.0 %	98.7 %	98.2 %
A04	843.0	27.43	100.1 %	99.7 %	99.7 %	99.4 %	98.9 %	98.4 %
A05	843.7	27.61	100.0 %	99.9 %	99.5 %	99.2 %	98.8 %	98.3 %
A06	853.8	27.67	100.1 %	100.8 %	100.5 %	100.0 %	99.7 %	99.2 %
A07	841.5	27.32	100.1 %	100.6 %	100.3 %	99.8 %	99.4 %	98.7 %
A08	863.1	27.68	100.1 %	100.9 %	100.7 %	100.4 %	100.0 %	99.5 %
A09	833.3	27.66	100.0 %	99.2 %	99.0 %	98.6 %	98.3 %	97.8 %
A10	840.6	27.38	100.1 %	99.2 %	98.9 %	98.6 %	98.3 %	97.8 %
A11	846.3	27.43	100.1 %	99.3 %	98.9 %	98.6 %	98.3 %	97.6 %
A12	836.0	27.54	99.9 %	99.3 %	99.0 %	98.7 %	98.4 %	97.9 %
A13	833.6	27.48	99.8 %	99.2 %	98.9 %	98.6 %	98.2 %	97.7 %
A14	847.8	27.65	99.9 %	99.0 %	98.9 %	98.5 %	98.0 %	97.5 %
A15	832.4	27.49	99.9 %	99.0 %	98.9 %	98.5 %	98.2 %	97.6 %
A16	858.3	27.63	99.9 %	99.1 %	99.0 %	98.6 %	98.3 %	97.7 %
A17	822.4	27.42	99.8 %	99.5 %	99.1 %	98.7 %	98.3 %	97.9 %
A18	836.7	27.15	99.8 %	99.8 %	99.5 %	99.2 %	98.9 %	98.4 %
A19	848.5	27.59	99.8 %	99.8 %	99.3 %	99.0 %	98.7 %	98.1 %
A20	851.3	27.53	99.9 %	99.9 %	99.6 %	99.3 %	98.9 %	98.4 %
A21	837.3	27.45	99.9 %	99.2 %	99.0 %	98.6 %	98.3 %	97.7 %
A22	841.2	27.48	99.9 %	99.3 %	98.8 %	98.6 %	98.3 %	97.8 %
A23	841.7	27.46	100.3 %	99.8 %	99.5 %	99.1 %	98.6 %	98.0 %
A24	853.3	27.80	100.3 %	99.6 %	99.1 %	98.9 %	98.6 %	98.1 %
A25	830.1	27.56	100.1 %	99.9 %	99.4 %	99.1 %	98.8 %	98.2 %
Max.	863.1	27.80	100.3 %	100.9 %	100.7 %	100.4 %	100.0 %	99.5 %
Min.	822.4	27.15	99.8 %	99.0 %	98.8 %	98.5 %	98.0 %	97.5 %
Avg.	843.63	27.51	100.0 %	99.6 %	99.3 %	99.0 %	98.6 %	98.1 %
std. deviation	9.65	0.14	0.15 %	0.53 %	0.51 %	0.50 %	0.48 %	0.48 %

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7.2.2 Correlated Color Temperature (CCT), CIE Color Coordinate (CIEx, CIEy) & Chromaticity Shift ( $\Delta u'v'$ )

Correlated Color Temperature (CCT)							
S/N	0 hr	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
A01	2898	2889	2881	2879	2877	2876	2881
A02	2932	2914	2912	2901	2899	2897	2901
A03	2956	2938	2928	2926	2924	2922	2926
A04	2969	2954	2940	2939	2935	2935	2938
A05	2942	2938	2929	2927	2924	2924	2930
A06	2966	2962	2954	2953	2950	2949	2955
A07	2883	2864	2851	2849	2846	2846	2848
A08	2944	2929	2918	2912	2914	2914	2917
A09	2890	2875	2860	2858	2854	2854	2857
A10	2878	2865	2856	2851	2849	2850	2852
A11	2903	2893	2886	2879	2876	2878	2880
A12	2923	2909	2900	2896	2891	2896	2894
A13	2905	2893	2882	2880	2878	2878	2880
A14	2878	2872	2862	2863	2860	2861	2866
A15	2923	2913	2900	2894	2890	2888	2893
A16	2942	2923	2908	2907	2903	2905	2906
A17	2914	2901	2895	2891	2888	2889	2892
A18	2927	2920	2916	2911	2906	2909	2910
A19	2913	2902	2886	2883	2879	2880	2882
A20	2909	2904	2894	2893	2890	2892	2895
A21	2946	2930	2916	2913	2910	2909	2911
A22	2929	2916	2899	2903	2896	2897	2899
A23	2882	2860	2853	2847	2843	2843	2846
A24	2928	2920	2915	2910	2906	2905	2909
A25	2909	2879	2865	2869	2867	2868	2870
Max.	2969	2962	2954	2953	2950	2949	2955
Min.	2878	2860	2851	2847	2843	2843	2846
Avg.	2919.6	2906.5	2896.2	2893.4	2890.2	2890.6	2893.5
std. deviation	26.6	27.8	28.1	28.1	28.1	27.8	28.2

Unit: K

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S/N	Initial (0 hr)		Chromaticity Shift ( $\Delta u'v'$ )					
	CIE <sub>x</sub>	CIE <sub>y</sub>	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
A01	0.4382	0.3946	0.0004	0.0007	0.0008	0.0009	0.0010	0.0008
A02	0.4495	0.4211	0.0007	0.0010	0.0013	0.0014	0.0015	0.0013
A03	0.4453	0.4159	0.0008	0.0013	0.0013	0.0014	0.0014	0.0013
A04	0.4466	0.4203	0.0007	0.0013	0.0013	0.0014	0.0015	0.0013
A05	0.4366	0.3967	0.0003	0.0006	0.0007	0.0007	0.0008	0.0007
A06	0.4345	0.3952	0.0004	0.0007	0.0007	0.0009	0.0008	0.0009
A07	0.4531	0.4220	0.0009	0.0014	0.0015	0.0017	0.0017	0.0016
A08	0.4484	0.4206	0.0007	0.0011	0.0013	0.0013	0.0013	0.0012
A09	0.4520	0.4209	0.0007	0.0014	0.0015	0.0016	0.0017	0.0015
A10	0.4525	0.4200	0.0005	0.0009	0.0012	0.0013	0.0012	0.0011
A11	0.4517	0.4219	0.0006	0.0010	0.0012	0.0013	0.0012	0.0012
A12	0.4480	0.4171	0.0006	0.0014	0.0013	0.0014	0.0012	0.0014
A13	0.4521	0.4230	0.0006	0.0011	0.0012	0.0013	0.0012	0.0012
A14	0.4402	0.3960	0.0004	0.0007	0.0007	0.0008	0.0008	0.0010
A15	0.4493	0.4198	0.0006	0.0011	0.0014	0.0015	0.0017	0.0014
A16	0.4455	0.4145	0.0008	0.0015	0.0016	0.0017	0.0016	0.0015
A17	0.4496	0.4190	0.0005	0.0008	0.0010	0.0011	0.0011	0.0010
A18	0.4366	0.3947	0.0004	0.0008	0.0008	0.0010	0.0010	0.0009
A19	0.4487	0.4171	0.0005	0.0012	0.0014	0.0015	0.0014	0.0014
A20	0.4385	0.3966	0.0003	0.0007	0.0007	0.0009	0.0010	0.0008
A21	0.4490	0.4220	0.0007	0.0013	0.0015	0.0016	0.0016	0.0015
A22	0.4490	0.4197	0.0005	0.0015	0.0012	0.0014	0.0014	0.0013
A23	0.4516	0.4188	0.0010	0.0013	0.0015	0.0016	0.0017	0.0016
A24	0.4396	0.4010	0.0006	0.0012	0.0011	0.0012	0.0012	0.0011
A25	0.4475	0.4144	0.0014	0.0019	0.0017	0.0018	0.0018	0.0017
Max.	0.4531	0.4230	0.0014	0.0019	0.0017	0.0018	0.0018	0.0017
Min.	0.4345	0.3946	0.0003	0.0006	0.0007	0.0007	0.0008	0.0007
Avg.	0.4461	0.4129	0.0006	0.0011	0.0012	0.0013	0.0013	0.0012
std. deviation	0.0058	0.0108	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003

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### 7.3 Lumen Maintenance and Color Maintenance Test

#### Test Condition: $T_s = 55\text{ }^\circ\text{C}$

Requirement	
Case Temperature [ $T_s$ ]: $\geq 53\text{ }^\circ\text{C}$	Average [ $T_s$ ]: $55.2\text{ }^\circ\text{C}$
Ambient Temperature [ $T_a$ ]: $\geq 50\text{ }^\circ\text{C}$	Average [ $T_a$ ]: $53.5\text{ }^\circ\text{C}$
Driver Current: 320 mA	Air Flow: Minimized
Measurement Current: 320 mA	Relative humidity: $< 65\text{ } \% \text{ RH}$

#### 7.3.1 Total Luminous Flux ( $\Phi_V$ )

S/N	Initial (0 hr)		Luminous Maintenance (%)					
	TLF(lm)	$V_F(V)$	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
B01	852.2	27.60	99.9 %	99.9 %	98.9 %	98.6 %	98.0 %	97.1 %
B02	843.9	27.55	99.9 %	99.5 %	99.0 %	98.6 %	98.2 %	97.4 %
B03	865.4	27.63	99.9 %	99.4 %	99.2 %	98.7 %	98.3 %	97.7 %
B04	863.5	27.52	99.8 %	99.6 %	99.2 %	98.6 %	98.1 %	97.6 %
B05	860.7	27.77	99.9 %	99.4 %	98.9 %	98.6 %	98.1 %	97.2 %
B06	866.5	27.64	99.9 %	99.3 %	98.8 %	98.3 %	97.9 %	97.3 %
B07	864.2	27.53	99.6 %	99.5 %	98.9 %	98.3 %	97.9 %	97.0 %
B08	854.3	27.53	99.8 %	99.9 %	99.1 %	98.8 %	98.2 %	97.4 %
B09	846.9	27.46	99.9 %	99.2 %	98.9 %	98.6 %	98.2 %	97.6 %
B10	867.6	27.48	99.9 %	99.1 %	98.9 %	98.5 %	97.9 %	97.3 %
B11	836.1	27.42	99.9 %	99.5 %	98.7 %	98.4 %	98.0 %	97.1 %
B12	856.2	27.75	99.9 %	99.9 %	99.1 %	98.5 %	98.1 %	97.5 %
B13	834.0	27.58	99.8 %	99.7 %	98.8 %	98.4 %	97.8 %	97.0 %
B14	853.2	27.57	99.9 %	99.4 %	98.7 %	98.4 %	98.0 %	97.2 %
B15	835.3	27.42	99.9 %	99.6 %	99.1 %	98.8 %	98.4 %	97.8 %
B16	838.5	27.47	99.8 %	99.8 %	99.1 %	98.8 %	98.3 %	97.4 %
B17	860.7	27.60	99.9 %	99.2 %	98.8 %	98.5 %	98.0 %	97.3 %
B18	840.6	27.42	99.9 %	99.8 %	99.3 %	99.0 %	98.6 %	97.8 %
B19	842.6	27.59	99.8 %	99.9 %	99.5 %	99.1 %	98.6 %	97.7 %
B20	854.0	27.51	99.8 %	99.6 %	99.0 %	98.6 %	98.2 %	97.6 %
B21	841.4	27.37	99.8 %	99.3 %	99.1 %	98.7 %	98.3 %	97.7 %
B22	834.4	27.52	99.7 %	99.3 %	98.8 %	98.5 %	98.1 %	97.5 %
B23	844.9	27.42	99.9 %	99.2 %	98.8 %	98.2 %	97.8 %	97.0 %
B24	855.0	27.56	99.8 %	99.5 %	98.6 %	98.2 %	97.8 %	97.2 %
B25	862.5	27.57	99.7 %	99.3 %	98.6 %	98.1 %	97.7 %	96.9 %
Max.	867.6	27.77	99.9 %	99.9 %	99.5 %	99.1 %	98.6 %	97.8 %
Min.	834.0	27.37	99.6 %	99.1 %	98.6 %	98.1 %	97.7 %	96.9 %
Avg.	850.98	27.54	99.8 %	99.5 %	98.9 %	98.6 %	98.1 %	97.4 %
std. deviation	11.20	0.10	0.07 %	0.24 %	0.21 %	0.25 %	0.23 %	0.27 %

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7.3.2 Correlated Color Temperature (CCT), CIE Color Coordinate (CIEx, CIEy) & Chromaticity Shift ( $\Delta u'v'$ )

Correlated Color Temperature (CCT)							
S/N	0hr	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
B01	2917	2914	2911	2911	2909	2908	2910
B02	2901	2899	2901	2901	2896	2896	2897
B03	2966	2965	2963	2962	2960	2960	2963
B04	2940	2934	2933	2932	2929	2929	2930
B05	2936	2938	2941	2943	2939	2940	2943
B06	2912	2910	2910	2910	2905	2905	2906
B07	2920	2917	2914	2913	2910	2910	2914
B08	2951	2949	2941	2942	2940	2938	2943
B09	2928	2924	2916	2917	2914	2914	2913
B10	2886	2884	2887	2886	2884	2884	2887
B11	2918	2912	2916	2912	2903	2901	2902
B12	2921	2930	2930	2931	2928	2930	2934
B13	2901	2901	2902	2906	2900	2900	2902
B14	2931	2926	2928	2930	2926	2926	2928
B15	2971	2969	2968	2968	2961	2962	2965
B16	2898	2899	2900	2899	2896	2898	2900
B17	2976	2985	2990	2989	2986	2984	2989
B18	2912	2908	2908	2908	2905	2907	2909
B19	2924	2927	2930	2930	2926	2926	2929
B20	2882	2882	2883	2883	2881	2880	2883
B21	2887	2884	2884	2886	2881	2882	2884
B22	2877	2875	2876	2873	2869	2870	2871
B23	2880	2876	2882	2881	2877	2879	2881
B24	2936	2939	2945	2949	2943	2944	2947
B25	2917	2910	2910	2910	2905	2907	2907
Max.	2976	2985	2990	2989	2986	2984	2989
Min.	2877	2875	2876	2873	2869	2870	2871
Avg.	2919.5	2918.3	2918.8	2918.9	2914.9	2915.2	2917.5
std. deviation	27.7	29.0	28.6	28.9	28.9	28.6	29.3

Unit: K

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S/N	Initial (0 hr)		Chromaticity Shift ( $\Delta u'v'$ )					
	CIE <sub>x</sub>	CIE <sub>y</sub>	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
B01	0.4478	0.4159	0.0003	0.0005	0.0004	0.0005	0.0005	0.0005
B02	0.4496	0.4174	0.0002	0.0001	0.0002	0.0003	0.0004	0.0004
B03	0.4441	0.4148	0.0004	0.0002	0.0008	0.0017	0.0027	0.0026
B04	0.4469	0.4170	0.0003	0.0004	0.0004	0.0005	0.0006	0.0006
B05	0.4382	0.3992	0.0001	0.0002	0.0003	0.0002	0.0002	0.0003
B06	0.4482	0.4160	0.0002	0.0002	0.0002	0.0004	0.0004	0.0003
B07	0.4519	0.4245	0.0002	0.0003	0.0004	0.0005	0.0005	0.0004
B08	0.4355	0.3956	0.0002	0.0006	0.0006	0.0006	0.0007	0.0006
B09	0.4506	0.4229	0.0002	0.0006	0.0005	0.0007	0.0007	0.0011
B10	0.4504	0.4171	0.0002	0.0001	0.0001	0.0002	0.0002	0.0001
B11	0.4491	0.4187	0.0004	0.0001	0.0004	0.0009	0.0010	0.0010
B12	0.4372	0.3954	0.0004	0.0004	0.0004	0.0003	0.0004	0.0006
B13	0.4378	0.3943	0.0002	0.0002	0.0002	0.0001	0.0002	0.0001
B14	0.4470	0.4160	0.0003	0.0003	0.0002	0.0003	0.0004	0.0003
B15	0.4442	0.4157	0.0002	0.0003	0.0003	0.0005	0.0005	0.0003
B16	0.4524	0.4224	0.0002	0.0002	0.0002	0.0001	0.0001	0.0002
B17	0.4339	0.3952	0.0004	0.0007	0.0007	0.0006	0.0005	0.0007
B18	0.4500	0.4195	0.0003	0.0003	0.0003	0.0004	0.0003	0.0003
B19	0.4368	0.3949	0.0001	0.0003	0.0003	0.0001	0.0001	0.0002
B20	0.4523	0.4202	0.0002	0.0002	0.0002	0.0002	0.0003	0.0002
B21	0.4495	0.4154	0.0003	0.0002	0.0002	0.0003	0.0003	0.0002
B22	0.4505	0.4161	0.0001	0.0002	0.0003	0.0004	0.0005	0.0005
B23	0.4536	0.4225	0.0002	0.0001	0.0001	0.0002	0.0001	0.0001
B24	0.4377	0.3982	0.0001	0.0004	0.0008	0.0004	0.0004	0.0005
B25	0.4481	0.4165	0.0004	0.0005	0.0004	0.0006	0.0006	0.0005
Max.	0.4536	0.4245	0.0004	0.0007	0.0008	0.0017	0.0027	0.0026
Min.	0.4339	0.3943	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Avg.	0.4457	0.4121	0.0002	0.0003	0.0004	0.0004	0.0005	0.0005
std. deviation	0.0062	0.0105	0.0001	0.0002	0.0002	0.0003	0.0005	0.0005

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7.4 Lumen Maintenance and Color Maintenance Test

**Test Condition:  $T_s = 85\text{ }^\circ\text{C}$**

Requirement	
Case Temperature [ $T_s$ ]: $\geq 83\text{ }^\circ\text{C}$	Average [ $T_s$ ]: $85.0\text{ }^\circ\text{C}$
Ambient Temperature [ $T_a$ ]: $\geq 80\text{ }^\circ\text{C}$	Average [ $T_a$ ]: $83.5\text{ }^\circ\text{C}$
Driver Current: 320 mA	Air Flow: Minimized
Measurement Current: 320 mA	Relative humidity: $< 65\text{ } \% \text{ RH}$

7.4.1 Total Luminous Flux ( $\Phi_V$ )

S/N	Initial (0 hr)		Luminous Maintenance (%)					
	TLF(lm)	$V_F(V)$	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
C01	864.9	27.73	99.7 %	98.8 %	98.3 %	97.9 %	97.4 %	96.5 %
C02	846.4	27.64	99.9 %	99.3 %	98.4 %	97.7 %	97.2 %	96.2 %
C03	854.7	27.27	99.7 %	99.2 %	98.3 %	97.8 %	97.3 %	96.5 %
C04	860.2	27.44	99.8 %	99.3 %	98.5 %	97.9 %	97.3 %	96.3 %
C05	858.0	27.67	99.8 %	99.1 %	98.5 %	98.0 %	97.5 %	96.5 %
C06	850.5	27.63	99.7 %	99.3 %	98.3 %	97.9 %	97.2 %	96.4 %
C07	849.0	27.56	99.9 %	99.2 %	98.6 %	98.0 %	97.4 %	96.3 %
C08	844.3	27.60	99.8 %	99.2 %	98.7 %	98.2 %	97.7 %	96.9 %
C09	855.1	27.71	100.4 %	99.5 %	98.9 %	98.4 %	97.9 %	96.8 %
C10	841.5	27.54	100.2 %	99.9 %	99.0 %	98.5 %	97.8 %	96.7 %
C11	843.5	27.56	99.8 %	99.4 %	98.9 %	98.4 %	97.9 %	97.0 %
C12	861.0	27.41	100.2 %	99.7 %	99.2 %	98.6 %	98.1 %	97.3 %
C13	847.8	27.60	99.9 %	99.2 %	98.6 %	97.9 %	97.4 %	96.4 %
C14	861.9	27.49	100.2 %	99.5 %	98.5 %	98.0 %	97.5 %	96.6 %
C15	870.0	27.66	100.2 %	99.8 %	99.0 %	98.6 %	97.9 %	96.8 %
C16	831.3	27.74	100.1 %	99.3 %	98.6 %	98.1 %	97.6 %	96.8 %
C17	860.8	27.67	99.8 %	99.1 %	98.3 %	97.7 %	97.1 %	96.1 %
C18	850.1	27.67	100.2 %	99.7 %	98.8 %	98.3 %	97.7 %	96.6 %
C19	838.2	27.44	99.9 %	99.4 %	98.6 %	98.0 %	97.3 %	96.2 %
C20	859.5	27.64	100.1 %	99.4 %	98.6 %	98.1 %	97.5 %	96.6 %
C21	845.9	27.58	99.8 %	99.2 %	98.2 %	97.8 %	97.1 %	96.2 %
C22	838.2	27.55	99.9 %	99.0 %	98.3 %	97.7 %	97.2 %	96.3 %
C23	824.5	27.89	99.9 %	99.3 %	98.4 %	97.9 %	97.2 %	96.4 %
C24	844.4	27.66	100.0 %	99.1 %	98.4 %	97.9 %	97.4 %	96.5 %
C25	843.5	27.81	99.6 %	98.9 %	98.2 %	97.5 %	97.0 %	96.1 %
Max.	870.0	27.89	100.4 %	99.9 %	99.2 %	98.6 %	98.1 %	97.3 %
Min.	824.5	27.27	99.6 %	98.8 %	98.2 %	97.5 %	97.0 %	96.1 %
Avg.	849.81	27.61	99.9 %	99.3 %	98.6 %	98.0 %	97.5 %	96.5 %
std. deviation	10.88	0.13	0.21 %	0.25 %	0.27 %	0.30 %	0.31 %	0.30 %

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7.4.2 Correlated Color Temperature (CCT), CIE Color Coordinate (CIEx, CIEy) & Chromaticity Shift ( $\Delta u'v'$ )

Correlated Color Temperature (CCT)							
S/N	0hr	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs
C01	2896	2910	2896	2899	2896	2897	2900
C02	2955	2963	2953	2954	2952	2953	2953
C03	2894	2887	2897	2899	2895	2899	2901
C04	2969	2964	2965	2966	2964	2964	2966
C05	2967	2966	2968	2970	2967	2967	2970
C06	2918	2907	2928	2920	2907	2908	2900
C07	2891	2891	2895	2895	2893	2894	2896
C08	2914	2917	2926	2929	2926	2928	2937
C09	2882	2879	2881	2883	2881	2881	2884
C10	2938	2935	2937	2939	2936	2936	2940
C11	2894	2901	2916	2906	2905	2906	2910
C12	2940	2939	2938	2941	2937	2939	2941
C13	2914	2921	2926	2930	2944	2943	2945
C14	2900	2904	2906	2908	2905	2906	2908
C15	2937	2942	2956	2956	2951	2949	2952
C16	2889	2883	2884	2883	2881	2882	2884
C17	2891	2890	2890	2891	2889	2889	2891
C18	2947	2943	2946	2942	2927	2928	2932
C19	2887	2885	2887	2890	2887	2886	2891
C20	2935	2937	2949	2950	2945	2945	2950
C21	2882	2883	2893	2892	2889	2889	2892
C22	2917	2919	2931	2933	2930	2929	2933
C23	2874	2881	2887	2886	2884	2884	2889
C24	2926	2925	2929	2935	2932	2931	2934
C25	2908	2905	2911	2917	2910	2916	2915
Max.	2969	2966	2968	2970	2967	2967	2970
Min.	2874	2879	2881	2883	2881	2881	2884
Avg.	2914.6	2915.1	2919.8	2920.6	2917.3	2918.0	2920.6
std. deviation	27.7	27.6	27.3	27.5	27.4	27.1	27.3

Unit: K

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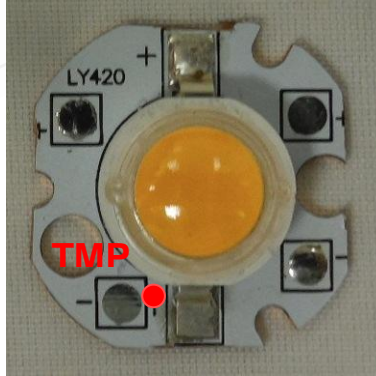
S/N	Initial (0 hr)		Chromaticity Shift ( $\Delta u'v'$ )					
	CIE <sub>x</sub>	CIE <sub>y</sub>	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
C01	0.4539	0.4251	0.0011	0.0007	0.0003	0.0003	0.0003	0.0003
C02	0.4447	0.4146	0.0009	0.0003	0.0001	0.0002	0.0003	0.0003
C03	0.4396	0.3968	0.0011	0.0002	0.0003	0.0001	0.0002	0.0003
C04	0.4473	0.4215	0.0004	0.0002	0.0001	0.0003	0.0003	0.0002
C05	0.4341	0.3945	0.0002	0.0001	0.0002	0.0001	0.0000	0.0002
C06	0.4373	0.3952	0.0018	0.0018	0.0018	0.0017	0.0017	0.0019
C07	0.4498	0.4164	0.0005	0.0003	0.0004	0.0003	0.0004	0.0004
C08	0.4368	0.3937	0.0002	0.0005	0.0006	0.0006	0.0006	0.0013
C09	0.4500	0.4157	0.0006	0.0003	0.0003	0.0003	0.0003	0.0002
C10	0.4468	0.4166	0.0004	0.0004	0.0001	0.0001	0.0001	0.0001
C11	0.4385	0.3947	0.0003	0.0014	0.0005	0.0005	0.0005	0.0007
C12	0.4462	0.4157	0.0003	0.0001	0.0001	0.0003	0.0003	0.0002
C13	0.4391	0.3982	0.0003	0.0006	0.0007	0.0023	0.0026	0.0032
C14	0.4495	0.4171	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004
C15	0.4372	0.3972	0.0002	0.0018	0.0011	0.0009	0.0007	0.0008
C16	0.4497	0.4160	0.0007	0.0001	0.0006	0.0006	0.0006	0.0005
C17	0.4502	0.4173	0.0003	0.0001	0.0001	0.0002	0.0002	0.0001
C18	0.4484	0.4209	0.0004	0.0002	0.0006	0.0007	0.0015	0.0019
C19	0.4518	0.4200	0.0005	0.0004	0.0002	0.0002	0.0002	0.0003
C20	0.4358	0.3941	0.0002	0.0007	0.0007	0.0005	0.0005	0.0007
C21	0.4441	0.4042	0.0002	0.0009	0.0005	0.0004	0.0004	0.0004
C22	0.4361	0.3927	0.0001	0.0007	0.0008	0.0007	0.0006	0.0008
C23	0.4444	0.4039	0.0004	0.0012	0.0007	0.0006	0.0006	0.0009
C24	0.4503	0.4221	0.0002	0.0005	0.0003	0.0002	0.0002	0.0003
C25	0.4483	0.4158	0.0004	0.0004	0.0004	0.0005	0.0006	0.0003
Max.	0.4539	0.4251	0.0018	0.0018	0.0018	0.0023	0.0026	0.0032
Min.	0.4341	0.3927	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001
Avg.	0.4444	0.4088	0.0005	0.0006	0.0005	0.0005	0.0006	0.0007
std. deviation	0.0060	0.0114	0.0004	0.0005	0.0004	0.0005	0.0006	0.0007

Note: The LED light source monitoring interval was per 24 hours.

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## 8 TEMPERATURE MEASUREMENT POINT (TMP) DEFINITION



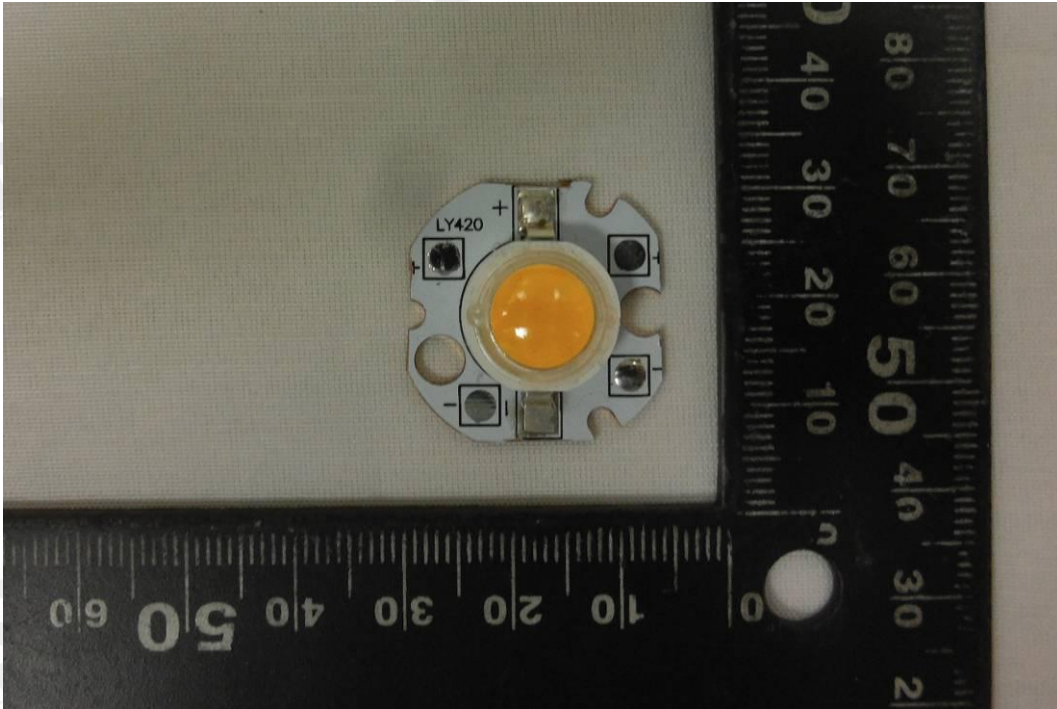
Temperature Measurement Point (TMP)

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## 9 PHOTO



Test Sample

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## APPENDIX A: Product Specification



### SPECIFICATION

(产品规格书)

**Part Number:**                     NX3                      
 产品型号  
**Description:**                     LED lamp bead                      
 产品描述  
**Spec NO:**                     NX3                      
 规格书编号  
**Date:**                     2013-4-19                      
 日期

Engineering Dept 工程部		
Approved(核准)	Checked(审核)	Prepared(制定)
		吴晓燕

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## LEPOWER 深圳市立洋光电子有限公司 Shenzhen Lepower Opto Electronics Co., Ltd

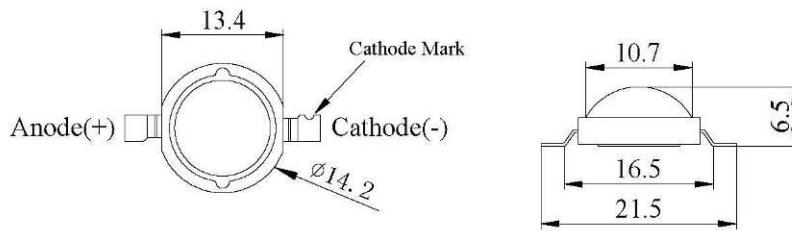
Part NO.:LY-IN030901B4545

SPECNO.:LY-LEPOWER-14041901

REV NO.:A2

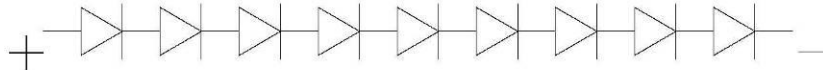
### Package Dimensions

外观尺寸



### Equivalent circuit diagram

等效电路图: 9 串 1 并



### Notes:

1. All dimensions are in millimeters.  
(所有尺寸以毫米为单位)
2. Tolerance is  $\pm 0.25$  unless otherwise noted  
(未标注公差为:  $\pm 0.25$ )

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**■ Electrical/Optical Characteristics (At  $T_A=25^{\circ}\text{C}$ )**

(光电参数)

Parameter 参数	Symbol 符号	Conditions 条件	Min. 最小值	Typ. 典型值	Max. 最大值	Units 单位
Luminous Flux 光通量	$\Phi_v$	$I_F=320\text{mA}$	1000	-	1500	lm
Luminous Efficiency 发光效率	$\eta_v$	$I_F=320\text{mA}$	120	-	140	lm/w
DC Forward Voltage 正向压降	$V_F$	$I_F=320\text{mA}$	27	-	29	V
Color Temperature 色温	CCT	$I_F=320\text{mA}$	2900	--	3100	K
Color Rendering 显指	Ra	$I_F=320\text{mA}$	80	-	-	-
Viewing Angle (发光角度)	$2\Theta_{1/2}$	$I_F=320\text{mA}$	--	120	--	Deg

**■ Absolute Maximum Rating (At  $T_A=25^{\circ}\text{C}$ )**

(极限参数)

Parameter 参数	Symbol 符号	Value 数值	Units 单位
DC Forward Current 正向电流	$I_F$	350	mA
Power Dissipation 功率	$P_D$	10150	mW
LED Junction Temperature 结点温度	$T_J$	120	$^{\circ}\text{C}$
Operating Temperature Range 工作温度	$T_{OPR}$	-20 $^{\circ}\text{C}$ To +80 $^{\circ}\text{C}$	
Storage Temperature Range 储存温度	$T_{stg}$	-40 $^{\circ}\text{C}$ To +100 $^{\circ}\text{C}$	
Manual Soldering Temperature 手工焊接温度	$T_{SOL}$	350 $^{\circ}\text{C} \pm 20^{\circ}\text{C}$ For 3~5 Seconds	

**Note:** (Tolerance:  $\text{lm} \pm 5\%$ ,  $\lambda_d \pm 2\text{nm}$ ,  $V_F \pm 0.05\text{V}$ )

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**Reliability**

TEST ITEMS AND RESULTS

Test	Reference Standard	Test Condition	Test Duration	Failure Criteria	Units Failed/Tested
Temperature Cycle	JEITA ED-4701 100 105	-40°C(30min)~25°C(5min)~80°C(30min)~25°C(5 in)	100cycles	#1	0/22
Moisture Resistance (C d e)	JE TA ED-4701 200 203	25°C~65°C(5min)~ -10°C, 90%RH,24hr per cycle	10cycles	#1	0/22
High Temperature Storage	JEITA ED-4701 200 201	T <sub>A</sub> =100°C	1000hours	#1	0/22
Temperature Humidity Storage	JEITA ED-4701 100 1 3	T <sub>A</sub> =60°C RH=90%	1000hours	#1	0/22
Low Temperature Storage	JEITA ED-4701 200 202	T <sub>A</sub> =-40°C	1000hours	#1	0/22
Room Temperature Operating Life		T <sub>A</sub> =25°C,IF=320mA	1000hours	#1	0/22
High Temperature Operating Life		T <sub>A</sub> =60°C,IF=320mA	1000hours	#1	0/22
Temperature Humidity Operating Life		60°C,RH=90%,IF=320mA	500hours	#1	0/22
Low Temperature Operating Life		T <sub>A</sub> =-20°C,IF=320mA	1000hours	#1	0/22

(2)Failure Criteria

Criteria#	Items	Conditions	Failure Criteria
#1	Forward Voltage(V <sub>F</sub> )	I <sub>F</sub> =320mA	>Initial valuex1.2
	Luminous Flux(Φ <sub>v</sub> )	I <sub>F</sub> =320mA	<Initial valuex0.7

U.S.L.:Upper Standard Level

L.S.L.:Lower Standard Level

**-End of Report-**

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